AGENDA

Mid Month Meeting of Council

To be held at the

Civic Centre

511 Burwood Highway

Wantirna South

On

Tuesday 11 June 2024 at 7:00 PM

This meeting will be conducted as a hybrid meeting

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Bruce Dobson

Chief Executive Officer

1 Apologies

2 Declarations of Conflict of Interest

3 Confirmation of Minutes

Confirmation of Minutes of Mid Month Meeting of Council on Monday 13 May 2024

4 Officer Reports

4.1 Amendment C157 - Landowner Request to Minister for Planning to Move the Urban Growth Boundary to Include the Churchill-Waverley Golf and Bowls Club and Rezone the Land

Final Report Destination:	Council
Paper Type:	For decision
Author	Senior Strategic Planner, Georgia Stensness
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Executive:	Director, City Liveability, Matt Kelleher

SUMMARY
A request was lodged in December 2023 by Intrapac Property, the Proponent, seeking in principle support from Council for a request it plans to lodge with the Minister for Planning, on a proposal to change the urban growth boundary (UGB) to include the Churchill-Waverley Golf and Bowls Club ('CWGBC'), formerly known as Waverley Golf Club, situated in Rowville. This recent request sought to reignite a proposal, draft Amendment C157knox, originally canvassed with Council in 2016, including intermittent discussions with Officers and Councillors since that time. The proposal also includes a rezoning of the land, to enable predominantly residential development and some commercial development, including open space and community facilities, and road upgrades. Key preliminary planning considerations are outlined in this report.

As the CWGBC is located outside of the UGB and includes a golf course, the proposal does not follow the usual planning scheme amendment process. Before the land can be rezoned, a decision to incorporate the CWGBC within the UGB must be approved by the Minister for Planning and receive a majority vote in both houses of Parliament. Given this, Intrapac Property are seeking Council's in principle support for the proposal (to provide to the Minister) via a Council resolution. If supported, the first step would involve writing to the Minister for Planning, advising them of Council's position, so that the proponent can and seek the Minister's in principle support on the proposal including a change to the UGB.

Officers have reviewed the draft package of information provided by Intrapac Property. Officers are supportive in principle of the proposal for the first step of seeking Ministerial support to consider changing the UGB, while acknowledging there are a number of matters that would need to be addressed, including those outlined in the Knox Housing Strategy and a finalised Planning Scheme Amendment package that would need to be prepared to the satisfaction of Council.

RECOMMENDATION
That Council:

1. Notes the proposal received and indicative proposal process.
2. Notes the key preliminary planning considerations set out in the report and acknowledges that the particulars of the proposal are subject to change.

3. Acknowledges Council has an existing position on the future of the site, and that the adopted Knox Housing Strategy and Knox Land for Business plan both identify the site as being suitable for residential development at a range of densities, provided various matters are satisfactorily addressed, along with the potential inclusion for a business land component.
4. Provides in principle support on the proposal and writes to the Minister for Planning to:
    a. outline Council's in principle support for the Minister for Planning to consider including the subject property within the Urban Growth Boundary;
    b. request, if the Minister does support its inclusion within the urban growth boundary, for the Minister to refer consideration of the subject site's zoning and redevelopment to a Standing Advisory Committee Public Hearing process for further consideration; and
    c. note Council's request to make submissions and participate in any public hearing process related to the Standing Advisory Committee Public Hearing.
5. Notes that officers will report back to Council at a future Council Meeting seeking endorsement of a preferred development outcome for the subject site prior to any public hearing process if the process to change the Urban Growth Boundary proceeds.

1. DISCUSSION

1.1. Background to UGB and rezoning request

The CWGBC was formed in 2016 through the merger of Waverley Golf Club and Churchill Park Golf Club. Waverley Golf Club is freehold land in Rowville (Knox) while the Churchill Park Golf Club is Crown Land leased from Parks Victoria (Casey). The primary motivation for the merger was to combine the membership of two struggling community golf clubs into a single site, which would be Churchill Park.

The Bergins Road Rowville site is proposed to be sold and the proceeds invested in the Churchill Park site and a modest future fund to ensure the club has a sustainable future. Intrapac Property entered into an option agreement for the sale of the Bergins Road site to enable this plan, alongside provision of financial and property development support to enable their objectives for the land. This was a 10 year option which will come to its conclusion over the next couple of years. The club's financial position is precarious, exacerbated by the Covid-19 pandemic, and it is seeking to take action to keep the club afloat.

Councillors and Officers attended a presentation and site tour on 11 September 2023 to better understand the club, the site and the proposal. The club has also engaged with individual Councillors regarding their intentions over the years.

<u>Timeline of events</u>

- In 2011, the Minister for Planning announced the Logical Inclusions Review to provide a pathway to consider and make changes to the Urban Growth Boundary. It is understood for administrative reasons this site was not considered and the opportunity for the full merits of the proposal did not occur.

- The Knox Housing Strategy January 2015 ('Housing Strategy') and Knox Planning Scheme ('Scheme') identifies the site as a Strategic Investigation Site, suitable for residential development at a range of densities. The Housing Strategy was implemented into the Scheme in March 2016 through Amendment 131knox.
- In 2016, Council received a formal request to change the Urban Growth Boundary (UGB) and rezone the site, including surrounding land. The properties along Stud Road no longer form part of the proposal. Council does not have the power to consider or effect a change to the UGB, it remains with the Minister and the Victorian Parliament.
- In September 2016, the Waverley Golf Club (Rowville) and Churchill Park Golf Club (Endeavour Hills) merged into one entity and is currently operating across two sites. This is not financially sustainable noting that the intent is to redevelop the Waverley Golf Club (described as 'CWGBC' in this report) and focus activities at Churchill Park.
- The Knox Land for Business Plan December 2018 ('Land for Business') and Knox Planning Scheme identifies the site as potentially being suitable for a business land component along Stud Road.
- The proposal was put on hold while processes were being developed for the redevelopment of golf courses.
- In August 2019, the Minister established the Golf Course Redevelopment Standing Advisory Committee to provide advice on proposals for the redevelopment of golf courses within the UGB.
- In June 2020, the State Government released Planning Guidelines for the Conversion of Golf Course Land to Other Purposes (to be considered by the Advisory Committee).
- In September 2023, Officers and Councillors attended a site visit of the CWGBC upon the invitation of the General Manager of CWGBC and Intrapac Property.
- In December 2023, the Proponent lodged a formal request to Council seeking in principle support for the proposal.

1.2. Process

As the CWGBC is located outside of the UGB and includes a golf course, the proposal does not follow the usual planning scheme amendment process. The proposal would generally follow the following steps:

<u>Amendment # 1 UGB</u>

Step 1:

- Receive in principle support from Council on the proposal for the Minister's consideration.
- The Mayor to write to the Minister for Planning ('Minster') to advise of Council's position and obtain in principle support on the proposal, namely, to change the UGB, as part of Intrapac/ CWGBC pursuing the proposed change with the Minister.
- If in principle support is received, the Proponent can ask the Minister to prepare an amendment to change the UGB.
- For a UGB change to occur, the amendment must be approved by the Minister and receive a majority vote in both houses of Parliament.

Amendment # 2 Planning Controls

Step 2:

- If Step 1 is successful, the Minister may set out a pathway for the rezoning planning scheme amendment.
- If the Minister does not set out a pathway, there are two options:
  A) The Proponent can prepare a draft amendment package and request that the Minister consider a planning scheme amendment to facilitate redevelopment of the golf course for residential and commercial purposes. If this occurs, views of relevant agencies including Council's will be sought through the Golf Course Redevelopment Standing Advisory Committee ('GCRSAC') process.
  B) Alternatively, it will be encouraged that the Proponent submit a draft amendment package to Council, for Officers to review as part of a conventional planning scheme amendment request. This includes referral to authorities/agencies for comment. Importantly, there are critical matters to resolve such as access and formalisation of Police Road, and the transfer of land including that section of land encumbered by high voltage transmissions lines and easements.
- Following option (B) above, the Mayor can then write to the Minister and include a draft amendment package, seeking the Minister refer the draft amendment to the GCRSAC. In this request, Council could highlight whether it has a desire for the Minister to become the Planning Authority (prepare amendment) or Responsible Authority (decision making). In most circumstances Council seeks to retain these powers.
- Should the Minister refer the draft amendment to the GCRSAC, the GCRSAC process would involve:
  1. Exhibition: DTP will give notice of the proposal for at least 30 days, noting that this would give Council an opportunity to make a submission. Importantly, it is a requirement that the GCRSAC consider the view of the relevant Council in the area where a proposal is located.
  2. Public Hearing: Provides all submitters including Council an opportunity to be heard.
  3. Report: The GCRSAC prepares a report for the Minister and provides recommendations on the proposal, including who should be the Planning Authority and Responsible Authority.

  Ultimately, the GCRSAC process replaces the normal planning scheme amendment exhibition process, and following this process, the Minister would decide on whether to adopt and approve the amendment.

1.3. Subject site

The site, commonly known as 82 Bergins Road, Rowville, comprises four lots: Lot 1 on TP 298604M, Lot 1 on TP 843714T, Lot 1 on PS 096639 and Lot 2 on PS 111072. With an area of approximately 49.5 hectares, the site is located on the edge of the municipality outside of the UGB, bordering Dandenong Police Paddocks Reserve and Casey City Council to the south.

Key features of the CWGBC include:

- It is occupied by a golf course along with club rooms, car parking and two bowling greens;
- Access is provided from Bergins Road;

- It is bisected and burdened by a series of easements (of approx. 177 metres wide) and high voltage transmission lines, covering approximately 22.6 hectares (46% of the site);
- Variable and undulating terrain, including fill;
- Dams;
- There is a variety of vegetation across the site, including native vegetation (and patches of remnant native vegetation).

The site also has access to seven bus routes within 1 kilometre, including three that are within 500 metres (routes 691, 682 and 901).

Note: Native vegetation is defined in the Knox Planning Scheme as, “Plants that are indigenous to Victoria, including trees, shrubs, herbs, and grasses.”

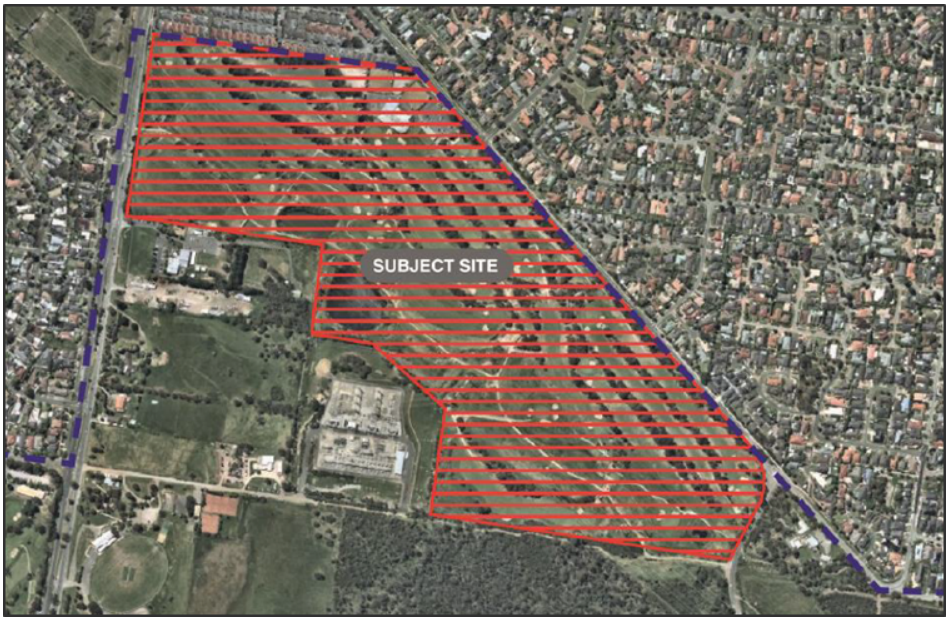


Figure 1: Subject site

Regarding applicable zoning and overlay controls, the CWGBC is predominantly in a Special Use Zone Schedule 1 (SUZ1) which reflects the golf course land use. A section of the land is also in a Special Use Zone Schedule 3 (SUZ3). This is likely an anomaly given the purpose of Schedule 3 is to provide for land to be used for an electricity terminal station, noting an electricity terminal station abuts the site to the south.

Various overlays also apply to the site. The Environmental Significance Overlay Schedule 2 covers the land, with the CWGBC recognised as having State level biological significance according to the Sites of Biological Significance in Knox – 2nd Edition 2010 (Site 77). At the time this report was prepared, the site was described as having rich wildlife, including the nationally protected Grey-headed Flying-fox and several species rare in Knox. Furthermore, a portion to the south is covered by the Bushfire Management Overlay. There is also a portion to the southeast adjacent to the Bergins Road and Churchill Park Drive roundabout subject to Vegetation Protection Overlay Schedule 1. Similarly, immediately east of 1331 Stud Road and 1325 Stud Road a portion of the Vegetation Protection Overlay Schedule 4 which applies to those parcels of land, extends into the subject site. The extent of this overlay may be a mapping error.

For noting, maps showing the extent of the zones and overlays form **Attachments 4 - 10**.

1.4. Planning policy context

The CWGBC is identified as a Strategic Investigation Site, Site 13, in the Housing Strategy and Scheme. Site 13 also includes adjoining properties along Stud Road, noting that they do not form part of this proposal.

The Housing Strategy recognises that the site is located outside of the UGB. It also states a successful application to the State Government to review the UGB is required prior to rezoning this site. Subject to the urban growth boundary being reviewed in favour of the site, residential development at a range of densities is considered suitable. Higher densities are considered appropriate adjacent to Stud Road (the SmartBus route). The following issues must be satisfactorily addressed through any future planning process for the site/s:

- Appropriate transport access.
- Impact on traffic flows on Bergins Road.
- Interface with high voltage powerlines.
- Interface to Stud Road.
- Sites of biological significance.
- Bushfire risk.

In addition, the golf course is identified in the Knox Land for Business plan and the Planning Scheme as potentially having a business land component along Stud Road. 'Business land' is referred to in the document as land zoned: Industrial 1 Zone, Commercial 1 Zone, Commercial 2 Zone, Mixed Use Zone and Priority Development Zone. Importantly, the Mixed Use Zone is a residential zone, and Knox no longer has any land in a Priority Development Zone.

Strategic Investigation Sites are also referred to in the Knox Social and Affordable Housing Strategy and Action Plan 2023-2027 ('Social and Affordable Housing Strategy'). It recognises that these sites are considered most suitable for social and affordable housing, and the importance of negotiating voluntary contributions with developers concerning these sites. While 'social housing' and 'affordable housing' have individual meanings, collectively, it can be summarised as public housing, and housing owned, controlled or managed by a participating registered agency, that is appropriate for the housing needs of very low, low and moderate income households. Additionally, the Social and Affordable Housing Strategy acknowledges that there is a need for social and affordable housing, especially for the cohorts most in need which include for example, women (and children), people with a disability and seniors.

1.5. Proposal

Broadly, the proposal involves an adjustment to the UGB to include the site, to facilitate a rezoning to enable residential and commercial development, including social and affording housing, and public/community uses. No planning permit application is proposed to form part of the proposal.

In addition, amongst the draft documents, Council was provided with conceptual plans. While they are subject to change, they include the following information:

- A variety of housing in the form of stand alone dwellings, townhouses and apartments;
- Mixed use area;
- Potential inclusion for a community hub and other community facilities;
- Provision of public open space and retarding basin;
- Multiple access points from Stud Road, Bergins Road and Police Road;
- Upgrading of Police Road for its extent to enable traffic access;
- Installation of roundabouts to existing roads;
- Removal of native vegetation;
- Potential bus route.

Refer to **Attachment 1** for a copy of the Concept Development Plan.

1.6. Key planning considerations

A number of draft background documents including conceptual plans have been provided to Council. Importantly, Council is not bound to the contents of these documents, noting that further discussions and negotiations with the Proponent will be necessary, particularly to address the requirements of the Housing Strategy.

The package of draft background documents are provided in **Attachments 11-23**. In reviewing the documentation, officers highlight the following matters:

<u>Relevant State and Local projects and statements</u>

- Victoria's Housing Statement released September 2023 acknowledges that there is an urgent need for more housing, to meet current and future demands.
- The Sites of Biological Significance in Knox – 2nd Edition 2010 is currently undergoing a three year review by the Biodiversity Team.
- The draft Knox Cycling Action Plan 2024-2035 seeks to improve and expand the cycling network, including creating routes along Police Road, Bergins Road and Churchill Park Drive, as shown in Figures 2 and 3 below.

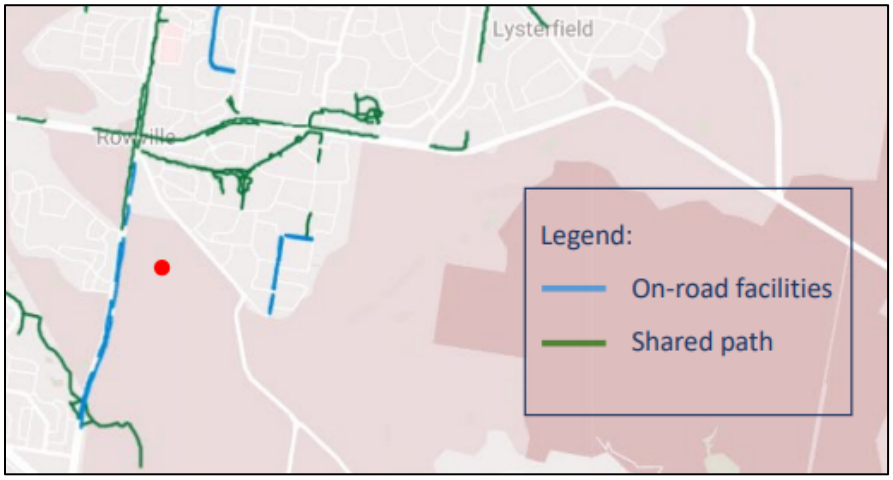


Figure 2: Knox's current cycling network (site shown by red dot)

Figure 3: Knox's proposed future cycling network (site shown by red dot)

Urban Growth Boundary

The CWGBC currently sits just outside of the UGB. The purpose of the UGB is to reduce sprawl and protect non-urban land from urban development pressures. While state planning policy seeks to maintain a permanent UGB, the proposed change to the UGB is supported by existing strategic work, namely the Knox Housing Strategy.

Proposed planning controls

The concept plans propose a rezoning of the CWGBC from Special Use Zone Schedules 1 and 3 to Special Use Zone, General Residential Zone, Mixed Use Zone and Commercial 2 Zone, and maximum building heights of 9 to 12 metres. Refer to **Attachments 1 and 2** for a copy of the Concept Development Plan and Concept Zoning Plan.

Firstly, the application of a Special Use Zone has been applied to the area of land encumbered by easements and high transmission voltage lines. This zone's application must be further explored by Officers, noting that it could be zoned differently to achieve a similar purpose.

The application of a General Residential Zone is suitable for areas offering good access to services and transport (in accordance with Planning Practice Note 91: Using the Residential Zones), and the Housing Strategy recognises that the site is suitable for residential development at a range of densities. The proposed maximum height of 12 metres will however require further strategic work, noting that a residential schedule can allow for a greater maximum building height beyond 11 metres, while maintaining the 3 storey requirement.

The incorporation of a Mixed Use Zone is also generally supported by Officers. The Retail Assessment recognises the potential for a small-scale retail component (such as a convenience store and food and drink premises) to serve the local catchment area. Also, its position within the

site generally aligns with state planning policy which encourages the creation of 20 minute neighbourhoods (800 metre walk from home to a destination).

There is also a pocket of Commercial 2 Zone land adjacent to Stud Road. While the incorporation of business land is supported by Land for Business, an Economic Assessment has not been carried out to determine its feasibility. Furthermore, Officers have concern with the proposed zoning and its compatibility with adjoining Green Wedge land, and therefore have a view that it should be zoned residential.

In addition, the application of other controls needs to be considered along with review of existing overlays (Refer to Section 1.3.). For instance, the CWGBC is not subject to local planning policy Clause 22.07 - Development in Residential Areas and Neighbourhood Character, which provides design guidance for residential development. Subsequently, it will be necessary to require the application of a built form overlay (such as the Development Plan Overlay) to the site, to guide its future use and development. Furthermore, should abutting Police Road be formalized and constructed, it will be necessary to consider its zoning and overlay regime.

Development pad areas

The Concept Development Plan shows northern and southern development pads to the CWGBC, divided by easements and transmission lines. Officers generally support the location of the development pads. However, it is worth noting that the visual impact of the powerlines and terminal station will need to be considered, along with the specific locations of and impacts to existing vegetation. In principle support will also need to be obtained from the relevant authorities to construct over easements and within proximity to assets. Addressing the latter early in the process will be crucial as it influences site accessibility.

Geotechnical and contamination considerations

A preliminary geotechnical and contamination investigation has been carried out (Refer to **Attachments 22 and 23**). The Preliminary Environmental and Geotechnical Investigation Report revealed that some septic odours were identified at the location of the vehicle wash down area. Remedial works can be undertaken to address this. It also revealed soil importation was carried out over a number of years for the purpose of improving the visual amenity of the golf course. Fill material up to 10.8 metres deep was encountered, noting further work is required to map its depth and spread.

The main areas where filling was conducted between October 2006 to September 2013 include:

- The transmission line easement, with the majority of fill located in the southern portion;
- The southern and western edges of the practice fairway; and
- The corner of the site adjacent to the eastern side of the electrical substation.
-

The report also states that while the preliminary sampling suggests that the chemical properties of imported soils appear suitable in the context of the proposed residential development, it is likely that any fill will require some form of treatment or improvement prior to development to minimise differential settlement effects. Furthermore, it is important to note that the southwestern part of the site is underlain by deep, potentially uncontrolled fill, which will require piled foundations or a program of ground improvements. More information on this will be needed

for Council to make any informed decisions regarding any potential land transfer, and the written views of the Environmental Protection Authority need to be sought.

Social and affordable housing

In response to the Knox Social and Affordable Housing Strategy and Action Plan 2023-2027 ('Knox Strategy'), the draft background documents include an Affordable Housing Strategy. The Affordable Housing Strategy specifies a voluntary contribution towards social and affordable housing being 5% of the total yield (page 31), with an aim to provide housing for people with a disability, older residents particularly women including those in housing stress, and young single parents with children.

The Knox Strategy states that Council's preferred outcome is for the gifting of land to a community housing organization, however flexibility is available in how to achieve this. To determine the most appropriate delivery model (e.g. gifting of land, gifting of completed dwellings or dwelling completed dwellings at a discount), consultation with local community housing organisations with a focus on Knox's cohorts in need will be required. Additionally, Officers aim to commence the process of securing contributions through an appropriate legal instrument under Step 2 (process outlined above), unless there is scope to do so earlier.

Public open space

The Knox Planning Scheme requires a public open space contribution of a minimum of 8.5% of the total land area. Considering the land has an area of approximately 49.5 hectares, the contribution can either be in the form of unencumbered land of approximately 42,000 square metres, a financial payment determined by the site's value, or a combination of both. Guidance on what Council must do with a public open space contribution is provided in Section 20 of the *Subdivision Act* 1988.

While Council typically accepts land in these instances, there may be scope for Council to accept a public open space contribution being a mix of unencumbered land and a financial payment, provided Council were able to take ownership of the encumbered land (easement/high voltage transmission line area).

Importantly, guidance on how open space is used and developed is detailed in the Knox Open Space Plan 2012-2022 and Knox Play Space Plan 2013-2023. Any land contribution should fit into an open space category included in those documents and be provided with appropriate amenities (amenities would form development contributions and costs borne by the Proponent).

Other open space opportunities

As mentioned above, there is potential for the encumbered land to be transferred to Council for various purposes. This position is supported by correspondence sent by Officers to the Proponent in September 2016, who advised that the following uses could be explored within the easements (the list is not exhaustive):

- Paths.
- Habitat corridor.
- Water treatment/storage/wetlands.

- Smart grid such as solar panels.
- Dog park.
- Soccer field.
- Hockey field.
- BMX bike track *(potential for dirt jumps).*
- Community garden.

Importantly, this will require further investigation and discussion, with more information to be provided on the composition of fill and the environmental benefits of the dams. There is also a set of requirements in the Knox Play Space Plan 2013-2023 which must be met, and includes:

- "Slope must not exceed 1 in 20. If design interventions (such as graded pathways up steep slopes, earthworks, retaining walls or extra provision for water sensitive urban design) are required, additional land must be provided so that the minimum functional size of land is still available for the activities. The site must be free of contamination; easements that restrict development and land use; soil erosion; unwanted previous structures; un-authorised, unusable or hazardous landfill; rubbish; dangerous or diseased vegetation..."

<u>Access and Transport</u>

Currently, the site is accessed solely from a single point along Bergins Road. However, the Concept Development Plan and Traffic Engineering Assessment propose several modifications to the surrounding road network. These include new access points from Bergins Road and the installation of a roundabout and signalised intersection at Bergins Road/Liberty Avenue, new access points from Stud Road, and a signalised intersection at Stud Road/Police Road. A new access point from Police Road is also proposed, along with the formalisation and upgrading of that road, which has the potential to improve traffic volumes along Bergins Road. Additionally, there is a proposed intersection at Police Road/Churchill Park Drive, as well as a potential bus route.

The proposed changes to the road network and internal road layout will require review by various internal teams, and in principle support will be necessary from external authorities/agencies such as Head Transport for Victoria, Ausnet, Casey City Council and Parks Victoria. It would also involve advocacy to The Department of Transport and Planning for changes to the bus network, noting that it may be possible to alter existing route 681/682.

Regarding Police Road, there are complexities involved with developing this road, and include for example:

- Only part of Police Road is currently registered as a road.
- The formalisation of the road would require the removal of native vegetation which is identified in the Sites of Biological Significance in Knox – 2nd Edition 2010 as having state level significance.
- Part of Police Road falls within Casey City Council municipality and is in a Transport Zone. It is identified as TRZ3 on the planning scheme map, which are higher order local roads.
- Parks Victoria is currently developing a masterplan for Dandenong Police Paddocks Reserve.
- Part of Police Road is zoned Special Use Zone.

- The draft Knox Cycling Action Plan 2024-2035 includes a proposed cycling route along this road.

Vegetation and Biodiversity

The Native Vegetation Assessment dated September 2020 covers the CWGBC and Police Road. According to the Native Vegetation Assessment, vegetation in the study area was dominated by manicured grass, with several small patches of native shrubs, grasses and stands of trees. Belts of trees occurred throughout the study area and included exotic, non-indigenous native and remnant indigenous trees. The following native vegetation was recorded in the study area:

- 56 patches of native vegetation, totally 4.05 hectares (including five large trees in patches); and
- 49 scattered trees (namely 34 large scattered trees and 15 small scattered trees).

Note: Definitions for 'patches,' 'scattered trees' and 'large trees' are provided in State Government document, Guidelines For The Removal, Destruction or Lopping of Native Vegetation.

Furthermore, the assessment notes the proposed removal of 3.553 hectares of native vegetation (inclusive of land outside of the Knox municipality). The assessment also notes the proposed retention of Habitat Zones A, D, G, I, J, K, L, M, N, R, S, T, U, V, X, Z, AA, AB, BD, BK, BL, BP, CC and CD, and the proposed partial removal of Habitat Zones B, C, H, O, O, BC, BG, BH, and BJ. Importantly, this information is indicative only, and it is worth highlighting that the assessment does not clearly demonstrate how it avoids the removal of native vegetation through the use of plans, nor does it include an assessment of fauna.

Aboriginal Heritage

No part of the subject site is within an area of cultural heritage sensitivity. Subsequently, no cultural heritage management plan is required.

Bushfire

The southern portion of the site adjacent to Police Road is affected by a Bushfire Management Overlay and around half of the site is in a Bushfire Prone Area. Risks related to the spread of bushfire can be managed early in the process by consulting with the relevant fire authority.

Flooding and Drainage

The package will need to be updated to include a report prepared by a relevant professional to address flooding and drainage requirements namely, flood mitigation and stormwater considerations, considering high voltage transmission easements as well as existing and proposed water bodies.

2. ENGAGEMENT

Officers did not undertake engagement with internal teams or external agencies/authorities upon receipt of the most recent documents. Such engagement would need to occur if the proposal proceeded.

3. SOCIAL IMPLICATIONS

There are no known adverse social impacts which would arise from the proposal.

The proposal will have a positive social benefit for the community through additional housing, recreational opportunities, employment and services, as well as contribution to social and affordable housing.

4. CLIMATE CHANGE CONSIDERATIONS

While further discussions will be needed with the Proponent, the proposal has the potential to address climate change in the following ways:

- Preserving biodiversity and tree retention.
- Designing streetscapes that support the reduction of the urban heat island effect and planting of new trees.
- Mitigating flood risks.
- Providing connections to public transport routes and walking trails.

In addition, for any community facility, Council will have scope to influence the design and implement the Sustainable Design and Infrastructure Policy.

5. ENVIRONMENTAL IMPLICATIONS

Environmental considerations are discussed throughout this report, and as highlighted, further work will be required.

6. FINANCIAL AND RESOURCE IMPLICATIONS

Step 1 in the process can be resources internally. However, should the proposal proceed to Step 2, financial implications include:

- Running costs to Council for managing new open spaces, recreational/community facilities and infrastructure;
- Potential costs to have documents peer reviewed;
- Costs relating to representation through the GCRSAC process.

Additionally, should the process outlined under Step 2 change, Council may seek a financial contribution from Intrapac Property.

7. RISKS

The club has indicated to officers that the club's operations have been in decline for some time and they are keen to explore the sale of the land for alternative uses supported through its incorporation within the UGB and rezoning. Officers understand that the sale of the land is contingent on support by the Minister for the proposal. Should the proposal not proceed, there is a risk that the club may not be in a financial position to continue maintaining the land and could face insolvency. This presents a risk to Council and the surrounding community. Further, there is risk that if Council does not retain its role as Planning Authority that there may be limitations in what it could negotiate for developer and social housing contributions, which must be attended to as part of and prior to Council giving any further support on the proposal.

8. KNOX COMMUNITY AND COUNCIL PLAN 2021-2025

Neighbourhoods, Housing & Infrastructure

Strategy 2.1 - Plan for and support diverse housing to meet changing community needs.

Strategy 2.2 - Create, enhance and maintain places and spaces for people to live, work, play and connect.
Strategy 2.3 - Provide, maintain and advocate for accessible and sustainable ways to move around Knox.

Natural Environment & Sustainability
Strategy 3.1 - Preserve our biodiversity and waterways, and enhance our urban landscape.
Strategy 3.2 - Prepare for, mitigate and adapt to the effects of climate change.

Connection, Resilience & Wellbeing
Strategy 4.1 - Support our community to improve their physical, mental and social health and wellbeing.

Civic Engagement & Integrity
Strategy 5.3 - Ensure our processes are transparent and decisions are accountable.

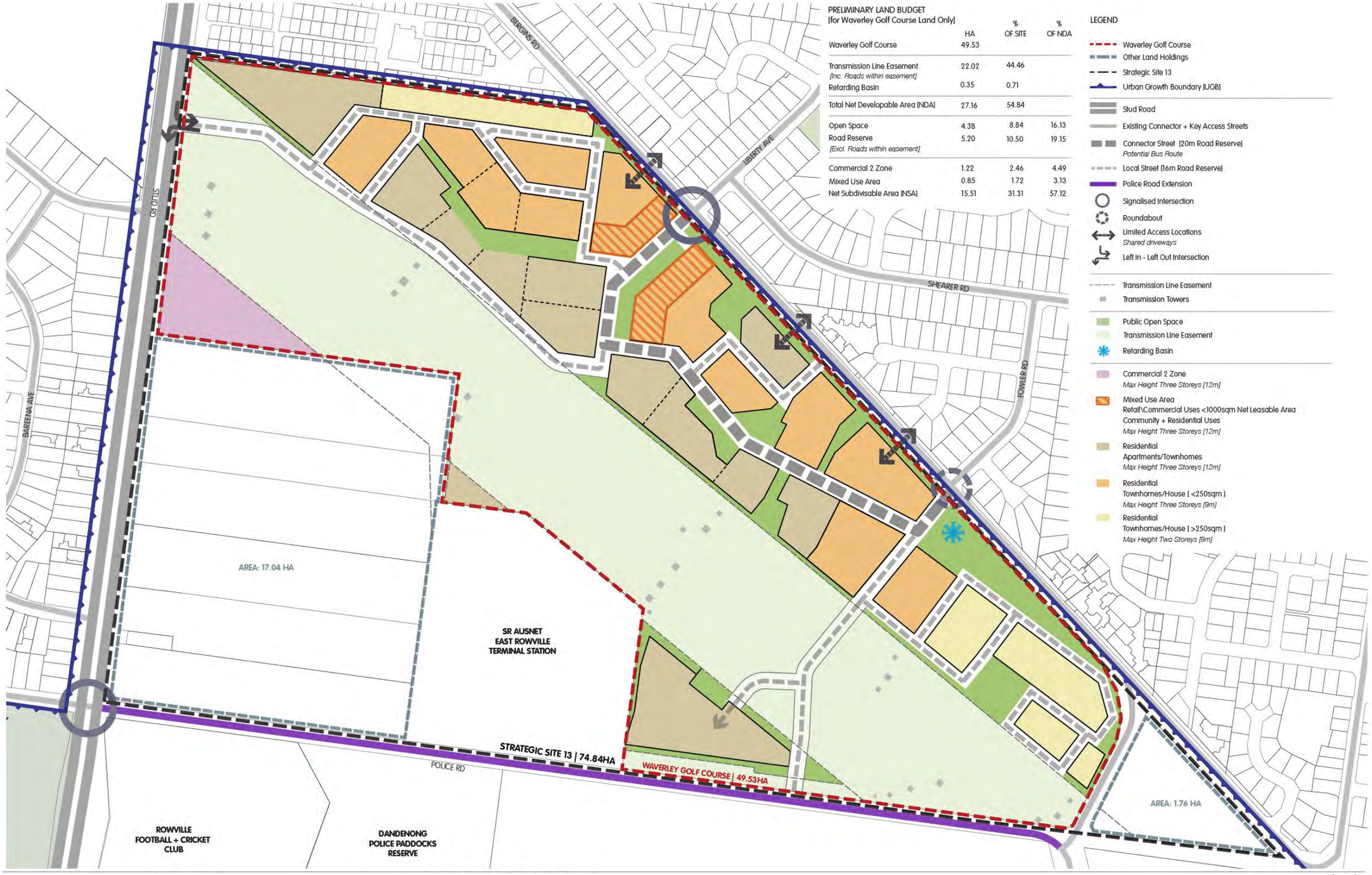
9. CONFLICT OF INTEREST
The officers contributing to and responsible for this report have no conflicts of interest requiring disclosure under Chapter 5 of the Governance Rules of Knox City Council.

10. STATEMENT OF COMPATIBILITY
This report is compatible with the Charter of Human Rights and Responsibilities, as it does not raise any human rights issues.

11. CONFIDENTIALITY
There is no content in this report that meets the definition of confidential information from the Local Government Act 2020.

ATTACHMENTS
1. Attachment 1 - Concept Development Plan [**4.1.1** - 1 page]
2. Attachment 2 - Concept Zoning Plan [**4.1.2** - 1 page]
3. Attachment 3 - Concept Open Space Plan [**4.1.3** - 1 page]
4. Attachment 4 - Map - Zoning Regime [**4.1.4** - 1 page]
5. Attachment 5 - Map - Bushfire Management Overlay [**4.1.5** - 1 page]
6. Attachment 6 - Map - Environmental Significance Overlay Schedule 2 [**4.1.6** - 1 page]
7. Attachment 7 - Map - Vegetation Protection Overlay Schedule 1 [**4.1.7** - 1 page]
8. Attachment 8 - Map - Vegetation Protection Overlay Schedule 1 - close up [**4.1.8** - 1 page]
9. Attachment 9 - Map - Vegetation Protection Overlay Schedule 4 [**4.1.9** - 1 page]
10. Attachment 10 - Map - Vegetation Protection Overly Schedule 4 - close up [**4.1.10** - 1 page]
11. Attachment 11 - Encumbrances Plan [**4.1.11** - 1 page]
12. Attachment 12 - Draft Planning Report [**4.1.12** - 52 pages]
13. Attachment 13 - Cultural Heritage Due Diligence Letter [**4.1.13** - 6 pages]
14. Attachment 14 - Draft Native Vegetation Assessment [**4.1.14** - 72 pages]
15. Attachment 15 - Draft Tree Assessment [**4.1.15** - 19 pages]
16. Attachment 16 - Draft Bushfire Risk Assessment [**4.1.16** - 25 pages]
17. Attachment 17 - Draft Traffic Engineering Assessment [**4.1.17** - 102 pages]
18. Attachment 18 - Draft Affordable Housing Strategy [**4.1.18** - 34 pages]
19. Attachment 19 - Draft Residential Land Analysis [**4.1.19** - 34 pages]

20. Attachment 20 - Draft Retail Assessment Potential Assessment [**4.1.20** - 19 pages]
21. Attachment 21 - Draft Community Infrastructure Assessment [**4.1.21** - 92 pages]
22. Attachment 22 - Background Document - Preliminary Environmental and Geotechnical Investigation dated [**4.1.22** - 150 pages]
23. Attachment 23 - Background Document - Additional Environmental Works dated September 2016 - received [**4.1.23** - 120 pages]



PRELIMINARY LAND BUDGET
[for Waverley Golf Course Land Only]

	HA	% OF SITE	% OF NDA
Waverley Golf Course	49.53		
Transmission Line Easement *[Inc. Roads within easement]*	22.02	44.46	
Retarding Basin	0.35	0.71	
Total Net Developable Area [NDA]	27.16	54.84	
Open Space	4.38	8.84	16.13
Road Reserve *[Excl. Roads within easement]*	5.20	10.50	19.15
Commercial 2 Zone	1.22	2.46	4.49
Mixed Use Area	0.85	1.72	3.13
Net Subdivisable Area [NSA]	15.51	31.31	57.12

LEGEND

- Waverley Golf Course
- Other Land Holdings
- Strategic Site 13
- Urban Growth Boundary [UGB]
- Stud Road
- Existing Connector + Key Access Streets
- Connector Street [20m Road Reserve] *Potential Bus Route*
- Local Street [16m Road Reserve]
- Police Road Extension
- Signalised Intersection
- Roundabout
- Limited Access Locations *Shared driveways*
- Left In - Left Out Intersection
- Transmission Line Easement
- Transmission Towers
- Public Open Space
- Transmission Line Easement
- Retarding Basin
- Commercial 2 Zone *Max Height Three Storeys [12m]*
- Mixed Use Area Retail\Commercial Uses <1000sqm Net Leasable Area Community + Residential Uses *Max Height Three Storeys [12m]*
- Residential Apartments/Townhomes *Max Height Three Storeys [12m]*
- Residential Townhomes/House [<250sqm] *Max Height Three Storeys [9m]*
- Residential Townhomes/House [>250sqm] *Max Height Two Storeys [9m]*

INTRAPAC PROPERTY

Development Plan
Waverley Golf Club, Rowville
City of Knox, VIC

REF NO	DRAW N	REV
INT WGC	**RD 3101**	**I**

REV	DESCRIPTION	DDMMYY	DRAWN	APPR'D
I	COMMERCIAL 2 ZONE UPDATE	240221	YS	CD
H	COMMERCIAL 2 ZONE UPDATE	220720	JB	EP
G	SITE AREA AMENDMENT	040517	NP	EP
F	SITE AREAS	180417	NP	EP
E	EASEMENT + NOTES PER HM	151216	KT	EP
D	PRT 02	091216	KT	EP
C	EASEMENT/POS AMEND	291116	KT	EP
-	--	--	--	--

N

SCALE 1:4,000 SIZE A3

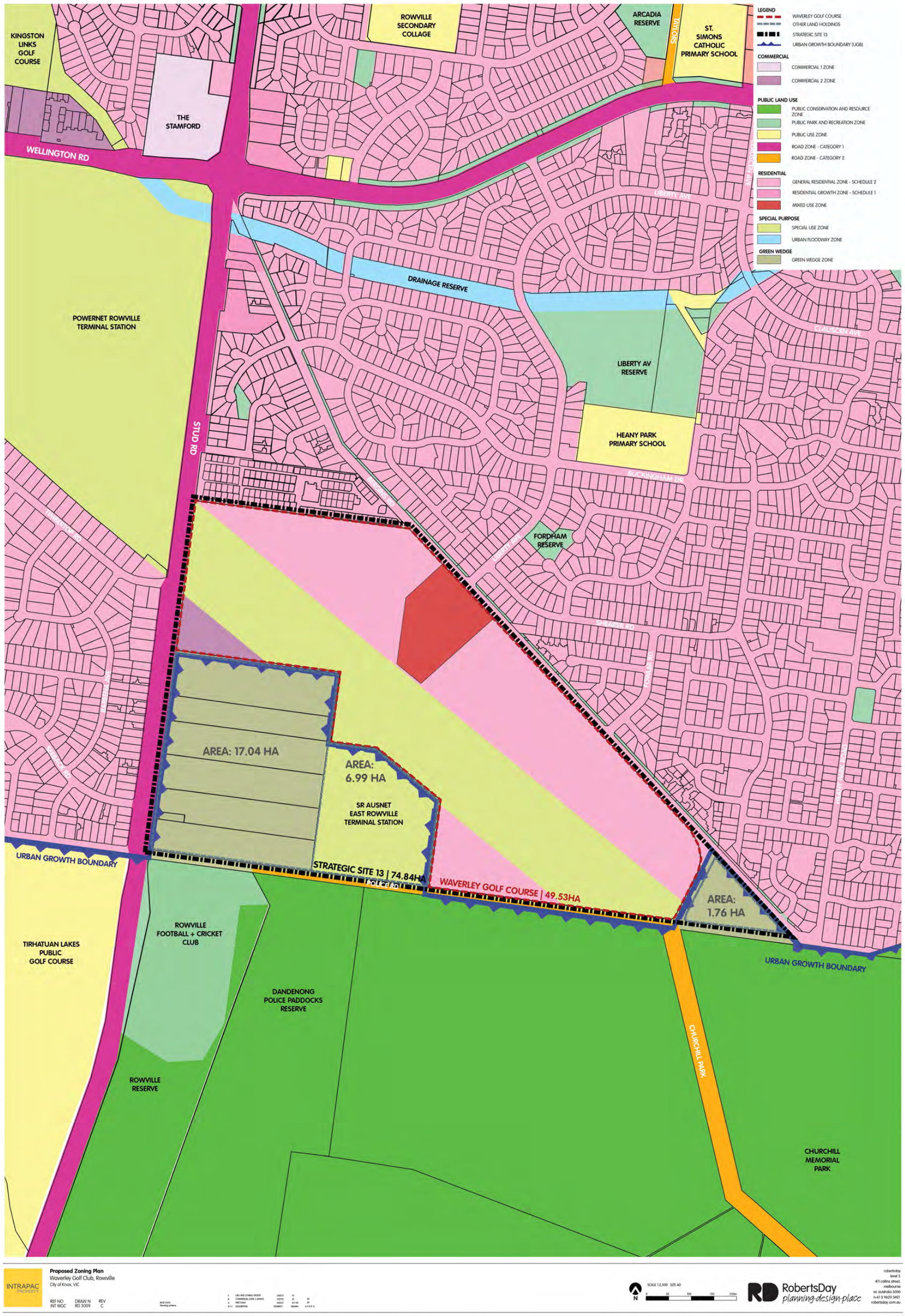
0 20 40 60 80 100m

Billard Leece Partnership

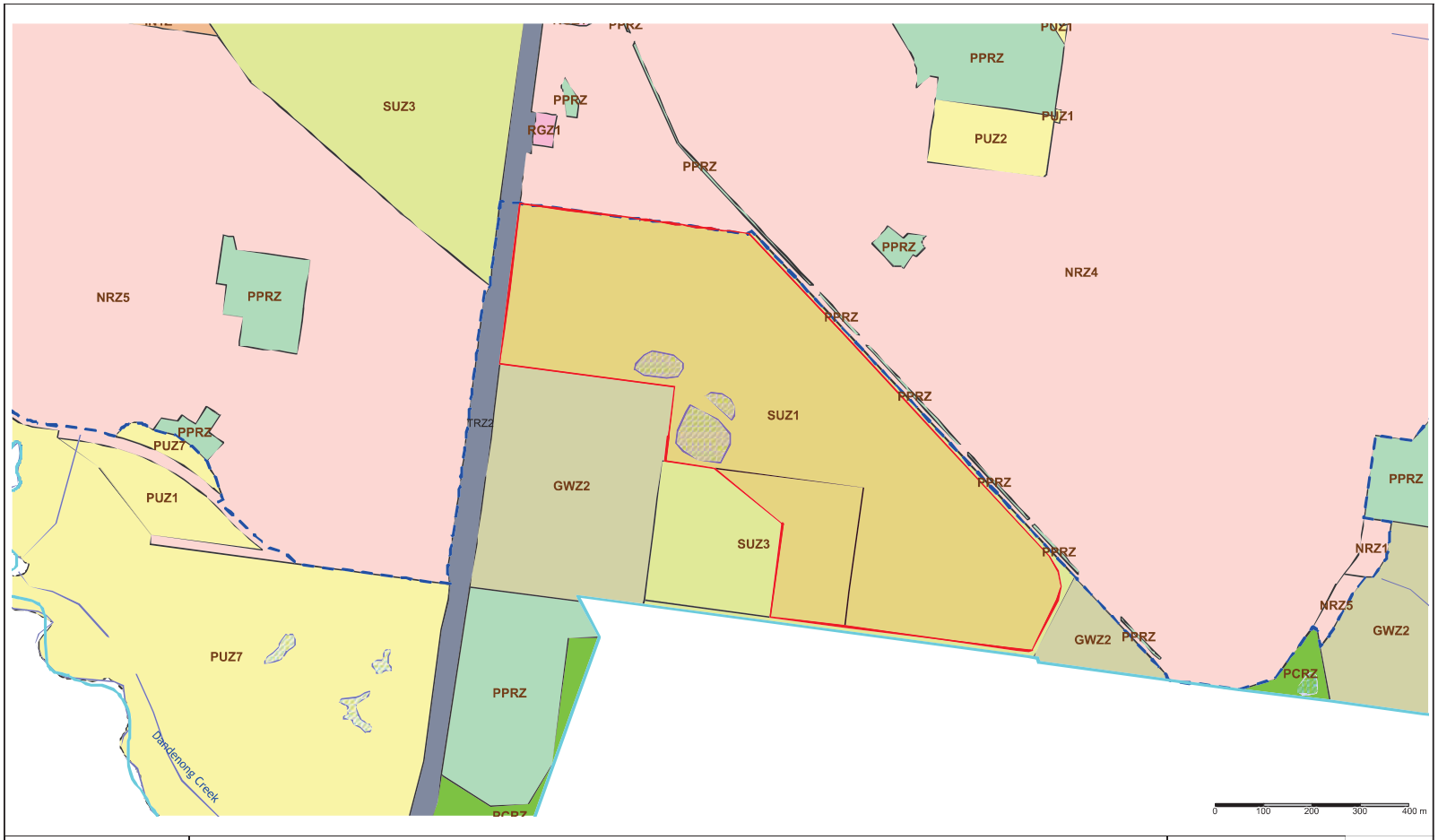
REEDS CONSULTING

RobertsDay planning·design·place

roberts day
level five
411 collins street
melbourne
vic australia 3000
t+61 3 9620 5421
robertsday.com.au


KINGSTON LINKS GOLF COURSE
THE STAMFORD
WELLINGTON RD
ROWVILLE SECONDARY COLLAGE
ARCADIA RESERVE
TAYLORS
ST. SIMONS CATHOLIC PRIMARY SCHOOL
LEGEND
WAVERLEY GOLF COURSE
OTHER LAND HOLDINGS
STRATEGIC SITE 13
URBAN GROWTH BOUNDARY (UGB)
COMMERCIAL
COMMERCIAL 1 ZONE
COMMERCIAL 2 ZONE
PUBLIC LAND USE
PUBLIC CONSERVATION AND RESOURCE ZONE
PUBLIC PARK AND RECREATION ZONE
PUBLIC USE ZONE
ROAD ZONE - CATEGORY 1
ROAD ZONE - CATEGORY 2
RESIDENTIAL
GENERAL RESIDENTIAL ZONE - SCHEDULE 2
RESIDENTIAL GROWTH ZONE - SCHEDULE 1
MIXED USE ZONE
SPECIAL PURPOSE
SPECIAL USE ZONE
URBAN FLOODWAY ZONE
GREEN WEDGE
GREEN WEDGE ZONE
LIBERTY AVE
DRAINAGE RESERVE
POWERNET ROWVILLE TERMINAL STATION
GLAUSCEN AVE
LIBERTY AV RESERVE
HEANY PARK PRIMARY SCHOOL
STUD RD
BUCKINGHAM DR
FORDHAM RESERVE
BREAKER RD
AREA: 17.04 HA
AREA: 6.99 HA
SR AUSNET EAST ROWVILLE TERMINAL STATION
URBAN GROWTH BOUNDARY
STRATEGIC SITE 13 | 74.84HA
WAVERLEY GOLF COURSE | 49.53HA
AREA: 1.76 HA
TIRHATUAN LAKES PUBLIC GOLF COURSE
ROWVILLE FOOTBALL + CRICKET CLUB
DANDENONG POLICE PADDOCKS RESERVE
ROWVILLE RESERVE
CHURCHILL PARK
CHURCHILL MEMORIAL PARK
INTRAPAC PROPERTY
Proposed Zoning Plan
Waverley Golf Club, Rowville
City of Knox, VIC
REF NO INT WGC
DRAW N RD 3009
REV C
SCALE 1:2,500 SIZE A0
RobertsDay planning·design·place

LEGEND
Waverley Golf Course
Other Land Holdings
Strategic Site 13
Urban Growth Boundary (UGB)
Police Road Extension
Signalised Intersection
Roundabout
Transmission Line Easement
Transmission Towers
Public Open Space
Transmission Line Easement
FORDHAM RESERVE
SHEARER RD
FOWLER RD
BERGINS RD
STUD RD
SR AUSNET EAST ROWVILLE TERMINAL STATION
NEW POLICE ROAD EXTENSION
STRATEGIC SITE 13 | 74.84HA
WAVERLEY GOLF COURSE | 49.52HA
ROWVILLE FOOTBALL + CRICKET CLUB
DANDENONG POLICE PADDOCKS RESERVE



Knox City Council

Subject site (solid red line) - Zoning regime

28/02/2024

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Aerial Photography - AAM (Flown January 2023 - unless otherwise stated)
Melbourne Water Drainage Information - Melbourne Water

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3. Drainage and flood extent information has been provided to Council on a yearly basis by Melbourne Water or by external consultants and is for indicative purposes only. Where the latest Melbourne Water drainage and flood extent mapping is critical, please contact Melbourne Water directly.

Scale 1:7755

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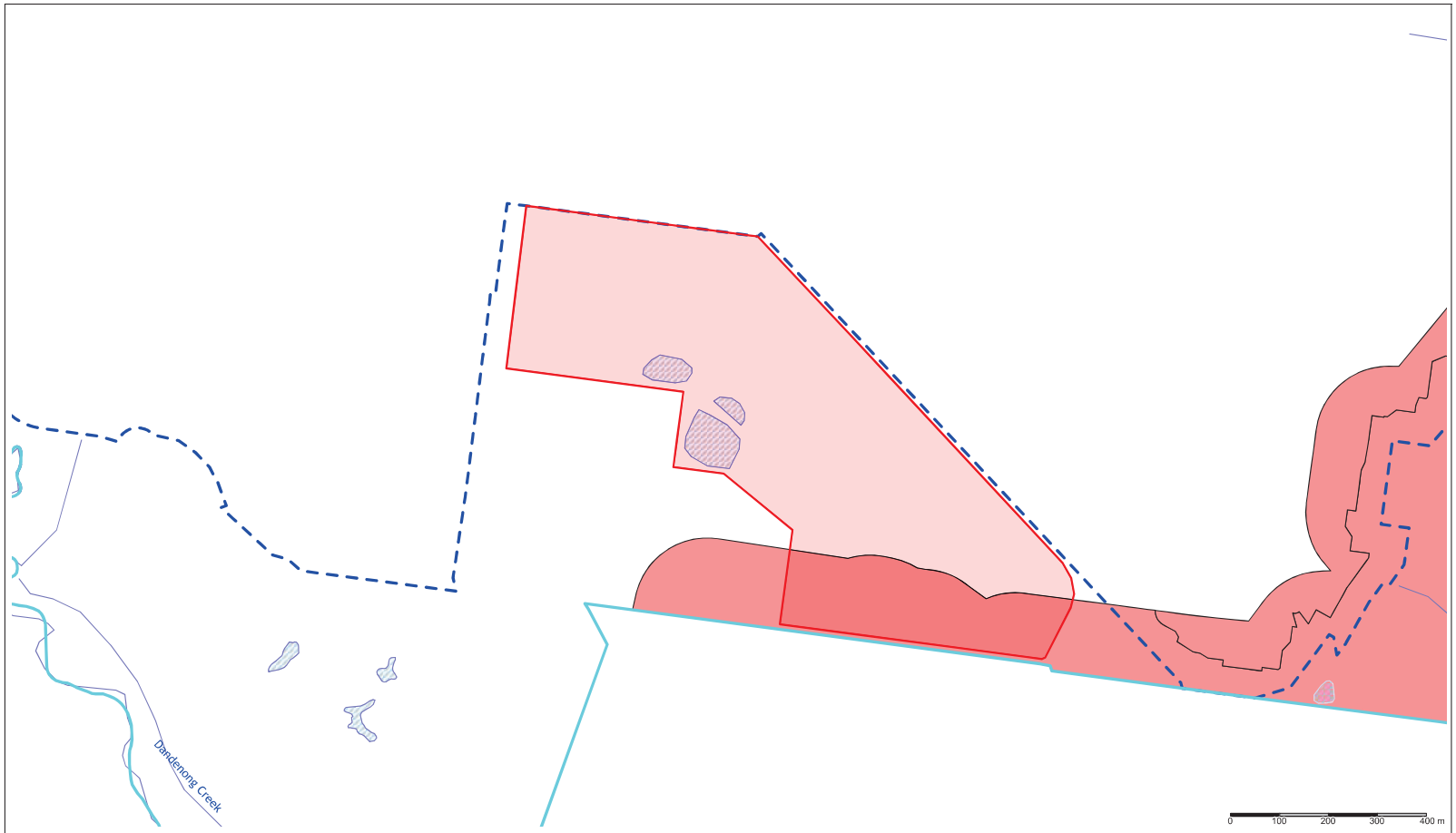

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Subject site - Bushfire Management Overlay

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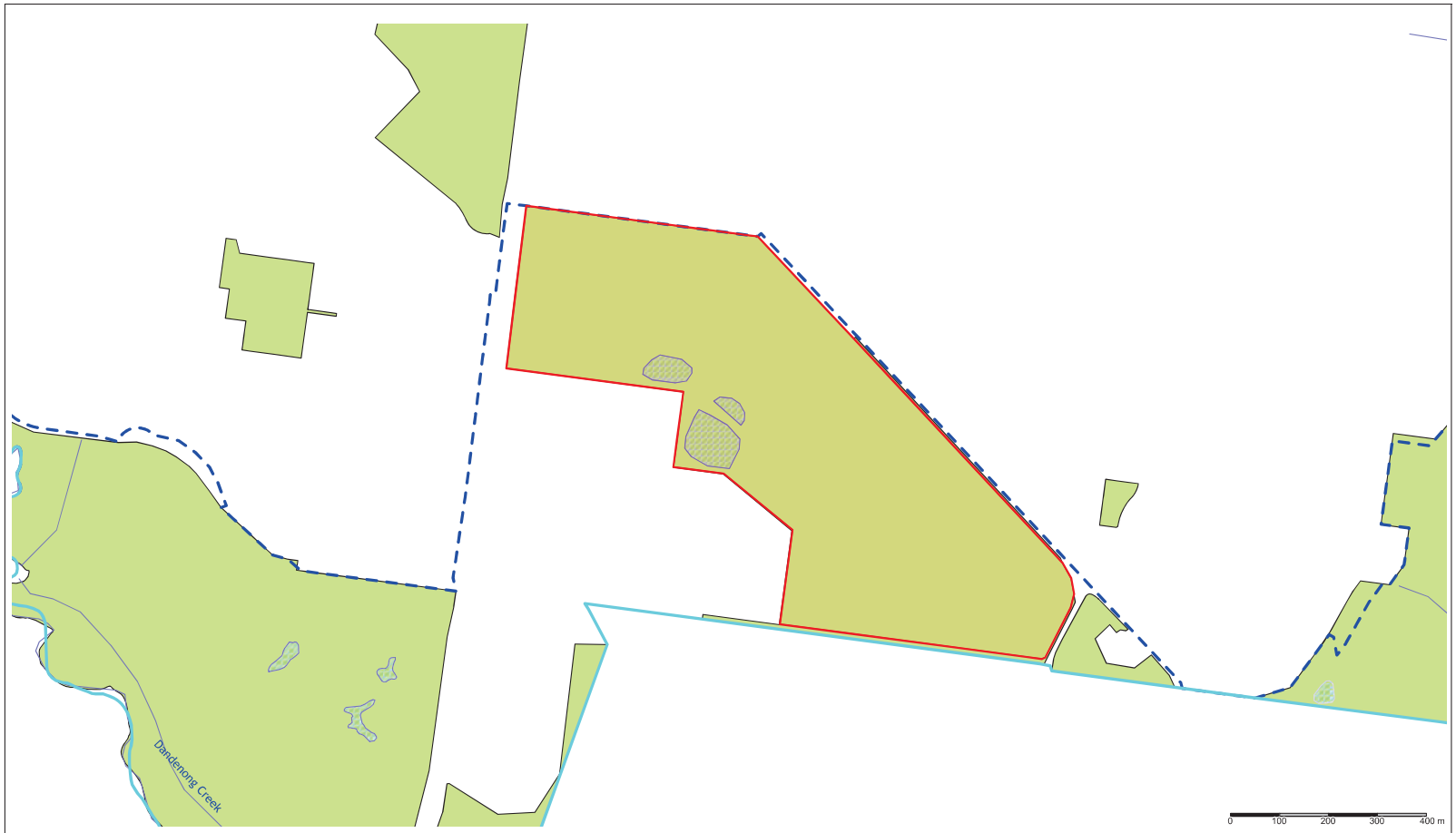

Knox City Council

Subject site - Environmental Significance Overlay Schedule 2

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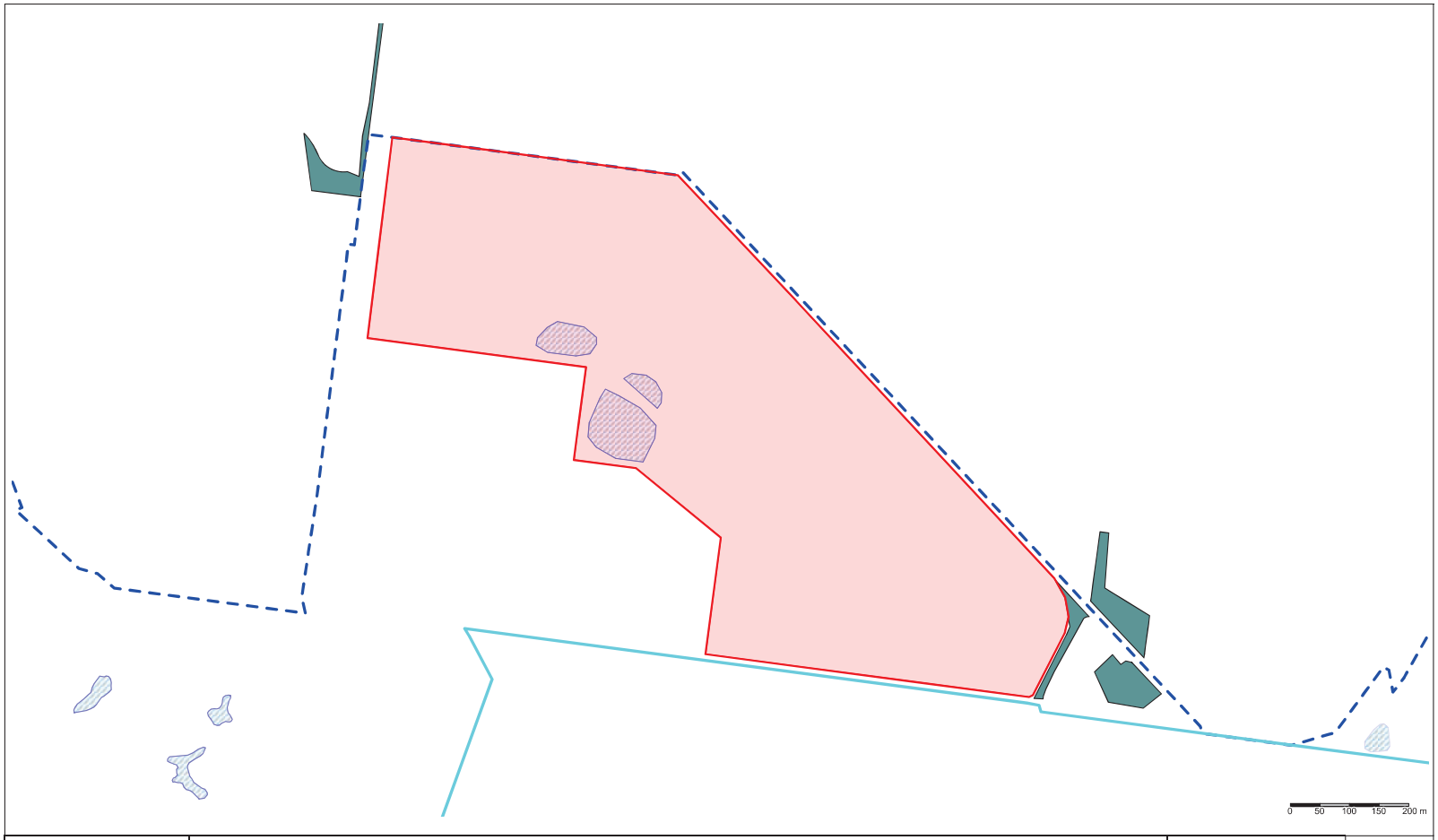

Knox City Council

Subject site - Vegetation Protection Overlay Schedule 1

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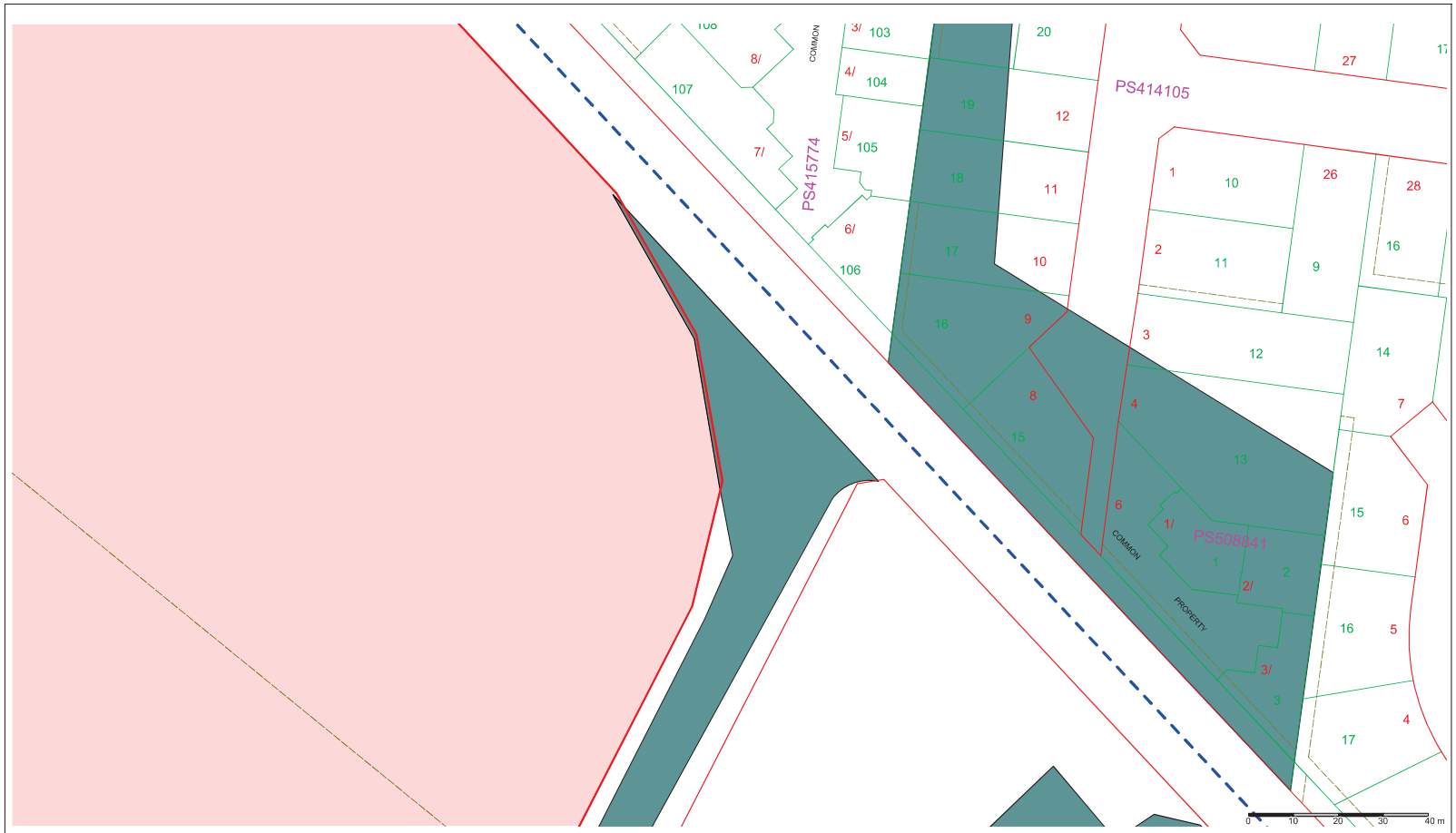

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Subject site - Vegetation Protection Overlay Schedule 1

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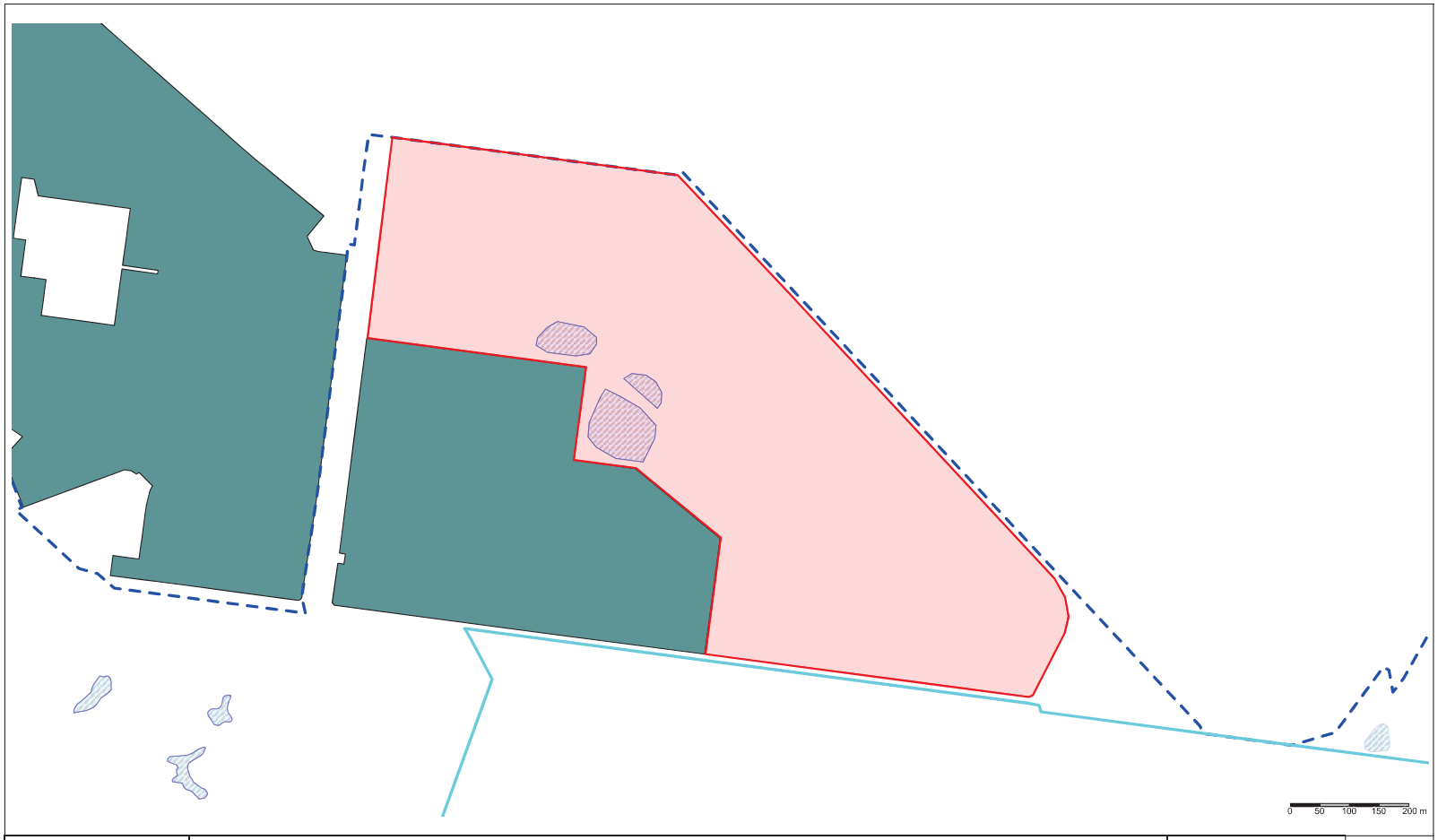

Knox City Council

Subject site - Vegetation Protection Overlay Schedule 4

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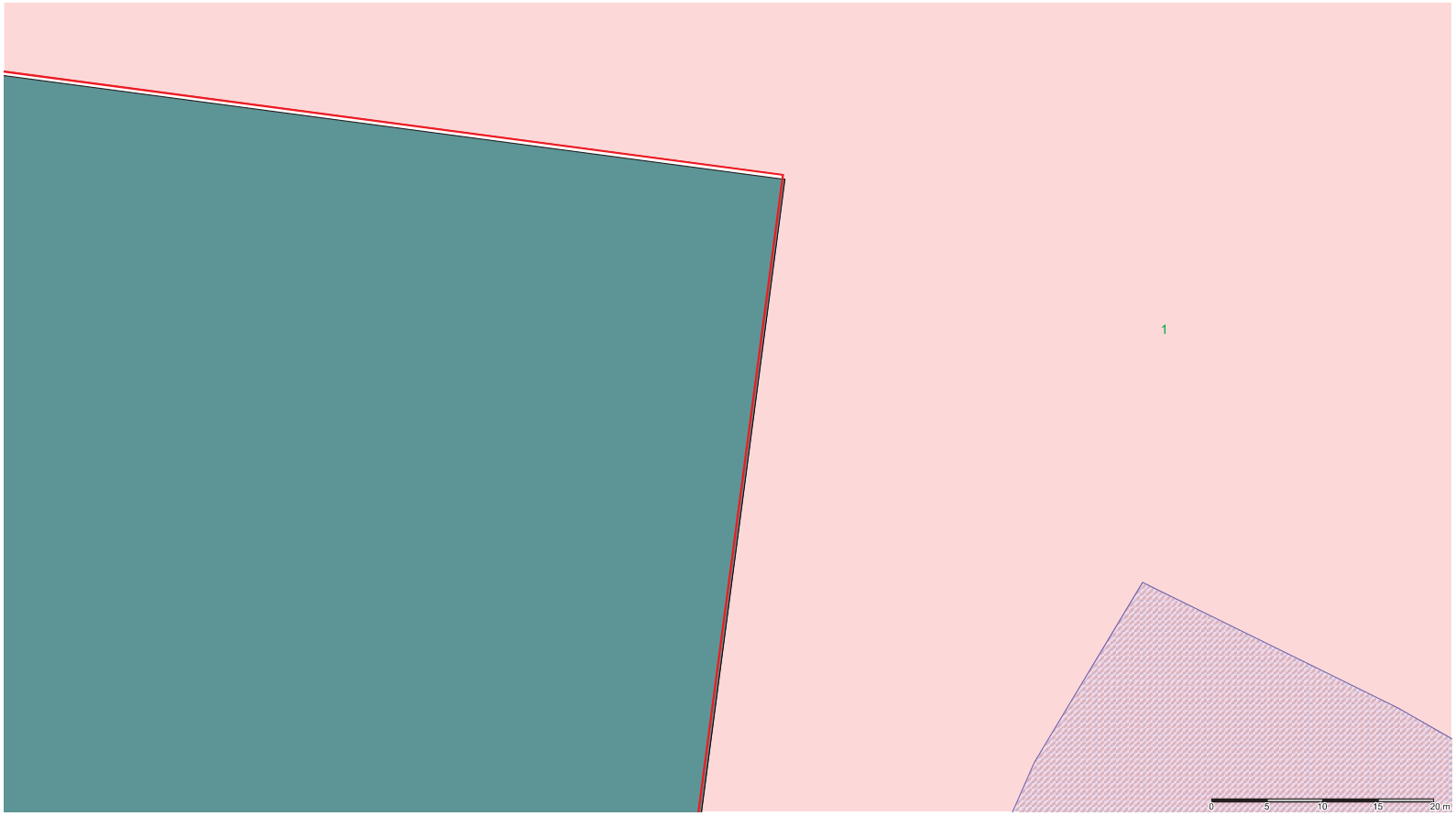

Knox City Council

Subject site - Vegetation Protection Overlay Schedule 4

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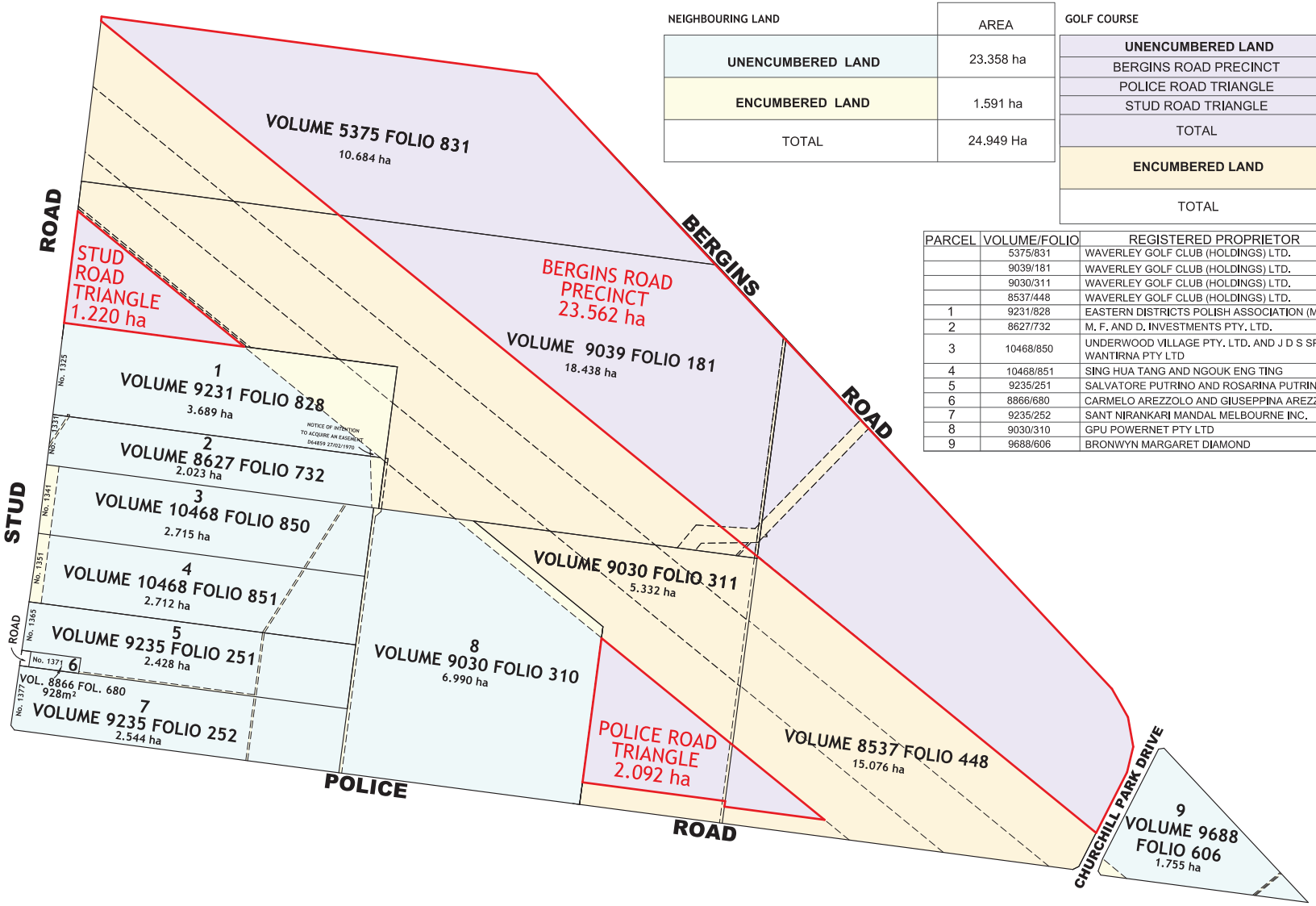

NEIGHBOURING LAND

	AREA
UNENCUMBERED LAND	23.358 ha
ENCUMBERED LAND	1.591 ha
TOTAL	24.949 Ha

GOLF COURSE

UNENCUMBERED LAND	AREA
BERGINS ROAD PRECINCT	23.562 ha
POLICE ROAD TRIANGLE	2.092 ha
STUD ROAD TRIANGLE	1.220 ha
TOTAL	26.784 ha
ENCUMBERED LAND	22.659 ha
TOTAL	49.533 Ha

PARCEL	VOLUME/FOLIO	REGISTERED PROPRIETOR	AREA
	5375/831	WAVERLEY GOLF CLUB (HOLDINGS) LTD.	10.684 ha
	9039/181	WAVERLEY GOLF CLUB (HOLDINGS) LTD.	18.438 ha
	9030/311	WAVERLEY GOLF CLUB (HOLDINGS) LTD.	5.330 ha
	8537/448	WAVERLEY GOLF CLUB (HOLDINGS) LTD.	15.076 ha
1	9231/828	EASTERN DISTRICTS POLISH ASSOCIATION (MELBOURNE)	3.689 ha
2	8627/732	M. F. AND D. INVESTMENTS PTY. LTD.	2.023 ha
3	10468/850	UNDERWOOD VILLAGE PTY. LTD. AND J D S SPORTS WANTIRNA PTY LTD	2.715 ha
4	10468/851	SING HUA TANG AND NGOUK ENG TING	2.712 ha
5	9235/251	SALVATORE PUTRINO AND ROSARINA PUTRINO	2.428 ha
6	8866/680	CARMELO AREZZOLO AND GIUSEPPINA AREZZOLLO	928m²
7	9235/252	SANT NIRANKARI MANDAL MELBOURNE INC.	2.544 ha
8	9030/310	GPU POWERNET PTY LTD	6.990 ha
9	9688/606	BRONWYN MARGARET DIAMOND	1.755 ha

PLAN OF ENCUMBERED AREAS
WAVERLY GOLF CLUB, 82 BERGINS ROAD, ROWVILLE

REF 22432
VERSION C

DATE 21/07/14 22432/ OFFICE WORK \ PLANS \ V8i 1EncumbrancesIC.dgn

50 0 50 100 150 200
SCALE 1: 4000 SHEET A3

LEVEL 6
440 ELIZABETH STREET
MELBOURNE VIC 3000
(03) 8660 3000
SURVEY@REEDSCONSULTING.COM.AU
WWW.REEDSCONSULTING.COM.AU

REEDS CONSULTING

ETHOS URBAN

DRAFT Planning Report
82 Bergins Road, Rowville
Inclusion of Waverley Golf Course within Urban Growth Boundary

Submitted to Knox City Council
On behalf of Intrapac Property Pty Ltd

October 2017

CONTACT

Paul Beatty Director PBeatty@ethosurban.com +61 3 9419 7226

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This document has been prepared by: This document has been reviewed by:

Josh Maitland Paul Beatty

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VERSION NO.A (DRAFT)	DATE OF ISSUE 12/11/17	REVISION BY JM	APPROVED BY PB

Ethos Urban
ACN 615 087 931 Pty Ltd.
www.ethosurban.com
+61 3 9419 7226

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1.0	**Introduction**	**1**
1.1	Site Context	1
1.2	Existing Conditions	6
2.0	**The Proposal**	**9**
2.1	Proposal Overview	9
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Appendices

Appendix A – Certificate of Titles

Appendix B – Feature Survey Plan

Appendix C – Removal of Native Vegetation Plan

Appendix D – Copy of Plans

Appendix E – Landscape Plan

Appendix F – Traffic Impact Assessment Report

Appendix G – Aboricultural Assessment Report

Appendix H – Melbourne Water Consent

Appendix I – Cultural Heritage Management Plan

1.0 Introduction

Ethos Urban have been engaged by Intrapac Property Pty Ltd to prepare a request to include the Waverley Golf Club site in Rowville within Melbourne's Urban Growth Boundary (UGB) and rezone the site from the current Special Use Zone, schedule 1 and 3, to enable its development for urban purposes. A table (**Table 1**) presenting the application summary is included on page 4.

The Municipal Strategic Statement in the Knox Planning Scheme recognises the subject land as a strategic investigation site which has the potential for residential development in the short to medium term. It is noted that the Waverley Golf Course site is the only strategic redevelopment site recognised through the Knox Planning Scheem that is located outside of the UGB.

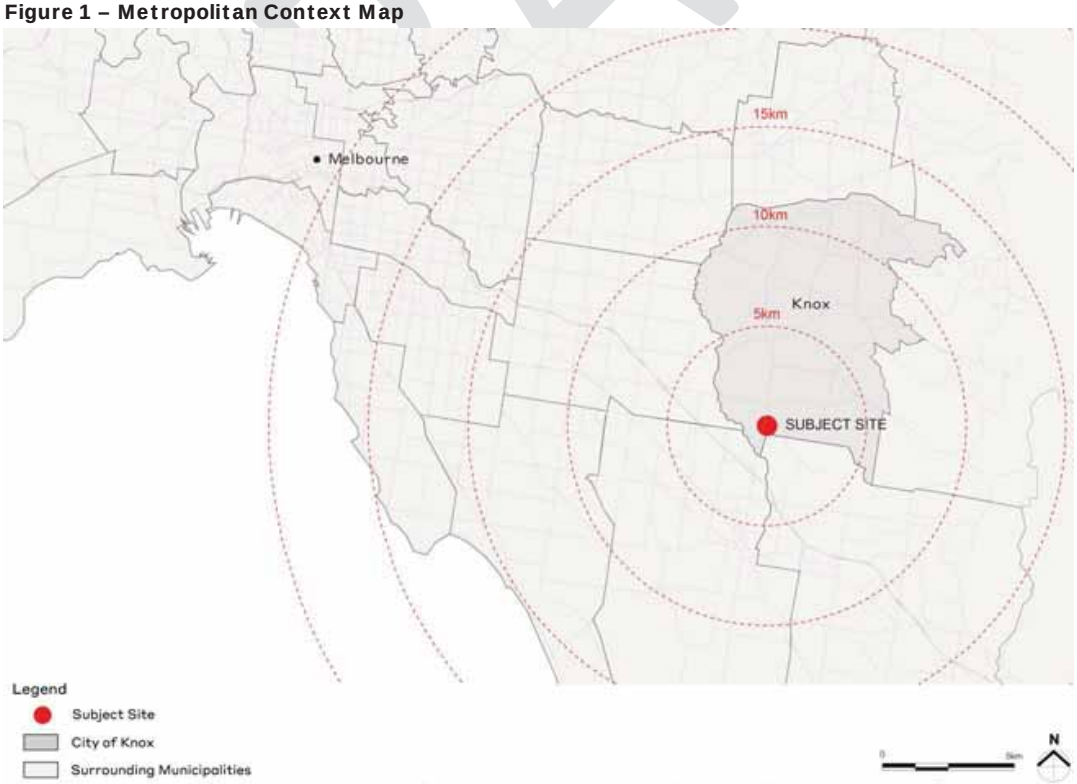
It is acknowledged that pursuant to Section 46AG of the *Planning and Environment Act 1987* a planning scheme amendment which has the effect of altering or removing any controls over the subdivision of any green wedge land does not take effect unless ratified by each house of Parliament. The subject site is located in green wedge land and as such any planning scheme amendment must be ratified by Parliament.

1.1 Site Context

Metropolitan Context

The subject site is approximately 25km south-east of Melbourne. Located approximately 6km from the Knox Central Principal Activity Centre, the subject site is located in the green wedge directly adjacent to the urban growth boundary.

Figure 1 – Metropolitan Context Map



Regional Context

The subject site is currently in use as a Golf Course and forms part of the green wedge that stretches through Casey, Knox and Yarra Ranges municipal areas. The site and the immediately surrounding area make a limited contribution to green wedge values and contain no productive agricultural uses. To the north, east and west of the subject site are established urban areas, primarily residential in nature.

To the south of the site is a wider Public Conservation and Resource Zoned area that stretches across the Knox, Casey and Yarra Ranges municipalities. The subject site is located within the City of Knox, adjacent to the City of Casey as shown in the map below.

Two former quarry sites are located approximately 4km to the west. The transmission lines that bisect the site supply power to the Powernet Rowville Terminal Station to the north east.

Figure 2 – Municipal Context Map

Local Context

The site comprises four lots with an area of approximatively 49.53 hectares. It is irregular in shape with frontages to Stud Road, Bergins Road and Police Road. Stud Road and Police Road are Road Zones, Category 1 and 2 respectively. The site is well serviced by road networks including frontages to Road Zones, Category 1 and 2.

The site is currently occupied by Waverley Golf Course, with the club rooms, bowling greens and car park located in the north-eastern portion of the site adjacent to Bergins Road. Transmission lines cross the site from the north-west to the south-east.

To the north, east and west of the subject site are established residential areas. To the south is the AusNet transmission station and the Dandenong Police Paddock Reserve. The corner of land bound by Stud Road, Police Road and the transmission line accommodates a polish community centre, a landscape supplies operation, the Sant Nirankari Mission and two large lot rural residential properties. The Tirhatuan Lakes Public Golf Course is located to the south-west.

The subject site is bisected by transmission lines that run from the south-east corner of the site to the north-west. These transmission lines and the associated easements are a major determinate in the form of any future use and development of the site.

The subject site and a number of sites fronting Stud Road and Police Road sit outside the Urban Growth Boundary; however they make a limited contribution to the wider green wedge nor are they adjacent to agricultural land. The future use and development of the subject site would not undermine any adjacent productive agricultural uses.

The Rowville Recreation Reserve and Dandenong Police Paddocks Reserve lie to the south. As such the inclusion of the subject site and the precinct in the corner of Stud Road and Police Road within the Urban Growth Boundary will not create uncertainty associated with an Urban Growth Boundary that has the potential to expland further.

DRAFT

Table1- Proposal Summary

Address	82 Bergins Road, Rowville
Lot on Title	Vol. 5375 Fol. 831 Vol. 9039 Fol. 181 Vol. 9030 Fol. 310 Vol. 8537 Fol. 448
Existing use and development	Waverley Golf Course
Proposed use and development	Residential use facilitated through the inclusion of the subject site within the Urban Growth Boundary and rezoning to General Residential Zone
Existing Zone	Special Use Zone, schedule 1 Special Use Zone, schedule 3
Overlays	Environmental Significance Overlay, schedule 2 Bushfire Management Overlay
State Planning Policy Framework	10.4 Integrated decision making 11 Settlement 11.06 Metropolitan Melbourne 14 Natural Resource Management 15 Built Environment and Heritage 16 Housing
Local Planning Policy Framework	21.01 Municipal Profile 21.05 Housing 21.06 Environment 21.08 Infrastructure
Particular Provisions	52.17 Native Vegetation 52.29 Land Adjacent to a Road Zone, Category 57 Metropolitan Green Wedge Land
Reference Documents	Knox Housing Strategy 2015
Incorporated Documents	N/A
Relevant Planning Scheme Amendments	N/A
Restrictive Covenants & Easements	Transmission line easements. Refer report
Previous Planning Permits	N/A

DRAFT

DRAFT

1.2 Existing Conditions

1.2.1 The Subject Area Site

The subject site has an irregular shape and a combined area of approximately 49.6ha. The land is commonly known as 82 Bergins Road, Rowville and comprises four (4) Certificates of Title. The land is also known as:

- Lot 1 on Plan of Subdivision 096639
- Lot 1 on Title Plan 298604M
- Lot 1 on Title Plan 843714T
- Lot 2 on Plan of Subdivision 111072

Figure 1 - Aerial Image showing the subject site

Easements, Restrictions & Reserves

The site is burdened by a series of easements for the State Electricity Commission of Victoria. These easements and the transmission lines that run across the site are a major determinate on the form of any future development of the site. Please refer to Appendix A for further details.

Site Features

The subject site is current occupied by the Waverley Golf Course and associated club rooms and car parking, and two bowling greens. Transmission lines cross the site from the south-east to the north-west. Refer to the Certificates of Title for lot boundaries.

The site is relatively unconstrained in terms of native vegetation or other natural features. The site is generally undulating with much of the natural land form modified by the establishment of the golf course, including constructed drainage channels and lakes.

The only areas of built form and hard standing are the golf club rooms and parking adjacent to Bergins Road, and the grounds keeping sheds located relatively centrally to the site. The site is currently accessed from Bergins Road, Stud Road and Police Road. Bergins Road is the only public access point to the site.

1.2.2 Zones and Overlays

The subject site is predominately zoned Special Use Zone, schedule 1 which reflects the private golf course use of the site. A portion of the site is zoned Special Use Zone, schedule 3 which is an anomaly likely to relate to the golf course purchasing excess land from the adjacent electricity terminal station use.

The site is covered by the Environmental Significance Overlay, schedule 2. A portion of the site adjacent to Police Road is also covered by the Bushfire Management Overlay. The following maps show the extent of the zones and overlays that apply to the subject site and adjacent land.

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Figure 3- Existing Zones

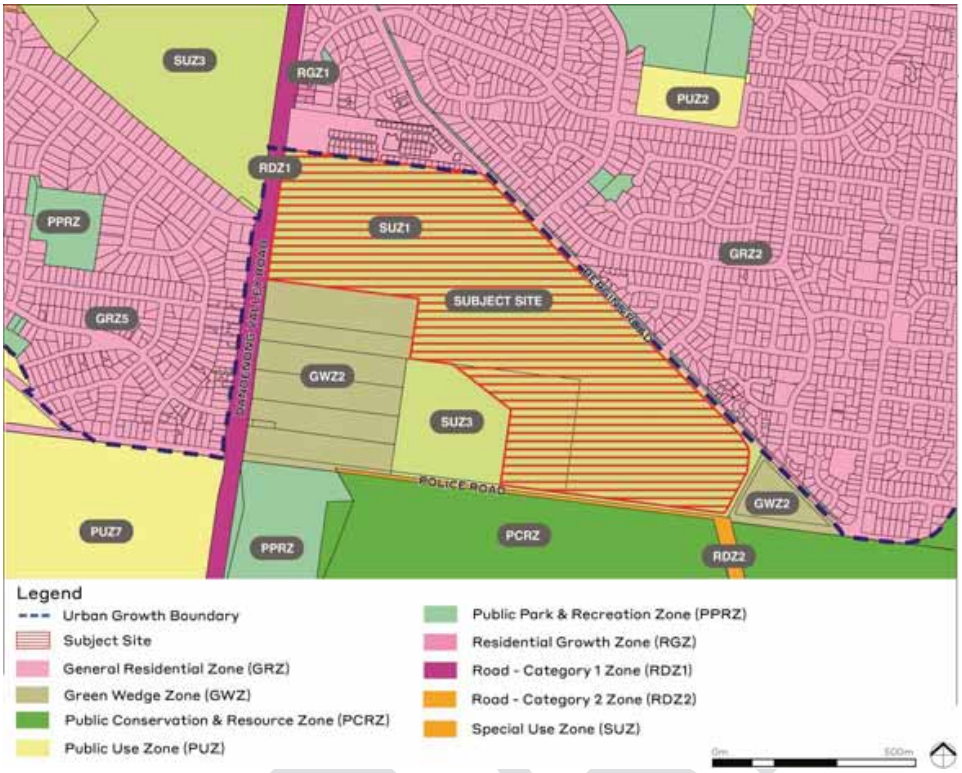
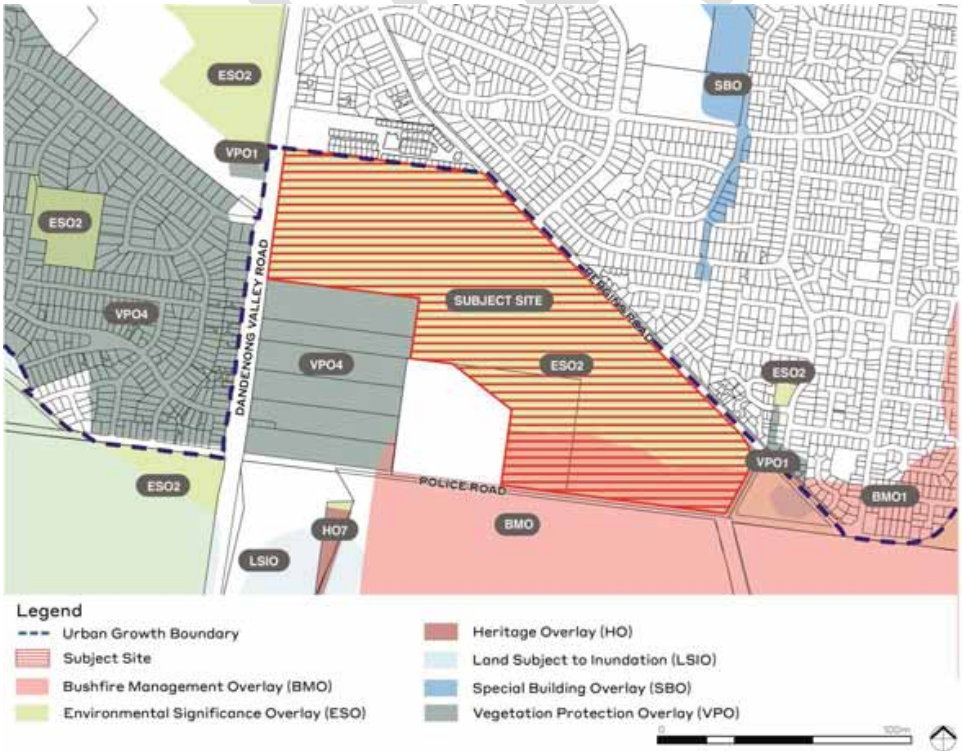


Figure 4 - Existing Overlays



1.2.3 Cultural Heritage Management Plan

The site is not subject to the Aboriginal Cultural Heritage Sensitivity Overlay. A due diligence assessment, prepared by Heritage Insight Pty Ltd and dated 28 July 2016, concludes that the preparation of a Cultural Heritage Management Plan is not required for the re-development of the subject site as:

- The preparation of a mandatory CHMP is not required by he Aboriginal Heritage Regulations 2007;
- The Soil Capability Investigation by KLM demonstrates the Waverley Golf Course site has undergone significant levels of excavation in the past, which is likely to have disturbed or destroyed any Aboriginal places; and
- The balance of the precinct has been subject to extensive land disturbance, including agricultural land use and building construction.

It is noted that Sections 27 and 28 of the Aboriginal Heritage Act 2006 provide blanket protection for all Aboriginal sites in Victoria.

2.0 The Proposal

2.1 Proposal Overview

The proposal seeks to include the subject site within the Urban Growth Boundary, rezone the site from Special Use Zone, schedule 1 and Special Use Zone, schedule 3 to General Residential Zone in the Knox Planning Scheme.

A number of assessments and investigations were undertaken to determine the economic, heritage and environmental impacts of the proposed rezoning on the site and the surrounding area. This includes:

- Flora and Fauna Assessment
- Traffic Engineering Assessment
- Tree Assessment
- Environmental and Geotechnical Assessment
- Residential Land Analysis
- Retail Development Potential Assessment
- Community Infrastructure Assessment
- Cultural Heritage Due Diligence Assessment
- Affordable Housing Strategy

The rezoning of the subject site will contribute to the supply of residential land and supports municipal housing objectives within an existing urban area where infrastructure services are available. The site is currently occupied by the Waverley Golf Club; however the club is intending to relocate via merger with the nearby Churchill Park Golf Club, located approximately 2km to the south-east of the site. The club membership voted 99% in support of the move in 2015 subject to inclusion of the site within the Urban Growth Boundary, and subsequent rezoning.

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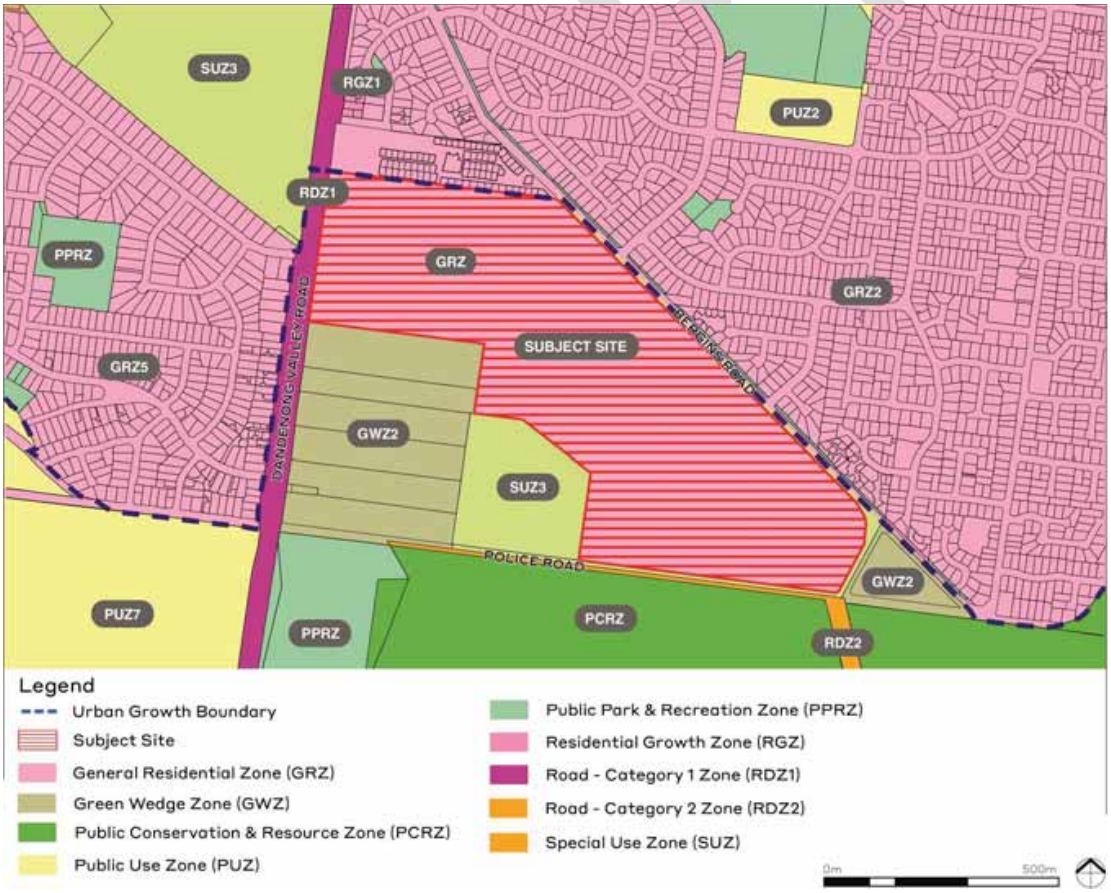
The City of Knox support for the inclusion of the site within the UGB. This is affirmed in the Knox Housing Strategy 2015 which was incorporated into the Knox Planning Scheme by Planning Scheme Amendment C131 in March 2016, which identifies the site as a strategic redevelopment site, notwithstanding its location outside of the current Urban Growth Boundary.

The proposed rezoning and inclusion of the site within the Urban Growth Boundary facilitates the orderly planning of the area as it creates a logical, defensible and permanent boundary for Metropolitan Melbourne. The rezoning will maintain and enhance the environmental values of the site by retaining significant trees and will create ecological corridors through the site that connect a wider network in the area, including the Parks Victoria Dandenong Police Paddocks Reserve located immediately south of the Police Road reserve, as well as the nearby Churchill National Park.

The proposed planning scheme amendment is considered to be strategically justified and is consistent with State and Local Planning Policy. The proposed Concept Plan sets out a practical and appropriate future subdivision of the subject site for residential purposes, will not create any on-site or off-site amenity impacts, and is consistent with all relevant requirements of the Knox Planning Scheme.

Figure 6 – Proposed Zoning Map



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3.0 Strategic Assessment Guidelines

The Department of Environment, Land, Water and Planning outline a set of Strategic Assessment Guidelines for preparing and evaluating planning scheme amendments, pursuant to Ministerial Direction No. 11.

The purpose of the guidelines is to provide a consistent framework for preparing and evaluating proposed planning scheme amendments. A response to each of the Strategic Assessment Guidelines is provided in the following pages.

1. Why is an Amendment Required?

The amendment will provide an increase of residential land supply in Rowville. The General Residential Zone allows residential land uses and a range of other associated complimentary uses. State and Local Planning Policies outline the importance of managing growth while also catering for the future needs of residents. A number of strategic investigations have been undertaken in the preparation of this proposal which support the rezoning of the land for residential purposes.

2. Does the Amendment Implement the Objectives of Planning and Address Any Environmental, Social and Economic Effects?

The amendment implements the objectives of Planning in Victoria by addressing the following objectives set out in Section 4 of the Planning and Environment Act 1987.

- To provide for the fair, orderly, economic and sustainable use, and development of land.
- To secure a pleasant, efficient and safe working, living and recreational environment for all Victorians and visitors to Victoria.
- To facilitate development in accordance with the objectives set out in paragraphs (a), (b), (c), (d) and (e).

The proposal satisfies the objectives of the Act.

There are limited environmental impacts of the proposal and any future development of the site will carefully manage the remnant native vegetaion and adjacent land uses. The proposal will develop ecological corridors that form part of the wider network in the area further mitigating any environmental impacts on the site.

3. Does the Amendment Address Relevant Bushfire Risk?

The southern portion of the site is subject to bushfire risk as identified by the BMO that applies to the southern extent of the subject site. The formation of Police Road associated with the inclusion of the subject site within the Urban Growth Boundary will create a buffer to the fire risk; however, a further buffer zone at the southern end of the subject site may be required. While this may be a constraint to the form of development at this end of the site, this issue can be satisfactorily resolved through the permit process and will not undermine the development of the site for urban purposes.

4. Does the Amendment Comply with All Relevant Minister's Directions?

The amendment complies with the Ministerial Direction on the Form and Content of Planning Schemes under Section 7(5) of the Planning and Environment Act 1987.

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5. Does the Amendment Support or Implement the State Planning Policy Framework?

The amendment contributes to the supply of residential land within an existing urban area in close proximity to existing and future community infrastructure. It also contributes to meeting the demand for residential land supply within the City of Knox by providing land for urban growth. Furthermore it creates the opportunity to deliver the Police Road connection between Churchill Park Drive and Stud Road which would alleviate local traffic issues along Bergins Road.

It will enhance social and community cohesion by contributing to the safety, diversity, choice and quality of living and working environments.

6. How Does the Amendment Support of Implement the Local Planning Policy Framework and Specifically the Municipal Strategic Statement?

The proposed amendment supports the municipal housing objectives by contributing to residential land supply on a site in a location that can be serviced be existing infrastructure. Furthermore, this will be achieved in a manner that will not compromise the environmental or cultural heritage values within the site or the surrounding sensitive interfaces.

The proposed amendment would specifically address the identification of the subject site as an investigation area in the Knox Housing Strategy 2015 which was incorporated into the Knox Planning Scheme as a reference document in Clause 21.09 by Planning Scheme Amendment C131 in March 2016.

7. Does the Amendment Make Proper Use of the Victoria Planning Provisions?

The General Residential Zone is the most appropriate planning tool to achieve the desired outcome. The application of this control is consistent with surrounding zoning and overlay provisions. There is no duplication of controls which apply to the land.

Furthermore, the amendment complies with all the relevant Practice Notes.

8. How Does the Amendment Address the Views of Relevant Agencies?

The Knox City Council is the Responsible and Planning Authority for the area, and the amendment is being undertaken with its support. The views of relevant agencies will be sought and considered during the amending process.

9. Does the Amendment Address the Requirements of the Transport Integration Act 2010?

The proposal will not have a significant impact on any components of the transport system as defined in Section 3 of the *Transport Integration Act 2010*. According a full assessment of the proposal against the requirements of Section 25 of the *Transport Integration Act 2010* is not required.

10. What Impact Will the New Planning Provisions have on the Administrative Costs of the Responsible Authority?

There will be no substantive impact on the resources of the Responsible Authority.

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4.0 Planning Scheme Assessment

4.1 State Planning Policy Framework

The State Planning Policy Framework (SPPF) provides the broad objectives and strategies for planning in Victoria. The key provisions of the SPPF relevant to this application are:

Clause 10.4	Integrated decision making
Clause 11	Settlement
Clause 11.06	Metropolitan Melbourne
Clause 14	Natural Resource Management
Clause 15	Built Environment and Heritage
Clause 16	Housing

Clause 10.4 – Integrated Decision Making

Clause 10 of the Scheme looks at Operation of the State Planning Policy Framework, and in particular Clause 10.4 of the Scheme looks at Integrated decision making.

Integrated decision making outlines the following:

- *Society has various needs and expectations such as land for settlement, protection of the environment, economic well-being, various social needs, proper management of resources and infrastructure. Planning aims to meet these by addressing aspects of economic, environmental and social well-being affected by land use and development.*
- *Planning authorities and responsible authorities should endeavour to integrate the range of policies relevant to the issues to be determined and balance conflicting objectives in favour of net community benefit and sustainable development for the benefit of present and future generations.*

Clause 11 - Settlement

Clause 11 highlights that planning should anticipate and respond to the needs of existing and future communities 'through the provision of zoned and serviced land for housing, employment, recreation and open space, commercial and community facilities and infrastructure.'

The policy also states:

- *Planning is to prevent environmental problems created by siting incompatible land uses close together.*
- *Planning is to facilitate sustainable development that takes full advantage of existing settlement patterns, and investment in transport and communication, water and sewerage and social facilities.*

At Clause 11.02 (Urban Growth) the policy set an objective of ensuring *a sufficient supply of land is available for residential, commercial, retail, industrial, recreational, institutional and other community uses.*

Relevant strategies to achieve this objective is:

- *Ensure the ongoing provision of land and supporting infrastructure to support sustainable urban development.*

- *Ensure that sufficient land is available to meet forecast demand.*
- *Plan to accommodate projected population growth over at least a 15 year period and provide clear direction on locations where growth should occur.*
- *Planning for urban growth should consider opportunities for the consolidation, redevelopment and intensification of existing urban areas.*
- *Restrict low-density rural residential deveopment that would compromise future development at higher densities.*

Clause 11.06 – Metropolitan Melbourne

Clause 11.06 contains the key policy objectives and strategies for metropolitan Melbourne and highlights the need to consider *Plan Melbourne 2017-2050: Metropolitan Planning Strategy* (Department of Environment, Land Water and Planning, 2017).

A relevant strategy to the context of this report in Clause 11.06-2 (Housing Choice) is:

- *Maintain a permanent urban growth boundary around Melbourne to create a more consolidated, sustainable city.*

A relevant strategy of Clause 11.06-4 (Place and Identity) is to:

- *Strengthen protection and management of green wedge land.*

Clause 11.06-6 (Sustainability and Resilience) contains the following relevant strategy:

- *Facilitate the uptake of renewable energy technologies on a site-by-site and neighbourhood level, including through the consideration of renewable energy opportunities during the master planning of new communities and in green wedge and peri-urban areas.*

Clause 11.06-7 contains objectives and strategies for Melbourne's Green Wedges. The objective of the policy is:

- *To protect the green wedges of Metropolitan Melbourne from inappropriate development.*

Key strategies of relevance to the context of the proposal are:

- *Ensure strategic planning and land management of each green wedge area to promote and encourage its key features and related values.*
- *Support development in the green wedge that provides for environmental, economic and social benefits.*
- *Consolidate new residential development within existing settlements and in locations where planned services are available and green wedge area values can be protected.*

Clause 14 – Natural Resource Management

Clause 14 addresses natural resource management, and contains policy regarding the protection of agricultural land, sustainable agricultural land use, forestry and timber production, catchment planning and management, and resource extraction.

For the purpose of this application, the following objective is of relevance from Clause 14.01:

- *Protect productive farmland which is of strategic significance in the local or regional context.*

The following strategies to achieve the aforementioned objective are of relevance to the context of this report:

- *Ensure that the State's agricultural base is protected from the unplanned loss of productive agricultural land due to permanent changes of land use.*

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- *Prevent inappropriately dispersed urban activities in rural areas.*
- *In considering a proposal to subdivide or develop agricultural land, the following factors must be considered:*
    - *The desirability and impacts of removing the land from primary production, given its agricultural productivity.*
    - *The impacts of the proposed subdivision or development on the continuation of primary production on adjacent land, with particular regard to land values and to the viability of infrastructure for such production.*
    - *The compatibility between the proposed or likely development and the existing uses of the surrounding land.*
    - *Assessment of the land capability.*

Clause 15 – Built Environment & Heritage

Clause 15 seeks to ensure that planning should ensure all new land use and development 'appropriately responds to its landscape, valued built form and cultural context, and protect places and sites with significant heritage, architectural, aesthetic, scientific and cultural value.'

Clause 15.03-2 contains the objective to:

- *Ensure the protection and conservation of places of Aboriginal cultural heritage significance.*

Strategies to achieve this are:

- *Identify, assess and document places of Aboriginal cultural heritage significance, in consultation with relevant Registered Aboriginal Parties, as a basis for their inclusion in the planning scheme.*
- *Provide for the protection and conservation of pre- and post-contact Aboriginal cultural heritage places.*
- *Ensure that permit approvals align with recommendations of a Cultural Heritage Management Plan approved under the* Aboriginal Heritage Act 2006.

Response to the SPPF

The SPPF provides a high-level strategic framework for land use and development across Victoria. The policies outlined above enable planning at a municipal level, and guide the formulation of local policies to implement good planning outcomes.

Clause 11 provides a policy framework for the management of urban growth. One of the tools for managing growth identified is ensuring urban land supply in appropriate locations to accommodate 15 years of projected populaton growth. An objective of consolidating, redeveloping and intensifying urban areas is included in this framework.

Clause 11.06 contains a series of objectives and strategies that seek to protect green wedge land by maintaining and strengthening an urban growth boundary. An objective of protecting Melbourne's green wedges from inappropriate development is identified. The strategies outlined include maintaining a permanent urban growth boundary around Melbourne to create a consolidated, sustainable city and consolidating new residential development within existing settlements and in locations where planned services are available and green wedge areas can be protected.

Clause 14 articulates the value of protecting productive agricultural land in non-urban areas from inappropriate urban expansion. Clause 15 seeks to ensure that land use and development responds to

its landscape, valued built form and cultural context, and protects sites with significant heritage, architectural, aesthetic, scientific and cultural value.

In this context there is considered to be significant policy support for achieving a logical, defensible urban growth boundary to establish a permanent limit to the growth of Melbourne's metropolitan area. An urban growth boundary that takes account of the wide myriad of factors, including patterns of land use, features of the land and infrastructure networks, will inform a logical urban limit that is inherently a more defensible and permanent boundary to urban growth.

The values of green wedge areas are important considerations in the establishment of a permanent urban growth boundary. Compatibility between proposed land use and development and surrounding existing uses are an important consideration in protecting primary production. The SPPF recognises the potential impact of subdivision and development on green wedge areas and the productivity of agricultural land.

The benefits of containing urban growth in terms of creating a more sustainable urban form and protecting the non-urban areas beyond the boundary are clearly articulated in the state planning policy framework. An incoherent boundary for urban growth creates uncertainty. This undermines the benefits of an urban growth boundary by encouraging speculative land banking and discourages investment in productive uses of non-urban land. A strong, consolidated urban growth boundary provides certainty for all surrounding land uses and supports the *consolidated, sustainable city* sought by the SPPF.

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4.2 Municipal Strategic Statement & Local Planning Policy Framework

The following policies contained within the MSS and LPPF are relevant to this proposal, and are outlined in the discussion and assessment below:

Clause 21.01	Municipal Profile
Clause 21.05	Housing
Clause 21.06	Environment
Clause 21.08	Infrastructure

Clause 21.01 – Municipal Profile

Clause 21.01 provides an overview of the regional context, development pattern and community profile of the City of Knox. Clause 21.01-3 identifies the need to manage the pressure for development beyond the Urban Growth Boundary to protect the environmental, landscape and visual amenity qualities of areas outside metropolitan Melbourne.

Clause 21.05 – Housing

Clause 21.05 implements the Knox Housing Strategy 2015 through a policy framework of objectives, strategies and implementation measures.

The Housing Framework Plan provided in Clause 21.05 identifies the Waverley Golf Course and adjoining sites on Stud Road as a strategic investigation site that may be suitable for residential development in the short to medium term. The subject site is the only investigation site identified beyond the Urban Growth Boundary.

A further action to be undertaken identified in Clause 12.05, includes working with land owners of Strategic Investigation Sites and the surrounding communities during future strategic planning process and any associated rezoning process to ensure that future residential and non-residential development reflects the guidance provided in the Knox Housing Strategy 2015.

Clause 21.06 – Environment

Clause 21.06 provides an overview of the natural environment and cultural heritage issues that exist in Knox. The subject site is identified in the Environmental and Landscape Framework Plan as a site of biological significance. This is reflected in the application of the Environmental Significance Overlay to the Waverley Golf Course. Objectives and strategies of particular relevance to the subject site are as follows:

Objectives

- *To ensure the ongoing conservation of all existing native flora and fauna species.*

Strategies

- *Ensure the retention and management of indigenous vegetation for its habitat, ecological and intrinsic values, particularly along creek valleys and linear reserves; in the vicinity of the Dandenong Ranges National Park and other parks and reserves; and in recognised sites of biological significance.*
- *Limit development where the extent of vegetation removal that would be required for bushfire management would adversely impact on environment or significant landscape values.*

Clause 21.08 – Infrastructure

Clause 21.08 identifies the key issues facing the provision of physical and social infrastructure in Knox City. Objectives are set for the provision of infrastructure and strategies are outlined to achieve these objectives. The clause recognises that new urban development that is not adequately serviced will have adverse environmental impacts. Objectives and strategies of relevance to the subject site are as follows:

Objective 1 – *To ensure that the provision of new infrastructure is designed to contribute positively to the urban fabric and fulfil the needs of its intended life.*

Objective 2 – *To ensure that residents have improved access to services, facilities and public transport.*

Strategies

- *Support new housing in locations that have existing access to frequent and reliable public transport facilities and services*
- *Require Social Impact Assessments (where a need has been identified) for key strategic redevelopment sites or larger residential developments to identify the level of physical and social infrastructure required to be provided.*

Objective 3 – *To provide a safe integrated movement system that increases levels of accessibility, use and transport choice for all members of the community.*

Strategies

- *Improve connectivity between new and existing residential areas to existing transport networks.*
- *Require new development to provide footpaths and/ or cycle paths where appropriate to complement the exiting path network.*
- *Ensure that new development improves the safety, connectivity and accessibility of pedestrian, shared path and bicycle networks.*

Objective 4 – *To provide accessible, linked open space areas.*

Strategies

- *Ensure planning for new development provides accessible, linked open space and protects natural values.*

Response to the MSS & LPPF

The MSS and LPPF provides guidance for local decision-makers regarding the interpretation and contextual application of the SPPF at the local level.

This high level policy identifies the role green wedge land plays in enabling agriculture, recreation and education uses, providing for large scale activities that require a buffer to avoid conflict with sensitive land uses, providing spacious relief to urban development and maintaining environmental, cultural heritage, water management, landscape, and amenity values and functions.

The Waverley Golf Course is identified in the MSS as a strategic investigation site for inclusion within the Urban Growth Boundary and re-development for residential and non-residential uses in the short to medium term. This policy position is further supported by the Knox Housing Strategy 2015 identifying the Waverley Golf Course site as an investigation site for inclusion within the Urban Growth Boundary that may be able to accommodate a range of housing densities. This reflects the

SPPF strategic direction whereby a consolidated, permanent urban growth boundary is seen as a key component in managing urban growth and land supply, and facilitating a sustainable city.

The Waverley Golf Course is identified as an area of biological significance in Clause 21.06. This is carried through to the overlay provisions with the application of the Environmental Significance Overlay to the subject site. The identification and management of all biological significance on the subject site must underpin any proposal to develop the site for urban purposes.

Clause 21.08 concerns the provision of physical and social infrastructure across the City of Knox. The objectives of ensuring residents have improved access to services and facilities, an integrated transport network that provides accessibility and transport choices and a network of accessible open spaces are all of relevant to the subject site. It is noted the development of the subject site could enable the completion of Police Road between Bergins Road and Stud Road. This project has the potential to address wider roading network issues that would be of substantial public benefit in the area, by reducing the reliance on the Bergins Road link to Stud Road, to the north of the subject land.

In this context there is considered to be clear policy support in the MSS and LPPF for the investigation of the Waverley Golf Course for inclusion within the Urban Growth Boundary and the development of the site for residential and other urban purposes. Any such investigation must consider the biological significance of the subject site and must provide for suitable infrastructure to service the site. The transport network, in particular Police Road, should be investigated as part of any proposal to develop the subject site for the potential to alleviate existing network issues.

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4.3 Zones, Overlay & Particular Provisions

4.3.1 Zone Provisions

Clause 37.01 – Special Use Zone, schedule 1

The majority of the subject site is zoned Special Use Zone, schedule 1 (SUZ1). The purpose of the SUZ1 is:

- *To recognise the use of private facilities including community, sporting leisure, recreation, education and religious facilities.*
- *To ensure that flood risk is taken into consideration for use or development of facilities on or near land subject to flooding.*

Permit Requirement

Pursuant to Clause 37.1-3, a permit is required to subdivide land.

Pursuant to Clause 37.01-4, a permit is required to construct a building or construct or carry out works unless the relevant schedule to the zone specified otherwise. Schedule 1 does not exempt any buildings and works from this permit requirement.

Pursuant to Clause 37.01-1, a small number of activities can occur without a permit in the SUZ1. Notably a dwelling, other than a caretaker's house, requires a permit.

Response to SUZ1

The SUZ1 reflects the sites current use as a private golf course. The SUZ1 is not compatible with the redevelopment of the site for any purpose other than a privately operated community, sporting leisure, recreation, education or religious facility.

Clause 37.01 – Special Use Zone, Schedule 3

A portion of the size is zoned Special Use Zone, scheudule 3 (SUZ3). The purpose of the SUZ3 is:

- *To provide for land to be used for an electricity terminal station.*

Permit Requirement

Pursuant to Clause 37.1-3, a permit is required to subdivide land.

Pursuant to Clause 37.01-4, a permit is required to construct a building or construct or carry out works unless the relevant schedule to the zone specified otherwise. Schedule 3 does not exempt any buildings and works from this permit requirement.

Pursuant to Clause 37.01-1, a small number of activities can occur without a permit in the SUZ3. Notably accommodation, other than a caretaker's house, is prohibited.

Response to SUZ3

The application of the SUZ3 to the subject site is an anomaly that has likely arisen from the golf course purchasing excess land from the electricity terminal station. The restrictions of the SUZ3 are not compatible with the inclusion of the site within the Urban Growth Boundary and the re-development of the site.

4.3.2 Overlay Provisions

Clause 42.01 – Environmental Significance Overlay, schedule 2

The subject site is located within the Environmental Significance Overlay, schedule 2 (ESO2). The environmental objectives the ESO2 is seeking to achieve are:

- *To protect sites of biological significance from:*
  - *Removal of indigenous vegetation that would be detrimental to the condition and viability of habitat, ecological communities, flora and fauna, genetic diversity or aquatic systems.*
  - *Removal of dead or fallen trees where it would adversely affect native fauna.*
  - *Environmental weeds.*
  - *Fragmentation and loss of habitat, including small scale incremental losses.*
  - *Degradation and interruption to the continuity of indigenous riparian vegetation.*
  - *Alterations to the natural flow and temperature regimes of streams and wetlands.*
  - *Input of pollutants and excessive sediment or nutrients into streams and water bodies.*
  - *Changes in flooding patterns that may adversely affect indigenous flora and fauna.*
  - *Changes in topography that may impact negatively on vegetation or cause erosion or landslip.*
- *To reduce the threat of extinction to vulnerable, endangered or critically endangered flora or fauna in Knox.*
- *To enhance the condition and viability of habitats, ecological communities, flora and fauna, genetic diversity and aquatic systems of sites, including both biological and physical components.*
- *To maintain connectivity between sites of biological significance and indigenous vegetation.*
- *To ensure buildings, works or subdivisions are compatible with the long-term protection and enhancement of biological significance.*
- *To increase the extent and quality of indigenous vegetation, consistent with the goal of 'Net Gain' as set out in Victoria's Native Vegetation Management – A Framework for Action (Department of Natural Resources and Environment 2002) utilising the three-step approach of avoid, minimise and offset. Offsets are to contribute to the achievement of specified net gain targets within ten years.*
- *To ensure offsets are located as close as practicable to the local catchment and plant/animal population areas impacted by vegetation loss. Preference is to be given to any reasonable option to locate offsets within Knox.*
- *To provide for adequate bushfire protection measures that minimise adverse environmental impacts.*
- *To provide appropriate fencing (temporary or permanent) to protect retained vegetation or aquatic environments from movements of machinery, vehicles or heavy foot traffic.*

Permit Requirement

Pursuant to Clause 42.01-2, a permit is required to subdivide land.

Pursuant to Clause 42.01-2, a permit is required to construct a building or construct or carry out works except for the construction of a building or the construction or carrying out of works in association with:

- *Roadworks.*
- *Dependent Persons Unit.*

- *Domestic Swimming Pool or Spa and associated mechanical and safety equipment.*
- *Pergola which increases a building's footprint on the site.*
- *Deck which increases a building's footprint on the site.*
- *Alterations to an existing building or carry out ancillary works.*

that does not either:

- *Result in excavation or filling within the tree protection zone of vegetation that would require a permit for its removal, destruction or lopping.*
- *Result in excavations or filling greater than one (1) metre in depth.*
- *To carry out works necessary for normal maintenance of artificial stormwater treatment ponds (except where works and/or associated vegetation removal exceed one hectare in area, or where machinery access would result in damage to remnant indigenous vegetation).*
- To undertake development or works that form part of a management plan approved by the responsible authority to enhance the site's biologically significant attributes.

Pursuant to Clause 42.01-2, a permit is required to remove, destroy or lop any vegetation, including dead vegetation, except vegetation that is:

- *Not indigenous within Knox.*
- *A tree with its trunk within two metres of the main roof structure of an existing building used for accommodation (excluding a fence).*
- *A tree overhanging the roof of a building used for Accommodation, excluding outbuildings and works normal to a dwelling. This exemption only allows the removal, destruction or lopping of that part of the tree which is overhanging the building consistent with the Australian Standard AS 4373 – 2007, 'Pruning of amenity trees'.*
- *Grass within a lawn, garden or other planted area and is to be mown or slashed for maintenance only.*
- *Grass within existing pasture and is to be cut or grazed.*
- *The minimum amount necessary to maintain a Minor utility installation in accordance with a current signed Memorandum of Understanding between Knox City Council and the relevant service provider.*
- *Required to be removed for normal maintenance of artificial stormwater treatment ponds (except where the vegetation removal and/or associated works exceed one hectare in area, or where machinery access would result in damage to indigenous vegetation).*
- *Seedlings or regrowth less than three years old and the land is being maintained for established pasture, crops or garden.*
- *Woody plants on an existing dam wall.*
- *For maintenance pruning only and no more than 1/3 of the foliage of any branch is removed from any individual plant. This exemption does not apply to:*
    - *Pruning or lopping of the trunk of a tree or shrub.*
    - *Vegetation within a road or railway reserve.*

Response to the ESO2

Flora and Fauna assessments of the subject site and the Police Road Reserve have been prepared by Brett Lane and Associates. The assessment of the subject site, Waverley Golf Course, identified 3.152 hectares of patches of remnant vegetation and 54 scattered indigenous trees on the highly modified

landscape. The proposed concept plan would retain 2.208 hectares of remnant native vegetation and 32 scattered trees.

The assessment of the Police Road reserve identified the road reserve contained approximately 0.852 hectares of native vegetation. The formation of a 15 metre wide road would result in the loss of less than 0.5 hectares of native vegetation.

The Waverley Golf Course assessment identifies the following offset requirements for the loss of 0.944 hectares of remnant patch vegetation and 22 scattered trees;

- 0.131 *general* biodiversity equivalence units with a minimum strategic biodiversity score of 0.271 within the Port Phillip and Westernport Catchment Management Authority area OR the Knox Municipal District;
- 0.455 *specific* biodiversity equivalence units of habitat for Green Leek-orchid located within any area of modelled important habitat for the impacted species anywhere in Victoria; and
- 0.034 *specific* biodiversity equivalence units of habitat for Studley Park Gum located within any area of modelled important habitat for the impacted species anywhere in Victoria.

The report also considered the potential for significant impacts on EPBC Act listed values based on analysis of the likelihood of occurrence and susceptibility to impacts of listed species recorded in the surrounding region or for which potential habitat has been modelled. No significant impacts were considered likely.

The Police Road Reserve assessment report identified a specific biodiversity equivalence unit offset for Studley Park Gum may be triggered based on habitat modelling. Alternative offset arrangements will be made with DELWP to satisfy any specific offset requirement once a detailed proposed vegetation removal analysis has been completed.

Clause 44.06 – Bushfire Management Overlay

The Bushfire Management Overlay (BMO) applies to the southern portion of the subject site adjacent to Police Road. The purpose of the BMO is:

- *To implement the State Planning Policy Framework and the Local Planning Policy Framework, including the Municipal Strategic Statement and local planning policies.*
- *To ensure that the development of land prioritises the protection of human life and strengthens community resilience to bushfire.*
- *To identify areas where the bushfire hazard warrants bushfire protection measures to be implemented.*
- *To ensure development is only permitted where the risk to life and property from bushfire can be reduced to an acceptable level.*

Permit Requirement

Pursuant to Clause 44.06-2, a permit is required to subdivide land.

Pursuant to Clause 44.06-2, a permit is required to construct a building or construct or carry out works associated with the following uses:

- Accommodation (including a Dependent person's unit)
- Child care centre
- Education centre
- Hospital

- Industry
- Leisure and Recreation
- Office
- Place of assembly
- Retail premises
- Service station
- Timber production
- Warehouse

This does not apply to any of the following:

- An alteration or extension to an existing building used for a dwelling or a dependent person's unit that is less than 50 percent of the gross floor area of the existing building.
- An alteration or extension to an existing building (excluding a dwelling and a dependent person's unit) that is less than 10 percent of the gross floor area of the existing building.
- A building or works with a floor area of less than 100 square metres not used for accommodation and ancillary to a dwelling.
- A building or works associated with Timber production provided the buildings or works are not within 150 metres of Accommodation or land zoned for residential or rural residential purposes.

Response to the BMO

The bushfire risk to the subject site is demonstrated by the application of the DMO to a limited potion of the southern extent of the site. The formation of Police Road between Churchill Park Drive and Stud Road will require vegetation removal that will provide a buffer of at least 15 metres in width. The southern extent of the site is relatively sparsely vegetated; however, an addition buffer area may be required.

The requirement for any buffer on the subject site will be determined through the permit process. While this may be a constraint that must be addressed via the future layout of this end of the subject site, it will not prejudice the ultimate development of the overall site for urban purposes.

4.4 Particular Provisions

4.4.1 Clause 52.17 – Native Vegetation

The purpose of Clause 52.17 is:

- To ensure permitted clearing of native vegetation results in no net loss in the contribution made by native vegetation to Victoria's biodiversity. This is achieved through the following approach:
  - *Avoid the removal of native vegetation that makes a significant contribution to Victoria's biodiversity.*
  - *Minimise impacts on Victoria's biodiversity from the removal of native vegetation.*

- *Where native vegetation is permitted to be removed, ensure that an offset is provided in a manner that makes a contribution to Victoria's biodiversity that is equivalent to the contribution made by the native vegetation to be removed.*
- To manage native vegetation to minimise land and water degradation.
- To manage native vegetation near buildings to reduce the threat to life and property from bushfire.

Permit Triggers

Pursuant to Clause 52.17 of all Victorian Planning Schemes a planning permit is required for the destruction, lopping or removal of native vegetation on land which has an area of 0.4 hectares or more (together with all contiguous land in single ownership). This includes the removal of dead trees with a DBH (diameter at breast height or 1.3 metres) of 40 centimetres or more and any individual scattered native plants.

Pursuant to Clause 52.17-1 a permit is required to remove, destroy or lop native vegetation, including dead native vegetation.

Response to Clause 52.17

Flora and fauna assessments been undertaken by Brett Lane & Associates for the Waverley Golf Course and the formation of Police Road. The assessment of the subject site, Waverley Golf Course, identified 3.152 hectares of patches of remnant vegetation and 54 scattered indigenous trees on the highly modified landscape. The proposed concept plan would retain 2.208 hectares of remnant native vegetation and 32 scattered trees.

The Waverley Golf Course site report identifies that a requirement for a planning permit is triggered under Clause 52.17 of the Knox Planning Scheme and the proposal would be assessed under the *high risk* assessment pathway and would trigger a referral to the Department of Environment, Land, Water and Planning.

The report identifies an offset requirement for the loss of 0.944 hectares of remnant vegetation and 22 scattered trees including:

- 0.131 *general* biodiversity equivalence units with a minimum strategic biodiversity score of 0.271 within the Port Phillip and Westernport Catchment Management Authority area or the Knox Municipal District;
- 0.455 *specific* biodiversity equivalence units of habitat for Green Leek-orchid located within any area of modelled important habitat for the impacted species anywhere in Victoria; and
- 0.034 *specific* biodiversity equivalence units of habitat for Studley Park Gum located within any area of modelled important habitat for the impacted species anywhere in Victoria.

The assessment of the Police Road reserve identified the road reserve contained approximately 0.852 hectares of native vegetation. The formation of a 15 metre wide road would result in the loss of less than 0.5 hectares of native vegetation.

The Police Road reserve report identifies that a permit would be required to remove native vegetaton under Clause 52.17 and such an application would be assessed under the high risk pathway, given the presence of Location Category C in the road reserve. In addition a specific biodiversity equivalence unit offset for Studley Park Gum may be triggered based on habitat modelling. Alternative offset arrangements will be made with DELWP to satisfy any specific offset requirement once a detailed proposed vegetation removal analysis has been completed.

On balance, it is considered that the proposed inclusion of the subject site within the Urban Growth Boundary and the future development of the land and formation of Police Road will offer an appropriate offset response to the removal of native vegetation and satisfies the requirements of Clause 52.17.

4.4.2 Clause 52.29 – Land Adjacent to a Road Zone, Category 1

The purpose of Clause 52.29 is:

To ensure appropriate access to identified roads.

To ensure appropriate subdivision of land adjacent to identified roads

Permit Triggers

Pursuant to clause 52.29 a permit required to create or alter an access to, or subdivide land adjacent to a Road Zone, Category 1 or land in a public acquisition overlay if the purpose of the overlay is for a Category 1 road. Hutton Road and Springvale Road are both Category 1 Road Zones.

Response to Clause 52.29

A Traffic Engineering Assessment, prepared by Traffix Group and attached as Appendix X, has been prepared for the subject site. The report assumes a development yield of 123 houses and 457 medium density townhouses, which would generate 3,726 vehicle movements per day. The report has been based on the indicative master plan that features three access points: Liberty Ave via a new roundabout or cross-intersection, Fowler Road via a new roundabout cross-intersection and Police Road via a new T-intersection between Churchill Park Drive and Stud Road.

It is noted the report has also taken into account the future residential development No.1325 to 1377 Stud Road in considering the traffic implications of the development of the subject site. For the purposes of the assessment the development potential of these sites were considered to be 91 detached dwellings and 339 townhouses which would generate an expected 2,762 vehicle movements per day.

The report concludes a number of mitigating works are warranted in order to accommodate the traffic generation associated with the development of the subject site for residential purposes, including:

- Signalisation of the Stud Road/Police Road intersection to accommodate the additional traffic generated by the site and the proposed re-routing of traffic along Police Road from Bergins Road;
- Two exit lanes to the Police Road approach;
- Police Road constructed to facilitate a traffic lane in each direction;
- A slip lane to Police Road along the Stud Road (north) approach is not warranted and the deceleration lane represents an improved outcome compared with the Bergins Road intersection which includes a combined left-turn/through lane; and
- No mitigating works are required to the Bergins Road/Stud Road intersection; however, changes to the phase timings of this intersection to re-allocate time from Bergins Road to Stud Road will be required given the reduced traffic volumes along Bergins Road.

The report also outlines a number of mitigating works that are required to accommodate the traffic generation associated with the future development of No.1325 to 1377 Stud Road in addition to those above. These works include:

- Stud Road/Police Road intersection will need to be upgraded from its initial signalised design;
- Police Road approach will need to include three exit lanes. The southern combined left-turn/through lane will need to be lengthened, whilst the northern right-turn lane will need to also be lengthened;
- The right-turn lane from the south approach and the left-turn lane from the north approach on Stud Road will need to be lengthened; and
- No mitigating works will be required to the Bergins Road/Stud Road intersection.

The report concludes that the Stud Road and Bergins Road signalisation intersection will continue to operate under good to excellent conditions post development, and the proposed Stud Road and Police Road signalised intersection will operate under generally good to excellent conditions, with the exception of the east approach to Police Road in the AM peak hour once both precincts are developed.

4.4.3 Clause 57 – Metropolitan Green Wedge Land

Clause 57 applies to land outside an Urban Growth Boundary as shown on a planning scheme map in the scheme. The purpose of Clause 57 is:

To protect metropolitan green wedge land from uses and development that would diminish its agricultural, environmental, cultural heritage, conservation, landscape natural resource or recreation values.

To protect productive agricultural land from incompatible uses and development.

To ensure that the scale of use is compatible with the non-urban character of metropolitan green wedge land.

To encourage the location of urban activities in urban areas.

To provide transitional arrangements for permit applications made to the responsible authority before 19 May 2004.

To provide deeming provisions for metropolitan green wedge land.

Deeming Provisions

Clause 57.01-5 outlines provisions for land located outside an urban growth boundary, and requires that any reference in the planning scheme to a Rural Zone or schedule to a Rural Zone is deemed to be a reference to a Green Wedge Zone or schedule to the Green Wedge Zone.

Response to Clause 57

The Clause 57 provisions are incompatible with the inclusion of the subject site within the Urban Growth Boundary. The proposal to include the subject site within the Urban Growth Boundary would consequently remove the restrictions imposed by Clause 57.

4.5 Clause 65 – General Provisions

Clause 65 provides standard decision guidelines which must be considered before the granting of a permit by Council as follows:

> *The matters set out in Section 60 of the Act*
>
> *The State Planning Policy Framework and the Local Planning Policy Framework, including the Municipal Strategic Statement and local planning policies.*
>
> *The purpose of the zone, overlay or other provisions.*
>
> *Any matter required to be considered in the zone, overlay or other provision.*
>
> *The orderly planning of the area.*
>
> *The effect on the amenity of the area.*
>
> *The proximity of the land to any public land.*
>
> *Factors likely to cause or contribute to land degradation, salinity or reduce water quality.*
>
> *Whether the proposed development is designed to maintain or improve the quality of stormwater within and existing the site.*
>
> *The extent and character of native vegetation is to be or can be protected, planted or allowed to regenerate.*
>
> *The degree of flood, erosion or fire hazard associated with the location of the land and the use, development or management of the land so as to minimise any such hazard.*

Response to the General Provisions

A response to Clause 65 is included in the following **Section 4 – Conclusion**.

4.6 Council Reference Documents

Knox Housing Strategy 2015

The Waverley Golf Course site is identified in the Knox Housing Strategy is identified as a potential location for residential development subject to a successful application to the State Government to review the Urban Growth Boundary in this location. Higher densities are identified as being appropriate adjacent to the SmartBus route on Stud Road.

A number of issues are identified with the site including access, impact on Bergins Road traffic flows, the high voltage transmission lines, interface with Stud Road, sites of biological significance and bushfire risk.

The Housing Strategy also identifies the subject site as potentially able to accommodate 350 dwellings in the form of detached dwellings, dual occupancies and villas units. It is acknowledged this capacity has been informed by discussions with the landowner and a preliminary concept plan.

DRAFT

5.0 Conclusion

This report has outlined the key elements of the PSA for land at 82 Bergins Road, Rowville including inclusion of the site within the Urban Growth Boundary and rezoning of the site from the Special Use Zone to an urban zone.

It has considered all of the relevant decision guidelines, policy objectives and practice notes, and the proposal demonstrates consistency with State, regional and local planning policies including the recently updated Plan Melbourne, the SPPF and LPPF of the Knox Planning Scheme and the Knox Housing Strategy 2015.

The proposal demonstrates the following positive attributes:

- It contributes to the supply of residential land and supports municipal housing objectives within an existing urban area where infrastructure services are available.
- Enables the development of the Police Road link to Stud Road (Road Zone, Category 1) which will alleviate existing wider traffic network issues.
- Will facilitate the orderly planning of the area and will not have any detrimental or material effect on the amenity of the area.
- The proposal would appropriately respond to the features and constraints of the site including the existing and remnant vegetation, landscape values and the features of cultural and historic significance.
- Promotes key urban design principles and provides areas that are safe, functional and contribute to a sense of place and cultural identity.
- Enhances social and community cohesion by contributing to the safety, diversity, choice and quality of living and working environments.
- Does not compromise the environmental or cultural heritage values within the site or the surrounding sensitive interfaces.

For these reasons, the proposed planning scheme amendment is considered to be strategically justified, is consistent with State and Local Planning Policy and warrants support. This report identifies that the site is appropriate for residential purposes, will not create any on-site or off-site amenity impacts, and the PSA is consistent with all relevant requirements of the Knox Planning Scheme.

Accordingly, it is respectively requested that the proposed amendment to the Knox Planning Scheme be formally supported by Council.

DRAFT

Appendix A. Certificate of Titles

DRAFT

DRAFT

Appendix B. Feature Survey Plan

DRAFT

DRAFT

Appendix C. Removal of Native Vegetation Plan

DRAFT

DRAFT

Appendix D. Copy of Plans

DRAFT

DRAFT

Appendix E. Landscape Plan

DRAFT

DRAFT

Appendix F. Traffic Impact Assessment Report

DRAFT

DRAFT

Appendix G. Arboricultural Assessment Report

DRAFT

DRAFT

Appendix H. Melbourne Water Consent

DRAFT

DRAFT

Appendix I. Cultural Heritage Management Plan

DRAFT

Heritage Insight Pty Ltd

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28th July 2016

Our Reference: 1524

Hamish McDonald
Intrapac Property Group
Level 6/ 580 St Kilda Road
Melbourne. Vic. 3004

Dear Hamish

RE. WAVERLY GOLF COURSE CULTURAL HERITAGE MANAGEMENT PLAN

I am writing in response to your query regarding the requirement for a Cultural Heritage Management Plan (CHMP) for the area of land referred to as the Police Road Development Precinct. The precinct is shown in Map 1. It comprises approximately 69ha of land made up of the Waverly Golf Course and surrounding properties. The latter have mainly been used for agriculture.

A mandatory Cultural Heritage Management Plan (CHMP) for any redevelopment of this land is not triggered by the *Aboriginal Heritage Regulations 2007* as the precinct is not within an area of cultural heritage sensitivity defined in Division 3 of the Regulations. However, there is still blanket protection to all Aboriginal cultural heritage afforded by Sections 27 – 28 of the *Aboriginal Heritage Act 2006*. Because of the latter, we have prepared a brief due diligence assessment of the precinct, to determine whether any redevelopment is likely to impact on Aboriginal cultural heritage.

The Police Road Development Precinct is approximately 69ha of land situated in the eastern suburbs of Melbourne, between Bergins Road to the east and Stud Road to the west (see Map 1). The entire golf course is situated on Humevale Siltsone, which is brown fine-grained Devonian siltstone and sandstone (Geovic Interactive Map Accessed 28/7/2016). Soils identified on this landform are shallow grey and yellow grey mottled duplex silty clay or yellow-brown duplex silty clay loam to silty clay averaging 1.20m in depth (Howe, D.F & Van de Graff 1976). The precinct has been partly redeveloped as a golf course (see Map 2). There are no natural water courses in the golf course prior or surrounding properties.

An aerial photograph of the precinct in 1945 (Figure 1) shows that the land was agricultural in nature, most likely used from grazing and cropping, with some regenerated woodland present. All of the woodland in this photo has since been removed. The electricity easement along the western side of the golf course had been constructed, and has since been enlarged.

A soil capability investigation of the Waverly Golf Course by KLM (2012), states that there is less than 0.1m of topsoil on the site, overlying silty clay and shale. The report documents extensive excavation and backfilling across the golf course, including excavation of the original natural soil surface and placement of fill under the transmission easement that crosses the golf course, excavation for the construction of

bunkers, buildings, underground fuel storage tanks and service depots. Excavation has also been carried out to construct several large dams on the golf course. Large quantities of sand were imported into the site to form the golf course. It would appear that the entire original land surface of the golf course was been excavated. As the soils were shallow silty clay, it is likely that the entire A horizon of the soil layer was excavated in this process.

The surrounding land in the precinct has been disturbed by recent building construction, including housing and construction of a car park. However, the balance is still largely agricultural land, used mainly for horse agistment. There are no areas of cultural heritage sensitivity on the balance of the site.

There are no registered Aboriginal Places in the precinct. A search of the site register at Aboriginal Victoria (AV) was carried out on 21/7/2016. There is one registered Aboriginal Place, a surface scatter of stone artefacts, approximately 200m south of the precinct (7922-0097 VAHR). The precinct is situated some 1.4km north of a significant Aboriginal site and place, the Dandenong Police Paddocks, which was the site of an Aboriginal protectorate station, the Native Police Headquarters between 1840-1849 and subsequent police horse stud depot. It was also a significant pre-contact Aboriginal place for traditional Woi wurrung owners, occurring as it did on the boundaries between several Woi wurrung and Boon Wurrung clans. There are also 18 registered Aboriginal places, all surface scatters of stone artefacts, recorded in Churchill National Park to the east of the precinct and on similar landforms. However, although the local region as a whole appears to have been intensively used by Aboriginal traditional owners and was of considerable cultural importance, there is no historical or archaeological evidence that the land within the precinct was of any particular significance. If surface scatters of stone artefacts associated with pre-contact Aboriginal campsites were once present on the golf course, they are highly likely to have been substantially disturbed and any cultural materials displaced by the significant excavation works that have occurred on the golf course in the past. Cultural materials on the surrounding agricultural properties, if present, would also have been disturbed by intensive agricultural land use.

It is the conclusion of the consultant, that the preparation of a Cultural Heritage Management Plan (CHMP) is not required for the Police Road Development Precinct. This is because:

- The preparation of a mandatory CHMP is not required by the *Aboriginal Heritage Regulations 2007*;
- The report by KLM demonstrates that the Waverly Golf Course site has undergone significant levels of excavation in the past, which is likely to have disturbed or destroyed any Aboriginal Places.
- The balance of the precinct has been subject to extensive land disturbance, including agricultural land use and building construction. A large sub-station has been constructed at the southern end of the precinct, but this is outside the study area.
- Therefore, there is no risk that redevelopment of the site will place the proponent in breach of Sections 27-28 of the Aboriginal Heritage Act 2006, which provide blanket protection for all Aboriginal sites in Victoria.

Although a CHMP and any further investigation for Aboriginal Cultural Heritage is not required, the information below is offered as general advice to the proponent, in the unlikely event that suspected archaeological sites are found during the works within the study are.

(1) If any suspected Aboriginal cultural material is located during works within the study area, the following steps must be carried out;

- All works within 25m of the relevant discovery area must cease immediately and if necessary protective fencing erected around the relevant area;
- The person making the discovery must immediately notify Parks Victoria and either AV or a Cultural Heritage Advisor;

- The cultural heritage advisor, if contacted, should also notify the three traditional owner groups of the discovery. These are the Boon Wurrung Foundation Ltd, The Bunurong Land and Sea Association and the Bunurong Land Council.
- While works are suspended the nominated project delegates and the Cultural Heritage Advisor must evaluate the Aboriginal cultural heritage.
- An appropriately qualified Cultural Heritage Advisor must be engaged to record the findings and advise on possible management strategies.
- If the remains are identified as Aboriginal cultural materials, all works near the site where they were found must cease until the materials have been adequately documented and OAAV has issued a statutory approval to proceed with the works.

(2) If any suspected human remains are found during the activity, all works must cease immediately. The Victoria Police and the State Coroner's Office must be notified immediately. If there are reasonable grounds to believe that the remains are Aboriginal, the State Control Centre (coordinator of the State Government's response to emergency matters) must be contacted immediately on (03) 9032 3600.

(3) The site manager or relevant site supervisor must be made aware of conditions one to two above and should be responsible for the reporting requirements of these conditions.

In addition to the above information regarding Aboriginal Heritage, this assessment also verifies that there are no Heritage Places listed on the site, including sites on the National Heritage List, the Victorian Heritage Register and Inventory, the Register of the National Estate and the City of Knox Heritage Overlay.

I certify that the information contained in this report is correct to the best of my knowledge.

Regards

David Rhodes
Director
Heritage Insight Pty ltd

References

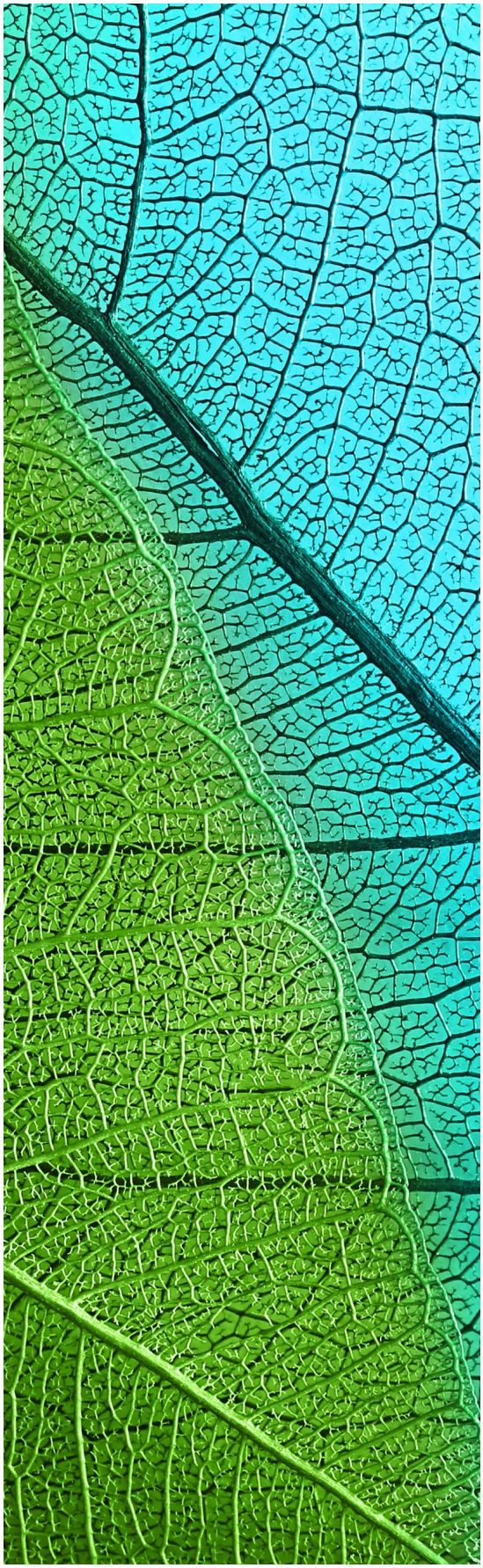
Howe, D.F. and Van de Graff, R 1976 *Upper Yarra Valley and Dandenong Ranges Land Management and Stream Environments Study.* Melbourne, Soil Conservation Authority.

KLM 2012 *Desktop Salinity and Soil Capability Investigation, Waverly Golf Course*. Report to Tract Consulting.

Map 1: Location of the Police Road Development Precinct

Map 2: Waverly Golf Course, existing conditions

Figure 1: 1945 aerial photograph showing the general area containing the Waverly Golf Course



Waverley Golf Course and Police Road, Rowville

Native Vegetation Assessment

Prepared for Intrapac Property Pty Ltd

September 2020
Report No. 16024 (3.1)

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1. Executive summary

Nature Advisory Pty Ltd undertook a native vegetation assessment of a 50-hectare area of private land in Rowville proposed for subdivision and residential development, and the adjacent 2.3-hectare area of road reserve along Police Road proposed for a road upgrade.

This report presents the information relevant to native vegetation on the properties to accompany a planning permit application under Clause 52.17 of the Knox and Casey Planning Schemes, in accordance with the *Guidelines for the removal, destruction or lopping of native vegetation* (DELWP 2017a), herein referred to as 'the Guidelines'.

The following native vegetation was recorded in the study area:

- 56 patches of native vegetation, totalling 4.05 hectares (including five large trees in patches); and
- 49 scattered trees (namely 34 large scattered trees and 15 small scattered trees).

The proponent proposes to remove the following vegetation:

- 2.05 hectares of native vegetation in patches (including three large trees in patches); and
- 30 scattered trees (including 25 large scattered trees and five small scattered trees).

The application site lies within Location 3. As such, the proposal will be assessed under the **Detailed** assessment pathway. This triggers a referral of the permit application to DELWP.

The *Native Vegetation Removal* (NVR) report for this proposed removal is provided in the appendices. The tables below summarise the compliance of the information in this report with the relevant application requirements of the Guidelines (DELWP 2017a).

The offset target for the current proposal will be achieved via a third-party offset. An online search of the *Native Vegetation Credit Register* (NVCR) has shown that the required offset is currently available for purchase from a native vegetation credit owner (DELWP 2020e). Evidence that the required offset is available is provided in Appendix 9. The required offset would be secured following approval of the application to remove native vegetation.

Application requirement		Response
1.	Information about the native vegetation to be removed.	See Appendix 8 – Native Vegetation Removal Report from DELWP.
2.	Topographic and land information relating to the native vegetation to be removed.	See Section 4.1.
3.	Recent, dated photographs of the native vegetation to be removed.	See Appendix 6.
4.	Details of any other native vegetation approved to be removed, or that was removed without the required approvals, on the same property or on contiguous land in the same ownership as the applicant, in the five-year period before the application for a permit is lodged.	N/A
5.	An avoid and minimise statement.	See Section 4.3.1.

	Application requirement	Response
6.	A copy of any Property Vegetation Plan contained within an agreement made pursuant to section 69 of the *Conservation, Forests and Lands Act 1987* that applies to the native vegetation to be removed.	N/A
7.	Where the removal of native vegetation is to create defendable space, a written statement explaining why the removal of native vegetation is necessary. This statement is not required when the creation of defendable space is in conjunction with an application under the Bushfire Management Overlay.	N/A
8.	If the application is under Clause 52.16, a statement that explains how the proposal responds to the Native Vegetation Precinct Plan considerations (at decision guideline 8).	N/A
9.	An offset statement providing evidence that an offset that meets the offset requirements for the native vegetation to be removed has been identified and can be secured in accordance with the Guidelines.	See Section 4.3.3 and Appendix 9.

Additional requirements for applications in the Detailed assessment pathway		
	Application requirement	Response
10.	A site assessment report of the native vegetation to be removed, including: ▪ A habitat hectare assessment of any patches of native vegetation, including the condition, extent (in hectares), Ecological Vegetation Class and bioregional conservation status. ▪ The location, number, circumference (in centimetres measured at 1.3 metres above ground level) and species of any large trees within patches. ▪ The location, number, circumference (in centimetres measured at 1.3 metres above ground level) and species of any scattered trees, and whether each tree is small or large.	See Section 4.2 and Appendices 2, 3 and 8.

Additional requirements for applications in the Detailed assessment pathway		
	Application requirement	Response
11.	Information about impacts on rare or threatened species habitat, including: The relevant section of the Habitat importance map for each rare or threatened species requiring a species offset. For each rare or threatened species that the native vegetation to be removed is habitat for, according to the Habitat importance maps: ▪ The species' conservation status ▪ The proportional impact of the removal of native vegetation on the total habitat for that species ▪ Whether their habitats are highly localised habitats, dispersed habitats, or important areas of habitat within a dispersed species habitat.	See Section 4.2.2 and Appendix 5.

2. Introduction

Intrapac Property Pty Ltd engaged Nature Advisory Pty Ltd to conduct a native vegetation assessment of a 50-hectare area of private land (Waverley Golf Course) in Rowville proposed for subdivision and residential development, and the adjacent 2.3-hectare area of road reserve along Police Road proposed for a road upgrade.

This investigation was commissioned to provide information on the extent and condition of native vegetation in the study area according to Victoria's *Guidelines for the removal, destruction or lopping of native vegetation* (DELWP 2017a), herein referred to as 'the Guidelines'. Potential impacts on flora and fauna matters listed under the Victorian *Flora and Fauna Guarantee Act 1988* (FFG Act) and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) have been considered as part of a review of existing information and field investigation.

This report updates BL&A Reports 16024 (1.1) and 16024 (2.1) to bring the contained information in line with the 2017 gazetted changes to Victoria's native vegetation removal regulations.

Specifically, the scope of the investigation included:

- A review of existing information on the flora and native vegetation of the study area and surrounds including:
  - Victorian Biodiversity Atlas administered by the Department of Environment, Land, Water and Planning (DELWP);
  - The Commonwealth EPBC Act Protected Matters Search Tool;
  - Victorian Department of Environment Land Water and Planning (DELWP) Native Vegetation Information Management (NVIM) system;
  - Previous reporting (EHP 2012); and
  - *Sites of Biological Significance in Knox, Vol.2 - Site 77: Waverley Golf Club, Rowville* (Lorimer 2010).
- Site surveys involving:
  - Characterisation and mapping of native vegetation on the site, as defined in the 'Guidelines';
  - Assessment of native vegetation in accordance with the Guidelines, including habitat hectare assessment, and large and scattered tree assessment;
  - Compilation of a flora species list for the site; and
  - Assessment of the nature and quality of fauna habitat on the site.

This report is divided into the following sections:

Section 3 describes the methods used for the assessment, definitions and the legislative background.

Section 4 presents the assessment results, proposed native vegetation removal and implications under the Guidelines.

This investigation was undertaken by a team from Nature Advisory comprising Elinor Ebsworth (Senior Ecologist), Verity Fyfe (Senior Botanist), Emily Baldwin (Botanist), Ned May (Senior GIS Analyst), Emma Loboda (GIS Analyst), Mal Wright (Senior Ecologist & Project Manager), Chris Dunk (Senior Ecologist & Project Manager) and Brett Lane (Principal Consultant).

3. Definitions, methods and assessment process

3.1. Definitions

3.1.1. Study area

The study area for this investigation is defined as the 50-hectare area of private land located at Bergins Road, Rowville, 25 kilometres south-east of Melbourne (Waverley Golf Course), and the adjacent 2.3-hectare area of road reserve along Police Road. The study area is bordered by Bergins Road to the north, Churchill Park Drive to the east, the Dandenong Police Paddocks Reserve to the south and Stud Road to the west.

3.1.2. Native vegetation

Native vegetation is currently defined in Clause 73.01 of all Victorian planning schemes as 'plants that are indigenous to Victoria, including trees, shrubs, herbs and grasses'. The Guidelines (DELWP 2017a) further classify native vegetation as belonging to two categories:

- Patch; or
- Scattered tree.

The definitions of these categories are provided below, along with the prescribed DELWP methods to assess them. Further details on definitions of patches and scattered trees are provided in Appendix 1.

Patch

A patch of native vegetation is either:

- An area of vegetation where at least 25 per cent of the total perennial understorey plant cover is native; or
- Any area with three or more native canopy trees[1] where the drip line[2] of each tree touches the drip line of at least one other tree, forming a continuous canopy; or
- Any mapped wetland included in the *Current wetlands map*, available at *MapShareVic* (DELWP 2020b).

Patch condition is assessed using the habitat hectare method (Parkes *et al.* 2003; DSE 2004b) whereby components of the patch (e.g. tree canopy, understorey and ground cover) are assessed against an EVC benchmark. The score effectively measures the percentage resemblance of the vegetation to its original condition.

The *Native Vegetation Information Management* (NVIM) system (DELWP 2020c) provides modelled condition scores for native vegetation to be used in certain circumstances.

Scattered tree

A scattered tree is:

- A native canopy tree that does not form part of a patch.

[1] A native canopy tree is a mature tree (i.e. it is able to flower) that is greater than 3 metres in height and is normally found in the upper layer of the relevant vegetation type.
[2] The drip line is the outermost boundary of a tree canopy (leaves and/or branches) where the water drips on to the ground.

Scattered trees are counted and mapped, the species identified and their circumference at 1.3 metres above the ground is recorded.

3.2. Field methods

Field assessments were conducted on the 15th April 2015, 7th October 2015, 15th April 2016, 6th May 2016 and 28th July 2020. During these assessments, the study area was surveyed on foot.

Sites in the study area found to support native vegetation or with potential to support listed matters were mapped through a combination of aerial photograph interpretation and ground-truthing using a hand-held GPS (accurate to approximately five metres). Particular attention was paid to the nature and extent of planted vegetation within the golf course to ensure accurate mapping of native vegetation (see planted vegetation exemption in section 3.3.1 below).

Information on large trees in patches was obtained from an arbourists assessment of the golf course undertaken in 2016 and inspection of the vegetation along Police Road on 28th July 2020.

While these assessments were not designed to provide an exhaustive inventory of flora species in the study area, all efforts were made to schedule the site assessments at a time of year when the majority of native vegetation life forms were likely to be present. The seasonal timing of the surveys and condition of vegetation was considered suitable to ascertain the extent and condition of native vegetation.

3.3. Planning permit and application requirements

State planning provisions are established under the *Victorian Planning and Environment Act 1987*. Clause 52.17 of all Victorian Planning Schemes states that:

A permit is required to remove, destroy or lop native vegetation, including dead native vegetation.

A permit is not required if:

- If an exemption in Table 52.17-7 specifically states that that a permit is not required.
- If a native vegetation precinct plan corresponding to the land is incorporated into the planning scheme and listed in the schedule to Clause 52.16.
- If the native vegetation is specified in a schedule to Clause 52.17.

3.3.1. Exemptions

Exemptions listed in Table 52.17-7 relevant to the study area include:

- *Dead native vegetation:* Native vegetation that is dead is exempt and does not require a planning permit for removal. This does not apply to a standing dead tree with a trunk diameter of 40 centimetres or more at a height of 1.3 metres above ground level. As such, any dead trees with a diameter of 40 centimetres or more at this height have been included in the tree data collected for this investigation.
- *Planted vegetation:* Native vegetation that is to be removed, destroyed or lopped that was either planted or grown as a result of direct seeding. This exemption does not apply to native vegetation planted or managed with public funding for the purpose of land protection or enhancing biodiversity.
- *Regrowth:* Native vegetation that is to be removed, destroyed or lopped that has naturally established or regenerated on land lawfully cleared of naturally established native vegetation, and is:
    - Less than 10 years old; or
    - Austral Bracken (*Pteridium esculentum*); or

- Within the boundary of a timber production plantation, as indicated on a Plantation Development Notice or other documented record, and has established after the plantation; or
- Less than ten years old at the time of a property vegetation plan being signed by the Secretary to the Department of Environment, Land, Water and Planning (as constituted under Part 2 of the *Conservation, Forests and Lands Act 1987*), and is shown on that plan as being 'certified regrowth'; and on land that is to be used or maintained for cultivation or pasture during the term of that plan.

This exemption does not apply to land where native vegetation has been destroyed or otherwise damaged as a result of flood, fire or other natural disaster.

3.3.2. Application requirements

Any application to remove, destroy or lop native vegetation must comply with the application requirements specified in the Guidelines (DELWP 2017a).

When assessing an application, Responsible Authorities are also obligated to refer to Clause 12.01-2 (Native vegetation management) in the Planning Scheme which in addition to the Guidelines, refers to the following:

- *Assessor's handbook – applications to remove, destroy or lop native vegetation* (DELWP 2018a).
- Statewide biodiversity information maintained by DELWP.

The application of the Guidelines (DELWP 2017a) are explained further in Appendix 1.

3.3.3. Referral to DELWP

Clause 66.02-2 of the Planning Scheme determines the role of DELWP in the assessment of native vegetation removal permit applications. If an application is referred, DELWP may make certain recommendations to the responsible authority in relation to the permit application.

Any application to remove, destroy or lop native vegetation must be referred to DELWP if:

- The impacts to native vegetation are in the *Detailed* assessment pathway;
- A property vegetation plan applies to the site; or
- The native vegetation is on Crown land which is occupied or managed by the responsible authority.

4. Existing information and results

4.1. Site description, zoning and overlays

The study area for this investigation (Figure 1) was approximately 50 hectares of private land (Waverley Golf Course) located at Bergins Road, Rowville, 25 kilometres south-east of Melbourne, and the adjacent 2.3 hectares of road reserve along Police Road. The study area is bordered by Bergins Road to the north, Churchill Park Drive to the east, the Dandenong Police Paddocks Reserve to the south and Stud Road to the west.

The study area supported well-drained sedimentary soils on an undulating landscape. Most of the study area was highly modified and landscaped, reflecting its current use as a golf course, with four artificial water bodies present. The southern portion of the study area is adjacent to Dandenong Police Paddocks Reserve and is in close proximity to Churchill National Park. Dandenong Creek is located approximately one kilometre west of the study area.

Vegetation in the study area was dominated by manicured introduced grasses, with several small patches of native shrubs, grasses and stands of trees. Belts of trees occurred throughout the study area and included exotic, non-indigenous native and remnant indigenous trees. Patches of native vegetation within the study area were characteristic of Valley Heathy Forest (EVC 127) and Swampy Woodland (EVC 937). Typical exotic weed species included Kikuyu, Canary-grass, Cocksfoot, Panic Veldt-grass, Sweet Vernal-grass, Caterpillar Grass, Sweet Pittosporum, Blackberry, Gorse and Cat's Ear.

The study area lies within the Gippsland Plain bioregion and falls within the Port Phillip and Westernport catchment. The 50-hectare area of private land and the northern and western portions of the Police Road road reserve lie within the Knox local government area, while the south-eastern portion of the road reserve lies within the Casey local government area.

The majority of the study area, including the north-eastern portion of the road reserve, is zoned Special Use Zone – Schedule 1. However, part of the area of private land is zoned Special Use Zone – Schedule 3. The western portion of the road reserve within the Knox local government area is zoned Green Wedge Zone – Schedule 2 and the south-eastern portion within the Casey local government area is zoned Road Zone Category 2.

The study area is subject to several overlays in the Knox and Casey Planning Schemes:

- *Environmental Significance Overlay - Schedule 2 (ESO2)* – covering the area of private land and the eastern section of the Police Road road reserve within the Knox local government area. This overlay relates to the protection of sites of biological significance including native vegetation and fauna habitat. Under ESO2, a permit is required to remove vegetation indigenous to Knox.
- *Bushfire Management Overlay (BMO)* – covering the south-eastern portion of the study area. The purpose of this overlay is to ensure that development is only permitted where the risk to life and property from bushfire can be reduced to an acceptable level.

4.2. Native vegetation

4.2.1. Species recorded

During the field assessments 106 plant species were recorded. Of these, 64 (61%) were indigenous and 41 (39%) were introduced or non-indigenous native in origin (Appendix 4).

4.2.2. Listed species

VBA records (DELWP 2020d) and the EPBC Protected Matters Search Tool (DAWE 2020a) indicated that within the search region there were records of, or there occurred potential suitable habitat for, 10 species

listed under the Commonwealth EPBC Act and 10 species listed under the state *Flora and Fauna Guarantee Act 1988* (FFG Act), including seven listed under both Acts. No flora species listed under the EPBC Act were recorded during the field survey.

The likelihood of occurrence in the study area of species listed under the EPBC Act and FFG Act is addressed in Appendix 5. Species considered 'likely to occur' are those that have a very high chance of being in the study area based on numerous records in the search region and suitable habitat in the study area. Species considered to have the 'potential to occur' are those where suitable habitat exists, but recent records are scarce.

This analysis indicates that none of these threatened flora species are likely to occur within the study area.

A targeted survey for Studley Park Gum undertaken by a senior ecologist from Brett Lane and Associates Pty Ltd on 14th December 2016 did not record the species.

4.2.3. Patches of native vegetation

Pre–European EVC mapping (DELWP 2020a) indicated that the study area and surrounds would have supported Valley Heathy Forest (EVC 127) and Swampy Woodland (EVC 937) prior to European settlement based on modelling of factors including rainfall, aspect, soils and remaining vegetation.

Evidence on site including floristic composition and soil characteristics suggested that Valley Heathy Forest (EVC 127) and Swampy Woodland (EVC 937) were present within the study area (Figure 1). A description of these EVCs are provided within the EVC benchmarks in Appendix 7.

56 patches (referred to herein as habitat zones) comprising the abovementioned EVCs, were identified in the study area (Table 1). This totalled an area of 4.05 hectares of native vegetation in patches and included five large trees.

Table 1: Description of habitat zones in the study area

Habitat Zone	EVC	Description
A, AA, J, K, L, M	Valley Heathy Forest (EVC 127)	Highly modified patch of Valley Heathy Forest lacking a canopy. Dominated by Burgan (*Kunzea ericoides*) over a ground layer of native graminoids, including Weeping Grass (*Microlaena stipoides*) and wallaby grass (*Rytidosperma* spp.) Low (15%) weed cover, including the high threat weeds Sweet Pittosporum (*Pittosporum undulatum*), Blackberry (*Rubus fruticosus* spp. agg.), Cape Ivy (*Delairea odorata*) and Common Dipogon (*Dipogon lignosus*). High (80%) litter cover. Logs absent.
AB, N, P, Q, R, S, T, U, V, X, Y	Valley Heathy Forest (EVC 127)	Highly modified patch of Valley Heathy Forest lacking a canopy. Dominated by Black Wattle (*Acacia mearnsii*), Hedge Wattle (*A. paradoxa*), Common Cassinia (*Cassinia aculeata*) and Manuka (*Leptospermum scoparium*) over an exotic ground layer of Toowoomba Canary-grass (*Phalaris aquatica*) and Paspalum (*Paspalum dilatatum*). High (60%) weed cover, including the high threat weeds Gorse (*Ulex europaeus*) and Blackberry. Moderate (40%) litter cover. Logs absent.

Habitat Zone	EVC	Description
B	Swampy Woodland (EVC 937)	Remnant patch of Swampy Woodland with a canopy of Swamp Gum (*Eucalyptus ovata*) and Narrow-leaf Peppermint (*E. radiata*) in moderate health over Drooping She-oak (*Allocasuarina littoralis*), Black Wattle, Hedge Wattle, Common Cassinia and Burgan. Ground layer dominated by Sweet Vernal-grass (*Anthoxanthum odoratum*) with scattered indigenous Veined Spear-grass (*Austrostipa rudis*). Moderate (30%) weed cover including the high-threat species Flax-leaf Broom (*Genista linifolia*), Gorse, Sweet Pittosporum and Blackberry. High (80%) litter cover. Logs absent.
BA	Valley Heathy Forest (EVC 127)	Canopy of Swamp Gum, Mealy Stringybark (*Eucalyptus cephalocarpa*) and Narrow-leaf Peppermint in good health with one large old tree in good health. Diverse shrub layer including Drooping Sheoak, Cherry Ballart (*Exocarpos cupressiformis*), Black Wattle, Blackwood (*Acacia melanoxylon*) and Burgan with a ground layer of wallaby grass and scattered herbs. High (55%) weed cover including the high-threat weeds Gorse and Sweet Pittosporum. Logs absent.
BB	Valley Heathy Forest (EVC 127)	Canopy of Swamp Gum and Narrow-leaf Peppermint in good health. Shrub layer absent with a ground layer of wallaby grass and scattered herbs. High (55%) weed cover with no high-threat weeds. Logs absent.
BC	Valley Heathy Forest (EVC 127)	Canopy of Swamp Gum and Narrow-leaf Peppermint in good health. Shrub layer absent with a ground layer of wallaby grass and scattered herbs. Moderate (35%) weed cover with no high-threat weeds. Logs absent.
BD	Valley Heathy Forest (EVC 127)	Canopy of Swamp Gum and Narrow-leaf Peppermint in moderate health. Shrub layer absent with a ground layer of wallaby grass. High (65%) weed cover with no high-threat weeds. Logs absent.
BE	Valley Heathy Forest (EVC 127)	Canopy absent with immature Mealy Stringybark in the understorey. Shrub layer absent with a ground layer of wallaby grass and scattered herbs. High (65%) weed cover with no high-threat weeds. Logs absent.
BF	Valley Heathy Forest (EVC 127)	Canopy of Narrow-leaf Peppermint in good health. Shrub layer absent with a ground layer of wallaby grass and scattered herbs. High (70%) weed cover with no high-threat weeds. Logs absent.
BG	Valley Heathy Forest (EVC 127)	Canopy of Mealy Stringybark and Narrow-leaf Peppermint in good health with no large old trees. Cherry Ballart in the understorey tree/shrub layer with a ground layer of wallaby grass, Weeping Grass and scattered herbs. Moderate (35%) weed cover including the high-threat weed Sweet Pittosporum. Logs absent.

Habitat Zone	EVC	Description
BH	Valley Heathy Forest (EVC 127)	Canopy of Swamp Gum, Mealy Stringybark and Narrow-leaf Peppermint in moderate health with one large old tree in good health. Diverse shrub layer including Cherry Ballart, Lightwood (*Acacia implexa*), Hedge Wattle and Burgan with a ground layer of wallaby grass, Weeping Grass and scattered Tasman Flax-lily (*Dianella tasmanica*), Spiny-headed Mat-rush (*Lomandra longifolia*) and herbs. Moderate (40%) weed cover with no high-threat weeds. Logs absent.
BJ & BN	Valley Heathy Forest (EVC 127)	Canopy of Swamp Gum, Mealy Stringybark and Narrow-leaf Peppermint in good health. Drooping Sheoak in the shrub layer with a ground layer of wallaby grass and scattered herbs. Moderate (45%) weed cover with no high-threat weeds. Logs absent.
BK	Valley Heathy Forest (EVC 127)	Canopy of Bundy (*Eucalyptus goniocalyx*) and Narrow-leaf Peppermint in moderate health. Shrub layer and indigenous ground layer absent. High (70%) weed cover with no high-threat weeds. Logs absent.
BL & BM	Valley Heathy Forest (EVC 127)	Canopy of Swamp Gum, Mealy Stringybark and Narrow-leaf Peppermint in good health. Diverse shrub layer including Drooping Sheoak, Cherry Ballart, Black Wattle, Blackwood and Burgan with a ground layer of wallaby grass and scattered herbs. High (55%) weed cover including the high-threat weeds Gorse and Sweet Pittosporum. Logs absent.
BO & BP	Valley Heathy Forest (EVC 127)	Canopy of Narrow-leaf Peppermint and Mealy Stringybark in good health over scattered Blackwood. Ground layer dominated by exotic graminoids including Sweet Vernal-grass and Panic Veldt-grass (*Ehrharta erecta)* with scattered wallaby grass and Kidney-weed (*Dichondra repens*). Moderate (45%) weed cover with no high-threat weeds. Low (25%) litter cover. Logs absent
C	Valley Heathy Forest (EVC 127)	Remnant patch of Valley Heathy Forest lacking canopy sized eucalypts but dominated by Red Stringybark (*Eucalyptus macrorhyncha*), Mealy Stringybark, Swamp Gum and Narrow-leaf Peppermint over Cherry Ballart, Drooping She-oak and Black Wattle. Ground layer co-dominated by wallaby grass and the exotic Sweet Vernal-grass, with Wood-sorrel (*Oxalis* spp.) and Kidney-weed. Moderate (30%) weed cover including the high-threat species Gorse and Sweet Pittosporum. Moderate (60%) litter cover and a small number of small logs.
CC & CD	Valley Heathy Forest (EVC 127)	Highly modified patch of Valley Heathy Forest lacking a canopy. Dominated by Burgan over a ground layer dominated by Kikuyu (*Cenchrus clandestinus*). High (60%) weed cover, including the high threat weed Blackberry. High (70%) litter cover. Logs absent.

Habitat Zone	EVC	Description
CE & CF	Valley Heathy Forest (EVC 127)	Remnant patch of Valley Heathy Forest with a canopy of Bundy in good health over Burgan, Lightwood, Large Kangaroo Apple (*Solanum laciniatum*) and Black Wattle. Ground Layer dominated by exotic species including Kikuyu, Couch (*Cynodon dactylon*) and Panic Veldt-grass. Moderate (30%) weed cover, including the high-threat species Gorse, Sweet Pittosporum and Blackberry. Moderate (55%) litter cover. Logs absent.
CG	Valley Heathy Forest (EVC 127)	Remnant patch of Valley Heathy Forest with a canopy in good health of Bundy and Narrow-leaf Peppermint in good health over Cherry Ballart. Ground layer dominated by exotic graminoids including Couch and Sweet Vernal-grass. High (75%) weed cover including the high-threat species Gorse. High (65%) litter cover. Logs absent.
CH	Valley Heathy Forest (EVC 127)	Remnant patch of Valley Heathy Forest with a canopy of Bundy, Mealy Stringybark and Narrow-leaf Peppermint in good health over Drooping She-oak. Ground layer co-dominated by bryophytes, soil crusts and exotic graminoids. Moderate (30%) weed cover with no high-threat weeds. Low (15%) litter cover. Logs absent.
D	Valley Heathy Forest (EVC 127)	Highly modified patch of Valley Heathy Forest lacking a canopy. Dominated by Drooping She-oak over a ground layer dominated by Sweet Vernal-grass with scattered indigenous Tasman Flax-lily. Low (15%) weed cover, including the high threat weeds Sweet Pittosporum and Blackberry. High (90%) litter cover. Logs absent.
E	Valley Heathy Forest (EVC 127)	Remnant patch of Valley Heathy Forest lacking canopy sized eucalypts but with a single Mealy Stringybark over Burgan, Black Wattle, Lightwood, Blackwood and Large Kangaroo Apple. Ground layer dominated by Sweet Vernal-grass with scattered indigenous wallaby grass and Kidney-weed. Moderate (35%) weed cover including the high-threat species Blackberry and Sweet Pittosporum. Moderate (60%) litter cover. Logs absent.
F	Valley Heathy Forest (EVC 127)	Remnant patch of Valley Heathy Forest with a canopy of Bundy and Narrow-leaf Peppermint in good health over a diverse shrub-layer including Drooping She-oak, Black Wattle, Lightwood, Blackwood, Common Cassinia and Burgan. Ground layer co-dominated by Sweet Vernal-grass and indigenous graminoids including Spiny-headed Mat-rush, Common Wallaby-grass (*Rytidosperma caespitosum*), Common Tussock-grass (*Poa labillardierei*), Veined Spear-grass and Weeping Grass. Moderate (30%) weed cover including the high-threat species Gorse and Sweet Pittosporum. High (70%) litter cover and a high cover of small logs.
G	Valley Heathy Forest (EVC 127)	Remnant patch of Valley Heathy Forest with a canopy of Mealy Stringybark and Swamp Gum in moderate health over Black Wattle. Ground layer dominated by indigenous graminoids including Wattle Mat-rush (*Lomandra filiformis*), Spiny-headed Mat-rush, Common Wallaby-grass, Veined Spear-grass and Weeping Grass. Moderate (40%) weed cover including the high-threat species Gorse and Blackberry. High (60%) litter cover. Logs absent.

Habitat Zone	EVC	Description
H	Valley Heathy Forest (EVC 127)	Remnant patch of Valley Heathy Forest lacking canopy sized eucalypts but dominated by Swamp Gum and Yellow Box (*Eucalyptus melliodora*) over a tree layer of Cherry Ballart, Sweet Bursaria (*Bursaria spinosa*) and Black Wattle and shrub layer of Hedge Wattle, Burgan and Manuka (*Leptospermum scoparium*). Ground layer dominated by indigenous graminoids including Kangaroo Grass (*Themeda triandra*), Veined Spear-grass, Black-anther Flax-lily (*Dianella revoluta*), wallaby grass, Variable Sword-sedge (*Lepidosperma laterale*) and Weeping Grass, with scattered Kidney-weed. Low (15%) weed cover including the high-threat species Blackberry and Sweet Pittosporum. Moderate (50%) litter cover. Logs absent.
I	Swampy Woodland (EVC 937)	Highly modified patch of Swampy Woodland lacking a canopy on the edge of an artificial waterbody. Dominated by indigenous herbs and graminoids including Slender Knotweed (*Persicaria decipiens*), Variable Willow-herb (*Epilobium billardierianum*), Hairy Pennywort (*Hydrocotyle hirta*), Centella (*Centella cordifolia*), Swamp Goodenia (*Goodenia humilis*), Cotton Fireweed (*Senecio quadridentatus*), Green Rush (*Juncus gregiflorus*), Broom Rush (*Juncus sarophorus*), Common Blown-grass (*Lachnagrostis filiformis*), Swamp Club-sedge (*Isolepis inundata*) and Common Tussock-grass. 10% cover of shrubs including Blackwood, Lightwood and Manuka. Moderate (35%) cover of weeds, including the high threat weeds Gorse and Blackberry. Low (10%) litter cover. Logs absent.
O	Valley Heathy Forest (EVC 127)	Remnant patch of Valley Heathy Forest lacking canopy sized eucalypts but dominated by Swamp Gum and Mealy Stringybark over Burgan, Blackwood and Common Cassinia. Ground layer dominated by Sweet Vernal-grass, with scattered indigenous Hairy Pennywort. Moderate (40%) weed cover including the high-threat species Gorse, Flax-leaf Broom and Sweet Pittosporum. High (65%) litter cover and high cover of small logs.
W & Z	Swampy Woodland (EVC 937)	Highly modified patch of Swampy Woodland lacking a canopy and shrub layer on the edge of an artificial waterbody. Dominated by indigenous graminoids including River Club-sedge (*Schoenoplectus tabernaemontani*), Tall Spike-sedge (*Eleocharis sphacelata*) and Green Rush with scattered indigenous herbs including Slender Knotweed and Variable Willow-herb. Low (5%) cover of weeds, dominated by the high threat weed Blackberry. Moderate (60%) litter cover. Logs absent.
GA	Swampy Woodland (EVC 937)	Dominated by dense thickets of recruiting Tea-tree. A single immature Swamp Gum canopy tree and Black Wattle tree were present. Understorey species aside from Tea-tree included Black-anther Flax-lily, Spiny-headed Mat-rush, Thatch Saw-sedge and Weeping Grass. Weed cover was 20%, <50% were considered to be of high threat. Dominant weeds included Kikuyu, Panic Veldt-grass, Blackberry and Cat's Ear. Logs absent.

Habitat Zone	EVC	Description
GB, GE, GF & GG	Valley Heathy Forest (EVC 127)	Indigenous overstorey species were mostly represented by Yellow Box and Narrow-leaved Peppermint. Long-leaved Box and Silver-leaved Stringybark were also present. Other common tree species included Blackwood, Black Wattle and Cherry Ballart. Indigenous understorey diversity was moderate to high. Common understorey species included Hedge Wattle, Tea-tree, Spiny-headed Mat-rush, Thatch Saw-sedge, Weeping Grass, Wallaby-grass and Kidney Weed. A high level of woody species recruitment was observed. Weed cover varied throughout. Dominant weeds included Kikuyu, Caterpillar Grass, Panic Veldt-grass, Sweet Vernal-grass, Large Quaking-grass, Sweet Pittosporum, Blackberry, Agapanthus and Gorse. Logs were moderately represented. In some cases the narrow access track represented narrow breaks between these habitat zones.
GC & GD	Valley Heathy Forest (EVC 127)	Dominated by Blackwood, including recruits. The only indigenous understorey species present was Weeping Grass. Weed cover was 20%, 50% were considered to be of high threat. Dominant weeds included Sweet Vernal-grass, Cat's Ear, Caterpillar Grass and Cat's Ear. Logs were absent.

The habitat hectare assessment results for these habitat zones are provided in Table 2. More detailed habitat scoring results are presented in Appendix 2. Details of large trees in patches are provided in Appendix 3.

Table 2: Summary of habitat hectare assessment results

Habitat Zone	EVC	Area (ha)	Condition score (out of 100)	No. of Large Trees in HZ
A	Valley Heathy Forest (EVC 127)	0.081	27	
AA	Valley Heathy Forest (EVC 127)	0.007	27	
AB	Valley Heathy Forest (EVC 127)	0.011	23	
B	Swampy Woodland (EVC 937)	0.220	25	
BA	Valley Heathy Forest (EVC 127)	0.056	32	
BB	Valley Heathy Forest (EVC 127)	0.106	27	
BC	Valley Heathy Forest (EVC 127)	0.160	30	
BD	Valley Heathy Forest (EVC 127)	0.060	28	1
BE	Valley Heathy Forest (EVC 127)	0.059	22	
BF	Valley Heathy Forest (EVC 127)	0.037	27	

Habitat Zone	EVC	Area (ha)	Condition score (out of 100)	No. of Large Trees in HZ
BG	Valley Heathy Forest (EVC 127)	0.138	34	
BH	Valley Heathy Forest (EVC 127)	0.332	35	
BJ	Valley Heathy Forest (EVC 127)	0.232	30	
BK	Valley Heathy Forest (EVC 127)	0.048	26	1
BL	Valley Heathy Forest (EVC 127)	0.034	24	
BM	Valley Heathy Forest (EVC 127)	0.033	24	
BN	Valley Heathy Forest (EVC 127)	0.128	30	
BO	Valley Heathy Forest (EVC 127)	0.035	32	
BP	Valley Heathy Forest (EVC 127)	0.013	32	
C	Valley Heathy Forest (EVC 127)	0.104	28	
CC	Valley Heathy Forest (EVC 127)	0.010	18	
CD	Valley Heathy Forest (EVC 127)	0.011	18	
CE	Valley Heathy Forest (EVC 127)	0.063	25	
CF	Valley Heathy Forest (EVC 127)	0.015	25	
CG	Valley Heathy Forest (EVC 127)	0.025	20	
CH	Valley Heathy Forest (EVC 127)	0.079	33	1
D	Valley Heathy Forest (EVC 127)	0.016	25	
E	Valley Heathy Forest (EVC 127)	0.037	26	
F	Valley Heathy Forest (EVC 127)	0.061	31	
G	Valley Heathy Forest (EVC 127)	0.017	26	
H	Valley Heathy Forest (EVC 127)	0.230	39	
I	Swampy Woodland (EVC 937)	0.041	26	
J	Valley Heathy Forest (EVC 127)	0.032	27	
K	Valley Heathy Forest (EVC 127)	0.016	27	
L	Valley Heathy Forest (EVC 127)	0.015	27	

Habitat Zone	EVC	Area (ha)	Condition score (out of 100)	No. of Large Trees in HZ
M	Valley Heathy Forest (EVC 127)	0.036	27	
N	Valley Heathy Forest (EVC 127)	0.069	23	
O	Valley Heathy Forest (EVC 127)	0.067	20	
P	Valley Heathy Forest (EVC 127)	0.111	23	
Q	Valley Heathy Forest (EVC 127)	0.010	23	
R	Valley Heathy Forest (EVC 127)	0.112	23	
S	Valley Heathy Forest (EVC 127)	0.040	23	
T	Valley Heathy Forest (EVC 127)	0.018	23	
U	Valley Heathy Forest (EVC 127)	0.095	23	
V	Valley Heathy Forest (EVC 127)	0.007	23	
W	Swampy Woodland (EVC 937)	0.011	24	
X	Valley Heathy Forest (EVC 127)	0.003	23	
Y	Valley Heathy Forest (EVC 127)	0.009	23	
Z	Swampy Woodland (EVC 937)	0.002	24	
GA	Swampy Woodland (EVC 937)	0.166	47	
GB	Valley Heathy Forest (EVC 127)	0.436	62	2
GC	Valley Heathy Forest (EVC 127)	0.005	28	
GD	Valley Heathy Forest (EVC 127)	0.008	28	
GE	Valley Heathy Forest (EVC 127)	0.092	60	
GF	Valley Heathy Forest (EVC 127)	0.056	27	
GG	Valley Heathy Forest (EVC 127)	0.136	51	
Total		**4.05**		**5**

Figure 1: Study area and native vegetation

Project: Waverley GC and Police Road
Client: Intrapac Property Pty Ltd
Date: 04/09/2020

Study area
Large scattered tree
Large tree in patch
Small scattered tree

Native vegetation
Valley Heathy Forest (EVC 127)
Swampy Woodland (EVC 937)

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4.2.4. Scattered trees

Scattered trees recorded in the study area would have once comprised the canopy component of Valley Heathy Forest (EVC 127) and Swampy Woodland (EVC 937).

49 scattered trees occurred in the study area (Figure 1), including:

- 34 large scattered trees (≥ 70 centimetre DBH); and
- 15 small scattered trees (< 70 centimetre DBH).

Details of all scattered trees recorded are listed in Appendix 3.

4.3. Proposed development

The current proposal involves subdivision of and residential development within Waverley Golf Course, and the upgrade of Police Road.

To determine impacts to native vegetation, the proposed development plan was overlaid with the native vegetation mapped as part of this investigation. Native vegetation occurring in the following locations was considered to be removed based on the proposed development plan:

- Direct removal:
  - Native vegetation within all proposed building envelopes
  - Native vegetation within all proposed driveways
- Consequential removal:
  - Native vegetation within 10m of all proposed building envelopes
  - Native vegetation 2 metres either side of all proposed lot boundaries (to address the future fence exemption of Clause 52.17)
  - Native vegetation 1.5 metres either side of Police Road

Impacts to trees

In accordance with the *Assessor's Handbook* (DELWP 2018a), a tree is deemed lost when earthworks encroach on more than 10% of its Tree Protection Zone (TPZ). A TPZ is defined as an area around the trunk of a tree which has a radius 12 times the diameter of the tree at breast height (DBH) (1.3 metres above the ground) to a maximum of 15 metres but no less than 2 metres. Dead trees are treated in the same manner.

4.3.1. Avoid and minimise statement

In accordance with the Guidelines, all applications to remove native vegetation must provide an avoid and minimise statement which details any efforts undertaken to avoid the removal of, and minimise the impacts on biodiversity and other values of native vegetation, and how these efforts focus on areas of native vegetation that have the most value. Efforts to avoid and minimise impacts to native vegetation in the current application are presented as follows:

- *Strategic level planning* – detail any regional or landscape scale strategic planning process that the site has been subject to that avoided and minimised impacts on native vegetation across a region or landscape.
- *Site level planning* – The development has been sited to retain Habitat Zones A, D, G, I, J, K, L, M, N, R, S, T, U, V, X, Z, AA, AB, BD, BK, BL, BP, CC and CD. Habitat Zones B, C, H, O, P, BC, BG, BH, BJ will

be partially retained. In designing the layout of the upgraded Police Road, careful consideration was given to minimising impacts on trees along that road reserve and impacts have been minimised.

4.3.2. Proposed native vegetation removal

The current proposed development plan will result in the loss of a total extent of 3.553 hectares of native vegetation as represented in Figure 2 and documented in the *Native Vegetation Removal* (NVR) report provided by DELWP (Appendix 8).

This comprised:

- 2.05 hectares of native vegetation in patches (including three large trees in patches); and
- 30 scattered trees (namely 25 large scattered trees and five small scattered trees), equating to an area loss of 1.67 hectares.

The native vegetation to be removed is in an area mapped as an endangered Ecological Vegetation Class.

It is understood that no native vegetation has been approved for removal on the property within the last five years.

Photographs of native vegetation proposed for removal are provided in Appendix 6.

4.3.3. Modelled species important habitat

The current proposal footprint will not have a significant impact on any habitat for any rare or threatened species as determined in Appendix 8.

4.3.4. Assessment pathway

The assessment pathway is determined by the location category and the extent of native vegetation as detailed for the study area as follows:

- **Location Category:** Location 3
- **Extent of native vegetation:** A total of 3.720 hectares of native vegetation (including 28 large trees).

Based on these details, the Guidelines stipulate that the proposal is to be assessed under the **Detailed** assessment pathway.

This proposal **would** trigger a referral to DELWP based on the criteria specified in Section 3.3.3.

4.3.5. Offset requirements

Offsets required to compensate for the proposed removal of native vegetation from the study area are provided below.

- 1.402 general habitat units and must include the following offset attribute requirements:
  - Minimum strategic biodiversity value (SBV) of 0.499
  - Occur within the Port Phillip and Westernport CMA boundary or the Casey City or Knox City municipal districts.
  - Include protection of at least 28 large trees.

Under the Guidelines all offsets must be secured prior to the removal of native vegetation.

4.3.6. Offset statement

The offset target for the current proposal will be achieved via a third-party offset.

An online search of the *Native Vegetation Credit Register* (NVCR) has shown that the required offset is currently available for purchase from a native vegetation credit owner (DELWP 2020e).

Evidence that the required offset is available is provided in Appendix 9. The required offset would be secured following approval of the application to remove native vegetation.

Figure 2: Native vegetation to be removed

Project: Waverley GC and Police Road
Client: Intrapac Property Pty Ltd
Date: 11/09/2020

- Study area
- Large scattered tree
- Large tree in patch
- Small scattered tree

Native vegetation

- Valley Heathy Forest (EVC 127)
- Swampy Woodland (EVC 937)
- Tree to be removed
- Native vegetation to be removed

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Appendix 1: Details of the assessment process in accordance with the *Guidelines for the removal, destruction or lopping of native vegetation* (DELWP 2017a)

Purpose and objective

Policies and strategies relating to the protection and management of native vegetation in Victoria are defined in the State Planning Policy Framework (SPPF). The objective identified in Clause 12.01 of all Victorian Planning Schemes is 'To ensure that there is no net loss to biodiversity as a result of the removal, destruction or lopping of native vegetation'.

This is to be achieved through the following three-step approach, as detailed in the Guidelines:

1. Avoid the removal, destruction or lopping of native vegetation.
2. Minimise impacts from the removal, destruction or lopping of native vegetation that cannot be avoided.
3. Provide an offset to compensate for the biodiversity impact from the removal, destruction or lopping of native vegetation.

Note: While a planning permit may still be required, if native vegetation does not meet the definition of either a patch or a scattered tree, an offset under the Guidelines is not required.

Assessment pathways

The first step in determining the type of assessment required for any site in Victoria is to determine the assessment pathway for the proposed native vegetation removal. The three possible assessment pathways for applications to remove native vegetation in Victoria are:

- Basic;
- Intermediate; or
- Detailed.

This assessment pathway is determined by two factors:

- **Location Category**, as determined using the states' Location Map. The location category indicates the potential risk to biodiversity from removing a small amount of native vegetation. The three location categories are defined as:
  - Location 1 – shown in light blue-green on the Location Map; occurring over most of Victoria.
  - Location 2 – shown in dark blue-green on the Location Map; includes areas mapped as endangered EVCs and/or sensitive wetlands and coastal areas.
  - Location 3 – shown in brown on the Location Map; includes areas where the removal of less than 0.5 hectares of native vegetation could have a significant impact on habitat for rare and threatened species.
- **Extent of native vegetation** – The extent of any patches and scattered trees proposed to be removed (as well as the extent of any past native vegetation removal), with consideration as to whether the proposed removal includes any large trees. Extent of native vegetation is determined as follows:
  - **Patch** – the area of the patch in hectares.
  - **Scattered Tree** – the extent of a scattered tree is dependent on whether the scattered tree is small or large. A tree is considered to be a large tree if it is greater or equal to the large tree benchmark diameter at breast height (DBH) for the relevant bioregional EVC. Any scattered

tree that is not a large tree is a small scattered tree. The extent of large and small scattered trees is determined as follows:

- **Large scattered tree** – the area of a circle with a 15-metre radius, with the trunk of the tree at the centre.
- **Small scattered tree** – the area of a circle with a ten-metre radius, with the trunk of the tree at the centre.

The assessment pathway for assessing an application to remove native vegetation is then determined as detailed in the following matrix table:

Extent of native vegetation	Location Category		
	Location 1	Location 2	Location 3
< 0.5 hectares and not including any large trees	Basic	Intermediate	Detailed
< 0.5 hectares and including one or more large trees	Intermediate	Intermediate	Detailed
≥ 0.5 hectares	Detailed	Detailed	Detailed

Note: If the native vegetation to be removed includes more than one location category, the higher location category is used to determine the assessment pathway.

Landscape scale information – strategic biodiversity value

The strategic biodiversity value (SBV) is a measure of a location's importance to Victoria's biodiversity, relative to other locations across the state. It is represented as a score between 0 and 1 and determined from the Strategic biodiversity value map, available from *NVIM* (DELWP 2020c).

Landscape scale information – habitat for rare or threatened species

Habitat importance for rare or threatened species is a measure of the importance of a location in the landscape as habitat for a particular rare or threatened species, in relation to other habitat available for that species. It is represented as a score between 0 and 1 and is determined from the Habitat importance maps, administered by DELWP.

This includes two groups of habitat:

- **Highly localised habitats** – Limited in area and considered to be equally important, therefore having the same habitat importance score.
- **Dispersed habitats** – Less limited in are and based on habitat distribution models.

Habitat for rare or threatened species is used to determine the type of offset required in the detailed assessment pathway.

Biodiversity value

A combination of site-based and landscape scale information is used to calculate the biodiversity value of native vegetation to be removed. Biodiversity value is represented by a general or species habitat score, detailed as follows.

Firstly, the extent and condition of native vegetation to be removed are combined to determine the habitat hectares as follows:

Habitat hectares = extent of native vegetation x condition score

Secondly, the habitat hectare score is combined with a landscape factor to obtain an overall measure of biodiversity value. Two landscape factors exist as follows:

- **General landscape factor** – determined using an adjusted strategic biodiversity score, and relevant when no habitat importance scores are applicable;
- **Species landscape factor** – determined using an adjusted habitat importance score for each rare or threatened species habitat mapped at a site in the Habitat importance map.

These factors are then used as follows to determine the biodiversity value of a site:

General habitat score = habitat hectares x general landscape factor

Species habitat score = habitat hectares x species landscape factor

Offset requirements

A native vegetation offset is required for the approved removal of native vegetation. Offsets conform to one of two types and each type incorporates a multiplier to address the risk of offset:

- A **general offset** is required when the removal of native vegetation does not have a significant impact on any habitat for rare or threatened species (i.e. the proportional impact is below the species offset threshold). In this case a multiplier of 1.5 applies to determine the general offset amount.

General offset (amount of general habitat units) = general habitat score x 1.5

- A **species offset** is required when the removal of native vegetation has a significant impact on habitat for a rare or threatened species (i.e. the proportional impact is above the species offset threshold). In this case a multiplier of 2 applies to determine the species offset amount.

Species offset (amount of species habitat units) = Species habitat score x 2

Note: if native vegetation does not meet the definition of either a patch or scattered tree an offset is not required.

Offset attributes

Offsets must meet the following attribute requirements, as relevant:

- General offsets
  - **Offset amount** – general offset = general habitat score x 1.5
  - **Strategic biodiversity value (SBV)** – the offset has at least 80% of the SBV of the native vegetation removed

- **Vicinity** – the offset is in the same CMA boundary or municipal district as the native vegetation removed
- Habitat for rare and threatened species – N/A
- **Large trees** – the offset include the protection of at least one large tree for every large tree to be removed

- Species offsets
  - **Offset amount** – species offset = species habitat score x 2
  - Strategic biodiversity value (SBV): N/A
  - Vicinity: N/A
  - **Habitat for rare and threatened species** – the offset comprises mapped habitat according to the Habitat importance map for the relevant species
  - **Large trees** – the offset include the protection of at least one large tree for every large tree to be removed

Appendix 2: Detailed habitat hectare assessment results

Habitat Zone			A	AA	AB	B	BA	BB	BC	BD	BE	BF	BG	BH
Bioregion			GipP	GipP	GipP	GipP	GipP	GipP	GipP	GipP	GipP	GipP	GipP	GipP
EVC Number			127	127	127	937	127	127	127	127	127	127	127	127
Total area of Habitat Zone (ha)			0.081	0.007	0.011	0.220	0.056	0.106	0.160	0.060	0.059	0.037	0.138	0.332
Site Condition	Large Old Trees	/10	0	0	0	0	0	0	0	1	0	0	0	0
	Tree Canopy Cover	/5	0	0	0	2	3	5	5	4	0	5	3	2
	Lack of Weeds	/15	9	9	4	4	2	4	7	4	4	4	6	4
	Understorey	/25	5	5	5	5	5	5	5	5	5	5	10	15
	Recruitment	/10	5	5	5	6	6	5	5	5	5	5	5	3
	Organic Matter	/5	3	3	4	3	3	3	3	5	3	3	5	3
	Logs	/5	0	0	0	0	0	0	0	0	0	0	0	0
	Site Condition subtotal		*22*	*22*	*18*	*20*	*27*	*22*	*25*	*23*	*17*	*22*	*29*	*30*
Landscape Context	Patch Size	/10	1	1	1	1	1	1	1	1	1	1	1	1
	Neighbourhood	/10	1	1	1	1	1	1	1	1	1	1	1	1
	Distance to Core	/5	3	3	3	3	3	3	3	3	3	3	3	3
Total Condition Score		/100	27	27	23	25	24	27	30	29	22	27	34	32

Habitat Zone			BJ	BK	BL	BM	BN	BO	BP	C	CC	CD	CE	CF
Bioregion			GipP	GipP	GipP	GipP	GipP	GipP	GipP	GipP	GipP	GipP	GipP	GipP
EVC Number			127	127	127	127	127	127	127	127	127	127	127	127
Total area of Habitat Zone (ha)			0.232	0.048	0.034	0.033	0.128	0.035	0.013	0.104	0.010	0.011	0.063	0.015
Site Condition	Large Old Trees	/10	0	1	0	0	0	0	0	0	0	0	0	0
	Tree Canopy Cover	/5	3	4	3	3	3	5	5	0	0	0	5	5
	Lack of Weeds	/15	4	7	2	2	4	7	7	6	0	0	4	4
	Understorey	/25	10	5	5	5	10	5	5	5	5	5	5	5
	Recruitment	/10	5	0	6	6	5	5	5	5	5	5	3	3
	Organic Matter	/5	3	5	3	3	3	5	5	5	3	3	3	3
	Logs	/5	0	0	0	0	0	0	0	2	0	0	0	0
	Site Condition subtotal		*25*	*21*	*19*	*19*	*25*	*27*	*27*	*23*	*13*	*13*	*20*	*20*
Landscape Context	Patch Size	/10	1	1	1	1	1	1	1	1	1	1	1	1
	Neighbourhood	/10	1	1	1	1	1	1	1	1	1	1	1	1
	Distance to Core	/5	3	3	3	3	3	3	3	3	3	3	3	3
Total Condition Score		/100	30	27	24	24	30	32	32	28	18	18	25	25

Habitat Zone			CG	CH	D	E	F	G	H	I	J	K	L	M
Bioregion			GipP	GipP	GipP	GipP	GipP	GipP	GipP	GipP	GipP	GipP	GipP	GipP
EVC Number			127	127	127	127	127	127	127	937	127	127	127	127
Total area of Habitat Zone (ha)			0.025	0.079	0.016	0.037	0.061	0.017	0.230	0.041	0.032	0.016	0.015	0.036
Site Condition	Large Old Trees	/10	0	1	0	0	0	0	0	0	0	0	0	0
	Tree Canopy Cover	/5	5	5	0	0	3	2	0	0	0	0	0	0
	Lack of Weeds	/15	0	7	7	6	6	4	7	6	9	9	9	9
	Understorey	/25	5	5	5	5	5	5	15	5	5	5	5	5
	Recruitment	/10	3	5	5	5	5	5	6	6	5	5	5	5
	Organic Matter	/5	2	0	3	5	3	5	5	4	3	3	3	3
	Logs	/5	0	0	0	0	4	0	0	0	0	0	0	0
	Site Condition subtotal		*15*	*28*	*20*	*21*	*26*	*21*	*33*	*21*	*22*	*22*	*22*	*22*
Landscape Context	Patch Size	/10	1	1	1	1	1	1	1	1	1	1	1	1
	Neighbourhood	/10	1	1	1	1	1	1	2	1	1	1	1	1
	Distance to Core	/5	3	3	3	3	3	3	3	3	3	3	3	3
Total Condition Score		**/100**	**20**	**28**	**25**	**26**	**31**	**26**	**39**	**26**	**27**	**27**	**27**	**27**

Habitat Zone			N	O	P	Q	R	S	T	U	V	W	X	Y
Bioregion			GipP	GipP	GipP	GipP	GipP	GipP	GipP	GipP	GipP	GipP	GipP	GipP
EVC Number			127	127	127	127	127	127	127	127	127	937	127	127
Total area of Habitat Zone (ha)			0.069	0.067	0.111	0.010	0.112	0.040	0.018	0.095	0.007	0.011	0.003	0.009
Site Condition	Large Old Trees	/10	0	0	0	0	0	0	0	0	0	0	0	0
	Tree Canopy Cover	/5	0	0	0	0	0	0	0	0	0	0	0	0
	Lack of Weeds	/15	4	4	4	4	4	4	4	4	4	11	4	4
	Understorey	/25	5	5	5	5	5	5	5	5	5	5	5	5
	Recruitment	/10	5	3	5	5	5	5	5	5	5	0	5	5
	Organic Matter	/5	4	3	4	4	4	4	4	4	4	3	4	4
	Logs	/5	0	0	0	0	0	0	0	0	0	0	0	0
	Site Condition subtotal		*18*	*15*	*18*	*18*	*18*	*18*	*18*	*18*	*18*	*19*	*18*	*18*
Landscape Context	Patch Size	/10	1	1	1	1	1	1	1	1	1	1	1	1
	Neighbourhood	/10	1	1	1	1	1	1	1	1	1	1	1	1
	Distance to Core	/5	3	3	3	3	3	3	3	3	3	3	3	3
Total Condition Score		**/100**	**23**	**20**	**23**	**23**	**23**	**23**	**23**	**23**	**23**	**24**	**23**	**23**

Habitat Zone			Z	GA	GB	GC	GD	GE	GF	GG
Bioregion			GipP	GipP	GipP	GipP	GipP	GipP	GipP	GipP
EVC Number			937	937	127	127	127	127	127	127
Total area of Habitat Zone (ha)			0.002	0.166	0.436	0.005	0.008	0.092	0.056	0.136
Site Condition	Large Old Trees	/10	0	0	2	0	0	0	0	0
	Tree Canopy Cover	/5	0	0	2	0	0	2	0	0
	Lack of Weeds	/15	11	9	9	9	9	9	0	9
	Understorey	/25	5	10	20	5	5	20	5	20
	Recruitment	/10	0	10	6	5	5	6	6	6
	Organic Matter	/5	3	5	5	5	5	5	3	3
	Logs	/5	0	0	5	0	0	5	0	0
	Site Condition subtotal		*19*	*34*	*49*	*24*	*24*	*47*	*14*	*38*
Landscape Context	Patch Size	/10	1	8	8	1	1	8	8	8
	Neighbourhood	/10	1	1	1	0	0	1	1	1
	Distance to Core	/5	3	4	4	3	3	4	4	4
Total Condition Score		**/100**	**24**	**47**	**62**	**28**	**28**	**60**	**27**	**51**

* Modified approach to habitat scoring - refer to Table 14 of DELWP's Vegetation Quality Assessment Manual (DSE, 2004b).

Appendix 3: Large trees in patches and scattered trees recorded in the study area

Tree no.	Common Name	Scientific Name	DBH (cm)	Habitat Category	Radius of TPZ (m)	Remove/ Retain
1	Mealy Stringybark	*Eucalyptus cephalocarpa*	78	Scattered tree	9.36	Retain
2	Mealy Stringybark	*Eucalyptus cephalocarpa*	74	Scattered tree	8.88	Retain
3	Mealy Stringybark	*Eucalyptus cephalocarpa*	106	Scattered tree	12.72	Retain
4	Mealy Stringybark	*Eucalyptus cephalocarpa*	70	Scattered tree	10.09	Retain
5	Narrow-leaved Peppermint	*Eucalyptus radiata*	76	Scattered tree	9.12	Retain
6	Mealy Stringybark	*Eucalyptus cephalocarpa*	79	Scattered tree	9.48	Retain
7	Mealy Stringybark	*Eucalyptus cephalocarpa*	77	Scattered tree	9.24	Retain
8	Long-leaved Box	*Eucalyptus goniocalyx*	160	Scattered tree	19.2	Retain
9	Long-leaved Box	*Eucalyptus goniocalyx*	111	Scattered tree	13.32	Retain
10	Long-leaved Box	*Eucalyptus goniocalyx*	101	Scattered tree	12.12	Retain
11	Long-leaved Box	*Eucalyptus goniocalyx*	98	Scattered tree	11.76	Retain
12	Gum Tree	*Eucalyptus* sp.	>70	Scattered tree	>10.09	Remove
13	Gum Tree	*Eucalyptus* sp.	>70	Scattered tree	>10.09	Remove
14	Gum Tree	*Eucalyptus* sp.	>70	Scattered tree	>10.09	Remove
15	Gum Tree	*Eucalyptus* sp.	>70	Scattered tree	>10.09	Remove
16	Gum Tree	*Eucalyptus* sp.	>70	Scattered tree	>10.09	Remove
17	Gum Tree	*Eucalyptus* sp.	>70	Scattered tree	>10.09	Remove
18	Gum Tree	*Eucalyptus* sp.	>70	Scattered tree	>10.09	Remove
19	Gum Tree	*Eucalyptus* sp.	>70	Scattered tree	>10.09	Remove
20	Gum Tree	*Eucalyptus* sp.	>70	Scattered tree	>10.09	Remove
21	Gum Tree	*Eucalyptus* sp.	>70	Scattered tree	>10.09	Remove
22	Gum Tree	*Eucalyptus* sp.	>70	Scattered tree	>10.09	Remove
23	Gum Tree	*Eucalyptus* sp.	>70	Scattered tree	>10.09	Remove

Tree no.	Common Name	Scientific Name	DBH (cm)	Habitat Category	Radius of TPZ (m)	Remove/ Retain
24	Gum Tree	*Eucalyptus* sp.	>70	Scattered tree	>10.09	Remove
25	Gum Tree	*Eucalyptus* sp.	>70	Scattered tree	>10.09	Remove
26	Gum Tree	*Eucalyptus* sp.	>70	Scattered tree	>10.09	Remove
27	Gum Tree	*Eucalyptus* sp.	>70	Scattered tree	>10.09	Remove
28	Gum Tree	*Eucalyptus* sp.	>70	Scattered tree	>10.09	Remove
29	Gum Tree	*Eucalyptus* sp.	>70	Scattered tree	>10.09	Remove
30	Gum Tree	*Eucalyptus* sp.	>70	Scattered tree	>10.09	Remove
31	Gum Tree	*Eucalyptus* sp.	>70	Scattered tree	>10.09	Remove
32	Gum Tree	*Eucalyptus* sp.	>70	Scattered tree	>10.09	Remove
33	Gum Tree	*Eucalyptus* sp.	>70	Scattered tree	>10.09	Remove
34	Gum Tree	*Eucalyptus* sp.	>70	Scattered tree	>10.09	Remove
35	Mealy Stringybark	*Eucalyptus cephalocarpa*	83	Large tree HZ BD	9.96	Retain
36	Long-leaved Box	*Eucalyptus goniocalyx*	86	Large tree HZ BK	10.32	Retain
37	Long-leaved Box	*Eucalyptus goniocalyx*	87	Large tree HZ CH	10.44	Retain
38	Mealy Stringybark	*Eucalyptus cephalocarpa*	73	Large tree HZ GB	8.76	Remove
39	Yellow Box	*Eucalyptus melliodora*	70	Large tree HZ GB	8.4	Remove

Notes: DBH = Diameter at breast height (130 cm from the ground); **TPZ =** Tree Protection Zone.

Appendix 4: Flora species recorded in the study area

Origin	Common name	Scientific name	EPBC	FFG-T	FFG-P
	Agapanthus	*Agapanthus* spp.			
*	Agapanthus	*Agapanthus praecox* subsp. *orientalis*			
*	Ash	*Fraxinus* spp.			
	Austral Bracken	*Pteridium esculentum*			
	Bidgee-widgee	*Acaena novae-zelandiae*			
*	Black Nightshade	*Solanum nigrum s.l.*			
	Black Sheoak	*Allocasuarina littoralis*			
	Black Wattle	*Acacia mearnsii*			
	Black-anther Flax-lily	*Dianella revoluta s.l.*			
*	Blackberry	*Rubus vestitus*			
*	Blackberry	*Rubus fruticosus* spp. agg.			
	Blackwood	*Acacia melanoxylon*			
	Broom Rush	*Juncus sarophorus*			
	Bundy	*Eucalyptus goniocalyx s.s.*			
	Burgan	*Kunzea ericoides* spp. agg.			
*	Canary Grass	*Phalaris* spp.			
*	Cape Ivy	*Delairea odorata*			
	Centella	*Centella cordifolia*			
	Cherry Ballart	*Exocarpos cupressiformis*			
*	Cocksfoot	*Dactylis glomerata*			
	Common Blown-grass	*Lachnagrostis filiformis s.l.*			
	Common Bottle-daisy	*Lagenophora stipitata*			
	Common Cassinia	*Cassinia aculeata* subsp. *aculeata*			
*	Common Centaury	*Centaurium erythraea*			
*	Common Dipogon	*Dipogon lignosus*			
	Common Flat-pea	*Platylobium obtusangulum*			
*	Common Sow-thistle	*Sonchus oleraceus*			
	Common Tussock-grass	*Poa labillardierei*			
	Common Wallaby-grass	*Rytidosperma caespitosum*			
	Cotton Fireweed	*Senecio quadridentatus*			
*	Couch	*Cynodon dactylon* var. *dactylon*			
	Couch	*Cynodon dactylon*			
*	Drain Flat-sedge	*Cyperus eragrostis*			
	Drooping Cassinia	*Cassinia* sp. aff. *arcuata* (Midlands)			
	Drooping Mistletoe	*Amyema pendula*			
*	English Oak	*Quercus robur*			
*	Flatweed	*Hypochaeris radicata*			
*	Flax-leaf Broom	*Genista linifolia*			

#	Giant Honey-myrtle	*Melaleuca armillaris* subsp. *armillaris*			
*	Gorse	*Ulex europaeus*			
	Green Rush	*Juncus gregiflorus*			
	Greenhood	*Pterostylis* spp.			
	Hairy Pennywort	*Hydrocotyle hirta*			
	Hedge Wattle	*Acacia paradoxa*			
*	Honey Locust	*Gleditsia triacanthos*			
*	Italian Buckthorn	*Rhamnus alaternus*			
	Kangaroo Grass	*Themeda triandra*			
	Kidney-weed	*Dichondra repens*			
*	Kikuyu	*Cenchrus clandestinus*			
	Large Kangaroo Apple	*Solanum laciniatum*			
*	Large Quaking-grass	*Briza maxima*			
*	Large-leaf Privet	*Ligustrum lucidum*			
	Lightwood	*Acacia implexa*			
	Manuka	*Leptospermum scoparium*			
	Mealy Stringybark	*Eucalyptus cephalocarpa s.s.*			
*	Montpellier Broom	*Genista monspessulana*			
	Narrow-leaf Peppermint	*Eucalyptus radiata s.l.*			
*	Oat	*Avena* spp.			
*	Panic Veldt-grass	*Ehrharta erecta* var. *erecta*			
*	Paspalum	*Paspalum dilatatum*			
*	Petty Spurge	*Euphorbia peplus*			
	Prickly Tea-tree	*Leptospermum continentale*			
*	Radiata Pine	*Pinus radiata*			
*	Rat-tail Grass	*Sporobolus africanus*			
	Red Stringybark	*Eucalyptus macrorhyncha*			
	Red-fruit Saw-sedge	*Gahnia sieberiana*			
*	Ribwort	*Plantago lanceolata*			
	River Club-sedge	*Schoenoplectus tabernaemontani*			
	Rush	*Juncus* spp.			
	Shady Wood-sorrel	*Oxalis exilis*			
*	Sheep Sorrel	*Acetosella vulgaris*			
	Silver-leaf Stringybark	*Eucalyptus cephalocarpa s.l.*			
	Slender Knotweed	*Persicaria decipiens*			
*	Slender Pigeon Grass	*Setaria parviflora*			
	Small-leaved Clematis	*Clematis microphylla s.l.*			
	Spear Grass	*Austrostipa* spp.			
*	Spear Thistle	*Cirsium vulgare*			
	Spiny-headed Mat-rush	*Lomandra longifolia* subsp. *longifolia*			
	Spiny-headed Mat-rush	*Lomandra longifolia*			

	Swamp Club-sedge	*Isolepis inundata*			
	Swamp Goodenia	*Goodenia humilis*			
	Swamp Gum	*Eucalyptus ovata*			
	Swamp Paperbark	*Melaleuca ericifolia*			
	Sweet Bursaria	*Bursaria spinosa*			
#	Sweet Pittosporum	*Pittosporum undulatum*			
*	Sweet Vernal-grass	*Anthoxanthum odoratum*			
	Sword Sedge	*Lepidosperma* spp.			
*	Tall Fleabane	*Conyza sumatrensis* var. *sumatrensis*			
	Tall Spike-sedge	*Eleocharis sphacelata*			
	Tasman Flax-lily	*Dianella tasmanica*			
*	Toowoomba Canary-grass	*Phalaris aquatica*			
	Tree Everlasting	*Ozothamnus ferrugineus*			
*	Turnip	*Brassica* spp.			
	Variable Sword-sedge	*Lepidosperma laterale*			
	Variable Willow-herb	*Epilobium billardierianum*			
	Veined Spear-grass	*Austrostipa rudis*			
	Wallaby Grass	*Rytidosperma* spp.			
	Wattle Mat-rush	*Lomandra filiformis* subsp. *filiformis*			
	Wattle Mat-rush	*Lomandra filiformis*			
	Weeping Grass	*Microlaena stipoides* var. *stipoides*			
*	White Arum-lily	*Zantedeschia aethiopica*			
*	White Clover	*Trifolium repens* var. *repens*			
	Wood Sorrel	*Oxalis* spp.			
	Yellow Box	*Eucalyptus melliodora*			
	Yellow Rush-lily	*Tricoryne elatior*			

Notes: EPBC = threatened species status under the EPBC Act (EX = presumed extinct in the wild; CR = critically endangered; EN = endangered; VU = vulnerable); **FFG-T** = listed as threatened (L) under the FFG Act; **FFG-P**: listed as protected (P) under the FFG Act.

* = introduced to Victoria

= Victorian native taxa occurring outside their natural range

Appendix 5: EPBC Act and FFG Act listed flora species and likelihood of occurrence

Common Name	Scientific name	EPBC	FFG	Habitat	Number of records	Date of last record	Likelihood of occurrence
Bow-lip Spider-orchid	*Caladenia toxochila*		L	Mallee-scrub or Callitris woodland on sandy soils or box-woodland on clay-loam (Entwisle 1994).	1	1/06/1984	No suitable habitat available within the study area, therefore **unlikely to occur**.
Clover Glycine	*Glycine latrobeana*	VU	L	In Victoria, occurs mainly in grasslands and grassy woodlands or within intermittently flooded streamlines (Carter & Sutter 2010; D.Coppolino pers. obs.).	1	1/10/1980	No suitable habitat. **Unlikely to occur.**
Grey Billy-buttons	*Craspedia canens*		L	Lowland grasslands, often on swamp fringes. Current records occur between Cranbourne and Traralgon (Everett 1999).	5	20/11/1993	No suitable habitat available within the study area, therefore **unlikely to occur**.
Leafy Greenhood	*Pterostylis cucullata*	VU	L	Tea-tree scrubs on tall sandy and calcareous dunes, in moist, open or even deep shaded locations (Jones 1994).	None	n/a	No suitable habitat available within the study area, therefore **unlikely to occur**.
Lilac Leek-orchid	*Prasophyllum colemaniae*	VU		Known from one collection (1992) from Grassy Woodland near Bayswater, probably now extinct (Entwisle 1994).	None	n/a	**Unlikely to occur**.
Maroon Leek-orchid	*Prasophyllum frenchii*	EN	L	Favouring heathland and Grassland on black clays (Bates 1994).	1	1/06/1984	No suitable habitat. **Unlikely to occur.**

Common Name	Scientific name	EPBC	FFG	Habitat	Number of records	Date of last record	Likelihood of occurrence
Matted Flax-lily	*Dianella amoena*	EN	L	Lowland grassland and grassy woodlands on well-drained to seasonally waterlogged fertile sandy loams to heavy cracking soils derived from sedimentary or volcanic geology. It is widely distributed from eastern to south-western Victoria (Carter 2010).	1	26/06/2000	No suitable habitat available within the study area, therefore **unlikely to occur**.
Metallic Sun-orchid	*Thelymitra epipactoides*	EN	L	Primarily in mesic coastal heathlands, grasslands and woodlands, but also in drier inland heathlands, open forests and woodlands (Backhouse & Jeanes 1995 in DSEWPC 2003).	1	1/01/1980	No suitable habitat. **Unlikely to occur.**
Purple Blown-grass	*Lachnagrostis punicea subsp. filifolia*		L	Seasonally wet, heavy clay soils (Walsh 1994).	1	19/11/1993	No suitable habitat available within the study area, therefore **unlikely to occur**.
River Swamp Wallaby-grass	*Amphibromus fluitans*	VU		Inhabits both natural and man-made water-bodies (Walsh 1994). The species requires moderately fertile soils with some bare ground, conditions that are caused by fluctuating water levels (NSW OEH 2013).	3	1/10/1994	No suitable habitat. **Unlikely to occur.**
Round-leaf Pomaderris	*Pomaderris vacciniifolia*	CE	L	Moist forest and scrub in the upper catchments of the Yarra, Plenty and Yea Rivers (Walsh 1999)	None	n/a	No suitable habitat available within the study area, therefore **unlikely to occur**.
Swamp Everlasting	*Xerochrysum palustre*	VU	L	Sedge-rich swamps and wetlands, usually on black cracking clay soils (Walsh & Entwisle	None	n/a	No suitable habitat available

Common Name	Scientific name	EPBC	FFG	Habitat	Number of records	Date of last record	Likelihood of occurrence
				1999). Scattered occurrences in Victoria range from the South Australian border in the west to the Cobberas, near Benambra, in the East (DSE 2008).			within the study area, therefore **unlikely to occur**.
Swamp Fireweed	*Senecio psilocarpus*	VU		Herb-rich winter-wet swamps on volcanic clays or peaty soils (Walsh 1999). Known from around 10 sites between Wallan, about 45 km north of Melbourne (DSEWPC 2008).	1	18/11/1982	No suitable habitat. **Unlikely to occur.**

Notes: EPBC = threatened species status under EPBC Act: CR = critically endangered; EN = endangered; VU = vulnerable; **FFG** = threatened species status under the FFG Act: L = listed as threatened.

Appendix 6: Photographs of native vegetation proposed for removal

Habitat Zones BA and BM

Habitat Zone BB

Habitat Zone BE

Habitat Zone BF

Habitat Zone BG

Habitat Zone BH

Habitat Zone BJ and BN

Habitat Zone BO

Habitat Zone C

Vegetation representative of Habitat Zone CD

Habitat Zone CH

Habitat Zone E

Habitat Zone H

Habitat Zone GA

Habitat Zone GB

Yellow Gum (*Eucalyptus melliodora*)

Mealy Stringybark (*Eucalyptus cephalocarpa*)

Appendix 7: EVC benchmarks

Valley Heathy Forest (EVC 127) – Gippsland Plain

Swampy Woodland (EVC 937) – Gippsland Plain

Department of Sustainability and Environment

EVC/Bioregion Benchmark for Vegetation Quality Assessment

Gippsland Plain bioregion

EVC 127: Valley Heathy Forest

Description:
A low, open forest to 15 m tall with a sedgy/grassy understorey with a component of small ericoid shrubs and grass-trees. Soil and moisture factors are critical in delimiting the vegetation.

Large trees:

Species	DBH(cm)	#/ha
Eucalyptus spp.	70 cm	20 / ha

Tree Canopy Cover:

%cover	Character Species	Common Name
30%	*Eucalyptus melliodora*	Yellow Box
	Eucalyptus goniocalyx s.l.	Bundy
	Eucalyptus cephalocarpa s.l.	Silverleaf Stringybark
	Eucalyptus obliqua	Messmate Stringybark

Understorey:

Life form	#Spp	%Cover	LF code
Immature Canopy Tree		5%	IT
Understorey Tree or Large Shrub	2	10%	T
Medium Shrub	7	15%	MS
Small Shrub	5	5%	SS
Prostrate Shrub	2	1%	PS
Medium Herb	6	10%	MH
Small or Prostrate Herb	3	5%	SH
Large Tufted Graminoid	2	5%	LTG
Large Non-tufted Graminoid	2	20%	LNG
Medium to Small Tufted Graminoid	7	15%	MTG
Medium to Tiny Non-tufted Graminoid	1	1%	MNG
Ground Fern	1	1%	GF
Scrambler or Climber	3	5%	SC
Bryophytes/Lichens	na	10%	BL

EVC 127: Valley Heathy Forest - Gippsland Plain bioregion

LF Code	Species typical of at least part of EVC range	Common Name
T	*Exocarpos cupressiformis*	Cherry Ballart
MS	*Epacris impressa*	Common Heath
MS	*Cassinia aculeata*	Common Cassinia
MS	*Daviesia leptophylla*	Narrow-leaf Bitter-pea
MS	*Cassinia arcuata*	Drooping Cassinia
SS	*Platylobium obtusangulum*	Common Flat-pea
SS	*Dillwynia cinerascens* s.l.	Grey Parrot-pea
SS	*Hovea heterophylla*	Common Hovea
SS	*Pimelea humilis*	Common Rice-flower
PS	*Acrotriche serrulata*	Honey-pots
PS	*Bossiaea prostrata*	Creeping Bossiaea
MH	*Leptorhynchos tenuifolius*	Wiry Buttons
MH	*Gonocarpus tetragynus*	Common Raspwort
MH	*Helichrysum scorpioides*	Button Everlasting
SH	*Opercularia varia*	Variable Stinkweed
SH	*Drosera whittakeri* ssp. *aberrans*	Scented Sundew
SH	*Oxalis corniculata* s.l.	Yellow Wood-sorrel
LTG	*Xanthorrhoea minor* ssp. *lutea*	Small Grass-tree
LTG	*Deyeuxia quadriseta*	Reed Bent-grass
LNG	*Gahnia radula*	Thatch Saw-sedge
MTG	*Joycea pallida*	Silvertop Wallaby-grass
MTG	*Lomandra filiformis*	Wattle Mat-rush
MTG	*Themeda triandra*	Kangaroo Grass
MTG	*Poa morrisii*	Soft Tussock-grass
MTG	*Dianella revoluta* s.l.	Black-anther Flax-lily
MNG	*Microlaena stipoides* var. *stipoides*	Weeping Grass
GF	*Lindsaea linearis*	Screw Fern
SC	*Billardiera scandens*	Common Apple-berry
SC	*Hardenbergia violacea*	Purple Coral-pea

Recruitment:
Episodic/Fire. Desirable period between disturbances is 30 years.

Organic Litter:
40 % cover

Logs:
20 m/0.1 ha.

Weediness:

LF Code	Typical Weed Species	Common Name	Invasive	Impact
T	*Pinus radiata*	Radiata Pine	high	high
MS	*Rubus fruticosus* spp. agg.	Blackberry	high	high
LH	*Plantago lanceolata*	Ribwort	high	low
MH	*Hypochoeris radicata*	Cat's Ear	high	low
MTG	*Briza maxima*	Large Quaking-grass	high	low
MTG	*Anthoxanthum odoratum*	Sweet Vernal-grass	high	high

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Department of Sustainability and Environment

EVC/Bioregion Benchmark for Vegetation Quality Assessment

Gippsland Plain bioregion

EVC 937: Swampy Woodland

Description:
Open eucalypt woodland to 15 m tall with ground-layer dominated by tussock grasses and/or sedges and often rich in herbs. Occurs on poorly drained, seasonally waterlogged heavy soils, primarily on swamp deposits but extending to suitable substrates within some landscapes of sedimentary origin.

Large trees:

Species	DBH(cm)	#/ha
Eucalyptus spp.	70 cm	15 / ha

Tree Canopy Cover:

%cover	Character Species	Common Name
15%	*Eucalyptus ovata*	Swamp Gum
	Eucalyptus cephalocarpa s.s.	Mealy Stringybark
	Eucalyptus radiata s.l.	Narrow-leaf Peppermint
	Eucalyptus obliqua	Messmate Stringybark

Understorey:

Life form	#Spp	%Cover	LF code
Immature Canopy Tree		5%	IT
Understorey Tree or Large Shrub	1	5%	T
Medium Shrub	2	20%	MS
Medium Herb	5	10%	MH
Small or Prostrate Herb	3	10%	SH
Large Tufted Graminoid	4	30%	LTG
Large Non-tufted Graminoid	2	10%	LNG
Medium to Small Tufted Graminoid	4	10%	MTG
Bryophytes/Lichens	na	20%	BL

LF Code	Species typical of at least part of EVC range	Common Name
T	*Melaleuca ericifolia*	Swamp Paperbark
MS	*Leptospermum continentale*	Prickly Tea-tree
MH	*Acaena novae-zelandiae*	Bidgee-widgee
MH	*Centella cordifolia*	Centella
MH	*Gratiola peruviana*	Austral Brooklime
SH	*Mazus pumilio*	Swamp Mazus
LTG	*Gahnia sieberiana*	Red-fruit Saw-sedge
LTG	*Poa labillardierei*	Common Tussock-grass
LTG	*Carex appressa*	Tall Sedge
LNG	*Gahnia radula*	Thatch Saw-sedge
LNG	*Phragmites australis*	Common Reed
MTG	*Schoenus apogon*	Common Bog-sedge
MTG	*Lepidosperma laterale*	Variable Sword-sedge
MNG	*Poa tenera*	Slender Tussock-grass
MNG	*Juncus holoschoenus*	Joint-leaf Rush

Recruitment:
Continuous

Organic Litter:
20 % cover

Logs:
15 m/0.1 ha.

EVC 937: Swampy Woodland - Gippsland Plain bioregion

Weediness:

LF Code	Typical Weed Species	Common Name	Invasive	Impact
MS	*Rubus* sp. aff. *armeniacus*	Blackberry	high	high
MH	*Hypochoeris radicata*	Cat's Ear	high	low
LNG	*Holcus lanatus*	Yorkshire Fog	high	high
MTG	*Anthoxanthum odoratum*	Sweet Vernal-grass	high	high

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Appendix 8: Native Vegetation Removal (NVR) report

Native vegetation removal report

This report provides information to support an application to remove, destroy or lop native vegetation in accordance with the *Guidelines for the removal, destruction or lopping of native vegetation*. The report **is not an assessment by DELWP** of the proposed native vegetation removal. Native vegetation information and offset requirements have been determined using spatial data provided by the applicant or their consultant.

Date of issue: **16/09/2020**
Time of issue: **12:56 pm**

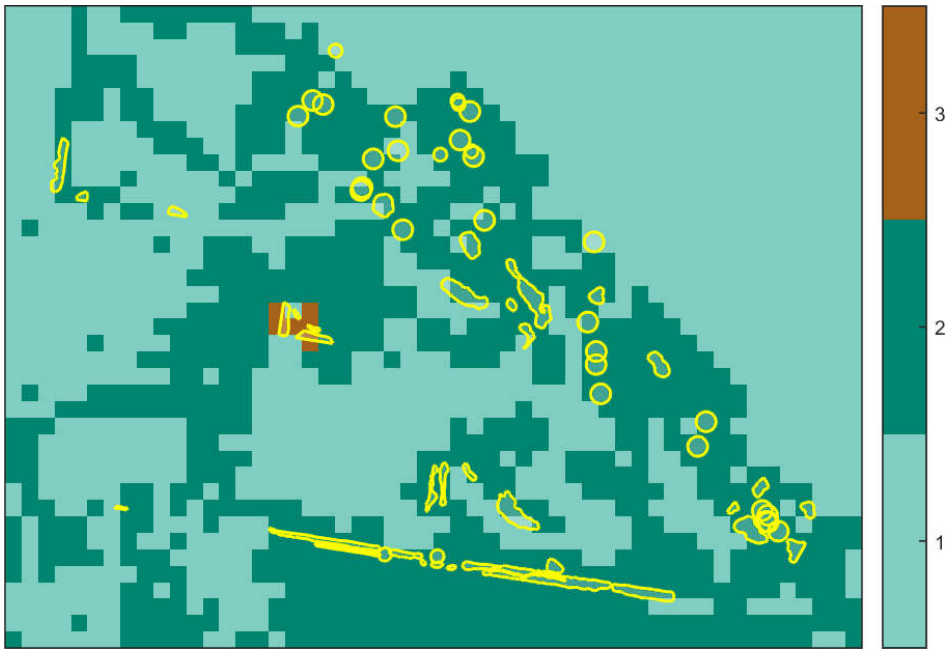
Report ID: NAA_2020_118

Project ID	NA_16024_Site_wPolice_rd_G2107

Assessment pathway

Assessment pathway	**Detailed Assessment Pathway**
Extent including past and proposed	3.720 ha
Extent of past removal	0.000 ha
Extent of proposed removal	3.720 ha
No. Large trees proposed to be removed	28
Location category of proposed removal	Location 3 The native vegetation is in an area where the removal of less than 0.5 hectares could have a significant impact on habitat for one or more rare or threatened species.The native vegetation is also in an area mapped as an endangered Ecological Vegetation Class (as per the statewide EVC map).

1. Location map



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Native vegetation removal report

Offset requirements if a permit is granted

Any approval granted will include a condition to obtain an offset that meets the following requirements:

General offset amount[1]	1.402 general habitat units
Vicinity	Port Phillip and Westernport Catchment Management Authority (CMA) or Casey City, Knox City Council
Minimum strategic biodiversity value score[2]	0.499
Large trees	28 large trees

NB: values within tables in this document may not add to the totals shown above due to rounding

Appendix 1 includes information about the native vegetation to be removed

Appendix 2 includes information about the rare or threatened species mapped at the site.

Appendix 3 includes maps showing native vegetation to be removed and extracts of relevant species habitat importance maps

1 The general offset amount required is the sum of all general habitat units in Appendix 1.

2 Minimum strategic biodiversity score is 80 per cent of the weighted average score across habitat zones where a general offset is required

Native vegetation removal report

Next steps

Any proposal to remove native vegetation must meet the application requirements of the Detailed Assessment Pathway and it will be assessed under the Detailed Assessment Pathway.

If you wish to remove the mapped native vegetation you are required to apply for a permit from your local council. Council will refer your application to DELWP for assessment, as required. **This report is not a referral assessment by DELWP.**

This *Native vegetation removal report* must be submitted with your application for a permit to remove, destroy or lop native vegetation.

Refer to the *Guidelines for the removal, destruction or lopping of native* vegetation (the Guidelines) for a full list of application requirements This report provides information that meets the following application requirements:

- The assessment pathway and reason for the assessment pathway
- A description of the native vegetation to be removed (partly met)
- Maps showing the native vegetation and property (partly met)
- Information about the impacts on rare or threatened species.
- The offset requirements determined in accordance with section 5 of the Guidelines that apply if approval is granted to remove native vegetation.

Additional application requirements must be met including:

- Topographical and land information
- Recent dated photographs
- Details of past native vegetation removal
- An avoid and minimise statement
- A copy of any Property Vegetation Plan that applies
- A defendable space statement as applicable
- A statement about the Native Vegetation Precinct Plan as applicable
- A site assessment report including a habitat hectare assessment of any patches of native vegetation and details of trees
- An offset statement that explains that an offset has been identified and how it will be secured.

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Notwithstanding anything else contained in this publication, you must ensure that you comply with all relevant laws, legislation, awards or orders and that you obtain and comply with all permits, approvals and the like that affect, are applicable or are necessary to undertake any action to remove, lop or destroy or otherwise deal with any native vegetation or that apply to matters within the scope of Clauses 52.16 or 52.17 of the Victoria Planning Provisions and Victorian planning schemes.

Appendix 1: Description of native vegetation to be removed

The species-general offset test was applied to your proposal. This test determines if the proposed removal of native vegetation has a proportional impact on any rare or threatened species habitats above the species offset threshold. The threshold is set at 0.005 per cent of the mapped habitat value for a species. When the proportional impact is above the species offset threshold a species offset is required. This test is done for all species mapped at the site. Multiple species offsets will be required if the species offset threshold is exceeded for multiple species.

Where a zone requires species offset(s), the species habitat units for each species in that zone is calculated by the following equation in accordance with the Guidelines:

Species habitat units = extent x condition x species landscape factor x 2, where the species landscape factor = 0.5 + (habitat importance score/2)

The species offset amount(s) required is the sum of all species habitat units per zone

Where a zone does not require a species offset, the general habitat units in that zone is calculated by the following equation in accordance with the Guidelines:

General habitat units = extent x condition x general landscape factor x 1.5, where the general landscape factor = 0.5 + (strategic biodiversity value score/2)

The general offset amount required is the sum of all general habitat units per zone.

Native vegetation to be removed

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	**Type**	**BioEVC**	**BioEVC conservation status**	**Large tree(s)**	**Partial removal**	**Condition score**	**Polygon Extent**	**Extent without overlap**	**SBV score**	**HI score**	**Habitat units**	**Offset type**
2-GC	Patch	gipp0127	Endangered	0	no	0.380	0.005	0.005	0.430		0.002	General
2-GA	Patch	gipp0937	Endangered	0	no	0.470	0.122	0.122	0.967		0.085	General
2-GB1	Patch	gipp0127	Endangered	2	no	0.660	0.287	0.287	0.852		0.263	General
2-GG	Patch	gipp0127	Endangered	0	no	0.660	0.103	0.103	0.483		0.076	General
2-GF	Patch	gipp0127	Endangered	0	no	0.660	0.036	0.036	0.980		0.035	General
2-GE	Patch	gipp0127	Endangered	0	no	0.660	0.039	0.039	0.654		0.032	General
2-GB2	Patch	gipp0127	Endangered	0	no	0.660	0.006	0.006	0.980		0.006	General
2-GB3	Patch	gipp0127	Endangered	0	no	0.660	0.011	0.011	0.980		0.011	General
2-GB4	Patch	gipp0127	Endangered	0	no	0.660	0.004	0.004	0.980		0.004	General

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
2-1	Scattered Tree	gipp0127	Endangered	0	no	0.200	0.031	0.031	0.980		0.009	General
2-2	Scattered Tree	gipp0127	Endangered	0	no	0.200	0.031	0.029	0.935		0.008	General
1-BA	Patch	gipp0127	Endangered	0	no	0.320	0.056	0.056	0.577		0.021	General
1-BM	Patch	gipp0127	Endangered	0	no	0.240	0.035	0.035	0.260		0.008	General
1-BB	Patch	gipp0127	Endangered	0	no	0.270	0.111	0.111	0.590		0.036	General
1-BN	Patch	gipp0127	Endangered	0	no	0.300	0.144	0.144	0.732		0.056	General
1-CH	Patch	gipp0127	Endangered	1	no	0.330	0.080	0.080	0.690		0.034	General
1-E	Patch	gipp0127	Endangered	0	no	0.260	0.041	0.041	0.260		0.010	General
1-BO	Patch	gipp0127	Endangered	0	no	0.320	0.037	0.037	0.520		0.014	General
1-H	Patch	gipp0127	Endangered	0	no	0.390	0.037	0.037	0.850		0.020	General
1-ST33	Scattered Tree	gipp0127	Endangered	1	no	0.200	0.070	0.070	0.610		0.017	General
1-ST23	Scattered Tree	gipp0127	Endangered	1	no	0.200	0.070	0.063	0.260		0.012	General
1-ST24	Scattered Tree	gipp0127	Endangered	1	no	0.200	0.070	0.026	0.260		0.005	General
1-ST25	Scattered Tree	gipp0127	Endangered	1	no	0.200	0.070	0.025	0.487		0.006	General
1-ST26	Scattered Tree	gipp0127	Endangered	1	no	0.200	0.070	0.028	0.266		0.005	General
1-ST27	Scattered Tree	gipp0127	Endangered	1	no	0.200	0.070	0.050	0.503		0.011	General
1-ST28	Scattered Tree	gipp0127	Endangered	1	no	0.200	0.070	0.070	0.610		0.017	General
1-B2	Patch	gipp0937	Endangered	0	no	0.250	0.152	0.152	0.780		0.051	General

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
1-BF	Patch	gipp0127	Endangered	0	no	0.270	0.040	0.040	0.660		0.013	General
1-BH3	Patch	gipp0127	Endangered	0	no	0.350	0.181	0.181	0.660		0.079	General
1-BJ1	Patch	gipp0127	Endangered	0	no	0.300	0.082	0.082	0.598		0.029	General
1-BJ2	Patch	gipp0127	Endangered	0	no	0.300	0.017	0.017	0.660		0.007	General
1-BG	Patch	gipp0127	Endangered	0	no	0.340	0.032	0.032	0.660		0.013	General
1-BC	Patch	gipp0127	Endangered	0	no	0.300	0.015	0.015	0.610		0.005	General
1-ST30	Scattered Tree	gipp0127	Endangered	1	no	0.200	0.070	0.070	0.660		0.018	General
1-ST32	Scattered Tree	gipp0127	Endangered	1	no	0.200	0.070	0.062	0.660		0.016	General
1-ST34	Scattered Tree	gipp0127	Endangered	1	no	0.200	0.070	0.070	0.670		0.018	General
1-ST35	Scattered Tree	gipp0127	Endangered	1	no	0.200	0.070	0.070	0.562		0.016	General
1-ST39	Scattered Tree	gipp0127	Endangered	1	no	0.200	0.070	0.070	0.690		0.018	General
1-ST43	Scattered Tree	gipp0127	Endangered	1	no	0.200	0.070	0.070	0.690		0.018	General
1-ST44	Scattered Tree	gipp0127	Endangered	1	no	0.200	0.070	0.059	0.452		0.013	General
1-ST45	Scattered Tree	gipp0127	Endangered	1	no	0.200	0.070	0.059	0.274		0.011	General
1-ST50	Scattered Tree	gipp0127	Endangered	1	no	0.200	0.070	0.070	0.470		0.016	General
1-ST54	Scattered Tree	gipp0127	Endangered	1	no	0.200	0.070	0.070	0.690		0.018	General

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
1-ST55	Scattered Tree	gipp0127	Endangered	1	no	0.200	0.070	0.043	0.690		0.011	General
1-ST56	Scattered Tree	gipp0127	Endangered	1	no	0.200	0.070	0.043	0.690		0.011	General
1-ST57	Scattered Tree	gipp0127	Endangered	1	no	0.200	0.070	0.070	0.690		0.018	General
1-ST4	Scattered Tree	gipp0127	Endangered	1	no	0.200	0.070	0.070	0.548		0.016	General
1-ST13	Scattered Tree	gipp0127	Endangered	1	no	0.200	0.070	0.070	0.550		0.016	General
1-BE	Patch	gipp0127	Endangered	0	no	0.220	0.070	0.070	0.150		0.013	General
1-F	Patch	gipp0127	Endangered	0	no	0.310	0.036	0.036	0.260		0.011	General
1-C	Patch	gipp0127	Endangered	0	no	0.280	0.020	0.020	0.648		0.007	General
2-ST32	Scattered Tree	gipp0127	Endangered	1	no	0.200	0.070	0.062	0.660		0.016	General
1-ST3	Scattered Tree	gipp0127	Endangered	0	no	0.200	0.031	0.021	0.210		0.004	General
2-ST4	Scattered Tree	gipp0127	Endangered	0	no	0.200	0.031	0.016	0.494		0.004	General
1-ST9	Scattered Tree	gipp0127	Endangered	1	no	0.200	0.070	0.070	0.550		0.016	General
1-ST8	Scattered Tree	gipp0127	Endangered	0	no	0.200	0.031	0.031	0.690		0.008	General
1-ST1	Scattered Tree	gipp0127	Endangered	1	no	0.200	0.070	0.070	0.674		0.018	General
1-ST10	Scattered Tree	gipp0127	Endangered	0	no	0.200	0.031	0.031	0.210		0.006	General
1-CE	Patch	gipp0127	Endangered	0	no	0.250	0.090	0.090	0.220		0.021	General

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
1-CF	Patch	gipp0127	Endangered	0	no	0.250	0.017	0.017	0.220		0.004	General
1-CG	Patch	gipp0127	Endangered	0	no	0.200	0.025	0.025	0.455		0.005	General
1-P	Patch	gipp0127	Endangered	0	no	0.230	0.054	0.054	0.950		0.018	General
1-Q	Patch	gipp0127	Endangered	0	no	0.230	0.007	0.007	0.950		0.002	General
1-Y	Patch	gipp0127	Endangered	0	no	0.230	0.009	0.009	0.923		0.003	General
1-O	Patch	gipp0127	Endangered	0	no	0.200	0.049	0.049	0.890		0.014	General
1-ST11	Scattered Tree	gipp0127	Endangered	0	no	0.200	0.031	0.005	0.571		0.001	General

Appendix 2: Information about impacts to rare or threatened species' habitats on site

This table lists all rare or threatened species' habitats mapped at the site.

Species common name	Species scientific name	Species number	Conservation status	Group	Habitat impacted	% habitat value affected
Grey-headed Flying-fox	*Pteropus poliocephalus*	11280	Vulnerable	Dispersed	Top ranking map	0.0014
Grey Billy-buttons	*Craspedia canens*	504643	Endangered	Dispersed	Habitat importance map	0.0006
Grey-headed Flying-fox	*Pteropus poliocephalus*	11280	Vulnerable	Dispersed	Habitat importance map	0.0005
Veined Spear-grass	*Austrostipa rudis subsp. australis*	504940	Rare	Dispersed	Habitat importance map	0.0005
Spurred Helmet-orchid	*Corybas aconitiflorus*	500835	Rare	Dispersed	Habitat importance map	0.0003
Benambra Club-sedge	*Isolepis gaudichaudiana*	504676	Vulnerable	Dispersed	Habitat importance map	0.0003
Green Scentbark	*Eucalyptus fulgens*	505175	Rare	Dispersed	Habitat importance map	0.0003
Fringed Helmet-orchid	*Corybas fimbriatus*	500839	Rare	Dispersed	Habitat importance map	0.0002
Matted Flax-lily	*Dianella amoena*	505084	Endangered	Dispersed	Habitat importance map	0.0002
Small Golden Moths	*Diuris basaltica*	501473	Endangered	Dispersed	Habitat importance map	0.0002
Sticky Wattle	*Acacia howittii*	500044	Rare	Dispersed	Habitat importance map	0.0001
Yarra Gum	*Eucalyptus yarraensis*	501326	Rare	Dispersed	Habitat importance map	0.0001
Pale Swamp Everlasting	*Coronidium gunnianum*	504655	Vulnerable	Dispersed	Habitat importance map	0.0001
Floodplain Fireweed	*Senecio campylocarpus*	507136	Rare	Dispersed	Habitat importance map	0.0001
Purple Diuris	*Diuris punctata*	501084	Vulnerable	Dispersed	Habitat importance map	0.0001
Arching Flax-lily	*Dianella sp. aff. longifolia (Benambra)*	505560	Vulnerable	Dispersed	Habitat importance map	0.0001
Melbourne Yellow-gum	*Eucalyptus leucoxylon subsp. connata*	504484	Vulnerable	Dispersed	Habitat importance map	0.0001
Grey Goshawk	*Accipiter novaehollandiae novaehollandiae*	10220	Vulnerable	Dispersed	Habitat importance map	0.0001
Southern Toadlet	*Pseudophryne semimarmorata*	13125	Vulnerable	Dispersed	Habitat importance map	0.0001

Growling Grass Frog	*Litoria raniformis*	13207	Endangered	Dispersed	Habitat importance map	0.0001
Western Golden-tip	*Goodia medicaginea*	501518	Rare	Dispersed	Habitat importance map	0.0000
Glossy Grass Skink	*Pseudemoia rawlinsoni*	12683	Vulnerable	Dispersed	Habitat importance map	0.0000
Black Falcon	*Falco subniger*	10238	Vulnerable	Dispersed	Habitat importance map	0.0000
Purple Blown-grass	*Lachnagrostis punicea subsp. filifolia*	504222	Rare	Dispersed	Habitat importance map	0.0000
Lewin's Rail	*Lewinia pectoralis pectoralis*	10045	Vulnerable	Dispersed	Habitat importance map	0.0000
Plains Yam-daisy	*Microseris scapigera s.s.*	504657	Vulnerable	Dispersed	Habitat importance map	0.0000
White-throated Needletail	*Hirundapus caudacutus*	10334	Vulnerable	Dispersed	Habitat importance map	0.0000
Veiled Fringe-sedge	*Fimbristylis velata*	501369	Rare	Dispersed	Habitat importance map	0.0000
Swamp Everlasting	*Xerochrysum palustre*	503763	Vulnerable	Dispersed	Habitat importance map	0.0000
Powerful Owl	*Ninox strenua*	10248	Vulnerable	Dispersed	Habitat importance map	0.0000
Round-leaf Pomaderris	*Pomaderris vacciniifolia*	502675	Endangered	Dispersed	Habitat importance map	0.0000
Chestnut-rumped Heathwren	*Calamanthus pyrrhopygius*	10498	Vulnerable	Dispersed	Habitat importance map	0.0000
Austral Tobacco	*Nicotiana suaveolens*	502275	Rare	Dispersed	Habitat importance map	0.0000

Habitat group

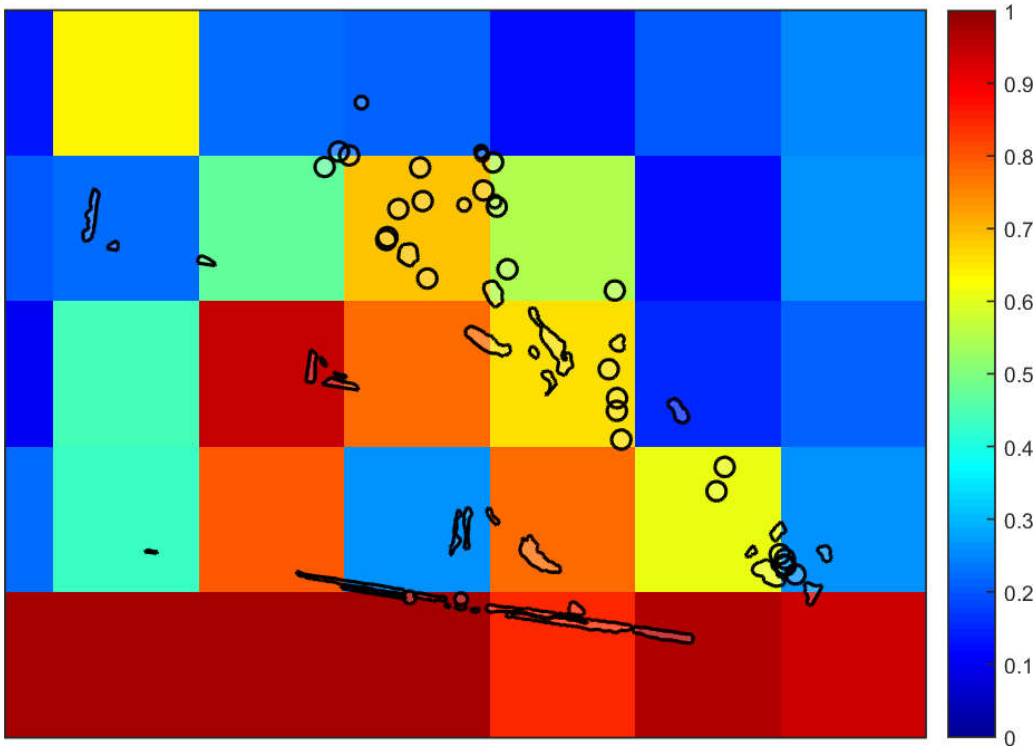
- Highly localised habitat means there is 2000 hectares or less mapped habitat for the species
- Dispersed habitat means there is more than 2000 hectares of mapped habitat for the species

Habitat impacted

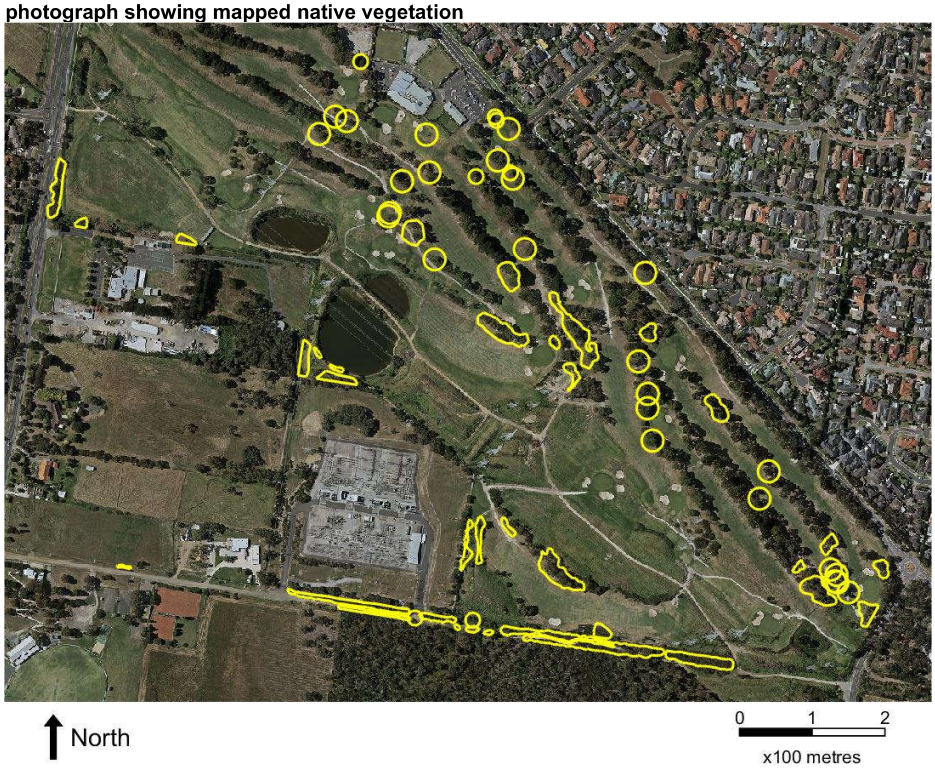
- Habitat importance maps are the maps defined in the Guidelines that include all the mapped habitat for a rare or threatened species
- Top ranking maps are the maps defined in the Guidelines that depict the important areas of a dispersed species habitat, developed from the highest habitat importance scores in dispersed species habitat maps and selected VBA records
- Selected VBA record is an area in Victoria that represents a large population, roosting or breeding site etc.

Appendix 3 – Images of mapped native vegetation

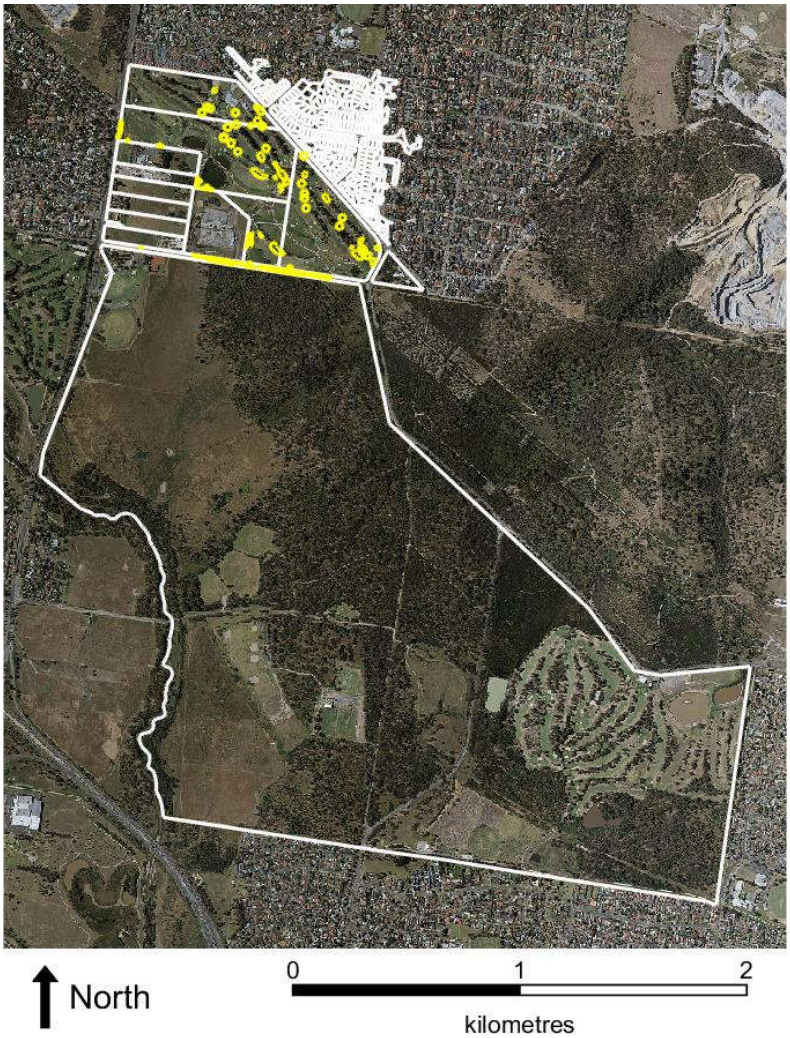
2. Strategic biodiversity values map



3. Aerial photograph showing mapped native vegetation



4. Map of the property in context



Yellow boundaries denote areas of proposed native vegetation removal.

Appendix 9: Evidence that native vegetation offset requirement is available

Report of available native vegetation credits

This report lists native vegetation credits available to purchase through the Native Vegetation Credit Register.

This report is **not evidence** that an offset has been secured. An offset is only secured when the units have been purchased and allocated to a permit or other approval and an allocated credit extract is provided by the Native Vegetation Credit Register.

Date and time: 17/09/2020 12:33 **Report ID: 5845**

What was searched for?

General offset

General habitat units	Strategic biodiversity value	Large trees	Vicinity (Catchment Management Authority or Municipal district)	
1.402	0.499	28	CMA	Port Phillip and Westernport
			or LGA	Casey City
			or LGA	Knox City

Details of available native vegetation credits on 17 September 2020 12:33

These sites meet your requirements for general offsets.

Credit Site ID	GHU	LT	CMA	LGA	Land owner	Trader	Fixed price	Broker(s)
BBA-0277	9.175	470	Port Phillip and Westernport	Mornington Peninsula Shire	No	Yes	No	Abezco, Ethos, VegLink
BBA-0670	19.308	175	Port Phillip and Westernport	Cardinia Shire	No	Yes	No	Abezco, VegLink
BBA-0677	20.777	1529	Port Phillip and Westernport	Whittlesea City	No	Yes	No	Abezco, VegLink
BBA-0678	49.814	2666	Port Phillip and Westernport	Nillumbik Shire	No	Yes	No	Contact NVOR
BBA-2790	2.911	116	Port Phillip and Westernport	Baw Baw Shire	Yes	Yes	No	Contact NVOR
BBA-2870	2.544	431	Port Phillip and Westernport	Yarra Ranges Shire	Yes	Yes	No	Contact NVOR
BBA-2871	15.834	1625	Port Phillip and Westernport	Yarra Ranges Shire	Yes	Yes	No	Contact NVOR
TFN-C1636	1.938	159	Port Phillip and Westernport	Yarra Ranges Shire	Yes	Yes	Yes	Yarra Ranges SC
TFN-C1650	1.535	63	Port Phillip and Westernport	Yarra Ranges Shire	Yes	Yes	Yes	Yarra Ranges SC
TFN-C1664	3.623	96	Port Phillip and Westernport	Yarra Ranges Shire	Yes	Yes	Yes	Yarra Ranges SC
VC_CFL-0838_01	2.584	807	Port Phillip And Westernport	Yarra Ranges Shire	Yes	Yes	No	VegLink
VC_CFL-3016_01	2.254	36	Port Phillip And Westernport	Yarra Ranges Shire	Yes	Yes	No	VegLink

These sites meet your requirements using alternative arrangements for general offsets.

Credit Site ID	GHU	LT	CMA	LGA	Land owner	Trader	Fixed price	Broker(s)

There are no sites listed in the Native Vegetation Credit Register that meet your offset requirements when applying the alternative arrangements as listed in section 11.2 of the Guidelines for the removal, destruction or lopping of native vegetation.

These potential sites are not yet available, land owners may finalise them once a buyer is confirmed.

Credit Site ID	GHU	LT	CMA	LGA	Land owner	Trader	Fixed price	Broker(s)

There are no potential sites listed in the Native Vegetation Credit Register that meet your offset requirements.

LT - Large Trees *CMA - Catchment Management Authority* *LGA - Municipal District or Local Government Authority*

Next steps

If applying for approval to remove native vegetation
Attach this report to an application to remove native vegetation as evidence that your offset requirement is currently available.

If you have approval to remove native vegetation
Below are the contact details for all brokers. Contact the broker(s) listed for the credit site(s) that meet your offset requirements. These are shown in the above tables. If more than one broker or site is listed, you should get more than one quote before deciding which offset to secure.

Broker contact details

Broker Abbreviation	Broker Name	Phone	Email	Website
Abezco	Abzeco Pty. Ltd.	(03) 9431 5444	offsets@abzeco.com.au	www.abzeco.com.au
Baw Baw SC	Baw Baw Shire Council	(03) 5624 2411	bawbaw@bawbawshire.vic.gov.au	www.bawbawshire.vic.gov.au
Bio Offsets	Biodiversity Offsets Victoria	0452 161 013	info@offsetsvictoria.com.au	www.offsetsvictoria.com.au
Contact NVOR	Native Vegetation Offset Register	136 186	nativevegetation.offsetregister@delwp.vic.gov.au	www.environment.vic.gov.au/native-vegetation
Ecocentric	Ecocentric Environmental Consulting	0410 564 139	ecocentric@me.com	Not avaliable
Ethos	Ethos NRM Pty Ltd	(03) 5153 0037	offsets@ethosnrm.com.au	www.ethosnrm.com.au
Nillumbik SC	Nillumbik Shire Council	(03) 9433 3316	offsets@nillumbik.vic.gov.au	www.nillumbik.vic.gov.au
TFN	Trust for Nature	8631 5888	offsets@tfn.org.au	www.trustfornature.org.au
VegLink	Vegetation Link Pty Ltd	(03) 5470 5232	offsets@vegetationlink.com.au	www.vegetationlink.com.au
Yarra Ranges SC	Yarra Ranges Shire Council	1300 368 333	biodiversityoffsets@yarraranges.vic.gov.au	www.yarraranges.vic.gov.au

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For more information contact the DELWP Customer Service Centre 136 186 or the Native Vegetation Credit Register at nativevegetation.offsetregister@delwp.vic.gov.au

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Obtaining this publication does not guarantee that the credits shown will be available in the Native Vegetation Credit Register either now or at a later time when a purchase of native vegetation credits is planned.

Notwithstanding anything else contained in this publication, you must ensure that you comply with all relevant laws, legislation, awards or orders and that you obtain and comply with all permits, approvals and the like that affect, are applicable or are necessary to undertake any action to remove, lop or destroy or otherwise deal with any native vegetation or that apply to matters within the scope of Clauses 52.16 or 52.17 of the Victoria Planning Provisions and Victorian planning schemes

Unit 4, 21 Eugene Terrace
Ringwood Victoria 3134

ABN: 95 080 021 610

T 03 9870 7700
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jacob.vittorio@treelogic.com.au

4 February 2016

Hamish Macdonald
Development Executive
Intrapac Projects Pty. Ltd
33 Coventry Street,
Southbank, Vic 3006

Dear Hamish,

RE: Review of Waverley Golf Course

I refer to your request to undertake a site assessment and review the moderate to high rated trees/groups in order to provide a more detailed assessment of trees within these groups that are worthy of retention. This arboricultural assessment should be considered in conjunction with the preliminary assessment prepared by Tree Logic on 6 August 2014 Reference No. 14_5924.

Assessment Overview – 2 February 2016

The assessment comprised of a walk-by of the vegetation within the course to review and assess the better quality specimens within the Moderate and High rated tree groups. Observations were made of the assessed trees to determine species, age category and condition. Measurements were taken to establish the crown height (measured with a height meter), crown width (paced) and trunk dimensions (measured 1.4 m up the trunk with a diameter tape unless otherwise stated). Descriptors used in the tree assessment can be seen in Appendix 3.

Assessment details of individual trees of better quality are listed in the Tree assessment table in Appendix 1. A copy of the tree plan can be seen in Appendix 2. The assessed trees have been allocated tree protection zones (TPZ). The Australian Standard, *AS 4970-2009 'Protections of trees on development sites'*, has been used as a guide in the allocation of TPZ's for the assessed trees.

This arboricultural assessment should be considered in conjunction with the Knox Planning Scheme. The site is subject to Clause 42.01 Environmental Significance Overlay and is covered by Schedule 2 to the Environmental Significance Overlay (ESO2) – Sites of biological significance. This schedule's primary aim is to protect indigenous vegetation. In this schedule the term 'Indigenous' refers to species that are native to Knox. A permit is required to remove, destroy or lop any vegetation, including dead vegetation.

Observations

The 48 ha golf course contains large patches of remnant vegetation in some of the roughs, interlinked by corridors of planted Victorian and Australian native trees and exotic conifers with a small amount of understory plantings.

The course is generally well treed with ample opportunity to retain trees within a residential development context. The majority of the trees were used to define the fairways and course boundaries. Overall the general tree population was of maturing specimens with a small amount of new plantings, the majority being of Australian native stock. Remnant, indigenous tree groups and individual trees were scattered throughout the course.

One hundred and twenty one (121) trees were assessed and considered to be of better quality or of an indigenous species, with expected increased ecological significance beyond that attributed from an arboricultural perspective. These trees have the potential to be medium to long term components of the landscape, if managed appropriately. Sufficient space should be allocated within the design to adequately protect the recommended tree protection zone and minimise construction encroachment.

Generally the trees in better condition were, either planted species such as Spotted Gum (*Corymbia maculata*), Lemon Scented Gum (*Corymbia citriodora*), Red Flowering Gums (*Corymbia ficifolia*), Smooth Barked Apple (*Angophora* costata), Red Iron Bark (*Eucalyptus sideroxylon*). Deodar Cedar (*Cedrus deodara*), Pin Oak (*Quercus palustris*) and Arizona Cypress (*Cupressus arizonica*) provide an exotic contrast.

The indigenous trees consisted of species including, Narrow-Leaved Peppermint (*Eucalyptus radiata*), Mealy Stringybark (*Eucalyptus cephalocarpa*) and Long Leaved Box (*Eucalyptus goniocalyx*). The remnant tree groups were concentrated towards the central and south-east sections of the course. The greatest concentration of remnant eucalypts were in the central area near the existing maintenance sheds.

Along with the High remnant groups of trees, retention of the one hundred and twenty one (121) assessed trees is highly desirable.

The remaining trees were generally not significant due to their size, age and/or condition. However, such trees still contribute to the overall landscape amenity and could be considered for retention, if not requiring a disproportionate expenditure of resources for a tree in its condition and location.

I reiterate that this tree assessment is preliminary in nature and that a detailed assessment of every tree within the course may be required in order to satisfy both planning and other regulatory requirements.

Should you have any questions, please do not hesitate to contact me.

Sincerely,

Jacob Vittorio (Dip. Arb.)

Consultant Arborist

Appendix 1: Tree details

DBH = Diameter at Breast Height (measured in centimetres at 1.4m above ground unless otherwise stated).
TPZ = Tree Protection Zone (metre radius). Radius distances measured in metres from the centre of the trunk.
For tree location and numbering refer Appendix 2. See Appendix 3 for Tree descriptors

Tree No.	Species (Common Name)	Age	Origin	Height x Width (m)	DBH (cm)	Health	Structure	TPZ (m radius)	Comment
1	*Corymbia maculata* (Spotted Gum)	Maturing	Victorian Native	18 x 10	92	Fair	Fair	11.0	Co-dominant union
2	*Eucalyptus cephalocarpa* (Mealy Stringybark)	Over-mature	Indigenous	16 x 12	49, 62	Fair	Fair to poor	9.5	Trunk decay, Remnant
3	*Eucalyptus cephalocarpa* (Mealy Stringybark)	Maturing	Indigenous	10 x 8	58	Fair	Fair	7.0	Suppressed
4	*Corymbia maculata* (Spotted Gum)	Early-mature	Victorian Native	16 x 8	47	Fair	Fair	5.6	
5	*Eucalyptus cephalocarpa* (Mealy Stringybark)	Maturing	Indigenous	14 x 9	56	Fair	Fair	6.7	
6	*Eucalyptus globulus* (Tasmanian Blue Gum)	Maturing	Victorian Native	19 x 10	96	Fair	Fair	11.5	
7	*Eucalyptus cephalocarpa* (Mealy Stringybark)	Early-mature	Indigenous	11 x 8	45	Fair to poor	Fair to poor	5.4	
8	*Eucalyptus cephalocarpa* (Mealy Stringybark)	Maturing	Indigenous	16 x 12	78	Fair	Fair to poor	9.4	Trunk decay, over extended limbs, Remnant
9	*Eucalyptus cephalocarpa* (Mealy Stringybark)	Maturing	Indigenous	15 x 10	74	Fair	Fair to poor	8.9	Trunk decay, remnant
10	*Eucalyptus cephalocarpa* (Mealy Stringybark)	Maturing	Indigenous	12 x 9	51	Fair	Fair to poor	6.1	Trunk lean
11	*Cupressus arizonica* (Rough-barked Arizona Cypress)	Early-mature	Exotic conifer	10 x 5	30	Fair	Fair	3.6	Group of 4
12	*Eucalyptus sideroxylon* (Red Ironbark)	Early-mature	Victorian Native	14 x 7	34	Fair	Fair	4.1	
13	*Eucalyptus cephalocarpa* (Mealy Stringybark)	Over-mature	Indigenous	17 x 12	106	Fair	Fair to poor	12.7	Remnant

Tree No.	Species (Common Name)	Age	Origin	Height x Width (m)	DBH (cm)	Health	Structure	TPZ (m radius)	Comment
14	*Eucalyptus cephalocarpa* (Mealy Stringybark)	Maturing	Indigenous	14 x 12	68, 46, 18	Fair	Poor	10.1	Trunk decay extending into base, Remnant
15	*Eucalyptus cephalocarpa* (Mealy Stringybark)	Maturing	Indigenous	16 x 9	57	Fair	Fair	6.8	
16	*Corymbia maculata* (Spotted Gum)	Maturing	Victorian Native	20 x 12	58	Fair	Fair	7.0	
17	*Eucalyptus sideroxylon* (Red Ironbark)	Maturing	Victorian Native	18 x 9	51	Fair	Fair	6.1	
18	*Eucalyptus sideroxylon* (Red Ironbark)	Maturing	Victorian Native	20 x 12	52	Fair	Fair	6.2	
19	*Corymbia maculata* (Spotted Gum)	Maturing	Victorian Native	19 x 13	52	Fair	Fair	6.2	
20	*Corymbia maculata* (Spotted Gum)	Early-mature	Victorian Native	17 x 8	38	Fair	Fair	4.6	
21	*Corymbia maculata* (Spotted Gum)	Early-mature	Victorian Native	17 x 11	45	Fair	Fair	5.4	Group of 9
22	*Eucalyptus cephalocarpa* (Mealy Stringybark)	Maturing	Indigenous	14 x 9	58	Fair	Fair	7.0	
23	*Eucalyptus cephalocarpa* (Mealy Stringybark)	Early-mature	Indigenous	12 x 7	43	Fair	Fair	5.2	
24	*Corymbia maculata* (Spotted Gum)	Maturing	Victorian Native	16 x 9	47	Fair	Fair	5.6	
25	*Corymbia maculata* (Spotted Gum)	Early-mature	Victorian Native	14 x 8	44	Fair	Fair	5.3	
26	*Eucalyptus cephalocarpa* (Mealy Stringybark)	Maturing	Indigenous	16 x 14	83	Fair	Fair	10.0	
27	*Eucalyptus radiata* (Narrow-leaved Peppermint)	Maturing	Indigenous	15 x 14	76	Fair	Fair to poor	9.1	Over extended limbs, Remnant
28	*Eucalyptus cinerea* (Argyle Apple)	Early-mature	Victorian Native	11 x 6	30	Fair	Fair	3.6	
29	*Eucalyptus cephalocarpa* (Mealy Stringybark)	Maturing	Indigenous	12 x 8	43	Fair	Fair	5.2	

Tree No.	Species (Common Name)	Age	Origin	Height x Width (m)	DBH (cm)	Health	Structure	TPZ (m radius)	Comment
30	*Eucalyptus cephalocarpa* (Mealy Stringybark)	Maturing	Indigenous	15 x 9	64	Fair	Fair	7.7	
31	*Eucalyptus cephalocarpa* (Mealy Stringybark)	Early-mature	Indigenous	11 x 7	39	Fair	Fair	4.7	
32	*Eucalyptus cephalocarpa* (Mealy Stringybark)	Early-mature	Indigenous	12 x 7	40	Fair	Fair	4.8	
33	*Eucalyptus cephalocarpa* (Mealy Stringybark)	Over-mature	Indigenous	17 x 12	48,57	Fair	Fair to poor	8.9	Remnant
34	*Corymbia citriodora* (Lemon-scented Gum)	Early-mature	Australian Native	16 x 7	36	Fair	Fair	4.3	
35	*Corymbia maculata* (Spotted Gum)	Early-mature	Victorian Native	15 x 8	40	Fair	Fair	4.8	
36	*Corymbia maculata* (Spotted Gum)	Early-mature	Victorian Native	14 x 7	33	Fair	Fair	4.0	
37	*Eucalyptus radiata* (Narrow-leaved Peppermint)	Maturing	Indigenous	11 x 12	48, 61	Fair	Fair	9.3	
38	*Corymbia ficifolia* (Red-flowering Gum)	Early-mature	Australian Native	11 x 6	48	Fair	Fair	5.8	Acute unions
39	*Corymbia maculata* (Spotted Gum)	Maturing	Victorian Native	15 x 10	49	Fair	Fair	5.9	
40	*Corymbia maculata* (Spotted Gum)	Early-mature	Victorian Native	15 x 6	38	Fair	Fair	4.6	
41	*Eucalyptus sideroxylon* (Red Ironbark)	Maturing	Victorian Native	19 x 16	92	Fair	Fair to poor	11.0	Over extended limbs developing, co-dominant stems
42	*Corymbia maculata* (Spotted Gum)	Maturing	Victorian Native	19 x 10	59	Fair	Fair	7.1	
43	*Corymbia maculata* (Spotted Gum)	Maturing	Victorian Native	17 x 12	64	Fair	Fair	7.7	
44	*Eucalyptus cephalocarpa* (Mealy Stringybark)	Maturing	Indigenous	11 x 8	55	Fair	Fair to poor	6.6	Power line pruned
45	*Corymbia maculata* (Spotted Gum)	Early-mature	Victorian Native	11 x 6	30	Fair	Fair	3.6	

Tree No.	Species (Common Name)	Age	Origin	Height x Width (m)	DBH (cm)	Health	Structure	TPZ (m radius)	Comment
46	*Corymbia maculata* (Spotted Gum)	Maturing	Victorian Native	14 x 8	50	Fair	Fair	6.0	
47	*Corymbia citriodora* (Lemon-scented Gum)	Early-mature	Australian Native	14 x 8	56	Fair	Fair	6.7	
48	*Corymbia maculata* (Spotted Gum)	Early-mature	Victorian Native	17 x 7	44	Fair	Fair	5.3	
49	*Corymbia maculata* (Spotted Gum)	Maturing	Victorian Native	17 x 10	53	Fair	Fair	6.4	
50	*Corymbia maculata* (Spotted Gum)	Maturing	Victorian Native	22 x 12	72	Fair	Fair	8.6	
51	*Corymbia maculata* (Spotted Gum)	Maturing	Victorian Native	17 x 10	51	Fair	Fair	6.1	
52	*Corymbia maculata* (Spotted Gum)	Early-mature	Victorian Native	15 x 8	40	Fair	Fair	4.8	
53	*Corymbia maculata* (Spotted Gum)	Maturing	Victorian Native	16 x 11	50	Fair	Fair	6.0	
54	*Eucalyptus cephalocarpa* (Mealy Stringybark)	Maturing	Indigenous	12 x 7	54	Fair to poor	Fair	6.5	Crown dieback
55	*Eucalyptus cephalocarpa* (Mealy Stringybark)	Over-mature	Indigenous	16 x 12	88	Fair	Fair to poor	10.6	Past limb failures, Remnant
56	*Eucalyptus cephalocarpa* (Mealy Stringybark)	Maturing	Indigenous	15 x 8	79	Fair	Fair	9.5	
57	*Eucalyptus cephalocarpa* (Mealy Stringybark)	Maturing	Indigenous	14 x 10	82	Fair	Fair to poor	9.8	Remnant
58	*Corymbia maculata* (Spotted Gum)	Early-mature	Victorian Native	12 x 6	42	Fair	Fair	5.0	
59	*Corymbia maculata* (Spotted Gum)	Maturing	Victorian Native	18 x 10	73	Fair	Fair	8.8	
60	*Eucalyptus cephalocarpa* (Mealy Stringybark)	Maturing	Indigenous	11 x 7	45, 30, 26	Fair	Poor	7.2	Multi stemmed, Remnant
61	*Corymbia maculata* (Spotted Gum)	Early-mature	Victorian Native	16 x 9	45	Fair	Fair	5.4	

Tree No.	Species (Common Name)	Age	Origin	Height x Width (m)	DBH (cm)	Health	Structure	TPZ (m radius)	Comment
62	*Corymbia maculata* (Spotted Gum)	Maturing	Victorian Native	16 x 10	58	Fair	Fair	7.0	
63	*Corymbia maculata* (Spotted Gum)	Early-mature	Victorian Native	12 x 6	38	Fair	Fair	4.6	
64	*Eucalyptus bicostata* (Victorian Blue Gum)	Maturing	Victorian Native	21 x 15	115	Fair	Fair to poor	13.8	Over extended limbs
65	*Corymbia maculata* (Spotted Gum)	Maturing	Victorian Native	15 x 9	54	Fair	Fair	6.5	
66	*Eucalyptus cephalocarpa* (Mealy Stringybark)	Maturing	Indigenous	12 x 8	50	Fair	Fair	6.0	
67	*Corymbia citriodora* (Lemon-scented Gum)	Early-mature	Australian Native	14 x 7	46	Fair	Fair	5.5	
68	*Eucalyptus cephalocarpa* (Mealy Stringybark)	Maturing	Indigenous	14 x 11	77	Fair	Fair	9.2	
69	*Corymbia maculata* (Spotted Gum)	Maturing	Victorian Native	16 x 9	53	Fair	Fair	6.4	
70	*Corymbia citriodora* (Lemon-scented Gum)	Maturing	Australian Native	16 x 10	66	Fair	Fair	7.9	
71	*Angophora costata* (Smooth-barked Apple)	Maturing	Australian Native	15 x 9	54	Fair	Fair	6.5	Trunk lean
72	*Eucalyptus cephalocarpa* (Mealy Stringybark)	Over-mature	Indigenous	13 x 10	89	Fair	Poor	10.7	Trunk decay, Remnant
73	*Corymbia ficifolia* (Red-flowering Gum)	Early-mature	Australian Native	12 x 7	48	Fair	Fair	5.8	
74	*Corymbia maculata* (Spotted Gum)	Early-mature	Victorian Native	15 x 8	43	Fair	Fair	5.2	
75	*Eucalyptus cephalocarpa* (Mealy Stringybark)	Maturing	Indigenous	14 x 9	69	Fair	Fair	8.3	
76	*Corymbia maculata* (Spotted Gum)	Maturing	Victorian Native	19 x 12	58	Fair	Fair	7.0	Over extended limbs developing
77	*Corymbia maculata* (Spotted Gum)	Maturing	Victorian Native	16 x 14	67	Fair	Fair	8.0	Over extended limbs developing

Tree No.	Species (Common Name)	Age	Origin	Height x Width (m)	DBH (cm)	Health	Structure	TPZ (m radius)	Comment
78	*Eucalyptus cephalocarpa* (Mealy Stringybark)	Early-mature	Indigenous	10 x 6	36	Fair	Fair	4.3	
79	*Angophora costata* (Smooth-barked Apple)	Early-mature	Australian Native	9 x 6	29	Fair	Fair	3.5	
80	*Corymbia maculata* (Spotted Gum)	Early-mature	Victorian Native	14 x 7	45	Fair	Fair	5.4	
81	*Corymbia maculata* (Spotted Gum)	Early-mature	Victorian Native	13 x 6	32	Fair	Fair	3.8	
82	*Corymbia maculata* (Spotted Gum)	Maturing	Victorian Native	16 x 9	53	Fair	Fair	6.4	
83	*Eucalyptus goniocalyx* (Long-leaved Box)	Over-mature	Indigenous	16 x 15	160	Fair	Poor	19.2	Multi stemmed with included bark unions, Remnant
84	*Corymbia maculata* (Spotted Gum)	Maturing	Victorian Native	20 x 10	63	Fair	Fair	7.6	
85	*Corymbia maculata* (Spotted Gum)	Maturing	Victorian Native	20 x 11	71	Fair	Fair	8.5	
86	*Eucalyptus goniocalyx* (Long-leaved Box)	Maturing	Indigenous	13 x 11	48, 43	Fair	Fair to poor	7.7	Co-dominant stems, Remnant
87	*Eucalyptus goniocalyx* (Long-leaved Box)	Over-mature	Indigenous	14 x 9	111	Fair to poor	Poor	13.3	Reduced canopy density, trunk decay Remnant
88	*Eucalyptus goniocalyx* (Long-leaved Box)	Over-mature	Indigenous	14 x 9	101	Fair	Poor	12.1	trunk and basal decay remnant
89	*Eucalyptus goniocalyx* (Long-leaved Box)	Over-mature	Indigenous	15 x 9	98	Fair	Fair to poor	11.8	Remnant
90	*Cedrus deodara* (Deodar)	Early-mature	Exotic conifer	13 x 8	39	Fair	Fair	4.7	
91	*Eucalyptus sp.* (Gum Tree)	Early-mature	Victorian Native	13 x 9	46	Fair	Fair	5.5	Trunk wound
92	*Corymbia maculata* (Spotted Gum)	Early-mature	Victorian Native	15 x 8	35	Fair	Fair	4.2	Group of 9
93	*Corymbia maculata* (Spotted Gum)	Early-mature	Victorian Native	15 x 8	40	Fair	Fair	4.8	

Tree No.	Species (Common Name)	Age	Origin	Height x Width (m)	DBH (cm)	Health	Structure	TPZ (m radius)	Comment
94	*Corymbia maculata* (Spotted Gum)	Early-mature	Victorian Native	15 x 10	43	Fair	Fair	5.2	
95	*Corymbia maculata* (Spotted Gum)	Early-mature	Victorian Native	14 x 8	35	Fair	Fair	4.2	
96	*Quercus palustris* (Pin Oak)	Maturing		14 x 12	68	Fair	Fair	8.2	
97	*Corymbia maculata* (Spotted Gum)	Early-mature	Victorian Native	12 x 9	39	Fair	Fair	4.7	Under powerlines
98	*Corymbia maculata* (Spotted Gum)	Maturing	Victorian Native	17 x 12	60	Fair	Fair	7.2	
99	*Eucalyptus cephalocarpa* (Mealy Stringybark)	Over-mature	Indigenous	11 x 6	68	Fair to poor	Poor	8.2	Reduced canopy density, trunk and basal decay. Remnant
100	*Eucalyptus radiata* (Narrow-leaved Peppermint)	Over-mature	Indigenous	13 x 7	73	Fair to poor	Fair to poor	8.8	dieback, trunk decay
101	*Eucalyptus sideroxylon* (Red Ironbark)	Maturing	Victorian Native	22 x 10	93	Fair	Fair to poor	11.2	
102	*Banksia integrifolia* (Coast Banksia)	Early-mature	Victorian Native	10 x 6	37	Fair	Fair	4.4	
103	*Corymbia maculata* (Spotted Gum)	Early-mature	Victorian Native	11 x 6	44	Fair	Fair	5.3	
104	*Eucalyptus radiata* (Narrow-leaved Peppermint)	Maturing	Indigenous	12 x 7	54	Fair	Fair	6.5	
105	*Eucalyptus radiata* (Narrow-leaved Peppermint)	Maturing	Indigenous	13 x 7	48	Fair	Fair	5.8	
106	*Eucalyptus radiata* (Narrow-leaved Peppermint)	Maturing	Indigenous	14 x 8	58	Fair	Fair	7.0	Over extended limbs developing
107	*Eucalyptus cephalocarpa* (Mealy Stringybark)	Early-mature	Indigenous	11 x 7	45	Fair	Fair	5.4	Suppressed
108	*Eucalyptus cephalocarpa* (Mealy Stringybark)	Early-mature	Indigenous	10 x 7	39	Fair to poor	Fair	4.7	Crown dieback
109	*Eucalyptus goniocalyx* (Long-leaved Box)	Maturing	Indigenous	16 x 10	86	Fair	Fair to poor	10.3	Remnant

Tree No.	Species (Common Name)	Age	Origin	Height x Width (m)	DBH (cm)	Health	Structure	TPZ (m radius)	Comment
110	*Eucalyptus radiata* (Narrow-leaved Peppermint)	Maturing	Indigenous	14 x 10	61	Fair	Fair to poor	7.3	Remnant
111	*Eucalyptus cephalocarpa* (Mealy Stringybark)	Maturing	Indigenous	15 x 9	59	Fair	Fair to poor	7.1	
112	*Eucalyptus cephalocarpa* (Mealy Stringybark)	Maturing	Indigenous	16 x 10	63	Fair	Fair to poor	7.6	Remnant
113	*Corymbia maculata* (Spotted Gum)	Early-mature	Victorian Native	16 x 7	38	Fair	Fair	4.6	
114	*Eucalyptus cephalocarpa* (Mealy Stringybark)	Maturing	Indigenous	14 x 9	50	Fair	Fair	6.0	
115	*Eucalyptus cephalocarpa* (Mealy Stringybark)	Maturing	Indigenous	10 x 7	42, 29	Fair	Fair to poor	6.1	Trunk lean, co-dominant stems with included bark union
116	*Eucalyptus goniocalyx* (Long-leaved Box)	Maturing	Indigenous	15 x 10	54, 47	Fair	Fair to poor	8.6	Remnant, co-dominant stems with included bark anion
117	*Eucalyptus cephalocarpa* (Mealy Stringybark)	Maturing	Indigenous	15 x 9	50, 40	Fair	Fair to poor	7.7	Co-dominant stems, over extended limbs, Remnant
118	*Eucalyptus goniocalyx* (Long-leaved Box)	Maturing	Indigenous	11 x 7	87	Fair to poor	Fair	10.4	Crown dieback, Remnant
119	*Corymbia maculata* (Spotted Gum)	Early-mature	Victorian Native	14 x 7	35	Fair	Fair	4.2	
120	*Corymbia ficifolia* (Red-flowering Gum)	Maturing	Australian Native	12 x 12	37, 20, 41	Fair	Fair	7.0	
121	*Corymbia maculata* (Spotted Gum)	Maturing	Victorian Native	16 x 9	66	Fair	Fair	7.9	

treelogic

Client: Intrapac Projects
Map Source: Near Maps
Author: Jacob Vittorio
Date: 3 February 2016

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Appendix 2 - Tree Numbers and Location
Waverley Golf Course

Co-ordinate System: GDA 1994
MGA Zone 55
Projection: Transverse Mercator
Datum: GDA 1994

Map 1

treelogic

Client: Intrapac Projects
Map Source: Near Maps
Author: Jacob Vittorio
Date: 3 February 2016

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Appendix 2 - Tree Numbers and Location
Waverley Golf Course

Co-ordinate System: GDA 1994
MGA Zone 55
Projection: Transverse Mercator
Datum: GDA 1994

Map 2

Appendix 3: Arboricultural Descriptors (April 2015)

Note that not all of the described tree descriptors may be used in a tree assessment and report. The assessment is undertaken with regard to contemporary arboricultural practices and consists of a visual inspection of external and above-ground tree parts.

1. Tree Condition

The assessment of tree condition evaluates factors of health and structure. The descriptors of health and structure attributed to a tree evaluate the individual specimen to what could be considered typical for that species growing in its location under current climatic conditions. For example, some species can display inherently poor branching architecture, such as multiple acute branch attachments with included bark. Whilst these structural defects may technically be considered arboriculturally poor, they are typical for the species and may not constitute an increased risk of failure. These trees may be assigned a structural rating of fair-poor (rather than poor) at the discretion of the assessor.

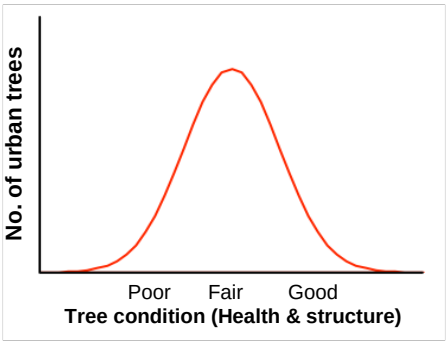


Diagram 1: Indicative normal distribution curve for tree condition

Diagram 1, provides an indicative distribution curve for tree condition to illustrate that within a normal tree population the majority of specimens are centrally located within the condition range (normal distribution curve). Furthermore, that those individual trees with an assessed condition approaching the outer ends of the spectrum occur less often.

2. Tree Name

Provides botanical name, (genus, species, variety and cultivar) according to accepted international code of taxonomic classification, and common name.

3. Tree Type

Describes the general geographic origin of the species and its type e.g. deciduous or evergreen.

Category	Description
Indigenous	Occurs naturally in the area or region of the subject site. Remnant.
Victorian native	Occurs naturally within some part of the State of Victoria (not exclusively) but is not indigenous (component of EVC benchmark). Could be planted indigenous trees.
Australian native	Occurs naturally within Australia but is not a Victorian native or indigenous
Exotic deciduous	Occurs outside of Australia and typically sheds its leaves during winter
Exotic evergreen	Occurs outside of Australia and typically holds its leaves all year round
Exotic conifer	Occurs outside of Australia and is classified as a gymnosperm
Native conifer	Occurs naturally within Australia and is classified as a gymnosperm
Native Palm	Occurs naturally within Australia. Woody monocotyledon
Exotic Palm	Occurs outside of Australia. Woody monocotyledon

4. Height and Width

Indicates height and width of the individual tree; dimensions are expressed in metres. Crown heights are measured with a height meter where possible. Due to the topography of some sites and/or the density of vegetation it may not be possible to do this for every tree. Tree heights may be estimated in line with previous height meter readings in conjunction with assessor's experience. Crown widths are generally paced (estimated) at the widest axis or can be measured on two axes and averaged. In some instances the crown width can be measured on the four cardinal direction points (North, South, East and West).

Crown height, crown spread are generally recorded to the nearest half metre (crown spread would be rounded up) for dimensions up to 10 m and the nearest whole metre for dimensions over 10 m. Estimated dimensions (e.g. for off-site or otherwise inaccessible trees where accurate data cannot be recovered) shall be clearly identified in the assessment data.

5. Trunk diameters

The position where trunk diameters are captured may vary dependent on the requirements of the specific assessment and an individual trees specific characteristics. DBH is the typical trunk diameter captured as it relates to the allocation of tree protection distances. The basal trunk diameter assists in the allocation of a structural root zone. Some municipalities require trunk diameters be captured at different heights, with 1.0 m above grade being a common requirement. The specific planning schemes will be checked to ascertain requirements.

Stem diameters shall be recorded in centimetres, rounded to the nearest 1 cm (0.01 m).

Diameter at Breast Height (DBH)

Indicates the trunk diameter (expressed in centimetres) of an individual tree measured at 1.4m above the existing ground level or where otherwise indicated, multiple leaders are measured individually. Plants with multiple leader habit may be measured at the base. The range of methods to suit particular trunk shapes, configurations and site conditions can be seen in Appendix A of Australian Standard *AS 4970-2009 Protection of trees on development site*s. Measurements undertaken using foresters tape or builders tape.

Basal trunk diameter

The basal dimension is the trunk diameter measured at the base of the trunk or main stem(s) immediately above the root buttress. Used to ascertain the Structural Root Zone (SRZ) as outlined in AS4970.

6. Health

Assesses various attributes to describe the overall health and vigour of the tree.

Category	Vigour, Extension growth	Decline symptoms, Deadwood, Dieback	Foliage density, colour, size, intactness	Pests and or disease
Good	Above typical. Excellent. Full canopy density	Negligible	Better than typical	Negligible
Fair	Typical. 90-100% canopy density	Minor or expected. Little or no dead wood	Typical. Minor deficiencies or defects could be present.	Minor, within damage thresholds

Category	Vigour, Extension growth	Decline symptoms, Deadwood, Dieback	Foliage density, colour, size, intactness	Pests and or disease
Fair to Poor	Below typical - low vigour	More than typical. Small sub-branch dieback	Exhibiting deficiencies. Could be thinning, or smaller	Exceeds damage thresholds
Poor	Minimal - declining	Excessive, large and/or prominent amount & size of dead wood	Exhibiting severe deficiencies. Thinning foliage, generally smaller or deformed	Extreme and contributing to decline
Dead	N/A	N/A	N/A	N/A

7. Structure

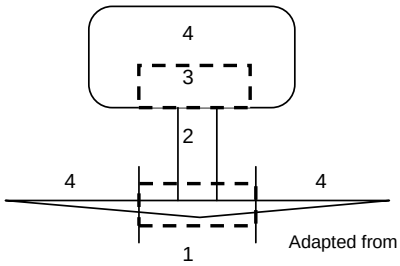
Assesses principal components of tree structure (Diagram 2).

Descriptor	Zone 1 - Root plate & lower stem	Zone 2 - Trunk	Zone 3 - Primary branch support	Zone 4 - Outer crown and roots
Good	No obvious damage, disease or decay; obvious basal flare / stable in ground	No obvious damage, disease or decay; well tapered	Well formed, attached, spaced and tapered. No history of failure.	No obvious damage, disease, decay or structural defect. No history of failure.
Fair	Minor damage or decay. Basal flare present.	Minor damage or decay	Generally well attached, spaced and tapered branches. Minor structural deficiencies may be present or developing. No history of branch failure.	Minor damage, disease or decay; minor branch end-weight or over-extension. No history of branch failure.
Fair to Poor	Moderate damage or decay; minimal basal flare.	Moderate damage or decay; approaching recognised thresholds	Weak, decayed or with acute branch attachments; previous branch failure evidence	Moderate damage, disease or decay; moderate branch end-weight or over-extension. Minor branch failure evident.
Poor	Major damage, disease or decay; fungal fruiting bodies present. Excessive lean placing pressure on root plate	Major damage, disease or decay; exceeds recognised thresholds; fungal fruiting bodies present. Acute lean. Stump re-sprout	Decayed, cavities or has acute branch attachments with included bark; excessive compression flaring; failure likely. Evidence of major branch failure.	Major damage, disease or decay; fungal fruiting bodies present; major branch end-weight or over-extension. Branch failure evident.
Very Poor	Excessive damage, disease or decay; unstable / loose in ground; altered exposure; failure probable	Excessive damage, disease or decay; cavities. Excessive lean. Stump re-sprout	Decayed, cavities or branch attachments with active split; failure imminent. History of major branch failure.	Excessive damage, disease or decay; excessive branch end-weight or over-extension. History of branch failure.

Structure ratings will also take into account general branching architecture, stem taper, live crown ratio, crown symmetry (bias or lean) and crown position such as tree being suppressed amongst more dominant trees.

Diagram 2: Tree structure zones

Root plate & lower stem
Trunk
Primary branch support
Outer crown & roots



Adapted from Coder (1996)

The lowest or worst descriptor assigned to the tree in any column could generally be the overall rating assigned to the tree. The assessment for structure is limited to observations of external and above ground tree parts. It does not include any exploratory assessment of underground or internal tree parts unless this is requested as part of the investigation. Trees are assessed and then given a rating for a point in time. Generally, trees with a poor or very poor structure are beyond the benefit of practical arboricultural treatments.

The management of trees in the urban environment requires appropriate arboricultural input and consideration of risk. Risk potential will take into account the combination of likelihood of failure and impact, including the perceived importance of the target(s).

8. Age class

Relates to the physiological stage of the tree's life cycle.

Category	Description
Young	Sapling tree and/or recently planted. Approximately 5 or less years in location.
Semi-mature	Tree increasing in size and yet to achieve expected size in situation. Primary developmental stage.
Early-mature	Tree established, generally growing vigorously. 50% of attainable age/size.
Mature	Specimen approaching expected size in situation, with reduced incremental growth.
Over-mature	Mature full-size with a retrenching crown. Tree is senescent and in decline. Significant decay generally present.

9. Arboricultural Rating

Relates to the combination of tree condition factors, including health and structure (arboricultural merit), and also conveys an amenity value. Amenity relates to the trees biological, functional and aesthetic characteristics (Hitchmough 1994) within an urban landscape context. The presence of any serious disease or tree-related hazards that would impact risk potential are taken into account.

Category	Description
High	Tree of high quality in good to fair condition. Generally a prominent arboricultural/landscape feature. These trees have the potential to be a medium- to long-term component of the landscape if managed appropriately. Retention of these trees is highly desirable.
Moderate	Tree of moderate quality, in fair or better condition. Tree may have a condition, and or structural problem that will respond to arboricultural treatment. These trees have the potential to be a medium- to long-term component of the landscape if managed appropriately. Retention of these trees is generally desirable.
Low	Unremarkable tree of low quality or little amenity value. Tree in either poor health or with poor structure or a combination. Tree is not significant because of either its size or age, such as young trees with a stem diameter below 15 cm. These trees are easily replaceable. Tree (species) is functionally inappropriate to specific location and would be expected to be problematic if retained. Retention of such trees may be considered if not requiring a disproportionate expenditure of resources for a tree in its condition and location.
None	Trees of low quality with an estimated remaining life expectancy of less than 5 years. Tree has either a severe structural defect or health problem or combination that cannot be sustained with practical arboricultural techniques and the loss of the tree would be expected in the short term. Trees that are dead or are showing signs of significant, immediate, and irreversible overall decline. Tree infected with pathogens of significance to either the health or safety of the tree or other adjacent trees. Tree whose retention would not be viable after the removal of adjacent trees (includes trees that have developed in close spaced groups and would not be expected to acclimatise to severe alterations to surrounding environment – removal of adjacent shelter trees). Tree has a detrimental effect on the environment, for example, the tree is a recognised environmental woody weed with potential to spread into waterways or natural areas. Unremarkable tree of no material landscape, conservation or other cultural value.

Trees have many values, not all of which are considered when an arboricultural assessment is undertaken. However, individual trees or tree group features may be considered important community resources because of unique or noteworthy characteristics or values other than their age, dimensions, health or structural condition. Recognition of one or more of the following criterion is designed to highlight other considerations that may influence the future management of such trees.

Significance	Description
Horticultural Value/ Rarity	Outstanding horticultural or genetic value; could be an important source of propagating stock, including specimens that are particularly resistant to disease or exposure. Any tree of a species or variety that is rare.
Historic, Aboriginal Cultural or Heritage Value	Tree could have value as a remnant of a particular important historical period or a remnant of a site or activity no longer in action. Tree has a recognised association with historic aboriginal activities, including scar trees. Tree commemorates a particular occasion, including plantings by notable people, or having associations with an important event in local history.
Ecological Value	Tree could have value as habitat for indigenous wildlife, including providing breeding, foraging or roosting habitat, or is a component of a wildlife reserve. Remnant Indigenous vegetation that contribute to biological diversity

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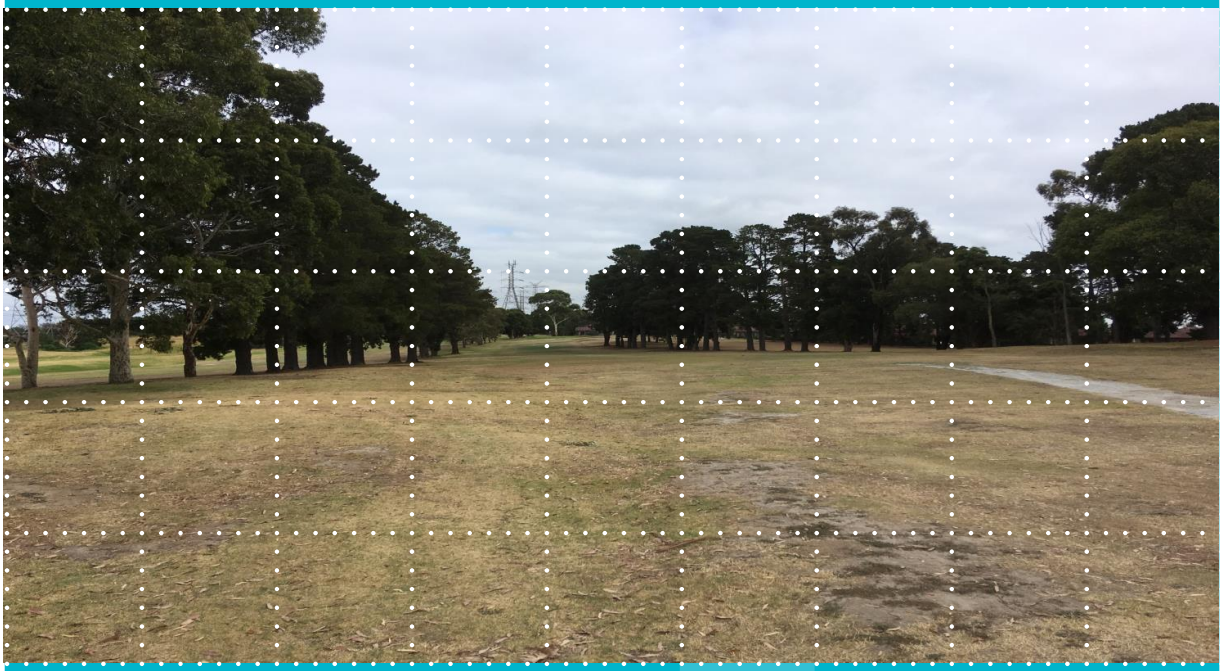
Final Report

Bushfire Risk Assessment for a planning scheme amendment: Several properties that include Waverley Golf Course, Diamond Boarding Kennels & Cattery and 1325-1377 Stud Road, Rowville, Victoria

Prepared for

Intrapac Property Pty. Ltd.

September 2020



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1 INTRODUCTION

1.1 Background

Ecology and Heritage were engaged by Intrapac Property Pty. Ltd. to prepare a Bushfire Risk Assessment for the proposed rezoning of a large section of land that includes Waverley Golf Course, Diamond Boarding Kennels & Cattery and 1325-1377 Stud Road, Rowville.

The purpose of the assessment is to detail the bushfire risk to the study area and demonstrate that adequate bushfire mitigation measures can be implemented to support its rezoning to a residential and commercial zone that accommodates future mixed-use development.

This report undertakes a bushfire risk assessment of the local and broader landscape and addresses the legislative implications associated with the proposal against Clause 13.02-1S Bushfire. Clause 44.06 Bushfire Management Overlay (BMO), Clause 53.02 Bushfire Planning and Australian Standard (AS) 3959:2018 Construction of buildings in bushfire prone areas (Standards Australia 2018) are also addressed as part of this report.

1.2 Study Area

The study area is approximately 74.8 hectares in area and 28 kilometres south-east of Melbourne's CBD. It is bound by residential dwellings to the north, Bergins Road to the east, Police Road to the south and Stud Road to the west.

The study area comprises several properties, including the Waverley Golf Course across most of the study area, Diamond Boarding Kennels & Cattery in the south-eastern corner, a power terminal station and a childcare centre along Police Road, large private properties in the south-western corner, and the Polish Community Centre and Donvale Garden Centre along Stud Road. The surrounding landscape is largely urbanised, with residential development to the north, east and west. Forest, Scrub and Grassland are found south of the study area on the southern side of Police Road.

The study area is zoned Special Use Zone – Schedules 1 and 3 (SUZ1, SUZ3) or Green Wedge Zone – Schedule 2 (GWZ) and is partially covered by the Bushfire Management Overlay (BMO), Environmental Significance Overlay – Schedule 2 (ESO2) and Vegetation Protection Overlay – Schedules 1 and 4 (VPO1, VPO4). The BMO extends approximately 150 metres into the study area's southern boundary for most of its length. The designated Bushfire Prone Area (BPA) also extends into the southern boundary by approximately 300 metres and into the north-eastern corner by approximately 10 metres (Department of Environment, Land, Water and Planning (DELWP) 2020a).

According to NatureKit (DELWP 2020b), the study area is located within the Gippsland Plain bioregion, Port Phillip and Westernport Management Authority and Knox City Council.

The study area was originally assessed on 14 March 2018. It is noted that the site and its broader landscape conditions have not significantly changed since that time and a second field assessment was therefore not warranted.

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2 RESPONSE TO CLAUSE 13.02-1S

Clause 13.02-1S has the objective to '*strengthen the resilience of settlements and communities to bushfire through risk-based planning that prioritises the protection of human life*' (p1). This clause applies to land in the Bushfire Prone Area (BPA), Bushfire Management Overlay (BMO) and/or proposed to be used or developed in a way that may create or increase bushfire hazard. The study area falls within the BPA and BMO categories.

Clause 13.02-1S contains five key strategies to meet the objective, which are:

- Protection of human life;
- Bushfire hazard identification and assessment;
- Settlement planning;
- Areas of biodiversity conservation value; and
- Uses and development in a Bushfire Prone Area.

A detailed assessment against each of the strategies is provided below.

The bushfire hazard risk is assessed at five different levels (Attachments 1 to 5), with a bushfire management plan provided in Attachment 6.

2.1 Protection of Human Life Strategy

These strategies require that the priority be given to the protection of human life.

2.1.1 *Prioritising the protection of human life over all other policy considerations*

The study area will be able to prioritise the protection of human life from a bushfire threat largely by virtue of its location and urban development to the north, east and west (Attachment 2). The only direction a bushfire could therefore approach from is the south and south-east. Several mitigation measures will be employed to prioritise the protection of human life from a fire approaching from these directions. With respect to access and water supply these include:

- Providing several opportunities for emergency vehicle access and occupant egress (i.e. appropriate road width, curve, angle etc.) towards the northern end of the study area;
- Converting the Police Road easement for a majority of its length to a sealed road that will provide access/egress opportunities and act as a fire break; and
- Ensuring emergency vehicle access to water supplies via a hydrant network in accordance with CFA requirements (i.e. hydrants will be positioned within 120 metres of the rear of each dwelling/building).

Furthermore, all buildings within the BPA and BMO will not be exposed to a radiant heat flux of more than 12.5 kilowatts/square metre, which is commensurate to a Bushfire Attack Level (BAL) 12.5 construction standard (Attachment 6). Vegetation will also be managed throughout the study area as public open spaces/reserves/parkland, nature strips and private lawns and ornamental gardens. There

is an existing patch of Forest vegetation towards the west of the study area within land owned by the Polish Community Centre and Donvale Garden Centre. Assuming this patch is retained, and the appropriate defendable space is provided for near-by buildings that may be constructed in the future, it is not considered to be a significant bushfire hazard given it is small and isolated.

2.1.2 *Directing population growth and development to low risk locations and ensuring the availability of, and safe access to, areas where human life can be better protected from the effects of bushfire*

The development is in a highly modified and low bushfire risk setting, which is largely characterised by urban development in three directions. Given the landscape context, occupants will be able to easily move to areas where life can be better protected from the effects of bushfires by moving northwards within the study area or travelling immediately north, east or west outside the study area into the urban areas.

2.1.3 *Reducing the vulnerability of communities to bushfire through the consideration of bushfire risk in decision making at all stages of the planning process*

Clause 13.02-1S is a strategic state-wide planning policy that provides the first opportunity to consider the bushfire risk in this process. This development addresses the risk by ensuring the following:

- All proposed future dwellings and other buildings within the BPA and BMO can be constructed to a BAL-12.5 construction standard;
- Access to/from the existing road network via Stud Road, Bergins Road and Police Road:
- An internal road network that ensures adequate occupant egress;
- Emergency vehicle access opportunities to and from the study area; and,
- Ensuring that a hydrant network is provided.

The CFA provides four principles to respond to Clause 13.02-1S, including that settlement planning decisions should:

- '*Direct development to locations of lower bushfire risk;*
- *Carefully consider development in locations where there is significant bushfire risk that cannot be avoided;*
- *Avoid development in locations of extreme bushfire risk; and*
- *Avoid development in areas where planned bushfire protection measures may be incompatible with other environmental objectives*' (CFA 2015, p.4).

The proposal is considered to apply all four principles by proposing that the planning scheme amendment occurs on land that has been largely cleared and contains exotic grasses and planted vegetation.

There is a small patch of Forest within the study area (Attachment 5) that appears to be native, which would need to be investigated as to its biodiversity values. If this patch was retained in the future, the amount of land available to develop would still be substantial.

2.2 Bushfire Hazard and Identification Assessment Strategies

These strategies require the bushfire hazard be identified and an appropriate risk assessment be undertaken.

2.2.1 *Applying the best available science to identify vegetation, topography and climatic conditions that create a bushfire hazard*

This report identifies the bushfire hazard and applies the standard site assessment methodology used in AS 3959:2018 (Standards Australia 2018), which is applied to developments in the BPA and BMO and is based on the best available science. The bushfire modelling inputs that form the basis for this methodology factor in vegetation type (e.g. Forest, Scrub, Grassland), potential fuel-loads in a long-unburnt vegetation community, weather conditions on higher bushfire risk days (e.g. wind speed, fuel moisture content, days since last rainfall) and the effect of slope gradient on the way fire travels through unmanaged vegetation.

The site assessment process and desktop assessment using GIS software has determined the most appropriate vegetation type and commensurate slope category for each section/aspect of unmanaged vegetation (Attachment 5), which has produced the requisite defendable space for BAL-12.5 construction in areas covered by the BPA and BMO (Attachments 5 and 6).

2.2.2 *Considering the best available information about bushfire hazard including the map of designated bushfire prone areas prepared under the Building Act 1993 or regulations made under the Act*

The BPA covers an extensive area east of Melbourne across agricultural, horticultural and forested landscapes. The BPA extends into the study area to the south by approximately 300 metres due to the presence of unmanaged Forest, Scrub and Grassland in this direction (Attachment 5). The BPA also extends approximately 10 metres into the study area's north-eastern corner (Attachment 5). The remainder of the study area (which is approximately half the area) is therefore not within an area considered to warrant specific bushfire mitigation measures.

2.2.3 *Applying the Bushfire Management Overlay to areas where the extent of vegetation can create an extreme bushfire hazard*

The BMO is applied approximately to the southern 150 metres of the study area due to the Forest and Scrub in this direction (Attachment 5). The Forest vegetation can create an extreme bushfire hazard, with any development within the study area being able to apply appropriate bushfire mitigation measures regarding building construction standards, vegetation management, water supply and access/egress.

2.2.4 *Considering and assessing the bushfire hazard on the basis of:*

- *Landscape conditions – meaning the conditions in the landscape within 20 kilometres from a site;*
- *Local conditions – meaning the conditions in the area within approximately 1 kilometre from a site;*
- *Neighbourhood conditions – meaning conditions in the area within 400 metres of a site; and*

- *The site for the development*

Landscape, local and neighbourhood conditions

The bushfire hazard assessment identifies the broader landscape as being Landscape Type Two, however it does share two characteristics with Landscape Type One (Table 1). The wider landscape (Attachment 1) is characterised by highly urbanised land to the north, east and west. There is some forested land to the south, which is in parks reserves.

At the five kilometre (Attachment 2), local (Attachment 3) and the neighbourhood scales (Attachment 4), the landscape context highlights the dominance of existing urban areas but also draws more focus to the local grassy and forested landscape south of the study area. While it is possible for embers to travel to the study area from a fire approaching from the south or south-east, these two directions are the unlikely directions of fire approach on days of severe fire weather and is thus considered very unlikely. These three scales also show the potential for a grass and/or bushfire to approach the study area directly from the south. While this is more likely than from the east or south-east, it is still relatively unlikely given the most likely directions of fire approach area from the north-west and south-west on days of extreme fire weather in Victoria. Thus, if a fire were to approach the study area under days of extreme fire weather from the south-west, it would be heading in a north-easterly direction and would have to ignite close to Stud Road and travel under perfect weather (particularly wind) conditions towards the study area to be a threat. Similarly, a grass/bushfire could approach the study area from the north-west but would be stopped by Stud Road.

In the event a fire does approach the study area, occupants will have immediate access to safe locations by travelling northwards into more urbanised areas.

Table 1. Bushfire risk landscape types and the dot points (grey) that apply to the study area (DELWP 2017a).

Landscape Type 1	Landscape Type 2	Landscape Type 3	Landscape Type 4
• There is little vegetation beyond 150 metres of the site (except grasslands and low-threat vegetation) • Extreme bushfire behaviour is not possible • The type and extent of vegetation is unlikely to result in neighbourhood-scale destruction of property • Immediate access is available to a place that provides shelter from bushfire	• The type and extent of vegetation located more than 150 metres from the site may result in neighbourhood-scale destruction as it interacts with the bushfire hazard on and close to the site • Bushfire can only approach from one aspect • The site is located in a suburban, township or urban area managed in a minimum fuel condition • Access is readily available to a place that provides shelter from bushfire. This will often be the surrounding developed area	• The type and extent of vegetation located more than 150 metres from the site may result in neighbourhood-scale destruction as it interacts with the bushfire hazard on and close to the site • Bushfire can approach from more than one aspect • The site is located in an area that is not managed in a minimum fuel condition • Access to an appropriate place that provides shelter from bushfire is not certain	• The broader landscape presents an extreme risk • Fires have hours or days to grow and develop before impacting • Evacuation options are limited or not available

Site conditions

The bushfire hazard site assessment describes the bushfire hazard within 150 metres of the study area through vegetation and slope classification in accordance with the site methodology in AS 3959:2018 (Standards Australia 2018). This methodology is used to determine the BAL construction standard and commensurate defendable space.

Classified vegetation within the 150-metre assessment zone comprises a small patch of Forest at the eastern end of the Polish Community Centre and Donvale Garden Centre, and Grassland in the study area's south-western properties. Forest (Plate 1), Scrub (Plate 2) and Grassland (Plate 2) vegetation are found south and north-west of the study area (Attachment 5).

The balance of the study area contains low threat vegetation and non-vegetated areas, including ornamental gardens within the boarding kennels to the east (Plate 3) and managed lawns/fairways within the golf course (Plate 4), power terminal station and other internal properties. While there is currently unmanaged vegetation within the Police Road road reserve south of the golf course, it is expected that this vegetation will be removed as part of the Police Road extension. Urban land north, east and west of the study area, as well as the recreational reserve south of Police Road all contain low threat vegetation and non-vegetated areas.

The local topography is highly variable, with the effective slope (i.e. the slope under the classified vegetation) being determined for each vegetation type (Attachment 5). Once the effective slope for each vegetation type is known, the commensurate defendable space (as per Table 2 to Clause 53.02-5) for a building constructed to BAL-12.5 (as required by Clause 13.02-1S) is determined. Defendable space is the area between buildings and unmanaged (classified) vegetation that is managed in a low threat state in perpetuity. The process used to determine the effective slope and defendable space for four classified vegetation types within and adjoining the study area are provided below, with the results also illustrated in Table 2:

- The slope under the Forest within the Polish Community Centre and Donvale Garden Centre properties sits within a small gully and then rises slightly towards the west at a gradient of 2.7 degrees. The slope classification is taken from the prospective of building being constructed south-west of this Forest vegetation, as no buildings will be constructed within the powerline easement (Special Use Zone on Attachment 6). This therefore places this slope into the Downslope >0 to 5 degrees category, with the Downslope referring to a fire beginning downhill of future buildings and travelling uphill towards them. The defendable space distance is 57 metres.
- The slope under the patch of Grassland south of the study area opposite the childcare centre and power terminal station is 0.8 degrees, with the highest point being along Police Road. The slope classification is Downslope >0 to 5 degrees and the defendable space distance from the Grassland south of Police Road is 22 metres.
- Forest and Grassland vegetation occur immediately south of the golf course component of the study area (Attachment 5). Given the small patch of Grassland present amongst a larger

area of Forest, the Grassland would have an insignificant influence over fire behaviour and thus Forest is the determining vegetation type. The slope leading up to the golf course from the south is approximately 3 degrees over 150 metres (i.e. the site assessment zone), with the highest point being closest to the study area. The slope category is therefore Downslope >0 to 5 degrees. The defendable space distance is 57 metres. The 57-metre defendable space distance for the golf course component begins at the southern boundary of the Police Road easement, as it's assumed that existing vegetation within the easement will be removed due to the proposed extension and widening of Police Road. The Police Road easement is 20 metres wide, which means that buildings within the study area must be set back 37 metres from its southern boundary to facilitate BAL-12.5 construction.

- While Forest and Scrub vegetation are present immediately south of the boarding kennels, the Scrub would not significantly influence a fire's behaviour compared with Forest, which is again the determining vegetation type. In this case the slope is higher at the outer perimeter of the 150-metre assessment zone and runs downhill towards the study area. The slope is therefore classified as Upslope/Flat land (Attachment 5). Attachment 6 shows a Downslope >0 to 5 degrees slope over the Scrub vegetation south of the boarding kennels, which would result in a defendable space distance of 31 metres for BAL-12.5 construction. In this case, the-48 metre defendable space distance based on Forest and Downslope >0 to 5 degrees is larger and thus applied instead. The 48-metre defendable space for the boarding kennels begins at the study area's southern boundary, as it is understood that there are no plans to develop this section of the Police Road easement at this stage.
- The slope under the Forest, Grassland and Scrub north-west of the study area is classified as Upslope/Flat land, with the defendable space distance in response to the Forest vegetation being 48 metres for a BAL-12.5 construction standard. Given that the study area boundary is 50 metres from the edge of the Forest, there are no siting restrictions for buildings in the study area's north-western corner.
- No slope arrows have been placed under the Grassland vegetation within the study area because the slope classification (and therefore defendable space distance) changes based on where a building is located. It is assumed that all this area will be managed as part of any future development and thus will be converted to low threat vegetation and/or non-vegetated areas. If for some reason unmanaged Grassland vegetation is retained, the maximum defendable space distance for any building will be 22 metres, which is based on a Downslope >0 to 5 degrees slope category.

Table 2. Defendable space calculations for BAL-12.5 (as per Table 2 to Clause 53.02-5).

Aspect	Within Donvale Garden Centre	South of childcare center	South of golf course	South of boarding kennels
Vegetation Classification	Forest	Grassland	Forest	Forest
Slope	Downslope >0 to 5 degrees	Downslope >0 to 5 degrees	Downslope >0 to 5 degrees	Upslope / Flat land
BAL Construction Standard	BAL-12.5	BAL-12.5	BAL-12.5	BAL-12.5
Defendable Space Distance	57 metres	22 metres	57 metres	48 metres

2.2.5 *Consulting with emergency management agencies and the relevant fire authority early in the process to receive recommendations and implement appropriate bushfire protection measures*

Consultation with Council have occurred as part of the proposed planning scheme amendment to discuss the bushfire risk and how best to implement bushfire protection measures. While specific details regarding lot layouts and road networks have not been considered due to the high-level nature of the proposal, appropriate bushfire protection measures can still be determined and understood at this stage and be implemented at the concept design phase.

This dialogue with authorities will continue to ensure that emergency management agencies are aware of the development's progress and are able to discuss certain design aspects and provide guidance where necessary.

2.2.6 *Ensuring that strategic planning documents, planning scheme amendments, planning permit applications and development plan approvals properly assess the bushfire risk and include appropriate bushfire protection measures*

Clause 13.02-1S, Clause 44.06, Clause 53.02, DELWP advisory and practice notes (DELWP 2017a, 2017b, 2018), CFA guidance note (CFA 2015) and the building regulations (i.e. AS 3959:2018) regarding bushfire matters have been referred to when assessing the bushfire risk. The standards and requirements provided in these documents have been addressed in this report through several appropriate bushfire mitigation measures regarding a building's construction standard, defendable space, water supply and access.

2.2.7 *Not approving development where a landowner or proponent has not satisfactorily demonstrated that the relevant policies have been addressed, performance measures satisfied or bushfire protection measures can be adequately implemented*

Several bushfire mitigation measures will be implemented as part of the study area's future development, which include implementing all the access and water supply requirements stipulated under the planning scheme. Dwellings and other buildings within the BPA and BMO will be built to a BAL-12.5 construction standard and provide the commensurate defendable space. Furthermore, vegetation within the study area (including the areas outside the BPA) will be maintained in a low threat state (i.e. lawn maintained to less than 100 millimetres in height) across the public and private areas as part of any future development. The only area that should not be expected to be maintained

is the existing patch of Forest towards the western end of the study area. This area is not considered to be a significant bushfire threat given it is small and isolated, and buildings can still be constructed around it to a BAL-12.5 standard (Attachment 6). Furthermore, the study area will become an extension of the local urban environment and therefore provide adequate egress and emergency vehicle access/egress opportunities and a compliant hydrant network.

The CFA specifies four situations where development should not proceed, which include:

- '*Isolated settlements where the size and/or configuration of the settlements will be insufficient to modify fire behaviour and provide protection from a bushfire;*
- *Where bushfire protection measures will not reduce the risk to an acceptable level;*
- *Where evacuation (access) is severely restricted; and*
- *Where the extent and potential impact of required bushfire protection measures may be incompatible with other environmental objectives or issues, e.g. vegetation protection, land subject to erosion or landslip.*' (CFA 2015, pp.5-6)

None of these criteria apply to the study area.

2.3 Settlement Planning Strategies

These strategies plan to strengthen the resilience of settlements and communities and prioritise protection of human life.

2.3.1 *Directing population growth and development to low risk locations, being those locations assessed as having a radiant heat flux of less than 12.5 kilowatts/square metre under AS 3959:2018 Construction of Buildings in Bushfire-prone Areas (Standards Australia 2018)*

All future buildings within the BPA will be able to achieve a BAL-12.5 construction standard. The commensurate defendable space to enable buildings to be setback the appropriate distance from classified vegetation to the south to meet BAL-12.5 is illustrated on Attachment 6. This means that all other buildings within the BPA and BMO that are constructed further north will therefore be setback further than the baseline measure of what is considered an acceptable distance.

2.3.2 *Ensuring the availability, and safe access to, areas assessed as a BAL-LOW rating under AS 3959:2018 Construction of Buildings in Bushfire-prone Areas (Standards Australia 2018) where human life can be better protected from the effects of bushfire*

Areas are classified as BAL-LOW if they are 100 metres or more away from classified vegetation. Therefore, the space between the classified vegetation and 100 metre distance must contain non-vegetated areas such as buildings, roads, carparks and footpaths, and low threat vegetation such as managed lawns, ornamental gardens and public open spaces (Standards Australia 2018). With respect to the study area, occupants have easy access to areas classified as BAL-LOW by travelling 100 metres away from classified vegetation within and adjoining the study area (Attachment 6) where human life can be better protected from the effects of bushfire.

2.3.3 Ensuring the bushfire risk to existing and future residents, property and community infrastructure will not increase as a result of future land use and development

Development within the study area will not increase bushfire risk to existing or future residents, property or community infrastructure. All buildings will be separated from unmanaged vegetation (Forest, Scrub and Grassland) vegetation in accordance with a BAL-12.5 construction standard and vegetation within the study area (apart from the small patch of Forest) will be managed in a low threat state. A proportion of the study area will also be converted to non-combustible surfaces such as sealed roads, footpaths and carparks. These measures will reduce the fire risk within the study area and therefore provide fire behaviour and management benefits for the surrounding properties.

2.3.4 Achieving no net increase in risk to existing and future residents, property and community infrastructure, through the implementation of bushfire protection measures and where possible reducing bushfire risk overall

Development of the study area will result in a reduction to the overall fuel available in the landscape due to the replacement of grass, shrubs and trees with urban features, which will contain associated low threat vegetation (e.g. nature strips, public open spaces, ornamental gardens, lawns) and non-vegetated areas (e.g. buildings, roads, carparks, footpaths). There will be no net increase in risk to infrastructure as a result of the development, as appropriate bushfire mitigation measures will be implemented. These include providing enough defendable space to facilitate BAL-12.5, access/egress points, water tanks and hydrants. The construction of a sealed road (i.e. Police Road) along most of the study area's southern boundary will act as an effective fire break between a fire travelling from the generally southern direction and future buildings.

2.3.5 Assessing and addressing the bushfire hazard posed to the settlement and the likely bushfire behaviour it will produce at a landscape, settlement, local, neighbourhood and site scale, including the potential for neighbourhood-scale destruction

This report addresses the bushfire hazard posed to the study area at a range of scales in Section 2.2.4.

While ember attack from a fire is possible from forested and grassy vegetation north-west, east, south-east and south of the study area, the only viable direction of grass/bushfire approach is from the south given the forested vegetation connects with the study area's southern boundary or comes within 20 metres of it. However, several bushfire measures can be incorporated into the future development of the study area that would mitigate the potential impacts of fires and prevent neighbourhood-scale destruction, namely providing adequate defendable space to attain a BAL-12.5 construction standard (Section 2.2.4).

2.3.6 Assessing alternative low risk locations for settlement growth on a regional, municipal, settlement, local and neighbourhood basis

No alternative low risk locations have been assessed, as this is considered an appropriate low risk location given it immediately adjoins existing urban development to the north, east and west.

2.3.7 *Not approving any strategic planning document, local planning policy, or planning scheme amendment that will result in the introduction or intensification of development in an area that has, or will on completion have, more than a BAL-12.5 rating under AS 3959:2018 Construction of Buildings in Bushfire-prone Areas (Standards Australia 2018)*

The site assessment methodology (Attachment 5) and proposed bushfire mitigation measures illustrated on Attachment 6 demonstrate that all buildings can be constructed to BAL-12.5 and provide the commensurate defendable space distances.

2.4 Areas of Biodiversity Conservation Value Strategy

This strategy directs growth away from unacceptable biodiversity impacts.

2.4.1 *Ensure settlement growth and development approvals can implement bushfire protection measures without unacceptable biodiversity impacts by discouraging settlement growth and development in bushfire affected areas that are of high biodiversity conservation value*

A Flora and Fauna Assessment was undertaken by Brett Lane & Associates (2016) for the golf course component of the study area. The golf course was found to support 3.152 hectares of native vegetation patches (present as Valley Heathy Forest [Ecological Vegetation Class] 127 and Swampy Woodland EVC 937) and 54 scattered native trees. No significant flora species, fauna species or ecological communities listed under the *Environment Protection and Biodiversity Conservation Act 1999* were recorded within the golf course. The biodiversity conservation value was considered relatively degraded given its use as a golf course (Brett Lane & Associates 2016).

It is very likely that a large majority of the remaining study area contains exotic vegetation in the form of pasture grass and ornamental shrubs and trees. The only area that may have higher biodiversity values is the area identified as Forest within the study area and the scattered trees south of this in the paddocks (Attachments 5 and 6). However, a biodiversity assessment would have to be undertaken to determine this. For the purposes of this Bushfire Risk Assessment, future development that implements bushfire protection measures can be designed to minimise and/or avoid impacts to high biodiversity conservation values (if present).

2.5 Use and Development Control in a Bushfire Prone Area Strategy

These strategies require certain developments in the BPA to consider the bushfire risk and potential impacts.

2.5.1 *In a bushfire prone area designated in accordance with regulations made under the Building Act 1993, bushfire risk should be considered when assessing planning applications for the following uses and development:*

- *Subdivisions of more than 10 lots.*
- *Accommodation*
- *Child care centre*

- *Education centre*
- *Emergency services facility*
- *Hospital*
- *Indoor recreational facility*
- *Major sports and recreation facility*
- *Place of assembly*
- *Any application for development that will result in people congregating in large numbers*

Approximately the southern half of the study area is covered by the BPA (Attachment 6), with any future development falling into the category of 'Subdivision of more than 10 lots'. The site assessment methodology and commensurate separation distances in AS 3959:2018 (Standards Australia 2018) have been applied to ensure all future buildings will achieve a BAL-12.5 construction.

2.5.2 *When assessing a planning permit application for the above uses and development:*

- *Consider the risk of bushfire to people, property and community infrastructure*
- *Require the implementation of appropriate bushfire protection measures to address the identified bushfire risk*
- *Ensure new development can implement bushfire protection measures without unacceptable biodiversity impacts*

These considerations have been discussed throughout Section 2. A bushfire can only approach from the south and south-east, which are very unlikely directions of fire approach on days of severe fire weather. Nonetheless, several bushfire mitigation measures can be implemented to address the risk. These include ensuring all buildings in the BPA and BMO can achieve a construction standard of BAL-12.5 with the commensurate defendable space and complying with authority water supply and access/egress requirements. Given the highly modified nature of the study area, small patches of native vegetation are spread across the golf course and are of low to moderate biodiversity value.

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3 CONCLUSION

This report has assessed the bushfire hazard within the study area and in the wider landscape in accordance with Clause 13.02-1S of the Knox Planning Scheme and the bushfire site assessment methodology provided in AS 3959:2018 (Standards Australia 2018).

The wider landscape is characterised by highly urbanised land to the north, east and west, with forested and (unmanaged) grassy vegetation south of the study area and to a lesser extent further east beyond the urban areas. While ember attack from a fire is possible from forested and grassy vegetation north-west, east, south-east and south of the study area, the only viable direction of grass/bushfire approach is from the south given the forested vegetation connects with the study area's southern boundary or comes within 20 metres of it. The slope under the forested vegetation within 150 metres of the study area is variable, and ranges from Upslope/Flat land to Downslope >0 to 5 degrees.

Several mitigation measures have been engaged to reduce the grass and bushfire risk to an acceptable level. These include the provision of appropriate defendable space setback distances from Forest and Grassland vegetation to facilitate BAL-12.5 construction standards for future buildings, several access/egress points from the study area to the established road network adjoining it (including the construction of a sealed road along Police Road for a majority of the study area's southern boundary) and ensuring the internal road network and water supply (hydrants and water tanks) meet Council and CFA requirements.

The proposed subdivision will decrease the bushfire risk to the surrounding areas, as the construction of buildings, roads, carparks, footpaths and managed vegetation will reduce the fuel available to burn.

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4 SITE PHOTOS

Plate 1. Forest vegetation south of the study area (Ecology and Heritage Partners Pty Ltd 14/03/2018).

Plate 2. Grassland vegetation in the foreground and Scrub vegetation in the background south of the study area (Ecology and Heritage Partners Pty Ltd 14/03/2018).

Plate 3. Low Threat vegetation in the boarding kennels property within the study area (Ecology and Heritage Partners Pty Ltd 14/03/2018).

Plate 4. Low Threat fairways within the golf course (Ecology and Heritage Partners Pty Ltd 14/03/2018).

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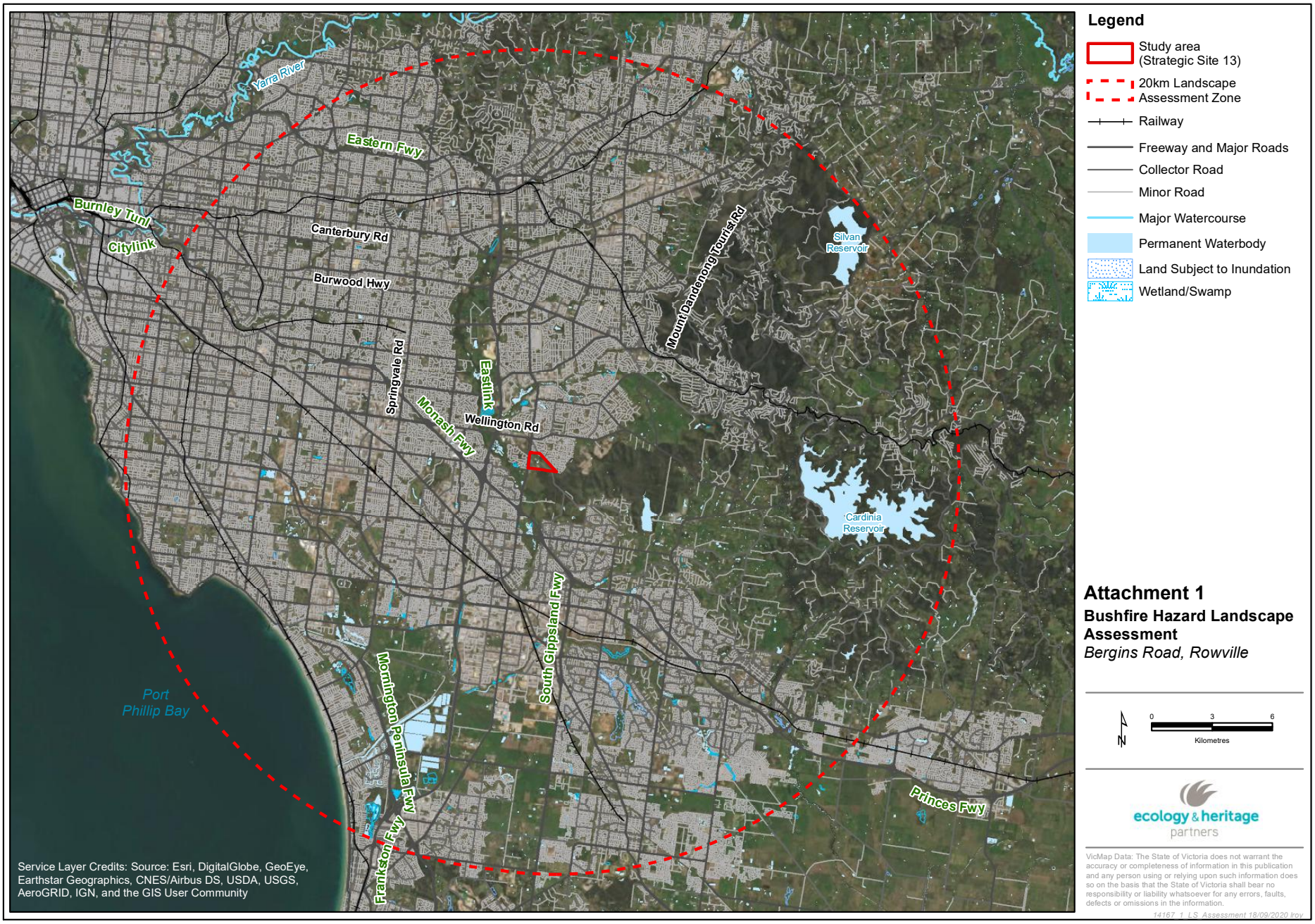
6 ATTACHMENTS


Yarra River
Eastern Fwy
Burnley Tunl
Citylink
Canterbury Rd
Burwood Hwy
Springvale Rd
Eastlink
Monash Fwy
Wellington Rd
Mount Dandenong Tourist Rd
Silvan Reservoir
Cardinia Reservoir
South Gippsland Fwy
Mornington Peninsula Fwy
Frankston Fwy
Princes Fwy
Port Phillip Bay
Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
Legend
Study area (Strategic Site 13)
20km Landscape Assessment Zone
Railway
Freeway and Major Roads
Collector Road
Minor Road
Major Watercourse
Permanent Waterbody
Land Subject to Inundation
Wetland/Swamp
Attachment 1
Bushfire Hazard Landscape Assessment
Bergins Road, Rowville
N
0
3
6
Kilometres
ecology & heritage partners
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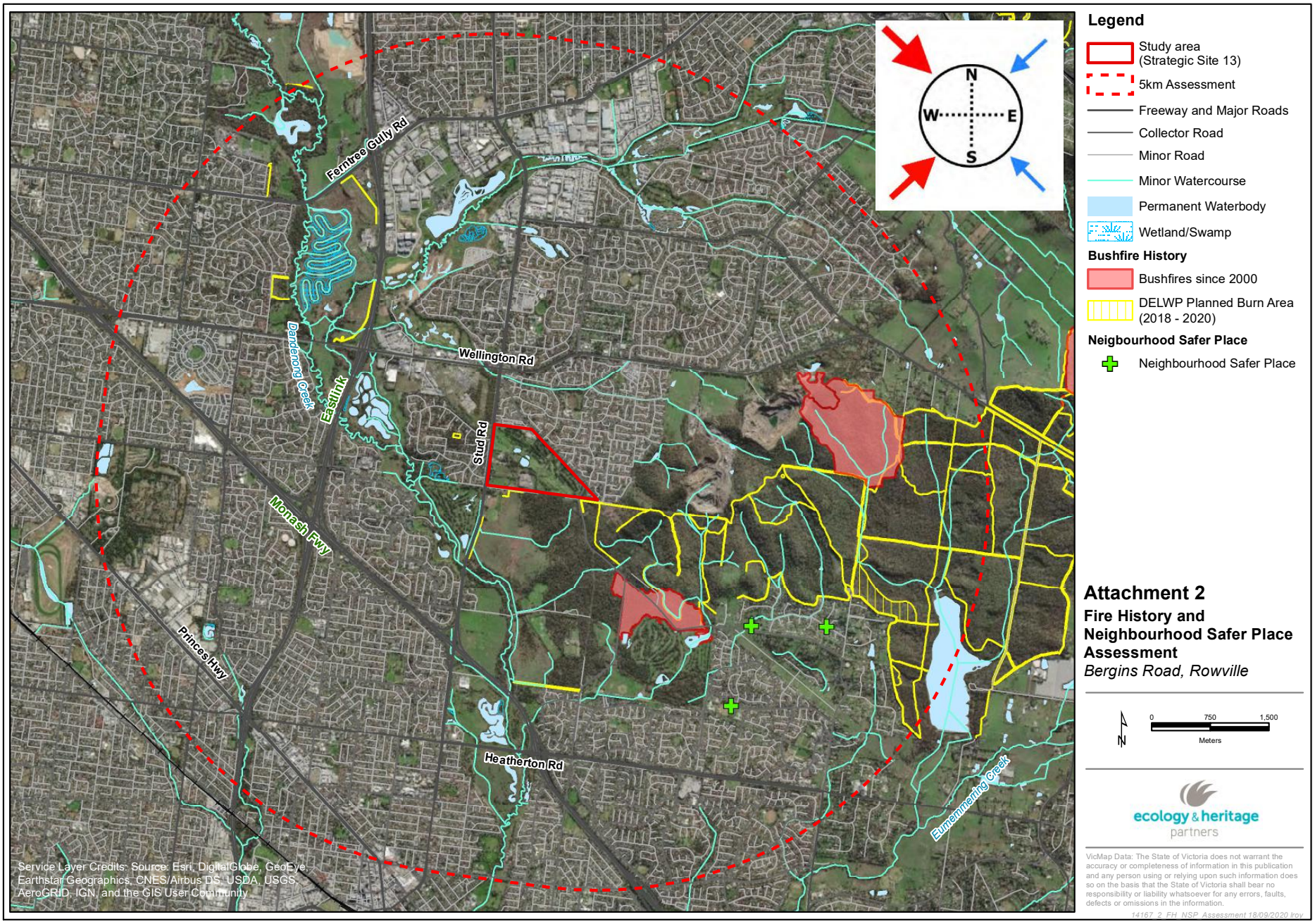
Fernuree Gully Rd
Dandenong Creek
Eastlink
Wellington Rd
Stud Rd
Monash Fwy
Princes Hwy
Heatherton Rd
Eumemmering Creek
N
W
E
S
Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
Legend
Study area (Strategic Site 13)
5km Assessment
Freeway and Major Roads
Collector Road
Minor Road
Minor Watercourse
Permanent Waterbody
Wetland/Swamp
Bushfire History
Bushfires since 2000
DELWP Planned Burn Area (2018 - 2020)
Neigbourhood Safer Place
Neighbourhood Safer Place
Attachment 2
Fire History and Neighbourhood Safer Place Assessment
Bergins Road, Rowville
N
0
750
1,500
Meters
ecology & heritage partners
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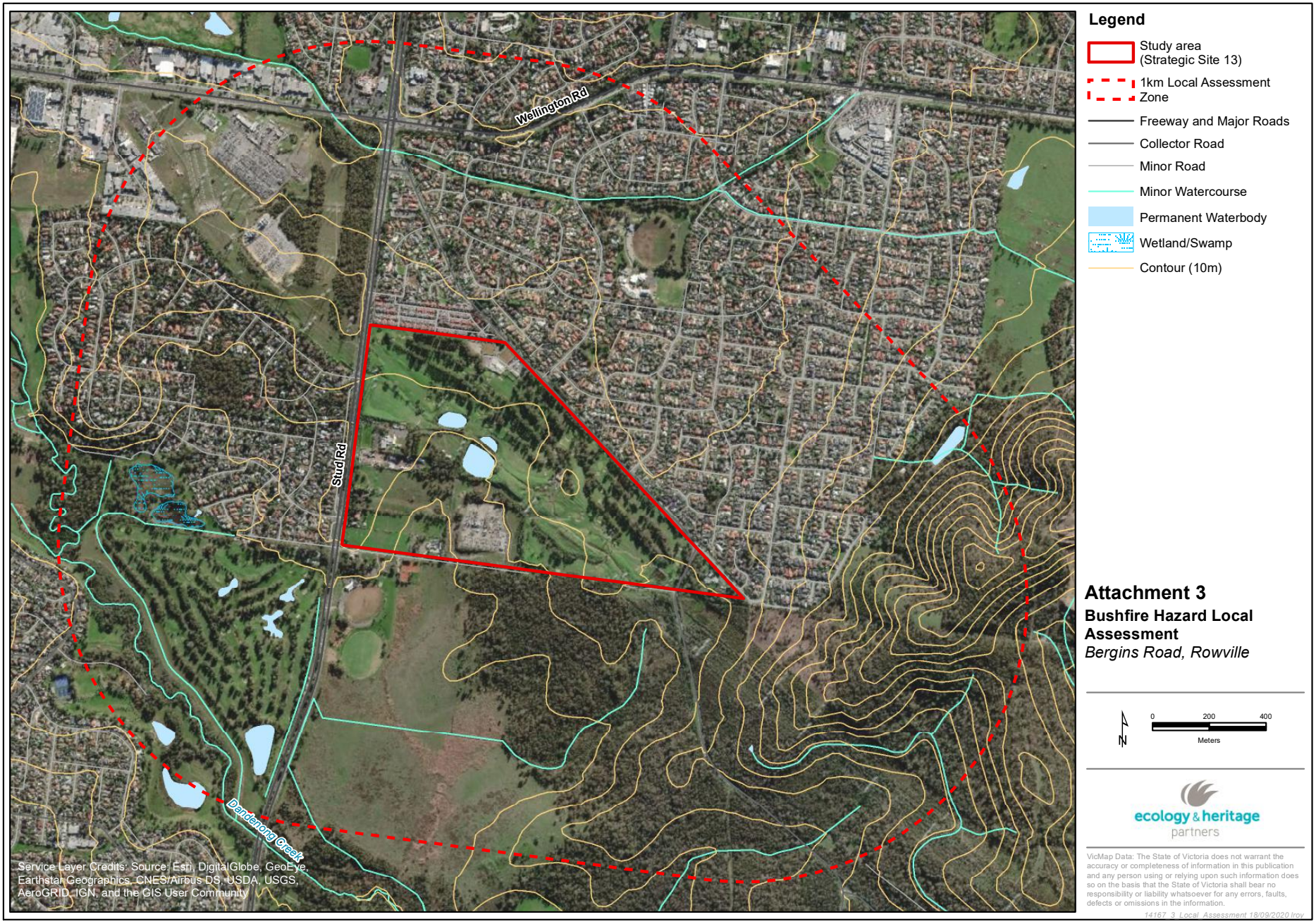
Wellington Rd
Stud Rd
Dandenong Creek
Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
Legend
Study area (Strategic Site 13)
1km Local Assessment Zone
Freeway and Major Roads
Collector Road
Minor Road
Minor Watercourse
Permanent Waterbody
Wetland/Swamp
Contour (10m)
Attachment 3
Bushfire Hazard Local Assessment
Bergins Road, Rowville
N
0
200
400
Meters
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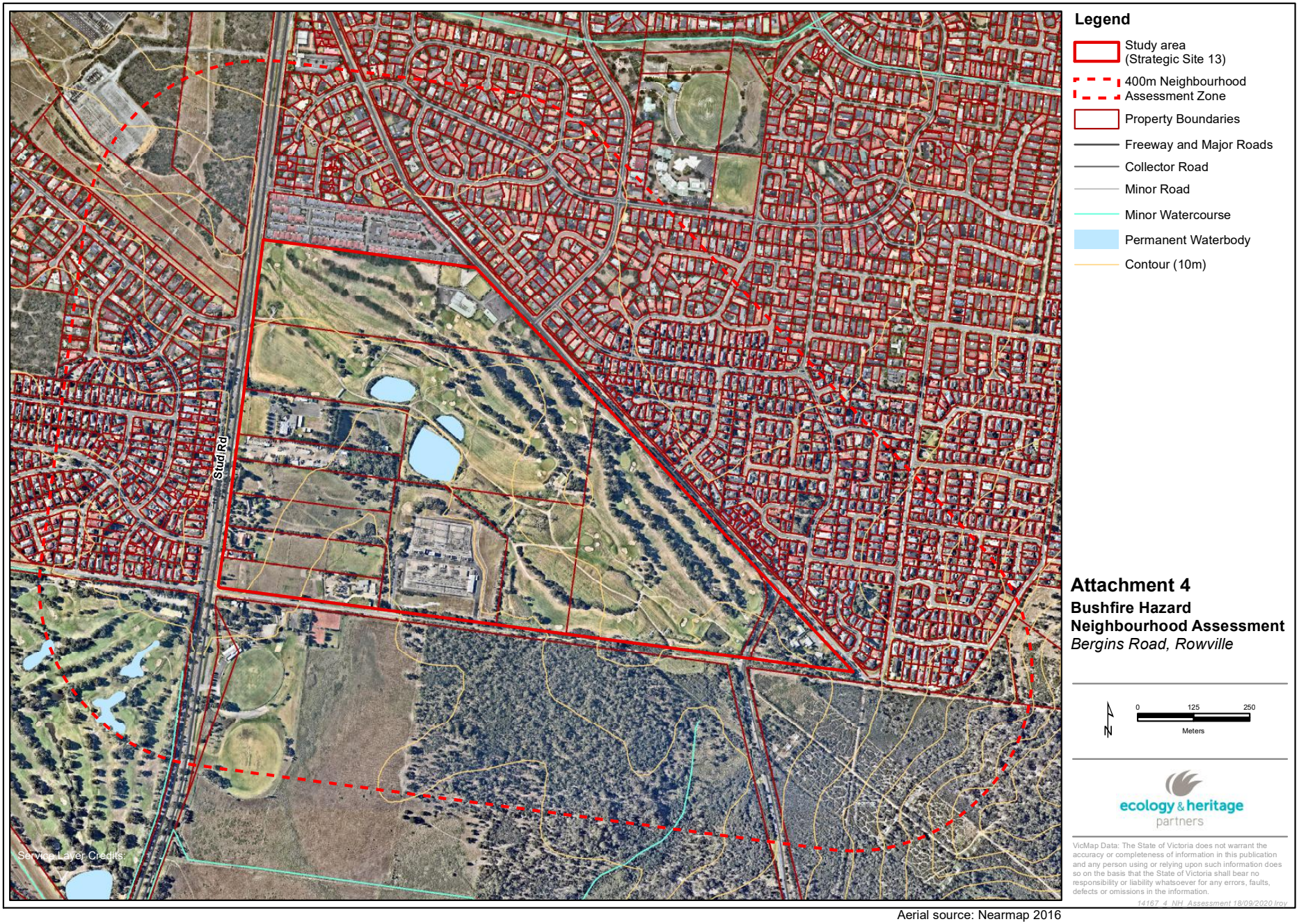
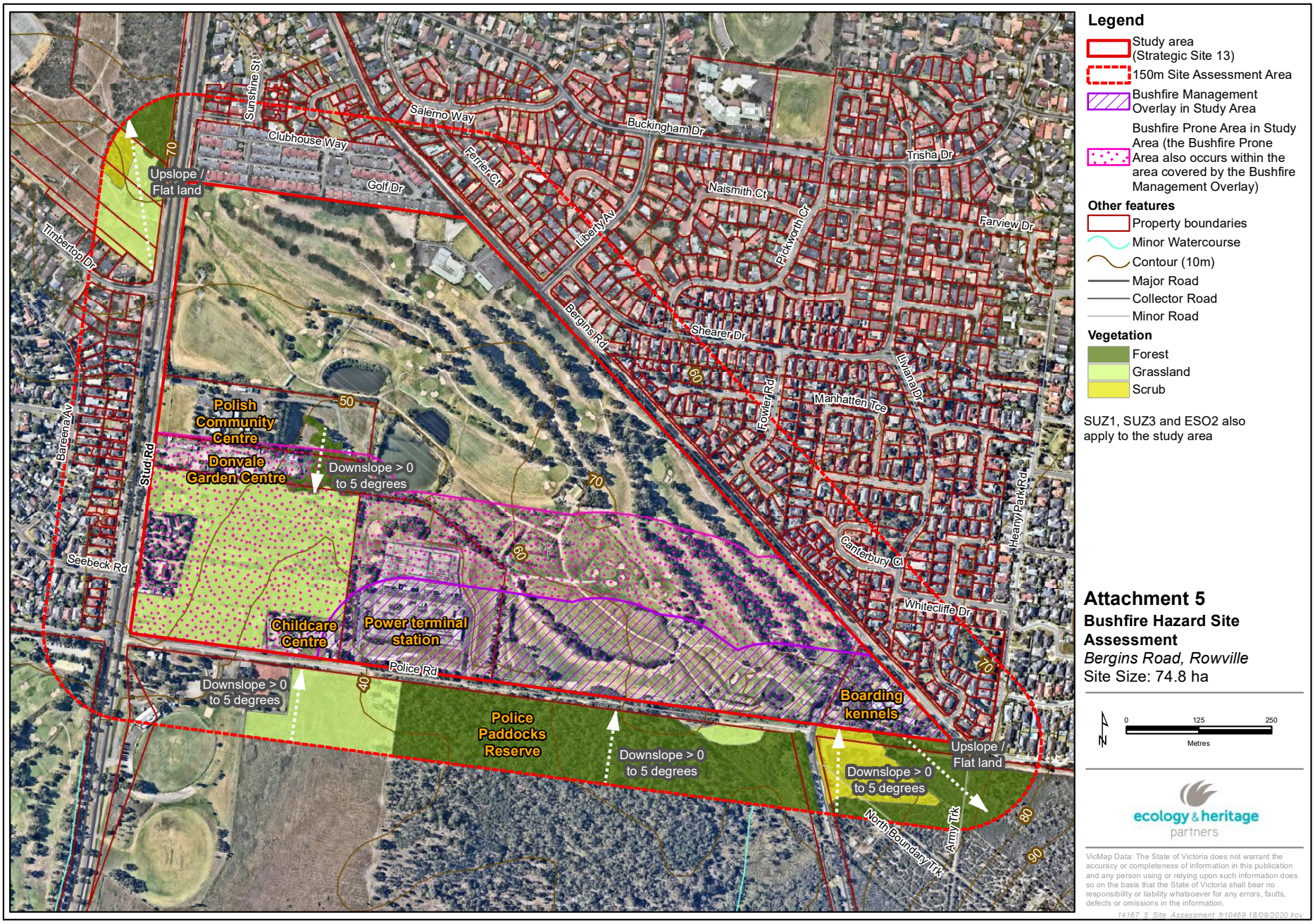
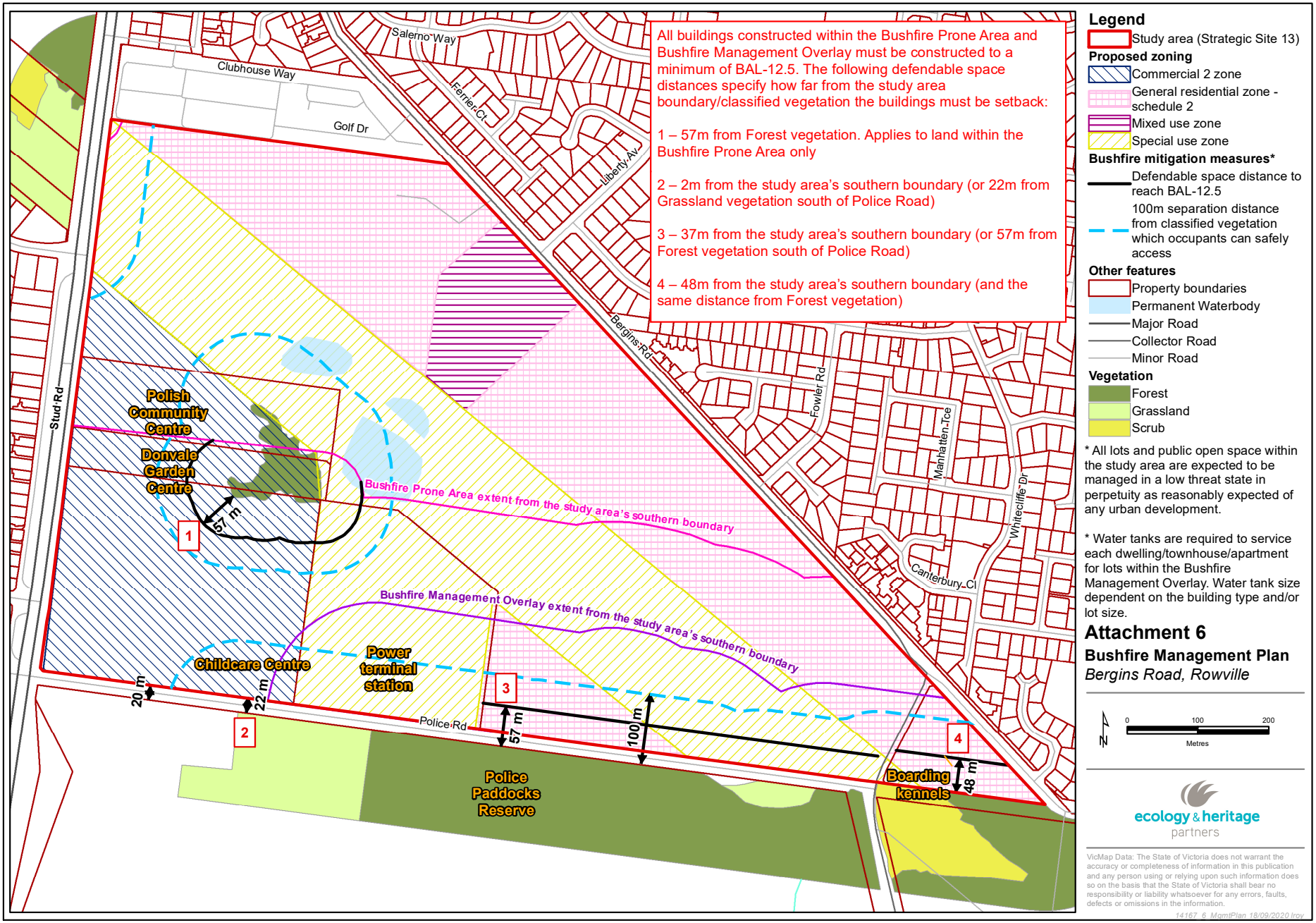


Aerial source: Nearmap 2016



Aerial source: Nearmap 2018


All buildings constructed within the Bushfire Prone Area and Bushfire Management Overlay must be constructed to a minimum of BAL-12.5. The following defendable space distances specify how far from the study area boundary/classified vegetation the buildings must be setback:
1 – 57m from Forest vegetation. Applies to land within the Bushfire Prone Area only
2 – 2m from the study area's southern boundary (or 22m from Grassland vegetation south of Police Road)
3 – 37m from the study area's southern boundary (or 57m from Forest vegetation south of Police Road)
4 – 48m from the study area's southern boundary (and the same distance from Forest vegetation)
Salerno Way
Clubhouse Way
Golf Dr
Ferrier Ct
Liberty Av
Bergins Rd
Fowler Rd
Manhattan Tce
Whitecliffe Dr
Canterbury Cl
Stud Rd
Police Rd
Polish Community Centre
Donvale Garden Centre
Childcare Centre
Power terminal station
Police Paddocks Reserve
Boarding kennels
Bushfire Prone Area extent from the study area's southern boundary
Bushfire Management Overlay extent from the study area's southern boundary
57 m
20 m
22 m
57 m
100 m
48 m
1
2
3
4
Legend
Study area (Strategic Site 13)
Proposed zoning
Commercial 2 zone
General residential zone - schedule 2
Mixed use zone
Special use zone
Bushfire mitigation measures*
Defendable space distance to reach BAL-12.5
100m separation distance from classified vegetation which occupants can safely access
Other features
Property boundaries
Permanent Waterbody
Major Road
Collector Road
Minor Road
Vegetation
Forest
Grassland
Scrub
* All lots and public open space within the study area are expected to be managed in a low threat state in perpetuity as reasonably expected of any urban development.
* Water tanks are required to service each dwelling/townhouse/apartment for lots within the Bushfire Management Overlay. Water tank size dependent on the building type and/or lot size.
Attachment 6
Bushfire Management Plan
Bergins Road, Rowville
0
100
200
Metres
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Traffic Engineers and Transport Planners

Traffic Engineering Assessment

Masterplan of Residential Development at Waverley Golf Club

Prepared For
Intrapac Property Pty Ltd

July, 2020
17644R#4

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Traffic Engineering Assessment

Masterplan of Residential Development
at
Waverley Golf Club

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1 Introduction

Traffix Group has been engaged by Intrapac Property Pty Ltd to prepare a traffic engineering assessment of the proposed rezoning of land at Bergins Road, Rowville also known as Waverley Golf Club (Golf Course).

In preparing this report, the subject site and environs have been inspected, relevant traffic data has been collected and reviewed and the traffic engineering implications of the proposed residential development have been assessed.

This report provides a traffic engineering assessment of the traffic engineering issues associated with the proposed development.

2 The Proposal

It is proposed to develop the existing Waverley Golf Course for the purposes of a residential development. The current Masterplan proposes a residential development which is typically expected to accommodate a combination of houses and townhouses.

We have been instructed to undertake a review of the traffic implications of a development which provides generally in accordance with the following breakdown of dwelling types:

- 90 standard lots (houses), and
- 810 medium density lots (townhouses and apartments).

The Masterplan proposes main vehicle access points at 3 locations, as follows:

- Liberty Avenue, via a new four-leg roundabout or signalised intersection.
- Fowler Road, via a new four-leg roundabout.
- Police Road, via a new T-intersection (located between Churchill Park Drive and Stud Road).

Potential lower order connections are proposed as follows:

- to Bergins Road - a limited number of access points for a small number of dwellings per access point, and
- to Stud Road - a left-in/left-out access at the north-west corner of the site.

The development plan indicates a small area of retail/commercial uses (e.g. café, shop, restaurant) located within the subject site with a total net leasable area of no more than 1,000m^2. It is anticipated that this small area of retail/commercial use will serve local demand and is unlikely to have any significant effect on traffic conditions.

We have been instructed to consider the traffic implications of the development site being re-zoned, which shall be known as the 'Interim' scenario, whilst also separately considering an 'Ultimate' scenario, which also additionally reviews the traffic implications of any future residential re-development of land parcels located within the 'Police Road Precinct'.

The 'Police Road Precinct' includes parcels of land which do not form part of the Waverley Golf Course site, but are likely to be rezoned for residential use in parallel with the golf course land. This

land includes the land parcel on the north-eastern corner of the Police Road and Stud Road intersection (with the exception of the SP AusNet East Rowville Terminal Station located along the site's south-western boundary) and additionally a triangle-shaped parcel of land located on the southern side of the roundabout between Churchill Park Drive and Bergins Road. These parcels of land are highlighted on Figure 1 and Figure 2. This analysis is detailed further in the report.

A number of improvement and mitigating works are proposed as part of this development and are detailed at Sections 4.4.3 and 4.4.5 in relation to the 'Interim' and 'Ultimate' stages, respectively. These include:

- the formalisation of Police Road to function as a Council Arterial Road,
- the re-routing of 'through' traffic from Churchill Park Drive (and Bergins Road) to Police Road,
- the construction of roundabout intersections at the site access locations to Bergins Road (i.e. at Liberty Avenue and Fowler Road), with the possibility of signalisation at the Liberty Avenue intersection, and
- the signalisation of the intersection between Stud Road and Police Road.

The Masterplan for the proposed development (Ref: RD3101, dated 4th May, 2017) is attached at Appendix A.

3 Existing Conditions

3.1 Development Site

The subject site is the Waverley Golf Club (Golf Course) and is located at 82 Bergins Road, Rowville. A locality plan and an aerial photograph depicting the site and surrounding arterial road network are presented at Figure 1 and Figure 2, respectively.

The site is irregular in shape with a total site area of approximately 49.47ha. Surrounding land uses include the following:

- residential uses to the north-east,
- SP AusNet East Rowville Terminal Station located along the site's south-western boundary,
- the Dandenong Police Paddocks Reserve located to the south of Police Road,
- the Tirhatuan Lakes Public Golf Course located to the south-west of the site, and
- the Waverley Country Club (retirement village) is located immediately to the north of the site and is accessed via Bergins Road.

The site is currently zoned Special Use Zone – Schedule 1 (SUZ1) and Special Use Zone – Schedule 3 (SUZ3) under the Knox Planning Scheme as presented at Figure 3 and is located outside the Urban Growth Boundary (UGB).

Vehicle access to the site is currently provided as follows:

- 13m wide crossover to Bergins Road, located approximately 100m north-west of Liberty Avenue, providing access to the Golf Club carpark, which includes a right-turn lane,
- 10.9m wide crossover to Churchill Park Drive, located approximately 200m south of Bergins Road, providing vehicle access primarily for maintenance purposes (via a locked gate) to the Waverley Golf Club, and
- 8.7m wide crossover to Stud Road, located adjacent to Timbertop Drive, providing vehicle access primarily for maintenance purposes (via a locked gate) to the Waverley Golf Club.

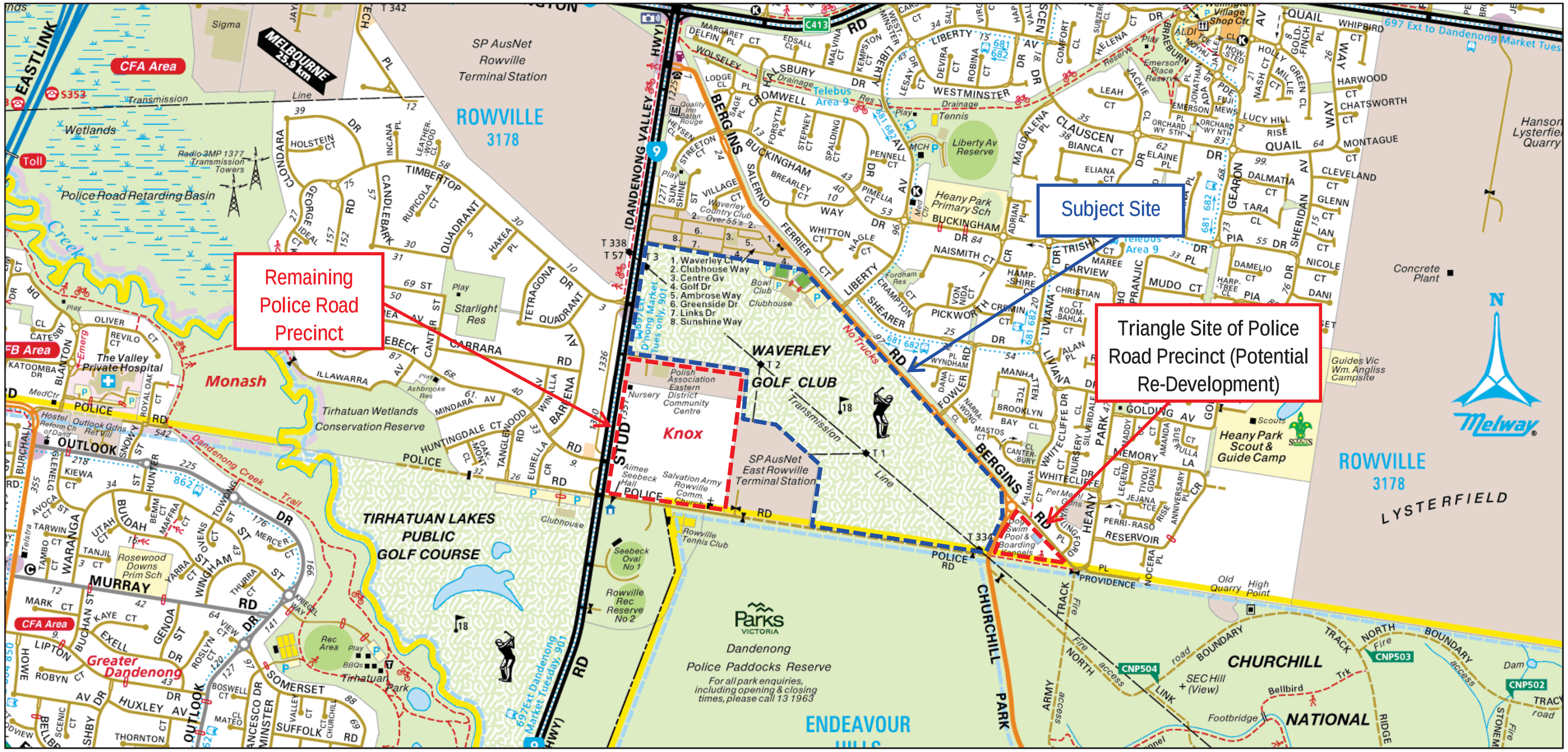

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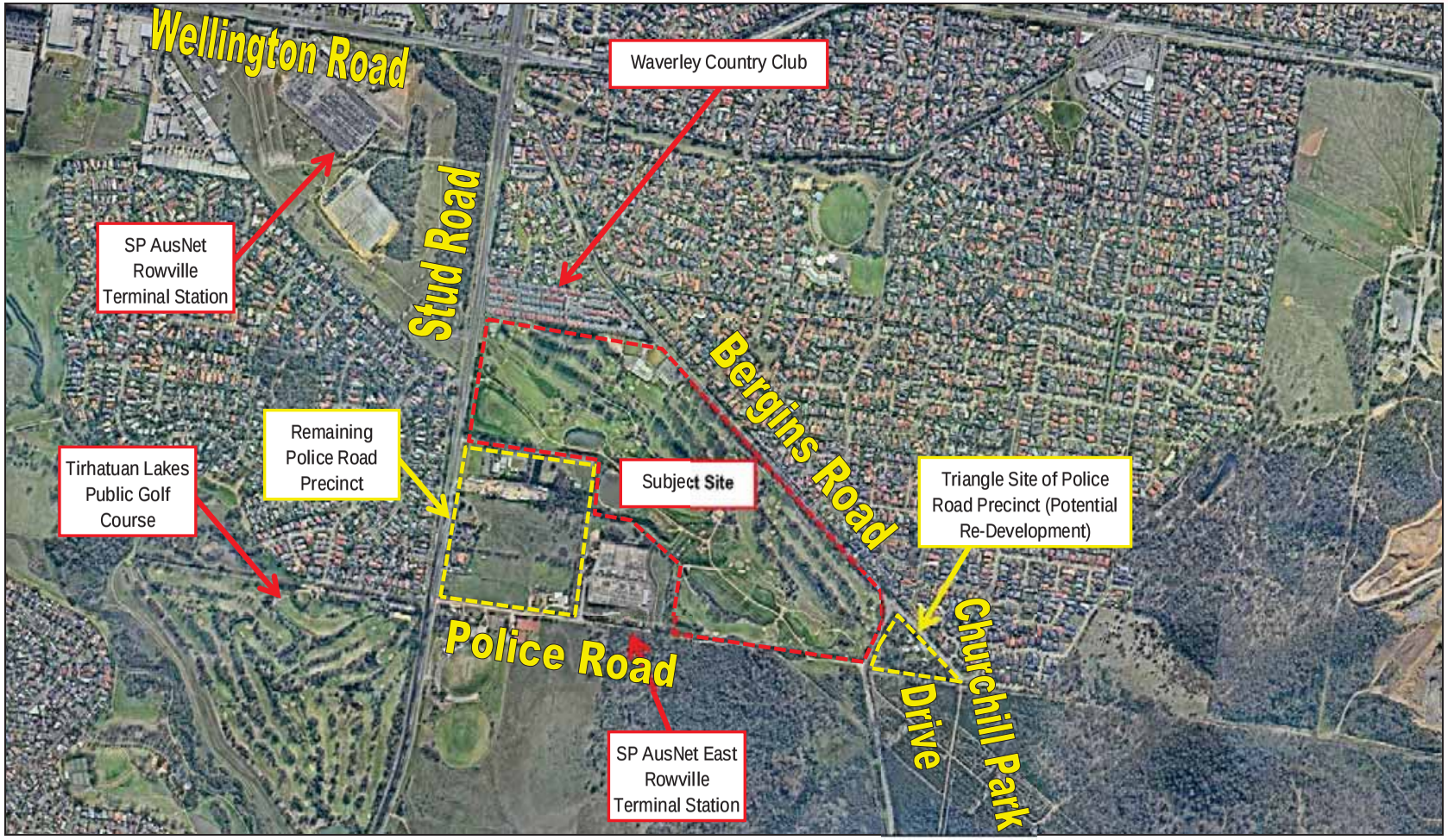
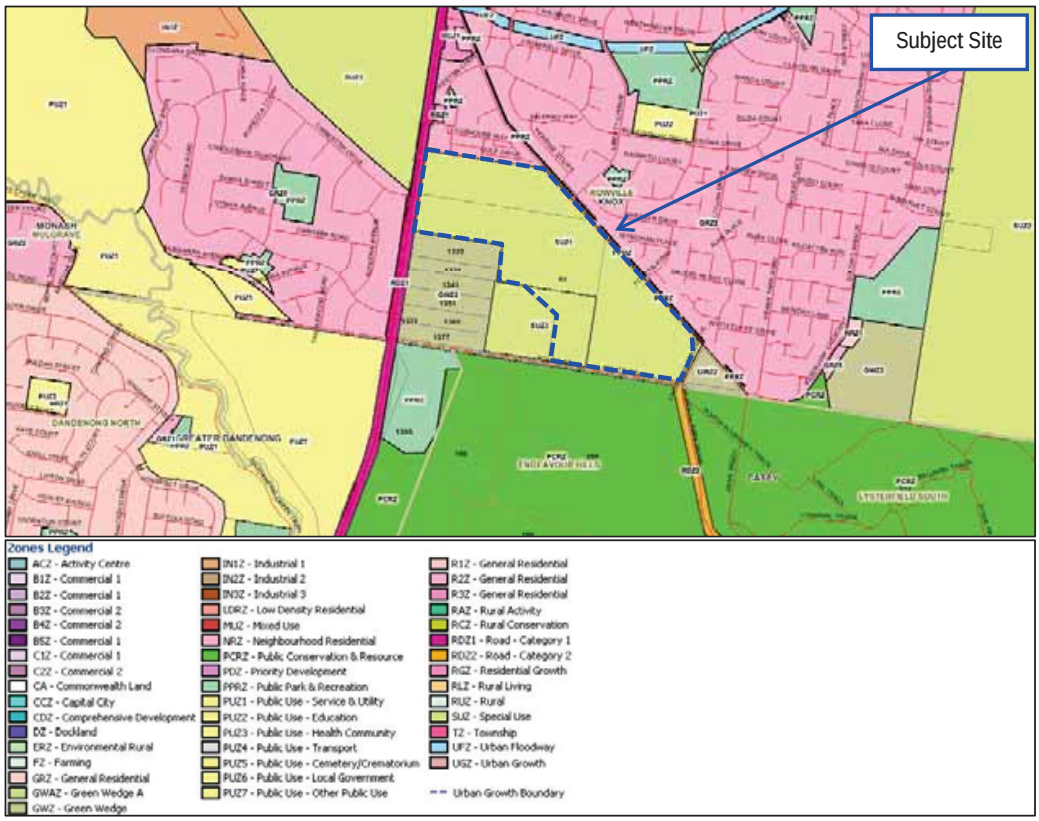
Figure 1: Locality Plan



Source: www.nearmap.com

Figure 2: Aerial Photograph



Source: http://planningschemes.dpcd.vic.gov.au

Figure 3: Land Use Zoning Map

3.2 Existing Road Network

A general description of the key arterial roads surrounding the site is provided below.

Stud Road is a VicRoads Arterial Road and Road Zone Category 1. Stud Road is aligned in a north-south direction between Mountain Highway in the north and Clow Street in the south (where it continues as Foster Street).

Adjacent to the site Stud Road provides a divided carriageway with 2 traffic lanes in each direction. A bus lane is provided in the northbound direction adjacent to the site.

A median break located adjacent to Timbertop Drive and Police Road, which both provide turning opportunities, including U-turn movements.

Parking is generally not available along Stud Road.

A bus stop is located along the site's frontage to Stud Road adjacent to Timbertop Drive.

A posted speed limit of 80km/h applies to Stud Road in the vicinity of the site.

The VicRoads arterial road traffic volume database indicates that Stud Road, between Bergins Road and Brady Road, carries approximately 34,000 vehicles per day (based on 2015 volumes).

Police Road is a Council managed 'Unsealed Road'[1] between Stud Road and Churchill Park Drive and is aligned in an east-west direction.

East of Stud Road, Police Road is a Road Zone Category 2 partially managed by Knox City Council and Casey City Council.

Police Road continues in a westerly direction past Stud Road as a sealed 'Access Road'.

Police Road (eastern leg) has a carriageway width of approximately 6.4m until a location adjacent to the SP AusNet East Rowville Terminal Station. At this location, Police Road continues as an informal track and is not open to the public (gated and vegetation does not facilitate access).

Access to the Arterial Road network is provided to Stud Road to the west, with a median break facilitating all turning movements. Right-turn lanes are provided on both Stud Road approaches.

The default urban speed limit of 50km/h applies to Police Road.

Bergins Road is a Council managed 'Link Road'[1] aligned in a north-west to south-east direction between Stud Road in the north-west and Churchill Park Drive in the south-east. Bergins Road continues in a south-easterly direction past Churchill Park Drive as a 'Collector Road'.

Bergins Road typically has a carriageway width of approximately 8.3m, whilst Bergins Road widens at locations up to 11m to accommodate turning lanes. A right-turn lane (for south-eastbound traffic) is provided into the Waverley Golf Club Carpark. No left-turn deceleration lane is provided.

Parking is not permitted on either side of Bergins Road at any location.

Bergins Road forms a roundabout intersection with Churchill Park Drive at the site's north-eastern boundary. Trucks are not permitted to access Bergins Road (No Heavy Vehicle signage at either end of Bergins Road).

A posted speed limit of 60km/h applies to Bergins Road between Stud Road and a location approximately 60m north-west of the existing access to the Waverley Golf Club Carpark. To the south-east of the existing site access, a posted speed limit of 70km/h applies.

Churchill Park Drive is a Council managed 'Link Road'[1] aligned in a north-south direction between Bergins Road to the north and Hallam North Road in the south-east.

Churchill Park Drive has a carriageway width typically of approximately between 7.7m in the vicinity of the site, which facilitates a through lane in each direction, with sealed shoulders of varying widths.

Parking is not permitted on either side of Churchill Park Drive in the vicinity of the site.

A posted speed limit of 70km/h applies to Churchill Park Drive in the vicinity of the site, with a speed limit of 80km/h applying to the south-east past the informal section of Police Road.

Aerial photographs of the key arterial road intersections are provided at Appendix B.

A table outlining the key specifications of the local roads which provide a connection to the arterial road network are provided in the table below.

[1] As referenced in Knox City Council's Road Management Plan (dated 4th February, 2015).

Table 1: Local Road Characteristics

Road Name	Carriageway Width	Road Reserve Width	Footpaths	Classification Under Clause 56.06-8	Environmental Capacity (veh. per day)
Police Road	5.6-6.4m	20m	Not provided	Access Street Lv 1	1,000-2,000
Bergins Road	8.3-11.1m	24.3m	Eastern side	Arterial Road (Council)	> 7,000
Churchill Park Drive	7.7-8m	20m	Not provided	Arterial Road (Council)	> 7,000
Liberty Avenue	11m	20m	Both sides	Local Road Lv 2	2,000-3,000
Fowler Road	7-8m	20.2m	Both sides	Local Road Lv 2	2,000-3,000

Liberty Avenue contains a splitter island at its intersection with Bergins Road in order to improve safety between pedestrians and vehicles entering/exiting Liberty Avenue.

Photographs of the local roads outlined in Table 1 are provided at Appendix C.

3.3 Bicycle and Pedestrian Movement

A number of off-road bicycle routes are located nearby to the site, including the Drainage Reserve Track, located approximately 800m north of the site and the Dandenong Creek Trail, located approximately 1.5km south of the site. Connectivity to the Dandenong Creek Trail is via Stud Road, which provides on-road bicycle lanes in a number of locations.

Significant land uses in the nearby area that are easily accessible by walking or bicycle are detailed as follows:

- **Heany Park Primary School**, located approximately 300m north of the site,
- **Rowville Tennis Club**, located approximately 500m south-west of the site,
- **Liberty Avenue Reserve**, located approximately 550m north of the site,
- **Seebeck Oval No. 1**, located approximately 650m south-west of the site,
- **Tirhatuan Lakes Public Golf Course**, located approximately 700m south-west of the site,
- **Stamford Inn Hotel**, located approximately 800m north of the site,
- **Rowville Rec Reserve No. 2**, located approximately 800m south-west of the site,
- **Stud Park Shopping Centre**, located approximately 1.5km north of the site, and
- **Rowville Primary School and Secondary College**, located approximately 1.6km north of the site.

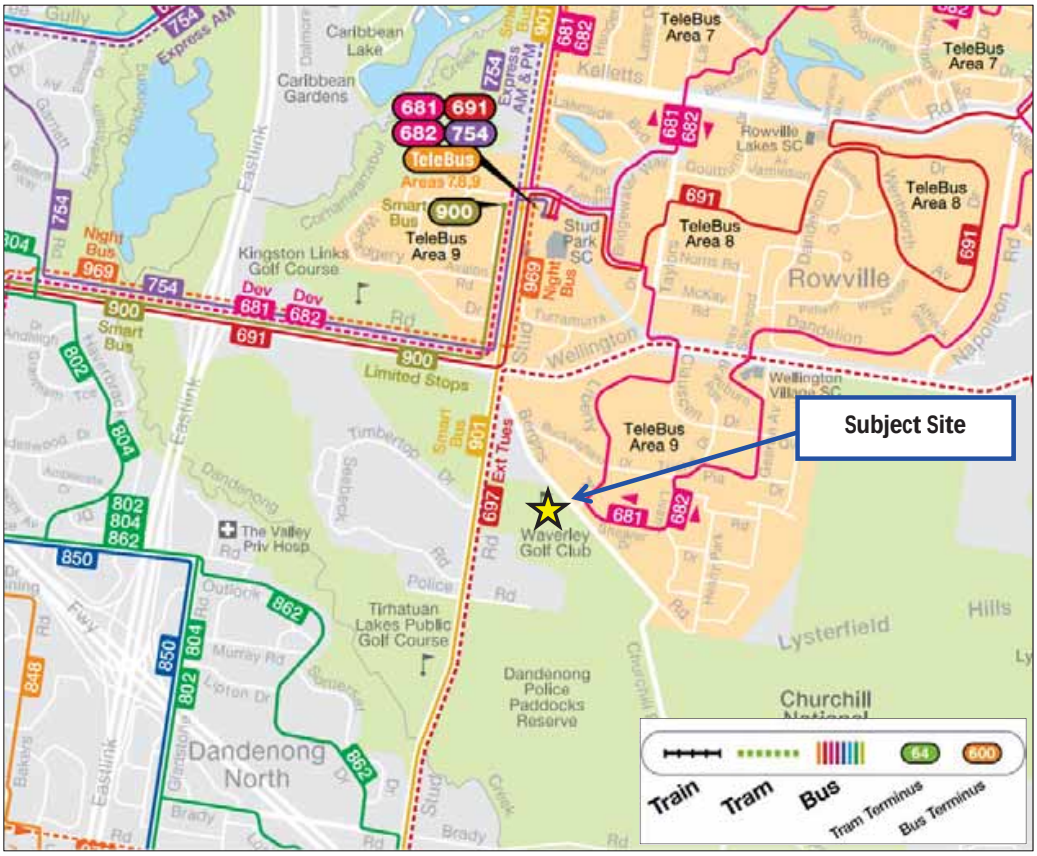
3.4 Public Transport

The site is served by public transport with a large number of bus services located within walking distance from the site. Significantly, a bus stop is located along the site's frontage to Stud Road, while a number of other bus stops are located nearby.

The public transport network surrounding the site is shown in Table 2, with the following key facilities located within the nearby area detailed in the following table.

Table 2: Summary of Public Transport Services

Service	Between	Via
Stud Road – located along the site's frontage – nearby to Timbertop Drive		
Bus Route 697	Belgrave & Belgrave South	Belgrave Heights
Bus Route 901 (Smart Bus)	Frankston & Melbourne Airport (SMARTBUS Service)	Dandenong, Greensborough & South Morang
Shearer Drive – approximately 100m north-east of the site		
Bus Route 681	Lysterfield & Knox City	Wantirna, Scoresby & Rowville (clockwise)
Wellington Road – approximately 800m north of the site		
Bus Route 681	Lysterfield & Knox City	Wantirna, Scoresby & Rowville (clockwise)
Bus Route 682	Lysterfield & Knox City	Wantirna, Scoresby & Rowville (anti-clockwise)
Bus Route 691	Boronia & Waverley Gardens	Ferntree Fully & Stud Park
Bus Route 754	Rowville & Glen Waverley	Caulfield Grammar & Wheelers Hill
Bus Route 900	Rowville & Caulfield	Monash University & Chadstone (SMARTBUS Service)
Bus Route 969 Night Bus	City & Caulfield	Ferntree Fully Road, Rowville, Wantirna & Ringwood



Source: Public Transport Victoria, ptv.vic.gov.au

Figure 4: Public Transport Map

3.5 Traffic Surveys

A number of traffic surveys have been undertaken of roads and intersections surrounding the subject site to understand the traffic volumes within the local roads and arterial road intersections that are likely to be used by residents accessing the site.

The traffic surveys were undertaken in the form of 7-day automatic tube counts and peak hour turning movement counts.

Seven-day automatic tube counts were conducted between Friday 15th April, 2016 and Thursday 21st April, 2016 at the following locations:

- Bergins Road, Rowville – between Stud Road & Buckingham Drive.
- Bergins Road, Rowville – between Waverley Country Club & Golf Course Entry.
- Bergins Road, Rowville – between Liberty Avenue & Fowler Road.
- Bergins Road, Rowville – between Fowler Road & Churchill Park Drive.
- Liberty Avenue, Rowville – between Bergins Road & Shearer Drive.
- Fowler Road, Rowville – between Bergins Road & Narra Wong Close.
- Churchill Park Drive, Rowville – between Police Road & Frankston Drive.
- Police Road, Rowville – near Stud Road intersection.

Detailed results of the surveys are provided at Appendix D.

Peak hour Turning Movement Counts (TMC) were undertaken between 7am-9am and 4pm-6pm on Thursday 21st April, 2016 at the following locations:

- Stud Road & Bergins Road signalised Intersection.
- Stud Road & Police Road unsignalised intersection.
- Bergins Road & Liberty Avenue unsignalised intersection.
- Bergins Road & Fowler Road unsignalised intersection.
- Bergins Road & Churchill Park Drive unsignalised intersection (roundabout).

Detailed results of the surveys are provided at Appendix E. A map of these approximate locations is shown in Figure 5.

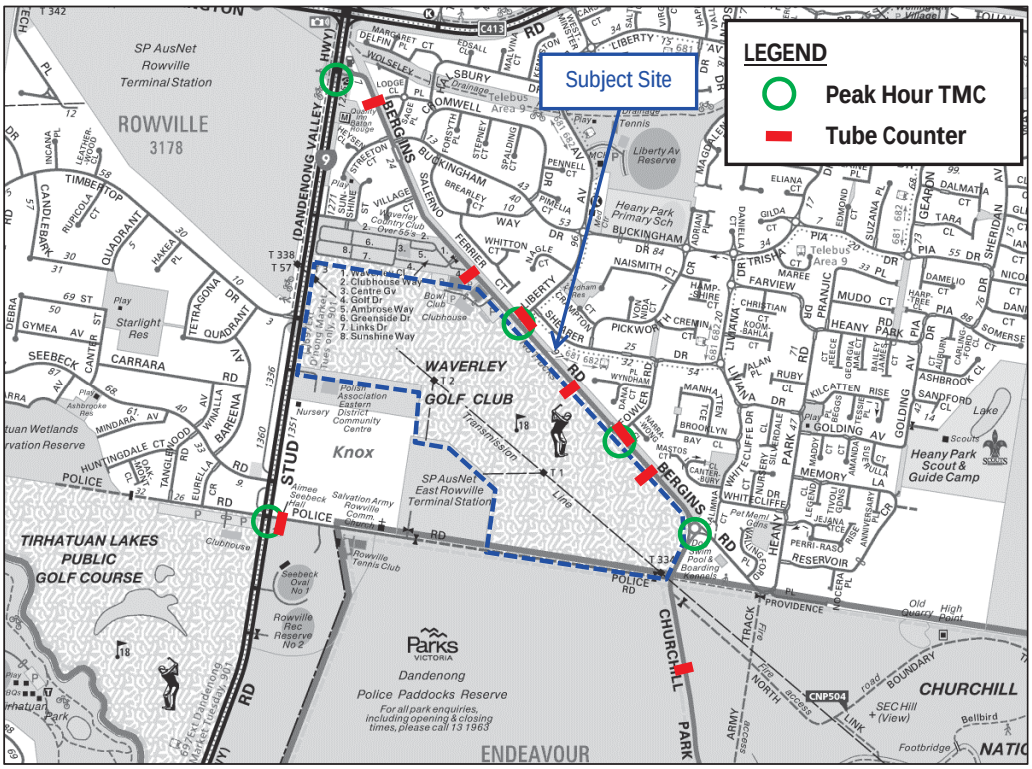


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Figure 5: Tube Counter Locations

The results of the 7-day automatic tube count surveys are summarised in Table 3 with a summary of the peak hour TMCs provided in Table 4.

Table 3: Tube Count Data Summary

Road	Two Way Traffic Volumes (vehicle trip ends)			Speed (km/h)	
	Daily Weekday Average	AM Peak	PM Peak	85th Percentile	Mean
Bergins Rd – btw Stud Rd & Buckingham Dr	12,234	850	1,296	57.0	50.4
Bergins Rd – btw Waverley Country Club & Golf Course Entry	9,728	773	1,050	67.4	61.2
Bergins Rd – btw Liberty Av & Fowler Rd	11,106	1,006	1,325	71.1	66.0
Bergins Rd – btw Fowler Rd & Churchill Park Dr	11,584	1,085	1,405	67.6	62.3
Liberty Av – btw Bergins Rd & Shearer Dr	3,866	382	460	44.9	37.3
Fowler Rd – btw Bergins Rd & Narra Wong Cl	1,478	184	159	43.4	37.2
Churchill Park Dr – btw Police Rd & Frankston Dr	11,049	1,094	1,410	78.0	72.0
Police Rd - btw Stud Rd & Hall	169	28	53	31.1	24.7

Table 4: Turning Movement Count Summary

Survey Site	Road	Two Way Volume (vehicle trip ends)		
		AM Two-Way Volume	PM Two-Way Volume	Estimated Daily Two-Way Volume
Stud Road / Bergins Road	Stud Road	3,281	3,794	32,800-38,000
	Bergins Road	912	1,185	9,100-11,900
Stud Road / Police Road	Stud Road	2,680	3,002	26,800-30,100
	Police Road (Eastern Leg)	8	7	70-80
	Police Road (Western Leg)	48	51	480-510
Bergins Road / Liberty Avenue	Bergins Road	953	1,405	9,500-14,100
	Liberty Avenue	392	479	3,900-4,800
Bergins Road / Fowler Road	Bergins Road	1,112	1,495	11,100-15,000
	Fowler Road	197	151	1,500-2,000
Bergins Road / Churchill Park Drive	Bergins Road (Western Leg)	1,113	1,469	11,100-14,700
	Bergins Road (Eastern Leg)	275	271	2,700-2,800
	Churchill Park Drive	1,149	1,459	11,400-14,600

The traffic surveys identified that both Stud Road and Bergins Road carry relatively high traffic volumes, which corresponds to their arterial road function, noting that Stud Road is a VicRoads' Arterial Road whilst Bergins Road is a Council 'Link Road'.

Significantly, the volumes recorded along Stud Road were in the same order of magnitude as the VicRoads Arterial Road database (February, 2016).

3.6 Journey to Work Data

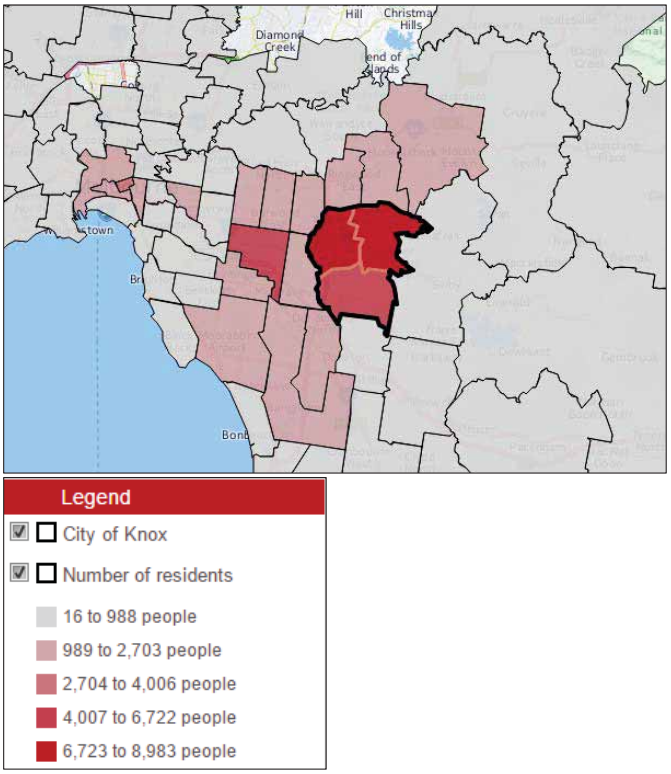
The following table and figure details the work destinations of Knox residents based on the 2011 Census.

This data shows that the work destinations of Knox residents are relatively well dispersed, which influences the directional distribution of work-based trips in the commuter peak hours.

This data shows that the whilst many residents work within Knox (approx. 28%), a reasonable proportion also travel closer towards the CBD to work, with some of the major employment destinations including Monash (10.4%), Whitehorse (7%) and Melbourne (6.7%). It is noted that within Knox, approximately 40% work within Knox North-East, whilst approximately 30% work in both Knox North-West and Knox South. This is a reasonably even split, with a number of employment clusters located in these areas (i.e. surrounding Ferntree Gully Road and Burwood Highway in these areas).

Table 5: LGA of work destinations for residents from Knox LGA

Top 10 LGAs		% Work Destinations
1.	Knox – North-East	11.6%
2.	Monash	10.4%
3.	Knox – North-West	8.7%
4.	Knox – South	7.8%
5.	Whitehorse	7%
6.	Melbourne	6.7%
7.	Greater Dandenong	5.8%
8.	Maroondah	5.6%
9.	Greater Melbourne	3.5%
10.	Kingston	2.3%
Other areas		30.6%
Total		**100%**



This data helps to form the basis of the distribution analysis outlined further within this report.

4 Traffic Engineering Assessment

We have been instructed to consider the traffic implications of the development site being re-zoned, which shall be known as the 'Interim' scenario, whilst also separately considering an 'Ultimate' scenario, which also additionally reviews the traffic implications of any future residential re-development of land parcels located within the 'Police Road Precinct'. The 'Police Road Precinct' includes parcels of land which do not form part of the Waverley Golf Course site, but are likely to be rezoned for residential use in parallel with the golf course land. This land includes the land parcel on the north-eastern corner of the Police Road and Stud Road intersection (with the exception of the SP AusNet East Rowville Terminal Station located along the site's south-western boundary) and additionally a triangle-shaped parcel of land located on the southern side of the roundabout between Churchill Park Drive and Bergins Road. This analysis is detailed further in the report.

The expected traffic generation associated with the 'Interim' scenario is outlined at Section 4.1, whilst the 'Ultimate' scenario is outlined at Section 4.2. A review of the traffic implications of both of these scenarios of nearby intersections is outlined within Section 4.4 based on traffic distributions set out at Section 4.3.

4.1 Traffic Generation Rates – Proposed Masterplan (Interim Scenario)

The RTA Guide to Traffic Generating Developments (RTA Guide, 2002) sets out traffic generation rates for a range of developments, based on survey data collected in New South Wales, and is generally regarded as a standard for metropolitan development characteristics.

The RTA Guide sets out the following rates for dwelling types, based on surveys conducted where new subdivisions are being built, which are considered appropriate for a development of this scale and in this location:

Townhouses & Apartments

- daily vehicle trips = 6 Vehicle Trip Ends (vte) per dwelling for medium-density townhouses.
- weekday peak hour vehicle trips = 0.6 vte per dwelling for medium-density townhouses.

Separate Dwellings

- daily vehicle trips = 8 vte per dwelling.
- weekday peak hour vehicle trips = 0.8 vte per dwelling.

We have been instructed to consider the traffic implications of the development site being re-zoned in an 'Interim' scenario.

Table 6 below outlines the traffic likely to be generated by the proposed masterplan in the Interim Scenario.

Table 6: Traffic Generation – Proposed Masterplan (Interim Scenario)

Number	Daily Rate	Daily Traffic Gen.	Peak Hour Rate	Peak Hour Traffic Gen.
90 Houses	8 vte per day	720 vte	0.8 vta per hour	72 vte
810 Townhouses (Note 1)	6 vte per day	4,860 vte	0.6 vta per hour	486 vte
Total		**5,580 vte**	-	**558 vte**

Note 1: In order to conduct a conservative assessment, all of the 'medium density' lots **have been considered as townhouses rather than a combination of townhouses and apartments (which would have a lower traffic generation rate).**

Accordingly, the proposed residential development comprising largely townhouse-style dwellings and some houses is estimated to generate 5,580 vehicle trip-ends per day and 558 vehicle trip ends in the peak periods.

As no significant trip attractors are planned within the site (i.e. shops, schools etc.), all traffic generated by the development is assumed to be to locations external to the development.

The proposed small commercial use area within the precinct will not generate additional traffic but rather service residents within the precinct. Accordingly, this does not need to be taken into consideration.

4.2 Traffic Generation Rates – Police Road Precinct (Ultimate Scenario)

Table 7 below outlines an estimate of traffic likely to be generated by the development of sites within the 'Police Road Precinct' that do not form part of the Waverley Golf Course site, but are likely to be rezoned for residential use in parallel with the golf course land. We have been instructed to consider the traffic implications of this land also being re-zoned in an 'Ultimate' scenario.

The 'Police Road Precinct' includes the parcels of land which are located at the north-eastern corner of the Stud Road and Police Road intersection, as well as a triangle-shaped parcel of land located on the southern side of the roundabout between Churchill Park Drive and Bergins Road. These parcels of land are highlighted on Figure 1 and Figure 2.

The breakdown of dwelling types has been conservatively estimated at this stage and in the event that more accurate dwelling breakdowns are known, there would potentially be a lower traffic volume generated by this precinct.

Analysis of the land potentially available for development suggests a maximum lot yield of 450, with the vast majority to be located within the land located nearby to Stud Road, rather than the triangle-shaped parcel of land located towards Churchill Park Drive. Based on the proportion of larger and smaller dwellings adopted for the Waverley Golf Course Development Plan this would result in approximately 45 houses and 405 townhouses/apartments.

Table 7: Traffic Generation – Police Road Precinct (Ultimate Scenario)

Number	Daily Rate	Daily Traffic Gen.	Peak Hour Rate	Peak Hour Traffic Gen.
45 Houses	8 vte per day	360 vte	0.8 vta per hour	36 vte
405 Townhouses (Note 1)	6 vte per day	2,430 vte	0.6 vta per hour	243 vte
Total		**2,790 vte**	-	**279 vte**

Note 1: In order to conduct a conservative assessment, all of the 'medium density' lots **have been considered as townhouses rather than a combination of townhouses and apartments (which would have a lower traffic generation rate).**

Accordingly, the potential future Police Road Precinct development comprising largely townhouse-style dwellings and some houses is estimated to generate 2,790 vehicle trip-ends per day and 279 vehicle trip ends in the peak periods.

4.3 Traffic Distribution

4.3.1 Travel Routes Between Site & Arterial Roads

A number of mitigating works are proposed as part of this development, which have been included in the following assessments and are further detailed in Figure 6, Section 4.4.3 (Interim) and Section 4.4.5 (Ultimate). These include:

- the formalisation of Police Road to function as a Council Arterial Road,
- the re-routing of 'through' traffic from Churchill Park Drive (and Bergins Road) to Police Road,
- the signalisation of the intersection between Stud Road and Police Road,
- the construction of a roundabout or signalised intersection at Bergins Road/Liberty Avenue and the site access, and
- the construction of a roundabout at Bergins Road/Fowler Road and the site access.

The primary and secondary travel routes to/from the site are provided in the figure below.

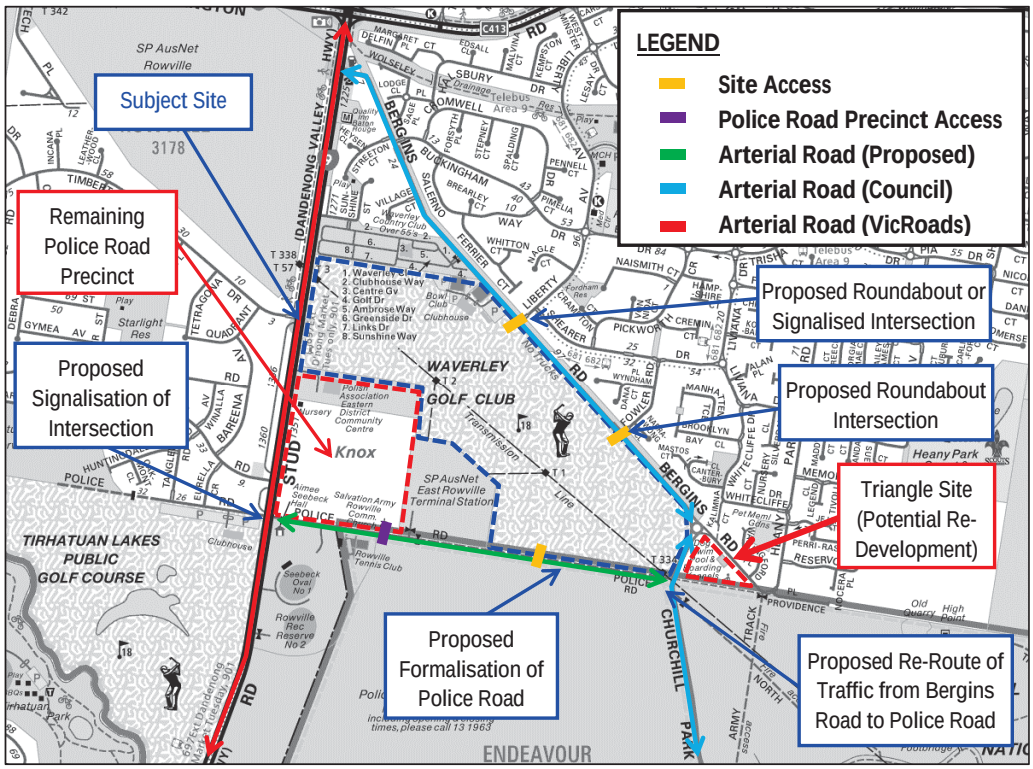


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Figure 6: Travel Routes To and From The Site

Bergins Road and Police Road will represent the key travel routes between the site and Stud Road and the wider road network.

Permeation through the local roads on the north-east side of Bergins Road will not substantially increase as there are limited attractions for traffic to travel to the north-east of the precinct.

Permeation through the golf course road network may occur from residents on the north-east side of Bergins Road as it will represent a quicker/shorter travel path to the arterial road network for some trips.

4.3.2 Re-Distribution of Traffic from Bergins Road to Police Road

Figure 7 indicates the volume of existing traffic currently using Bergins Road as a through link between Stud Road and Churchill Park Drive, which will be re-routed along Police Road by the change in intersection priority.

This includes:

- 500 and 150 vehicles travelling westbound in the AM and PM peak hours, respectively, and
- 80 and 500 vehicles travelling eastbound in the AM and PM peak hours, respectively.

This volume has been calculated based on an analysis of the traffic movement counts conducted of the existing conditions at the site (See Section 3.3), taking into account the volume of traffic travelling 'through' Bergins Road (i.e. using Bergins Road as a connection between destinations), rather than using it as access to/from local roads.

By considering the overall volume of traffic travelling in each direction along Bergins Road and deducting the traffic which enters/exits Fowler Road and Liberty Avenue (and with the aid of tube counters), we have been able to determine the volume of traffic flowing along Bergins Road from Churchill Park Drive to Stud Road. We propose that in the future, this volume of traffic will be re-routed along Police Road due to the convenience of this route, lack of additional roundabout or signalised intersections and reversed priority at the intersection of Churchill Park Drive and Police Road.

It is important to recognise the significant improvement in traffic volumes using Bergins Road as a result of the re-routing of traffic.

A two-way traffic volume of 847 and 1,185 vehicles currently utilise Bergins Road at the intersection with Stud Road in the AM and PM peak hours, respectively, while post-development (after the construction of the Police Road works, including signalisation with Stud Road), the traffic volumes will decrease to approximately 407 and 675 vehicles in the AM and PM peak hours, respectively. The bulk of this decrease is as a result of the re-routing of traffic priority from Bergins Road to Police Road.

4.3.3 Traffic Distribution Across Road Network

The majority of the traffic from the residential subdivision will be required to enter or exit the site via Police Road or Bergins Road. There is also the potential for a number of secondary access locations, including a left-in/left-out access to Stud Road. For the purposes of our assessment, we have considered all of the traffic volumes utilising the primary access locations, rather than the secondary access locations. Our assessment on traffic distribution is based on the key traffic routes provided at Figure 7. These traffic routes have been calculated based on the areas which residents of the development will be travelling to and from for work purposes (as detailed at Section 3.6).

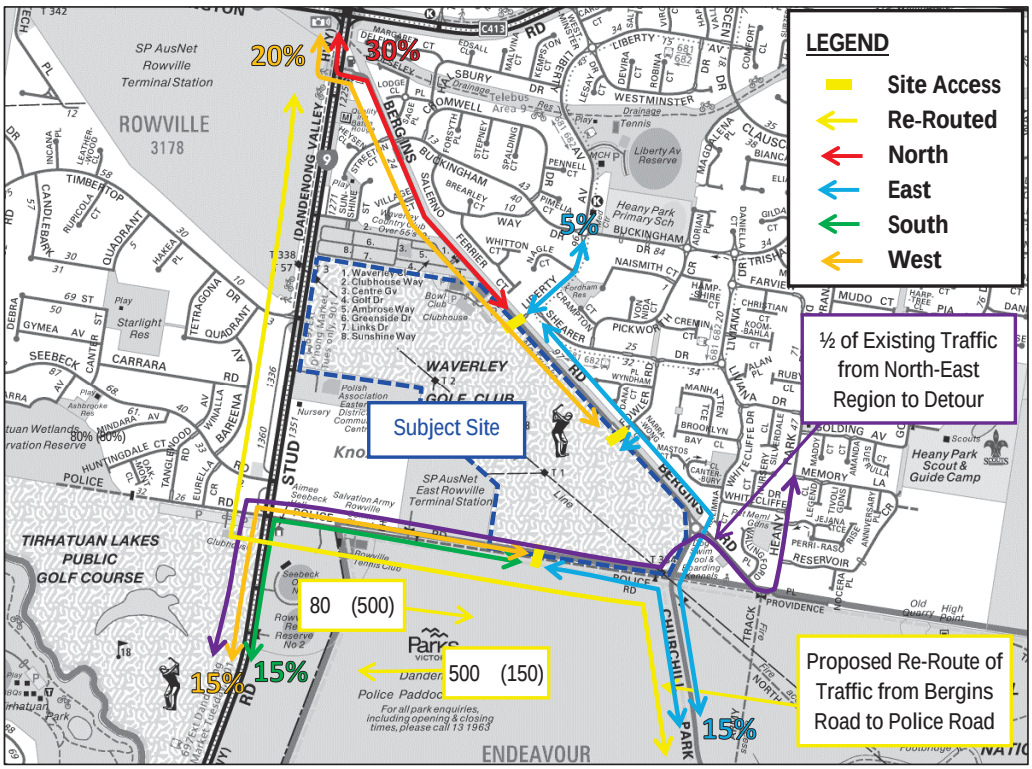

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Figure 7: Traffic Distribution Routes To and From The Site

The peak hour traffic distribution as follows:

- 80% of vehicles will exit the site and 20% will enter the site during the AM peak hour, and
- 30% of vehicles will exit the site and 70% will enter the site during the PM peak hour.

In the assessment of traffic generation of the proposed development the critical aspect required to be assessed is the peak hour traffic volumes through the key signalised intersections between Stud Road/Police Road and Stud Road/Bergins Road, noting that Police Road is proposed to be signalised under this proposal.

Vehicle access to the 'Police Road Precinct' is expected to be along that site's eastern boundary to Police Road (i.e. as far away from Stud Road as practical), with 80% of traffic movements occurring via the Stud Road intersection and 20% travelling to/from the east via Police Road.

Assessments of these intersections are provided in the following sections.

4.4 Intersection Analysis

4.4.1 Expected Peak Hour Traffic Volumes & Distribution

The critical factor in terms of peak hour traffic generation relates to access to the arterial road network. In this case there are two key signalised intersections (noting that the development proposes to signalise the intersection of Stud Road and Police Road) in which traffic from the proposed development will access the arterial road intersection. These are the following:

- Stud Road and Bergins Road Intersection.
- Stud Road and Police Road Intersection.

The remaining traffic will access the arterial road network to/from the south-east via Churchill Park Drive to the south-east. At this stage, the traffic to the south-east is considered to be less critical due to the lower volume of traffic travelling in that direction.

Based on the assumptions in Section 4.3.3 (and in Figure 6 and Figure 7), Figure 8 and Figure 9 outline the predicted traffic volumes associated with the proposed development through the signalised intersections in the Interim and Ultimate scenarios, respectively.

Figure 10 outlines the traffic volumes associated with existing 'through' traffic along Bergins Road which will be re-routed along Police Road as a result of the mitigating works to be completed as part of this development. This figure breaks down traffic that will be added and also deducted from the relevant traffic movements.

Turning movement diagrams of the post-development Interim (Waverley Golf Club) and Ultimate (i.e. Entire Precinct) traffic conditions at the signalised intersections are provided at Appendix F and Appendix G, respectively.

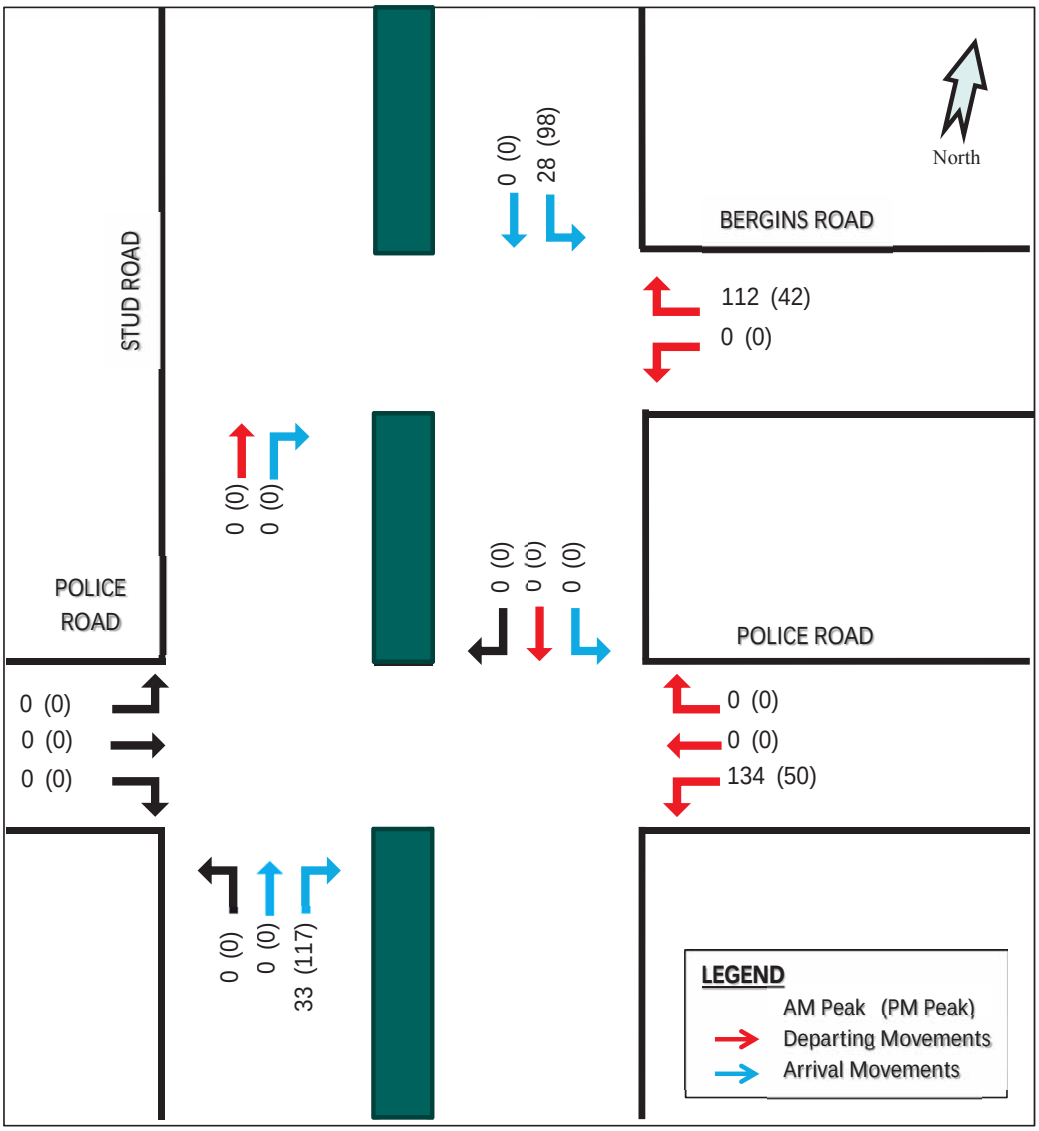


Figure 8: Signalised Intersections – Interim Scenario (Site Development) Traffic Volumes

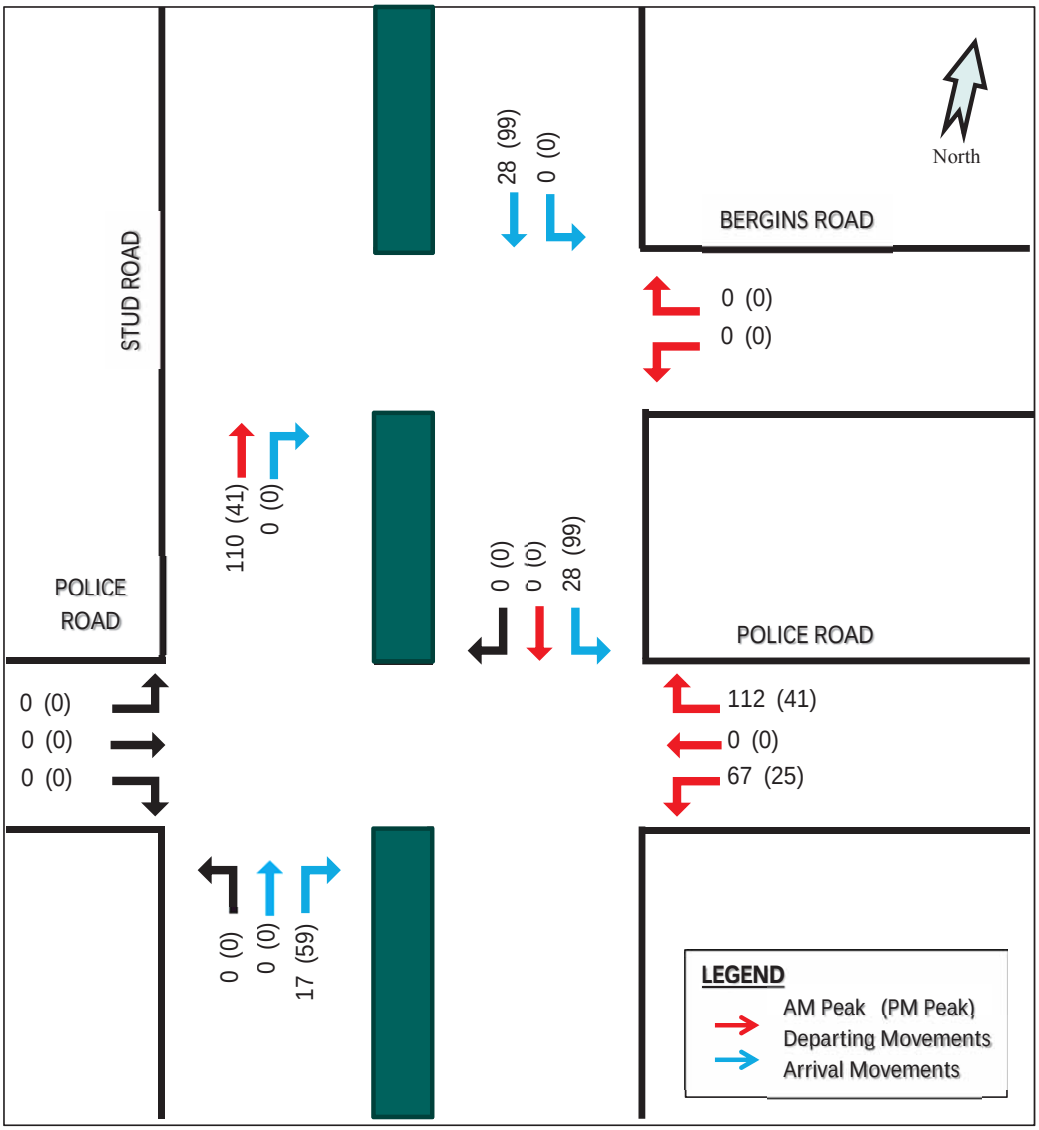


Figure 9: Signalised Intersections – Ultimate Scenario (Police Road Precinct) Development Traffic Volumes

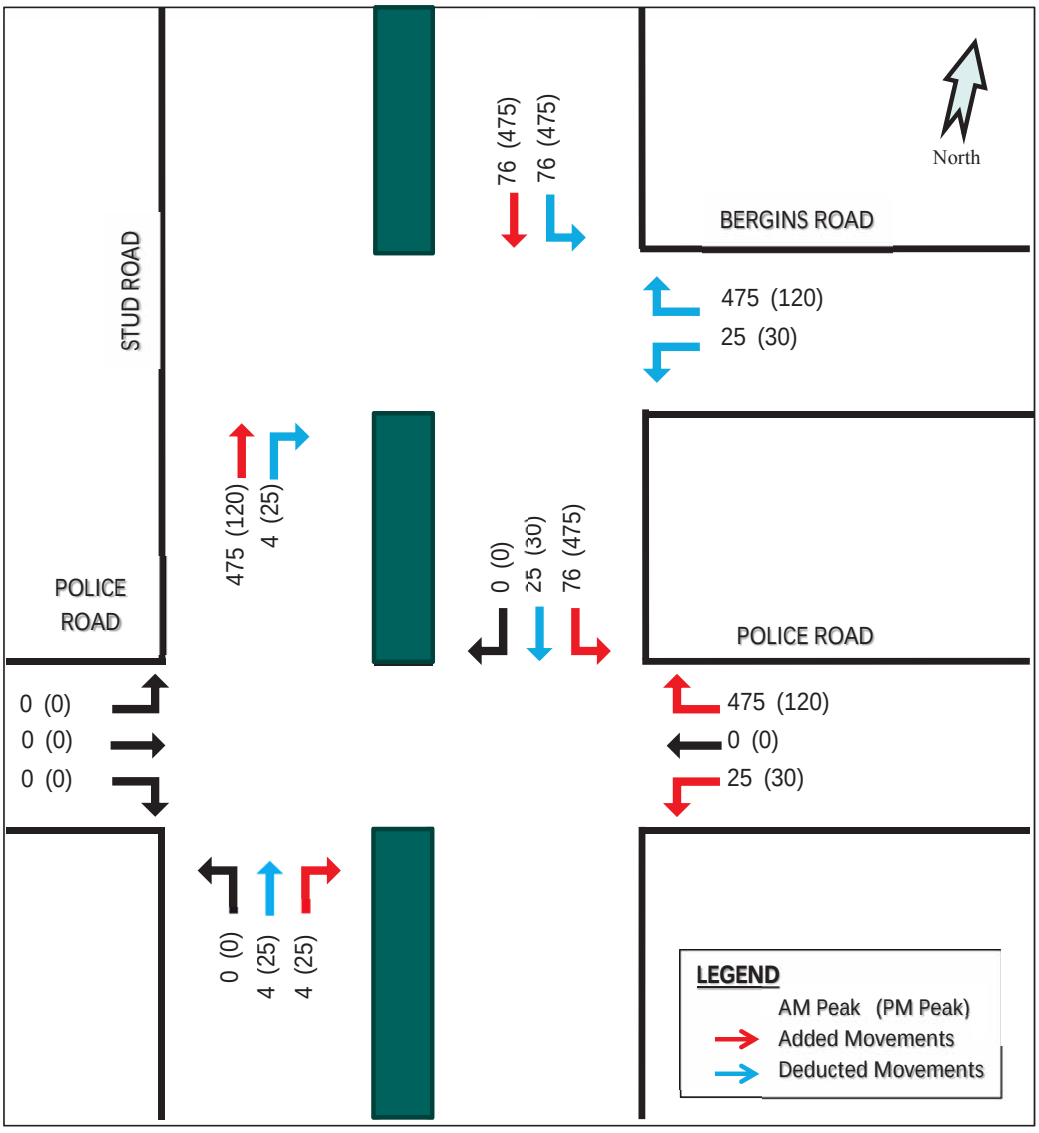


Figure 10: Signalised Intersections – Re-Routed Traffic Volumes

Based on the existing traffic volumes (based on surveys), re-routed traffic volumes and predicted development traffic volumes (based on various assumptions and predictions), the post-development traffic volumes can be analysed. The post-development traffic volumes in the Interim Scenario (Waverley Golf Club) and Ultimate Scenario (i.e. Entire Precinct) traffic conditions are provided at Appendix F and Appendix G, respectively.

These traffic volumes form the basis of our assessment below.

4.4.2 Existing Intersection Operating Conditions

Sidra Intersection 7.0 has been used to model the current performance of the Stud Road and Bergins Road Intersection. The intersection of Stud Road and Police Road has not been modelled for the existing conditions at the site due to the lack of vehicle movements currently using the eastern leg of Police Road (due to its lack of formal connection through to Churchill Park Drive) and the lack of traffic signals at this intersection.

The assessment of the Stud Road and Bergins Road intersection's performance was made on the basis of the traffic volumes presented in Section 3.5/Appendix E.

The intersection layout adopted is presented at Appendix H.

Traffix Group has also sourced IDM (Intersection Diagnostic Management) data for the same intersection for the time periods from the traffic surveys, 7am-9am, 4:30pm-6:30pm on Friday 27th May, 2016. This data provides the signal plan and signal timing information for the intersections during these times.

The IDM data is attached at Appendix I.

This assessment allows for:

- The phases times used in the analysis are based on the actual phase time proportions that ran during the survey times between 7am-9am, 4:30pm-6:30pm on Friday 27th May, 2016.
- The phase times used.

The following assumptions have been made in terms of the intersections.

- The peak hour traffic volumes were recorded as per Section 3.5/Appendix E.
- Grades through the intersection were considered to be negligible.
- A heavy vehicle percentage has been based on the volumes of heavy vehicles observed during our traffic movement counts for all movements.
- Lane capacity shared between all relevant turning and through lanes in the peak hours.
- Phase timing at the Stud Road/Police Road intersection adjusted to provide priority to Stud Road through movements.

The intersection capacity analysis allows estimation of key operating parameters such as intersection degree of saturation (DoS), average delay and 95th percentile queue lengths, which are described below:

- **Degree Of Saturation (DoS)** – measure of intersection performance expressed as a ratio of demand/capacity. A DOS greater than 0.95 is generally regarded as unsatisfactory for a signalised intersection, see shown in the table below.

Level of Service		Intersection Degree of Saturation	
		Unsignalised Intersection	**Signalised Intersection**
A	Excellent	<= 0.60	**<= 0.60**
B	Very Good	0.60 – 0.70	**0.60 – 0.70**
C	Good	0.70 – 0.80	**0.70 – 0.90**
D	Acceptable	0.80 – 0.90	**0.90 – 0.95**
E	Poor	0.90 – 1.00	**0.95 – 1.00**
F	Very Poor	>= 1.0	**>= 1.0**

- **95th Percentile Queue Length (m)** – one car represents a 7m queue
- **Average delay** - no. of seconds delayed
- **Level of Service (LOS)** – the level of service is based on the Degree Of Saturation rather than delay

The Sidra assessment results of existing conditions are set out in Table 8 (AM) and Table 9 (PM).

The diagrammatical results are set out as follows:

- Figure 11 – AM Degree of Saturation (DoS)
- Figure 12 – AM Level of Service (LOS)
- Figure 13 – PM Degree of Saturation (DoS)
- Figure 14 – PM Level of Service (LOS)

Appendix K provides the Sidra output movement summary and phasing diagrams for the existing conditions traffic analysis.

Table 8: Existing Conditions Traffic Analysis – AM Peak Hour

Intersection Approach	Movement	Demand (veh/h)	Degree of Sat.	LOS	95th %-ile Queue (veh)	Average Delay (sec)
STUD ROAD & BERGINS ROAD INTERSECTION						
Stud Road (south)	Right-Turn	31	0.493	A	2.2	83.4
	Through	1,057	0.353	A	9.1	12.8
Bergins Road (east)	Left-Turn	33	1.362	F	68.1	429.4
	Right-Turn	689	1.362	F	68.1	429.7
Stud Road (north)	Left-Turn	139	0.205	A	6.5	15.0
	Through	1,568	0.579	A	26.5	13.2

Table 9: Existing Conditions Traffic Analysis – PM Peak Hour

Intersection Approach	Movement	Demand (veh/h)	Degree of Sat.	LOS	95th %-ile Queue (veh)	Average Delay (sec)
STUD ROAD & BERGINS ROAD INTERSECTION						
Stud Road (south)	Right-Turn	99	0.852	C	7.7	87.4
	Through	1,479	0.376	A	9.2	5.7
Bergins Road (east)	Left-Turn	57	0.662	B	10.7	71.5
	Right-Turn	243	0.662	B	10.7	72.5
Stud Road (north)	Left-Turn	848	0.539	A	15.7	8.5
	Through	1,423	0.539	A	23.8	11.3

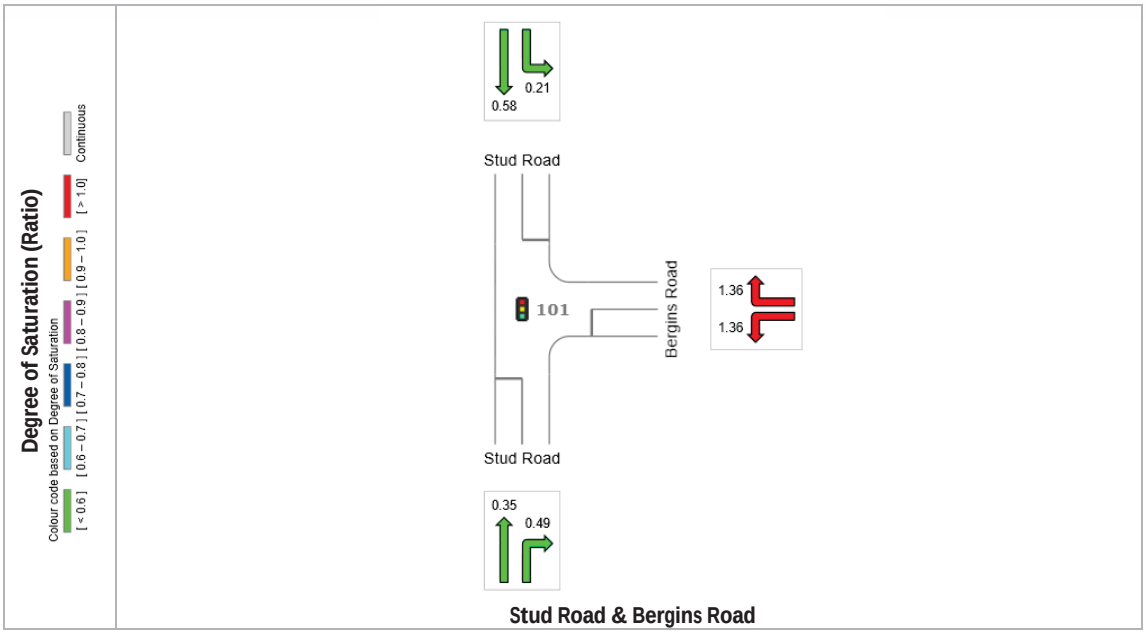


Figure 11: Existing Conditions Traffic Analysis – AM Peak Hour - Degree of Saturation

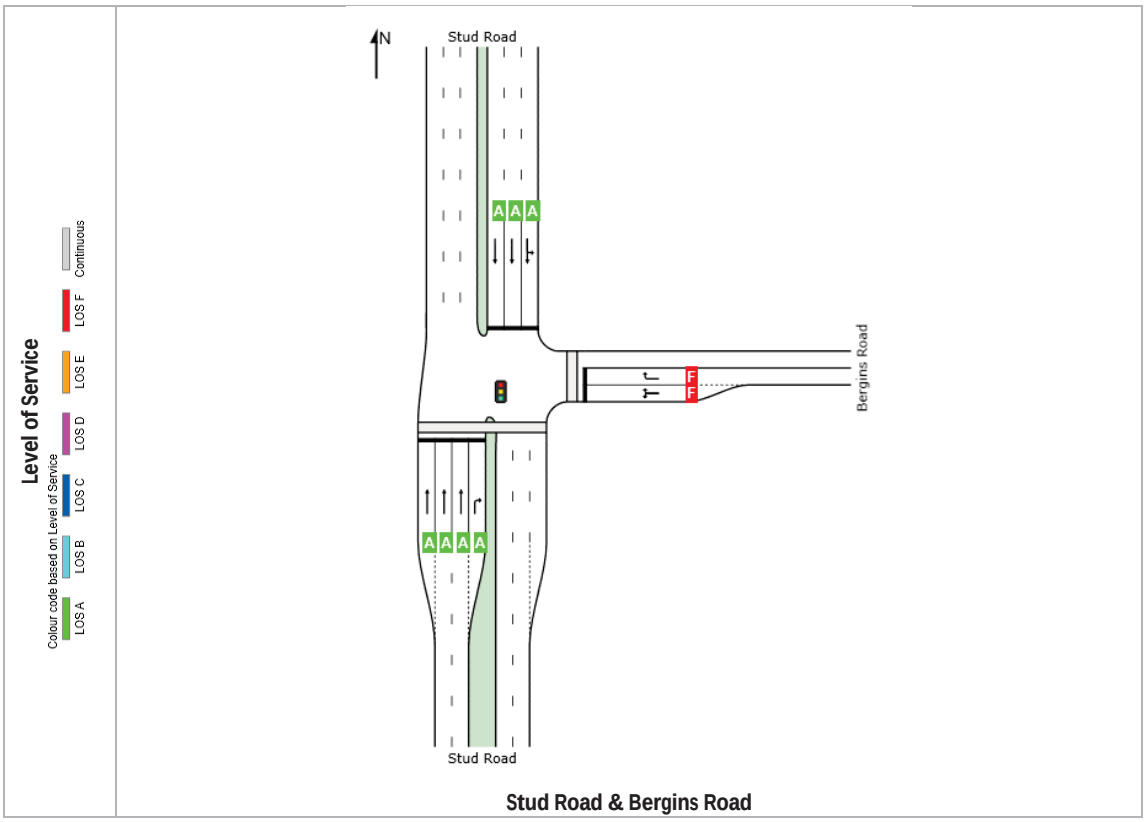


Figure 12: Existing Conditions Traffic Analysis - AM Peak Hour - Level of Service (LOS)

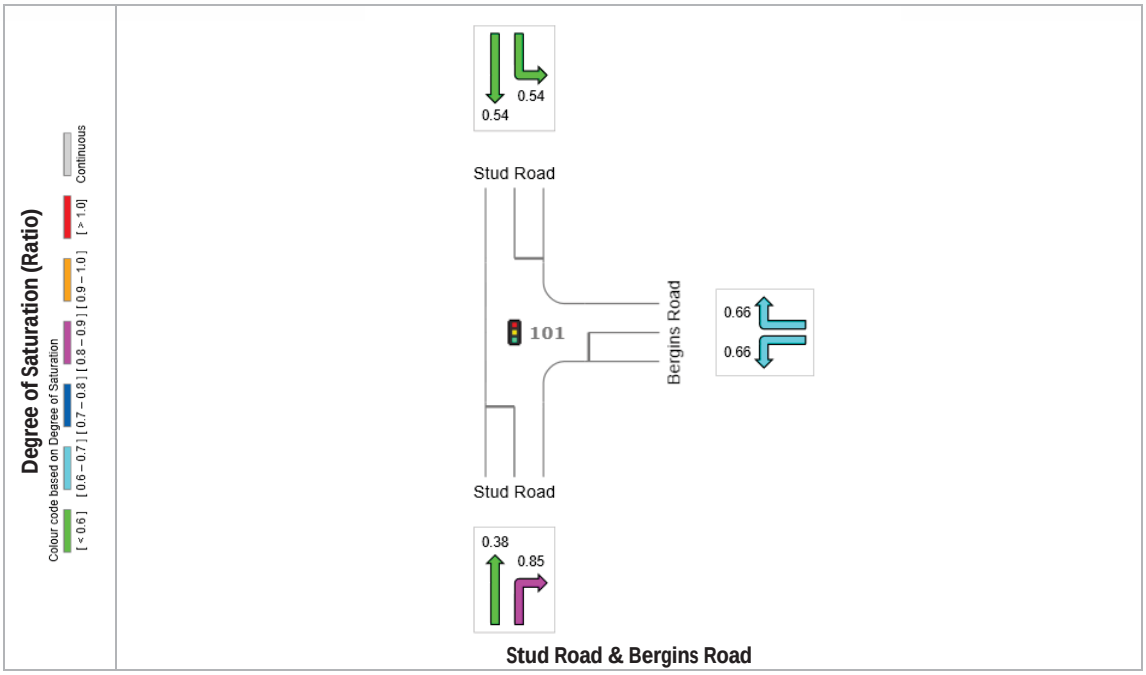


Figure 13: Existing Conditions Traffic Analysis – PM Peak Hour - Degree of Saturation

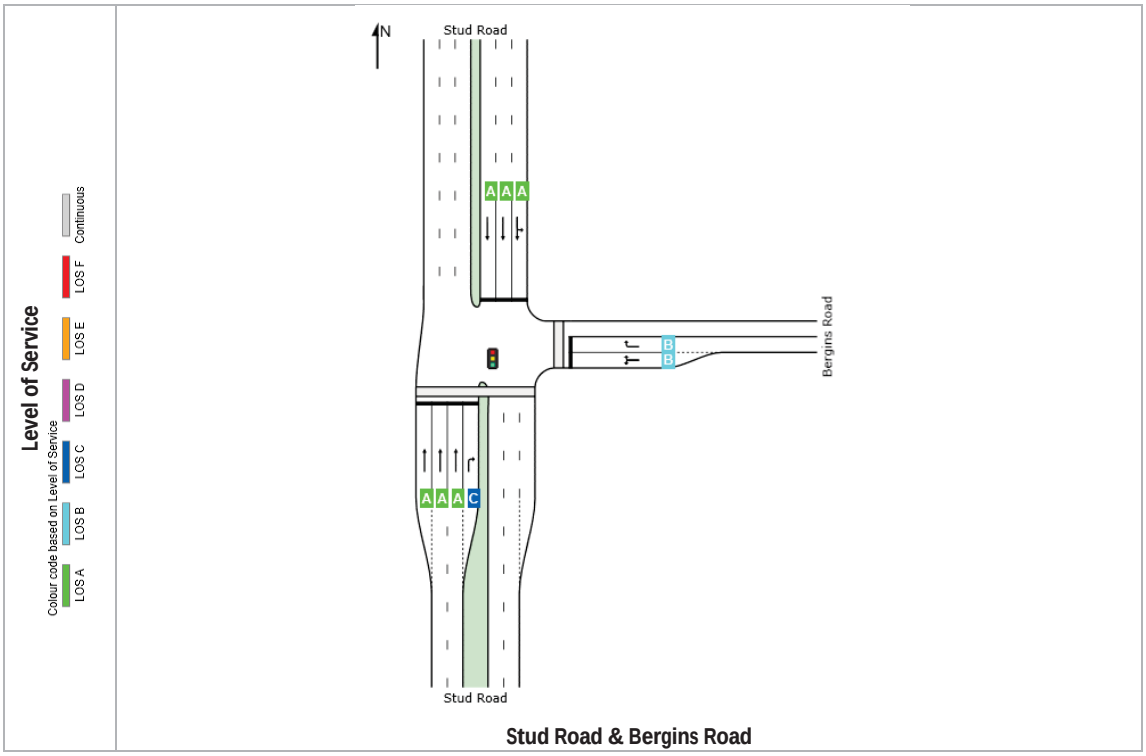


Figure 14: Existing Conditions Traffic Analysis - PM Peak Hour - Level of Service (LOS)

The key observations of the Stud Road & Bergins Road intersection under existing conditions are as follows:

Stud Road & Bergins Road Intersection

- All legs operate at LOS C or better in both the AM peak hour and PM peak hour, with the exception of Bergins Road in the AM peak hour (LOS F).
- The 95th %ile queue is a maximum of 68.1 vehicles (Bergins Road in the AM Peak), however is generally less than 25 vehicles (this is backed up by site inspections undertaken during AM peak time periods).
- Delays on Stud Road are a maximum of 87.4 seconds (right-turn in the AM peak hour), however are typically less than 15 seconds for through movements.

Overall, the intersection of Stud Road and Bergins Road, which currently provides the only arterial road connection from the site, operates reasonably well for traffic along Stud Road, however traffic utilising Bergins Road during the AM peak hour experiences significant delays.

4.4.3 Post-Development Analysis – Interim Scenario (Waverley Golf Club Development)

The following assessment has been undertaken in order to analyse the post-development traffic conditions in relation to the redevelopment of the Waverley Golf Club, which is considered to be the Interim Scenario.

The key intersections which have been analysed are:

- Stud Road and Bergins Road, and
- Stud Road and Police Road.

As a result of the proposed development of the Waverley Golf Club, the intersection of Stud Road and Police Road will need to be signalised in order to accommodate greater volumes of traffic. The layout of the Stud Road and Police Road signalised intersection (as modelled in SIDRA) is provided in the figure below. A concept plan of the signalised intersection of Stud Road and Police Road in the Interim Scenario is provided at Appendix O.

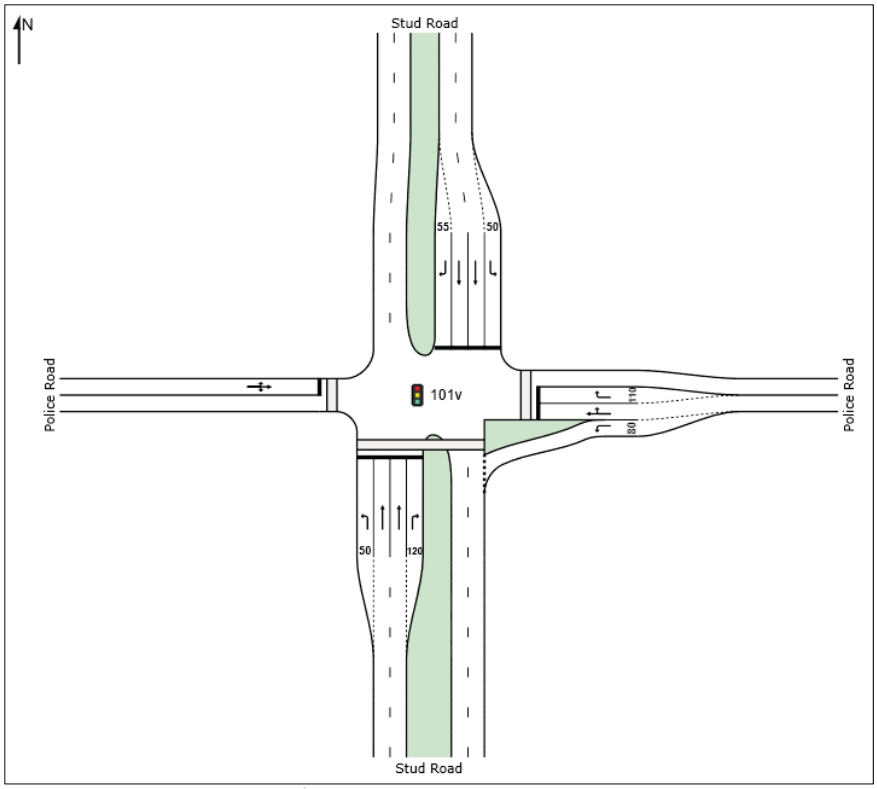


Figure 15: Layout of Stud Road and Police Road Signalised Intersection

In order to assess this new signalised intersection, we have maintained the existing cycle time for the intersection of Stud Road and Bergins Road (noting that both the AM and PM peak hours have different cycle times). The phase timings have been adjusted for the intersection of Stud Road and Police Road in order to ensure that the maximum amount of green time is provided to the through movements along Stud Road. Minor adjustments to phase timings have been made to the intersection of Stud Road and Bergins Road due to the lower traffic volumes using Bergins Road post-development (due to the re-routing of traffic along Police Road).

The following improvements to existing conditions and required works arise from the proposed development:

Signalisation of the Stud Road & Police Road Intersection

- The layout for the intersection has been created based on advice received from VicRoads, as detailed at Section 4.5, as well as what is practical and possible to provide.
- This intersection will need to be signalised in order to accommodate the additional traffic generated by the site and the proposed re-routing of traffic along Police Road from Bergins Road.
- Police Road will need to be constructed to accommodate the anticipated volumes of traffic, generally facilitating a traffic lane in each direction. A concept plan of the expected cross-section of Police Road at a mid-point location along the site's frontage is provided at Appendix J.

Three exit lanes will need to be provided, with the northern lane providing for right-turn access, the middle lane providing for left, through and right-turn access and the southern lane providing a left-turn slip lane.

- A slip lane to Police Road along the Stud Road (north) approach is not strictly warranted, nor possible to construct in the Interim phase, with the deceleration lane representing an improved outcome compared with the Bergins Road intersection which includes a combined left-turn/through lane.
- The right-turn lane from the south approach to Stud Road will need to be increased by approximately 30m to 135m in order to accommodate the large increase in right-turning traffic.

Re-routing of traffic from Churchill Park Drive to Police Road (i.e. to avoid Bergins Road)

- This proposed construction work will reverse the priority of the T-intersection of Police Road and Churchill Park Drive to make Churchill Park Drive a less convenient option for 'through' commuters. The concept plan of this design is attached at Appendix O.
- Commuters will be directed down Police Road which will subsequently connect to Stud Road to the west.
- This will significantly reduce the traffic volumes along Bergins Road, including significantly improving performance of 'local' traffic exiting Bergins Road to Stud Road.
- Potentially more green time could be ultimately given to Stud Road at the Stud Road/Bergins Road intersection, given the reduced traffic volumes along Bergins Road.

Post-Development Conditions (Interim Scenario)

The Sidra assessment results are set out in Table 10 (AM) and Table 11 (PM).

The diagrammatical results are set out as follows:

- Figure 16 – AM Degree of Saturation (DoS)
- Figure 17 – AM Level of Service (LOS)
- Figure 18 – PM Degree of Saturation (DoS)
- Figure 19 – PM Level of Service (LOS)

Appendix L provides the Sidra output movement summary and phasing diagrams for the post-development conditions (Interim Scenario) traffic analysis.

Table 10: Post-Development Conditions Traffic Analysis (Interim Scenario) – AM Peak Hour

Intersection Approach	Movement	Demand (veh/h)	Degree of Sat.	LOS	95th %-ile Queue (veh)	Average Delay (sec)
STUD ROAD & BERGINS ROAD INTERSECTION						
Stud Road (south)	Right-Turn	14	0.186	A	1.0	80.3
	Through	1,557	0.451	A	13.2	10.1
Bergins Road (east)	Left-Turn	6	0.570	A	10.2	66.0
	Right-Turn	307	0.570	A	10.2	66.3
Stud Road (north)	Left-Turn	101	0.206	A	6.4	14.2
	Through	1,652	0.580	A	26.4	12.1
STUD ROAD & POLICE ROAD INTERSECTION						
Stud Road (south)	Left-Turn	4	0.004	A	0.1	12.5
	Through	1,107	0.484	A	21.2	17.0
	Right	39	0.493	A	2.8	83.3
Police Road (east)	Left-Turn	236	0.375	A	8.5	19.9
	Through	11	0.880	C	19.4	74.0
	Right	500	0.880	C	19.4	79.6
Stud Road (north)	Left-Turn	83	0.057	A	1.2	10.4
	Through	1,659	0.748	C	41.8	21.3
	Right	9	0.120	A	0.7	80.5
Police Road (west)	Left-Turn	16	0.372	A	2.6	78.5
	Through	11	0.372	A	2.6	72.9
	Right	11	0.372	A	2.6	78.5

Table 11: Post-Development Conditions Traffic Analysis (Interim Scenario) – PM Peak Hour

Intersection Approach	Movement	Demand (veh/h)	Degree of Sat.	LOS	95th %-ile Queue (veh)	Average Delay (sec)
STUD ROAD & BERGINS ROAD INTERSECTION						
Stud Road (south)	Right-Turn	46	0.603	B	3.5	85.0
	Through	1,605	0.411	A	11.1	7.7
Bergins Road (east)	Left-Turn	25	0.589	A	6.8	76.4
	Right-Turn	161	0.589	A	6.8	77.0
Stud Road (north)	Left-Turn	478	0.296	A	5.5	7.1
	Through	1,924	0.673	B	33.4	9.5
STUD ROAD & POLICE ROAD INTERSECTION						
Stud Road (south)	Left-Turn	4	0.003	A	0.0	8.5
	Through	1,729	0.587	A	25.5	7.5
	Right	195	0.806	C	14.4	79.2
Police Road (east)	Left-Turn	113	0.167	A	2.6	12.8
	Through	11	0.536	A	4.9	74.0
	Right	126	0.536	A	4.9	79.6
Stud Road (north)	Left-Turn	501	0.397	A	12.7	14.4
	Through	1,358	0.680	B	36.8	17.3
	Right	9	0.372	A	0.8	94.8
Police Road (west)	Left-Turn	9	0.275	A	1.8	80.8
	Through	7	0.275	A	1.8	75.2
	Right	8	0.275	A	1.8	80.8

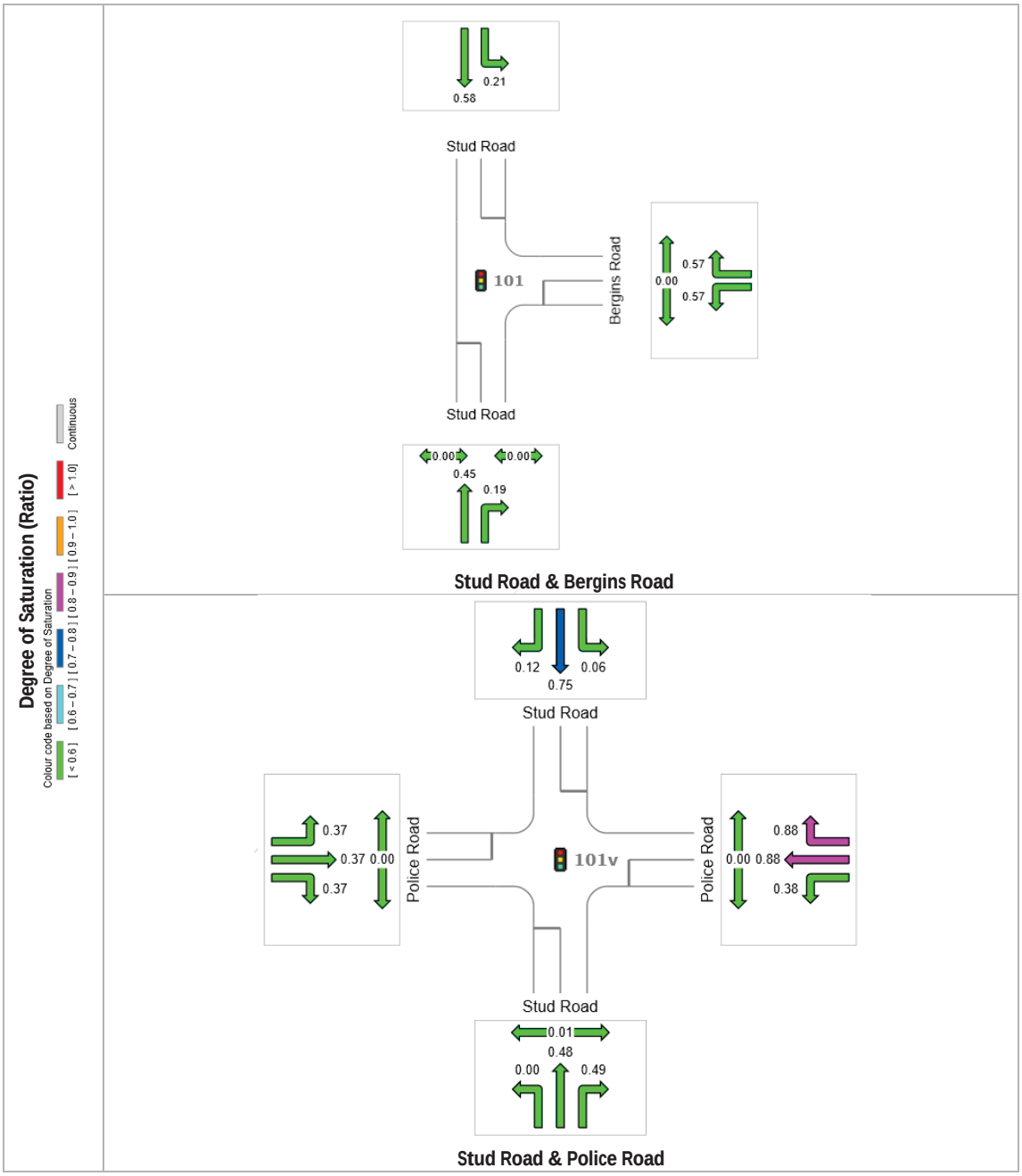


Figure 16: Post-Development Conditions Traffic Analysis – AM Peak Hour - Degree of Saturation

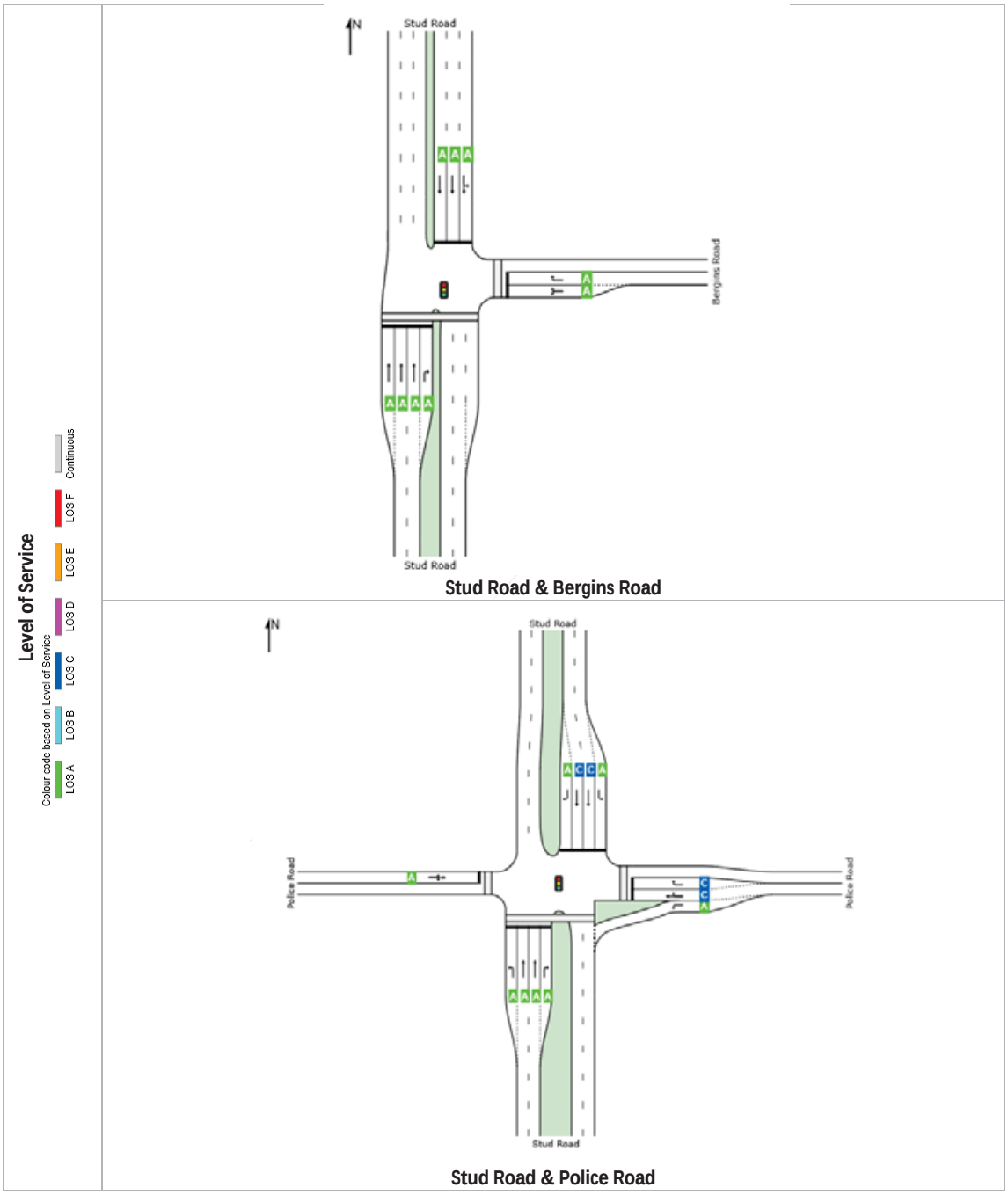


Figure 17: Post-Development Conditions Traffic Analysis - AM Peak Hour - Level of Service (LOS)

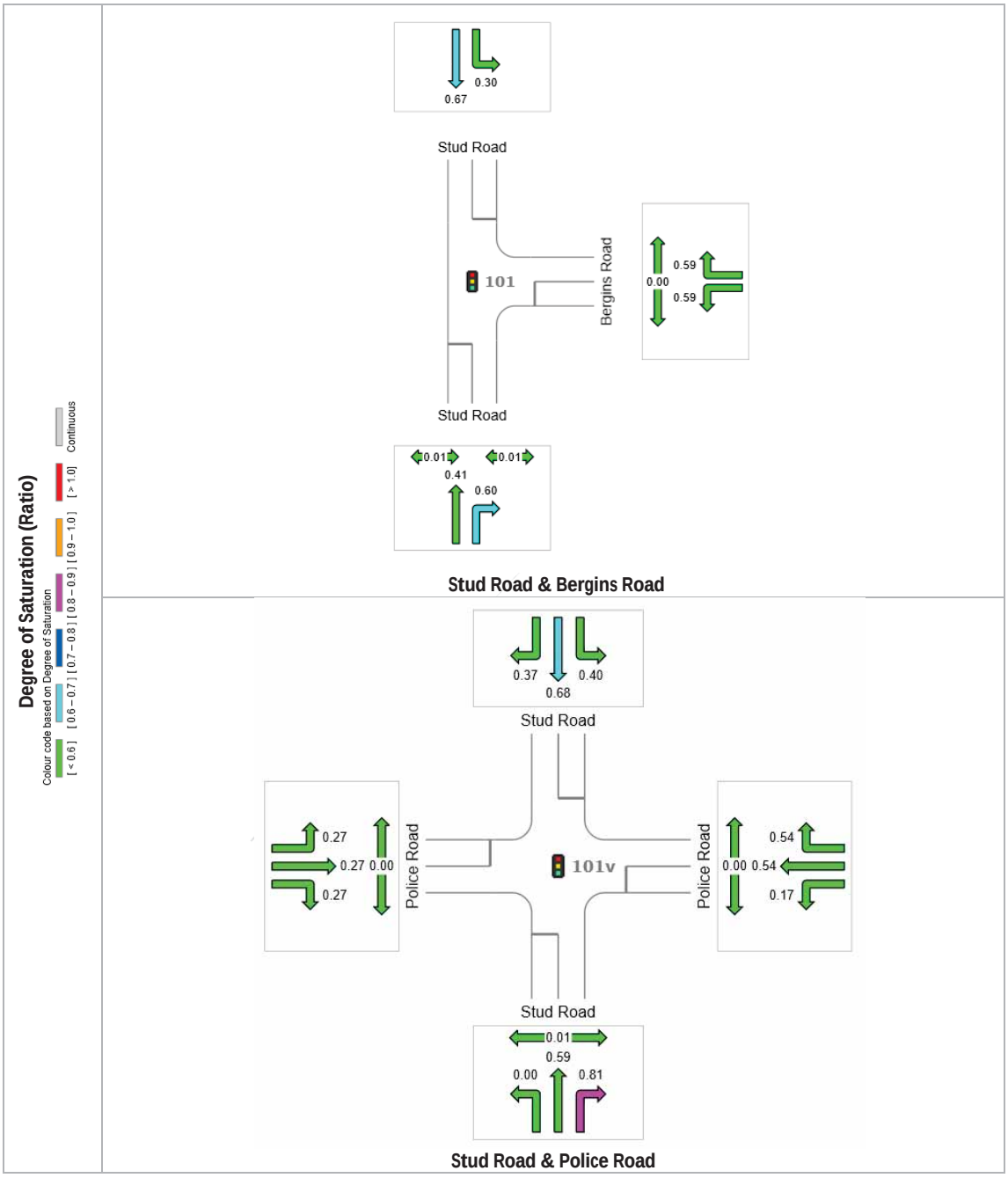


Figure 18: Post-Development Conditions Traffic Analysis – PM Peak Hour - Degree of Saturation

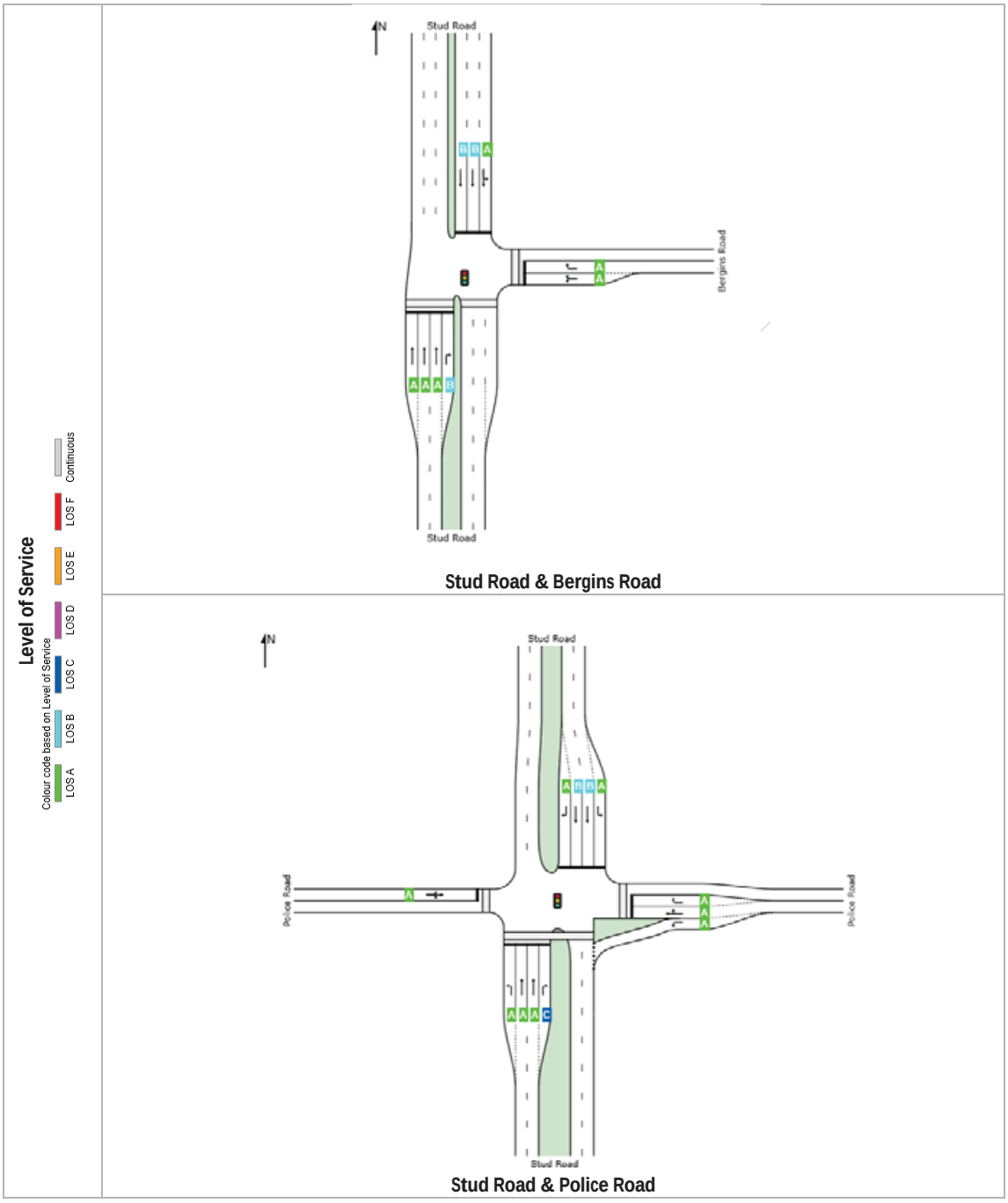


Figure 19: Post-Development **Conditions Traffic Analysis - PM Peak Hour - Level of Service (LOS)**

The key observations of the 2 intersections under post-development conditions are as follows:

Stud Road & Bergins Road Intersection

- All legs now operate at LOS A in the AM peak.
- All legs now operate at LOS A in the PM peak, with the exception of the right-turn from Stud Road (south) and through movements along Stud Road from the north approach which will operate at LOS B (Very Good).
- Bergins Road now operates with a 95th %ile queue of maximum 10.2 vehicles in the AM peak hour, whilst the average delay is now a maximum of 77.0 seconds in the PM peak hour. This compares to a 95th %ile queue of 68.1 vehicles under existing conditions in the AM peak hour.

Stud Road & Police Road Intersection

- All legs will operate at LOS C or better in both peak hours.
- The southern leg of Stud Road will operate at LOS A in both peak hours.
- The northern leg of Stud Road will operate with a LOS of C and B in the AM and PM peak hours, respectively.

Overall, the intersections surrounding the site will operate under Excellent (LOS A) to Good (LOS C) conditions, noting that Bergins Road no longer operates under Very Poor (LOS F) conditions.

4.4.4 Key Impacts of Interim Scenario (Waverley Golf Club Development Traffic)

After reviewing the existing and post-development interim operating conditions, the following outlines the key findings and impacts of the proposed development.

The Sidra assessment comparison of changes between the existing and post-development models are set out in Table 12 (AM) and Table 13 (PM).

The intersection of Stud Road and Police Road is not currently signalised, with Police Road not connecting through to Churchill Park Drive to the east. We have not assessed the difference between existing and post-development conditions for this reason and as such, have based our assessment of this intersection on the post-development conditions.

Table 12: Change in Operating Conditions – AM Peak Hour

Intersection Approach	Movement	Demand (veh/h)	Degree of Sat.	LOS	95th %-ile Queue (veh)	Average Delay (sec)
STUD ROAD & BERGINS ROAD INTERSECTION						
Stud Road (south)	Right-Turn	-17	-0.307	-	-1.2	-3.1
	Through	+500	+0.098	-	+4.1	-2.7
Bergins Road (east)	Left-Turn	-27	-0.792	F to A	-57.9	-363.4
	Right-Turn	-382	-0.792	F to A	-57.9	-363.4
Stud Road (north)	Left-Turn	-38	+0.001	-	-0.1	-0.8
	Through	+84	+0.001	-	-0.1	-1.1

Table 13: Change in Operating Conditions – PM Peak Hour

Intersection Approach	Movement	Demand (veh/h)	Degree of Sat.	LOS	95th %-ile Queue (veh)	Average Delay (sec)
STUD ROAD & BERGINS ROAD INTERSECTION						
Stud Road (south)	Right-Turn	-53	-0.249	C to B	-4.2	-2.4
	Through	+126	+0.035	-	+1.9	+2.0
Bergins Road (east)	Left-Turn	-32	-0.073	B to A	-3.9	+4.9
	Right-Turn	-82	-0.073	B to A	-3.9	+4.5
Stud Road (north)	Left-Turn	-370	-0.243	-	-10.2	-1.4
	Through	+501	+0.134	A to B	+9.6	-1.8

The key observations of the changed operating conditions for the 2 intersections are as follows:

Stud Road & Bergins Road Intersection

- All legs have observed either a continuation or improvement in LOS to LOS A (Excellent), with the exception of the through movement along Stud Road in the PM peak hour from LOS A to LOS B (Very Good).
- Significant improvement of Bergins Road from **LOS F to LOS A** in the AM peak hour and LOS B to LOS A in the PM peak hour with substantially improved queue lengths and delays.
- Delay generally comparable for all movements, with minor changes observed. A significant reduction in delay has been observed for the AM peak hour for traffic exiting Bergins Road with an improvement of approximately **363.4 seconds**.
- A decrease in the 95th percentile queue in the AM peak hour for Bergins Road by **57.9 vehicles**.
- 95th percentile queue on any leg increased by a maximum of 9.6 vehicles (Stud Road (North) in the PM peak hour, with the queue on the south approach to Stud Road in the AM peak hour increasing by 4.1 vehicles. The majority of other legs experienced changes (almost entirely improvements) between 1-5 vehicle movements.
- The DoS increases by a maximum of 0.134 which changes the LOS from Excellent (LOS A) to Very Good (LOS B). Generally, the change in DoS is less than 0.1 (including a number that improve) and the LOS remains unchanged.

Stud Road & Police Road Intersection

- The analysis of the post-development conditions of this intersection is provided at Section 4.4.3.
- Significantly, the redistribution of traffic from Bergins Road in conjunction with the through traffic of Stud Road can be catered for by the proposed signalisation of this intersection.

Overall, we are satisfied that the level of traffic likely to be generated can be accommodated by the surrounding signalised intersections and results in significant improvements to Bergins Road, in particular at the Stud Road intersection.

4.4.5 Post-Development Analysis – Ultimate Scenario (Entire Precinct Development)

The following assessment has been undertaken in order to analyse the post-development traffic conditions in relation to the redevelopment of the Police Road Precinct in addition to the Waverley Golf Club, also known as the 'Ultimate' scenario.

The key intersections which have been analysed are:

- Stud Road and Bergins Road, and
- Stud Road and Police Road.

As previously discussed, as a result of the proposed development of the Waverley Golf Club, the intersection of Stud Road and Police Road will be signalised in order to accommodate greater volumes of traffic. The redevelopment of the Police Road Precinct will generate significant additional traffic volumes (refer to Section 4.2) compared to the rezoning of solely the Waverley Golf Club. We reviewed the traffic impacts of maintaining the same intersection configuration at Stud Road and Police Road and found that the intersection did not operate satisfactorily and had an unacceptable impact on Stud Road. A concept plan of the signalised intersection of Stud Road and Police Road in the Ultimate Scenario is provided at Appendix P.

In order to improve the capacity and design of the intersection, adjustments must be made which require additional road reserve than what is currently available. This additional road reserve will come from within the 'Police Road Precinct' on the north-eastern corner of the intersection. This is a reasonable outcome in our view given that these works are required for that land to be fully developed for residential purposes.

The primary changes to the signalised intersection as a result of this additional traffic relates to:

- Additional 60m long right-turn lane on the southern approach on Stud Road into Police Road (and associated works),
- Additional 'through' lane along the southbound approaches of Stud Road in order to increase southbound capacity of the intersection, and
- Increased length and adjustment to a 'slip-lane' for the left-turn on the north approach from Stud Road into Police Road.

Importantly, the eastern approach of Police Road to the intersection will not require any significant adjustments from the 'Interim' intersection design, with the aim of this being to reduce the amount of 're-work' to the intersection.

The layout of the upgraded Stud Road and Police Road signalised intersection (as modelled in SIDRA) is provided in the figure below.

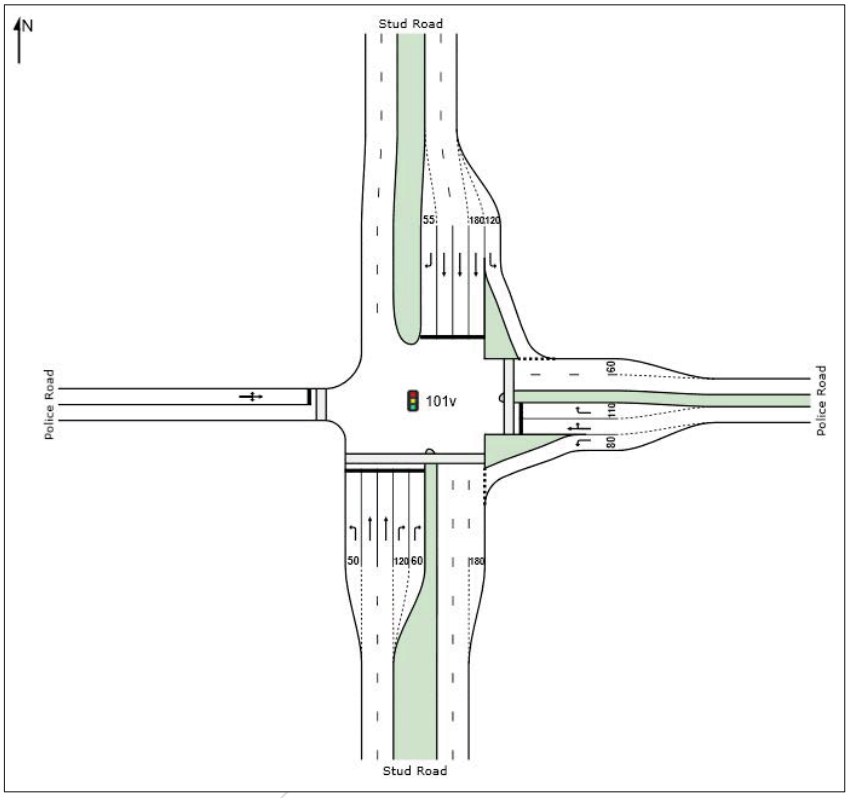


Figure 20: Layout of upgraded Stud Road and Police Road Signalised Intersection

The following improvements to existing conditions and mitigating works arise from the development of the remaining Police Road Precinct (in addition to the Waverley Golf Course re-development):

Signalisation of the Stud Road & Police Road Intersection

- The layout for the intersection has been created based on advice received from VicRoads, as detailed at Section 4.5, as well as considering what is practical and possible.
- This upgrade of the intersection will be provided in greater detail at a later stage as part of the approval process and will require land acquisition from the relevant adjoining properties (noting that the trigger for this upgrade of the intersection would come from the re-development of the land immediately to the north of Police Road at its intersection with Stud Road).

Police Road

- The eastern approach of Police Road in relation to traffic approaching from the east will largely remain the same, as the 'Interim' design has taken into account the 'Ultimate' design to minimise re-work of the intersection.
- An additional 'exit' lane will be required to accommodate the second right-turn lane from Stud Road into Police Road, resulting in widening works to the north. A central median island will be required to facilitate pedestrian movements across the wider road.

Stud Road

- An additional right-turn lane from the south approach will be required due to the increase in traffic, which must have a length of at least **60m**. The primary right-turn lane from the south approach can be maintained from the 'Interim' design.
- The left-turn lane from the north approach of Stud Road into Police Road will need to be modified to a 'slip-lane' design, as well as the length increased to provide a full **95m** long left-turn lane prior to the slip-lane. This requires additional road reserve to the east.
- An additional 'through' lane is required in the southbound direction on both the north and south legs for a length of **200m** on both legs in order to increase the southbound capacity of the intersection. This requires additional road reserve to the east on the northern leg of the intersection.

The same analysis (utilising Sidra 7.0) has been undertaken for the ultimate scenario post-development traffic conditions based on the same assumptions and vehicle distribution as outlined previously.

The Sidra assessment results for the Ultimate Scenario are set out in Table 14 (AM) and Table 15 (PM).

The diagrammatical results are set out as follows:

- Figure 21 – AM Degree of Saturation (DoS)
- Figure 22 – AM Level of Service (LOS)
- Figure 23 – PM Degree of Saturation (DoS)
- Figure 24 – PM Level of Service (LOS)

Appendix M provides the Sidra output movement summary and phasing diagrams for the post-development conditions (Entire Precinct) traffic analysis.

Table 14: Post-Development Conditions Traffic Analysis (Ultimate Scenario) – AM Peak Hour

Intersection Approach	Movement	Demand (veh/h)	Degree of Sat.	LOS	95th %-ile Queue (veh)	Average Delay (sec)
STUD ROAD & BERGINS ROAD INTERSECTION						
Stud Road (south)	Right-Turn	14	0.186	A	1.0	80.3
	Through	1,675	0.480	A	14.8	10.3
Bergins Road (east)	Left-Turn	6	0.570	A	10.2	66.0
	Right-Turn	307	0.570	A	10.2	66.3
Stud Road (north)	Left-Turn	101	0.209	A	6.6	14.3
	Through	1,681	0.590	A	27.2	12.2
STUD ROAD & POLICE ROAD INTERSECTION						
Stud Road (south)	Left-Turn	4	0.004	A	0.1	14.5
	Through	1,107	0.528	A	23.9	21.5
	Right	57	0.360	A	2.0	82.6
Police Road (east)	Left-Turn	306	0.397	A	8.0	12.1
	Through	11	0.861	C	22.8	67.6
	Right	618	0.861	C	23.4	73.2
Stud Road (north)	Left-Turn	113	0.068	A	0.5	7.7
	Through	1,659	0.525	A	23.8	21.4
	Right	9	0.120	A	0.7	80.5
Police Road (west)	Left-Turn	16	0.372	A	2.6	78.5
	Through	11	0.372	A	2.6	72.9
	Right	11	0.372	A	2.6	78.5

Table 15: Post-Development Conditions Traffic Analysis (Ultimate Scenario) – PM Peak Hour

Intersection Approach	Movement	Demand (veh/h)	Degree of Sat.	LOS	95th %-ile Queue (veh)	Average Delay (sec)
STUD ROAD & BERGINS ROAD INTERSECTION						
Stud Road (south)	Right-Turn	46	0.607	B	3.5	85.6
	Through	1,648	0.393	A	9.1	4.9
Bergins Road (east)	Left-Turn	25	0.708	C	7.1	81.2
	Right-Turn	161	0.708	C	7.1	81.7
Stud Road (north)	Left-Turn	478	0.296	A	5.5	7.1
	Through	2,026	0.695	B	35.1	8.9
STUD ROAD & POLICE ROAD INTERSECTION						
Stud Road (south)	Left-Turn	4	0.003	A	0.0	8.5
	Through	1,729	0.587	A	25.5	7.5
	Right	257	0.439	A	8.4	67.8
Police Road (east)	Left-Turn	139	0.168	A	1.6	7.5
	Through	11	0.706	C	6.7	76.5
	Right	169	0.706	C	6.7	82.1
Stud Road (north)	Left-Turn	605	0.384	A	5.6	8.3
	Through	1,358	0.395	A	16.7	16.3
	Right	9	0.372	A	0.8	94.8
Police Road (west)	Left-Turn	9	0.275	A	1.8	80.8
	Through	7	0.275	A	1.8	75.2
	Right	8	0.275	A	1.8	80.8

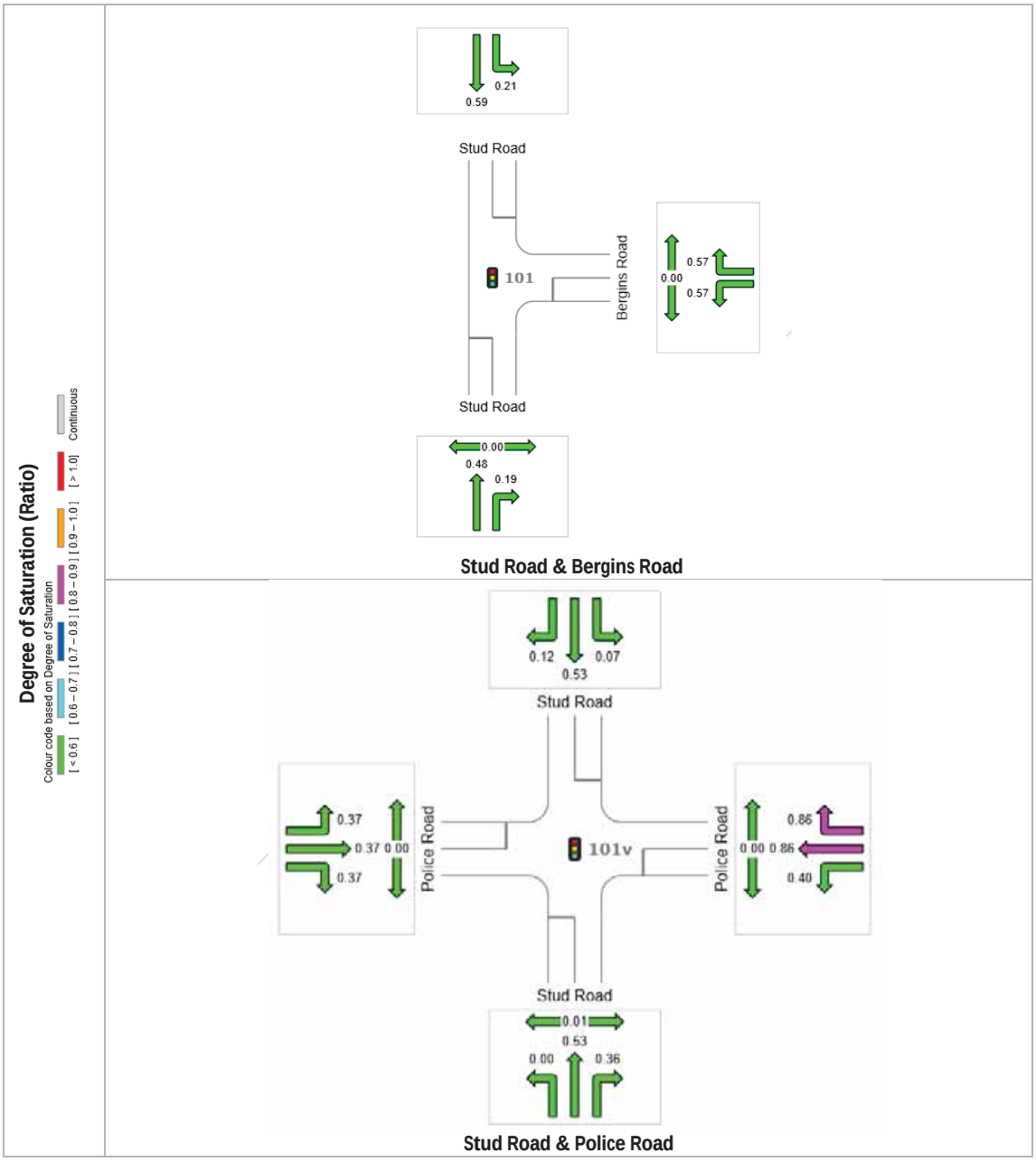


Figure 21: Post-Development Conditions Traffic Analysis (Ultimate Scenario) – AM Peak Hour - Degree of Saturation

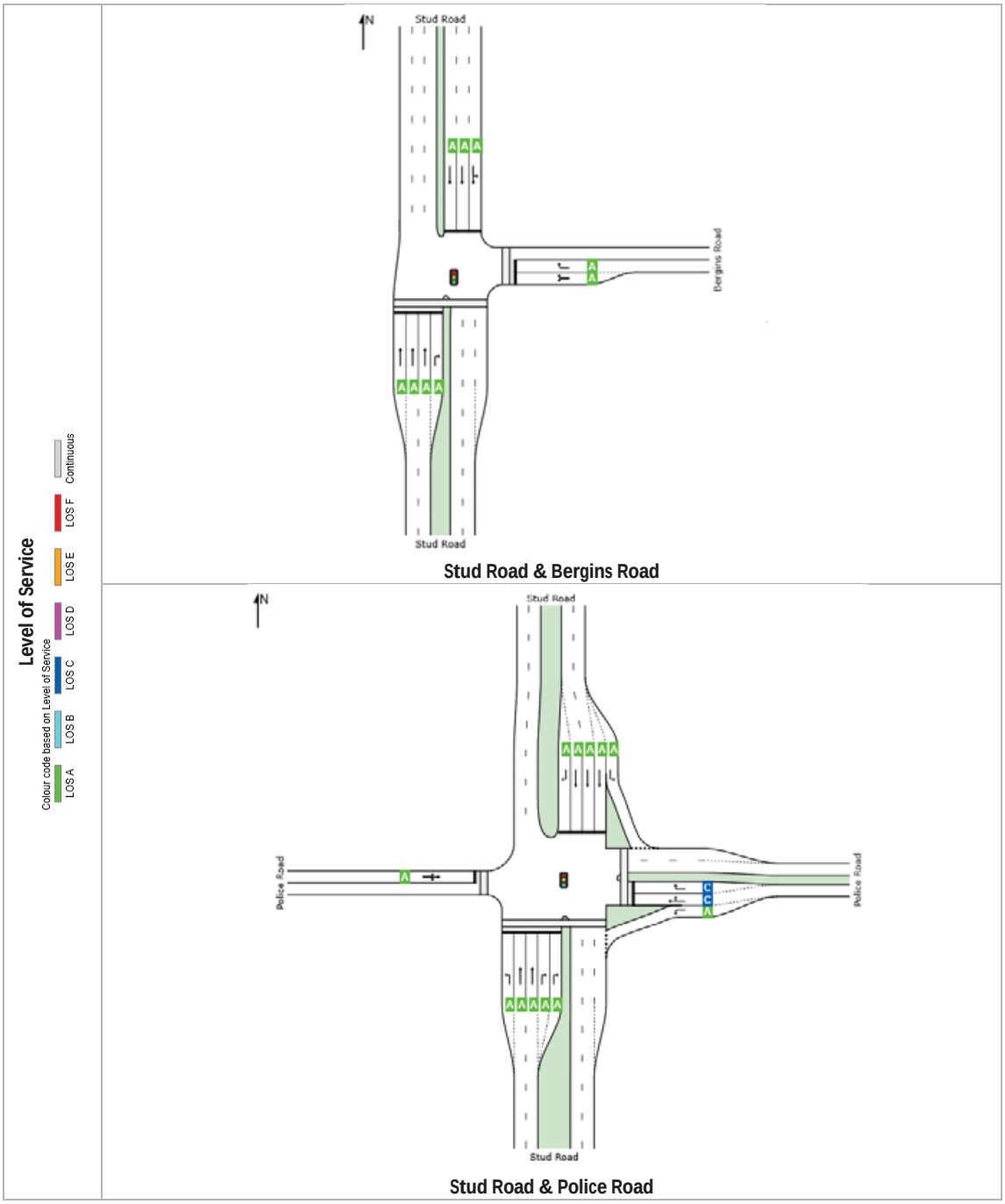


Figure 22: Post-Development Conditions Traffic Analysis (Ultimate Scenario) - AM Peak Hour - Level of Service (LOS)

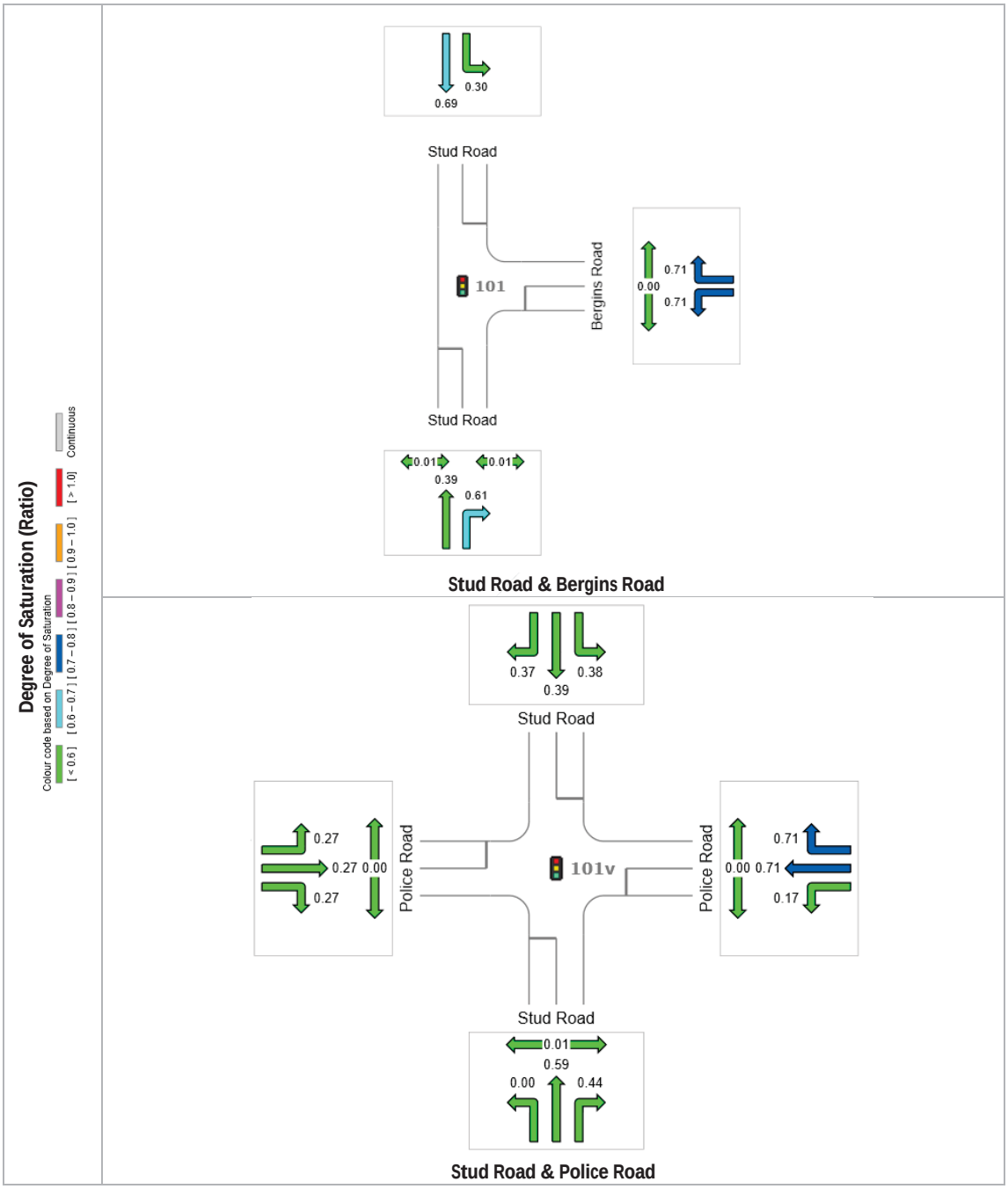


Figure 23: Post-Development Conditions Traffic Analysis (Ultimate Scenario) – PM Peak Hour - Degree of Saturation

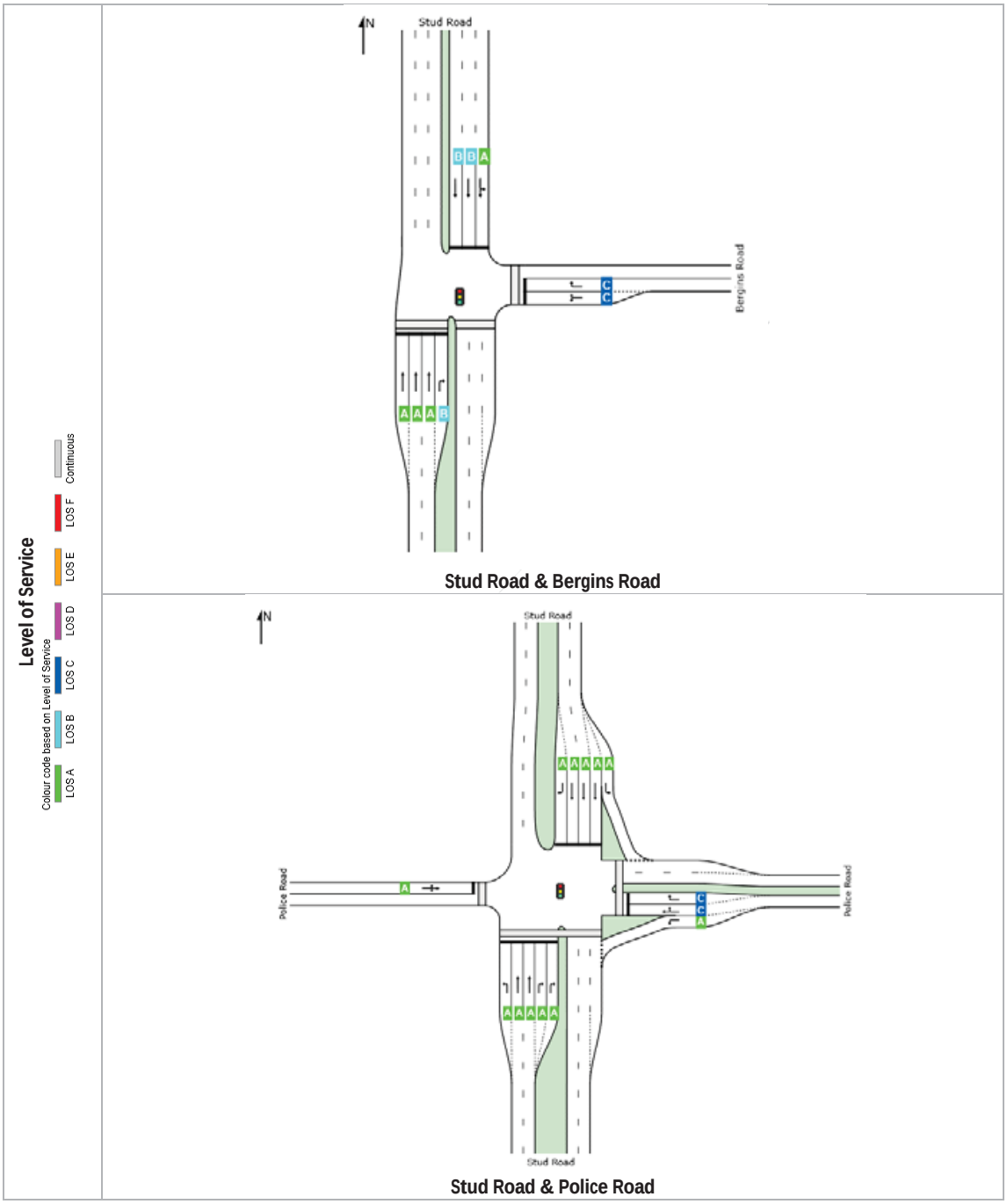


Figure 24: Post-Development Conditions Traffic Analysis (Ultimate Scenario) - PM Peak Hour - Level of Service (LOS)

The key observations of the 2 intersections under the Ultimate Scenario (i.e. entire precinct is developed) are as follows:

Stud Road & Bergins Road Intersection

- All legs continue to operate at the same LOS or better as per the post-development conditions from the development of the Waverley Golf Club, with the exception of the left and right-turn on the east approach to Bergins Road in the PM peak hour (LOS C – Good).
- Only minor variations between the post-development conditions from the development of the Waverley Golf Club have been recorded.

Stud Road & Police Road Intersection

- In the AM peak hour, all legs continue to operate at the same LOS as per the post-development conditions from the development of the Waverley Golf Club, with the exception of the through movement on the north approach, which improves from LOS C to LOS A (Excellent).
- In the PM peak hour, all legs continue to operate at the same LOS (or better) as per the post-development conditions from the development of the Waverley Golf Club, with the exception of the through and right-turn movements from the eastern leg of Police Road, which change from LOS A to C (Good). The right-turn from south leg of Stud Road into Police Road improves from LOS C to A (Excellent). The through movement on the north approach of Stud Road improves from LOS B to A (Excellent).
- Stud Road will operate at LOS A for both legs in the AM and PM peak hours.
- Delays in any one leg are a maximum of 94.8 seconds (Stud Road (North)), however are typically less than 80 seconds.
- The 95th %ile queue is a maximum of 25.5 vehicles (Stud Road (South)) in the PM peak, however is generally less than 25 vehicles.

Overall, the intersections surrounding the site will operate under Excellent (LOS A) to Good (LOS C) conditions, noting that Bergins Road no longer operates under Very Poor (LOS F) conditions in the AM peak hour.

4.4.6 Key Impacts of Ultimate Scenario (Police Road Precinct Traffic)

After reviewing the existing and post-development operating conditions, the following outlines the key findings and impacts of the potential future development of the Police Road Precinct.

The Sidra assessment compares the changes between the post-development model associated with the Waverley Golf Club and the ultimate future development of the Police Road Precinct (inclusive of the WGC development) are set out in Table 16 (AM) and Table 17 (PM).

Table 16: Change in Operating Conditions – AM Peak Hour

Intersection Approach	Movement	Demand (veh/h)	Degree of Sat.	LOS	95th %-ile Queue (veh)	Average Delay (sec)
STUD ROAD & BERGINS ROAD INTERSECTION						
Stud Road (south)	Right-Turn	-	-	-	-	-
	Through	+118	+0.029	-	+1.6	+0.2
Bergins Road (east)	Left-Turn	-	-	-	-	-
	Right-Turn	-	-	-	-	-
Stud Road (north)	Left-Turn	-	+0.003	-	+0.2	+0.1
	Through	+29	+0.01	-	+0.8	+0.1
STUD ROAD & POLICE ROAD INTERSECTION						
Stud Road (south)	Left-Turn	-	-	-	-	+2.0
	Through	-	+0.044	-	+2.7	+4.5
	Right	+18	-0.133	-	-0.8	-0.7
Police Road (east)	Left-Turn	+70	+0.022	-	-0.5	-7.8
	Through	-	-0.019	-	+3.4	-6.4
	Right	+118	-0.019	-	+4.0	-6.4
Stud Road (north)	Left-Turn	+30	+0.011	-	-0.7	-2.7
	Through	-	-0.223	C to A	-18.0	+0.1
	Right	-	-	-	-	-
Police Road (west)	Left-Turn	-	-	-	-	-
	Through	-	-	-	-	-
	Right	-	-	-	-	-

Table 17: Change in Operating Conditions – PM Peak Hour

Intersection Approach	Movement	Demand (veh/h)	Degree of Sat.	LOS	95th %-ile Queue (veh)	Average Delay (sec)
STUD ROAD & BERGINS ROAD INTERSECTION						
Stud Road (south)	Right-Turn	-	+0.004	-	-	+0.6
	Through	+43	-0.018	-	-2.0	-2.8
Bergins Road (east)	Left-Turn	-	+0.119	A to C	+0.3	+4.8
	Right-Turn	-	+0.119	A to C	+0.3	+4.7
Stud Road (north)	Left-Turn	-	-	-	-	-
	Through	+102	+0.022	-	+1.7	-0.6
STUD ROAD & POLICE ROAD INTERSECTION						
Stud Road (south)	Left-Turn	-	-	-	-	-
	Through	-	-	-	-	-
	Right	+62	-0.367	C to A	-6.0	-11.4
Police Road (east)	Left-Turn	+26	+0.001	-	-1.0	-5.3
	Through	-	+0.170	A to C	+1.8	+2.5
	Right	+43	+0.170	A to C	+1.8	+2.5
Stud Road (north)	Left-Turn	+104	-0.013	-	-7.1	-6.1
	Through	-	-0.285	B to A	-20.1	-1.0
	Right	-	-	-	-	-
Police Road (west)	Left-Turn	-	-	-	-	-
	Through	-	-	-	-	-
	Right	-	-	-	-	-

The key observations of the changed operating conditions for the 2 intersections are as follows:

Stud Road & Bergins Road Intersection

- All legs have observed either a continuation in LOS, with the exception of Bergins Road (East) in the PM peak hour, which will operate at LOS C (Good).
- Minor changes have been observed in a number of legs.

Stud Road & Police Road Intersection

- All legs have observed either a continuation or improvement in LOS, with the exception of the right-turn and through movements from Police Road (east) from LOS A to C (Good) as a result of allocating additional phase timing to the Stud Road through movements.
- Improvement in the through movement from Stud Road (north) **from LOS C and LOS B to LOS A** in the AM and PM peak hours, respectively. A decrease in the 95th percentile queue in the AM and PM peak hours for the through movements of Stud Road (north) by **18.0 and 20.1** vehicles, respectively.
- Improvement of the right-turn movement from Stud Road (south) to Police Road from **LOS C to LOS A**.
- Minor changes have been observed in a number of legs.

Overall, we are satisfied that the level of traffic likely to be generated can be accommodated by the surrounding signalised intersections.

4.5 Discussions with VicRoads

A preliminary meeting was held with VicRoads on 27th October, 2017, in relation to the development of the Waverley Golf Course for the purposes of a residential development, as well as the additional re-development of the 'Police Road Precinct'. VicRoads were sent a previous version of this Traffic Report prior to the meeting.

VicRoads advised at the meeting that they were generally supportive of the proposal and asked for a few items to be included within the proposed signalised intersection of Stud Road and Police Road. The key items which they asked to be included were:

- Double right-turn lanes on the south approach of Stud Road,
- Additional 'through' lanes along both approaches of Stud Road in both the entry and exit direction for 200m each side of Police Road,
- Left-turn slip lane from Police Road into Stud Road,
- Left-turn slip lane from Stud Road into Police Road.

VicRoads acknowledged the difficulties in designing Interim and Ultimate intersection designs, noting that some land acquisition may be required at certain stages.

We have investigated whether these items are possible to be provided, as well as whether they are required in relation to this development.

Interim Scenario

In the Interim intersection design, we have designed the Police Road eastern approach to resemble the layout of the Ultimate design as closely as possible, noting that the land to the north of Police Road is not available for the Interim design, but only at the Ultimate scenario stage.

In the Interim design, a left-turn slip lane from Police Road to Stud Road has been provided, whilst a 135m long right-turn lane has been provided along the south approach of Stud Road. An extended right-turn lane has been provided on the north approach of Stud Road. This design requires the acquisition of land located on the south-eastern side of the intersection in order to facilitate three exit lanes, one of which is a left-turn slip lane. These lanes will not be adjusted for the Ultimate scenario.

Ultimate Scenario

In the Ultimate design, the key changes include the addition of a second 60m long right-turn lane from Stud Road (south) into Police Road, the creation of additional 'through' lanes along both approaches of Stud Road in the southbound direction for 200m each side of Police Road and a left-turn slip lane from Stud Road into Police Road (with extended lane length).

The majority of the Police Road (east) leg of the intersection will remain the same, however additional land is required to the north in order to provide for an additional 'entry' lane (i.e. from the right-turn lanes of Stud Road). Additional land along the east side of Stud Road is also required due to the creation of 2 new lanes (1 through lane and 1 left-turn slip lane).

We are of the view that the additional 'through' lane in the northbound direction along Stud Road is not strictly necessary, given that the northbound movements of Stud Road will operate with an LOS

of A in both peak hours. The inclusion of two right-turn lanes into Police Road from Stud Road (south), as well as an additional 'through' lane in the southbound direction, have provided for an acceptable outcome in our view and the additional 'through' lane in the northbound direction is not required.

We are of the view that the proposed intersection designs generally satisfy VicRoads' requests, where practical.

4.6 Proposed Internal Road Network

The development yield of the residential precinct is expected to generate approximately 5,580 vehicle movements per day. However, with three access points proposed to the external road network, this traffic would be distributed and no single section of road would experience this level of daily traffic.

The new access roads carriageway, pedestrian provisions, and kerbside parking provisions should satisfy the requirements specified in Table C1 of Clause 56.06-8 of the Knox Planning Scheme. These roads are defined as follows:

- *Access Place – A minor street providing local residential access with shared traffic, pedestrian and recreation use, but with pedestrian priority.*
- *Access Street – Level 1 – A street providing local residential access where traffic is subservient, speed and volume are low and pedestrian and bicycle movements are facilitated.*
- *Access Street – Level 2 – A street providing local residential access where traffic is subservient, speed and volume are low and pedestrian and bicycle movements are facilitated.*

Table 18: Clause 56.06-8 – Table C1 Design of Roads and Neighbourhood Streets

	Key Design Requirements		
Component	**Access Place**	**Access Street – Level 1**	**Access Street – Level 1**
Traffic volume	300vpd to 1,000vpd	1,000vpd to 2,000vpd	2,000vpd to 3,000vpd
Target speed	15kph	30kph	40kph
Carriageway width & parking provision within street reservation	5.5m wide with 1 hard standing verge parking space per 2 lots, or 5.5m wide with parking on carriageway- one side - Appropriately signed.	5.5m wide with 1 hard standing verge parking space per 2 lots, or	7m-7.5m wide with parking on both sides of carriageway
Verge width	7.5m minimum total width. For services provide a minimum of 3.5m on one side and a minimum of 2.5m on the other	4m minimum each side	4.5m minimum each side
Kerbing	Semi-mountable rollover or flush and swale or other water sensitive urban design treatment area.	Semi-mountable rollover or flush and swale or other water sensitive urban design treatment area.	Semi-mountable rollover or flush and swale or other water sensitive urban design treatment area.

Footpath provision	Not required if serving 5 dwellings or less and the carriageway is designed as a shared zone and appropriately signed, or 1.5m wide footpath offset a minimum distance of 1m from the kerb.	1.5m wide footpath. Footpaths should be widened to 2.0m in the vicinity of a school, shop or other activity centre Be offset a minimum distance of 1m from the kerb.	1.5m wide footpath. Footpaths should be widened to 2.0m in the vicinity of a school, shop or other activity centre Be offset a minimum distance of 1m from the kerb.
Cycle path provision	None	Carriageway designed as a shared zone and appropriately signed	Carriageway designed as a shared zone and appropriately signed

Due to the scale of the development, it will be important that the following design issues are addressed:

- A highly connective pedestrian network be provided, including the provision of footpaths on both sides of any Access Street within the development.
- Visitor parking be provided on the site in accordance with the requirements of Clause 52.06[3]/Clause 56 where appropriate, to reduce the potential for reliance on on-street parking in the surrounding area, external to the proposed development. This would include the provision of on-street parking along the internal road network.
- Cross-intersections in the local road network should be avoided (as shown in the Masterplan), including the vehicle access points to the external road network.
- Any roundabouts to be designed in accordance with the relevant standards and have regard for pedestrian/bicycle safety.
- The site layout must adequately accommodate emergency and service vehicle access and avoid the need for such vehicles to perform reversing manoeuvres within or to/from the site.

Access Streets

Based on the above, the majority of streets would be designed as local roads or 'Access Street - Level 2' as this will allow for the proposed traffic volumes expected.

The predicted traffic volumes are well within acceptable limits for the relevant streets as suggested in the Planning Scheme and no adverse traffic impacts are expected as a result.

The new local roads within the development will generally be provided with a 16m wide road reservation. It would be anticipated that this would accommodate a carriageway width of 7.3m with a 4.5m wide verge on one side and 4.2m verge on the other side (including 1.5m wide footpath on both sides).

The 16m wide road reserve has been adopted for the access streets within the proposed subdivision in-line with the Metropolitan Planning Authority (MPA) Engineering Design and Construction Manual (formerly Growth Area Authority (GAA)) with the standard cross-section shown in Figure 25.

[3] The visitor car parking requirement under Clause 52.06-5 for residential dwellings is to provide 1 space to every 5 dwellings, for developments of 5 or more dwellings. Clause 52.06-5 specifies that where a car parking calculation results in a requirement that is not a whole number, then number of spaces should be rounded down to the nearest whole number.

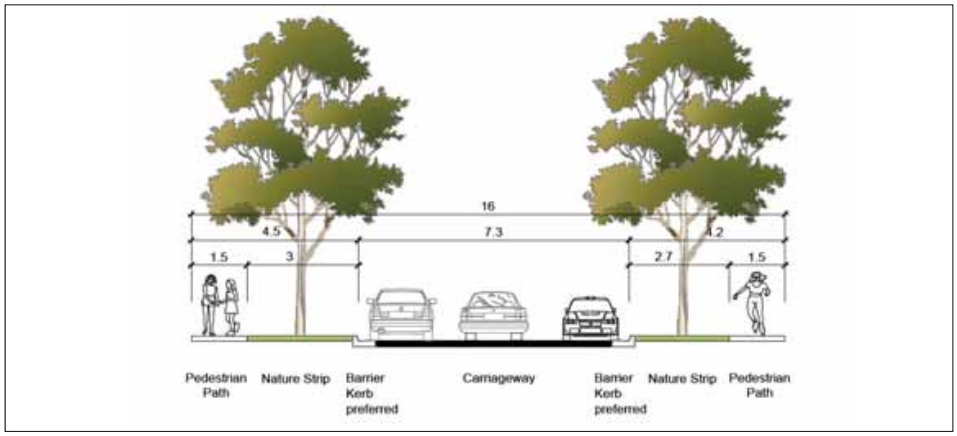


Figure 25: Carriageway Configuration – Access Street – Level 1/2

The provision of 7.3m wide carriageways allows for on-street parking on both sides of the road (with one lane of through traffic) without requiring separate hard stand verge parking. We regard this arrangement as satisfactory.

This is typical of most local roads across metropolitan Melbourne and is sufficient to facilitate emergency service vehicle and general service vehicles.

We are satisfied that all local roads, which provide access to properties, should be designed as Access Street - Level 2.

The 'Laneways' shown can be designed as Access Place as described under Clause 56.06-8 and will not need to facilitate parking unless these provide the only frontage to dwellings.

Further details on local road configurations would be provided at subsequent stages in this process.

4.6.1 Possible Road Extension through to Police Road Precinct

A road extension could potentially be provided from the Waverley Golf Course redevelopment site through to the Police Road Precinct (portion of precinct located nearby to Stud Road).

This connection would improve the vehicular access to the nearby road network and improve pedestrian connectivity across the entire site.

This arrangement will be detailed at a later stage, if applicable.

4.6.2 Possible Bus Route Extension through Site

It is proposed that bus services may navigate through the site in order to improve public transport access to/from the site. A possible solution to this could be the extension of Bus Route 682 through to site by crossing Bergins Road (via the roundabout intersections or signalised intersection). A possible travel path for this extension to Bus Route 682 is detailed at Figure 26 and Figure 27.

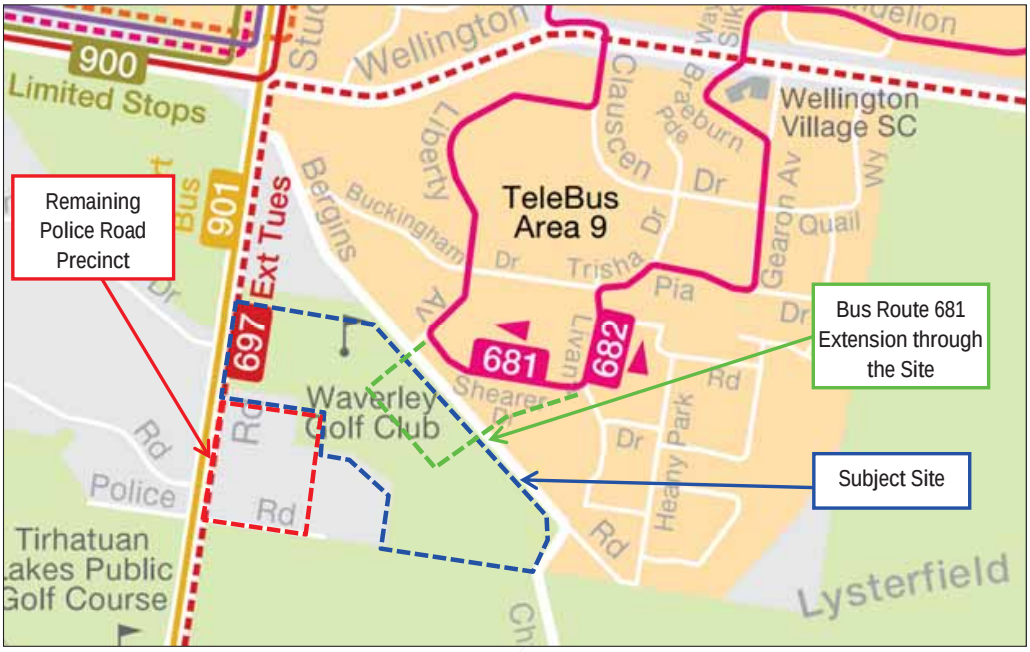


Figure 26: Possible Bus Route Extension through site

Figure 27: Possible Bus Route Extension through site

4.7 Key Intersections to Bergins Road

The masterplan proposes to provide roundabout treatments (or signalisation as discussed below) at the site access locations with Bergins Road at Fowler Road and Liberty Avenue in order to ensure safe and efficient vehicle movements to and from the site.

There is a significant volume of traffic travelling into and out of Fowler Road and Liberty Avenue. If roundabout treatments are not provided at these locations, there will be issues with vehicles in particular exiting the site via a right-turn, as well as the impacts of traffic entering the site upon vehicles exiting Fowler Road and Liberty Avenue to Bergins Road.

The intersection of Bergins Road and Liberty Avenue will either be constructed to provide a roundabout treatment or a signalised intersection. The traffic volumes (post-development) through this intersection will not be overly significant and the purpose of any traffic signals provided here will be to provide improved pedestrian connections to/from the proposed mixed use zone located nearby to this intersection within the site. A roundabout treatment at this location would also be suitable in terms of traffic movements.

The provision of any roundabout treatments will also aid in re-routing traffic from Bergins Road to Police Road. Bergins Road will be a less attractive travel route due to the roundabout treatments creating more give way points and reduced traffic speeds compared to existing conditions and to the proposed Police Road route.

There may be potential issues with the widening of the carriageway to accommodate the roundabout treatments, in particular to nearby trees within the development site. This would be provided at subsequent design stages by way of Functional Layout Plans (FLP).

We do not anticipate that Sidra analysis will be required at this stage as the roundabouts (or signalised intersection at Liberty Avenue) will operate under excellent conditions based on the large reduction in traffic utilising Bergins Road in the post-development conditions. This reduction in traffic along Bergins Road is discussed in detail at Section 4.3.2.

4.8 Proposed Secondary Access Points

Secondary connections to the surrounding road network will be limited and will require further consideration. Secondary connections included in the masterplan are:

- Four low volume access points to Bergins Road (i.e. car courts), and
- a left-in/left-out access to Stud Road.

These secondary connections will require a more detailed review as the masterplan develops. It is anticipated that the secondary connections will function as 'car courts', which will provide vehicular access to a small number of garages. These will be designed to ensure that vehicles can enter and exit the site in a forwards direction. None of these secondary connections will provide for 'through' access throughout the development site and will only serve a small number of vehicle movements per day.

The provision of two large roundabout intersections (or signalised intersection at Liberty Avenue) will provide for safe and efficient movements to and from the site, as well as along Bergins Road.

There is also the possibility that a secondary access location could be permitted at the location of the site's existing access, however this is only due to the existing right-turn lane along Bergins Road. This secondary access location would need to ban right-turn out movements due to the nearby proposed roundabout treatment.

No direct lot access locations will be possible to any of the surrounding roads, as direct access from Arterial Roads is typically the least preferred option, particularly in terms of vehicle and pedestrian safety.

Access to Stud Road may be possible, however there are potentially a number of issues to be overcome, including sight distance issues and obtaining approval from VicRoads.

In any event, if access is granted to Stud Road, it is likely to be limited to left-in and left-out movements only.

Further, it is also likely that VicRoads (based on previous discussions) would prefer any Stud Road access to be incorporated into Timbertop Drive, with subsequent signalisation. This is not considered of practical utility for the proposed development site due to the location of the large power transmission towers located within the subject site restricting access via a large signalised intersection.

4.9 Future Adjustments to the Phase Timings of Stud Road and Bergins Road

The post-development interim and ultimate traffic conditions at the intersection of Stud Road and Bergins Road are detailed at Section 4.4.3 and Section 4.4.5, respectively.

In order to determine the best outcome for the intersection, we allowed Sidra to determine the best phase timings using the 'User-Given Cycle Time' setting. The cycle time was determined based on the existing cycle time of the intersection in the AM and PM peak periods. This option resulted in suitable results for the AM peak hour for both the post-development (Waverley Golf Club) and Entire Precinct conditions. This resulted in similar time being allocated to Phases A/C and a reduction in time to Phases B/D.

In the PM peak hour, it was evident that phase time needed to be re-allocated from the Bergins Road leg (given the reduced volume of traffic exiting this leg and the increase in traffic on other legs). As such, 'User-Given Phase Times' were selected. It was ensured that the phase timings totalled the current phase cycle time of the intersection. This resulted in similar time being allocated to Phases A and C, more time being allocated to Phase B and a reduction in time to Phase D.

4.10 Parking Provision

Each future residential dwelling should provide off-street parking to accommodate parking as follows.

Apartment Buildings:

- 1 resident space per one and two-bedroom apartment, and
- 2 resident spaces per three-bedroom plus apartment.

Townhouses:

- 1 resident space per one and two-bedroom dwelling.
- 2 resident spaces per three-bedroom plus dwelling.

Houses:

- 2 resident spaces per three bedroom plus dwelling.

Visitor Parking:

- 0.2-0.5 spaces per dwelling[4] across the entire site.

Visitor parking can be accommodated on-street within the carriageways of the internal roads proposed within the site. The 7.3m wide carriageways for the local roads will be sufficient for parking to readily occur on both sides of the road whilst maintaining a single through lane (two-way) for traffic. Accordingly, hard stand verge parking will not be required.

We recommend that double crossovers be provided to adjoining lots wherever possible in order to maximise the provision of on-street parking spaces and also maximise manoeuvring areas into and out of the proposed lots.

Mixed Use Zone

We understand that a small Mixed Use Zone (less than 1,000m^2) will be located nearby to the intersection of Bergins Road and Liberty Avenue.

This Mixed Use Zone will comprise a small number of commercial tenancies which will primarily serve residents of the development (i.e. not a significant attractor of external visitors).

Parking for the Mixed Use Zone will be provided by a combination of both on-site and on-street car parking in order to meet the statutory required number of car spaces under Clause 52.06-5. The exact arrangements of this area will be detailed at a later stage.

Overall, we are satisfied that adequate on-street parking will be available within the internal road network for the proposed subdivision.

[4] The visitor car parking requirement under Clause 52.06-5 for residential dwellings is to provide 1 space to every 5 dwellings, for developments of 5 or more dwellings. Clause 52.06-5 specifies that where a car parking calculation results in a requirement that is not a whole number, then number of spaces should be rounded down to the nearest whole number.

4.11 Access for Service & Emergency Vehicles

The CFA 'Requirements for Water Supplies and Access for Subdivisions in Residential 1 and 2 and Township Zones' document (dated 9th October, 2006) indicates the following in relation to access for fire trucks:

> *'The road width must allow room for safe passage of a fire truck with additional margins for human error and safe clearances. A 3.5 metre clearance is required horizontally and 4 metres vertically for access by a fire truck. A road at least 7.3 metres wide will allow for parking on both sides of the road and still enable access by a fire truck. A road 5.5 metres wide will allow parking on one side of the road only. Widths in between these* may encourage parking on both sides of the road so that access by a fire truck is not possible.'

The proposed provision of a 7.3m wide carriageways for the local roads is in accordance with the Planning Scheme, the MPA Guidelines and the CFA requirements.

It is noted that a number of the local roads within the surrounding area are 7m wide and accordingly, we are satisfied that 7m-7.3m width within the site is appropriate and functional.

The 'Requirements for Water Supplies and Access for Subdivisions in Residential 1 and 2 and Township Zones' document (dated 9th October, 2006) also states:

> *'Constructed roads more than 60m in length from the nearest intersection must have a turning circle with a minimum radius of 8m (including roll-over kerbs if they are provided). Other solutions using T or Y heads of specified dimensions are also appropriate.*

The proposed turning area treatments will be required to be appropriately designed for the 'No Through Roads' in excess of 60m.

We are satisfied that sufficient area can be provided to accommodate turning treatments as necessary in accordance with MPA and the CFA requirements.

5 Conclusions

Having undertaken a detailed traffic engineering assessment of the Masterplan of Residential Development at Waverley Golf Club, we are of the opinion that:

a) the development yield of approximately 90 houses and 810 medium density dwellings is expected to generate in the order of 5,580 vehicle movements per day,

b) with three major access points proposed to the external road network, no single section of road will carry this many vehicles per day,

c) Bergins Road and Police Road are expected to carry 35% and 65% of the development traffic, respectively, based on likely travel routes,

d) a two-way travel volume of 580 and 650 vehicles will be re-routed from Bergins Road to Police Road in the AM and PM peak hours, respectively,

e) the re-routing of 'through' traffic from Bergins Road to Police Road will significantly improve traffic flow for traffic exiting Bergins Road via Stud Road,

f) the proposed mitigating works that are warranted in order to accommodate the level of traffic likely to be generated by the proposed re-development of the golf course (i.e. Interim Scenario):

   i) Stud Road/Police Road intersection will need to be signalised in order to accommodate the additional traffic generated by the site and the proposed re-routing of traffic along Police Road from Bergins Road.

   ii) Police Road approach will need to include three exit lanes due to the large volumes of traffic expected, as shown within our Sidra assessment (See Section 4.4.3).

   iii) Police Road will need to be constructed to accommodate the anticipated volumes of traffic, generally facilitating a traffic lane in each direction.

   iv) A slip lane to Police Road along the Stud Road (north) approach is not necessary or possible to provide at the Interim stage and the deceleration lane represents an improved outcome compared with the Bergins Road intersection which includes a combined left-turn/through lane.

   v) No mitigating works will be required to the Bergins Road/Stud Road intersection. Changes to the phase timings of this intersection to re-allocate time from Bergins Road to Stud Road will be required given the reduced traffic volumes along Bergins Road and increase along Stud Road.

g) the 'Police Road Precinct' development yield of approximately 45 houses and 405 medium density dwellings is expected to generate in the order of 2,790 vehicle movements per day,

h) the following mitigating works that are warranted in order to accommodate the level of traffic likely to be generated by the Ultimate scenario (i.e. development of the remaining Police Road Precinct):

   i) Stud Road/Police Road intersection will need to be upgraded from its initial signalised design in order to accommodate the additional traffic generated by the Police Road Precinct,

   ii) An additional right-turn lane will be required along the south approach of Stud Road,

iii) An additional 'through' lane in the southbound direction is required to improve the operation of Stud Road,

iv) A left-turn slip lane is required, including full length extension, and

v) No mitigating works will be required to the Bergins Road/Stud Road intersection.

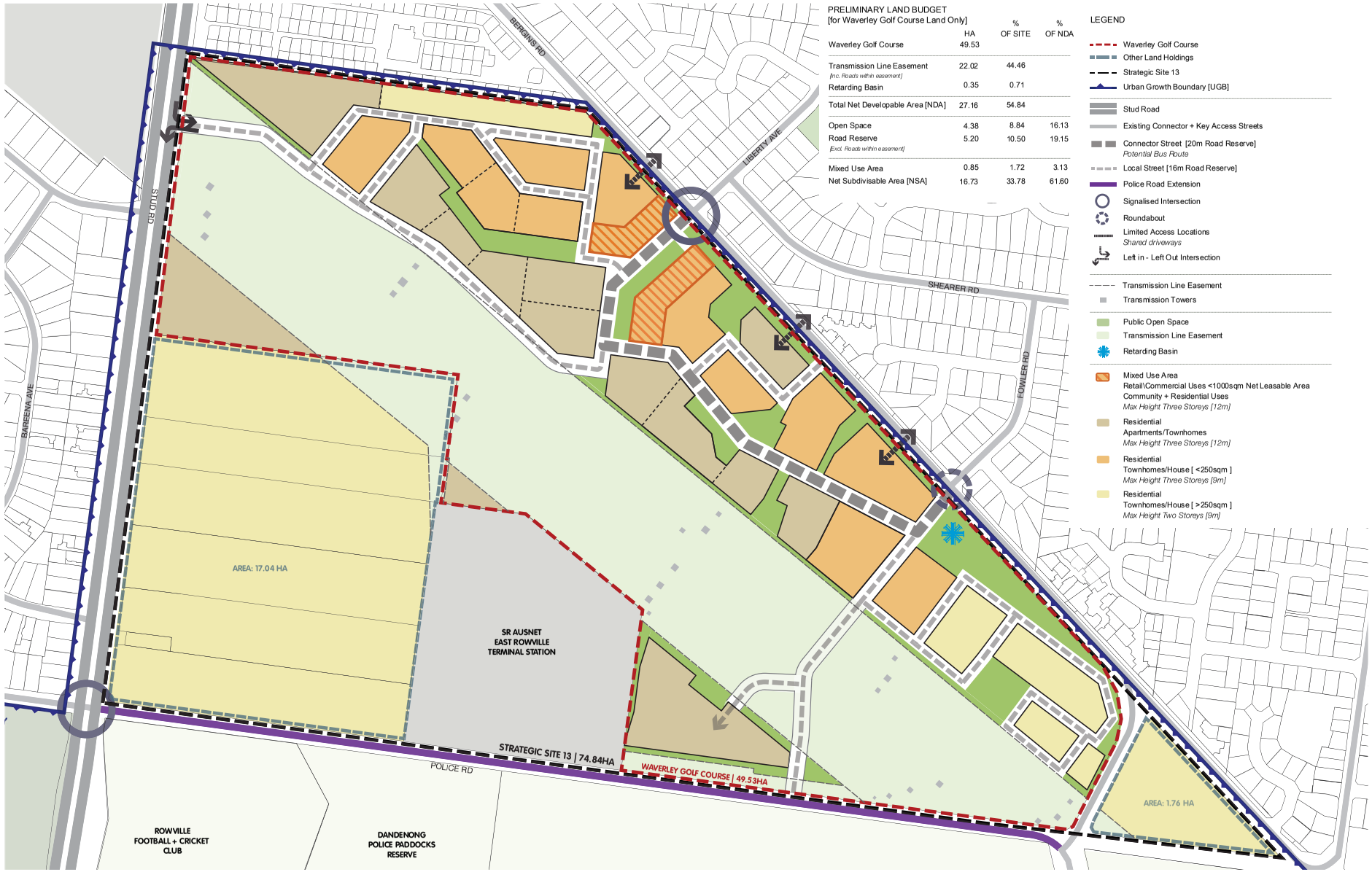
i) detailed Sidra analysis confirms that the Stud Road/Bergins Road signalised intersection will continue to operate under Good (LOS C) to Excellent (LOS A) conditions post-development,

j) detailed Sidra analysis confirms that the proposed Stud Road/Police Road signalised intersection will operate generally under Good (LOS C) to Excellent (LOS A) conditions post-development (under both Interim and Ultimate Scenarios),

k) the internal roads should generally be designed as Access Streets – Level 2, with a 7-7.3m wide carriageway and 16m road reserve, and

l) we are satisfied that there are no traffic engineering reasons why a permit for the re-development of the Waverley Golf Club and associated Police Road Precincts for the purposes of a residential development should not be granted, subject to appropriate mitigating works and conditions.

Appendix A: Masterplan



PRELIMINARY LAND BUDGET
[for Waverley Golf Course Land Only]

	HA	% OF SITE	% OF NDA
Waverley Golf Course	49.53		
Transmission Line Easement *[inc. Roads within easement]*	22.02	44.46	
Retarding Basin	0.35	0.71	
Total Net Developable Area [NDA]	27.16	54.84	
Open Space	4.38	8.84	16.13
Road Reserve *[Excl. Roads within easement]*	5.20	10.50	19.15
Mixed Use Area	0.85	1.72	3.13
Net Subdivisable Area [NSA]	16.73	33.78	61.60

LEGEND

- Waverley Golf Course
- Other Land Holdings
- Strategic Site 13
- Urban Growth Boundary [UGB]
- Stud Road
- Existing Connector + Key Access Streets
- Connector Street [20m Road Reserve] *Potential Bus Route*
- Local Street [16m Road Reserve]
- Police Road Extension
- Signalised Intersection
- Roundabout
- Limited Access Locations *Shared driveways*
- Left in - Left Out Intersection
- Transmission Line Easement
- Transmission Towers
- Public Open Space
- Transmission Line Easement
- Retarding Basin
- Mixed Use Area Retail\Commercial Uses <1000sqm Net Leasable Area Community + Residential Uses *Max Height Three Storeys [12m]*
- Residential Apartments/Townhomes *Max Height Three Storeys [12m]*
- Residential Townhomes/House [<250sqm] *Max Height Three Storeys [9m]*
- Residential Townhomes/House [>250sqm] *Max Height Two Storeys [9m]*

INTRAPAC

Development Plan
Waverley Golf Club, Rowville
City of Knox, VIC

REF NO	DRAW N	REV
INT WGC	**RD 3101**	**G**

REV	DESCRIPTION	DDMMYY	DRAWN	APPR'D
G	SITE AREA AMENDMENT	040517	NP	EP
F	SITE AREAS	180417	NP	EP
E	EASEMENT + NOTES PER HM	151216	KT	EP
D	PRT 02	091216	KT	EP
C	EASEMENT/POS AMEND	291116	KT	EP
B	PER INTRAPAC - HM 28/11/16	291116	KT	EP
A	FIRST ISSUE	231116	KT	EP

N

SCALE 1:4,000 SIZE A3

0 20 40 60 80 100m

Billard Leece Partnership

RobertsDay
planning·design·place

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suite two
33 chessell street,
south melbourne
vic australia 3205
t+61 3 9645 0788
robertsday.com.au
melbourne sydney perth

Appendix B: Aerial Photographs of Signalised Intersections

Figure B1: Aerial Photograph - Stud Road and Bergins Road Intersection

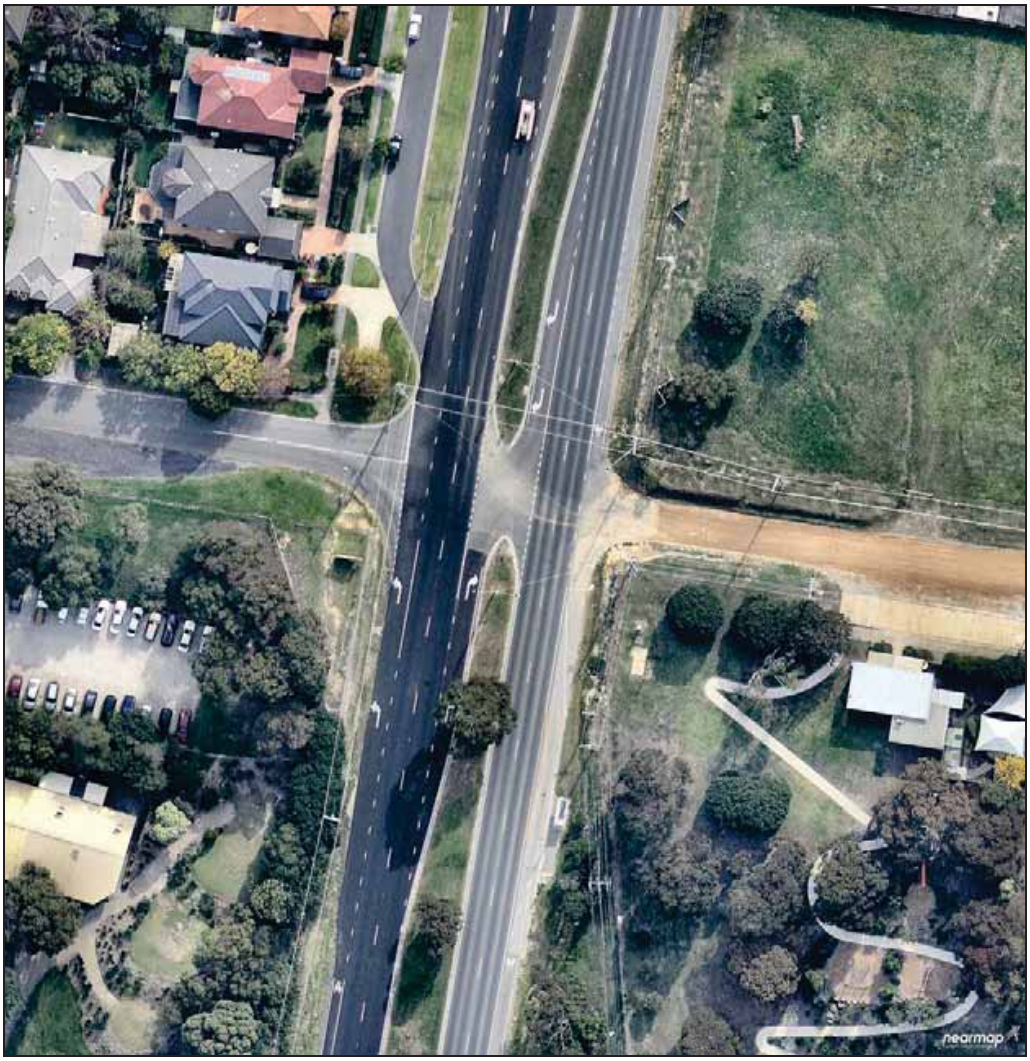


Figure B2: Aerial Photograph - Stud Road and Police Road Intersection

Appendix C:
Local Road Photographs

Figure C1: Police Road (view west)

Figure C2: Police Road (view east)

Figure C3: Police Road (view west)

Figure C4: Police Road (view east)

Figure C5: Bergins Road (view north-west)

Figure C6: Bergins Road (view south-east)

Figure C7: Liberty Avenue (view north-east)

Figure C8: Liberty Avenue (view south-west)

Figure C9: Fowler Road (view north-east)

Figure C10: Fowler Road (view south-west)

Appendix D:
Traffic Count Summaries
(Tube Counts)

Appendix E: Turning Movement Counts – Existing Traffic Volumes

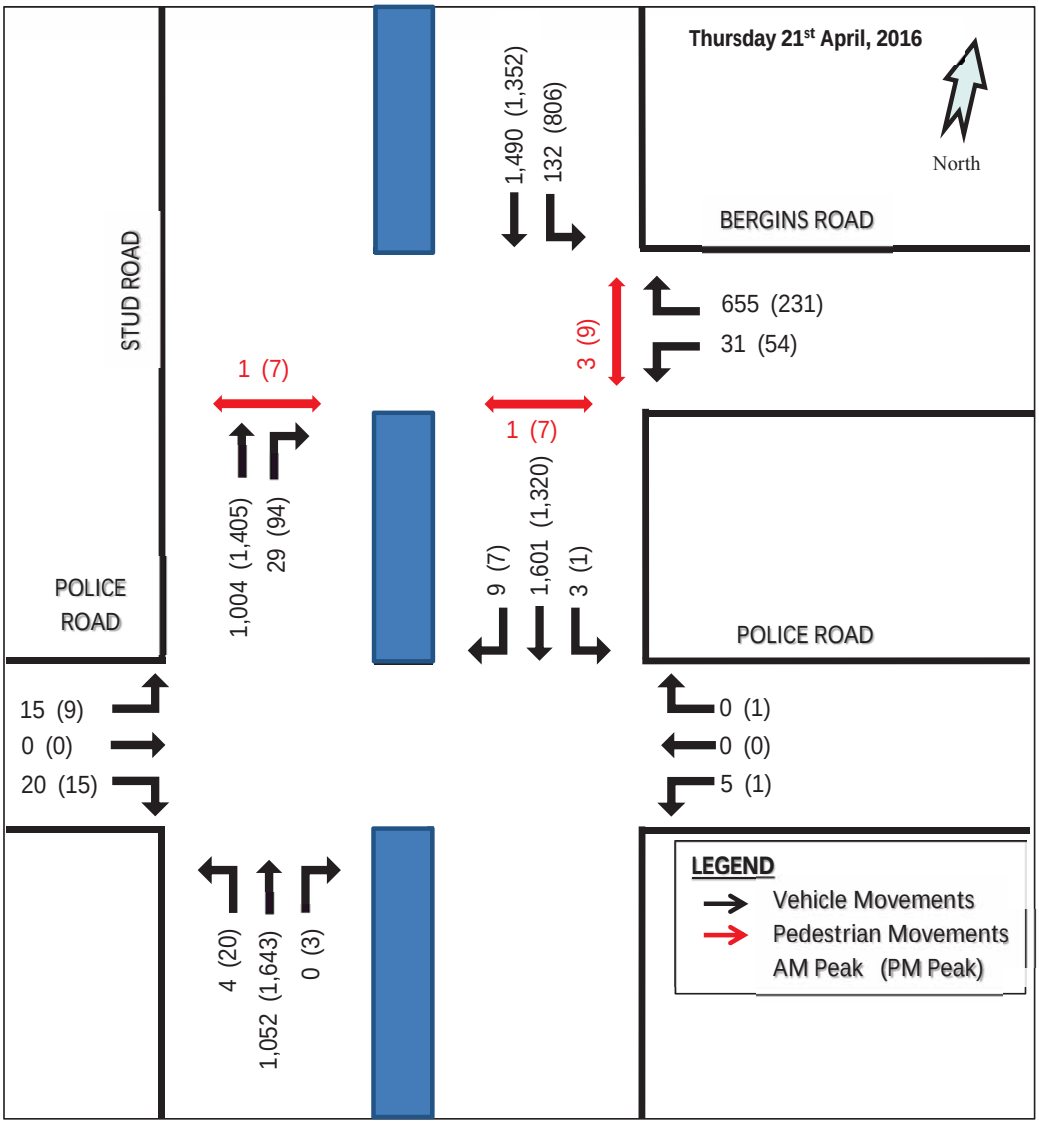


Figure E1: Existing Traffic Volumes

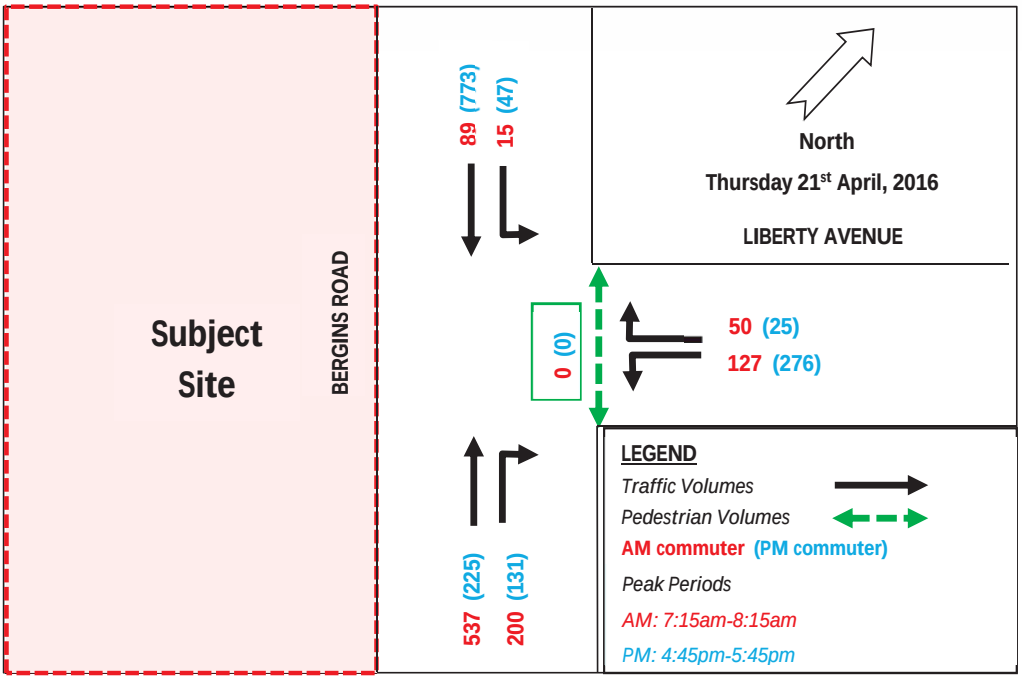


Figure E2: Existing Traffic Volumes – Bergins Road and Liberty Avenue intersection

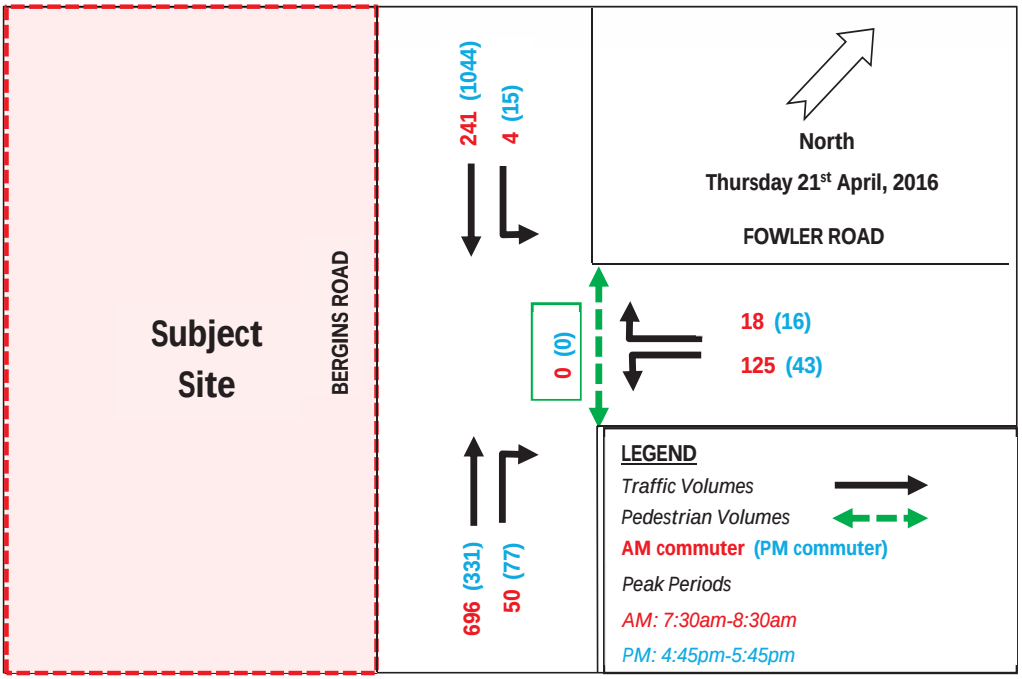


Figure E3: Existing Traffic Volumes – Bergins Road and Fowler Road intersection

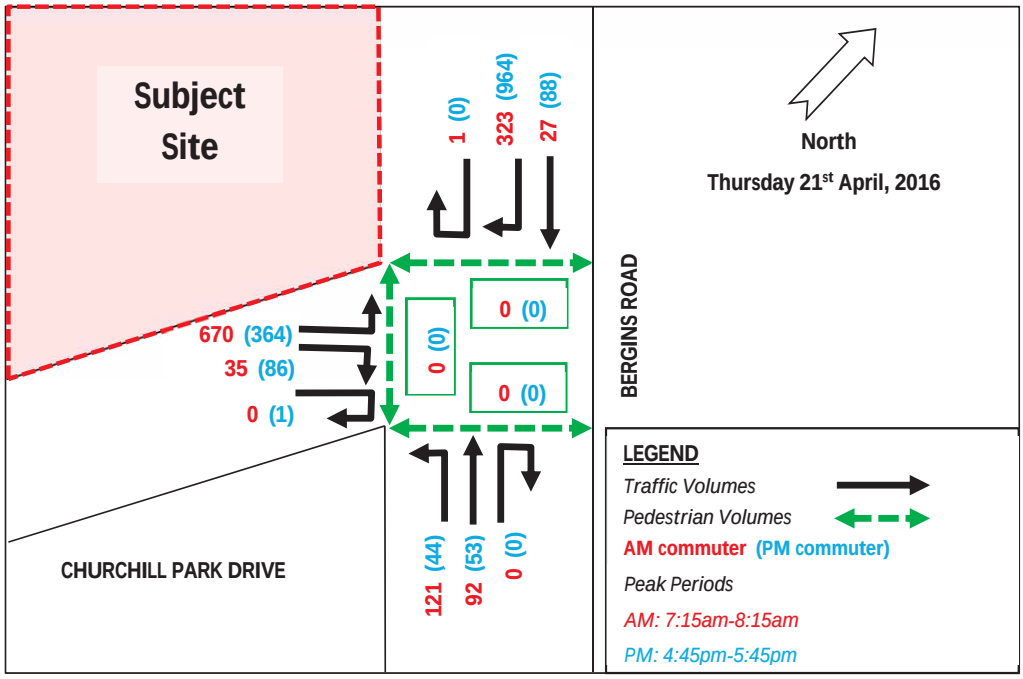


Figure E4: Existing Traffic Volumes – Bergins Road and Churchill Park Drive intersection

Appendix F:
Post-Development Traffic Volumes Interim (Waverley Golf Club)

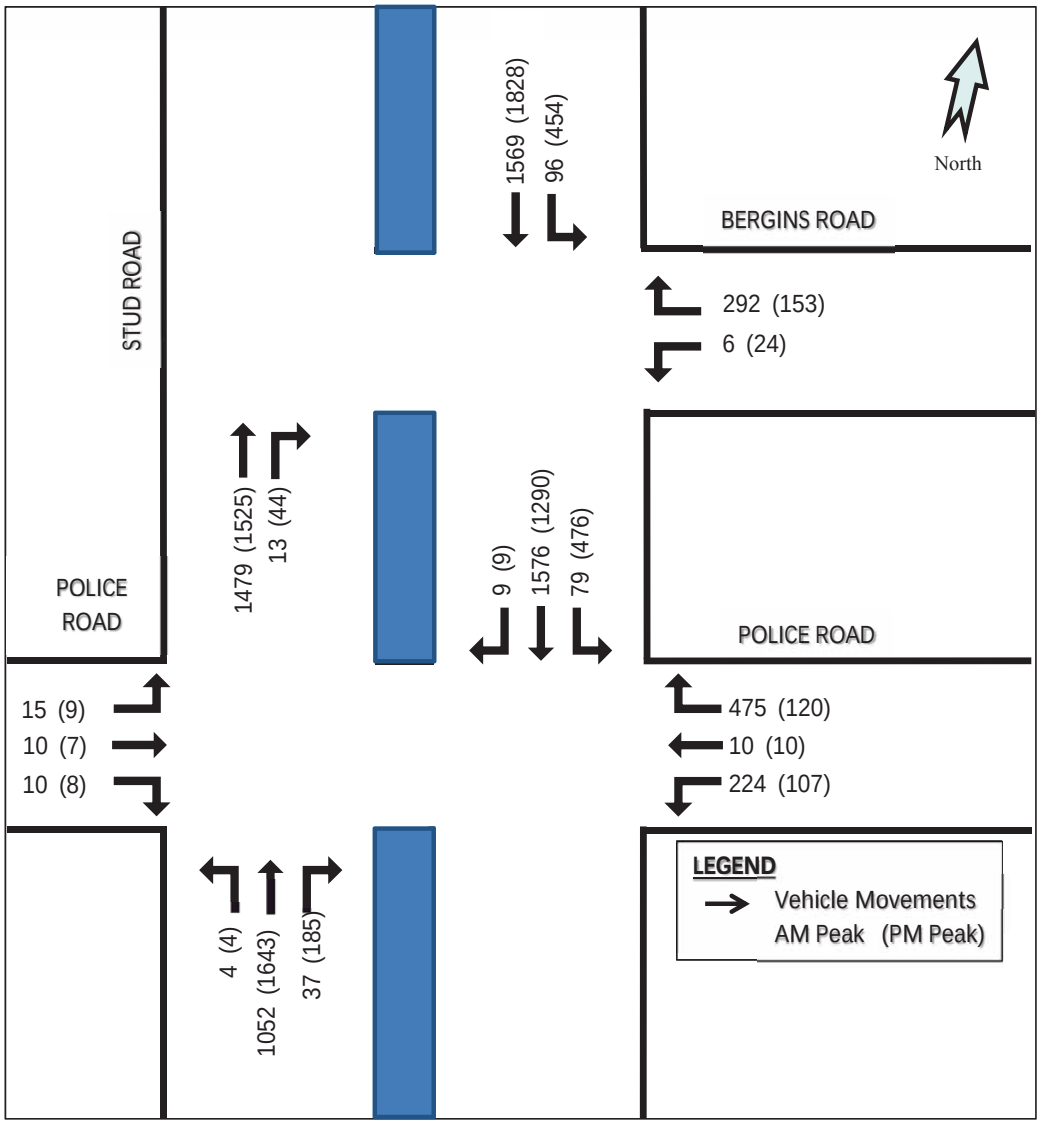


Figure F1: Post-Development Traffic Volumes (Interim Scenario)

Appendix G:
Post-Development Traffic Volumes
Ultimate (Police Road Precinct)

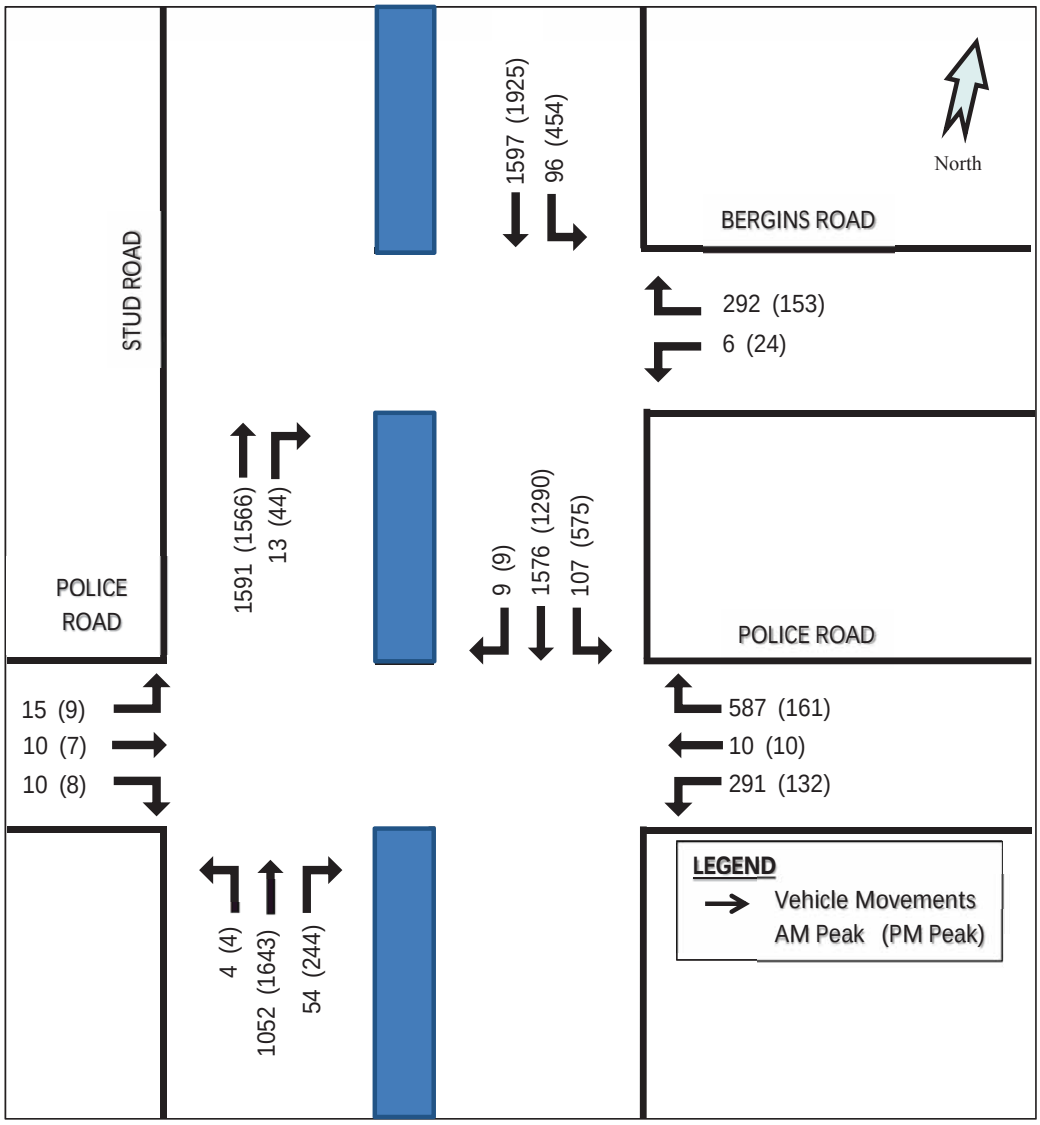


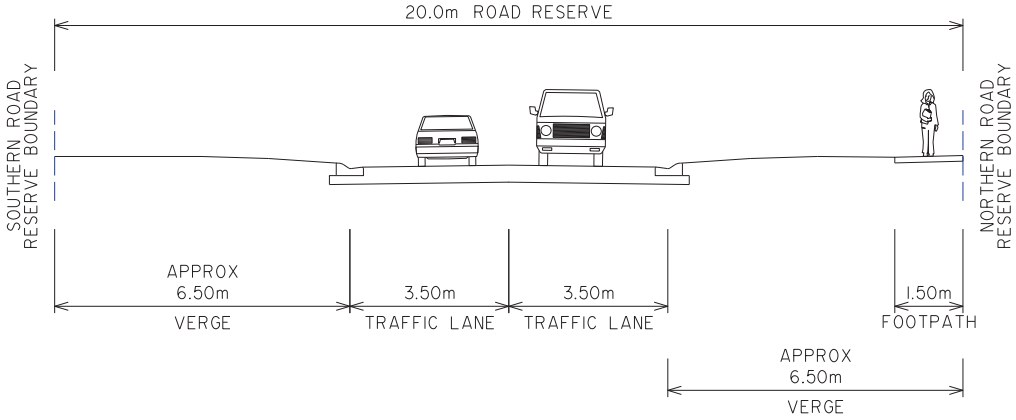
Figure G1: Post-Development Traffic Volumes (Ultimate Scenario)

Appendix H:
SIDRA Intersection Layouts

Appendix I:
IDM Data

Appendix J: Proposed Cross-Section of Police Road

POLICE ROAD
(PROPOSED)



PRELIMINARY PLAN
FOR DISCUSSION PURPOSES ONLY

WARNING
BEWARE OF UNDERGROUND SERVICES
The locations of underground services shown are approximate only and their exact position should be proven on site.

ISSUE	ISSUE DESCRIPTION	ISSUE DATE
A	TYPICAL CROSS SECTIONS	15 MAR 2018

GENERAL NOTES
1 ALL DIMENSIONS ARE TO FACE OF KERB & CHANNEL

DESIGNED S O'KEEFE 15 MAR 2018
CHECKED/APPROVED J STONE 15 MAR 2018
FILE NAME G17644-C-00.dgn

TraffixGroup
Traffic Engineers and Transport Planners
Suite 8/431 Burke Road TEL : (03) 9822-2888
GLEN IRIS VICTORIA 3146 FAX: (03) 9822-7444
www.traffixgroup.com.au

POLICE ROAD (PROPOSED)
KNOX CITY
TYPICAL CROSS SECTION

NOT TO SCALE | SHEET No. | DWG No. G17644-C-01

Appendix K: Sidra Movement Summaries & Phasing Diagrams – Existing Conditions

Appendix L: Sidra Movement Summaries & Phasing Diagrams – Post-Development Conditions (Interim Scenario)

Appendix M: Sidra Movement Summaries & Phasing Diagrams – Post-Development Conditions (Ultimate Scenario)

Appendix N: Concept Plan – Reverse Priority Treatment - Police Road & Churchill Park Drive

REVISION	REVISION NOTES	REVISION DATE

GENERAL NOTES
1 BASE INFORMATION FROM ARCHITECTS DRAWINGS AND AERIAL PHOTOGRAPH (SOURCE NEARMAP)
2 DESIGNED BASED ON 60km/h SPEED ZONE (PROPOSED)

DESIGNED S O'KEEFE 20 MAR 2018
CHECKED/APPROVED J J STONE 20 MAR 2018
FILE NAME G17644-A-00.dgn

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GLEN IRIS VICTORIA 3146 TEL: (03) 9822-2888
FAX: (03) 9822-7444
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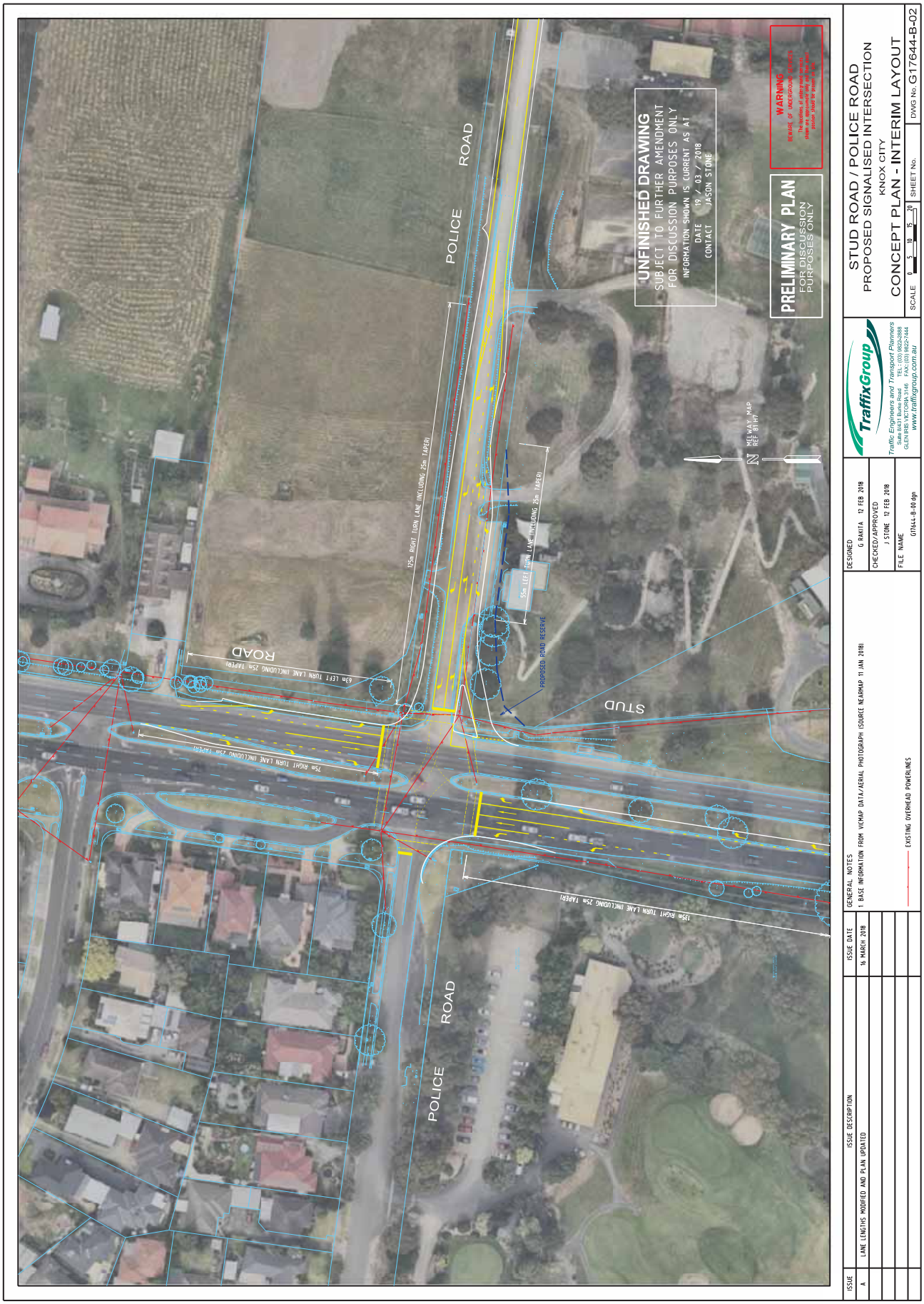
CHURCHILL PARK DRIVE / POLICE ROAD
PROPOSED REVERSE PRIORITY
KNOX CITY
CONCEPT PLAN

SCALE 0 2.5 5 7.5 10
SHEET No.
DWG No. G17644-A-02

Appendix O: Concept Plan – Stud Road & Police Road Signalised Intersection (Interim Scenario)


UNFINISHED DRAWING
SUBJECT TO FURTHER AMENDMENT
FOR DISCUSSION PURPOSES ONLY
INFORMATION SHOWN IS CURRENT AS AT
DATE 19 / 03 / 2018
CONTACT JASON STONE
PRELIMINARY PLAN
FOR DISCUSSION PURPOSES ONLY
WARNING
STUD ROAD / POLICE ROAD
PROPOSED SIGNALISED INTERSECTION
KNOX CITY
CONCEPT PLAN - INTERIM LAYOUT
SCALE 0 5 10 15 20
SHEET No.
DWG No. G17644-B-02
TraffixGroup
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Suite 8431 Burke Road
GLEN IRIS VICTORIA 3146
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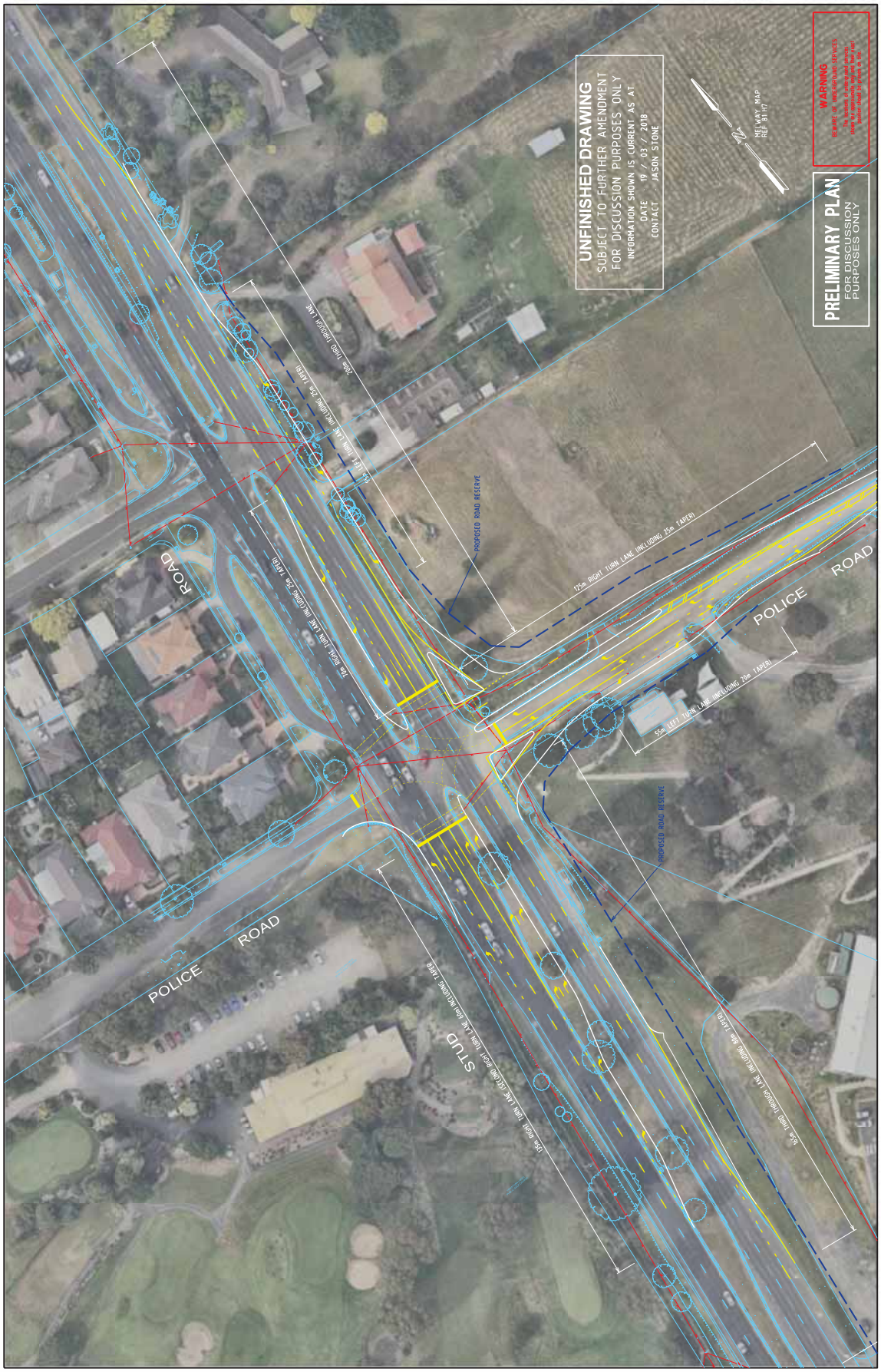
FAX: (03) 9822-7444
www.traffixgroup.com.au
DESIGNED G RAKITA 12 FEB 2018
CHECKED/APPROVED J STONE 12 FEB 2018
FILE NAME G17644-B-00.dgn
GENERAL NOTES
1 BASE INFORMATION FROM VICMAP DATA/AERIAL PHOTOGRAPH (SOURCE NEARMAP 11 JAN 2018)
EXISTING OVERHEAD POWERLINES
ISSUE DATE 16 MARCH 2018
ISSUE DESCRIPTION
ISSUE
A LANE LENGTHS MODIFIED AND PLAN UPDATED
POLICE ROAD
STUD ROAD
125m RIGHT TURN LANE (INCLUDING 25m TAPER)
63m LEFT TURN LANE (INCLUDING 25m TAPER)
75m RIGHT TURN LANE (INCLUDING 25m TAPER)
135m RIGHT TURN LANE (INCLUDING 25m TAPER)
55m LEFT TURN LANE (INCLUDING 25m TAPER)
PROPOSED ROAD RESERVE
MELWAY MAP REF 81 H7
N

Appendix P: Concept Plan – Stud Road & Police Road Signalised Intersection (Ultimate Scenario)



ISSUE	ISSUE DESCRIPTION	ISSUE DATE
A	LANE LENGTHS MODIFIED AND PLAN ROTATED	16 MARCH 2018

GENERAL NOTES
1 BASE INFORMATION FROM VICMAP DATA/AERIAL PHOTOGRAPH (SOURCE NEARMAP 11 JAN 2018)

EXISTING OVERHEAD POWERLINES

DESIGNED G RAKITA 12 FEB 2018
CHECKED/APPROVED J STONE 12 FEB 2018
FILE NAME G17644-B-00.dgn

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STUD ROAD / POLICE ROAD
PROPOSED SIGNALISED INTERSECTION
KNOX CITY
CONCEPT PLAN - ULTIMATE LAYOUT

SCALE 0 5 10 15 20 SHEET No. DWG No. G17644-B-01

An Affordable Housing Strategy

Waverley Golf Course

Hal Bisset
Ward Bisset Consulting

September 2020

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Background

The Waverly Golf Course is an 18-hole privately owned course located at 82 Bergins Road, Rowville in the City of Knox, in south-eastern Melbourne. The course is approximately 50 hectares in size.[1]

Intrapac is a privately owned company which has been undertaking residential land development since 1984. It prides itself on "high quality developments and inspiring environments – places people want to live".[2]

Intrapac has a call option to purchase the golf course and intends to develop the site for residential use subject to obtaining a rezoning of the land making such use permissible.

As part of the preparation for its submission for rezoning the site Intrapac engaged Ethos Urban[3] to undertake a Residential Land Analysis[3]. This report concludes:

- The State government projects an additional 23,000 residents in the municipality of Knox over the coming 15 years requiring an additional 12,300 dwellings.
- Property and land prices have increased at a significantly higher rate in Knox than the metropolitan Melbourne average over the last 15 years indicating that affordability in the municipality is declining.
- The municipality requires an additional 8,200 dwellings by 2016 but the existing or planned supply of new dwellings is just 1,685 leaving a deficit of 6,515.
- The implications of the under supply include lack of housing choice, increased house and land prices, reduced affordability, and difficulty in attracting new residents.

The report notes that the proposed development of the Waverley Golf Course could supply 600 new dwellings to the municipality providing 10% of the forecast shortfall in new housing.

In June of 2020 the Victorian government released 'Planning Guidelines for the Conversion of Golf Course Land to other Purposes'.[4] The Guidelines draw attention to Clause 16 of the State Planning Policy which recognise planning should provide for housing diversity and efficient provision of supporting infrastructure, ensure long-term sustainability of new housing and provide land for affordable housing.

In September of 2020 the government also released revised Guidelines for Precinct Structure Planning in draft form for public engagement.[5] While the Waverley Golf Course is not in a Greenfields site and therefore not subject to the provisions of these Guidelines they do express the views of government with respect to affordable housing outcomes in large scale developments. The new version of the Guidelines states they will 'lift the bar' by requiring or encouraging higher standards of design and development. The Guidelines aim to articulate general planning principles and set Performance

[1] http://www.waverleygolfclub.com.au/welcome/index.mhtml
[2] http://www.intrapac.com.au/about/
[3] Waverley Golf Club – Residential Land Analysis, Ethos Urban Pty Ltd, September 2016
[4] https://www.planning.vic.gov.au/policy-and-strategy/guidelines-for-golf-course-redevelopment
[5] https://vpa.vic.gov.au/project/psp-guidelines/

Targets that deliver improved outcomes including increased densities and the provision of affordable housing.

The Guidelines make clear that in Greenfield areas, PSPs should facilitate and support the development of neighbourhoods that have affordable housing options – including social housing – that provide choices for very low, low and moderate-income households. It states that:

- Affordable housing should be located in areas that have convenient access to commercial and community facilities, services and public transport.
- PSP's should utilise existing planning mechanisms to support delivery of affordable housing (e.g. Section 173 agreements).
- PSP's should set a minimum target for affordable housing.

However the Guidelines also clarify that meeting the affordable housing targets should not render the proposed development economically unviable or negatively impact the affordability of other housing.

It is against this background that Intrapac engaged Ward Bisset Consulting to assist with the development of an 'affordable housing strategy' to form part of their overall submission for rezoning of the site. Hal Bisset[6] of WBC has over 30 years' experience in the social and affordable housing industry and is well positioned to develop a realistic approach to the issue.

[6] See Attachment 1 for a brief Resume of Hal Bisset.

Approach

In developing this Affordable Housing Strategy WBC established a set of key principles, in consultation with Intrapac, to guide the approach.

Key Principles	Explanation
Target need	The strategy should target an identified group within the community that have a high and enduring need.
Innovative	The strategy should preferably demonstrate best practice in housing the identified target group and provide an example that Intrapac can be proud to showcase.
Commercially realistic	The strategy must reflect the known commercial parameters, i.e. not impose such a high financial impost on the development that it undermines the overall viability of the development.
Financially viable	The resultant affordable housing must be financially viable over the long term with sufficient cash flow to ensure the properties are well maintained and the residents are well supported.
Delivery certainty	The strategy should be able to be implemented without the assumption of some unknown source of funding, i.e. not dependent on some as yet unidentified government funding program.
Options for expansion	The strategy should be such as to allow for an increase in the yield of affordable housing over and above that identified in this strategy should a new source of government funding make that possible with such an increase being delivered at normal commercial rates.

With these principles in mind WBC has carefully examined the context in which the strategy will be implemented in order to find an approach which will deliver the **maximum yield of affordable housing for minimal cost to the project but greatest certainty to all key stakeholders**. The contexts considered include:

- Municipal context – the City of Knox.
- State context – the planning and housing policies of the Victorian government.
- Commonwealth context – the housing policies of the national government.
- Industry context – the community housing sector with its opportunities and constraints.

An additional contextual dimension is the Covid-19 pandemic. There is no certainty about how long the pandemic and the consequential restrictions and constraints will be placed upon business. While the constraints may well end in 1-2 years it is unlikely that the country will return to 'business as usual'.

Municipal Context

1. Plans & Policies

Knox City Council released its Housing Strategy in 2015[7] (Strategy) which set objectives and strategies for achieving desired outcomes for housing affordability and choice within the City.

The commitments in the Strategy in regard to housing affordability are modest. However the Strategy was followed by a Knox Affordable Housing Action Plan 2015-20[8] (Action Plan) which provides more detail about Council's approach and its commitment to affordable housing. The three key strategies adopted by Council in the Action Plan are:

1. A diversity of housing choice is provided in appropriate locations that meets the accessibility, sustainability and affordability needs of the community.
2. Implement measures to raise the community's awareness of the health and well-being benefits of a diverse housing stock in Knox.
3. Implement programs and policies to ensure that residential development better responds to the community's current and future needs, and allows people to 'age-in-place'.[9]

Council has defined Affordable Housing as:

Housing, where the cost (whether mortgage repayment or rent) is no more than 30% of that household's net income. Exceeding this mark places one under 'housing stress, particularly in the lower 40% of the income distribution scale. This housing should be well located and appropriate to the needs of the given household.[10]

While Council is supportive of expanding the supply of affordable housing it considers that it is mostly beyond the capacity of Council to have a significant influence over the commitment of the private sector to deliver. Consequently the key focus of the Action Plan is to increase the supply of social housing – an objective Council believes it can contribute towards.

Social housing provides for the most vulnerable and disadvantaged households in Knox. Council has greater capacity to influence this market in partnership with social housing providers that are responsible for financing, constructing and managing social housing in Victoria. Council's options to increase affordability within the private housing market are limited because the Victorian planning system does not currently allow councils to require developers to contribute to affordable and/or social housing.[11]

Council is planning to update the Affordable Housing Action Plan early in 2021 following the completion of a project funded by the Department of Health & Human Services under the Social

[7] http://www.knox.vic.gov.au/Files/Planning/Knox_Housing_Strategy_January_2015.pdf
[8] https://www.knox.vic.gov.au/Files/Plans/Knox_Affordable_Housing_Action_Plan_2015_-_20.pdf
[9] Affordable Housing Action Plan, p19
[10] https://www.knox.vic.gov.au/Files/HousingStrategy/Defining_Affordable_Housing_and_a_Minimum_Supply_of_Social_Housing_for_Knox.pdf
[11] Affordable Housing Action Plan, p4

Housing Investment Planning program (SHIP). The aim of the project is to '...lay a social housing pipeline in Knox'. It includes the following objectives:[12]

- Strategic and Surplus Sites Framework – scope and establish an internal working framework for the identification of strategic and surplus sites in Knox for social housing. Nine site combinations were investigated as part of this work.
- Social Housing Futures Fund Investigation – exploration of the establishment of a social housing fund or other options that levies and collects, and then invests and allocates contributions towards the delivery of social and affordable housing.
- Laying a Social Housing Pipeline in Knox Report – findings of the above brought together into a single document.

It can be anticipated that the next iteration of the Affordable Housing Action Plan will build on the current plan and include more definitive strategies to grow the supply of social housing.

2. Demand & Supply

Council first commissioned research to identify the shortfall in the supply of social housing in 2014. The report, entitled Knox Minimum Supply of Social Housing 2014-2036, identified that the shortfall (in 2014) was 390 social housing dwellings but that this will increase to 860 social housing dwellings by 2036. According to Council this represents the minimum requirement for additional social housing over the subsequent two decades.[13]

Council is currently updating the report following the 2018 amendments to the Planning Act defining affordable housing (discussed below). Preliminary data provided to the author prior to the finalisation of the report indicates that the shortfall in social housing has grown by over 25% in the intervening years.[14]

The following table summarises the social housing shortfall in Knox anticipated over the next twenty years in the absence of any intervention to increase the social and affordable housing supply.

Shortfall of social housing summary, Knox, 2020-2041	
Current (2020)	530
By 2021	570
By 2026	690
By 2031	790
By 2036	900
By 2041	1010

NB: Shortfall numbers rounded to nearest 10.

[12] Email correspondence with Sharon Barker, Senior Social Planner, City of Knox

[13] https://www.knox.vic.gov.au/Files/HousingStrategy/Knox_Minimum_Supply_of_Social_Housing_2014_-_2036.pdf

[14] The following italicised section is taken from the draft report provided to the author by Darlene Swan, Senior Program Manager, City Research & Mapping

- The Table sets out the additional dwellings needed to supplement the existing supply of social housing and estimated affordable, private rentals in Knox in order to fully meet the low-cost housing needs of the 'target market' now and into the future.
- The shortfall figures are not cumulative, but specific totals by each year nominated, assuming the absence of any action to increase the low-cost housing supply.
- Clearly, the current and estimated supply of low-cost housing will not be capable of fully meeting the needs of the target market, now or into the future unless there is some form of intervention to increase the supply of social housing, availability of affordable private rentals, or both.
- A forecast need for at least 1010 social housing dwellings in Knox by 2041 would equate to 50 additional dwellings per year over the next twenty years (2021-2041).

The Affordable Housing Action Plan identifies several key approaches to address the social housing supply shortfall which are of relevance to this project. Most importantly however is the following objective:

3.3 Exercise planning powers to support the development of affordable housing including[15]:

- *Promote diverse and affordable housing options as an outcome of structure plans, Strategic Investigation Sites and other new residential developments and advise developers of the role of Registered Housing Associations.*
- *Negotiation with developers for a voluntary contribution to social housing (of approximately 5%) on larger scale development sites on a case by case basis.[16]*
- *Advise commercial developers of the need for greater housing diversity in Knox (particularly the provision of affordable, smaller, well designed dwellings that are located close to services and facilities).*
- *Advise developers of Council's preference for dispersed affordable and social housing.*

The Action Plan does not identify which target groups are in need of this additional social housing – it would appear to be relying on the Social Housing Register managed by the Department of Health & Human Services.

3. Housing Stress

What is housing stress?

Housing stress is a specific term which refers to households having trouble meeting their financial housing obligations – rent or mortgage payments. For those who are purchasing or renting their dwellings, we use the definition of housing stress used by a number of State Governments across Australia, which is ***households in prescribed income brackets, spending more than 30% of their gross household income on either rent or mortgage repayments***. Income brackets for this definition are generally classified as Very Low, Low and Moderate and can be found in the data notes.[17]

[15] Affordable Housing Action Plan, p27-28
[16] Emphasis added by author
[17] https://housing.id.com.au/knox/affordability-and-availability

In 2016 it was estimated that 6,348 households – i.e. 11.4% of the 55,442 households in the municipality were experiencing housing stress. Of these, 3,530 were experiencing mortgage stress whereas 2,818 were experiencing rental stress (29.6% of all households renting privately). According to the id.community Housing Monitor on the Council website only 0.2% of all listings in the private rental market during 2019 were affordable to the very low income group whereas 35.4% were affordable to the low income group and 95% affordable to the moderate income group. Clearly any 'affordable housing strategy' needs to focus on the needs of the very low income group[18].

4. Housing Need

As at June 2020 there were 2,171 applicants for social housing within the Outer East of Melbourne which includes Knox. Of these 944 are registered as Priority Applicants while the balance of 1,227 are Wait Turn[19]. In 2016 there were 671 households who reported living in social housing[20]. In other words there is a need to at least double the supply of social housing in the municipality.

This is supported by the fact that the 2016 Census revealed there were 23,651 persons in 10,393 low income households. Of these:

- 8,778 were over the age of 60
- 3,951 were single person households
- 2,623 were households with a couple without children
- 1,635 were single parent families
- 1,700 low income households renting privately

Across the City there were also 7,417 people needing help in their day to day activities due to a disability[21]. Of these 1,506 were in the age group 20-59. Many of these would be clients of the National Disability Insurance Scheme.

5. Housing Initiatives

There have been a number of social housing developments in the municipality over the last decade but these have been undertaken on an ad hoc basis by Registered Housing Agencies and the Office of Housing and are summarised in the Table below.

Recent affordable/social housing developments in Knox[22]		
Location	Details	Housing provider
656 Mountain Hwy, Bayswater	Four storey apartment building comprising 27 one and two bedroom apartments for women	Women's Housing Limited
Site adjacent to 656 Mountain Hwy, Bayswater	Four storey apartment building comprising 24 one and two bedroom apartments for women	Women's Housing Limited

[18] https://housing.id.com.au/knox/affordability-and-availability
[19] http://www.housing.vic.gov.au/public-housing-waiting-list
[20] http://profile.id.com.au/knox/low-income-by-housing-tenure
[21] http://profile.id.com.au/knox/assistance
[22] Information originally provided by Sharon Barker, Social Planner, City of Knox in 2015 and updated by the author 2020

16-18 Elsie Street, Boronia	Six double storey, three bedroom dwellings on two lots	Community Housing (Victoria) Limited
18 Clyde Street, Ferntree Gully	Three double storey, three bedroom dwellings	Community Housing (Victoria) Limited
39 Olive Grove, Boronia	Two double storey, three bedroom dwellings	Community Housing (Victoria) Limited
Lot 10 A Burwood Highway, Ferntree Gully	79 multi-storey units	Community Housing (Victoria) Limited
23-25 Chandler Rd, Boronia	Multi-storey apartment building comprising 32 one and two bedroom apartments	Haven (former Loddon Mallee Housing Services)
11 Hadlow Drive, Wantirna	5 unit medium density development for families.	Housing Choices Australia
King Street Bayswater	Public housing - 6 medium density town houses	DHHS, State Government

Within private sector developments Council is committed to implementing its policy of 5% social housing through voluntary agreements with individual developers. Two such agreements were finalised prior to 2015:

- The Waterlea development was on land owned by Council and the 5% social housing was a requirement of the tender for rights to develop the site and the cost was therefore included in the price paid for the land.
- The second was on private land and it is understood that the Agreement resulted in 3% (7 social housing dwellings) being included in the development.

In 2015 Council officers advised that negotiations were well advanced on a number of other sites which were at the planning stage and that they expected to be able to achieve the 5% target because "...many developers like to be recognised as good corporate citizens and have positively engaged with the concept of contributing to increasing the supply of social housing in Knox"[23]

Council officers offered the following comments at the time:

- They expect to be successful in negotiating an affordable housing outcome on all major sites.
- Their experience with the Austral Bricks site which included the Director of Housing as the owner / provider of the social housing was informative – the considerable delays experienced has caused them to go directly to the RHA sector in future.
- No comments were made in regard to the financing of the affordable housing except to say that it was the responsibility of the private developer – it is understood that the developer did not meet the full cost with the housing provider making some payment towards the cost of land and construction.

Since 2015 it is understood that Council have negotiated a Section 173 Agreement over one further significant development – the Kingston Links Golf Course redevelopment being undertaken by Pask.

[23] Information initially provided by Sharon Barker, Social Planner, City of Knox, in 2015.

> *The redevelopment will offer a vibrant and sustainable 800 lot residential community which is set within a pedestrian focused environment and adorned by its generous provision of public spaces and high quality landscape. More than 40% of the Site will be retained as open space including an extensive network of off-road shared pedestrian and cycle paths. The redevelopment will rehabilitate the Corhanwarrabul Creek through the creation and of upgrade 12 wetlands. The development will offer a diversity of lot sizes from 150m2 for terrace houses to above 600m2 for detached houses. Higher density products are also provided for in and around a future and centralised Mixed Use Precinct.*[24]

Being the most recent negotiation and for a project of similar scale to the Waverly Golf Course this project is worthy of careful examination.

Under their policy Council had an expectation of 40 social housing dwellings within the development (5% of dwellings). It is understood the Section 173 Agreement now mandates the developer will make a cash contribution of $4.5M to Council and ensure the inclusion of 20 social housing dwellings. It is also understood that the developer has reached agreement with Women's Housing Ltd to purchase a site on which it will develop the 20 social housing dwellings although the terms of the purchase have yet to be determined. WHL have indicated that they will seek a mutually agreeable purchase but their capacity to pay will depend on the availability of net rental income to support debt plus any other capital subsidy that might be available.

In order to estimate the cost of the affordable housing contribution to the project the following logic could be applied:

- It can be assumed that the $4.5M cash contribution was in lieu of 20 social housing dwellings and therefore represented a contribution of $225,000 per dwelling – approximately the value of 20 lots.
- It might also be assumed that the project provided up to an equivalent value to WHL through the sale of lots at a discount. The value of the discount could be expected to be between 25% and 100% - i.e. $56,260 to $225,000 per lot – at a cost of between $1,125M and $4.5M to the project.
- For WHL to construct dwellings on the lots purchased at a discount they will require an additional say $5M if we assume construction costs of $250,000 per dwelling. Given the dwellings will be used for social housing we can estimate that the net rental income could at best service approximately $75,000 and hence WHL would have to secure an additional $175,000 per dwelling or $3.5M for the 20 dwellings in government subsidy. This will be completely dependent on whether there is a funding program available at the appropriate time and whether WHL can secure the funding required in a competitive environment. If the RHA is unsuccessful then the developer will remain liable to construct the dwellings.
- The total cost to the project therefore could be estimated as being in the range of:

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[24] http://envirodevelopment.com.au/portfolio/kingston-links/#:~:text=A%20first%20for%20the%20team,Kingston%20Links')%20in%20Rowville.&text=The%20redevelopment%20will%20rehabilitate%20the,and%20of%20upgrade%2012%20wetlands.

  - $4.5M + $1.125M = $5.625M or $140,625 per social housing dwelling if the RHA is able to secure subsidy for the balance of the land purchase price plus construction costs; and
  - $4.5M + $8M = $13.5M or $337,500 per dwelling if the RHA is unable to secure any government subsidy and can contribute debt only to the level that can be serviced by net rental income (assuming a construction cost of $250,000 per dwelling).
- Based on the preparedness of Council to accept $4.5M in cash in lieu of 20 dwellings it is reasonable to assume that this is the expectation of Council as to the level of subsidy to be provided for the 20 dwellings within the development for a total cost to the project of $9M.
- The only other factor that might impact cost to the project is whether Council decide to make a contribution to the cost of construction from the $4.5M cash that has been contributed to the social housing fund from the development.

This analysis implies that the developer is exposed to considerable cost and risk if they sign a Section 173 Agreement in the absence of any State government subsidy to support the cost of construction.

The following Table provides a summary of the recent Section 173 Agreements negotiated by Knox Council with developers on major redevelopment sites.

Private developments underway which will include affordable housing[25]		
Harcrest (Austral Bricks site Stud Rd)	Mirvac	Developer agreed to 3% social housing in the development. The agreement was confirmed under a section 173 agreement[26]. The affordable housing yield is 7 dwellings (two story town houses) – designed and constructed by the developer. The Director of Housing was a third party to the Agreement and it was the DoH's intention to transfer the affordable housing dwellings to a RHA.
Waterlea (Stamford Park Rowville)	Stockland	Site owned by Council and put to the market with a 5% affordable housing requirement. The 5% requirement was subsequently mandated by a section 173 agreement. The affordable housing yield is for 9 dwellings for social housing. The developer and Council called for expressions of interest from RHA's for the ownership and management of the dwellings and Housing First was selected. Under the terms of this agreement the RHA purchased the dwellings for construction cost only – approximately 50% of the market value of the dwellings.

[25] Information provided by Sharon Barker, Social Planner, City of Knox

[26] This is a legal contract made between Council and another party under section 173 of the Planning and Environment Act 1987. An agreement generally provides for someone to carry out, or not carry out, any matters specified in the agreement and should be used where a condition on a permit or planning scheme controls will not provide the requirement to be fulfilled (for example, a prohibition, restriction or regulation of the uses or development of the land; conditions subject to which the land may be used or developed for specified purposes; any matters intended to achieve or advance the objectives of planning in Victoria or the objectives of the planning scheme or an amendment to the planning scheme).

Kingston Links Golf Course	Pask	During negotiations for the Development Approval Council sought a commitment for 5% of dwellings to be social housing – an estimated total of 40 dwellings. A Section 173 Agreement was eventually executed which committed the developer to a cash contribution of $4.5M to a Council social housing fund and an undertaking to deliver 20 dwellings within the development. The Section 173 Agreement identifies Women's Housing Ltd as the RHA which will acquire the 20 dwellings however the terms of the acquisition have yet to be agreed.
Strategic Investigation Sites in Knox (refer to the Knox Housing Strategy)	Various	Knox Affordable Housing Action Plan Objective 3.3 – Negotiate with developers (on a case-by-case basis) for a voluntary 5% contribution of social housing in larger-scale private land developments, including Strategic Investigation Sites.

6. Summary of Municipal Context

Summarising the municipal context we can identify:

- Knox Council had a shortfall of 530 social housing dwellings in 2020 forecast to grow to 1010 by 2041.
- There are 1,700 low income households in the municipality that rent privately.
- The most significant groups in need are older single persons (particularly women), single parent families and people with a disability between the ages of 20 and 59 (mostly in the care of their parents).
- Knox Council is very supportive of the inclusion of affordable housing in all developments and social housing in particular.
- Knox Council has a target of achieving 5% of all major new developments as social housing and has been successful in negotiating this outcome on some sites in recent years including one rezoning.
- On the site involving a re-zoning – the Kingston Links Golf Course –it is estimated that the value of the social housing contribution was in the range $140,000 to $337,000 per dwelling. The most probable cost was $225,000 per dwelling.

State Context

There are three focal points of State policy that impact on the shape of an appropriate and achievable affordable strategy for the Waverley Golf Course:

- Planning policy
- Housing assistance policy
- Community housing industry policy

1. Planning

The proposed development is being planned in the context of Plan Melbourne[27], the Victorian government's metropolitan planning strategy for the next 40 years. Plan Melbourne:

...is a strategy to house, employ and connect people to jobs and services, closer to where they live. It ensures that while Melbourne grows its best features are protected and enhanced. Plan Melbourne provides communities with clear direction about the future of their neighbourhoods, identifies areas that can accommodate future growth and seeks to build a vibrant central city core.[28]

The author of this paper is not a Planner so is unable to make comment about the extent to which the proposed development "fits" within the urban growth framework. However the Plan does identify affordability as one of the challenges that the Plan is tackling:

> *As competition for housing increases, areas close to the city have become increasingly unaffordable for middle and low-income households wanting to buy or rent. In future, we will need to provide a better range and supply of affordable housing options close to the central city and other major areas of employment.*[29]

Housing choice and affordability is therefore a key principle within Plan Melbourne which is translated into a primary objective:

> *Provide a diversity of housing in defined locations that caters for different households and is close to jobs and services.*[30]

In elaborating on this objective the Plan states:

> *It will require making efficient use of underutilised land, enabling significant density in defined locations and well-planned growth in greenfield locations.*
>
> *Plan Melbourne will partly accommodate future growth through focusing on medium and high-density development in defined areas in the existing urban area. Development of this nature will take place in designated urban-renewal precincts.*

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[27] See Know Your Plan Melbourne which provides a summary of Plan Melbourne: The Metropolitan Planning Strategy, 2014
[28] Know Your Plan Melbourne, p1
[29] Know Your Plan Melbourne, p3
[30] Know Your Plan Melbourne, p4

> *Housing affordability varies significantly across Melbourne and growth in house prices has outpaced growth in incomes. Our plan is to encourage greater diversity in housing types and access to more affordable housing options.*
>
> *Achieving housing and population growth and facilitating housing choice in defined locations will enable local governments to protect the majority of Melbourne's existing suburbs from significant housing densification.*
>
> *A key element of Plan Melbourne will be an expanded central city and a series of new urban renewal precincts that will have the capacity to accommodate a large proportion of Melbourne's future housing needs close to transport and services.*[31]

In 2017 Plan Melbourne underwent a "Refresh" process which did not result in major changes to overall direction of planning in Victoria but strengthened a number of strategies to achieve the key Outcomes.[32]

Under Outcome 2 which is 'Housing choices close to jobs and services' the Refresh has resulted in a number of new policies being included and some existing policies being improved, to address housing affordability, diversity and supply. Of particular interest to this project are:

- *New policies to boost social and affordable housing include using surplus government land to boost the supply of social housing (Policy 2.3.1) and streamlining decision-making for social housing proposals (Policy 2.3.2).*
- *A new policy (2.3.4) to capture and share value uplift from land re-zonings means communities may share in uplift benefits more social or affordable housing, open space or facilities which is designed to support the existing policy to strengthen the role of planning in facilitating and delivering the supply of social and affordable housing (Policy 2.3.3).*

The implementation of these policies resulted in changes to the *Planning and Environment Act 1987*[33] which became effective on July 1, 2018. The changes include a new definition of 'Affordable Housing' and provides for the Governor in Council, on the advice of the Minister for Planning, to make an order specifying the income ranges for very low, low and moderate-income households (that is not social housing) for the purposes of the definition of 'Affordable Housing'[34].

The *Planning and Environment Act 1987* was also amended to enable a Responsible Authority to enter into a Section 173 Agreement with a landowner for the development or provision of Affordable Housing. Agreements providing for the provision of Affordable Housing are intended to be voluntary and at the discretion of a landowner.

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[31] Know Your Plan Melbourne. P12

[32] See https://www.planmelbourne.vic.gov.au/__data/assets/pdf_file/0010/377128/Plan_Melbourne_Whats_changed.pdf

[33] https://www.planning.vic.gov.au/latest-news/affordable-housing-agreements

[34] https://www.planning.vic.gov.au/policy-and-strategy/affordable-housing

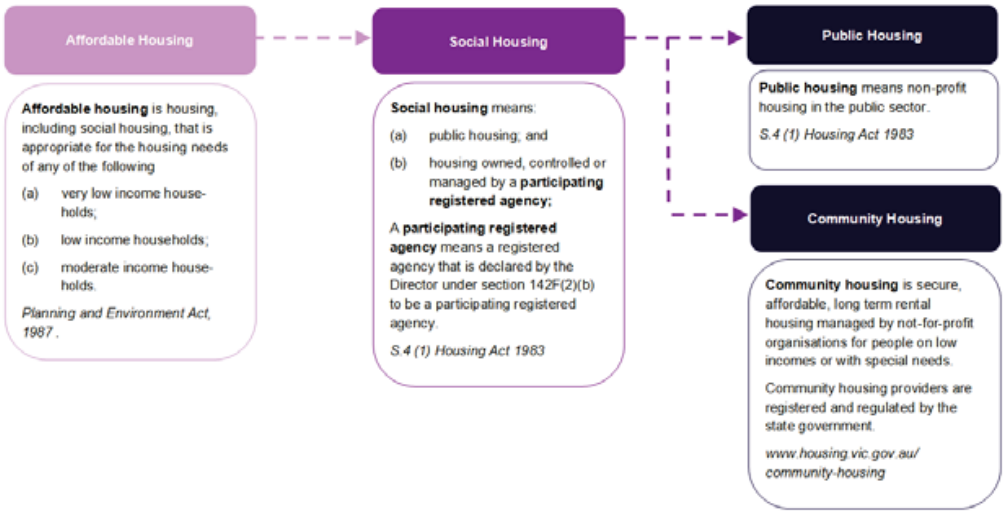
The amendments to the Act also provide for the Minister to specify by Ministerial Notice what matters must be regarded for the purposes of determining what is appropriate for the needs of the eligible target groups. The Minister has specified the following:

- *Allocation*
- *Affordability (in terms of the capacity for very low income, low income and moderate income households that it is intended for)*
- *Longevity (in terms of the public benefit of the provision)*
- *Tenure*
- *Type of housing, in terms of form and quality*
- *Location, in terms of site location and proximity to amenities, employment and transport*
- *Integration, in terms of the physical build and local community*
- *The following official estimates of housing need:*
    - *Australian Bureau of Statistics Community Profiles*
    - *Census profiles for Victoria*
    - *Department of Health and Human Services Rental Report*
    - *Metropolitan regional housing plans to guide housing growth*
    - *Public housing waiting list (Victorian Housing Register list)*
    - *Victoria in Future data tables.*

The Department of Environment, Land, Water & Planning (DELWP) has also developed a model Section 173 Agreement which can be used by a LGA and Developer to formalise any voluntary agreement that is negotiated in relation to the provision of affordable housing within a development subject to planning approval.

It should be noted that the Act specifies affordable housing not social housing and has issued guidance as to how these different terms are to be understood. The following diagram is taken from that guidance[35].

[35] https://dhhs.vic.gov.au/delivering-social-housing-affordable-housing-contribution



In September 2019 the Minister for Planning appointed an advisory committee to provide advice on the possible models and options to facilitate the supply of affordable housing through the Victorian Planning System – effectively a review of the 'voluntary' nature of the 'affordable housing agreements'.

The Ministerial Advisory Committee (MAC) delivered its advice to the Minister for Planning in late 2019. The departmental website advises that the MAC proposed a reconsideration of the current voluntary framework for affordable housing and a move towards a more consistent and uniform approach to support affordable housing development (however the report has not yet been released).[36]

Recent events have necessarily turned Government's focus towards efforts that will support Victoria's recovery through the coronavirus (COVID-19) pandemic. As such, consideration of the MAC's findings has been deferred at this time. In the meantime, the Minister for Planning has requested that work continue to investigate options that would enable a more consistent and uniform approach that could be considered at an appropriate time.

Other States have been developing related mechanisms for some time and South Australia has been leading the charge with 15% affordable housing being a requirement for all new significant developments (generally anything over 20 units) including government land, major developments and private developments that are bound by development plan policy for affordable housing.[37] Of the 15% one third (5%) must be social housing while the balance can be a range of tenures provided they achieve certain price points.

[36] https://www.planning.vic.gov.au/policy-and-strategy/affordable-housing

[37] https://www.sa.gov.au/topics/property-and-land/land-and-property-development/planning-professionals/developer-responsibilities-for-affordable-housing

It is reasonable to expect Victoria may ultimately move toward a SA type approach with say an inclusionary zoning requirement of 5-15% affordable housing with say 5% being funded from the uplift in value and the balance reliant on market take up of a lower priced product and / or acquired with finance secured by RHA's or first home buyers.

In the meantime it is worth mentioning the Social Housing Investment Planning (SHIP) program announced by the Minister for Housing in 2018. Fifteen councils were funded to 'develop innovative new social housing projects designed to meet increasing demand for affordable housing'.[38]

The grants, worth up to $200,000 each, were to help councils drive the development of social housing through a variety of approaches, including creating municipal social housing plans and identifying land suitable for future social housing projects. One of the first projects completed was a Social Housing Plan 2021-2041 by the City of Greater Geelong. This plan sets ambitious targets for an expansion in the supply of social housing to meet the community demand:[39]

- *Increase the supply of social housing from the current 3% to 7% by 2031 (an estimated increase in supply of 6,750 dwellings including the replacement of 750 existing public housing dwellings.)*
- *Increase the supply of social housing from the proposed 7% in 2031 to 10% by 2041 (an estimated further increase in supply of 6,750 dwellings including the replacement of 750 existing public housing dwellings.)*

In order to meet those targets the Plan calls on Council to pursue six roles:

- *Assume a leadership role in advocating for an increase in social housing in public policy and in the local community*
- *Evaluate the suitability of surplus Council land for social housing which leverages significant funding from State and Commonwealth Governments*
- *Develop partnership agreements with Commonwealth and State Governments for investment in social housing which expands the supply of social housing in Geelong*
- *Negotiate the inclusion of social housing in all new private developments where rezoning and planning approvals add value to land*
- *Contribute to continued urban renewal plans for Corio, Norlane and Whittington*
- *Develop the capacity of the City of Greater Geelong to manage the implementation of the Social Housing Plan by establishing essential elements of local infrastructure needed to support an increase in social housing*

This plan signals a much more interventionist approach by council – one in which council will be proactive in dealing with all stakeholders including developers, registered housing agencies and the State government to achieve their aspirational targets.

[38] https://www.premier.vic.gov.au/social-housing-grant-winners-announced/
[39] https://www.geelongaustralia.com.au/socialhousing/documents/item/8d7bb60089eabef.aspx

As mentioned above the City of Knox was also successful in securing funding under the SHIP program for a project to 'lay a social housing pipeline in Knox'. This document is expected to be available late in 2020.

Finally, two examples illustrate the extent to which local government authorities are seeking to employ 'voluntary' affordable housing agreements as part of the planning approvals process:

- The City of Melbourne has struck an agreement with developer Cairo Melbourne to build a residential and commercial development on council-owned land that will feature 20 per cent affordable housing.[40]
- In December 2015 Yarra Council approved a Development Plan for the Alphington Paper Mill site.[41] The approved Development Plan for the site adopted the recommendations of a Housing Diversity report and includes a requirement for 5% affordable housing although the Guidelines did not define what constituted affordable housing. [42]

2. Housing

This brings us to the second aspect of State government policy that will impact on the capacity of the market to deliver affordable housing within new developments – housing policy.

The Andrews Labor government, unlike all previous State Labor governments, was surprisingly quiet on housing policy during their first term. It was only at the end of their first term that they released *Homes for Victorians*[43] which is a comprehensive strategy to address housing and homelessness in Victoria and is the primary source document for identifying the Victorian government's policy settings. It committed $2.7 billion in funding and financial instruments to address the spectrum of housing affordability issues, including social housing and homelessness.

The plan includes:

- $1 billion Social Housing Growth Fund to increase the supply of social and affordable housing
- $1.1 billion in financial support for the social housing sector
- Increased housing support for survivors of family violence through the $152 million Family Violence Housing Blitz
- An extra 913 social housing dwellings through the $120 million Social Housing Pipeline
- $109 million to help move homeless Victorians into stable housing
- $185 million Public Housing Renewal Program
- $33 million to help 4,000 Victorians get a private rental home.

The government claims the Homes for Victorians plan should result in:

- Around 6,000 new social housing homes
- About 2,500 existing public housing residences renewed

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40 http://www.thefifthestate.com.au/innovation/building-construction/inner-city-melbourne-project-to-include-20-per-cent-affordable-housing/84958

41 http://www.yarracity.vic.gov.au/planning--building/Major-developments/alphington-papermill/

42 https://spaces.hightail.com/space/EzthZ/fi-63a0fe26-3e20-4f59-b69e-00cb1d4f331c/fv-44a548dc-a5d7-419f-81ea-a34836f3ff33/Alphington%20Paper%20Mill.pdf

43 https://www.housing.vic.gov.au/homes-victorians

- Help for 19,000 people who are homeless or at the risk of being homeless.

The most significant initiative within Homes for Victorians is the $2.1 billion committed to financial instruments to grow community housing in partnership with other stakeholders through the Social Housing Growth Fund (SHGF) and low interest loans and guarantees.

The SHGF provides an ongoing mechanism for the Victorian Government to partner with the community, private, not for profit and local government sectors to deliver housing assistance to Victorians.[44] It has two distinct underlying programs that support:

- Construction of new social and affordable housing dwellings on non-Victorian Government land - the Build and Operate program (BOP). The new social and affordable dwellings could be part of mixed developments including private housing, or any other form of development that consortia may wish to propose. To achieve this, the Department of Health and Human Services (DHHS) in close collaboration with the Department of Treasury and Finance (DTF) will operate regular competitive funding rounds to encourage consortia to develop innovative proposals to increase housing supply.
- Recurrent funding to lease new dwellings from the private sector to increase the availability of social housing rental stock and facilitate investment in new social housing for the rental market - the New Rental Developments Program (NRDP).

The SHGF, while marketed as flexible, is modelled on the Social & Affordable Housing Fund (SAHF) set up in NSW and represents a fundamental shift in the way State governments provide financial assistance to community housing providers. Rather than up-front capital grants (secured by a second ranked mortgage) these programs offer an operating subsidy (or service payment) for up to 30 years to support the servicing of private debt raised by Registered Housing Agencies.

From the States perspective this approach can bring forward supply but transfers significant financial risks to the community housing sector. To address some of this risk and to lower the cost of finance the Victorian government has gone one step further than NSW by offering up to $550M in Treasury debt priced at the BBSY rate plus an administrative margin. It has also committed to providing up to $550M in loan guarantees to debt provided by the private banking sector to Registered Housing Associations.

Combined these initiatives are anticipated to deliver 2,200 new social housing dwellings over the next 3 years. Given the low cost debt is restricted to Housing Associations it can therefore be assumed that this small group of community housing providers will deliver the vast bulk of the new supply under this initiative. This is an important implication for Councils and developers seeking to negotiate ambitious targets for 'voluntary' affordable housing agreements.

The Department of Health & Human Services has been slow to implement the new programs but recently announced the outcomes of the first Request for Proposals from Registered Housing agencies. The results are summarised in the Table below.[45]

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[44] https://www.dhhs.vic.gov.au/victorian-social-housing-growth-fund
[45] https://www.dhhs.vic.gov.au/victorian-social-housing-growth-fund

Agency name	Location	Total number dwellings
1. Aboriginal Housing Victoria	• Werribee – 3 dwellings • Doveton – 3 dwellings • Hampton Park – 3 dwellings • Endeavour Hills – 2 dwellings • Reservoir – 10 dwellings	21 dwellings
2. Beyond Housing	• Seymour & Wallan - 4 dwellings • Wodonga - 8 dwellings • Shepparton - 6 dwellings • Wangaratta - 6 dwellings	24 dwellings
3. Centacare Housing Services Limited	• Wendouree	9 apartments
4. Common Equity Housing Limited	• Thornbury	2 dwellings
5. Community Housing Victoria Ltd	• Mernda – 24 apartments • Alphington – 165 apartments	189 apartments
6. Haven; Home, Safe	• Epping	151 apartments
7. Housing Choices Australia	• South Melbourne - 50 apartments Melbourne - 48 apartments	98 apartments
8. Housing First	• Parkville - 86 apartments • Box Hill – 73 apartments	159 apartments
9. Salvation Army Housing Victoria	• Grovedale	13 dwellings
10. South Port Community Housing Group Inc	• South Melbourne	45 apartments
11. The Haven Foundation	• Pakenham - 16 dwellings • Mooroopna- 36 dwellings	52 dwellings
12. Women's Property Initiatives Ltd	• Brunswick – 9 apartments • Bundoora – 10 apartments	19 apartments
Total new dwellings		782 dwellings

3. Summary of the State Context

The approach of the Victorian government has been slow to emerge but it is now reasonable to conclude that the key policies which pertain to this project are:

- The State government will support Councils negotiating affordable housing agreements with developers seeking re-zoning, planning scheme amendments and master plan approvals and the current voluntary nature of those agreements may move more toward mandatory minimum outcomes in the future. Indeed, they are encouraging Councils to take a more strategic approach utilising their own land and the opportunities presented by new developments.
- The State government will expect the provider of social and affordable housing developed with State support – be it planning support or financial support – to be a Registered Housing

Agency. This does not mean that all housing outcomes must be owned by these agencies but that they are controlled by them and deliver value for money to the State as investor.

- Financial support provided to Registered Housing Agencies to deliver social and affordable housing in the future is likely to move to an operating subsidy to help meet the cost of capital rather than capital grants. This significantly changes the risk profile of RHA's and implies they will become significant borrowers of private finance.
- Achieving the ambitious social housing targets based on identified need that are likely to be pushed by Councils (5-10% of all new housing) will require innovative partnerships between developers and the Registered Housing Agencies sector. The total cost of delivering 5% social housing in the Waverley Golf Club development would be no less than $13.5 million – this is not a cost that could reasonably be borne by the project alone.

National Context

The current Commonwealth government considers housing policy, and in particular social and affordable housing supply side polices, to be a State responsibility. It has therefore done little to support the development of social and affordable housing allowing funding for housing under the National Housing & Homelessness Agreement to further erode in real terms and to discontinue the National Rental Affordability Scheme.

1. National Housing Finance Investment Corporation

However, in response to the chorus of commentators highlighting the increasing lack of housing affordability in Australia they have set up the National Housing Finance and Investment Corporation (NHFIC) as a 'corporate Commonwealth entity dedicated to improving housing outcomes, with a particular focus on affordable housing'.[46]

NHFIC operates four programs:

- *The Affordable Housing Bond Aggregator (AHBA) provides low cost and longer-term loans to registered community housing providers to support the provision of more social and affordable housing.*
- *The National Housing Infrastructure Facility (NHIF) is a $1 billion facility that provides finance for eligible infrastructure projects that will unlock new housing supply, particularly affordable housing.*
- *The First Home Loan Deposit Scheme supports eligible first home buyers to purchase their first home sooner. 10,000 Scheme places are available through participating lenders each financial year.*
- *NHFIC social bonds provide a unique opportunity for institutional partners to invest in sustainable, Australian social bonds and be part of the solution to the housing affordability challenge faced by everyday Australians. Bonds are AAA-rated, repo eligible, hold HQLA status, and are 100% guaranteed by the Commonwealth of Australia.*

Since establishment NHFIC has become a major financier to Registered Housing Agencies initially providing refinance and more recently looking to fund newly developed portfolios (although it does not as yet provide construction finance). NHFIC generally offers a 10 year fixed rate interest only loan at a current rate of around 2.1% but requires an initial interest cover ratio of 1.5 and loan to valuation ratio of 50%. This source of finance will potentially be of significance to any RHA identified by Intrapac as the takeout of the affordable housing defined in any affordable housing agreement entered into with Council.

Less well known but of potentially equal significance is the NHIF. The NHIF offers concessional loans, grants and equity finance to help support critical housing-enabling infrastructure. To be eligible for financing, an applicant must demonstrate that without NHFIC financing its project would be unlikely to proceed, or likely to proceed only at a much later date or with a lesser impact on new affordable housing.

[46] https://www.nhfic.gov.au/

The NHIF can provide finance to help support critical housing-enabling infrastructure. This includes new or upgraded infrastructure for:

- Electricity and gas
- Water, sewerage and stormwater
- Transportation including roads
- Telecommunications

Recipients eligible for NHIF finance may include:

- Registered community housing providers
- State or territory governments or government-owned development corporations or utility providers
- Local governments or their investment corporations or utility providers
- Incorporated special purpose vehicles that have at least one eligible foundation member (as above)

The application of NHIF finance may assist a project like the proposed redevelopment of the Waverley Golf Course achieve a much higher level of affordable housing than might otherwise be commercially viable.

2. National Disability Insurance Scheme

The National Disability Insurance Scheme (NDIS) is a new way of providing community linking and individualised support for people with a permanent and significant disability, their families and carers.[47] It also provides a potential source of finance for social housing for a high needs target group.

Like all Australians, participants in the scheme need access to affordable, appropriate and secure housing. Some participants will have additional housing needs as a result of their disability and this may attract a Specialist Disability Accommodation (SDA) payment.[48]

SDA refers to accommodation for participants in NDIS who require specialist housing solutions to assist with the delivery of supports that cater for their significant functional impairment and / or very high support needs – it is the homes in which such people live.

- *....the Agency's approach to SDA seeks to bring greater choice and control for people with disabilities in relation to their need for reasonable and necessary housing support. SDA funding in a participant's plan will reflect a range of different SDA solutions (p3).*
- *By providing prices that cover the full cost of owning and operating a range of building types ... the agency will be providing new incentives for SDA providers to develop smaller and innovative forms of accommodation, including one, two and three bedroom dwellings (p3).*

SDA payments have been set to encourage private investment and, in particular, institutional investment with a 20 year investment horizon. The pricing model assumes that at the end of 20 years the property could be sold in the private market, providing a lump sum cash flow to the investor equal

[47] See https://www.ndis.gov.au/

[48] The following references to the SDA payments are taken from Specialist Disability Accommodation – Decision Paper on pricing and payments, NDIS, 1 June 2016

to the (non-SDA) market value of the property. When combined, the revenue from SDA payments, the reasonable rent paid by the participants (based on capacity to pay) and the sale value of the property will be sufficient to recover the initial investment, all maintenance, outgoing and management costs, and an "institutional" rate of return on debt and equity.

In theory at least this provides another opportunity for a developer to deliver on a much needed type of social housing without need for significant subsidy. The investment options could be:

- The developer builds and owns the dwellings and retains them as an investment. This would require the engagement of a specialist SDA housing provider to manage them on the developer's behalf. This presumes the developer has the financial capacity to retain a 20 year investment.
- The developer constructs the dwellings in consultation with a SDA housing provider and sells them on to an institutional investor who would appoint the SDA housing provider as the management body. The Summer Foundation has established a Social Investment Fund with the express purpose of investing in SDA housing into the future.[49]
- The developer builds and sells the SDA compliant dwellings directly to an SDA provider – a number of RHA's and other agencies which focus on supporting people with a disability are emerging. To complete the transaction at this stage of the development of the sector this would need to be based on a cost to construct price rather than market value (cost price with modifications may in fact be higher than market value based on standard private rental arrangements).

3. Summary of National Context

The current national government is reluctant to become directly involved in the delivery of affordable housing however:

- The establishment of the National Housing Finance Investment Corporation has opened up access to low cost finance which may directly support the delivery of social and affordable housing via affordable housing agreements struck between developers and the local planning authority.
- The inclusion of a Specialist Disability Accommodation subsidy to qualifying clients of the NDIA has created a market of both non-profit and for-profit organisations that are developing, owning and managing appropriate dwellings in community settings for people with significant disabilities.

[49] See https://www.summerfoundation.org.au/resources/financing-housing-for-ndis-participants/

Industry Context

The social housing industry has traditionally been dominated by the State government through the Director of Housing (DOH). Over the last 20 years however the role of public housing has gradually given way to community housing. This was accelerated in the early years of the current century with amendments to the Victorian Housing Act (1983) which saw the creation of a new regulatory system for community housing providers. This in turn made it possible for the State government to redirect both new investment and existing assets to the Registered Housing Agencies. With the increasing fiscal constraints on State governments the biggest question therefore is how RHA's can finance any new developments. In this section we examine these two players and their financial constraints.

1. Director of Housing

The DOH is a statutory position which sits within the Department of Health & Human Services (DHHS). This department has undergone continuous change over the last 10 years reflecting the increasing concerns of government to focus on those in greatest need and deliver tailored support.

In this context the traditional housing role has been diminished and today there is very little housing development and management expertise within the Department, particularly at a Head Office level.

There is an expectation that over time the role of ownership and management of social housing will be transferred to the Registered Housing Agencies. Already the State has an obligation under the National Housing & Homelessness Agreement with the Commonwealth that 35% of all social housing will be under the management of RHA's and that this target will grow in the future.

The DOH is therefore not a likely direct partner to a private developer to deliver on an affordable housing obligation on a development site. This would also seem to be the experience of Knox Council in relation to the Austral Bricks site.

2. Registered Housing Agencies

Registered Housing Associations are approved by the Housing Registrar having demonstrated their capacity to meet and maintain certain performance standards.[50] Currently there are:

- *10 registered Housing Associations which "...expand new housing through construction, purchase or acquisition using a mix of government funds and private sector investment."*[51]
- *29 registered Housing Providers which "...are essentially managers of social housing".*[52]

Housing Associations are therefore the most likely partners for a private developer looking to achieve an affordable housing outcome on a development site because:

i. HA's have priority access to the State government funding when it is available.

[50] See http://www.housingregistrar.vic.gov.au/Home for a full description of the role of the Housing Registrar.
[51] See http://www.housingregistrar.vic.gov.au/Registered-Housing-Sector/Housing-association

[52] See http://www.housingregistrar.vic.gov.au/Registered-Housing-Sector/Housing-provider

ii. HA's have significant balance sheets which can be leveraged to secure new investment in projects even when there is no new government investment (which some are now trying to do by refinancing through NHFIC).

Housing Providers may be approved for small social housing grants and some of the faith based Housing Providers do have access to their own equity and therefore may be potential partners. However as a rule of thumb a Housing Association is more likely to be good partner as this is their core business.

3. Financing affordable housing historically

Traditionally social and affordable housing has been financed by a combination of Registered Housing Association equity, State government capital grant (secured by second ranking mortgage) and a private debt facility (secured by first ranking mortgage).

The equity contribution provided by the RHA might typically be comprised of:

- Negotiated discount to market value of 5-10%
- GST rebate on the purchase price of the dwelling of 9.1%
- Contribution from balance sheet of 0-5%

The quantum of private debt will be determined by the net cash flow and the lenders risk parameters. Typically bank lenders are requiring an Interest Cover Ratio of 1.5 or more and a Loan to Valuation Ratio of 50% or less. This results in an amortisation period of approximately 20-30 years.

The net rental income will depend principally on the target group where:

- Social housing clients pay an income related rent that generally approximates to about 40-60% of market rent (depending on local market)
- Affordable housing clients (low wage workers) pay a discount to market rent of 75% of the market rent or 30% of income (whichever is the lower)

In the absence of any other subsidy typically the level of debt that can be secured will be:

- Social housing: 10-15% of market value
- Affordable Housing: 15-25% of market value

When NRAS[53] was available, i.e. a payment of approximately $10,000 per property per annum for 10 years the level of debt that could be serviced increased to:

- Social housing: 20-30% of market value
- Affordable Housing: 30-40% of market value

Projects could only proceed if the State government contributed capital funds for the balance of the cost of acquisition. Generally access to State funds has been via a competitive process with

[53] National Rental Affordability Scheme – see https://www.dss.gov.au/our-responsibilities/housing-support/programmes-services/national-rental-affordability-scheme

government looking for the greatest leverage possible while meeting all other social and commercial objectives.

In most instances however the level of government capital funding has been in the range of 75% (social housing) to 50% (affordable housing) while NRAS was available and higher now that NRAS is not available. This represents a significant cost to the State budget and hence the reason why there is so much interest in private financing.

This means that when there is no government grant funding available and no NRAS type recurrent subsidy a Housing Association will be limited in what it can afford to pay for new housing stock to (i) equity (from balance sheet and GST rebate) and (ii) debt that can be serviced from the net income stream from the project (assuming it is fully leveraged on the rest of its portfolio). At best a Housing Association might be expected to pay a developer 20-25% of market value of the affordable housing properties. The balance would need to be provided by way of discount to the purchase price.

From the developer's perspective in the current climate the cost to deliver on affordable housing will be the difference between the cost to develop (land and construction) and the capacity of the HA to pay. This could be the gap between 85% of the market value (assuming a 15% profit margin) and 20% of the market value, i.e. 65% of market value or approximately $309K (assuming a market value of $475K) per dwelling.

Over 30 dwellings (5% of the anticipated yield of 600 dwellings) this amounts to $9.3M. It is unlikely that a development contribution to affordable housing of this magnitude would be commercially viable unless it had been factored into the original land price. An alternative mechanism to finance the Council target will therefore need to be identified or Councils expectation of the volume of affordable housing will need to be revised.

4. Financing affordable housing in the future

As noted above the adoption of the Homes for Victorians policy statement and the introduction of the Social Housing Growth Fund at the State level and National Housing Finance Investment Corporation at the Commonwealth level have created new financing options which may make the preferred Council outcomes more achievable.

In other countries borrowing terms and conditions for affordable housing are very favourable where there is a strong community sector and a proven track record for borrowing combined with trusted government subsidy arrangements. For example projects approved by the US Department of Housing & Urban Development (HUD) can negotiate much higher debt levels – recent offers include a minimum 1.1 to 1.15 ICR, maximum 90% LVR and maximum amortisation period of 35-40 years.[54]

The Australian experience cannot match that but the Social & Affordable Housing Fund in NSW has resulted in nine contracts between the NSW Department of Families & Community Services and Registered Housing Agencies to deliver 3,400 new social and affordable housing dwellings.[55]

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[54] https://www.linkedin.com/groups/1806831/1806831-6184028288726421506?midToken=AQFSzYONO-1nFQ&trk=eml-group_announcement_message-null-4-null&trkEmail=eml-group_announcement_message-null-4-null-null-1ke418~itbonxe9~ok

[55] https://www.facs.nsw.gov.au/about/reforms/future-directions/initiatives/SAHF

Successful RHA's are paid a Monthly Service Payment for 25 years for the provision of:

- Accommodation Services (i.e. the dwellings)
- Tenancy and Property Management Services
- Tailored Support Coordination Services (assisting tenants to access "wrap around services")
- Performance & Data Monitoring Services

The latter three services cost each proponent approximately the same amount to deliver hence the competition was in the cost of the Accommodation Services. This depended on the relative equity contributions and the expectations of return on equity (placing Councils and faith based charities with large land holdings at an advantage) as well as the cost of debt. It is understood that some of the successful proponents were able to secure debt finance for up to 75% of the cost of delivery with ICR's as low as 1.2-1.3.

In Victoria the Social Housing Growth Fund is not as well advanced but it is understood that successful proponents were able to package together a bid which included:

- Construction finance provided by State Treasury low cost loans
- NHFIC finance for up to 50% of the cost of delivery
- Equity contributions comprised of a combination of land provided by others, cash from the balance sheet and the GST rebate
- SHGF funding including grants necessary to achieve the required LVR and then an operating subsidy for up to 30 years to help meet the cost of debt finance

It is highly likely that any partnership between Intrapac and an RHA to deliver the affordable housing outcomes on the Waverley Golf Course development will require support of a similar nature from the SHGF.

5. RHA's in Knox

There are several RHA's active in Knox including:

- Housing Choices
- Housing First
- Community Housing Ltd
- Haven, Home, Safe
- Women's Housing Ltd

Of these, Women's Housing Ltd and Housing First have been involved in the most recent Section 173 Agreements in respect of affordable housing outcomes as part of Development Approvals on significant redevelopments within Knox.

- Council officers speak positively of the performance of both WHL and HF.
- Both have expressed interest in future opportunities to deliver affordable housing through development agreements.
- Both parties have articulated their experience and commitment to negotiate mutually beneficial terms for the purchase of land or land and dwellings under Section 173 Agreements.

- Both however have noted that any deal must be financially viable from their perspective – meaning that they have limited equity to contribute, must rely on net rental income to service any debt raised for the acquisition, and can only commit further resources if State government subsidy is available.

While no NDIA Specialist Disability Accommodation service providers have been identified in Knox the sector has developed rapidly over the last few years. One agency with a strong track record and with a growing presence in the south and east of Melbourne is Melba Support Services.[56]

In their own words 'Melba makes a difference by empowering people with a disability to live the life they want. For nearly 50 years we have been supporting people to dream big, be happy and do what they choose and value.' One of the largest and most respected disability service providers in Victoria the organisation has a turnover in excess of $100M per annum.[57]

Since the introduction of NDIS and in particular the SDA funding stream Melba have embarked on a series of SDA projects. These are small community based housing projects co-designed with the future occupants to empower clients with a disability live inclusively in local neighbourhoods. Melba has completed 8 such developments providing independent living for over 50 clients. A feature of the model is that 24x7 care is provided from a locally based office/unit with direct communication with each of the residences.[58]

Melba has trialled a number of different ownership arrangements and has recently established a subsidiary company to develop and own, joint venture with private investors, or lease from private investors purpose built accommodation which they subsequently manage for clients of both their parent organisation or any other disability support provider.[59]

Melba has indicated a significant interest in working with Intrapac in Knox to deliver Specialist Disability Accommodation as part of an overall affordable housing strategy provided they shared common values in relation to the quality of the accommodation for their clients while ensuring an appropriate risk adjusted rate of return on their investment.

[56] https://www.melbasupport.com.au/
[57] Glenn Foard, former CEO, telephone interview 18/09/2020
[58] Ibid
[59] https://www.melbasupport.com.au/specalist-disability-accommodation

An affordable housing strategy for WGC

Following this review of the current and possible future context for affordable housing policy Ward Bisset Consulting proposes the following strategy to address Councils stated expectation of a 5% social housing outcome on Strategic Investigation Sites.

The WGC affordable housing strategy would be comprised of two components:

- Housing Project for people with a disability funded by an SDA service provider registered with the NDIA – the project would target people with a profound disability
- Social housing project funded by RHA's with developer support which would target older local residents renting privately (particularly women) and in housing stress and younger single parents with 1-2 children.

The total number of social housing dwellings to be delivered would be up to 30 (5% of the estimated total yield of 600 from the development). This would include:

- 10-15 SDA units comprised of 50% 1BR dwellings of approximately 65sqm and 50% 2BR dwellings of approximately 75sqm designed to be compliant with the requirements of NDIA for SDA payments plus 1 x 1BR office/dwelling of approximately 55sqm for an on-site carer.
- General social housing comprised of 50% 1BR dwellings of approximately 55sqm and 50% 2BR dwellings of approximately 65sqm designed to meet the standard specifications of a RHA.
- The SDA sale process will be undertaken first, and the outcome of that process will set the target number of general social housing dwellings (i.e. the remainder of the total of 30).

Intrapac will engage directly with the RHA and SDA sector to identify suitable service providers to purchase up to 30 social housing properties under the following sale principles:

- The SDA dwellings would be sold at cost under an open book transaction to the selected SDA provider with the 1 x 1BR carers dwelling gifted by the developer.
- The general social housing dwellings would be sold through a competitive RHA bid process. The maximum financial impost to the project arising from the general social housing will be $225,000 per dwelling, i.e. the estimated value of the land component.

By way of example the strategy might involve:

- The NDIS sale process results in 12 NDIS dwellings being created plus 1 carers dwelling for a total of 13 social housing dwellings
- The target number of general social housing dwellings therefore becomes 17 (30 less 13)
- The financial impost to the project (Contribution) for general social housing is set at $3.825m (17 x $225,000)
- RHA's are invited to bid for dwellings (at a 50/50 mix of one and two bed dwellings)
- The number of social housing dwellings that are sold to the RHA will be the lesser of 17, or the number of dwellings that expenses the Contribution in accordance with the bets of the RHA bids

The bid process would be transparent to Council, subject to normal commercial confidentiality undertakings.

The assessment of the RHA and SDA partners would be determined on a range of criteria including:

- Quality of tenancy management services
- Quality of property management services
- Experience of the RHA/SDA in working collaboratively with developers in co-designing social housing and specifically NDIS compliant housing
- Capacity to deliver management services in the Knox area
- Capacity of the RHA/SDA to work collaboratively with Support Providers to ensure all residents are empowered to live independently and lead fulfilling lives
- Commitment of the RHA to work for the growth of social housing in the Knox municipality
- Price

The anticipated cost to the developer under this arrangement will the aggregate of:

- The cost of the of the carers unit in the disability housing project (land & building).
- Up to $3.825M or the value of the discount required by the preferred RHA to deliver the maximum social housing within their funding capacity.
- The opportunity cost of foregoing returns for normal economic development on the land occupied by the social housing. Whilst often disregarded this impost is material for projects that have been structured without the impost of a social housing requirement at the outset. We understand this is the case for the Waverley Golf Course project.

This strategy meets all of the criteria identified on page 4 above.

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Attachment 1

Hal Bisset

Director - Ward Bisset Consulting

Director – Affordable Housing Solutions

Hal has been a leading figure in the social housing sector for over 30 years.

In 1985 he was founder of Ecumenical Housing and then CEO for 18 years. A not-for-profit organisation EH was known for its housing research and policy advice as well as being a developer of joint venture community housing projects. In 2004 he facilitated a merger with Inner City Social Housing to form Melbourne Affordable Housing which later evolved into Housing Choices Australia.

He was Chairperson of the Victorian Ministerial Advisory Committee on the Supported Accommodation Assistance Program and a member of the Victorian Ministerial Advisory Committee on Housing in the 1990s.

Hal has served as a Director of the Australian Housing & Urban Research Institute and the Australian Institute for Health & Welfare and as Chairperson of the Community Housing Federation of Australia and the National Community Housing Forum.

In 2004 he established Ward Bisset Consulting through which he has provided housing policy and project development advice to all levels of government and numerous community housing organisations in all States and Territories as well as New Zealand. Hal has played a role in some of the biggest public housing estate renewal schemes in Australia including Kensington and Ashwood-Chadstone in Melbourne and Bonnyrigg in Sydney.

Over the last 10 years he has been a partner and Executive Director of Affordable Housing Solutions which has worked with the private and community sectors to deliver 1500 affordable housing dwellings under the National Rental Affordability Scheme across Victoria, NSW and Queensland; assisted St George Community Housing to successfully bid for one third of all new social housing developed under the Nation Building program in NSW; and Port Phillip Housing Association to implement several projects in Victoria under the same program.

During 2013 & 2014 he served as the CEO of the Central Australian Affordable Housing Company based in Alice Springs a company set up by Tangentyere Council to provide

housing for Aboriginal people. This included the management of the Alice Springs Town Camps.

Since returning to Victoria in 2015 he has continued to provide advice through Ward Bisset Consulting to Victorian and NSW based Community Housing Organisations. He has also been a key part of the Affordable Housing Solutions team that successfully supported the Society of St Vincent de Paul to bid for the delivery of 500 new social and affordable housing dwellings in NSW under the Social & Affordable Housing Fund initiative requiring the raising of $240M in capital. AHS is now finalising the delivery of those dwellings on SVDP land and though market acquisitions.

In 2019 Hal joined with K2 Planning, Thomson Goodall & Associates and Plan A Planning to prepare a Social Housing Plan 2020-2041 for the City of Greater Geelong – a plan that was adopted by Council in February 2020. This is a radical plan that aims to address the social housing deficit by facilitating the development of 13,000 new dwellings over the next 2 decades.

Hal is a member of the Australasian Housing Institute. He was awarded a Churchill Fellowship in 1992 and recognised for his contribution to social housing with a Centenary Medal in 2001 and investiture as a Member of the Order of Australia in 2005.

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ETHOS URBAN

Waverley Golf Club Site

Residential Land Analysis

Prepared for Intrapac Property Pty Ltd

September 2020 | 3200220

Authorship

Report stage	Author	Date	Review	Date
Draft report	Julie Lim John Henshall	29 August 2016	John Henshall	29 August 2016
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Disclaimer

Every effort has been made to ensure the accuracy of the material and the integrity of the analysis presented in this report. However, Ethos Urban Pty Ltd accepts no liability for any actions taken on the basis of report contents.

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Introduction

Background

Intrapac Projects Pty Ltd (Intrapac) engaged Essential Economics Pty Ltd to undertake a residential land assessment with regard to the proposed rezoning of land at Waverley Golf Club (WGC) for residential purposes.

Objective

This report provides a detailed market demand assessment of the subject site, based on prepared Master Plans and indicative product yield and mix. The analysis covers the following aspects:

- Update of residential land supply and demand in the City of Knox
- Reference to current planning policies relevant to the City of Knox
- Assessment of the type and extent of dwelling demand and supply, both currently (2016) and into the future (2026)
- Assessment of the contribution of the proposed development to residential supply in Knox.

This Report

This report contains the following chapters:

1. **Subject Site** – Provides an overview of the subject site and nearby amenities
2. **Golf Industry Overview** – Provides a summary of international and national golfing trends, and a review of WGC's current financial position and relocation plans.
3. **Planning Context** – Presents an overview strategic policy relevant to the rezoning of the subject site, including *Plan Melbourne Refresh* and local housing policies.
4. **Residential Market Assessment** – Provides a long-term assessment of supply and demand conditions in the City of Knox, and provides comment on the adequacy of supply and the role the subject site in meeting identified housing demand and choice.
5. **Interviews with Real Estate Agents** – Provides a qualitative insight into residential supply and demand conditions in the City of Knox.
6. **Key Findings**

Note, the key findings outlined in this report are based on socio-economic, industry and development conditions as of September 2016. An update to data, analysis and key findings which reflects 2020 conditions can be provided on request.

1 Subject Site

1.1 Location and Potential Development

The Waverley Golf Club (WGC) is an 18-hole privately-owned club located at 82 Bergins Road, Rowville in the City of Knox, in south-eastern Melbourne. The links course, situated on a site of approximately 50ha in area, was established approximately 90 years ago.

Intrapac has a call option to purchase the WGC land and intends to redevelop it for residential usage. Rezoning is required for the site to be developed. The WGC land is substantially encumbered by power transmission infrastructure. Of the 49.5ha gross site area, only 26.9ha are unencumbered and potentially available for redevelopment.

Intrapac's current master planning for the site envisages a mix of vacant land and completed medium-density dwellings being sold. A substantial project home builder display village would most likely be created on site for land purchasers to select a new home and builder. Intrapac's current modelling forecasts a yield in the order of 600 new dwellings, comprising 125 vacant land lots and 475 medium density dwellings.

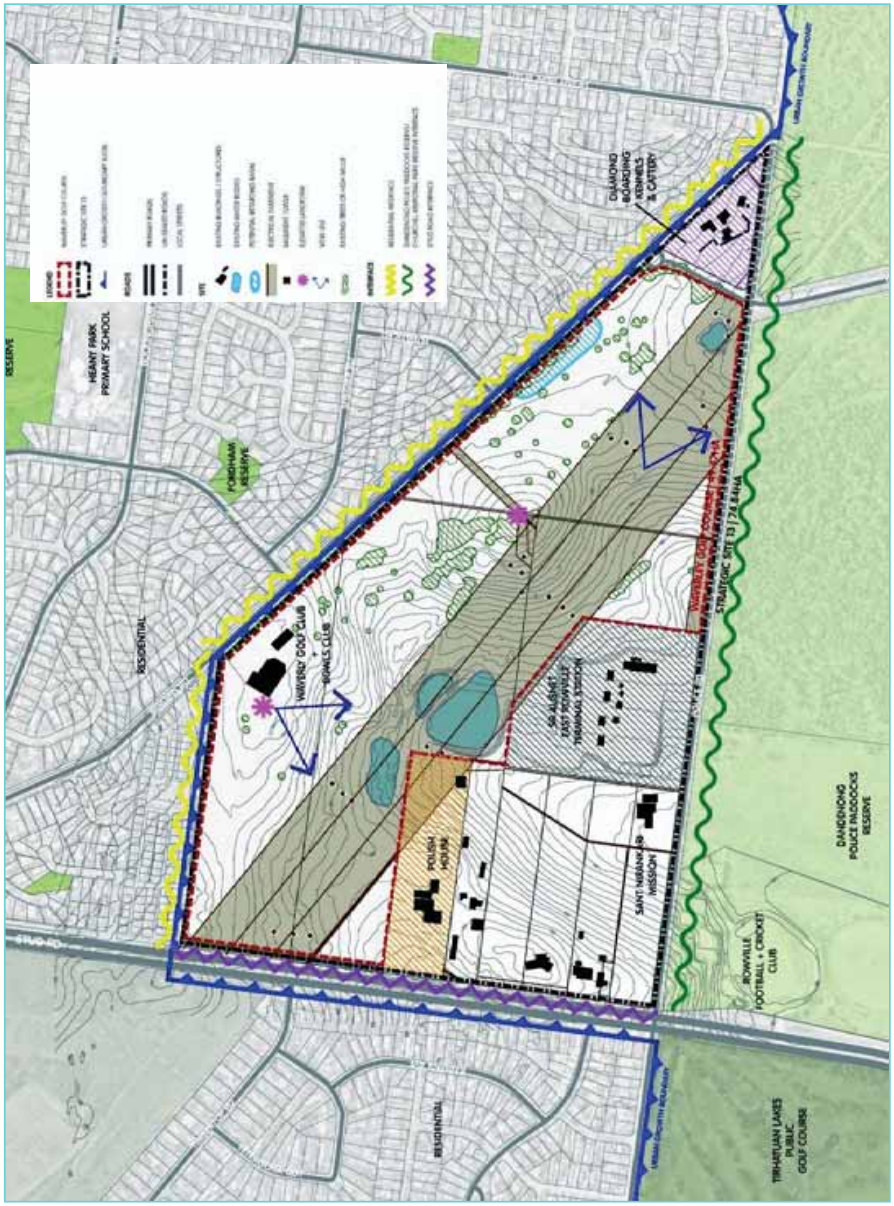
The subject site is bordered by – but currently excluded from – State Government's Urban Growth Boundary (UGB), as shown in Figure 1.1. Standard residential development can only occur on the WGC site if the land is brought within the UGB and rezoned or if the Green Wedge Zone subdivision controls are amended. The Knox Housing strategy (2015) and planning scheme amendment C131 have identified the subject site to be suitable for residential development at a range of densities (as noted in Section 3.2).

Recent analysis by Roberts Day, urban design consultants to Intrapac (2016), indicates – in regard to the site's accessibility to services and amenities – that the location is well-suited for creation of a 20-minute neighbourhood as detailed in the Plan Melbourne Refresh Discussion Paper released in October 2015. In this context, the site's attributes include the following:

- The site is located within walking distance of two primary schools, two secondary schools, a number of childcare centres, and a church;
- A network of bike paths and public transport services are located in the area, particularly to the north and west of the subject site. However, the area is highly car- dependent and it is anticipated that most future residents will own a vehicle; and
- The site is within walking distance of numerous sporting grounds, parks and community gardens, including Rowville Football and Cricket Club, Starlight Reserve, Liberty Avenue Reserve, and Churchill National Park.

The Roberts Day 20-minute neighbourhood is illustrated in Figure 1.2. The location of local infrastructure, services and amenities in the general environs of the subject site are shown in Figure 3.1.

Figure 1.1: Subject Site



Source: Roberts Day, 2016

Figure 1.2: Roberts Day 20-Minute Neighbourhood

Source: Roberts Day, 2016

Figure 1.3: Local Infrastructure, Services and Amenities nearby Subject Site

Source: Roberts Day, 2016

1.2 Need to Relocate the WGC

Key challenges facing the WGC are outlined in the Club's relocation document (*Waverley Golf Club Relocation Proposal*, June 2015) and include the following:

- Membership is forecast to decline by one-half in less than a decade, declining from approximately 770 members in 2011-12 to approximately 350 members in 2019-20
- Ageing membership, with a median age of 60 years
- Ageing infrastructure, with the need for upgrades to the course and facilities.

With regard to finances, the following points are noted:

- Falling revenues from golf subscriptions and entrance fees, which are impacting on the Club's bottom line
- Trading loss in 2013-14, with losses expected to continue into the next four years
- Unable to raise sufficient capital expenditure to bring the course and facilities up to a satisfactory standard, with approximately $2.4 million required
- Limited scope exists to generate further revenues due to market factors and constraints on existing facilities
- Limited ability for the Club to make further cost savings.

WGC has been assessing the club's viability for many years, including a proposal to relocate the Club to Lysterfield over a decade ago. As the Lysterfield option did not proceed, financial conditions are such that a variety of further options have been assessed by the WGC Board, leading to a new relocation proposal aimed at ensuring the Club's long-term viability.

Specifics of the relocation plan are outlined in the proposal documentation (p12):

- WGC has granted Intrapac a call option to purchase the WGC land; Intrapac pays WGC annual call option fees. Intrapac is unlikely to exercise the call option unless the WGC land can be redeveloped for residential usage.
- WGC and Intrapac will seek to have the existing Rowville land approved for residential development.
- In addition to the exercise price, Intrapac will pay WGC an agreed proportion of the returns arising from the redevelopment, above a pre-agreed threshold.

Timing of the redevelopment and relocation is contingent upon rezoning of the WGC land for residential development.

WGC members voted in June 2015 to adopt the relocation proposal, with a 99% positive vote.

In September 2016, the membership of WGC and the nearby Churchill Park Golf Club voted overwhelmingly to merge their clubs onto the Churchill Park site, approximately 3km south-east (direct distance) from WGC.

1.3 Conclusion

1. WGC has experienced a long-term trend of reducing viability.
2. WGC has undertaken significant strategic assessments in regard to potential options to address the club's long-term viability, and this has resulted in the current relocation proposal.
3. The existing WGC land is recognised by the Knox City Council as being appropriate for residential redevelopment and a recent assessment by Roberts Day (2016) supports this view.
4. In order for the WGC proposal to proceed, it is important that the site is included within a revised UGB; this will enable the strategically-important land parcel to be rezoned for residential development.
5. Recently, the membership of WGC and the nearby Churchill Park Golf Club voted overwhelmingly to merge their clubs onto the Churchill Park site, located approximately 3km south-east (direct distance) from WGC.

2 Golf Industry Overview

Golf clubs across Australia are facing considerable financial pressure for a number of reasons including:

- Declining participation rates
- Changing nature of golf participation – shorter rounds / less time available
- Declining club memberships
- Ageing membership base, with low participation rates emerging for the next generation of golfers (15-34 year-old cohort)
- Falling revenues, placing many clubs in a perilous financial position
- Supply outstripping demand, with too many 18-hole golf courses located in and around Melbourne and increasingly not enough golfers.

Nationally, private golf club memberships have declined by 20% in total over the past decade. Information sourced from Inside Golf (www.insidegolf.com.au) highlights this decline through a long list of proposed sales, recent sales, mergers and closures across the industry, including the following:

Recently Listed for Sale

- Moonah Links/Sands Torquay
- Eagle Ridge Golf Club

Recently Sold

- Capital Golf Club
- Heritage Golf & Country Club
- Kingswood Golf Club
- Links Hope Island
- Noosa Springs
- Cypress Lakes
- Lakelands Golf Club

Moving or Merged

- Kingswood (to Peninsula) Golf Club
- The Eastern Golf Club
- Croydon Golf Club
- Chirnside Park/Gardiners Run
- Horton Park Golf Club

- Waverly Golf Club/Churchill Park Golf Club

Closed

- Capricorn Country Club
- Ipswich Golf Club (Receivers)

This decline in golf is not unique to Australia. The Economist in its article *Handicapped – The Future of Golf* (December 2014) highlights the following with regard to the USA, which is the world's largest golfing market:

In 2014, 25 million Americans played golf and this figure is down 5 million in participation (or 18%) from the 30 million participants in 2006. Over this same period, the population of the USA increased by 20 million people or almost 7%.

Golf does not hold the same appeal as in the past for younger Americans and those from minority communities, which are both considered key cohorts in terms of future participation rates.

TV ratings in the USA have been declining for golf events for some years, while retail sales for golf merchandise and clothing have also been contracting over this period.

Similar to the USA, golf participation is declining in other key established golfing markets such as the UK, Australia and Japan.

In today's society where people are more time-poor, playing an 18-hole round of golf is regarded as one of the most time-consuming activities available.

The Economist notes that the industry is slowly responding to these challenges by considering more flexible and innovative ways to participate in the sport (such as simplifying the rules, introducing 6-hole circuits, and providing hitting bays and stimulators as alternatives to playing a round etc.), with faster, easier versions of the sport likely to be the main way to reignite interest in the game.

The above findings highlight the ongoing challenges that face existing 18-hole golf courses in terms of relevance and financial sustainability over the coming years.

In summary, golf participation – in the traditional sense of an 18-hole round – is in decline in many parts of the world, including Australia, due to a range of factors. Principal among these reasons are the declining appeal to younger generations and the public's increasing desire to seek shorter forms of recreational activity. In Australia, this is evidenced by falling participation rates and memberships at established golf clubs, resulting in some cases in club mergers and closures.

3 Planning Context

3.1 Metropolitan Planning Context

Plan Melbourne Refresh will update *Plan Melbourne* and become the cornerstone planning document to guide metropolitan growth over coming decades. Of relevance to the WGC land is the expressed need to encourage higher-density development in established areas, support 20-minute neighbourhoods (walking), and lock-in the Urban Growth Boundary.

The *2012 Growth Area Logical Inclusions Review* brought additional strategically-located land within the UGB which was previously excluded. The WGC land was to be considered by the logical inclusions process but was excluded due to administrative failure. Plan Melbourne Refresh provides an opportunity to bring the subject site within the UGB in view of the site's strategic importance in supporting residential growth in the middle-ring metropolitan locations.

3.2 Knox Housing Strategy 2015

The *Knox Housing Strategy 2015* sets out Council's plan for managing residential development to respond to the current and future needs of the Knox community.

This Strategy outlines the current housing situation in Knox; summarises Knox community stakeholder feedback; considers the factors that drive residential development; and sets out Council's strategies to respond to the housing challenges and opportunities facing the municipality.

Recent trends identified include the following:

- Over 55s make up 25.3% of the Knox population, and this represents an increase of 8% over ten years.
- The proportion of children aged 0-14 years in Knox dropped from 20.3% in 2006 to 18.5% in 2011.
- The number of 'lone person' and 'couple only' households increased slightly from 41% in 2006 to 43% in 2011.
- 28% of Knox residents were born overseas, an increase from 25% in 2006.
- Future trends identified include the following:
- The growth rate of new households is high and the average household size is expected to decrease. More new households will be forming.
- The 60-plus age group is expected to be the fastest growing group, but the 35-49 age group will continue to be the largest age group.
- 'Families with children' will continue to be the dominant household type, almost double the next closest group of 'couple-only' households.
- 'Couple-only' and 'one-person' households are the fastest growing household types.
- Housing affordability is an increasing issue in the City of Knox

Of particular relevance to this project, The Knox Housing Strategy 2015 identifies 14 strategic sites where current land use is likely to change over time, providing an opportunity for residential development. These sites include non-operational quarries, former school sites, and golf courses. Significantly, the WGC site is one of the strategic sites identified in the Strategy, where "residential

development at a range of densities is considered suitable, and higher densities are considered appropriate adjacent to Stud Road" (p27).

Planning Scheme Amendment C131 – March 2016

The Minister for Planning has approved Amendment C131, which updates the Knox Housing Strategy, with a number of changes to Council's adopted amendment. The most significant changes are summarised below:

Local Policy Clause 22.07 – The Minister has deleted "discouraged" dwelling types.

Knox Neighbourhood – General Residential Zone Schedule 2 - the Minister has approved a maximum building height requirement of 9 metres, with exceptions for slope of land. Council's adopted maximum building height requirement was 8 metres, with exceptions for slope of land and exceptions for architectural features.

Activity Areas – Residential Growth Zone Schedule 1 - the Minister has approved a preferred maximum building height of 13.5 metres. Council's adopted maximum building height requirement was 9 metres, with exceptions for slope of land and exceptions for architectural features.

Of particular relevance to this project, the Planning Scheme Amendment C131 has deleted "discourage other forms of housing" and "discourage apartments", which indicates that the Minister has recognised the value of other forms of housing, including apartments, in Knox.

3.3 Knox Affordable Housing Action Plan 2015-2020

The main focus of the *Knox Affordable Housing Action Plan 2015-2020* is to increase the supply of social housing, although more general issues of housing affordability and choice are identified in the document.

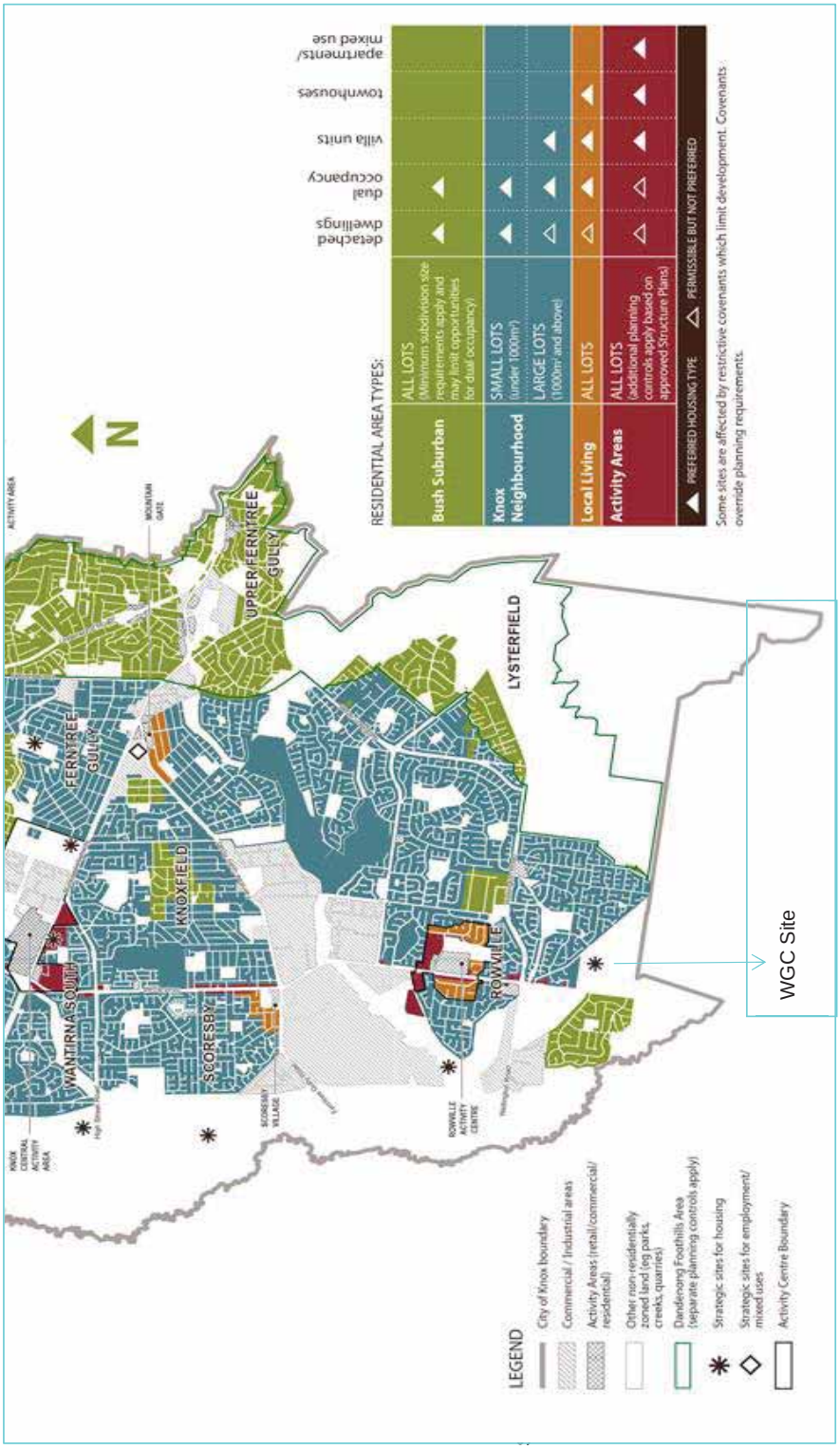
Key points from the Action Plan include the following:

Housing choice is limited in Knox, with only 13.1% of housing in the medium or high- density category.

Housing stress is increasing among Knox households, with 9% of households (4,755 households) paying 30% or more of their gross weekly income on either rent or mortgages in 2011, compared with 8% of households (4,000 households) in 2006.

One reason affordability is declining is that growth in median house prices is outstripping growth in median incomes.

Figure 3.1: Residential Policy Map, City of Knox, 2016



Overall, the current sizes and types of housing in Knox are inadequate to respond to increasing demand for smaller households, particularly sole and older person households as the population ages. This situation is creating a dwelling-to-household mismatch, which directly impacts on housing affordability.

Greater housing diversity can contribute to Knox's affordable housing stock. For example:

As Knox continues to experience a gradual increase in smaller households, the provision of different types and sizes of dwellings (units, apartments and villa units) will enable more choice in the marketplace

Environmentally-efficient homes can reduce ongoing running and maintenance costs. For example, a large, poorly-designed home can require more heating, cooling and ongoing repairs than a well-designed home

Homes located close to infrastructure and services are generally more liveable than those located some distance away, and this can reduce reliance on private transport and reduce cost-of-living expenses.

A shortage of greenfield sites exists in Knox, with future demand expected to be met through brownfield and infill development.

3.4 Golf Club Rezoning Precedents

In recent years a number of former golf club sites in the eastern region (Croydon, Eastern, and Chirnside Park) have been successfully developed for residential purposes. These developments have contributed to wider local residential choice and have yielded significant dwelling numbers on these sites. In each case, the golf clubs have been relocated to new sites. These precedents provide positive direction for the proposed redevelopment of the WGC site for much-needed residential use.

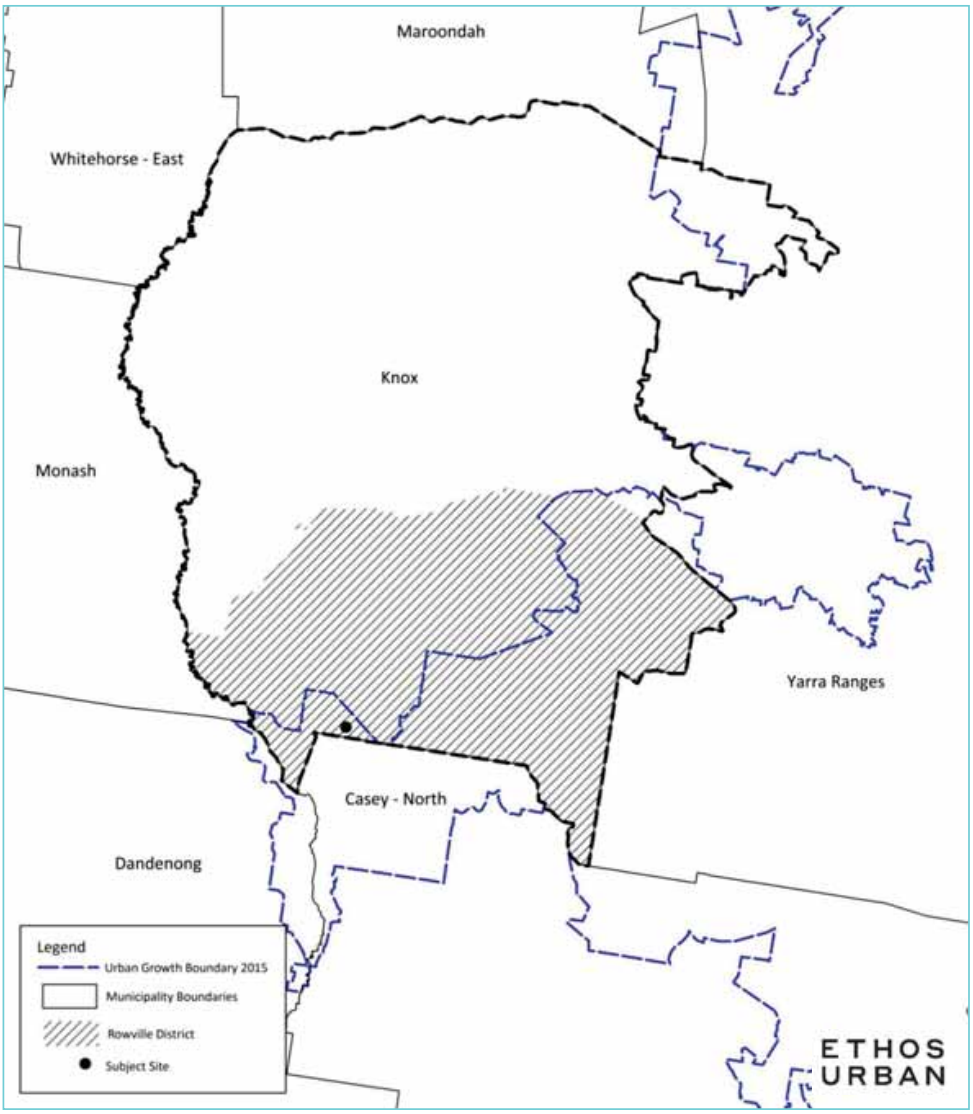
4 Residential Market Assessment

This Chapter presents a residential supply and demand assessment for the City of Knox, and is based on a review of the latest State Government information on population, dwelling and household formation; a review of the Urban Development Program data; and reference to other sources, including building approvals and sales data.

The City of Knox is compared with the Rowville District in terms of population and dwelling projections, to provide additional insights surrounding the subject site. The Rowville District catchment is defined using *Victoria in Future*'s Small Areas datasets (DEWLP, 2016). The areas located directly south of the Rowville District are non-developable areas in the City of Casey and so have not been included in this catchment. Although the growth rate of the population is projected to be slightly slower in Rowville compared to the rest of the Knox municipality, the growth rates for dwellings are projected to be the same. This indicates that the average household size in Rowville will decrease slightly more (-0.34 persons per household) than the rest of the municipality (-0.14 persons per household) over the next 15 years.

Figure 4.1 shows the location of the subject site in relation to the City of Knox municipal boundaries, the Rowville District, and the Urban Growth Boundary.

Figure 4.1: City of Knox and Rowville District Boundaries



Source: DELWP, Victoria in Future 2016; DELWP, Urban Growth Boundary 2015

4.1 Population Forecasts

The latest official population forecasts (*Victoria in Future 2016*) show the population of Rowville is forecast to reach 44,510 persons by 2031, representing an increase of +3,300 persons at an average growth rate of 0.5% pa. This is slightly slower in comparison to the population growth rate projected for the rest of the municipality at 0.9% pa. The figures are shown in Table 4.1. The City of Knox is compared with Metropolitan Melbourne's (a) established urban areas and (b) growth areas in terms of 10-year dwelling supply, with an outline provided of the long-term adequacy of supply and the role of the subject site in helping to reverse the dwelling deficit in the City of Knox.

Table 4.1: Population Projections, City of Knox, 2016-2031

	2016	2021	2026	2031	Change 2016-31	AAGR 2016-31
City of Knox	157,100	164,100	171,900	180,250	23,150	0.9%
Rowville District	41,210	42,250	43,300	44,510	3,300	0.5%
Metropolitan Melbourne	4,558,690	5,025,180	5,482,780	5,931,010	1,372,320	1.8%
• Established Urban Areas	3,398,830	3,650,650	3,876,580	4,096,560	697,720	1.3%
• Growth Areas	1,159,860	1,374,540	1,606,200	1,834,450	674,590	3.1%

Source: DELWP, Victoria in Future 2016

Note: AAGR: Annual Average Growth Rate

Values not adjusted for annual inflation

Rowville District information from VIF Small Area projections

4.2 Housing Demand Analysis

Trends in Residential Building Approvals

New dwelling approvals in the City of Knox over the period 2005/06 to 2015/16 have increased by approximately 4% pa (increasing from 636 approvals to 918 approvals) and averaged 665 approvals pa. Growth in approvals has been significantly focused on medium and higher- density dwelling approvals ('new other residential building'), which have increased at 13% pa compared to a -1% contraction in standard housing approvals, as shown in Table 4.2 and Figure 4.2. This trend is also apparent in the growth of the value of approvals, with medium to higher-density approvals increasing in value by 17% pa compared to 5% pa for standard dwellings.

Table 4.2: Residential Building Approvals and Value, City of Knox, 2005/06 to 2015/16

	New houses (no.)	New other residential building (no.)	Total new dwellings (no.)	Value of new houses ($m)	Value of new other residential building ($m)	Value of total new residential building ($m)
2005/06	507	129	636	92.0	17.0	109.0
2006/07	354	248	602	74.3	35.0	109.3
2007/08	433	133	566	89.1	22.9	112.0
2008/09	428	85	513	91.5	15.5	107.0
2009/10	278	238	516	65.4	52.2	117.6
2010/11	294	222	516	71.9	40.4	112.3
2011/12	392	264	656	104.0	45.1	149.1
2012/13	284	330	614	81.2	77.4	158.6
2013/14	340	583	923	93.1	137.6	230.7
2014/15	425	328	753	121.7	67.3	189.0
2015/16	471	447	918	146.3	84.5	230.8
Change 2005/06 to 2015/16	-36	+318	+282	+54.3	+67.5	+121.8
Average 2005/06	382	273	656	93.7	54.1	147.8

to 2015/16						
AAGR 2005/06 to 2015/16	-1%	13%	4%	5%	17%	8%

Source: ABS, Building Approvals, Australia (various)
Note: AAGR: Annual Average Growth Rate
Values not adjusted for annual inflation
"Other residential buildings" includes semi-detached, row or terrace houses or townhouses; and flats, units or apartments.

Figure 4.2: Number of Residential Building Approvals by Type, City of Knox, 2005/06 to 2015/16

Source: ABS, Building Approvals, Australia (various)

Trends in Vacant Block Sales

Vacant house block sales have fluctuated over the past 10 to 15 years due to the influence of factors such as the Global Financial Crisis. However, a review of State Government data for the 2000 to 2015 period highlights a slowdown in vacant land sales over recent years (especially in the City of Knox), which indicates supply constraints may be impacting on the market.

The trend with respect to the City of Knox shows vacant land sales have averaged just 68 blocks since 2008, and this is approximately one-third of the long-term average of 184 vacant block sales; only 42 vacant house block sales were recorded in 2015. These trends are shown in Figure 4.3.

Figure 4.3: Vacant House Block Sales, City of Knox, 2004 to 2015

Source: DELWP, A Guide to Property Values, 2015

Property Price Trends

Median House Prices

Over the period 2000 to 2015, median house prices have increased at a higher rate in the City of Knox (+9.8% pa) than for metropolitan Melbourne (+8.0% pa) and Victoria (+7.7% pa).

As of 2015, the median house price in the City of Knox ($675,000) was 11% higher than the metropolitan average ($600,000), and this compares to the year 2000 when median house prices in the municipality were 13% below the metropolitan average, as shown in Table 4.3 and Figure 4.4.

Table 4.3: Median House Price Trends, City of Knox, 2000 to 2015

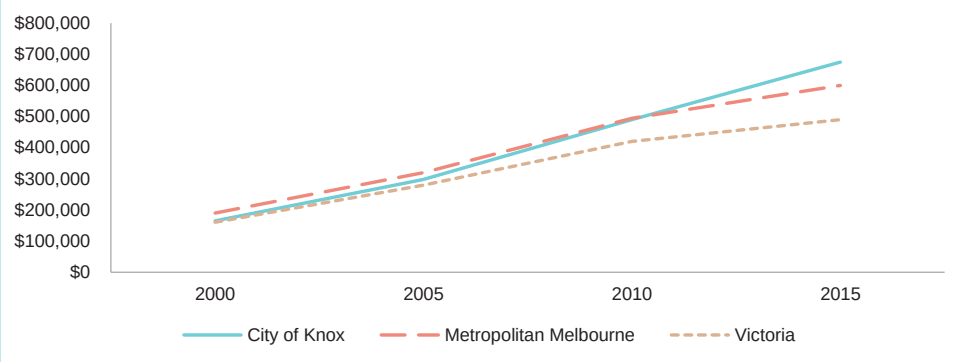
Year	City of Knox	Metropolitan Melbourne	Victoria
2000	$165,000	$190,000	$160,500
2005	$298,000	$320,000	$280,000
2010	$490,000	$495,000	$420,500
2015	$675,000	$600,000	$490,000
Change 2000-2015	**+$510,000**	**+$410,000**	**+$329,500**
AAGR 2000-2015	**+9.8%**	**+8.0%**	**+7.7%**

Source: DELWP, A Guide to Property Values, 2015

Note: AAGR: Annual Average Growth Rate

Values not adjusted for annual inflation

Figure 4.4: Median House Price Trends, City of Knox, 2000 to 2015



Source: DELWP, A Guide to Property Values, 2015
Note: Values not adjusted for annual inflation

Median Unit/Apartment Prices

A similar trend is observed with regard to median unit / apartment prices, with price growth in the City of Knox (+8.2% pa) outstripping price growth in metropolitan Melbourne (+6.5% pa) and Victoria (+6.6% pa) over the period 2000 to 2015.

As shown in Table 4.4 and Figure 4.5, the price gap of median units/apartments in the City of Knox with Metropolitan Melbourne has closed from 25% in 2000 to 6% in 2015.

Table 4.4: Median Unit / Apartment Price Trends, City of Knox, 2000 to 2015

Year	City of Knox	Metropolitan Melbourne	Victoria
2000	$140,000	$187,000	$175,000
2005	$251,000	$285,000	$272,500
2010	$380,000	$445,000	$425,000
2015	$455,000	$482,500	$455,000
Change 2000-2015	**$315,000**	**$295,500**	**$280,000**
AAGR 2000-2015	**+8.2%**	**+6.5%**	**+6.6%**

Source: DELWP, A Guide to Property Values, 2015
Note: AAGR: Annual Average Growth Rate
Values not adjusted for annual inflation

Figure 4.5: Median Unit / Apartment Price Trends, City of Knox, 2000 to 2015

Source: DELWP, A Guide to Property Values, 2015
Note: Values not adjusted for annual inflation

Median Vacant House Block Prices

When median vacant house block price trends are considered for the period 2000 to 2015, land prices in the City of Knox (+10.8% pa) have comfortably outpaced metropolitan Melbourne (+9.1% pa) and Victoria (+8.9% pa), as shown in Table 4.5 and Figure 4.6.

The price differential for median vacant house blocks for the City of Knox compared to metropolitan Melbourne over the period 2000 to 2015 has increased from +49% to +200%.

These vacant block price trends, when combined with trends in median house and unit/apartment prices, clearly show that land and property in the City of Knox is becoming increasingly unaffordable when compared to metropolitan Melbourne averages.

Table 4.5: Median Vacant House Block Price Trends, City of Knox, 2000 to 2015

Year	City of Knox	Metropolitan Melbourne	Victoria
2000	$97,000	$65,300	$57,420
2005	$214,900	$137,000	$120,000
2010	$350,000	$190,000	$173,000
2015	$407,000	$220,000	$190,000
Change 2000-2015	**+$310,000**	**+$154,700**	**+$132,580**
AAGR 2000-2015	**+10.8%**	**+9.1%**	**+8.9%**

Source: DELWP, A Guide to Property Values, 2015
Note: AAGR: Annual Average Growth Rate
Values not adjusted for annual inflation

Figure 4.6: Median Vacant House Block Price Trends, City of Knox, 2000 to 2015

Source: DELWP, A Guide to Property Values, 2015

Note: Values not adjusted for annual inflation

Household Dwelling Forecasts

VIF2016 projections for the period 2016 to 2031 indicate that the City of Knox will require a further +12,300 new dwellings, with the municipality's dwelling requirement increasing from 58,830 occupied private dwellings in 2016 to 71,130 dwellings in 2031, an expansion of 1.3% pa. For the next ten years, 2016 to 2026, an additional +8,200 dwellings will be required in the municipality. Over this same period, an additional +3,000 dwellings will be required in the Rowville District, which is the immediate area within which the subject site is located. This information for the City of Knox, Rowville and for metropolitan Melbourne is summarised in Table 4.6.

Policy settings will need to ensure sufficient land supply is available in Knox to accommodate the required number of additional dwellings identified. Section 4.3 examines the adequacy of supply in the municipality.

Table 4.6: Dwelling Projections (Occupied Private Dwellings), City of Knox, 2016 to 2031

	2016	2021	2026	2031	Change 2016-31	AAGR 2016-31
City of Knox	58,830	62,920	67,030	71,130	+12,300	1.3%
Rowville District	13,860	14,910	15,920	16,860	+3,000	1.3%
Metropolitan Melbourne	1,718,460	1,943,020	2,126,660	2,311,950	593,490	2.0%
• Established Urban Areas	1,357,330	1,469,680	1,569,360	1,669,020	311,690	1.4%
• Growth Areas	361,130	473,340	557,300	642,930	281,800	3.9%

Source: DELWP, Victoria in Future 2016

Note: AAGR: Annual Average Growth Rate

Values not adjusted for annual inflation

Rowville District information from VIF Small Area projections

Household Formation Forecasts

Changing household structure is a vital consideration when determining the mix and density of housing required in a particular location. VIF 2016 provides household formation forecasts by household type for the period 2016-2031 and this information is presented in Table 4.7.

Household formations in the City of Knox show future growth will be significantly underpinned by smaller households. For example, over the coming 15 years, 74% of new households are projected to fall into the 'lone person/couples without family' categories, and this compares to an average of 51% for these categories across metropolitan Melbourne. In contrast, projected household formations in the 'couple family with children/group households' categories represent just 16% of all formations over the period, compared to an average of 52% for these categories across metropolitan Melbourne.

These trends indicate a much stronger demand for smaller dwellings and higher-density developments in the City of Knox in the coming years.

Table 4.7: Household Formation Forecasts (No. Households), City of Knox, 2016 to 2031

	Couple family with children	Couple family without children	One-parent family	Other family	Group household	Lone person	All Household Types
2016	22,500	15,460	6,660	650	1,490	12,070	58,830
2031	24,320	19,820	7,810	710	1,680	16,800	71,130
Additional Households 2016-31	**+1,820**	**+4,360**	**+1,150**	**+60**	**+190**	**+4,730**	**+12,300**
Additional Households per year	+120	+290	+80	+4	+10	+320	+824
Share of additional households City of Knox 2016-31	14.8%	35.4%	9.3%	0.5%	1.5%	38.5%	100.0%
Share of additional households Metropolitan Melbourne 2016-31	31.9%	25.9%	10.8%	1.5%	4.4%	25.5%	100.0%

Source: DELWP, Victoria in Future 2016

4.3 Housing Typology and Size

While no formulaic linkage exists between a particular household's structure and the size and type of house that the household lives in, useful forecasts can be made based on observed market behaviour on the household dwelling mix. The assumed dwelling mix and annual dwelling demand for the City of Knox is shown in Table 4.8.

Based on the assumed dwelling mix, it is estimated that the City of Knox will require approximately 325 two bedroom homes and 280 three bedroom homes per year.

Table 4.8: Household Dwelling Mix and Demand (Average Per Year) City of Knox, 2016 to 2031

Household Structure	Assumed Dwelling Mix [1]				Annual Dwelling Demand [2]			
	1bed	2bed	3bed	>3bed	1bed	2bed	3bed	>3bed
Couple with dependants	-	10%	40%	50%	-	10	50	60
Couple without dependants	10%	40%	40%	10%	30	120	120	30
One parent households	-	40%	50%	10%	-	30	40	10
Lone person households	30%	50%	20%	-	90	160	60	-
Group households	-	20%	50%	30%	-	3	6	4
Other	-	50%	50%	-	-	2	2	-
Total Dwelling Demand Per Year					**120**	**325**	**278**	**104**

Source: [1] Intrapac; [2] DELWP, *Victoria in Future 2016*

4.4 Land Supply Analysis

Existing and Potential Supply

The State Government's Urban Development Program 2015 (UDP 2015) has been used to identify potential residential supply growth in the City of Knox. Reference to aerial photography (Nearmap) is useful in estimating the quantity of supply consumed since the UDP 2015.

In the City of Knox, approximately 15ha of zoned land supply is available as of August 2016, comprising 5ha of broadhectare supply and 10ha of supply in major development sites, as shown in Table 4.9. Based on densities applied in UDP 2015, this area of land supply has the potential to deliver 1,685 new dwellings in the municipality. The general location and timing of supply is identified in Figure 4.7 (broadhectare) and Figure 4.8 (major development sites).

Table 4.9: Estimated Existing and Potential Residential Land Supply, City of Knox

	Dwellings No.	Land Ha.
Urban Development Program 2015 [1]		
Broadhectare	70 Dwellings	5ha
Major Redevelopment Sites	3,830 Dwellings	80ha
Total	*3,900 Dwellings*	*85ha*
Development Since 2015 [2]		
Broadhectare	-	-
Major Redevelopment Sites	2,215 Dwellings *	70ha*
Total	*2,215 Dwellings*	*70ha*
Estimated Existing and Potential Supply from August 2016		
Broadhectare	**70 Dwellings**	**5ha**
Major Redevelopment Sites	**1,615 Dwellings**	**10ha**
Total	**1,685 Dwellings**	**15ha**

Source: [1] DELWP, *Urban Development Program 2015*; [2] Essential Economics

Note: *Assumes those marked 'completed' and 'under construction' have been completed

*Assumes 50% of dwellings marked '0-2 years' have been completed.

4.5 Adequacy of Supply

Based on the analysis in the preceding sections, a significant shortfall is identified in the supply of land to meet growth forecasts for the City of Knox. The shortfall in land supply, analysed over a 10-year period, is presented in Table 4.10.

In summary, the City of Knox has an estimated requirement over the coming 10 years for approximately +8,200 additional dwellings (Table 4.6), with an identified capacity to deliver an estimated +1,685 dwellings (Table 4.9), thus resulting in a deficit of -6,515 dwellings over this period.

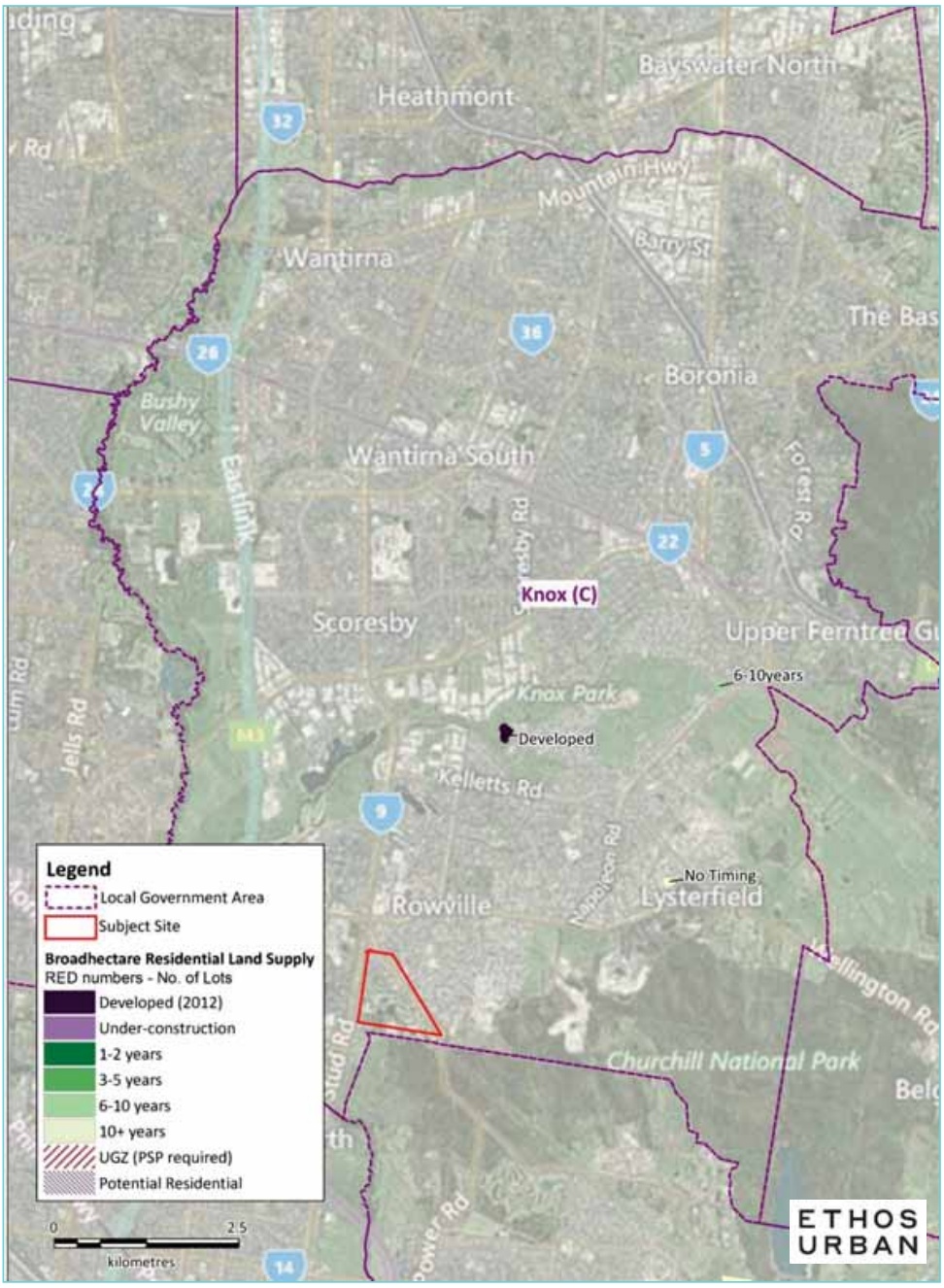
The forecast 2026 land supply deficit is estimated to be within the range of 204ha (@ 32 dwellings per ha) to 407ha (@ 16 dwellings per ha).

Table 4.10: Existing and Potential Residential Land Supply, City of Knox

	Dwellings	Land
Existing Supply (2015) (1)		
Broadhectare	70 Dwellings	5ha
Major Redevelopment Sites	1,615 Dwellings	10ha
Total Dwelling Supply	1,685 Dwellings	15ha
Identified 10-Year Demand (2)		
Total Dwelling Demand (10 years)	8,200 *Dwellings*	*256ha (@ 32 dwellings per ha) to 512ha (@16 dwellings per ha)*
Dwelling and Land Supply Deficit (10 years)	**- 6,515 Dwellings**	**-204ha (@ 32 dwellings per ha) to -407ha (@ 16 dwellings per ha)**

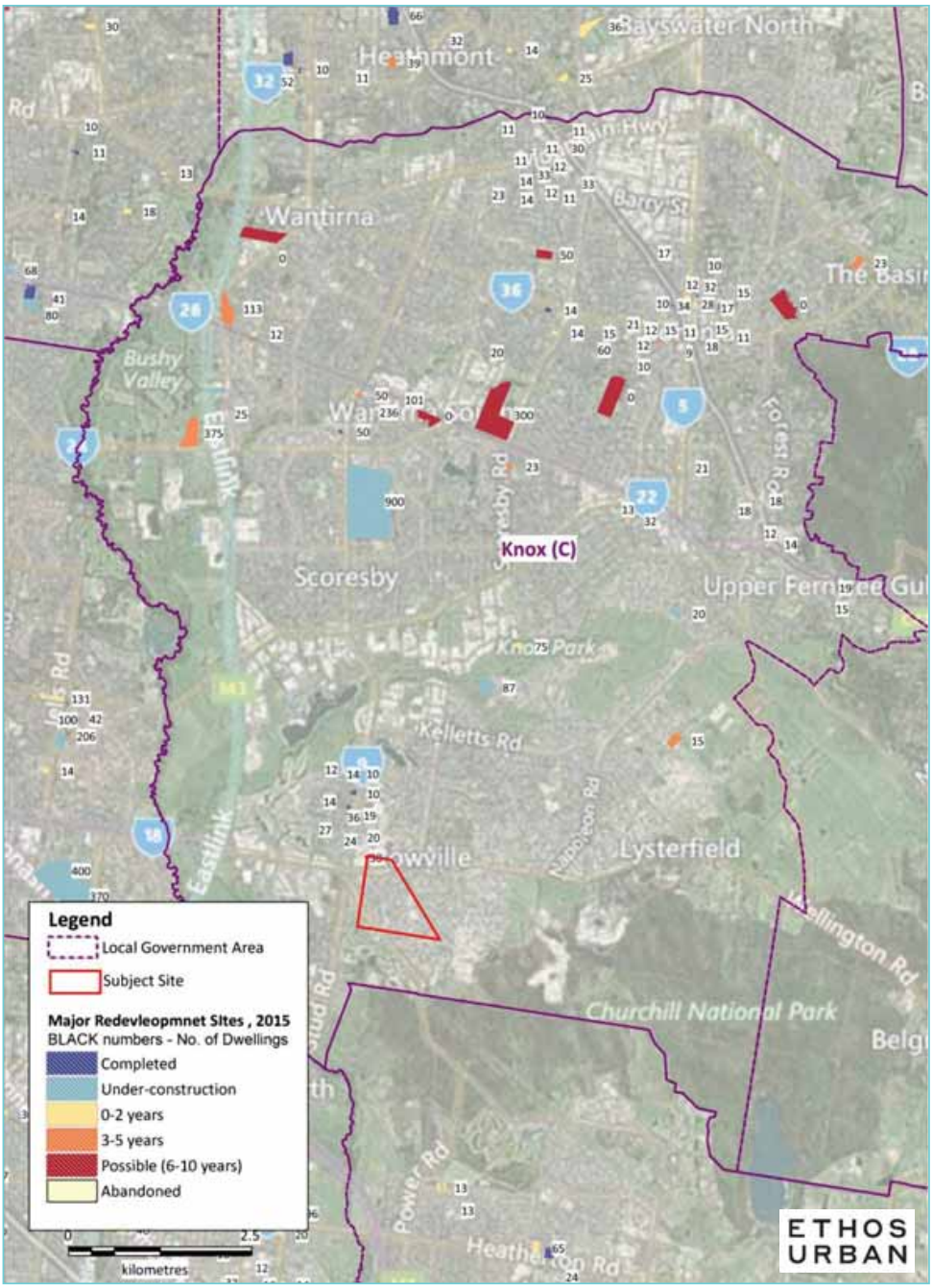
Sources: (1) DELWP, Urban Development Program 2015; (2) DELWP, Victoria in Future 2016

Figure 4.7: Existing and Potential Broadhectare Residential Land Supply, City of Knox, 2015 to 2025



Source: Prepared by Essential Economics Pty using MapInfo, StreetPro and the UDP 2015

Figure 4.8: Existing and Potential Major Redevelopment Sites, City of Knox, 2015 to 2025



Source: Prepared by Essential Economics Pty using MapInfo, StreetPro and the UDP 2015

4.6 Benchmarking Residential Land Supply

Table 4.11 provides estimates of the adequacy of residential land supply for a selection of middle-ring Melbourne municipalities and compares the results with the City of Knox and metropolitan Melbourne.

The analysis shows that a number of the Melbourne municipalities are reasonably well-provided for in terms of potential supply (UDP 2015) against estimated dwelling requirements (VIF 2016) over the next 10 years, although most have a supply deficit to some extent. The supply / requirement ratio ranges from 40% for City of Boroondara to 115% for the City of Port Philip. The metropolitan average is 37%, while the City of Knox is the lowest with just 26% supply of residential land to 2026 relative to demand.

Importantly, the situation for metropolitan Melbourne overall reflects the existing under-supply outlook in many middle-ring areas and highlights the difficulty the State Government faces in meeting its goal of a 70/30 distribution of new dwellings between the metropolitan area and the Growth Areas under existing planning policies.

Table 4.11: Estimated 10-Year Dwelling Demand and Land Supply, Selected Locations, 2015 to 2025

Municipality	Additional Dwellings Required (10 years) (1)	Potential Dwelling Supply (10 years)* (2)	Surplus/Deficit of Potential Dwellings (10 years)	Supply as Share of Demand (10 years)
City of Yarra	9,290	8,100	-1,190	87%
City of Maribyrnong	13,170	14,010	840	106%
City of Stonington	8,270	6,350	-1,920	77%
City of Hobsons Bay	4,800	5,020	220	105%
City of Port Phillip	9,730	11,230	1,500	115%
City of Boroondara	7,640	3,020	-4,620	40%
City of Moonee Valley	6,680	3,100	-3,580	46%
Metropolitan Melbourne	388,930	145,030	**-243,900**	**37%**
City of Knox	8,200	1,685	**-6,515**	**26%**

Sources: (1) DELWP, Victoria in Future 2016; (2) DELWP, Urban Development Program 2015

Note: *Assumes those marked 'completed' and 'under construction' have been completed

*Assumes 50% of dwellings marked '0-2 years' have been completed

4.7 Implications of Land Supply Constraints

The following implications can be expected to arise from an insufficient residential land supply to meet long-term housing demand in the City of Knox:

Lack of housing choice, which will impact on the household mix in the municipality

Higher price points (including rentals), which will place pressure on those wanting to remain in or move to the municipality

Deterrent to inward migration, which could negatively impact on population growth and with subsequent issues for the local economy

Lack of sufficient housing will be delivered in proximity to existing infrastructure and employment nodes

Current and potential residents are likely to seek more affordable options, including relocation to Melbourne's Growth Areas, where residents' access to infrastructure, services and jobs is not optimum.

4.8 Potential Housing Yield from the Subject Site

In light of the identified land supply shortfalls in the City of Knox, it is important to consider the role of the WGC land in supporting future land supply, especially in view of its strategic location bordering established residential areas and infrastructure.

Intrapac's current planning will deliver in the order of 600 new dwellings on the WGC land, representing approximately 10% of the forecast City of Knox supply shortfall, as set out in table 4.10, above.

4.9 Conclusions

The main findings of this Residential Assessment are as follows:

1. State Government projections show an additional +23,000 people will be living in the municipality of Knox over the coming 15 years. This will give rise to the need for an additional +12,300 dwellings in the municipality over the period to 2031. Taking only the Rowville District (in which the subject site is located), an estimated +3,000 additional dwellings will be required over the coming 15 years according to official State Government forecasts.

2. Housing demand has been strong, with dwelling growth averaging 656 approvals per year over the past decade, with an above average number of approvals recorded in the past couple of years. A shift has occurred in the approvals mix over the period, with multi-unit approvals increasing at a much stronger rate than standard house approvals in the municipality, thus highlighting increasing demand for higher-density living in Knox.

3. Property and land prices in the municipality have increased at significantly higher rates than the metropolitan Melbourne average over the past 15 years. These price trends indicate that affordability in the municipality is declining; this is likely to be exacerbated by the declining residential land supply and increasing land prices, with these trends evident from reduced land sales activity observed in recent years.

4. The City of Knox requires an additional 8,200 dwellings to meet forecast dwelling demand over the next decade. Land available for potential dwelling supply for the next decade could create an estimated 1,685 dwellings. On this basis, the deficit in supply is estimated at 6,515 dwellings by 2026.

5. Implications of this undersupply include lack of housing choice, increased house and land prices, reduced affordability, and difficulty attracting new residents.

6. With the strategic location of the WGC land, in proximity to established infrastructure, housing and employment, a clear role is identified for the site to provide housing choice and increase housing supply.

7. The site can deliver approximately 600 dwellings and would provide for approximately 10% of the forecast shortfall in dwellings in the municipality. With reference to just the immediate Rowville District, the subject site would accommodate 20% of dwelling demand to 2031. In this context, inclusion of the subject site within the UGB and its subsequent rezoning for residential use and development should be seen as a priority for the State Government in meeting well-identified growth in housing demand in the City of Knox.

5 Local Insight

Interviews with active real estate agents in Knox provide insight into the current market trends for residential property. The interviews highlight current trends in regard to dwelling types that are in demand and dwelling types that are currently being supplied. Five real estate agents active in the Knox residential property market were contacted for comment in regard to the topics:

1. Who are the people most interested in acquiring residential property? Dwellings or lots?
2. Have you noticed any changes lately in terms of dwellings types that are in demand?
3. Have you noticed any changes lately in terms of price points?
4. Do you see a demand for more town houses or land lots around Rowville?
5. What areas compete with the Rowville area?
6. How do you see the outlook for residential development in Rowville?

The real estate agents all agreed that an increasing demand for medium-density dwellings is in evidence, particularly from investors and those looking to downsize their residential property.

- “Those who are most interested in Rowville are investors (mainly from China) and down-sizers (grandparents who want to stay in the area nearby kids and grandchildren)”
- “It seems like the Chinese investors are more interested in townhouses than land lots in Rowville”
- “Most of the interests are from investors; there are some young couples and first home buyers, but not as much as the investor-interest”
- “Lots of the current residents who are down-sizing will want to stay in the area, so perhaps they’ll look for a smaller home in Rowville”
- “Many of the more affordable homes are concentrated in the northern suburbs of the municipality, such as in Glen Waverly or Knox”
- “Apartments and townhouses sell reasonably quickly in Rowville”
- “There’s definitely interest in apartments and townhouses. For example, the recent development west of Stud Road is doing really well, particularly along Stamford crescent”.

6 Key Findings

Subject Land

1. Waverley Golf Club is not financially viable and has undertaken significant strategic assessments in regard to potential options to address the Club's long-term viability. In June 2015 the WGC membership voted (99% positive) to relocate the club to an alternative existing course, either on its own or as part of a merger. In September 2016, the membership of WGC and the nearby Churchill Park Golf Club voted overwhelmingly to merge their clubs onto the Churchill Park Site. The WGC land is recognised by the City of Knox as being appropriate for residential redevelopment. An assessment by Roberts Day (2016) indicates that the location is well-placed to meet the 20-minute neighbourhood aspirations set out in Plan Melbourne Refresh.

2. In order for the WGC proposal to proceed, it is important that the site is included within the UGB and appropriately rezoned.

Golf Industry Overview

3. Golf clubs, both nationally and internationally have experienced a decline in golfing activity for many years, and the outlook is bleak due to falling revenues, financial losses and debt, and the inability to fund necessary maintenance and upgrades to the course and its facilities.

Planning Context

4. Plan Melbourne Refresh provides an opportunity to bring the subject site within the UGB in view of the site's strategic importance in supporting residential growth.

5. Of particular relevance to this project, the Planning Scheme Amendment C131 has deleted "discourage other forms of housing" and "discourage apartments", and this indicates that the Council has recognised the value of other forms of housing and apartments in Knox.

Residential Market Assessment

6. Latest State Government projections show an additional +23,000 people will be living in the municipality of Knox over the coming 15 years, and this will give rise to the need for an additional +12,300 dwellings over the period.

7. Housing demand has been strong over the past decade, with dwelling growth averaging 656 approvals per year in the City of Knox, and with an above-average number of approvals recorded in the past couple of years. However, a notable shift has occurred in the approvals mix over the period, with multi-unit approvals increasing at a much stronger rate than standard house approvals in the municipality, thus highlighting increasing demand for higher-density living in Knox.

8. Property and land prices in the municipality have increased at a significantly higher rate than the metropolitan Melbourne average over the past 15 years. These price trends indicate that affordability in the municipality is declining; this is likely to be exacerbated by a decline in residential land supply and increasing land prices, with these trends evident from reduced land sales activity observed in recent years.

9. The City of Knox requires an additional 8,200 dwellings to meet forecast population growth and dwelling demand by 2026. However, the existing or planned supply of new dwellings is estimated at just 1,685 dwellings, leaving a deficit in supply of 6,515 dwellings by 2026.

10. Implications of this undersupply include lack of housing choice, increased house and land prices, reduced affordability, and difficulty in attracting new residents.

11. In view of the strategic location of the site in proximity to established infrastructure, housing and employment, a clear role exists for the subject site to provide housing choice and increased housing supply in the municipality.

12. The site can deliver in the order of 600 dwellings, and would provide for approximately 10% of the shortfall in dwellings identified.

Local Views of Real Estate Agents

13. Real estate agents active in and around Rowville all agree that there is an increasing demand for medium-density dwellings, particularly from investors and those looking to down-size their residential property.

Conclusion

14. Inclusion of the subject site within the UGB and subsequent rezoning of the site for residential use and development should be a priority for the State Government in assisting in meeting identified growth in housing demand in the City of Knox. This contribution to residential dwelling supply in an established part of metropolitan Melbourne will also assist in reducing residential growth pressures on the metropolitan periphery.

ETHOS URBAN

Waverley Golf Club Site

Assessment of Retail Development Potential

Prepared for Intrapac Property Pty Ltd

August 2020 | 3200220

Authorship

Report stage	Author	Date	Review	Date
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Disclaimer

Every effort has been made to ensure the accuracy of the material and the integrity of the analysis presented in this report. However, Ethos Urban Pty Ltd accepts no liability for any actions taken on the basis of report contents.

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Introduction

Background

Intrapac Property Pty Ltd is seeking to have the Waverley Golf Club (WGC) property included within the Urban Growth Boundary and for the site to be developed for residential purposes. Intrapac is also keen to establish if a retail component is supportable on the site, having regard for the number of new residents who will be living in the area to be vacated by WGC, as well as the needs of existing residents in the surrounding area. It is also important to ensure, where possible, that residents are living with a 20-minute walkable neighbourhood and therefore accessible to a range of retail, community and other facilities and services.

This report provides an assessment of the potential for retail development at the WGC site, including an indication of the type and extent such retail development may take, having regard for the catchment such a retail facility would serve, and the socio-economic, demographic and retail spending patterns of the surrounding population.

Objective

To provide an assessment of the potential for the development of a retail facility at the WGC site and, if such development is feasible, to indicate the type and extent of such development.

Approach

The following tasks have been undertaken in this retail assessment:

- Identification of the catchment that would be served by a retail facility at the WGC site, having regard for existing (and planned) centres in the surrounding area; existing and forecast resident population including the WGC site in residential use; transport links; barriers to movement (eg, green wedge; rail lines); and the 20-minute walkable neighbourhood in Plan Melbourne Refresh.
- Identify existing provision of retail floorspace serving the catchment, and convert this floorspace to retail sales for subsequent comparison with available retail expenditure of catchment population.
- Prepare estimates of existing and future resident population (2016 and 2026) in the catchment, having regard for *Victoria in Future 2016* population forecasts (DELWP) and id Consulting forecasts for the local area.
- Identify available retail spend of catchment residents, based on data from the *MarketInfo* retail spending model (based on ABS data) and provide a forecast for the period 2016 to 2026.
- Assess the likely share of retail spending available in the catchment that may be captured by a retail component on the subject site (having regard for competition) and convert to estimated retail floorspace supportable on the site. This task considers the size of the catchment population, existing and planned retail competition, and other factors.
- Identify appropriate retail components, based on supportable retail floorspace. This task will consider the (likely) convenience retail components, such as grocery/ convenience store, coffee shop, drycleaner, and the like.
- Assess likely trading impact, if any, on other activity centres serving the catchment.

This Report

This report contains the following chapters:

1 Background

2 Catchment Identification

3 Existing and Forecast Catchment Population

4 Available Retail Expenditures of Catchment Population

5 Potential Retail Development at the Subject Site

6 Conclusion

Note, the key findings outlined in this report are based on socio-economic, industry and development conditions as of October 2016. An update to data, analysis and key findings which reflects 2020 conditions can be provided on request.

1 Project Background

The subject land is the Waverley Golf Club (WGC), an 18-hole privately-owned club located at 82 Bergins Road, Rowville in the City of Knox, in south-eastern Melbourne. The links course, situated on a site of approximately 50ha in area, was established approximately 90 years ago.

Intrapac has a call option to purchase the subject land and intends to redevelop it for residential usage. Rezoning is required for the site to be developed. The site is substantially encumbered by power transmission infrastructure; of the 49.5ha gross site area, the area potentially available for redevelopment totals 26.9ha.

Intrapac's current master planning for the site envisages a development comprising a mix of vacant land and completed medium-density dwellings. Current modelling for the site indicates a yield in the order of 600 new dwellings, comprising 125 vacant land lots and 475 medium density dwellings. The subject site is shown in the Locality Plan at Figure 1.1.

In addition to the main residential component planned, Intrapac is also interested to have an assessment of retail potential that may exist for the subject site, noting that approximately 1,560 new residents will be living in the area at full development (at an average density of 2.6 persons per dwelling), as well as having regard for the existing residents in the surrounding area. The potential for retail development is the focus for the report.

Figure 1.1: Locality Plan and the Subject Site

Source: Ethos Urban with MapInfo, Bing Maps & StreetPro

2 Catchment Identification

2.1 Definition

A catchment in retail economics is described as the residential area from which a retail facility or centre draws the majority of its retail sales. Where the development of a new retail premises or a new activity centre is under consideration, a necessary exercise is to identify the catchment that the new retailing would serve. This includes identification of the likely resident population and other features, including the socio-economic and demographic profile of residents, the extent of any passing trade, and so on. The catchment identified for the subject site is shown at Figure 2.1 on the following page.

Identification of the retail catchment for the subject site considers the following factors:

- The location, retail floorspace provision and role (in the centre hierarchy) of existing shopping centres in the overall region
- The road network that serves the surrounding region and the network's relationship to the subject site and to existing residential areas
- The layout of existing residential neighbourhoods and their ease (or otherwise) of access to the subject site
- Any barriers to movement, such as waterbodies and extensive areas of land in the green wedge zone.

2.2 Existing Centres

Existing centres serving the region surrounding the subject site are as follows:

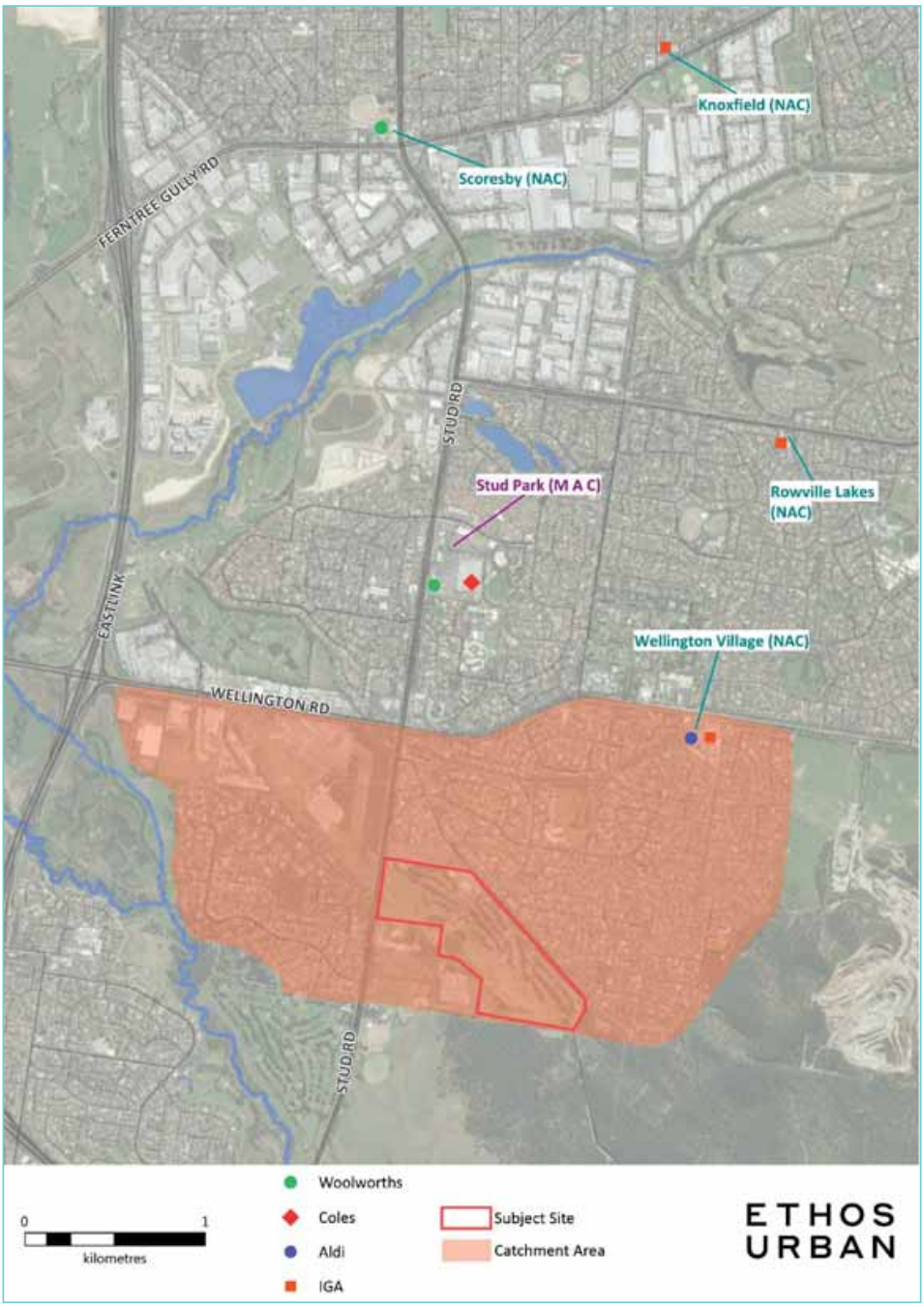
- Wellington Village shopping centre
- Stud Park shopping centre.

The particular features of each centre are summarised in Table 2.1.

As shown in the Table, Stud Park is a Sub-Regional shopping centre. This is the type of centre where catchment residents would likely visit for their high-order retail and other services. It has three national brand anchor stores and 53 specialty shops. In contrast, Wellington Village is a smaller centre that performs the role of a Neighbourhood shopping centre; it has two small anchor stores and 20 specialty shops.

Residents typically visit their neighbourhood shopping centre on a regular basis – at least one week and more often in some cases – and this is where they mainly purchase convenience-type goods and services, such as groceries, newsagent, chemist and hairdresser.

Figure 2.1: Catchment Area for the Subject Site



Source: Ethos Urban with MapInfo, Bing Maps & StreetPro

In contrast, residents visit the sub-regional centre for high-order goods and services, such as clothing & footwear, furniture, homewares, and the like. These visits are less frequent than visits to the neighbourhood centre. Where necessary, the residents will visit regional shopping centres where they have access to department stores and a wider selection of specialty shops, including international brands.

It will be necessary to have regard for these existing centres when assessing the potential for a retail component at the subject site.

Table 2.1: Features of Shopping Centres Serving the Region

Centre Features	Wellington Village Shopping Centre	Stud Park Shopping Centre
Centre Classification in Hierarchy	Neighbourhood	Sub-Regional
Year of Opening	2002	1989
Distance from Subject Site	1.5km	1.75km
Total Retail Floorspace	6,650m^2	20,520m^2
Anchor Tenants	Ritchies IGA (2,600m^2) ALDI (1,590m^2)	Coles (4,350m^2), Woolworths (4,970m^2), Kmart (7,080m^2)
Specialty Tenants and Retail Floorspace	No. = 20 2,460m^2	No. = 53 4,120m^2
Non-Retail Tenants and Floorspace	No. = 6 1,590m^2	No. = 7 2,475m^2
Total		

Source: Property Council of Australia, Shopping Centre Directory, Victoria & Tasmania, 2015

2.3 Road Network and Residential Neighbourhoods

The main roads that provide regional and metropolitan access to the subject site are identified as Wellington Road which provides access in an east-west direction, and Stud Road which provides north-south access. EastLink, which links the Eastern Freeway at Ringwood to Frankston, is located approximately 2.5km (direct distance) to the west of the subject site and is accessed from Wellington Road.

At the more localised level, the Rowville residential areas are serviced by a complex network of ‘courts’ and ‘drives’, with the Bergins Road as the principal collector road that provides access to the residential areas in the eastern part of the catchment. The western segment of the catchment is located with direct access from Stud Road. This residential street pattern is illustrated in the Catchment Plan at Figure 2.1

2.4 Barriers to Movement

The catchment is characterised by a number of barriers to vehicular and pedestrian access. These barriers include the following:

- Lysterfield Quarry to the east,
- SP AusNet terminal station to the north-west, and
- Extensive areas of land in the green wedge zone located to the south and south-east (comprising Parks Victoria land) and to the south-west (Tirhatuan Lakes Public Golf Course) and further to the west (Melbourne Water land).

2.5 Conclusion

The catchment that would be served by a retail component on the subject site is well-defined by the existing road network and by large areas of non-urban land uses, principally in the Green Wedge Zone located to the south and west of the site.

The subject site is well-suited for the creation of a 20-minute neighbourhood (which is promoted in the Plan Melbourne Refresh Discussion Paper released in October 2015) and confirmed in recent analysis by Roberts Day (urban design consultants to Intrapac, 2016). This includes accessibility to two primary schools, two secondary schools, a number of childcare centres, a church, and within walking distance of a network of bike paths and public transport services, and numerous sporting grounds, parks, and community gardens.

The subject site and its surrounding catchment are also served by two existing shopping centres: Stud Road sub-regional shopping centre and Wellington Village neighbourhood shopping centre.

However, the catchment would benefit from having a centrally-located community centre focused on a small retail component, as later described in this report. Such a facility would provide an excellent meeting place for the local residents, particularly as the catchment residents live beyond a convenient walking distance to the existing centres.

3 Population Trends and Forecasts

3.1 Existing and Forecast Population

The current resident population in the catchment totals 10,995 persons, based on data available from the Australian Bureau of Statistics. Over time, this number of residents will expand with the development of the subject site for new residential use. The eventual construction of 600 dwellings on the former WGC site assumed to occur over the period to 2026. This new development is reflected in the population forecasts for the catchment.

On this basis, by 2021 the catchment population is forecast to reach 11,530 persons, with the number of residents further increasing to 12,750 residents by 2026. Growth is expected to slow after this period, with just 12,790 residents by 2031. These figures and the growth rates are shown in Table 3.1. The growth figures represent *net* population growth (ie, allowing for births, deaths and new incoming residents).

Table 3.1: Current and Forecast Catchment Population, Waverley Golf Club Site, 2016 to 2031

	2011	2016	2021	2026	2031
Primary Catchment	11,240	11,000	11,530	12,750	12,790
Average Annual Growth (%)		-0.4%	+0.9%	+2.0%	+0.1%
Average Annual Growth (No.)		-50	+110	+240	+10

Source: Ethos Urban, Australian Bureau of Statistics, id Consulting

Note: Figures rounded to the nearest 10

3.2 Socio-Economic Profile of Catchment Residents

The catchment has a relatively high socio-economic profile compared with the metropolitan average, as indicated with reference to the ABS Population & Housing Census, 2011, as shown in Table 3.2. This profile has positive implications for the commercial success of any retail component on the subject site. Catchment residents have the following features:

- A higher median individual income ($34,880) compared with the metropolitan Melbourne median ($30,810);
- A higher median household income ($96,330) compared with Melbourne ($69,510);
- More families with children (63%) compared with Melbourne (48%); and
- More home-owners (89% owned outright or with a mortgage) compared with Melbourne (84%).

Table 3.2: Socio-Economic Features of Catchment Population, 2011

Category	Catchment	Greater Melbourne
Income		
Median household income (annual)	$96,330	$69,510
Variation from Greater Melbourne median	38.6%	0.0%
% of Households earning $2,500pw or more	30.5%	21.6%
Age Structure		
0-4 years	6.6%	6.5%
5-19 years	24.4%	18.3%
20-34 years	16.5%	22.9%
35-64 years	44.3%	39.1%
65-84 years	7.9%	11.3%
85 years and over	0.3%	1.8%
Median Age (years)	36	36
Country of Birth		
Australia	66.5%	66.8%
Other Major English Speaking Countries	7.0%	7.6%
Other Overseas Born	26.5%	25.6%
% speak English only at home	*69.3%*	*69.5%*
Family Composition		
Couple family with no children	26.4%	34.8%
Couple family with children under 15 years	40.5%	31.7%
Couple family with no children under 15 years	22.4%	16.2%
Couple family with children - Total	62.9%	47.9%
Couple family - Total	89.3%	82.7%
One parent family with children under 15 years	3.9%	7.0%
One parent family with no children under 15 years	5.8%	8.3%
One parent family - Total	9.6%	15.3%
Other families	1.1%	2.0%
Dwelling Structure (Occupied Private Dwellings)		
Separate house	96.9%	72.7%
Semi-detached, row or terrace house, townhouse etc.	2.0%	11.6%
Flat, unit or apartment	1.0%	15.3%
Other dwelling	0.1%	0.4%
Occupancy rate	*95.8%*	*91.0%*
Average household size	3.2	2.6
Tenure Type (Occupied Private Dwellings)		
Owned outright	32.0%	33.5%
Owned with a mortgage	56.9%	37.7%
Rented	9.2%	28.0%
Other tenure type	1.8%	0.8%

Table 3.2, cont.

Housing Costs		
Median monthly mortgage repayment	$1,870	$1,840
Variation from Greater Melbourne median	1.6%	0.0%
Median mortgage as a share of median household income	23.3%	31.8%
Median weekly rents	$380	$310
Variation from Greater Melbourne median	22.6%	0.0%
Share of occupied dwellings connected to the internet	92.7%	82.0%
Car Ownership per Dwelling		
None	0.8%	9.4%
One	17.8%	36.1%
Two	52.4%	38.0%
Three of more	29.0%	16.5%
Attending Education (% of those attending)		
Pre-school	6.7%	7.0%
Infants/Primary	37.7%	31.3%
Secondary	30.5%	26.1%
Technical or Further Educational Institution	7.5%	9.2%
University or other Tertiary Institution	15.7%	22.1%
Other type of educational institution	1.9%	4.2%
% of total population attending education	*33.0%*	*30.8%*
Highest Year of School Completed (% of population aged 15 years and over)		
Year 12 or equivalent	58.8%	56.7%
Year 9-11 or equivalent	32.0%	27.8%
Year 8 or below	3.6%	6.3%
Did not go to school	0.6%	1.3%
Highest year of school not stated	5.1%	8.0%
Occupation		
Managers & professionals	34.3%	37.4%
Clerical & sales workers	39.3%	34.7%
Technicians & trades workers	14.2%	13.7%
Machinery operators & drivers	5.1%	6.0%
Labourers & related workers	7.1%	8.1%
Industry of Employment (employed persons aged 15 years and over)		
Primary sector	0%	1%
Secondary Sector	24%	19%
Tertiary sector	75%	80%
Producer services	*28%*	*29%*
Consumer services	*47%*	*51%*

Source: ABS, Population & Housing Census, 2011

4 Retail Spending Analysis

Average retail expenditures of catchment residents in 2016 are estimated at $14,600 per capita, and this compares with the metropolitan average of $14,190 per capita, as shown in Table 4.1. These estimates are based on information provided by MarketInfo, a retail model based on official data sources (ABS, etc) and widely-used by retail economists.

Table 4.1: Average Per Capita Spending, Trading Catchment, 2016 ($2016)

	Food & Groceries	Liquor	Food Catering	Non-Food	Services	Total Retail
Catchment Area	$4,900	$610	$1,840	$6,700	$550	$14,600
Melbourne Average	*$4,820*	*$610*	*$1,880*	*$6,330*	*$560*	*$14,190*
Variation from Metropolitan Melbourne Average (%)	+1.7%	+0.0%	-2.1%	+5.8%	-1.8%	+2.9%

Source: Market Info, Ethos Urban

Note: Figures rounded to the nearest 10

In 2016, total available spending on retail goods and services totals an estimated $161 million per year (rounded), as shown in Table 4.1.

Allowing for growth in catchment population numbers (shown in Table 3.1) and in retail spending in real terms (ie, excluding future increases in price inflation), an estimated $208 million in retail spending by catchment residents is forecast for 2026 (expressed in constant 2016 prices). These trends are shown in Table 4.1.

Table 4.2: Total Retail Spending, Trading Catchment, 2016 to 2031 ($2016)

Year	Food & Groceries	Liquor	Food Catering	Non-Food	Services	Total Retail
2016	$53.9m	$6.7m	$20.2m	$73.7m	$6.1m	**$160.6m**
2021	$57.3m	$7.3m	$21.9m	$84.3m	$6.9m	**$177.8m**
2026	$64.2m	$8.3m	$25.1m	$102.0m	$8.3m	**$207.9m**
2031	$65.2m	$8.6m	$26.1m	$112.0m	$9.1m	**$220.9m**
Change (2016 - 2031)	**+$11.3m**	**+$1.8m**	**+$5.8m**	**+$38.3m**	**+$3.0m**	**+$60.3m**
Annual Growth	**1.3%**	**1.6%**	**1.7%**	**2.8%**	**2.7%**	**2.1%**

Source: MarketInfo, Ethos Urban

Note: AAGR: Average Annual Growth Rate

These retail spending forecasts indicate that the catchment residents in 2026 will have an additional $47 million in retail spending compared with the current situation in 2016. This spending will be directed to the existing two shopping centres serving the surrounding area, as well as directed to centres providing higher-order regional-level retail and other services. A small share of the available spending can also be directed to new local retail facilities to be provided in the catchment, as is under consideration for the subject site.

The potential for a retail component on the subject site that would serve the surrounding catchment is explored in the following Chapter.

5 Potential Retail Development at the Subject Site

5.1 Potential Retail Development

The WGC catchment is well-served by existing centres, as earlier described (refer Chapter 2), including Stud Road shopping centre (Coles, Woolworths, Kmart) and Wellington Village shopping centre (Ritchies IGA and ALDI), and with each centre having a range of specialty shops.

However, the existing WGC catchment and the new residential development proposed for the subject site (and comprising 600 new dwellings) would benefit by having convenient access – within walking distance for many residents – to a small local retail component to meet local needs. Such a development would provide the basis for a community gathering centre, focused around say, a small convenience store, a bakery and coffee shop, a small café, and a takeaway food shop. Total retail floorspace would be in the order of 650m^2, as summarised in Table 5.1.

A small local retail component of 650m^2 would be expected to generate retail sales of around $3.5 million per year, as indicated in the Table.

Table 5.1: Indicative Retail Floorspace and Retail Sales ($2016)

Store Type	Retail Floorspace	Average Turnover	Estimated Turnover
Convenience Store / General Store	300m^2	$7,000/m^2	$2.1m
Bakery/Coffee Shop (*)	100m^2	$4,000/m^2	$0.4m
Café	150m^2	$4,000/m^2	$0.6m
Take-away Food	100m^2	$4,000/m^2	$0.4m
Total Retail	**650m^2**	**$5,380/m^2**	**$3.5m**

Source: Ethos Urban

Note: (*) retail component only

The convenience store would possibly be presented along the lines of a 'general store', focused on providing local retail goods and services to the surrounding neighbourhood. It would not be a 7-Eleven-type commercial premises, but a small retailer with a true, small 'neighbourhood' vibe and focus. An example is The Leaf Store which operates in Elwood and Brighton (www.theleafstore.com.au), providing a range of produce, including locally-sourced and organic fruit & vegetables, chilled meals and desserts, dairy products, children's foods and pantry essentials. Another example is Harris Farm Markets (www.harrisfarm.com.au), with 22 stores located around Sydney and other parts of NSW. Like The Leaf Store, Harris Farm focus on fresh fruit & vegetables, as well as other lines, including fresh meat, delicatessen, and other produce.

The other retail components are typical of a small local community retail centre where residents and their friends can visit and relax over a coffee or a meal, or purchase prepared food for home consumption.

Clearly, the architectural design of this retail component would need to be carefully considered and assessed, and would be suitably presented in a landscaped setting within the new residential development on the subject site. The retail component would be central to the concept of providing a 'gathering space' for the surrounding community.

Importantly, the commercial viability of this retail component would be supported by a main road location, and this would involve frontage to Bergins Road. This road provides excellent vehicular access through the eastern part of the catchment, while pedestrian links would be important in providing access from the western part of the catchment (noting that the provision of some form of

pedestrian access across Stud Road would assist those walking to the subject site from this western area).

A local example in Melbourne of a small retail component is situated at Beacon Cove. This development is anchored by a general store (IGA Express), a packaged liquor 'cellar', a sub-newsagency, and a gourmet café / bar. Although this local focus also serves beach-goers and other visitation to the area, the mix of retail components is of note.

The likely upper limit – from a planning perspective – for retail floorspace provision at the WGC site would be (in round terms) 1,000m^2, provided that the retail components are actually commercially viable. A major consideration in regard to this 'commercial viability' aspect would be the actual physical planning and design of the small local 'centre', such that the centre is regarded by the local community as their 'place' and that they would go there often enough to provide the necessary cash flow to support these businesses. The impact from 1,000m^2 of retail floorspace would also be marginal on existing centres, as noted below.

5.2 Estimated Market Share

The local retail component as described above would be expected to capture only a small share of the available spend of catchment residents, and this is estimated at 3.4%, as indicated in Table 5.2.

Table 5.2: Market Share Assessment of Centre

Category	Value
Estimated sales at proposed retail facility	$3.5m
Share of sales sourced from catchment	95%
Total sales sourced from catchment	$3.3m
Total available retail spending on FLG in 2026 (refer Table 4.2)	$97.6m
Market share	**3.4%**

Source: Ethos Urban
Note: FLG: Food, Liquor & Food Catering

The market share for a 1,000m^2 retail component, based on the same assumptions, would be equivalent to 5.2% of the available FLG retail spend of catchment residents.

5.3 Potential Impact on Retail in Existing Shopping Centres

Stud Road sub-regional shopping centre has total retail floorspace provision of 20,515m^2, while Wellington Village neighbourhood shopping centre has total retail floorspace provision of 6,649m^2 (refer Table 2.1).

Having regard for the number, size and branding of the anchor tenants and speciality shops at each centre and their likely average turnover rates (noting that these variables differ between centres), the two centres are estimated to generate annual retail sales in 2016 of $195 million.

By 2026, the two centres are forecast to generate retail sales totalling $238 million per year. This increase on 2016 levels is estimated to result from a real increase in sales of approximately 2% per year. These sales estimates are shown in Table 5.3. The Table also shows potential trading impacts on these two centres if the proposed small retail component is developed at the subject site.

Table 5.3: Estimated Trading Impacts at Existing Shopping Centres in 2026

Store Type	Stud Road	Wellington Village	Total, Both Centres
Estimated total retail sales in 2016	$145.0/yr	$50.0m/yr	$195.0m/yr
Estimated total retail sales in 2026 (allow 2.0% real growth pa)	$177.0m/yr	$61.0m/yr	$238.0m/yr
Estimated sales attracted to Subject Site	$1.65m/yr	$1.65m/yr	$3.3m/yr
Estimated impact on sales at each centre	**-0.9%**	**-2.7%**	**-1.4%**

Source: Ethos Urban

As earlier indicated in Table 5.2, the retail component proposed for the subject site would potentially generate retail sales of around $3.5 million per year, with possibly 95% of these sales or $3.3 million per year drawn from the existing two centres serving the catchment (and wider) area. The retail trading impact on each of the centres would be very minimal, as shown in Table 5.3, with a potential 0.9% impact on Stud Road shopping centre and 2.7% on Wellington Village shopping centre.

Retail impacts at the levels shown above are considered to be only minor in terms of retail trading impacts. Typically, a retail trading impact of between 10% and 15% of retail sales is the generally-accepted benchmark at planning tribunals (such as VCAT), with impacts in excess of these levels requiring close assessment for potential adverse outcomes on affected centres.

The retail impact of a 1,000m^2 retail component, based on the same assumptions, would be equivalent to 2.1% of the estimated retail sales at the two centres.

6 Conclusion

Background

1 Intrapac Property Pty Ltd is seeking to have the Waverley Golf Club (WGC) property included within the Urban Growth Boundary and for the site to be developed for residential purposes. Intrapac is also keen to establish if a retail component is supportable on the site, having regard for the number of new residents who will be living in the area to be vacated by WGC (estimated at 1,560 new residents), as well as the needs of existing residents in the surrounding area.

Catchment Definition

2 The catchment that would be served by a retail component on the subject site is well-defined by the existing road network and by large areas of non-urban land uses, principally in the Green Wedge Zone located to the south and west of the site. The site is also well-suited for the creation of a 20-minute neighbourhood, having regard for accessibility to primary and secondary schools, childcare centres, a church, a network of bike paths and public transport services, and numerous sporting grounds, parks and community gardens.

3 The subject site and its surrounding catchment are served by two existing shopping centres: Stud Road sub-regional shopping centre and Wellington Village neighbourhood shopping centre.

4 The catchment would benefit from having a centrally-located community centre focused on a small retail component. Such a facility would provide an excellent gathering place for the local residents, particularly as residents live beyond a convenient walking distance to the existing shopping centres which are located almost 2km away.

Catchment Population

5 The current resident population in the catchment totals 10,995 persons (source: ABS) and this number will expand over time with the development of the subject site for new residential use. By 2021 the (net) catchment population is forecast to reach 11,530 persons, increasing to 12,750 residents by 2026. Growth is expected to slow after this period, with just 12,790 residents by 2031.

6 The catchment has a relatively high socio-economic profile compared with the metropolitan average (ABS Population & Housing Census, 2011), and this is evident in terms of individual and household incomes, family types, and home ownership.

Available Retail Spending of Catchment Residents

7 In 2016, total available spending by catchment residents on retail goods and services totals an estimated $161 million per year (rounded). Allowing for growth in catchment population numbers and in retail spending in real terms, an estimated $208 million in retail spending by catchment residents is forecast for 2026 (expressed in constant 2016 prices). Thus, retail spending will increase by additional $47 million compared with the current situation in 2016.

8 This spending will be directed to the existing two shopping centres serving the surrounding area, as well as directed to centres providing higher-order regional-level retail and other services. A small share of the available spending can also be directed to new local retail facilities to be provided in the catchment.

Potential Retail Component at Subject Site

9 The existing WGC catchment and the new residential development proposed for the subject site (comprising 600 new dwellings) would benefit by having convenient access – within

walking distance for many residents – to a small local retail component to meet local needs. Such a development would provide the basis for a community gathering centre, focused around (say) a small convenience store, a bakery and coffee shop, a small café, and a takeaway food shop. Total retail floorspace would be in the order of 650m^2 and would be expected to generate retail sales of around $3.5 million per year.

10 Among other factors, the architectural design of this retail component would need to be carefully considered and assessed, and would be suitably presented in a landscaped setting within the new residential development on the subject site. The retail component would be central to the concept of providing a 'gathering space' for the surrounding community. It would assist in developing a 'sense of place' for this community.

11 Commercial viability of this retail component would be supported by a main road location, and this would involve frontage to Bergins Road. This road provides excellent vehicular access through the eastern part of the catchment, while pedestrian links would be important in providing access from the western part of the catchment (noting that the provision of some form of pedestrian access across Stud Road would assist those walking to the subject site from this western area).

12 A local retail component of some 650m^2 and sales of $3.5 million per year would be expected to capture only a small share of the available spend of catchment residents, and this is estimated at 3.4%.

13 The retail trading impact on each of the existing centres would be very minimal, with a potential 0.9% impact on retail sales at the Stud Road shopping centre and a 2.7% impact on retail sales at the Wellington Village shopping centre.

14 For a retail component comprising 1,000m2 in retail floorspace, the market share would be equivalent to 5.2% of available FLG spending of catchment residents, while the impact on retail sales at the two existing centres would be 2.1%.

15 Retail impacts at these levels (for a retail component of between 650m^2 and 1,000m^2) are considered to be only minor in terms of retail trading impacts. Typically, a retail trading impact of between 10% and 15% of retail sales is the generally-accepted benchmark at planning tribunals (such as VCAT), with impacts in excess of these levels requiring close assessment for potential adverse outcomes on affected centres and their roles in the hierarchy of activity centres.

Conclusion

16 Having regard for very minimal trading impacts of the small retail component on each of the two existing centres, it is concluded that the provision of a small retail component at the subject site should be supported. Such development would provide a convenient and accessible gathering place for the local community (which is to expand with the new development of the WGC site), and no adverse impacts would be experienced by the two existing shopping centres that serve this area. A location with frontage to Bergins Road would be important in terms of contributing to the commercial viability of the small retail component.

Waverley Golf Course

Community Infrastructure Assessment

Final Report

Prepared by ASR Research
On behalf of Intrapac
July 2020

Waverley Golf Course
Community Infrastructure Assessment

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Waverley Golf Course
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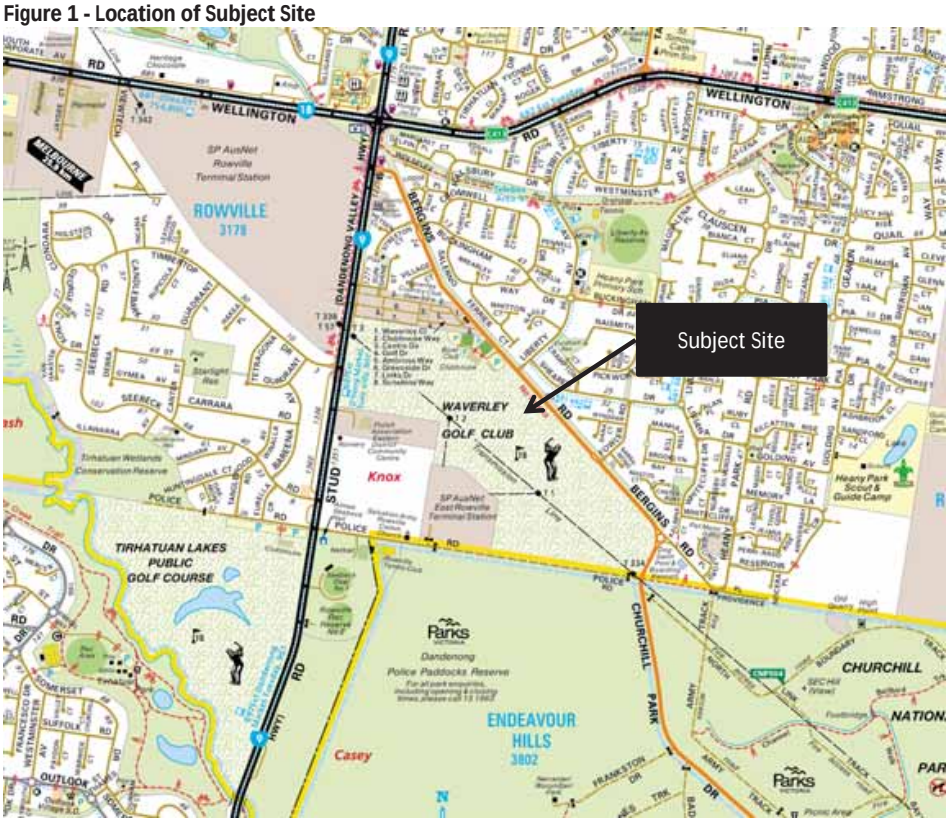
1. Introduction

1.1 Background

Intrapac Property Pty Ltd have contracted to purchase the Waverley Golf Course and engaged ASR Research to prepare the following community infrastructure assessment to form part of a rezoning application for the site. As shown in Figure 1 below, the subject site is located at 82 Bergins Rd, Rowville, and at the southern edge of the City of Knox. The City of Casey is located south of Police Road which forms the southern boundary of the site.

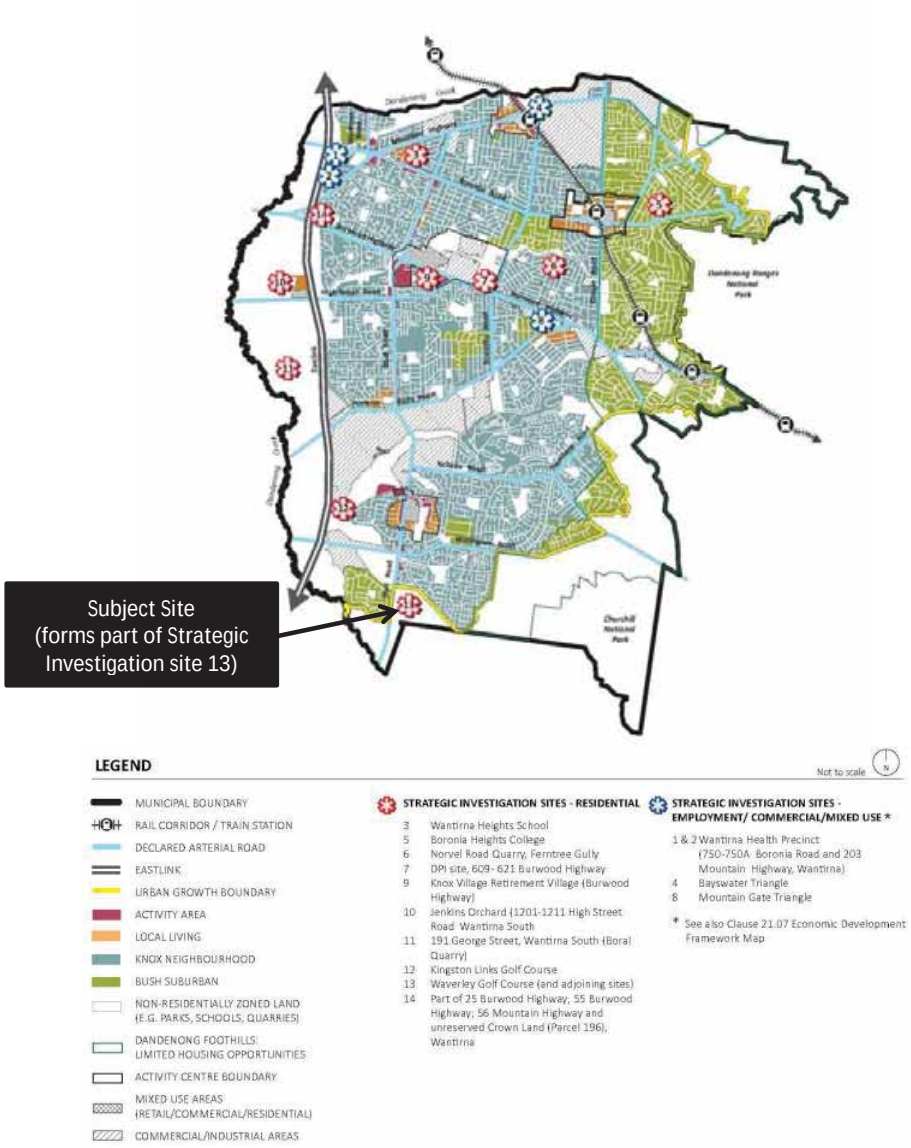
Figure 1 - Location of Subject Site



The Waverley Golf Course is approximately 49.5 hectares in size, and a 177-metre-wide electricity transmission line easement crosses the site and covers approximately 22.6ha (46% of the site). The line voltage ranges from 200kV to 500kV. Buildings and other structures are prohibited on the easement.

Figure 2 below shows the location of the Waverley Golf Course in relation to the City of Knox Housing Map (Clause 21.06 of the Knox Planning Scheme). Objective 1 of the Clause is 'to support a scaled approach to residential development in accordance with the Knox Housing Strategy 2015'. The subject site forms the majority part of what is referred to as "Strategic Investigation Site 13 – Residential". A key strategy associated with Objective 1 is to 'support residential development, where appropriate, on Strategic Investigation Sites (in whole or in part)'.

Figure 2 - City of Knox Housing Map



1.2 Purpose of Assessment

The purpose of this assessment is to:

- Identify and classify the existing community infrastructure that exists generally within 1.5-kilometres of Waverley Golf Course;
- Establish current community infrastructure provision levels within 1.5-kilometres of the subject site;
- Determine the extent to which community infrastructure gaps exist within the 1.5-kilometre catchment of Waverley Golf Course:
- Identify potential community infrastructure requirements and opportunities associated with the development of Waverley Golf Course assuming a development scenario of approximately 800 dwellings; and
- Identify existing Council and other agency strategic community infrastructure needs and recommendations that may need to be addressed by future development of Waverley Golf Course.

2. Assessment Scope & Catchment Details

2.1 Scope of Community Infrastructure Items Reviewed

This report contains detailed tables showing the existing supply of community infrastructure generally within a 1.5-kilometre radius[1] of Waverley Golf Course and indicative estimates of demand and / or supply requirements for each form of community infrastructure. It is envisaged that the Waverley Golf Course development will have the greatest impact on what are considered as local level community infrastructure forms that are typically managed by local government.

For the purposes of undertaking this assessment an audit of the following community infrastructure categories were selected:

1. Early years services;
2. Open space (active and passive);
3. Community meeting spaces, libraries and learning centres;
4. Public art;

[1] Some forms of community infrastructure such as libraries, hospitals etc have population catchments which can typically exceed a standard low density urban residential 1.5-kilometre population catchment.

5. Indoor recreation facilities;
6. Education facilities;
7. Health services;
8. Police & Emergency services; and
9. Residential aged care.

Categories 1 to 3 are typically (but not exclusively) Local Government responsibilities and are often (but not always) included in development contribution agreements associated with significant land use developments. However, government education facilities (typically primary and secondary schools), where deemed to be required within a land use development, are generally funded (both land and building costs) by the State Government.

Although not prescriptive different forms of community infrastructure generally have different population catchments as shown in Table 1.

Table 1 – Scope of Community Infrastructure Items Assessed

Population Catchment Hierarchy	Items
Level 1 Neighbourhood Level *Provision ratios up to 10,000 people*	• Open space (passive and active) • Local playgrounds • Local bicycle / pedestrian pathways (on and off-road) • Kindergartens • Playgroups • Government primary schools • Neighbourhood house (Inc. Community education services) • Community meeting spaces (Council and Non-Council) • Senior citizens groups • Long Day Child Care • Public art installations • Social housing
Level 2 Precincts (2-3 Neighbourhoods) *Provision ratios between 10,000 and 30,000 people*	• Occasional Child Care • Government secondary Schools • Catholic primary Schools • Maternal and Child Health Services • Indoor recreation centres • Residential aged care
Level 3 Cluster of Precincts (District) *Provision ratios between 30,000 people and 60,000 people*	• Libraries • Council aquatic / leisure centres • Community arts centres • Other non-government secondary schools • Community health centres
Level 4 Municipal Level *Provision for the total municipality*	• Principal Bicycle Network (on and off-road) • Civic centres
Level 5 Regional Level Provision for 2 or more municipalities	• Highest Order Performance Arts Facility • Universities/TAFEs • Public and private hospitals

2.2 Defining the Catchment Area

This assessment uses a 1.5-kilometre radial catchment around the subject site as the basis of reviewing the existing supply of a variety of services and facilities. The 1.5-kilometre catchment is based on Plan Melbourne's proposal to establish "20-minute neighbourhoods"[2].

Figure 3 on page 10 shows the location of the Waverley Golf Course in the southern section of Rowville (which falls within the City of Knox). The 1.5-kilometre catchment area of the subject site includes small portions of Lysterfield South and Endeavour Hills to the south, Dandenong North to the south west and Mulgrave to the west.

The subject site is located within the Knox City Council small area planning unit of Rowville South. These small area planning units are used by Council as the basis of preparing community profile and small area population forecasts.

As Table 2 on the following page shows Rowville South currently has a population of approximately 10,800 people and is projected to grow on only moderately by an additional 140 people by 2041 (a 1% increase). The projections indicate declining household size in the area from 3.1 in 2020 to 2.8 by 2041.

[2] *Plan Melbourne*, the city's metropolitan planning strategy, proposes a city made up of 20 minute neighbourhoods were every home will be within 20 minutes travel time of jobs, shops, cafes, schools, parks and community facilities. Rather than basing this on car based travel times, Plan Melbourne proposes it will be 20 minutes travel by active modes i.e. by public transport, walking and cycling. For the purposes of this assessment the 1.5 kilometre radius was chosen as it approximately equates to a 20 minute walk.

Table 2 – Projected Average Household, Dwelling & Population for Rowville South from 2020 to 2041

	2020	2026	2031	2036	2041	Change from 2020 to 2041 No.	Change from 2020 to 2041 %
Average household size	3.05	2.9	2.84	2.82	2.82	-0.23	-7.5%
Dwellings	3,659	3,724	3,750	3,825	4,005	346	9.5%
Total Population	10,780	10,464	10,305	10,420	10,921	141	1.3%

Source: City of Knox Population and household forecasts, 2016 to 2041, prepared by .id, April 2019

The residential development assumptions[3] upon which the Rowville South population forecasts are based are:

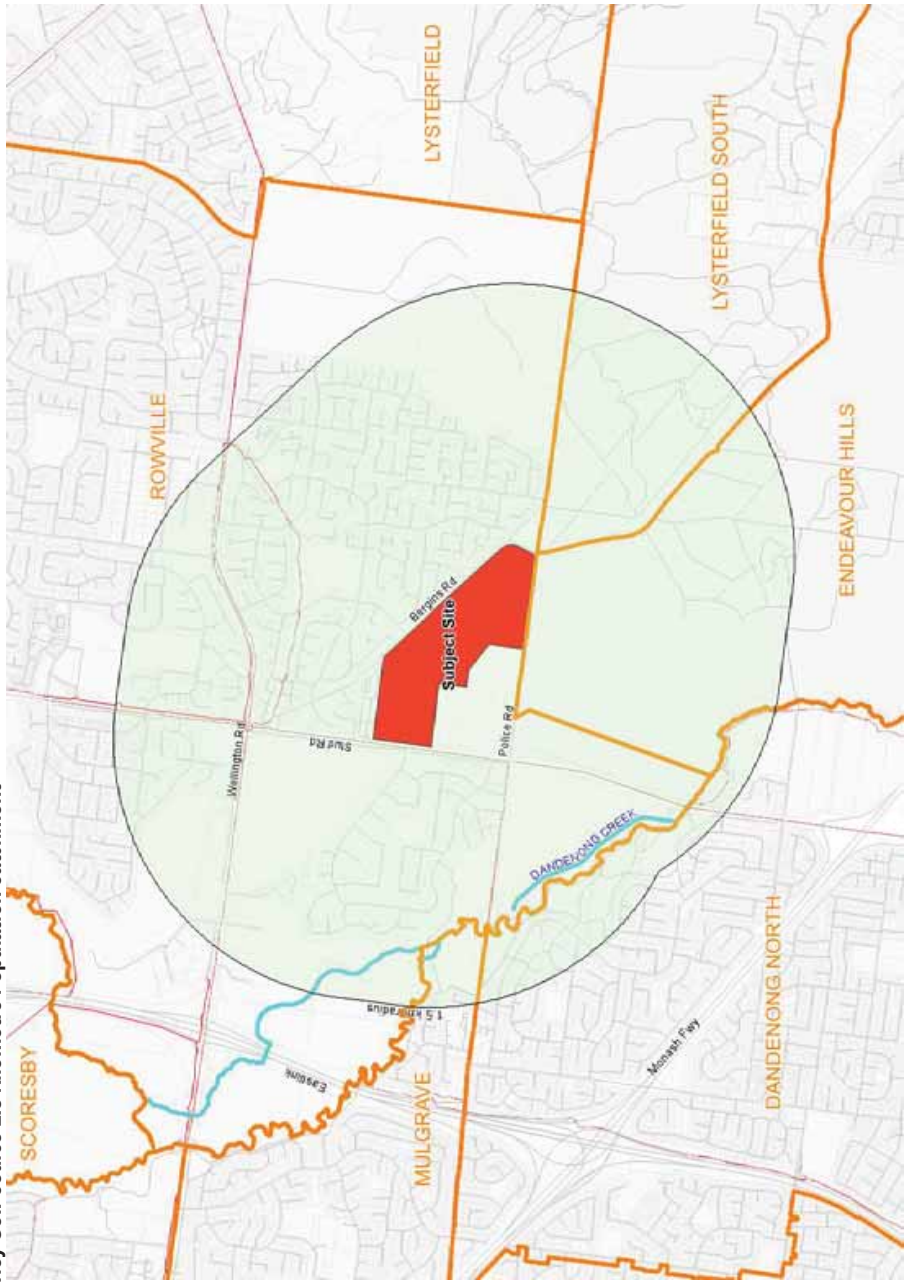
- 1030 Wellington Road - 18 dwellings (2018);
- Waverley Golf Club - 195 dwellings (2035-2041);
- Low level of vacant lot development (0-7 dwellings per annum); and
- Low level of infill (4-6 dwellings per annum).

These assumptions currently underestimate the yield generated by the current Waverley Golf Club proposal by approximately 600 dwellings and require updating if the proposal is approved. When this figure is included, Rowville South could potentially accommodate 4,600 dwellings and have a population of approximately 13,100.

An adjusted Rowville South forecast is included in the demand and supply estimates provided in Appendix 2 of this report.

[3] Source: City of Knox Population and household forecasts, 2016 to 2041, prepared by .id, April 2019. Development assumptions are from 2016 onwards. The 2017 dwelling additions are based on building approvals, lagged by 12-18 months.

Figure 3 – Waverley Golf Course 1.5 Kilometre Population Catchment



3 Review of Statutory Framework & Other Strategic Documents

3.1 Overview

This section reviews:

- Two key statutory documents that inform future community infrastructure priorities for the City of Knox: 1) the Knox Planning Scheme, and 2) *Plan Melbourne 2017*.
- Other Council and non-Council strategic documents of potential relevance to this assessment.

The review allows for existing statutory requirements and broader strategic objectives to be identified and assessed for its potential relevance and application to the subject site.

3.2 Knox Planning Scheme

The Planning Scheme is a statutory document that guides and shapes development in Knox. It includes State Government provisions as well as local policies specific to Knox and a strategic vision for the municipality.

3.2.1 State Planning Policy Framework (SPPF)

Every Victorian planning scheme includes the State Planning Policy Framework (SPPF) containing general principles for land use and development in Victoria. Planning authorities and responsible authorities must take these general principles and specific policies into account in their integrated decision making process. For the purposes of this assessment the following Clauses are potentially relevant.

11.03 PLANNING FOR PLACES

- 11.03-1S Activity centres
- 11.03-1R Activity centres - Metropolitan Melbourne
- 11.03-6S Regional and local places

19.02 COMMUNITY INFRASTRUCTURE

- 19.02-1S Health facilities

- 19.02-1R Health precincts - Metropolitan Melbourne
- 19.02-2S Education facilities
- 19.02-2R Education precincts - Metropolitan Melbourne

- 19.02-3S Cultural facilities
- 19.02-3R Cultural facilities - Metropolitan Melbourne
- 19.02-4S Social and cultural infrastructure
- 19.02-5S Emergency services
- 19.02-6S Open space
- 19.02-6R Open space - Metropolitan Melbourne

Details of each of these Clauses is provided in Appendix 1a of this report.

3.2.2 Local Planning Policy Framework (LPPF)

The Local Planning Policy Framework (LPPF) sets a local strategic policy context for a municipality. There are two parts to the LPPF

- the Municipal Strategic Statement; and
- specific local planning policies.

The Knox Planning Scheme contains a number of Clauses of potential relevance to the development of the subject site. These include:

- Clause 21.01-2 Key Issues and Influences
- Clause 21.02 Vision;
- Clause 21.03 Environmental and Landscape Values;
- Clause 21.06 Housing
- Clause 21.08 Community Development
- Schedule to Clause 53.01 Public Open Space Contribution and Subdivision.

A summary of each of these Clauses is provided Appendix 1b.

3.3 Plan Melbourne 2017

Plan Melbourne 2017 is a metropolitan planning strategy that defines the future shape of the city and state over the next 35 years. Integrating long-term land use, infrastructure and transport planning, Plan Melbourne sets out the strategy for supporting jobs and growth, while building on Melbourne's legacy of distinctiveness, liveability and sustainability. The plan includes:

- 9 principles to guide policies and actions
- 7 outcomes to strive for in creating a competitive, liveable and sustainable city

- 32 directions outlining how these outcomes will be achieved
- 90 policies detailing how these directions will be turned into action

In addition, a separate 5-year Implementation Plan with 112 actions has been developed. Of particular relevance to this assessment are the directions and policies outlined in Outcome 2 (housing related directions) and Outcome 5 (community infrastructure related directions). The directions and polices associated with these two outcomes are summarised in Appendix 1c.

3.4 Review of Other Council and Non-Council Documents

A number of Knox City Council and other non-Council agency strategies, plans and polices were identified and reviewed for potential relevance to the community needs analysis (refer to Appendix 1d for more details). Council policies, strategies and plans reviewed include:

- Knox Community & Council Plan 2017–2021;
- Knox Housing Strategy (2015);
- Knox Affordable Housing Action Plan 2015-2020;
- Knox Open Space Plan 2012-2022;
- Knox Leisure Plan 2014-2019;
- Melbourne East Sport and Recreation Strategy (2016);
- Knox Regional Sports Park Masterplan (2018);
- Key Life Stages Plan 2017-2021;
- Community Facilities Planning Policy (2016); and
- Knox Arts and Cultural Plan 2012-22.

A summary of important non-Council community infrastructure strategies is provided in Appendix 1e of this report, and where applicable, discussed as part of the more detailed assessment in Section 5 of this report. These include:

- Swinburne University of Technology 2025 Strategic Plan;
- Eastern Health Strategic Plan 2017-2022;
- Eastern Health 2022: The Strategic Clinical Service Plan 2012–2022;
- EACH 2020: A National Strategy, 2016-2020;
- Victoria Police Blue Paper: A Vision for Victoria Police In 2025;
- VICSES Corporate Plan 2015-2018;
- Ambulance Victoria Strategic Plan 2017-2022; and
- Court Services Victoria Strategic Asset Plan:2016-2031.

3.5 Implications of the Review of Strategic Documents

Where relevant, the implications of the review on community infrastructure response measures for the proposed development are discussed in more detail in Section 5.4 of this report.

4. Community Infrastructure Audit Analysis

4.1 Audit Finding Implications

Appendix 3 of this report provides an audit of the following existing community infrastructure categories generally located within 1.5 kilometres of Waverley Golf Course:

1. Open space (active and passive);
2. Early years services;
3. Community meeting spaces, libraries and learning centres;
4. Indoor recreation facilities;
5. Education facilities;
6. Health services;
7. Police & Emergency services; and
8. Residential aged care.

Table 3 on page 17 summarises the existing community infrastructure provision levels, generally within 1.5 kilometres of Waverley Golf Course. The implications of the audit findings include:

Open space implications

- The overall supply and distribution of open space is satisfactory within the 1.5-kilometre catchment, both for passive and active open space.

Early years implications

- There is only one sessional Kindergarten facility located within the 1.5-kilometre catchment of the subject site (Rowville Preschool), but it is located north of Bergins Road. The lack of provision south of Bergins Road provides some grounds for investigating further with Council opportunities for additional Kindergarten provision within the subject site.

Community meeting spaces, libraries and learning centres

- The overall supply and distribution of community meeting spaces and learning centres within the 1.5-kilometre catchment appears satisfactory.
- The Rowville Library is located just beyond the 1.5-kilometre catchment.

- The size of the proposed development may support the inclusion of a site within the subject site along with an appropriate contribution toward the construction of a new Council community facility.

Indoor recreation implications

- The location of the soon to be upgraded Carrington Leisure Centre, and the significant supply of indoor recreation courts (for high ball sports such as basketball and netball) across the Knox municipality, suggests that local indoor recreation centre provision is more than satisfactory.
- The pursuit of indoor recreation provision opportunities at Waverley Golf Course appears not to be warranted.

Education facility implications

- There are four schools within a 1.5 km radius of the subject site. Most of the government primary schools currently appear to have sufficient spare capacity to absorb the additional demands generated by the Waverley Golf Course development. However, there is a broader issue in relation to Government Secondary School provision in the area. The Rowville Secondary College, the nearest Government Secondary School to the subject site, has many enrolments (approximately 1,700) and the Department of Education & Training acknowledges a need to upgrade and increase the capacity of the School. However, because there is no definitive view on the need for an additional Government Secondary School site by the Department of Education & Training (DET), a school site option has not been included as part of the proposed masterplan.

Health service implications

- Despite the lack of primary and acute health facilities within the 1.5-kilometre population catchment Waverley Golf Course is unlikely to be a suitable location for addressing additional acute or community health provision opportunities.

Police, Justice& Emergency service implications

- The close proximity of most Police and emergency services to the subject site suggests that response times are likely to be satisfactory and no additional provision warranted.

Residential aged care implications

- The supply of residential aged care beds within the 1.5-kilometre population catchment is less than Federal Government provision benchmarks aspire to and suggests that additional provision may generate commercial interest from existing residential aged care providers.

Table 3 - Current Community Infrastructure Provision Levels within 1.5 Kilometres of Waverley Golf Course

Community infrastructure category	Quantity
Open space	
Number of active open space reserves	2
Recreation facilities	
Number of indoor recreation high ball courts	0
Number of council aquatic / leisure centres	0
Early years facilities	
Number of sessional kindergarten facilities	1
Number of maternal & child health facilities	1
Number of playgroup venues	2
Number of occasional child care venues	0
Number of long day child care facilities	4
Other community centre elements	
Number of community meeting venues for hire	2
Number of neighbourhood houses	0
Number of planned activity group centres	0
Libraries	
Number of library facilities	0
Education facilities	
Number of govt specialist schools	0
Number of govt primary schools	2
Number of catholic primary schools	1
Number of non govt primary schools	0
Number of govt secondary schools	1
Number of catholic secondary schools	0
Number of non gov secondary schools	0
Number of TAFE campuses	0
Number of university campuses	0
Police, justice & emergency services	
Number of CFA sites	0
Number of ambulance sites	1
Number of SES sites	0
Number of police station sites	1
Number of law court facilities	0
Health services	

Waverley Golf Course
Community Infrastructure Assessment

Community infrastructure category	Quantity
Number of community health service sites	0
Number of acute health facilities	1
Residential aged care	
Number of residential aged care facilities	0

5. Assessment of Development Generated Community Infrastructure Demand

This section provides a detailed analysis of community infrastructure need based on the demand generated by the proposed development, its projected dwelling yield, the supply and distribution of existing services and facilities, and any relevant policy or strategic directions identified as part of this report.

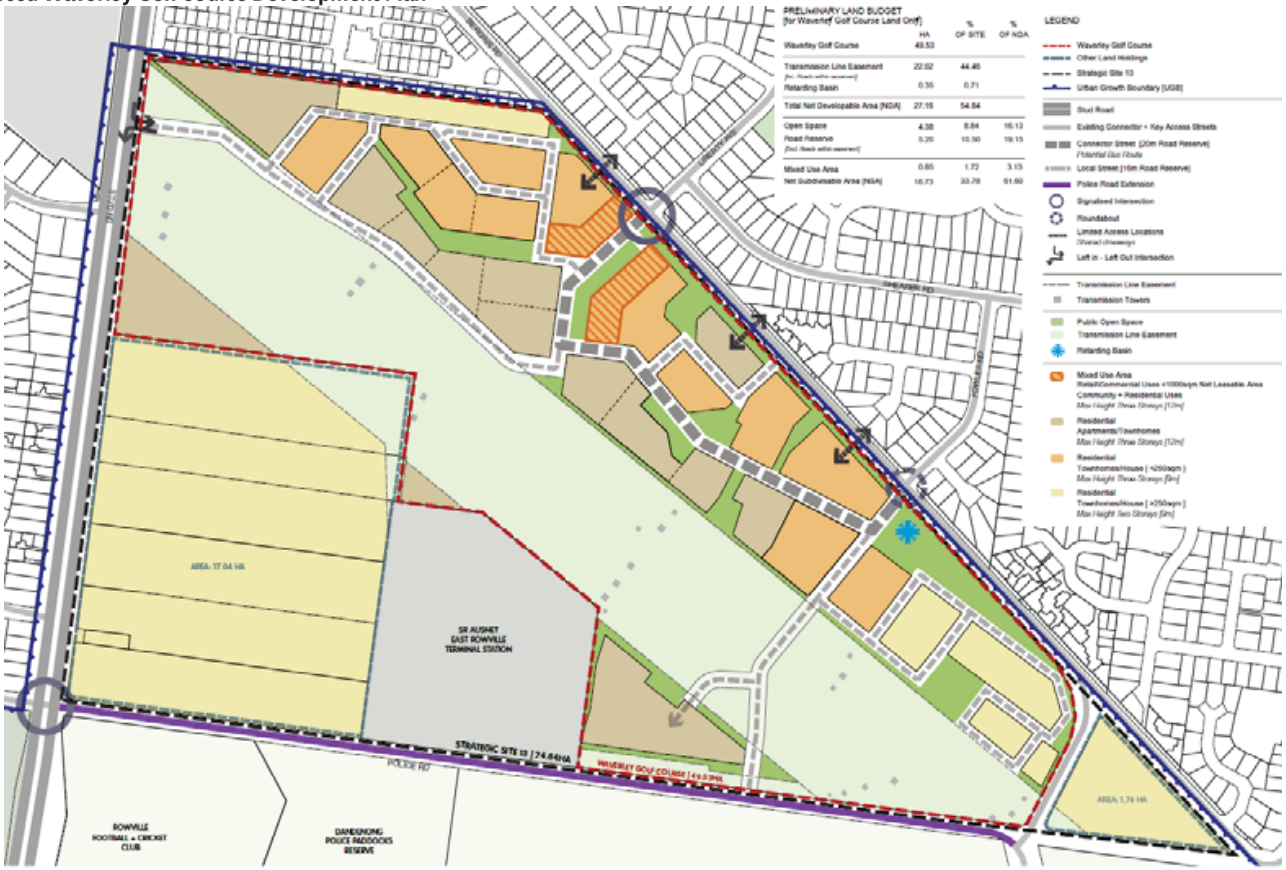
5.1 Proposed Development Plan

Figure 4 on the following page shows the current proposed Development Plan for the Waverley Golf Course in the context of the entire Strategic Site 13. For the purposes of this assessment it is assumed that the land holding in the south west corner of Strategic Site 13 (17.04 hectares) will be zoned Commercial and the smaller land holding to the south east (1.76 hectares) will be zoned residential. The dwelling yield capacity across the entire Strategic Site 13 is assumed to be approximately 800.

The major features of the proposal include:

- A Net Developable Area of (NDA) of 27.16 hectares;
- Residential dwellings delivered largely in the form of townhouses and apartments;
- 4.38 hectares of public open space; and
- 0.85 hectares of mixed use land.

Figure 4 – Proposed Waverley Golf Course Development Plan



Source: RobertsDay

5.2 Community Infrastructure Standards and Demand and Supply Estimates

Appendix 2 of this report provides indicative estimates for various forms of community infrastructure that lend themselves to some form of quantifiable demand and / or supply measure. The source of these demand / supply measures is also identified in Appendix 2. ***It should be emphasised that the numbers indicated should not be interpreted as final provision recommendations for the Waverley Golf Course development scenario.***

5.3 Waverley Golf Course Dwelling and Population Scenario

For the purposes of undertaking the assessment a dwelling yield of approximately 800 has been assumed, most likely to be accommodated in the form of detached and medium density housing stock. Under this development scenario the dwelling yield is likely to generate a residential population of approximately 2,270 people. The estimated population yield was calculated by applying the projected average household size for Rowville South in 2041 (2.84 persons per household)[4]. An age profile was then developed for the subject site using the single age profile projected for Rowville South in 2041[5]. The age cohorts shown reflect a requirement for (but not necessarily restricted to) the following types of services and / or facilities:

- 0 - 3 Years - Maternal and Child Health Services, Playgroups;
- 4 Years - Preschool Services;
- 0-6 Years - Long Day Child Care, Occasional Child Care, Maternal and Child; Health Services, Family Day Care, Specialist Early Intervention Services;
- 5-11 Years - Primary School, After Hours School Care, School Holiday; Programs, Family Day Care;
- 5-14 Years – Participation by children in organised sport and leisure activities
- 12-17 Years - Secondary School, School Holiday programs;
- 15 years and over - Participation in organised sport and leisure activities
- 55+ Years- Senior Citizens Groups and Centres;
- 70+ Years - HACC Services, Nursing Homes/Aged Hostels / Retirement Villages;
- Centre Based Support Services (e.g. Planned Activity group); and
- All population age cohorts – Libraries, Neighbourhood Houses etc.

[4] Source: Small Area Population Forecasts for the City of Knox, prepared by .id on behalf Knox City Council.
[5] Source: Small Area Population Forecasts for the City of Knox, prepared by .id on behalf Knox City Council.

The likely age cohort yields from the development of the subject site are summarised in Table 4 below.

Table 4 - Target Population Projections for key Community Infrastructure Age Cohorts

		Subject Site	Rowville South by 2041	Adjusted Rowville South by 2041[6]
Age Cohort	**Community infrastructure types the age cohort is relevant to**			
0-3	MCH, Playgroups	104	502	601
4	4 Year Old Kindergarten	27	131	157
0-4	Long Day Child Care & Occasional Child Care	132	633	758
5-11	Primary School enrolments, out of school hours care	191	920	1,102
0-14	Participation in organised children's sport	409	1,965	2,353
15+	Participation in organised youth & adult sport	1,863	8,957	10,725
15-24	Participation in higher education (youth & young adult)	287	1,378	1,650
25+	Participation in higher education (older adults)	1,577	7,579	9,075
12-17	Secondary School enrolments	173	834	999
70+	Residential & home based aged care services	385	1,850	2,215
0 to 69 years	HACC services (younger clients)	1,887	9,072	10,863
Total Population	**Total Population**	**2,272**	**10,922**	**13,078**
Dwellings	**Total Dwellings**	**800**	**4,005**	**4,605**

Using ASR Research's previous experience of undertaking community infrastructure assessments, the implications of this population profile can be summarised as follows:

- The dwelling yield likely to be generated by the Waverley Golf Course development scenario would increase the number of dwellings in Rowville South by approximately 22% (based on Council's small area population forecast estimate for the area in 2020, and excluding other residential development which may occur within the catchment); and
- The population yield likely to be generated by the Waverley Golf Course development scenario would also increase the number of people living in Rowville South by approximately 21% (note: the population increase proportion is less than dwelling increase proportion due to a projected decline in household size).

[6] The adjustment includes an additional 600 dwellings for the subject site not included in Council's population forecasts which assumes approximately 200 dwellings.

5.4 Summary of Development Generated Demand Impacts & Recommended Response Measures

Table 5 on the following pages summarises the key findings, issues and demand impacts associated with the proposed development of Waverley Golf Course and outlines recommended response measures for each form of community infrastructure.

Table 5 – Detailed Assessment of Community Infrastructure Response Measures to Proposed Waverley Golf Course Development

<table>
<tr><th>Service / Community infrastructure type</th><th>Key Assessment Findings</th><th>Recommended Response Measures</th><th>Is the recommended response likely to form part of a development contributions agreement (either a DCP or Section 173 agreement)?</th></tr>
<tr><td>Passive Open Space</td><td>The current Knox Planning Scheme Public Open Space contribution rates (Schedule to Clause 53.01) are structured as follows:
<table>
<tr><th>Type or location of subdivision</th><th>Amount of contribution for public open space</th></tr>
<tr><td>Subdivision of land into lots having an area of 725 square metres or greater in a Residential 1 Zone, Residential 2 Zone or Residential 3 Zone.</td><td>Minimum of 5% of the total land to be subdivided.</td></tr>
<tr><td>Subdivision of land which includes lots having an area of less than 725 square metres in a Residential 1 Zone, Residential 2 Zone or Residential 3 Zone.</td><td>Minimum of 8.5% of the total land to be subdivided.</td></tr>
</table>
Although the total site area of the golf course is 49.52 hectares, 22.87 hectares is encumbered by an electricity transmission easement and associated buffers.

Therefore, the net developable area (NDA) is 27.16 hectares. On the basis that Council will request an 8.5% public open space contribution in the form of land, the development</td><td>On-site public open space provision
• Under the current Knox Planning Scheme the proposed development would be required to provide a public open space contribution of 8.5% (which equates to 2.31 hectares of public open space). The current Development Plan public open space contribution is 4.38 hectares (16.13% of NDA) and exceeds the planning scheme requirement by 2.07 hectares.
• Based on the open space hierarchy presented within the Knox Open Space Plan (2012-2022) Waverley Golf Course is sufficiently large (both in population and in land area), and has various physical attributes (e.g. transmission easement) to reasonably expect the provision of a mixture of open space forms including:
- Linear open space corridors;
- Local parks; and
- Potentially an active open space.
• These proposed open spaces should be delivered in accordance with Council's open space design guidelines as outlined in the Knox Open Space Plan.
• On this basis, the Waverley Golf Course open space strategy should include:
- Identifying a passive recreational trail function for the transmission easement corridor;
- The establishment of small local parks; and
- Potential inclusion of a small active open space.
• Council has already provided feedback that the transmission easement could provide for open space, with links to Churchill Park to the south of the site. The State Planning Policy Framework supports creating open spaces to meet a variety of needs with links to regional</td><td>Yes, the current plan includes and exceeds the public open space contribution requirement for 8.5% specified in Clause 53.01 of the Knox Planning Scheme.</td></tr>
</table>

Service / Community infrastructure type	Key Assessment Findings	Recommended Response Measures	Is the recommended response likely to form part of a development contributions agreement (either a DCP or Section 173 agreement)?
	would be required to set aside 2.31 hectares of land as open space.	parks (Clause 15.01-3). It believes open space should be multi-purpose combining open space recreation with pedestrian and cycle movement and habitat corridors. It could also include opportunities for outdoor fitness/exercise park (subject to the restrictions of AusNet Services). This assessment supports this request. • Council has also requested that part of the open space developed for the site cater dog off leash activities and include a community garden. Again, this assessment supports these suggestions.	
Active Open Space	• There are two key sporting reserves located within a 1.5-kilometre radius of the subject site (Rowville Recreation Reserve and Liberty Avenue Reserve). • The Knox Leisure Plan (2014-19) identifies a shortage of sports fields (rectangular shape sports facility) in Rowville (Refer to action 16). Seebeck Oval to the south of the site already accommodates netball, tennis and two sports ovals used for cricket and football. The lack of sports fields in the Rowville area is impacting the area's ability to accommodate soccer. • The Knox City Council recreation department was consulted about the need for additional active open space provision within the site or potential expansion / redevelopment of the two existing nearby reserves. Although additional capacity is required in the Rowville area Council does not wish to secure active open space within the subject site that may potentially be encumbered by the transmission easement. • Extrapolating from AusPlay Survey data (refer to Appendix 2 for more details) the proposed development would	Given confirmation of the existing capacity constraints in Rowville, and the opportunity the subject site affords for additional active open space provision, this assessment recommends that the proponent and Council continue to assess the viability of including outdoor sporting infrastructure within the development. Because of the irregularity of the subject site and the presence of the transmission easement, sports with a smaller land requirement (e.g. soccer, outdoor netball, tennis) are recommended subject to Council confirming demand for such sports.	Yes, the current plan includes a site option for such a facility and is included in the draft DCP.

Service / Community infrastructure type	Key Assessment Findings	Recommended Response Measures	Is the recommended response likely to form part of a development contributions agreement (either a DCP or Section 173 agreement)?
	generate the following additional outdoor sporting demand levels: - 121 Australian rules football participants; - 95 cricket participants; - 93 tennis participants; - 89 soccer participants; - 74 netball participants; and - 74 athletics participants.		
Council Indoor & Aquatic Leisure Centres	• The subject site is located approximately 5 kilometres from Carrington Park Leisure Centre which Knox Council is proposing to redevelop, and 6 kilometres from the Dandenong Oasis Leisure Centre (Greater Dandenong). • In terms of other high ball indoor facilities (e.g. basketball, netball etc) the Knox Regional Sports Park is located approximately 7 kilometres from the subject site, and Knox Regional Netball Centre is approximately 6 kilometres from the site. • All of these facilities are considered to be within reasonable distance of Waverley Golf Course, and there is no indication that the development would stretch demand for these facilities beyond their capacity. • No new aquatic leisure centre developments or significant redevelopments of existing facilities are proposed. • The proposed development scenario is likely to generate an additional 87 Council leisure centre members (approximately), 560 additional fitness / gym participants, 330 swimming participants, and generates the demand for the equivalent of 0.2 indoor courts.	The provision of existing high ball indoor recreation centres and Council indoor aquatic leisure facilities within or close to the catchment area is considered to be adequate, both in terms of supply and proximity. Therefore, no response measures are recommended.	No

Service / Community infrastructure type	Key Assessment Findings	Recommended Response Measures	Is the recommended response likely to form part of a development contributions agreement (either a DCP or Section 173 agreement)?
Early Years Services			
Long Day Child Care	• There are 4 Long Day Child Care facilities within 1.5 kilometres of the subject site. • Based on vacancy data available from the *Mychild* website (July 2020), there are existing vacancies at most of the existing facilities closest to the subject site. • The proposed development scenario would generate the need for the equivalent of 36 long day child care places.	Given reasonable existing supply levels and spare capacity, no existing long day child care provision is recommended.	No
4 & 3 year old sessional Kindergartens	There is only one Council owned sessional Kindergarten facility within 1.5 kilometres of the subject site (Rowville Preschool). However, this facility is located north of Bergins Road. The proposed development will generate demand for an additional 20 four-year-old Kindergarten enrolments and 20 three-year-old Kindergarten enrolments (assuming a 75% participation rate by all 3 year olds). Combined, these estimates indicate a potential need for one additional Kindergarten room.	Based on the current supply and distribution of Kindergarten facilities and the demand estimates, there appears to be merit in investigating the need for additional Council kindergarten capacity in Rowville. However, this will need to be confirmed with Council.	Potentially.
Maternal & Child Health	• There is one MCH facility within a 1.5-kilometre radius of the subject site (Liberty Avenue MCH). • The proposed development will generate demand for an additional 2 MCH sessions per week, which equates about 20% of the use of 1 MCH consulting suite per week.	Demand estimates do not warrant a new MCH facility within the development at Waverley Golf Course.	No

Service / Community infrastructure type	Key Assessment Findings	Recommended Response Measures	Is the recommended response likely to form part of a development contributions agreement (either a DCP or Section 173 agreement)?
Occasional Child Care	• There are no Occasional Child Care facilities within a 1.5 km radius of the subject site, but an occasional child care service operates from the Rowville Community Centre just beyond this catchment. • The proposed development will generate demand for an additional 3 occasional child care places.	Due to a combination of insufficient demand generated by the development scenario, and reasonable existing supply levels, no additional provision measures for occasional child care is recommended.	No
Playgroups	• There are 2 playgroup venues within 1.5 kilometres of the subject site. • The proposed development will generate an additional 1 playgroup session per week.	Demand estimates for playgroup do not warrant a new dedicated playgroup facility within the subject site.	No
Community Meeting Spaces	• Four community meeting space venues within the 1.5-kilometre catchment are available for hire, only one of which is a Council owned / managed facility –Aimee Seebeck Hall. • The proposed development scenario generates the need for the equivalent of 80 square metres of flexible community meeting space.	The establishment of a small Council community centre within the development, potentially consisting of general community meeting space and Kindergarten programs, is worthy of further discussion with Council.	Potentially
Neighbourhood Houses	• There is one neighbourhood house located just beyond the 1.5-kilometre catchment – the Rowville & District Neighbourhood House Inc. located within the Rowville Community Centre. • The subject site generates the equivalent of 0.1 neighbourhood house facilities and approximately 68Neighbourhood House users per week.	Existing Neighbourhood House provision appears to be more than adequate, and a new stand-alone service appears not be justified.	No

Service / Community infrastructure type	Key Assessment Findings	Recommended Response Measures	Is the recommended response likely to form part of a development contributions agreement (either a DCP or Section 173 agreement)?
Libraries	• There is one library facility located just beyond the 1.5-kilometre catchment – the Rowville Library. It was established in 1989 under the clock tower at Stud Park Shopping Centre. • The proposed development would generate demand for an additional 17,300 (approximately) loans per annum and 10,700 (approximately) visits per annum. • Council does not currently have plans to develop new library facilities or redevelop existing facilities within the study area.	The provision of existing library facilities within the catchment area is considered to be adequate; both in terms of supply and proximity. Therefore, no response measures are recommended.	No
Education Facilities	• There are four schools within a 1.5 km radius of the subject site. • Nearest government schools (and 2019 enrolment numbers) are: - Heaney Park Primary School[7] (371 enrolments) - Rowville Primary School (437 enrolments) - Rowville Secondary College[8] (1,797 enrolments) - St Simons School (575 enrolments) • Monash University – Clayton Campus is also located approximately 10 kilometres west of the subject site. • Overall enrolments trends at schools located within the 1.5 kilometre catchment shows evidence of spare capacity, particularly for primary schools.	The Department of Education and Training (DET), who were contacted as part of this assessment in 2018, indicated there were no plans to establish additional Government schools in the area. However, at that stage, upgrade and expansion to the capacity of Rowville Secondary College remained a priority. DET have previously expressed a possible (but not confirmed) interest in discussing with the proponent of the Waverley Golf Course development the potential for including a future school within Strategic Site 13. Under the scenario that DET wishes to pursue additional provision within Strategic Site 13, the proponent considers the south west corner of Site 13 (potentially to be rezoned commercial) to be a preferred location rather than the Waverley Golf Course.	No

[7] The Heaney Park Primary School zone catchment area includes the subject site. Schools may accept enrolments from outside of their designated neighbourhood zone if they have enough space.

[8] The Rowville Secondary College zone catchment area includes the subject site. Schools may accept enrolments from outside of their designated neighbourhood zone if they have enough space.

Service / Community infrastructure type	Key Assessment Findings	Recommended Response Measures	Is the recommended response likely to form part of a development contributions agreement (either a DCP or Section 173 agreement)?
	• The proposed development will generate an additional (approximate only): - 135 Government Primary school enrolments; - 30 Catholic Primary School enrolments; - 15 non-Government Primary School enrolments; - 100 Government Secondary school enrolments; - 40 Catholic Secondary School enrolments; - 25 non-Government Secondary School enrolments; - 40 TAFE enrolments; and - 100 University enrolments.	This assessment recommends for discussion with DET to confirm its position on this matter.	
Public art & other cultural facilities	Not applicable.	Because of the prominence of the subject site, scale of proposed development and potential inclusion of a community hub, this assessment suggests there is merit in providing 2 installations of public art within the subject site, preferably within a proposed open space location likely to be a focal point for community gatherings.	Yes, with a total nominal value of $20,000
Pedestrian / bicycle pathways	Council has expressed the following in relation to pedestrian and bicycle path measures for the subject site: • *"Knox City Council's draft Municipal Strategic Statement (Knox Planning Scheme Amendment C150) encourages development that contributes towards an active, safe and accessible transport network (supporting Objective 2, Cl.21.09-1 and Objective 1 of Cl.21.08 as exhibited in Amendment C150 Planning Scheme Rewrite). Strategies include providing footpaths and cycle paths to complement the existing path network and improve safety, connectivity and accessibility and enhancing*	Development at the subject site should be linked into Council's existing and proposed cycling and pedestrian networks to provide for both commuter and recreational users. To contribute to the integration of the subject site with existing surrounding infrastructure, it is recommended that the proposed development provide improvements to bicycle and pedestrian infrastructure that facilitate movement to key locations within and adjoining the subject site, with a particular focus on the development of pathways along the transmission easement.	To be included within the proposed masterplan for the site.

Service / Community infrastructure type	Key Assessment Findings	Recommended Response Measures	Is the recommended response likely to form part of a development contributions agreement (either a DCP or Section 173 agreement)?
	pedestrian accessibility to public transport facilities. Knox City Council is currently updating its Principal Pedestrian Network and through connections for the site should be considered to provide better connections to the SmartBus stops on Stud Road to the west of the site. Accessibility to surrounding community facilities should also be considered. These opportunities should be investigated as part of a future transport and movement report".		
Justice, Police & Emergency Services	• The 1.5-kilometre population catchment and beyond is well serviced by the Rowville Police Station, Rowville Ambulance Station, Rowville CFA Station and the Scoresby CFA Station. Therefore, likely response times for Police and other emergency services to the subject site appear to be more than satisfactory.	No response recommended.	No
Health Services	• There is only one acute hospital facility located within the 1.5 km radius of the subject site – The Valley Private Hospital. • However, quite a number of other acute facilities are located between 5 to 8 kilometres from the site including the Monash Medical Centre, Sir John Monash Private Hospital, South Eastern Private Hospital, Angliss Hospital and Knox Private Hospital. • The subject site generates the equivalent of 9 public and private hospital beds, 65 community health clients, 1 general practice and 1 dental practice.	Given its location and lack of proposed town centres, the Waverley Golf Course development does not warrant future engagement with the Department of Health and Human Services, or any other private or community based health provider.	No

Service / Community infrastructure type	Key Assessment Findings	Recommended Response Measures	Is the recommended response likely to form part of a development contributions agreement (either a DCP or Section 173 agreement)?
Aged Care	• There are no residential aged care providers located within 1.5 kilometres of the subject site. • The subject site generates the equivalent of 47 additional aged care places.	The supply of residential aged care beds within the 1.5-kilometre population suggests that additional provision within the subject site may be both desirable and generate commercial interest from existing residential aged care providers.	No

6 Conclusions and Recommendations

A summary of key conclusions and recommendations is summarised below. These are divided into various community infrastructure categories.

6.1 Dwelling & Population Assumptions

Using ASR Research's previous experience of undertaking community infrastructure assessments, the implications of this population profile can be summarised as follows:

- The population yield likely to be generated by the subject site (approximately 2,270 residents) is likely to increase the population of Rowville South by approximately 21%; and
- An additional 2,270 people will generate a sufficient level of demand for local services and facilities to warrant either on-site or off-site community infrastructure initiatives (or combination of both) to satisfy those demands.

Based on the information obtained and analysed in the previous sections of this report the following conclusions and recommendations have been identified.

6.2 Public Open Space & Recreation

The proposed Waverley Golf Course development is sufficiently large (both in population terms and area size), and contains physical features (e.g. transmission easement) that warrants the provision of a diverse open space strategy, consisting of a mixture of passive and active open space initiatives as described below.

Passive Open Space

1. Under the current Knox Planning Scheme the proposed development would be required to provide a public open space contribution of 8.5% (which equates to 2.31 hectares of public open space). The current Development Plan public open space contribution is 4.38 hectares (16.13% of NDA) and exceeds the planning scheme requirement by 2.07 hectares.
2. Based on the open space hierarchy presented within the Knox Open Space Plan (2012-2022) Waverley Golf Course is sufficiently large (both in population and in land area), and has various physical attributes (e.g. transmission easement) to reasonably expect the provision of a mixture of open space forms including:

- Linear open space corridors;
- Local parks; and
- Potentially an active open space.

3. These proposed open spaces should be delivered in accordance with Council's open space design guidelines as outlined in the Knox Open Space Plan.
4. Council has already provided feedback that the transmission easement could provide for open space, with links to Churchill Park to the south of the site. The State Planning Policy Framework supports creating open spaces to meet a variety of needs with links to regional parks (Clause 15.01-3). It believes open space should be multi-purpose combining open space recreation with pedestrian and cycle movement and habitat corridors. It could also include opportunities for outdoor fitness/exercise park (subject to the restrictions of AusNet Services). This assessment supports this request.
5. Council has also requested that part of the open space developed for the site cater dog off leash activities and include a community garden. Again, this assessment supports these suggestions with the existing power line easement providing a potentially suitable location.

Active Open Space

6. Given confirmation of the existing capacity constraints in Rowville, and the opportunity the subject site affords for additional active open space provision, this assessment recommends that the proponent and Council continue to assess the viability of including outdoor sporting infrastructure close to the transmission line easement. Because of the irregularity of the subject site and the presence of the transmission easement, sports with a smaller land requirement (e.g. soccer, outdoor netball, tennis) are recommended subject to Council confirming demand for such sports.

Indoor Recreation Facilities

7 The provision of existing high ball indoor recreation centres and Council indoor aquatic leisure facilities within or close to the catchment area is considered to be adequate; both in terms of supply and proximity. Therefore, no response measures are recommended.

6.3 Community Services

Early Years Services

8 The demand estimates for Kindergarten services generated by the subject site appears to warrant either an expansion to existing Kindergarten facilities nearest to the development,

or the establishment of a small early years facility within the subject site. Responsibility for determining the preferred option will rest with Knox City Council.

9 There is insufficient evidence to support the provision of an additional long day child care service within Waverley Golf Course.

10 The supply of existing MCH services and the MCH demand estimates do not warrant a new MCH facility within the development.

11 Due to a combination of insufficient demand generated by the proposed development, and existing supply levels, no additional provision measures for occasional childcare is recommended.

12 Demand estimates for playgroup appear not to warrant a new dedicated playgroup facility within the development.

Council Community Centre

13 The establishment of a small Council community centre within the development, potentially consisting of general community meeting space and Kindergarten programs, is worthy of further discussion with Council. It is recommended that the proponent confirm Council's position on this potential provision item.

Library

14 The provision of existing library facilities within the catchment area is considered to be adequate; both in terms of supply and proximity. Therefore, no response measures are recommended.

6.4 Education

15 The Department of Education and Training (DET), who were contacted as part of this assessment in 2018, indicated there were no plans to establish additional Government schools in the area. However, at that stage, upgrade and expansion to the capacity of Rowville Secondary College remained a priority. DET have previously expressed a possible (but not confirmed) interest in discussing with the proponent of the Waverley Golf Course development the potential for including a future school within Strategic Site 13. Under the scenario that DET wishes to pursue additional provision within Strategic Site 13, the proponent considers the south west corner of Site 13 (potentially to be rezoned commercial) to be a preferred location rather than the Waverley Golf Course.

16 This assessment recommends for discussion with DET to confirm its position on this matter.

6.5 Public Art

17 Because of the prominence of the subject site, scale of proposed development and potential inclusion of some form of community infrastructure hub, this assessment suggests there is merit in providing the installation of public art within the subject site, preferably within a proposed open space location likely to be a focal point for community gatherings. The developers of Waverley Golf Course are encouraged to discuss with Council potential themes and cultural interpretation opportunities.

6.6 Pedestrian & Bicycle Pathways

18 To contribute to the integration of the subject site with existing surrounding infrastructure, it is recommended that the proposed development provide improvements to bicycle and pedestrian infrastructure that facilitates movement to key locations within and adjoining the subject site.

6.7 Health

19 Given its location and nearby existing facilities in the area, the Waverley Golf Course development proposal does not warrant future engagement with the Department of Health and Human Services, or any other private or community based health provider.

6.8 Other General Conclusions and Recommendations

20. The community infrastructure recommendations identified above are generally consistent and supportive of the literature material reviewed in this report.

6.9 Process related conclusions and recommendations

21 The initial community infrastructure priorities identified above will require further discussion with Knox City Council. These discussions will most likely commence when Council receives this assessment and is asked to comment gain momentum when Intrapac lodges the formal rezoning submission with Knox City Council.

Appendices

Appendix 1a. Review of Relevant Clauses from the State Planning Policy Framework (SPPF)

Clause	Objectives / Strategies
11.03 PLANNING FOR PLACES	
11.03-1S Activity centres	Objectives • To encourage the concentration of major retail, residential, commercial, administrative, entertainment and cultural developments into activity centres that are highly accessible to the community.
11.03-1R Activity centres - Metropolitan Melbourne	Strategies • Support the development and growth of Metropolitan Activity Centres by ensuring they: • Are able to accommodate significant growth for a broad range of land uses. • Are supported with appropriate infrastructure. • Are hubs for public transport services. • Offer good connectivity for a regional catchment. • Provide high levels of amenity. • Locate significant new education, justice, community, administrative and health facilities that attract users from large geographic areas in or on the edge of Metropolitan Activity Centres or Major Activity Centres with good public transport. • Locate new small scale education, health and community facilities that meet local needs in or around Neighbourhood Activity Centres. • Ensure Neighbourhood Activity Centres are located within convenient walking distance in the design of new subdivisions.
11.03-6S Regional and local places	To facilitate integrated place-based planning. Strategies • Integrate relevant planning considerations to provide specific direction for the planning of sites, places, neighbourhoods and towns. • Consider the distinctive characteristics and needs of regional and local places in planning for future land use and development.
19.02 COMMUNITY INFRASTRUCTURE	
19.02-1S Health facilities	Objective • To assist the integration of health facilities with local and regional communities.
19.02-1R Health precincts - Metropolitan Melbourne	Strategies • Facilitate health and community wellbeing precincts through the co-location of: • Hospitals, allied health services and not-for-profit health providers at the regional level. • General practitioners, community health facilities, allied health services and not-for-profit health providers at the neighbourhood level. • Create health precincts in new suburbs in or close to town centres. • Ensure health precincts are well serviced by community services.
19.02-2S Education facilities	Objective • To assist the integration of education and early childhood facilities with local and regional communities.

Clause	Objectives / Strategies
	Strategies • Consider demographic trends, existing and future demand requirements and the integration of facilities into communities in planning for the location of education and early childhood facilities. • Locate childcare, kindergarten and primary school facilities to maximise access by public transport and safe walking and cycling routes. • Ensure childcare, kindergarten and primary school facilities provide safe vehicular drop-off zones. • Locate secondary school and tertiary education facilities in designated education precincts and areas that are highly accessible to public transport. • Locate tertiary education facilities within or adjacent to activity centres. • Ensure streets and accessways adjoining education and early childhood facilities are designed to encourage safe bicycle and pedestrian access. • Develop libraries as community based learning centres.
19.02-2R Education precincts - Metropolitan Melbourne	Strategy • Ensure education precincts are well serviced by community services.
19.02-3S Cultural facilities	Objective • To develop a strong cultural environment and increase access to arts, recreation and other cultural facilities. Strategies • Encourage a wider range of arts, cultural and entertainment facilities including cinemas, restaurants, nightclubs and live theatres in the Central City and at Metropolitan Activity Centres. • Reinforce the existing major precincts for arts, sports and major events of state wide appeal. • Establish new facilities at locations well served by public transport.
19.02-3R Cultural facilities - Metropolitan Melbourne	Strategies • Maintain and strengthen Melbourne's distinctiveness as a leading cultural and sporting city with world-class facilities.
19.02-4S Social and cultural infrastructure	Objective • To provide fairer distribution of and access to, social and cultural infrastructure. Strategies • Identify and address gaps and deficiencies in social and cultural infrastructure, including additional regionally significant cultural and sporting facilities. • Encourage the location of social and cultural infrastructure in activity centres. • Ensure social infrastructure is designed to be accessible. • Ensure social infrastructure in growth areas, is delivered early in the development process and in the right locations. • Plan and design community places and buildings so they can adapt as the population changes and different patterns of work and social life emerge. • Support innovative ways to maintain equitable service delivery to settlements that have limited or no capacity for further growth, or that experience population decline. • Identify and protect land for cemeteries and crematoria.
19.02-5S Emergency services	Objective

Clause	Objectives / Strategies
	• To ensure suitable locations for police, fire, ambulance and other emergency services. Strategies • Ensure police, fire, ambulance and other emergency services are provided for in or near activity centres. • Locate emergency services together in newly developing areas.
19.02-6S Open space	Objective • To establish, manage and improve a diverse and integrated network of public open space that meets the needs of the community. Strategies • Plan for regional and local open space networks for both recreation and conservation of natural and cultural environments. • Ensure that open space networks: • Are linked, including through the provision of walking and cycling trails. • Are integrated with open space from abutting subdivisions. • Incorporate, where possible, links between major parks and activity areas, along waterways and natural drainage corridors, connecting places of natural and cultural interest. • Maintain public accessibility on public land immediately adjoining waterways and coasts. • Create opportunities to enhance open space networks within and between settlements. • Ensure that land is set aside and developed in residential areas for local recreational use and to create pedestrian and bicycle links to commercial and community facilities. • Ensure that land use and development adjoining regional open space networks, national parks and conservation reserves complements the open space in terms of visual and noise impacts, preservation of vegetation and treatment of waste water to reduce turbidity and pollution. • Improve the quality and distribution of open space and ensure long-term protection. • Protect large regional parks and significant conservation areas. • Ensure land identified as critical to the completion of open space links is transferred for open space purposes. • Ensure that where there is a reduction of open space due to a change in land use or occupation, additional or replacement parkland of equal or greater size and quality is provided. • Ensure that urban open space provides for nature conservation, recreation and play, formal and informal sport, social interaction, opportunities to connect with nature and peace and solitude. • Accommodate community sports facilities in a way that is not detrimental to other park activities. • Ensure open space provision is fair and equitable with the aim of providing access that meets the needs of all members of the community, regardless of age, gender, ability or a person's location. • Develop open space to maintain wildlife corridors and greenhouse sinks. • Provide new parkland in growth areas and in areas that have an undersupply of parkland. • Encourage the preparation of management plans or explicit statements of management objectives for urban parks. • Ensure exclusive occupation of parkland by community organisations is restricted to activities consistent with management objectives of the park to maximise broad community access to open space.

Clause	Objectives / Strategies
	• Ensure the provision of buildings and infrastructure is consistent with the management objectives of the park. • Ensure public access is not prevented by developments along stream banks and foreshores. • Ensure public land immediately adjoining waterways and coastlines remains in public ownership. • Plan open space areas for multiple uses, such as community gardens, sports and recreation, active transport routes, wildlife corridors and flood storage basins.
19.02-6R Open space - Metropolitan Melbourne	Objective • To strengthen the integrated metropolitan open space network. Strategies • Develop a network of local open spaces that are accessible and of high-quality and include opportunities for new local open spaces through planning for urban redevelopment projects. • Ensure major open space corridors are protected and enhanced. • Develop open space networks in growth areas and in the surrounding region of Metropolitan Melbourne, where existing open space is limited and demand is growing, including: • Cardinia Creek Parklands. • Cranbourne Regional Park. • Kororoit Creek Corridor. • Quarry Hills Regional Park. • Chain of Parks - Sandbelt. • Sunbury Regional Park - Jacksons Creek Valley. • Toolern Creek Regional Park. • Werribee Township Regional Park. • Create continuous open space links and trails along the: • Frankston parklands (linking existing parks from Carrum to Mornington). • Maribyrnong River parklands. • Merri Creek parklands (extending to Craigieburn). • Western Coastal parklands (linking Point Gellibrand, Point Cook and Werribee). • Yarra River parklands (extending from Warrandyte to the Port Phillip Bay). • Provide long term planning protection to meet demand for future open space along the Plenty Gorge parklands, Yarra Valley parklands, Cardinia Creek parklands, Heatherton/Dingley 'Sandbelt' parklands and Dandenong Valley parklands. • Protect the metropolitan water's edge parklands from intrusion and encroachment of development that impacts on open space and their natural landscape setting. • Continue development of the lower Yarra River as a focus for sport, entertainment and leisure. • Support establishing community gardens and productive streetscapes.

Appendix 1b. Local Planning Policy Framework (LPPF)

Clause 21.01-2 Key Issues and Influences

The key planning issues and influences affecting the City of Knox include:

Environment and landscape values

- Protecting the Dandenong Foothills, Sites of Biological Significance and other areas of significant biological and landscape value from inappropriate development.
- Loss of vegetation, tree canopy and habitat eroding Knox's 'green and leafy' image.
- Habitat fragmentation.

Housing

- A growing population requires increased housing supply in Activity Areas, Local Living areas and some Strategic Investigation Sites outside of the Dandenong Foothills.
- Knox's community is ageing and diversifying, requiring more diverse and accessible housing options.
- Knox's supply of social housing is below the Melbourne Metropolitan average.
- Managing the density and scale of activity centres located in the Dandenong Foothills.

Community development

- Enhancing the liveability of Knox.
- Providing a range of community facilities, infrastructure and open space to meet the needs of an increasing and ageing population and to support health and wellbeing.
- Continued development of the Wantirna Health Precinct as a State significant health precinct that will serve a growing and ageing population.
- Minimising harmful social impacts from gaming and licensed premises.

Transport and Infrastructure

- Large parts of the municipality are poorly served by public transport.
- Providing integrated transport options to reduce high rates of private car usage.
- Linking and providing quality infrastructure for walking and cycling.
- Improving accessibility and mobility for people of all abilities.
- The need to fund new or upgraded infrastructure as a result of new development.
- Improving efficiency, reducing the impacts of stormwater run-off and protecting the ecological health of waterways and wetlands with integrated water management solutions.

Clause 21.02 Vision

Knox Vision: Our City, Our Future 2013-17 articulates the community and Knox City Council vision for the desired future of Knox under five aspirations. The Knox City Plan (incorporating the Council Plan) 2013-17 sets out objectives to achieve these aspirations:

- Healthy, connected communities.
- Prosperous, advancing economy.
- Vibrant and sustainable built and natural environments.
- Culturally rich and active communities.
- Democratic and engaged communities.

The Integrated City Strategy and Implementation Plan 2015-17 sets out strategic direction for how Knox City Council will deliver the Knox Vision and Knox City Plan with 15 integrated strategies:

- Encourage local living by providing a positive local amenity that makes it attractive to live and work in Knox.
- Improve lifelong learning opportunities in Knox by raising community awareness of and increasing access to learning options for all ages.
- Appropriately plan and provide guidance for land use and development by responding to changing family/living structures and other drivers of change.
- Enhance and protect biodiversity and the green leafy image by proactively managing local waterways, wildlife and significant vegetation communities, landscape character and streetscapes.
- Improve the physical and mental health and wellbeing of people in Knox and mitigate lifestyle risks through the provision of high-quality services, support, infrastructure, partnerships, advocacy and regulation.
- Ensure the municipality is responsive to people at all stages of life by developing policies, plans, services and infrastructure that recognise the range of needs that arise across the lifespan.
- Support community resilience to external influences through efficient use of local energy, water and waste resources and planning for adaptation in response to a changing climate.
- Enable people in Knox to participate in community life by providing high quality infrastructure and public space and access to services and facilities.
- Enable improved transport choices supported by integrated and sustainable transport systems and infrastructure.

- Improve business reach and growth into national and global markets and boost local employment by supporting the development of local businesses with a particular focus on advanced manufacturing, health, ageing and business services sectors.
- Support business and employment growth by promoting the need for improved infrastructure and technology requirements within the municipality and enhancing strategic employment places for business.
- Improve safety in Knox by working together to address community safety problems, family violence and child and elder abuse.
- Enhance community connectedness and leadership by enabling and empowering individuals and supporting community groups to operate in an increasingly regulated environment.
- Enable people to celebrate and feel proud of Knox's diverse culture and local identity by participation in artistic expression and protecting and enhancing the cultural heritage and strengths of Knox.
- Ensure Knox City Council is contemporary, effective and well governed through the pursuit of excellence in Council practices, projects and service delivery.

The Dandenong Valley Parklands are a series of regionally significant reserves extending 10 kilometres along the Dandenong Creek. A large area of the Parklands are within Knox, with EastLink situated along the eastern edge of the Parklands between the creek and residential areas. It is one of the most highly visited and popular parks in Melbourne.

Clause 21.03 Environmental and Landscape Values

Key issues identified by this Clause include:

- Maintaining the unique landscape character, amenity and natural values of Knox's significant landscapes, including the Dandenong Foothills, Lysterfield Valley and the Dandenong Creek Valley, despite development pressures and managing bushfire risk.
- The opportunity in the Dandenong Valley Parklands to consolidate the many disjointed component parklands and reserves since the construction of EastLink.

The key objectives of this Clause are:

Objective 1 - To protect and strengthen treed character and landscape value across all areas in Knox.
Objective 2 - To retain and enhance native vegetation in Knox, in extent and ecological condition.
Objective 3 - To protect and enhance the natural values of Sites of Biological Significance.
Objective 4 - To maintain the diversity and genetic integrity of indigenous flora and fauna within Knox to prevent species from becoming locally extinct.

Objective 5 - To protect and enhance the network of habitat and creek corridors, as key public, landscape and environmental assets.
Objective 6 - To protect and enhance the role of Knox's significant landscapes.
Objective 7 - To protect existing and potential aesthetic, biodiversity, landscape, amenity, cultural and agricultural values of rural and green wedge land.

The key strategies identified by this Clause include:

5.1 Develop and enhance the creek corridor system as a network of paths, public open space, and natural systems with a sense of address.
5.2 Support an improved network of habitat corridors and waterways to connect sites of biological significance and other areas of indigenous vegetation.
5.3 Support interaction of public and private realms along creek corridors and waterways.
5.4 Support and strengthen opportunities for creek corridors being actively used as public spaces, with high levels of connectivity from nearby urban areas, enhancing their role as places for social, recreational, cultural and community activities.
5.5 Manage bushfire risks of natural corridors and adjoining land.
6.5 Protect and enhance the landscape quality and role of the Dandenong Creek Valley as a wide, green pastoral break separating Knox from the suburban character of the balance of the eastern suburbs of Melbourne.
6.6 Limit development within the Dandenong Foothills, Lysterfield Valley and Dandenong Creek Valley that may compromise their landscape and environmental significance.
7.5 Minimise the visual dominance of development in:

- Rural and green wedge land.
- Along the Dandenong Creek Valley.

Future strategic work by this Clause include:

- Work with State Government agencies and neighbouring municipalities to strategically plan for, consolidate and improve the recreational activities and landscape characteristics of the Dandenong Valley parklands, and to address interface issues between parkland and urban development.
- Review planning strategies and zoning in the area surrounding the Dandenong Valley Parklands to ensure consistency with objectives for development of the park.
- n partnership with Melbourne Water, develop a masterplan for Lewis Park and the Blind Creek Corridor.

Clause 21.06 Housing

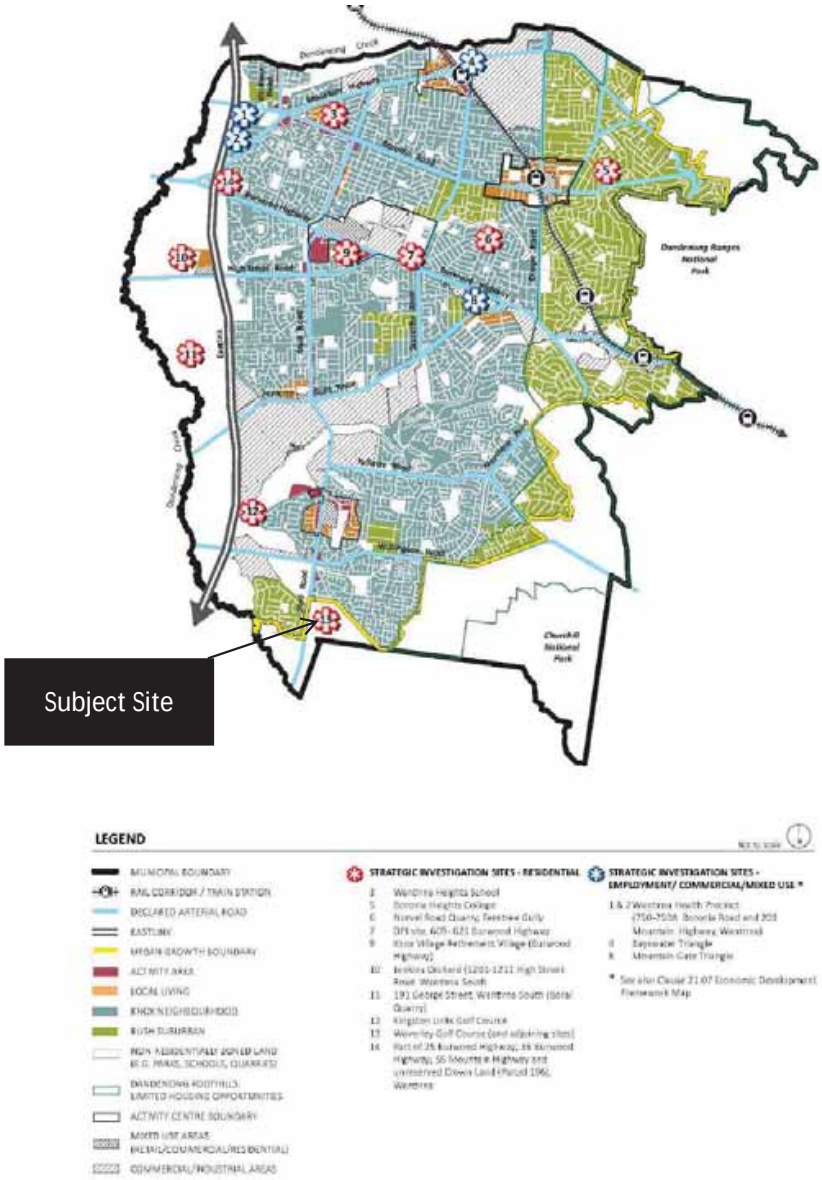
The key objectives of this Clause are:

Objective 1 - To support a scaled approach to residential development in accordance with the Knox Housing Strategy 2015.
Objective 2 - To support a diversity of housing choices (styles, types, forms and sizes) to cater for the Knox community's current and future needs, in appropriate locations.
Objective 3 - To provide residential development that allows people to 'age-in-place'.
Objective 4 - To support high quality housing design that responds to the City's 'green and leafy' character, local character and creates a strong sense of place.
Objective 5 - To protect and enhance the landscape and environmental values of natural areas of significance within the municipality.
Objective 6 - To reduce the risk and impacts of bushfire in the high risk areas of the Foothills of the Dandenong Ranges and Lysterfield.
Objective 7 - To support some non-residential uses in appropriate residential areas without impacting on residential amenity or creating defacto commercial precincts.

The key strategies of this Clause include:

2.1 Support a diverse range of housing, including smaller dwellings.
2.2 Support developments of three or more dwellings in Activity Areas and Local Living areas that include a mix of sizes (including 1 and 2 bedroom dwellings).
2.3 Support development that includes social housing, particularly in Activity Centres, Strategic Investigation Sites and other large-scale sites.
2.4 Support social housing on Council-owned sites.
3.1 Support smaller scale dwellings that cater for older people.
3.2 Support new residential aged care facilities, except in Bush Suburban areas within the Dandenong Foothills or in a Site of Biological Significance.
3.3 Support the diversification of existing aged care facilities to provide a range of housing and care levels on-site.

Waverley Golf Course
Community Infrastructure Assessment



Clause 21.08 Community Development

Liveability

Objective 1

To provide for communities that are walkable, accessible, safe and attractive to support the health and wellbeing of the community.

Strategies

1.1 Support development that promotes a more compact, connected, efficient and accessible urban form.

1.2 Require land use and development in Strategic Investigation Sites and on other large development sites to maximise walkability and incorporate landscaped pedestrian and bicycle paths and links to open space and community facilities.

1.3 Support development that contributes to vibrant, well-serviced and accessible activity centres, with a range of shops and services and community, cultural and recreational facilities that meet the daily needs of communities.

1.4 Support development that is attractive, well landscaped, pedestrian friendly and promotes opportunities for social interaction, recreation and enjoyment of the arts.

Open space and recreation

Objective 2

To provide a safe, accessible, linked and functional open space network which meets community needs.

Strategies

2.1 Provide active and passive open space in new and existing communities to meet the needs of a changing population.

2.2 Require the planning for new development to provide for safe, accessible and linked open space while protecting and enhancing its natural landscape and environmental values.

2.3 Require open space to be integrated with surrounding development.

2.4 Require active street frontages and community surveillance to open space areas.

2.5 Support the use and development of open space that is compatible with the desired purpose and function of the open space area.

2.6 Require new subdivisions to contribute to the provision and/or improvement of public open space.

2.7 In partnership with Melbourne Water, develop a masterplan for Lewis Park and the Blind Creek corridor.

Community facilities

Objective 3

Facilitate community infrastructure that is accessible and meets the existing and future needs of the community.

Strategies

3.1 Support community facilities that are co-located, integrated and/or multipurpose to service a range of activities.

3.2 Support accessible community facility hubs as focal points for community activity.

3.3 Direct community facilities and services, particularly those providing essential services such as education, employment, and health care to be visible, accessible and located near nodes of activity and public transport routes.

3.4 Direct community, health and education facilities that have a municipal or regional catchment to be located within the Knox Central Activity Centre or the Wantirna Health Precinct.

3.5 Support key community development proposals that provide active, secure and safe public realm opportunities.

3.6 Provide and support a range of community infrastructure and services that serve individuals and families throughout their life cycle.

3.7 Support the design of community facilities to be flexible and adaptable to accommodate a variety of uses through the building lifespan.

Health and education facilities

Objective 4

To provide health and education facilities that are accessible, adaptable and meet community needs.

Strategies

4.1 Support the co-location of primary, secondary and tertiary health services and human services, particularly in the Wantirna Health Precinct.

4.2 Support the establishment of new medical and health facilities in and around activity centres and close to public transport.

4.3 Support retention and expansion of education and training facilities, including lifelong learning opportunities, in accessible locations across the municipality, to service the needs of residents and workers.

4.4 Facilitate and support development of the Wantirna Health Precinct with a focus on health, education and other community uses.

Schedule to Clause 53.01 Public Open Space Contribution and Subdivision

The Schedule indicates the likely public open space contribution rates that can be anticipated for the subject site. The Table shown in the Schedule (as shown below) indicates a rate of 8.5% of the total land to be subdivided can be expected to be applied to the subject site.

Type or location of subdivision	Amount of contribution for public open space
Subdivision of land into lots having an area of 725 square metres or greater in a Residential Growth Zone, General Residential Zone or Neighbourhood Residential Zone.	Minimum of 5% of the total land to be subdivided.
Subdivision of land which includes lots having an area of less than 725 square metres in a Residential Growth Zone, General Residential Zone or Neighbourhood Residential Zone.	Minimum of 8.5% of the total land to be subdivided.

Appendix 1c. Plan Melbourne 2017

Key Outcomes and Strategies

Outcome 02: Melbourne provides housing choice in locations close to jobs and services

Manage the supply of new housing in the right locations to meet population growth and create a sustainable city

- Maintain a permanent urban growth boundary around Melbourne to create a more consolidated, sustainable city
- Facilitate an increased percentage of new housing in established areas to create a city of 20-minute neighbourhoods close to existing services, jobs and public transport
- Plan for and define expected housing needs across Melbourne's regions
- Provide certainty about the scale of growth in the suburbs

Deliver more housing closer to jobs and public transport

- Facilitate well-designed, high-density residential developments that support a vibrant public realm in Melbourne's central city
- Direct new housing and mixed-use development to urban-renewal precincts and sites across Melbourne
- Support new housing in activity centres and other places that offer good access to jobs, services and public transport
- Provide support and guidance for greyfield areas to deliver more housing choice and diversity

- Require development in growth areas to be sequenced and staged to better link infrastructure delivery to land release

Increase the supply of social and affordable housing

- Utilise government land to deliver additional social housing
- Streamline decision-making processes for social housing proposals
- Strengthen the role of planning in facilitating and delivering the supply of social and affordable housing
- Create ways to capture and share value uplift from rezonings

Facilitate decision-making processes for housing in the right locations

- Support streamlined approval processes in defined locations
- Facilitate the remediation of contaminated land, particularly on sites in developed areas of Melbourne with potential for residential development

Provide greater choice and diversity of housing

- Facilitate housing that offers choice and meets changing household needs
- Provide a range of housing types in growth areas

Outcome 05: Melbourne is a city of inclusive, vibrant and healthy neighbourhoods

Create a city of 20-minute neighbourhoods

- Create mixed-use neighbourhoods at varying densities
- Support a network of vibrant neighbourhood activity centres

Create neighbourhoods that support safe communities and healthy lifestyles

- Improve neighbourhoods to enable walking and cycling as a part of daily life

Deliver community infrastructure to support strong communities

- Facilitate a whole-of-government approach to the delivery of community infrastructure
- Create health and education precincts to support neighbourhoods
- Support not-for-profit community services to build social capital and stronger communities
- Provide and protect land for cemeteries and crematoria

Deliver local parks and green neighbourhoods in collaboration with communities

- Develop a network of accessible high-quality, local open spaces
- Support community gardens and productive streetscapes

Subject Site in the Context of Eastern Region Plan

The subject site is located within the Eastern Region of Metropolitan Melbourne. Figure 5 on the following page shows the location of the subject site in the context of the Eastern Region Plan produced as part of Plan Melbourne 2017. Figure 6 shows the subject site's proximity to nearby activity centre, higher order health and education precincts and major regional open spaces. These include:

- Rowville – Stud Park major activity centre (2.4 kilometres to the north);
- Knox Private Hospital (12 kilometres to the north – a designated health precinct);
- Monash National Employment and Innovation Cluster (NEIC) to the south west which includes:
  - Monash University Precinct, Clayton (10 kilometres to the west – a designated health and education precinct); and
  - Monash Medical Centre (12 kilometres to west – a designated health precinct).
- Churchill National Park (3.6 kilometres to the south east); and
- Lysterfield Lake & Park (11 kilometres to the south east).

Figure 5 - Extract of Eastern Metropolitan Plan

Appendix 1d. Other Relevant Council Strategic Documents

Table 6 – Existing Strategic Directions & Actions Potentially Relevant to the Assessment

Strategy
Corporate Strategies
Knox Community & Council Plan 2017–2021 The Plan is Knox's roadmap for the future. It describes the desired future state, what it is going to focus on for the next ten years and beyond, and what Knox City Council has committed to for the next four years to help get it there. Vision 2035 The Plan includes a Vision 2035 statement: *"Nestled between the foothills of the Dandenong Ranges and the wetlands of the Dandenong Creek Valley, Knox has a rich natural environment and picturesque landscape, highly valued by residents and visitors alike. Knox encompasses the best of city and suburban living. From the thriving modern city vibe of Knox Central at its heart, plentiful public open spaces, outstanding civic facilities and diverse residential offerings to its leafy suburban centres with abundant space, clean air, excellent schools and good transport links, Knox is the preferred place to live, work and play today and for generations to come".* The key goals of the Plan are: Goal 1 — We value our natural and built environment Goal 2 — We have housing to meet our changing needs Goal 3 — We can move around easily Goal 4 — We are safe and secure Goal 5 — We have a strong regional economy, local employment and learning opportunities Goal 6 — We are healthy, happy and well Goal 7 — We are inclusive, feel a sense of belonging and value our identity Goal 8 — We have confidence in decision making Some of the key relevant actions contained within the plan are: 1.3.5 Incorporate in the development of the Strategic Asset and Investment Strategy, Community Infrastructure Plans in key locations with models for alternative funding to enable the development of multi-use community facilities and infrastructure. 2.1.2 Implement Council's Housing Strategy including facilitation of strategic redevelopment sites. 2.3.1 Implement the Affordable Housing Action Plan including advocacy for an increase for the supply of social and affordable housing at key strategic sites and across the municipality. 2.3.2 Explore and where appropriate leverage Council's own land to pilot and partner the development of a range of housing models. 3.2.2 Increase the number of cyclists using Council's shared path networks. 5.2.2 Continue to implement the Knox Central program to progress the development of a new Civic and Arts precinct for Knox. 5.2.3 Advance the planning for the Wantirna Health Precinct in partnership with the Metropolitan Planning Authority and Department of Economic Development, Jobs, Transport and Resources. 5.2.4 Initiate a Precinct Investment Plan for Wantirna Health Precinct and the enabling planning and implementation frameworks. 5.3.3 Progress the development, implementation and evaluation of Development Contributions Plan (DCP) planning including addressing infrastructure information gaps and mapping necessary to inform these plans. 5.4.3 Construct and open two Early Years Hubs in Wantirna South and Bayswater to support early education, life long learning and improved physical and mental health. 6.2.1 Develop an Aquatic Plan. 6.2.2 Develop a Pavilion Plan. 6.2.3 Progressively upgrade Council's sporting facilities in line with universal design to support an increase in female participation in sport. 7.2.2 Further develop partnerships with community houses for extended programming related to digital literacy. 7.3.1 Advocate and plan for the development of a Bayswater Multipurpose Community Facility. 7.3.2 Support the development of the new The Basin Community House on The Basin Primary School site. 7.3.7 Relocate the Knox City Library service and Youth Information Centre within Knox Westfield.
Housing
Knox Housing Strategy (2015) The Knox Housing Strategy 2015 sets out Council's plan for managing residential development to respond to the current and future needs of the Knox community.

Strategy

The Knox Housing Strategy 2015 aims to meet future housing needs whilst protecting and enhancing the green and leafy character of the municipality. This will be achieved by:

- Identifying preferred locations for new housing (in parts of Knox with good access to existing infrastructure and services, such as public transport, shops and schools).
- Identifying non-preferred locations for new housing (areas where there are environmentally significant vegetation or landscape character elements that should be protected).
- Giving current and future Knox residents choices about the type, size and location of housing within the City.
- Assisting developers and investors understand where and what types of housing are preferred, and where not to build.
- Assisting Council and other government agencies to decide where to invest in infrastructure and services.
- Providing guidance and therefore assisting residents with choices of where to live and businesses where to locate.

Some notable future trends that are forecast include:

- The growth rate of new households is high and the average household size is expected to decrease. More new households will be forming.
- The 60+ age group is expected to be the fastest growing, but the 35-49 age group will continue to be the largest age group.
- Families with children will continue to be the dominant household type, at nearly double the next closest group of couple-only households.
- Couple-only and one-person households are the fastest growing household types.
- Given that the predominant household type in Knox will continue to be families with children, it is expected that there will continue to be demand for larger, 3-4 bedroom housing.
- However, there will also be a need for some smaller, 1-2 bedroom housing for the growing number of one-person households.
- Some couple-only households may require larger homes, while others may prefer smaller ones. Given the expected increase in the 60+ age group, it is likely that many couple-only households will be older people wishing to downsize to a smaller house.

The Strategy identifies fourteen sites as Strategic Investigation Sites including the subject site. In relation to the site the Strategy states:

It is considered that the site may be suitable for a mix of commercial and residential land. The following elements must be satisfactorily addressed through any future planning process for the site:

- *Council's preference is that primary access to the site is not via George Street. Access via George Street will only be supported if sufficient evidence is provided that this would not result in unreasonable loss of amenity in existing residential areas.*
- *The provision of public open space.*
- *A suitable mix of uses to suit the strategic location of the site. The provision of employment generating land is encouraged.*
- *Maintaining the integrity of the Dandenong Valley Parklands.*
- *Effectively and constructively dealing with the constraints of the site such as flooding, power lines, vegetation and topography.*
- *Ensuring that the safety and amenity of any residential development is protected by applying the precautionary principle to development near closed landfill sites, development near existing materials recycling centre and Eastlink.*

The Strategy acknowledges that the Planning Scheme can only encourage the provision of social housing – there is currently no means of specifying the provision of social housing within the Planning Scheme. However, it can be negotiated during the process of amending the Knox Planning Scheme to rezone land for residential use. Negotiations such as this also need a willing social housing provider – either the Office of Housing or a Registered Housing Association.

Knox Affordable Housing Action Plan 2015-2020

The key focus of the Action Plan is to increase the supply of social housing. Social housing provides for the most vulnerable and disadvantaged households in Knox. Council has a greater capacity to influence this market in partnership with social housing providers that are responsible for financing, constructing and managing social housing in Victoria. Council's options to influence affordability within the private housing market are limited because the Victorian planning system does not currently allow councils to require developers to contribute to affordable and/or social housing.

Council has forecast that an additional 860 social housing dwellings will be needed in Knox by 2036 to meet minimum requirements, as well as more diverse and affordable housing options generally. Key approaches to achieve an increased supply across the municipality include:

- A strengthened advocacy role through the Eastern Affordable Housing Alliance;
- Continued engagement and partnership development with social housing providers;
- Negotiation with developers for a voluntary contribution to social housing (of approximately 5%) on larger-scale development sites (on a case-by-case basis);

Strategy

- A commitment by Council to provide for at least 5% social housing on Council-owned development sites;
- Ensuring that the need for affordable and social housing is considered and addressed in the development of structure plans and other place-based strategic plans for Activity Centres and Strategic Investigation Sites;
- Continuing the Housing Monitoring Program to understand housing needs in Knox and measure changes in the supply of social housing; and
- An ongoing commitment to raising the community's awareness of the need for greater diversity and affordability in housing to counter poor perceptions of affordable and social housing.

Other key actions identified by the Plan are:

- Develop relationships between Knox City Council and Registered Housing Associations that operate in Knox – and referral protocols developed as required.
- Promote diverse and affordable housing options as an appropriate outcome of structure plans, Strategic Investigation Sites and other new residential developments and advise developers of the role of Registered Housing Associations and provide contact details as appropriate.
- Negotiate with developers (on a case-by-case basis) for a voluntary 5% contribution of social housing in larger-scale private land developments, including Strategic Investigation Sites.
- Advise commercial, community and public developers of the social housing minimum supply targets for Knox and advocate for more social housing to respond to identified need.
- Advise commercial developers of the need for greater housing diversity in Knox (particularly the provision of affordable, smaller, well-designed dwellings that are located close to services and facilities) and advocate for the development of a diverse range of housing types and sizes in Knox.
- Introduce obligatory contributions to affordable housing on larger-scale development through inclusionary zoning if/when the Victorian Government provides legislative support for such measures.
- Advise developers of Council's preference for dispersed affordable and social housing in Knox.

Open Space

Knox Open Space Plan 2012-2022

Knox City Council has prepared a forward looking plan to enhance and maintain our green and leafy image and diverse lifestyle experience in our parks and open spaces. This plan is called the Knox Open Space Plan 2012-2022.

The Knox Open Space Plan 2012-2022 was prepared with input from the Knox community at a series of neighbourhood workshops, and through the Future Parks and Streets Schools Competition.

The Plan describes the many demands on parks and open space and the opportunities for them to be further improved for the community's use.

The Knox Open Space Plan (2012-2022) defines a vision for Knox's open space and four major strategic directions.

The vision for Knox open space is:

Knox open space will be sustainable, attractive and green. It will provide for a diversity of leisure activities, and enable people to enjoy nature, engage with others, learn and play. Our open space network will be we/l-connected and accessible.

The four strategic directions are:

1. Create healthy creek corridors that people love
2. Activate community hubs
3. Empower the community to be stewards of open spaces
4. Engender a network of sustainable spaces

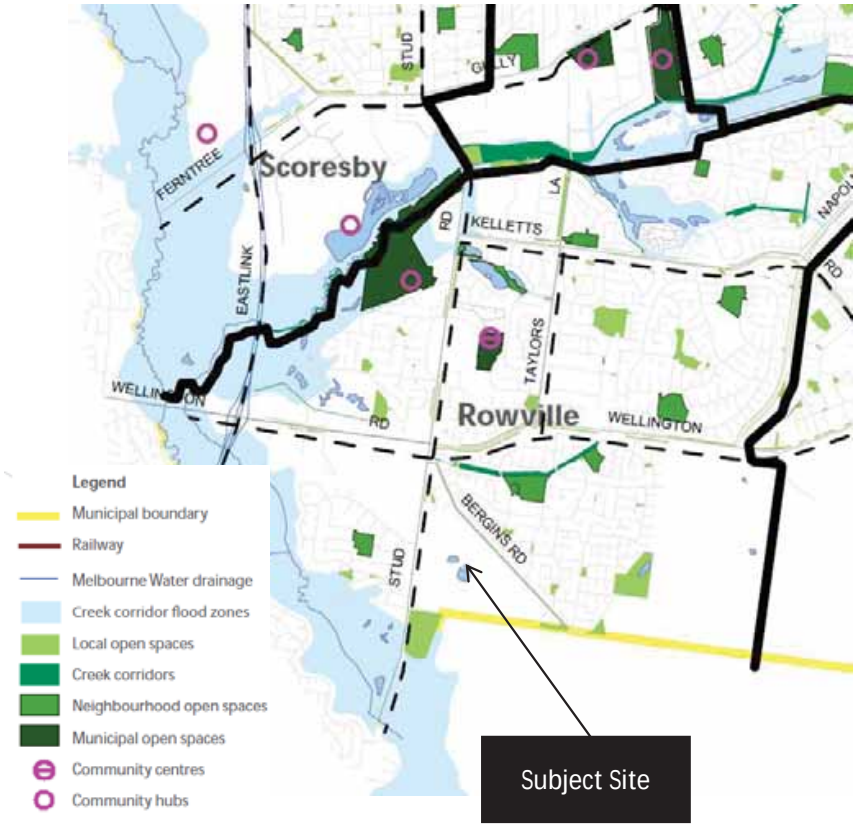
Open space spatial framework

Open space serves many purposes. Section 3 describes Knox's open space network, defining five broad types of open space and describing their distinctive roles as part of the network:

- Municipal
- Neighbourhood
- Local
- Creek corridors
- Community hubs

Waverley Golf Course
Community Infrastructure Assessment

Strategy



Design principles - types of open spaces

Municipal open spaces and community hubs - high infrastructure investment

- Community infrastructure should be of a high standard and adequate quantity, including paths; benches; drinking fountains (including dog facilities); barbecue facilities; way-finding signage; playground soft and hard equipment etc.
- Vegetation including trees, shrubs and low planting should be specifically designed for the area to enhance the spatial design and character of the space. Garden bed design should be of a high standard.
- Toilet and other built facilities should be considered for the site and include access for children and people with
- disabilities.
- Public transport and other passive transport connections should be developed and easily accessible.
- Consideration of appropriately powered and located lighting and Closed-circuit television (CCTV).

Neighbourhood open spaces -medium infrastructure investment

- Community infrastructure should be of a high standard and adequate quantity, including paths; benches; drinking
- fountains (including dog facilities); barbecue facilities; way-finding signage, playground soft and hard equipment etc.
- Vegetation including trees, shrubs and low planting should be specifically designed for the area to enhance the spatial design and character of the space.
- Toilet and other built facilities should be considered for the site and include access for children and people with
- disabilities.
- Public transport and other passive transport connections should be developed and easily accessible.
- Consideration of informal sporting infrastructure integrated into the space, e.g basketball hoops.

Local - standard infrastructure investment

- Community infrastructure should include appropriate seating opportunities.
- Vegetation including trees, shrubs and low planting should be specifically designed for the area to enhance the
- spatial design and character of the space.

Creek corridors

Strategy

- Community infrastructure should be of a high standard and adequate quantity, including paths; benches; drinking fountains and way-finding signage.
- Vegetation including trees, shrubs and low planting should be specifically designed for the creek corridor to enhance the health of the creek corridor.
- Consider linear trail infrastructure including distance markers, dog drinking bowls, outdoor gym facilities and appropriate lighting on priority trails.

Key actions identified by the Plan include:

- Review creek corridor amenity and assess open spaces in relation to the urban design framework and high demand community destinations. Prioritise and scope projects for design intervention, stakeholder groups, community consultation and budget requirements.
- Progressively design corridors and spaces and implement on a year by year basis.
- Review creek corridors and drainage lines to assess opportunities to daylight water to improve drainage, creek health and community outcomes. Prioritise and scope projects for design intervention, stakeholder groups, community consultation and budget requirements.
- Develop an action plan to integrate indoor facility based community hubs and leisure based activities with open space community hubs.
- Create multi-generational environments that are inclusive, interesting and diverse by developing a community masterplan for play spaces within community hubs through a design review and community stakeholder project group that is place based.
- Facilitate local arts and the community in scoping their presence and vision for the community hub.
- Identify opportunities with other landowners where open space can be connected with private land to improve the amenity of industry and business areas.
- Allow small scale economic activities like busking or coffee carts to enliven local spaces.
- Ensure that an integrated design process is undertaken that looks specifically at site context, opportunities and crosses all management boundaries (e.g. footpaths and road design) to determine the type and variety of design opportunity in open space.

Recreation

Knox Leisure Plan 2014-2019

The Leisure Plan has been developed to assist Council to achieve its long-term vision and respond to priorities established in the Knox City Plan 2013 -2017 and the Council Plan. The Leisure Plan provides a decision-making framework for Council and identifies how the delivery of leisure services by Council will assist Council to achieve its City Plan objectives.

The key actions areas are:

1. Information provision and communication
2. Club Viability, Volunteer Support and Partnerships
3. Structured Sport Planning, Trends, Fees and Charges
4. Service/Facility Planning/Standards and Service Levels
5. Health Promotion and Active Living Infrastructure
6. Targeted Access Initiatives

Some of the more relevant actions contained within the Plan are:

- Investigate opportunities for privately owned facilities to address the needs of community sport.
- Identify short, medium and longer term strategies for addressing the shortage of indoor netball courts.
- Develop an internal service and facility planning checklist to support a coordinated approach to Council planning for Leisure Infrastructure.
- Investigate opportunities for the provision of additional sports reserves, with a particular focus on opportunities in Rowville.
- Review the pavilion renewal and upgrade capital works program.
- Develop a business plan for the growth and development of netball with a particular focus on the Knox Regional Netball Centre.
- Prepare a strategy for the future provision of indoor aquatic, health and fitness services and facilities in Knox.
- Explore opportunities for the establishment of outdoor gyms.

Melbourne East Sport and Recreation Strategy (2016)

The delivery of the Melbourne East Regional Sport and Recreation Strategy is driven by the need to identify and plan for the development of new, and the renewal of existing, regional level facilities and shared trails that address the future needs of the region.

A number of gaps in the current provision of regional level sport and recreation facilities in Melbourne's East have been identified. These include:

Waverley Golf Course
Community Infrastructure Assessment

Strategy
• The connection and development of shared recreation trails. • Fit for purpose indoor sports courts for basketball, netball and other compatible sports. • Development of specialised purpose built facilities for gymnastics. • A destination for mountain biking that caters for the strong recreation market. The key regional priority for Knox is to investigate the redevelopment of a regional level baseball / softball facility at Gilbert Park in Knoxfield that includes multiple floodlit diamonds and caters for regional and state level events and competitions.
Early years, youth services and older persons
Key Life Stages Plan 2017-2021 This Key Life Stages Plan brings together Council's previous Municipal Early Years, Youth Strategic and Active Ageing Plans; focuses on the key life stages of early childhood, youth and older age; and recognises that intervention during these key life stages has the greatest benefit for individuals, families and the community. It both aligns with and responds to the Knox Community and Council Plan 2017-2021; identifies key issues across life stages; provides direction for Council's response across and between life stages; and sets out a framework to assist Council to determine its role and service response to current and future reform agendas. The key life stage specific focus areas include: • Early years – government policy reform, early years services management, out-of- home care, family violence, facilities, health and mental health, sustainable transport and lifelong learning; • Youth – health and mental health including prevention of suicide, working with parents/families/carers/workers, youth engagement, LGBTIQ+, facilities, working with young people living in out-of-home-care and who are official carers of a parent, family violence and bullying, and community safety issues affecting youth; and • Older People – government policy reform, elder abuse, housing issues, age friendly initiatives, health and mental health, financial security, social isolation, facilities, supporting community groups, lifelong learning and end of life issues. The key actions include: • Adopt an intergenerational approach, where possible, in implementing the Knox City Council's Open Space Plan 2012-2022. • Adopt an intergenerational approach, where possible, in implementing the Knox City Council's Affordable Housing Action Plan 2015-2020. • Construct and open two Early Years Hubs in Wantirna South and Bayswater to support early education, life-long learning and improved physical and mental health. • Adopt a Council-wide set of guiding principles for planning and implementing all-ability and intergenerational activity spaces in the municipality including at Stamford Parklands. • Adopt an intergenerational approach, where possible, in implementing the Knox City Council's 'An Active Future: Knox Leisure Plan 2014-2019'. • Provide dedicated resources to undertake strategic municipal wide planning for children and families. • Design, develop and implement an approach to facility management that integrates service and facility advocacy, is consistent across the organisation, and improves efficiencies in the management of Council's buildings. • Provide capacity building opportunities for older person groups and senior citizens clubs in Knox to improve wellbeing and • social connections for older people through: – Focusing on current facility use and demand; and – Developing a sustainable and equitable support model for Knox Senior Citizens Clubs. • Design and plan for the development of Carrington Park Seniors Centre into a multipurpose community centre in conjunction with the Carrington Park Master Plan review, incorporating the outdoor space areas.
Libraries / Neighbourhood Houses / Community Meeting Spaces
Community Facilities Planning Policy (2016) This Policy outlines Council's commitment to an integrated planning process for the planning, delivery and management of community facilities, and as part of that process, to consider opportunities for multipurpose, co-located or integrated uses or community hub opportunities when planning for new and/or upgrades or change of use of Council community facilities. The policy integrates with Council's Service Planning approach by ensuring that consideration of the community demand for services, Council's role and models for delivery of services are key elements of the Community Infrastructure Planning Process. The Policy includes key considerations and criteria Council will use when planning community facilities. For example, when planning for a new, upgrade or redevelopment of a community facility in Knox, including a change of use, it is policy that: 1. Planning for Council owned community facilities must consider:

Strategy
(a) Multipurpose Use: Flexible, functional and adaptable spaces within a facility which can support a range of compatible services and activities; (b) Co-located Use: Joint location of services within the same facility; (c) Integrated Service Provision: The joint location of services within a facility and with integrated service delivery and management; or (d) Community Hub: Creation of or enhancement of an existing cluster of community facilities on the same or adjoining sites, which creates a focal point for community activity. 2. The suitability of the location of community facilities to optimise multipurpose, co-located or integrated use or community hub opportunities, will be informed by the ability to maximise efficient land use, accessibility and convenience for users to achieve greatest community benefit. These locational considerations will give priority to: • Access to public transport, activity centres, open space, pedestrian connections, car parking and other community infrastructure; and • The level of support for the location of the facility that is provided in the Knox Planning Scheme or any approved Structure Plan for that area. 3. Planning for the multipurpose, co-located or integrated use of community facilities or community hub opportunities will include engagement with internal and external stakeholders in order to maximise opportunities to integrate service and asset planning and build collaboration and partnerships with community stakeholders. 4. Multipurpose, co-located or integrated facilities will have appropriate governance and facility management arrangements in place. Licensing Agreements entered into between Council and community groups shall be based on the policy criteria outlined in Section 7.1 of the Policy. Although this Policy applies to Council and Council staff, the policy will have implications for how Council assesses the need for any community facility potentially proposed by the subject site's development.
Knox Arts and Cultural Plan 2012-22 The Knox Arts and Culture Plan 2012- 22 identifies key outcomes for the Arts and Cultural wellbeing of Knox, focused on: increasing community participation in the arts, creating vibrant and interesting public spaces, improving relationships with the local arts and cultural community, improving Council's arts and cultural amenity, and raising the visibility of the range of arts and cultural activity in the city. The Knox Arts and Cultural Plan sets out four key objectives to meet these outcomes: • Increasing Community Participation in Arts and Culture • Creating Vibrant Public Places • Leadership and Advocacy for Arts and Culture • Increasing Capacity in Knox City Council to support Arts and Culture Key actions of the Plan include: • Develop and adopt a strong and effective Public Arts Policy that establishes an integrated and sustainable process for the delivery of Art in the parks and other public places. • Investigate the inclusion of a 1% for Public Art, a Council contribution from new capital works projects, in the Public Art Policy. • Complete the staged upgrade of Knox Community Arts Centre in Bayswater. • Consider the upgrade of the Ferntree Gully Community Arts Centre to better meet the needs of the community. • Encourage the inclusion of artistic elements in the design of Council-owned facilities. • Investigate opportunities to develop a future community gallery. • Consider the development needs of the arts community during asset and infrastructure reviews such as at the former Placemaker site in Ferntree Gully. • Progress the Ambleside Master Plan to deliver a Heritage Resource Centre for the City. • Continue to support the development of a significant Cultural Facility at the Knox Central Precinct.

Appendix 1e. Review of Non-Council Strategic Documents

Table 7 – Non-Council Strategies and Plans

Document Name
Swinburne University of Technology 2025 Strategic Plan Swinburne has campuses across Melbourne including Wantirna South, Hawthorn and Croydon, and has a campus in Malaysia. The Wantirna South campus is in the heart of Melbourne's eastern suburbs, close to Knox City Shopping Centre and only 4 kilometres north east of the subject site. The 2025 Strategic Plan was introduced early in 2017 to lead Swinburne into the future with its focus on graduating students ready for the careers of the future, and on transformative research. **Strategic framework** To realise the vision Swinburne will build its capability by investing in its people, processes and systems. This will be achieved by: **Future-Ready Learners** • Transforming learning strategy spans from refreshing curriculum, to fostering active learning and supporting employability outcomes. • Our health innovations see us expanding our offerings to deliver a new suite of industry-linked courses that support the changing needs of the health industry. • We will build on our strengths in STEM education through new course offerings, learning spaces and evolving our industry engagement and partnerships. • We are strengthening business by developing outstanding products with a unique value proposition, having the best people from industry, and creating state-of the-art flexible learning spaces. **Research with Impact** • Our Swinburne Innovation Precinct brings design, manufacturing and digital innovation together to create a hub of interdisciplinary collaboration involving students, staff, mentors, community, and industry. • Our research institutes continue to facilitate collaboration with multidisciplinary and interdisciplinary research teams for economic and social impact. • We continue to build long-lasting relationships with businesses and industries to develop programs and activities that focus on research translation and commercialisation. • Joint research centres will increase the strength, scale and reach of Swinburne's research endeavours globally. **Innovative Enterprise** • Global capability sees us expanding our international presence and competitive product portfolio to prepare our students to graduate as truly global citizens. • Digital transformation is about continually creating digital experiences and capabilities that meet the demands of a dynamic digital future.
Eastern Health Strategic Plan 2017-2022 Eastern Health is one of Melbourne's largest metropolitan public health services. It has over 50 facilities and its main sites include: • Angliss Hospital in Upper Ferntree Gully • Box Hill Hospital in Box Hill • Healesville Hospital and Yarra Valley Health in Healesville • Maroondah Hospital in Ringwood East • Peter James Centre in Burwood East • Spectrum - which provides treatment for people with personality disorders • Turning Point - which provides treatment, research and education in the fields of alcohol, other drugs and gambling • Wantirna Health in Wantirna • Yarra Ranges Health in Lilydale

Document Name
Of these, Wantirna Health is the nearest Eastern Health facility to the subject site and is located 6 kilometres north of the proposed development. Established in 2007, Wantirna Health in Wantirna is a purpose-built palliative care and Geriatric Medicine hospital. Wantirna Health provides a wide range of ambulatory services, including home-based and centre-based rehabilitation and specialist clinics. Eastern Health's vision is to "great care, everywhere, every time". To deliver on its vision over the next five years Eastern Health will focus its efforts around four strategic initiatives and associated priority goals as outlined below.
Eastern Health 2022: The Strategic Clinical Service Plan 2012–2022 Eastern Health 2022 provides a framework that guides Eastern Health's future decision-making. Eastern Health 2022 is fundamentally focused around 5 strategic directions and 20 Clinical Service priority initiatives. The key strategic directions of the Plan are: 1. A Provider ff Great Healthcare 2. A Great Patient Experience 3. A Great Place to Learn and Work 4. A Great Partner with Our Communities 5. A Great Achiever in Sustainability In addition to the 20 priority initiatives, Eastern Health 2022 outlines over 400 specific and targeted improvements that relate to specific clinical service groups across the organisation. The Plan includes some relevant discussion about future infrastructure priorities as outlined below. *"Maximise utilisation of all Eastern Health infrastructure and align future service expansion with forecast geographical demand for public health services in the mid-section of Eastern Health's primary catchment area - specifically Yarra Ranges (Lilydale), Maroondah (Croydon) and Knox (North-East).* *We have some work to do to align our service capacity with projected demand from a geographical perspective, whilst maximising all existing and planned Eastern Health infrastructure to its full potential. The largest share of inpatient bed days that Eastern Health is forecast to provide by 2021-22 relates to people who live in Yarra Ranges (Lilydale), Maroondah (Croydon) and Knox (North-East).* *Hospitals within the mid-section of Eastern Health's catchment are Yarra Ranges Health, Maroondah Hospital, the Angliss Hospital and Wantirna Health, with Wantirna Health being most central to Eastern Health's total primary catchment area. Eastern Health must consider future clinical service expansion in these areas where they will be closer to where patients live and are forecast to be living by 2022".*
EACH 2020: A National Strategy, 2016-2020 On 1 January 2014, Knox Community Health Services merged with EACH. As part of that transition process, Knox Community Health Services modified its name to become, 'Knox Social & Community Health – a service of EACH'.

Document Name
In the City of Knox, EACH has services provided from a number of locations including: • Boronia Road, Wantirna • Burwood Highway, Ferntree Gully • Westfield Knox Ozone EACH provides an integrated range of health, disability, counselling and community mental health services across Australia. The vision outlined by the Plan is to help create 'a healthy and inclusive community'. The Strategic Plan has the following five 'strategic pillars': 1. Customers & Community 2. Influence & Advocacy 3. Innovation & Technology 4. Growth & Sustainability 5. People & Learning
Victoria Police Blue Paper: A Vision for Victoria Police In 2025 Based on an understanding of the role of Victoria Police, the principles of policing, and the external and internal challenges facing Victoria Police, A Vision for Victoria Police in 2025 lays out three proposed strategic directions to enhance public safety, and increase value for money for the Victorian community through its investment in Victoria Police: **1. Better matching of resources to demand by rethinking the traditional operating model** The Paper makes the following observations on this direction: *The traditional police service delivery model needs to shift from one based on an historical geographic footprint, to one that is mobile, technologically-advanced, and more responsive to changing demand. The type and location of police operations should be determined by what is required to provide the best possible service to the community. For example, larger, consolidated 'supersites' should replace many of the smaller and less operationally-effective traditional police stations. The supersite – or sites - in each Division should be the central 'hub' that supports a variety of other Victoria Police service points for local communities, such as 'shopfronts', mobile police stations, and self-service kiosks for non-urgent issues. In rural Victoria, multiple hubs might be required. Supersites should be multi-disciplinary centres where Victoria Police is co-located with other public services"".* **2. Improving capability through workforce reform and technology** The Paper makes the following observations on this direction: *"Victoria Police officers need to be far better supported by modern technology. They need to have the information and systems to do their work in a more 'virtual' environment, and to be freed from time-consuming paperwork. Technology should also support a strong culture of information security.* *Frontline officers should not need to return to their supersite during their shift: the proportion of an officer's time spent in the community (not in a police complex) should increase from 54 per cent to around 80 per cent. Each supersite should be designed to accommodate an IT system which allocates tasks and coordinates police operations. The system would integrate audio and video feeds from mobile and fixed sensor platforms, advanced analytics, and advice from partner agencies. It would also have capacity for a custody suite, operated by a private provider.* *Victorians should be able to report crime and suspicious activity through online self-service portals, and provide pictures and video to assist in offender identification. There should also be a dedicated non-emergency telephone line, where the public can talk directly to a staff member who can take their report and provide access to crime prevention information. Individuals should be able to track the progress of their reports via a secure online system. The system would, via social media, provide the community with real time alerts and requests for assistance to solve a crime or problem."*

Document Name
3. Collaborating more closely through partnerships The Paper makes the following observations on this direction: *"Different types of partnerships with the community are necessary:* • *An effective model of local policing in collaboration with residents and business owners will remain of vital importance, for maintaining and building community trust and confidence in Victoria Police.* • *Local policing partnerships should use practical and wide-reaching methods for public participation to shape local* • *priorities (such as community forums and social media platforms). A more personal approach, through greater face-to-face interaction with identified individual police officers – recognisable 'faces' – is vital.* • *Victoria Police must increase the trust that communities of identity (relating to gender, ethnicity, religion, sexuality, age, capacity or otherwise) have in its ability to serve them as well and treat them as fairly as anybody else.* • *Victoria Police needs to engage with businesses in a different way for mutual benefit, based on enduring structures and processes.* • *Police and private security firms need to work together to deter crime and maintain public order most effectively, but police should retain an involvement in the regulation of the industry and could become involved in the training of its members".*
VICSES Corporate Plan 2015-2018 The mission outlined in this Strategy is for VICSES to partner with communities, government, other agencies and business to provide timely and effective emergency management services, building community preparedness, disaster resilience and contributing to risk prevention. The strategic themes and associated actions outlined by the Plan are: 1. People and Culture • Implement the VICSES Our People strategy 2014-2018 • Develop a VICSES volunteer strategy 2. Community and Industry Partnerships • Develop and deliver a community connection program that meets the diverse needs of the communities in which VICSES operates • Foster wide support from industry, business and/or employers for the VICSES, and its volunteer members, to deliver services to the community 3. Government Support • Develop and deliver a Government and Local Government engagement and advocacy strategy • Develop appropriate business cases for investment in VICSES capability and establish appropriate advocacy programs • Contribute to the delivery of the Emergency Management Victoria Strategic Action Plan 4. Service Delivery • Implement the Planning the Future Together strategy recommendations • Implement the information communication technology strategy 2014-2018 • Develop a Memorandum of Understanding between emergency services to better deliver support for diverse communities 5. Community Awareness • Develop and implement a strategic communication strategy and corporate communications plan • Develop a community resilience strategy
Ambulance Victoria Strategic Plan 2017-2022

Document Name
This Strategic Plan outlines how Ambulance Victoria will continue its recent operational reforms, to provide Victorians with a world-class emergency ambulance service over the next five years. The Plan focuses on achieving four key outcomes and associated priorities: **Outcome1 - An exceptional patient experience** • Providing safe, high quality, timely and expert patient care every time • Helping people to make informed decisions about their emergency health care • Connecting people with the care they need • Using research and evidence to continuously learn and improve our services **Outcome 2 - Partnerships that make a difference** • Working with communities to deliver local emergency health care solutions • Collaborating with our partners to improve health outcomes • Planning for and responding to major events and emergencies • Sharing knowledge, experience and data **Outcome 3 - A great place to work and volunteer** • Keeping our people safe, and physically and psychologically well • Providing an inclusive and flexible workplace • Developing a culture of continual learning and development • Embedding an ethical, just and respectful culture **Outcome 4 - A high performing organisation** • Embracing innovative ideas, systems and technology • Being accountable for our actions and outcomes • Improving our integrated service model • Operating in a financially and environmentally sustainable way
Court Services Victoria Strategic Asset Plan:2016-2031 The purpose of this Plan is to deliver safe, secure and sustainable court and tribunal assets via excellent and expert asset management. Court Services Victoria (CSV) aims to enable provision of accessible justice for all Victorians through a portfolio of buildings that are safe, secure and sustainable to meet the service needs of the jurisdictions, court and tribunal users and community, now and into the future. The key priority focus areas are: • Enabling specialist court infrastructure including family violence response • Ensuring safe, flexible, future proofed and fit-for-purpose environments • Delivering Melbourne CBD Legal Precinct (the Precinct) development requirements • Delivering Melbourne growth corridor development priorities • Implementing the Court Services Delineation Model across metropolitan and regional Victoria • Identifying a set of principles that will determine proper priorities and allocation of resources for new capital works and maintenance of the existing asset base both within and between the CBD, metropolitan Melbourne, and regional Victoria. The strategy responds to the defined service needs of all jurisdictions, incorporating the following components over a 15 year period: • Investment in ten new court and tribunal facilities • Expansion of five existing court and tribunal facilities • Upgrade and lifecycle management across the court portfolio - Accommodating the new Court Services Delineation Model - Replacing/upgrading critical infrastructure

Document Name
- Increase in recurrent maintenance funding • Divestment of up to thirteen properties • Release of up to ten leased properties.

Appendix 2. Community Infrastructure Demand & Supply Estimates & Sources of Demand Assumptions

Table 8 - Description of Community Infrastructure Provision Standards & Demand & Supply Estimates for Development Scenario (800 dwellings)

Community Infrastructure Category	Provision ratio / participation Rate	Description of measure	Source of measure	Subject Site	Rowville South by 2041	Adjusted Rowville South by 2041[9]
Public open space	8.5%	Public open space	Schedule to Clause 53.01 Knox Planning Scheme Requirement	2.14	Not available	Not available
Organised Sport Facility & Participation Estimates						
Indoor and outdoor recreation facilities						
Indoor recreation centres / courts	10,000	Total population per court	Typical standard used by some Melbourne Growth Area Councils (note: individual LGAs vary on their views about the "desired" benchmark and some have no documented working benchmark).	0.2	1.1	1.3
Council aquatic / leisure centre memberships	3.4%	% of Population who are members of a Council aquatic / leisure centre	Based on 2010 CERM PI® Operational Management Benchmarks for Australian Public Sports & Aquatic Centres	77	371	445
Council aquatic / leisure centres	165,000	Approximate total population per facility in Knox (2018)	ASR Research calculation based on City of Knox having 1 Council indoor aquatic leisure centre (2019).	0.0	0.1	0.1
Participation in organisation/venue based activity: Adults (people aged 15 and over)						
Fitness/Gym	30.2%	% of people aged 15 years and over participating in organised physical activity or sport at least once per year	Australian Sports Commission, AusPlay Survey (AusPlay): January 2018 to December 2018 Victoria Data (Table 11)	563	2705	3,239
Swimming	9.1%	As above	As above	170	815	976
Golf	4.1%	As above	As above	76	367	440
Pilates	4.0%	As above	As above	74	356	426

[9] The adjustment includes an additional 700 dwellings for subject site not included in Council's population forecasts.

Community Infrastructure Category	Provision ratio / participation Rate	Description of measure	Source of measure	Subject Site	Rowville South by 2041	Adjusted Rowville South by 2041[9]
Basketball	3.9%	As above	As above	73	349	418
Tennis	3.4%	As above	As above	63	303	363
Football/soccer	2.5%	As above	As above	47	224	268
Yoga	4.1%	As above	As above	76	367	440
Netball	2.4%	As above	As above	45	215	257
Australian football	3.6%	As above	As above	67	322	386
Athletics, track and field (includes jogging and running)	3.1%	As above	As above	58	278	332
Cricket	2.6%	As above	As above	48	233	279
Organised participation by activity - top 10 activities (children aged 0 to 14)						
Swimming	39.4%	% of children aged 0-14 participating in organised physical activity or sport at least once per year	Australian Sports Commission, AusPlay Survey (AusPlay): January 2018 to December 2018 Victoria Data (Table 10)	161	774	927
Australian football	13.1%	As above	As above	54	257	308
Basketball	11.4%	As above	As above	47	224	268
Cricket	5.7%	As above	As above	23	112	134
Dancing (recreational)	10.6%	As above	As above	43	208	249
Netball	7.1%	As above	As above	29	140	167
Football/soccer	10.4%	As above	As above	43	204	245
Tennis	7.3%	As above	As above	30	143	172
Gymnastics	11.0%	As above	As above	45	216	259
Athletics, track and field (includes jogging and running)	4.0%	As above	As above	16	79	94
Early Years Services						

Community Infrastructure Category	Provision ratio / participation Rate	Description of measure	Source of measure	Subject Site	Rowville South by 2041	Adjusted Rowville South by 2041[9]
Kindergartens						
Number of 4 year olds participating in 4 year old Kindergarten	89.5%	% of all eligible children participating in 4 Year Old Subsidised Kindergarten	Department of Education and Training Early Learning Profile for Knox 2018	24	117	140
Total number of enrolments in 4 year old sessional Kindergarten	81%	% of participating children (see above) enrolled at a Sessional Kindergarten service	Victorian Child and Adolescent Monitoring System (VCAMS), Department of Education & Training Based on indicator 31.4 Number of four year old kindergarten enrolments in a long day care or integrated children's services setting for Knox: 19% (2015 data).	20	95	114
Number of 4 year old Kindergarten rooms	66	Number of sessional Kindergarten rooms required if 1 Kindergarten room accommodates 66 enrolments per week	ASR Research constructed measure assuming one kindergarten room is licensed for 33 places	0.3	1.4	1.7
Number of 3 year olds participating in 3 year old Kindergarten	75%	% of children participating in 3 Year old Kindergarten	ASR assumption based on proposed introduction of subsidised 3 year old Kindergarten program	20	96	115
Number of 4 year old Kindergarten rooms	66	Number of 3 year old kindergarten participants per 3 year old Kindergarten group	ASR Research constructed measure assuming one kindergarten room is licensed for 33 places	0.3	1.5	1.7
Maternal & Child Health						
Number of MCH Full-Time Nurses	130	1 FT nurse per 130 children 0 years	ASR Research calculated measure using actual Growth Area Council data (2008)	0.2	1.0	1.1
Number of MCH consulting units	1	Number of MCH consulting units required per FT nurse	ASR Research calculated measure using actual Growth Area Council data (2008)	0.2	1.0	1.1
Playgroup						
Number of 2 hr playgroup sessions per week	134	Total number of children aged 0-3 years required to generate demand for a 2 hour playgroup session per week	ASR Research constructed measure using Playgroup Victoria	0.8	3.7	4
Occasional Child Care						

Community Infrastructure Category	Provision ratio / participation Rate	Description of measure	Source of measure	Subject Site	Rowville South by 2041	Adjusted Rowville South by 2041[9]
Number of occasional child care places	52.6	Total number people aged 0 to 4 years per licensed place	Victorian Planning Authority, Melbourne Metropolitan Community Infrastructure Assessment: Local and Subregional Rates of Provision (MMCIA). A provision rate of occasional child care places equal to that documented by the MMCIA report (2015) for Knox	2.5	12.0	14
Number of occasional child care centres	30	Total number of facilities required based on number of licensed places generated (see above)	ASR Research constructed measure based on a typical sized occasional child care facility.	0.1	0.4	0.5
Long Day Child Care Centres						
Number of Long Day Child Care places	275.2	Total number of licensed places per 1,000 children aged 0 to 4 years	Victorian Planning Authority, Melbourne Metropolitan Community Infrastructure Assessment: Local and Subregional Rates of Provision (MMCIA). A provision rate of long day child care places equal to that documented by the MMCIA report (2015) for Knox	36	174	209
Number of Long Day Child Care centres	120	Total number of facilities required based on number of licensed places generated (see above)	ASR Research constructed measure based on a typical large sized long day child care facility.	0.3	1.5	1.7
Community Centres, Meeting spaces, Neighbourhood Houses & Libraries						
multipurpose community meeting space	30	Total population per m2 of meeting space	ASR Research constructed measure	76	364	436
Neighbourhood Houses						
Number of Neighbourhood Houses	23,000	Approximate total population per facility in Metropolitan Melbourne (2016)	ASR calculation of the number of Neighbourhood Houses identified by Neighbourhood Houses Victoria operating in the Melbourne metropolitan area.	0.1	0.5	0.6
Number of Neighbourhood House users per week	3%	Percentage of population using a Neighbourhood House in a given week	Neighbourhood Houses Victoria, Neighbourhood Houses Survey 2017	68	328	392
Libraries						

Community Infrastructure Category	Provision ratio / participation Rate	Description of measure	Source of measure	Subject Site	Rowville South by 2041	Adjusted Rowville South by 2041[9]
Number of library loans annum	7.6	Total loans per person	Public Libraries Victoria Network, 2015-16 PLVN Annual Statistical Survey (2016), Eastern RLS data	17,267	83,007	99,394
Number of library visits per annum	4.7	Total visits per person	Public Libraries Victoria Network, 2015-16 PLVN Annual Statistical Survey (2016), Eastern RLS data	10,678	51,333	61,468
Number of library facilities	2.6	Library facilities per 100,000 people	Victorian Planning Authority, Melbourne Metropolitan Community Infrastructure Assessment: Local and Subregional Rates of Provision (MMCIA). A provision rate of library facilities equal to that documented by the MMCIA report (2015) for the City of Knox	0.1	0.3	0.3
Education Enrolment & Facility Estimates						
Primary Schools						
Govt Primary Enrolment	70%	% of 5-11 year old population	Australian Bureau of Statistics, 2016 Census of Population and Housing, based on data for Knox Local Government Area	134	646	773
Catholic Primary Enrolment	16%	% of 5-11 year old population	As above	31	148	177
Non Govt Primary Enrolment	9%	% of 5-11 year old population	As above	17	79	95
Total Primary Enrolment	95%	% of 5-11 year old population	As above	182	873	1,046
Govt Primary School	3,000	Total number of dwellings per facility	Department of Education & Training	0.3	1.3	1.5
Secondary Schools						
Govt Secondary Enrolment	57%	% of 12-17 year old population	Australian Bureau of Statistics, 2016 Census of Population and Housing, based on data for Knox Local Government Area	99	474	567
Catholic Secondary Enrolment	23%	% of 12-17 year old population	As above	39	190	227
Non Gov Secondary Enrolment	14%	% of 12-17 year old population	As above	25	121	145
Total Secondary Enrolment	94%	% of 12-17 year old population	As above	163	784	938
Govt Secondary School	10,000	Total number of dwellings per facility	Department of Education & Training	0.0	0.0	0.0

Community Infrastructure Category	Provision ratio / participation Rate	Description of measure	Source of measure	Subject Site	Rowville South by 2041	Adjusted Rowville South by 2041[9]
TAFE						
TAFE Full-Time Enrolment (15 to 24)	3.3%	% of 15-24 year old population	Australian Bureau of Statistics, 2016 Census of Population and Housing, based on data for Knox Local Government Area	9	45	54
TAFE Full-Time Enrolment (25+)	0.4%	% 25 + year old population	As above	6	30	36
TAFE Part-Time Enrolment (15 to 24)	3.8%	% of 15-24 year old population	As above	11	52	62
TAFE Part-Time Enrolment (25+)	0.9%	% 25 + year old population	As above	14	69	83
Total TAFE students			As above	41	197	236
Universities						
University Full-Time Enrolment (15 to 24)	21.0%	% of 15-24 year old population	As above	60	290	347
University Full-Time Enrolment (25+)	0.9%	% 25 + year old population	As above	15	70	84
University Part-Time Enrolment (25 to 24)	2.5%	% of 15-24 year old population	As above	7	35	42
University Part-Time Enrolment (25+)	1.2%	% 25 + year old population	As above	19	90	107
Total University students		% 25 + year old population	As above	101	485	580
Primary & Acute Health Services						
Number of public and private hospital beds	3.9	Number of public and private beds per 1,000 people	Australian Institute of Health & Welfare, Australian hospital statistics 2015–16	9	42	50
Number of public hospital beds	2.4	Number of public beds per 1,000 people	Australian Institute of Health & Welfare, Australian hospital statistics 2015–16	5	26	32
Community health clients	2.9%	Proportion of population that is a registered community health client	Victorian Auditor-General's report, Community Health Program (June 2018)	65	313	375

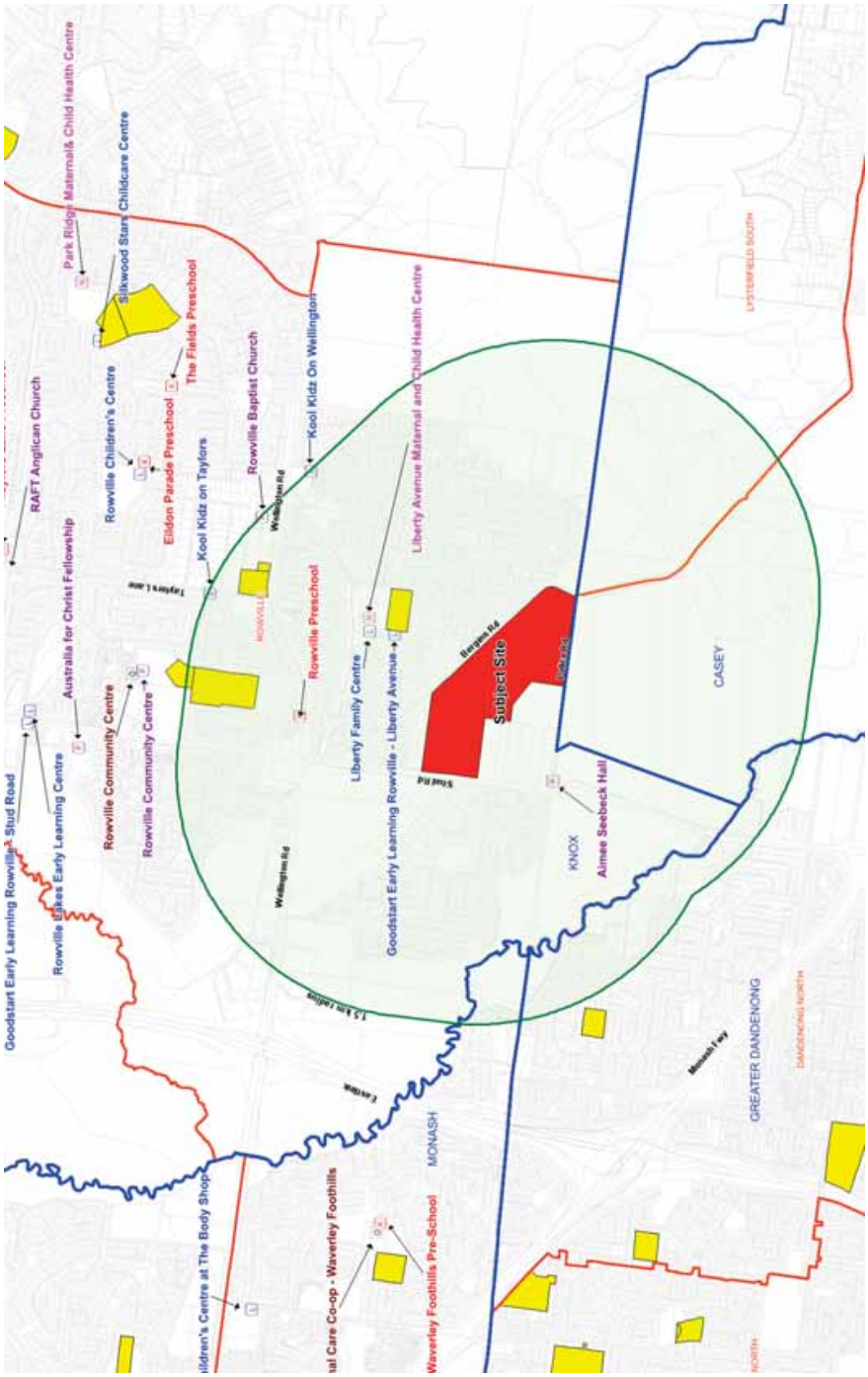
Community Infrastructure Category	Provision ratio / participation Rate	Description of measure	Source of measure	Subject Site	Rowville South by 2041	Adjusted Rowville South by 2041[9]
Allied health service sites	0.60	Number of allied health service sites per 1,000 people (Knox LGA)	Department of Health and Human Services, Knox LGA Health Profile 2015 (https://www2.health.vic.gov.au/about/reporting-planning-data/gis-and-planning-products/geographical-profiles)	1	7	8
General practices	0.30	Number of general practice clinics per 1,000 people (Knox LGA)	Department of Health and Human Services, Knox LGA Health Profile 2015 (https://www2.health.vic.gov.au/about/reporting-planning-data/gis-and-planning-products/geographical-profiles)	0.7	3.3	4
Dental services	0.30	Number of dental service sites per 1,000 people (Knox LGA)	Department of Health and Human Services, Knox LGA Health Profile 2015 (https://www2.health.vic.gov.au/about/reporting-planning-data/gis-and-planning-products/geographical-profiles)	0.7	3.3	4
Pharmacies	0.10	Number of pharmacies per 1,000 people (Knox LGA)	Department of Health and Human Services, Knox LGA Health Profile 2015 (https://www2.health.vic.gov.au/about/reporting-planning-data/gis-and-planning-products/geographical-profiles)	0.2	1.1	1
Projected hospital admissions	471.5	Hospital inpatient separations per 1,000 people (Knox LGA). Note: projected to increase by 3.0% per annum until 2026/27.	Department of Health and Human Services, Knox LGA Health Profile 2015 (https://www2.health.vic.gov.au/about/reporting-planning-data/gis-and-planning-products/geographical-profiles)	1071	5150	6,166
Emergency presentations	255.8	Emergency department presentations per 1,000 people (Knox LGA). Note: projected to increase by 1.9% per annum until 2026/27	Department of Health and Human Services, Knox LGA Health Profile 2015 (https://www2.health.vic.gov.au/about/reporting-planning-data/gis-and-planning-products/geographical-profiles)	581	2794	3,345
Drug & alcohol clients	6.5	Number of registered Alcohol & Drug Treatment clients per 1,000 people (Knox LGA)	Department of Health and Human Services, Knox LGA Health Profile 2015 (https://www2.health.vic.gov.au/about/reporting-planning-data/gis-and-planning-products/geographical-profiles)	15	71	85
Mental health clients	9.8	Number of registered mental health clients per 1,000 people (Knox LGA)	Department of Health and Human Services, Knox LGA Health Profile 2015 (https://www2.health.vic.gov.au/about/reporting-planning-data/gis-and-planning-products/geographical-profiles)	22	107	128

Community Infrastructure Category	Provision ratio / participation Rate	Description of measure	Source of measure	Subject Site	Rowville South by 2041	Adjusted Rowville South by 2041[9]
Aged Care						
Aged Care						
Number of aged care places (residential and home care)	123	Number of aged care places per 1000 people aged 70 years +	Australian Government Planning Ratio 2019	47	228	272
Short Term Restorative Care Programme	2	Number of STRC places per 1000 people aged 70 years +	Australian Government Planning Ratio by 2019	1	4	4

Appendix 3 Existing Community Infrastructure Maps

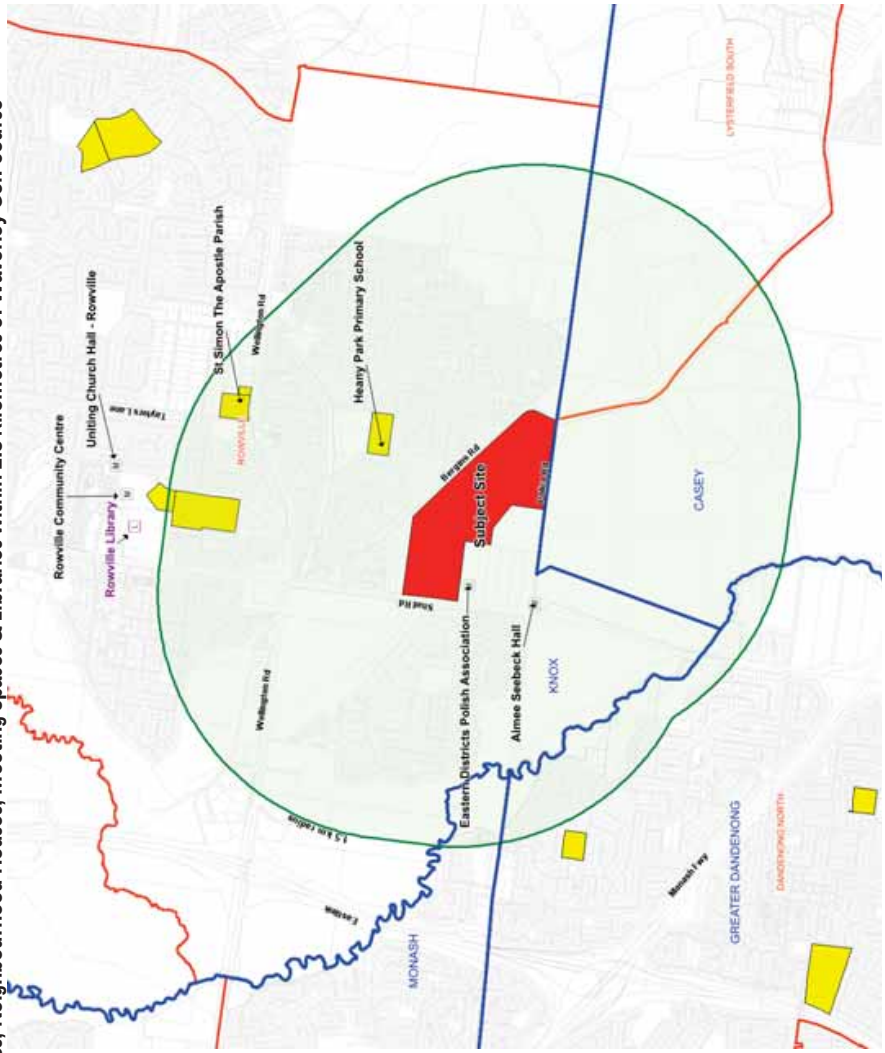
Early Years Services

Figure 6 - Early Years Facilities within 1.5 Kilometres of Waverley Golf Course (L=Long Day Child Care, O=Occasional Child care, P=Playgroups, M= Maternal & Child Health)



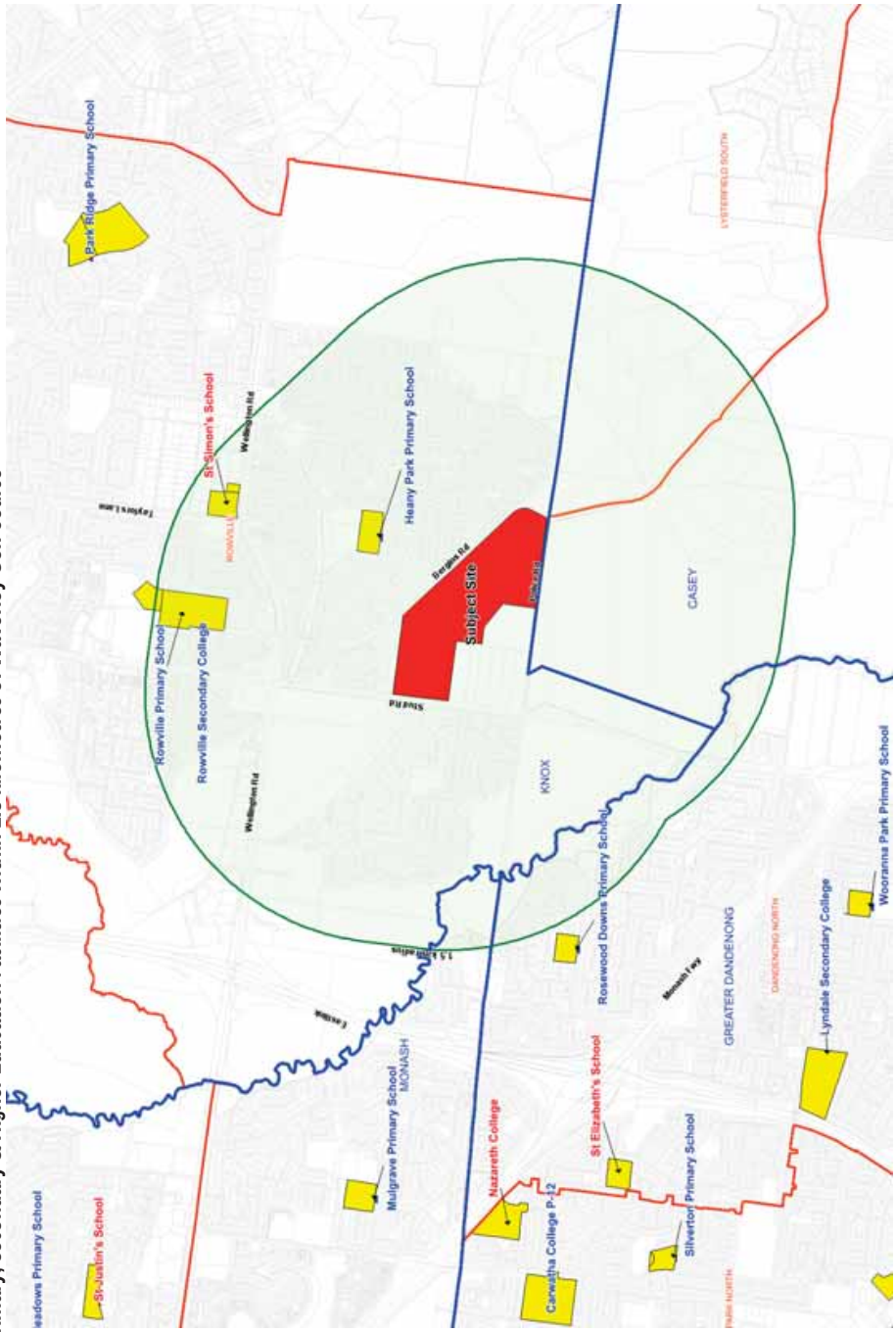
Community Meeting Spaces, Libraries & Learning Centres

Figure 7 – Community Centres, Neighbourhood Houses, Meeting Spaces & Libraries within 1.5 Kilometres of Waverley Golf Course



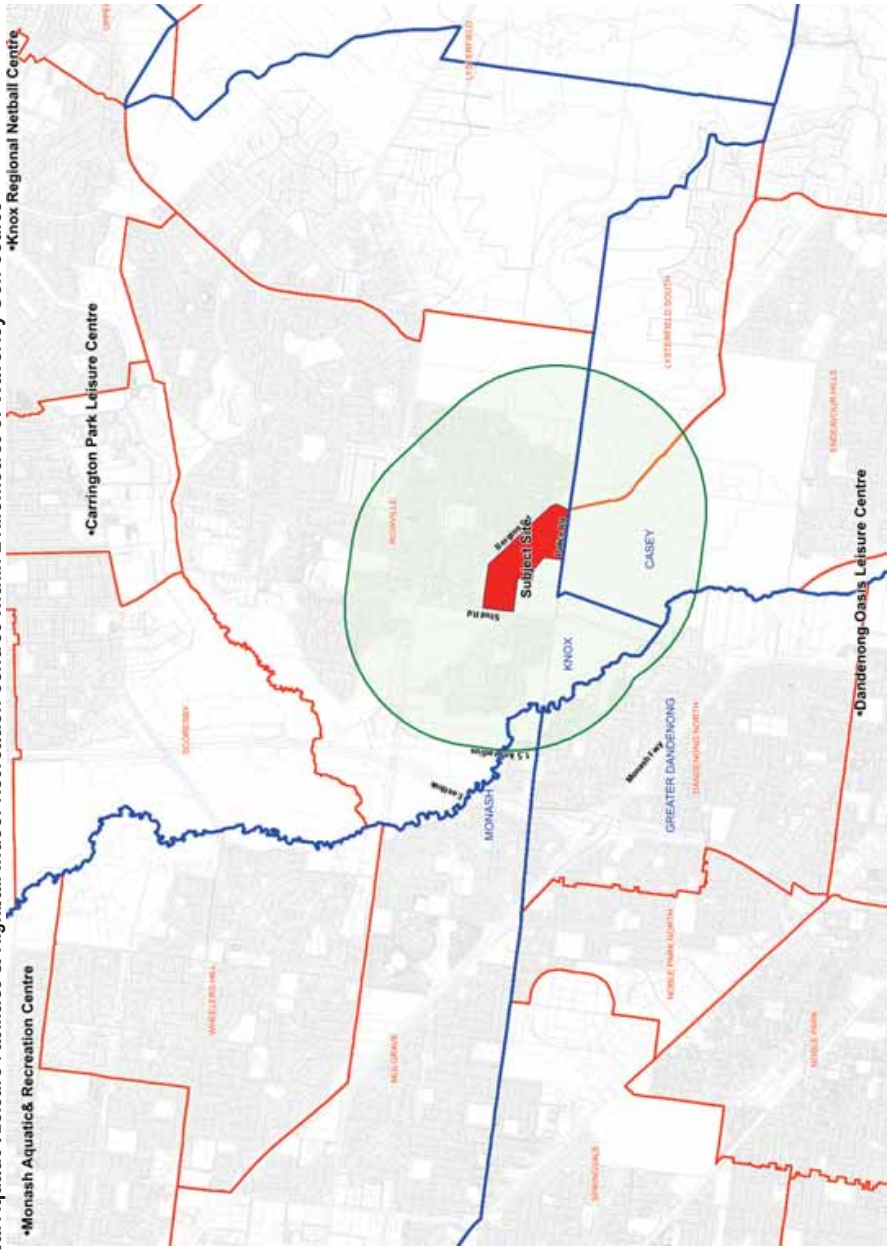
Education Facilities

Figure 8 – Primary, Secondary & Higher Education Facilities within 1.5 kilometres of Waverley Golf Course



Indoor Recreation Facilities

Figure 9 – Municipal Aquatic /Leisure Facilities & Highball Indoor Recreation Centres within 2 Kilometres of Waverley Golf Course

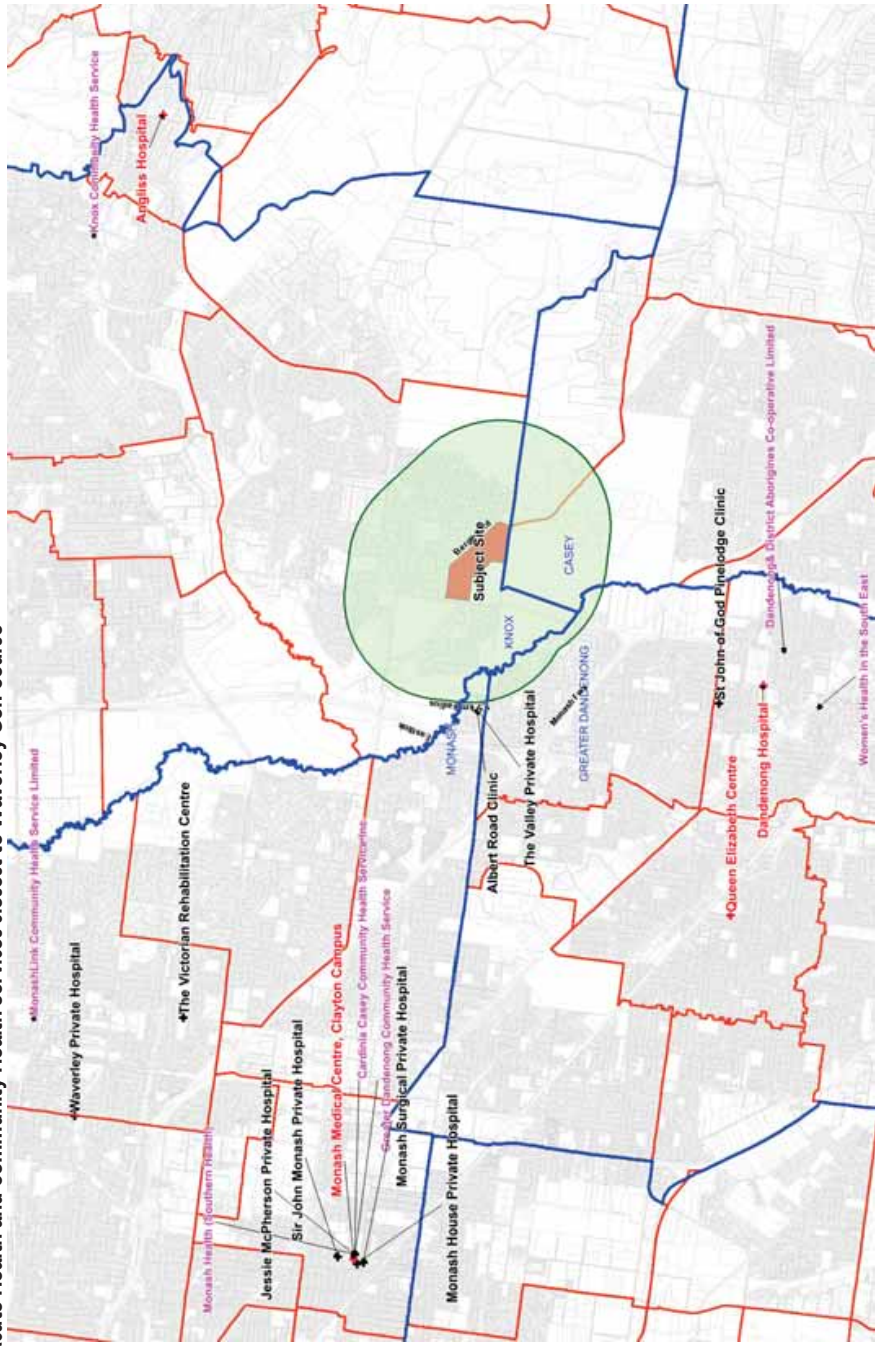


Open Space

Figure 10 – Major Open Space within 1.5 Kilometres of Waverley Golf Course (active open space shown as dark green shade)

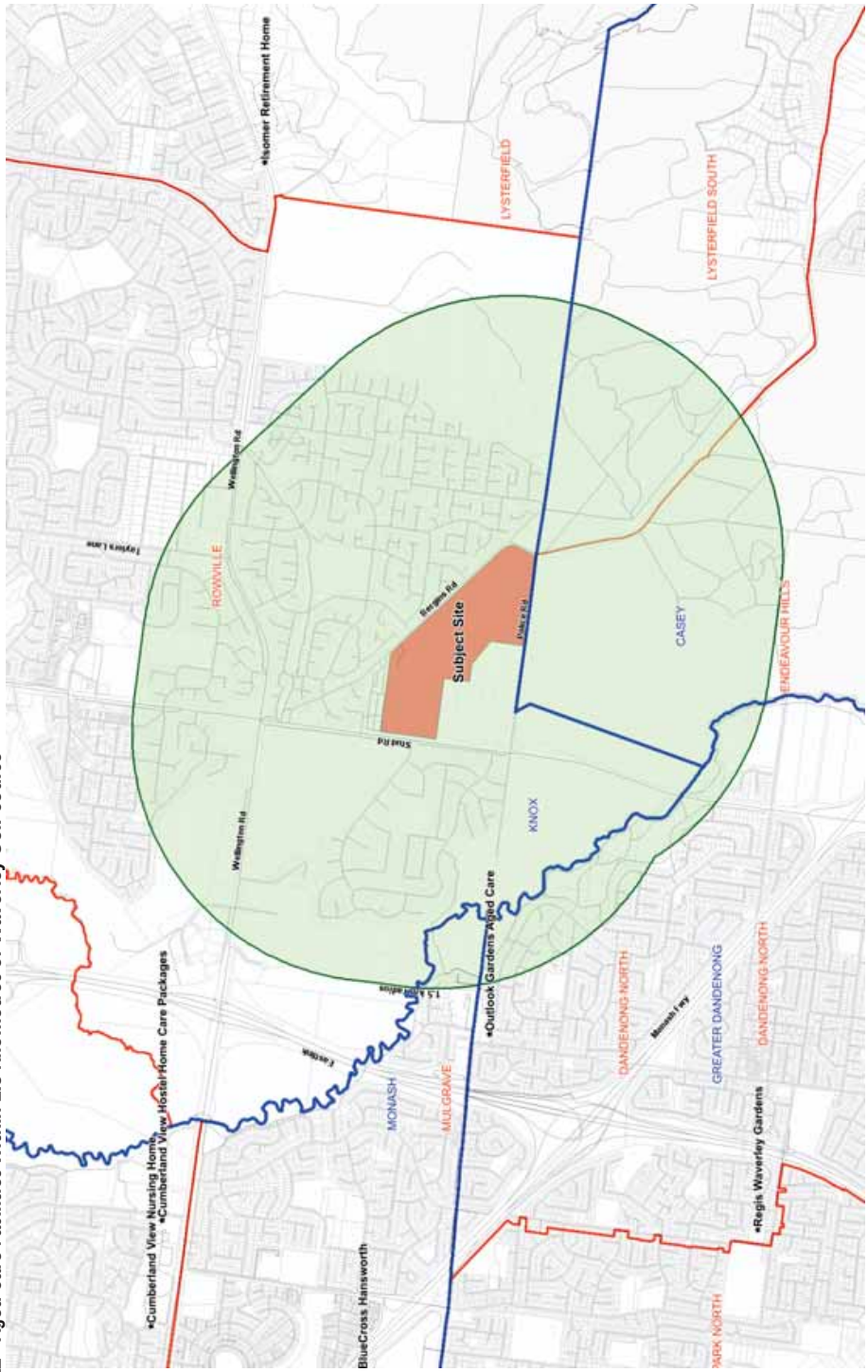
Acute & Primary Health Services

Figure 11 – Acute Health and Community Health Services closest to Waverley Golf Course



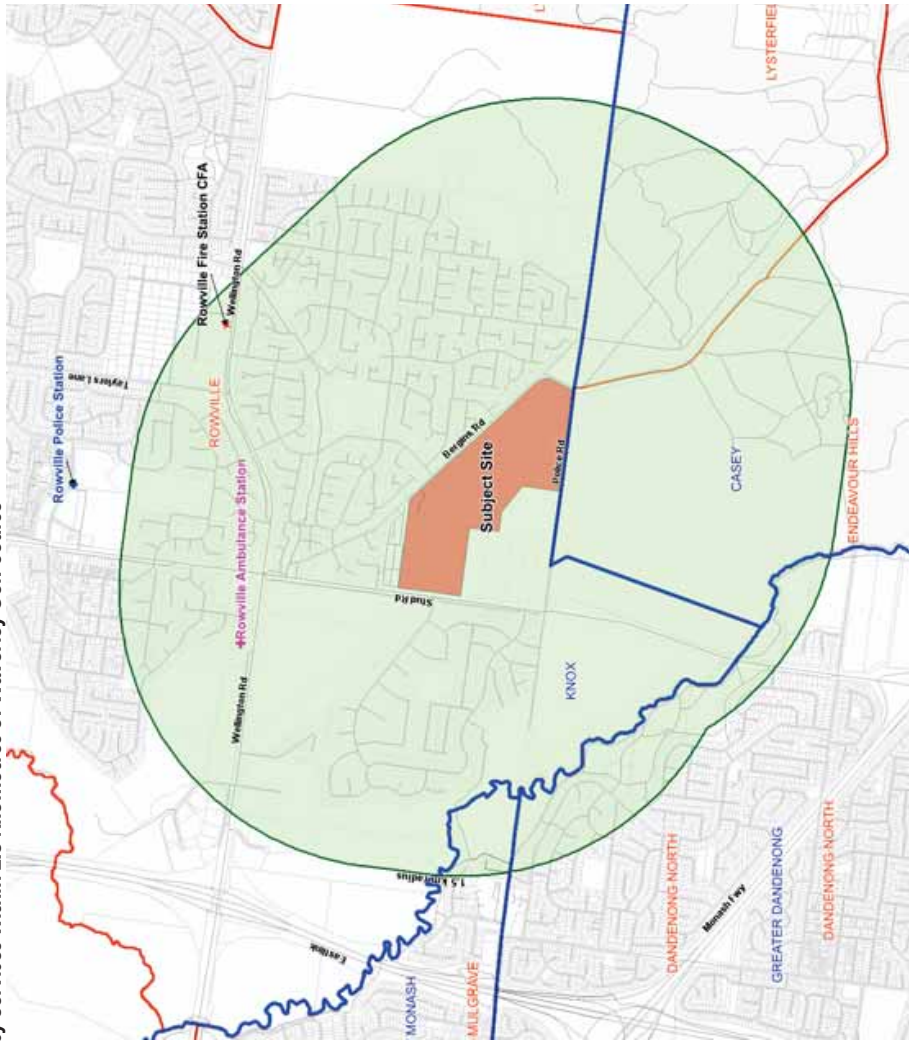
Residential Aged Care

Figure 12 - Aged Care Facilities within 1.5 Kilometres of Waverley Golf Course



Police & Emergency Services

Figure 13 - Police & Emergency Services within 1.5 Kilometres of Waverley Golf Course



REPORT

Intrapac Projects Pty Ltd

Preliminary Environmental and Geotechnical Investigation - Waverley Golf Club - Bergins Road, Rowville

Tonkin & Taylor

ENVIRONMENTAL AND ENGINEERING CONSULTANTS

REPORT

Intrapac Projects Pty Ltd

Preliminary Environmental and Geotechnical Investigation - Waverley Golf Club - Bergins Road, Rowville

Report prepared for:

Intrapac Projects Pty Ltd

Report prepared by:

Tonkin & Taylor Pty Ltd

Distribution:

Intrapac Projects Pty Ltd	1 pdf copy
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August 2014

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Table of Abbreviations

Acronym	Definition
ANZECC	Australian and New Zealand Environment and Conservation Council
AS4482.1	Guide to the investigation and sampling of sites with potentially contaminated soil
AS4482.2	Guide to the sampling and investigation of potentially contaminated soil
C_6-C_{36}	Hydrocarbon chain length fraction
bgl	below ground level
BTEXN	Benzene, Toluene, Ethyl benzene, Xylenes and Naphthalene
COC	Chain of Custody
DO	Dissolved Oxygen
EC	Electrical Conductivity
EPA	Environment Protection Authority
GME	Groundwater Monitoring Event
LNAPL	Light Non-Aqueous Phase Liquid
LOR	Limit of Reporting
m	metre
mg/L	Milligrams per Litre
MNA	Monitored Natural Attenuation
MW	Monitoring Well
NEPM	National Environment Protection Measure
OCP	Organochlorine Pesticides
OPP	Organophosphorous Pesticides
PAH	Polycyclic Aromatic Hydrocarbons
PSH	Phase Separated Hydrocarbons
QA	Quality Assurance
QC	Quality Control
RPD	Relative Percentage Difference
SSSP	Site Specific Safety Plan
SWMS	Safe Work Method Statement
TDS	Total Dissolved Solids
TPH	Total Petroleum Hydrocarbons
TRH	Total Recoverable Hydrocarbon
µg/L	Micrograms per Litre

1 Introduction

Tonkin & Taylor Pty Ltd (T&T) was engaged by Intrapac Projects Pty Ltd (Intrapac) to conduct a preliminary environmental and geotechnical investigation of the Waverley Golf Course located on Bergins Road, Victoria. T&T understands that Intrapac is considering purchase and development of the site and is seeking to obtain additional information on potential environmental (contamination) and geotechnical constraints associated with the site in the context of a residential development.

Information provided in a report prepared for the site previously by T&T[1] indicated filling was occurring at the site, located predominantly along the easement occupied by high voltage transmission lines that transverse the property. Several locations (or 'hotspots') predominantly located around existing site infrastructure were also identified in the T&T report as having potential for contamination.

This work was undertaken in accordance with our proposal of 15 July 2014.

1.1 Objectives

The objective of this investigation is to provide Intrapac with preliminary information on the presence of contaminated fill and other potential contamination sources, as well as indicative information on the geotechnical conditions at the site in the context of the proposed residential site development.

1.2 Scope of works

The following scope of works was undertaken by T&T for this investigation:

- A review of the previous T&T report to identify locations of potential contamination.
- Inspection of the current site conditions to establish the presence of any additional potential sources of contamination.
- Drilling of 10 boreholes providing relatively even coverage of the site, with a focus on the fill within the electrical transmission line easement that traverses the site.
- Excavation at eight targeted boreholes (using hand auger) in areas of potential fill, areas associated with the maintenance facility and a lawn bowls area.
- Desk based evaluation of geological conditions at the site including review of bore logs from the environmental works, existing geological data, topographic features and readily available published reports.
- Provision of this report detailing the findings of the environmental and geotechnical investigation.

Works were undertaken with reference to the National Environment Protection Council (1999) *National Environment Protection (Assessment of Site Contamination) Measure (NEPM) May 2013 Amendment* (ASC NEPM), Australian Standard AS4482.1 2005 and industry practice.

[1] Tonkin & Taylor (January 2012) – Desktop Salinity and Soil Capability Investigation, Waverley Golf Club, Rowville.

2 Background Information

2.1 Site location and description

The site is located at 82 Bergins Road, Rowville, Victoria and is approximately 49 ha in size (refer to Figure 1 for regional site location). The site has been used as a golf course since 1962.

The site is irregular in shape, with a portion of the northeast boundary fronting Bergins Road (including the main site entrance). The western site boundary fronts Stud Road. The remainder of the land immediately surrounding the site is residential in the north, a power substation and Polish cultural centre in the south west and Dandenong Police Paddock Reserve in the south. The site is situated at an elevation of between approximately 48 and 73 mAHD

The majority of the adjacent land to the north, east and west is occupied by residential properties.

2.2 Zoning

A review of the Department of Planning, Transport and Local Infrastructure planning property report indicates the site is zoned as 'Special Use Zone'. Zoning to the north, east and west is designated as R1Z or R3Z, for residential use. A Green Wedge Zone (GWZ) applies to land to the southeast and southwest of the Site. Dandenong Police Paddock Reserve is zoned as a Public Conservation and Resource Zone (PCRZ).

An Environmental Significance Overlay exists for the entirety of the Site. An extract on the objectives of this overlay is provided below.

To protect sites of biological significance from:

- Removal of indigenous vegetation that would be detrimental to the condition and viability of habitat, ecological communities, flora and fauna, genetic diversity or aquatic systems.
- Removal of dead or fallen trees where it would adversely affect native fauna.
- Environmental weeds.
- Fragmentation and loss of habitat, including small scale incremental losses.
- Degradation and interruption to the continuity of indigenous riparian vegetation.
- Alterations to the natural flow and temperature regimes of streams and wetlands.
- Input of pollutants and excessive sediment or nutrients into streams and water bodies.
- Changes in flooding patterns that may adversely affect indigenous flora and fauna.
- Changes in topography that may impact negatively on vegetation or cause erosion or landslip.
- To reduce the threat of extinction to vulnerable, endangered or critically endangered flora or fauna in Knox.
- To enhance the condition and viability of habitats, ecological communities, flora and fauna, genetic diversity and aquatic systems of sites, including both biological and physical components.
- To maintain connectivity between sites of biological significance and indigenous vegetation.
- To ensure buildings, works or subdivisions are compatible with the long-term protection and enhancement of biological significance.
- To increase the extent and quality of indigenous vegetation, consistent with the goal of 'Net Gain' as set out in Victoria's Native Vegetation Management – A Framework for Action (Department of Natural Resources and Environment 2002) utilising the three-step approach

of avoid, minimise and offset. Offsets are to contribute to the achievement of specified net gain targets within ten years.

- To ensure offsets are located as close as practicable to the local catchment and plant/animal population areas impacted by vegetation loss. Preference is to be given to any reasonable option to locate offsets within Knox.
- To provide for adequate bushfire protection measures that minimise adverse environmental impacts.
- To provide appropriate fencing (temporary or permanent) to protect retained vegetation or aquatic environments from movements of machinery, vehicles or heavy foot traffic.

To the south, southeast and west is a Vegetation Protection Overlay with a bushfire management overlay applying to the land to the south of the Site including the Dandenong Police Paddock Reserve.

2.3 Review of T&T report

A review of the information provided in the 2012 T&T report was undertaken as part of the investigation. Information pertinent to this investigation is outlined below.

The report indicates, based on published geological mapping and site observations, that the main soil type at the site predominantly comprised a shallow layer of topsoil (around 0.1m), overlying a shallow layer of (silty) clay (less than a metre), overlying weathered siltstone rock. This was consistent with the geology encountered onsite during recent works.

Depth to permanent water table beneath the surface of the site is expected to be greater than 10 m.

The site inspection included a preliminary evaluation of obvious sources of contamination that may impact on site development and require further investigation. The identified potential sources of contamination included:

- Application of fertilisers, pesticides and herbicides across the entire golf course and on the lawn bowls greens.
- The diesel and petrol ASTs identified adjacent to the maintenance building.
- Storage and use of engine oil, fertilisers, and suspected herbicides/pesticides around the maintenance building.
- Small scale storage of fuel, paint, fertiliser, and weed killer identified in the garden sheds located adjacent to the lawn bowls greens.
- The water and sediments contained within the dams on site.
- Fill soils currently being imported to the site.
- The Waverley sub-station neighbouring the site to the south-west. However, it was unlikely that any contamination from this property would have migrated on to the site considering the down gradient location of the terminal station.

The T&T report indicated that based on the observations made during the site inspection, site uses may have resulted in some contamination at localised areas of the site, and across the site as a whole. However, contamination was generally expected to be minor and limited to surface soils.

2.4 Anecdotal information

The golf course general manager provided information indicating that the importation of soil at the golf club was undertaken through 'Clean Fill Agreements' with contractors during a period

from October 2006 to September 2013 with the purpose of improving visual amenity of the course. During this time a volume of approximately 390,000 m^3 was imported on to the site. The general manager also confirmed council permitting and compliance with EPA requirements were conditions of contract for all works during the period filling was undertaken at the site. In more recent years the filling activity was periodically inspected by a representative from the Environment Protection Authority (EPA). The main areas on which filling was conducted were:

- The transmission line easement, with the majority of fill located in the southern portion;
- The southern and western edges of the practice fairway; and
- The corner of the site adjacent to the eastern side of the Waverley electrical substation.

3 Assessment Criteria

Consistent with the requirements of the State environment protection policy *Prevention and Management of Contamination of Land* (PMCL SEPP), analytical results were evaluated against relevant screening criteria provided in the ASC NEPM for assessing impacts on protected beneficial uses of land under a proposed residential land use setting. Protected beneficial uses include:

- Maintenance of Ecosystems;
- Human Health;
- Aesthetics;
- Production of Food, Flora and Fibre; and
- Buildings and Structures.

For the purposes of evaluating impacts on the 'Maintenance of Ecosystem' beneficial use, T&T evaluated analytical results against Ecological Investigation and Ecological Screening Levels (EILs and ESLs) from the ASC NEPM. The EILs are also typically adopted as an initial screen for potential impacts on the Production of Food, Flora and Fibre. The NEPM provided EILs that are based on added contaminant limits (ACLs) over and above the existing ambient background concentrations (ABC) to which natural flora and fauna may be adapted. For the purposes of the screening assessment, we have compared results against a range of ACLs provided in the NEPM for various soil characteristics (pH and CEC) that were reported for the soil types encountered. As a conservative position, the ABCs were generally set at 'zero'.

T&T also reviewed analytical results against Health Investigation and Health Screening Levels (HILs and HSLs) provided in the ASC NEPM with the 'Residential A' setting being adopted for assessing impacts on the proposed residential land use.

No criteria are established for aesthetics; a qualitative assessment of impacts is considered based on the presence of odours, staining or non-natural materials in soils. Impacts on buildings and structures are assessed based on potential for soils or chemical contamination to be corrosive or damaging to construction material.

4 Soil Investigation Program and Results

4.1 Soil sampling and analysis

On 28 July 2014, T&T attended the site and undertook an intrusive investigation comprising drilling and soil sampling at 10 borehole locations across the site using a 4WD mounted drilling rig (see Figure 2 for locations). Boreholes depths were variable and ranged from 0.5 mbgl to 12.0 mbgl (due the depth of fill encountered). Drilling was primarily undertaken to identify the presence of 'fill' soils, which the previous T&T report suggested were present on site. From the 21 soil samples obtained, ten of these were selected for analysis predominantly based on the presence of 'Fill" soils recorded during the drilling works. Hand augering at an additional eight locations was also undertaken, with five of these surrounding the maintenance shed and the lawn bowls green, as areas identified as potential 'hotspots'. The remaining three locations were at points of potential filling. Sampling of the site soils at these locations was undertaken to provide a better understanding of any potential contamination associated with past activities at the site. Records of the lithology and other observations for each of the borehole locations is contained in Appendix A.

Samples were obtained from the surface soils and nominally at 0.5m bgl at the majority of locations with care taken to minimise the potential for cross contamination. Deeper samples were obtained within Fill soils where encountered.

Sampling, transport and analysis of samples was generally conducted in accordance with EPA Publication IWRG 701 *Sampling and Analysis of Waters, Waste Waters, Soils and Wastes*. Disposable gloves were used to collect samples which were placed in sterile jars for transport to the laboratory in chilled eskies.

The lithology encountered across all locations within the indigenous site soils typically comprised sandy/silty SAND overlying silty CLAY.

All soil samples recovered were submitted with Chain of Custody documentation to laboratories accredited by the National Association of Testing Authorities (NATA) to perform all analyses as described in Table 4-1.

Table 4-1: Analytical Schedule

Sample area	Number of locations	Depth of samples (m)	Number of samples	Number of samples for analysis	Analyses
The wider site area (~49 ha)	13	0.1 – 0.5 in natural 0.1 – 5.0 in fill	21	10	4 x OCPs/OPPs[2] and metals[3] 3 x OCPs/OPPs, metals, TRH[4] and PAH[5] 2 x IWRG621 screen[6] 1 x Broad screen analysis[7]

[2] Organochlorine Pesticides, Organophosphorous Pesticide
[3] Metals screen including (As, Cd, Cr, Cu, Ni, Pb, Zn, Hg, Mo, Se, Ag, Sn) as potential contaminants of concern.
[4] Total Recoverable Hydrocarbons
[5] Polycyclic aromatic hydrocarbons
[6] Broad Screen of analytes as listed in Table 2 of EPA Publication IWRG 621 Soil Hazard Categorisation and Management
[7] Broad screen of selected analytes as listed in Table 1A(1) Health Investigation Levels for soil Contaminants (ASC NEPM)

Sample area	Number of locations	Depth of samples (m)	Number of samples	Number of samples for analysis	Analyses
Maintenance Facility and Lawn bowls	5	Between 0.05 to 1.0	11	7	7 x OCPs/OPPs and metals with selected TRH and PAH

4.2 Field observations

No significant odours or staining indicative of contamination were observed during the soil sampling program with the exception of a strong, septic odour noted at location HA04, which is adjacent to the vehicle wash-down location. A faint hydrocarbon sheen was also observed on accumulated water at this location.

Fragments of potential asbestos containing material were observed on the surface of one of the imported soil stockpiles in the electrical transmission easement. Fragments were located near location BH08. Although not identified while drilling at location BH08 there is potential for additional ACM to be present within the soils at this location, however further investigation would be required to confirm this.

Solid inert waste in the form of fragments of brick, concrete, plastic and metal was observed across the areas of the site at which imported fill has been deposited.

Photos taken during the site works are contained in Appendix B.

4.3 Analytical results and discussion

Analytical results for the soil samples are presented in Table 1 in the Table section of this report along with the adopted screening criteria. The NATA endorsed analytical reports with the Chain of Custody forms are also included in Appendix C. A brief discussion of the results is provided below.

All samples reported concentrations of measured contaminants below the adopted Health Investigation Levels (HILs) and Ecological Investigation Levels (EILs) for residential sites, with the exception of the near-surface sample obtained from location HA04, adjacent to the vehicle wash down area at the maintenance facility.

The same sample (HA04) reported concentrations for TPH (+C10 – C36) above the EPA Industrial Waste Resource Guidelines 621 (IWRG621) 'Fill Material' criterion (1,000 mg/kg) for offsite disposal. All the remaining samples reported concentrations below the upper limits for Fill Material for the other analytes tested.

No contaminants were identified that were considered likely to impact on the buildings and structures beneficial use.

8

5 Geotechnical Assessment

5.1 Regional geology

Available geological maps[8&9] show the site to be underlain by two geological units (Figure 1 below):

- Devonian Period – Humevale Siltstone Formation (Dlh – new map code Dxh);
- Devonian Period – un-named hornfels (m – new map code H).

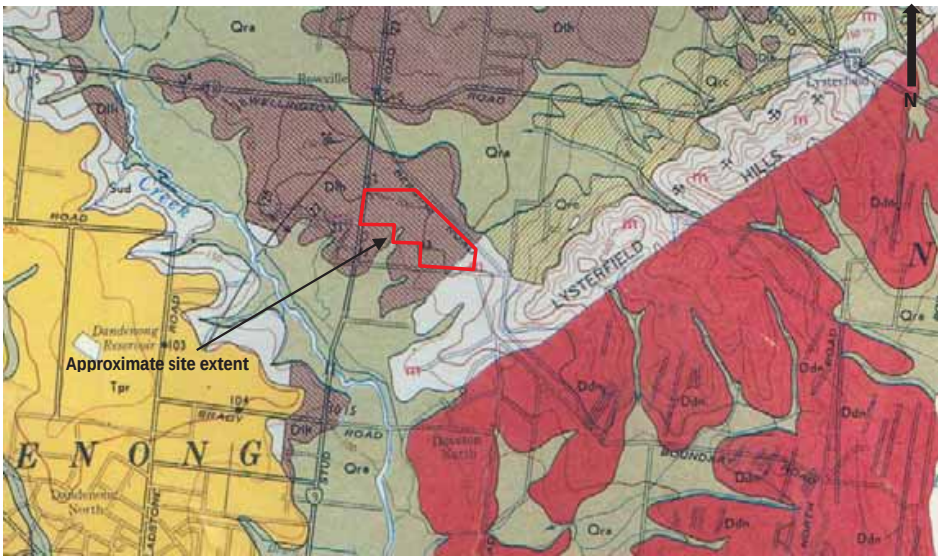

Figure 1 Geological Map (Vandenberg, 1981). Not to scale.

The Humevale Siltstone Formation is described as massive to thin bedded siltstone with thin sandstone interbedded near the base of the unit. The hornfels represents contact metamorphism of the siltstone and sandstone with the intruded Lysterfield Granodiorite to the southeast.

The regional geological maps do not show anthropogenic effects therefore recent earthworks activities such as quarrying or filling will not be shown.

5.2 Ground conditions

During the investigation, the site was noted to be undulating with a fall of approximately 20m (70m AHD to 50m AHD) to the southwest. A number of water bodies exist, which appear to be remnant quarry pits. There also appears to have been significant amounts of fill placed.

The subsurface materials encountered in the boreholes at the site could be categorised into four main geological units as summarised as follows:

Unit 1 – Fill Material

Fill was encountered in a number of boreholes across the site to a maximum depth of 10.8m bgl, and typically described as silty clay. The fill was predominantly found to the southwest of a line

[8] *Vandenberg, A.H.M. (1981) RINGWOOD Sheet 849 Zone 7, 1:63,360 Geological Map. Geological Survey of Victoria. .*
[9] Vandenberg, A.H.M. (1997) *MELBOURNE SJ 55-5 Edition 2, 1:250 000 Geological Map. Geological Survey of Victoria*

bisecting the site from the northwest corner to the southeast corner (boreholes BH05 to BH10 inclusive).

Unit 2 –Sandy or clayey Silt

Natural sandy or clayey silt was encountered to an approximate depth of 0.4m bgl, within the northeast portion of the site not directly underlain by fill (boreholes BH01 to BH04 and hand auger HA01 to HA05 and HA08).

Unit 3 – Silty Clay

Silty clay was encountered beneath the clayey or sandy silt to a maximum depth of 3.5m bgl.

Unit 4 – Clayey or sandy Silt

Clayey or sandy silt was encountered beneath the silty clay, or underlying the fill soils, to a maximum penetrated depth of 12m bgl.

Units 2, 3 and 4 are consistent with strata of the Humevale Siltstone Formation, weathered to a residual soil. The sandy or clayey silt of Unit 2 is considered likely to represent a near surface leached horizon where the clay minerals have leached down into the underlying Unit 3.

Groundwater was not observed during the investigation. The Visualising Victoria's Groundwater database[10] indicates that groundwater is likely to be within 5m to 10m of ground surface, although in some areas it may be deeper at 10m to 20m below ground surface. However, the database shows areas in the vicinity of the site where groundwater is within 5m of the ground surface therefore it is possible that shallow groundwater may be present.

5.3 Development considerations

5.3.1 Foundations

It is understood that the site is being considered for redevelopment as a residential subdivision. It is anticipated that the proposed structures will therefore comprise one or two storey residential structures although some multi-storey apartments and townhouses may also be included.

Shallow pad or strip footings founded within the silty clay (Unit 3), encountered from 0.4m bgl, are likely to be suitable for single or double storey residential structures. The clays of Unit 3 can be highly reactive therefore some footings may need to be designed for reactive sites. The presence of fill and trees may also result in localised P classification. The history of fill placement at the site is unknown, although fill up to 10.8m deep has been encountered. It is likely that any fill will require some form of treatment or improvement prior to development to minimise differential settlement effects. Further work is required to map the depth and spread of fill material and a strategy should be developed with consideration of the proposed land use and site constraints (i.e. Fill) to allow efficient development of the site. For example, the locations of depth fill could be developed as recreational zones or public spaces.

Taller or more heavily loaded structures, or those in areas of deep uncontrolled fill, may require piled foundations. Pile construction may encounter groundwater therefore CFA or driven piles are considered to represent more feasible options.

[10] Federation University Australia (2014) *Visualising Victoria's Groundwater*. Centre for eResearch and Digital Innovation. Federation University Australia.

5.3.2 Excavations

Rock is not anticipated at shallow depth, therefore it is anticipated that excavations can be carried out using conventional earth moving plant. Groundwater is not anticipated within the anticipated shallow foundation excavation depth, although there is potential for perched groundwater to exist due to the presence of near surface clay soils. Shallow or perched groundwater will affect batter stability therefore batters shallower than 3(h):1(v) may be required, although this will need to be determined based on site specific testing.

Due to the general topographical fall across the site, it is likely that retaining walls and associated cut and fill earthworks will be required to establish level building platforms.

5.3.3 Suitability for reuse

It is likely that the silty clay deposits, including the existing fill, will be suitable for reuse, subject to adequate testing to verify compaction and moisture conditioning requirements. Silty soils are unlikely to be suitable for reuse as structural fill but may be suitable for general landscaping.

5.3.4 Pavements

Previous experience with clay soils as described within this report has shown that they are susceptible to severe loss of strength with an increase in moisture content that can occur during wetter times of the year or after heavy rainfall. Therefore significant subgrade improvement may be required if construction is programmed during winter or heavy rainfall occurs during the construction period. Wetting up of clay soils can also create problems with the subgrade meeting proof rolling requirements. Previous experience however, has shown that these materials if carefully treated or controlled can lead to the construction of roads exhibiting good performance.

Detailed design of pavements will need to consider the potential for the clay soils to have a low CBR and to potentially be expansive, and the requirement for subgrade improvement measures.

5.3.5 Construction

Cohesive soils can suffer softening and degradation on exposure and wetting. It is therefore recommended that exposed surfaces are protected as soon as practicable with compacted granular fill or blinding. Degradation of the clay soils also has the potential to impact on site access during construction and it is recommended that this is considered when developing the construction programme.

6 Quality Assurance and Quality Control

A quality assurance/quality control (QA/QC) program was implemented as part of field procedures, which are based on relevant Australian Standards.

The QA/QC program undertaken as part of the assessment by T&T included the following:

- Comparison of field and laboratory data.
- Preservation of samples during field activities and transport from the field to the laboratory.
- Transportation of samples with accompanying Chain of Custody (COC) documentation.
- Collection of blind and split duplicate samples and calculation and review of relative percent difference (RPDs).
- Collection of field blank samples.
- Compliance with recommended sample holding times.
- Review of laboratory internal QA/QC data including analysis of blanks, spikes and duplicates.

6.1 Field QC sampling program

The QC sampling program conducted as part of this investigation involved collection of replicate samples for data reliability purposes, assessing possible errors due to potential sources of cross contamination, inconsistencies in sampling, and analytical techniques etc.

A quantitative measure of the accuracy of the results obtained was undertaken by calculating the RPD values for each duplicate pair. The RPD values were calculated using the following equation:

$$\text{Relative Percent Difference} = \frac{\text{Result 1} - \text{Result 2}}{\text{Mean Result}} \times 100$$

Where, Result 1 = concentration obtained from the original sample

Result 2 = concentration obtained from the split or duplicate sample

The RPD was used to normalise each pair of results, allowing data interpretation of reliability. For RPD values that exceed a generally accepted 30 to 50% limit (AS 4482.1 – 2005), correlation of data between the sample pair is considered poor.

QC samples collected included intra-laboratory and inter-laboratory replicate samples for the soil sampling. The primary laboratory was Eurofins | mgt (Eurofins) and the secondary laboratory was Australian Laboratory Services (ALS).

Summarised in Table 6-1 is the QC samples collected during the investigation works.

Table 6-1: QC sampling program

Sample Type	Sample ID	Matrix	Laboratory	Date Sampled	Primary Sample ID	Replicated Analysis
Blind Duplicate	QC1	Soil	Primary	28/07/2014	TP08-0.1	Metals, TRH, PAH and OCPs
Split Duplicate	QC2	Soil	Secondary	28/07/2014	TP08-0.1	Metals, TRH, PAH and OCPs
Rinse Blank	RB02	Water	Primary	29/07/2014	-	Volatile contaminants
Trip Blank	TB02	Water	Primary	29/07/2014	-	Volatile contaminants

Results from the comparison reported RPD results within the accepted range for the analytes tested with the exception of the both the blind and split pairs for arsenic and the split pair for vanadium. For results refer to Table 2 in the 'Tables' section of this report.

6.1.1 Field blank samples

Results from the trip and rinse blank samples reported results below the laboratory limit of reporting for all analytes tested. For results refer to Table 3 in the 'Tables' section of this report.

6.2 Laboratory internal Quality Control

The testing laboratory conducted their own internal QC program including sample duplicates, spike recoveries and method blanks in accordance with NATA certification requirements. Table 6-2 summarises the results of the laboratory internal quality control.

Table 6-2: Summary of laboratory internal Quality Control results

Laboratory	Report Number	Date Reported	Method Blank	Spike Recoveries (range %)	Internal Duplicate RPD (range)	Comments
Eurofins|mgt	426759	5/08/2014	n.d.	33 – 129	<1 – 11 %	Results are considered acceptable
ALS	EM1407501	6/08/2014	n.d.	71 – 120	<1 – 11.3 %	Results are considered acceptable

Note: n.d. = non-detect

6.3 Conclusions of QA/QC program

Based on the results of the QA/QC program as detailed above, the following is concluded:

- The internal laboratory quality control program reported acceptable results.
- The field sampling procedure was carried out in accordance with the T&T QA/QC program, which is based on sampling guidelines provided in the Australian Standard 4482.1 and 4482.2.
- The RPDs between primary and duplicate samples were below the accepted range of 30-50% with the exception of both the blind and split pairs for arsenic and the split pair for vanadium. The exceedances are considered to be attributed to comparison of

concentrations close to the limit of reporting, and the variability of concentrations within the soil matrix. Subsequently these results were not considered to significantly influence the validity of the reported results.

- The results for the field blank samples reported below the laboratory limit of reporting.
- Laboratories used were NATA accredited for the analyses performed.
- Samples were analysed within the applicable holding times.

It is concluded that the sampling and analytical programs were acceptable and the results obtained are of reliable quality to reach the conclusions made in this report regarding the contamination status of soils at the site.

7 Summary and Conclusions

7.1 Environmental investigation

T&T was engaged to conduct a preliminary soil investigation to identify and assess potential sources of contamination associated with the site that may impact on the proposed use of the site for residential purposes.

Based on the investigation it is considered past site activities may have contributed to onsite contamination. Some septic odours were identified at the location of the vehicle wash down area which constitute an aesthetic impact in a residential setting. Some fragments of potentially asbestos containing material were identified at one of the sampling locations (BH08). Solid inert material that could be considered an aesthetic impact was identified across areas of the site where the importation of fill has been undertaken.

Based on the results of the soil investigation no concentrations for the analytes tested were reported above the NEPM Health Investigation Levels 'A' for low density residential land use or the NEPM Ecological Investigation Levels for 'Urban residential and public open space'. The exception to this was one sample (HA04/0.1) from surfaces soils adjacent to the drainage channel down gradient from the vehicle wash down area. A sheen on the water at this location indicates minor contamination from oils/fuels from the wash down area may have contributed to the hydrocarbon contamination reported at this location.

The same sample (HA04/0.1) reported concentrations for hydrocarbons (+C10 – C36) above the IWRG621 'Fill Material' criterion (1,000 mg/kg) for offsite disposal. This would provisionally classify the soils at this location as 'Category C' Prescribed Industrial Waste, however additional sampling would be required to confirm this. All the remaining samples reported concentrations below the upper limits for Fill Material for the other analytes tested.

7.2 Environmental considerations

Based on the above summary and conclusions, the following items are likely to require further works prior to the site being suitable for the proposed redevelopment:

- Excavation of impacted soils from the drainage line adjacent to the vehicle wash down area as the hydrocarbon concentrations exceed the relevant health and ecological criteria. Furthermore the odours reported at this location are considered an aesthetic impact for a residential site.
- Further investigation of the soils at location BH08 where potential ACM was identified, to establish if additional potential ACM is present at depth within the soils at this location.

Additionally, while the preliminary sampling program suggests that chemical properties of imported soils appear suitable in the context of the proposed residential development, the volume of imported soil and the presence of some solid inert waste and fragments of potential ACM observed at the surface of the filled areas suggests a potential for these types of materials to be variably present throughout the fill profile. Although significant quantities of solid inert material were not identified during the drilling program, and the fill was reportedly imported with some degree of regulatory control (EPA and Council approval and periodic supervision), careful management of the imported soils will still be required if these are to be moved as part of site development works. In particular, if onsite re-use of these fills soils is proposed (i.e. for filling of dams or landscaping or levelling works) screening of the solid inert material from the soil matrix or capping with clean fill may be required to prevent aesthetic impacts (as a protected beneficial use for residential use), as well as an additional analytical sampling program aligned with observations of fill types, to confirm that no contaminated soils are present.

It is understood that prior to development of the site for residential use a change of zoning would be required, from Special Use Zone to Residential. Additional environmental works will likely be required to satisfy the Council the site is suitable for residential use. At present no Environmental Audit Overlay exists at the site however an Audit may be a requirement for a change of zoning. Potential environmental considerations that may require addressing are provided below:

- Additional soil sampling to provide greater coverage of the site and areas not targeted within this scope of work (i.e. greens, tees and fairways).
- Validation sampling of soils following removal of site infrastructure (e.g. maintenance facility, wash down area, lawn bowls greens, etc.).
- Surface water in the onsite dams prior to use during construction or offsite disposal.
- Sampling and analysis of dam sediments which can be a source of accumulated insoluble contamination.
- An assessment of groundwater to establish if any beneficial uses (in a residential setting) are precluded at the site.

7.3 Geotechnical assessment

The site can be separated into two distinct areas. The northeast is underlain by natural soils and shallow pad or strip foundations are likely to be suitable for most structures. Taller or more highly loaded apartment structures, if included in the proposed development, may require piled foundations. The south western part of the site is underlain by deep, potentially uncontrolled fill, therefore structures will require piled foundations, or a programme of ground improvement will need to be implemented.

Groundwater is considered unlikely to be present within the anticipated depth of excavation for shallow foundations, although it may be present within the potential piling depth.

7.4 Geotechnical recommendations

It is recommended that further geotechnical investigation is carried out once the layout of the proposed development has been confirmed. The investigation will need to confirm or identify:

- Site classification to AS 2870;
- Allowable bearing capacities;
- Sewer embedment and backfill requirements;
- Retaining wall design parameters;
- Pavement design.

8 Applicability

This report has been prepared for the benefit of Intrapac Projects Pty Ltd with respect to the particular brief given to us and it may not be relied upon in other contexts or for any other purpose without our prior review and agreement.

Recommendations and opinions in this report are based on data from discrete sampling locations. The nature and continuity of subsoil away from the sampling locations are inferred but it must be appreciated that actual conditions could vary from the assumed model.

Tonkin & Taylor Pty Ltd

Environmental and Engineering Consultants

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.....	.....
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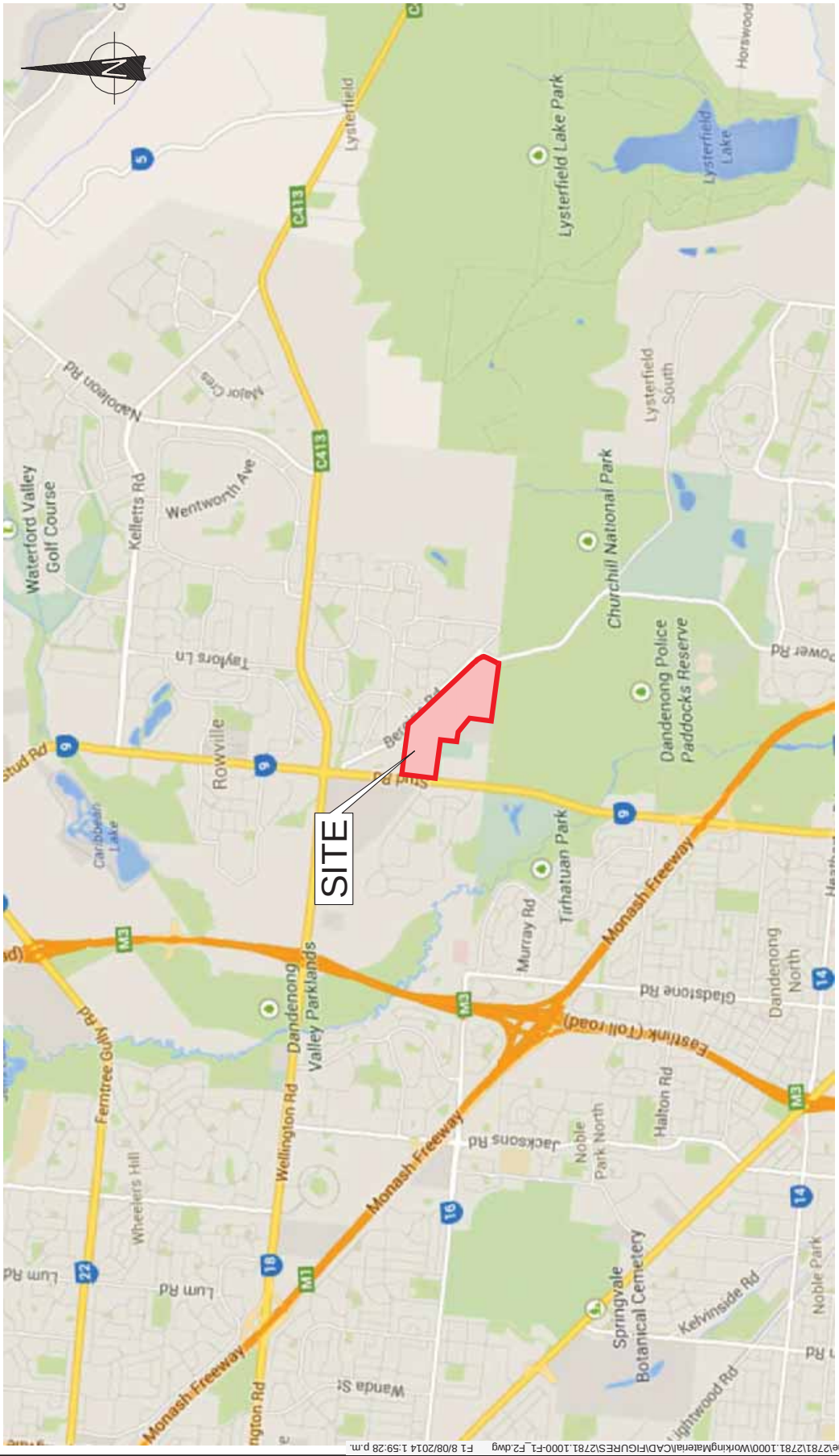
Figures



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PRELIMINARY ENVIRONMENTAL & GEOTECHNICAL INVESTIGATION
82 BERGINS ROAD, ROWVILLE
Site Location Plan

FIG. No. Figure 1.
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SCALE 1:7500
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Site boundary
BH02 T&T Borehole test location (28/07/2014)
HA05 T&T Hand auger test location (28/07/2014)
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Aerial photo sourced from NearMap, date flown: 14.05.2014
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SCALES (AT A4 SIZE) AS SHOWN
PROJECT No. 2781.1000
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PRELIMINARY ENVIRONMENTAL & GEOTECHNICAL INVESTIGATION
82 BERGINS ROAD, ROWVILLE
Geotechnical Sampling Plan
FIG. No. Figure 2.
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Tables

Tonkin & Taylor

Table 1: Soil Results Summary

Intrapac Projects Pty Ltd,Waverley Golf Course

ChemName	Units	EQL	EPA IWRG 621 Category B Upper limits - TC2	EPA IWRG 621 Category C Upper limits - TC1	EPA IWRG 621 Fill Material Upper Limit(s)	NEPM 2013 Residential A Soil	NEPM 2013 Urban residential and public open space, Fine Soil	BH01/0.05	BH02/0.05	BH03/0.05	BH04/0.05	BH05/2.5	BH06/2.5	BH07/3.5	BH08/0.1	BH08/1.5	BH09/1.0	BH10/0.1	HA01/0.05	HA02/0.05	HA03/0.05	HA04/0.05	HA06/0.5	HA07/0.4	HA08/0.1
Sampled Date								28/07/2014	28/07/2014	28/07/2014	28/07/2014	28/07/2014	28/07/2014	28/07/2014	28/07/2014	28/07/2014	28/07/2014	28/07/2014	29/07/2014	29/07/2014	29/07/2014	29/07/2014	29/07/2014	29/07/2014	29/07/2014
Lab. Report No.								426759	426759	426759	426759	426759	426759	426759	426759	427688	426759	426759	426759	426759	426759	426759	426759	426759	426759
Tokuthion	mg/kg	0.2						<0.2	<0.2	<0.2	<0.2	<0.2	-	-	<0.2	-	<0.2	<0.2	-	-	<0.2	<0.2	<0.2	<0.2	<0.2
BTEX																									
Benzene	mg/kg	0.1	16	4	1		65	-	-	-	-	-	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-
Ethylbenzene	mg/kg	0.1					125	-	-	-	-	-	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-
Toluene	mg/kg	0.1					105	-	-	-	-	-	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-
Xylene (m & p)	mg/kg	0.2						-	-	-	-	-	<0.2	<0.2	-	-	-	-	-	-	-	-	-	-	-
Xylene (o)	mg/kg	0.1						-	-	-	-	-	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-
Xylene Total	mg/kg	0.3					45	-	-	-	-	-	<0.3	<0.3	-	-	-	-	-	-	-	-	-	-	-
C6-C10 less BTEX (F1)	mg/kg	20						-	-	-	-	<20	<20	<20	<20	-	<20	<20	<20	<20	-	<20	-	-	-
Chlorinated Hydrocarbons																									
1,1,1,2-tetrachloroethane	mg/kg	0.05						-	-	-	-	-	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	-
1,1,1-trichloroethane	mg/kg	0.05						-	-	-	-	-	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	-
1,1,2,2-tetrachloroethane	mg/kg	0.05						-	-	-	-	-	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	-
1,1,2-trichloroethane	mg/kg	0.05						-	-	-	-	-	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	-
1,1-dichloroethane	mg/kg	0.05						-	-	-	-	-	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	-
1,1-dichloroethene	mg/kg	0.05						-	-	-	-	-	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	-
1,2,3-trichloropropane	mg/kg	0.05						-	-	-	-	-	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	-
1,2-dichloroethane	mg/kg	0.05						-	-	-	-	-	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	-
1,2-dichloropropane	mg/kg	0.05						-	-	-	-	-	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	-
1,3-dichloropropane	mg/kg	0.05						-	-	-	-	-	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	-
Bromochloromethane	mg/kg	0.05						-	-	-	-	-	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	-
Bromodichloromethane	mg/kg	0.05						-	-	-	-	-	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	-
Bromoform	mg/kg	0.05						-	-	-	-	-	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	-
Carbon tetrachloride	mg/kg	0.05						-	-	-	-	-	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	-
Chlorodibromomethane	mg/kg	0.05						-	-	-	-	-	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	-
Chloroethane	mg/kg	0.05						-	-	-	-	-	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	-
Chloroform	mg/kg	0.05						-	-	-	-	-	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	-
Chloromethane	mg/kg	0.05						-	-	-	-	-	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	-
cis-1,2-dichloroethene	mg/kg	0.05						-	-	-	-	-	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	-
cis-1,3-dichloropropene	mg/kg	0.05						-	-	-	-	-	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	-
Dibromomethane	mg/kg	0.05						-	-	-	-	-	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	-
Dichloromethane	mg/kg	0.05						-	-	-	-	-	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	-
Hexachlorobutadiene	mg/kg	0.2	11	2.8				-	-	-	-	-	<0.2	<0.2	-	-	-	-	-	-	-	-	-	-	-
Trichloroethene	mg/kg	0.05						-	-	-	-	-	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	-
Tetrachloroethene	mg/kg	0.05						-	-	-	-	-	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	-
trans-1,2-dichloroethene	mg/kg	0.05						-	-	-	-	-	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	-
trans-1,3-dichloropropene	mg/kg	0.05						-	-	-	-	-	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	-
Vinyl chloride	mg/kg	0.05	4.8	1.2				-	-	-	-	-	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	-
Halogenated Benzenes																									
1,2,4-trichlorobenzene	mg/kg	0.2						-	-	-	-	-	<0.2	<0.2	-	-	-	-	-	-	-	-	-	-	-
1,2-dichlorobenzene	mg/kg	0.05						-	-	-	-	-	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	-
1,3-dichlorobenzene	mg/kg	0.05						-	-	-	-	-	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	-
1,4-dichlorobenzene	mg/kg	0.05						-	-	-	-	-	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	-
4-chlorotoluene	mg/kg	0.05						-	-	-	-	-	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	-
Bromobenzene	mg/kg	0.05						-	-	-	-	-	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	-
Chlorobenzene	mg/kg	0.05						-	-	-	-	-	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	-
Hexachlorobenzene	mg/kg	0.05				10		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	-	<0.05	<0.05	<0.05	<0.05	<0.05
Halogenated Hydrocarbons																									
1,2-dibromoethane	mg/kg	0.05						-	-	-	-	-	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	-
Bromomethane	mg/kg	0.05						-	-	-	-	-	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	-
Dichlorodifluoromethane	mg/kg	0.05						-	-	-	-	-	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	-
Iodomethane	mg/kg	0.05						-	-	-	-	-	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	-
Trichlorofluoromethane	mg/kg	0.05						-	-	-	-	-	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	-
Halogenated Phenols																									
2,4,5-trichlorophenol	mg/kg	1						-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-	-	-	-
2,4,6-trichlorophenol	mg/kg	1						-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-	-	-	-
2,4-dichlorophenol	mg/kg	0.5						-	-	-	-	-	<0.5	<0.5	-	-	-	-	-	-	-	-	-	-	-
2,6-dichlorophenol	mg/kg	0.5						-	-	-	-	-	<0.5	<0.5	-	-	-	-	-	-	-	-	-	-	-
2-chlorophenol	mg/kg	0.5						-	-	-	-	-	<0.5	<0.5	-	-	-	-	-	-	-	-	-	-	-
Pentachlorophenol	mg/kg	1				100		-	-	-	-	-	<1	<1	-	<1	-	-	-	-	-	-	-	-	-
tetrachlorophenols	mg/kg	1						-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-	-	-	-
Herbicides																									
2,4,5-Trichlorophenoxy Acetic Acid	mg/kg	0.5				600		-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-	-	-	-	-
Hedonal	mg/kg	0.5				900		-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-	-	-	-	-
Atrazine	mg/kg	0.2				320		-	-	-	-	-	-	-	-	<0.2	-	-	-	-	-	-	-	-	-
Dinoseb	mg/kg	20						-	-	-	-	-	<20	<20	-	-	-	-	-	-	-	-	-	-	-
2-Methyl-4-chlorophenoxyacetic acid	mg/kg	0.5				600		-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-	-	-	-	-
2-Methyl-4-Chlorophenoxy Butanoic Acid	mg/kg	0.5				600		-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-	-	-	-	-
Mecoprop	mg/kg	0.5				600		-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-	-	-	-	-
Inorganics																									
Cyanide (Free)	mg/kg	5				250		-	-	-	-	-	-	-	-	<5	-	-	-	-	-	-	-	-	-
Cyanide Total	mg/kg	5	10000	2500	50			-	-	-	-	-	<5	<5	-	-	-	-	-	-	-	-	-	-	-
Fluoride	mg/kg	100	40000	10000	450			-	-	-	-	-	160	210	-	-	-	-	-	-	-	-	-	-	-
Moisture Content (dried @ 103°C)	%	0.1						11	8.4	18	15	18	15	20	21	15	14	19	12	17	21	32	20	16	13
pH (aqueous extract)	pH_Units	0.1						-	-	-	-	-	8	7.6	-	-	-	-	-	-	-	-	-	-	-
Lead																									
Lead	mg/kg	5	6000	1500	300	300	1,100	15	8.8	11	11	34	38	18	16	18	21	12	-	12	27	7.5	8.3	20	15
MAH																									
1,2,4-trimethylbenzene	mg/kg	0.05						-	-	-	-	-	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	-
1,3,5-trimethylbenzene	mg/kg	0.05						-	-	-	-	-	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	-
Isopropylbenzene	mg/kg	0.05						-	-	-	-	-	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	-
Styrene	mg/kg	0.05						-	-	-	-	-	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	-
Metals																									
Antimony	mg/kg	10						<10	<10	<10	<10	<10	-	-	<10	-	<10	<10	-	<10	<10	<10	<10	<10	<10
Arsenic	mg/kg	2	2000	500	20	100	100	<2	<2	<2	<2	<2	2.5	<2	<2	<2	<2	<2	-	<2	2.7	<2	<2	<2	<2
Beryllium	mg/kg	2				60		<2	<2	<2	<2	<2	-	-	<2	<2	<2	<2	-	<2	<2	<2	<2	<2	<2
Boron	mg/kg	10				4500		<10	<10	<10	<10	<10	-	-	<10	<10	<10	<10	-	<10	<10	<10	<10	<10	<10
Cadmium	mg/kg	0.4	400	100	3	20		<0.4	<0.4	<0.4	<0.4	0.4	0.4	<0.4	<0.4	<0.4	<0.4	<0.4	-	<0.4	0.4	<0.4	<0.4	<0.4	<0.4
Chromium (hexavalent)	mg/kg	1	2000	500	1	100		-	-	-	-	-	<1	<1	-	<1	-	-	-	-	-	-	-	-	-
Chromium (III+VI)	mg/kg	5						22	23	22	26	36	23	17	23	-	37	27	-	21	21	7.4	23	23	59
Cobalt	mg/kg	5				100		<5	<5	<5	<5	<5	-	-	<5	5.1	<5	<5	-	<5	<5	<5	5.9	<5	7.6
Copper	mg/kg	5	20000	5000	100	6000	830*	5.2	<5	<5	<5	50	17	11	11	12	15	7.3	-	8.8	12	9.3	8.2	11	19
Manganese	mg/kg	5				3800		14	18	73	35	59	-	-	42	72	64	31	-	64	74	44	120	66	170
Mercury	mg/kg	0.1	300	75	1	40		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Molybdenum	mg/kg	10	4000	1000	40			<10	<10	<10	<10	<10	<10	<10	<10	-	<10	<10	-	<10	<10	<10	<10	<10	<10
Nickel	mg/kg	5	12000	3000	60	400		<5	<5	5	<5	9.9	12	11	8.5	11	13	5.9	-	8	8	5.9	9.8	11	23
Selenium	mg/kg	2	200	50	10	200		<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	-	<2	<2	<2	<2	<2	<2
Silver	mg/kg	5	720	180	10			<5	<5	<5	<5	<5	<5	<5	<5	-	<5	<5	-	<5	<5	<5	<5	<5	<5
Tin	mg/kg	10		500	50			<10	<10	<10	<10	<10	<10	<10	<10	-	<10	<10	-	<10	<10	<10	<10	<10	<10
Vanadium	mg/kg	10						37	56	47	69	36	-	-	51	-	61	36	-	30	35	10	41	35	20
Zinc	mg/kg	5	140000	35000	200	7400	230*	8.1	<5	19	<5	65	74	58	27	34	29	15	-	56	77	36	20	37	41
Organochlorine Pesticides																									
4,4-DDE	mg/kg	0.05						<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	-	<0.05	<0.05	<0.05	<0.05	<0.05
a-BHC	mg/kg	0.05						<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	<0.05	<0.05	-	-	<0.05	<0.05	<0.05	<0.05	<0.05
Aldrin	mg/kg	0.05						<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	-	<0.05	<0.05	<0.05	<0.05	<0.05
b-BHC	mg/kg	0.05						<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	<0.05	<0.05	-	-	<0.05	<0.05	<0.05	<0.05	<0.05
chlordane	mg/kg	0.1	16	4		50		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	<0.1	<0.1	<0.1	<0.1	<0.1
d-BHC	mg/kg	0.05						<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	<0.05	<0.05	-	-	<0.05	<0.05	<0.05	<0.05	<0.05
DDD	mg/kg	0.05						<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	-	<0.05	<0.05	<0.05	<0.05	<0.05
DDT	mg/kg	0.05					180	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	-	<0.05	<0.05	<0.05	<0.05	<0.05
Dieldrin	mg/kg	0.05						<0.05	<0.05	<0.05	<0.05	<0.05	0.06	<0.05	<0.05	<0.05	<0.05	<0.05	-	-	<0.05	<0.05	<0.05	<0.05	<0.05
Endosulfan I	mg/kg	0.05						<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	-	<0.05	<0.05	<0.05	<0.05	<0.05

[Filter]

2781.100_Soil Results Table1.xlsm , 12/08/2014

Tonkin & Taylor

Intrapac Projects Pty Ltd,Waverley Golf Course

Table 1: Soil Results Summary

ChemName	Units	EQL	EPA IWRG 621 Category B Upper limits - TC2	EPA IWRG 621 Category C Upper limits - TC1	EPA IWRG 621 Fill Material Upper Limit(s)	NEPM 2013 Residential A Soil	NEPM 2013 Urban residential and public open space, Fine Soil	BH01/0.05	BH02/0.05	BH03/0.05	BH04/0.05	BH05/2.5	BH06/2.5	BH07/3.5	BH08/0.1	BH08/1.5	BH09/1.0	BH10/0.1	HA01/0.05	HA02/0.05	HA03/0.05	HA04/0.05	HA06/0.5	HA07/0.4	HA08/0.1
Sampled Date								28/07/2014	28/07/2014	28/07/2014	28/07/2014	28/07/2014	28/07/2014	28/07/2014	28/07/2014	28/07/2014	28/07/2014	28/07/2014	29/07/2014	29/07/2014	29/07/2014	29/07/2014	29/07/2014	29/07/2014	29/07/2014
Lab. Report No.								426759	426759	426759	426759	426759	426759	426759	426759	427688	426759	426759	426759	426759	426759	426759	426759	426759	426759
Endosulfan II	mg/kg	0.05						<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	-	<0.05	<0.05	<0.05	<0.05	<0.05
Endosulfan sulphate	mg/kg	0.05						<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	-	<0.05	<0.05	<0.05	<0.05	<0.05
Endrin	mg/kg	0.05				10		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	-	<0.05	<0.05	<0.05	<0.05	<0.05
Endrin aldehyde	mg/kg	0.05						<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	<0.05	<0.05	-	-	<0.05	<0.05	<0.05	<0.05	<0.05
Endrin ketone	mg/kg	0.05						<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	<0.05	<0.05	-	-	<0.05	<0.05	<0.05	<0.05	<0.05
g-BHC (Lindane)	mg/kg	0.05						<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	<0.05	<0.05	-	-	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor	mg/kg	0.05	4.8	1.2		6		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	-	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor epoxide	mg/kg	0.05						<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	<0.05	<0.05	-	-	<0.05	0.12	<0.05	<0.05	<0.05
Methoxychlor	mg/kg	0.05				300		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	-	<0.05	<0.05	<0.05	<0.05	<0.05
Toxaphene	mg/kg	1				20		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	-	<1	<1	<1	<1	<1
Organophosphorous Pesticides																									
Azinophos methyl	mg/kg	0.2						<0.2	<0.2	<0.2	<0.2	<0.2	-	-	<0.2	-	<0.2	<0.2	-	-	<0.2	<0.2	<0.2	<0.2	<0.2
Bolstar (Sulprofos)	mg/kg	0.2						<0.2	<0.2	<0.2	<0.2	<0.2	-	-	<0.2	-	<0.2	<0.2	-	-	<0.2	<0.2	<0.2	<0.2	<0.2
Chlorpyrifos	mg/kg	0.2				160		<0.2	<0.2	<0.2	<0.2	<0.2	-	-	<0.2	<0.2	<0.2	<0.2	-	-	<0.2	1.8	<0.2	<0.2	<0.2
Demeton-O	mg/kg	0.2						<0.2	<0.2	<0.2	<0.2	<0.2	-	-	<0.2	-	<0.2	<0.2	-	-	<0.2	<0.2	<0.2	<0.2	<0.2
Diazinon	mg/kg	0.2						<0.2	<0.2	<0.2	<0.2	<0.2	-	-	<0.2	-	<0.2	<0.2	-	-	<0.2	<0.2	<0.2	<0.2	<0.2
Dichlorvos	mg/kg	0.2						<0.2	<0.2	<0.2	<0.2	<0.2	-	-	<0.2	-	<0.2	<0.2	-	-	<0.2	<0.2	<0.2	<0.2	<0.2
Disulfoton	mg/kg	0.2						<0.2	<0.2	<0.2	<0.2	<0.2	-	-	<0.2	-	<0.2	<0.2	-	-	<0.2	<0.2	<0.2	<0.2	<0.2
Ethion	mg/kg	0.2						<0.2	<0.2	<0.2	<0.2	<0.2	-	-	<0.2	-	<0.2	<0.2	-	-	<0.2	<0.2	<0.2	<0.2	<0.2
Ethoprop	mg/kg	0.2						<0.2	<0.2	<0.2	<0.2	<0.2	-	-	<0.2	-	<0.2	<0.2	-	-	<0.2	<0.2	<0.2	<0.2	<0.2
Fenitrothion	mg/kg	0.2						<0.2	<0.2	<0.2	<0.2	<0.2	-	-	<0.2	-	<0.2	<0.2	-	-	<0.2	<0.2	<0.2	<0.2	<0.2
Fensulfothion	mg/kg	0.2						<0.2	<0.2	<0.2	<0.2	<0.2	-	-	<0.2	-	<0.2	<0.2	-	-	<0.2	<0.2	<0.2	<0.2	<0.2
Fenthion	mg/kg	0.2						<0.2	<0.2	<0.2	<0.2	<0.2	-	-	<0.2	-	<0.2	<0.2	-	-	<0.2	<0.2	<0.2	<0.2	<0.2
Merphos	mg/kg	0.2						<0.2	<0.2	<0.2	<0.2	<0.2	-	-	<0.2	-	<0.2	<0.2	-	-	<0.2	<0.2	<0.2	<0.2	<0.2
Methyl parathion	mg/kg	0.2						<0.2	<0.2	<0.2	<0.2	<0.2	-	-	<0.2	-	<0.2	<0.2	-	-	<0.2	<0.2	<0.2	<0.2	<0.2
Mevinphos (Phosdrin)	mg/kg	0.2						<0.2	<0.2	<0.2	<0.2	<0.2	-	-	<0.2	-	<0.2	<0.2	-	-	<0.2	<0.2	<0.2	<0.2	<0.2
Naled (Dibrom)	mg/kg	0.5						<0.5	<0.5	<0.5	<0.5	<0.5	-	-	<0.5	-	<0.5	<0.5	-	-	<0.5	<0.5	<0.5	<0.5	<0.5
Phorate	mg/kg	0.2						<0.2	<0.2	<0.2	<0.2	<0.2	-	-	<0.2	-	<0.2	<0.2	-	-	<0.2	<0.2	<0.2	<0.2	<0.2
Ronnel	mg/kg	0.2						<0.2	<0.2	<0.2	<0.2	<0.2	-	-	<0.2	-	<0.2	<0.2	-	-	<0.2	<0.2	<0.2	<0.2	<0.2
Trichloronate	mg/kg	0.2						<0.2	<0.2	<0.2	<0.2	<0.2	-	-	<0.2	-	<0.2	<0.2	-	-	<0.2	<0.2	<0.2	<0.2	<0.2
PAH																									
Benzo[b+j]fluoranthene	mg/kg	0.5						-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	-	-	-
PAH/Phenols																									
2,4-dimethylphenol	mg/kg	0.5						-	-	-	-	-	<0.5	<0.5	-	-	-	-	-	-	-	-	-	-	-
2,4-dinitrophenol	mg/kg	5						-	-	-	-	-	<5	<5	-	-	-	-	-	-	-	-	-	-	-
2-methylphenol	mg/kg	0.2						-	-	-	-	-	<0.2	<0.2	-	<0.2	-	-	-	-	-	-	-	-	-
2-nitrophenol	mg/kg	1						-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-	-	-	-
3-&4-methylphenol	mg/kg	0.4						-	-	-	-	-	<1	<0.4	-	<0.4	-	-	-	-	-	-	-	-	-
4,6-Dinitro-2-methylphenol	mg/kg	5						-	-	-	-	-	<5	<5	-	-	-	-	-	-	-	-	-	-	-
4-chloro-3-methylphenol	mg/kg	1						-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-	-	-	-
4-nitrophenol	mg/kg	5						-	-	-	-	-	<5	<5	-	-	-	-	-	-	-	-	-	-	-
Acenaphthene	mg/kg	0.5						-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	-	-	-
Acenaphthylene	mg/kg	0.5						-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	-	-	-
Anthracene	mg/kg	0.5						-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	-	-	-
Benz(a)anthracene	mg/kg	0.5						-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	-	-	-
Benzo(a) pyrene	mg/kg	0.5	20	5	1		0.7	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	-	-	-
Benzo(g,h,i)perylene	mg/kg	0.5						-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	-	-	-
Benzo(k)fluoranthene	mg/kg	0.5						-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	-	-	-
Chrysene	mg/kg	0.5						-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	-	-	-
Dibenz(a,h)anthracene	mg/kg	0.5						-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	-	-	-
Fluoranthene	mg/kg	0.5						-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	-	<0.5	-	-	-
Fluorene	mg/kg	0.5						-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	-	-	-
Indeno(1,2,3-c,d)pyrene	mg/kg	0.5						-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	-	-	-
Naphthalene	mg/kg	0.5					170	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	-	-	-
PAHs (Sum of total)	mg/kg	0.5	400	100	20	300		-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.1	-	0.7	-	-	-
Phenanthrene	mg/kg	0.5						-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.7	-	-	-
Phenol	mg/kg	0.5				3000		-	-	-	-	-	<0.5	<0.5	-	<0.5	-	-	-	-	-	-	-	-	-
Picloram	mg/kg	0.01				4500		-	-	-	-	-	-	-	-	<0.01	-	-	-	-	-	-	-	-	-
Pyrene	mg/kg	0.5						-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.5	-	<0.5	-	-	-
Pesticides																									
Bifenthrin	mg/kg	2				600		-	-	-	-	-	-	-	-	<2	-	-	-	-	-	-	-	-	-
Mirex	mg/kg	0.01				10		-	-	-	-	-	-	-	-	<0.05	-	-	-	-	-	-	-	-	-
Phenolics																									
4,6-Dinitro-o-cyclohexyl phenol	mg/kg	20						-	-	-	-	-	<20	<20	-	-	-	-	-	-	-	-	-	-	-
Phenols (Total Halogenated)	mg/kg	1						-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-	-	-	-
Phenols (Total Non Halogenated)	mg/kg	20						-	-	-	-	-	<20	<20	-	-	-	-	-	-	-	-	-	-	-
Polychlorinated Biphenyls																									
Arochlor 1016	mg/kg	0.1						-	-	-	-	-	<0.1	<0.1	-	<0.1	-	-	-	-	-	-	-	-	-
Arochlor 1221	mg/kg	0.1						-	-	-	-	-	<0.1	<0.1	-	<0.1	-	-	-	-	-	-	-	-	-
Arochlor 1232	mg/kg	0.1						-	-	-	-	-	<0.1	<0.1	-	<0.1	-	-	-	-	-	-	-	-	-
Arochlor 1242	mg/kg	0.1						-	-	-	-	-	<0.1	<0.1	-	<0.1	-	-	-	-	-	-	-	-	-
Arochlor 1248	mg/kg	0.1						-	-	-	-	-	<0.1	<0.1	-	<0.1	-	-	-	-	-	-	-	-	-
Arochlor 1254	mg/kg	0.1						-	-	-	-	-	<0.1	<0.1	-	<0.1	-	-	-	-	-	-	-	-	-
Arochlor 1260	mg/kg	0.1						-	-	-	-	-	<0.1	<0.1	-	<0.1	-	-	-	-	-	-	-	-	-
PCBs (Sum of total)	mg/kg	0.1	0	0	2	1		-	-	-	-	-	<0.1	<0.1	-	<0.1	-	-	-	-	-	-	-	-	-
Solvents																									
Methyl Ethyl Ketone	mg/kg	0.05						-	-	-	-	-	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	-
4-Methyl-2-pentanone	mg/kg	0.05						-	-	-	-	-	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	-
Acetone	mg/kg	0.05						-	-	-	-	-	<0.25	<0.25	-	-	-	-	-	-	-	-	-	-	-
Allyl chloride	mg/kg	0.05						-	-	-	-	-	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	-
Carbon disulfide	mg/kg	0.05						-	-	-	-	-	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	-
TPH																									
C10-C16	mg/kg	50					120	-	-	-	-	<50	<50	<50	<50	-	<50	<50	<50	<50	-	390	-	-	-
C16-C34	mg/kg	100					1300	-	-	-	-	120	<100	<100	<100	-	<100	<100	<100	250	-	2,900	-	-	-
C34-C40	mg/kg	100					5600	-	-	-	-	<100	<100	<100	<100	-	<100	<100	<100	<100	-	220	-	-	-
F2-NAPHTHALENE	mg/kg	50						-	-	-	-	<50	<50	<50	<50	-	<50	<50	<50	<50	-	390	-	-	-
C6 - C9	mg/kg	20	2600	650	100			-	-	-	-	<20	<20	<20	<20	-	<20	<20	<20	<20	-	<20	-	-	-
C10 - C14	mg/kg	20						-	-	-	-	42	<20	<20	<20	-	<20	<20	<20	43	-	150	-	-	-
C15 - C28	mg/kg	50						-	-	-	-	69	<50	<50	<50	-	<50	<50	<50	110	-	2,400	-	-	-
C29-C36	mg/kg	50						-	-	-	-	81	<50	61	<50	-	<50	<50	<50	170	-	560	-	-	-
+C10 - C36 (Sum of total)	mg/kg	50	40000	10000	1000			-	-	-	-	190	<50	61	<50	-	<50	<50	<50	320	-	3,100	-	-	-
C6-C10	mg/kg	20					180	-	-	-	-	<20	<20	<20	<20	-	<20	<20	<20	<20	-	<20	-	-	-

Tonkin & Taylor

Table 2: RPD Results Summary

Intrapac Projects Pty Ltd / Waverley Golf Course

Field Duplicates (SOIL)
Filter: ALL

SDG	2121	2121		2121	Interlab_D	
Field_ID	BH08/0.1	QC1	RPD	BH08/0.1	QC2	RPD
Sampled_Date-Time	28/07/2014	28/07/2014		28/07/2014	28/07/2014	

ChemName	Units	EQL						
Tokuthion	mg/kg	0.2	<0.2	<0.2	0	<0.2		
BTEX								
C6-C10 less BTEX (F1)	mg/kg	20 (Primary): 10 (Interlab)	<20.0	<20.0	0	<20.0	<10.0	0
Halogenated Benzenes								
Hexachlorobenzene	mg/kg	0.05	<0.05	<0.05	0	<0.05	<0.05	0
Inorganics								
Moisture Content (dried @ 103°C)	%	0.1	21.0	19.0	10	21.0		
Lead								
Lead	mg/kg	5	16.0	17.0	6	16.0	19.0	17
Metals								
Antimony	mg/kg	10 (Primary): 5 (Interlab)	<10.0	<10.0	0	<10.0	23.0	79
Arsenic	mg/kg	2 (Primary): 5 (Interlab)	**<2.0**	**15.0**	**153**	**<2.0**	**10.0**	**133**
Beryllium	mg/kg	2 (Primary): 1 (Interlab)	<2.0	<2.0	0	<2.0	<1.0	0
Boron	mg/kg	10 (Primary): 50 (Interlab)	<10.0	<10.0	0	<10.0	<50.0	0
Cadmium	mg/kg	0.4 (Primary): 1 (Interlab)	<0.4	<0.4	0	<0.4	<1.0	0
Chromium (III+VI)	mg/kg	5 (Primary): 2 (Interlab)	23.0	31.0	30	23.0	37.0	47
Cobalt	mg/kg	5 (Primary): 2 (Interlab)	<5.0	<5.0	0	<5.0	3.0	0
Copper	mg/kg	5	11.0	16.0	37	11.0	17.0	43
Manganese	mg/kg	5	42.0	58.0	32	42.0	36.0	15
Mercury	mg/kg	0.1	<0.1	<0.1	0	<0.1	<0.1	0
Molybdenum	mg/kg	10 (Primary): 2 (Interlab)	<10.0	<10.0	0	<10.0	<2.0	0
Nickel	mg/kg	5 (Primary): 2 (Interlab)	8.5	11.0	26	8.5	13.0	42
Selenium	mg/kg	2 (Primary): 5 (Interlab)	<2.0	<2.0	0	<2.0	<5.0	0
Silver	mg/kg	5 (Primary): 2 (Interlab)	<5.0	<5.0	0	<5.0	<2.0	0
Tin	mg/kg	10 (Primary): 5 (Interlab)	<10.0	<10.0	0	<10.0	<5.0	0
Vanadium	mg/kg	10 (Primary): 5 (Interlab)	51.0	70.0	31	**51.0**	**89.0**	**54**
Zinc	mg/kg	5	27.0	34.0	23	27.0	31.0	14
Organochlorine Pesticides								
4,4-DDE	mg/kg	0.05	<0.05	<0.05	0	<0.05	<0.05	0
a-BHC	mg/kg	0.05	<0.05	<0.05	0	<0.05	<0.05	0
Aldrin	mg/kg	0.05	<0.05	<0.05	0	<0.05	<0.05	0
b-BHC	mg/kg	0.05	<0.05	<0.05	0	<0.05	<0.05	0
chlordane	mg/kg	0.1 (Primary): 0.05 (Interlab)	<0.1	<0.1	0	<0.1	<0.05	0
d-BHC	mg/kg	0.05	<0.05	<0.05	0	<0.05	<0.05	0
DDD	mg/kg	0.05	<0.05	<0.05	0	<0.05	<0.05	0
DDT	mg/kg	0.05 (Primary): 0.2 (Interlab)	<0.05	<0.05	0	<0.05	<0.2	0
Dieldrin	mg/kg	0.05	<0.05	<0.05	0	<0.05	<0.05	0
Endosulfan I	mg/kg	0.05	<0.05	<0.05	0	<0.05	<0.05	0
Endosulfan II	mg/kg	0.05	<0.05	<0.05	0	<0.05	<0.05	0
Endosulfan sulphate	mg/kg	0.05	<0.05	<0.05	0	<0.05	<0.05	0
Endrin	mg/kg	0.05	<0.05	<0.05	0	<0.05	<0.05	0
Endrin aldehyde	mg/kg	0.05	<0.05	<0.05	0	<0.05	<0.05	0
Endrin ketone	mg/kg	0.05	<0.05	<0.05	0	<0.05	<0.05	0
g-BHC (Lindane)	mg/kg	0.05	<0.05	<0.05	0	<0.05	<0.05	0
Heptachlor	mg/kg	0.05	<0.05	<0.05	0	<0.05	<0.05	0
Heptachlor epoxide	mg/kg	0.05	<0.05	<0.05	0	<0.05	<0.05	0
Methoxychlor	mg/kg	0.05 (Primary): 0.2 (Interlab)	<0.05	<0.05	0	<0.05	<0.2	0
Toxaphene	mg/kg	1	<1.0	<1.0	0	<1.0		
Organophosphorous Pesticides								
Azinophos methyl	mg/kg	0.2 (Primary): 0.05 (Interlab)	<0.2	<0.2	0	<0.2	<0.05	0
Bolstar (Sulprofos)	mg/kg	0.2	<0.2	<0.2	0	<0.2		
Chlorpyrifos	mg/kg	0.2 (Primary): 0.05 (Interlab)	<0.2	<0.2	0	<0.2	<0.05	0
Demeton-O	mg/kg	0.2	<0.2	<0.2	0	<0.2		
Diazinon	mg/kg	0.2 (Primary): 0.05 (Interlab)	<0.2	<0.2	0	<0.2	<0.05	0
Dichlorvos	mg/kg	0.2 (Primary): 0.05 (Interlab)	<0.2	<0.2	0	<0.2	<0.05	0
Disulfoton	mg/kg	0.2	<0.2	<0.2	0	<0.2		
Ethion	mg/kg	0.2 (Primary): 0.05 (Interlab)	<0.2	<0.2	0	<0.2	<0.05	0
Ethoprop	mg/kg	0.2	<0.2	<0.2	0	<0.2		
Fenitrothion	mg/kg	0.2	<0.2	<0.2	0	<0.2		
Fensulfothion	mg/kg	0.2	<0.2	<0.2	0	<0.2		
Fenthion	mg/kg	0.2 (Primary): 0.05 (Interlab)	<0.2	<0.2	0	<0.2	<0.05	0
Merphos	mg/kg	0.2	<0.2	<0.2	0	<0.2		
Methyl parathion	mg/kg	0.2	<0.2	<0.2	0	<0.2	<0.2	0
Mevinphos (Phosdrin)	mg/kg	0.2	<0.2	<0.2	0	<0.2		
Naled (Dibrom)	mg/kg	0.5	<0.5	<0.5	0	<0.5		
Phorate	mg/kg	0.2	<0.2	<0.2	0	<0.2		
Ronnel	mg/kg	0.2	<0.2	<0.2	0	<0.2		
Trichloronate	mg/kg	0.2	<0.2	<0.2	0	<0.2		
PAH								
Benzo[b+j]fluoranthene	mg/kg	0.5	<0.5	<0.5	0	<0.5		
PAH/Phenols								
Acenaphthene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0
Acenaphthylene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0
Anthracene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0
Benz(a)anthracene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0
Benzo(a) pyrene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0
Benzo(g,h,i)perylene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0
Benzo(k)fluoranthene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0
Chrysene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0
Dibenz(a,h)anthracene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0
Fluoranthene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0
Fluorene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0
Indeno(1,2,3-c,d)pyrene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0
Naphthalene	mg/kg	0.5 (Primary): 1 (Interlab)	<0.5	<0.5	0	<0.5	<0.5	0
Naphthalene	mg/kg	0.5 (Primary): 1 (Interlab)	<0.5	<0.5	0	<0.5	<0.5	0
PAHs (Sum of total)	mg/kg	0.5	<0.5	<0.5	0	<0.5		
Phenanthrene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0
Pyrene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0
TPH								
C10-C16	mg/kg	50	<50.0	<50.0	0	<50.0	<50.0	0
C16-C34	mg/kg	100	<100.0	<100.0	0	<100.0	<100.0	0
C34-C40	mg/kg	100	<100.0	<100.0	0	<100.0	<100.0	0
F2-NAPHTHALENE	mg/kg	50	<50.0	<50.0	0	<50.0	<50.0	0
C6 - C9	mg/kg	20 (Primary): 10 (Interlab)	<20.0	<20.0	0	<20.0	<10.0	0
C10 - C14	mg/kg	20 (Primary): 50 (Interlab)	<20.0	<20.0	0	<20.0	<50.0	0
C15 - C28	mg/kg	50 (Primary): 100 (Interlab)	<50.0	<50.0	0	<50.0	<100.0	0
C29-C36	mg/kg	50 (Primary): 100 (Interlab)	<50.0	<50.0	0	<50.0	<100.0	0
+C10 - C36 (Sum of total)	mg/kg	50	<50.0	<50.0	0	<50.0	<50.0	0
C6-C10	mg/kg	20 (Primary): 10 (Interlab)	<20.0	<20.0	0	<20.0	<10.0	0

*RPDs have only been considered where a concentration is greater than 1 times the EQL.
**High RPDs are in bold (Acceptable RPDs for each EQL multiplier range are: 80 (1-10 x EQL); 50 (10-30 x EQL); 30 (> 30 x EQL))
***Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any methods in the row header relate to those used in the primary laboratory

Filter: ALL

Tonkin & Taylor

Table 3: Blank Results Summary

Intrapac Projects Pty Ltd / Waverley Golf Course

SDG			2121	2121
Field_ID			RB02	TB02
Sampled_Date-Time			29/07/2014	29/07/2014
Sample_Type			Rinsate	Trip_B
ChemName	**Units**	**EQL**		
BTEX				
C6-C10 less BTEX (F1)	mg/l	0.02	<0.02	<0.02
PAH/Phenols				
Naphthalene	µg/l	20	<20	<20
TPH				
C10-C16	mg/l	0.05	<0.05	<0.05
C16-C34	mg/l	0.1	<0.1	<0.1
C34-C40	mg/l	0.1	<0.1	<0.1
F2-NAPHTHALENE	mg/l	0.05	<0.05	<0.05
C6 - C9	µg/l	20	<20	<20
C10 - C14	µg/l	50	<50	<50
C15 - C28	µg/l	100	<100	<100
C29-C36	µg/l	100	<100	<100
+C10 - C36 (Sum of total)	µg/l	100	<100	<100
C6-C10	mg/l	0.02	<0.02	<0.02

Filter: ALL

Appendix A: Borehole Logs

TONKIN & TAYLOR LTD

BOREHOLE LOG

BOREHOLE No: BH01
Hole Location:

SHEET 1 OF 1

PROJECT: Waverley GC	LOCATION: Bergins Road, Rowvile	JOB No: 2781.1000
CO-ORDINATES 5799712 345294	DRILL TYPE: Solid Auger	HOLE STARTED: 28/7/14
	DRILL METHOD: Borehole	HOLE FINISHED: 28/7/14
R.L. m		DRILLED BY: Matrix Drilling
DATUM	DRILL FLUID:	LOGGED BY: KRK CHECKED: TOM

BORING							ENGINEERING DESCRIPTION					FIELD TESTING		LABORATORY TESTS		
FLUID LOSS	WATER	CORE RECOVERY (%)	METHOD	CASING	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITIONS / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	FIELD RECORDS/ COMMENTS	CONTAMINATION INDICATORS (ODOURS, STAINING, IMPORTED FILL, ASH, SEPARATE PHASE LIQUIDS)	SAMPLES, TESTS	MC (%)	PID (ppm)
									Sandy SILT, low to medium plasiticity, brown, very fine grained sand.	D	S-F			BH01/0.05		
						0.5								BH01/0.5		
									Silty CLAY, medium to high plasticity, pale brown mottled white.	D	F					
						1.0			**BH01 terminated @ 1.0mbgl**							
						1.5										
						2.0										
						2.5										
						3.0										
						3.5										

T+T DATATEMPLATE.GDT krk

Log Scale 1:20

BOREHOLE-ENVIRONMENTAL 2781.1000 GINT.GPJ 8/8/14

TONKIN & TAYLOR LTD

BOREHOLE LOG

BOREHOLE No: BH02
Hole Location:

SHEET 1 OF 1

PROJECT: Waverley GC	LOCATION: Bergins Road, Rowvile	JOB No: 2781.1000
CO-ORDINATES 5799448 345535	DRILL TYPE: Solid Auger	HOLE STARTED: 28/7/14
	DRILL METHOD: Borehole	HOLE FINISHED: 28/7/14
R.L. m		DRILLED BY: Matrix Drilling
DATUM	DRILL FLUID:	LOGGED BY: KRK CHECKED: TOM

BORING							ENGINEERING DESCRIPTION					FIELD TESTING		LABORATORY TESTS		
FLUID LOSS	WATER	CORE RECOVERY (%)	METHOD	CASING	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITIONS / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	FIELD RECORDS/ COMMENTS	CONTAMINATION INDICATORS (ODOURS, STAINING, IMPORTED FILL, ASH, SEPARATE PHASE LIQUIDS)	SAMPLES, TESTS	MC (%)	PID (ppm)
									Sandy SILT, low to medium plasiticity, brown, very fine grained sand.	D	S-F			BH02/0.05		
									Silty CLAY, medium to high plasticity, pale brown mottled white.	D	F			BH02/0.5		
						0.5			**BH02 terminated @ 0.5mbgl**							
						1.0										
						1.5										
						2.0										
						2.5										
						3.0										
						3.5										

T+T DATATEMPLATE.GDT krk

Log Scale 1:20

BOREHOLE-ENVIRONMENTAL 2781.1000 GINT.GPJ 8/8/14

TONKIN & TAYLOR LTD

BOREHOLE LOG

BOREHOLE No: BH03
Hole Location:

SHEET 1 OF 1

PROJECT: Waverley GC	LOCATION: Bergins Road, Rowvile	JOB No: 2781.1000
CO-ORDINATES 5799204 345744	DRILL TYPE: Solid Auger	HOLE STARTED: 28/7/14
	DRILL METHOD: Borehole	HOLE FINISHED: 28/7/14
R.L. m		DRILLED BY: Matrix Drilling
DATUM	DRILL FLUID:	LOGGED BY: KRK CHECKED: TOM

BORING							ENGINEERING DESCRIPTION					FIELD TESTING		LABORATORY TESTS		
FLUID LOSS	WATER	CORE RECOVERY (%)	METHOD	CASING	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITIONS / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	FIELD RECORDS/ COMMENTS	CONTAMINATION INDICATORS (ODOURS, STAINING, IMPORTED FILL, ASH, SEPARATE PHASE LIQUIDS)	SAMPLES, TESTS	MC (%)	PID (ppm)
									Sandy SILT, low to medium plasiticity, brown, very fine grained sand.	D-M				BH03/0.05 BH03/0.5		
						0.5			Silty CLAY, medium to high plasticity, brown mottled red, trace fine to medium grained gravel.	D	F					
									BH03 terminated @0.6mbgl							
						1.0										
						1.5										
						2.0										
						2.5										
						3.0										
						3.5										

T+T DATATEMPLATE.GDT krk

Log Scale 1:20

BOREHOLE-ENVIRONMENTAL 2781.1000 GINT.GPJ 8/8/14

TONKIN & TAYLOR LTD

BOREHOLE LOG

BOREHOLE No: BH04
Hole Location:

SHEET 1 OF 1

PROJECT: Waverley GC	LOCATION: Bergins Road, Rowvile	JOB No: 2781.1000
CO-ORDINATES 5799226 345623	DRILL TYPE: Solid Auger	HOLE STARTED: 28/7/14
	DRILL METHOD: Borehole	HOLE FINISHED: 28/7/14
R.L. m		DRILLED BY: Matrix Drilling
DATUM	DRILL FLUID:	LOGGED BY: KRK CHECKED: TOM

BORING							ENGINEERING DESCRIPTION					FIELD TESTING		LABORATORY TESTS		
FLUID LOSS	WATER	CORE RECOVERY (%)	METHOD	CASING	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITIONS / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	FIELD RECORDS/ COMMENTS	CONTAMINATION INDICATORS (ODOURS, STAINING, IMPORTED FILL, ASH, SEPARATE PHASE LIQUIDS)	SAMPLES, TESTS	MC (%)	PID (ppm)
									Sandy SILT, low to medium plasiticity, brown, very fine grained sand.	D	S-F			BH04/0.05		
						0.5			Silty CLAY, medium to high plasticity, brown mottled red, trace fine to medium grained gravel.	D	St			BH04/0.5		
									BH04 terminated @0.6mbgl							
						1.0										
						1.5										
						2.0										
						2.5										
						3.0										
						3.5										

T+T DATATEMPLATE.GDT krk

Log Scale 1:20

BOREHOLE-ENVIRONMENTAL 2781.1000 GINT.GPJ 8/8/14

TONKIN & TAYLOR LTD

BOREHOLE LOG

BOREHOLE No: BH05
Hole Location:

SHEET 1 OF 2

PROJECT: Waverley GC	LOCATION: Bergins Road, Rowvile	JOB No: 2781.1000
CO-ORDINATES 5799147 345510	DRILL TYPE: Solid Auger	HOLE STARTED: 28/7/14
	DRILL METHOD: Borehole	HOLE FINISHED: 28/7/14
R.L. m		DRILLED BY: Matrix Drilling
DATUM	DRILL FLUID:	LOGGED BY: KRK CHECKED: TOM

BORING							ENGINEERING DESCRIPTION					FIELD TESTING		LABORATORY TESTS		
FLUID LOSS	WATER	CORE RECOVERY (%)	METHOD	CASING	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITIONS / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	FIELD RECORDS/ COMMENTS	CONTAMINATION INDICATORS (ODOURS, STAINING, IMPORTED FILL, ASH, SEPARATE PHASE LIQUIDS)	SAMPLES, TESTS	MC (%)	PID (ppm)
									FILL: Clayey SILT, brown, trace fine to medium grained gravel			Brick and glass at surface		BH05/0.1		
									FILL: Silty CLAY, brown to black, trace fine to medium grained gravel	D-M						
						0.5										
						1.0										
						1.5										
						2.0										
						2.5								BH05/2.5		
						3.0										
						3.5			Clayey SILT, pale yellowish brown, medium to high plasticity							

T+T DATATEMPLATE.GDT KRK

Log Scale 1:20

BOREHOLE-ENVIRONMENTAL 2781.1000 GINT.GPJ 12/8/14

TONKIN & TAYLOR LTD

BOREHOLE LOG

BOREHOLE No: BH05
Hole Location:

SHEET 2 OF 2

PROJECT: Waverley GC	LOCATION: Bergins Road, Rowvile	JOB No: 2781.1000
CO-ORDINATES 5799147 345510	DRILL TYPE: Solid Auger	HOLE STARTED: 28/7/14
	DRILL METHOD: Borehole	HOLE FINISHED: 28/7/14
R.L. m		DRILLED BY: Matrix Drilling
DATUM	DRILL FLUID:	LOGGED BY: KRK CHECKED: TOM

BORING							ENGINEERING DESCRIPTION					FIELD TESTING		LABORATORY TESTS		
FLUID LOSS	WATER	CORE RECOVERY (%)	METHOD	CASING	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITIONS / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	FIELD RECORDS/ COMMENTS	CONTAMINATION INDICATORS (ODOURS, STAINING, IMPORTED FILL, ASH, SEPARATE PHASE LIQUIDS)	SAMPLES, TESTS	MC (%)	PID (ppm)
									Clayey SILT, pale yellowish brown, medium to high plasticity							
						4.5			- Grades to greyish brown @4.5mbgl							
						5.0										
						5.5			**BH05 terminated @5.5mbgl**							
						6.0										
						6.5										
						7.0										
						7.5										

T+T DATATEMPLATE.GDT KRK

Log Scale 1:20

BOREHOLE-ENVIRONMENTAL 2781.1000 GINT.GPJ 12/8/14

TONKIN & TAYLOR LTD

BOREHOLE LOG

BOREHOLE No: BH06
Hole Location:

SHEET 1 OF 2

PROJECT: Waverley GC	LOCATION: Bergins Road, Rowvile	JOB No: 2781.1000
CO-ORDINATES 5799200 345445	DRILL TYPE: Solid Auger	HOLE STARTED: 28/7/14
	DRILL METHOD: Borehole	HOLE FINISHED: 28/7/14
R.L. m		DRILLED BY: Matrix Drilling
DATUM	DRILL FLUID:	LOGGED BY: KRK CHECKED: TOM

BORING							ENGINEERING DESCRIPTION					FIELD TESTING		LABORATORY TESTS		
FLUID LOSS	WATER	CORE RECOVERY (%)	METHOD	CASING	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITIONS / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	FIELD RECORDS/ COMMENTS	CONTAMINATION INDICATORS (ODOURS, STAINING, IMPORTED FILL, ASH, SEPARATE PHASE LIQUIDS)	SAMPLES, TESTS	MC (%)	PID (ppm)
									FILL: Silty CLAY, brown to dark brown, trace fine grained sand, some fine to coarse grained gravel.	M	F	Brick fragments tilings concrete at surface		BH06/0.1		
						0.5										
						1.0										
						1.5										
						2.0			FILL: Clayey siltstone, medium to high plasticity, pale yellowish brown.	D-M	F					
						2.5			FILL: Silty CLAY, medium plasticity, grey to dark brown, trace fine grained sand.	M	F-St			BH06/2.5		
						3.0										
						3.5										

T+T DATATEMPLATE.GDT KRK

Log Scale 1:20

BOREHOLE-ENVIRONMENTAL 2781.1000 GINT.GPJ 12/8/14

TONKIN & TAYLOR LTD

BOREHOLE LOG

BOREHOLE No: BH06
Hole Location:

SHEET 2 OF 2

PROJECT: Waverley GC	LOCATION: Bergins Road, Rowvile	JOB No: 2781.1000
CO-ORDINATES 5799200 345445	DRILL TYPE: Solid Auger	HOLE STARTED: 28/7/14
	DRILL METHOD: Borehole	HOLE FINISHED: 28/7/14
R.L. m		DRILLED BY: Matrix Drilling
DATUM	DRILL FLUID:	LOGGED BY: KRK CHECKED: TOM

BORING							ENGINEERING DESCRIPTION					FIELD TESTING		LABORATORY TESTS		
FLUID LOSS	WATER	CORE RECOVERY (%)	METHOD	CASING	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITIONS / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	FIELD RECORDS/ COMMENTS	CONTAMINATION INDICATORS (ODOURS, STAINING, IMPORTED FILL, ASH, SEPARATE PHASE LIQUIDS)	SAMPLES, TESTS	MC (%)	PID (ppm)
						4.5			FILL: Silty CLAY, medium plasticity, grey to dark brown, trace fine grained sand.							
						5.0			**Refusal for BH06 @ 4.8mbgl**							
						5.5										
						6.0										
						6.5										
						7.0										
						7.5										

T+T DATATEMPLATE.GDT KRK

Log Scale 1:20

BOREHOLE-ENVIRONMENTAL 2781.1000 GINT.GPJ 12/8/14

TONKIN & TAYLOR LTD

BOREHOLE LOG

BOREHOLE No: BH07
Hole Location:

SHEET 1 OF 3

PROJECT: Waverley GC	LOCATION: Bergins Road, Rowvile	JOB No: 2781.1000
CO-ORDINATES 5799151 345213	DRILL TYPE: Solid Auger	HOLE STARTED: 28/7/14
	DRILL METHOD: Borehole	HOLE FINISHED: 28/7/14
R.L. m		DRILLED BY: Matrix Drilling
DATUM	DRILL FLUID:	LOGGED BY: KRK CHECKED: TOM

BORING							ENGINEERING DESCRIPTION					FIELD TESTING		LABORATORY TESTS		
FLUID LOSS	WATER	CORE RECOVERY (%)	METHOD	CASING	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITIONS / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	FIELD RECORDS/ COMMENTS	CONTAMINATION INDICATORS (ODOURS, STAINING, IMPORTED FILL, ASH, SEPARATE PHASE LIQUIDS)	SAMPLES, TESTS	MC (%)	PID (ppm)
									FILL: Clayey SILT, brown, minor fine to medium grained gravel, trace very fine grained sand	M	S-F	Tiling		BH07/0.1		
						0.5										
						1.0										
						1.5										
						2.0			- Grades to stiff @ 2.0mbgl	M	St					
						2.5										
						3.0										
									FILL: Silty CLAY, medium to high plasticity, black to dark brown, trace fine grained sand	M	F	Trace bricks and asphalt fragments				
						3.5								BH07/3.5		

T+T DATATEMPLATE.GDT KRK

Log Scale 1:20

BOREHOLE-ENVIRONMENTAL 2781.1000 GINT.GPJ 12/8/14

TONKIN & TAYLOR LTD

BOREHOLE LOG

BOREHOLE No: BH07
Hole Location:

SHEET 2 OF 3

PROJECT: Waverley GC	LOCATION: Bergins Road, Rowvile	JOB No: 2781.1000
CO-ORDINATES 5799151 345213	DRILL TYPE: Solid Auger	HOLE STARTED: 28/7/14
	DRILL METHOD: Borehole	HOLE FINISHED: 28/7/14
R.L. m		DRILLED BY: Matrix Drilling
DATUM	DRILL FLUID:	LOGGED BY: KRK CHECKED: TOM

BORING							ENGINEERING DESCRIPTION					FIELD TESTING		LABORATORY TESTS		
FLUID LOSS	WATER	CORE RECOVERY (%)	METHOD	CASING	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITIONS / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	FIELD RECORDS/ COMMENTS	CONTAMINATION INDICATORS (ODOURS, STAINING, IMPORTED FILL, ASH, SEPARATE PHASE LIQUIDS)	SAMPLES, TESTS	MC (%)	PID (ppm)
									FILL: Silty CLAY, medium to high plasticity, black to dark brown, trace fine grained sand							
						4.5										
						5.0			- Grades to some fine to medium grained sand @ 5.0mbgl					BH07/5.0		
						5.5										
						6.0										
						6.5										
						7.0										
						7.5										

T+T DATATEMPLATE.GDT KRK

Log Scale 1:20

BOREHOLE-ENVIRONMENTAL 2781.1000 GINT.GPJ 12/8/14

TONKIN & TAYLOR LTD

BOREHOLE LOG

BOREHOLE No: BH07
Hole Location:

SHEET 3 OF 3

PROJECT: Waverley GC	LOCATION: Bergins Road, Rowvile	JOB No: 2781.1000
CO-ORDINATES 5799151 345213	DRILL TYPE: Solid Auger	HOLE STARTED: 28/7/14
	DRILL METHOD: Borehole	HOLE FINISHED: 28/7/14
R.L. m		DRILLED BY: Matrix Drilling
DATUM	DRILL FLUID:	LOGGED BY: KRK CHECKED: TOM

BORING							ENGINEERING DESCRIPTION					FIELD TESTING		LABORATORY TESTS		
FLUID LOSS	WATER	CORE RECOVERY (%)	METHOD	CASING	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITIONS / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	FIELD RECORDS/ COMMENTS	CONTAMINATION INDICATORS (ODOURS, STAINING, IMPORTED FILL, ASH, SEPARATE PHASE LIQUIDS)	SAMPLES, TESTS	MC (%)	PID (ppm)
									FILL: Silty CLAY, medium to high plasticity, black to dark brown, trace fine grained sand							
						8.5										
						9.0			FILL: Silty CLAY, high plasticity, pale brown, trace fine to medium rounded gravel	M	St					
						9.5										
						10.0			- Grades to grey @ 10.0mbgl							
						10.5										
						11.0			Sandy SILT, brown, fine to medium grained.	D	F					
						11.5			**BH07 terminated @11.5mbgl**							

T+T DATATEMPLATE.GDT KRK

Log Scale 1:20

BOREHOLE-ENVIRONMENTAL 2781.1000 GINT.GPJ 12/8/14

TONKIN & TAYLOR LTD

BOREHOLE LOG

BOREHOLE No: BH08
Hole Location:

SHEET 1 OF 4

PROJECT: Waverley GC	LOCATION: Bergins Road, Rowvile	JOB No: 2781.1000
CO-ORDINATES 5799403 345164	DRILL TYPE: Solid Auger	HOLE STARTED: 28/7/14
	DRILL METHOD: Borehole	HOLE FINISHED: 28/7/14
R.L. m		DRILLED BY: Matrix Drilling
DATUM	DRILL FLUID:	LOGGED BY: KRK CHECKED: TOM

BORING							ENGINEERING DESCRIPTION					FIELD TESTING		LABORATORY TESTS		
FLUID LOSS	WATER	CORE RECOVERY (%)	METHOD	CASING	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITIONS / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	FIELD RECORDS/ COMMENTS	CONTAMINATION INDICATORS (ODOURS, STAINING, IMPORTED FILL, ASH, SEPARATE PHASE LIQUIDS)	SAMPLES, TESTS	MC (%)	PID (ppm)
									FILL: Silty CLAY, orangey brown, minor fine to medium grained gravel, minor fine to coarse grained sand	D-M	F-St	Contains brick tiling PVC concrete and tiling at surface		BH08/0.1 QC1 QC2		
						0.5										
						1.0										
						1.5								BH08/1.5		
						2.0										
						2.5										
						3.0										
						3.5										

T+T DATATEMPLATE.GDT KRK

Log Scale 1:20

BOREHOLE-ENVIRONMENTAL 2781.1000 GINT.GPJ 12/8/14

TONKIN & TAYLOR LTD

BOREHOLE LOG

BOREHOLE No: BH08
Hole Location:

SHEET 2 OF 4

PROJECT: Waverley GC	LOCATION: Bergins Road, Rowvile	JOB No: 2781.1000
CO-ORDINATES 5799403 345164	DRILL TYPE: Solid Auger	HOLE STARTED: 28/7/14
	DRILL METHOD: Borehole	HOLE FINISHED: 28/7/14
R.L. m		DRILLED BY: Matrix Drilling
DATUM	DRILL FLUID:	LOGGED BY: KRK CHECKED: TOM

BORING							ENGINEERING DESCRIPTION					FIELD TESTING		LABORATORY TESTS		
FLUID LOSS	WATER	CORE RECOVERY (%)	METHOD	CASING	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITIONS / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	FIELD RECORDS/ COMMENTS	CONTAMINATION INDICATORS (ODOURS, STAINING, IMPORTED FILL, ASH, SEPARATE PHASE LIQUIDS)	SAMPLES, TESTS	MC (%)	PID (ppm)
									FILL: Silty CLAY, orangey brown, minor fine to medium grained gravel, minor fine to coarse grained sand - Grades to dark brown and grey @ 4.0mbgl							
						4.5										
						5.0										
						5.5										
						6.0										
						6.5										
						7.0										
						7.5										

T+T DATATEMPLATE.GDT KRK

Log Scale 1:20

BOREHOLE-ENVIRONMENTAL 2781.1000 GINT.GPJ 12/8/14

TONKIN & TAYLOR LTD

BOREHOLE LOG

BOREHOLE No: BH08
Hole Location:

SHEET 3 OF 4

PROJECT: Waverley GC	LOCATION: Bergins Road, Rowvile	JOB No: 2781.1000
CO-ORDINATES 5799403 345164	DRILL TYPE: Solid Auger	HOLE STARTED: 28/7/14
	DRILL METHOD: Borehole	HOLE FINISHED: 28/7/14
R.L. m		DRILLED BY: Matrix Drilling
DATUM	DRILL FLUID:	LOGGED BY: KRK CHECKED: TOM

BORING							ENGINEERING DESCRIPTION					FIELD TESTING		LABORATORY TESTS		
FLUID LOSS	WATER	CORE RECOVERY (%)	METHOD	CASING	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITIONS / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	FIELD RECORDS/ COMMENTS	CONTAMINATION INDICATORS (ODOURS, STAINING, IMPORTED FILL, ASH, SEPARATE PHASE LIQUIDS)	SAMPLES, TESTS	MC (%)	PID (ppm)
									FILL: Silty CLAY, orangey brown, minor fine to medium grained gravel, minor fine to coarse grained sand							
						8.5										
						9.0										
						9.5										
						10.0										
						10.5										
									Sandy SILT, brown, fine to medium grained.	D	F					
						11.0										
						11.5										

T+T DATATEMPLATE.GDT KRK

Log Scale 1:20

BOREHOLE-ENVIRONMENTAL 2781.1000 GINT.GPJ 12/8/14

TONKIN & TAYLOR LTD

BOREHOLE LOG

BOREHOLE No: BH08
Hole Location:

SHEET 4 OF 4

PROJECT: Waverley GC	LOCATION: Bergins Road, Rowvile	JOB No: 2781.1000
CO-ORDINATES 5799403 345164	DRILL TYPE: Solid Auger	HOLE STARTED: 28/7/14
	DRILL METHOD: Borehole	HOLE FINISHED: 28/7/14
R.L. m		DRILLED BY: Matrix Drilling
DATUM	DRILL FLUID:	LOGGED BY: KRK CHECKED: TOM

BORING							ENGINEERING DESCRIPTION					FIELD TESTING		LABORATORY TESTS		
FLUID LOSS	WATER	CORE RECOVERY (%)	METHOD	CASING	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITIONS / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	FIELD RECORDS/ COMMENTS	CONTAMINATION INDICATORS (ODOURS, STAINING, IMPORTED FILL, ASH, SEPARATE PHASE LIQUIDS)	SAMPLES, TESTS	MC (%)	PID (ppm)
									BH08 terminated @ 12.0mbgl							
						12.5										
						13.0										
						13.5										
						14.0										
						14.5										
						15.0										
						15.5										

T+T DATATEMPLATE.GDT KRK

Log Scale 1:20

BOREHOLE-ENVIRONMENTAL 2781.1000 GINT.GPJ 12/8/14

TONKIN & TAYLOR LTD

BOREHOLE LOG

BOREHOLE No: BH09
Hole Location:

SHEET 1 OF 1

PROJECT: Waverley GC	LOCATION: Bergins Road, Rowvile	JOB No: 2781.1000
CO-ORDINATES 5799593 344974	DRILL TYPE: Solid Auger	HOLE STARTED: 28/7/14
	DRILL METHOD: Borehole	HOLE FINISHED: 28/7/14
R.L. m		DRILLED BY: Matrix Drilling
DATUM	DRILL FLUID:	LOGGED BY: KRK CHECKED: TOM

BORING							ENGINEERING DESCRIPTION					FIELD TESTING		LABORATORY TESTS		
FLUID LOSS	WATER	CORE RECOVERY (%)	METHOD	CASING	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITIONS / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	FIELD RECORDS/ COMMENTS	CONTAMINATION INDICATORS (ODOURS, STAINING, IMPORTED FILL, ASH, SEPARATE PHASE LIQUIDS)	SAMPLES, TESTS	MC (%)	PID (ppm)
									FILL: Silty CLAY, dark brown, minor fine to coarse grained gravel, trace fine to coarse grained sand	M	F-St	Metal bricks and tiling at surface		BH09/0.1		
						0.5										
						1.0								BH09/1.0		
						1.5										
						2.0										
						2.5										
									Sandy SILT, brown, fine to medium grained.	D-M	S-F					
						3.0			**BH09 terminated @ 3.0mbgl**							
						3.5										

T+T DATATEMPLATE.GDT KRK

Log Scale 1:20 BOREHOLE-ENVIRONMENTAL 2781.1000 GINT.GPJ 12/8/14

TONKIN & TAYLOR LTD

BOREHOLE LOG

BOREHOLE No: BH10
Hole Location:

SHEET 1 OF 3

PROJECT: Waverley GC	LOCATION: Bergins Road, Rowvile	JOB No: 2781.1000
CO-ORDINATES 5799855 344640	DRILL TYPE: Solid Auger	HOLE STARTED: 28/7/14
	DRILL METHOD: Borehole	HOLE FINISHED: 28/7/14
R.L. m		DRILLED BY: Matrix Drilling
DATUM	DRILL FLUID:	LOGGED BY: KRK CHECKED: TOM

BORING							ENGINEERING DESCRIPTION					FIELD TESTING		LABORATORY TESTS		
FLUID LOSS	WATER	CORE RECOVERY (%)	METHOD	CASING	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITIONS / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	FIELD RECORDS/ COMMENTS	CONTAMINATION INDICATORS (ODOURS, STAINING, IMPORTED FILL, ASH, SEPARATE PHASE LIQUIDS)	SAMPLES, TESTS	MC (%)	PID (ppm)
									FILL: Silty CLAY, brown mottled white, grey and orange, trace fine to coarse grained gravel, some fine to coarse grained sand	M	F	Concrete bricks plastic scrap at surface		BH10/0.1		
						0.5										
									FILL: Sandy SILT/Silty SAND, dark brown, fine to medium grained.	D-M	L/S					
						1.0								BH10/1.0		
						1.5			FILL: Sandy silty CLAY, dark brown to grey, trace fine to medium grained gravel, rounded to sub-angular.	M	F					
						2.0										
						2.5										
						3.0										
						3.5										

T+T DATATEMPLATE.GDT KRK

Log Scale 1:20

BOREHOLE-ENVIRONMENTAL 2781.1000 GINT.GPJ 12/8/14

TONKIN & TAYLOR LTD

BOREHOLE LOG

BOREHOLE No: BH10
Hole Location:

SHEET 2 OF 3

PROJECT: Waverley GC	LOCATION: Bergins Road, Rowvile	JOB No: 2781.1000
CO-ORDINATES 5799855 344640	DRILL TYPE: Solid Auger	HOLE STARTED: 28/7/14
	DRILL METHOD: Borehole	HOLE FINISHED: 28/7/14
R.L. m		DRILLED BY: Matrix Drilling
DATUM	DRILL FLUID:	LOGGED BY: KRK CHECKED: TOM

BORING							ENGINEERING DESCRIPTION					FIELD TESTING		LABORATORY TESTS		
FLUID LOSS	WATER	CORE RECOVERY (%)	METHOD	CASING	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITIONS / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	FIELD RECORDS/ COMMENTS	CONTAMINATION INDICATORS (ODOURS, STAINING, IMPORTED FILL, ASH, SEPARATE PHASE LIQUIDS)	SAMPLES, TESTS	MC (%)	PID (ppm)
									FILL: Sandy silty CLAY, dark brown to grey, trace fine to medium grained gravel, rounded to sub-angular.							
						4.5										
						5.0			FILL: Silty CLAY, pale brown, minor fine to medium grained gravel, rounded to sub-angular	M	St					
						5.5										
						6.0			FILL: Silty CLAY, highly plastic, red mottled white							
						6.5										
						7.0										
						7.5			Clayey SILT, siltstone, pale brown mottled grey, fine to medium grained siltstone gravel, with pockets of clay.							

T+T DATATEMPLATE.GDT KRK

Log Scale 1:20

BOREHOLE-ENVIRONMENTAL 2781.1000 GINT.GPJ 12/8/14

TONKIN & TAYLOR LTD

BOREHOLE LOG

BOREHOLE No: BH10
Hole Location:

SHEET 3 OF 3

PROJECT: Waverley GC	LOCATION: Bergins Road, Rowvile	JOB No: 2781.1000
CO-ORDINATES 5799855 344640	DRILL TYPE: Solid Auger	HOLE STARTED: 28/7/14
	DRILL METHOD: Borehole	HOLE FINISHED: 28/7/14
R.L. m		DRILLED BY: Matrix Drilling
DATUM	DRILL FLUID:	LOGGED BY: KRK CHECKED: TOM

BORING							ENGINEERING DESCRIPTION					FIELD TESTING		LABORATORY TESTS		
FLUID LOSS	WATER	CORE RECOVERY (%)	METHOD	CASING	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITIONS / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	FIELD RECORDS/ COMMENTS	CONTAMINATION INDICATORS (ODOURS, STAINING, IMPORTED FILL, ASH, SEPARATE PHASE LIQUIDS)	SAMPLES, TESTS	MC (%)	PID (ppm)
									Clayey SILT, siltstone, pale brown mottled grey, fine to medium grained siltstone gravel, with pockets of clay.							
									BH10 terminated @ 8.2mbgl							
						8.5										
						9.0										
						9.5										
						10.0										
						10.5										
						11.0										
						11.5										

T+T DATATEMPLATE.GDT KRK

Log Scale 1:20

BOREHOLE-ENVIRONMENTAL 2781.1000 GINT.GPJ 12/8/14

TONKIN & TAYLOR LTD

BOREHOLE LOG

BOREHOLE No: HA01
Hole Location:

SHEET 1 OF 1

PROJECT: Waverley GC	LOCATION: Bergins Road, Rowvile	JOB No: 2781.1000
CO-ORDINATES 5799420 345305	DRILL TYPE: Hand Auger	HOLE STARTED: 29/7/14
	DRILL METHOD: Borehole	HOLE FINISHED: 29/7/14
R.L. m		DRILLED BY: KRK
DATUM	DRILL FLUID:	LOGGED BY: KRK CHECKED: TOM

BORING							ENGINEERING DESCRIPTION					FIELD TESTING		LABORATORY TESTS		
FLUID LOSS	WATER	CORE RECOVERY (%)	METHOD	CASING	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITIONS / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	FIELD RECORDS/ COMMENTS	CONTAMINATION INDICATORS (ODOURS, STAINING, IMPORTED FILL, ASH, SEPARATE PHASE LIQUIDS)	SAMPLES, TESTS	MC (%)	PID (ppm)
									Sandy silty CLAY: Brown, fine to coarse trace gravel, fine to medium	D	F-St			HA01/0.05		
									Gravelley CLAY: Brown and orange, fine to medium, rounded	D	MD					
									Silty CLAY: Orangey brown with white mottling, medium to high plasticity	D	St			HA01/0.35		
						0.5										
									HA01 terminated @ 0.55mbgl							
						1.0										
						1.5										

T+T DATATEMPLATE.GDT krk

Log Scale 1:10

BOREHOLE-ENVIRONMENTAL 2781.1000 GINT.GPJ 8/8/14

TONKIN & TAYLOR LTD

BOREHOLE LOG

BOREHOLE No: HA02
Hole Location:

SHEET 1 OF 1

PROJECT: Waverley GC	LOCATION: Bergins Road, Rowvile	JOB No: 2781.1000
CO-ORDINATES 5799439 345315	DRILL TYPE: Hand Auger	HOLE STARTED: 29/7/14
	DRILL METHOD: Borehole	HOLE FINISHED: 29/7/14
R.L. m		DRILLED BY: KRK
DATUM	DRILL FLUID:	LOGGED BY: KRK CHECKED: TOM

BORING							ENGINEERING DESCRIPTION					FIELD TESTING		LABORATORY TESTS		
FLUID LOSS	WATER	CORE RECOVERY (%)	METHOD	CASING	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITIONS / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	FIELD RECORDS/ COMMENTS	CONTAMINATION INDICATORS (ODOURS, STAINING, IMPORTED FILL, ASH, SEPARATE PHASE LIQUIDS)	SAMPLES, TESTS	MC (%)	PID (ppm)
									Clayey SILT: Brown, low plasticity	M	F	Organic odour		HA02/0.05		
									Silty CLAY: Orangey brown with white mottling, medium to high plasticity	D	St			HA02/0.35		
						0.5			**HA02 terminated @ 0.5Mbgl**							
						1.0										
						1.5										

T+T DATATEMPLATE.GDT krk

Log Scale 1:10

BOREHOLE-ENVIRONMENTAL 2781.1000 GINT.GPJ 8/8/14

TONKIN & TAYLOR LTD

BOREHOLE LOG

BOREHOLE No: HA03
Hole Location:

SHEET 1 OF 1

PROJECT: Waverley GC	LOCATION: Bergins Road, Rowvile	JOB No: 2781.1000
CO-ORDINATES 5799454 345299	DRILL TYPE: Hand Auger	HOLE STARTED: 29/7/14
	DRILL METHOD: Borehole	HOLE FINISHED: 29/7/14
R.L. m		DRILLED BY: KRK
DATUM	DRILL FLUID:	LOGGED BY: KRK CHECKED: TOM

BORING							ENGINEERING DESCRIPTION					FIELD TESTING		LABORATORY TESTS		
FLUID LOSS	WATER	CORE RECOVERY (%)	METHOD	CASING	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITIONS / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	FIELD RECORDS/ COMMENTS	CONTAMINATION INDICATORS (ODOURS, STAINING, IMPORTED FILL, ASH, SEPARATE PHASE LIQUIDS)	SAMPLES, TESTS	MC (%)	PID (ppm)
									Silty CLAY: Brown mottled orange and pale brown, minor fine to medium sand, low ot medium plasticity	M	F			HA03/0.05		
						0.5			Silty CLAY: Orangey brown mottled red, plae brown, very fine grained sand, medium to high plasticity	M	F			HA03/0.5		
									Silty CLAY: Pale brown, medium to high plasticity	M	F					
									HA03 terminated @ 0.85mbgl							
						1.0										
						1.5										

T+T DATATEMPLATE.GDT krk

Log Scale 1:10

BOREHOLE-ENVIRONMENTAL 2781.1000 GINT.GPJ 8/8/14

TONKIN & TAYLOR LTD

BOREHOLE LOG

BOREHOLE No: HA04
Hole Location:

SHEET 1 OF 1

PROJECT: Waverley GC	LOCATION: Bergins Road, Rowvile	JOB No: 2781.1000
CO-ORDINATES 5799415 345283	DRILL TYPE: Hand Auger	HOLE STARTED: 29/7/14
	DRILL METHOD: Borehole	HOLE FINISHED: 29/7/14
R.L. m		DRILLED BY: KRK
DATUM	DRILL FLUID:	LOGGED BY: KRK CHECKED: TOM

BORING							ENGINEERING DESCRIPTION					FIELD TESTING		LABORATORY TESTS		
FLUID LOSS	WATER	CORE RECOVERY (%)	METHOD	CASING	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITIONS / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	FIELD RECORDS/ COMMENTS	CONTAMINATION INDICATORS (ODOURS, STAINING, IMPORTED FILL, ASH, SEPARATE PHASE LIQUIDS)	SAMPLES, TESTS	MC (%)	PID (ppm)
									Silty SAND: Brown mottled orange and dark brown, fine to medium grained				- Strong putrid organic/stagnant water odour - Light sheen	HA04/0.05		
									HA04 terminated @ 0.3mbgl							
						0.5										
						1.0										
						1.5										

T+T DATATEMPLATE.GDT KRK

Log Scale 1:10 BOREHOLE-ENVIRONMENTAL 2781.1000 GINT.GPJ 12/8/14

TONKIN & TAYLOR LTD

BOREHOLE LOG

BOREHOLE No: HA05
Hole Location:

SHEET 1 OF 1

PROJECT: Waverley GC	LOCATION: Bergins Road, Rowvile	JOB No: 2781.1000
CO-ORDINATES 5799909 345073	DRILL TYPE: Hand Auger	HOLE STARTED: 29/7/14
	DRILL METHOD: Borehole	HOLE FINISHED: 29/7/14
R.L. m		DRILLED BY: KRK
DATUM	DRILL FLUID:	LOGGED BY: KRK CHECKED: TOM

BORING							ENGINEERING DESCRIPTION					FIELD TESTING		LABORATORY TESTS		
FLUID LOSS	WATER	CORE RECOVERY (%)	METHOD	CASING	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITIONS / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	FIELD RECORDS/ COMMENTS	CONTAMINATION INDICATORS (ODOURS, STAINING, IMPORTED FILL, ASH, SEPARATE PHASE LIQUIDS)	SAMPLES, TESTS	MC (%)	PID (ppm)
									Silty SAND: Brown mottled orange, fine to medium, rounded	M	L			HA05/0.05		
									HA05 terminated @ 0.4mbgl							
						0.5										
						1.0										
						1.5										

T+T DATATEMPLATE.GDT krk

Log Scale 1:10

BOREHOLE-ENVIRONMENTAL 2781.1000 GINT.GPJ 8/8/14

TONKIN & TAYLOR LTD

BOREHOLE LOG

BOREHOLE No: HA06
Hole Location:

SHEET 1 OF 1

PROJECT: Waverley GC	LOCATION: Bergins Road, Rowvile	JOB No: 2781.1000
CO-ORDINATES 5799674 344614	DRILL TYPE: Hand Auger	HOLE STARTED: 29/7/14
	DRILL METHOD: Borehole	HOLE FINISHED: 29/7/14
R.L. m		DRILLED BY: KRK
DATUM	DRILL FLUID:	LOGGED BY: KRK CHECKED: TOM

BORING							ENGINEERING DESCRIPTION					FIELD TESTING		LABORATORY TESTS		
FLUID LOSS	WATER	CORE RECOVERY (%)	METHOD	CASING	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITIONS / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	FIELD RECORDS/ COMMENTS	CONTAMINATION INDICATORS (ODOURS, STAINING, IMPORTED FILL, ASH, SEPARATE PHASE LIQUIDS)	SAMPLES, TESTS	MC (%)	PID (ppm)
									Silty CLAY: Pale brown mottled orange, dark briwn, minor fine to medium gravel and trace fine to coarse sand	D-M	F-St	PVC concrete and brick fragments at surface		HA06/0.05		
						0.5			Grades to greyish brown							
									HA06 terminated @ 0.9mbgl							
						1.0										
						1.5										

T+T DATATEMPLATE.GDT krk

Log Scale 1:10

BOREHOLE-ENVIRONMENTAL 2781.1000 GINT.GPJ 8/8/14

TONKIN & TAYLOR LTD

BOREHOLE LOG

BOREHOLE No: HA07
Hole Location:

SHEET 1 OF 1

PROJECT: Waverley GC	LOCATION: Bergins Road, Rowvile	JOB No: 2781.1000
CO-ORDINATES 5799672 344905	DRILL TYPE: Hand Auger	HOLE STARTED: 29/7/14
	DRILL METHOD: Borehole	HOLE FINISHED: 29/7/14
R.L. m		DRILLED BY: KRK
DATUM	DRILL FLUID:	LOGGED BY: KRK CHECKED: TOM

BORING							ENGINEERING DESCRIPTION					FIELD TESTING		LABORATORY TESTS		
FLUID LOSS	WATER	CORE RECOVERY (%)	METHOD	CASING	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITIONS / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	FIELD RECORDS/ COMMENTS	CONTAMINATION INDICATORS (ODOURS, STAINING, IMPORTED FILL, ASH, SEPARATE PHASE LIQUIDS)	SAMPLES, TESTS	MC (%)	PID (ppm)
									FILL: Silty clay, brown mottled orange, grey, dark brown, medium plasticity with trace fine to coarse sand, minor fine to medium gravels	D-M	F-St	Bricks concrete and tiles at surface		HA07/0.4		
						0.5										
									HA07 terminated @ 0.8mbgl							
						1.0										
						1.5										

T+T DATATEMPLATE.GDT krk

Log Scale 1:10

BOREHOLE-ENVIRONMENTAL 2781.1000 GINT.GPJ 8/8/14

TONKIN & TAYLOR LTD

BOREHOLE LOG

BOREHOLE No: HA08
Hole Location:

SHEET 1 OF 1

PROJECT: Waverley GC	LOCATION: Bergins Road, Rowvile	JOB No: 2781.1000
CO-ORDINATES 5799915 344990	DRILL TYPE: Hand Auger	HOLE STARTED: 29/7/14
	DRILL METHOD: Borehole	HOLE FINISHED: 29/7/14
R.L. m		DRILLED BY: KRK
DATUM	DRILL FLUID:	LOGGED BY: KRK CHECKED: TOM

BORING							ENGINEERING DESCRIPTION					FIELD TESTING		LABORATORY TESTS		
FLUID LOSS	WATER	CORE RECOVERY (%)	METHOD	CASING	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITIONS / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	FIELD RECORDS/ COMMENTS	CONTAMINATION INDICATORS (ODOURS, STAINING, IMPORTED FILL, ASH, SEPARATE PHASE LIQUIDS)	SAMPLES, TESTS	MC (%)	PID (ppm)
									Sandy GRAVEL: Grey, fine to medium, sub rounded to angular	D	MD			HA08/0.1		
									HA08 terminated @ 0.25mbgl							
						0.5										
						1.0										
						1.5										

T+T DATATEMPLATE.GDT krk

Log Scale 1:10

BOREHOLE-ENVIRONMENTAL 2781.1000 GINT.GPJ 8/8/14

Appendix B: Site Photographs

Photograph 1 *Date: 18/7/2014* Solid inert waste at the surface of the mounds of fill at site. This is representative of majority of locations investigated.	
Photograph 2 *Date: 29/7/2014* Drilling borehole BH05, fill materials from borehole in the bottom left in the photo.	

Photograph 3 *Date: 29/7/2014* Fragments of potentially asbestos containing material observed at surface at location BH8.	
Photograph 4 *Date: 30/7/2014* The former above ground storage tank near the maintenance shed on site. Is not used since fuel has been stored inside shed.	

Photograph 5 *Date: 30/7/2014* Current method for fuel storage, fuel stored along western wall of the maintenance shed.	
Photograph 6 *Date: 30/7/2014* Chemical stores in the north-east corner of the maintenance shed.	

Photograph 7 *Date: 30/7/2014* Drainage trench leading away from the vehicle wash-down area. Location HA04 was excavated adjacent to the sediment pit at the bottom centre of the photo.	

Appendix C: NATA Endorsed Laboratory Certificates and Chain of Custody Information

eurofins | mgt

Certificate of Analysis

NATA Accredited
Accreditation Number 1261
Site Number 1254

Accredited for compliance with ISO/IEC 17025.
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Tonkin & Taylor P/L
Ground Floor, 95 Coventry St
South Melbourne
VIC 3006

Attention: **Thomas Madill**

Report **426759-S**
Client Reference WAVERLY GC 2781.001
Received Date Jul 29, 2014

Client Sample ID			**BH01/0.05**	**BH02/0.05**	**BH03/0.05**	**BH04/0.05**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins | mgt Sample No.			**M14-JI25367**	**M14-JI25368**	**M14-JI25369**	**M14-JI25370**
Date Sampled			**Jul 28, 2014**	**Jul 28, 2014**	**Jul 28, 2014**	**Jul 28, 2014**
Test/Reference	LOR	Unit				
Organochlorine Pesticides						
Chlordanes - Total	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
4.4'-DDD	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
4.4'-DDE	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
4.4'-DDT	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
a-BHC	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Aldrin	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
b-BHC	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
d-BHC	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Dieldrin	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endosulfan I	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endosulfan II	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endosulfan sulphate	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endrin	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endrin aldehyde	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endrin ketone	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
g-BHC (Lindane)	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Heptachlor	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Heptachlor epoxide	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Hexachlorobenzene	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Methoxychlor	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Toxaphene	1	mg/kg	< 1	< 1	< 1	< 1
Dibutylchlorendate (surr.)	1	%	119	92	105	77
Tetrachloro-m-xylene (surr.)	1	%	85	119	116	137
Organophosphorous Pesticides						
Bolstar	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Chlorpyrifos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Demeton-O	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Diazinon	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Dichlorvos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Disulfoton	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Ethion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Ethoprop	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Fenitrothion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Fensulfothion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Fenthion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Merphos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2

Client Sample ID			BH01/0.05	BH02/0.05	BH03/0.05	BH04/0.05
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			M14-JI25367	M14-JI25368	M14-JI25369	M14-JI25370
Date Sampled			Jul 28, 2014	Jul 28, 2014	Jul 28, 2014	Jul 28, 2014
Test/Reference	LOR	Unit				
Organophosphorous Pesticides						
Methyl azinphos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Methyl parathion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Mevinphos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Naled	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Phorate	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Ronnel	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Tokuthion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Trichloronate	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Triphenylphosphate (surr.)	1	%	100	92	106	88
% Moisture	0.1	%	11	8.4	18	15
Heavy Metals						
Antimony	10	mg/kg	< 10	< 10	< 10	< 10
Arsenic	2	mg/kg	< 2	< 2	< 2	< 2
Beryllium	2	mg/kg	< 2	< 2	< 2	< 2
Boron	10	mg/kg	< 10	< 10	< 10	< 10
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	22	23	22	26
Cobalt	5	mg/kg	< 5	< 5	< 5	< 5
Copper	5	mg/kg	5.2	< 5	< 5	< 5
Lead	5	mg/kg	15	8.8	11	11
Manganese	5	mg/kg	14	18	73	35
Mercury	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Molybdenum	10	mg/kg	< 10	< 10	< 10	< 10
Nickel	5	mg/kg	< 5	< 5	5.0	< 5
Selenium	2	mg/kg	< 2	< 2	< 2	< 2
Silver	5	mg/kg	< 5	< 5	< 5	< 5
Tin	10	mg/kg	< 10	< 10	< 10	< 10
Vanadium	10	mg/kg	37	56	47	69
Zinc	5	mg/kg	8.1	< 5	19	< 5

Client Sample ID			BH05/2.5	BH06/2.5	BH07/3.5	BH08/0.1
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			M14-JI25371	M14-JI25372	M14-JI25373	M14-JI25374
Date Sampled			Jul 28, 2014	Jul 28, 2014	Jul 28, 2014	Jul 28, 2014
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	< 20	< 20	< 20	< 20
TRH C10-C14	20	mg/kg	42	< 20	< 20	< 20
TRH C15-C28	50	mg/kg	69	< 50	< 50	< 50
TRH C29-C36	50	mg/kg	81	< 50	61	< 50
TRH C10-36 (Total)	50	mg/kg	190	< 50	61	< 50
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
TRH C6-C10	20	mg/kg	< 20	< 20	< 20	< 20
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	< 20	< 20	< 20	< 20
TRH >C10-C16	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	< 50	< 50	< 50	< 50

Client Sample ID			BH05/2.5	BH06/2.5	BH07/3.5	BH08/0.1
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			M14-JI25371	M14-JI25372	M14-JI25373	M14-JI25374
Date Sampled			Jul 28, 2014	Jul 28, 2014	Jul 28, 2014	Jul 28, 2014
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
TRH >C16-C34	100	mg/kg	120	< 100	< 100	< 100
TRH >C34-C40	100	mg/kg	< 100	< 100	< 100	< 100
Volatile Organics						
1.2.4-Trichlorobenzene	0.2	mg/kg	-	< 0.2	< 0.2	-
Hexachlorobutadiene	0.2	mg/kg	-	< 0.2	< 0.2	-
1.1-Dichloroethane	0.05	mg/kg	-	< 0.05	< 0.05	-
1.1-Dichloroethene	0.05	mg/kg	-	< 0.05	< 0.05	-
1.1.1-Trichloroethane	0.05	mg/kg	-	< 0.05	< 0.05	-
1.1.1.2-Tetrachloroethane	0.05	mg/kg	-	< 0.05	< 0.05	-
1.1.2-Trichloroethane	0.05	mg/kg	-	< 0.05	< 0.05	-
1.1.2.2-Tetrachloroethane	0.05	mg/kg	-	< 0.05	< 0.05	-
1.2-Dibromoethane	0.05	mg/kg	-	< 0.05	< 0.05	-
1.2-Dichlorobenzene	0.05	mg/kg	-	< 0.05	< 0.05	-
1.2-Dichloroethane	0.05	mg/kg	-	< 0.05	< 0.05	-
1.2-Dichloropropane	0.05	mg/kg	-	< 0.05	< 0.05	-
1.2.3-Trichloropropane	0.05	mg/kg	-	< 0.05	< 0.05	-
1.2.4-Trimethylbenzene	0.05	mg/kg	-	< 0.05	< 0.05	-
1.3-Dichlorobenzene	0.05	mg/kg	-	< 0.05	< 0.05	-
1.3-Dichloropropane	0.05	mg/kg	-	< 0.05	< 0.05	-
1.3.5-Trimethylbenzene	0.05	mg/kg	-	< 0.05	< 0.05	-
1.4-Dichlorobenzene	0.05	mg/kg	-	< 0.05	< 0.05	-
2-Butanone (MEK)	0.05	mg/kg	-	< 0.05	< 0.05	-
2-Propanone (Acetone)	0.05	mg/kg	-	< 0.25	< 0.25	-
4-Chlorotoluene	0.05	mg/kg	-	< 0.05	< 0.05	-
4-Methyl-2-pentanone (MIBK)	0.05	mg/kg	-	< 0.05	< 0.05	-
Allyl chloride	0.05	mg/kg	-	< 0.05	< 0.05	-
Benzene	0.1	mg/kg	-	< 0.1	< 0.1	-
Bromobenzene	0.05	mg/kg	-	< 0.05	< 0.05	-
Bromochloromethane	0.05	mg/kg	-	< 0.05	< 0.05	-
Bromodichloromethane	0.05	mg/kg	-	< 0.05	< 0.05	-
Bromoform	0.05	mg/kg	-	< 0.05	< 0.05	-
Bromomethane	0.05	mg/kg	-	< 0.05	< 0.05	-
Carbon disulfide	0.05	mg/kg	-	< 0.05	< 0.05	-
Carbon Tetrachloride	0.05	mg/kg	-	< 0.05	< 0.05	-
Chlorobenzene	0.05	mg/kg	-	< 0.05	< 0.05	-
Chloroethane	0.05	mg/kg	-	< 0.05	< 0.05	-
Chloroform	0.05	mg/kg	-	< 0.05	< 0.05	-
Chloromethane	0.05	mg/kg	-	< 0.05	< 0.05	-
cis-1.2-Dichloroethene	0.05	mg/kg	-	< 0.05	< 0.05	-
cis-1.3-Dichloropropene	0.05	mg/kg	-	< 0.05	< 0.05	-
Dibromochloromethane	0.05	mg/kg	-	< 0.05	< 0.05	-
Dibromomethane	0.05	mg/kg	-	< 0.05	< 0.05	-
Dichlorodifluoromethane	0.05	mg/kg	-	< 0.05	< 0.05	-
Ethylbenzene	0.1	mg/kg	-	< 0.1	< 0.1	-
Iodomethane	0.05	mg/kg	-	< 0.05	< 0.05	-
Isopropyl benzene (Cumene)	0.05	mg/kg	-	< 0.05	< 0.05	-
m&p-Xylenes	0.2	mg/kg	-	< 0.2	< 0.2	-
Methylene Chloride	0.05	mg/kg	-	< 0.05	< 0.05	-
o-Xylene	0.1	mg/kg	-	< 0.1	< 0.1	-

eurofins | mgt

Client Sample ID			BH05/2.5	BH06/2.5	BH07/3.5	BH08/0.1
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			M14-JI25371	M14-JI25372	M14-JI25373	M14-JI25374
Date Sampled			Jul 28, 2014	Jul 28, 2014	Jul 28, 2014	Jul 28, 2014
Test/Reference	LOR	Unit				
Volatile Organics						
Styrene	0.05	mg/kg	-	< 0.05	< 0.05	-
Tetrachloroethene	0.05	mg/kg	-	< 0.05	< 0.05	-
Toluene	0.1	mg/kg	-	< 0.1	< 0.1	-
trans-1.2-Dichloroethene	0.05	mg/kg	-	< 0.05	< 0.05	-
trans-1.3-Dichloropropene	0.05	mg/kg	-	< 0.05	< 0.05	-
Trichloroethene	0.05	mg/kg	-	< 0.05	< 0.05	-
Trichlorofluoromethane	0.05	mg/kg	-	< 0.05	< 0.05	-
Vinyl chloride	0.05	mg/kg	-	< 0.05	< 0.05	-
Xylenes - Total	0.3	mg/kg	-	< 0.3	< 0.3	-
Fluorobenzene (surr.)	1	%	-	84	66	-
4-Bromofluorobenzene (surr.)	1	%	-	89	74	-
Polycyclic Aromatic Hydrocarbons						
Acenaphthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Acenaphthylene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benz(a)anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(a)pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(b&j)fluoranthene[N07]	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(g.h.i)perylene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(k)fluoranthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Chrysene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Dibenz(a.h)anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Fluoranthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Fluorene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Naphthalene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Phenanthrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Total PAH	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(a)pyrene TEQ (lower bound)*	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(a)pyrene TEQ (medium bound)*	0.5	mg/kg	0.6	0.6	0.6	0.6
Benzo(a)pyrene TEQ (upper bound)*	0.5	mg/kg	1.2	1.2	1.2	1.2
2-Fluorobiphenyl (surr.)	1	%	139	102	114	109
p-Terphenyl-d14 (surr.)	1	%	146	105	116	113
Organochlorine Pesticides						
Chlordanes - Total	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
4.4'-DDD	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
4.4'-DDE	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
4.4'-DDT	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
a-BHC	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Aldrin	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
b-BHC	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
d-BHC	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Dieldrin	0.05	mg/kg	< 0.05	0.06	< 0.05	< 0.05
Endosulfan I	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endosulfan II	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endosulfan sulphate	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endrin	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endrin aldehyde	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05

Client Sample ID			BH05/2.5	BH06/2.5	BH07/3.5	BH08/0.1
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			M14-JI25371	M14-JI25372	M14-JI25373	M14-JI25374
Date Sampled			Jul 28, 2014	Jul 28, 2014	Jul 28, 2014	Jul 28, 2014
Test/Reference	LOR	Unit				
Organochlorine Pesticides						
Endrin ketone	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
g-BHC (Lindane)	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Heptachlor	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Heptachlor epoxide	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Hexachlorobenzene	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Methoxychlor	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Toxaphene	1	mg/kg	< 1	< 1	< 1	< 1
Dibutylchlorendate (surr.)	1	%	107	101	126	106
Tetrachloro-m-xylene (surr.)	1	%	103	111	126	116
Organophosphorous Pesticides						
Bolstar	0.2	mg/kg	< 0.2	-	-	< 0.2
Chlorpyrifos	0.2	mg/kg	< 0.2	-	-	< 0.2
Demeton-O	0.2	mg/kg	< 0.2	-	-	< 0.2
Diazinon	0.2	mg/kg	< 0.2	-	-	< 0.2
Dichlorvos	0.2	mg/kg	< 0.2	-	-	< 0.2
Disulfoton	0.2	mg/kg	< 0.2	-	-	< 0.2
Ethion	0.2	mg/kg	< 0.2	-	-	< 0.2
Ethoprop	0.2	mg/kg	< 0.2	-	-	< 0.2
Fenitrothion	0.2	mg/kg	< 0.2	-	-	< 0.2
Fensulfothion	0.2	mg/kg	< 0.2	-	-	< 0.2
Fenthion	0.2	mg/kg	< 0.2	-	-	< 0.2
Merphos	0.2	mg/kg	< 0.2	-	-	< 0.2
Methyl azinphos	0.2	mg/kg	< 0.2	-	-	< 0.2
Methyl parathion	0.2	mg/kg	< 0.2	-	-	< 0.2
Mevinphos	0.2	mg/kg	< 0.2	-	-	< 0.2
Naled	0.5	mg/kg	< 0.5	-	-	< 0.5
Phorate	0.2	mg/kg	< 0.2	-	-	< 0.2
Ronnel	0.2	mg/kg	< 0.2	-	-	< 0.2
Tokuthion	0.2	mg/kg	< 0.2	-	-	< 0.2
Trichloronate	0.2	mg/kg	< 0.2	-	-	< 0.2
Triphenylphosphate (surr.)	1	%	96	-	-	96
Polychlorinated Biphenyls						
Aroclor-1016	0.1	mg/kg	-	< 0.1	< 0.1	-
Aroclor-1221	0.1	mg/kg	-	< 0.1	< 0.1	-
Aroclor-1232	0.1	mg/kg	-	< 0.1	< 0.1	-
Aroclor-1242	0.1	mg/kg	-	< 0.1	< 0.1	-
Aroclor-1248	0.1	mg/kg	-	< 0.1	< 0.1	-
Aroclor-1254	0.1	mg/kg	-	< 0.1	< 0.1	-
Aroclor-1260	0.1	mg/kg	-	< 0.1	< 0.1	-
Total PCB	0.1	mg/kg	-	< 0.1	< 0.1	-
Dibutylchlorendate (surr.)	1	%	-	101	126	-
Tetrachloro-m-xylene (surr.)	1	%	-	111	126	-
Phenols (Halogenated)						
2-Chlorophenol	0.5	mg/kg	-	< 0.5	< 0.5	-
2.4-Dichlorophenol	0.5	mg/kg	-	< 0.5	< 0.5	-
2.4.5-Trichlorophenol	1.0	mg/kg	-	< 1	< 1	-
2.4.6-Trichlorophenol	1.0	mg/kg	-	< 1	< 1	-
2.6-Dichlorophenol	0.5	mg/kg	-	< 0.5	< 0.5	-
4-Chloro-3-methylphenol	1.0	mg/kg	-	< 1	< 1	-

Client Sample ID			BH05/2.5	BH06/2.5	BH07/3.5	BH08/0.1
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			M14-JI25371	M14-JI25372	M14-JI25373	M14-JI25374
Date Sampled			Jul 28, 2014	Jul 28, 2014	Jul 28, 2014	Jul 28, 2014
Test/Reference	LOR	Unit				
Phenols (Halogenated)						
Pentachlorophenol	1.0	mg/kg	-	< 1	< 1	-
Tetrachlorophenols - Total	1.0	mg/kg	-	< 1	< 1	-
Total Halogenated Phenol	1	mg/kg	-	< 1	< 1	-
Phenols (non-Halogenated)						
2-Cyclohexyl-4.6-dinitrophenol	20	mg/kg	-	< 20	< 20	-
2-Methyl-4.6-dinitrophenol	5	mg/kg	-	< 5	< 5	-
2-Methylphenol (o-Cresol)	0.2	mg/kg	-	< 0.2	< 0.2	-
2-Nitrophenol	1.0	mg/kg	-	< 1	< 1	-
2.4-Dimethylphenol	0.5	mg/kg	-	< 0.5	< 0.5	-
2.4-Dinitrophenol	5	mg/kg	-	< 5	< 5	-
3&4-Methylphenol (m&p-Cresol)	0.4	mg/kg	-	< 1	< 0.4	-
4-Nitrophenol	5	mg/kg	-	< 5	< 5	-
Dinoseb	20	mg/kg	-	< 20	< 20	-
Phenol	0.5	mg/kg	-	< 0.5	< 0.5	-
Total Non-Halogenated Phenol	20	mg/kg	-	< 20	< 20	-
Phenol-d6 (surr.)	1	%	-	108	119	-
Chromium (hexavalent)	1	mg/kg	-	< 1	< 1	-
Cyanide (total)	5	mg/kg	-	< 5	< 5	-
Fluoride	100	mg/kg	-	160	210	-
pH (1:5 Aqueous extract)	0.1	units	-	8.0	7.6	-
% Moisture	0.1	%	18	15	20	21
Heavy Metals						
Antimony	10	mg/kg	< 10	-	-	< 10
Arsenic	2	mg/kg	< 2	2.5	< 2	< 2
Beryllium	2	mg/kg	< 2	-	-	< 2
Boron	10	mg/kg	< 10	-	-	< 10
Cadmium	0.4	mg/kg	0.4	0.4	< 0.4	< 0.4
Chromium	5	mg/kg	36	23	17	23
Cobalt	5	mg/kg	< 5	-	-	< 5
Copper	5	mg/kg	50	17	11	11
Lead	5	mg/kg	34	38	18	16
Manganese	5	mg/kg	59	-	-	42
Mercury	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Molybdenum	10	mg/kg	< 10	< 10	< 10	< 10
Nickel	5	mg/kg	9.9	12	11	8.5
Selenium	2	mg/kg	< 2	< 2	< 2	< 2
Silver	5	mg/kg	< 5	< 5	< 5	< 5
Tin	10	mg/kg	< 10	< 10	< 10	< 10
Vanadium	10	mg/kg	36	-	-	51
Zinc	5	mg/kg	65	74	58	27

eurofins | mgt

Client Sample ID			BH09/1.0	BH10/0.1	QC1	HA01/0.05
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			M14-JI25375	M14-JI25376	M14-JI25377	M14-JI25380
Date Sampled			Jul 28, 2014	Jul 28, 2014	Jul 28, 2014	Jul 29, 2014
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	< 20	< 20	< 20	< 20
TRH C10-C14	20	mg/kg	< 20	< 20	< 20	< 20
TRH C15-C28	50	mg/kg	< 50	< 50	< 50	< 50
TRH C29-C36	50	mg/kg	< 50	< 50	< 50	< 50
TRH C10-36 (Total)	50	mg/kg	< 50	< 50	< 50	< 50
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
TRH C6-C10	20	mg/kg	< 20	< 20	< 20	< 20
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	< 20	< 20	< 20	< 20
TRH >C10-C16	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C16-C34	100	mg/kg	< 100	< 100	< 100	< 100
TRH >C34-C40	100	mg/kg	< 100	< 100	< 100	< 100
Polycyclic Aromatic Hydrocarbons						
Acenaphthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Acenaphthylene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benz(a)anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(a)pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(b&j)fluoranthene[N07]	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(g.h.i)perylene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(k)fluoranthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Chrysene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Dibenz(a.h)anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Fluoranthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Fluorene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Naphthalene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Phenanthrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Total PAH	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(a)pyrene TEQ (lower bound)*	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(a)pyrene TEQ (medium bound)*	0.5	mg/kg	0.6	0.6	0.6	0.6
Benzo(a)pyrene TEQ (upper bound)*	0.5	mg/kg	1.2	1.2	1.2	1.2
2-Fluorobiphenyl (surr.)	1	%	110	103	112	112
p-Terphenyl-d14 (surr.)	1	%	114	110	118	118
Organochlorine Pesticides						
Chlordanes - Total	0.1	mg/kg	< 0.1	< 0.1	< 0.1	-
4.4'-DDD	0.05	mg/kg	< 0.05	< 0.05	< 0.05	-
4.4'-DDE	0.05	mg/kg	< 0.05	< 0.05	< 0.05	-
4.4'-DDT	0.05	mg/kg	< 0.05	< 0.05	< 0.05	-
a-BHC	0.05	mg/kg	< 0.05	< 0.05	< 0.05	-
Aldrin	0.05	mg/kg	< 0.05	< 0.05	< 0.05	-
b-BHC	0.05	mg/kg	< 0.05	< 0.05	< 0.05	-
d-BHC	0.05	mg/kg	< 0.05	< 0.05	< 0.05	-
Dieldrin	0.05	mg/kg	< 0.05	< 0.05	< 0.05	-
Endosulfan I	0.05	mg/kg	< 0.05	< 0.05	< 0.05	-
Endosulfan II	0.05	mg/kg	< 0.05	< 0.05	< 0.05	-
Endosulfan sulphate	0.05	mg/kg	< 0.05	< 0.05	< 0.05	-

Client Sample ID			BH09/1.0	BH10/0.1	QC1	HA01/0.05
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			M14-JI25375	M14-JI25376	M14-JI25377	M14-JI25380
Date Sampled			Jul 28, 2014	Jul 28, 2014	Jul 28, 2014	Jul 29, 2014
Test/Reference	LOR	Unit				
Organochlorine Pesticides						
Endrin	0.05	mg/kg	< 0.05	< 0.05	< 0.05	-
Endrin aldehyde	0.05	mg/kg	< 0.05	< 0.05	< 0.05	-
Endrin ketone	0.05	mg/kg	< 0.05	< 0.05	< 0.05	-
g-BHC (Lindane)	0.05	mg/kg	< 0.05	< 0.05	< 0.05	-
Heptachlor	0.05	mg/kg	< 0.05	< 0.05	< 0.05	-
Heptachlor epoxide	0.05	mg/kg	< 0.05	< 0.05	< 0.05	-
Hexachlorobenzene	0.05	mg/kg	< 0.05	< 0.05	< 0.05	-
Methoxychlor	0.05	mg/kg	< 0.05	< 0.05	< 0.05	-
Toxaphene	1	mg/kg	< 1	< 1	< 1	-
Dibutylchlorendate (surr.)	1	%	112	110	128	-
Tetrachloro-m-xylene (surr.)	1	%	131	113	108	-
Organophosphorous Pesticides						
Bolstar	0.2	mg/kg	< 0.2	< 0.2	< 0.2	-
Chlorpyrifos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	-
Demeton-O	0.2	mg/kg	< 0.2	< 0.2	< 0.2	-
Diazinon	0.2	mg/kg	< 0.2	< 0.2	< 0.2	-
Dichlorvos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	-
Disulfoton	0.2	mg/kg	< 0.2	< 0.2	< 0.2	-
Ethion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	-
Ethoprop	0.2	mg/kg	< 0.2	< 0.2	< 0.2	-
Fenitrothion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	-
Fensulfothion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	-
Fenthion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	-
Merphos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	-
Methyl azinphos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	-
Methyl parathion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	-
Mevinphos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	-
Naled	0.5	mg/kg	< 0.5	< 0.5	< 0.5	-
Phorate	0.2	mg/kg	< 0.2	< 0.2	< 0.2	-
Ronnel	0.2	mg/kg	< 0.2	< 0.2	< 0.2	-
Tokuthion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	-
Trichloronate	0.2	mg/kg	< 0.2	< 0.2	< 0.2	-
Triphenylphosphate (surr.)	1	%	99	89	97	-
% Moisture	0.1	%	14	19	19	12
Heavy Metals						
Antimony	10	mg/kg	< 10	< 10	< 10	-
Arsenic	2	mg/kg	< 2	< 2	15	-
Beryllium	2	mg/kg	< 2	< 2	< 2	-
Boron	10	mg/kg	< 10	< 10	< 10	-
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	-
Chromium	5	mg/kg	37	27	31	-
Cobalt	5	mg/kg	< 5	< 5	< 5	-
Copper	5	mg/kg	15	7.3	16	-
Lead	5	mg/kg	21	12	17	-
Manganese	5	mg/kg	64	31	58	-
Mercury	0.1	mg/kg	< 0.1	< 0.1	< 0.1	-
Molybdenum	10	mg/kg	< 10	< 10	< 10	-
Nickel	5	mg/kg	13	5.9	11	-

Client Sample ID			BH09/1.0	BH10/0.1	QC1	HA01/0.05
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			M14-JI25375	M14-JI25376	M14-JI25377	M14-JI25380
Date Sampled			Jul 28, 2014	Jul 28, 2014	Jul 28, 2014	Jul 29, 2014
Test/Reference	LOR	Unit				
Heavy Metals						
Selenium	2	mg/kg	< 2	< 2	< 2	-
Silver	5	mg/kg	< 5	< 5	< 5	-
Tin	10	mg/kg	< 10	< 10	< 10	-
Vanadium	10	mg/kg	61	36	70	-
Zinc	5	mg/kg	29	15	34	-

Client Sample ID			HA02/0.05	HA03/0.05	HA04/0.05	HA06/0.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			M14-JI25381	M14-JI25382	M14-JI25383	M14-JI25384
Date Sampled			Jul 29, 2014	Jul 29, 2014	Jul 29, 2014	Jul 29, 2014
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	< 20	-	< 20	-
TRH C10-C14	20	mg/kg	43	-	150	-
TRH C15-C28	50	mg/kg	110	-	2400	-
TRH C29-C36	50	mg/kg	170	-	560	-
TRH C10-36 (Total)	50	mg/kg	320	-	3100	-
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.5	mg/kg	< 0.5	-	< 0.5	-
TRH C6-C10	20	mg/kg	< 20	-	< 20	-
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	< 20	-	< 20	-
TRH >C10-C16	50	mg/kg	< 50	-	390	-
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	< 50	-	390	-
TRH >C16-C34	100	mg/kg	250	-	2900	-
TRH >C34-C40	100	mg/kg	< 100	-	220	-
Polycyclic Aromatic Hydrocarbons						
Acenaphthene	0.5	mg/kg	< 0.5	-	< 0.5	-
Acenaphthylene	0.5	mg/kg	< 0.5	-	< 0.5	-
Anthracene	0.5	mg/kg	< 0.5	-	< 0.5	-
Benz(a)anthracene	0.5	mg/kg	< 0.5	-	< 0.5	-
Benzo(a)pyrene	0.5	mg/kg	< 0.5	-	< 0.5	-
Benzo(b&j)fluoranthene[N07]	0.5	mg/kg	< 0.5	-	< 0.5	-
Benzo(g.h.i)perylene	0.5	mg/kg	< 0.5	-	< 0.5	-
Benzo(k)fluoranthene	0.5	mg/kg	< 0.5	-	< 0.5	-
Chrysene	0.5	mg/kg	< 0.5	-	< 0.5	-
Dibenz(a.h)anthracene	0.5	mg/kg	< 0.5	-	< 0.5	-
Fluoranthene	0.5	mg/kg	0.6	-	< 0.5	-
Fluorene	0.5	mg/kg	< 0.5	-	< 0.5	-
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	< 0.5	-	< 0.5	-
Naphthalene	0.5	mg/kg	< 0.5	-	< 0.5	-
Phenanthrene	0.5	mg/kg	< 0.5	-	0.7	-
Pyrene	0.5	mg/kg	0.5	-	< 0.5	-
Total PAH	0.5	mg/kg	1.1	-	0.7	-
Benzo(a)pyrene TEQ (lower bound)*	0.5	mg/kg	< 0.5	-	< 0.5	-
Benzo(a)pyrene TEQ (medium bound)*	0.5	mg/kg	0.6	-	0.6	-
Benzo(a)pyrene TEQ (upper bound)*	0.5	mg/kg	1.2	-	1.2	-
2-Fluorobiphenyl (surr.)	1	%	110	-	116	-
p-Terphenyl-d14 (surr.)	1	%	109	-	107	-

Client Sample ID			HA02/0.05	HA03/0.05	HA04/0.05	HA06/0.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			M14-JI25381	M14-JI25382	M14-JI25383	M14-JI25384
Date Sampled			Jul 29, 2014	Jul 29, 2014	Jul 29, 2014	Jul 29, 2014
Test/Reference	LOR	Unit				
Organochlorine Pesticides						
Chlordanes - Total	0.1	mg/kg	-	< 0.1	< 0.1	< 0.1
4.4'-DDD	0.05	mg/kg	-	< 0.05	< 0.05	< 0.05
4.4'-DDE	0.05	mg/kg	-	< 0.05	< 0.05	< 0.05
4.4'-DDT	0.05	mg/kg	-	< 0.05	< 0.05	< 0.05
a-BHC	0.05	mg/kg	-	< 0.05	< 0.05	< 0.05
Aldrin	0.05	mg/kg	-	< 0.05	< 0.05	< 0.05
b-BHC	0.05	mg/kg	-	< 0.05	< 0.05	< 0.05
d-BHC	0.05	mg/kg	-	< 0.05	< 0.05	< 0.05
Dieldrin	0.05	mg/kg	-	< 0.05	< 0.05	< 0.05
Endosulfan I	0.05	mg/kg	-	< 0.05	< 0.05	< 0.05
Endosulfan II	0.05	mg/kg	-	< 0.05	< 0.05	< 0.05
Endosulfan sulphate	0.05	mg/kg	-	< 0.05	< 0.05	< 0.05
Endrin	0.05	mg/kg	-	< 0.05	< 0.05	< 0.05
Endrin aldehyde	0.05	mg/kg	-	< 0.05	< 0.05	< 0.05
Endrin ketone	0.05	mg/kg	-	< 0.05	< 0.05	< 0.05
g-BHC (Lindane)	0.05	mg/kg	-	< 0.05	< 0.05	< 0.05
Heptachlor	0.05	mg/kg	-	< 0.05	< 0.05	< 0.05
Heptachlor epoxide	0.05	mg/kg	-	< 0.05	0.12	< 0.05
Hexachlorobenzene	0.05	mg/kg	-	< 0.05	< 0.05	< 0.05
Methoxychlor	0.05	mg/kg	-	< 0.05	< 0.05	< 0.05
Toxaphene	1	mg/kg	-	< 1	< 1	< 1
Dibutylchlorendate (surr.)	1	%	-	79	105	99
Tetrachloro-m-xylene (surr.)	1	%	-	120	96	69
Organophosphorous Pesticides						
Bolstar	0.2	mg/kg	-	< 0.2	< 0.2	< 0.2
Chlorpyrifos	0.2	mg/kg	-	< 0.2	1.8	< 0.2
Demeton-O	0.2	mg/kg	-	< 0.2	< 0.2	< 0.2
Diazinon	0.2	mg/kg	-	< 0.2	< 0.2	< 0.2
Dichlorvos	0.2	mg/kg	-	< 0.2	< 0.2	< 0.2
Disulfoton	0.2	mg/kg	-	< 0.2	< 0.2	< 0.2
Ethion	0.2	mg/kg	-	< 0.2	< 0.2	< 0.2
Ethoprop	0.2	mg/kg	-	< 0.2	< 0.2	< 0.2
Fenitrothion	0.2	mg/kg	-	< 0.2	< 0.2	< 0.2
Fensulfothion	0.2	mg/kg	-	< 0.2	< 0.2	< 0.2
Fenthion	0.2	mg/kg	-	< 0.2	< 0.2	< 0.2
Merphos	0.2	mg/kg	-	< 0.2	< 0.2	< 0.2
Methyl azinphos	0.2	mg/kg	-	< 0.2	< 0.2	< 0.2
Methyl parathion	0.2	mg/kg	-	< 0.2	< 0.2	< 0.2
Mevinphos	0.2	mg/kg	-	< 0.2	< 0.2	< 0.2
Naled	0.5	mg/kg	-	< 0.5	< 0.5	< 0.5
Phorate	0.2	mg/kg	-	< 0.2	< 0.2	< 0.2
Ronnel	0.2	mg/kg	-	< 0.2	< 0.2	< 0.2
Tokuthion	0.2	mg/kg	-	< 0.2	< 0.2	< 0.2
Trichloronate	0.2	mg/kg	-	< 0.2	< 0.2	< 0.2
Triphenylphosphate (surr.)	1	%	-	98	55	94
% Moisture	0.1	%	17	21	32	20

Client Sample ID			HA02/0.05	HA03/0.05	HA04/0.05	HA06/0.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			M14-JI25381	M14-JI25382	M14-JI25383	M14-JI25384
Date Sampled			Jul 29, 2014	Jul 29, 2014	Jul 29, 2014	Jul 29, 2014
Test/Reference	LOR	Unit				
Heavy Metals						
Antimony	10	mg/kg	< 10	< 10	< 10	< 10
Arsenic	2	mg/kg	< 2	2.7	< 2	< 2
Beryllium	2	mg/kg	< 2	< 2	< 2	< 2
Boron	10	mg/kg	< 10	< 10	< 10	< 10
Cadmium	0.4	mg/kg	< 0.4	0.4	< 0.4	< 0.4
Chromium	5	mg/kg	21	21	7.4	23
Cobalt	5	mg/kg	< 5	< 5	< 5	5.9
Copper	5	mg/kg	8.8	12	9.3	8.2
Lead	5	mg/kg	12	27	7.5	8.3
Manganese	5	mg/kg	64	74	44	120
Mercury	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Molybdenum	10	mg/kg	< 10	< 10	< 10	< 10
Nickel	5	mg/kg	8.0	8.0	5.9	9.8
Selenium	2	mg/kg	< 2	< 2	< 2	< 2
Silver	5	mg/kg	< 5	< 5	< 5	< 5
Tin	10	mg/kg	< 10	< 10	< 10	< 10
Vanadium	10	mg/kg	30	35	10	41
Zinc	5	mg/kg	56	77	36	20

Client Sample ID			HA07/0.4	HA08/0.1
Sample Matrix			Soil	Soil
Eurofins | mgt Sample No.			M14-JI25385	M14-JI25386
Date Sampled			Jul 29, 2014	Jul 29, 2014
Test/Reference	LOR	Unit		
Organochlorine Pesticides				
Chlordanes - Total	0.1	mg/kg	< 0.1	< 0.1
4.4'-DDD	0.05	mg/kg	< 0.05	< 0.05
4.4'-DDE	0.05	mg/kg	< 0.05	< 0.05
4.4'-DDT	0.05	mg/kg	< 0.05	< 0.05
a-BHC	0.05	mg/kg	< 0.05	< 0.05
Aldrin	0.05	mg/kg	< 0.05	< 0.05
b-BHC	0.05	mg/kg	< 0.05	< 0.05
d-BHC	0.05	mg/kg	< 0.05	< 0.05
Dieldrin	0.05	mg/kg	< 0.05	< 0.05
Endosulfan I	0.05	mg/kg	< 0.05	< 0.05
Endosulfan II	0.05	mg/kg	< 0.05	< 0.05
Endosulfan sulphate	0.05	mg/kg	< 0.05	< 0.05
Endrin	0.05	mg/kg	< 0.05	< 0.05
Endrin aldehyde	0.05	mg/kg	< 0.05	< 0.05
Endrin ketone	0.05	mg/kg	< 0.05	< 0.05
g-BHC (Lindane)	0.05	mg/kg	< 0.05	< 0.05
Heptachlor	0.05	mg/kg	< 0.05	< 0.05
Heptachlor epoxide	0.05	mg/kg	< 0.05	< 0.05
Hexachlorobenzene	0.05	mg/kg	< 0.05	< 0.05
Methoxychlor	0.05	mg/kg	< 0.05	< 0.05
Toxaphene	1	mg/kg	< 1	< 1
Dibutylchlorendate (surr.)	1	%	91	122
Tetrachloro-m-xylene (surr.)	1	%	107	107

Client Sample ID			HA07/0.4	HA08/0.1
Sample Matrix			Soil	Soil
Eurofins | mgt Sample No.			M14-JI25385	M14-JI25386
Date Sampled			Jul 29, 2014	Jul 29, 2014
Test/Reference	LOR	Unit		
Organophosphorous Pesticides				
Bolstar	0.2	mg/kg	< 0.2	< 0.2
Chlorpyrifos	0.2	mg/kg	< 0.2	< 0.2
Demeton-O	0.2	mg/kg	< 0.2	< 0.2
Diazinon	0.2	mg/kg	< 0.2	< 0.2
Dichlorvos	0.2	mg/kg	< 0.2	< 0.2
Disulfoton	0.2	mg/kg	< 0.2	< 0.2
Ethion	0.2	mg/kg	< 0.2	< 0.2
Ethoprop	0.2	mg/kg	< 0.2	< 0.2
Fenitrothion	0.2	mg/kg	< 0.2	< 0.2
Fensulfothion	0.2	mg/kg	< 0.2	< 0.2
Fenthion	0.2	mg/kg	< 0.2	< 0.2
Merphos	0.2	mg/kg	< 0.2	< 0.2
Methyl azinphos	0.2	mg/kg	< 0.2	< 0.2
Methyl parathion	0.2	mg/kg	< 0.2	< 0.2
Mevinphos	0.2	mg/kg	< 0.2	< 0.2
Naled	0.5	mg/kg	< 0.5	< 0.5
Phorate	0.2	mg/kg	< 0.2	< 0.2
Ronnel	0.2	mg/kg	< 0.2	< 0.2
Tokuthion	0.2	mg/kg	< 0.2	< 0.2
Trichloronate	0.2	mg/kg	< 0.2	< 0.2
Triphenylphosphate (surr.)	1	%	85	102
% Moisture	0.1	%	16	13
Heavy Metals				
Antimony	10	mg/kg	< 10	< 10
Arsenic	2	mg/kg	< 2	< 2
Beryllium	2	mg/kg	< 2	< 2
Boron	10	mg/kg	< 10	< 10
Cadmium	0.4	mg/kg	< 0.4	< 0.4
Chromium	5	mg/kg	23	59
Cobalt	5	mg/kg	< 5	7.6
Copper	5	mg/kg	11	19
Lead	5	mg/kg	20	15
Manganese	5	mg/kg	66	170
Mercury	0.1	mg/kg	< 0.1	< 0.1
Molybdenum	10	mg/kg	< 10	< 10
Nickel	5	mg/kg	11	23
Selenium	2	mg/kg	< 2	< 2
Silver	5	mg/kg	< 5	< 5
Tin	10	mg/kg	< 10	< 10
Vanadium	10	mg/kg	35	20
Zinc	5	mg/kg	37	41

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results (regarding both quality and NATA accreditation).

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Vic EPA IWRG 621 (Solids)			
Total Recoverable Hydrocarbons - 1999 NEPM Fractions	Melbourne	Jul 30, 2014	14 Day
- Method: TRH C6-C36 - MGT 100A			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Melbourne	Jul 30, 2014	14 Day
- Method: LM-LTM-ORG2010			
Volatile Organics	Melbourne	Jul 30, 2014	7 Day
- Method: USEPA 8260 - MGT 350A Volatile Organics by GCMS			
Polycyclic Aromatic Hydrocarbons	Melbourne	Jul 30, 2014	14 Day
- Method: USEPA 8270 Polycyclic Aromatic Hydrocarbons			
Organochlorine Pesticides	Melbourne	Jul 30, 2014	14 Day
- Method: USEPA 8081 Organochlorine Pesticides			
Polychlorinated Biphenyls	Melbourne	Jul 30, 2014	28 Day
- Method: USEPA 8082 Polychlorinated Biphenyls			
Phenols (Halogenated)	Melbourne	Jul 30, 2014	14 Day
- Method: USEPA 8270 Phenols			
Phenols (non-Halogenated)	Melbourne	Jul 30, 2014	14 Day
- Method: USEPA 8270 Phenols			
Chromium (hexavalent)	Melbourne	Jul 30, 2014	28 Day
- Method: APHA 3500-Cr Hexavalent Chromium- (Extraction:- USEPA3060)			
Cyanide (total)	Melbourne	Jul 30, 2014	14 Day
- Method: USEPA 9010 Cyanide			
Fluoride	Melbourne	Jul 30, 2014	28 Day
- Method: NEPC 404 (Fusion followed by ISE)			
pH (1:5 Aqueous extract)	Melbourne	Jul 30, 2014	7 Day
- Method: LM-LTM-INO-4000			
IWRG 621 Metals : Metals M12	Melbourne	Jul 30, 2014	28 Day
- Method: USEPA 6010/6020 Heavy Metals & USEPA 7470/71 Mercury			
Organophosphorous Pesticides	Melbourne	Jul 30, 2014	14 Day
- Method: USEPA 8270 Organophoshorus Pesticides			
% Moisture	Melbourne	Jul 30, 2014	14 Day
- Method: Method 102 - ANZECC - % Moisture			
Metals M18	Melbourne	Jul 30, 2014	28 Day
- Method: USEPA 6010/6020 Heavy Metals & USEPA 7470/71 Mercury			

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NATA # 1261 Site # 20794

Company Name: Tonkin & Taylor P/L
Address: Ground Floor, 95 Coventry St
South Melbourne
VIC 3006

Client Job No.: WAVERLY GC 2781.001

Order No.:
Report #: 426759
Phone: 03 9863 8686
Fax: 03 9863 8685

Received: Jul 29, 2014 3:59 PM
Due: Aug 5, 2014
Priority: 5 Day
Contact Name: Thomas Madill

Eurofins | mgt Client Manager: Mary Makarios

Sample Detail					% Moisture	HOLD	Polycyclic Aromatic Hydrocarbons	Organochlorine Pesticides	Organophosphorous Pesticides	Metals M18	Total Recoverable Hydrocarbons	Vic EPA IWRG 621 (Solids)
Laboratory where analysis is conducted												
Melbourne Laboratory - NATA Site # 1254 & 14271					X	X	X	X	X	X	X	X
Sydney Laboratory - NATA Site # 18217												
Brisbane Laboratory - NATA Site # 20794												
External Laboratory												
Sample ID	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**								
BH01/0.05	Jul 28, 2014		Soil	M14-Jl25367	X			X	X	X		
BH02/0.05	Jul 28, 2014		Soil	M14-Jl25368	X			X	X	X		
BH03/0.05	Jul 28, 2014		Soil	M14-Jl25369	X			X	X	X		
BH04/0.05	Jul 28, 2014		Soil	M14-Jl25370	X			X	X	X		
BH05/2.5	Jul 28, 2014		Soil	M14-Jl25371	X		X	X	X	X	X	
BH06/2.5	Jul 28, 2014		Soil	M14-Jl25372	X							X
BH07/3.5	Jul 28, 2014		Soil	M14-Jl25373	X							X
BH08/0.1	Jul 28, 2014		Soil	M14-Jl25374	X		X	X	X	X	X	
BH09/1.0	Jul 28, 2014		Soil	M14-Jl25375	X		X	X	X	X	X	
BH10/0.1	Jul 28, 2014		Soil	M14-Jl25376	X		X	X	X	X	X	

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NATA # 1261 Site # 20794

Company Name:	Tonkin & Taylor P/L	**Order No.:**		**Received:**	Jul 29, 2014 3:59 PM
Address:	Ground Floor, 95 Coventry St South Melbourne VIC 3006	**Report #:**	426759	**Due:**	Aug 5, 2014
		Phone:	03 9863 8686	**Priority:**	5 Day
		Fax:	03 9863 8685	**Contact Name:**	Thomas Madill
Client Job No.:	WAVERLY GC 2781.001				

Eurofins | mgt Client Manager: Mary Makarios

Sample Detail					% Moisture	HOLD	Polycyclic Aromatic Hydrocarbons	Organochlorine Pesticides	Organophosphorous Pesticides	Metals M18	Total Recoverable Hydrocarbons	Vic EPA IWRG 621 (Solids)
Laboratory where analysis is conducted												
Melbourne Laboratory - NATA Site # 1254 & 14271					X	X	X	X	X	X	X	X
Sydney Laboratory - NATA Site # 18217												
Brisbane Laboratory - NATA Site # 20794												
External Laboratory												
QC1	Jul 28, 2014		Soil	M14-Jl25377	X		X	X	X	X	X	
TB02	Jul 29, 2014		Water	M14-Jl25378							X	
RB02	Jul 29, 2014		Water	M14-Jl25379							X	
HA01/0.05	Jul 29, 2014		Soil	M14-Jl25380	X		X				X	
HA02/0.05	Jul 29, 2014		Soil	M14-Jl25381	X		X			X	X	
HA03/0.05	Jul 29, 2014		Soil	M14-Jl25382	X			X	X	X		
HA04/0.05	Jul 29, 2014		Soil	M14-Jl25383	X		X	X	X	X	X	
HA06/0.5	Jul 29, 2014		Soil	M14-Jl25384	X			X	X	X		
HA07/0.4	Jul 29, 2014		Soil	M14-Jl25385	X			X	X	X		
HA08/0.1	Jul 29, 2014		Soil	M14-Jl25386	X			X	X	X		
BH01/0.5	Jul 28, 2014		Soil	M14-Jl25387		X						

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Eurofins | mgt Client Manager: Mary Makarios

Sample Detail					% Moisture	HOLD	Polycyclic Aromatic Hydrocarbons	Organochlorine Pesticides	Organophosphorous Pesticides	Metals M18	Total Recoverable Hydrocarbons	Vic EPA IWRG 621 (Solids)
Laboratory where analysis is conducted												
Melbourne Laboratory - NATA Site # 1254 & 14271					X	X	X	X	X	X	X	X
Sydney Laboratory - NATA Site # 18217												
Brisbane Laboratory - NATA Site # 20794												
External Laboratory												
BH02/0.5	Jul 28, 2014		Soil	M14-JI25388		X						
BH03/0.5	Jul 28, 2014		Soil	M14-JI25389		X						
BH04/0.5	Jul 28, 2014		Soil	M14-JI25390		X						
BH05/0.1	Jul 28, 2014		Soil	M14-JI25391		X						
BH06/0.1	Jul 28, 2014		Soil	M14-JI25392		X						
BH07/0.1	Jul 28, 2014		Soil	M14-JI25393		X						
BH07/5.0	Jul 28, 2014		Soil	M14-JI25394		X						
BH08/1.5	Jul 28, 2014		Soil	M14-JI25395		X						
BH09/0.1	Jul 28, 2014		Soil	M14-JI25396		X						
BH10/1.0	Jul 28, 2014		Soil	M14-JI25397		X						
TB01	Jul 28, 2014		Water	M14-JI25398		X						

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Sample Detail					% Moisture	HOLD	Polycyclic Aromatic Hydrocarbons	Organochlorine Pesticides	Organophosphorous Pesticides	Metals M18	Total Recoverable Hydrocarbons	Vic EPA IWRG 621 (Solids)
Laboratory where analysis is conducted												
Melbourne Laboratory - NATA Site # 1254 & 14271					X	X	X	X	X	X	X	X
Sydney Laboratory - NATA Site # 18217												
Brisbane Laboratory - NATA Site # 20794												
External Laboratory												
RB01	Jul 28, 2014		Water	M14-Jl25399		X						
HA01/0.35	Jul 29, 2014		Soil	M14-Jl25400		X						
HA02/0.35	Jul 29, 2014		Soil	M14-Jl25401		X						
HA03/0.5	Jul 29, 2014		Soil	M14-Jl25402		X						
HA05/0.05	Jul 29, 2014		Soil	M14-Jl25403		X						

Eurofins | mgt Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil results are reported on a dry basis, unless otherwise stated.
3. Actual PQLs are matrix dependant. Quoted PQLs may be raised where sample extracts are diluted due to interferences.
4. Results are uncorrected for matrix spikes or surrogate recoveries.
5. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
6. Samples were analysed on an 'as received' basis. 7. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the Sample Receipt Acknowledgment.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

****NOTE:** pH duplicates are reported as a range NOT as RPD

UNITS

mg/kg: milligrams per Kilogram

ug/l: micrograms per litre

ppb: Parts per billion

org/100ml: Organisms per 100 millilitres

MPN/100mL: Most Probable Number of organisms per 100 millilitres

mg/l: milligrams per litre

ppm: Parts per million

%: Percentage

NTU: Units

TERMS

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery
CRM	Certified Reference Material - reported as percent recovery
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands. In the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
Batch Duplicate	A second piece of analysis from a sample outside of the clients batch of samples but run within the laboratory batch of analysis.
Batch SPIKE	Spike recovery reported on a sample from outside of the clients batch of samples but run within the laboratory batch of analysis.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
ASLP	Australian Standard Leaching Procedure (AS4439.3)
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within
TEQ	Toxic Equivalency Quotient

QC - ACCEPTANCE CRITERIA

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries : Recoveries must lie between 50-150% - Phenols 20-130%.

QC DATA GENERAL COMMENTS

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxophene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxophene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Arochlor 1260 in Matrix Spikes and LCS's.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPD's are calculated from raw analytical data thus it is possible to have two sets of data.

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Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	mg/kg	< 20			20	Pass	
TRH C10-C14	mg/kg	< 20			20	Pass	
TRH C15-C28	mg/kg	< 50			50	Pass	
TRH C29-C36	mg/kg	< 50			50	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	mg/kg	< 0.5			0.5	Pass	
TRH C6-C10	mg/kg	< 20			20	Pass	
TRH C6-C10 less BTEX (F1)	mg/kg	< 20			20	Pass	
TRH >C10-C16	mg/kg	< 50			50	Pass	
TRH >C16-C34	mg/kg	< 100			100	Pass	
TRH >C34-C40	mg/kg	< 100			100	Pass	
Method Blank							
Volatile Organics							
1.2.4-Trichlorobenzene	mg/kg	< 0.2			0.2	Pass	
Hexachlorobutadiene	mg/kg	< 0.2			0.2	Pass	
1.1-Dichloroethane	mg/kg	< 0.05			0.05	Pass	
1.1-Dichloroethene	mg/kg	< 0.05			0.05	Pass	
1.1.1-Trichloroethane	mg/kg	< 0.05			0.05	Pass	
1.1.1.2-Tetrachloroethane	mg/kg	< 0.05			0.05	Pass	
1.1.2-Trichloroethane	mg/kg	< 0.05			0.05	Pass	
1.1.2.2-Tetrachloroethane	mg/kg	< 0.05			0.05	Pass	
1.2-Dibromoethane	mg/kg	< 0.05			0.05	Pass	
1.2-Dichlorobenzene	mg/kg	< 0.05			0.05	Pass	
1.2-Dichloroethane	mg/kg	< 0.05			0.05	Pass	
1.2-Dichloropropane	mg/kg	< 0.05			0.05	Pass	
1.2.3-Trichloropropane	mg/kg	< 0.05			0.05	Pass	
1.2.4-Trimethylbenzene	mg/kg	< 0.05			0.05	Pass	
1.3-Dichlorobenzene	mg/kg	< 0.05			0.05	Pass	
1.3-Dichloropropane	mg/kg	< 0.05			0.05	Pass	
1.3.5-Trimethylbenzene	mg/kg	< 0.05			0.05	Pass	
1.4-Dichlorobenzene	mg/kg	< 0.05			0.05	Pass	
2-Butanone (MEK)	mg/kg	< 0.05			0.05	Pass	
2-Propanone (Acetone)	mg/kg	< 0.05			0.05	Pass	
4-Chlorotoluene	mg/kg	< 0.05			0.05	Pass	
4-Methyl-2-pentanone (MIBK)	mg/kg	< 0.05			0.05	Pass	
Allyl chloride	mg/kg	< 0.05			0.05	Pass	
Benzene	mg/kg	< 0.1			0.1	Pass	
Bromobenzene	mg/kg	< 0.05			0.05	Pass	
Bromochloromethane	mg/kg	< 0.05			0.05	Pass	
Bromodichloromethane	mg/kg	< 0.05			0.05	Pass	
Bromoform	mg/kg	< 0.05			0.05	Pass	
Bromomethane	mg/kg	< 0.05			0.05	Pass	
Carbon disulfide	mg/kg	< 0.05			0.05	Pass	
Carbon Tetrachloride	mg/kg	< 0.05			0.05	Pass	
Chlorobenzene	mg/kg	< 0.05			0.05	Pass	
Chloroethane	mg/kg	< 0.05			0.05	Pass	
Chloroform	mg/kg	< 0.05			0.05	Pass	
Chloromethane	mg/kg	< 0.05			0.05	Pass	
cis-1.2-Dichloroethene	mg/kg	< 0.05			0.05	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
cis-1.3-Dichloropropene	mg/kg	< 0.05			0.05	Pass	
Dibromochloromethane	mg/kg	< 0.05			0.05	Pass	
Dibromomethane	mg/kg	< 0.05			0.05	Pass	
Dichlorodifluoromethane	mg/kg	< 0.05			0.05	Pass	
Ethylbenzene	mg/kg	< 0.1			0.1	Pass	
Iodomethane	mg/kg	< 0.05			0.05	Pass	
Isopropyl benzene (Cumene)	mg/kg	< 0.05			0.05	Pass	
m&p-Xylenes	mg/kg	< 0.2			0.2	Pass	
Methylene Chloride	mg/kg	< 0.05			0.05	Pass	
o-Xylene	mg/kg	< 0.1			0.1	Pass	
Styrene	mg/kg	< 0.05			0.05	Pass	
Tetrachloroethene	mg/kg	< 0.05			0.05	Pass	
Toluene	mg/kg	< 0.1			0.1	Pass	
trans-1.2-Dichloroethene	mg/kg	< 0.05			0.05	Pass	
trans-1.3-Dichloropropene	mg/kg	< 0.05			0.05	Pass	
Trichloroethene	mg/kg	< 0.05			0.05	Pass	
Trichlorofluoromethane	mg/kg	< 0.05			0.05	Pass	
Vinyl chloride	mg/kg	< 0.05			0.05	Pass	
Xylenes - Total	mg/kg	< 0.3			0.3	Pass	
Method Blank							
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	mg/kg	< 0.5			0.5	Pass	
Acenaphthylene	mg/kg	< 0.5			0.5	Pass	
Anthracene	mg/kg	< 0.5			0.5	Pass	
Benz(a)anthracene	mg/kg	< 0.5			0.5	Pass	
Benzo(a)pyrene	mg/kg	< 0.5			0.5	Pass	
Benzo(b&j)fluoranthene	mg/kg	< 0.5			0.5	Pass	
Benzo(g.h.i)perylene	mg/kg	< 0.5			0.5	Pass	
Benzo(k)fluoranthene	mg/kg	< 0.5			0.5	Pass	
Chrysene	mg/kg	< 0.5			0.5	Pass	
Dibenz(a.h)anthracene	mg/kg	< 0.5			0.5	Pass	
Fluoranthene	mg/kg	< 0.5			0.5	Pass	
Fluorene	mg/kg	< 0.5			0.5	Pass	
Indeno(1.2.3-cd)pyrene	mg/kg	< 0.5			0.5	Pass	
Naphthalene	mg/kg	< 0.5			0.5	Pass	
Phenanthrene	mg/kg	< 0.5			0.5	Pass	
Pyrene	mg/kg	< 0.5			0.5	Pass	
Method Blank							
Organochlorine Pesticides							
Chlordanes - Total	mg/kg	< 0.1			0.1	Pass	
4.4'-DDD	mg/kg	< 0.05			0.05	Pass	
4.4'-DDE	mg/kg	< 0.05			0.05	Pass	
4.4'-DDT	mg/kg	< 0.05			0.05	Pass	
a-BHC	mg/kg	< 0.05			0.05	Pass	
Aldrin	mg/kg	< 0.05			0.05	Pass	
b-BHC	mg/kg	< 0.05			0.05	Pass	
d-BHC	mg/kg	< 0.05			0.05	Pass	
Dieldrin	mg/kg	< 0.05			0.05	Pass	
Endosulfan I	mg/kg	< 0.05			0.05	Pass	
Endosulfan II	mg/kg	< 0.05			0.05	Pass	
Endosulfan sulphate	mg/kg	< 0.05			0.05	Pass	
Endrin	mg/kg	< 0.05			0.05	Pass	
Endrin aldehyde	mg/kg	< 0.05			0.05	Pass	
Endrin ketone	mg/kg	< 0.05			0.05	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
g-BHC (Lindane)	mg/kg	< 0.05			0.05	Pass	
Heptachlor	mg/kg	< 0.05			0.05	Pass	
Heptachlor epoxide	mg/kg	< 0.05			0.05	Pass	
Hexachlorobenzene	mg/kg	< 0.05			0.05	Pass	
Methoxychlor	mg/kg	< 0.05			0.05	Pass	
Toxaphene	mg/kg	< 1			1	Pass	
Method Blank							
Organophosphorous Pesticides							
Bolstar	mg/kg	< 0.2			0.2	Pass	
Chlorpyrifos	mg/kg	< 0.2			0.2	Pass	
Demeton-O	mg/kg	< 0.2			0.2	Pass	
Diazinon	mg/kg	< 0.2			0.2	Pass	
Dichlorvos	mg/kg	< 0.2			0.2	Pass	
Disulfoton	mg/kg	< 0.2			0.2	Pass	
Ethion	mg/kg	< 0.2			0.2	Pass	
Ethoprop	mg/kg	< 0.2			0.2	Pass	
Fenitrothion	mg/kg	< 0.2			0.2	Pass	
Fensulfothion	mg/kg	< 0.2			0.2	Pass	
Fenthion	mg/kg	< 0.2			0.2	Pass	
Merphos	mg/kg	< 0.2			0.2	Pass	
Methyl azinphos	mg/kg	< 0.2			0.2	Pass	
Methyl parathion	mg/kg	< 0.2			0.2	Pass	
Mevinphos	mg/kg	< 0.2			0.2	Pass	
Naled	mg/kg	< 0.5			0.5	Pass	
Phorate	mg/kg	< 0.2			0.2	Pass	
Ronnel	mg/kg	< 0.2			0.2	Pass	
Tokuthion	mg/kg	< 0.2			0.2	Pass	
Trichloronate	mg/kg	< 0.2			0.2	Pass	
Method Blank							
Polychlorinated Biphenyls							
Aroclor-1016	mg/kg	< 0.1			0.1	Pass	
Aroclor-1221	mg/kg	< 0.1			0.1	Pass	
Aroclor-1232	mg/kg	< 0.1			0.1	Pass	
Aroclor-1242	mg/kg	< 0.1			0.1	Pass	
Aroclor-1248	mg/kg	< 0.1			0.1	Pass	
Aroclor-1254	mg/kg	< 0.1			0.1	Pass	
Aroclor-1260	mg/kg	< 0.1			0.1	Pass	
Total PCB	mg/kg	< 0.1			0.1	Pass	
Method Blank							
Phenols (Halogenated)							
2-Chlorophenol	mg/kg	< 0.5			0.5	Pass	
2.4-Dichlorophenol	mg/kg	< 0.5			0.5	Pass	
2.4.5-Trichlorophenol	mg/kg	< 1			1.0	Pass	
2.4.6-Trichlorophenol	mg/kg	< 1			1.0	Pass	
2.6-Dichlorophenol	mg/kg	< 0.5			0.5	Pass	
4-Chloro-3-methylphenol	mg/kg	< 1			1.0	Pass	
Pentachlorophenol	mg/kg	< 1			1.0	Pass	
Tetrachlorophenols - Total	mg/kg	< 1			1.0	Pass	
Method Blank							
Phenols (non-Halogenated)							
2-Cyclohexyl-4.6-dinitrophenol	mg/kg	< 20			20	Pass	
2-Methyl-4.6-dinitrophenol	mg/kg	< 5			5	Pass	
2-Methylphenol (o-Cresol)	mg/kg	< 0.2			0.2	Pass	
2-Nitrophenol	mg/kg	< 1			1.0	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
2.4-Dimethylphenol	mg/kg	< 0.5			0.5	Pass	
2.4-Dinitrophenol	mg/kg	< 5			5	Pass	
3&4-Methylphenol (m&p-Cresol)	mg/kg	< 0.4			0.4	Pass	
4-Nitrophenol	mg/kg	< 5			5	Pass	
Dinoseb	mg/kg	< 20			20	Pass	
Phenol	mg/kg	< 0.5			0.5	Pass	
Method Blank							
Chromium (hexavalent)	mg/kg	< 1			1	Pass	
Cyanide (total)	mg/kg	< 5			5	Pass	
Fluoride	mg/kg	< 100			100	Pass	
Method Blank							
Heavy Metals							
Antimony	mg/kg	< 10			10	Pass	
Arsenic	mg/kg	< 2			2	Pass	
Arsenic	mg/kg	< 2			2	Pass	
Beryllium	mg/kg	< 2			2	Pass	
Boron	mg/kg	< 10			10	Pass	
Cadmium	mg/kg	< 0.4			0.4	Pass	
Cadmium	mg/kg	< 0.4			0.4	Pass	
Chromium	mg/kg	< 5			5	Pass	
Chromium	mg/kg	< 5			5	Pass	
Cobalt	mg/kg	< 5			5	Pass	
Copper	mg/kg	< 5			5	Pass	
Copper	mg/kg	< 5			5	Pass	
Lead	mg/kg	< 5			5	Pass	
Lead	mg/kg	< 5			5	Pass	
Manganese	mg/kg	< 5			5	Pass	
Mercury	mg/kg	< 0.1			0.1	Pass	
Molybdenum	mg/kg	< 10			10	Pass	
Molybdenum	mg/kg	< 10			10	Pass	
Nickel	mg/kg	< 5			5	Pass	
Nickel	mg/kg	< 5			5	Pass	
Selenium	mg/kg	< 2			2	Pass	
Selenium	mg/kg	< 2			2	Pass	
Silver	mg/kg	< 5			5	Pass	
Silver	mg/kg	< 5			5	Pass	
Tin	mg/kg	< 10			10	Pass	
Tin	mg/kg	< 10			10	Pass	
Vanadium	mg/kg	< 10			10	Pass	
Zinc	mg/kg	< 5			5	Pass	
Zinc	mg/kg	< 5			5	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	%	119			70-130	Pass	
TRH C10-C14	%	91			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	%	80			75-125	Pass	
TRH C6-C10	%	120			70-130	Pass	
TRH >C10-C16	%	99			70-130	Pass	
LCS - % Recovery							
Volatile Organics							
1.1.1-Trichloroethane	%	99			70-130	Pass	
1.2-Dichloroethane	%	95			70-130	Pass	

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Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Benzene	%	103			70-130	Pass	
Ethylbenzene	%	96			70-130	Pass	
m&p-Xylenes	%	97			70-130	Pass	
Toluene	%	98			70-130	Pass	
Trichloroethene	%	86			70-130	Pass	
Xylenes - Total	%	96			70-130	Pass	
LCS - % Recovery							
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	%	109			70-130	Pass	
Acenaphthylene	%	108			70-130	Pass	
Anthracene	%	110			70-130	Pass	
Benz(a)anthracene	%	105			70-130	Pass	
Benzo(a)pyrene	%	109			70-130	Pass	
Benzo(b&j)fluoranthene	%	110			70-130	Pass	
Benzo(g.h.i)perylene	%	88			70-130	Pass	
Benzo(k)fluoranthene	%	116			70-130	Pass	
Chrysene	%	103			70-130	Pass	
Dibenz(a.h)anthracene	%	93			70-130	Pass	
Fluoranthene	%	106			70-130	Pass	
Fluorene	%	104			70-130	Pass	
Indeno(1.2.3-cd)pyrene	%	94			70-130	Pass	
Naphthalene	%	108			70-130	Pass	
Phenanthrene	%	117			70-130	Pass	
Pyrene	%	107			70-130	Pass	
LCS - % Recovery							
Organochlorine Pesticides							
4.4'-DDD	%	129			70-130	Pass	
4.4'-DDE	%	93			70-130	Pass	
4.4'-DDT	%	122			70-130	Pass	
a-BHC	%	110			70-130	Pass	
Aldrin	%	112			70-130	Pass	
b-BHC	%	112			70-130	Pass	
d-BHC	%	109			70-130	Pass	
Dieldrin	%	90			70-130	Pass	
Endosulfan I	%	105			70-130	Pass	
Endosulfan II	%	117			70-130	Pass	
Endosulfan sulphate	%	121			70-130	Pass	
Endrin	%	101			70-130	Pass	
Endrin aldehyde	%	122			70-130	Pass	
Endrin ketone	%	122			70-130	Pass	
g-BHC (Lindane)	%	116			70-130	Pass	
Heptachlor	%	107			70-130	Pass	
Heptachlor epoxide	%	107			70-130	Pass	
Hexachlorobenzene	%	104			70-130	Pass	
Methoxychlor	%	129			70-130	Pass	
LCS - % Recovery							
Organophosphorous Pesticides							
Diazinon	%	82			70-130	Pass	
Ethion	%	97			70-130	Pass	
Fenitrothion	%	84			70-130	Pass	
Methyl parathion	%	72			70-130	Pass	
Mevinphos	%	103			70-130	Pass	
LCS - % Recovery							
Polychlorinated Biphenyls							

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Aroclor-1260	%	72			70-130	Pass	
LCS - % Recovery							
Phenols (Halogenated)							
2-Chlorophenol	%	85			30-130	Pass	
2.4-Dichlorophenol	%	83			30-130	Pass	
2.4.5-Trichlorophenol	%	79			30-130	Pass	
2.4.6-Trichlorophenol	%	77			30-130	Pass	
2.6-Dichlorophenol	%	86			30-130	Pass	
4-Chloro-3-methylphenol	%	85			30-130	Pass	
Pentachlorophenol	%	35			30-130	Pass	
Tetrachlorophenols - Total	%	66			30-130	Pass	
LCS - % Recovery							
Phenols (non-Halogenated)							
2-Cyclohexyl-4.6-dinitrophenol	%	52			30-130	Pass	
2-Methyl-4.6-dinitrophenol	%	38			30-130	Pass	
2-Methylphenol (o-Cresol)	%	80			30-130	Pass	
2-Nitrophenol	%	81			30-130	Pass	
2.4-Dimethylphenol	%	74			30-130	Pass	
2.4-Dinitrophenol	%	45			30-130	Pass	
3&4-Methylphenol (m&p-Cresol)	%	82			30-130	Pass	
4-Nitrophenol	%	72			30-130	Pass	
Dinoseb	%	33			30-130	Pass	
Phenol	%	86			30-130	Pass	
LCS - % Recovery							
Chromium (hexavalent)	%	101			70-130	Pass	
Cyanide (total)	%	97			70-130	Pass	
Fluoride	%	95			70-130	Pass	
LCS - % Recovery							
Heavy Metals							
Antimony	%	93			80-120	Pass	
Arsenic	%	85			80-120	Pass	
Beryllium	%	97			80-120	Pass	
Boron	%	88			80-120	Pass	
Cadmium	%	95			80-120	Pass	
Cadmium	%	87			80-120	Pass	
Chromium	%	96			80-120	Pass	
Chromium	%	92			80-120	Pass	
Cobalt	%	97			80-120	Pass	
Copper	%	101			80-120	Pass	
Copper	%	95			80-120	Pass	
Lead	%	96			80-120	Pass	
Lead	%	91			80-120	Pass	
Manganese	%	100			80-120	Pass	
Mercury	%	92			75-125	Pass	
Molybdenum	%	96			80-120	Pass	
Molybdenum	%	88			80-120	Pass	
Nickel	%	98			80-120	Pass	
Nickel	%	91			80-120	Pass	
Selenium	%	88			80-120	Pass	
Silver	%	96			80-120	Pass	
Tin	%	82			80-120	Pass	
Vanadium	%	101			80-120	Pass	
Zinc	%	95			80-120	Pass	
Zinc	%	91			80-120	Pass	

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Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Heavy Metals				Result 1					
Silver	M14-Jl24795	NCP	%	75			75-125	Pass	
Tin	M14-Jl24970	NCP	%	80			75-125	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Antimony	M14-Jl25369	CP	%	78			70-130	Pass	
Beryllium	M14-Jl25369	CP	%	83			75-125	Pass	
Cadmium	M14-Jl25369	CP	%	83			75-125	Pass	
Chromium	M14-Jl25369	CP	%	88			75-125	Pass	
Cobalt	M14-Jl25369	CP	%	80			75-125	Pass	
Copper	M14-Jl25369	CP	%	92			75-125	Pass	
Lead	M14-Jl25369	CP	%	76			75-125	Pass	
Manganese	M14-Jl25369	CP	%	76			75-125	Pass	
Mercury	M14-Jl25369	CP	%	89			70-130	Pass	
Molybdenum	M14-Jl25369	CP	%	82			75-125	Pass	
Nickel	M14-Jl25369	CP	%	79			75-125	Pass	
Vanadium	M14-Jl25369	CP	%	75			75-125	Pass	
Zinc	M14-Jl25369	CP	%	78			75-125	Pass	
Spike - % Recovery									
Polycyclic Aromatic Hydrocarbons				Result 1					
Acenaphthene	M14-Jl25371	CP	%	104			70-130	Pass	
Acenaphthylene	M14-Jl25371	CP	%	103			70-130	Pass	
Anthracene	M14-Jl25371	CP	%	100			70-130	Pass	
Benz(a)anthracene	M14-Jl25371	CP	%	100			70-130	Pass	
Benzo(a)pyrene	M14-Jl25371	CP	%	103			70-130	Pass	
Benzo(b&j)fluoranthene	M14-Jl25371	CP	%	109			70-130	Pass	
Benzo(g.h.i)perylene	M14-Jl25371	CP	%	81			70-130	Pass	
Benzo(k)fluoranthene	M14-Jl25371	CP	%	107			70-130	Pass	
Chrysene	M14-Jl25371	CP	%	102			70-130	Pass	
Dibenz(a.h)anthracene	M14-Jl25371	CP	%	89			70-130	Pass	
Fluoranthene	M14-Jl25371	CP	%	99			70-130	Pass	
Fluorene	M14-Jl25371	CP	%	102			70-130	Pass	
Indeno(1.2.3-cd)pyrene	M14-Jl25371	CP	%	91			70-130	Pass	
Naphthalene	M14-Jl25371	CP	%	104			70-130	Pass	
Phenanthrene	M14-Jl25371	CP	%	99			70-130	Pass	
Pyrene	M14-Jl25371	CP	%	104			70-130	Pass	
Spike - % Recovery									
Organophosphorous Pesticides				Result 1					
Diazinon	M14-Jl25371	CP	%	87			70-130	Pass	
Ethion	M14-Jl25371	CP	%	78			70-130	Pass	
Fenitrothion	M14-Jl25371	CP	%	91			70-130	Pass	
Methyl parathion	M14-Jl25371	CP	%	77			70-130	Pass	
Mevinphos	M14-Jl25371	CP	%	125			70-130	Pass	
Spike - % Recovery									
Phenols (Halogenated)				Result 1					
2-Chlorophenol	M14-Jl25371	CP	%	93			30-130	Pass	
2.4-Dichlorophenol	M14-Jl25371	CP	%	97			30-130	Pass	
2.4.5-Trichlorophenol	M14-Jl25371	CP	%	96			30-130	Pass	
2.4.6-Trichlorophenol	M14-Jl25371	CP	%	96			30-130	Pass	
2.6-Dichlorophenol	M14-Jl25371	CP	%	96			30-130	Pass	
4-Chloro-3-methylphenol	M14-Jl25371	CP	%	99			30-130	Pass	
Pentachlorophenol	M14-Jl25371	CP	%	43			30-130	Pass	
Tetrachlorophenols - Total	M14-Jl25371	CP	%	93			30-130	Pass	

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Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Phenols (non-Halogenated)				Result 1					
2-Cyclohexyl-4.6-dinitrophenol	M14-Jl25371	CP	%	33			30-130	Pass	
2-Methyl-4.6-dinitrophenol	M14-Jl25371	CP	%	36			30-130	Pass	
2-Methylphenol (o-Cresol)	M14-Jl25371	CP	%	102			30-130	Pass	
2-Nitrophenol	M14-Jl25371	CP	%	103			30-130	Pass	
2.4-Dimethylphenol	M14-Jl25371	CP	%	101			30-130	Pass	
2.4-Dinitrophenol	M14-Jl25371	CP	%	60			30-130	Pass	
3&4-Methylphenol (m&p-Cresol)	M14-Jl25371	CP	%	102			30-130	Pass	
4-Nitrophenol	M14-Jl25371	CP	%	98			30-130	Pass	
Dinoseb	M14-Jl25371	CP	%	56			30-130	Pass	
Phenol	M14-Jl25371	CP	%	101			30-130	Pass	
Spike - % Recovery									
Polychlorinated Biphenyls				Result 1					
Aroclor-1260	S14-Jl27315	NCP	%	78			70-130	Pass	
Spike - % Recovery									
				Result 1					
Chromium (hexavalent)	M14-Jl25006	NCP	%	98			70-130	Pass	
Cyanide (total)	M14-Jl26303	NCP	%	101			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1					
TRH C6-C9	M14-Jl25373	CP	%	98			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
Naphthalene	M14-Jl25373	CP	%	75			70-130	Pass	
TRH C6-C10	M14-Jl25373	CP	%	98			70-130	Pass	
Spike - % Recovery									
Volatile Organics				Result 1					
1.1.1-Trichloroethane	M14-Jl25373	CP	%	88			70-130	Pass	
1.2-Dichlorobenzene	M14-Jl25373	CP	%	84			70-130	Pass	
1.2-Dichloroethane	M14-Jl25373	CP	%	87			70-130	Pass	
Benzene	M14-Jl25373	CP	%	88			70-130	Pass	
Ethylbenzene	M14-Jl25373	CP	%	89			70-130	Pass	
m&p-Xylenes	M14-Jl25373	CP	%	92			70-130	Pass	
o-Xylene	M14-Jl25373	CP	%	90			70-130	Pass	
Toluene	M14-Jl25373	CP	%	91			70-130	Pass	
Trichloroethene	M14-Jl25373	CP	%	80			70-130	Pass	
Xylenes - Total	M14-Jl25373	CP	%	91			70-130	Pass	
Spike - % Recovery									
Polycyclic Aromatic Hydrocarbons				Result 1					
Acenaphthene	M14-Jl25374	CP	%	118			70-130	Pass	
Acenaphthylene	M14-Jl25374	CP	%	118			70-130	Pass	
Anthracene	M14-Jl25374	CP	%	120			70-130	Pass	
Benz(a)anthracene	M14-Jl25374	CP	%	113			70-130	Pass	
Benzo(a)pyrene	M14-Jl25374	CP	%	96			70-130	Pass	
Benzo(b&j)fluoranthene	M14-Jl25374	CP	%	114			70-130	Pass	
Benzo(g.h.i)perylene	M14-Jl25374	CP	%	76			70-130	Pass	
Benzo(k)fluoranthene	M14-Jl25374	CP	%	81			70-130	Pass	
Chrysene	M14-Jl25374	CP	%	113			70-130	Pass	
Dibenz(a.h)anthracene	M14-Jl25374	CP	%	83			70-130	Pass	
Fluoranthene	M14-Jl25374	CP	%	117			70-130	Pass	
Fluorene	M14-Jl25374	CP	%	114			70-130	Pass	
Indeno(1.2.3-cd)pyrene	M14-Jl25374	CP	%	83			70-130	Pass	
Naphthalene	M14-Jl25374	CP	%	118			70-130	Pass	

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Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Phenanthrene	M14-Jl25374	CP	%	115			70-130	Pass	
Pyrene	M14-Jl25374	CP	%	117			70-130	Pass	
Spike - % Recovery									
Phenols (Halogenated)				Result 1					
2-Chlorophenol	M14-Jl25374	CP	%	101			30-130	Pass	
2.4-Dichlorophenol	M14-Jl25374	CP	%	105			30-130	Pass	
2.4.5-Trichlorophenol	M14-Jl25374	CP	%	92			30-130	Pass	
2.4.6-Trichlorophenol	M14-Jl25374	CP	%	107			30-130	Pass	
2.6-Dichlorophenol	M14-Jl25374	CP	%	103			30-130	Pass	
4-Chloro-3-methylphenol	M14-Jl25374	CP	%	109			30-130	Pass	
Pentachlorophenol	M14-Jl25374	CP	%	84			30-130	Pass	
Tetrachlorophenols - Total	M14-Jl25374	CP	%	108			30-130	Pass	
Spike - % Recovery									
Phenols (non-Halogenated)				Result 1					
2-Cyclohexyl-4.6-dinitrophenol	M14-Jl25374	CP	%	37			30-130	Pass	
2-Methyl-4.6-dinitrophenol	M14-Jl25374	CP	%	50			30-130	Pass	
2-Methylphenol (o-Cresol)	M14-Jl25374	CP	%	108			30-130	Pass	
2-Nitrophenol	M14-Jl25374	CP	%	110			30-130	Pass	
2.4-Dimethylphenol	M14-Jl25374	CP	%	104			30-130	Pass	
2.4-Dinitrophenol	M14-Jl25374	CP	%	90			30-130	Pass	
3&4-Methylphenol (m&p-Cresol)	M14-Jl25374	CP	%	106			30-130	Pass	
4-Nitrophenol	M14-Jl25374	CP	%	104			30-130	Pass	
Dinoseb	M14-Jl25374	CP	%	67			30-130	Pass	
Phenol	M14-Jl25374	CP	%	101			30-130	Pass	
Spike - % Recovery									
Organochlorine Pesticides				Result 1					
4.4'-DDD	M14-Jl25375	CP	%	113			70-130	Pass	
4.4'-DDE	M14-Jl25375	CP	%	122			70-130	Pass	
4.4'-DDT	M14-Jl25375	CP	%	70			70-130	Pass	
a-BHC	M14-Jl25375	CP	%	122			70-130	Pass	
Aldrin	M14-Jl25375	CP	%	116			70-130	Pass	
b-BHC	M14-Jl25375	CP	%	126			70-130	Pass	
d-BHC	M14-Jl25375	CP	%	122			70-130	Pass	
Dieldrin	M14-Jl25375	CP	%	105			70-130	Pass	
Endosulfan I	M14-Jl25375	CP	%	107			70-130	Pass	
Endosulfan II	M14-Jl25375	CP	%	117			70-130	Pass	
Endosulfan sulphate	M14-Jl25375	CP	%	116			70-130	Pass	
Endrin	M14-Jl25375	CP	%	76			70-130	Pass	
Endrin aldehyde	M14-Jl25375	CP	%	106			70-130	Pass	
Endrin ketone	M14-Jl25375	CP	%	128			70-130	Pass	
g-BHC (Lindane)	M14-Jl25375	CP	%	113			70-130	Pass	
Heptachlor	M14-Jl25375	CP	%	98			70-130	Pass	
Heptachlor epoxide	M14-Jl25375	CP	%	118			70-130	Pass	
Hexachlorobenzene	M14-Jl25375	CP	%	129			70-130	Pass	
Methoxychlor	M14-Jl25375	CP	%	87			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1					
TRH C6-C9	M14-Jl25376	CP	%	108			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
Naphthalene	M14-Jl25376	CP	%	80			70-130	Pass	
TRH C6-C10	M14-Jl25376	CP	%	108			70-130	Pass	
Spike - % Recovery									
Volatile Organics				Result 1					

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Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Benzene	M14-Jl25376	CP	%	92			70-130	Pass	
Ethylbenzene	M14-Jl25376	CP	%	86			70-130	Pass	
m&p-Xylenes	M14-Jl25376	CP	%	86			70-130	Pass	
o-Xylene	M14-Jl25376	CP	%	85			70-130	Pass	
Toluene	M14-Jl25376	CP	%	88			70-130	Pass	
Xylenes - Total	M14-Jl25376	CP	%	86			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1					
TRH C10-C14	M14-Jl25380	CP	%	88			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
TRH >C10-C16	M14-Jl25380	CP	%	97			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Antimony	M14-Jl25382	CP	%	89			70-130	Pass	
Arsenic	M14-Jl25382	CP	%	84			75-125	Pass	
Beryllium	M14-Jl25382	CP	%	90			75-125	Pass	
Boron	M14-Jl25382	CP	%	75			75-125	Pass	
Cadmium	M14-Jl25382	CP	%	93			75-125	Pass	
Chromium	M14-Jl25382	CP	%	95			75-125	Pass	
Cobalt	M14-Jl25382	CP	%	87			75-125	Pass	
Copper	M14-Jl25382	CP	%	106			75-125	Pass	
Lead	M14-Jl25382	CP	%	90			75-125	Pass	
Mercury	M14-Jl25382	CP	%	89			70-130	Pass	
Molybdenum	M14-Jl25382	CP	%	91			75-125	Pass	
Nickel	M14-Jl25382	CP	%	88			75-125	Pass	
Selenium	M14-Jl25382	CP	%	87			75-125	Pass	
Vanadium	M14-Jl25382	CP	%	104			75-125	Pass	
Zinc	M14-Jl25382	CP	%	114			75-125	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Antimony	M14-Jl25368	CP	mg/kg	< 10	< 10	<1	30%	Pass	
Arsenic	M14-Jl25368	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Beryllium	M14-Jl25368	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Boron	M14-Jl25368	CP	mg/kg	< 10	< 10	<1	30%	Pass	
Cadmium	M14-Jl25368	CP	mg/kg	< 0.4	< 0.4	<1	30%	Pass	
Chromium	M14-Jl25368	CP	mg/kg	23	18	21	30%	Pass	
Cobalt	M14-Jl25368	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Copper	M14-Jl25368	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Lead	M14-Jl25368	CP	mg/kg	8.8	9.6	8.0	30%	Pass	
Manganese	M14-Jl25368	CP	mg/kg	18	15	19	30%	Pass	
Mercury	M14-Jl25368	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Molybdenum	M14-Jl25368	CP	mg/kg	< 10	< 10	<1	30%	Pass	
Nickel	M14-Jl25368	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Selenium	M14-Jl25368	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Silver	M14-Jl25368	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Tin	M14-Jl25368	CP	mg/kg	< 10	< 10	<1	30%	Pass	
Vanadium	M14-Jl25368	CP	mg/kg	56	44	22	30%	Pass	
Zinc	M14-Jl25368	CP	mg/kg	< 5	< 5	<1	30%	Pass	

Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Antimony	M14-Jl25369	CP	mg/kg	< 10	< 10	<1	30%	Pass	
Arsenic	M14-Jl25369	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Beryllium	M14-Jl25369	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Boron	M14-Jl25369	CP	mg/kg	< 10	< 10	<1	30%	Pass	
Cadmium	M14-Jl25369	CP	mg/kg	< 0.4	< 0.4	<1	30%	Pass	
Chromium	M14-Jl25369	CP	mg/kg	22	23	2.0	30%	Pass	
Cobalt	M14-Jl25369	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Copper	M14-Jl25369	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Lead	M14-Jl25369	CP	mg/kg	11	12	4.0	30%	Pass	
Manganese	M14-Jl25369	CP	mg/kg	73	77	5.0	30%	Pass	
Mercury	M14-Jl25369	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Molybdenum	M14-Jl25369	CP	mg/kg	< 10	< 10	<1	30%	Pass	
Nickel	M14-Jl25369	CP	mg/kg	5.0	5.2	4.0	30%	Pass	
Selenium	M14-Jl25369	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Silver	M14-Jl25369	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Tin	M14-Jl25369	CP	mg/kg	< 10	< 10	<1	30%	Pass	
Vanadium	M14-Jl25369	CP	mg/kg	47	48	2.0	30%	Pass	
Zinc	M14-Jl25369	CP	mg/kg	19	19	1.0	30%	Pass	
Duplicate									
Polycyclic Aromatic Hydrocarbons				Result 1	Result 2	RPD			
Acenaphthene	M14-Jl25370	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Acenaphthylene	M14-Jl25370	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Anthracene	M14-Jl25370	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benz(a)anthracene	M14-Jl25370	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(a)pyrene	M14-Jl25370	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(b&j)fluoranthene	M14-Jl25370	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(g.h.i)perylene	M14-Jl25370	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(k)fluoranthene	M14-Jl25370	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Chrysene	M14-Jl25370	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Dibenz(a.h)anthracene	M14-Jl25370	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Fluoranthene	M14-Jl25370	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Fluorene	M14-Jl25370	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Indeno(1.2.3-cd)pyrene	M14-Jl25370	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Naphthalene	M14-Jl25370	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Phenanthrene	M14-Jl25370	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Pyrene	M14-Jl25370	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Duplicate									
Organophosphorous Pesticides				Result 1	Result 2	RPD			
Bolstar	M14-Jl25370	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Chlorpyrifos	M14-Jl25370	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Demeton-O	M14-Jl25370	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Diazinon	M14-Jl25370	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Dichlorvos	M14-Jl25370	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Disulfoton	M14-Jl25370	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Ethion	M14-Jl25370	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Ethoprop	M14-Jl25370	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Fenitrothion	M14-Jl25370	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Fensulfothion	M14-Jl25370	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Fenthion	M14-Jl25370	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Merphos	M14-Jl25370	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Methyl azinphos	M14-Jl25370	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Methyl parathion	M14-Jl25370	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Mevinphos	M14-Jl25370	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Naled	M14-Jl25370	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	

Duplicate									
Organophosphorous Pesticides				Result 1	Result 2	RPD			
Phorate	M14-Jl25370	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Ronnel	M14-Jl25370	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Tokuthion	M14-Jl25370	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Trichloronate	M14-Jl25370	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Duplicate									
Phenols (Halogenated)				Result 1	Result 2	RPD			
2-Chlorophenol	M14-Jl25370	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
2.4-Dichlorophenol	M14-Jl25370	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
2.4.5-Trichlorophenol	M14-Jl25370	CP	mg/kg	< 1	< 1	<1	30%	Pass	
2.4.6-Trichlorophenol	M14-Jl25370	CP	mg/kg	< 1	< 1	<1	30%	Pass	
2.6-Dichlorophenol	M14-Jl25370	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
4-Chloro-3-methylphenol	M14-Jl25370	CP	mg/kg	< 1	< 1	<1	30%	Pass	
Pentachlorophenol	M14-Jl25370	CP	mg/kg	< 1	< 1	<1	30%	Pass	
Tetrachlorophenols - Total	M14-Jl25370	CP	mg/kg	< 1	< 1	<1	30%	Pass	
Duplicate									
Phenols (non-Halogenated)				Result 1	Result 2	RPD			
2-Cyclohexyl-4.6-dinitrophenol	M14-Jl25370	CP	mg/kg	< 20	< 20	<1	30%	Pass	
2-Methyl-4.6-dinitrophenol	M14-Jl25370	CP	mg/kg	< 5	< 5	<1	30%	Pass	
2-Methylphenol (o-Cresol)	M14-Jl25370	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
2-Nitrophenol	M14-Jl25370	CP	mg/kg	< 1	< 1	<1	30%	Pass	
2.4-Dimethylphenol	M14-Jl25370	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
2.4-Dinitrophenol	M14-Jl25370	CP	mg/kg	< 5	< 5	<1	30%	Pass	
3&4-Methylphenol (m&p-Cresol)	M14-Jl25370	CP	mg/kg	< 0.4	< 0.4	<1	30%	Pass	
4-Nitrophenol	M14-Jl25370	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Dinoseb	M14-Jl25370	CP	mg/kg	< 20	< 20	<1	30%	Pass	
Phenol	M14-Jl25370	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C6-C9	M14-Jl25372	CP	mg/kg	< 20	< 20	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	M14-Jl25372	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
TRH C6-C10	M14-Jl25372	CP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH C6-C10 less BTEX (F1)	M14-Jl25372	CP	mg/kg	< 20	< 20	<1	30%	Pass	
Duplicate									
Volatile Organics				Result 1	Result 2	RPD			
1.2.4-Trichlorobenzene	M14-Jl25372	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Hexachlorobutadiene	M14-Jl25372	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
1.1-Dichloroethane	M14-Jl25372	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
1.1-Dichloroethene	M14-Jl25372	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
1.1.1-Trichloroethane	M14-Jl25372	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
1.1.1.2-Tetrachloroethane	M14-Jl25372	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
1.1.2-Trichloroethane	M14-Jl25372	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
1.1.2.2-Tetrachloroethane	M14-Jl25372	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
1.2-Dibromoethane	M14-Jl25372	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
1.2-Dichlorobenzene	M14-Jl25372	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
1.2-Dichloroethane	M14-Jl25372	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
1.2-Dichloropropane	M14-Jl25372	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
1.2.3-Trichloropropane	M14-Jl25372	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
1.2.4-Trimethylbenzene	M14-Jl25372	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
1.3-Dichlorobenzene	M14-Jl25372	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
1.3-Dichloropropane	M14-Jl25372	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
1.3.5-Trimethylbenzene	M14-Jl25372	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
1.4-Dichlorobenzene	M14-Jl25372	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	

Duplicate									
Volatile Organics				Result 1	Result 2	RPD			
2-Butanone (MEK)	M14-Jl25372	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
2-Propanone (Acetone)	M14-Jl25372	CP	mg/kg	< 0.25	< 0.25	<1	30%	Pass	
4-Chlorotoluene	M14-Jl25372	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
4-Methyl-2-pentanone (MIBK)	M14-Jl25372	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Allyl chloride	M14-Jl25372	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Benzene	M14-Jl25372	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Bromobenzene	M14-Jl25372	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Bromochloromethane	M14-Jl25372	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Bromodichloromethane	M14-Jl25372	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Bromoform	M14-Jl25372	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Bromomethane	M14-Jl25372	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Carbon disulfide	M14-Jl25372	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Carbon Tetrachloride	M14-Jl25372	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Chlorobenzene	M14-Jl25372	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Chloroethane	M14-Jl25372	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Chloroform	M14-Jl25372	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Chloromethane	M14-Jl25372	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
cis-1.2-Dichloroethene	M14-Jl25372	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
cis-1.3-Dichloropropene	M14-Jl25372	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Dibromochloromethane	M14-Jl25372	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Dibromomethane	M14-Jl25372	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Dichlorodifluoromethane	M14-Jl25372	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Ethylbenzene	M14-Jl25372	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Iodomethane	M14-Jl25372	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Isopropyl benzene (Cumene)	M14-Jl25372	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
m&p-Xylenes	M14-Jl25372	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Methylene Chloride	M14-Jl25372	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
o-Xylene	M14-Jl25372	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Styrene	M14-Jl25372	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Tetrachloroethene	M14-Jl25372	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Toluene	M14-Jl25372	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
trans-1.2-Dichloroethene	M14-Jl25372	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
trans-1.3-Dichloropropene	M14-Jl25372	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Trichloroethene	M14-Jl25372	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Trichlorofluoromethane	M14-Jl25372	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Vinyl chloride	M14-Jl25372	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Xylenes - Total	M14-Jl25372	CP	mg/kg	< 0.3	< 0.3	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Chromium (hexavalent)	M14-Jl25217	NCP	mg/kg	< 1	< 1	<1	30%	Pass	
Cyanide (total)	M14-Jl25298	NCP	mg/kg	< 5	< 5	<1	30%	Pass	
Fluoride	M14-Jl27079	NCP	mg/kg	590	620	5.8	30%	Pass	
Duplicate									
Polycyclic Aromatic Hydrocarbons				Result 1	Result 2	RPD			
Acenaphthene	M14-Jl25373	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Acenaphthylene	M14-Jl25373	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Anthracene	M14-Jl25373	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benz(a)anthracene	M14-Jl25373	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(a)pyrene	M14-Jl25373	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(b&j)fluoranthene	M14-Jl25373	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(g.h.i)perylene	M14-Jl25373	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(k)fluoranthene	M14-Jl25373	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Chrysene	M14-Jl25373	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Dibenz(a.h)anthracene	M14-Jl25373	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	

Duplicate									
Polycyclic Aromatic Hydrocarbons				Result 1	Result 2	RPD			
Fluoranthene	M14-Jl25373	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Fluorene	M14-Jl25373	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Indeno(1.2.3-cd)pyrene	M14-Jl25373	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Naphthalene	M14-Jl25373	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Phenanthrene	M14-Jl25373	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Pyrene	M14-Jl25373	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Duplicate									
Phenols (Halogenated)				Result 1	Result 2	RPD			
2-Chlorophenol	M14-Jl25373	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
2.4-Dichlorophenol	M14-Jl25373	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
2.4.5-Trichlorophenol	M14-Jl25373	CP	mg/kg	< 1	< 1	<1	30%	Pass	
2.4.6-Trichlorophenol	M14-Jl25373	CP	mg/kg	< 1	< 1	<1	30%	Pass	
2.6-Dichlorophenol	M14-Jl25373	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
4-Chloro-3-methylphenol	M14-Jl25373	CP	mg/kg	< 1	< 1	<1	30%	Pass	
Pentachlorophenol	M14-Jl25373	CP	mg/kg	< 1	< 1	<1	30%	Pass	
Tetrachlorophenols - Total	M14-Jl25373	CP	mg/kg	< 1	< 1	<1	30%	Pass	
Duplicate									
Phenols (non-Halogenated)				Result 1	Result 2	RPD			
2-Cyclohexyl-4.6-dinitrophenol	M14-Jl25373	CP	mg/kg	< 20	< 20	<1	30%	Pass	
2-Methyl-4.6-dinitrophenol	M14-Jl25373	CP	mg/kg	< 5	< 5	<1	30%	Pass	
2-Methylphenol (o-Cresol)	M14-Jl25373	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
2-Nitrophenol	M14-Jl25373	CP	mg/kg	< 1	< 1	<1	30%	Pass	
2.4-Dimethylphenol	M14-Jl25373	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
2.4-Dinitrophenol	M14-Jl25373	CP	mg/kg	< 5	< 5	<1	30%	Pass	
3&4-Methylphenol (m&p-Cresol)	M14-Jl25373	CP	mg/kg	< 0.4	< 0.4	<1	30%	Pass	
4-Nitrophenol	M14-Jl25373	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Dinoseb	M14-Jl25373	CP	mg/kg	< 20	< 20	<1	30%	Pass	
Phenol	M14-Jl25373	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
pH (1:5 Aqueous extract)	M14-Jl25373	CP	units	7.6	7.5	pass	30%	Pass	
Duplicate									
Organochlorine Pesticides				Result 1	Result 2	RPD			
Chlordanes - Total	M14-Jl25374	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
4.4'-DDD	M14-Jl25374	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
4.4'-DDE	M14-Jl25374	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
4.4'-DDT	M14-Jl25374	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
a-BHC	M14-Jl25374	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Aldrin	M14-Jl25374	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
b-BHC	M14-Jl25374	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
d-BHC	M14-Jl25374	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Dieldrin	M14-Jl25374	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endosulfan I	M14-Jl25374	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endosulfan II	M14-Jl25374	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endosulfan sulphate	M14-Jl25374	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endrin	M14-Jl25374	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endrin aldehyde	M14-Jl25374	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endrin ketone	M14-Jl25374	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
g-BHC (Lindane)	M14-Jl25374	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Heptachlor	M14-Jl25374	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Heptachlor epoxide	M14-Jl25374	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Hexachlorobenzene	M14-Jl25374	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Methoxychlor	M14-Jl25374	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Toxaphene	M14-Jl25374	CP	mg/kg	< 1	< 1	<1	30%	Pass	

Duplicate									
Polychlorinated Biphenyls				Result 1	Result 2	RPD			
Aroclor-1016	M14-Jl25374	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Aroclor-1221	M14-Jl25374	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Aroclor-1232	M14-Jl25374	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Aroclor-1242	M14-Jl25374	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Aroclor-1248	M14-Jl25374	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Aroclor-1254	M14-Jl25374	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Aroclor-1260	M14-Jl25374	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Total PCB	M14-Jl25374	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C6-C9	M14-Jl25375	CP	mg/kg	< 20	< 20	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	M14-Jl25375	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
TRH C6-C10	M14-Jl25375	CP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH C6-C10 less BTEX (F1)	M14-Jl25375	CP	mg/kg	< 20	< 20	<1	30%	Pass	
Duplicate									
Volatile Organics				Result 1	Result 2	RPD			
Benzene	M14-Jl25375	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Ethylbenzene	M14-Jl25375	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
m&p-Xylenes	M14-Jl25375	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
o-Xylene	M14-Jl25375	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Toluene	M14-Jl25375	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Xylenes - Total	M14-Jl25375	CP	mg/kg	< 0.3	< 0.3	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C10-C14	M14-Jl25377	CP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH C15-C28	M14-Jl25377	CP	mg/kg	< 50	< 50	<1	30%	Pass	
TRH C29-C36	M14-Jl25377	CP	mg/kg	< 50	< 50	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
TRH >C10-C16	M14-Jl25377	CP	mg/kg	< 50	< 50	<1	30%	Pass	
TRH >C16-C34	M14-Jl25377	CP	mg/kg	< 100	< 100	<1	30%	Pass	
TRH >C34-C40	M14-Jl25377	CP	mg/kg	< 100	< 100	<1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Antimony	M14-Jl25381	CP	mg/kg	< 10	< 10	<1	30%	Pass	
Arsenic	M14-Jl25381	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Beryllium	M14-Jl25381	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Boron	M14-Jl25381	CP	mg/kg	< 10	< 10	<1	30%	Pass	
Cadmium	M14-Jl25381	CP	mg/kg	< 0.4	< 0.4	<1	30%	Pass	
Chromium	M14-Jl25381	CP	mg/kg	21	27	25	30%	Pass	
Cobalt	M14-Jl25381	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Copper	M14-Jl25381	CP	mg/kg	8.8	9.4	6.0	30%	Pass	
Lead	M14-Jl25381	CP	mg/kg	12	14	10	30%	Pass	
Manganese	M14-Jl25381	CP	mg/kg	64	64	1.0	30%	Pass	
Mercury	M14-Jl25381	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Molybdenum	M14-Jl25381	CP	mg/kg	< 10	< 10	<1	30%	Pass	
Nickel	M14-Jl25381	CP	mg/kg	8.0	9.7	19	30%	Pass	
Selenium	M14-Jl25381	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Silver	M14-Jl25381	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Tin	M14-Jl25381	CP	mg/kg	< 10	< 10	<1	30%	Pass	
Vanadium	M14-Jl25381	CP	mg/kg	30	40	30	30%	Pass	
Zinc	M14-Jl25381	CP	mg/kg	56	63	11	30%	Pass	

Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Antimony	M14-Jl25382	CP	mg/kg	< 10	< 10	<1	30%	Pass	
Arsenic	M14-Jl25382	CP	mg/kg	2.7	2.7	1.0	30%	Pass	
Beryllium	M14-Jl25382	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Boron	M14-Jl25382	CP	mg/kg	< 10	< 10	<1	30%	Pass	
Cadmium	M14-Jl25382	CP	mg/kg	0.4	0.5	7.0	30%	Pass	
Chromium	M14-Jl25382	CP	mg/kg	21	21	2.0	30%	Pass	
Cobalt	M14-Jl25382	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Copper	M14-Jl25382	CP	mg/kg	12	13	2.0	30%	Pass	
Lead	M14-Jl25382	CP	mg/kg	27	29	7.0	30%	Pass	
Manganese	M14-Jl25382	CP	mg/kg	74	75	1.0	30%	Pass	
Mercury	M14-Jl25382	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Molybdenum	M14-Jl25382	CP	mg/kg	< 10	< 10	<1	30%	Pass	
Nickel	M14-Jl25382	CP	mg/kg	8.0	8.1	2.0	30%	Pass	
Selenium	M14-Jl25382	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Silver	M14-Jl25382	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Tin	M14-Jl25382	CP	mg/kg	< 10	< 10	<1	30%	Pass	
Vanadium	M14-Jl25382	CP	mg/kg	35	36	2.0	30%	Pass	
Zinc	M14-Jl25382	CP	mg/kg	77	80	4.0	30%	Pass	
Duplicate									
Polycyclic Aromatic Hydrocarbons				Result 1	Result 2	RPD			
Acenaphthene	M14-Jl25386	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Acenaphthylene	M14-Jl25386	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Anthracene	M14-Jl25386	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benz(a)anthracene	M14-Jl25386	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(a)pyrene	M14-Jl25386	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(b&j)fluoranthene	M14-Jl25386	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(g.h.i)perylene	M14-Jl25386	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(k)fluoranthene	M14-Jl25386	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Chrysene	M14-Jl25386	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Dibenz(a.h)anthracene	M14-Jl25386	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Fluoranthene	M14-Jl25386	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Fluorene	M14-Jl25386	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Indeno(1.2.3-cd)pyrene	M14-Jl25386	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Naphthalene	M14-Jl25386	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Phenanthrene	M14-Jl25386	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Pyrene	M14-Jl25386	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Duplicate									
Organophosphorous Pesticides				Result 1	Result 2	RPD			
Bolstar	M14-Jl25386	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Chlorpyrifos	M14-Jl25386	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Demeton-O	M14-Jl25386	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Diazinon	M14-Jl25386	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Dichlorvos	M14-Jl25386	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Disulfoton	M14-Jl25386	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Ethion	M14-Jl25386	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Ethoprop	M14-Jl25386	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Fenitrothion	M14-Jl25386	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Fensulfothion	M14-Jl25386	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Fenthion	M14-Jl25386	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Merphos	M14-Jl25386	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Methyl azinphos	M14-Jl25386	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Methyl parathion	M14-Jl25386	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Mevinphos	M14-Jl25386	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Naled	M14-Jl25386	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	

Duplicate									
Organophosphorous Pesticides				Result 1	Result 2	RPD			
Phorate	M14-Jl25386	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Ronnel	M14-Jl25386	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Tokuthion	M14-Jl25386	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Trichloronate	M14-Jl25386	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Duplicate									
Phenols (Halogenated)				Result 1	Result 2	RPD			
2-Chlorophenol	M14-Jl25386	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
2.4-Dichlorophenol	M14-Jl25386	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
2.4.5-Trichlorophenol	M14-Jl25386	CP	mg/kg	< 1	< 1	<1	30%	Pass	
2.4.6-Trichlorophenol	M14-Jl25386	CP	mg/kg	< 1	< 1	<1	30%	Pass	
2.6-Dichlorophenol	M14-Jl25386	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
4-Chloro-3-methylphenol	M14-Jl25386	CP	mg/kg	< 1	< 1	<1	30%	Pass	
Pentachlorophenol	M14-Jl25386	CP	mg/kg	< 1	< 1	<1	30%	Pass	
Tetrachlorophenols - Total	M14-Jl25386	CP	mg/kg	< 1	< 1	<1	30%	Pass	
Duplicate									
Phenols (non-Halogenated)				Result 1	Result 2	RPD			
2-Cyclohexyl-4.6-dinitrophenol	M14-Jl25386	CP	mg/kg	< 20	< 20	<1	30%	Pass	
2-Methyl-4.6-dinitrophenol	M14-Jl25386	CP	mg/kg	< 5	< 5	<1	30%	Pass	
2-Methylphenol (o-Cresol)	M14-Jl25386	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
2-Nitrophenol	M14-Jl25386	CP	mg/kg	< 1	< 1	<1	30%	Pass	
2.4-Dimethylphenol	M14-Jl25386	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
2.4-Dinitrophenol	M14-Jl25386	CP	mg/kg	< 5	< 5	<1	30%	Pass	
3&4-Methylphenol (m&p-Cresol)	M14-Jl25386	CP	mg/kg	< 0.4	< 0.4	<1	30%	Pass	
4-Nitrophenol	M14-Jl25386	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Dinoseb	M14-Jl25386	CP	mg/kg	< 20	< 20	<1	30%	Pass	
Phenol	M14-Jl25386	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
N01	F2 is determined by arithmetically subtracting the "naphthalene" value from the ">C10-C16" value. The naphthalene value used in this calculation is obtained from volatiles (Purge & Trap analysis).
N02	Where we have reported both volatile (P&T GCMS) and semivolatile (GCMS) naphthalene data, results may not be identical. Provided correct sample handling protocols have been followed, any observed differences in results are likely to be due to procedural differences within each methodology. Results determined by both techniques have passed all QAQC acceptance criteria, and are entirely technically valid.
N04	F1 is determined by arithmetically subtracting the "Total BTEX" value from the "C6-C10" value. The "Total BTEX" value is obtained by summing the concentrations of BTEX analytes. The "C6-C10" value is obtained by quantitating against a standard of mixed aromatic/aliphatic analytes.
N07	Please note:- These two PAH isomers closely co-elute using the most contemporary analytical methods and both the reported concentration (and the TEQ) apply specifically to the total of the two co-eluting PAHs

Authorised By

Mary Makarios	Client Services
Carroll Lee	Senior Analyst-Volatile (VIC)
Emily Rosenberg	Senior Analyst-Metal (VIC)
Huong Le	Senior Analyst-Inorganic (VIC)
Stacey Jenkins	Senior Analyst-Organic (VIC)

Glenn Jackson
Laboratory Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Uncertainty data is available on request

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Certificate of Analysis

NATA Accredited
Accreditation Number 1261
Site Number 1254

Accredited for compliance with ISO/IEC 17025.
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Tonkin & Taylor P/L
Ground Floor, 95 Coventry St
South Melbourne
VIC 3006

Attention: **Thomas Madill**

Report **426759-W**
Client Reference WAVERLY GC 2781.001
Received Date Jul 29, 2014

Client Sample ID			**TB02**	**RB02**
Sample Matrix			**Water**	**Water**
Eurofins | mgt Sample No.			**M14-JI25378**	**M14-JI25379**
Date Sampled			**Jul 29, 2014**	**Jul 29, 2014**
Test/Reference	LOR	Unit		
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				
TRH C6-C9	0.02	mg/L	< 0.02	< 0.02
TRH C10-C14	0.05	mg/L	< 0.05	< 0.05
TRH C15-C28	0.1	mg/L	< 0.1	< 0.1
TRH C29-C36	0.1	mg/L	< 0.1	< 0.1
TRH C10-36 (Total)	0.1	mg/L	< 0.1	< 0.1
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				
Naphthalene[N02]	0.02	mg/L	< 0.02	< 0.02
TRH C6-C10	0.02	mg/L	< 0.02	< 0.02
TRH C6-C10 less BTEX (F1)[N04]	0.02	mg/L	< 0.02	< 0.02
TRH >C10-C16	0.05	mg/L	< 0.05	< 0.05
TRH >C10-C16 less Naphthalene (F2)[N01]	0.05	mg/L	< 0.05	< 0.05
TRH >C16-C34	0.1	mg/L	< 0.1	< 0.1
TRH >C34-C40	0.1	mg/L	< 0.1	< 0.1

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results (regarding both quality and NATA accreditation).

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Vic EPA IWRG 621 (Solids)			
Total Recoverable Hydrocarbons - 1999 NEPM Fractions	Melbourne	Jul 29, 2014	7 Day
- Method: TRH C6-C36 - MGT 100A			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Melbourne	Jul 29, 2014	7 Day
- Method: LM-LTM-ORG2010			

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Phone : +61 2 9900 8400
NATA # 1261 Site # 18217

Brisbane
1/21 Smallwood Place
Murarrie QLD 4172
Phone : +61 7 3902 4600
NATA # 1261 Site # 20794

Company Name:	Tonkin & Taylor P/L	**Order No.:**		**Received:**	Jul 29, 2014 3:59 PM
Address:	Ground Floor, 95 Coventry St South Melbourne VIC 3006	**Report #:**	426759	**Due:**	Aug 5, 2014
		Phone:	03 9863 8686	**Priority:**	5 Day
		Fax:	03 9863 8685	**Contact Name:**	Thomas Madill
Client Job No.:	WAVERLY GC 2781.001				

Eurofins | mgt Client Manager: Mary Makarios

Sample Detail					% Moisture	HOLD	Polycyclic Aromatic Hydrocarbons	Organochlorine Pesticides	Organophosphorous Pesticides	Metals M18	Total Recoverable Hydrocarbons	Vic EPA IWRG 621 (Solids)
Laboratory where analysis is conducted												
Melbourne Laboratory - NATA Site # 1254 & 14271					X	X	X	X	X	X	X	X
Sydney Laboratory - NATA Site # 18217												
Brisbane Laboratory - NATA Site # 20794												
External Laboratory												
Sample ID	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**								
BH01/0.05	Jul 28, 2014		Soil	M14-Jl25367	X			X	X	X		
BH02/0.05	Jul 28, 2014		Soil	M14-Jl25368	X			X	X	X		
BH03/0.05	Jul 28, 2014		Soil	M14-Jl25369	X			X	X	X		
BH04/0.05	Jul 28, 2014		Soil	M14-Jl25370	X			X	X	X		
BH05/2.5	Jul 28, 2014		Soil	M14-Jl25371	X		X	X	X	X	X	
BH06/2.5	Jul 28, 2014		Soil	M14-Jl25372	X							X
BH07/3.5	Jul 28, 2014		Soil	M14-Jl25373	X							X
BH08/0.1	Jul 28, 2014		Soil	M14-Jl25374	X		X	X	X	X	X	
BH09/1.0	Jul 28, 2014		Soil	M14-Jl25375	X		X	X	X	X	X	
BH10/0.1	Jul 28, 2014		Soil	M14-Jl25376	X		X	X	X	X	X	

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Eurofins | mgt Client Manager: Mary Makarios

Sample Detail					% Moisture	HOLD	Polycyclic Aromatic Hydrocarbons	Organochlorine Pesticides	Organophosphorous Pesticides	Metals M18	Total Recoverable Hydrocarbons	Vic EPA IWRG 621 (Solids)
Laboratory where analysis is conducted												
Melbourne Laboratory - NATA Site # 1254 & 14271					X	X	X	X	X	X	X	X
Sydney Laboratory - NATA Site # 18217												
Brisbane Laboratory - NATA Site # 20794												
External Laboratory												
QC1	Jul 28, 2014		Soil	M14-Jl25377	X		X	X	X	X	X	
TB02	Jul 29, 2014		Water	M14-Jl25378							X	
RB02	Jul 29, 2014		Water	M14-Jl25379							X	
HA01/0.05	Jul 29, 2014		Soil	M14-Jl25380	X		X				X	
HA02/0.05	Jul 29, 2014		Soil	M14-Jl25381	X		X			X	X	
HA03/0.05	Jul 29, 2014		Soil	M14-Jl25382	X			X	X	X		
HA04/0.05	Jul 29, 2014		Soil	M14-Jl25383	X		X	X	X	X	X	
HA06/0.5	Jul 29, 2014		Soil	M14-Jl25384	X			X	X	X		
HA07/0.4	Jul 29, 2014		Soil	M14-Jl25385	X			X	X	X		
HA08/0.1	Jul 29, 2014		Soil	M14-Jl25386	X			X	X	X		
BH01/0.5	Jul 28, 2014		Soil	M14-Jl25387		X						

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Eurofins | mgt Client Manager: Mary Makarios

Sample Detail					% Moisture	HOLD	Polycyclic Aromatic Hydrocarbons	Organochlorine Pesticides	Organophosphorous Pesticides	Metals M18	Total Recoverable Hydrocarbons	Vic EPA IWRG 621 (Solids)
Laboratory where analysis is conducted												
Melbourne Laboratory - NATA Site # 1254 & 14271					X	X	X	X	X	X	X	X
Sydney Laboratory - NATA Site # 18217												
Brisbane Laboratory - NATA Site # 20794												
External Laboratory												
BH02/0.5	Jul 28, 2014		Soil	M14-JI25388		X						
BH03/0.5	Jul 28, 2014		Soil	M14-JI25389		X						
BH04/0.5	Jul 28, 2014		Soil	M14-JI25390		X						
BH05/0.1	Jul 28, 2014		Soil	M14-JI25391		X						
BH06/0.1	Jul 28, 2014		Soil	M14-JI25392		X						
BH07/0.1	Jul 28, 2014		Soil	M14-JI25393		X						
BH07/5.0	Jul 28, 2014		Soil	M14-JI25394		X						
BH08/1.5	Jul 28, 2014		Soil	M14-JI25395		X						
BH09/0.1	Jul 28, 2014		Soil	M14-JI25396		X						
BH10/1.0	Jul 28, 2014		Soil	M14-JI25397		X						
TB01	Jul 28, 2014		Water	M14-JI25398		X						

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Sample Detail					% Moisture	HOLD	Polycyclic Aromatic Hydrocarbons	Organochlorine Pesticides	Organophosphorous Pesticides	Metals M18	Total Recoverable Hydrocarbons	Vic EPA IWRG 621 (Solids)
Laboratory where analysis is conducted												
Melbourne Laboratory - NATA Site # 1254 & 14271					X	X	X	X	X	X	X	X
Sydney Laboratory - NATA Site # 18217												
Brisbane Laboratory - NATA Site # 20794												
External Laboratory												
RB01	Jul 28, 2014		Water	M14-Jl25399		X						
HA01/0.35	Jul 29, 2014		Soil	M14-Jl25400		X						
HA02/0.35	Jul 29, 2014		Soil	M14-Jl25401		X						
HA03/0.5	Jul 29, 2014		Soil	M14-Jl25402		X						
HA05/0.05	Jul 29, 2014		Soil	M14-Jl25403		X						

Eurofins | mgt Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil results are reported on a dry basis, unless otherwise stated.
3. Actual PQLs are matrix dependant. Quoted PQLs may be raised where sample extracts are diluted due to interferences.
4. Results are uncorrected for matrix spikes or surrogate recoveries.
5. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
6. Samples were analysed on an 'as received' basis. 7. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the Sample Receipt Acknowledgment.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

****NOTE:** pH duplicates are reported as a range NOT as RPD

UNITS

mg/kg: milligrams per Kilogram

ug/l: micrograms per litre

ppb: Parts per billion

org/100ml: Organisms per 100 millilitres

MPN/100mL: Most Probable Number of organisms per 100 millilitres

mg/l: milligrams per litre

ppm: Parts per million

%: Percentage

NTU: Units

TERMS

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery
CRM	Certified Reference Material - reported as percent recovery
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands. In the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
Batch Duplicate	A second piece of analysis from a sample outside of the clients batch of samples but run within the laboratory batch of analysis.
Batch SPIKE	Spike recovery reported on a sample from outside of the clients batch of samples but run within the laboratory batch of analysis.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
ASLP	Australian Standard Leaching Procedure (AS4439.3)
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within
TEQ	Toxic Equivalency Quotient

QC - ACCEPTANCE CRITERIA

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries : Recoveries must lie between 50-150% - Phenols 20-130%.

QC DATA GENERAL COMMENTS

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxophene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxophene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Arochlor 1260 in Matrix Spikes and LCS's.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPD's are calculated from raw analytical data thus it is possible to have two sets of data.

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Quality Control Results

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions									
TRH C6-C9			mg/L	< 0.02			0.02	Pass	
TRH C10-C14			mg/L	< 0.05			0.05	Pass	
TRH C15-C28			mg/L	< 0.1			0.1	Pass	
TRH C29-C36			mg/L	< 0.1			0.1	Pass	
Method Blank									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions									
Naphthalene			mg/L	< 0.02			0.02	Pass	
TRH C6-C10			mg/L	< 0.02			0.02	Pass	
TRH C6-C10 less BTEX (F1)			mg/L	< 0.02			0.02	Pass	
TRH >C10-C16			mg/L	< 0.05			0.05	Pass	
TRH >C16-C34			mg/L	< 0.1			0.1	Pass	
TRH >C34-C40			mg/L	< 0.1			0.1	Pass	
LCS - % Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions									
TRH C6-C9			%	109			70-130	Pass	
TRH C10-C14			%	90			70-130	Pass	
LCS - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions									
Naphthalene			%	96			75-125	Pass	
TRH C6-C10			%	110			70-130	Pass	
TRH >C10-C16			%	90			70-130	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Spike - % Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1					
TRH C6-C9	M14-Jl24764	NCP	%	122			70-130	Pass	
TRH C10-C14	M14-Jl25079	NCP	%	113			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
Naphthalene	M14-Jl24764	NCP	%	80			70-130	Pass	
TRH C6-C10	M14-Jl24764	NCP	%	122			70-130	Pass	
TRH >C10-C16	M14-Jl25079	NCP	%	113			70-130	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C6-C9	M14-Jl25378	CP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
TRH C10-C14	M14-Jl25078	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
TRH C15-C28	M14-Jl25078	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
TRH C29-C36	M14-Jl25078	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	M14-Jl25378	CP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
TRH C6-C10	M14-Jl25378	CP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
TRH C6-C10 less BTEX (F1)	M14-Jl25378	CP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
TRH >C10-C16	M14-Jl25078	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
TRH >C16-C34	M14-Jl25078	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
TRH >C34-C40	M14-Jl25078	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C6-C9	M14-Jl25379	CP	mg/L	< 0.02	< 0.02	<1	30%	Pass	

Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	M14-Jl25379	CP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
TRH C6-C10	M14-Jl25379	CP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
TRH C6-C10 less BTEX (F1)	M14-Jl25379	CP	mg/L	< 0.02	< 0.02	<1	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
N01	F2 is determined by arithmetically subtracting the "naphthalene" value from the ">C10-C16" value. The naphthalene value used in this calculation is obtained from volatiles (Purge & Trap analysis).
N02	Where we have reported both volatile (P&T GCMS) and semivolatile (GCMS) naphthalene data, results may not be identical. Provided correct sample handling protocols have been followed, any observed differences in results are likely to be due to procedural differences within each methodology. Results determined by both techniques have passed all QAQC acceptance criteria, and are entirely technically valid.
N04	F1 is determined by arithmetically subtracting the "Total BTEX" value from the "C6-C10" value. The "Total BTEX" value is obtained by summing the concentrations of BTEX analytes. The "C6-C10" value is obtained by quantitating against a standard of mixed aromatic/aliphatic analytes.

Authorised By

Mary Makarios	Client Services
Carroll Lee	Senior Analyst-Volatile (VIC)
Stacey Jenkins	Senior Analyst-Organic (VIC)

Glenn Jackson
Laboratory Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Uncertainty data is available on request

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Tonkin & Taylor

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Ground Floor,
95 Coventry Street, Southbank, Victoria, 3006
Ph: 61-3-9863 8686 Fax: 61-3-9863 8685

Chain of Custody (COC)

Sheet 1 of 2

Serial No. 2121

Laboratory: MCT

Address: 3 Kingston Town Close

Project Name: Waverly GC

Project Manager: Tan Macdill

Samplers Name: Kris Knight

Job Number: 2781.001

Comment/Instructions: Please forward QC2 for to ALS

Container Type & Preservation Codes: I-Ice, P-Plastic, G-Glass, V-Vial, N-Nitric Acid Preserved
C-Hydrochloric Acid Preserved, S-Sulphuric Acid Preserved

Analysis Required:

Sample ID	Sample Date	Time	Sample Matrix (e.g soil, water etc)	Container/Preservative Type (e.g. glass, vial etc)	TWG621 Screen	OCPs/OPPs	Metals suite (M18)	TRH & PAH	HOLD	Notes
BH01/0.05	28/7/14	9AM	SOIL	GLASS JAR		✓	✓			
BH01/0.5									✓	
BH02/0.05						✓	✓			
BH02/0.5									✓	
BH03/0.05						✓	✓			
BH03/0.5									✓	
BH04/0.05						✓	✓			
BH04/0.5									✓	
BH05/0.1		11 Am							✓	
BH05/2.5						✓	✓	✓		
BH06/0.1									✓	
BH06/2.5					✓					
BH07/0.1		1 Pm							✓	
BH07/3.5					✓					
BH07/5.0					✓					
X BH08/0.1		3 Pm				✓	✓	✓	✓	
BH08/1.5						✓	✓	✓	✓	
BH09/0.1						✓	✓	✓	✓	
BH09/1.0						✓	✓	✓	✓	
Total:										

Results Requested Within: 24hrs 48hrs 5days

Relinquished By: K. KNIGHT		Received By:		Relinquished By:		Received By: LIAM CF/MCT	
Signature:	Date: 29/7/14	Signature:	Date:	Signature:	Date:	Signature:	Date: 29/7
Company: T&T	Time:	Company:	Time:	Company:	Time:	Company:	Time: 3.59pm

426759

Tonkin & Taylor
32 Fiveways Boulevard, Keysborough, Victoria 3173
Ph: 61-3-8796 7900 Fax: 61-3-8796 7944
Ground Floor,
95 Coventry Street, Southbank, Victoria, 3006
Ph: 61-3-9863 8686 Fax: 61-3-9863 8685

Chain of Custody (COC)

Sheet 2 of 2
Serial No. 2122

Laboratory: MGT
Address: 3 Kingston Town Close
Project Name: WAVERLY QC
Project Manager: Tom Medill
Samplers Name: KRIS KNIGHT
Job Number: 2781.001
Comment/Instructions:

Container Type & Preservation Codes: I-Ice, P-Plastic, G-Glass, V-Vial, N-Nitric Acid Preserved
C-Hydrochloric Acid Preserved, S-Sulphuric Acid Preserved

Analysis Required:

Sample ID	Sample Date	Time	Sample Matrix (e.g soil, water etc)	Container/Preservative Type (e.g. glass, vial etc)	OCPs/OPPs	TRH	PAH	Metals M18	HOLD	Notes
BH10/0.1	28/7/14	4pm	SOIL	GLASS JAR	✓	✓	✓	✓		
BH10/1.0	↓	↓	↓	↓					✓	
QC1					✓	✓	✓	✓		
QC2	↓		↓	↓						→ To ALS for OCPs/OPPs TRH, PAH and Metals
TB01	28/7/14		WATER	VIALS, AMBERS		✓			✓	
TB02	29/7/14		↓	↓		✓		✓		
RB01	28/7/14					✓		✓	✓	
RB02	29/7/14		↓	↓		✓		✓	✓	
HA01/0.05	↓	Am	SOIL	GLASS JAR		✓	✓			
HA01/0.35		↓	↓	↓						
HA02/0.05						✓	✓	✓		
HA02/0.35									✓	
HA03/0.05					✓	✓		✓		
HA03/0.5									✓	
HA04/0.05					✓	✓	✓	✓		
HA05/0.05									✓	
HA06/0.5					✓			✓		
HA08/0.4					✓			✓		
HA09/0.1	↓	↓	↓	↓	✓			✓		
Results Requested Within:		24hrs	48hrs	5days						
				Total:						

Relinquished By:		Received By:		Relinquished By:		Received By:	
Signature:	Date:	Signature:	Date:	Signature:	Date:	Signature:	Date:
Company:	Time:	Company:	Time:	Company:	Time:	Company:	Time:

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Certificate of Analysis

NATA Accredited
Accreditation Number 1261
Site Number 1254

Accredited for compliance with ISO/IEC 17025.
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Tonkin & Taylor P/L
Ground Floor, 95 Coventry St
South Melbourne
VIC 3006

Attention: **Thomas Madill**

Report **427688-S**
Client Reference WAVERLY GC 2781.001
Received Date Aug 06, 2014

Client Sample ID			**BH08/1.5**
Sample Matrix			**Soil**
Eurofins | mgt Sample No.			**M14-Au04348**
Date Sampled			**Jul 28, 2014**
Test/Reference	LOR	Unit	
Atrazine	0.2	mg/kg	< 0.2
Bifenthrin*	2	mg/kg	< 2
Chlorpyrifos	0.2	mg/kg	< 0.2
Chromium (hexavalent)	1	mg/kg	< 1
Cyanide (free)	5	mg/kg	< 5
% Moisture	0.1	%	15
Polycyclic Aromatic Hydrocarbons			
Acenaphthene	0.5	mg/kg	< 0.5
Acenaphthylene	0.5	mg/kg	< 0.5
Anthracene	0.5	mg/kg	< 0.5
Benz(a)anthracene	0.5	mg/kg	< 0.5
Benzo(a)pyrene	0.5	mg/kg	< 0.5
Benzo(b&j)fluoranthene[N07]	0.5	mg/kg	< 0.5
Benzo(g.h.i)perylene	0.5	mg/kg	< 0.5
Benzo(k)fluoranthene	0.5	mg/kg	< 0.5
Chrysene	0.5	mg/kg	< 0.5
Dibenz(a.h)anthracene	0.5	mg/kg	< 0.5
Fluoranthene	0.5	mg/kg	< 0.5
Fluorene	0.5	mg/kg	< 0.5
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	< 0.5
Naphthalene	0.5	mg/kg	< 0.5
Phenanthrene	0.5	mg/kg	< 0.5
Pyrene	0.5	mg/kg	< 0.5
Total PAH	0.5	mg/kg	< 0.5
Benzo(a)pyrene TEQ (lower bound)*	0.5	mg/kg	< 0.5
Benzo(a)pyrene TEQ (medium bound)*	0.5	mg/kg	0.6
Benzo(a)pyrene TEQ (upper bound)*	0.5	mg/kg	1.2
2-Fluorobiphenyl (surr.)	1	%	98
p-Terphenyl-d14 (surr.)	1	%	113
Polychlorinated Biphenyls			
Aroclor-1016	0.1	mg/kg	< 0.1
Aroclor-1221	0.1	mg/kg	< 0.1
Aroclor-1232	0.1	mg/kg	< 0.1
Aroclor-1242	0.1	mg/kg	< 0.1
Aroclor-1248	0.1	mg/kg	< 0.1
Aroclor-1254	0.1	mg/kg	< 0.1

Client Sample ID			BH08/1.5
Sample Matrix			Soil
Eurofins | mgt Sample No.			M14-Au04348
Date Sampled			Jul 28, 2014
Test/Reference	LOR	Unit	
Polychlorinated Biphenyls			
Aroclor-1260	0.1	mg/kg	< 0.1
Total PCB	0.1	mg/kg	< 0.1
Dibutylchlorendate (surr.)	1	%	92
Tetrachloro-m-xylene (surr.)	1	%	107
NEPM 2013 Acid Herbicides			
Picloram	0.01	mg/kg	< 0.01
2.4-D	0.5	mg/kg	< 0.5
2.4.5-T	0.5	mg/kg	< 0.5
MCPA	0.5	mg/kg	< 0.5
MCPB	0.5	mg/kg	< 0.5
Mecoprop	0.5	mg/kg	< 0.5
Warfarin (surr.)	1	%	92
NEPM 2013 Organochlorine Pesticides			
Endosulfan sulphate	0.05	mg/kg	< 0.05
Mirex	0.01	mg/kg	< 0.05
4.4'-DDD	0.05	mg/kg	< 0.05
4.4'-DDE	0.05	mg/kg	< 0.05
4.4'-DDT	0.05	mg/kg	< 0.05
Aldrin	0.05	mg/kg	< 0.05
Chlordanes - Total	0.1	mg/kg	< 0.1
Dieldrin	0.05	mg/kg	< 0.05
Endosulfan I	0.05	mg/kg	< 0.05
Endosulfan II	0.05	mg/kg	< 0.05
Endrin	0.05	mg/kg	< 0.05
Heptachlor	0.05	mg/kg	< 0.05
Hexachlorobenzene	0.05	mg/kg	< 0.05
Methoxychlor	0.05	mg/kg	< 0.05
Toxaphene	1	mg/kg	< 1
Dibutylchlorendate (surr.)	1	%	92
Tetrachloro-m-xylene (surr.)	1	%	107
NEPM 2013 Phenols			
2-Methylphenol (o-Cresol)	0.2	mg/kg	< 0.2
3&4-Methylphenol (m&p-Cresol)	0.4	mg/kg	< 0.4
Pentachlorophenol	1.0	mg/kg	< 1
Phenol	0.5	mg/kg	< 0.5
Phenol-d6 (surr.)	1	%	113
Heavy Metals			
Arsenic	2	mg/kg	< 2
Beryllium	2	mg/kg	< 2
Boron	10	mg/kg	< 10
Cadmium	0.4	mg/kg	< 0.4
Cobalt	5	mg/kg	5.1
Copper	5	mg/kg	12
Lead	5	mg/kg	18
Manganese	5	mg/kg	72
Mercury	0.1	mg/kg	< 0.1
Nickel	5	mg/kg	11
Selenium	2	mg/kg	< 2
Zinc	5	mg/kg	34

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Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results (regarding both quality and NATA accreditation).

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
NEPM Screen Table 1(A) HIL's for Soil Contaminants - Basic Suite - Excluding Methyl Mercury/PBDE			
Atrazine	Melbourne	Aug 08, 2014	14 Day
- Method: LM-LTM-ORG-2900			
Bifenthrin*	Melbourne	Aug 08, 2014	14 Day
- Method: MGT Method 120 - Pyrethroids by HPLC			
Chlorpyrifos	Melbourne	Aug 08, 2014	14 Day
- Method: USEPA 8141A Organophosphorus Pesticides			
Chromium (hexavalent)	Melbourne	Aug 08, 2014	28 Day
- Method: APHA 3500-Cr Hexavalent Chromium- (Extraction:- USEPA3060)			
Polycyclic Aromatic Hydrocarbons	Melbourne	Aug 08, 2014	14 Day
- Method: USEPA 8270 Polycyclic Aromatic Hydrocarbons			
Polychlorinated Biphenyls	Melbourne	Aug 08, 2014	28 Day
- Method: USEPA 8082 Polychlorinated Biphenyls			
NEPM 2013 Acid Herbicides	Melbourne	Aug 08, 2014	14 Day
- Method: MGT 530			
NEPM 2013 Organochlorine Pesticides	Melbourne	Aug 08, 2014	14 Day
- Method: USEPA 8081 Organochlorine Pesticides			
NEPM 2013 Phenols	Melbourne	Aug 08, 2014	14 Day
- Method: USEPA 8270 Phenols			
NEPM 2013 Metals : Metals M12	Melbourne	Aug 08, 2014	28 Day
- Method: USEPA 6010/6020 Heavy Metals & USEPA 7470/71 Mercury			
% Moisture	Melbourne	Aug 08, 2014	14 Day
- Method: Method 102 - ANZECC - % Moisture			

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NATA # 1261 Site # 18217

Brisbane
1/21 Smallwood Place
Murarrie QLD 4172
Phone : +61 7 3902 4600
NATA # 1261 Site # 20794

Company Name:	Tonkin & Taylor P/L	**Order No.:**		**Received:**	Aug 6, 2014 3:08 PM
Address:	Ground Floor, 95 Coventry St South Melbourne VIC 3006	**Report #:**	427688	**Due:**	Aug 13, 2014
		Phone:	03 9863 8686	**Priority:**	5 Day
		Fax:	03 9863 8685	**Contact Name:**	Thomas Madill
Client Job No.:	WAVERLY GC 2781.001				

Eurofins | mgt Client Manager: Mary Makarios

Sample Detail					% Moisture	Reverse HOLD Charge	NEPM Screen Table 1(A) HIL's for Soil Contaminants - Basic Suite - Excluding
Laboratory where analysis is conducted							
Melbourne Laboratory - NATA Site # 1254 & 14271					X	X	X
Sydney Laboratory - NATA Site # 18217							
Brisbane Laboratory - NATA Site # 20794							
External Laboratory							
Sample ID	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**			
BH08/1.5	Jul 28, 2014		Soil	M14-Au04348	X	X	X

Eurofins | mgt Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil results are reported on a dry basis, unless otherwise stated.
3. Actual PQLs are matrix dependant. Quoted PQLs may be raised where sample extracts are diluted due to interferences.
4. Results are uncorrected for matrix spikes or surrogate recoveries.
5. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
6. Samples were analysed on an 'as received' basis. 7. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the Sample Receipt Acknowledgment.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

****NOTE:** pH duplicates are reported as a range NOT as RPD

UNITS

mg/kg: milligrams per Kilogram

ug/l: micrograms per litre

ppb: Parts per billion

org/100ml: Organisms per 100 millilitres

MPN/100mL: Most Probable Number of organisms per 100 millilitres

mg/l: milligrams per litre

ppm: Parts per million

%: Percentage

NTU: Units

TERMS

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery
CRM	Certified Reference Material - reported as percent recovery
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands. In the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
Batch Duplicate	A second piece of analysis from a sample outside of the clients batch of samples but run within the laboratory batch of analysis.
Batch SPIKE	Spike recovery reported on a sample from outside of the clients batch of samples but run within the laboratory batch of analysis.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
ASLP	Australian Standard Leaching Procedure (AS4439.3)
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within
TEQ	Toxic Equivalency Quotient

QC - ACCEPTANCE CRITERIA

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries : Recoveries must lie between 50-150% - Phenols 20-130%.

QC DATA GENERAL COMMENTS

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxophene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxophene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Arochlor 1260 in Matrix Spikes and LCS's.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPD's are calculated from raw analytical data thus it is possible to have two sets of data.

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Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Bifenthrin*	mg/kg	< 2			2	Pass	
Chromium (hexavalent)	mg/kg	< 1			1	Pass	
Method Blank							
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	mg/kg	< 0.5			0.5	Pass	
Acenaphthylene	mg/kg	< 0.5			0.5	Pass	
Anthracene	mg/kg	< 0.5			0.5	Pass	
Benz(a)anthracene	mg/kg	< 0.5			0.5	Pass	
Benzo(a)pyrene	mg/kg	< 0.5			0.5	Pass	
Benzo(b&j)fluoranthene	mg/kg	< 0.5			0.5	Pass	
Benzo(g.h.i)perylene	mg/kg	< 0.5			0.5	Pass	
Benzo(k)fluoranthene	mg/kg	< 0.5			0.5	Pass	
Chrysene	mg/kg	< 0.5			0.5	Pass	
Dibenz(a.h)anthracene	mg/kg	< 0.5			0.5	Pass	
Fluoranthene	mg/kg	< 0.5			0.5	Pass	
Fluorene	mg/kg	< 0.5			0.5	Pass	
Indeno(1.2.3-cd)pyrene	mg/kg	< 0.5			0.5	Pass	
Naphthalene	mg/kg	< 0.5			0.5	Pass	
Phenanthrene	mg/kg	< 0.5			0.5	Pass	
Pyrene	mg/kg	< 0.5			0.5	Pass	
Method Blank							
Polychlorinated Biphenyls							
Aroclor-1016	mg/kg	< 0.1			0.1	Pass	
Aroclor-1221	mg/kg	< 0.1			0.1	Pass	
Aroclor-1232	mg/kg	< 0.1			0.1	Pass	
Aroclor-1242	mg/kg	< 0.1			0.1	Pass	
Aroclor-1248	mg/kg	< 0.1			0.1	Pass	
Aroclor-1254	mg/kg	< 0.1			0.1	Pass	
Aroclor-1260	mg/kg	< 0.1			0.1	Pass	
Total PCB	mg/kg	< 0.1			0.1	Pass	
Method Blank							
NEPM 2013 Acid Herbicides							
Picloram	mg/kg	< 0.01			0.01	Pass	
2.4-D	mg/kg	< 0.5			0.5	Pass	
2.4.5-T	mg/kg	< 0.5			0.5	Pass	
MCPA	mg/kg	< 0.5			0.5	Pass	
MCPB	mg/kg	< 0.5			0.5	Pass	
Mecoprop	mg/kg	< 0.5			0.5	Pass	
Method Blank							
NEPM 2013 Organochlorine Pesticides							
Endosulfan sulphate	mg/kg	< 0.05			0.05	Pass	
4.4'-DDD	mg/kg	< 0.05			0.05	Pass	
4.4'-DDE	mg/kg	< 0.05			0.05	Pass	
4.4'-DDT	mg/kg	< 0.05			0.05	Pass	
Aldrin	mg/kg	< 0.05			0.05	Pass	
Chlordanes - Total	mg/kg	< 0.1			0.1	Pass	
Dieldrin	mg/kg	< 0.05			0.05	Pass	
Endosulfan I	mg/kg	< 0.05			0.05	Pass	
Endosulfan II	mg/kg	< 0.05			0.05	Pass	
Endrin	mg/kg	< 0.05			0.05	Pass	
Heptachlor	mg/kg	< 0.05			0.05	Pass	

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Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Hexachlorobenzene	mg/kg	< 0.05			0.05	Pass	
Methoxychlor	mg/kg	< 0.05			0.05	Pass	
Toxaphene	mg/kg	< 1			1	Pass	
Method Blank							
NEPM 2013 Phenols							
2-Methylphenol (o-Cresol)	mg/kg	< 0.2			0.2	Pass	
3&4-Methylphenol (m&p-Cresol)	mg/kg	< 0.4			0.4	Pass	
Pentachlorophenol	mg/kg	< 1			1.0	Pass	
Phenol	mg/kg	< 0.5			0.5	Pass	
Method Blank							
Heavy Metals							
Arsenic	mg/kg	< 2			2	Pass	
Beryllium	mg/kg	< 2			2	Pass	
Boron	mg/kg	< 10			10	Pass	
Cadmium	mg/kg	< 0.4			0.4	Pass	
Cobalt	mg/kg	< 5			5	Pass	
Copper	mg/kg	< 5			5	Pass	
Lead	mg/kg	< 5			5	Pass	
Manganese	mg/kg	< 5			5	Pass	
Mercury	mg/kg	< 0.1			0.1	Pass	
Nickel	mg/kg	< 5			5	Pass	
Selenium	mg/kg	< 2			2	Pass	
Zinc	mg/kg	< 5			5	Pass	
LCS - % Recovery							
Bifenthrin*	%	79			75-125	Pass	
Chromium (hexavalent)	%	100			70-130	Pass	
LCS - % Recovery							
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	%	101			70-130	Pass	
Acenaphthylene	%	108			70-130	Pass	
Anthracene	%	103			70-130	Pass	
Benz(a)anthracene	%	94			70-130	Pass	
Benzo(a)pyrene	%	98			70-130	Pass	
Benzo(b&j)fluoranthene	%	98			70-130	Pass	
Benzo(g.h.i)perylene	%	90			70-130	Pass	
Benzo(k)fluoranthene	%	97			70-130	Pass	
Chrysene	%	84			70-130	Pass	
Dibenz(a.h)anthracene	%	103			70-130	Pass	
Fluoranthene	%	86			70-130	Pass	
Fluorene	%	102			70-130	Pass	
Indeno(1.2.3-cd)pyrene	%	100			70-130	Pass	
Naphthalene	%	100			70-130	Pass	
Phenanthrene	%	101			70-130	Pass	
Pyrene	%	84			70-130	Pass	
LCS - % Recovery							
Polychlorinated Biphenyls							
Aroclor-1260	%	72			70-130	Pass	
LCS - % Recovery							
NEPM 2013 Acid Herbicides							
Picloram	%	85			70-130	Pass	
2.4-D	%	85			70-130	Pass	
2.4.5-T	%	89			70-130	Pass	
MCPA	%	90			70-130	Pass	
MCPB	%	81			70-130	Pass	

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Mecoprop			%	85			70-130	Pass	
LCS - % Recovery									
NEPM 2013 Organochlorine Pesticides									
Endosulfan sulphate			%	102			70-130	Pass	
4.4'-DDD			%	112			70-130	Pass	
4.4'-DDE			%	101			70-130	Pass	
4.4'-DDT			%	111			70-130	Pass	
Aldrin			%	110			70-130	Pass	
Dieldrin			%	99			70-130	Pass	
Endosulfan I			%	109			70-130	Pass	
Endosulfan II			%	112			70-130	Pass	
Endrin			%	105			70-130	Pass	
Heptachlor			%	101			70-130	Pass	
Hexachlorobenzene			%	105			70-130	Pass	
Methoxychlor			%	117			70-130	Pass	
LCS - % Recovery									
NEPM 2013 Phenols									
2-Methylphenol (o-Cresol)			%	109			30-130	Pass	
3&4-Methylphenol (m&p-Cresol)			%	105			30-130	Pass	
Pentachlorophenol			%	46			30-130	Pass	
Phenol			%	109			30-130	Pass	
LCS - % Recovery									
Heavy Metals									
Arsenic			%	105			80-120	Pass	
Beryllium			%	106			80-120	Pass	
Boron			%	97			80-120	Pass	
Cadmium			%	104			80-120	Pass	
Cobalt			%	108			80-120	Pass	
Copper			%	107			80-120	Pass	
Lead			%	109			80-120	Pass	
Manganese			%	109			80-120	Pass	
Mercury			%	107			75-125	Pass	
Nickel			%	109			80-120	Pass	
Selenium			%	99			80-120	Pass	
Zinc			%	110			80-120	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Spike - % Recovery									
				Result 1					
Bifenthrin*	M14-Au04348	CP	%	95			70-130	Pass	
Chromium (hexavalent)	M14-Au04266	NCP	%	97			70-130	Pass	
Spike - % Recovery									
Polycyclic Aromatic Hydrocarbons				Result 1					
Acenaphthene	M14-Au04348	CP	%	116			70-130	Pass	
Acenaphthylene	M14-Au04348	CP	%	125			70-130	Pass	
Anthracene	M14-Au04348	CP	%	96			70-130	Pass	
Benz(a)anthracene	M14-Au04348	CP	%	124			70-130	Pass	
Benzo(a)pyrene	M14-Au04348	CP	%	127			70-130	Pass	
Benzo(b&j)fluoranthene	M14-Au04348	CP	%	127			70-130	Pass	
Benzo(g.h.i)perylene	M14-Au04348	CP	%	116			70-130	Pass	
Benzo(k)fluoranthene	M14-Au04348	CP	%	112			70-130	Pass	
Chrysene	M14-Au04348	CP	%	103			70-130	Pass	
Dibenz(a.h)anthracene	M14-Au04348	CP	%	120			70-130	Pass	
Fluoranthene	M14-Au04348	CP	%	112			70-130	Pass	
Fluorene	M14-Au04348	CP	%	106			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Indeno(1.2.3-cd)pyrene	M14-Au04348	CP	%	121			70-130	Pass	
Naphthalene	M14-Au04348	CP	%	106			70-130	Pass	
Phenanthrene	M14-Au04348	CP	%	96			70-130	Pass	
Pyrene	M14-Au04348	CP	%	109			70-130	Pass	
Spike - % Recovery									
Polychlorinated Biphenyls				Result 1					
Aroclor-1260	M14-Au04612	NCP	%	105			70-130	Pass	
Spike - % Recovery									
NEPM 2013 Acid Herbicides				Result 1					
Picloram	M14-Au02386	NCP	%	86			70-130	Pass	
2.4-D	M14-Au02386	NCP	%	82			70-130	Pass	
MCPA	M14-Au02386	NCP	%	87			70-130	Pass	
MCPB	M14-Au02386	NCP	%	92			70-130	Pass	
Spike - % Recovery									
NEPM 2013 Organochlorine Pesticides				Result 1					
Endosulfan sulphate	M14-Au04602	NCP	%	96			70-130	Pass	
4.4'-DDD	M14-Au04602	NCP	%	96			70-130	Pass	
4.4'-DDE	M14-Au04602	NCP	%	80			70-130	Pass	
4.4'-DDT	M14-Au04602	NCP	%	86			70-130	Pass	
Aldrin	M14-Au04602	NCP	%	90			70-130	Pass	
Dieldrin	M14-Au04602	NCP	%	77			70-130	Pass	
Endosulfan I	M14-Au04602	NCP	%	88			70-130	Pass	
Endosulfan II	M14-Au04602	NCP	%	86			70-130	Pass	
Endrin	M14-Au04602	NCP	%	85			70-130	Pass	
Heptachlor	M14-Au04602	NCP	%	83			70-130	Pass	
Hexachlorobenzene	M14-Au04602	NCP	%	105			70-130	Pass	
Methoxychlor	M14-Au04602	NCP	%	71			70-130	Pass	
Spike - % Recovery									
NEPM 2013 Phenols				Result 1					
2-Methylphenol (o-Cresol)	M14-Au04348	CP	%	112			30-130	Pass	
3&4-Methylphenol (m&p-Cresol)	M14-Au04348	CP	%	118			30-130	Pass	
Pentachlorophenol	M14-Au04348	CP	%	48			30-130	Pass	
Phenol	M14-Au04348	CP	%	124			30-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Arsenic	M14-Au05330	NCP	%	90			75-125	Pass	
Beryllium	M14-Au05330	NCP	%	106			75-125	Pass	
Boron	M14-Au05330	NCP	%	95			75-125	Pass	
Cadmium	M14-Au05330	NCP	%	102			75-125	Pass	
Cobalt	M14-Au05330	NCP	%	99			75-125	Pass	
Copper	M14-Au05330	NCP	%	105			75-125	Pass	
Lead	M14-Au05330	NCP	%	107			75-125	Pass	
Manganese	M14-Au05330	NCP	%	87			75-125	Pass	
Mercury	M14-Au05330	NCP	%	115			70-130	Pass	
Nickel	M14-Au05330	NCP	%	99			75-125	Pass	
Selenium	M14-Au05330	NCP	%	98			75-125	Pass	
Zinc	M14-Au05330	NCP	%	113			75-125	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
				Result 1	Result 2	RPD			
Bifenthrin*	M14-Au04558	NCP	mg/kg	< 2	< 2	<1	30%	Pass	
Chromium (hexavalent)	M14-Au04844	NCP	mg/kg	< 1	< 1	<1	30%	Pass	

Duplicate									
Polycyclic Aromatic Hydrocarbons				Result 1	Result 2	RPD			
Acenaphthene	M14-Au04006	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Acenaphthylene	M14-Au04006	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Anthracene	M14-Au04006	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benz(a)anthracene	M14-Au04006	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(a)pyrene	M14-Au04006	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(b&j)fluoranthene	M14-Au04006	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(g.h.i)perylene	M14-Au04006	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(k)fluoranthene	M14-Au04006	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Chrysene	M14-Au04006	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Dibenz(a.h)anthracene	M14-Au04006	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Fluoranthene	M14-Au04006	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Fluorene	M14-Au04006	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Indeno(1.2.3-cd)pyrene	M14-Au04006	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Naphthalene	M14-Au04006	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Phenanthrene	M14-Au04006	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Pyrene	M14-Au04006	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Duplicate									
Polychlorinated Biphenyls				Result 1	Result 2	RPD			
Aroclor-1016	M14-Au03130	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Aroclor-1221	M14-Au03130	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Aroclor-1232	M14-Au03130	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Aroclor-1242	M14-Au03130	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Aroclor-1248	M14-Au03130	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Aroclor-1254	M14-Au03130	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Aroclor-1260	M14-Au03130	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Total PCB	M14-Au03130	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Duplicate									
NEPM 2013 Acid Herbicides				Result 1	Result 2	RPD			
Picloram	M14-Au04558	NCP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
2.4-D	M14-Au04558	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
2.4.5-T	M14-Au04558	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
MCPA	M14-Au04558	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
MCPB	M14-Au04558	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Mecoprop	M14-Au04558	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Duplicate									
NEPM 2013 Organochlorine Pesticides				Result 1	Result 2	RPD			
Endosulfan sulphate	M14-Au03130	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
4.4'-DDD	M14-Au03130	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
4.4'-DDE	M14-Au03130	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
4.4'-DDT	M14-Au03130	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Aldrin	M14-Au03130	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Chlordanes - Total	M14-Au03130	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Dieldrin	M14-Au03130	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endosulfan I	M14-Au03130	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endosulfan II	M14-Au03130	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endrin	M14-Au03130	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Heptachlor	M14-Au03130	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Hexachlorobenzene	M14-Au03130	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Methoxychlor	M14-Au03130	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Toxaphene	M14-Au03130	NCP	mg/kg	< 1	< 1	<1	30%	Pass	

Duplicate									
NEPM 2013 Phenols				Result 1	Result 2	RPD			
2-Methylphenol (o-Cresol)	M14-Au04006	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
3&4-Methylphenol (m&p-Cresol)	M14-Au04006	NCP	mg/kg	< 0.4	< 0.4	<1	30%	Pass	
Pentachlorophenol	M14-Au04006	NCP	mg/kg	< 1	< 1	<1	30%	Pass	
Phenol	M14-Au04006	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	M14-Au05739	NCP	mg/kg	< 2	< 2	<1	30%	Pass	
Beryllium	M14-Au05739	NCP	mg/kg	< 2	< 2	<1	30%	Pass	
Boron	M14-Au05739	NCP	mg/kg	10	< 10	25	30%	Pass	
Cadmium	M14-Au05739	NCP	mg/kg	< 0.4	< 0.4	<1	30%	Pass	
Cobalt	M14-Au05739	NCP	mg/kg	< 5	< 5	<1	30%	Pass	
Copper	M14-Au05739	NCP	mg/kg	9.2	9.5	3.0	30%	Pass	
Lead	M14-Au05739	NCP	mg/kg	8.6	8.5	1.0	30%	Pass	
Manganese	M14-Au05740	NCP	mg/kg	170	180	1.0	30%	Pass	
Mercury	M14-Au05739	NCP	mg/kg	0.20	0.20	5.0	30%	Pass	
Nickel	M14-Au05739	NCP	mg/kg	13	19	41	30%	Fail	Q15
Selenium	M14-Au05739	NCP	mg/kg	< 2	< 2	<1	30%	Pass	
Zinc	M14-Au05739	NCP	mg/kg	5.8	6.2	7.0	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
N07	Please note:- These two PAH isomers closely co-elute using the most contemporary analytical methods and both the reported concentration (and the TEQ) apply specifically to the total of the two co-eluting PAHs
Q15	The RPD reported passes Eurofins | mgt's Acceptance Criteria as stipulated in SOP 05. Refer to Glossary Page of this report for further details

Authorised By

Mary Makarios	Client Services
Emily Rosenberg	Senior Analyst-Metal (VIC)
Huong Le	Senior Analyst-Inorganic (VIC)
Stacey Jenkins	Senior Analyst-Organic (VIC)

Glenn Jackson
Laboratory Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Uncertainty data is available on request

Eurofins | mgt shall not be liable for loss, cost, damages or expenses incurred by the client, or any other person or company, resulting from the use of any information or interpretation given in this report. In no case shall Eurofins | mgt be liable for consequential damages including, but not limited to, lost profits, damages for failure to meet deadlines and lost production arising from this report. This document shall not be reproduced except in full and relates only to the items tested. Unless indicated otherwise, the tests were performed on the samples as received.

EnviroSampleVIC

From:	Mary Makarios
Sent:	Wednesday, 6 August 2014 3:08 PM
To:	EnviroSampleVIC
Cc:	Tom Madill (TMadill@tonkintaylor.com.au)
Subject:	FW: Eurofins | mgt Test Results - Report 426759 : Site WAVERLY GC 2781.001
Importance:	High

ADDITIONAL ANALYSIS

Mary Makarios
Phone : +61 3 8564 5088
Email : MaryMakarios@eurofins.com.au

Acid Sulphate Soils 'Centre of Excellence' opens in Eurofins | mgt Brisbane laboratory – http://environment.eurofins.com.au/media/9905615/environote_1045_-_acid_sulfate_soils.pdf

-----Original Message-----
From: Tom Madill [mailto:TMadill@tonkintaylor.com.au]
Sent: Wednesday, 6 August 2014 2:51 PM
To: Mary Makarios
Subject: RE: Eurofins | mgt Test Results - Report 426759 : Site WAVERLY GC 2781.001

Hi Mary, JL25395 (H)

Can I please have sample BH08/1.5 from the above report run for a Basic NEPM (R20) screen please.

Cheers,

28/7 Catherine EF/mgt 6/8 3.08 pm 427688

Tom Madill
BSc (Env Eng), Dip (Env Mgt)
Environmental Scientist
m: 0402 904 971 Ph: (03) 9863 8686 Fax: (03) 9863 8685 Direct : (03) 8796 7925
E-mail: tmadill@tonkintaylor.com.au Website : http://www.tonkintaylor.com.au

Tonkin & Taylor Pty Ltd - Environmental & Engineering Consultants Ground Floor, 95 Coventry Street, South Bank VIC 3006

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-----Original Message-----
From: MaryMakarios@eurofins.com.au [mailto:MaryMakarios@eurofins.com.au]
Sent: Tuesday, 5 August 2014 4:36 p.m.
To: Tom Madill
Cc: Kris Knight

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EM1407501**	Page	: 1 of 7
Client	: **TONKIN AND TAYLOR PTY LTD**	Laboratory	: Environmental Division Melbourne
Contact	: MR TOM MADILL	Contact	: Bronwyn Sheen
Address	: 32 FIVEWAYS BOULEVARD KEYSBOROUGH MELBOURNE, VICTORIA, AUSTRALIA 3173	Address	: 4 Westall Rd Springvale VIC Australia 3171
E-mail	: tmadill@tonkintaylor.com.au	E-mail	: bronwyn.sheen@alsglobal.com
Telephone	: +61 03 8796 7900	Telephone	: +61-3-8549 9636
Facsimile	: +61 03 8796 7944	Facsimile	: +61-3-8549 9601
Project	: 2781 001 WAVERLY GC	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: 2122	Date Samples Received	: 30-JUL-2014
Sampler	: KK	Issue Date	: 06-AUG-2014
Site	: ----		
		No. of samples received	: 1
Quote number	: MEBQ/143/14	No. of samples analysed	: 1

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

NATA WORLD RECOGNISED ACCREDITATION

NATA Accredited Laboratory 825

Accredited for compliance with ISO/IEC 17025.

Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Nikki Stepniewski	Senior Inorganic Instrument Chemist	Melbourne Inorganics
Xingbin Lin	Senior Organic Chemist	Melbourne Organics

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting

- **Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero, for 'TEQ 1/2LOR' are treated as half the reported LOR, and for 'TEQ LOR' are treated as being equal to the reported LOR. Note: TEQ 1/2LOR and TEQ LOR will calculate as 0.6mg/Kg and 1.2mg/Kg respectively for samples with non-detects for all of the eight TEQ PAHs.**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	QC2	----	----	----	----
			Client sampling date / time	28-JUL-2014 15:00	----	----	----	----
Compound	CAS Number	LOR	Unit	EM1407501-001	----	----	----	----
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	20.6	----	----	----	----
EG005T: Total Metals by ICP-AES								
Antimony	7440-36-0	5	mg/kg	23	----	----	----	----
Beryllium	7440-41-7	1	mg/kg	<1	----	----	----	----
Boron	7440-42-8	50	mg/kg	<50	----	----	----	----
Cobalt	7440-48-4	2	mg/kg	3	----	----	----	----
Manganese	7439-96-5	5	mg/kg	36	----	----	----	----
Molybdenum	7439-98-7	2	mg/kg	<2	----	----	----	----
Selenium	7782-49-2	5	mg/kg	<5	----	----	----	----
Silver	7440-22-4	2	mg/kg	<2	----	----	----	----
Tin	7440-31-5	5	mg/kg	<5	----	----	----	----
Vanadium	7440-62-2	5	mg/kg	89	----	----	----	----
Arsenic	7440-38-2	5	mg/kg	10	----	----	----	----
Cadmium	7440-43-9	1	mg/kg	<1	----	----	----	----
Chromium	7440-47-3	2	mg/kg	37	----	----	----	----
Copper	7440-50-8	5	mg/kg	17	----	----	----	----
Lead	7439-92-1	5	mg/kg	19	----	----	----	----
Nickel	7440-02-0	2	mg/kg	13	----	----	----	----
Zinc	7440-66-6	5	mg/kg	31	----	----	----	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	----	----	----	----
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.05	mg/kg	<0.05	----	----	----	----
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	----	----	----	----
beta-BHC	319-85-7	0.05	mg/kg	<0.05	----	----	----	----
gamma-BHC	58-89-9	0.05	mg/kg	<0.05	----	----	----	----
delta-BHC	319-86-8	0.05	mg/kg	<0.05	----	----	----	----
Heptachlor	76-44-8	0.05	mg/kg	<0.05	----	----	----	----
Aldrin	309-00-2	0.05	mg/kg	<0.05	----	----	----	----
Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	----	----	----	----
^ Total Chlordane (sum)	----	0.05	mg/kg	<0.05	----	----	----	----
trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	----	----	----	----
alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	----	----	----	----

Page	:	4 of 7
Work Order	:	EM1407501
Client	:	TONKIN AND TAYLOR PTY LTD
Project	:	2781 001 WAVERLY GC

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	QC2	----	----	----	----
			Client sampling date / time	28-JUL-2014 15:00	----	----	----	----
Compound	CAS Number	LOR	Unit	EM1407501-001	----	----	----	----
EP068A: Organochlorine Pesticides (OC) - Continued								
cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	----	----	----	----
Dieldrin	60-57-1	0.05	mg/kg	<0.05	----	----	----	----
4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	----	----	----	----
Endrin	72-20-8	0.05	mg/kg	<0.05	----	----	----	----
beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	----	----	----	----
^ Endosulfan (sum)	115-29-7	0.05	mg/kg	<0.05	----	----	----	----
4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	----	----	----	----
Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	----	----	----	----
Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	----	----	----	----
4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	----	----	----	----
Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	----	----	----	----
Methoxychlor	72-43-5	0.2	mg/kg	<0.2	----	----	----	----
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg	<0.05	----	----	----	----
^ Sum of DDD + DDE + DDT	----	0.05	mg/kg	<0.05	----	----	----	----
EP068B: Organophosphorus Pesticides (OP)								
Dichlorvos	62-73-7	0.05	mg/kg	<0.05	----	----	----	----
Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	----	----	----	----
Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	----	----	----	----
Dimethoate	60-51-5	0.05	mg/kg	<0.05	----	----	----	----
Diazinon	333-41-5	0.05	mg/kg	<0.05	----	----	----	----
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	----	----	----	----
Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	----	----	----	----
Malathion	121-75-5	0.05	mg/kg	<0.05	----	----	----	----
Fenthion	55-38-9	0.05	mg/kg	<0.05	----	----	----	----
Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	----	----	----	----
Parathion	56-38-2	0.2	mg/kg	<0.2	----	----	----	----
Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	----	----	----	----
Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	----	----	----	----
Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	----	----	----	----
Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	----	----	----	----
Prothiofos	34643-46-4	0.05	mg/kg	<0.05	----	----	----	----
Ethion	563-12-2	0.05	mg/kg	<0.05	----	----	----	----
Carbophenothion	786-19-6	0.05	mg/kg	<0.05	----	----	----	----
Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	----	----	----	----

Page	:	5 of 7
Work Order	:	EM1407501
Client	:	TONKIN AND TAYLOR PTY LTD
Project	:	2781 001 WAVERLY GC

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	QC2	----	----	----	----
			Client sampling date / time	28-JUL-2014 15:00	----	----	----	----
Compound	CAS Number	LOR	Unit	EM1407501-001	----	----	----	----
EP068B: Organophosphorus Pesticides (OP) - Continued								
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	----	----	----	----
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	----	----	----	----
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	----	----	----	----
Fluorene	86-73-7	0.5	mg/kg	<0.5	----	----	----	----
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	----	----	----	----
Anthracene	120-12-7	0.5	mg/kg	<0.5	----	----	----	----
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	----	----	----	----
Pyrene	129-00-0	0.5	mg/kg	<0.5	----	----	----	----
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	----	----	----	----
Chrysene	218-01-9	0.5	mg/kg	<0.5	----	----	----	----
Benzo(b+j)fluoranthene	205-99-2	0.5	mg/kg	<0.5	----	----	----	----
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	----	----	----	----
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	----	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	----	----	----	----
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	----	----	----	----
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	----	----	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	----	----	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	----	----	----	----
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	**0.6**	----	----	----	----
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	**1.2**	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	<10	----	----	----	----
C10 - C14 Fraction	----	50	mg/kg	<50	----	----	----	----
C15 - C28 Fraction	----	100	mg/kg	<100	----	----	----	----
C29 - C36 Fraction	----	100	mg/kg	<100	----	----	----	----
^ C10 - C36 Fraction (sum)	----	50	mg/kg	<50	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013								
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	----	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	<10	----	----	----	----
>C10 - C16 Fraction	>C10_C16	50	mg/kg	<50	----	----	----	----
>C16 - C34 Fraction	----	100	mg/kg	<100	----	----	----	----

Page	:	6 of 7
Work Order	:	EM1407501
Client	:	TONKIN AND TAYLOR PTY LTD
Project	:	2781 001 WAVERLY GC

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	QC2	----	----	----	----
			Client sampling date / time	28-JUL-2014 15:00	----	----	----	----
Compound	CAS Number	LOR	Unit	EM1407501-001	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 - Continued								
>C34 - C40 Fraction	----	100	mg/kg	<100	----	----	----	----
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	----	----	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	<50	----	----	----	----
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	<0.2	----	----	----	----
Toluene	108-88-3	0.5	mg/kg	<0.5	----	----	----	----
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	----	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	----	----	----	----
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	----	----	----	----
^ Sum of BTEX	----	0.2	mg/kg	<0.2	----	----	----	----
^ Total Xylenes	1330-20-7	0.5	mg/kg	<0.5	----	----	----	----
Naphthalene	91-20-3	1	mg/kg	<1	----	----	----	----
EP068S: Organochlorine Pesticide Surrogate								
Dibromo-DDE	21655-73-2	0.1	%	122	----	----	----	----
EP068T: Organophosphorus Pesticide Surrogate								
DEF	78-48-8	0.1	%	102	----	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.1	%	82.0	----	----	----	----
2-Chlorophenol-D4	93951-73-6	0.1	%	91.2	----	----	----	----
2.4.6-Tribromophenol	118-79-6	0.1	%	60.7	----	----	----	----
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.1	%	91.2	----	----	----	----
Anthracene-d10	1719-06-8	0.1	%	114	----	----	----	----
4-Terphenyl-d14	1718-51-0	0.1	%	95.9	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.1	%	76.9	----	----	----	----
Toluene-D8	2037-26-5	0.1	%	84.3	----	----	----	----
4-Bromofluorobenzene	460-00-4	0.1	%	93.2	----	----	----	----

Surrogate Control Limits

Sub-Matrix: **SOIL**

Compound	CAS Number	Recovery Limits (%) Low	Recovery Limits (%) High
EP068S: Organochlorine Pesticide Surrogate			
Dibromo-DDE	21655-73-2	38	128
EP068T: Organophosphorus Pesticide Surrogate			
DEF	78-48-8	33	139
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	54	125
2-Chlorophenol-D4	93951-73-6	65	123
2.4.6-Tribromophenol	118-79-6	34	122
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	61	125
Anthracene-d10	1719-06-8	62	130
4-Terphenyl-d14	1718-51-0	67	133
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	51	125
Toluene-D8	2037-26-5	55	125
4-Bromofluorobenzene	460-00-4	56	124

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EM1407501**	Page	: 1 of 13
Client	: **TONKIN AND TAYLOR PTY LTD**	Laboratory	: Environmental Division Melbourne
Contact	: MR TOM MADILL	Contact	: Bronwyn Sheen
Address	: 32 FIVEWAYS BOULEVARD KEYSBOROUGH MELBOURNE, VICTORIA, AUSTRALIA 3173	Address	: 4 Westall Rd Springvale VIC Australia 3171
E-mail	: tmadill@tonkintaylor.com.au	E-mail	: bronwyn.sheen@alsglobal.com
Telephone	: +61 03 8796 7900	Telephone	: +61-3-8549 9636
Facsimile	: +61 03 8796 7944	Facsimile	: +61-3-8549 9601
Project	: 2781 001 WAVERLY GC	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Site	: ----		
C-O-C number	: 2122	Date Samples Received	: 30-JUL-2014
Sampler	: KK	Issue Date	: 06-AUG-2014
Order number	: ----		
		No. of samples received	: 1
Quote number	: MEBQ/143/14	No. of samples analysed	: 1

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

NATA WORLD RECOGNISED ACCREDITATION

NATA Accredited Laboratory 825

Accredited for compliance with ISO/IEC 17025.

Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Nikki Stepniewski	Senior Inorganic Instrument Chemist	Melbourne Inorganics
Xingbin Lin	Senior Organic Chemist	Melbourne Organics

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key :
Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA055: Moisture Content (QC Lot: 3566544)									
EM1407491-004	Anonymous	EA055-103: Moisture Content (dried @ 103°C)	---	1.0	%	19.6	19.2	2.5	0% - 50%
EG005T: Total Metals by ICP-AES (QC Lot: 3569904)									
EM1407481-002	Anonymous	EG005T: Beryllium	7440-41-7	1	mg/kg	<1	<1	0.0	No Limit
		EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.0	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	34	35	0.0	0% - 50%
		EG005T: Cobalt	7440-48-4	2	mg/kg	15	15	0.0	No Limit
		EG005T: Molybdenum	7439-98-7	2	mg/kg	<2	<2	0.0	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	42	43	2.4	0% - 20%
		EG005T: Silver	7440-22-4	2	mg/kg	<2	<2	0.0	No Limit
		EG005T: Antimony	7440-36-0	5	mg/kg	5	<5	0.0	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	8	9	0.0	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	53	53	0.0	0% - 50%
		EG005T: Lead	7439-92-1	5	mg/kg	257	262	2.0	0% - 20%
		EG005T: Manganese	7439-96-5	5	mg/kg	225	231	2.7	0% - 20%
		EG005T: Selenium	7782-49-2	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Tin	7440-31-5	5	mg/kg	5	5	0.0	No Limit
		EG005T: Vanadium	7440-62-2	5	mg/kg	34	34	0.0	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	344	350	1.9	0% - 20%
		EG005T: Boron	7440-42-8	50	mg/kg	<50	<50	0.0	No Limit
EM1407498-002	Anonymous	EG005T: Beryllium	7440-41-7	1	mg/kg	<1	<1	0.0	No Limit
		EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.0	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	33	33	0.0	0% - 50%
		EG005T: Cobalt	7440-48-4	2	mg/kg	11	11	0.0	No Limit
		EG005T: Molybdenum	7439-98-7	2	mg/kg	<2	<2	0.0	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	38	39	0.0	0% - 50%
		EG005T: Silver	7440-22-4	2	mg/kg	<2	<2	0.0	No Limit
		EG005T: Antimony	7440-36-0	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	29	29	0.0	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	19	17	11.3	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	11	11	0.0	No Limit
		EG005T: Manganese	7439-96-5	5	mg/kg	241	245	1.6	0% - 20%
		EG005T: Selenium	7782-49-2	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Tin	7440-31-5	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Vanadium	7440-62-2	5	mg/kg	69	70	1.5	0% - 50%
		EG005T: Zinc	7440-66-6	5	mg/kg	32	32	0.0	No Limit
		EG005T: Boron	7440-42-8	50	mg/kg	<50	<50	0.0	No Limit

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 3569905)									
EM1407481-002	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	0.2	0.2	0.0	No Limit
EM1407498-002	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
EP068A: Organochlorine Pesticides (OC) (QC Lot: 3569825)									
EM1407449-001	Anonymous	EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.18	<0.18	0.0	No Limit
		EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.18	<0.18	0.0	No Limit
		EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.18	<0.18	0.0	No Limit
		EP068: gamma-BHC	58-89-9	0.05	mg/kg	<0.18	<0.18	0.0	No Limit
		EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.18	<0.18	0.0	No Limit
		EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.18	<0.18	0.0	No Limit
		EP068: Aldrin	309-00-2	0.05	mg/kg	<0.18	<0.18	0.0	No Limit
		EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.18	<0.18	0.0	No Limit
		EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.18	<0.18	0.0	No Limit
		EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.18	<0.18	0.0	No Limit
		EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.18	<0.18	0.0	No Limit
		EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.18	<0.18	0.0	No Limit
		EP068: 4.4`-DDE	72-55-9	0.05	mg/kg	<0.18	<0.18	0.0	No Limit
		EP068: Endrin	72-20-8	0.05	mg/kg	<0.18	<0.18	0.0	No Limit
		EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.18	<0.18	0.0	No Limit
		EP068: Endosulfan (sum)	115-29-7	0.05	mg/kg	<0.18	<0.18	0.0	No Limit
		EP068: 4.4`-DDD	72-54-8	0.05	mg/kg	<0.18	<0.18	0.0	No Limit
		EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.18	<0.18	0.0	No Limit
		EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.18	<0.18	0.0	No Limit
		EP068: Endrin ketone	53494-70-5	0.05	mg/kg	<0.18	<0.18	0.0	No Limit
		EP068: 4.4`-DDT	50-29-3	0.2	mg/kg	<0.7	<0.7	0.0	No Limit
		EP068: Methoxychlor	72-43-5	0.2	mg/kg	<0.7	<0.7	0.0	No Limit
EM1407481-001	Anonymous	EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP068A: Organochlorine Pesticides (OC) (QC Lot: 3569825) - continued									
EM1407481-001	Anonymous	EP068: Endosulfan (sum)	115-29-7	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP068: Methoxychlor	72-43-5	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
EP068B: Organophosphorus Pesticides (OP) (QC Lot: 3569825)									
EM1407449-001	Anonymous	EP068: Dichlorvos	62-73-7	0.05	mg/kg	<0.18	<0.18	0.0	No Limit
		EP068: Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.18	<0.18	0.0	No Limit
		EP068: Dimethoate	60-51-5	0.05	mg/kg	<0.18	<0.18	0.0	No Limit
		EP068: Diazinon	333-41-5	0.05	mg/kg	<0.18	<0.18	0.0	No Limit
		EP068: Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.18	<0.18	0.0	No Limit
		EP068: Malathion	121-75-5	0.05	mg/kg	<0.18	<0.18	0.0	No Limit
		EP068: Fenthion	55-38-9	0.05	mg/kg	<0.18	<0.18	0.0	No Limit
		EP068: Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.18	<0.18	0.0	No Limit
		EP068: Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.18	<0.18	0.0	No Limit
		EP068: Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.18	<0.18	0.0	No Limit
		EP068: Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.18	<0.18	0.0	No Limit
		EP068: Fenamiphos	22224-92-6	0.05	mg/kg	<0.18	<0.18	0.0	No Limit
		EP068: Prothiofos	34643-46-4	0.05	mg/kg	<0.18	<0.18	0.0	No Limit
		EP068: Ethion	563-12-2	0.05	mg/kg	<0.18	<0.18	0.0	No Limit
		EP068: Carbophenothion	786-19-6	0.05	mg/kg	<0.18	<0.18	0.0	No Limit
		EP068: Azinphos Methyl	86-50-0	0.05	mg/kg	<0.18	<0.18	0.0	No Limit
		EP068: Monocrotophos	6923-22-4	0.2	mg/kg	<0.7	<0.7	0.0	No Limit
		EP068: Parathion-methyl	298-00-0	0.2	mg/kg	<0.7	<0.7	0.0	No Limit
		EP068: Parathion	56-38-2	0.2	mg/kg	<0.7	<0.7	0.0	No Limit
EM1407481-001	Anonymous	EP068: Dichlorvos	62-73-7	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Dimethoate	60-51-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Diazinon	333-41-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Malathion	121-75-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Fenthion	55-38-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Prothiofos	34643-46-4	0.05	mg/kg	<0.05	<0.05	0.0	No Limit

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP068B: Organophosphorus Pesticides (OP) (QC Lot: 3569825) - continued									
EM1407481-001	Anonymous	EP068: Ethion	563-12-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Carbophenothion	786-19-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP068: Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP068: Parathion	56-38-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 3568551)									
EM1407359-014	Anonymous	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
EM1407449-034	Anonymous	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 3566522)									

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
				Laboratory Duplicate (DUP) Report					
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 3566522) - continued									
EM1407479-001	Anonymous	EP080: C6 - C9 Fraction	---	10	mg/kg	<10	<10	0.0	No Limit
EM1407479-010	Anonymous	EP080: C6 - C9 Fraction	---	10	mg/kg	<10	<10	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 3568550)									
EM1407359-014	Anonymous	EP071: C15 - C28 Fraction	---	100	mg/kg	<100	<100	0.0	No Limit
		EP071: C29 - C36 Fraction	---	100	mg/kg	<100	<100	0.0	No Limit
		EP071: C10 - C14 Fraction	---	50	mg/kg	<50	<50	0.0	No Limit
		EP071: C10 - C36 Fraction (sum)	---	50	mg/kg	<50	<50	0.0	No Limit
EM1407449-034	Anonymous	EP071: C15 - C28 Fraction	---	100	mg/kg	<100	<100	0.0	No Limit
		EP071: C29 - C36 Fraction	---	100	mg/kg	<100	<100	0.0	No Limit
		EP071: C10 - C14 Fraction	---	50	mg/kg	<50	<50	0.0	No Limit
		EP071: C10 - C36 Fraction (sum)	---	50	mg/kg	<50	<50	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 (QC Lot: 3566522)									
EM1407479-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.0	No Limit
EM1407479-010	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 (QC Lot: 3568550)									
EM1407359-014	Anonymous	EP071: >C16 - C34 Fraction	---	100	mg/kg	<100	<100	0.0	No Limit
		EP071: >C34 - C40 Fraction	---	100	mg/kg	<100	<100	0.0	No Limit
		EP071: >C10 - C16 Fraction	>C10_C16	50	mg/kg	<50	<50	0.0	No Limit
		EP071: >C10 - C40 Fraction (sum)	---	50	mg/kg	<50	<50	0.0	No Limit
EM1407449-034	Anonymous	EP071: >C16 - C34 Fraction	---	100	mg/kg	<100	<100	0.0	No Limit
		EP071: >C34 - C40 Fraction	---	100	mg/kg	<100	<100	0.0	No Limit
		EP071: >C10 - C16 Fraction	>C10_C16	50	mg/kg	<50	<50	0.0	No Limit
		EP071: >C10 - C40 Fraction (sum)	---	50	mg/kg	<50	<50	0.0	No Limit
EP080: BTEXN (QC Lot: 3566522)									
EM1407479-001	Anonymous	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.0	No Limit
EM1407479-010	Anonymous	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.0	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG005T: Total Metals by ICP-AES (QCLot: 3569904)								
EG005T: Antimony	7440-36-0	5	mg/kg	<5	4.6 mg/kg	103	77	127
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	21.7 mg/kg	96.4	79	113
EG005T: Beryllium	7440-41-7	1	mg/kg	<1	5.63 mg/kg	104	77	125
EG005T: Boron	7440-42-8	50	mg/kg	<50	33.2 mg/kg	103	84	124
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	4.64 mg/kg	99.6	87	115
EG005T: Chromium	7440-47-3	2	mg/kg	<2	43.9 mg/kg	102	89	113
EG005T: Cobalt	7440-48-4	2	mg/kg	<2	16.0 mg/kg	96.3	81	117
EG005T: Copper	7440-50-8	5	mg/kg	<5	32.0 mg/kg	96.1	90	116
EG005T: Lead	7439-92-1	5	mg/kg	<5	40.0 mg/kg	96.6	85	107
EG005T: Manganese	7439-96-5	5	mg/kg	<5	130 mg/kg	97.5	87	113
EG005T: Molybdenum	7439-98-7	2	mg/kg	<2	7.9 mg/kg	102	85	119
EG005T: Nickel	7440-02-0	2	mg/kg	<2	55.0 mg/kg	99.0	89	111
EG005T: Selenium	7782-49-2	5	mg/kg	<5	5.37 mg/kg	102	93	109
EG005T: Silver	7440-22-4	2	mg/kg	<2	2.10 mg/kg	101	80	108
EG005T: Tin	7440-31-5	5	mg/kg	<5	5.2 mg/kg	108	94	114
EG005T: Vanadium	7440-62-2	5	mg/kg	<5	29.6 mg/kg	101	81	117
EG005T: Zinc	7440-66-6	5	mg/kg	<5	60.8 mg/kg	99.6	89	111
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3569905)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	2.57 mg/kg	98.1	85	103
EP068A: Organochlorine Pesticides (OC) (QCLot: 3569825)								
EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	0.5 mg/kg	109	48	126
EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	0.5 mg/kg	107	47	125
EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	0.5 mg/kg	110	47	131
EP068: gamma-BHC	58-89-9	0.05	mg/kg	<0.05	0.5 mg/kg	109	48	126
EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	0.5 mg/kg	92.4	51	127
EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	0.5 mg/kg	102	48	124
EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	0.5 mg/kg	102	54	124
EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	0.5 mg/kg	96.6	55	127
EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	0.5 mg/kg	106	54	126
EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	0.5 mg/kg	80.0	55	129
EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	0.5 mg/kg	107	54	126
EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.05	0.5 mg/kg	95.2	51	129
EP068: 4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	0.5 mg/kg	106	53	127
EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	0.5 mg/kg	110	30.7	137

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EP068A: Organochlorine Pesticides (OC) (QCLot: 3569825) - continued								
EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	0.5 mg/kg	106	53	129
EP068: 4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	0.5 mg/kg	106	53	131
EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	0.5 mg/kg	81.4	42	132
EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	0.5 mg/kg	108	43	133
EP068: 4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	0.5 mg/kg	108	37	137
EP068: Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	0.5 mg/kg	107	50	134
EP068: Methoxychlor	72-43-5	0.2	mg/kg	<0.2	0.5 mg/kg	110	33	137
EP068B: Organophosphorus Pesticides (OP) (QCLot: 3569825)								
EP068: Dichlorvos	62-73-7	0.05	mg/kg	<0.05	0.5 mg/kg	112	26.6	129
EP068: Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	0.5 mg/kg	106	28.9	143
EP068: Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	0.5 mg/kg	116	33	171
EP068: Dimethoate	60-51-5	0.05	mg/kg	<0.05	0.5 mg/kg	116	28	154
EP068: Diazinon	333-41-5	0.05	mg/kg	<0.05	0.5 mg/kg	112	53	129
EP068: Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	0.5 mg/kg	99.7	51	127
EP068: Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	0.5 mg/kg	109	46	130
EP068: Malathion	121-75-5	0.05	mg/kg	<0.05	0.5 mg/kg	108	40	136
EP068: Fenthion	55-38-9	0.05	mg/kg	<0.05	0.5 mg/kg	104	55	129
EP068: Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	0.5 mg/kg	104	54	128
EP068: Parathion	56-38-2	0.2	mg/kg	<0.2	0.5 mg/kg	110	52	130
EP068: Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	0.5 mg/kg	105	52	130
EP068: Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	0.5 mg/kg	112	37	157
EP068: Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	0.5 mg/kg	107	55	133
EP068: Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	0.5 mg/kg	114	32	138
EP068: Prothiofos	34643-46-4	0.05	mg/kg	<0.05	0.5 mg/kg	107	53	129
EP068: Ethion	563-12-2	0.05	mg/kg	<0.05	0.5 mg/kg	109	49	133
EP068: Carbophenothion	786-19-6	0.05	mg/kg	<0.05	0.5 mg/kg	108	49	131
EP068: Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	0.5 mg/kg	112	14.4	162
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 3568551)								
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	10 mg/kg	77.5	73	124
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	10 mg/kg	80.6	65	127
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	10 mg/kg	75.6	73	123
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	10 mg/kg	78.8	66	130
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	10 mg/kg	79.8	74	124
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	10 mg/kg	75.0	71	123
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	10 mg/kg	81.6	72	126
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	10 mg/kg	76.4	73	125
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	10 mg/kg	# 68.9	71	127
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	10 mg/kg	79.9	72	130
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2	0.5	mg/kg	<0.5	10 mg/kg	78.6	65	131

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 3568551) - continued								
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	10 mg/kg	71.4	70	130
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	10 mg/kg	78.1	68	128
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	10 mg/kg	70.1	66	126
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	10 mg/kg	71.1	67	125
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	10 mg/kg	76.6	63	127
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3566522)								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	36 mg/kg	110	68	129
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3568550)								
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	581 mg/kg	99.3	72	130
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	2609 mg/kg	99.4	77	123
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	1446 mg/kg	96.1	75	119
EP071: C10 - C36 Fraction (sum)	----	50	mg/kg	<50	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 (QCLot: 3566522)								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	45 mg/kg	108	66	132
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 (QCLot: 3568550)								
EP071: >C10 - C16 Fraction	>C10_C16	50	mg/kg	<50	848 mg/kg	99.9	75	123
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	4076 mg/kg	90.3	77	127
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	158 mg/kg	109	43	123
EP071: >C10 - C40 Fraction (sum)	----	100	mg/kg	<100	----	----	----	----
EP080: BTEXN (QCLot: 3566522)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	2 mg/kg	112	74	124
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	2 mg/kg	115	74	130
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	2 mg/kg	120	71	127
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	4 mg/kg	117	71	133
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	2 mg/kg	120	74	130
EP080: Naphthalene	91-20-3	1	mg/kg	<1	0.5 mg/kg	113	68	132

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
EG005T: Total Metals by ICP-AES (QCLot: 3569904)							
EM1407486-001	Anonymous	EG005T: Arsenic	7440-38-2	50 mg/kg	99.1	80	116
		EG005T: Beryllium	7440-41-7	50 mg/kg	101	84	122

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%) MS	Recovery Limits (%) Low	High
EG005T: Total Metals by ICP-AES (QCLot: 3569904) - continued							
EM1407486-001	Anonymous	EG005T: Cadmium	7440-43-9	50 mg/kg	100	85	115
		EG005T: Chromium	7440-47-3	50 mg/kg	103	79	119
		EG005T: Copper	7440-50-8	50 mg/kg	95.0	83	119
		EG005T: Lead	7439-92-1	50 mg/kg	101	79	117
		EG005T: Manganese	7439-96-5	50 mg/kg	86.4	68	134
		EG005T: Molybdenum	7439-98-7	50 mg/kg	92.0	84	108
		EG005T: Nickel	7440-02-0	50 mg/kg	106	79	117
		EG005T: Selenium	7782-49-2	50 mg/kg	96.2	82	112
		EG005T: Vanadium	7440-62-2	50 mg/kg	90.5	78	122
		EG005T: Zinc	7440-66-6	50 mg/kg	102	75	121
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3569905)							
EM1407486-001	Anonymous	EG035T: Mercury	7439-97-6	5.0 mg/kg	90.8	76	116
EP068A: Organochlorine Pesticides (OC) (QCLot: 3569825)							
EM1407449-002	Anonymous	EP068: gamma-BHC	58-89-9	0.5 mg/kg	97.6	22.5	129
		EP068: Heptachlor	76-44-8	0.5 mg/kg	87.2	16.8	133
		EP068: Aldrin	309-00-2	0.5 mg/kg	79.2	23	133
		EP068: Dieldrin	60-57-1	0.5 mg/kg	86.4	43	135
		EP068: Endrin	72-20-8	0.5 mg/kg	106	21.1	155
		EP068: 4.4`-DDT	50-29-3	0.5 mg/kg	86.3	21.8	142
EP068B: Organophosphorus Pesticides (OP) (QCLot: 3569825)							
EM1407449-002	Anonymous	EP068: Diazinon	333-41-5	0.5 mg/kg	102	47	131
		EP068: Chlorpyrifos-methyl	5598-13-0	0.5 mg/kg	83.9	41	125
		EP068: Pirimphos-ethyl	23505-41-1	0.5 mg/kg	92.2	46	128
		EP068: Bromophos-ethyl	4824-78-6	0.5 mg/kg	95.4	47	127
		EP068: Prothiofos	34643-46-4	0.5 mg/kg	93.8	42	124
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 3568551)							
EM1407359-015	Anonymous	EP075(SIM): Acenaphthene	83-32-9	10 mg/kg	82.9	71	121
		EP075(SIM): Pyrene	129-00-0	10 mg/kg	98.8	62	136
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3566522)							
EM1407479-002	Anonymous	EP080: C6 - C9 Fraction	---	28 mg/kg	87.2	42	131
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3568550)							
EM1407359-014	Anonymous	EP071: C10 - C14 Fraction	---	581 mg/kg	91.8	71	131
		EP071: C15 - C28 Fraction	---	2609 mg/kg	92.8	72	126
		EP071: C29 - C36 Fraction	---	1446 mg/kg	86.7	74	122
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 (QCLot: 3566522)							
EM1407479-002	Anonymous	EP080: C6 - C10 Fraction	C6_C10	33 mg/kg	80.6	39	129
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 (QCLot: 3568550)							

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%) MS	Recovery Limits (%) Low	Recovery Limits (%) High
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 (QCLot: 3568550) - continued							
EM1407359-014	Anonymous	EP071: >C10 - C16 Fraction	>C10_C16	848 mg/kg	92.9	73	123
		EP071: >C16 - C34 Fraction	----	4076 mg/kg	83.6	75	129
		EP071: >C34 - C40 Fraction	----	158 mg/kg	72.2	54	124
EP080: BTEXN (QCLot: 3566522)							
EM1407479-002	Anonymous	EP080: Benzene	71-43-2	2 mg/kg	97.9	50	136
		EP080: Toluene	108-88-3	2 mg/kg	106	56	139

Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report

The quality control term Matrix Spike (MS) and Matrix Spike Duplicate (MSD) refers to intralaboratory split samples spiked with a representative set of target analytes. The purpose of these QC parameters are to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report: Spike Concentration	Spike Recovery (%) MS	Spike Recovery (%) MSD	Recovery Limits (%) Low	Recovery Limits (%) High	RPDs (%) Value	RPDs (%) Control Limit
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3566522)										
EM1407479-002	Anonymous	EP080: C6 - C9 Fraction	----	28 mg/kg	87.2	----	42	131	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 (QCLot: 3566522)										
EM1407479-002	Anonymous	EP080: C6 - C10 Fraction	C6_C10	33 mg/kg	80.6	----	39	129	----	----
EP080: BTEXN (QCLot: 3566522)										
EM1407479-002	Anonymous	EP080: Benzene	71-43-2	2 mg/kg	97.9	----	50	136	----	----
		EP080: Toluene	108-88-3	2 mg/kg	106	----	56	139	----	----
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3568550)										
EM1407359-014	Anonymous	EP071: C10 - C14 Fraction	----	581 mg/kg	91.8	----	71	131	----	----
		EP071: C15 - C28 Fraction	----	2609 mg/kg	92.8	----	72	126	----	----
		EP071: C29 - C36 Fraction	----	1446 mg/kg	86.7	----	74	122	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 (QCLot: 3568550)										
EM1407359-014	Anonymous	EP071: >C10 - C16 Fraction	>C10_C16	848 mg/kg	92.9	----	73	123	----	----
		EP071: >C16 - C34 Fraction	----	4076 mg/kg	83.6	----	75	129	----	----
		EP071: >C34 - C40 Fraction	----	158 mg/kg	72.2	----	54	124	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 3568551)										
EM1407359-015	Anonymous	EP075(SIM): Acenaphthene	83-32-9	10 mg/kg	82.9	----	71	121	----	----
		EP075(SIM): Pyrene	129-00-0	10 mg/kg	98.8	----	62	136	----	----
EP068A: Organochlorine Pesticides (OC) (QCLot: 3569825)										
EM1407449-002	Anonymous	EP068: gamma-BHC	58-89-9	0.5 mg/kg	97.6	----	22.5	129	----	----
		EP068: Heptachlor	76-44-8	0.5 mg/kg	87.2	----	16.8	133	----	----
		EP068: Aldrin	309-00-2	0.5 mg/kg	79.2	----	23	133	----	----
		EP068: Dieldrin	60-57-1	0.5 mg/kg	86.4	----	43	135	----	----

Sub-Matrix: **SOIL**

				Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report						
				Spike	Spike Recovery (%)		Recovery Limits (%)		RPDs (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	MSD	Low	High	Value	Control Limit
EP068A: Organochlorine Pesticides (OC) (QCLot: 3569825) - continued										
EM1407449-002	Anonymous	EP068: Endrin	72-20-8	0.5 mg/kg	106	----	21.1	155	----	----
		EP068: 4.4`-DDT	50-29-3	0.5 mg/kg	86.3	----	21.8	142	----	----
EP068B: Organophosphorus Pesticides (OP) (QCLot: 3569825)										
EM1407449-002	Anonymous	EP068: Diazinon	333-41-5	0.5 mg/kg	102	----	47	131	----	----
		EP068: Chlorpyrifos-methyl	5598-13-0	0.5 mg/kg	83.9	----	41	125	----	----
		EP068: Pirimphos-ethyl	23505-41-1	0.5 mg/kg	92.2	----	46	128	----	----
		EP068: Bromophos-ethyl	4824-78-6	0.5 mg/kg	95.4	----	47	127	----	----
		EP068: Prothiofos	34643-46-4	0.5 mg/kg	93.8	----	42	124	----	----
EG005T: Total Metals by ICP-AES (QCLot: 3569904)										
EM1407486-001	Anonymous	EG005T: Arsenic	7440-38-2	50 mg/kg	99.1	----	80	116	----	----
		EG005T: Beryllium	7440-41-7	50 mg/kg	101	----	84	122	----	----
		EG005T: Cadmium	7440-43-9	50 mg/kg	100	----	85	115	----	----
		EG005T: Chromium	7440-47-3	50 mg/kg	103	----	79	119	----	----
		EG005T: Copper	7440-50-8	50 mg/kg	95.0	----	83	119	----	----
		EG005T: Lead	7439-92-1	50 mg/kg	101	----	79	117	----	----
		EG005T: Manganese	7439-96-5	50 mg/kg	86.4	----	68	134	----	----
		EG005T: Molybdenum	7439-98-7	50 mg/kg	92.0	----	84	108	----	----
		EG005T: Nickel	7440-02-0	50 mg/kg	106	----	79	117	----	----
		EG005T: Selenium	7782-49-2	50 mg/kg	96.2	----	82	112	----	----
		EG005T: Vanadium	7440-62-2	50 mg/kg	90.5	----	78	122	----	----
		EG005T: Zinc	7440-66-6	50 mg/kg	102	----	75	121	----	----
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3569905)										
EM1407486-001	Anonymous	EG035T: Mercury	7439-97-6	5.0 mg/kg	90.8	----	76	116	----	----

ALS Environmental

INTERPRETIVE QUALITY CONTROL REPORT

Work Order	: **EM1407501**	Page	: 1 of 5
Client	: TONKIN AND TAYLOR PTY LTD	Laboratory	: Environmental Division Melbourne
Contact	: MR TOM MADILL	Contact	: Bronwyn Sheen
Address	: 32 FIVEWAYS BOULEVARD KEYSBOROUGH MELBOURNE, VICTORIA, AUSTRALIA 3173	Address	: 4 Westall Rd Springvale VIC Australia 3171
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Facsimile	: +61 03 8796 7944	Facsimile	: +61-3-8549 9601
Project	: 2781 001 WAVERLY GC	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Site	: ----		
C-O-C number	: 2122	Date Samples Received	: 30-JUL-2014
Sampler	: KK	Issue Date	: 06-AUG-2014
Order number	: ----		
		No. of samples received	: 1
Quote number	: MEBQ/143/14	No. of samples analysed	: 1

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Interpretive Quality Control Report contains the following information:

- Analysis Holding Time Compliance
- Quality Control Parameter Frequency Compliance
- Brief Method Summaries
- Summary of Outliers

Page	: 2 of 5
Work Order	: EM1407501
Client	: TONKIN AND TAYLOR PTY LTD
Project	: 2781 001 WAVERLY GC

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with recommended holding times (USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / *Container / Client Sample ID(s)*	*Sample Date*	*Extraction / Preparation*			*Analysis*		
		Date extracted	*Due for extraction*	*Evaluation*	*Date analysed*	*Due for analysis*	*Evaluation*
EA055: Moisture Content							
Soil Glass Jar - Unpreserved (EA055-103)							
QC2	**28-JUL-2014**	**----**	----	----	**30-JUL-2014**	11-AUG-2014	✓
EG005T: Total Metals by ICP-AES							
Soil Glass Jar - Unpreserved (EG005T)							
QC2	**28-JUL-2014**	**02-AUG-2014**	24-JAN-2015	✓	**05-AUG-2014**	24-JAN-2015	✓
EG035T: Total Recoverable Mercury by FIMS							
Soil Glass Jar - Unpreserved (EG035T)							
QC2	**28-JUL-2014**	**02-AUG-2014**	25-AUG-2014	✓	**04-AUG-2014**	25-AUG-2014	✓
EP068A: Organochlorine Pesticides (OC)							
Soil Glass Jar - Unpreserved (EP068)							
QC2	**28-JUL-2014**	**01-AUG-2014**	11-AUG-2014	✓	**04-AUG-2014**	10-SEP-2014	✓
EP068B: Organophosphorus Pesticides (OP)							
Soil Glass Jar - Unpreserved (EP068)							
QC2	**28-JUL-2014**	**01-AUG-2014**	11-AUG-2014	✓	**04-AUG-2014**	10-SEP-2014	✓
EP080/071: Total Petroleum Hydrocarbons							
Soil Glass Jar - Unpreserved (EP071)							
QC2	**28-JUL-2014**	**01-AUG-2014**	11-AUG-2014	✓	**04-AUG-2014**	10-SEP-2014	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
Soil Glass Jar - Unpreserved (EP075(SIM))							
QC2	**28-JUL-2014**	**01-AUG-2014**	11-AUG-2014	✓	**04-AUG-2014**	10-SEP-2014	✓
EP080: BTEXN							
Soil Glass Jar - Unpreserved (EP080)							
QC2	**28-JUL-2014**	**30-JUL-2014**	11-AUG-2014	✓	**01-AUG-2014**	11-AUG-2014	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013							
Soil Glass Jar - Unpreserved (EP080)							
QC2	**28-JUL-2014**	**30-JUL-2014**	11-AUG-2014	✓	**01-AUG-2014**	11-AUG-2014	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(where) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Moisture Content	EA055-103	1	3	**33.3**	**10.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
PAH/Phenols (SIM)	EP075(SIM)	2	15	**13.3**	**10.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Pesticides by GCMS	EP068	2	13	**15.4**	**10.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Mercury by FIMS	EG035T	2	12	**16.7**	**10.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-AES	EG005T	2	16	**12.5**	**10.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TRH - Semivolatile Fraction	EP071	2	20	**10.0**	**10.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TRH Volatiles/BTEX	EP080	2	18	**11.1**	**10.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Laboratory Control Samples (LCS)							
PAH/Phenols (SIM)	EP075(SIM)	1	15	**6.7**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Pesticides by GCMS	EP068	1	13	**7.7**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Mercury by FIMS	EG035T	1	12	**8.3**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-AES	EG005T	1	16	**6.3**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TRH - Semivolatile Fraction	EP071	1	20	**5.0**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TRH Volatiles/BTEX	EP080	1	18	**5.6**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Method Blanks (MB)							
PAH/Phenols (SIM)	EP075(SIM)	1	15	**6.7**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Pesticides by GCMS	EP068	1	13	**7.7**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Mercury by FIMS	EG035T	1	12	**8.3**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-AES	EG005T	1	16	**6.3**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TRH - Semivolatile Fraction	EP071	1	20	**5.0**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TRH Volatiles/BTEX	EP080	1	18	**5.6**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Matrix Spikes (MS)							
PAH/Phenols (SIM)	EP075(SIM)	1	15	**6.7**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Pesticides by GCMS	EP068	1	13	**7.7**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Mercury by FIMS	EG035T	1	12	**8.3**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-AES	EG005T	1	16	**6.3**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TRH - Semivolatile Fraction	EP071	1	20	**5.0**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TRH Volatiles/BTEX	EP080	1	18	**5.6**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Moisture Content	EA055-103	SOIL	A gravimetric procedure based on weight loss over a 12 hour drying period at 103-105 degrees C. This method is compliant with NEPM (2013) Schedule B(3) Section 7.1 and Table 1 (14 day holding time).
Total Metals by ICP-AES	EG005T	SOIL	(APHA 21st ed., 3120; USEPA SW 846 - 6010) (ICPAES) Metals are determined following an appropriate acid digestion of the soil. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM (2013) Schedule B(3)
Total Mercury by FIMS	EG035T	SOIL	AS 3550, APHA 21st ed., 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
Pesticides by GCMS	EP068	SOIL	(USEPA SW 846 - 8270B) Extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This technique is compliant with NEPM (2013) Schedule B(3) (Method 504,505)
TRH - Semivolatile Fraction	EP071	SOIL	(USEPA SW 846 - 8015A) Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C40.
PAH/Phenols (SIM)	EP075(SIM)	SOIL	(USEPA SW 846 - 8270B) Extracts are analysed by Capillary GC/MS in Selective Ion Mode (SIM) and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3) (Method 502 and 507)
TRH Volatiles/BTEX	EP080	SOIL	(USEPA SW 846 - 8260B) Extracts are analysed by Purge and Trap, Capillary GC/MS. Quantification is by comparison against an established 5 point calibration curve.

Preparation Methods	Method	Matrix	Method Descriptions
Methanolic Extraction of Soils for Purge and Trap	ORG16	SOIL	(USEPA SW 846 - 5030A) 5g of solid is shaken with surrogate and 10mL methanol prior to analysis by Purge and Trap - GC/MS.
Tumbler Extraction of Solids (Option A - Concentrating)	ORG17A	SOIL	In-house, Mechanical agitation (tumbler). 20g of sample, Na2SO4 and surrogate are extracted with 150mL 1:1 DCM/Acetone by end over end tumble. The solvent is decanted, dehydrated and concentrated (by KD) to the desired volume for analysis.
Tumbler Extraction of Solids (Option B - Non-concentrating)	ORG17B	SOIL	In-house, Mechanical agitation (tumbler). 10g of sample, Na2SO4 and surrogate are extracted with 20mL 1:1 DCM/Acetone by end over end tumble. The solvent is transferred directly to a GC vial for analysis.

Page	:	5 of 5
Work Order	:	EM1407501
Client	:	TONKIN AND TAYLOR PTY LTD
Project	:	2781 001 WAVERLY GC

Summary of Outliers

Outliers : Quality Control Samples

The following report highlights outliers flagged in the Quality Control (QC) Report. Surrogate recovery limits are static and based on USEPA SW846 or ALS-QWI/EN/38 (in the absence of specific USEPA limits). This report displays QC Outliers (breaches) only.

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **SOIL**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Laboratory Control Spike (LCS) Recoveries							
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons	4273337-007	----	**Benz(a)anthracene**	56-55-3	68.9 %	71-127%	**Recovery less than lower control limit**

- **For all matrices, no Method Blank value outliers occur.**
- **For all matrices, no Duplicate outliers occur.**
- **For all matrices, no Matrix Spike outliers occur.**

Regular Sample Surrogates

- **For all regular sample matrices, no surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

This report displays Holding Time breaches only. Only the respective Extraction / Preparation and/or Analysis component is/are displayed.

- **No Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

The following report highlights breaches in the Frequency of Quality Control Samples.

- **No Quality Control Sample Frequency Outliers exist.**

Tonkin & Taylor
32 Fiveways Boulevard, Keysborough, Victoria 3173
Ph: 61-3-8796 7900 Fax: 61-3-8796 7944
Ground Floor,
95 Coventry Street, Southbank, Victoria, 3006
Ph: 61-3-9863 8686 Fax: 61-3-9863 8685

Chain of Custody (COC)

Sheet 2 of 2
Serial No. 2122

Laboratory: MGT
Address: 3 Kingston Town Close
Project Name: WAVERLY GC
Project Manager: Tom Medill
Samplers Name: KRIS KNIGHT
Job Number: 2781.001
Comment/Instructions:

Container Type & Preservation Codes: **I**-Ice, **P**-Plastic, **G**-Glass, **V**-Vial, **N**-Nitric Acid Preserved
C-Hydrochloric Acid Preserved, **S**-Sulphuric Acid Preserved

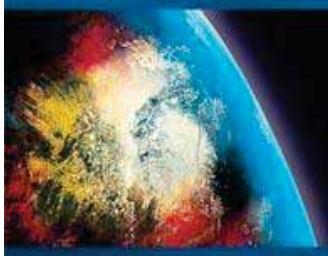
Analysis Required:

Sample ID	Sample Date	Time	Sample Matrix (e.g soil, water etc)	Container/Preservative Type (e.g. glass, vial etc)	OCPs/OPPs	TRH	PAH	Metals M18	HOLD	Notes
BH10/0.1	28/7/14	4pm	SOIL	GLASS JAR	✓	✓	✓	✓		
BH10/1.0	↓	↓	↓	↓					✓	
QC1	↓	↓	↓	↓	✓	✓	✓	✓		
QC2	↓	↓	↓	↓	✓	✓	✓	✓		To ALS for OCPs/OPPs TRH, PAH and Metals
TB01	28/7/14		WATER	VIALS, AMBERS		✓			✓	
TB02	29/7/14		↓	↓		✓		✓		
RB01	28/7/14		↓	↓		✓		✓	✓	
RB02	29/7/14		↓	↓		✓		✓	✓	
HA01/0.05	↓	AM	SOIL	GLASS JAR		✓	✓			
HA01/0.35	↓	↓	↓	↓						
HA02/0.05	↓	↓	↓	↓		✓	✓	✓		
HA02/0.35	↓	↓	↓	↓					✓	
HA03/0.05	↓	↓	↓	↓	✓	✓		✓		
HA03/0.5	↓	↓	↓	↓					✓	
HA04/0.05	↓	↓	↓	↓	✓	✓	✓	✓		
HA08/0.05	↓	↓	↓	↓					✓	
HA06/0.5	↓	↓	↓	↓	✓			✓		
HA09/0.4	↓	↓	↓	↓	✓			✓		
HA09/0.1	↓	↓	↓	↓	✓			✓		
Results Requested Within:		24hrs	48hrs	5days						
				Total:						

SCANNED

Environmental Division Melbourne
Work Order
EM1407501
Telephone : +61-3-8549 9600

Relinquished By:		Received By:		Relinquished By:		Received By:	
Signature:	Date:	Signature: Manu Ali	Date: 30/07	Signature:	Date:	Signature:	Date:
Company:	Time:	Company:	Time: 8:40	Company:	Time:	Company:	Time:



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ENVIRONMENTAL AND ENGINEERING CONSULTANTS

REPORT

Tonkin+Taylor

Additional Environmental Works

Waverley Golf Course 82 Bergins Road, Rowville, Victoria

Prepared for
Hume Keysborough Pty Ltd
Prepared by
Tonkin & Taylor Pty Ltd
Date
Sept 2016
Job Number
2781.002.v01

Exceptional thinking together
www.tonkintaylor.com.au

Distribution:

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1 Introduction

Tonkin & Taylor Pty Ltd (T+T) was engaged by Hume Keysborough Pty Ltd (Hume) to conduct additional environmental works at Waverley Golf Course located on 82 Bergins Road, Rowville, Victoria. The site location plan is provided in Appendix A of this report.

T+T understands that Hume is considering development of the site for residential subdivision and is seeking to obtain additional information on potential environmental contamination associated with the site which might constrain the proposed development. Information provided in a report prepared for the site previously by T+T[1] indicated significant filling had occurred at the site, located predominantly along the easement occupied by high voltage transmission lines that traverse the property. T+T understands that construction of residential dwellings is not permitted within the easement, therefore this area of the site will be designated as public open space within the proposed site development. Several locations (or 'hotspots') predominantly located around the maintenance facility were also identified as having potential for contamination.

The works outlined in this report were undertaken in accordance with our proposal of 23 May 2016.

1.1 Objectives

The objective of this investigation is to provide Hume with additional information on the presence of contaminated fill and other potential contamination sources at the site, in the context of the proposed residential site development.

1.2 Scope of works

The following scope of works was undertaken by T+T for this investigation:

- Sampling and analysis of soils beneath hardstand and building footprints for fill or hydrocarbon impacts, specifically targeting the maintenance facility.
- Representative sampling from soils likely to have been subject to more intensive application of chemicals (i.e. greens and tees).
- Delineation of previously identified impacts at the vehicle wash bay and site infrastructure (e.g. former and current ASTs, etc.).
- Sampling surface water from the four on-site dams to facilitate onsite use during construction, or off-site disposal.
- Sampling and analysis of the dam sediments from each of the four dams.
- Inspection of the near surface soils at a location (BH08) where possible ACM material was previously identified, within the transmission line easement.
- Excavations along the perceived boundary of the filled area within the transmission line easement to establish northern extent of filling within this area.
- Provision of this report for the above listed works and recommendations for any additional works if required.

Works were undertaken with reference to the National Environment Protection Council (1999) National Environment Protection (Assessment of Site Contamination) Measure (NEPM) May 2013 Amendment (ASC NEPM), Australian Standard AS4482.1 2005.

[1] (T+T) August 2014: Preliminary Environmental and Geotechnical Investigation – Waverley Golf Club, Bergins Road, Rowville.

2 Background Information

2.1 Site location and description

The site is located at 82 Bergins Road, Rowville, Victoria and is approximately 49 ha in size (refer to Figure 1 for regional site location). The site has been used as a golf course since 1962.

The site is irregular in shape, with a portion of the northeast boundary fronting Bergins Road (including the main site entrance). The western site boundary fronts Stud Road. The remainder of the land immediately surrounding the site is residential in the north, a power substation and Polish cultural centre in the south west, and Dandenong Police Paddock Reserve in the south. The site is situated at an elevation of between approximately 73 m Australian Height Datum (AHD) in the north and 48 m AHD in the south. The majority of the adjacent land to the north, east and west is occupied by residential properties.

A review of the Department of Planning, Transport and Local Infrastructure planning property report indicates the site is zoned as 'Special Use Zone'. Zoning to the north, east and west is designated as R1Z or R3Z, for residential use. A Green Wedge Zone (GWZ) applies to land to the southeast and southwest of the Site. Dandenong Police Paddock Reserve is zoned as a Public Conservation and Resource Zone (PCRZ). An Environmental Significance Overlay exists for the entire site.

2.2 Site ground conditions

The subsurface materials encountered in the boreholes undertaken during the previous investigation at the site could be categorised into four main geological units as summarised as follows:

Unit 1 – Fill Material

Fill was encountered in a number of boreholes across the site (predominantly within the transmission line easement) to a maximum depth of 10.8m bgl, and typically described as silty clay.

Unit 2 –Sandy or clayey Silt

Natural sandy or clayey silt was encountered to an approximate depth of 0.4m bgl, within the northeast portion of the site.

Unit 3 – Silty Clay

Silty clay was encountered beneath the clayey or sandy silt to a maximum depth of 3.5m bgl.

Unit 4 – Clayey or sandy Silt

Clayey or sandy silt was encountered beneath the silty clay, or underlying the fill soils, to a maximum penetrated depth of 12m bgl.

Units 2, 3 and 4 are consistent with strata of the Humevale Siltstone Formation, weathered to a residual soil. The sandy or clayey silt of Unit 2 is considered likely to represent a near surface leached horizon where the clay minerals have leached down into the underlying Unit 3.

2.3 Hydrology

Four earthen dams of various capacities are located on site. The three largest dams are clustered together near the middle of the south-western boundary, while a smaller dam is located in the south-eastern portion of the site.

Discussions with Waverly Golf Club manager, revealed that the dams are used to control stormwater and manage irrigation, and are not considered to be fed by groundwater discharge. Stormwater

from around the clubhouse buildings and surrounding land drains to the northernmost dam, via underground pipes and surface water runoff. Stormwater from the middle of the north-eastern boundary, and surrounding land collects into the smallest of the three clustered dams via underground pipes and surface water runoff. Water from this dam then flows into the adjoining 'main dam'.

The small dam in the south-eastern portion of the site collects stormwater from the southern portion of the site fronting Bergins Road, and the residential land to the north, via underground pipes and surface water runoff.

Water from the dams on site is expected to recharge groundwater beneath the site, and eventually discharge to Dandenong Creek, located approximately 1.2 km southwest of the site.

2.4 Hydrogeology

An online search of the VVG website revealed there are no groundwater bores on the site. One (1) groundwater bore is located 280 m to the north of the site. This bore is installed to a depth of 21.33 m bgl. It is registered for Private Individual/Corporation groundwater use, but is listed as being abandoned.

Regional groundwater flow direction is expected to be broadly to the south-west, towards Dandenong Creek and Port Phillip Bay, consistent with general topography and hydrology of the area. The water table is expected to be located at a depth greater than 10 m below the surface of the site with higher groundwater levels expected beneath the lower lying portions of the site.

Groundwater was not observed at any of the previous investigation locations.

3 Assessment Criteria

The State Environment Protection Policy (Prevention and Management of Contamination of Land) ("Land SEPP") sets out the regulatory framework for the prevention and management of contaminated land within the State of Victoria. The intent of this framework is to maintain and maximise (to the extent practicable) the quality of the land environment in Victoria, in order to protect its existing and potential beneficial uses. The Land SEPP was declared in June 2002 in accordance with Section 16 of the Environment Protection Act 1970.

The Land SEPP identifies specific land use categories as well as a number of protected beneficial uses associated with each of the land use categories. The EPA considers that land (soil) is polluted where current and/or future protected beneficial uses for the relevant land use categories are precluded. Beneficial uses of land are considered to be precluded when relevant soil quality objectives set out in the Land SEPP, for those beneficial uses, have been exceeded.

Based on the proposed development of the site (i.e. residential), the land use for the site would be defined as "Sensitive Use". It is noted that the area within the transmission line easement is proposed for "Recreational/ Open space", however the more conservative "Sensitive Use" scenario has been adopted for the entire site.

The beneficial uses of land requiring protection, based on the proposed land use are identified as the shaded areas in Table 3-1.

Table 3-1: Protected beneficial uses of land

Beneficial Uses	Land Use						
	Parks & Reserves	Agricultural	Sensitive Use		Recreational /Open Space	Commercial	Industrial
			High Density	Other			
Maintenance of Ecosystems							
Natural Ecosystems	✓						
Modified Ecosystems	✓	✓		✓	✓		
Highly Modified Ecosystems		✓	✓	✓	✓	✓	✓
Human Health	✓	✓	✓	✓	✓	✓	✓
Buildings & Structures	✓	✓	✓	✓	✓	✓	✓
Aesthetics	✓		✓	✓	✓	✓	
Production of Food, Flora & Fibre	✓	✓		✓			

Note: The above table is a reproduction of 'Table 1' from the State Environment Protection Policy (Prevention and Management of Contamination of Land); June 2002.
The shading in the above table denotes beneficial uses to be protected at the site based on the zoning and the most sensitive proposed land use for the land.

3.1 Adopted screening criteria

Based on the relevant beneficial uses (as highlighted in Table 3-1), the adopted criteria for protection of each of these beneficial uses are discussed below. Where the listed guidelines do not provide criteria for specific analytes, alternative criteria have been adopted (where available).

The guideline documents referenced to assess the protection of each beneficial use are presented below. Adopted criteria are provided on the soil results tables provided in Appendix C.

3.1.1 Maintenance of ecosystems

The Ecological Investigation/Screening Levels (EILs/ESLs) contained within the ASC NEPM were the primary adopted screening levels for the purposes of determining whether or not this beneficial use is precluded by the chemical condition of site soils. The EILs are also typically adopted as an initial screen for potential impacts on the Production of Food, Flora and Fibre. The ASC NEPM provides EILs that are based on added contaminant limits (ACLs) over and above the existing ambient background concentrations (ABC) to which natural flora and fauna may be adapted. For the purposes of the screening assessment, we have evaluated results against a range of ACLs provided in the ASC NEPM for various soil characteristics which might be expected for the types of soil encountered (clay). As a conservative position, the ABCs were generally set at 'zero'.

3.1.2 Human health

The Health Investigation/Screening Levels (HILs/HSLs) contained within the ASC NEPM were adopted for the purposes of determining whether or not this beneficial use is precluded by the chemical condition of site soils. The ASC NEPM 'A' HILs provide reference criteria to assess whether soil contamination poses a risk to human health for Residential land use, which includes residential properties with garden/accessible soil, including childcare centres, preschools and primary schools.

3.1.3 Buildings and structures

For the protection of buildings and structures at the site, consideration was given to the potential for the land to be corrosive to or adversely affect the integrity of structures or building materials. Specifically, consideration was given to the COPC that may have a potential detrimental impact on the integrity of structures or building materials, as provided in Table 6.4.2(C) of Australian Standard AS2159 Piling Design and Installation.

3.1.4 Aesthetics

The Land SEPP states that "contamination must not cause the land to be offensive to the senses of human beings". Currently there are no concentration-based aesthetic criteria for soil. While aesthetic observations are subjective, it is considered that if there is discolouration, noticeable odour from the soil on the site or if there are obvious components of waste, such as rubble, slag, bagged waste or similar, then there is a potential aesthetic concern.

4 Sampling Program

4.1 Soil sampling and analysis

On 4 August 2016, T+T attended the site and undertook soil sampling and analysis outlined in the scope in Section 1.2. The works included thirteen (13) hand auger locations to a maximum depth of 1.2 meters below ground level (m bgl) centred around the maintenance facility; four (4) test pits on the northern side of the transmission line easement using a backhoe to the maximum depth of 1 m bgl and a total of eighteen (18) locations at selected greens and tees across the golf course.

The thirteen locations in the vicinity of the maintenance facility were undertaken to delineate previously identified impacts. Six locations were placed around the wash bay and the associated drainage channel (HA4.1 to HA4.6), four locations were located around the bunded AST used for fuel storage (HA1.1 to HA1.4), and the other three locations targeted the chemical and fuel storage locations inside the maintenance shed. Two samples from each location were collected at surface (or under the layer of concrete) and within natural soils at the interface with any fill soils. The near surface sample at each location was submitted for analysis.

Samples of sediment from all four (4) dams was obtained using a dredge sampler.

The four test pit locations along the electrical easement were to investigate the presence and depth of fill outside the easement, with no soil sampling undertaken at these locations.

Records of the lithology and other observations for each of the borehole and test pit locations are contained in Appendix B.

Sampling, transport and analysis of samples was generally conducted in accordance with EPA Publication IWRG 701 *Sampling and Analysis of Waters, Waste Waters, Soils and Wastes*. Disposable gloves were used to collect samples which were placed in sterile jars for transport to the laboratory in chilled containers.

All soil samples recovered were submitted with Chain of Custody documentation to laboratories accredited by the National Association of Testing Authorities (NATA) to perform all analyses as described in Table 4-1.

Table 4-1 Analytical Schedule

Sample area	Number of locations	Depth of samples (m)	Number of samples	Number of samples for analysis	Analyses
Greens and Tees	18	0.05 – 0.5 in natural	18	18	18 x Herbicides[1]
Maintenance Facility and ASTs	13	Between 0.05 to 1.0	26	13	12 x TRH[2], PAH[3] and BTEXN[4], 8 x Metals[5], 1x OCP/OPP[6] and Herbicides.
Dam Sediment	4	Bottom of Dam	4	4	4 x Metals, OCPs, OPPs and Herbicides.

1. Herbicides screen: Picloram, 2,4-D, 2,4.5-T, MCPA, MCPB and Mecoprop.
2. Total recoverable hydrocarbons
3. Polycyclic aromatic hydrocarbons
4. Benzene, Toluene, Ethyl Benzene, Xylene and Naphthalene.
5. Metals screen including (As, B, Ba, Be, Cd, Cr, Co, Cu, Mn, Ni, Pb, Se, V, Zn, Hg)
6. Organochlorine Pesticides and Organophosphate Pesticides

4.2 Field observations

A minor hydrocarbon odour was noted within the maintenance shed, and significant staining was noted on the concrete slab at specific locations (i.e. locations HA10 and HA11). Following removal of a core of the concrete slab, no significant staining or odours were observed to be associated with the soils directly beneath the slab. Similarly, staining and odour were noted inside the concrete bunding for the AST, but no significant staining or odours were identified within the soils at the sampling locations surrounding the bund.

4.2.1 ACM inspection

An investigation of the surface soils was undertaken at a location (BH08) where potential ACM (i.e. fragments of fibro-cement sheet) was identified during the previous site works. Shallow trenching was undertaken at various locations in the vicinity of BH08 location to the depth of 0.5 m to 0.75 m. No further fragments of asbestos cement sheet were identified during the inspection of this location.

4.3 Soil profile

The environmental bore logs, attached in Appendix B of this report, show the soil profile encountered at each location, any observations of potential contamination, together with the depth of samples recovered as well as the depth of fill material present at the sampling locations.

Fill soils were recorded under the concrete slab in the maintenance shed and around the AST bunding. The depth of fill in the maintenance shed was noted to be between 0.3 m bgl and 0.35 m bgl under a 0.1 m concrete slab. The depth to fill in around the AST bunding was noted to be between 0.2 m bgl and 0.25 m bgl. Natural soils consisting of light brown to brown clay were typically encountered underlying the fill. Fill soils were not encountered at any of the other investigation locations as part of this phase of works. A sandy clay layer overlying the natural clay was recorded in all the other locations.

4.4 Soil results

Tabulated analytical results are provided in Appendix C and NATA Certified Laboratory reports are provided in Appendix D.

4.4.1 Maintenance of modified & highly modified ecosystems & production of food, flora and fibre

All results for the samples analysed for this phase of works reported results below the adopted ecological criteria for the site.

It is noted that one of the samples (HA04/0.05) from the previous investigation reported a concentration for total petroleum hydrocarbons, fractions C10-C16 and C16-C34 (390 mg/kg and 2,900 mg/kg respectively) above the ecological criteria (120 mg/kg and 1,300 mg/kg respectively). As stated in Section 3.1.1 the protection of the beneficial use for production of food, flora and fibre is considered to be addressed by the criteria adopted for the protection of ecosystem.

4.4.2 Human health

All results for the samples analysed reported results below the human health criteria adopted for the site in a residential scenario.

4.4.3 Buildings and structures

The concentrations of the analytes reported are not considered to present a significant risk to typical building materials. The presence of structures onsite and adjacent also indicate the natural conditions of soils at the site are not likely to present a significant risk to buildings and structures in the context of the proposed development.

4.4.4 Aesthetics

Odours were reported within the drainage line adjacent to the vehicle wash down area, which are considered an aesthetic impact. While faint hydrocarbon odours were also identified within the maintenance shed and AST bund, soils inspected at these locations did not exhibit significant odours or staining.

Solid inert waste was identified within the fill soils located in the transmission line easement during the previous investigation.

4.5 Dam water sampling and analysis

During the works undertaken on the 4 August T+T undertook sampling of water within all four (4) onsite dams. Water was obtained from just below the surface (to avoid floating material) using a boom sampler, with the water decanted into sampling containers provided by the laboratory. Sampling, transport and analysis of samples was generally conducted in accordance with EPA Publication IWRG 701 *Sampling and Analysis of Waters, Waste Waters, Soils and Wastes*.

The water from all four dams was observed to have no significant discolouration, particulate matter or odours.

All water samples recovered were submitted with Chain of Custody documentation to laboratories accredited by the National Association of Testing Authorities (NATA) to perform all analyses as described in Table 4-2.

Table 4-2 Analytical schedule for surface water

Sample area	Number dams	Depth of samples (m)	Number of samples	Number of samples for analysis	Analyses
Onsite dams	4	Below water surface	1 sample per dam	1 sample per dam	4 x Major Anions and Cations, Metals, TDS, E. Coli, OCPs, pH, Total N and Total P

4.5.1 Dam water analytical results

Analytical results for the dam waters are presented along with the adopted screening criteria in Table 2 of Appendix C. The NATA endorsed analytical reports with the Chain of Custody forms are provided in Appendix D. All samples reported concentrations of measured contaminants below the adopted guidelines for 95% organism protection for freshwater (ANZECC 2000), with the exception of the samples from Dam 1 and Dam 3, which only marginal exceeded the criteria for copper and zinc.

5 Quality Assurance and Quality Control

5.1 Quality Assurance program

A quality assurance (QA) program was implemented for the works, which was based on relevant Australian Standards.

The QA program undertaken as part of the assessment by T+T included the following:

- Comparison of field and laboratory data.
- Preservation of samples in chilled containers during field activities and transport from the field to the laboratory.
- Collection of quality control (QC) samples including split duplicate samples and calculation and review of relative percent difference (RPDs).
- Transportation of samples with accompanying Chain of Custody (COC) documentation.
- Compliance with recommended sample holding times.
- Review of laboratory internal QC data including analysis of blanks, spikes and duplicates.

5.2 Field QC sampling program

The QC sampling program conducted as part of this investigation involved collection of replicate samples for data reliability purposes, assessing possible errors due to potential sources of cross contamination, inconsistencies in sampling, and analytical techniques etc.

A quantitative measure of the accuracy of the results obtained was undertaken by calculating the RPD values for each duplicate pair. The RPD values were calculated using the following equation:

$$\text{Relative Percent Difference} = \frac{\text{Result 1} - \text{Result 2}}{\text{Mean Result}} \times 100$$

Where, Result 1 = concentration obtained from the original sample
Result 2 = concentration obtained from the split or duplicate sample

The RPD was used to normalise each pair of results, allowing data interpretation of reliability. For RPD values that exceed a generally accepted 30 to 50% limit (AS 4482.1 – 2005), correlation of data between the sample pair is considered poor. QC samples collected included intra-laboratory and inter-laboratory replicate samples. The primary laboratory was Eurofins|mgt (Eurofins) and the secondary laboratory was Australian Laboratory Services (ALS). QC samples collected during the investigation works are summarised in Table 5-1.

Table 5-1: QC sampling program

Sample Type	Matrix	Laboratory	Date Sampled	Sample ID	Primary Sample ID	Analysis
Split Duplicate	Soil	Secondary	25/08/2016	HA1.4/0.05	HA1.4/0.05	Metals, PAH
Split Duplicate	Soil	Secondary	25/08/2016	HA4.2/0.05	HA4.2/0.05	Metals, PAH, TRH

The results of the RPD calculations for the soil samples reported all analytes to be below the typical acceptable RPD range of 30-50% between the primary sample and split duplicates, with the exception of results for TPH C10 – C36 in both split samples with RPDs of 80% and 96%. The RPD for total chromium (97%) also exceeded the accepted range for sample HA4.2/0.05. While the RPD range was exceeded for total chromium, hexavalent chromium is the main contaminant of potential concern within this group. However, the reported concentrations are considered likely to reflect

naturally occurring chromium III. The exceedances of the RPD range for TPH C10 – C36 were well below the adopted criteria and therefore are not considered to invalidate the findings of this report.

The holding times for all samples were complied with for all samples submitted to the laboratory.

Tabulated analytical results are provided in Appendix C and NATA Certified Laboratory reports are provided in Appendix D.

5.3 Laboratory internal Quality Control

The laboratories (ALS and Eurofins) conducted their own internal QC programs including sample duplicates, spike recoveries, and method blanks in accordance with NATA certification requirements. Laboratory quality control data was concluded by the laboratory to meet their own internal quality requirements. On this basis, and considering the quality assurance procedures implemented, it was considered that the dataset reliability is acceptable.

5.4 Conclusions of QA/QC program

Based on the results of the QA/QC program as detailed above, the following is concluded:

- The internal laboratory quality control program reported acceptable results.
- The field sampling procedure was carried out in accordance with the T+T QA program, which is based on sampling guidelines provided in the Australian Standard 4482.1 and 4482.2.
- The RPD between primary and duplicate samples were below the accepted range of 30-50% for all analytes, with the exception of results for TPH C10 – C36 and total chromium. The rationale for which is provided in Section 5.2.
- Laboratories used were NATA accredited for the analyses performed.
- Samples were analysed within the applicable holding times.

It is concluded that the sampling and analytical programs were acceptable and the results obtained are of reliable quality to reach the conclusions made in this report regarding the contamination status of soils at the site.

6 Summary and Conclusions

T+T was engaged to conduct an additional environmental investigation to provide further information on the presence of contaminated fill and other potential contamination sources at the site the Waverley Golf Course, in the context of the proposed development of the site for residential use.

Based on the findings of the previous and current investigations it is considered past and current site activities may have contributed to onsite contamination. Hydrocarbon odours were associated with soils within the vehicle wash down bay, while hydrocarbon contamination exceeding the adopted ecological criteria was identified in one sample (HA04) from the adjacent drainage line.

Sampling surrounding the AST bund did not report any significant contamination, therefore the lateral extent of any contamination associated with the AST is considered delineated to the soils beneath bund. The condition of these soils should be validated upon removal of the AST and bund.

While no significant chemical contamination was identified within the fill soils located within the transmission line easement, fragments of solid inert waste were identified at various locations across this area. This material constitutes an aesthetic impact in a 'Sensitive site' and 'Recreational/ Open space' scenario.

Based on the results of the current soil investigation no concentrations for the analytes tested were reported above the NEPM Health Investigation or Screening Levels 'A' for low density residential land use or the NEPM Ecological Investigation or screening Levels for 'Urban residential and public open space'. The only laboratory result from the previous investigation exceeding the adopted ecological criteria (for petroleum hydrocarbons) was from location HA04, adjacent to the vehicle wash bay. The remaining results were all below the adopted human health and ecological criteria.

An investigation of the location (BH08) at which fragments of fibro-cement sheet were previously observed did not identify any additional fragments at the surface or within the excavation trenching (depths of 0.5 m to 0.75 m) at this location.

Based on the above summary and conclusions, the following items will require further works prior to the site being suitable for the proposed redevelopment:

- Excavation of delineated hydrocarbon impacted soils from sample location HA04 within the drainage line adjacent to the vehicle wash down area. Removal of any odorous soils from this location.
- The laboratory results reported the water from Dam 1 and Dam 3 marginally exceeded the ecological criteria. Consultation with the stormwater asset operator may allow for discharge of the water from these dams to the stormwater network. Alternatively, this water could be discharged to sewer on a 'one off release' licensing arrangement, or used onsite during the proposed development works for dust suppression etc.
- With regard to the SIW within the fill located within the transmission line easement, the incidence of this material through the fill soils may be varied. Therefore where encountered, the top 300 mm of the finished surface of this area should be free from any SIW. This could be accomplished through removal of this material from the soils or capping with clean fill. An environmental management plan may be useful during any future site development works to ensure these are soils are managed appropriately.

Based on the findings of this and previous site investigation works the condition of the site (excluding those items listed above) is not considered to present a significant risk to onsite receptors in the context of the proposed site development.

7 Applicability

This report has been prepared for the exclusive use of our client Hume Keysborough Pty Ltd, with respect to the particular brief given to us and it may not be relied upon in other contexts or for any other purpose, or by any person other than our client, without our prior written agreement.

Recommendations and opinions in this report are based on data from the discrete investigation locations. The nature and continuity of subsoil away from the investigated locations are inferred but it must be appreciated that actual conditions could vary from the assumed model.

Tonkin & Taylor Pty Ltd

Report prepared by:	Authorised for Tonkin & Taylor Pty Ltd by:
.....	.....
Tom Madill	Tim Vass
Senior Environmental Scientist	Project Director

pdb
t:\south melbourne\projects\2781\2781.0020\workingmaterial\2781.002_pdb_23082016_r01.docx

Appendix A: Figures

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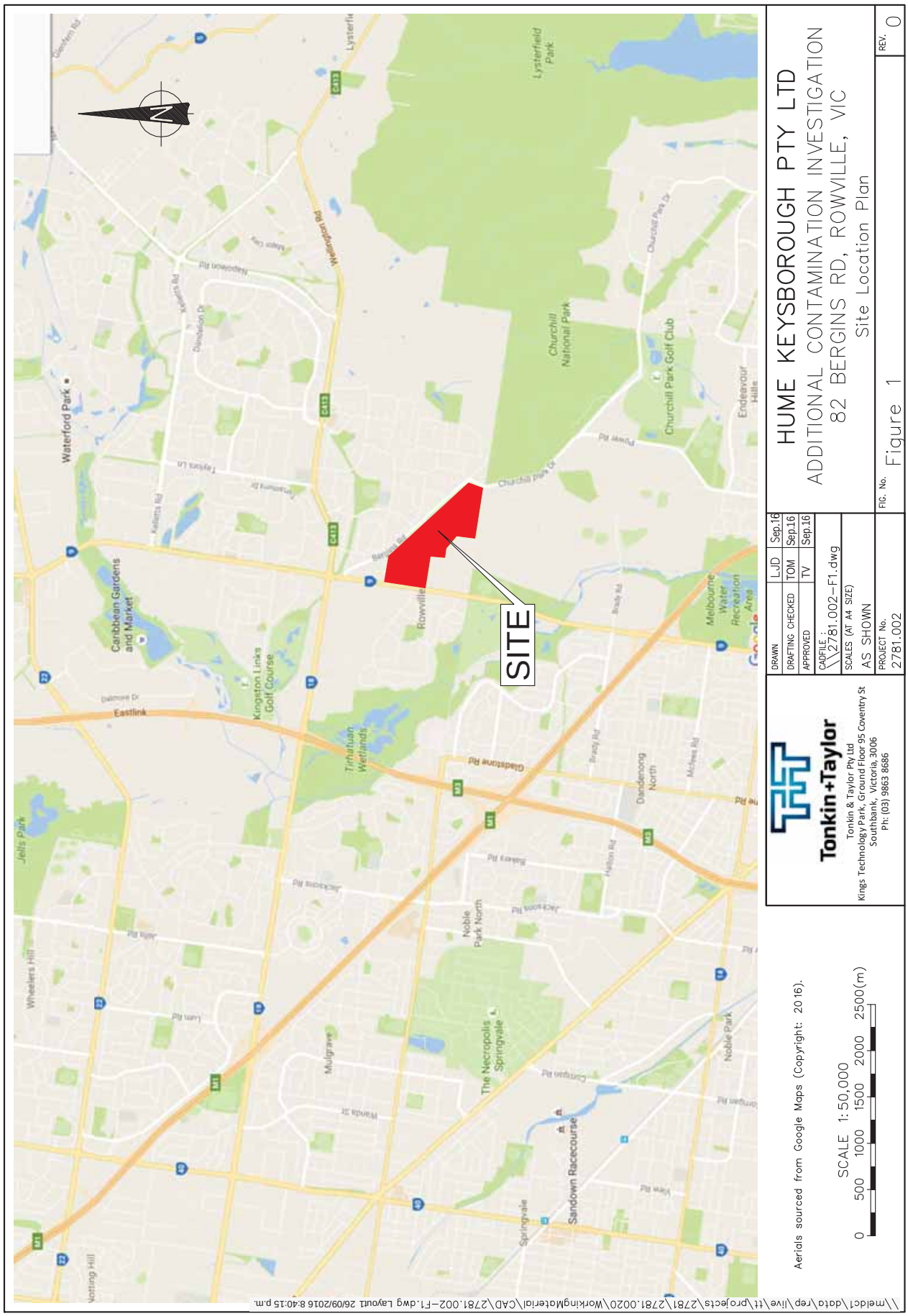
SITE
Rowville
Lysterfield Park
Churchill National Park
Churchill Park Golf Club
Waterford Park
Caribbean Gardens and Market
Kingston Links Golf Course
Tirhatuan Wetlands
Melbourne Water Recreation Area
Dandenong North
Noble Park North
The Necropolis Springvale
Sandown Racecourse
Springvale
Mulgrave
Wheelers Hill
Jells Park
Eastlink
Wellington Rd
Churchill Park Dr
Gladstone Rd
Jacksons Rd
Bakers Rd
Brady Rd
Hallon Rd
Mcfees Rd
Wanda St
Corrigan Rd
Lum Rd
Jells Rd
Dalmore Dr
Kelletts Rd
Napoleon Rd
Taylors Ln
Tenamans Dr
Power Rd
Endeavour Hills
Noble Park
Aerials sourced from Google Maps (Copyright: 2016).
SCALE 1:50,000
0 500 1000 1500 2000 2500(m)
HUME KEYSBOROUGH PTY LTD
ADDITIONAL CONTAMINATION INVESTIGATION
82 BERGINS RD, ROWVILLE, VIC
Site Location Plan
FIG. No. Figure 1
REV. 0
DRAWN LJD Sep.16
DRAFTING CHECKED TOM Sep.16
APPROVED TV Sep.16
CADFILE : \\2781.002-F1.dwg
SCALES (AT A4 SIZE) AS SHOWN
PROJECT No. 2781.002
Tonkin+Taylor
Tonkin & Taylor Pty Ltd
Kings Technology Park, Ground Floor 95 Coventry St
Southbank, Victoria, 3006
Ph: (03) 9863 8686
\\melda1\data\rep\live\tt\projects\2781\2781.0020\WorkingMaterial\CAD\2781.002-F1.dwg Layout1 26/09/2016 8:40:15 p.m.

HUME KEYSBOROUGH PTY LTD
ADDITIONAL CONTAMINATION INVESTIGATION
82 BERGINS RD, ROWVILLE, VIC
Site Layout and Investigation Locations
Figure 2
REV. 0
FIG. No.
DRAWN LJD Sep.16
DRAFTING CHECKED TOM Sep.16
APPROVED TV Sep.16
CADFILE : \\2781.002-F2.dwg
SCALES (AT A3 SIZE) AS SHOWN
PROJECT No. 2781.002
Tonkin+Taylor
Tonkin & Taylor Pty Ltd
Kings Technology Park, Ground Floor 95 Coventry St
Southbank, Victoria, 3006
Ph: (03) 98638686
www.tonkintaylor.com.au
Aerials sourced from NearMaps data (Images Copyright: 2016). Imagery Date: July 2016.
SCALE 1:4000
0 40 80 120 160 200 (m)
LEGEND
Approximate site boundary
Handauger test location (T+T, 2014)
Handauger test location (T+T, 2016)
Testpit location
Delineation location
Sediment & water sampling location
SCALE 1:1000
0 10 20 30 40 50 (m)
BERGINS RD
STUD RD
Maintenance facility
Approximate transmission line easement
TP01
TP02
TP03
TP04
DAM1
DAM2
DAM3
DAM4
HA01
HA1.1
HA1.2
HA1.3
HA1.4
HA4.1
HA4.2
HA4.3
HA4.4
HA4.5
HA4.6
HA09
HA10
HA11
HA04
\\melc1\data\rep\live\tt\projects\2781\2781.0020\WorkingMaterial\CAD\2781.002-F2.dwg, Layout1, 26/09/2016 8:41:46 p.m., ljd

Appendix B: Environmental Bore Logs

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TONKIN & TAYLOR PTY LTD

BOREHOLE LOG

BOREHOLE No: HA1.1
Hole Location: Refer to Site Plan

SHEET 1 OF 1

PROJECT: Additional Contamination Investigation	LOCATION: Waverley Golf Course	JOB No: 2781.002
CO-ORDINATES	DRILL TYPE: Hand Auger	HOLE STARTED: 4/8/16
		HOLE FINISHED: 4/8/16
R.L. m	DRILL METHOD: BH	DRILLED BY: T+T
DATUM	DRILL FLUID:	LOGGED BY: PDB CHECKED: TOM

BORING							ENGINEERING DESCRIPTION					FIELD TESTING		LABORATORY TESTS		
FLUID LOSS	WATER	CORE RECOVERY (%)	METHOD	CASING	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITIONS / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	FIELD RECORDS/ COMMENTS	CONTAMINATION INDICATORS (ODOURS, STAINING, IMPORTED FILL, ASH, SEPARATE PHASE LIQUIDS)	SAMPLES, TESTS	MC (%)	PID (ppm)
									FILL: Sandy gravel, grey, medium grained gravel with some fine to medium grained sand	W	L			HA1.1-0.05		
									Sandy CLAY, brown, low plasticity with fine to medium grained sand	M	St					
						0.5			CLAY, brown to light brown, medium to high plasticity	M	St			HA1.1-0.5		
						1.0										
									HA1.1 terminated @ 1.2 m							

T+T DATATEMPLATE.GDT pdb

Log Scale 1:7.5 BOREHOLE-ENVIRONMENTAL 2781.002.GPJ 26/9/16

TONKIN & TAYLOR PTY LTD

BOREHOLE LOG

BOREHOLE No: HA1.2
Hole Location: Refer to Site Plan

SHEET 1 OF 1

PROJECT: Additional Contamination Investigation	LOCATION: Waverley Golf Course	JOB No: 2781.002
CO-ORDINATES	DRILL TYPE: Hand Auger	HOLE STARTED: 4/8/16
		HOLE FINISHED: 4/8/16
R.L. m	DRILL METHOD: BH	DRILLED BY: T+T
DATUM	DRILL FLUID:	LOGGED BY: PDB CHECKED: TOM

BORING							ENGINEERING DESCRIPTION					FIELD TESTING		LABORATORY TESTS		
FLUID LOSS	WATER	CORE RECOVERY (%)	METHOD	CASING	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITIONS / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	FIELD RECORDS/ COMMENTS	CONTAMINATION INDICATORS (ODOURS, STAINING, IMPORTED FILL, ASH, SEPARATE PHASE LIQUIDS)	SAMPLES, TESTS	MC (%)	PID (ppm)
									FILL: Sandy gravel, grey, medium grained gravel with some fine to medium grained sand	W	L			HA1.2-0.05		
									Sandy CLAY, brown, low plasticity with fine to medium grained sand	M	St					
						0.5			CLAY, brown to light brown, medium to high plasticity	M	St			HA1.2-0.5		
						1.0			**HA1.2 terminated @ 1.0 m**							

T+T DATATEMPLATE.GDT pdb

Log Scale 1:7.5 BOREHOLE-ENVIRONMENTAL 2781.002.GPJ 26/9/16

Tonkin+Taylor

TONKIN & TAYLOR PTY LTD

BOREHOLE LOG

BOREHOLE No: HA1.3
Hole Location: Refer to Site Plan

SHEET 1 OF 1

PROJECT: Additional Contamination Investigation	LOCATION: Waverley Golf Course	JOB No: 2781.002
CO-ORDINATES	DRILL TYPE: Hand Auger	HOLE STARTED: 4/8/16
		HOLE FINISHED: 4/8/16
R.L. m	DRILL METHOD: BH	DRILLED BY: T+T
DATUM	DRILL FLUID:	LOGGED BY: PDB CHECKED: TOM

BORING							ENGINEERING DESCRIPTION					FIELD TESTING		LABORATORY TESTS		
FLUID LOSS	WATER	CORE RECOVERY (%)	METHOD	CASING	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITIONS / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	FIELD RECORDS/ COMMENTS	CONTAMINATION INDICATORS (ODOURS, STAINING, IMPORTED FILL, ASH, SEPARATE PHASE LIQUIDS)	SAMPLES, TESTS	MC (%)	PID (ppm)
									FILL: Sandy gravel, grey, medium grained gravel with some fine to medium grained sand	W	L			HA1.3-0.05		
									Sandy CLAY, brown, low plasticity with fine to medium grained sand	M	St					
						0.5			CLAY, brown to light brown, medium to high plasticity	M	St			HA1.3-0.5		
						1.0			**HA1.3 terminated @ 1.0 m**							

T+T DATATEMPLATE.GDT pdb

Log Scale 1:7.5 BOREHOLE-ENVIRONMENTAL 2781.002.GPJ 26/9/16

Tonkin+Taylor

TONKIN & TAYLOR PTY LTD

BOREHOLE LOG

BOREHOLE No: HA1.4
Hole Location: Refer to Site Plan

SHEET 1 OF 1

PROJECT: Additional Contamination Investigation	LOCATION: Waverley Golf Course	JOB No: 2781.002
CO-ORDINATES	DRILL TYPE: Hand Auger	HOLE STARTED: 4/8/16
		HOLE FINISHED: 4/8/16
R.L. m	DRILL METHOD: BH	DRILLED BY: T+T
DATUM	DRILL FLUID:	LOGGED BY: PDB CHECKED: TOM

BORING							ENGINEERING DESCRIPTION					FIELD TESTING		LABORATORY TESTS		
FLUID LOSS	WATER	CORE RECOVERY (%)	METHOD	CASING	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITIONS / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	FIELD RECORDS/ COMMENTS	CONTAMINATION INDICATORS (ODOURS, STAINING, IMPORTED FILL, ASH, SEPARATE PHASE LIQUIDS)	SAMPLES, TESTS	MC (%)	PID (ppm)
									FILL: Sandy gravel, grey, medium grained gravel with some fine to medium grained sand	W	L			HA1.4-0.05		
									Sandy CLAY, brown, low plasticity with fine to medium grained sand	M	St					
						0.5			CLAY, brown to light brown, medium to high plasticity	M	St			HA1.4-0.5		
						1.0			**HA1.4 terminated @ 1.0 m**							

T+T DATATEMPLATE.GDT pdb

Log Scale 1:7.5 BOREHOLE-ENVIRONMENTAL 2781.002.GPJ 26/9/16

TONKIN & TAYLOR PTY LTD

BOREHOLE LOG

BOREHOLE No: HA4.1
Hole Location: Refer to Site Plan

SHEET 1 OF 1

PROJECT: Additional Contamination Investigation	LOCATION: Waverley Golf Course	JOB No: 2781.002
CO-ORDINATES	DRILL TYPE: Hand Auger	HOLE STARTED: 3/8/16
	DRILL METHOD: BH	HOLE FINISHED: 3/8/16
R.L. m		DRILLED BY: T+T
DATUM	DRILL FLUID:	LOGGED BY: PDB CHECKED: TOM

BORING							ENGINEERING DESCRIPTION					FIELD TESTING		LABORATORY TESTS		
FLUID LOSS	WATER	CORE RECOVERY (%)	METHOD	CASING	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITIONS / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	FIELD RECORDS/ COMMENTS	CONTAMINATION INDICATORS (ODOURS, STAINING, IMPORTED FILL, ASH, SEPARATE PHASE LIQUIDS)	SAMPLES, TESTS	MC (%)	PID (ppm)
									Sandy CLAY, brown to grey, low plasticity with fine to medium grained sand	M	S			HA4.1-0.05		
						0.5			CLAY, brown to light brown, medium to high plasticity	M	St			HA4.1-0.5		
						1.0			**HA4.1 terminated @ 1.0 m**							

T+T DATATEMPLATE.GDT pdb

Log Scale 1:7.5 BOREHOLE-ENVIRONMENTAL 2781.002.GPJ 26/9/16

Tonkin+Taylor

TONKIN & TAYLOR PTY LTD

BOREHOLE LOG

BOREHOLE No: HA4.2
Hole Location: Refer to Site Plan

SHEET 1 OF 1

PROJECT: Additional Contamination Investigation	LOCATION: Waverley Golf Course	JOB No: 2781.002
CO-ORDINATES	DRILL TYPE: Hand Auger	HOLE STARTED: 3/8/16
		HOLE FINISHED: 3/8/16
R.L. m	DRILL METHOD: BH	DRILLED BY: T+T
DATUM	DRILL FLUID:	LOGGED BY: PDB CHECKED: TOM

BORING							ENGINEERING DESCRIPTION					FIELD TESTING		LABORATORY TESTS		
FLUID LOSS	WATER	CORE RECOVERY (%)	METHOD	CASING	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITIONS / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	FIELD RECORDS/ COMMENTS	CONTAMINATION INDICATORS (ODOURS, STAINING, IMPORTED FILL, ASH, SEPARATE PHASE LIQUIDS)	SAMPLES, TESTS	MC (%)	PID (ppm)
									Sandy CLAY, brown to grey, low plasticity with fine to medium grained sand	M	S			HA4.2-0.05		
						0.5			CLAY, brown to light brown, medium to high plasticity	M	St			HA4.2-0.5		
						1.0			**HA4.2 terminated @ 1.0 m**							

T+T DATATEMPLATE.GDT pdb

Log Scale 1:7.5 BOREHOLE-ENVIRONMENTAL 2781.002.GPJ 26/9/16

TONKIN & TAYLOR PTY LTD

BOREHOLE LOG

BOREHOLE No: HA4.3
Hole Location: Refer to Site Plan

SHEET 1 OF 1

PROJECT: Additional Contamination Investigation	LOCATION: Waverley Golf Course	JOB No: 2781.002
CO-ORDINATES	DRILL TYPE: Hand Auger	HOLE STARTED: 3/8/16
	DRILL METHOD: BH	HOLE FINISHED: 3/8/16
R.L. m		DRILLED BY: T+T
DATUM	DRILL FLUID:	LOGGED BY: PDB CHECKED: TOM

BORING							ENGINEERING DESCRIPTION					FIELD TESTING		LABORATORY TESTS		
FLUID LOSS	WATER	CORE RECOVERY (%)	METHOD	CASING	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITIONS / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	FIELD RECORDS/ COMMENTS	CONTAMINATION INDICATORS (ODOURS, STAINING, IMPORTED FILL, ASH, SEPARATE PHASE LIQUIDS)	SAMPLES, TESTS	MC (%)	PID (ppm)
									Sandy CLAY, brown to grey, low plasticity with fine to medium grained sand	M	S			HA4.3-0.05		
									CLAY, brown to light brown, medium to high plasticity	M	St					
						0.5								HA4.3-0.5		
						1.0			**HA4.3 terminated @ 1.0 m**							

T+T DATATEMPLATE.GDT pdb

Log Scale 1:7.5 BOREHOLE-ENVIRONMENTAL 2781.002.GPJ 26/9/16

Tonkin+Taylor

TONKIN & TAYLOR PTY LTD

BOREHOLE LOG

BOREHOLE No: HA4.4
Hole Location: Refer to Site Plan

SHEET 1 OF 1

PROJECT: Additional Contamination Investigation	LOCATION: Waverley Golf Course	JOB No: 2781.002
CO-ORDINATES	DRILL TYPE: Hand Auger	HOLE STARTED: 3/8/16
		HOLE FINISHED: 3/8/16
R.L. m	DRILL METHOD: BH	DRILLED BY: T+T
DATUM	DRILL FLUID:	LOGGED BY: PDB CHECKED: TOM

BORING							ENGINEERING DESCRIPTION					FIELD TESTING		LABORATORY TESTS		
FLUID LOSS	WATER	CORE RECOVERY (%)	METHOD	CASING	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITIONS / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	FIELD RECORDS/ COMMENTS	CONTAMINATION INDICATORS (ODOURS, STAINING, IMPORTED FILL, ASH, SEPARATE PHASE LIQUIDS)	SAMPLES, TESTS	MC (%)	PID (ppm)
									Sandy CLAY, brown to grey, low plasticity with fine to medium grained sand	M	S			HA4.4-0.05		
						0.5			CLAY, brown to light brown, medium to high plasticity	M	St			HA4.4-0.5		
						1.0			**HA4.4 terminated @ 1.0 m**							

T+T DATATEMPLATE.GDT pdb

Log Scale 1:7.5 BOREHOLE-ENVIRONMENTAL 2781.002.GPJ 26/9/16

TONKIN & TAYLOR PTY LTD

BOREHOLE LOG

BOREHOLE No: HA4.5
Hole Location: Refer to Site Plan

SHEET 1 OF 1

PROJECT: Additional Contamination Investigation	LOCATION: Waverley Golf Course	JOB No: 2781.002
CO-ORDINATES	DRILL TYPE: Hand Auger	HOLE STARTED: 3/8/16
		HOLE FINISHED: 3/8/16
R.L. m	DRILL METHOD: BH	DRILLED BY: T+T
DATUM	DRILL FLUID:	LOGGED BY: PDB CHECKED: TOM

BORING							ENGINEERING DESCRIPTION					FIELD TESTING		LABORATORY TESTS		
FLUID LOSS	WATER	CORE RECOVERY (%)	METHOD	CASING	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITIONS / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	FIELD RECORDS/ COMMENTS	CONTAMINATION INDICATORS (ODOURS, STAINING, IMPORTED FILL, ASH, SEPARATE PHASE LIQUIDS)	SAMPLES, TESTS	MC (%)	PID (ppm)
									Sandy CLAY, brown to grey, low plasticity with fine to medium grained sand	M	S			HA4.5-0.05		
						0.5			CLAY, brown to light brown, medium to high plasticity	M	St			HA4.5-0.5		
						1.0			**HA4.5 terminated @ 1.0 m**							

T+T DATATEMPLATE.GDT pdb

Log Scale 1:7.5 BOREHOLE-ENVIRONMENTAL 2781.002.GPJ 26/9/16

TONKIN & TAYLOR PTY LTD

BOREHOLE LOG

BOREHOLE No: HA4.6
Hole Location: Refer to Site Plan

SHEET 1 OF 1

PROJECT: Additional Contamination Investigation	LOCATION: Waverley Golf Course	JOB No: 2781.002
CO-ORDINATES	DRILL TYPE: Hand Auger	HOLE STARTED: 3/8/16
		HOLE FINISHED: 3/8/16
R.L. m	DRILL METHOD: BH	DRILLED BY: T+T
DATUM	DRILL FLUID:	LOGGED BY: PDB CHECKED: TOM

BORING							ENGINEERING DESCRIPTION					FIELD TESTING		LABORATORY TESTS		
FLUID LOSS	WATER	CORE RECOVERY (%)	METHOD	CASING	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITIONS / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	FIELD RECORDS/ COMMENTS	CONTAMINATION INDICATORS (ODOURS, STAINING, IMPORTED FILL, ASH, SEPARATE PHASE LIQUIDS)	SAMPLES, TESTS	MC (%)	PID (ppm)
									Sandy CLAY, brown to grey, low plasticity with fine to medium grained sand	M	S			HA4.6-0.05		
									CLAY, brown to light brown, medium to high plasticity	M	St					
						0.5								HA4.6-0.5		
						1.0			**HA4.6 terminated @ 1.0 m**							

T+T DATATEMPLATE.GDT pdb

Log Scale 1:7.5 BOREHOLE-ENVIRONMENTAL 2781.002.GPJ 26/9/16

TONKIN & TAYLOR PTY LTD

BOREHOLE LOG

BOREHOLE No: HA09
Hole Location: Refer to Site Plan

SHEET 1 OF 1

PROJECT: Additional Contamination Investigation	LOCATION: Waverley Golf Course	JOB No: 2781.002
CO-ORDINATES	DRILL TYPE: Hand Auger	HOLE STARTED: 3/8/16
		HOLE FINISHED: 3/8/16
R.L. m	DRILL METHOD: BH	DRILLED BY: Hire
DATUM	DRILL FLUID:	LOGGED BY: PDB CHECKED: TOM

BORING							ENGINEERING DESCRIPTION					FIELD TESTING		LABORATORY TESTS		
FLUID LOSS	WATER	CORE RECOVERY (%)	METHOD	CASING	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITIONS / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	FIELD RECORDS/ COMMENTS	CONTAMINATION INDICATORS (ODOURS, STAINING, IMPORTED FILL, ASH, SEPARATE PHASE LIQUIDS)	SAMPLES, TESTS	MC (%)	PID (ppm)
									Concrete 100 mm							
									FILL: Sandy gravel, brown to grey, medium grained gravel and fine to medium grained sand.	M	L			HA09-0.1		
						0.5			CLAY, brown to light brown, medium to high plasticity with trace fine to medium grained sand	M	St			HA09-0.5		
						1.0										
									HA09 terminated @ 1.2 m							

T+T DATATEMPLATE.GDT pdb

Log Scale 1:7.5 BOREHOLE-ENVIRONMENTAL 2781.002.GPJ 26/9/16

Tonkin+Taylor

TONKIN & TAYLOR PTY LTD

BOREHOLE LOG

BOREHOLE No: HA10
Hole Location: Refer to Site Plan

SHEET 1 OF 1

PROJECT: Additional Contamination Investigation	LOCATION: Waverley Golf Course	JOB No: 2781.002
CO-ORDINATES	DRILL TYPE: Hand Auger	HOLE STARTED: 3/8/16
	DRILL METHOD: BH	HOLE FINISHED: 3/8/16
R.L. m		DRILLED BY: Hire
DATUM	DRILL FLUID:	LOGGED BY: PDB CHECKED: TOM

BORING							ENGINEERING DESCRIPTION					FIELD TESTING		LABORATORY TESTS		
FLUID LOSS	WATER	CORE RECOVERY (%)	METHOD	CASING	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITIONS / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	FIELD RECORDS/ COMMENTS	CONTAMINATION INDICATORS (ODOURS, STAINING, IMPORTED FILL, ASH, SEPARATE PHASE LIQUIDS)	SAMPLES, TESTS	MC (%)	PID (ppm)
									Concrete 100 mm							
									FILL: Sandy gravel, brown to grey, medium grained gravel and fine to medium grained sand.	M	L			HA10-0.1		
						0.5			CLAY, brown to light brown, medium to high plasticity with trace fine to medium grained sand	M	S			HA10-0.5		
						1.0										
									HA10 terminated @ 1.2 m							

T+T DATATEMPLATE.GDT pdb

Log Scale 1:7.5 BOREHOLE-ENVIRONMENTAL 2781.002.GPJ 26/9/16

Tonkin+Taylor

TONKIN & TAYLOR PTY LTD

BOREHOLE LOG

BOREHOLE No: HA11
Hole Location: Refer to Site Plan

SHEET 1 OF 1

PROJECT: Additional Contamination Investigation	LOCATION: Waverley Golf Course	JOB No: 2781.002
CO-ORDINATES	DRILL TYPE: Hand Auger	HOLE STARTED: 3/8/16
		HOLE FINISHED: 3/8/16
R.L. m	DRILL METHOD: BH	DRILLED BY: Hire
DATUM	DRILL FLUID:	LOGGED BY: PDB CHECKED: TOM

BORING							ENGINEERING DESCRIPTION					FIELD TESTING		LABORATORY TESTS		
FLUID LOSS	WATER	CORE RECOVERY (%)	METHOD	CASING	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITIONS / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	FIELD RECORDS/ COMMENTS	CONTAMINATION INDICATORS (ODOURS, STAINING, IMPORTED FILL, ASH, SEPARATE PHASE LIQUIDS)	SAMPLES, TESTS	MC (%)	PID (ppm)
									Concrete 100 mm							
									FILL: Sandy gravel, brown to grey, medium grained gravel and fine to medium grained sand.	M	L			HA11-0.1		
						0.5			CLAY, brown to light brown, medium to high plasticity with trace fine to medium grained sand	M	S			HA11-0.5		
						1.0										
									HA11 terminated @ 1.2 m							

T+T DATATEMPLATE.GDT pdb

Log Scale 1:7.5 BOREHOLE-ENVIRONMENTAL 2781.002.GPJ 26/9/16

Tonkin+Taylor

TONKIN & TAYLOR PTY LTD

EXCAVATION LOG

EXCAVATION No: TP01
Location: Refer to Site Plan

SHEET 1 OF 1

PROJECT: Additional Contamination Investigation	LOCATION: Waverley Golf Course	JOB No: 2781.002

CO-ORDINATES:	EXPOSURE TYPE: Test Pit	EXCAV. STARTED:	4/8/16
	EQUIPMENT: Backhoe	EXCAV FINISHED:	4/8/16
R.L. m	OPERATOR: Hire	LOGGED BY:	PDB
DATUM	DIMENSIONS: 0.5 m x 1.0 m	CHECKED BY:	TOM

EXCAVATION						ENGINEERING DESCRIPTION						FIELD TESTING		LABORATORY TESTS		
METHOD	PENETRATION 1 2 3	SUPPORT	WATER	R.L. (m)	DEPTH (m)	GEOLOGICAL UNIT	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITIONS / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	FIELD RECORDS/ COMMENTS	CONTAMINATION INDICATORS (ODOURS, STAINING, IMPORTED FILL, ASH, SEPARATE PHASE LIQUIDS)	SAMPLES, TESTS	MC (%)	PID (ppm)
									Sandy CLAY, brown, low plasticity with fine grained sand	M	S			TP01-0.1		
									CLAY, brown to light brown, medium to high plasticity	M	St					
					0.5									TP01-0.5		
					1.0				**TP01 terminated @ 1.0m**							

T+T DATATEMPLATE.GDT pdb

Log Scale 1:7.5

EXCAVATION-ENVIRONMENTAL 2781.002.GPJ 26/9/16

Tonkin+Taylor

TONKIN & TAYLOR PTY LTD

EXCAVATION LOG

EXCAVATION No: TP02
Location: Refer to Site Plan

SHEET 1 OF 1

PROJECT: Additional Contamination Investigation	LOCATION: Waverley Golf Course	JOB No: 2781.002

CO-ORDINATES:	EXPOSURE TYPE: Test Pit	EXCAV. STARTED:	4/8/16
	EQUIPMENT: Backhoe	EXCAV FINISHED:	4/8/16
R.L. m	OPERATOR: Hire	LOGGED BY:	PDB
DATUM	DIMENSIONS: 0.5 m x 1.0 m	CHECKED BY:	TOM

EXCAVATION						ENGINEERING DESCRIPTION						FIELD TESTING		LABORATORY TESTS		
METHOD	PENETRATION 1 2 3	SUPPORT	WATER	R.L. (m)	DEPTH (m)	GEOLOGICAL UNIT	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITIONS / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	FIELD RECORDS/ COMMENTS	CONTAMINATION INDICATORS (ODOURS, STAINING, IMPORTED FILL, ASH, SEPARATE PHASE LIQUIDS)	SAMPLES, TESTS	MC (%)	PID (ppm)
									Sandy CLAY, brown, low plasticity with fine grained sand	M	S			TP02-0.1		
									CLAY, brown to light brown, medium to high plasticity	M	St					
					0.5									TP02-0.5		
					1.0				**TP02 terminated @ 1.0 m**							

T+T DATATEMPLATE.GDT pdb

Log Scale 1:7.5

EXCAVATION-ENVIRONMENTAL 2781.002.GPJ 26/9/16

Tonkin+Taylor

TONKIN & TAYLOR PTY LTD

EXCAVATION LOG

EXCAVATION No: TP03
Location: Refer to Site Plan

SHEET 1 OF 1

PROJECT: Additional Contamination Investigation	LOCATION: Waverley Golf Course	JOB No: 2781.002

CO-ORDINATES:	EXPOSURE TYPE: Test Pit	EXCAV. STARTED:	4/8/16
	EQUIPMENT: Backhoe	EXCAV FINISHED:	4/8/16
R.L. m	OPERATOR: Hire	LOGGED BY:	PDB
DATUM	DIMENSIONS: 0.5 m x 1.0 m	CHECKED BY:	TOM

EXCAVATION						ENGINEERING DESCRIPTION						FIELD TESTING		LABORATORY TESTS		
METHOD	PENETRATION 1 2 3	SUPPORT	WATER	R.L. (m)	DEPTH (m)	GEOLOGICAL UNIT	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITIONS / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	FIELD RECORDS/ COMMENTS	CONTAMINATION INDICATORS (ODOURS, STAINING, IMPORTED FILL, ASH, SEPARATE PHASE LIQUIDS)	SAMPLES, TESTS	MC (%)	PID (ppm)
									Sandy CLAY, brown, low plasticity with fine grained sand	M	S			TP03-0.1		
									CLAY, brown to light brown, medium to high plasticity	M	St					
					0.5									TP03-0.5		
					1.0				**TP03 terminated @ 1.0 m**							

T+T DATATEMPLATE.GDT pdb

Log Scale 1:7.5

EXCAVATION-ENVIRONMENTAL 2781.002.GPJ 26/9/16

Tonkin+Taylor

TONKIN & TAYLOR PTY LTD

EXCAVATION LOG

EXCAVATION No: TP04
Location: Refer to Site Plan

SHEET 1 OF 1

PROJECT: Additional Contamination Investigation	LOCATION: Waverley Golf Course	JOB No: 2781.002

CO-ORDINATES:		EXPOSURE TYPE:	Test Pit	EXCAV. STARTED:	4/8/16
		EQUIPMENT:	Backhoe	EXCAV FINISHED:	4/8/16
R.L.	m	OPERATOR:	Hire	LOGGED BY:	PDB
DATUM		DIMENSIONS:	0.5 m x 1.0 m	CHECKED BY:	TOM

EXCAVATION							ENGINEERING DESCRIPTION					FIELD TESTING		LABORATORY TESTS		
METHOD	PENETRATION 1 2 3	SUPPORT	WATER	R.L. (m)	DEPTH (m)	GEOLOGICAL UNIT	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITIONS / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	FIELD RECORDS/ COMMENTS	CONTAMINATION INDICATORS (ODOURS, STAINING, IMPORTED FILL, ASH, SEPARATE PHASE LIQUIDS)	SAMPLES, TESTS	MC (%)	PID (ppm)
									Sandy CLAY, brown, low plasticity with fine grained sand	M	S			TP04-0.1		
									CLAY, brown to light brown, medium to high plasticity	M	St					
					0.5									TP04-0.5		
					1.0				**TP04 terminated @ 1.0 m**							

T+T DATATEMPLATE.GDT pdb

Log Scale 1:7.5 EXCAVATION-ENVIRONMENTAL 2781.002.GPJ 26/9/16

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Appendix C: Tabulated Analytical Results

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Table 1: Soil Results Summary

Hume Keysborough Pty Ltd - Waverley Golf Course

									Sample ID	DAM01	DAM02	DAM03	DAM04	GR01	GR03	GR05	GR07	GR09	GR11	GR13	GR15	GR17	HA01.1-0.05	HA09-0.1	HA1.2-0.05	HA1.3-0.05	HA1.4-0.05	HA10-0.1
									Lab Report No.	510630	510630	510630	510630	510630	510630	510630	510630	510630	510630	510630	510630	510630	510630	510630	510630	510630	510630
									Date	4/08/2016	4/08/2016	4/08/2016	4/08/2016	3/08/2016	3/08/2016	3/08/2016	3/08/2016	3/08/2016	3/08/2016	3/08/2016	3/08/2016	3/08/2016	4/08/2016	3/08/2016	4/08/2016	4/08/2016	4/08/2016	3/08/2016
				EPA IWRG 621 Category B Upper limits - TC2	EPA IWRG 621 Category C Upper limits - TC1	EPA IWRG 621 Fill Material Upper Limit(s)	NEPM 2013 Residential A Soil HIL & HSL	NEPM 2013 Urban residential and public open space, Fine Soil EIL & ESL																				
Chem_Group	ChemName	Units	EQL																									
	Monocylic aromatic hydrocarbons as per IWRG621	mg/kg		240	70	7			-	-	-	-	-	-	-	-	-	-	-	-	-	<0.6	-	<0.6	<0.6	<0.6	<0.6
	Organochlorine pesticides as per IWRG621	mg/kg				1			<1	<1	<1	<1	-	-	-	-	-	-	-	-	-	-	<1	-	-	-	-
	Other organochlorine pesticides as per IWRG621	mg/kg		50	10	-			<0.75	<0.75	<0.75	<0.75	-	-	-	-	-	-	-	-	-	-	<0.75	-	-	-	-
	Phenols (non-halogenated) as per IWRG621	mg/kg		2200	560	60			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	-	-	-	-
	Polycylic aromatic hydrocarbons as per IWRG621	mg/kg							-	-	-	-	-	-	-	-	-	-	-	-	-	<7.5	-	<7.5	<7.5	<7.5	<7.5
	Tokuthion	mg/kg	0.2						<0.2	<0.2	<0.2	<0.2	-	-	-	-	-	-	-	-	-	-	<0.2	-	-	-	-
BTEX	Benzene	mg/kg	0.1	16	4	1	0.6	65	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	-	<0.1	<0.1	<0.1	<0.1
	Ethylbenzene	mg/kg	0.1					125	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	-	<0.1	<0.1	<0.1	<0.1
	Toluene	mg/kg	0.1				390	105	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	-	<0.1	<0.1	<0.1	<0.1
	Xylene (m & p)	mg/kg	0.2						-	-	-	-	-	-	-	-	-	-	-	-	-	<0.2	-	<0.2	<0.2	<0.2	<0.2
	Xylene (o)	mg/kg	0.1						-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	-	<0.1	<0.1	<0.1	<0.1
	Xylene Total	mg/kg	0.3				95	45	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.3	-	<0.3	<0.3	<0.3	<0.3
	C6-C10 less BTEX (F1)	mg/kg	20						-	-	-	-	-	-	-	-	-	-	-	-	-	<20	-	<20	<20	<20	<20
Halogenated Benzenes	Hexachlorobenzene	mg/kg	0.05				10		<0.05	<0.05	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	<0.05	-	-	-	-
Herbicides	2,4,5-Trichlorophenoxy Acetic Acid	mg/kg	0.5				600		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-	-	-
	2,4,5-TP (Silvex)	mg/kg	0.5						<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-	-	-
	Hedonal	mg/kg	0.5				900		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-	-	-
	2,4-Dichlorprop	mg/kg	0.5						<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-	-	-
	4-(2,4-Dichlorophenoxy)butyric Acid (2,4-DB)	mg/kg	0.5						<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-	-	-
	Dicamba	mg/kg	0.5						<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-	-	-
	Dinoseb	mg/kg	0.5						<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-	-	-
	2-Methyl-4-chlorophenoxyacetic acid	mg/kg	0.5				600		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-	-	-
	2-Methyl-4-Chlorophenoxy Butanoic Acid	mg/kg	0.5				600		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-	-	-
	Mecoprop	mg/kg	0.5				600		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-	-	-
Inorganics	Moisture Content (dried @ 103°C)	%	1						32	32	20	24	14	21	20	7.6	8.4	13	16	18	10	26	21	26	28	18	16
Lead	Lead	mg/kg	5	6000	1500	300	300	1100	13	25	9.4	17	-	-	-	-	-	-	-	-	-	-	11	-	-	-	9.4
Metals	Arsenic	mg/kg	2	2000	500	20	100	100	11	4.4	3.7	5.7	-	-	-	-	-	-	-	-	-	-	7	-	-	-	3.3
	Cadmium	mg/kg	0.4	400	100	3	20		<0.4	<0.4	<0.4	<0.4	-	-	-	-	-	-	-	-	-	-	<0.4	-	-	-	<0.4
	Chromium (III+VI)	mg/kg	5						34	25	17	38	-	-	-	-	-	-	-	-	-	-	48	-	-	-	20
	Copper	mg/kg	5	20000	5000	100	6000	830	6.5	<5	<5	15	-	-	-	-	-	-	-	-	-	-	27	-	-	-	13
	Mercury	mg/kg	0.1	300	75	1	40		<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	<0.1	-	-	-	<0.1
	Molybdenum	mg/kg	5	4000	1000	40			<5	<5	<5	<5	-	-	-	-	-	-	-	-	-	-	<5	-	-	-	<5
	Nickel	mg/kg	5	12000	3000	60	400	50	10	<5	<5	<5	-	-	-	-	-	-	-	-	-	-	12	-	-	-	7.6
	Selenium	mg/kg	2	200	50	10	200		<2	<2	<2	<2	-	-	-	-	-	-	-	-	-	-	<2	-	-	-	<2
	Silver	mg/kg	0.2	720	180	10			<0.2	<0.2	<0.2	<0.2	-	-	-	-	-	-	-	-	-	-	<0.2	-	-	-	<0.2
	Tin	mg/kg	10		500	50			<10	<10	<10	<10	-	-	-	-	-	-	-	-	-	-	<10	-	-	-	<10
	Zinc	mg/kg	5	140000	35000	200	7400	230	37	18	<5	28	-	-	-	-	-	-	-	-	-	-	20	-	-	-	21
Organochlorine Pesticides	4,4-DDE	mg/kg	0.05						<0.05	<0.05	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	<0.05	-	-	-	-
	a-BHC	mg/kg	0.05						<0.05	<0.05	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	<0.05	-	-	-	-
	Aldrin	mg/kg	0.05						<0.05	<0.05	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	<0.05	-	-	-	-
	Aldrin + Dieldrin	mg/kg		4.8	1.2		6		<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	<0.1	-	-	-	-
	b-BHC	mg/kg	0.05						<0.05	<0.05	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	<0.05	-	-	-	-
	chlordane	mg/kg	0.1	16	4		50		<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	<0.1	-	-	-	-
	d-BHC	mg/kg	0.05						<0.05	<0.05	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	<0.05	-	-	-	-
	DDD	mg/kg	0.05					180	<0.05	<0.05	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	<0.05	-	-	-	-
	DDT	mg/kg	0.05						<0.05	<0.05	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	<0.05	-	-	-	-
	DDT+DDE+DDD	mg/kg		50	50		240		<0.15	<0.15	<0.15	<0.15	-	-	-	-	-	-	-	-	-	-	<0.15	-	-	-	-
	Dieldrin	mg/kg	0.05						<0.05	<0.05	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	<0.05	-	-	-	-
	Endosulfan I	mg/kg	0.05						<0.05	<0.05	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	<0.05	-	-	-	-
	Endosulfan II	mg/kg	0.05						<0.05	<0.05	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	<0.05	-	-	-	-
	Endosulfan sulphate	mg/kg	0.05						<0.05	<0.05	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	<0.05	-	-	-	-
	Endrin	mg/kg	0.05				10		<0.05	<0.05	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	<0.05	-	-	-	-
	Endrin aldehyde	mg/kg	0.05						<0.05	<0.05	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	<0.05	-	-	-	-
	Endrin ketone	mg/kg	0.05						<0.05	<0.05	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	<0.05	-	-	-	-
	g-BHC (Lindane)	mg/kg	0.05						<0.05	<0.05	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	<0.05	-	-	-	-
	Heptachlor	mg/kg	0.05	4.8	1.2		6		<0.05	<0.05	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	<0.05	-	-	-	-
	Heptachlor epoxide	mg/kg	0.05						<0.05	<0.05	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	<0.05	-	-	-	-
	Methoxychlor	mg/kg	0.05				300		<0.05	<0.05	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	<0.05	-	-	-	-
	Toxaphene	mg/kg	1				20		<1	<1	<1	<1	-	-	-	-	-	-	-	-	-	-	<1	-	-	-	-
Organophosphorous Pesticides	Azinophos methyl	mg/kg	0.2						<0.2	<0.2	<0.2	<0.2	-	-	-	-	-	-	-	-	-	-	<0.2	-	-	-	-
	Bolstar (Sulprofos)	mg/kg	0.2						<0.2	<0.2	<0.2	<0.2	-	-	-	-	-	-	-	-	-	-	<0.2	-	-	-	-
	Chlorfenvinphos	mg/kg	0.2						<0.2	<0.2	<0.2	<0.2	-	-	-	-	-	-	-	-	-	-	<0.2	-	-	-	-
	Chlorpyrifos	mg/kg	0.2				160		<0.2	<0.2	<0.2	<0.2	-	-	-	-	-	-	-	-	-	-	<0.2	-	-	-	-
	Chlorpyrifos-methyl	mg/kg	0.2						<0.2	<0.2	<0.2	<0.2	-	-	-	-	-	-	-	-	-	-	<0.2	-	-	-	-
	Coumaphos	mg/kg	2						<2	<2	<2	<2	-	-	-	-	-	-	-	-	-	-	<2	-	-	-	-
	Demeton-O	mg/kg	0.2						<0.2	<0.2	<0.2	<0.2	-	-	-	-	-	-	-	-	-	-	<0.2	-	-	-	-
	Demeton-S	mg/kg	0.2						<0.2	<0.2	<0.2	<0.2	-	-	-	-	-	-	-	-	-	-	<0.2	-	-	-	-
	Diazinon	mg/kg	0.2						<0.2	<0.2	<0.2	<0.2	-	-	-	-	-	-	-	-	-	-	<0.2	-	-	-	-
	Dichlorvos	mg/kg	0.2						<0.2	<0.2	<0.2	<0.2	-	-	-	-	-	-	-	-	-	-	<0.2	-	-	-	-
	Dimethoate	mg/kg	0.2						<0.2	<0.2	<0.2	<0.2	-	-	-	-	-	-	-	-	-	-	<0.2	-	-	-	-
	Disulfoton	mg/kg	0.2						<0.2	<0.2	<0.2	<0.2	-	-	-	-	-	-	-	-	-	-	<0.2	-	-	-	-
	Ethion	mg/kg	0.2						<0.2	<0.2	<0.2	<0.2	-	-	-	-	-	-	-	-	-	-	<0.2	-	-	-	-
	Ethoprop	mg/kg	0.2						<0.2	<0.2	<0.2	<0.2	-	-	-	-	-	-	-	-	-	-	<0.2	-	-	-	-
	Fenitrothion	mg/kg	0.2						<0.2	<0.2	<0.2	<0.2	-	-	-	-	-	-	-	-	-	-	<0.2	-	-	-	-
	Fensulfothion	mg/kg	0.2						<0.2	<0.2	<0.2	<0.2	-	-	-	-	-	-	-	-	-	-	<0.2	-	-	-	-
	Fenthion	mg/kg	0.2						<0.2	<0.2	<0.2	<0.2	-	-	-	-	-	-	-	-	-	-	<0.2	-	-	-	-
	Malathion	mg/kg	0.2						<0.2	<0.2	<0.2	<0.2	-	-	-	-	-	-	-	-	-	-	<0.2	-	-	-	-
	Merphos	mg/kg	0.2						<0.2	<0.2	<0.2	<0.2	-	-	-	-	-	-	-	-	-	-	<0.2	-	-	-	-
	Methyl parathion	mg/kg	0.2						<0.2	<0.2	<0.2	<0.2	-	-	-	-	-	-	-	-	-	-	<0.2	-	-	-	-
	Mevinphos (Phosdrin)	mg/kg	0.2						<0.2	<0.2	<0.2	<0.2	-	-	-	-	-	-	-	-	-	-	<0.2	-	-	-	-

Table 1: Soil Results Summary

Hume Keysborough Pty Ltd - Waverley Golf Course

									Sample ID	DAM01	DAM02	DAM03	DAM04	GR01	GR03	GR05	GR07	GR09	GR11	GR13	GR15	GR17	HA01.1-0.05	HA09-0.1	HA1.2-0.05	HA1.3-0.05	HA1.4-0.05	HA10-0.1
									Lab Report No.	510630	510630	510630	510630	510630	510630	510630	510630	510630	510630	510630	510630	510630	510630	510630	510630	510630	510630	510630
									Date	4/08/2016	4/08/2016	4/08/2016	4/08/2016	3/08/2016	3/08/2016	3/08/2016	3/08/2016	3/08/2016	3/08/2016	3/08/2016	3/08/2016	3/08/2016	4/08/2016	3/08/2016	4/08/2016	4/08/2016	4/08/2016	3/08/2016
				EPA IWRG 621 Category B Upper limits - TC2	EPA IWRG 621 Category C Upper limits - TC1	EPA IWRG 621 Fill Material Upper Limit(s)	NEPM 2013 Residential A Soil HIL & HSL	NEPM 2013 Urban residential and public open space, Fine Soil EIL & ESL																					
Chem_Group	ChemName	Units	EQL																										
	Monocrotophos	mg/kg	2						<2	<2	<2	<2	-	-	-	-	-	-	-	-	-	-	-	<2	-	-	-	-
	Naled (Dibrom)	mg/kg	0.2						<0.2	<0.2	<0.2	<0.2	-	-	-	-	-	-	-	-	-	-	-	<0.2	-	-	-	-
	Omethoate	mg/kg	2						<2	<2	<2	<2	-	-	-	-	-	-	-	-	-	-	-	<2	-	-	-	-
	Phorate	mg/kg	0.2						<0.2	<0.2	<0.2	<0.2	-	-	-	-	-	-	-	-	-	-	-	<0.2	-	-	-	-
	Pyrazophos	mg/kg	0.2						<0.2	<0.2	<0.2	<0.2	-	-	-	-	-	-	-	-	-	-	-	<0.2	-	-	-	-
	Ronnel	mg/kg	0.2						<0.2	<0.2	<0.2	<0.2	-	-	-	-	-	-	-	-	-	-	-	<0.2	-	-	-	-
	Terbufos	mg/kg	0.2						<0.2	<0.2	<0.2	<0.2	-	-	-	-	-	-	-	-	-	-	-	<0.2	-	-	-	-
	Trichloronate	mg/kg	0.2						<0.2	<0.2	<0.2	<0.2	-	-	-	-	-	-	-	-	-	-	-	<0.2	-	-	-	-
	Tetrachlorvinphos	mg/kg	0.2						<0.2	<0.2	<0.2	<0.2	-	-	-	-	-	-	-	-	-	-	-	<0.2	-	-	-	-
Other	Actril (Ioxynil)	mg/kg	0.5						<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-	-	-
PAH	Benzo[b+j]fluoranthene	mg/kg	0.5						-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.5	-	<0.5	<0.5	<0.5	<0.5
	Benzo(a)pyrene TEQ (lower bound) *	MG/KG	0.5						-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.5	-	<0.5	<0.5	<0.5	<0.5
	Benzo(a)pyrene TEQ (medium bound) *	MG/KG	0.5						-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.6	-	0.6	0.6	0.6	0.6
	Benzo(a)pyrene TEQ (upper bound) *	MG/KG	0.5						-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.2	-	1.2	1.2	1.2	1.2
PAH/Phenols	4,6-Dinitro-2-methylphenol	mg/kg	0.5						<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-	-	-
	Acenaphthene	mg/kg	0.5						-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.5	-	<0.5	<0.5	<0.5	<0.5
	Acenaphthylene	mg/kg	0.5						-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.5	-	<0.5	<0.5	<0.5	<0.5
	Anthracene	mg/kg	0.5						-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.5	-	<0.5	<0.5	<0.5	<0.5
	Benz(a)anthracene	mg/kg	0.5						-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.5	-	<0.5	<0.5	<0.5	<0.5
	Benzo(a) pyrene	mg/kg	0.5	20	5	1		0.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.5	-	<0.5	<0.5	<0.5	<0.5
	Benzo(g,h,i)perylene	mg/kg	0.5						-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.5	-	<0.5	<0.5	<0.5	<0.5
	Carcinogenic PAHs as B(a)P TPE	mg/kg					3		-	-	-	-	-	-	-	-	-	-	-	-	-	-	<1.21	-	<1.21	<1.21	<1.21	<1.21
	Benzo(k)fluoranthene	mg/kg	0.5						-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.5	-	<0.5	<0.5	<0.5	<0.5
	Chrysene	mg/kg	0.5						-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.5	-	<0.5	<0.5	<0.5	<0.5
	Dibenz(a,h)anthracene	mg/kg	0.5						-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.5	-	<0.5	<0.5	<0.5	<0.5
	Fluoranthene	mg/kg	0.5						-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.5	-	<0.5	<0.5	<0.5	<0.5
	Fluorene	mg/kg	0.5						-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.5	-	<0.5	<0.5	<0.5	<0.5
	Indeno(1,2,3-c,d)pyrene	mg/kg	0.5						-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.5	-	<0.5	<0.5	<0.5	<0.5
	Naphthalene	mg/kg	0.5				4	170	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.5	-	<0.5	<0.5	<0.5	<0.5
	PAHs (Sum of total)	mg/kg	0.5	400	100	20	300		-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.5	-	<0.5	<0.5	<0.5	<0.5
	Phenanthrene	mg/kg	0.5						-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.5	-	<0.5	<0.5	<0.5	<0.5
	Pyrene	mg/kg	0.5						-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.5	-	<0.5	<0.5	<0.5	<0.5
Pesticides	Parathion	mg/kg	0.2						<0.2	<0.2	<0.2	<0.2	-	-	-	-	-	-	-	-	-	-	-	<0.2	-	-	-	-
	Pirimiphos-methyl	mg/kg	0.2						<0.2	<0.2	<0.2	<0.2	-	-	-	-	-	-	-	-	-	-	-	<0.2	-	-	-	-
SVOCs	EPN	mg/kg	0.2						<0.2	<0.2	<0.2	<0.2	-	-	-	-	-	-	-	-	-	-	-	<0.2	-	-	-	-
TPH	C10-C16	mg/kg	50				230	120	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<50	-	<50	<50	<50	<50
	C16-C34	mg/kg	100					1300	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<100	-	<100	<100	<100	<100
	C34-C40	mg/kg	100					5600	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<100	-	<100	<100	<100	<100
	F2-NAPHTHALENE	mg/kg	50						-	-	-	-	-	-	-	-	-	-	-	-	-	-	<50	-	<50	<50	<50	<50
	C6 - C9	mg/kg	20	2600	650	100			-	-	-	-	-	-	-	-	-	-	-	-	-	-	<20	-	<20	<20	<20	<20
	C10 - C14	mg/kg	20						-	-	-	-	-	-	-	-	-	-	-	-	-	-	<20	-	<20	<20	<20	<20
	C15 - C28	mg/kg	50						-	-	-	-	-	-	-	-	-	-	-	-	-	-	<50	-	<50	<50	50	<50
	C29-C36	mg/kg	50						-	-	-	-	-	-	-	-	-	-	-	-	-	-	<50	-	<50	<50	67	<50
	+C10 - C36 (Sum of total)	mg/kg	50	40000	10000	1000			-	-	-	-	-	-	-	-	-	-	-	-	-	-	<50	-	<50	<50	117	<50
	C6-C10	mg/kg	20				40	180	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<20	-	<20	<20	<20	<20

Table 1: Soil Results Summary

Hume Keysborough Pty Ltd - Waverley Golf Course

								Sample ID	HA11-0.1	HA4.1-0.05	HA4.2-0.05	HA4.3-0.05	HA4.4-0.05	HA4.5-0.05	HA4.6-0.05	TE02	TE04	TE06	TE08	TE10	TE12	TE14	TE16	TE18
								Lab Report No.	510630	510630	510630	510630	510630	510630	510630	510630	510630	510630	510630	510630	510630	510630	510630	510630
								Date	3/08/2016	3/08/2016	3/08/2016	3/08/2016	3/08/2016	3/08/2016	3/08/2016	3/08/2016	3/08/2016	3/08/2016	3/08/2016	3/08/2016	3/08/2016	3/08/2016	3/08/2016	3/08/2016
				EPA IWRG 621 Category B Upper limits - TC2	EPA IWRG 621 Category C Upper limits - TC1	EPA IWRG 621 Fill Material Upper Limit(s)	NEPM 2013 Residential A Soil HIL & HSL	NEPM 2013 Urban residential and public open space, Fine Soil EIL & ESL																
Chem_Group	**ChemName**	**Units**	**EQL**																					
	Monocylic aromatic hydrocarbons as per IWRG621	mg/kg		240	70	7			<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	-	-	-	-	-	-	-	-	-
	Organochlorine pesticides as per IWRG621	mg/kg				1			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Other organochlorine pesticides as per IWRG621	mg/kg		50	10				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Phenols (non-halogenated) as per IWRG621	mg/kg		2200	560	60			-	-	-	-	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1
	Polycylic aromatic hydrocarbons as per IWRG621	mg/kg							<7.5	<7.5	<7.5	<7.5	<7.5	<7.5	<7.5	-	-	-	-	-	-	-	-	-
	Tokuthion	mg/kg	0.2						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BTEX	Benzene	mg/kg	0.1	16	4	1	0.6	65	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-
	Ethylbenzene	mg/kg	0.1					125	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-
	Toluene	mg/kg	0.1				390	105	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-
	Xylene (m & p)	mg/kg	0.2						<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	-	-	-	-	-	-	-	-	-
	Xylene (o)	mg/kg	0.1						<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-
	Xylene Total	mg/kg	0.3				95	45	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	-	-	-	-	-	-	-	-	-
	C6-C10 less BTEX (F1)	mg/kg	20						<20	<20	<20	<20	<20	<20	<20	-	-	-	-	-	-	-	-	-
Halogenated Benzenes	Hexachlorobenzene	mg/kg	0.05				10		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Herbicides	2,4,5-Trichlorophenoxy Acetic Acid	mg/kg	0.5				600		-	-	-	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	2,4,5-TP (Silvex)	mg/kg	0.5						-	-	-	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	Hedonal	mg/kg	0.5				900		-	-	-	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	2,4-Dichlorprop	mg/kg	0.5						-	-	-	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	4-(2,4-Dichlorophenoxy)butyric Acid (2,4-DB)	mg/kg	0.5						-	-	-	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	Dicamba	mg/kg	0.5						-	-	-	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	Dinoseb	mg/kg	0.5						-	-	-	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	2-Methyl-4-chlorophenoxyacetic acid	mg/kg	0.5				600		-	-	-	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	2-Methyl-4-Chlorophenoxy Butanoic Acid	mg/kg	0.5				600		-	-	-	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	Mecoprop	mg/kg	0.5				600		-	-	-	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Inorganics	Moisture Content (dried @ 103°C)	%	1						17	21	23	19	18	17	16	14	12	11	10	14	16	15	4.3	15
Lead	Lead	mg/kg	5	6000	1500	300	300	1100	8.2	11	16	18	15	12	13	-	-	-	-	-	-	-	-	-
Metals	Arsenic	mg/kg	2	2000	500	20	100	100	2.3	<2	3.9	3.2	6.6	7.3	5.3	-	-	-	-	-	-	-	-	-
	Cadmium	mg/kg	0.4	400	100	3	20		<0.4	<0.4	<0.4	1.8	<0.4	<0.4	<0.4	-	-	-	-	-	-	-	-	-
	Chromium (III+VI)	mg/kg	5						15	11	29	16	15	16	17	-	-	-	-	-	-	-	-	-
	Copper	mg/kg	5	20000	5000	100	6000	830	11	<5	<5	<5	<5	<5	<5	-	-	-	-	-	-	-	-	-
	Mercury	mg/kg	0.1	300	75	1	40		<0.1	<0.1	<0.1	0.6	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-
	Molybdenum	mg/kg	5	4000	1000	40			<5	<5	<5	<5	<5	<5	<5	-	-	-	-	-	-	-	-	-
	Nickel	mg/kg	5	12000	3000	60	400	50	6.2	<5	<5	<5	<5	<5	<5	-	-	-	-	-	-	-	-	-
	Selenium	mg/kg	2	200	50	10	200		<2	<2	<2	<2	<2	<2	<2	-	-	-	-	-	-	-	-	-
	Silver	mg/kg	0.2	720	180	10			<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	-	-	-	-	-	-	-	-	-
	Tin	mg/kg	10		500	50			<10	<10	<10	<10	<10	<10	<10	-	-	-	-	-	-	-	-	-
	Zinc	mg/kg	5	140000	35000	200	7400	230	18	16	20	11	14	13	15	-	-	-	-	-	-	-	-	-
Organochlorine Pesticides	4,4-DDE	mg/kg	0.05						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	a-BHC	mg/kg	0.05						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Aldrin	mg/kg	0.05						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Aldrin + Dieldrin	mg/kg		4.8	1.2		6		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	b-BHC	mg/kg	0.05						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	chlordane	mg/kg	0.1	16	4		50		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	d-BHC	mg/kg	0.05						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	DDD	mg/kg	0.05					180	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	DDT	mg/kg	0.05						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	DDT+DDE+DDD	mg/kg		50	50		240		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Dieldrin	mg/kg	0.05						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Endosulfan I	mg/kg	0.05						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Endosulfan II	mg/kg	0.05						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Endosulfan sulphate	mg/kg	0.05						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Endrin	mg/kg	0.05				10		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Endrin aldehyde	mg/kg	0.05						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Endrin ketone	mg/kg	0.05						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	g-BHC (Lindane)	mg/kg	0.05						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Heptachlor	mg/kg	0.05	4.8	1.2		6		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Heptachlor epoxide	mg/kg	0.05						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Methoxychlor	mg/kg	0.05				300		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Toxaphene	mg/kg	1				20		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Organophosphorous Pesticides	Azinophos methyl	mg/kg	0.2						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Bolstar (Sulprofos)	mg/kg	0.2						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Chlorfenvinphos	mg/kg	0.2						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Chlorpyrifos	mg/kg	0.2				160		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Chlorpyrifos-methyl	mg/kg	0.2						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Coumaphos	mg/kg	2						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Demeton-O	mg/kg	0.2						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Demeton-S	mg/kg	0.2						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Diazinon	mg/kg	0.2						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Dichlorvos	mg/kg	0.2						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Dimethoate	mg/kg	0.2						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Disulfoton	mg/kg	0.2						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Ethion	mg/kg	0.2						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Ethoprop	mg/kg	0.2						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Fenitrothion	mg/kg	0.2						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Fensulfothion	mg/kg	0.2						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Fenthion	mg/kg	0.2						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Malathion	mg/kg	0.2						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Merphos	mg/kg	0.2						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Methyl parathion	mg/kg	0.2						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Mevinphos (Phosdrin)	mg/kg	0.2						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 1: Soil Results Summary

Hume Keysborough Pty Ltd - Waverley Golf Course

									Sample ID	HA11-0.1	HA4.1-0.05	HA4.2-0.05	HA4.3-0.05	HA4.4-0.05	HA4.5-0.05	HA4.6-0.05	TEE02	TEE04	TEE06	TEE08	TEE10	TEE12	TEE14	TEE16	TEE18
									Lab Report No.	510630	510630	510630	510630	510630	510630	510630	510630	510630	510630	510630	510630	510630	510630	510630	510630
									Date	3/08/2016	3/08/2016	3/08/2016	3/08/2016	3/08/2016	3/08/2016	3/08/2016	3/08/2016	3/08/2016	3/08/2016	3/08/2016	3/08/2016	3/08/2016	3/08/2016	3/08/2016	3/08/2016
				EPA IWRG 621 Category B Upper limits - TC2	EPA IWRG 621 Category C Upper limits - TC1	EPA IWRG 621 Fill Material Upper Limit(s)	NEPM 2013 Residential A Soil HIL & HSL	NEPM 2013 Urban residential and public open space, Fine Soil EIL & ESL																	
Chem_Group	ChemName	Units	EQL																						
	Monocrotophos	mg/kg	2						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Naled (Dibrom)	mg/kg	0.2						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Omethoate	mg/kg	2						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Phorate	mg/kg	0.2						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Pyrazophos	mg/kg	0.2						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Ronnel	mg/kg	0.2						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Terbufos	mg/kg	0.2						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Trichloronate	mg/kg	0.2						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Tetrachlorvinphos	mg/kg	0.2						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other	Actril (Ioxynil)	mg/kg	0.5						-	-	-	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
PAH	Benzo[b+j] fluoranthene	mg/kg	0.5						<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-	-	-	-	-	-	-
	Benzo(a)pyrene TEQ (lower bound) *	MG/KG	0.5						<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-	-	-	-	-	-	-
	Benzo(a)pyrene TEQ (medium bound) *	MG/KG	0.5						0.6	0.6	0.6	0.6	0.6	0.6	0.6	-	-	-	-	-	-	-	-	-	-
	Benzo(a)pyrene TEQ (upper bound) *	MG/KG	0.5						1.2	1.2	1.2	1.2	1.2	1.2	1.2	-	-	-	-	-	-	-	-	-	-
PAH/Phenols	4,6-Dinitro-2-methylphenol	mg/kg	0.5						-	-	-	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	Acenaphthene	mg/kg	0.5						<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-	-	-	-	-	-	-
	Acenaphthylene	mg/kg	0.5						<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-	-	-	-	-	-	-
	Anthracene	mg/kg	0.5						<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-	-	-	-	-	-	-
	Benz[a]anthracene	mg/kg	0.5						<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-	-	-	-	-	-	-
	Benzo(a) pyrene	mg/kg	0.5	20	5	1		0.7	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-	-	-	-	-	-	-
	Benzo(g,h,i)perylene	mg/kg	0.5						<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-	-	-	-	-	-	-
	Carcinogenic PAHs as B(a)P TPE	mg/kg					3		<1.21	<1.21	<1.21	<1.21	<1.21	<1.21	<1.21	-	-	-	-	-	-	-	-	-	-
	Benzo(k)fluoranthene	mg/kg	0.5						<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-	-	-	-	-	-	-
	Chrysene	mg/kg	0.5						<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-	-	-	-	-	-	-
	Dibenz(a,h)anthracene	mg/kg	0.5						<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-	-	-	-	-	-	-
	Fluoranthene	mg/kg	0.5						<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-	-	-	-	-	-	-
	Fluorene	mg/kg	0.5						<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-	-	-	-	-	-	-
	Indeno(1,2,3-c,d)pyrene	mg/kg	0.5						<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-	-	-	-	-	-	-
	Naphthalene	mg/kg	0.5				4	170	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-	-	-	-	-	-	-
	PAHs (Sum of total)	mg/kg	0.5	400	100	20	300		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-	-	-	-	-	-	-
	Phenanthrene	mg/kg	0.5						<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-	-	-	-	-	-	-
	Pyrene	mg/kg	0.5						<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-	-	-	-	-	-	-
Pesticides	Parathion	mg/kg	0.2						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Pirimiphos-methyl	mg/kg	0.2						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SVOCs	EPN	mg/kg	0.2						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TPH	C10-C16	mg/kg	50				230	120	<50	<50	<50	<50	<50	<50	<50	-	-	-	-	-	-	-	-	-	-
	C16-C34	mg/kg	100					1300	<100	<100	120	<100	<100	<100	<100	-	-	-	-	-	-	-	-	-	-
	C34-C40	mg/kg	100					5600	<100	<100	<100	<100	<100	<100	<100	-	-	-	-	-	-	-	-	-	-
	F2-NAPHTHALENE	mg/kg	50						<50	<50	<50	<50	<50	<50	<50	-	-	-	-	-	-	-	-	-	-
	C6 - C9	mg/kg	20	2600	650	100			<20	<20	<20	<20	<20	<20	<20	-	-	-	-	-	-	-	-	-	-
	C10 - C14	mg/kg	20						<20	<20	53	<20	<20	<20	<20	-	-	-	-	-	-	-	-	-	-
	C15 - C28	mg/kg	50						<50	<50	90	<50	<50	<50	<50	-	-	-	-	-	-	-	-	-	-
	C29-C36	mg/kg	50						<50	<50	<50	80	<50	<50	<50	-	-	-	-	-	-	-	-	-	-
	+C10 - C36 (Sum of total)	mg/kg	50	40000	10000	1000			<50	<50	143	80	<50	<50	<50	-	-	-	-	-	-	-	-	-	-
	C6-C10	mg/kg	20				40	180	<20	<20	<20	<20	<20	<20	<20	-	-	-	-	-	-	-	-	-	-

Table 2: Dam water results summary

Hume Keysborough Pty Ltd - Waverley Golf Course

				Field_ID	DAM01	DAM02	DAM03	DAM04
				Sampled_Date-Time	4/08/2016	4/08/2016	4/08/2016	4/08/2016
				Lab_Report_Number	510630	510630	510630	510630
				ANZECC 2000 FW 95%				
Chem_Group	**ChemName**	**Units**	**EQL**					
Inorganic	Nitrate & Nitrite (as N)	MG/L	0.05		0.72	0.16	1.1	0.14
Halogenated Benzenes	Hexachlorobenzene	µg/L	0.1		<0.1	<0.1	<0.1	<0.1
Inorganics	Alkalinity (Bicarbonate as CaCO3)	mg/L	20		140	120	59	73
	Alkalinity (Carbonate as CaCO3)	mg/L	10		<10	<10	<10	<10
	Ammonia as N	µg/L	10		<10	340	190	60
	Chloride	mg/L	1		33	33	27	24
	Kjeldahl Nitrogen Total	mg/L	0.2		1	1.3	1.1	1
	Nitrate (as N)	mg/L	0.02		0.72	0.16	1.1	0.12
	Nitrogen (Total)	µg/L	200		1700	1500	2200	1100
	pH (Lab)	pH_Units	0.1		8	8	7.4	7.2
	Phosphate total (P)	mg/L	0.05		<0.05	<0.05	<0.05	<0.05
	Sodium	mg/L	0.5		240	240	180	170
	Sulphate as S	mg/L	5		19	9.5	12	<5
	TDS	mg/L	10		270	220	190	150
Lead	Lead	mg/L	0.001	0.0034	<0.001	<0.001	<0.001	<0.001
Metals	Arsenic	mg/L	0.001		0.001	0.002	0.001	0.001
	Cadmium	mg/L	0.0002	0.0002	<0.0002	<0.0002	<0.0002	<0.0002
	Calcium	mg/L	0.5		320	230	150	120
	Chromium (III+VI)	mg/L	0.001		0.001	<0.001	0.001	0.001
	Copper	mg/L	0.001	0.0014	0.002	<0.001	0.002	0.001
	Magnesium	mg/L	0.5		120	100	72	61
	Mercury	mg/L	0.0001	0.0006	<0.0001	<0.0001	<0.0001	<0.0001
	Molybdenum	mg/L	0.005		<0.005	<0.005	<0.005	<0.005
	Nickel	mg/L	0.001	0.011	0.002	0.002	0.003	0.001
	Potassium	mg/L	0.5		96	82	99	54
	Selenium	mg/L	0.001	0.011	<0.001	<0.001	<0.001	<0.001
	Silver	mg/L	0.005	0.00005	<0.005	<0.005	<0.005	<0.005
	Tin	mg/L	0.005		<0.005	<0.005	<0.005	<0.005
	Zinc	mg/L	0.005	0.008	0.015	<0.005	0.01	0.008
Organochlorine Pesticides	4,4-DDE	µg/L	0.1		0.2	<0.1	<0.1	<0.1
	a-BHC	µg/L	0.1		<0.1	<0.1	<0.1	<0.1
	Aldrin	µg/L	0.1		<0.1	<0.1	<0.1	<0.1
	b-BHC	µg/L	0.1		<0.1	<0.1	<0.1	<0.1
	chlordane	µg/L	1	0.08	<1	<1	<1	<1
	d-BHC	µg/L	0.1		<0.1	<0.1	<0.1	<0.1
	DDD	µg/L	0.1		<0.1	<0.1	<0.1	<0.1
	DDT	µg/L	0.1	0.01	<0.1	<0.1	<0.1	<0.1
	Dieldrin	µg/L	0.1		<0.1	<0.1	<0.1	<0.1
	Endosulfan I	µg/L	0.1		<0.1	<0.1	<0.1	<0.1
	Endosulfan II	µg/L	0.1		<0.1	<0.1	<0.1	<0.1
	Endosulfan sulphate	µg/L	0.1		<0.1	<0.1	<0.1	<0.1
	Endrin	µg/L	0.1	0.02	<0.1	<0.1	<0.1	<0.1
	Endrin aldehyde	µg/L	0.1		<0.1	<0.1	<0.1	<0.1
	Endrin ketone	µg/L	0.1		<0.1	<0.1	<0.1	<0.1
	g-BHC (Lindane)	µg/L	0.1	0.2	<0.1	<0.1	<0.1	<0.1
	Heptachlor	µg/L	0.1	0.09	<0.1	<0.1	<0.1	<0.1
	Heptachlor epoxide	µg/L	0.1		<0.1	<0.1	<0.1	<0.1
	Methoxychlor	µg/L	0.1		<0.1	<0.1	<0.1	<0.1
	Toxaphene	mg/L	0.01	0.0002	<0.01	<0.01	<0.01	<0.01

Table 3: RPD Results Summary

Hume Keysborough Pty Ltd - Waverley Golf Course

			SDG	1057	ALSE-Melbourne 16-Sep-16		1057	ALSE-Melbourne 16-Sep-16	
			Field ID	HA4.2-0.05	HA4.2-0.05	**RPD**	HA1.4-0.05	HA1.4-0.05	**RPD**
			Sampled Date/Time	3/08/2016	3/08/2016		4/08/2016	4/08/2016	
Method_Type	**ChemName**	**Units**	**EQL**						
OPP	Tokuthion	mg/kg	0.2						
Organic	C6-C10 less BTEX (F1)	mg/kg	20 (Primary): 10 (Interlab)	<20.0	<10.0	0	<20.0	<10.0	0
Volatile	Benzene	mg/kg	0.1 (Primary): 0.2 (Interlab)	<0.1	<0.2	0	<0.1	<0.2	0
	Ethylbenzene	mg/kg	0.1 (Primary): 0.5 (Interlab)	<0.1	<0.5	0	<0.1	<0.5	0
	Toluene	mg/kg	0.1 (Primary): 0.5 (Interlab)	<0.1	<0.5	0	<0.1	<0.5	0
	Xylene (m & p)	mg/kg	0.2 (Primary): 0.5 (Interlab)	<0.2	<0.5	0	<0.2	<0.5	0
	Xylene (o)	mg/kg	0.1 (Primary): 0.5 (Interlab)	<0.1	<0.5	0	<0.1	<0.5	0
	Xylene Total	mg/kg	0.3 (Primary): 0.5 (Interlab)	<0.3	<0.5	0	<0.3	<0.5	0
OCP	Hexachlorobenzene	mg/kg	0.05						
Inorganic	Moisture Content (dried @ 103°C)	%	0.1						
Heavy Metal	Lead	mg/kg	5	16.0	15.0	6			
	Antimony	mg/kg	10 (Primary): 5 (Interlab)						
	Arsenic	mg/kg	2 (Primary): 5 (Interlab)	3.9	<5.0	0			
	Beryllium	mg/kg	2 (Primary): 1 (Interlab)						
	Boron	mg/kg	10 (Primary): 50 (Interlab)						
	Cadmium	mg/kg	0.4 (Primary): 1 (Interlab)	<0.4	<1.0	0			
	Chromium (III+VI)	mg/kg	5 (Primary): 2 (Interlab)	**29.0**	**10.0**	**97**			
	Cobalt	mg/kg	5 (Primary): 2 (Interlab)						
	Copper	mg/kg	5	<5.0	<5.0	0			
	Manganese	mg/kg	5						
	Mercury	mg/kg	0.1	<0.1	0.1	0			
	Molybdenum	mg/kg	10 (Primary): 2 (Interlab)						
	Nickel	mg/kg	5 (Primary): 2 (Interlab)	<5.0	3.0	0			
	Selenium	mg/kg	2 (Primary): 5 (Interlab)						
	Silver	mg/kg	5 (Primary): 2 (Interlab)						
	Tin	mg/kg	10 (Primary): 5 (Interlab)						
	Vanadium	mg/kg	10 (Primary): 5 (Interlab)						
	Zinc	mg/kg	5	20.0	12.0	50			
al									
OCP	4,4-DDE	mg/kg	0.05						
	a-BHC	mg/kg	0.05						
	Aldrin	mg/kg	0.05						
	b-BHC	mg/kg	0.05						
	chlordane	mg/kg	0.1 (Primary): 0.05 (Interlab)						
	d-BHC	mg/kg	0.05						
	DDD	mg/kg	0.05						
	DDT	mg/kg	0.05 (Primary): 0.2 (Interlab)						
	Dieldrin	mg/kg	0.05						
	Endosulfan I	mg/kg	0.05						
	Endosulfan II	mg/kg	0.05						
	Endosulfan sulphate	mg/kg	0.05						
	Endrin	mg/kg	0.05						
	Endrin aldehyde	mg/kg	0.05						
	Endrin ketone	mg/kg	0.05						
	g-BHC (Lindane)	mg/kg	0.05						
	Heptachlor	mg/kg	0.05						
	Heptachlor epoxide	mg/kg	0.05						
	Methoxychlor	mg/kg	0.05 (Primary): 0.2 (Interlab)						
	Toxaphene	mg/kg	1						
OPP	Azinophos methyl	mg/kg	0.2 (Primary): 0.05 (Interlab)						
	Bolstar (Sulprofos)	mg/kg	0.2						
	Chlorpyrifos	mg/kg	0.2 (Primary): 0.05 (Interlab)						
	Demeton-O	mg/kg	0.2						
	Diazinon	mg/kg	0.2 (Primary): 0.05 (Interlab)						
	Dichlorvos	mg/kg	0.2 (Primary): 0.05 (Interlab)						
	Disulfoton	mg/kg	0.2						
	Ethion	mg/kg	0.2 (Primary): 0.05 (Interlab)						
	Ethoprop	mg/kg	0.2						
	Fenitrothion	mg/kg	0.2						
	Fensulfothion	mg/kg	0.2						
	Fenthion	mg/kg	0.2 (Primary): 0.05 (Interlab)						
	Merphos	mg/kg	0.2						
	Methyl parathion	mg/kg	0.2						
	Mevinphos (Phosdrin)	mg/kg	0.2						
	Naled (Dibrom)	mg/kg	0.5						
	Phorate	mg/kg	0.2						
	Ronnel	mg/kg	0.2						
	Trichloronate	mg/kg	0.2						
PAH	Benzo[b+j]fluoranthene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0
	Benzo(a)pyrene TEQ (lower bound) *	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0
	Benzo(a)pyrene TEQ (medium bound) *	mg/kg	0.5	0.6	0.6	0	0.6	0.6	0
	Benzo(a)pyrene TEQ (upper bound) *	mg/kg	0.5	1.2	1.2	0	1.2	1.2	0
Organic	Naphthalene	mg/kg	0.5 (Primary): 1 (Interlab)	<0.5	<0.5	0	<0.5	<0.5	0
PAH	Acenaphthene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0
	Acenaphthylene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0
	Anthracene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0
	Benz(a)anthracene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0
	Benzo(a) pyrene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0
	Benzo(g,h,i)perylene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0

Filter: ALL

Table 3: RPD Results Summary

Hume Keysborough Pty Ltd -
Waverley Golf Course

			SDG	1057	ALSE-Melbourne 16-Sep-16		1057	ALSE-Melbourne 16-Sep-16	
			Field ID	HA4.2-0.05	HA4.2-0.05	**RPD**	HA1.4-0.05	HA1.4-0.05	**RPD**
			Sampled Date/Time	3/08/2016	3/08/2016		4/08/2016	4/08/2016	
	Benzo(k)fluoranthene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0
	Chrysene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0
	Dibenz(a,h)anthracene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0
	Fluoranthene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0
	Fluorene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0
	Indeno(1,2,3-c,d)pyrene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0
	Naphthalene	mg/kg	0.5 (Primary): 1 (Interlab)	<0.5	<0.5	0	<0.5	<0.5	0
	PAHs (Sum of total)	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0
	Phenanthrene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0
	Pyrene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0
Organic	C10-C16	mg/kg	50	<50.0	<50.0	0	<50.0	<50.0	0
	C16-C34	mg/kg	100	120.0	<100.0	18	<100.0	120.0	18
	C34-C40	mg/kg	100	<100.0	<100.0	0	<100.0	<100.0	0
	F2-NAPHTHALENE	mg/kg	50	<50.0	<50.0	0	<50.0	<50.0	0
	C6 - C9	mg/kg	20 (Primary): 10 (Interlab)	<20.0	<10.0	0	<20.0	<10.0	0
	C6-C10	mg/kg	20 (Primary): 10 (Interlab)	<20.0	<10.0	0	<20.0	<10.0	0
TPH	C10 - C14	mg/kg	20 (Primary): 50 (Interlab)	53.0	<50.0	6	<20.0	<50.0	0
	C15 - C28	mg/kg	50 (Primary): 100 (Interlab)	90.0	<100.0	0	50.0	<100.0	0
	C29-C36	mg/kg	50 (Primary): 100 (Interlab)	<50.0	<100.0	0	67.0	<100.0	0
	+C10 - C36 (Sum of total)	mg/kg	50	**143.0**	**<50.0**	**96**	**117.0**	**<50.0**	**80**

*RPDs have only been considered where a concentration is greater than 1 times the EQL.
**High RPDs are in bold (Acceptable RPDs for each EQL multiplier range are: 80 (1-10 x EQL); 50 (10-30 x EQL); 30 (> 30 x EQL))
***Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any methods in the row header relate to those used in the primary laboratory

Filter: ALL

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Appendix D: NATA Approved Certificates

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eurofins | mgt

Certificate of Analysis

NATA Accredited
Accreditation Number 1261
Site Number 1254 & 14271

Accredited for compliance with ISO/IEC 17025.
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Tonkin & Taylor P/L
Ground Floor, 95 Coventry St
South Bank
VIC 3006

Attention: **Thomas Madill**

Report **510630-S**
Project name ROWVILLE
Project ID 2781.200
Received Date Aug 04, 2016

Client Sample ID			**GR01**	**GR03**	**GR05**	**GR07**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins | mgt Sample No.			**M16-Au05009**	**M16-Au05010**	**M16-Au05011**	**M16-Au05012**
Date Sampled			**Aug 03, 2016**	**Aug 03, 2016**	**Aug 03, 2016**	**Aug 03, 2016**
Test/Reference	LOR	Unit				
Acid Herbicides						
2.4-D	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
2.4-DB	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
2.4.5-T	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
2.4.5-TP	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Actril (loxynil)	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Dicamba	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Dichlorprop	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Dinitro-o-cresol	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Dinoseb	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
MCPA	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
MCPB	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Mecoprop	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Warfarin (surr.)	1	%	83	82	82	86
% Moisture	1	%	14	21	20	7.6

Client Sample ID			**GR09**	**GR11**	**GR13**	**GR15**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins | mgt Sample No.			**M16-Au05013**	**M16-Au05014**	**M16-Au05015**	**M16-Au05016**
Date Sampled			**Aug 03, 2016**	**Aug 03, 2016**	**Aug 03, 2016**	**Aug 03, 2016**
Test/Reference	LOR	Unit				
Acid Herbicides						
2.4-D	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
2.4-DB	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
2.4.5-T	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
2.4.5-TP	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Actril (loxynil)	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Dicamba	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Dichlorprop	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Dinitro-o-cresol	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Dinoseb	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
MCPA	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
MCPB	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Mecoprop	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Warfarin (surr.)	1	%	93	83	82	83

Client Sample ID			GR09	GR11	GR13	GR15
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			M16-Au05013	M16-Au05014	M16-Au05015	M16-Au05016
Date Sampled			Aug 03, 2016	Aug 03, 2016	Aug 03, 2016	Aug 03, 2016
Test/Reference	LOR	Unit				
% Moisture	1	%	8.4	13	16	18

Client Sample ID			GR17	TEE02	TEE04	TEE06
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			M16-Au05017	M16-Au05018	M16-Au05019	M16-Au05020
Date Sampled			Aug 03, 2016	Aug 03, 2016	Aug 03, 2016	Aug 03, 2016
Test/Reference	LOR	Unit				
Acid Herbicides						
2.4-D	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
2.4-DB	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
2.4.5-T	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
2.4.5-TP	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Actril (loxynil)	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Dicamba	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Dichlorprop	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Dinitro-o-cresol	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Dinoseb	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
MCPA	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
MCPB	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Mecoprop	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Warfarin (surr.)	1	%	83	82	83	86
% Moisture	1	%	10	14	12	11

Client Sample ID			TEE08	TEE10	TEE12	TEE14
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			M16-Au05021	M16-Au05022	M16-Au05023	M16-Au05024
Date Sampled			Aug 03, 2016	Aug 03, 2016	Aug 03, 2016	Aug 03, 2016
Test/Reference	LOR	Unit				
Acid Herbicides						
2.4-D	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
2.4-DB	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
2.4.5-T	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
2.4.5-TP	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Actril (loxynil)	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Dicamba	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Dichlorprop	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Dinitro-o-cresol	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Dinoseb	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
MCPA	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
MCPB	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Mecoprop	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Warfarin (surr.)	1	%	83	83	86	94
% Moisture	1	%	10	14	16	15

Client Sample ID			TEE16	TEE18	HA09-0.1	HA10-0.1
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			M16-Au05025	M16-Au05026	M16-Au05027	M16-Au05028
Date Sampled			Aug 03, 2016	Aug 03, 2016	Aug 03, 2016	Aug 03, 2016
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	-	-	-	< 20
TRH C10-C14	20	mg/kg	-	-	-	< 20
TRH C15-C28	50	mg/kg	-	-	-	< 50
TRH C29-C36	50	mg/kg	-	-	-	< 50
TRH C10-36 (Total)	50	mg/kg	-	-	-	< 50
BTEX						
Benzene	0.1	mg/kg	-	-	-	< 0.1
Toluene	0.1	mg/kg	-	-	-	< 0.1
Ethylbenzene	0.1	mg/kg	-	-	-	< 0.1
m&p-Xylenes	0.2	mg/kg	-	-	-	< 0.2
o-Xylene	0.1	mg/kg	-	-	-	< 0.1
Xylenes - Total	0.3	mg/kg	-	-	-	< 0.3
4-Bromofluorobenzene (surr.)	1	%	-	-	-	58
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.5	mg/kg	-	-	-	< 0.5
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	-	-	-	< 50
TRH C6-C10	20	mg/kg	-	-	-	< 20
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	-	-	-	< 20
Polycyclic Aromatic Hydrocarbons						
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	-	-	-	< 0.5
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	-	-	-	0.6
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	-	-	-	1.2
Acenaphthene	0.5	mg/kg	-	-	-	< 0.5
Acenaphthylene	0.5	mg/kg	-	-	-	< 0.5
Anthracene	0.5	mg/kg	-	-	-	< 0.5
Benz(a)anthracene	0.5	mg/kg	-	-	-	< 0.5
Benzo(a)pyrene	0.5	mg/kg	-	-	-	< 0.5
Benzo(b&j)fluoranthene[N07]	0.5	mg/kg	-	-	-	< 0.5
Benzo(g.h.i)perylene	0.5	mg/kg	-	-	-	< 0.5
Benzo(k)fluoranthene	0.5	mg/kg	-	-	-	< 0.5
Chrysene	0.5	mg/kg	-	-	-	< 0.5
Dibenz(a.h)anthracene	0.5	mg/kg	-	-	-	< 0.5
Fluoranthene	0.5	mg/kg	-	-	-	< 0.5
Fluorene	0.5	mg/kg	-	-	-	< 0.5
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	-	-	-	< 0.5
Naphthalene	0.5	mg/kg	-	-	-	< 0.5
Phenanthrene	0.5	mg/kg	-	-	-	< 0.5
Pyrene	0.5	mg/kg	-	-	-	< 0.5
Total PAH*	0.5	mg/kg	-	-	-	< 0.5
2-Fluorobiphenyl (surr.)	1	%	-	-	-	90
p-Terphenyl-d14 (surr.)	1	%	-	-	-	78
Organochlorine Pesticides						
Chlordanes - Total	0.1	mg/kg	-	-	< 0.1	-
4.4'-DDD	0.05	mg/kg	-	-	< 0.05	-
4.4'-DDE	0.05	mg/kg	-	-	< 0.05	-
4.4'-DDT	0.05	mg/kg	-	-	< 0.05	-
a-BHC	0.05	mg/kg	-	-	< 0.05	-
Aldrin	0.05	mg/kg	-	-	< 0.05	-
b-BHC	0.05	mg/kg	-	-	< 0.05	-

Client Sample ID			TEE16	TEE18	HA09-0.1	HA10-0.1
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			M16-Au05025	M16-Au05026	M16-Au05027	M16-Au05028
Date Sampled			Aug 03, 2016	Aug 03, 2016	Aug 03, 2016	Aug 03, 2016
Test/Reference	LOR	Unit				
Organochlorine Pesticides						
d-BHC	0.05	mg/kg	-	-	< 0.05	-
Dieldrin	0.05	mg/kg	-	-	< 0.05	-
Endosulfan I	0.05	mg/kg	-	-	< 0.05	-
Endosulfan II	0.05	mg/kg	-	-	< 0.05	-
Endosulfan sulphate	0.05	mg/kg	-	-	< 0.05	-
Endrin	0.05	mg/kg	-	-	< 0.05	-
Endrin aldehyde	0.05	mg/kg	-	-	< 0.05	-
Endrin ketone	0.05	mg/kg	-	-	< 0.05	-
g-BHC (Lindane)	0.05	mg/kg	-	-	< 0.05	-
Heptachlor	0.05	mg/kg	-	-	< 0.05	-
Heptachlor epoxide	0.05	mg/kg	-	-	< 0.05	-
Hexachlorobenzene	0.05	mg/kg	-	-	< 0.05	-
Methoxychlor	0.05	mg/kg	-	-	< 0.05	-
Toxaphene	1	mg/kg	-	-	< 1	-
Dibutylchlorendate (surr.)	1	%	-	-	98	-
Tetrachloro-m-xylene (surr.)	1	%	-	-	70	-
Organophosphorus Pesticides						
Azinphos-methyl	0.2	mg/kg	-	-	< 0.2	-
Bolstar	0.2	mg/kg	-	-	< 0.2	-
Chlorfenvinphos	0.2	mg/kg	-	-	< 0.2	-
Chlorpyrifos	0.2	mg/kg	-	-	< 0.2	-
Chlorpyrifos-methyl	0.2	mg/kg	-	-	< 0.2	-
Coumaphos	2	mg/kg	-	-	< 2	-
Demeton-S	0.2	mg/kg	-	-	< 0.2	-
Demeton-O	0.2	mg/kg	-	-	< 0.2	-
Diazinon	0.2	mg/kg	-	-	< 0.2	-
Dichlorvos	0.2	mg/kg	-	-	< 0.2	-
Dimethoate	0.2	mg/kg	-	-	< 0.2	-
Disulfoton	0.2	mg/kg	-	-	< 0.2	-
EPN	0.2	mg/kg	-	-	< 0.2	-
Ethion	0.2	mg/kg	-	-	< 0.2	-
Ethoprop	0.2	mg/kg	-	-	< 0.2	-
Ethyl parathion	0.2	mg/kg	-	-	< 0.2	-
Fenitrothion	0.2	mg/kg	-	-	< 0.2	-
Fensulfothion	0.2	mg/kg	-	-	< 0.2	-
Fenthion	0.2	mg/kg	-	-	< 0.2	-
Malathion	0.2	mg/kg	-	-	< 0.2	-
Merphos	0.2	mg/kg	-	-	< 0.2	-
Methyl parathion	0.2	mg/kg	-	-	< 0.2	-
Mevinphos	0.2	mg/kg	-	-	< 0.2	-
Monocrotophos	2	mg/kg	-	-	< 2	-
Naled	0.2	mg/kg	-	-	< 0.2	-
Omethoate	2	mg/kg	-	-	< 2	-
Phorate	0.2	mg/kg	-	-	< 0.2	-
Pirimiphos-methyl	0.2	mg/kg	-	-	< 0.2	-
Pyrazophos	0.2	mg/kg	-	-	< 0.2	-
Ronnel	0.2	mg/kg	-	-	< 0.2	-
Terbufos	0.2	mg/kg	-	-	< 0.2	-
Tetrachlorvinphos	0.2	mg/kg	-	-	< 0.2	-

Client Sample ID			TEE16	TEE18	HA09-0.1	HA10-0.1
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			M16-Au05025	M16-Au05026	M16-Au05027	M16-Au05028
Date Sampled			Aug 03, 2016	Aug 03, 2016	Aug 03, 2016	Aug 03, 2016
Test/Reference	LOR	Unit				
Organophosphorus Pesticides						
Tokuthion	0.2	mg/kg	-	-	< 0.2	-
Trichloronate	0.2	mg/kg	-	-	< 0.2	-
Triphenylphosphate (surr.)	1	%	-	-	94	-
Acid Herbicides						
2.4-D	0.5	mg/kg	< 0.5	< 0.5	-	-
2.4-DB	0.5	mg/kg	< 0.5	< 0.5	-	-
2.4.5-T	0.5	mg/kg	< 0.5	< 0.5	-	-
2.4.5-TP	0.5	mg/kg	< 0.5	< 0.5	-	-
Actril (loxynil)	0.5	mg/kg	< 0.5	< 0.5	-	-
Dicamba	0.5	mg/kg	< 0.5	< 0.5	-	-
Dichlorprop	0.5	mg/kg	< 0.5	< 0.5	-	-
Dinitro-o-cresol	0.5	mg/kg	< 0.5	< 0.5	-	-
Dinoseb	0.5	mg/kg	< 0.5	< 0.5	-	-
MCPA	0.5	mg/kg	< 0.5	< 0.5	-	-
MCPB	0.5	mg/kg	< 0.5	< 0.5	-	-
Mecoprop	0.5	mg/kg	< 0.5	< 0.5	-	-
Warfarin (surr.)	1	%	88	91	-	-
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
TRH >C10-C16	50	mg/kg	-	-	-	< 50
TRH >C16-C34	100	mg/kg	-	-	-	< 100
TRH >C34-C40	100	mg/kg	-	-	-	< 100
Heavy Metals						
Arsenic	2	mg/kg	-	-	7.0	3.3
Cadmium	0.4	mg/kg	-	-	< 0.4	< 0.4
Chromium	5	mg/kg	-	-	48	20
Copper	5	mg/kg	-	-	27	13
Lead	5	mg/kg	-	-	11	9.4
Mercury	0.1	mg/kg	-	-	< 0.1	< 0.1
Molybdenum	5	mg/kg	-	-	< 5	< 5
Nickel	5	mg/kg	-	-	12	7.6
Selenium	2	mg/kg	-	-	< 2	< 2
Silver	0.2	mg/kg	-	-	< 0.2	< 0.2
Tin	10	mg/kg	-	-	< 10	< 10
Zinc	5	mg/kg	-	-	20	21
% Moisture	1	%	4.3	15	21	16

Client Sample ID			HA11-0.1	HA4.1-0.05	HA4.2-0.05	HA4.3-0.05
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			M16-Au05029	M16-Au05030	M16-Au05031	M16-Au05032
Date Sampled			Aug 03, 2016	Aug 03, 2016	Aug 03, 2016	Aug 03, 2016
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	< 20	< 20	< 20	< 20
TRH C10-C14	20	mg/kg	< 20	< 20	53	< 20
TRH C15-C28	50	mg/kg	< 50	< 50	90	< 50
TRH C29-C36	50	mg/kg	< 50	< 50	< 50	80
TRH C10-36 (Total)	50	mg/kg	< 50	< 50	143	80

eurofins | mgt

Client Sample ID			HA11-0.1	HA4.1-0.05	HA4.2-0.05	HA4.3-0.05
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			M16-Au05029	M16-Au05030	M16-Au05031	M16-Au05032
Date Sampled			Aug 03, 2016	Aug 03, 2016	Aug 03, 2016	Aug 03, 2016
Test/Reference	LOR	Unit				
BTEX						
Benzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Toluene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Ethylbenzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
m&p-Xylenes	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
o-Xylene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Xylenes - Total	0.3	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3
4-Bromofluorobenzene (surr.)	1	%	51	76	58	60
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	< 50	< 50	< 50	< 50
TRH C6-C10	20	mg/kg	< 20	< 20	< 20	< 20
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	< 20	< 20	< 20	< 20
Polycyclic Aromatic Hydrocarbons						
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	0.6	0.6	0.6	0.6
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	1.2	1.2	1.2	1.2
Acenaphthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Acenaphthylene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benz(a)anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(a)pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(b&j)fluoranthene[N07]	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(g.h.i)perylene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(k)fluoranthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Chrysene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Dibenz(a.h)anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Fluoranthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Fluorene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Naphthalene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Phenanthrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Total PAH*	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
2-Fluorobiphenyl (surr.)	1	%	90	90	90	89
p-Terphenyl-d14 (surr.)	1	%	78	74	90	88
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
TRH >C10-C16	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C16-C34	100	mg/kg	< 100	< 100	120	< 100
TRH >C34-C40	100	mg/kg	< 100	< 100	< 100	< 100
Heavy Metals						
Arsenic	2	mg/kg	2.3	< 2	3.9	3.2
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	1.8
Chromium	5	mg/kg	15	11	29	16
Copper	5	mg/kg	11	< 5	< 5	< 5
Lead	5	mg/kg	8.2	11	16	18
Mercury	0.1	mg/kg	< 0.1	< 0.1	< 0.1	0.6
Molybdenum	5	mg/kg	< 5	< 5	< 5	< 5
Nickel	5	mg/kg	6.2	< 5	< 5	< 5
Selenium	2	mg/kg	< 2	< 2	< 2	< 2

Client Sample ID			HA11-0.1	HA4.1-0.05	HA4.2-0.05	HA4.3-0.05
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			M16-Au05029	M16-Au05030	M16-Au05031	M16-Au05032
Date Sampled			Aug 03, 2016	Aug 03, 2016	Aug 03, 2016	Aug 03, 2016
Test/Reference	LOR	Unit				
Heavy Metals						
Silver	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Tin	10	mg/kg	< 10	< 10	< 10	< 10
Zinc	5	mg/kg	18	16	20	11
% Moisture	1	%	17	21	23	19

Client Sample ID			HA4.4-0.05	HA4.5-0.05	HA4.6-0.05	HA01.1-0.05
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			M16-Au05033	M16-Au05034	M16-Au05035	M16-Au05036
Date Sampled			Aug 03, 2016	Aug 03, 2016	Aug 03, 2016	Aug 04, 2016
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	< 20	< 20	< 20	< 20
TRH C10-C14	20	mg/kg	< 20	< 20	< 20	< 20
TRH C15-C28	50	mg/kg	< 50	< 50	< 50	< 50
TRH C29-C36	50	mg/kg	< 50	< 50	< 50	< 50
TRH C10-36 (Total)	50	mg/kg	< 50	< 50	< 50	< 50
BTEX						
Benzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Toluene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Ethylbenzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
m&p-Xylenes	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
o-Xylene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Xylenes - Total	0.3	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3
4-Bromofluorobenzene (surr.)	1	%	73	55	51	54
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	< 50	< 50	< 50	< 50
TRH C6-C10	20	mg/kg	< 20	< 20	< 20	< 20
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	< 20	< 20	< 20	< 20
Polycyclic Aromatic Hydrocarbons						
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	0.6	0.6	0.6	0.6
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	1.2	1.2	1.2	1.2
Acenaphthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Acenaphthylene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benz(a)anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(a)pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(b&j)fluoranthene[N07]	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(g.h.i)perylene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(k)fluoranthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Chrysene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Dibenz(a.h)anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Fluoranthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Fluorene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Naphthalene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5

Client Sample ID			HA4.4-0.05	HA4.5-0.05	HA4.6-0.05	HA01.1-0.05
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			M16-Au05033	M16-Au05034	M16-Au05035	M16-Au05036
Date Sampled			Aug 03, 2016	Aug 03, 2016	Aug 03, 2016	Aug 04, 2016
Test/Reference	LOR	Unit				
Polycyclic Aromatic Hydrocarbons						
Phenanthrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Total PAH*	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
2-Fluorobiphenyl (surr.)	1	%	91	88	94	89
p-Terphenyl-d14 (surr.)	1	%	92	86	91	88
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
TRH >C10-C16	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C16-C34	100	mg/kg	< 100	< 100	< 100	< 100
TRH >C34-C40	100	mg/kg	< 100	< 100	< 100	< 100
Heavy Metals						
Arsenic	2	mg/kg	6.6	7.3	5.3	-
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	-
Chromium	5	mg/kg	15	16	17	-
Copper	5	mg/kg	< 5	< 5	< 5	-
Lead	5	mg/kg	15	12	13	-
Mercury	0.1	mg/kg	< 0.1	< 0.1	< 0.1	-
Molybdenum	5	mg/kg	< 5	< 5	< 5	-
Nickel	5	mg/kg	< 5	< 5	< 5	-
Selenium	2	mg/kg	< 2	< 2	< 2	-
Silver	0.2	mg/kg	< 0.2	< 0.2	< 0.2	-
Tin	10	mg/kg	< 10	< 10	< 10	-
Zinc	5	mg/kg	14	13	15	-
% Moisture	1	%	18	17	16	26

Client Sample ID			HA1.2-0.05	HA1.3-0.05	HA1.4-0.05	DAM01
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			M16-Au05037	M16-Au05038	M16-Au05039	M16-Au05040
Date Sampled			Aug 04, 2016	Aug 04, 2016	Aug 04, 2016	Aug 04, 2016
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	< 20	< 20	< 20	-
TRH C10-C14	20	mg/kg	< 20	< 20	< 20	-
TRH C15-C28	50	mg/kg	< 50	< 50	50	-
TRH C29-C36	50	mg/kg	< 50	< 50	67	-
TRH C10-36 (Total)	50	mg/kg	< 50	< 50	117	-
BTEX						
Benzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	-
Toluene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	-
Ethylbenzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	-
m&p-Xylenes	0.2	mg/kg	< 0.2	< 0.2	< 0.2	-
o-Xylene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	-
Xylenes - Total	0.3	mg/kg	< 0.3	< 0.3	< 0.3	-
4-Bromofluorobenzene (surr.)	1	%	58	70	64	-

Client Sample ID			HA1.2-0.05	HA1.3-0.05	HA1.4-0.05	DAM01
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			M16-Au05037	M16-Au05038	M16-Au05039	M16-Au05040
Date Sampled			Aug 04, 2016	Aug 04, 2016	Aug 04, 2016	Aug 04, 2016
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.5	mg/kg	< 0.5	< 0.5	< 0.5	-
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	< 50	< 50	< 50	-
TRH C6-C10	20	mg/kg	< 20	< 20	< 20	-
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	< 20	< 20	< 20	-
Polycyclic Aromatic Hydrocarbons						
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	< 0.5	< 0.5	< 0.5	-
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	0.6	0.6	0.6	-
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	1.2	1.2	1.2	-
Acenaphthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	-
Acenaphthylene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	-
Anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	-
Benz(a)anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	-
Benzo(a)pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	-
Benzo(b&j)fluoranthene[N07]	0.5	mg/kg	< 0.5	< 0.5	< 0.5	-
Benzo(g.h.i)perylene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	-
Benzo(k)fluoranthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	-
Chrysene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	-
Dibenz(a.h)anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	-
Fluoranthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	-
Fluorene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	-
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	-
Naphthalene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	-
Phenanthrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	-
Pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	-
Total PAH*	0.5	mg/kg	< 0.5	< 0.5	< 0.5	-
2-Fluorobiphenyl (surr.)	1	%	98	96	86	-
p-Terphenyl-d14 (surr.)	1	%	88	85	73	-
Organochlorine Pesticides						
Chlordanes - Total	0.1	mg/kg	-	-	-	< 0.1
4.4'-DDD	0.05	mg/kg	-	-	-	< 0.05
4.4'-DDE	0.05	mg/kg	-	-	-	< 0.05
4.4'-DDT	0.05	mg/kg	-	-	-	< 0.05
a-BHC	0.05	mg/kg	-	-	-	< 0.05
Aldrin	0.05	mg/kg	-	-	-	< 0.05
b-BHC	0.05	mg/kg	-	-	-	< 0.05
d-BHC	0.05	mg/kg	-	-	-	< 0.05
Dieldrin	0.05	mg/kg	-	-	-	< 0.05
Endosulfan I	0.05	mg/kg	-	-	-	< 0.05
Endosulfan II	0.05	mg/kg	-	-	-	< 0.05
Endosulfan sulphate	0.05	mg/kg	-	-	-	< 0.05
Endrin	0.05	mg/kg	-	-	-	< 0.05
Endrin aldehyde	0.05	mg/kg	-	-	-	< 0.05
Endrin ketone	0.05	mg/kg	-	-	-	< 0.05
g-BHC (Lindane)	0.05	mg/kg	-	-	-	< 0.05
Heptachlor	0.05	mg/kg	-	-	-	< 0.05
Heptachlor epoxide	0.05	mg/kg	-	-	-	< 0.05
Hexachlorobenzene	0.05	mg/kg	-	-	-	< 0.05
Methoxychlor	0.05	mg/kg	-	-	-	< 0.05
Toxaphene	1	mg/kg	-	-	-	< 1

Client Sample ID			HA1.2-0.05	HA1.3-0.05	HA1.4-0.05	DAM01
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			M16-Au05037	M16-Au05038	M16-Au05039	M16-Au05040
Date Sampled			Aug 04, 2016	Aug 04, 2016	Aug 04, 2016	Aug 04, 2016
Test/Reference	LOR	Unit				
Organochlorine Pesticides						
Dibutylchlorendate (surr.)	1	%	-	-	-	114
Tetrachloro-m-xylene (surr.)	1	%	-	-	-	75
Organophosphorus Pesticides						
Azinphos-methyl	0.2	mg/kg	-	-	-	< 0.2
Bolstar	0.2	mg/kg	-	-	-	< 0.2
Chlorfenvinphos	0.2	mg/kg	-	-	-	< 0.2
Chlorpyrifos	0.2	mg/kg	-	-	-	< 0.2
Chlorpyrifos-methyl	0.2	mg/kg	-	-	-	< 0.2
Coumaphos	2	mg/kg	-	-	-	< 2
Demeton-S	0.2	mg/kg	-	-	-	< 0.2
Demeton-O	0.2	mg/kg	-	-	-	< 0.2
Diazinon	0.2	mg/kg	-	-	-	< 0.2
Dichlorvos	0.2	mg/kg	-	-	-	< 0.2
Dimethoate	0.2	mg/kg	-	-	-	< 0.2
Disulfoton	0.2	mg/kg	-	-	-	< 0.2
EPN	0.2	mg/kg	-	-	-	< 0.2
Ethion	0.2	mg/kg	-	-	-	< 0.2
Ethoprop	0.2	mg/kg	-	-	-	< 0.2
Ethyl parathion	0.2	mg/kg	-	-	-	< 0.2
Fenitrothion	0.2	mg/kg	-	-	-	< 0.2
Fensulfothion	0.2	mg/kg	-	-	-	< 0.2
Fenthion	0.2	mg/kg	-	-	-	< 0.2
Malathion	0.2	mg/kg	-	-	-	< 0.2
Merphos	0.2	mg/kg	-	-	-	< 0.2
Methyl parathion	0.2	mg/kg	-	-	-	< 0.2
Mevinphos	0.2	mg/kg	-	-	-	< 0.2
Monocrotophos	2	mg/kg	-	-	-	< 2
Naled	0.2	mg/kg	-	-	-	< 0.2
Omethoate	2	mg/kg	-	-	-	< 2
Phorate	0.2	mg/kg	-	-	-	< 0.2
Pirimiphos-methyl	0.2	mg/kg	-	-	-	< 0.2
Pyrazophos	0.2	mg/kg	-	-	-	< 0.2
Ronnel	0.2	mg/kg	-	-	-	< 0.2
Terbufos	0.2	mg/kg	-	-	-	< 0.2
Tetrachlorvinphos	0.2	mg/kg	-	-	-	< 0.2
Tokuthion	0.2	mg/kg	-	-	-	< 0.2
Trichloronate	0.2	mg/kg	-	-	-	< 0.2
Triphenylphosphate (surr.)	1	%	-	-	-	93
Acid Herbicides						
2.4-D	0.5	mg/kg	-	-	-	< 0.5
2.4-DB	0.5	mg/kg	-	-	-	< 0.5
2.4.5-T	0.5	mg/kg	-	-	-	< 0.5
2.4.5-TP	0.5	mg/kg	-	-	-	< 0.5
Actril (loxynil)	0.5	mg/kg	-	-	-	< 0.5
Dicamba	0.5	mg/kg	-	-	-	< 0.5
Dichlorprop	0.5	mg/kg	-	-	-	< 0.5
Dinitro-o-cresol	0.5	mg/kg	-	-	-	< 0.5
Dinoseb	0.5	mg/kg	-	-	-	< 0.5
MCPA	0.5	mg/kg	-	-	-	< 0.5

Client Sample ID			HA1.2-0.05	HA1.3-0.05	HA1.4-0.05	DAM01
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			M16-Au05037	M16-Au05038	M16-Au05039	M16-Au05040
Date Sampled			Aug 04, 2016	Aug 04, 2016	Aug 04, 2016	Aug 04, 2016
Test/Reference	LOR	Unit				
Acid Herbicides						
MCPB	0.5	mg/kg	-	-	-	< 0.5
Mecoprop	0.5	mg/kg	-	-	-	< 0.5
Warfarin (surr.)	1	%	-	-	-	81
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
TRH >C10-C16	50	mg/kg	< 50	< 50	< 50	-
TRH >C16-C34	100	mg/kg	< 100	< 100	< 100	-
TRH >C34-C40	100	mg/kg	< 100	< 100	< 100	-
Heavy Metals						
Arsenic	2	mg/kg	-	-	-	11
Cadmium	0.4	mg/kg	-	-	-	< 0.4
Chromium	5	mg/kg	-	-	-	34
Copper	5	mg/kg	-	-	-	6.5
Lead	5	mg/kg	-	-	-	13
Mercury	0.1	mg/kg	-	-	-	< 0.1
Molybdenum	5	mg/kg	-	-	-	< 5
Nickel	5	mg/kg	-	-	-	10
Selenium	2	mg/kg	-	-	-	< 2
Silver	0.2	mg/kg	-	-	-	< 0.2
Tin	10	mg/kg	-	-	-	< 10
Zinc	5	mg/kg	-	-	-	37
% Moisture	1	%	26	28	18	32

Client Sample ID			DAM02	DAM03	DAM04
Sample Matrix			Soil	Soil	Soil
Eurofins | mgt Sample No.			M16-Au05041	M16-Au05042	M16-Au05043
Date Sampled			Aug 04, 2016	Aug 04, 2016	Aug 04, 2016
Test/Reference	LOR	Unit			
Organochlorine Pesticides					
Chlordanes - Total	0.1	mg/kg	< 0.1	< 0.1	< 0.1
4.4'-DDD	0.05	mg/kg	< 0.05	< 0.05	< 0.05
4.4'-DDE	0.05	mg/kg	< 0.05	< 0.05	< 0.05
4.4'-DDT	0.05	mg/kg	< 0.05	< 0.05	< 0.05
a-BHC	0.05	mg/kg	< 0.05	< 0.05	< 0.05
Aldrin	0.05	mg/kg	< 0.05	< 0.05	< 0.05
b-BHC	0.05	mg/kg	< 0.05	< 0.05	< 0.05
d-BHC	0.05	mg/kg	< 0.05	< 0.05	< 0.05
Dieldrin	0.05	mg/kg	< 0.05	< 0.05	< 0.05
Endosulfan I	0.05	mg/kg	< 0.05	< 0.05	< 0.05
Endosulfan II	0.05	mg/kg	< 0.05	< 0.05	< 0.05
Endosulfan sulphate	0.05	mg/kg	< 0.05	< 0.05	< 0.05
Endrin	0.05	mg/kg	< 0.05	< 0.05	< 0.05
Endrin aldehyde	0.05	mg/kg	< 0.05	< 0.05	< 0.05
Endrin ketone	0.05	mg/kg	< 0.05	< 0.05	< 0.05
g-BHC (Lindane)	0.05	mg/kg	< 0.05	< 0.05	< 0.05
Heptachlor	0.05	mg/kg	< 0.05	< 0.05	< 0.05
Heptachlor epoxide	0.05	mg/kg	< 0.05	< 0.05	< 0.05
Hexachlorobenzene	0.05	mg/kg	< 0.05	< 0.05	< 0.05

Client Sample ID			DAM02	DAM03	DAM04
Sample Matrix			Soil	Soil	Soil
Eurofins | mgt Sample No.			M16-Au05041	M16-Au05042	M16-Au05043
Date Sampled			Aug 04, 2016	Aug 04, 2016	Aug 04, 2016
Test/Reference	LOR	Unit			
Organochlorine Pesticides					
Methoxychlor	0.05	mg/kg	< 0.05	< 0.05	< 0.05
Toxaphene	1	mg/kg	< 1	< 1	< 1
Dibutylchlorendate (surr.)	1	%	141	118	110
Tetrachloro-m-xylene (surr.)	1	%	89	81	68
Organophosphorus Pesticides					
Azinphos-methyl	0.2	mg/kg	< 0.2	< 0.2	< 0.2
Bolstar	0.2	mg/kg	< 0.2	< 0.2	< 0.2
Chlorfenvinphos	0.2	mg/kg	< 0.2	< 0.2	< 0.2
Chlorpyrifos	0.2	mg/kg	< 0.2	< 0.2	< 0.2
Chlorpyrifos-methyl	0.2	mg/kg	< 0.2	< 0.2	< 0.2
Coumaphos	2	mg/kg	< 2	< 2	< 2
Demeton-S	0.2	mg/kg	< 0.2	< 0.2	< 0.2
Demeton-O	0.2	mg/kg	< 0.2	< 0.2	< 0.2
Diazinon	0.2	mg/kg	< 0.2	< 0.2	< 0.2
Dichlorvos	0.2	mg/kg	< 0.2	< 0.2	< 0.2
Dimethoate	0.2	mg/kg	< 0.2	< 0.2	< 0.2
Disulfoton	0.2	mg/kg	< 0.2	< 0.2	< 0.2
EPN	0.2	mg/kg	< 0.2	< 0.2	< 0.2
Ethion	0.2	mg/kg	< 0.2	< 0.2	< 0.2
Ethoprop	0.2	mg/kg	< 0.2	< 0.2	< 0.2
Ethyl parathion	0.2	mg/kg	< 0.2	< 0.2	< 0.2
Fenitrothion	0.2	mg/kg	< 0.2	< 0.2	< 0.2
Fensulfothion	0.2	mg/kg	< 0.2	< 0.2	< 0.2
Fenthion	0.2	mg/kg	< 0.2	< 0.2	< 0.2
Malathion	0.2	mg/kg	< 0.2	< 0.2	< 0.2
Merphos	0.2	mg/kg	< 0.2	< 0.2	< 0.2
Methyl parathion	0.2	mg/kg	< 0.2	< 0.2	< 0.2
Mevinphos	0.2	mg/kg	< 0.2	< 0.2	< 0.2
Monocrotophos	2	mg/kg	< 2	< 2	< 2
Naled	0.2	mg/kg	< 0.2	< 0.2	< 0.2
Omethoate	2	mg/kg	< 2	< 2	< 2
Phorate	0.2	mg/kg	< 0.2	< 0.2	< 0.2
Pirimiphos-methyl	0.2	mg/kg	< 0.2	< 0.2	< 0.2
Pyrazophos	0.2	mg/kg	< 0.2	< 0.2	< 0.2
Ronnel	0.2	mg/kg	< 0.2	< 0.2	< 0.2
Terbufos	0.2	mg/kg	< 0.2	< 0.2	< 0.2
Tetrachlorvinphos	0.2	mg/kg	< 0.2	< 0.2	< 0.2
Tokuthion	0.2	mg/kg	< 0.2	< 0.2	< 0.2
Trichloronate	0.2	mg/kg	< 0.2	< 0.2	< 0.2
Triphenylphosphate (surr.)	1	%	93	95	93
Acid Herbicides					
2.4-D	0.5	mg/kg	< 0.5	< 0.5	< 0.5
2.4-DB	0.5	mg/kg	< 0.5	< 0.5	< 0.5
2.4.5-T	0.5	mg/kg	< 0.5	< 0.5	< 0.5
2.4.5-TP	0.5	mg/kg	< 0.5	< 0.5	< 0.5
Actril (loxynil)	0.5	mg/kg	< 0.5	< 0.5	< 0.5
Dicamba	0.5	mg/kg	< 0.5	< 0.5	< 0.5
Dichlorprop	0.5	mg/kg	< 0.5	< 0.5	< 0.5
Dinitro-o-cresol	0.5	mg/kg	< 0.5	< 0.5	< 0.5

Client Sample ID			DAM02	DAM03	DAM04
Sample Matrix			Soil	Soil	Soil
Eurofins | mgt Sample No.			M16-Au05041	M16-Au05042	M16-Au05043
Date Sampled			Aug 04, 2016	Aug 04, 2016	Aug 04, 2016
Test/Reference	LOR	Unit			
Acid Herbicides					
Dinoseb	0.5	mg/kg	< 0.5	< 0.5	< 0.5
MCPA	0.5	mg/kg	< 0.5	< 0.5	< 0.5
MCPB	0.5	mg/kg	< 0.5	< 0.5	< 0.5
Mecoprop	0.5	mg/kg	< 0.5	< 0.5	< 0.5
Warfarin (surr.)	1	%	81	86	83
Heavy Metals					
Arsenic	2	mg/kg	4.4	3.7	5.7
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	25	17	38
Copper	5	mg/kg	< 5	< 5	15
Lead	5	mg/kg	25	9.4	17
Mercury	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Molybdenum	5	mg/kg	< 5	< 5	< 5
Nickel	5	mg/kg	< 5	< 5	< 5
Selenium	2	mg/kg	< 2	< 2	< 2
Silver	0.2	mg/kg	< 0.2	< 0.2	< 0.2
Tin	10	mg/kg	< 10	< 10	< 10
Zinc	5	mg/kg	18	< 5	28
% Moisture	1	%	32	20	24

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results (regarding both quality and NATA accreditation).

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Eurofins | mgt Suite B4			
Total Recoverable Hydrocarbons - 1999 NEPM Fractions	Melbourne	Aug 06, 2016	14 Day
- Method: TRH C6-C36 - LTM-ORG-2010			
BTEX	Melbourne	Aug 06, 2016	14 Day
- Method: TRH C6-C40 - LTM-ORG-2010			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Melbourne	Aug 06, 2016	14 Day
- Method: TRH C6-C40 - LTM-ORG-2010			
Polycyclic Aromatic Hydrocarbons	Melbourne	Aug 06, 2016	14 Day
- Method: USEPA 8270 Polycyclic Aromatic Hydrocarbons			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Melbourne	Aug 06, 2016	14 Day
- Method: TRH C6-C40 - LTM-ORG-2010			
Organochlorine Pesticides	Melbourne	Aug 05, 2016	14 Day
- Method: USEPA 8081 Organochlorine Pesticides			
Organophosphorus Pesticides	Melbourne	Aug 05, 2016	14 Day
- Method: LTM-ORG-2200 Organophosphorus Pesticides by GC-MS			
Acid Herbicides	Melbourne	Aug 05, 2016	14 Day
- Method: LTM-ORG-2180 Phenoxy Acid Herbicides			
IWRG 621 Metals : Metals M12	Melbourne	Aug 06, 2016	28 Day
- Method: LTM-MET-3030 by ICP-OES (hydride ICP-OES for Mercury)			
% Moisture	Melbourne	Aug 04, 2016	14 Day
- Method: LTM-GEN-7080 Moisture			

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NATA # 1261 Site # 20794

Company Name: Tonkin & Taylor P/L
Address: Ground Floor, 95 Coventry St
South Bank
VIC 3006

Project Name: ROWVILLE
Project ID: 2781.200

Order No.:
Report #: 510630
Phone: 03 9863 8686
Fax: 03 9863 8685

Received: Aug 4, 2016 2:24 PM
Due: Aug 11, 2016
Priority: 5 Day
Contact Name: Thomas Madill

Eurofins | mgt Analytical Services Manager : Mary Makarios

Sample Detail						E.coli	HOLD	pH	Phosphate total (as P)	Total Dissolved Solids	Organochlorine Pesticides	Organophosphorus Pesticides	Acid Herbicides	IWRG 621 Metals : Metals M12	Total Nitrogen Set (as N)	Major Anions	Major Cations	Moisture Set	Eurofins | mgt Suite B4
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X	X	X	X	X	X	X	X	X	X
Sydney Laboratory - NATA Site # 18217																			
Brisbane Laboratory - NATA Site # 20794																			
External Laboratory																			
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**														
1	GR01	Aug 03, 2016		Soil	M16-Au05009								X					X	
2	GR03	Aug 03, 2016		Soil	M16-Au05010								X					X	
3	GR05	Aug 03, 2016		Soil	M16-Au05011								X					X	
4	GR07	Aug 03, 2016		Soil	M16-Au05012								X					X	
5	GR09	Aug 03, 2016		Soil	M16-Au05013								X					X	
6	GR11	Aug 03, 2016		Soil	M16-Au05014								X					X	
7	GR13	Aug 03, 2016		Soil	M16-Au05015								X					X	
8	GR15	Aug 03, 2016		Soil	M16-Au05016								X					X	
9	GR17	Aug 03, 2016		Soil	M16-Au05017								X					X	
10	TEE02	Aug 03, 2016		Soil	M16-Au05018								X					X	

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Sample Detail						E.coli	HOLD	pH	Phosphate total (as P)	Total Dissolved Solids	Organochlorine Pesticides	Organophosphorus Pesticides	Acid Herbicides	IWRG 621 Metals : Metals M12	Total Nitrogen Set (as N)	Major Anions	Major Cations	Moisture Set	Eurofins | mgt Suite B4
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X	X	X	X	X	X	X	X	X	X
Sydney Laboratory - NATA Site # 18217																			
Brisbane Laboratory - NATA Site # 20794																			
External Laboratory																			
11	TEE04	Aug 03, 2016		Soil	M16-Au05019								X					X	
12	TEE06	Aug 03, 2016		Soil	M16-Au05020								X					X	
13	TEE08	Aug 03, 2016		Soil	M16-Au05021								X					X	
14	TEE10	Aug 03, 2016		Soil	M16-Au05022								X					X	
15	TEE12	Aug 03, 2016		Soil	M16-Au05023								X					X	
16	TEE14	Aug 03, 2016		Soil	M16-Au05024								X					X	
17	TEE16	Aug 03, 2016		Soil	M16-Au05025								X					X	
18	TEE18	Aug 03, 2016		Soil	M16-Au05026								X					X	
19	HA09-0.1	Aug 03, 2016		Soil	M16-Au05027						X	X		X				X	
20	HA10-0.1	Aug 03, 2016		Soil	M16-Au05028									X				X	X
21	HA11-0.1	Aug 03, 2016		Soil	M16-Au05029									X				X	X
22	HA4.1-0.05	Aug 03, 2016		Soil	M16-Au05030									X				X	X

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Company Name:	Tonkin & Taylor P/L	**Order No.:**		**Received:**	Aug 4, 2016 2:24 PM
Address:	Ground Floor, 95 Coventry St South Bank VIC 3006	**Report #:**	510630	**Due:**	Aug 11, 2016
		Phone:	03 9863 8686	**Priority:**	5 Day
		Fax:	03 9863 8685	**Contact Name:**	Thomas Madill
Project Name:	ROWVILLE				
Project ID:	2781.200				

Eurofins | mgt Analytical Services Manager : Mary Makarios

Sample Detail						E.coli	HOLD	pH	Phosphate total (as P)	Total Dissolved Solids	Organochlorine Pesticides	Organophosphorus Pesticides	Acid Herbicides	IWRG 621 Metals : Metals M12	Total Nitrogen Set (as N)	Major Anions	Major Cations	Moisture Set	Eurofins | mgt Suite B4
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X	X	X	X	X	X	X	X	X	X
Sydney Laboratory - NATA Site # 18217																			
Brisbane Laboratory - NATA Site # 20794																			
External Laboratory																			
23	HA4.2-0.05	Aug 03, 2016		Soil	M16-Au05031									X				X	X
24	HA4.3-0.05	Aug 03, 2016		Soil	M16-Au05032									X				X	X
25	HA4.4-0.05	Aug 03, 2016		Soil	M16-Au05033									X				X	X
26	HA4.5-0.05	Aug 03, 2016		Soil	M16-Au05034									X				X	X
27	HA4.6-0.05	Aug 03, 2016		Soil	M16-Au05035									X				X	X
28	HA01.1-0.05	Aug 04, 2016		Soil	M16-Au05036													X	X
29	HA1.2-0.05	Aug 04, 2016		Soil	M16-Au05037													X	X
30	HA1.3-0.05	Aug 04, 2016		Soil	M16-Au05038													X	X
31	HA1.4-0.05	Aug 04, 2016		Soil	M16-Au05039													X	X
32	DAM01	Aug 04, 2016		Soil	M16-Au05040						X	X	X	X				X	
33	DAM02	Aug 04, 2016		Soil	M16-Au05041						X	X	X	X				X	
34	DAM03	Aug 04, 2016		Soil	M16-Au05042						X	X	X	X				X	

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Company Name: Tonkin & Taylor P/L
Address: Ground Floor, 95 Coventry St
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VIC 3006

Project Name: ROWVILLE
Project ID: 2781.200

Order No.:
Report #: 510630
Phone: 03 9863 8686
Fax: 03 9863 8685

Received: Aug 4, 2016 2:24 PM
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Priority: 5 Day
Contact Name: Thomas Madill

Eurofins | mgt Analytical Services Manager : Mary Makarios

Sample Detail						E.coli	HOLD	pH	Phosphate total (as P)	Total Dissolved Solids	Organochlorine Pesticides	Organophosphorus Pesticides	Acid Herbicides	IWRG 621 Metals : Metals M12	Total Nitrogen Set (as N)	Major Anions	Major Cations	Moisture Set	Eurofins | mgt Suite B4
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X	X	X	X	X	X	X	X	X	X
Sydney Laboratory - NATA Site # 18217																			
Brisbane Laboratory - NATA Site # 20794																			
External Laboratory																			
35	DAM04	Aug 04, 2016		Soil	M16-Au05043						X	X	X	X				X	
36	DAM01	Aug 04, 2016		Water	M16-Au05044	X		X	X	X	X			X	X	X	X		
37	DAM02	Aug 04, 2016		Water	M16-Au05045	X		X	X	X	X			X	X	X	X		
38	DAM03	Aug 04, 2016		Water	M16-Au05046	X		X	X	X	X			X	X	X	X		
39	DAM04	Aug 04, 2016		Water	M16-Au05047	X		X	X	X	X			X	X	X	X		
40	HA09-0.5	Aug 04, 2016		Soil	M16-Au05048		X												
41	HA10-0.5	Aug 04, 2016		Soil	M16-Au05049		X												
42	HA11-0.5	Aug 04, 2016		Soil	M16-Au05050		X												
43	HA4.1-0.5	Aug 04, 2016		Soil	M16-Au05051		X												
44	HA4.2-0.5	Aug 04, 2016		Soil	M16-Au05052		X												
45	HA4.3-0.5	Aug 04, 2016		Soil	M16-Au05053		X												
46	HA4.4-0.5	Aug 04, 2016		Soil	M16-Au05054		X												

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Project Name: ROWVILLE
Project ID: 2781.200

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Phone: 03 9863 8686
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Received: Aug 4, 2016 2:24 PM
Due: Aug 11, 2016
Priority: 5 Day
Contact Name: Thomas Madill

Eurofins | mgt Analytical Services Manager : Mary Makarios

Sample Detail						E.coli	HOLD	pH	Phosphate total (as P)	Total Dissolved Solids	Organochlorine Pesticides	Organophosphorus Pesticides	Acid Herbicides	IWRG 621 Metals : Metals M12	Total Nitrogen Set (as N)	Major Anions	Major Cations	Moisture Set	Eurofins | mgt Suite B4
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X	X	X	X	X	X	X	X	X	X
Sydney Laboratory - NATA Site # 18217																			
Brisbane Laboratory - NATA Site # 20794																			
External Laboratory																			
47	HA4.5-0.5	Aug 04, 2016		Soil	M16-Au05055		X												
48	HA4.6-0.5	Aug 04, 2016		Soil	M16-Au05056		X												
49	HA1.1-0.5	Aug 04, 2016		Soil	M16-Au05057		X												
50	HA1.2-0.5	Aug 04, 2016		Soil	M16-Au05058		X												
51	HA1.3-0.5	Aug 04, 2016		Soil	M16-Au05059		X												
52	HA1.4-0.5	Aug 04, 2016		Soil	M16-Au05060		X												
53	TP01-0.1	Aug 04, 2016		Soil	M16-Au05061		X												
54	TP01-0.5	Aug 04, 2016		Soil	M16-Au05062		X												
55	TP02-0.1	Aug 04, 2016		Soil	M16-Au05063		X												
56	TP02-0.5	Aug 04, 2016		Soil	M16-Au05064		X												
57	TP03-0.1	Aug 04, 2016		Soil	M16-Au05065		X												
58	TP03-0.5	Aug 04, 2016		Soil	M16-Au05066		X												

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Company Name:	Tonkin & Taylor P/L	**Order No.:**		**Received:**	Aug 4, 2016 2:24 PM
Address:	Ground Floor, 95 Coventry St South Bank VIC 3006	**Report #:**	510630	**Due:**	Aug 11, 2016
		Phone:	03 9863 8686	**Priority:**	5 Day
		Fax:	03 9863 8685	**Contact Name:**	Thomas Madill
Project Name:	ROWVILLE				
Project ID:	2781.200				

Eurofins | mgt Analytical Services Manager : Mary Makarios

Sample Detail						E.coli	HOLD	pH	Phosphate total (as P)	Total Dissolved Solids	Organochlorine Pesticides	Organophosphorus Pesticides	Acid Herbicides	IWRG 621 Metals : Metals M12	Total Nitrogen Set (as N)	Major Anions	Major Cations	Moisture Set	Eurofins | mgt Suite B4
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X	X	X	X	X	X	X	X	X	X
Sydney Laboratory - NATA Site # 18217																			
Brisbane Laboratory - NATA Site # 20794																			
External Laboratory																			
59	TP04-0.1	Aug 04, 2016		Soil	M16-Au05067		X												
60	TP04-0.5	Aug 04, 2016		Soil	M16-Au05068		X												
Test Counts						4	21	4	4	4	9	5	22	17	4	4	4	35	12

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil results are reported on a dry basis, unless otherwise stated.
3. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
4. Results are uncorrected for matrix spikes or surrogate recoveries.
5. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
6. Samples were analysed on an 'as received' basis. 7. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the Sample Receipt Advice.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

****NOTE:** pH duplicates are reported as a range NOT as RPD

Units

mg/kg: milligrams per Kilogram

ug/l: micrograms per litre

ppb: Parts per billion

org/100ml: Organisms per 100 millilitres

MPN/100mL: Most Probable Number of organisms per 100 millilitres

mg/l: milligrams per litre

ppm: Parts per million

%: Percentage

NTU: Nephelometric Turbidity Units

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery
CRM	Certified Reference Material - reported as percent recovery
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands. In the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
Batch Duplicate	A second piece of analysis from a sample outside of the clients batch of samples but run within the laboratory batch of analysis.
Batch SPIKE	Spike recovery reported on a sample from outside of the clients batch of samples but run within the laboratory batch of analysis.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries: Recoveries must lie between 50-150%-Phenols & PFASs 20-130%

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	mg/kg	< 20			20	Pass	
TRH C10-C14	mg/kg	< 20			20	Pass	
TRH C15-C28	mg/kg	< 50			50	Pass	
TRH C29-C36	mg/kg	< 50			50	Pass	
Method Blank							
BTEX							
Benzene	mg/kg	< 0.1			0.1	Pass	
Toluene	mg/kg	< 0.1			0.1	Pass	
Ethylbenzene	mg/kg	< 0.1			0.1	Pass	
m&p-Xylenes	mg/kg	< 0.2			0.2	Pass	
o-Xylene	mg/kg	< 0.1			0.1	Pass	
Xylenes - Total	mg/kg	< 0.3			0.3	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	mg/kg	< 0.5			0.5	Pass	
TRH C6-C10	mg/kg	< 20			20	Pass	
Method Blank							
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	mg/kg	< 0.5			0.5	Pass	
Acenaphthylene	mg/kg	< 0.5			0.5	Pass	
Anthracene	mg/kg	< 0.5			0.5	Pass	
Benz(a)anthracene	mg/kg	< 0.5			0.5	Pass	
Benzo(a)pyrene	mg/kg	< 0.5			0.5	Pass	
Benzo(b&j)fluoranthene	mg/kg	< 0.5			0.5	Pass	
Benzo(g.h.i)perylene	mg/kg	< 0.5			0.5	Pass	
Benzo(k)fluoranthene	mg/kg	< 0.5			0.5	Pass	
Chrysene	mg/kg	< 0.5			0.5	Pass	
Dibenz(a.h)anthracene	mg/kg	< 0.5			0.5	Pass	
Fluoranthene	mg/kg	< 0.5			0.5	Pass	
Fluorene	mg/kg	< 0.5			0.5	Pass	
Indeno(1.2.3-cd)pyrene	mg/kg	< 0.5			0.5	Pass	
Naphthalene	mg/kg	< 0.5			0.5	Pass	
Phenanthrene	mg/kg	< 0.5			0.5	Pass	
Pyrene	mg/kg	< 0.5			0.5	Pass	
Method Blank							
Organochlorine Pesticides							
Chlordanes - Total	mg/kg	< 0.1			0.1	Pass	
4.4'-DDD	mg/kg	< 0.05			0.05	Pass	
4.4'-DDE	mg/kg	< 0.05			0.05	Pass	
4.4'-DDT	mg/kg	< 0.05			0.05	Pass	
a-BHC	mg/kg	< 0.05			0.05	Pass	
Aldrin	mg/kg	< 0.05			0.05	Pass	
b-BHC	mg/kg	< 0.05			0.05	Pass	
d-BHC	mg/kg	< 0.05			0.05	Pass	
Dieldrin	mg/kg	< 0.05			0.05	Pass	
Endosulfan I	mg/kg	< 0.05			0.05	Pass	
Endosulfan II	mg/kg	< 0.05			0.05	Pass	
Endosulfan sulphate	mg/kg	< 0.05			0.05	Pass	
Endrin	mg/kg	< 0.05			0.05	Pass	
Endrin aldehyde	mg/kg	< 0.05			0.05	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Endrin ketone	mg/kg	< 0.05			0.05	Pass	
g-BHC (Lindane)	mg/kg	< 0.05			0.05	Pass	
Heptachlor	mg/kg	< 0.05			0.05	Pass	
Heptachlor epoxide	mg/kg	< 0.05			0.05	Pass	
Hexachlorobenzene	mg/kg	< 0.05			0.05	Pass	
Methoxychlor	mg/kg	< 0.05			0.05	Pass	
Toxaphene	mg/kg	< 1			1	Pass	
Method Blank							
Organophosphorus Pesticides							
Azinphos-methyl	mg/kg	< 0.2			0.2	Pass	
Bolstar	mg/kg	< 0.2			0.2	Pass	
Chlorfenvinphos	mg/kg	< 0.2			0.2	Pass	
Chlorpyrifos	mg/kg	< 0.2			0.2	Pass	
Chlorpyrifos-methyl	mg/kg	< 0.2			0.2	Pass	
Coumaphos	mg/kg	< 2			2	Pass	
Demeton-S	mg/kg	< 0.2			0.2	Pass	
Demeton-O	mg/kg	< 0.2			0.2	Pass	
Diazinon	mg/kg	< 0.2			0.2	Pass	
Dichlorvos	mg/kg	< 0.2			0.2	Pass	
Dimethoate	mg/kg	< 0.2			0.2	Pass	
Disulfoton	mg/kg	< 0.2			0.2	Pass	
EPN	mg/kg	< 0.2			0.2	Pass	
Ethion	mg/kg	< 0.2			0.2	Pass	
Ethoprop	mg/kg	< 0.2			0.2	Pass	
Ethyl parathion	mg/kg	< 0.2			0.2	Pass	
Fenitrothion	mg/kg	< 0.2			0.2	Pass	
Fensulfothion	mg/kg	< 0.2			0.2	Pass	
Fenthion	mg/kg	< 0.2			0.2	Pass	
Malathion	mg/kg	< 0.2			0.2	Pass	
Merphos	mg/kg	< 0.2			0.2	Pass	
Methyl parathion	mg/kg	< 0.2			0.2	Pass	
Mevinphos	mg/kg	< 0.2			0.2	Pass	
Monocrotophos	mg/kg	< 2			2	Pass	
Naled	mg/kg	< 0.2			0.2	Pass	
Omethoate	mg/kg	< 2			2	Pass	
Phorate	mg/kg	< 0.2			0.2	Pass	
Pirimiphos-methyl	mg/kg	< 0.2			0.2	Pass	
Pyrazophos	mg/kg	< 0.2			0.2	Pass	
Ronnel	mg/kg	< 0.2			0.2	Pass	
Terbufos	mg/kg	< 0.2			0.2	Pass	
Tetrachlorvinphos	mg/kg	< 0.2			0.2	Pass	
Tokuthion	mg/kg	< 0.2			0.2	Pass	
Trichloronate	mg/kg	< 0.2			0.2	Pass	
Method Blank							
Acid Herbicides							
2.4-D	mg/kg	< 0.5			0.5	Pass	
2.4-DB	mg/kg	< 0.5			0.5	Pass	
2.4.5-T	mg/kg	< 0.5			0.5	Pass	
2.4.5-TP	mg/kg	< 0.5			0.5	Pass	
Actril (loxynil)	mg/kg	< 0.5			0.5	Pass	
Dicamba	mg/kg	< 0.5			0.5	Pass	
Dichlorprop	mg/kg	< 0.5			0.5	Pass	
Dinitro-o-cresol	mg/kg	< 0.5			0.5	Pass	
Dinoseb	mg/kg	< 0.5			0.5	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
MCPA	mg/kg	< 0.5			0.5	Pass	
MCPB	mg/kg	< 0.5			0.5	Pass	
Mecoprop	mg/kg	< 0.5			0.5	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
TRH >C10-C16	mg/kg	< 50			50	Pass	
TRH >C16-C34	mg/kg	< 100			100	Pass	
TRH >C34-C40	mg/kg	< 100			100	Pass	
Method Blank							
Heavy Metals							
Arsenic	mg/kg	< 2			2	Pass	
Cadmium	mg/kg	< 0.4			0.4	Pass	
Chromium	mg/kg	< 5			5	Pass	
Copper	mg/kg	< 5			5	Pass	
Lead	mg/kg	< 5			5	Pass	
Mercury	mg/kg	< 0.1			0.1	Pass	
Molybdenum	mg/kg	< 5			5	Pass	
Nickel	mg/kg	< 5			5	Pass	
Selenium	mg/kg	< 2			2	Pass	
Silver	mg/kg	< 0.2			0.2	Pass	
Tin	mg/kg	< 10			10	Pass	
Zinc	mg/kg	< 5			5	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	%	114			70-130	Pass	
TRH C10-C14	%	96			70-130	Pass	
LCS - % Recovery							
BTEX							
Benzene	%	92			70-130	Pass	
Toluene	%	100			70-130	Pass	
Ethylbenzene	%	99			70-130	Pass	
m&p-Xylenes	%	102			70-130	Pass	
Xylenes - Total	%	101			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	%	93			70-130	Pass	
TRH C6-C10	%	109			70-130	Pass	
LCS - % Recovery							
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	%	112			70-130	Pass	
Acenaphthylene	%	115			70-130	Pass	
Anthracene	%	120			70-130	Pass	
Benz(a)anthracene	%	113			70-130	Pass	
Benzo(a)pyrene	%	113			70-130	Pass	
Benzo(b&j)fluoranthene	%	96			70-130	Pass	
Benzo(g.h.i)perylene	%	80			70-130	Pass	
Benzo(k)fluoranthene	%	121			70-130	Pass	
Chrysene	%	121			70-130	Pass	
Dibenz(a.h)anthracene	%	92			70-130	Pass	
Fluoranthene	%	92			70-130	Pass	
Fluorene	%	113			70-130	Pass	
Indeno(1.2.3-cd)pyrene	%	92			70-130	Pass	
Naphthalene	%	106			70-130	Pass	
Phenanthrene	%	120			70-130	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Pyrene	%	93			70-130	Pass	
LCS - % Recovery							
Organochlorine Pesticides							
4.4'-DDD	%	101			70-130	Pass	
4.4'-DDE	%	98			70-130	Pass	
4.4'-DDT	%	88			70-130	Pass	
a-BHC	%	96			70-130	Pass	
Aldrin	%	99			70-130	Pass	
b-BHC	%	76			70-130	Pass	
d-BHC	%	84			70-130	Pass	
Dieldrin	%	90			70-130	Pass	
Endosulfan I	%	95			70-130	Pass	
Endosulfan II	%	91			70-130	Pass	
Endosulfan sulphate	%	83			70-130	Pass	
Endrin	%	75			70-130	Pass	
Endrin aldehyde	%	92			70-130	Pass	
Endrin ketone	%	95			70-130	Pass	
g-BHC (Lindane)	%	98			70-130	Pass	
Heptachlor	%	83			70-130	Pass	
Heptachlor epoxide	%	94			70-130	Pass	
Hexachlorobenzene	%	89			70-130	Pass	
Methoxychlor	%	97			70-130	Pass	
LCS - % Recovery							
Organophosphorus Pesticides							
Diazinon	%	121			70-130	Pass	
Dimethoate	%	102			70-130	Pass	
Ethion	%	120			70-130	Pass	
Fenitrothion	%	102			70-130	Pass	
Methyl parathion	%	86			70-130	Pass	
Mevinphos	%	129			70-130	Pass	
LCS - % Recovery							
Acid Herbicides							
2.4-D	%	111			70-130	Pass	
2.4-DB	%	108			70-130	Pass	
2.4.5-T	%	122			70-130	Pass	
2.4.5-TP	%	89			70-130	Pass	
Actril (Ioxynil)	%	98			70-130	Pass	
Dicamba	%	87			70-130	Pass	
Dichlorprop	%	103			70-130	Pass	
Dinitro-o-cresol	%	88			70-130	Pass	
Dinoseb	%	112			70-130	Pass	
MCPA	%	100			70-130	Pass	
MCPB	%	103			70-130	Pass	
Mecoprop	%	101			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
TRH >C10-C16	%	95			70-130	Pass	
LCS - % Recovery							
Heavy Metals							
Arsenic	%	104			80-120	Pass	
Cadmium	%	106			80-120	Pass	
Chromium	%	111			80-120	Pass	
Copper	%	113			80-120	Pass	
Lead	%	108			80-120	Pass	

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Mercury			%	90			75-125	Pass	
Molybdenum			%	108			80-120	Pass	
Nickel			%	110			80-120	Pass	
Selenium			%	98			80-120	Pass	
Silver			%	106			80-120	Pass	
Tin			%	107			80-120	Pass	
Zinc			%	111			80-120	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Spike - % Recovery									
Acid Herbicides				Result 1					
2.4-D	M16-Au05019	CP	%	100			70-130	Pass	
Actril (loxynil)	M16-Au05019	CP	%	89			70-130	Pass	
Dichlorprop	M16-Au05019	CP	%	97			70-130	Pass	
MCPA	M16-Au05019	CP	%	93			70-130	Pass	
MCPB	M16-Au05019	CP	%	74			70-130	Pass	
Spike - % Recovery									
Organochlorine Pesticides				Result 1					
4.4'-DDD	M16-Au05353	NCP	%	78			70-130	Pass	
4.4'-DDE	M16-Au05353	NCP	%	92			70-130	Pass	
4.4'-DDT	M16-Au05353	NCP	%	82			70-130	Pass	
a-BHC	M16-Au05353	NCP	%	112			70-130	Pass	
Aldrin	M16-Au05353	NCP	%	117			70-130	Pass	
b-BHC	M16-Au05353	NCP	%	90			70-130	Pass	
d-BHC	M16-Au05353	NCP	%	109			70-130	Pass	
Dieldrin	M16-Au05353	NCP	%	129			70-130	Pass	
Endosulfan I	M16-Au05353	NCP	%	112			70-130	Pass	
Endosulfan II	M16-Au05353	NCP	%	107			70-130	Pass	
Endosulfan sulphate	M16-Au05353	NCP	%	96			70-130	Pass	
Endrin	M16-Au05353	NCP	%	104			70-130	Pass	
Endrin aldehyde	M16-Au05353	NCP	%	100			70-130	Pass	
Endrin ketone	M16-Au05353	NCP	%	107			70-130	Pass	
g-BHC (Lindane)	M16-Au05353	NCP	%	117			70-130	Pass	
Heptachlor	M16-Au05353	NCP	%	111			70-130	Pass	
Heptachlor epoxide	M16-Au05353	NCP	%	112			70-130	Pass	
Hexachlorobenzene	M16-Au05353	NCP	%	106			70-130	Pass	
Methoxychlor	M16-Au05353	NCP	%	97			70-130	Pass	
Spike - % Recovery									
Organophosphorus Pesticides				Result 1					
Diazinon	M16-Au05027	CP	%	129			70-130	Pass	
Dimethoate	M16-Au05027	CP	%	105			70-130	Pass	
Ethion	M16-Au05027	CP	%	126			70-130	Pass	
Fenitrothion	M16-Au05027	CP	%	108			70-130	Pass	
Methyl parathion	M16-Au05027	CP	%	86			70-130	Pass	
Mevinphos	M16-Au05027	CP	%	116			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Selenium	M16-Au04725	NCP	%	84			75-125	Pass	
Tin	M16-Au04725	NCP	%	90			75-125	Pass	
Zinc	M16-Au04725	NCP	%	102			75-125	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1					
TRH C10-C14	M16-Au04723	NCP	%	97			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					

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Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
TRH >C10-C16	M16-Au04723	NCP	%	97			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1					
TRH C6-C9	M16-Au05030	CP	%	84			70-130	Pass	
Spike - % Recovery									
BTEX				Result 1					
Benzene	M16-Au05030	CP	%	89			70-130	Pass	
Toluene	M16-Au05030	CP	%	88			70-130	Pass	
Ethylbenzene	M16-Au05030	CP	%	88			70-130	Pass	
m&p-Xylenes	M16-Au05030	CP	%	83			70-130	Pass	
o-Xylene	M16-Au05030	CP	%	83			70-130	Pass	
Xylenes - Total	M16-Au05030	CP	%	83			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
Naphthalene	M16-Au05030	CP	%	105			70-130	Pass	
TRH C6-C10	M16-Au05030	CP	%	77			70-130	Pass	
Spike - % Recovery									
Polycyclic Aromatic Hydrocarbons				Result 1					
Acenaphthene	M16-Au05032	CP	%	92			70-130	Pass	
Acenaphthylene	M16-Au05032	CP	%	120			70-130	Pass	
Anthracene	M16-Au05032	CP	%	119			70-130	Pass	
Benz(a)anthracene	M16-Au05032	CP	%	111			70-130	Pass	
Benzo(a)pyrene	M16-Au05032	CP	%	97			70-130	Pass	
Benzo(b&j)fluoranthene	M16-Au05032	CP	%	106			70-130	Pass	
Benzo(g.h.i)perylene	M16-Au05032	CP	%	111			70-130	Pass	
Benzo(k)fluoranthene	M16-Au05032	CP	%	100			70-130	Pass	
Chrysene	M16-Au05032	CP	%	105			70-130	Pass	
Dibenz(a.h)anthracene	M16-Au05032	CP	%	124			70-130	Pass	
Fluoranthene	M16-Au05032	CP	%	100			70-130	Pass	
Fluorene	M16-Au05032	CP	%	101			70-130	Pass	
Indeno(1.2.3-cd)pyrene	M16-Au05032	CP	%	117			70-130	Pass	
Naphthalene	M16-Au05032	CP	%	96			70-130	Pass	
Phenanthrene	M16-Au05032	CP	%	104			70-130	Pass	
Pyrene	M16-Au05032	CP	%	97			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Arsenic	M16-Au05040	CP	%	78			75-125	Pass	
Cadmium	M16-Au05040	CP	%	83			75-125	Pass	
Chromium	M16-Au05040	CP	%	85			75-125	Pass	
Copper	M16-Au05040	CP	%	102			75-125	Pass	
Lead	M16-Au05040	CP	%	81			75-125	Pass	
Mercury	M16-Au05040	CP	%	80			70-130	Pass	
Molybdenum	M16-Au05040	CP	%	80			75-125	Pass	
Nickel	M16-Au05040	CP	%	80			75-125	Pass	
Silver	M16-Au05040	CP	%	89			75-125	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Acid Herbicides				Result 1	Result 2	RPD			
2.4-D	M16-Jl12772	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
2.4-DB	M16-Jl12772	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
2.4.5-T	M16-Jl12772	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
2.4.5-TP	M16-Jl12772	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Actril (Ioxynil)	M16-Jl12772	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Dicamba	M16-Jl12772	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	

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Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Acid Herbicides				Result 1	Result 2	RPD			
Dichlorprop	M16-Jl12772	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Dinitro-o-cresol	M16-Jl12772	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Dinoseb	M16-Jl12772	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
MCPA	M16-Jl12772	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
MCPB	M16-Jl12772	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Mecoprop	M16-Jl12772	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	M16-Au05018	CP	%	14	13	5.0	30%	Pass	
Duplicate									
Organochlorine Pesticides				Result 1	Result 2	RPD			
Chlordanes - Total	M16-Au06596	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
4.4'-DDD	M16-Au06596	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
4.4'-DDE	M16-Au06596	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
4.4'-DDT	M16-Au06596	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
a-BHC	M16-Au06596	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Aldrin	M16-Au06596	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
b-BHC	M16-Au06596	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
d-BHC	M16-Au06596	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Dieldrin	M16-Au06596	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endosulfan I	M16-Au06596	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endosulfan II	M16-Au06596	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endosulfan sulphate	M16-Au06596	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endrin	M16-Au06596	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endrin aldehyde	M16-Au06596	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endrin ketone	M16-Au06596	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
g-BHC (Lindane)	M16-Au06596	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Heptachlor	M16-Au06596	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Heptachlor epoxide	M16-Au06596	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Hexachlorobenzene	M16-Au06596	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Methoxychlor	M16-Au06596	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Toxaphene	M16-Au06596	NCP	mg/kg	< 1	< 1	<1	30%	Pass	
Duplicate									
Organophosphorus Pesticides				Result 1	Result 2	RPD			
Azinphos-methyl	M16-Au05435	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Bolstar	M16-Au05435	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Chlorfenvinphos	M16-Au05435	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Chlorpyrifos	M16-Au05435	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Chlorpyrifos-methyl	M16-Au05435	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Coumaphos	M16-Au05435	NCP	mg/kg	< 2	< 2	<1	30%	Pass	
Demeton-S	M16-Au05435	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Demeton-O	M16-Au05435	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Diazinon	M16-Au05435	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Dichlorvos	M16-Au05435	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Dimethoate	M16-Au05435	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Disulfoton	M16-Au05435	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
EPN	M16-Au05435	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Ethion	M16-Au05435	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Ethoprop	M16-Au05435	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Ethyl parathion	M16-Au05435	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Fenitrothion	M16-Au05435	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Fensulfothion	M16-Au05435	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	

Duplicate									
Organophosphorus Pesticides				Result 1	Result 2	RPD			
Fenthion	M16-Au05435	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Malathion	M16-Au05435	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Merphos	M16-Au05435	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Methyl parathion	M16-Au05435	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Mevinphos	M16-Au05435	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Monocrotophos	M16-Au05435	NCP	mg/kg	< 2	< 2	<1	30%	Pass	
Naled	M16-Au05435	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Omethoate	M16-Au05435	NCP	mg/kg	< 2	< 2	<1	30%	Pass	
Phorate	M16-Au05435	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Pirimiphos-methyl	M16-Au05435	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Pyrazophos	M16-Au05435	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Ronnel	M16-Au05435	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Terbufos	M16-Au05435	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Tetrachlorvinphos	M16-Au05435	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Tokuthion	M16-Au05435	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Trichloronate	M16-Au05435	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C10-C14	M16-Au05435	NCP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH C15-C28	M16-Au05435	NCP	mg/kg	< 50	< 50	<1	30%	Pass	
TRH C29-C36	M16-Au05435	NCP	mg/kg	< 50	< 50	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
TRH >C10-C16	M16-Au05435	NCP	mg/kg	< 50	< 50	<1	30%	Pass	
TRH >C16-C34	M16-Au05435	NCP	mg/kg	< 100	< 100	<1	30%	Pass	
TRH >C34-C40	M16-Au05435	NCP	mg/kg	< 100	< 100	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	M16-Au05028	CP	%	16	17	6.0	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C6-C9	M16-Au05029	CP	mg/kg	< 20	< 20	<1	30%	Pass	
Duplicate									
BTEX				Result 1	Result 2	RPD			
Benzene	M16-Au05029	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Toluene	M16-Au05029	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Ethylbenzene	M16-Au05029	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
m&p-Xylenes	M16-Au05029	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
o-Xylene	M16-Au05029	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Xylenes - Total	M16-Au05029	CP	mg/kg	< 0.3	< 0.3	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	M16-Au05029	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
TRH C6-C10	M16-Au05029	CP	mg/kg	< 20	< 20	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C6-C9	M16-Au05031	CP	mg/kg	< 20	< 20	<1	30%	Pass	
Duplicate									
BTEX				Result 1	Result 2	RPD			
Benzene	M16-Au05031	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Toluene	M16-Au05031	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Ethylbenzene	M16-Au05031	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
m&p-Xylenes	M16-Au05031	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
o-Xylene	M16-Au05031	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Xylenes - Total	M16-Au05031	CP	mg/kg	< 0.3	< 0.3	<1	30%	Pass	

Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	M16-Au05031	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
TRH C6-C10	M16-Au05031	CP	mg/kg	< 20	< 20	<1	30%	Pass	
Duplicate									
Polycyclic Aromatic Hydrocarbons				Result 1	Result 2	RPD			
Acenaphthene	M16-Au05031	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Acenaphthylene	M16-Au05031	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Anthracene	M16-Au05031	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benz(a)anthracene	M16-Au05031	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(a)pyrene	M16-Au05031	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(b&j)fluoranthene	M16-Au05031	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(g.h.i)perylene	M16-Au05031	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(k)fluoranthene	M16-Au05031	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Chrysene	M16-Au05031	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Dibenz(a.h)anthracene	M16-Au05031	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Fluoranthene	M16-Au05031	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Fluorene	M16-Au05031	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Indeno(1.2.3-cd)pyrene	M16-Au05031	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Naphthalene	M16-Au05031	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Phenanthrene	M16-Au05031	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Pyrene	M16-Au05031	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	M16-Au05035	CP	mg/kg	5.3	4.4	19	30%	Pass	
Cadmium	M16-Au05035	CP	mg/kg	< 0.4	< 0.4	<1	30%	Pass	
Chromium	M16-Au05035	CP	mg/kg	17	16	5.0	30%	Pass	
Copper	M16-Au05035	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Lead	M16-Au05035	CP	mg/kg	13	18	32	30%	Fail	Q15
Mercury	M16-Au05035	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Molybdenum	M16-Au05035	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Nickel	M16-Au05035	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Selenium	M16-Au05035	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Silver	M16-Au05035	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Tin	M16-Au05035	CP	mg/kg	< 10	< 10	<1	30%	Pass	
Zinc	M16-Au05035	CP	mg/kg	15	16	3.0	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	M16-Au05038	CP	%	28	28	1.0	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	M16-Au05040	CP	mg/kg	11	12	5.0	30%	Pass	
Cadmium	M16-Au05040	CP	mg/kg	< 0.4	< 0.4	<1	30%	Pass	
Chromium	M16-Au05040	CP	mg/kg	34	35	2.0	30%	Pass	
Copper	M16-Au05040	CP	mg/kg	6.5	6.6	1.0	30%	Pass	
Lead	M16-Au05040	CP	mg/kg	13	18	33	30%	Fail	Q15
Mercury	M16-Au05040	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Molybdenum	M16-Au05040	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Nickel	M16-Au05040	CP	mg/kg	10	10	3.0	30%	Pass	
Selenium	M16-Au05040	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Silver	M16-Au05040	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Tin	M16-Au05040	CP	mg/kg	< 10	< 10	<1	30%	Pass	
Zinc	M16-Au05040	CP	mg/kg	37	37	<1	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	No
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	N/A
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
N01	F2 is determined by arithmetically subtracting the "naphthalene" value from the ">C10-C16" value. The naphthalene value used in this calculation is obtained from volatiles (Purge & Trap analysis).
N02	Where we have reported both volatile (P&T GCMS) and semivolatile (GCMS) naphthalene data, results may not be identical. Provided correct sample handling protocols have been followed, any observed differences in results are likely to be due to procedural differences within each methodology. Results determined by both techniques have passed all QAQC acceptance criteria, and are entirely technically valid.
N04	F1 is determined by arithmetically subtracting the "Total BTEX" value from the "C6-C10" value. The "Total BTEX" value is obtained by summing the concentrations of BTEX analytes. The "C6-C10" value is obtained by quantitating against a standard of mixed aromatic/aliphatic analytes.
N07	Please note:- These two PAH isomers closely co-elute using the most contemporary analytical methods and both the reported concentration (and the TEQ) apply specifically to the total of the two co-eluting PAHs
Q15	The RPD reported passes Eurofins | mgt's QC - Acceptance Criteria as defined in the Internal Quality Control Review and Glossary page of this report.

Authorised By

Mary Makarios	Analytical Services Manager
Alex Petridis	Senior Analyst-Metal (VIC)
Harry Bacalis	Senior Analyst-Volatile (VIC)
Huong Le	Senior Analyst-Inorganic (VIC)
Mele Singh	Senior Analyst-Organic (VIC)

Glenn Jackson
National Operations Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

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Certificate of Analysis

NATA Accredited
Accreditation Number 1261
Site Number 1254 & 14271

Accredited for compliance with ISO/IEC 17025.
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Tonkin & Taylor P/L
Ground Floor, 95 Coventry St
South Bank
VIC 3006

Attention: **Thomas Madill**

Report **510630-W**
Project name ROWVILLE
Project ID 2781.200
Received Date Aug 04, 2016

Client Sample ID			**DAM01**	**DAM02**	**DAM03**	**DAM04**
Sample Matrix			**Water**	**Water**	**Water**	**Water**
Eurofins | mgt Sample No.			**M16-Au05044**	**M16-Au05045**	**M16-Au05046**	**M16-Au05047**
Date Sampled			**Aug 04, 2016**	**Aug 04, 2016**	**Aug 04, 2016**	**Aug 04, 2016**
Test/Reference	LOR	Unit				
Organochlorine Pesticides						
Chlordanes - Total	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
4.4'-DDD	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
4.4'-DDE	0.0001	mg/L	0.0002	< 0.0001	< 0.0001	< 0.0001
4.4'-DDT	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
a-BHC	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Aldrin	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
b-BHC	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
d-BHC	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Dieldrin	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Endosulfan I	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Endosulfan II	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Endosulfan sulphate	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Endrin	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Endrin aldehyde	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Endrin ketone	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
g-BHC (Lindane)	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Heptachlor	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Heptachlor epoxide	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Hexachlorobenzene	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Methoxychlor	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Toxaphene	0.01	mg/L	< 0.01	< 0.01	< 0.01	< 0.01
Dibutylchlorendate (surr.)	1	%	81	104	84	74
Tetrachloro-m-xylene (surr.)	1	%	57	65	97	98
Ammonia (as N)	0.01	mg/L	< 0.01	0.34	0.19	0.06
Nitrate & Nitrite (as N)	0.05	mg/L	0.72	0.16	1.1	0.14
pH	0.1	pH Units	8.0	8.0	7.4	7.2
Phosphate total (as P)	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
Total Dissolved Solids	10	mg/L	270	220	190	150
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	1.0	1.3	1.1	1.0
Total Nitrogen (as N)	0.2	mg/L	1.7	1.5	2.2	1.1

Client Sample ID			DAM01	DAM02	DAM03	DAM04
Sample Matrix			Water	Water	Water	Water
Eurofins | mgt Sample No.			M16-Au05044	M16-Au05045	M16-Au05046	M16-Au05047
Date Sampled			Aug 04, 2016	Aug 04, 2016	Aug 04, 2016	Aug 04, 2016
Test/Reference	LOR	Unit				
Major Anions						
Bicarbonate Alkalinity (as CaCO3)	20	mg/L	140	120	59	73
Carbonate Alkalinity (as CaCO3)	10	mg/L	< 10	< 10	< 10	< 10
Chloride	1	mg/L	33	33	27	24
Nitrate (as N)	0.02	mg/L	0.72	0.16	1.1	0.12
Sulphate (as S)	5	mg/L	19	9.5	12	< 5
Alkali Metals						
Calcium	0.5	mg/L	320	230	150	120
Magnesium	0.5	mg/L	120	100	72	61
Potassium	0.5	mg/L	96	82	99	54
Sodium	0.5	mg/L	240	240	180	170
Heavy Metals						
Arsenic	0.001	mg/L	0.001	0.002	0.001	0.001
Cadmium	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Chromium	0.001	mg/L	0.001	< 0.001	0.001	0.001
Copper	0.001	mg/L	0.002	< 0.001	0.002	0.001
Lead	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Mercury	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Molybdenum	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Nickel	0.001	mg/L	0.002	0.002	0.003	0.001
Selenium	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Silver	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Tin	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Zinc	0.005	mg/L	0.015	< 0.005	0.010	0.008
Pathogens						
E.coli	1	MPN/100mL	[M05]11	11	[M05]79	49

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results (regarding both quality and NATA accreditation).

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Organochlorine Pesticides	Melbourne	Aug 09, 2016	7 Day
- Method: USEPA 8081 Organochlorine Pesticides			
pH	Melbourne	Aug 04, 2016	0 Hours
- Method: LTM-GEN-7090 pH in water by ISE			
Phosphate total (as P)	Melbourne	Aug 04, 2016	28 Day
- Method: APHA 4500-P E. Phosphorous			
Total Dissolved Solids	Melbourne	Aug 04, 2016	7 Day
- Method: LM-LTM-INO-4110 (Total Dissolved Solids @ 178°C - 182°C)			
Major Anions			
Bicarbonate Alkalinity (as CaCO3)	Melbourne	Aug 04, 2016	14 Day
- Method: APHA 2320 Alkalinity by Titration			
Carbonate Alkalinity (as CaCO3)	Melbourne	Aug 04, 2016	14 Day
- Method: APHA 2320 Alkalinity by Titration			
Chloride	Melbourne	Aug 04, 2016	28 Day
- Method: LTM-INO-4090 Chloride by Discrete Analyser			
Nitrate (as N)	Melbourne	Aug 04, 2016	7 Day
- Method: APHA 4500-NO3 Nitrate Nitrogen by FIA			
Sulphate (as S)	Melbourne	Aug 04, 2016	28 Day
- Method: LTM-INO-4110 Sulfate by Discrete Analyser			
IWRG 621 Metals : Metals M12	Melbourne	Aug 04, 2016	28 Day
- Method: LTM-MET-3040 Metals in Waters by ICP-MS			
E.coli	Melbourne	Aug 05, 2016	24 Hour
- Method: LTM-MIC-6621			
Major Cations			
Ammonia (as N)	Melbourne	Aug 05, 2016	28 Day
- Method: APHA 4500-NH3 Ammonia Nitrogen by FIA			
Alkali Metals	Melbourne	Aug 04, 2016	180 Day
- Method: USEPA 6010 Alkali Metals			
Total Nitrogen Set (as N)			
Nitrate & Nitrite (as N)	Melbourne	Aug 05, 2016	28 Day
- Method: APHA 4500-NO3/NO2 Nitrate-Nitrite Nitrogen by FIA			
Total Kjeldahl Nitrogen (as N)	Melbourne	Aug 04, 2016	7 Day
- Method: APHA 4500 TKN			

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Company Name: Tonkin & Taylor P/L
Address: Ground Floor, 95 Coventry St
South Bank
VIC 3006

Project Name: ROWVILLE
Project ID: 2781.200

Order No.:
Report #: 510630
Phone: 03 9863 8686
Fax: 03 9863 8685

Received: Aug 4, 2016 2:24 PM
Due: Aug 11, 2016
Priority: 5 Day
Contact Name: Thomas Madill

Eurofins | mgt Analytical Services Manager : Mary Makarios

Sample Detail						E.coli	HOLD	pH	Phosphate total (as P)	Total Dissolved Solids	Organochlorine Pesticides	Organophosphorus Pesticides	Acid Herbicides	IWRG 621 Metals : Metals M12	Total Nitrogen Set (as N)	Major Anions	Major Cations	Moisture Set	Eurofins | mgt Suite B4
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X	X	X	X	X	X	X	X	X	X
Sydney Laboratory - NATA Site # 18217																			
Brisbane Laboratory - NATA Site # 20794																			
External Laboratory																			
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**														
1	GR01	Aug 03, 2016		Soil	M16-Au05009								X					X	
2	GR03	Aug 03, 2016		Soil	M16-Au05010								X					X	
3	GR05	Aug 03, 2016		Soil	M16-Au05011								X					X	
4	GR07	Aug 03, 2016		Soil	M16-Au05012								X					X	
5	GR09	Aug 03, 2016		Soil	M16-Au05013								X					X	
6	GR11	Aug 03, 2016		Soil	M16-Au05014								X					X	
7	GR13	Aug 03, 2016		Soil	M16-Au05015								X					X	
8	GR15	Aug 03, 2016		Soil	M16-Au05016								X					X	
9	GR17	Aug 03, 2016		Soil	M16-Au05017								X					X	
10	TEE02	Aug 03, 2016		Soil	M16-Au05018								X					X	

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Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X	X	X	X	X	X	X	X	X	X
Sydney Laboratory - NATA Site # 18217																			
Brisbane Laboratory - NATA Site # 20794																			
External Laboratory																			
11	TEE04	Aug 03, 2016		Soil	M16-Au05019								X					X	
12	TEE06	Aug 03, 2016		Soil	M16-Au05020								X					X	
13	TEE08	Aug 03, 2016		Soil	M16-Au05021								X					X	
14	TEE10	Aug 03, 2016		Soil	M16-Au05022								X					X	
15	TEE12	Aug 03, 2016		Soil	M16-Au05023								X					X	
16	TEE14	Aug 03, 2016		Soil	M16-Au05024								X					X	
17	TEE16	Aug 03, 2016		Soil	M16-Au05025								X					X	
18	TEE18	Aug 03, 2016		Soil	M16-Au05026								X					X	
19	HA09-0.1	Aug 03, 2016		Soil	M16-Au05027						X	X		X				X	
20	HA10-0.1	Aug 03, 2016		Soil	M16-Au05028									X				X	X
21	HA11-0.1	Aug 03, 2016		Soil	M16-Au05029									X				X	X
22	HA4.1-0.05	Aug 03, 2016		Soil	M16-Au05030									X				X	X

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Sample Detail						E.coli	HOLD	pH	Phosphate total (as P)	Total Dissolved Solids	Organochlorine Pesticides	Organophosphorus Pesticides	Acid Herbicides	IWRG 621 Metals : Metals M12	Total Nitrogen Set (as N)	Major Anions	Major Cations	Moisture Set	Eurofins | mgt Suite B4
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X	X	X	X	X	X	X	X	X	X
Sydney Laboratory - NATA Site # 18217																			
Brisbane Laboratory - NATA Site # 20794																			
External Laboratory																			
23	HA4.2-0.05	Aug 03, 2016		Soil	M16-Au05031									X				X	X
24	HA4.3-0.05	Aug 03, 2016		Soil	M16-Au05032									X				X	X
25	HA4.4-0.05	Aug 03, 2016		Soil	M16-Au05033									X				X	X
26	HA4.5-0.05	Aug 03, 2016		Soil	M16-Au05034									X				X	X
27	HA4.6-0.05	Aug 03, 2016		Soil	M16-Au05035									X				X	X
28	HA01.1-0.05	Aug 04, 2016		Soil	M16-Au05036													X	X
29	HA1.2-0.05	Aug 04, 2016		Soil	M16-Au05037													X	X
30	HA1.3-0.05	Aug 04, 2016		Soil	M16-Au05038													X	X
31	HA1.4-0.05	Aug 04, 2016		Soil	M16-Au05039													X	X
32	DAM01	Aug 04, 2016		Soil	M16-Au05040						X	X	X	X				X	
33	DAM02	Aug 04, 2016		Soil	M16-Au05041						X	X	X	X				X	
34	DAM03	Aug 04, 2016		Soil	M16-Au05042						X	X	X	X				X	

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Sample Detail						E.coli	HOLD	pH	Phosphate total (as P)	Total Dissolved Solids	Organochlorine Pesticides	Organophosphorus Pesticides	Acid Herbicides	IWRG 621 Metals : Metals M12	Total Nitrogen Set (as N)	Major Anions	Major Cations	Moisture Set	Eurofins | mgt Suite B4
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X	X	X	X	X	X	X	X	X	X
Sydney Laboratory - NATA Site # 18217																			
Brisbane Laboratory - NATA Site # 20794																			
External Laboratory																			
35	DAM04	Aug 04, 2016		Soil	M16-Au05043						X	X	X	X				X	
36	DAM01	Aug 04, 2016		Water	M16-Au05044	X		X	X	X	X			X	X	X	X		
37	DAM02	Aug 04, 2016		Water	M16-Au05045	X		X	X	X	X			X	X	X	X		
38	DAM03	Aug 04, 2016		Water	M16-Au05046	X		X	X	X	X			X	X	X	X		
39	DAM04	Aug 04, 2016		Water	M16-Au05047	X		X	X	X	X			X	X	X	X		
40	HA09-0.5	Aug 04, 2016		Soil	M16-Au05048		X												
41	HA10-0.5	Aug 04, 2016		Soil	M16-Au05049		X												
42	HA11-0.5	Aug 04, 2016		Soil	M16-Au05050		X												
43	HA4.1-0.5	Aug 04, 2016		Soil	M16-Au05051		X												
44	HA4.2-0.5	Aug 04, 2016		Soil	M16-Au05052		X												
45	HA4.3-0.5	Aug 04, 2016		Soil	M16-Au05053		X												
46	HA4.4-0.5	Aug 04, 2016		Soil	M16-Au05054		X												

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Project Name: ROWVILLE
Project ID: 2781.200

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Received: Aug 4, 2016 2:24 PM
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Contact Name: Thomas Madill

Eurofins | mgt Analytical Services Manager : Mary Makarios

Sample Detail						E.coli	HOLD	pH	Phosphate total (as P)	Total Dissolved Solids	Organochlorine Pesticides	Organophosphorus Pesticides	Acid Herbicides	IWRG 621 Metals : Metals M12	Total Nitrogen Set (as N)	Major Anions	Major Cations	Moisture Set	Eurofins | mgt Suite B4
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X	X	X	X	X	X	X	X	X	X
Sydney Laboratory - NATA Site # 18217																			
Brisbane Laboratory - NATA Site # 20794																			
External Laboratory																			
47	HA4.5-0.5	Aug 04, 2016		Soil	M16-Au05055		X												
48	HA4.6-0.5	Aug 04, 2016		Soil	M16-Au05056		X												
49	HA1.1-0.5	Aug 04, 2016		Soil	M16-Au05057		X												
50	HA1.2-0.5	Aug 04, 2016		Soil	M16-Au05058		X												
51	HA1.3-0.5	Aug 04, 2016		Soil	M16-Au05059		X												
52	HA1.4-0.5	Aug 04, 2016		Soil	M16-Au05060		X												
53	TP01-0.1	Aug 04, 2016		Soil	M16-Au05061		X												
54	TP01-0.5	Aug 04, 2016		Soil	M16-Au05062		X												
55	TP02-0.1	Aug 04, 2016		Soil	M16-Au05063		X												
56	TP02-0.5	Aug 04, 2016		Soil	M16-Au05064		X												
57	TP03-0.1	Aug 04, 2016		Soil	M16-Au05065		X												
58	TP03-0.5	Aug 04, 2016		Soil	M16-Au05066		X												

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Company Name:	Tonkin & Taylor P/L	**Order No.:**		**Received:**	Aug 4, 2016 2:24 PM
Address:	Ground Floor, 95 Coventry St South Bank VIC 3006	**Report #:**	510630	**Due:**	Aug 11, 2016
		Phone:	03 9863 8686	**Priority:**	5 Day
		Fax:	03 9863 8685	**Contact Name:**	Thomas Madill
Project Name:	ROWVILLE				
Project ID:	2781.200				

Eurofins | mgt Analytical Services Manager : Mary Makarios

Sample Detail						E.coli	HOLD	pH	Phosphate total (as P)	Total Dissolved Solids	Organochlorine Pesticides	Organophosphorus Pesticides	Acid Herbicides	IWRG 621 Metals : Metals M12	Total Nitrogen Set (as N)	Major Anions	Major Cations	Moisture Set	Eurofins | mgt Suite B4
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X	X	X	X	X	X	X	X	X	X
Sydney Laboratory - NATA Site # 18217																			
Brisbane Laboratory - NATA Site # 20794																			
External Laboratory																			
59	TP04-0.1	Aug 04, 2016		Soil	M16-Au05067		X												
60	TP04-0.5	Aug 04, 2016		Soil	M16-Au05068		X												
Test Counts						4	21	4	4	4	9	5	22	17	4	4	4	35	12

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil results are reported on a dry basis, unless otherwise stated.
3. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
4. Results are uncorrected for matrix spikes or surrogate recoveries.
5. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
6. Samples were analysed on an 'as received' basis. 7. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the Sample Receipt Advice.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

****NOTE:** pH duplicates are reported as a range NOT as RPD

Units

mg/kg: milligrams per Kilogram

ug/l: micrograms per litre

ppb: Parts per billion

org/100ml: Organisms per 100 millilitres

MPN/100mL: Most Probable Number of organisms per 100 millilitres

mg/l: milligrams per litre

ppm: Parts per million

%: Percentage

NTU: Nephelometric Turbidity Units

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery
CRM	Certified Reference Material - reported as percent recovery
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands. In the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
Batch Duplicate	A second piece of analysis from a sample outside of the clients batch of samples but run within the laboratory batch of analysis.
Batch SPIKE	Spike recovery reported on a sample from outside of the clients batch of samples but run within the laboratory batch of analysis.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries: Recoveries must lie between 50-150%-Phenols & PFASs 20-130%

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

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Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Organochlorine Pesticides							
Chlordanes - Total	mg/L	< 0.001			0.001	Pass	
4.4'-DDD	mg/L	< 0.0001			0.0001	Pass	
4.4'-DDE	mg/L	< 0.0001			0.0001	Pass	
4.4'-DDT	mg/L	< 0.0001			0.0001	Pass	
a-BHC	mg/L	< 0.0001			0.0001	Pass	
Aldrin	mg/L	< 0.0001			0.0001	Pass	
b-BHC	mg/L	< 0.0001			0.0001	Pass	
d-BHC	mg/L	< 0.0001			0.0001	Pass	
Dieldrin	mg/L	< 0.0001			0.0001	Pass	
Endosulfan I	mg/L	< 0.0001			0.0001	Pass	
Endosulfan II	mg/L	< 0.0001			0.0001	Pass	
Endosulfan sulphate	mg/L	< 0.0001			0.0001	Pass	
Endrin	mg/L	< 0.0001			0.0001	Pass	
Endrin aldehyde	mg/L	< 0.0001			0.0001	Pass	
Endrin ketone	mg/L	< 0.0001			0.0001	Pass	
g-BHC (Lindane)	mg/L	< 0.0001			0.0001	Pass	
Heptachlor	mg/L	< 0.0001			0.0001	Pass	
Heptachlor epoxide	mg/L	< 0.0001			0.0001	Pass	
Hexachlorobenzene	mg/L	< 0.0001			0.0001	Pass	
Methoxychlor	mg/L	< 0.0001			0.0001	Pass	
Toxaphene	mg/L	< 0.01			0.01	Pass	
Method Blank							
Ammonia (as N)	mg/L	< 0.01			0.01	Pass	
Nitrate & Nitrite (as N)	mg/L	< 0.05			0.05	Pass	
Phosphate total (as P)	mg/L	< 0.05			0.05	Pass	
Total Dissolved Solids	mg/L	< 10			10	Pass	
Total Kjeldahl Nitrogen (as N)	mg/L	< 0.2			0.2	Pass	
Method Blank							
Major Anions							
Bicarbonate Alkalinity (as CaCO3)	mg/L	< 20			20	Pass	
Carbonate Alkalinity (as CaCO3)	mg/L	< 10			10	Pass	
Chloride	mg/L	< 1			1	Pass	
Nitrate (as N)	mg/L	< 0.02			0.02	Pass	
Sulphate (as S)	mg/L	< 5			5	Pass	
Method Blank							
Alkali Metals							
Calcium	mg/L	< 0.5			0.5	Pass	
Magnesium	mg/L	< 0.5			0.5	Pass	
Potassium	mg/L	< 0.5			0.5	Pass	
Sodium	mg/L	< 0.5			0.5	Pass	
Method Blank							
Heavy Metals							
Arsenic	mg/L	< 0.001			0.001	Pass	
Cadmium	mg/L	< 0.0002			0.0002	Pass	
Chromium	mg/L	< 0.001			0.001	Pass	
Copper	mg/L	< 0.001			0.001	Pass	
Lead	mg/L	< 0.001			0.001	Pass	
Mercury	mg/L	< 0.0001			0.0001	Pass	
Molybdenum	mg/L	< 0.005			0.005	Pass	
Nickel	mg/L	< 0.001			0.001	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Selenium	mg/L	< 0.001			0.001	Pass	
Silver	mg/L	< 0.005			0.005	Pass	
Tin	mg/L	< 0.005			0.005	Pass	
Zinc	mg/L	< 0.005			0.005	Pass	
LCS - % Recovery							
Organochlorine Pesticides							
4.4'-DDD	%	85			70-130	Pass	
4.4'-DDE	%	85			70-130	Pass	
4.4'-DDT	%	85			70-130	Pass	
a-BHC	%	79			70-130	Pass	
Aldrin	%	73			70-130	Pass	
b-BHC	%	85			70-130	Pass	
d-BHC	%	89			70-130	Pass	
Dieldrin	%	80			70-130	Pass	
Endosulfan I	%	70			70-130	Pass	
Endosulfan II	%	85			70-130	Pass	
Endosulfan sulphate	%	76			70-130	Pass	
Endrin	%	85			70-130	Pass	
Endrin aldehyde	%	84			70-130	Pass	
Endrin ketone	%	82			70-130	Pass	
g-BHC (Lindane)	%	78			70-130	Pass	
Heptachlor	%	71			70-130	Pass	
Heptachlor epoxide	%	84			70-130	Pass	
Hexachlorobenzene	%	75			70-130	Pass	
Methoxychlor	%	84			70-130	Pass	
LCS - % Recovery							
Ammonia (as N)	%	94			70-130	Pass	
Nitrate & Nitrite (as N)	%	99			70-130	Pass	
Phosphate total (as P)	%	93			70-130	Pass	
Total Dissolved Solids	%	95			70-130	Pass	
Total Kjeldahl Nitrogen (as N)	%	97			70-130	Pass	
LCS - % Recovery							
Major Anions							
Carbonate Alkalinity (as CaCO3)	%	111			70-130	Pass	
Chloride	%	120			70-130	Pass	
Nitrate (as N)	%	99			70-130	Pass	
Sulphate (as S)	%	114			70-130	Pass	
LCS - % Recovery							
Alkali Metals							
Calcium	%	101			70-130	Pass	
Magnesium	%	105			70-130	Pass	
Potassium	%	98			70-130	Pass	
Sodium	%	109			70-130	Pass	
LCS - % Recovery							
Heavy Metals							
Arsenic	%	89			80-120	Pass	
Cadmium	%	93			80-120	Pass	
Chromium	%	86			80-120	Pass	
Copper	%	92			80-120	Pass	
Lead	%	87			80-120	Pass	
Mercury	%	89			75-125	Pass	
Molybdenum	%	89			80-120	Pass	
Nickel	%	90			80-120	Pass	
Selenium	%	88			80-120	Pass	

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Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Silver			%	89			80-120	Pass	
Tin			%	86			80-120	Pass	
Zinc			%	95			80-120	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Spike - % Recovery									
				Result 1					
Phosphate total (as P)	M16-Au04427	NCP	%	104			70-130	Pass	
Total Kjeldahl Nitrogen (as N)	M16-Au04026	NCP	%	91			70-130	Pass	
Spike - % Recovery									
Major Anions				Result 1					
Bicarbonate Alkalinity (as CaCO3)	M16-Au05738	NCP	%	129			70-130	Pass	
Chloride	M16-Au07733	NCP	%	70			70-130	Pass	
Sulphate (as S)	M16-Au07743	NCP	%	108			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Arsenic	M16-Au00236	NCP	%	91			75-125	Pass	
Cadmium	M16-Au00236	NCP	%	92			75-125	Pass	
Chromium	M16-Au00236	NCP	%	89			75-125	Pass	
Copper	M16-Au00236	NCP	%	91			75-125	Pass	
Lead	M16-Au00236	NCP	%	91			75-125	Pass	
Mercury	M16-Au00236	NCP	%	94			70-130	Pass	
Molybdenum	M16-Au00236	NCP	%	92			75-125	Pass	
Nickel	M16-Au00236	NCP	%	90			75-125	Pass	
Selenium	M16-Au00236	NCP	%	83			75-125	Pass	
Silver	M16-Au00236	NCP	%	83			75-125	Pass	
Tin	M16-Au00236	NCP	%	88			75-125	Pass	
Zinc	M16-Au00236	NCP	%	75			75-125	Pass	
Spike - % Recovery									
				Result 1					
Ammonia (as N)	M16-Au05045	CP	%	92			70-130	Pass	
Nitrate & Nitrite (as N)	M16-Au05045	CP	%	94			70-130	Pass	
Spike - % Recovery									
Major Anions				Result 1					
Nitrate (as N)	M16-Au05045	CP	%	94			70-130	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Organochlorine Pesticides				Result 1	Result 2	RPD			
Chlordanes - Total	M16-Au03704	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
4.4'-DDD	M16-Au03704	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
4.4'-DDE	M16-Au03704	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
4.4'-DDT	M16-Au03704	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
a-BHC	M16-Au03704	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Aldrin	M16-Au03704	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
b-BHC	M16-Au03704	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
d-BHC	M16-Au03704	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Dieldrin	M16-Au03704	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Endosulfan I	M16-Au03704	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Endosulfan II	M16-Au03704	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Endosulfan sulphate	M16-Au03704	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Endrin	M16-Au03704	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Endrin aldehyde	M16-Au03704	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Endrin ketone	M16-Au03704	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
g-BHC (Lindane)	M16-Au03704	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	

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Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Organochlorine Pesticides				Result 1	Result 2	RPD			
Heptachlor	M16-Au03704	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Heptachlor epoxide	M16-Au03704	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Hexachlorobenzene	M16-Au03704	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Methoxychlor	M16-Au03704	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Toxaphene	M16-Au03704	NCP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Phosphate total (as P)	M16-Au04659	NCP	mg/L	1.8	1.9	5.0	30%	Pass	
Total Kjeldahl Nitrogen (as N)	M16-Au04569	NCP	mg/L	0.5	< 0.2	<1	30%	Pass	
Duplicate									
Major Anions				Result 1	Result 2	RPD			
Chloride	M16-Au07249	NCP	mg/L	18000	19000	4.6	30%	Pass	
Sulphate (as S)	M16-Au07743	NCP	mg/L	< 5	< 5	<1	30%	Pass	
Duplicate									
Alkali Metals				Result 1	Result 2	RPD			
Calcium	M16-Au05737	NCP	mg/L	260	250	2.0	30%	Pass	
Magnesium	M16-Au05737	NCP	mg/L	390	390	2.0	30%	Pass	
Potassium	M16-Au05737	NCP	mg/L	64	63	1.0	30%	Pass	
Sodium	M16-Au05737	NCP	mg/L	3100	3000	2.0	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	M16-Au00236	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Cadmium	M16-Au00236	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Chromium	M16-Au00236	NCP	mg/L	0.013	0.013	2.0	30%	Pass	
Copper	M16-Au00236	NCP	mg/L	0.018	0.019	9.0	30%	Pass	
Lead	M16-Au00236	NCP	mg/L	0.003	0.003	1.0	30%	Pass	
Mercury	M16-Au00236	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Molybdenum	M16-Au00236	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Nickel	M16-Au00236	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Selenium	M16-Au00236	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Silver	M16-Au00236	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Tin	M16-Au00236	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Zinc	M16-Au01343	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Ammonia (as N)	M16-Au05045	CP	mg/L	0.34	0.38	10	30%	Pass	
Nitrate & Nitrite (as N)	M16-Au05045	CP	mg/L	0.16	0.15	6.0	30%	Pass	
pH	M16-Au05045	CP	pH Units	8.0	7.9	pass	30%	Pass	
Duplicate									
Major Anions				Result 1	Result 2	RPD			
Bicarbonate Alkalinity (as CaCO3)	M16-Au05045	CP	mg/L	120	120	<1	30%	Pass	
Carbonate Alkalinity (as CaCO3)	M16-Au05045	CP	mg/L	< 10	< 10	<1	30%	Pass	
Nitrate (as N)	M16-Au05045	CP	mg/L	0.16	0.15	6.0	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
pH	M16-Au05047	CP	pH Units	7.2	7.2	pass	30%	Pass	
Total Dissolved Solids	M16-Au05047	CP	mg/L	150	150	1.0	30%	Pass	
Duplicate									
Major Anions				Result 1	Result 2	RPD			
Bicarbonate Alkalinity (as CaCO3)	M16-Au05047	CP	mg/L	73	73	<1	30%	Pass	
Carbonate Alkalinity (as CaCO3)	M16-Au05047	CP	mg/L	< 10	< 10	<1	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	No
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	N/A
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
M05	Sample submitted in non-sterile bottle

Authorised By

Mary Makarios	Analytical Services Manager
Alex Petridis	Senior Analyst-Metal (VIC)
Huong Le	Senior Analyst-Inorganic (VIC)
Ian Bolch	Senior Analyst-Microbiology (VIC)
Mele Singh	Senior Analyst-Organic (VIC)

Glenn Jackson
National Operations Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

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AU02_USR_LAB00020

From: Tom Madill <TMadill@tonkintaylor.com.au>
Sent: Thursday, 4 August 2016 2:58 PM
To: AU02_USR_LAB00020
Cc: Mary Makarios; Priyadarshan PD Bapat
Subject: RE: 2781.200

Follow Up Flag: Follow up
Flag Status: Completed

Yes please Antony. I will follow up with PD as to why these weren't supplied.

Cheers,
Tom.

From: AU02_USR_LAB00020 [mailto:EnviroSampleVic@eurofins.com]
Sent: Thursday, 4 August 2016 2:55 p.m.
To: Tom Madill <TMadill@tonkintaylor.com.au>
Cc: Mary Makarios <MaryMakarios@eurofins.com>
Subject: 2781.200
Importance: High

Hi Tom,

We haven't received micro bottles for Dam's 1 & 3-would you like us to pour off for these?

Please advise asap.

Anthony

Enviro Sample VIC

Eurofins | MGT
2-5 Kingston Town Close
OAKLEIGH VIC 3166
AUSTRALIA

Phone : +61 3 8564 5043
Fax : +61 3 8564 5090

Email : EnviroSampleVic@eurofins.com
Website : www.eurofins.com.au

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Robert Johnston 04/08/16 Eurofins MGT S10630

Tonkin & Taylor

32 Fiveways Boulevard, Keysborough, Victoria 3173
Ph: 61-3-8796 7900 Fax: 61-3-8796 7944
Level 4, 111 Coventry Street, Southbank, Victoria 3006
Ph: 61-3-9863 8686 Fax: 61-3-9863 8685

Chain of Custody (COC)

Sheet 1 of

Seriel No. 1057

Laboratory: MGT EUROFINS

Address: OAKLEIGH

Project Name: Rawville.

Project Manager: TOM MADILL

Samplers Name: PD Bagat

Job Number: 2781-200

Comment/Instructions:

Analysis Required:

Container Type & Preservation Codes: I-Ice, P-Plastic, G-Glass, V-Vial, N-Nitric Acid Preserved, C-Hydrochloric Acid Preserved, S-Sulphuric Acid Preserved

Sample ID	Sample Date	Time	Sample Matrix (e.g soil, water etc)	Container/Preservative Type (e.g. glass, vial etc)	HERBISIDE SCREEN	Notes
GR01	3/8/16		SOIL	1G	✓	
GR03					✓	
GR05					✓	
GR07					✓	
GR09					✓	
GR11					✓	
GR13					✓	
GR15					✓	
GR17					✓	
TEE02					✓	
TEE04					✓	
TEE06					✓	
TEE08					✓	
TEE10					✓	
TEE12					✓	
TEE14					✓	
TEE16					✓	
TEE18					✓	
				Total:		

Results Requested Within: 24hrs 48hrs 5 days

Relinquished By: PD Bagat		Received By: DANIEL WRIGHT		Relinquished By:		Received By:	
Signature:	Date: 4/8/16	Signature:	Date: 040816	Signature:	Date:	Signature:	Date:
Company: T+T	Time:	Company: EF MGT	Time:	Company:	Time:	Company:	Time:

Tonkin & Taylor

32 Fiveways Boulevard, Keysborough, Victoria 3173
Ph: 61-3-8796 7900 Fax: 61-3-8796 7944
Level 4, 111 Coventry Street, Southbank, Victoria 3006
Ph: 61-3-9863 8686 Fax: 61-3-9863 8685

Chain of Custody (COC)

Sheet 2 of

Seriel No. 1058

Laboratory: MGT EUROFINS

Address: OAKLEIGH

Project Name: ROWVILLE

Project Manager: TOM MADILL

Samplers Name: PD BAPAT

Job Number: 2781.200

Comment/Instructions:

Container Type & Preservation Codes: **I**-Ice, **P**-Plastic, **G**-Glass, **V**-Vial, **N**-Nitric Acid Preserved, **C**-Hydrochloric Acid Preserved, **S**-Sulphuric Acid Preserved

Analysis Required:

Sample ID	Sample Date	Time	Sample Matrix *(e.g soil, water etc)*	Container/Preservative Type *(e.g. glass, vial etc)*	M12	OCP & OPP	HOLD	B4									Notes
HA09-0.1	3/8/16		SOIL	1G	✓	✓											
-0.5							✓										
HA10-0.1					✓	✓		✓									
-0.5							✓										
HA11-0.1					✓			✓									
-0.5							✓										
HA41-0.05					✓			✓									
-0.5							✓										
HA42-0.05					✓			✓									
-0.5							✓										
HA43-0.05					✓			✓									
-0.5							✓										
HA44-0.05					✓			✓									
-0.5							✓										
HA45-0.05					✓			✓									
-0.5							✓										
HA46-0.05					✓			✓									
-0.5							✓										
Results Requested Within:			24hrs	48hrs	5 days												
				Total:													

Relinquished By:		Received By:		Relinquished By:		Received By:	
PD BAPAT		DANIEL WRIGHT					
Signature:	Date: 4/8/16	Signature:	Date: 04/08/16	Signature:	Date:	Signature:	Date:
Company: T+T	Time:	Company: KFMH	Time:	Company:	Time:	Company:	Time:

Tonkin & Taylor

32 Fiveways Boulevard, Keysborough, Victoria 3173
Ph: 61-3-8796 7900 Fax: 61-3-8796 7944
Level 4, 111 Coventry Street, Southbank, Victoria 3006
Ph: 61-3-9863 8686 Fax: 61-3-9863 8685

Chain of Custody (COC)

Sheet 3 of

Seriel No. 1059

Laboratory: MGT EUROFINS

Address: OAKLEIGH

Project Name: Rowville

Project Manager: TOM MADILL

Samplers Name: Po Bagat

Job Number: 2781.200

Comment/Instructions:

Analysis Required:

Container Type & Preservation Codes: I-Ice, P-Plastic, G-Glass, V-Vial, N-Nitric Acid Preserved, C-Hydrochloric Acid Preserved, S-Sulphuric Acid Preserved

Sample ID	Sample Date	Time	Sample Matrix (e.g soil, water etc)	Container/Preservative Type (e.g. glass, vial etc)	HOLD	B4	Notes
HA01-1-0.05	4/3/16		SOIL	1G		✓	
-0.5					✓		
HA1.2-0.05						✓	
-0.5					✓		
HA1.3-0.05						✓	
-0.5					✓		
HA14-0.05						✓	
-0.5					✓		
TP01-0.1					✓		
-0.5					✓		
TP02-0.1					✓		
-0.5					✓		
TP03-0.1					✓		
-0.5					✓		
TP04-0.1					✓		
-0.5					✓		

Results Requested Within: 24hrs 48hrs 5 days

Total:

Relinquished By:		Received By: DANIEL WALLER		Relinquished By:		Received By:	
Signature:	Date:	Signature:	Date: 040816	Signature:	Date:	Signature:	Date:
Company:	Time:	Company: EF MGT	Time:	Company:	Time:	Company:	Time:

Tonkin & Taylor

32 Fiveways Boulevard, Keysborough, Victoria 3173
Ph: 61-3-8796 7900 Fax: 61-3-8796 7944
Level 4, 111 Coventry Street, Southbank, Victoria 3006
Ph: 61-3-9863 8686 Fax: 61-3-9863 8685

Chain of Custody (COC)

Sheet 4 of

Seriel No. 1060

Laboratory: MGT EUROFINS

Address: OAKLEIGH

Project Name: Raoville

Project Manager: TOM Meddil

Samplers Name: PD BAPAT

Job Number: 2781.200

Comment/Instructions:

Analysis Required:

Container Type & Preservation Codes: I-Ice, P-Plastic, G-Glass, V-Vial, N-Nitric Acid Preserved, C-Hydrochloric Acid Preserved, S-Sulphuric Acid Preserved

Sample ID	Sample Date	Time	Sample Matrix (e.g soil, water etc)	Container/Preservative Type (e.g. glass, vial etc)	M12, OCP, OPP	HERBICIDE	Anions, Cations, TDS,	Metals (M12), OCP, pH	E coli	Total P, Total N							Notes
DAM01	4/3/16		SOIL	1G	✓	✓											
DAM02	↓		↓	↓	✓	✓											
DAM03					✓	✓											
DAM04					✓	✓											
DAM01			WATER	~~1P~~ 1P			✓	✓	✓	✓							
DAM02							✓	✓	✓	✓							
DAM03							✓	✓	✓	✓							
DAM04							✓	✓	✓	✓							
Results Requested Within:			24hrs	48hrs	5 days												
					Total:												

Relinquished By: PD Bapat		Received By: DANIEL WRIGHT		Relinquished By:		Received By:	
Signature:	Date:	Signature:	Date: 040816	Signature:	Date:	Signature:	Date:
Company:	Time:	Company: EF MGT	Time:	Company:	Time:	Company:	Time:

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EM1610933**	Page	: 1 of 6
Client	: **TONKIN AND TAYLOR PTY LTD**	Laboratory	: Environmental Division Melbourne
Contact	: TOM MADILL	Contact	: Bronwyn Sheen
Address	: GROUND FLOOR 95 COVENTRY STREET SOUTHBANK VIC 3006	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: +61 03 9863 8686	Telephone	: +61-3-8549 9636
Project	: 2781.002	Date Samples Received	: 16-Sep-2016 13:05
Order number	: ----	Date Analysis Commenced	: 19-Sep-2016
C-O-C number	: ----	Issue Date	: 20-Sep-2016 13:51
Sampler	: ----		
Site	: Waverley GC		
Quote number	: ----		
No. of samples received	: 2		
No. of samples analysed	: 2		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Andrew Lu	Organic Instrument Chemist	Melbourne Inorganics, Springvale, VIC
Andrew Lu	Organic Instrument Chemist	Melbourne Organics, Springvale, VIC
Chris Lemaitre	Non-Metals Team Leader	Melbourne Inorganics, Springvale, VIC
Dilani Fernando	Senior Inorganic Chemist	Melbourne Inorganics, Springvale, VIC

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero, for 'TEQ 1/2LOR' are treated as half the reported LOR, and for 'TEQ LOR' are treated as being equal to the reported LOR. Note: TEQ 1/2LOR and TEQ LOR will calculate as 0.6mg/Kg and 1.2mg/Kg respectively for samples with non-detects for all of the eight TEQ PAHs.

Page	:	3 of 6
Work Order	:	EM1610933
Client	:	TONKIN AND TAYLOR PTY LTD
Project	:	2781.002

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	HA4.2-0.05	HA1.4-0.05	----	----	----
			Client sampling date / time	[14-Sep-2016]	[14-Sep-2016]	----	----	----
Compound	CAS Number	LOR	Unit	EM1610933-001	EM1610933-002	--------	--------	--------
				Result	Result	----	----	----
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1	%	22.0	15.4	----	----	----
EG005T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	<5	----	----	----
Cadmium	7440-43-9	1	mg/kg	<1	4	----	----	----
Chromium	7440-47-3	2	mg/kg	10	22	----	----	----
Copper	7440-50-8	5	mg/kg	<5	<5	----	----	----
Lead	7439-92-1	5	mg/kg	15	16	----	----	----
Nickel	7440-02-0	2	mg/kg	3	2	----	----	----
Zinc	7440-66-6	5	mg/kg	12	12	----	----	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	0.1	1.4	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	----	----	----
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	----	----	----
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	----	----	----
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	----	----	----
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	----	----	----
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	----	----	----
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	----	----	----
Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	----	----	----
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	----	----	----
Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	----	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	----	----	----
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	----	----	----
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	----	----	----
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	----	----	----
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	----	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	----	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	----	----	----
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	0.6	0.6	----	----	----
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	1.2	1.2	----	----	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	<10	<10	----	----	----

Page	: 4 of 6
Work Order	: EM1610933
Client	: TONKIN AND TAYLOR PTY LTD
Project	: 2781.002

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	HA4.2-0.05	HA1.4-0.05	----	----	----
			Client sampling date / time	[14-Sep-2016]	[14-Sep-2016]	----	----	----
Compound	CAS Number	LOR	Unit	EM1610933-001	EM1610933-002	--------	--------	--------
				Result	Result	----	----	----
EP080/071: Total Petroleum Hydrocarbons - Continued								
C10 - C14 Fraction	----	50	mg/kg	<50	<50	----	----	----
C15 - C28 Fraction	----	100	mg/kg	<100	<100	----	----	----
C29 - C36 Fraction	----	100	mg/kg	<100	<100	----	----	----
^ C10 - C36 Fraction (sum)	----	50	mg/kg	<50	<50	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	<10	<10	----	----	----
>C10 - C16 Fraction	----	50	mg/kg	<50	<50	----	----	----
>C16 - C34 Fraction	----	100	mg/kg	<100	120	----	----	----
>C34 - C40 Fraction	----	100	mg/kg	<100	<100	----	----	----
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	120	----	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	<50	<50	----	----	----
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	----	----	----
Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	----	----	----
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	----	----	----
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	----	----	----
^ Sum of BTEX	----	0.2	mg/kg	<0.2	<0.2	----	----	----
^ Total Xylenes	1330-20-7	0.5	mg/kg	<0.5	<0.5	----	----	----
Naphthalene	91-20-3	1	mg/kg	<1	<1	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5	%	108	100	----	----	----
2-Chlorophenol-D4	93951-73-6	0.5	%	106	105	----	----	----
2.4.6-Tribromophenol	118-79-6	0.5	%	85.6	91.8	----	----	----
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	114	119	----	----	----
Anthracene-d10	1719-06-8	0.5	%	111	116	----	----	----
4-Terphenyl-d14	1718-51-0	0.5	%	117	113	----	----	----
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	76.8	75.0	----	----	----
Toluene-D8	2037-26-5	0.2	%	98.6	97.4	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	HA4.2-0.05	HA1.4-0.05	----	----	----
			Client sampling date / time	[14-Sep-2016]	[14-Sep-2016]	----	----	----
Compound	CAS Number	LOR	Unit	EM1610933-001	EM1610933-002	--------	--------	--------
				Result	Result	----	----	----
EP080S: TPH(V)/BTEX Surrogates - Continued								
4-Bromofluorobenzene	460-00-4	0.2	%	84.6	84.4	----	----	----

Surrogate Control Limits

Sub-Matrix: SOIL		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	54	125
2-Chlorophenol-D4	93951-73-6	65	123
2.4.6-Tribromophenol	118-79-6	34	122
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	61	125
Anthracene-d10	1719-06-8	62	130
4-Terphenyl-d14	1718-51-0	67	133
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	51	125
Toluene-D8	2037-26-5	55	125
4-Bromofluorobenzene	460-00-4	56	124

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EM1610933**	Page	: 1 of 6
Client	: **TONKIN AND TAYLOR PTY LTD**	Laboratory	: Environmental Division Melbourne
Contact	: TOM MADILL	Contact	: Bronwyn Sheen
Address	: GROUND FLOOR 95 COVENTRY STREET SOUTHBANK VIC 3006	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: +61 03 9863 8686	Telephone	: +61-3-8549 9636
Project	: 2781.002	Date Samples Received	: 16-Sep-2016
Order number	: ----	Date Analysis Commenced	: 19-Sep-2016
C-O-C number	: ----	Issue Date	: 20-Sep-2016
Sampler	: ----		
Site	: Waverley GC		
Quote number	: ----		
No. of samples received	: 2		
No. of samples analysed	: 2		

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This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Andrew Lu	Organic Instrument Chemist	Melbourne Inorganics, Springvale, VIC
Andrew Lu	Organic Instrument Chemist	Melbourne Organics, Springvale, VIC
Chris Lemaitre	Non-Metals Team Leader	Melbourne Inorganics, Springvale, VIC
Dilani Fernando	Senior Inorganic Chemist	Melbourne Inorganics, Springvale, VIC

Page	:	2 of 6
Work Order	:	EM1610933
Client	:	TONKIN AND TAYLOR PTY LTD
Project	:	2781.002

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA055: Moisture Content (QC Lot: 587938)									
EM1610933-001	HA4.2-0.05	EA055-103: Moisture Content (dried @ 103°C)	---	1	%	22.0	22.4	1.97	0% - 20%
EG005T: Total Metals by ICP-AES (QC Lot: 587912)									
EM1610933-001	HA4.2-0.05	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	10	11	0.00	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	3	2	0.00	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	15	12	18.4	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	12	12	0.00	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 587913)									
EM1610933-001	HA4.2-0.05	EG035T: Mercury	7439-97-6	0.1	mg/kg	0.1	0.1	0.00	No Limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 587903)									
EM1610933-001	HA4.2-0.05	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
				Laboratory Duplicate (DUP) Report					
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 587903) - continued									
EM1610933-001	HA4.2-0.05	EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 587902)									
EM1610933-001	HA4.2-0.05	EP080: C6 - C9 Fraction	---	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 587904)									
EM1610933-001	HA4.2-0.05	EP071: C15 - C28 Fraction	---	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C29 - C36 Fraction	---	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	---	50	mg/kg	<50	<50	0.00	No Limit
		EP071: C10 - C36 Fraction (sum)	---	50	mg/kg	<50	<50	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 587902)									
EM1610933-001	HA4.2-0.05	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 587904)									
EM1610933-001	HA4.2-0.05	EP071: >C16 - C34 Fraction	---	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction	---	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C10 - C16 Fraction	---	50	mg/kg	<50	<50	0.00	No Limit
		EP071: >C10 - C40 Fraction (sum)	---	50	mg/kg	<50	<50	0.00	No Limit
EP080: BTEXN (QC Lot: 587902)									
EM1610933-001	HA4.2-0.05	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit

Page	:	4 of 6
Work Order	:	EM1610933
Client	:	TONKIN AND TAYLOR PTY LTD
Project	:	2781.002

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG005T: Total Metals by ICP-AES (QCLot: 587912)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	21.7 mg/kg	98.7	79	113
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	4.64 mg/kg	95.8	85	109
EG005T: Chromium	7440-47-3	2	mg/kg	<2	43.9 mg/kg	98.6	89	113
EG005T: Copper	7440-50-8	5	mg/kg	<5	32 mg/kg	91.1	84	116
EG005T: Lead	7439-92-1	5	mg/kg	<5	40 mg/kg	91.2	85	107
EG005T: Nickel	7440-02-0	2	mg/kg	<2	55 mg/kg	96.6	89	111
EG005T: Zinc	7440-66-6	5	mg/kg	<5	60.8 mg/kg	104	89	111
EG035T: Total Recoverable Mercury by FIMS (QCLot: 587913)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	2.57 mg/kg	93.8	85	103
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 587903)								
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	3 mg/kg	113	80	121
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	3 mg/kg	112	70	130
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	3 mg/kg	102	80	120
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	3 mg/kg	113	70	124
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	3 mg/kg	94.4	80	122
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	3 mg/kg	103	80	126
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	3 mg/kg	114	70	128
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	3 mg/kg	110	80	125
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	3 mg/kg	92.8	70	130
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	3 mg/kg	108	80	126
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	3 mg/kg	89.5	70	124
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	3 mg/kg	106	75	125
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	3 mg/kg	94.2	65	125
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	3 mg/kg	102	65	128
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	3 mg/kg	102	65	126
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	3 mg/kg	109	65	127
EP080/071: Total Petroleum Hydrocarbons (QCLot: 587902)								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	36 mg/kg	89.9	70	127
EP080/071: Total Petroleum Hydrocarbons (QCLot: 587904)								
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	751 mg/kg	101	65	131
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	3103 mg/kg	96.8	70	126
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	1482 mg/kg	86.7	70	122
EP071: C10 - C36 Fraction (sum)	----	50	mg/kg	<50	----	----	----	----

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 587902)								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	45 mg/kg	86.0	68	125
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 587904)								
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	1135 mg/kg	98.5	68	130
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	4080 mg/kg	88.7	72	116
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	162 mg/kg	100	38	132
EP071: >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	----	----	----	----
EP080: BTEXN (QCLot: 587902)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	2 mg/kg	93.9	74	124
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	2 mg/kg	100	77	125
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	2 mg/kg	91.2	73	125
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	4 mg/kg	94.5	77	128
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	2 mg/kg	95.8	81	128
EP080: Naphthalene	91-20-3	1	mg/kg	<1	0.5 mg/kg	92.0	66	130

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
EG005T: Total Metals by ICP-AES (QCLot: 587912)							
EM1610933-002	HA1.4-0.05	EG005T: Arsenic	7440-38-2	50 mg/kg	95.5	78	124
		EG005T: Cadmium	7440-43-9	50 mg/kg	103	84	116
		EG005T: Chromium	7440-47-3	50 mg/kg	92.8	79	121
		EG005T: Copper	7440-50-8	50 mg/kg	97.5	82	124
		EG005T: Lead	7439-92-1	50 mg/kg	92.9	76	124
		EG005T: Nickel	7440-02-0	50 mg/kg	95.8	78	120
		EG005T: Zinc	7440-66-6	50 mg/kg	103	74	128
EG035T: Total Recoverable Mercury by FIMS (QCLot: 587913)							
EM1610933-002	HA1.4-0.05	EG035T: Mercury	7439-97-6	5 mg/kg	79.0	76	116
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 587903)							
EM1610933-002	HA1.4-0.05	EP075(SIM): Acenaphthene	83-32-9	3 mg/kg	90.9	67	117
		EP075(SIM): Pyrene	129-00-0	3 mg/kg	111	52	148
EP080/071: Total Petroleum Hydrocarbons (QCLot: 587902)							
EM1610933-002	HA1.4-0.05	EP080: C6 - C9 Fraction	----	28 mg/kg	68.6	42	131

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Work Order	: EM1610933
Client	: TONKIN AND TAYLOR PTY LTD
Project	: 2781.002

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP080/071: Total Petroleum Hydrocarbons (QCLot: 587904)							
EM1610939-001	Anonymous	EP071: C10 - C14 Fraction	----	751 mg/kg	106	53	123
		EP071: C15 - C28 Fraction	----	3103 mg/kg	101	70	124
		EP071: C29 - C36 Fraction	----	1482 mg/kg	87.7	64	118
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 587902)							
EM1610933-002	HA1.4-0.05	EP080: C6 - C10 Fraction	C6_C10	33 mg/kg	69.2	39	129
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 587904)							
EM1610939-001	Anonymous	EP071: >C10 - C16 Fraction	----	1135 mg/kg	104	65	123
		EP071: >C16 - C34 Fraction	----	4080 mg/kg	91.7	67	121
		EP071: >C34 - C40 Fraction	----	162 mg/kg	93.1	44	126
EP080: BTEXN (QCLot: 587902)							
EM1610933-002	HA1.4-0.05	EP080: Benzene	71-43-2	2 mg/kg	85.6	50	136
		EP080: Toluene	108-88-3	2 mg/kg	101	56	139

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EM1610933**	Page	: 1 of 4
Client	: **TONKIN AND TAYLOR PTY LTD**	Laboratory	: Environmental Division Melbourne
Contact	: TOM MADILL	Telephone	: +61-3-8549 9636
Project	: 2781.002	Date Samples Received	: 16-Sep-2016
Site	: Waverley GC	Issue Date	: 20-Sep-2016
Sampler	: ----	No. of samples received	: 2
Order number	: ----	No. of samples analysed	: 2

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Page	:	2 of 4
Work Order	:	EM1610933
Client	:	TONKIN AND TAYLOR PTY LTD
Project	:	2781.002

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / *Container / Client Sample ID(s)*		*Sample Date*	*Extraction / Preparation*			*Analysis*		
			Date extracted	*Due for extraction*	*Evaluation*	*Date analysed*	*Due for analysis*	*Evaluation*
EA055: Moisture Content								
Soil Glass Jar - Unpreserved (EA055-103)								
HA4.2-0.05,	HA1.4-0.05	**14-Sep-2016**	**----**	----	----	**19-Sep-2016**	28-Sep-2016	✓
EG005T: Total Metals by ICP-AES								
Soil Glass Jar - Unpreserved (EG005T)								
HA4.2-0.05,	HA1.4-0.05	**14-Sep-2016**	**19-Sep-2016**	13-Mar-2017	✓	**19-Sep-2016**	13-Mar-2017	✓
EG035T: Total Recoverable Mercury by FIMS								
Soil Glass Jar - Unpreserved (EG035T)								
HA4.2-0.05,	HA1.4-0.05	**14-Sep-2016**	**19-Sep-2016**	12-Oct-2016	✓	**19-Sep-2016**	12-Oct-2016	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Soil Glass Jar - Unpreserved (EP075(SIM))								
HA4.2-0.05,	HA1.4-0.05	**14-Sep-2016**	**19-Sep-2016**	28-Sep-2016	✓	**19-Sep-2016**	29-Oct-2016	✓
EP080/071: Total Petroleum Hydrocarbons								
Soil Glass Jar - Unpreserved (EP080)								
HA4.2-0.05,	HA1.4-0.05	**14-Sep-2016**	**19-Sep-2016**	28-Sep-2016	✓	**19-Sep-2016**	28-Sep-2016	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
Soil Glass Jar - Unpreserved (EP080)								
HA4.2-0.05,	HA1.4-0.05	**14-Sep-2016**	**19-Sep-2016**	28-Sep-2016	✓	**19-Sep-2016**	28-Sep-2016	✓
EP080: BTEXN								
Soil Glass Jar - Unpreserved (EP080)								
HA4.2-0.05,	HA1.4-0.05	**14-Sep-2016**	**19-Sep-2016**	28-Sep-2016	✓	**19-Sep-2016**	28-Sep-2016	✓

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Work Order	: EM1610933
Client	: TONKIN AND TAYLOR PTY LTD
Project	: 2781.002

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Moisture Content	EA055-103	1	3	**33.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	1	3	**33.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	2	**50.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	2	**50.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	3	**33.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	3	**33.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
PAH/Phenols (SIM)	EP075(SIM)	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
PAH/Phenols (SIM)	EP075(SIM)	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
PAH/Phenols (SIM)	EP075(SIM)	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Moisture Content	EA055-103	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 103-105 degrees C. This method is compliant with NEPM (2013) Schedule B(3) Section 7.1 and Table 1 (14 day holding time).
Total Metals by ICP-AES	EG005T	SOIL	In house: Referenced to APHA 3120; USEPA SW 846 - 6010. Metals are determined following an appropriate acid digestion of the soil. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM (2013) Schedule B(3)
Total Mercury by FIMS	EG035T	SOIL	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
TRH - Semivolatile Fraction	EP071	SOIL	In house: Referenced to USEPA SW 846 - 8015A Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C40.
PAH/Phenols (SIM)	EP075(SIM)	SOIL	In house: Referenced to USEPA SW 846 - 8270D Extracts are analysed by Capillary GC/MS in Selective Ion Mode (SIM) and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3) (Method 502 and 507)
TRH Volatiles/BTEX	EP080	SOIL	In house: Referenced to USEPA SW 846 - 8260B Extracts are analysed by Purge and Trap, Capillary GC/MS. Quantification is by comparison against an established 5 point calibration curve.

Preparation Methods	Method	Matrix	Method Descriptions
Hot Block Digest for metals in soils sediments and sludges	EN69	SOIL	In house: Referenced to USEPA 200.2. Hot Block Acid Digestion 1.0g of sample is heated with Nitric and Hydrochloric acids, then cooled. Peroxide is added and samples heated and cooled again before being filtered and bulked to volume for analysis. Digest is appropriate for determination of selected metals in sludge, sediments, and soils. This method is compliant with NEPM (2013) Schedule B(3) (Method 202)
Methanolic Extraction of Soils for Purge and Trap	ORG16	SOIL	In house: Referenced to USEPA SW 846 - 5030A. 5g of solid is shaken with surrogate and 10mL methanol prior to analysis by Purge and Trap - GC/MS.
Tumbler Extraction of Solids	ORG17	SOIL	In house: Mechanical agitation (tumbler). 10g of sample, Na2SO4 and surrogate are extracted with 30mL 1:1 DCM/Acetone by end over end tumble. The solvent is decanted, dehydrated and concentrated (by KD) to the desired volume for analysis.

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4.2 Councillor Expenses and Support Policy

Final Report Destination:	Council
Paper Type:	For Decision
Authors	Manager Governance and Risk, Andrew Dowling and Head of Governance, Saskia Weerheim
Executive:	Director Customer and Performance, Greg Curcio

SUMMARY
The *Local Government Act 2020* requires Council to establish and maintain an expenses policy for reimbursing out-of-pocket expenses incurred by Councillors and delegated committee members. The current Councillor Expenses and Support Policy, adopted in August 2020, has undergone a thorough review, taking into account Councillor feedback and alignment with best governance practices.

Following a Council resolution, the draft policy went out for community consultation to gather public input before final consideration by Council. Feedback received from the community has been considered as part of this report.

Presented for Council's consideration is a revised draft policy, inclusive of proposed changes across various categories. These proposed changes aim to enhance clarity, accountability, and efficiency in the management of Councillor expenses.

RECOMMENDATION
That Council adopt the amended Councillor Expenses and Support Policy as set out in Attachment 1 to the report.

1. DISCUSSION

The *Local Government Act 2020* requires Council to adopt and maintain an expenses policy in relation to the reimbursement of out-of-pocket expenses for Councillors and members of delegated committees. The current Councillor Expenses and Support Policy was adopted in August 2020. A review of the current Policy has been completed with consideration given to community and Councillor feedback and best governance practices.

A revised draft policy was presented for Council consideration and endorsement for community engagement purposes at the Council meeting of 8 April 2024. The Council resolution incorporated further changes included in the endorsed draft Policy for community engagement purposes. Community feedback has been considered and a draft Councillor Expenses and Support Policy (Attachment 1) is presented for Council consideration.

1.1 Travel and Transport

Interstate and overseas travel was featured in the previous iteration of this policy but based on Councillor feedback, under the revised policy interstate or overseas travel expenses must be applied for, a*nd approved by Council resolution*, in advance of the travel occurring – see 6.2.

Community feedback indicated that Councillors shouldn't have to travel interstate or overseas in their Councillor roles:

I do not feel that any Councillor needs to go interstate or overseas for local government. All information can be sent and received via video conference, and the money saved can be spent supporting the community which is what local government is for.

No International/overseas travel at all should be supported or encouraged. This is wasting ratepayers hard earned money. Council expenditure must be controlled. Why do you need interstate and oversea travel.

Officers have considered this feedback and note that Councillors rarely travel interstate or overseas, apart from the ALGA National General Assembly on an annual basis. Officers believe that the requirement for a Council resolution for interstate or overseas travel will ensure appropriate scrutiny and accountability for interstate or overseas travel.

Attendance at ALGA in accordance with the policy is excluded from this requirement.

1.2 Information and Communications Technology (ICT)

Feedback has been sought from Councillors about their ICT needs and proposed changes have been made regarding:

- Availability of monitors as part of the suite of equipment available to Councillors at the commencement of their term – this has been incorporated into Section 6.3.1.
- Potential to make multi-function printers available on request instead of provisioned as standard equipment – this has been incorporated into Section 6.3.1.
- Availability of headphones.

A change has also been made to reflect that outgoing Councillors may request to retain their Council provided mobile phone number at the conclusion of their term.

Some feedback was received regarding this section of the Policy:

Every Councillor should have available a computer if that is what a monitor means with access to council servers. Printers should be shared unless privacy dictates otherwise and headphones should be standard, personal equipment for every Councillor.

Following community engagement, no further amendments are proposed to this section.

1.3 Professional Development, Training, Seminars, Conferences and Other Representation

The current policy position is, in summary:

1. Councillors have access to a corporate offering of professional development training. An allocation for these expenses is made, subject to consideration and approval in an annual corporate budget. Inclusions in this corporate offering are explicitly detailed in the policy and include team building and interpersonal skills training, MAV/VLGA Councillor Development Programs, meeting procedure training, and governance training including the Australian Institute of Company Directors (AICD) course.
2. Councillors also have access to discretionary training and professional activities nominated by each Councillor according to their individual needs. This training sits outside the corporate offering and is funded separately as an expense from individual Councillor training and development entitlements (currently capped an annual amount of $10,000 for the Mayor; and $5,000 each for the Deputy Mayor and Councillors).

Officers have considered Councillor feedback over time about the management of professional development entitlements and the challenges in differentiating whether some activities should be classified as professional development or representation expenses under the current Policy. Officers have taken this feedback onboard and proposed an alternative policy position.

In the revised draft – section 6.4, officers have proposed to build upon the entitlement for professional development expenses, broadening the scope of the entitlement and giving Councillors flexibility to manage expenses for professional development, as well as other training, conferences, seminars and broader representation costs, all within an increased prescribed total annual limit.

These proposed changes would empower Councillors to apply their entitlements in a way that is responsive to their individual needs and preferences, and to the different demands placed upon them in discharging their roles in the community. Councillors would still be accountable for ensuring expenditure falls within the bounds of the policy, and within the prescribed budget limits. The more flexible approach however, addresses some of the challenges and uncertainty that comes from requiring officers and Councillors to distinguish between professional development and representation expenses.

Following the April Council meeting, some changes were made to this section by Council resolution. These changes were incorporated into the draft for community engagement. The resolution was as follows:

Section 6.4.2 (Annual Budget Allocation for Conferences, Seminars, Training, Professional Development and Representation) being amended as shown below:

Subject to consideration and approval of the annual Council budget, an allocation for Conferences, Seminars, Training, Professional Development and Representation of:

- **$5,500 will be made in respect of each Councillor;**
- **$7,000 for the Deputy Mayor; and**
- **$11,000 for the Mayor;**

for use within a given mayoral year at the discretion of the individual Councillor. Allocations are not cumulative as between mayoral years.

The following table shows the proposed expenditure caps for each mayoral year:

Provision	Maximum Entitlement per mayoral year
For conferences, seminars, training, professional development and broader representation – Mayor	$11,000
For conferences, seminars, training, professional development and broader representation – Deputy Mayor	$7,000
For conferences, seminars, training, professional development and broader representation – Seven Councillors ($5,500 per Councillor)	$ 38,500
Total	**$56,500**

It is anticipated that except as specifically provided for in the policy, the above entitlements would be exclusive of travel costs associated with attendance at seminars, conference and other representation.

The table shows the maximum entitlement per Mayoral year. Officers will budget annually for reimbursing or meeting Councillor entitlements, noting that not all Councillors fully utilise their entitlements and actual spending varies based on individual needs and representation demands.

Some feedback about this provision was provided by the community as follows:

> *The courses must be approved prior to attendance and the relevance to the Councillor's role must be evident.*
>
> *We never get any professional development from our jobs, but we have to pay for it. Why is it different for councils. Stop the waste and spending.*
>
> *Make payments and reimbursements public.*

Officers have considered this feedback and note that Councillor expenses will continue to be reported through quarterly and annual financial reports to Council – which are available for the community to review. These expenses are also reported and monitored by the Council's Audit and Risk Committee, providing an extra level of scrutiny of Councillor expenses.

Ongoing professional development is considered an investment in good governance as continuous learning enhances Councillors' ability to perform their roles and ultimately to serve their constituents. In terms of ensuring the training is relevant to the role, it is noted the overarching policy principles would require any professional development expenses be “used prudently and solely in the public interest,” and that expenses are “reasonably necessary to meet the legitimate needs of Councillors when performing their duties”.

It is the officer recommendation that the amounts proposed in the draft Policy remain as they are (as per the Council resolution).

1.4 Australian Institute of Company Directors’, Company Directors Course

A further change was made by Council resolution to section 6.4.4 (Councillor Induction and sector training) as follows:

> **A Councillor’s entitlement to have met or reimbursed the cost of undertaking the Australian Institute of Company Directors’, Company Directors Course is subject to and conditional upon the course commencing prior to the calendar year in which a general election is to be held.**

No specific community feedback was received about this change. No further changes are recommended.

1.5 Australian Local Government Association (ALGA) National General Assembly

ALGA is the peak body for local government nationally, representing councils across the country. ALGA operates in structure as a federation of state and territory local government associations, with the Municipal Association of Victoria (MAV) being the relevant Victorian body.

The NGA is convened by ALGA each year in Canberra and is the peak annual event for local government in Australia. The NGA provides the opportunity for representatives from Australia's 537 local governments to come together to meet with and hear from high profile and engaging speakers and Federal Government representatives, advocate on specific issues directly with Federal Ministers and Members, share learnings and industry best practice, and shape the national local government policy and advocacy agenda.

Officers consider that Councillor representation at the NGA is an opportunity to discuss and advocate on key local issues, as well as matters of national importance to local government, which contributes to the effective leadership in Knox, and in the broader local government sector. It also provides an opportunity to network with colleagues and Federal members of Parliament.

Feedback received from the community about this provision is as follows:

> *If more than the Mayor and three Councillors wish to attend than the cost should be allocated from their allocation in item 6.4.*
>
> *.... attend at the individuals' costs and claim from Tax. I do it that way and why is it different to the councillors.*

Officers are of the view that Councillor representation at the NGA is an opportunity to demonstrate and contribute to leadership in Knox, and the Local Government sector through discussion and advocacy on key local issues, as well as matters of national importance to local government.

The Policy addresses the situation where more than four Councillors wish to claim an entitlement under this section, with the matter being referred to Council for determination. It is also noted that the total cost for attending the NGA (excluding meals and transport costs) under this section will not be deducted from individual Councillors' Conference, Seminar and Representation Expenses entitlement.

Consequently, the officer recommendation is to include this provision as presented within the draft policy to ensure that Council can be represented at the NGA, limiting attendance to the Mayor and three additional Councillors, plus a Council officer, if desired, to support the attending Councillors.

1.6 Other Support

Amendments have been made in the policy to reflect support provided to Councillors when attending events on behalf of Council – see Section 6.7 Other Support. Such support includes:

- Administrative support managing invitations and RSVPs provided by the Executive Assistant to the Mayor and Councillors.
- Provision of talking points for the Mayor (or delegate), for events where a formal invitation is received to attend and speak.
- Providing background information for Councillors attending other events if requested.
- Support associated with the wearing (and security of) of the Mayoral Robes and Chain for events where formal attire is considered necessary and appropriate.
- Taking photos of Councillors (using Councillor's devices) at events on request, provided such requests are incidental to, and not disruptive to, the officer's role at the event.

No community feedback was received about these proposed changes. No further changes are recommended.

1.7 Alcohol

An amendment was made by Council resolution for section 6.8.2 (Alcohol) to be replaced with the following:

Where this policy makes allowance for refreshments or meals for the Mayor, Councillors or Committee members, in the absence of a prior resolution of Council, the cost of alcoholic beverages shall not be met or reimbursed as an expense except:

- **Where they cannot be reasonably avoided (such as where alcoholic beverages are included as part of the ticket price of an event or function.)**
- **Where the Chief Executive Officer has determined the provision of alcoholic beverages is appropriate at a Knox City Council civic or other function involving members of the community, having regard to:**
  - **The nature and purpose of the function.**
  - **Community expectation and the policy principles set out in section 6.1.1**
  - **The impact alcohol can have on the safe, competent and professional performance of the duties of a Councillor, or other attendees.**

No community feedback was received about this proposed changes. No further changes are recommended.

1.8 Subscription

An amendment was made by Council resolution for section 6.11 (Subscriptions) to be replaced with the following:

Councillors can access The Age newspaper as part of a Your Library Membership.

Council will directly pay for or reimburse the cost of a subscription to The Herald Sun newspaper.

Other subscriptions may be considered in accordance with section 6.15 of this Policy.

No community feedback was received about these proposed changes. No further changes are recommended.

1.9 Other Changes

Other relatively minor changes have been made as follows:

- In section 6.6.2 (regarding GST Liability for spouses/partners).
- To the formatting and structure of Section 6.15 (Other Expenditure Not Specified) to clarify the procedural steps associated with resolving any uncertainty or disagreement regarding entitlements; or where there is any failure to comply with the policy.
- Minor administrative changes have been made to numbering, cross-referencing, position titles and spelling mistakes.

2. ENGAGEMENT

The draft policy was made available for community consultation, before being brought to Council for final consideration. This engagement was advertised on Council's Facebook page, website and a poster displayed at the Council meeting on 22 April 2024. A total of 6 community members provided feedback through Council's Have Your Say page. This feedback is reflected in this report and included in full in Attachment 2.

3. SOCIAL IMPLICATIONS

Transparent governance is a cornerstone of a healthy and thriving society. It plays a vital role in promoting accountability and trust for our community. Ensuring that decision-making processes and policies are accessible, clear, and open to public scrutiny, supports transparency and public accountability; while building community confidence in the governance standards of Council.

4. CLIMATE CHANGE CONSIDERATIONS

Implementation of the recommendation is considered to have no direct implications or has no direct impacts upon Council's Net Zero 2030 target, the Community Net Zero 2040, exposure to climate risks or climate change adaptation.

5. ENVIRONMENTAL IMPLICATIONS

Nil.

6. FINANCIAL AND RESOURCE IMPLICATIONS

Changes to the Councillor Expenses and Support Policy may have a direct impact on the Council's budget. The extent of those impacts will depend on the scope of Councillor entitlements, and any limitations imposed on those entitlements; as well as the extent to which Councillors seek Council funding, or reimbursement of their expenses under the approved policy.

Suggested amendments in the revised draft (particularly in relation to attendance at the ALGA NGA, and the entitlement for seminars, conferences, and representation expenses) are intended to provide greater clarity regarding entitlements.

7. RISKS

This Policy serves as a robust mechanism for mitigating both financial and reputational risks, offering a thorough framework designed to instill confidence and provide assurance for both Council and the broader community regarding the integrity of Council's management of Councillor expenses and support.

By providing a framework to manage Councillor expenses and support, the revised Policy not only provides Councillors with clearer guidance and greater certainty regarding entitlements, it also ensures transparency, accountability, and fairness of our processes in the allocation of Council resources.

8. KNOX COMMUNITY AND COUNCIL PLAN 2021-2025

Civic Engagement & Integrity

Strategy 5.2 - Manage our resources effectively to ensure financial sustainability and improved customer experience.

Strategy 5.3 - Ensure our processes are transparent and decisions are accountable.

9. CONFLICT OF INTEREST

The officers contributing to and responsible for this report have no conflicts of interest requiring disclosure under Chapter 5 of the Governance Rules of Knox City Council.

10. STATEMENT OF COMPATIBILITY

This report is compatible with the Charter of Human Rights and Responsibilities, as it does not raise any human rights issues.

11. CONFIDENTIALITY

There is no content in this report that meets the definition of confidential information from the Local Government Act 2020.

ATTACHMENTS

1. Attachment 1 - Councillor Expenses and Support - clean [**4.2.1** - 25 pages]
2. Attachment 2 - Community Feedback [**4.2.2** - 1 page]

Policy & Procedure

Councillor Expenses and Support

Policy Number:	2003/21	Directorate:	Customer and Performance
Approval by:	Council	Responsible Officer:	Manager Governance and Risk
Approval Date:	TBC	Version Number:	5
Review Date:	3 years from date of approval		

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1. Purpose

This document assists Councillors, members of delegated committees, Council staff and the community to understand the entitlements of the Mayor, Councillors and members of Delegated Committees by outlining:

- entitlements for reimbursement of reasonable bona fide out-of- pocket expenses incurred while performing the duties of a Councillor or a member of a delegated committee.
- entitlements to have reasonable bona fide expenses associated with performing the duties of a Councillor or a member of a delegated committee paid on their behalf.
- Councillors' entitlements to professional development support and resources.
- The facilities, resources and support considered necessary and appropriate for Councillors to perform their duties in accordance with the requirements of the Local Government Act 2020 (the Act).

This document also sets out:

- The process and standards for claiming expenses.
- The process and standards for reporting and accountability.

2. Context

Part 2, Division 6 of the Act provides for the payment of allowances; the reimbursement of expenses; and the provision of resources and facilities to the Mayor, Councillors and members of delegated committees for the purpose of supporting them perform their duties.

Councillors and members of delegated committees are entitled, under section 40 of the Act, to reimbursement of expenses reasonably incurred in the performance of their duties.

This policy ensures that the reimbursement of these expenses is in accordance with the Act and meets the Act's principles of public transparency; achieving the best outcomes for the municipal community; and ensuring the ongoing financial viability of the council.

Section 41 of the Act requires Council to adopt and maintain an expenses policy in relation to the reimbursement of out-of-pocket expenses for Councillors and members of delegated committees.

3. Scope

This Policy applies to the Knox City Council Mayor, Councillors and delegated committee members and specifically addresses a broad range of expenses including:

- Transport and travel;
- Information and Communications Technology
- Conference, seminars, training and professional development;
- Meals and refreshments; and
- Carer Support

This policy is not intended to prescribe for every possible situation that may arise. Any situation that is not adequately covered by this policy will be determined in accordance with section 6.15 or referred to Council for determination by resolution.

Any cost or expense (or portion thereof) which should reasonably be borne by another entity, or for which another entity is reasonably liable, is outside the scope of this policy and shall not be paid or reimbursed by Council.

The payment of allowances for the Mayor, Deputy Mayor and Councillors is outside of the scope of this policy and will be determined according to the requirements of section 39 of the Act.

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4. References

4.1 Community Plan 2021-2031

4.2 Council Plan 2021-2025

Key Direction 5: Civic engagement and integrity

Ensure our processes are transparent and decisions are accountable.

4.3 Relevant Legislation

- Local Government Act 2020
- Carers Recognition Act 2012

4.4 Charter of Human Rights

This policy has been assessed against and complies with the Charter of Human Rights.

4.5 Related Council Policies

- Governance Rules
- Public Transparency Policy
- Councillor Media Policy
- Election Period Policy
- Email, Internet & Web Browsing Policy
- Information Management Security Policy
- Password Policy

5. Definitions

the Act	Means the *Local Government Act 2020* as amended.
Bona fide	Means honest; genuine; actual; authentic; acting without the intention of defrauding.
Carer	Mean a carer as defined under section 4 of the Carers Recognition Act 2012.
Civic function	A ceremonial or celebratory Council event (including reception or ball).
Council	Means Knox City Council, being a body corporate constituted as a municipal Council under the *Local Government Act 2020.*
Delegated Committee	Means a Delegated Committee established under section 63 of the Act.
Duties as a Councillor	Means duties performed by a Councillor that are necessary or appropriate for the purposes of achieving the objectives of a Council having regard to any relevant Act, regulations, Ministerial guidelines or Council policies. Such duties include, but not are not limited to, attendance at: • Council Meetings, Delegated Committee Meetings, or other committee meetings; • Briefing sessions, workshops, or other meetings with Council staff; • Training sessions, professional development opportunities and conferences (as an attendee and / or speaker) which: – Are consistent with Council's objectives; – Will cover or present material with application / importance / relevance to current or future issues faced by the Council; and – Are within the General, or Councillor's annual budget allocations. • Conferences or other meetings as Council's nominated representative or delegate. • Civic or ceremonial functions convened or scheduled by the Council, Mayor or Chief Executive Officer; • Meetings with individual community members, organisations and community groups; • Other meetings, inspections or events attended by a Councillor in an official capacity relevant to their duties.
Duties as a Delegated Committee Member	Means duties performed by a member of a Delegated Committee who is not a Councillor, that is necessary or appropriate for the purposes of achieving the objectives of the Committee having regard to any relevant Act, regulations, Ministerial guidelines Instrument of Delegation or Council policy.

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Expenses	Means expenses • initially incurred by a Mayor, Councillor or member of a delegated committee for which a claim is subsequently made for reimbursement; and • expenses incurred by Council for or on behalf of a Mayor, Councillor or member of a delegated committee.
Fair and reasonable **(in relation to expenses, support and resources)**	Means: • An amount, level or type that is consistent with what a reasonable person would pay or accept, if they were not a Councillor or member of a delegated committee, in the same or similar circumstances for the same or similar item. • An amount that represents value for money and minimises waste or extravagance
Material cost	Means a cost greater than 10% of the: • total once-off expense incurred; or • monthly expense incurred.
Professional development	Means the process of improving and increasing the capabilities, knowledge, mindset or skillset of councillors through access to education and training opportunities, whether through outside organisations or in the workplace.
Reasonable personal use	Means personal use that: • is infrequent and brief, and/or does not have a cost to Council, or a material cost to Council in the context of the expense in question. • does not interfere with the operation of Council. • does not unreasonably interfere with another councillor's use of Council's resources and facilities. • does not compromise the security of the Council's systems or assets. • does not impact on Council's electronic storage capacity. • does not decrease Council's network performance, or consume bandwidth or data in a manner that could interfere with the service provided to others (e.g. large email attachments can decrease system performance and potentially cause system outages; streaming content can consume large amounts of bandwidth on Council's network, or data from Council's mobile plan). • corresponds to Council's procedures for email maintenance and archiving documents. • is not an unacceptable use, as defined.
Representing Council	Representing Council means external-facing responsibilities focused on promoting Council's interests and position; or where Council receives an official invitation seeking Council representation at an event

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Term of office	In accordance with Section 29 of the Local Government Act 2020, the term of office of a Councillor elected at a general election commences on the day that the Councillor takes the Oath or affirmation of Office and expires at 6.00am on the day appointed for the next general election. In terms of this policy, the term of office for any Councillor elected as a result of an extraordinary vacancy expires at 6.00am on the day appointed for the next general election.
Tools of trade	Includes the following items of information and communications technology equipment provided to conduct business as a Councillor: • Laptop and or Tablet Computer • Printer/Copier/Facsimile/Scanner • Mobile Communication Device (eg Smartphone)
Unacceptable use	Means use: • To create or exchange messages that are offensive, harassing, obscene or threatening. • To visit web sites containing objectionable (including pornographic) or criminal material. • To store publish or transmit material that is offensive, obscene, abusive, defamatory or unlawful. • That exchanges any confidential or sensitive information contrary to law. • That infringes intellectual property laws. • That transmits files or viruses that cause a negative impact on Council's computer system. • Of software that is unauthorised. • That is for electioneering purposes or any other purpose prohibited by law.

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6. Council Policy

6.1.1. Policy Principles

The following principles represent the foundation of Council's Policy on payment or the reimbursement of expenses for the Mayor, Councillors and delegated committee members. The following principles also represent the foundation of Council's Policy on the provision of resources and facilities to support the Mayor and Councillors:

- Public resources will be used prudently and solely in the public interest, in accordance with the Councillor Conduct principles as prescribed in the Act.
- Public resources will be allocated in a fair and equitable manner taking into account individual needs and circumstances, to facilitate the full participation of all Councillors.
- The provision of support and resources, and the reimbursement of expenses must be accountable and transparent to the community.
- Expenses must be:
    - Fair, reasonable and bona fide;

- actually incurred in the performance and discharge of a Councillor's or delegated committee member's duties;
- adequately substantiated; and
- in accordance with statutory requirements and community expectations.

- Support and resources provided must be:
  - fair and reasonable;
  - reasonably necessary to meet the legitimate needs of Councillors when performing their duties; and
  - in accordance with statutory requirements and community expectations.
- Councillors must reimburse Council for any costs incurred which relate to personal use which is not specifically authorised in this Policy.
- Council will provide reasonable additional support, facilities and/ or equipment for any Councillor with a disability to enable them to perform their duties.

6.2. Transport and travel

6.2.1. General Provisions

The following general provisions shall apply when determining any expenses to be met or reimbursed by Council:

- Subject to section 6.5.1 interstate or overseas travel expenses must be applied for, and approved by Council resolution, in advance of the travel occurring.
- Expenses will only be met or reimbursed by Council where undertaking the duties of a Councillor is the primary and predominate purpose of travel.
- Travel shall be by the most practical mode and route possible, and be reasonable in the circumstances taking into account factors such as duration and total cost of travel.
- Costs should be minimised by sharing travel arrangements where reasonable and practicable.
- The amount paid or reimbursed by Council for air travel shall not exceed the cost of economy class air travel to the relevant destination.
- Where private travel is undertaken in conjunction with travel related to the duties of a Councillor:
  - All costs incurred for private purposes must be clearly delineated and documented pre-departure.
  - Council will not directly pay for or reimburse any costs related to private travel.
- The quantum of expenses met or reimbursed by Council will generally be on the basis of the actual cost incurred and the form of transport used. However, Council may reimburse an amount less than the amount claimed, where the actual expense incurred is considered unreasonable, taking into account for example, the alternative models of travel available.

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- Council will not reimburse expenses for travel to Council or Delegated Committee meetings, meetings of Council committees, formal briefing sessions and civic and ceremonial functions.

6.2.2. Mayoral Vehicle

A fully maintained motor vehicle will be made available to the Mayor for the duration of their term, including for reasonable personal use.

The make and model of vehicle will be determined in accordance with Council Policy or at the discretion of the Chief Executive Officer.

Reserved parking will be provided for the Mayoral Vehicle at the Civic Centre.

6.2.3. Private Vehicle Use

Councillors and members of a delegated committee using their own private vehicles to carry out their duties as a Councillor or a delegated committee member may be reimbursed travel expenses. Reimbursement shall be on a per-kilometre basis at the rate prescribed for deductions for work-related car expenses by the Australian Taxation Office (ATO) using the cents per kilometre method.

Where a Councillor or delegated committee member uses a car for interstate travel in accordance with this policy, the amount paid or reimbursed by Council to undertake the interstate travel (inclusive of tolls, car parking and additional accommodation costs) shall not exceed the cost of economy class air travel and transfers to the relevant destination.

Parking will be provided for Councillors' private vehicles at the Civic Centre.

6.2.4. Council Vehicle Use

In exceptional circumstances, where practicable and by prior arrangement through the Chief Executive Officer, a Council pool vehicle may be made available for use by a Councillor where use of a private vehicle or other means of transport is not available or convenient.

All use of Council pool vehicles must be reasonably necessary to discharge the duties of a Councillor and pool vehicles may not be used for personal use.

Council does not have an allocated pool vehicle for use by Councillors and availability of vehicles is subject to operational demands upon the fleet.

Any Councillor use of Council pool vehicles is subject to relevant Council policies and procedures.

6.2.5. Tolls and Car Parking Costs

Councillors and delegated committee members may be reimbursed for the cost of:

- Car parking for the reasonable duration required to perform their duties.
- Fees for use of toll roads (EastLink and CityLink) incurred in attending to their duties.

The most value for money parking options should be sought. Where premium, valet or personalised parking services are used, the amount paid or reimbursed by Council shall not exceed the cost of standard parking facilities available in reasonable proximity.

6.2.6. Public Transport

Councillors and delegated committee members may be reimbursed for the cost of using public transport incurred in attending to their duties as a Councillor.

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6.2.7. Taxi Costs (including ride share and other fare based services)

Where it is not practicable or cost effective to use public transport, a Council or private motor vehicle, Councillors and delegated committee members may be reimbursed for taxi costs incurred in attending to their duties.

Where a Councillor or a delegated committee member uses a ride share service or other service providing a vehicle and driver, the amount paid or reimbursed by Council shall not exceed the cost of an equivalent taxi service.

Councillors may request a "Cab-Charge" voucher from Council for the payment of taxi services.

6.2.8. Overseas Travel

Overseas travel expenses will only be incurred or reimbursed in accordance with a specific Council resolution made prior to the travel being undertaken.

Expenses relating to overseas travel, accommodation, meals and reasonable entertainment will be met or reimbursed by Council in accordance with the resolution.

6.2.9. Exclusions

Council will not directly pay for, or reimburse, the costs of any infringements incurred, including:

- For road, traffic or parking offences.
- For public transport offences.

6.2.10. Travel Expenses not covered by the foregoing.

Where travel expenses are proposed to be incurred outside this section or there is doubt as to the application of this section to expenses incurred, then the provisions of section 6.15 of this Policy can be applied.

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6.3. Information and Communications Technology (ICT)

6.3.1. Selection and Provision of Councillors' ICT Equipment

The following tools of trade will be made available to each Councillor to assist them perform their duties as a Councillor:

- one mobile telephone: Wi-Fi and mobile data (ie 3G, 4G, or 5G) enabled with a voice mail or voice to text service.
- one mobile tablet or laptop computer: Wi-Fi and mobile data (ie 3G, 4G, or 5G) enabled.
- one multi-function copier/printer/scanner – if requested.
- monitor with a second monitor available on request.
- headphones suitable for tablet / laptop based MS Teams and Zoom meetings.

The capital costs of Councillors' tools of trade are not an expense for the purposes of this policy.

Council will directly pay for the expenses associated with providing a mobile data plan for tools of trade through plans established periodically according to Council's usual procurement processes.

The make, model, and functionality of Councillors' tools of trade will be subject to consultation with Councillors, but will otherwise:

- Be selected in accordance with Council's ICT strategy and the usual standards and processes applied across Council for its business activities;
- Not exceed, nor be less than, the standard or specifications of equipment available to staff (including Directors and the Chief Executive Officer);
- Be consistent across the Councillor group to enable more efficient training, support and asset management;
- Be reviewed at the commencement of each electoral term; and
- Be upgraded at the end of their useful life or otherwise in accordance with Council's ICT strategy and the usual standards and processes applied across Council for its business activities.

Where a reasonable mobile data (ie 3G, 4G, 5G) connection cannot be accessed at a Councillor's normal place of residence, expenses for an alternative solution can be considered in accordance with section 6.15 of this Policy.

6.3.2. Selection and Installation of ICT Software

Councillors' tools of trade will be equipped with a range of approved software. Software selected will be subject to consultation with Councillors, but will otherwise be selected and upgraded in accordance with Council's ICT strategy and the usual standards, processes and security safeguards applied across Council's network.

The installation of additional software on Councillor tools of trade is subject to consultation with the IT Department.

Councillors must not load pirated, suspect or illegal software or content onto any Council provided device. Council has the right to audit a tool of trade, including applications and information, to ensure compliance with the law and this policy. The Chief Executive Officer has the authority to delete any inappropriate information or unauthorised software from a Council provided tool of trade.

The cost of approved software selected and made available to all Councillors is not considered an expense for the purposes of this policy.

6.3.3. Use of ICT Equipment

Councillors must maintain the integrity and the configuration of the tools of trade provided, protect and generally ensure the safe custody and operation of such equipment and the information they contain.

Councillors' tools of trade are to be used for their duties as a Councillor, however reasonable personal use (as defined) of Councillors' tools of trade is permissible. Councillors' tools of trade must not be used to conduct personal business or other unacceptable uses.

Councillors should take all reasonable steps to ensure that Council provided tools of trade are not used in breach of this policy by third parties.

Councillors will be provided an opportunity to review the costs associated with their tools of trade at regular intervals, in order to identify and reimburse Council for private usage which is beyond reasonable personal use.

6.3.4. International Roaming

Councillors travelling overseas travel in accordance with section 6.2.8 may have international roaming provisioned on their tools of trade for the duration of the trip in accordance with Council's resolution.

International use of tools of trade in all other circumstances requires approval of the Chief Executive Officer prior to departure and the quantum of expense to be met or reimbursed by Council shall be limited to $100 per Councillor per 4 week period.

6.3.5. User Accounts and Data

Councillors will be provided a user account enabling access to:

- Their tools of trade and any associated local, network, or cloud based storage.
- An email account on Council's @Knox.vic.gov.au domain.
- Software provided in accordance with section 6.3.2.
- Other data and resources relevant to their duties as a Councillors.

Councillors' use of the accounts and data provided via their tools of trade (or any other method) are subject to the various codes, policies and procedures set out Section 4.

Council will typically provide personalised user accounts and avoid generic (ie ward based) accounts to ensure the privacy and confidentiality of Councillors' data following the end of a Councillor's term of office.

6.3.6. Damage, Loss or Theft of Equipment

Any damage sustained to Councillors' tools of trade will be repaired at Council's expense. Device covers are highly recommended and may be supplied by Council.

Where a mobile device is damaged, lost or stolen a Councillor must:

- report the damage, loss or theft to the Information Technology Team as soon as practicable; and
- where requested, provide a Statutory Declaration including the details of the device and the circumstances of the damage, loss or theft.

All stolen or lost tools of trade will be subject to a remote wipe by Council.

6.3.7. Return of Councillor Equipment

All Councillor equipment must be returned to Council:

- upon request; and or
- at the conclusion of a Councillors' term of office.

Council staff will take appropriate steps to remove / destroy any data stored on Councillor equipment that is returned, before it is disposed of or re-deployed.

6.3.8. Disposal of Redundant Councillor Equipment

Councillors will be provided with an opportunity to purchase (at market value) the tools of trade that have been provided to, and used by them, if they are determined by the Director Customer and Performance to be redundant or additional to Council's needs.

Any equipment purchased must be returned to Council beforehand, to enable corporate software and personal information to be removed, in accordance with section 6.3.7.

Tools of trade are not considered redundant or surplus to Council's needs if they:

- are of a type and specification still being procured or deployed for use by Council; and/or
- are of a type and specification that are appropriate to retain for redeployment to other Councillors or staff members, Council programs or activities.

Equipment that remains relevant and useful to Council's needs will not be made available to Councillors for purchase.

The market value of any tools of trade to be sold in accordance with this section will be determined by the Director Customer and Performance; having regard to contemporary market rates for the sale or trade-in value of such equipment. Records of how the market value(s) was determined will be maintained by the Director Customer and Performance.

Once notified of the opportunity to purchase the equipment and the market value, a Councillor must inform Council of their intent to purchase or not within 7 days.

Any equipment not purchased must be returned to Council promptly in accordance with a notification from the Director Customer and Performance.

6.3.9. Transfer of mobile telephone number

A Councillor wanting to retain their Council owned mobile telephone number at the conclusion of may request the number be transferred to them.

Any associated costs in the transfer and any fees or charges incurred at this time and after will be met by the Councillor wanting to transfer the number.

6.4. Conferences, Seminars, Training and Professional Development

6.4.1. General Provisions

Council recognises the need for Councillors to attend training, conferences, seminars and professional development activities in order to be kept informed on relevant local government matters and to assist them performing their roles as Councillors. Generally, and as defined in this Policy, professional development means the process of improving and increasing the capabilities, knowledge, mindset or skillset of Councillors.

Annual budget provisions for conferences, seminars, training and professional development are addressed in Section 6.4.2.

Prior approval to attend the training and development activity must have been obtained from either the Chief Executive Officer or resolution of Council for expenses to be paid or reimbursed to Councillors.

The expenses paid or reimbursed to Councillors may include:

6.4.1.1 registration fees.

6.4.1.2 accommodation costs other than in the metropolitan area.
6.4.1.3 reasonable cost of meals and refreshments.

Where appropriate, Councillors will present a short synopsis of the event (written or verbal) at the next practicable Council meeting as part of their monthly Councillor report, following attendance at a conference, seminar, training or professional development.

Conferences, training or professional development conducted or delivered by Council staff are not considered expenses for the purposes of this policy, (including the cost of ancillary meals and refreshments including in accordance with Section6.8).

A delegated committee member may have training and professional development expenses paid or reimbursed by Council in accordance with a specific Council resolution made prior to the training or activity being undertaken.

Expenses relating to registration fees, accommodation and meals will be met or reimbursed by Council in accordance with the resolution.

6.4.2. Annual Budget Allocation for Conferences, Seminars, Training, Professional Development and Representation

Subject to consideration and approval of the annual Council budget, an allocation for Conferences, Seminars, Training, Professional Development and Representation of:

- $5,500 will be made in respect of each Councillor;
- $7,000 for the Deputy Mayor; and
- $11,000 for the Mayor;

for use within a given mayoral year at the discretion of the individual Councillor. Allocations are not cumulative as between mayoral years.

6.4.3. Accommodation and Meals at Conferences, Seminars, Training and Professional Development

Where it is understood that a Councillor training and development activity involves related costs, such as accommodation or meals, these should be identified prior to registration.

If not included in the cost of the registration, the cost of meals and beverages (within reasonable limits) for the duration of the training and development activity may be reimbursed to Councillors and delegated committee members.

Appropriate accommodation, as selected by the Chief Executive Officer or delegate, for the duration of the training and development activity may be paid by Council. Accommodation expenses within the metropolitan Melbourne area will not be paid or reimbursed to Councillors or delegated committee members.

Accommodation and meal expenses should be consistent with Table 3 in the annual determinations of the Australian Taxation Office regarding reasonable accommodation and meal expenses (See for example Taxation Determination TD 2023/3 included at Appendix 1, or subsequent determinations as circulated to Councillors from time to time.)

6.4.4. Councillor Induction and sector training

A mandatory induction and training program will be conducted for all Councillors at the commencement of each electoral term. Periodically throughout the Councillors' terms of office, Councillors will also have access to program of training and professional development opportunities including:

6.4.1.1 Meeting procedures
6.4.1.2 Chairing of meetings
6.4.1.3 Media training
6.4.1.4 Governance training (for example, Australian Institute of Company Directors course)
6.4.1.5 Financial training
6.4.1.6 Information Technology usage
6.4.1.7 Team Building and interpersonal skills
6.4.1.8 MAV/VLGA Councillor Development Programs
6.4.1.9 Cranlana Colloquium

- An allocation for these expenses will be made, subject to consideration and approval in the annual Council budget.

- A Councillor's entitlement to have met or reimbursed the cost of undertaking the Australian Institute of Company Directors', Company Directors Course is subject to and conditional upon the course commencing prior to the calendar year in which a general election is to be held.

- Additional training and professional activities outside of the above program must be funded separately as an expense from individual Councillor budget allocations in accordance with Section 6.4.2.

- A Councillor who is not entitled (or seeking) to be reimbursed for attending the Australian Local Government Association (ALGA) National General Assembly (NGA) in accordance with Section 6.5.1, may fund their attendance at the NGA from their individual Councillor training and development budgets. (For the purposes of this section, the costs of attending the NGA shall include all registration, travel, meals, accommodation and incidental expenses).

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6.5. Representing Council

6.5.1. Attendance at the Australian Local Government Association (ALGA) National General Assembly (NGA)

The Mayor and up to three additional Councillors are entitled under this section to have met or reimbursed, the costs for attending and representing Council at the Annual National General Assembly of the Australian Local Government Association (ALGA), which provides Councils with the opportunity to participate and engage in advocacy and discussion on matters of national importance to local government.

Where more than three Councillors, other than the Mayor, wish to claim an entitlement under this section, the Mayor shall consult with Councillors seeking to reduce the number of Councillor delegates to four. Priority will be given to Councillors who have not previously attended the NGA in the current term of Council. Where, following consultation with the Mayor, more than four Councillors wish to claim an entitlement under this section, the matter shall be referred to Council for determination.

The total cost for attending the NGA (excluding meals and transport costs) under this section shall not be deducted from individual Councillors ' Conference, Seminar and Representation Expenses entitlement.

At the request of the Mayor, and subject to available budget provisions, the Councillor delegation to the NGA may be supported (at Council's expense) by the Chief Executive Officer or another member of the Executive Leadership Team.

6.5.2. Attendance at Fundraising and Charitable Events

Council will directly pay for or reimburse the cost of ticketed events for Councillors invited, in their role as a Councillor, by written invitation to attend Fundraising or Charitable Events:

a) Conducted by a neighbouring municipality, or municipality in the Municipal Association of Victoria's Metropolitan East Region; or
b) Where prior approval has been given by Council, or the Chief Executive Officer in consultation with the Mayor (or in the case of Mayoral expenses, the Deputy Mayor), and the event benefits the Knox Community.

6.5.3. Appointments to External Organisations

Each year, and from time to time, Council resolves to appoint Councillors to represent it on a number of external organisations.

For these organisations the nominated Councillors or their substitute are to be Council representatives at regular meetings of these organisations and any special events, with partners where appropriate.

Councillors are entitled to have paid by Council, or reimbursed, reasonable bona fide costs associated with representing Council on such organisations subject to expenditure in excess of $500 per annum per delegate (including substitute nominees) per organisation being approved in advance by Council.

6.6. Attendance by a Councillor's Spouse or Partner

6.6.1. Attendance at Functions of Victorian Councils

Where there is a mutual expectation of partners attending, Council will directly pay for or reimburse the reasonable costs of a Councillor's spouse or partner attending functions:

a) held by Knox City Council; or

b) held by other Victorian municipalities

A mutual expectation of partners attending would arise for example where:

- A spouse / partner is specified on the invitation; and
- The event is a dance, ball, or gala, to which a partner would typically be invited; or
- The event is of a nature where other attendees will be accompanied by partners.

6.6.2. Attendance at other seminars, conferences or civic functions

Attendance at any seminar, conference or civic function by a councillor's spouse / partner shall be at the expense of the councillor except where:

a) Prior approval has been given by Council or the Chief Executive Officer in consultation with the Mayor (or in the case of Mayoral expenses, the Deputy Mayor); and

b) Attendance by a councillor's spouse / partner is considered to be necessary or appropriate to support the business or representational needs of Council; and

c) Sufficient provision exists in the approved annual budget for conferences and seminars.

In order to effectively manage GST liability – all arrangements for a Councillor's spouse or partner's attendance may be requested to be paid for by the Councillor, with reimbursement provided by Council.

6.7. Other Support

Where a Councillor attends an event on behalf of Council, the following support can be provided when required and as follows:

- Administrative support managing invitations and RSVPs provided by the Executive Assistant to the Mayor and Councillors.
- Provision of talking points for the Mayor (or delegate), for events where a formal invitation is received to attend and speak.
- Providing background information for Councillors attending other events if requested.
- Support associated with the wearing (and security of) of the Mayoral Robes and Chain for events where formal attire is considered necessary and appropriate.
- Taking photos of Councillors (using Councillor's devices) at events on request, provided such requests are incidental to, and not disruptive to the officer's role at the event.

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6.8. Meals and Refreshment

6.8.1. General Provisions

Council will provide reasonable meals (typically either a buffet style meal or plated meal) during evenings of Council meetings, Delegated Committee meetings, Issues Briefings and other key meetings as determined by the Chief Executive Officer in consultation with the Mayor.

Reasonable meals may also be provided when other Council events or meetings are held at times that immediately follow or extend through normal mealtimes.

Council will provide reasonable refreshments for Councillors' in their office and meeting space.

6.8.2. Alcohol

Where this policy makes allowance for refreshments or meals for the Mayor, Councillors or Committee members, in the absence of a prior resolution of Council, the cost of alcoholic beverages shall not be met or reimbursed as an expense except:

- Where they cannot be reasonably avoided (such as where alcoholic beverages are included as part of the ticket price of an event or function.)
- Where the Chief Executive Officer has determined the provision of alcoholic beverages is appropriate at a Knox City Council civic or other function involving members of the community, having regard to:
  - The nature and purpose of the function.
  - Community expectation and the policy principles set out in section 6.1.1.

- The impact alcohol can have on the safe, competent and professional performance of the duties of a Councillor, or other attendees.

6.9. Carer Support

Council will directly pay for, or reimburse fair and reasonable childcare / family care expenses incurred by Councillors whilst discharging their duties as a councillor. The total expense paid for, or reimbursed, by Council must exclude any applicable rebates or subsidies.

Council will directly pay for, or reimburse fair and reasonable childcare / family care expenses incurred by a delegated committee member whilst discharging their duties as a member of a delegated committee. The total expense paid for, or reimbursed, by Council must exclude any applicable rebates or subsidies.

Family care relates to care provided to any immediate family member who is either a child or a sick, elderly, or disabled person. A child is defined as a person up to, but not including, 16 years of age.

Council may also make reasonable adjustments, and directly pay for or reimburse fair and reasonable additional expenses incurred by a Councillor who is breastfeeding.

Eligible care does not include care performed by a direct relative (spouse, domestic partner, son, daughter, mother, father, brother or sister of the Councillor or their spouse or partner).

Council will provide reimbursement of costs where the provision of carer services is reasonably required when a councillor or delegated committee member who is a carer incurs reasonable expenses in the performance of their duties.

Each claim must be substantiated by a receipt from the caregiver showing the dates and times care was provided and a written statement identifying the duty performed by the Councillor.

6.10. Professional Memberships

Council will directly pay for, or reimburse the cost of the following memberships:

- Australian Institute of Company Directors
- The Victorian Local Government Association
- The Australian Local Government Women's Association

Other memberships, which are considered demonstrably beneficial to Council or the performance of the duties of a Councillor, may be considered in accordance with section 6.15 of this Policy.

6.11. Subscriptions

Councillors can access The Age newspaper as part of a Your Library Membership.

Council will directly pay for, or reimburse the cost of a subscription to The Herald Sun newspaper.

Other subscriptions may be considered in accordance with section 6.15 of this Policy.

6.12. Miscellaneous Support and Expenses

All Councillors will be provided with:

- Standard stationery and office consumables held or obtained generally for the organisations requirements.
- Personalised business cards.
- Names badges, including for a spouse or partner.
- A page on Council's website including, but not limited to, a photo, contact details, term dates and committees. Additional information may be included at the request of individual Councillors, subject to approval by the Chief Executive Officer.
- Any safety equipment required for a Councillor's duties. This equipment is to be returned to the organisation promptly upon the completion of the activity/duty for which the articles were required.
- Council business papers, personal mail and other Council information will be couriered to Councillors' place of residence weekly or as required.

The Chief Executive Officer shall also provide an appropriate level of secretarial/administrative support for the Mayor and Councillors.

6.12.1. Donations and/or sponsorship

Donations and/or sponsorship made by a Councillor will be made on their own behalf and not on behalf of Council, except in accordance with a prior resolution of Council.

Councillor donations and/or sponsorship not in accordance with a prior resolution of Council will not be reimbursed by Council.

6.12.2. Insurance Policies

Councillors and delegated committee members are covered under the following Council insurance policies while discharging, in good faith, the duties of civic office including attendance at meetings of external bodies as Council representatives:

- Public Liability Insurance;
- Professional indemnity Insurance;
- Councillors and Officers liability Insurance;
- Personal Accident (accompanying partners are also covered) Insurance;
- Travel Insurance; and
- Work Cover (as a deemed employee).

The insurance does not cover criminal or willful acts.

The Council will pay the insurance policy excess in respect of any claim made against a Councillor or member of a delegated committee arising from Council business where any claim is accepted by Council's insurers, whether defended or not.

6.12.3. Legal Expenses

Other than by specific Council resolution, any legal expenses incurred by a Councillor shall be the responsibility of that Councillor.

6.12.4. People Assist Program

Council provides a People Assist Program to staff which is also available for use by Councillors. The program provides professional and confidential support services for personal or work related issues for Councillors and their immediate family at no cost.

Councillors can access the People Assist Program for up to four free hours, per issue.

6.13. Office and Meeting Space

At the Civic Centre there shall be provided:

- A Mayoral Office
- A separate, shared office space provided for use by Councillors
- A Councillors' Room.

All spaces will be determined by the Chief Executive (in consultation with Councillors) and suitably equipped for computer use, photocopying, reading, research and meetings.

Councillors will be provided with 24 hour security access to the Councillors' Room and shared office space. The Mayor shall have 24 hour security access to the Mayoral Office.

Subject to availability, other Council meeting/function rooms owned and controlled by Council may be booked by Councillors for use free of charge for meetings and other functions, provided the Councillor is in attendance and the use is necessary or appropriate for performing the duties of a Councillor or the conduct of Council business.

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6.14. Ward Meetings

An annual budget provision will be made (and reviewed annually as part of the Council budget process) for the reasonable costs associated with holding one Ward Meeting per calendar year.

6.14.1. General Provisions

Ward Meetings are conducted as an informal feedback session for the benefit of Councillors. It is not intended that detailed information be provided by staff on the progress of projects or upcoming projects.

Ward meetings are held at the discretion of individual Councillors who are responsible for setting the agenda, preparing relevant content and conducting their Ward meetings.

Councillors are requested to indicate their intention to hold Ward Meetings at the commencement of each calendar year.

Ward meetings may be held at the Civic Offices, or at a convenient location within the Ward as selected by the Councillor.

Refreshments provided shall be limited to tea, coffee and biscuits.

Ward meetings will not be held during an election period.

6.14.2. Staff Attendance

Council staff typically do not participate in Ward Meetings.

At the request of the Ward Councillor, a staff member may attend to act as a note taker.

Councillors may request the attendance of a specific Council Officer to discuss a specific item. The Chief Executive Officer is responsible for determining the attendance and role of Council officers at Ward Meetings.

6.14.3. Advertising

Advertising will be conducted via Council's website and social media channels, and signage at Council's Civic Centre and local libraries.

Additional advertising may be considered in accordance with section 6.15of this Policy.

6.15. Other Expenditure Not Specified

Where any expense sought to be paid for, or reimbursed to, a Councillor is not covered by this Policy or exceeds the budgetary limits in section 6.4.2 the following process shall apply:

- The Councillor shall make application prior to incurring any expense.
- For expenses $300 or less and generally within the terms of section 75 of the Act and in compliance with this Policy:
  - The Chief Executive Officer shall confer on the matter with the Mayor (or in the case of Mayoral expenses, the Deputy Mayor).
  - The Chief Executive Officer may then determine the matter and inform the Councillor, providing reasons for their decision.
- For expenses greater than $300 the matter will be referred to Council for consideration and determination.

Where there is any uncertainty or disagreement as to an entitlement; or where there is any failure to comply with this Policy, the following process shall apply:

1. The Chief Executive Officer shall confer on the matter with the Mayor (or in the case of Mayoral expenses, the Deputy Mayor).
2. The Chief Executive Officer may then determine the matter, or a proposed course of action to resolve the disagreement / uncertainty or the non-compliance, and inform the Councillor, providing reasons for their decision.
3. If the matter remains unresolved it will be referred to Council for consideration.

If the Chief Executive Officer and Mayor have been party to the decision which is the subject of the uncertainty / disagreement:

1. The Chief Executive Officer shall refer the matter to the Director Customer and Performance for independent review.
2. The Director Customer and Performance shall confer with the Manager Governance and Risk and determine the matter, or agree a proposed course of action to resolve the disagreement / uncertainty or the non-compliance.
3. The Director Customer and Performance will inform the affected Councillor of the proposed course of action to resolve the disagreement / uncertainty or the non-compliance.
4. If the matter remains unresolved it will be referred to Council for consideration.

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6.16. Claims and records

6.16.1. Form of claims

All claims must be made on the form provided and be complete as to all specified detail.

Councillors and delegated committee members may also be periodically requested to certify details of expenses incurred on their behalf.

The following substantiation rules apply to all expense claims.

- A claim for reimbursement must be supported by written evidence, being a receipt, tax invoice or similar document that sets out the relevant particulars. This means a document from the supplier of the goods or services the expense is for, setting out:
  - the name or business name of the supplier; and
  - the amount of the expense, expressed in the currency in which it was incurred; and detailing any GST paid, and
  - the nature of the goods or services; and
  - the date the expense was incurred; and
  - the date the document was made.
- Where this documentation is not available a statutory declaration must be submitted to support the claim.

Incomplete claims or claims which are outside this Policy will be initially referred to the claimant Councillor for further advice.

Claims which are not in accordance with this Policy will be considered under section 6.15.

6.16.2. Timeframe for submission of claims

Councillors and delegated committee members are required to submit claims in a timely manner to ensure transparency and timely accountability.

Claims for reimbursement of expenses in the September, December and March quarters must be submitted by the close of business of the following month.

Claims for reimbursement of expenses in the June quarter must be submitted within 7 working days of the end of financial year.

Claims for reimbursement which are not in accordance with the above timeframes will not be processed unless Council resolves to accept the claim.

6.16.3. Assessment of claims

The Chief Executive Officer will oversee the processing of all claims by the Governance Department.

Where a claim appears incomplete or outside this Policy it will be initially referred to the claimant Councillor for further discussion. Unresolved issues will be managed in accordance with Section 6.15.

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6.17. Accountability

Council is committed to accountability and transparency for reimbursement of expenses and the provision of resources and facilities to Councillors. This Policy will be posted on Council's website.

Quarterly reports of all councillor and delegated committee member expenses will be provided to council, and the council's Audit and Risk Committee.

The report will include:

- expenses incurred on behalf of councillors and delegated committee members during the quarter;
- reimbursement claims made by councillors and delegated committee members during the quarter; and
- reimbursements made by councillors and delegated committee members during the quarter.

In accordance with Council's Public Transparency Policy, Council maintains a public register which includes details of overseas or interstate travel (other than interstate travel by land for less than 3 days) undertaken in an official capacity by any Councillor in the previous 12 months, including—

- the name of the Councillor;
- the dates on which the travel began and ended; and
- the destination of the travel; and
- the purpose of the travel; and
- the total cost to the Council of the travel, including accommodation costs.

Council's annual report shall include information regarding all Mayoral and Councillor expenses (whether paid directly by Council or reimbursed to the Councillor) broken down into categories as required by the Act:

- Transport and Travel
- Communications Equipment
- Conferences, Seminars, Training and Professional Development
- Professional Memberships
- Carer Support
- Other Expenses

7. Administrative Updates

From time to time, circumstances may change leading to the need for minor administrative changes to this policy. Where an update does not materially alter this policy, such a change may be made administratively on approval of the Chief Executive Officer. Examples of minor administrative changes include changes to names of Council departments or positions, change to names of Federal or State Government departments or a minor amendment to legislation that does not have material impact. Where any change or update may materially change the intent of this policy, it must be considered by Council.

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Appendix 1 Extract from Taxation Determination TD 2023/3 - Income tax: what are the reasonable travel and overtime meal allowance expense amounts for the 2023-24 income year?

Table 3: Reasonable amounts for domestic travel expenses – employee's annual salary $247,021 or more

Place	Accomm. ($)	Food and drink ($) breakfast 38.90 lunch 55.00 dinner 77.00	Incidentals ($)	Daily total ($)
Adelaide	211	as above	32.90	414.80
Brisbane	257	as above	32.90	460.80
Canberra	246	as above	32.90	449.80
Darwin	293	as above	32.90	496.80
Hobart	235	as above	32.90	438.80
Melbourne	265	as above	32.90	468.80
Perth	265	as above	32.90	468.80
Sydney	265	as above	32.90	468.80
All country centres	$195 or the relevant amount in Table 4 if higher	as above	32.90	variable

https://www.ato.gov.au/law/view/pdf/pbr/td2023-003.pdf

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ALLOCATION NO:

Claim Form – Carer Costs

Knox City Council

Application for Payment or Reimbursement of Carer Costs

Councillor Name:		
Date(s) claimed for:		
Councillor or Delegated Committee Duties undertaken whilst carer support is provided		
Names of person or organisation providing care		
Costs	Hours	
	Hourly Rate	$
Declaration:	I declare that the above claim is submitted in accordance with the requirements of the Councillor Support Policy and Procedure and: ☐ Is net of any rebates or subsidies; ☐ Is not for care provided by a direct relative (as defined); ☐ the expenses claimed are fair, reasonable, bona fide and reasonably necessary to enable me to perform my duties as a Councillor; and ☐ I have included appropriate supporting documentation in including a receipt from the caregiver.	
Councillor Signature		**Date:**
CEO Signature:		**Date:**

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ALLOCATION NO:

Claim Form – Travel Expenses

Knox City Council

Application for Payment or Reimbursement of Travel Expenses

Councillor Name:		
Description of Expenses claimed:		
Councillor Duties or Delegated Committee undertaken necessitating travel		
Value of expenses claimed	Travel	$
	Accommodation	$
	Attendance/ Registration	$
	Meals/Drinks	$
	Other Costs, specify	$
	Total	$
Declaration:	I declare that the above claim is submitted in accordance with the requirements of the Councillor Support Policy and Procedure and: ☐ That undertaking the duties of a Councillor was the primary and predominate purpose of travel; ☐ the expenses claimed are fair, reasonable, bona fide; and ☐ I have included appropriate supporting documentation. I further understand that details of this travel will be disclosed publicly in accordance with Section 222 of the Local Government Act.	
Councillor Signature		**Date:**
CEO Signature:		**Date:**

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ALLOCATION NO:

Claim Form – General Expenses

Knox City Council

Application for Payment or Reimbursement of General Expenses

Councillor Name:		
Description of Expenses claimed:		
Councillor Duties or Delegated Committee undertaken relevant to expenses incurred		
Value of expenses claimed	**Type of expenses**	**Value**
		$
		$
		$
		$
		$
	Total	**$**
Declaration:	I declare that the above claim is submitted in accordance with the requirements of the Councillor Support Policy and Procedure and: ☐ the expenses claimed are fair, reasonable, bona fide; and ☐ I have included appropriate supporting documentation.	
Councillor Signature		**Date:**
CEO Signature:		**Date:**

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Feedback Received
Changes are okay as long as they are used properly. Reasons should be valid and checked thoroughly if it is a legitimate expense and not a waste of ratepayer's money.
I do not feel that any Councillor needs to go interstate or overseas for local government. All information can be sent and received via video conference , and the money saved can be spent supporting the community which is what Local government is for.
Financial support for councillors is sensible if we want them to do their work for us well. Make payments and reimbursements public. Make councillors' diaries public to show everyone those with whom they are engaging, and how much they do!
I think this is excess as a very high taxpayer I don't support this. The council keeps increasing and increasing rates with no real reason and the excess spend is not justified. Council are there to manage the resources of the council and the costs should be reduced and not increased. So, a big and definite NO. - interstate and overseas travel expenses must be applied for and approved by Council resolution, in advance of the trip No International/overseas travel at all should be supported or encouraged. This is wasting rate payers hard earned money. Council expenditure must be controlled. Why do you need interstate and oversea travel. - changing entitlements for professional development expenses to provide more support and flexibility for Councillors NO. Again, please think of the rate payer that we are earning and paying high rates every year. We never get any professional development from our jobs, but we have to pay for it. Why is it different for councils. Stop the waste and spending. - amendments to reflect existing support provided to Councillors when attending events on behalf of Council What events should the councillors attend on behalf the council. Stop the waste please. Seek professional help if and when required through the governments and other bodies. After all most tasks are outsourced to specialists which is the right thing to do. So, no to attending events. If reimbursement is required claim it from tax. - provision for attendance at the ALGA National General Assembly Again attend at the individuals' costs and claim from Tax. I do it that way and why is it different to the councillors. After all I pay the rates and have to make money. So please stop this idea and conserve funds and try and reduce rates for the council rates.
I would not give you a red cent until you recognise Australia Day.
6.2 If this is not a current requirement it is simply disgusting. Planning and therefore prior approval is essential. 6.3 Every Councillor should have available a computer if that is what a monitor means with access to council servers. Printers should be shared unless privacy dictates otherwise and headphones should be standard, personal equipment for every Councillor. 6.4 The courses must be approved prior attendance and the relevance to the Councillor's role must be evident. 6.5 If more than the Mayor and three Councillors wish to attend than the cost should be allocated from their allocation in item 6.4.

4.3 Biannual Report of the Audit and Risk Committee

Final Report Destination: Council
Paper Type: For Noting
Author: Manager Governance & Risk, Andrew Dowling
Executive: Acting Director Customer and Performance, Scott Coleman

SUMMARY
This report presents to Council the Audit and Risk Committee Biannual Report - March 2024, in accordance with the requirements of the Local Government Act 2020 (LGA 2020) and the Audit and Risk Committee Charter February 2023 (the Charter).

RECOMMENDATION
That Council receive and note the Audit and Risk Committee Biannual Report - March 2024, as set out in Attachment 1 to the report.

1. DISCUSSION
The Audit and Risk Committee (the Committee) is a Committee established in accordance with section 53 of the LGA 2020. Under the LGA 2020 and its Charter, the Committee is required to formally report on its activities twice annually to Council.

The Committee's Biannual Report to March 2024 is set out in Attachment 1 and provides Council with a summary of the matters the Committee has addressed in discharging its responsibilities under its Charter.

2. ENGAGEMENT
The Report has been prepared in consultation with the Committee Chairperson and the report was presented to the Audit and Risk Committee and endorsed at its March 2024 meeting.

3. SOCIAL IMPLICATIONS
Nil

4. CLIMATE CHANGE CONSIDERATIONS
Implementation of the recommendation is considered to have no direct implications or has no direct impacts upon Council's Net Zero 2030 target, the Community Net Zero 2040, exposure to climate risks or climate change adaptation.

5. ENVIRONMENTAL IMPLICATIONS
Nil

6. FINANCIAL AND RESOURCE IMPLICATIONS
Nil

7. RISKS

The Audit and Risk Committee (ARC) is established to strengthen Council's governance, risk management, financial management; and to drive continuous improvement. Presentation of the ARC's biannual report provides assurance to Council that the Committee is effectively overseeing these areas and ensuring that robust controls and risk management practices are in place.

8. KNOX COMMUNITY AND COUNCIL PLAN 2021-2025

Civic Engagement & Integrity

Strategy 5.3 - Ensure our processes are transparent and decisions are accountable.

9. CONFLICT OF INTEREST

The officers contributing to and responsible for this report have no conflicts of interest requiring disclosure under Chapter 5 of the Governance Rules of Knox City Council.

10. STATEMENT OF COMPATIBILITY

There are no legislative obligations under the Human Rights Charter, Child Safe Standards or the Gender Equity Act that are incompatible with the recommendation in this report.

11. CONFIDENTIALITY

There is no content in this report that meets the definition of confidential information from the Local Government Act 2020.

ATTACHMENTS

1. Attachment 1 - Biannual ARC Report - March 2024 [**4.3.1** - 8 pages]

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Audit and Risk Committee

Biannual Report
March 2024

1. Background and Purpose of this Report

The Audit and Risk Committee (the Committee) is a committee established in accordance with section 53 and 54 of the Local Government Act 2020 (LGA). Under the Charter, the Committee is to formally report on its operations to the Council twice annually.

This report meets the reporting requirements to Council as mandated by section 54(5) OF the Local Government Act 2020 and importantly provides Council with a summary of the matters that the Committee has addressed in the reporting period in discharging its responsibilities under its Charter

The Committee's Charter is set by the Council and was last revised and approved by the Committee on 8 December 2022 before being adopted by Council on 27 February 2023.

2. Period of Reporting

This report covers the Audit and Risk Committee Meetings on 7 December 2023 and 14 March 2024.

3. Committee Membership and Meetings

The composition of the Committee in accordance with its Charter is three independent members and two Council representatives. Councillor members are appointed by Council annually, for a 12-month term, which may be renewed subject to Council resolution. Independent members are appointed by Council for a three-year term following an external selection process.

The Chief Executive Officer and Senior Management representatives attended meetings of the Committee, by invitation, to assist in meeting discussions and procedures. Representatives from the internal and external auditors also attend to present on matters related to internal and external audit activities.

The Mayor, Councillor Jude Dwight, and Councillor Marcia Timmers-Leitch were appointed to the Audit and Risk Committee at the Council Meeting on 14 November 2023.

Mr. Geoff Harry was appointed as the 2024 Chairperson at the March Meeting

The following table provides details of the Committee members and meeting attendance during the reporting period.

Attendee	Role	7/12/2023 Meeting	14/03/2024 Meeting
Mr. Geoff Harry	Independent Chair (March 2023-December 2024)	Yes	Yes
Mr. Homi Burjorjee	Independent Member	Yes	Yes
Mr. Mick Jaensch	Independent Member	Yes	Yes
Cr Jude Dwight	Councillor Member	Yes	Yes
Cr Marcia Timmers-Leitch	Councillor Member	Yes	Yes

4. Committee Responsibilities

The Committee's Charter is used to develop an Annual Work Plan which guides the agenda and activities at each meeting during the year and on Behalf of the Committee.

Relevant obligations under the Charter were addressed during the reporting period.

4.1 Chief Executive Officer Report

The Committee received quarterly updates from the Chief Executive Officer Bruce Dobson on matters including:

- Code of Conduct matters
- Mayoral Election, Deputy Mayoral Election and Appointments to Committees
- Budget and Planning Update
- Victorian Government Housing Statement
- Local Government Act 2020 Reforms
- Council Election 2024
- Submission of Knox's Performance Reporting data to Local Government Victoria
- 2024/25 Budget Update
- Realignment of People Culture & Development into Customer & Performance Directorate
- Pro-Palestine Rally at Civic Offices – 26 February 2024
- Local Government Act 2020 Reforms Consultation Paper

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4.2 Internal Audit

The Interim Strategic Internal Audit Plan (SIAP) for 2024 and 2025 was reviewed and endorsed at the 7 December 2023 Committee meeting. Progress against the adopted SIAP is monitored at each meeting. Council's internal audit service provider (Crowe) continued the practice of preparing and completing internal audit reports which provides recommended actions for the organisation.

The following Internal Audit reports have been presented to the Committee:

December 2023	March 2024
• Tendering Management	• Asset Management
• Parking Administration and Enforcement	• Statutory Building
	• Playground Maintenance

Recommendations contained within all reports were accepted by Management for implementation.

Council's contract with Crowe expired in November 2023 and was extended into March 2024 to facilitate finalisation of the 2023 annual audit program.

In February 2024, a new Internal Auditor, HLB Mann Judd, was appointed as Council's internal auditor under and representatives from HLB Mann Judd attended the March 2024 Audit Committee and provided an overview regarding their proposed approach to the SIAP for calendar year 2024.

<u>Actions from Completed Internal Audits</u>

Addressing outstanding Internal Audit Actions from previous Internal Audit Reviews remains a prime focus of the Committee, with a revised reporting format providing the Committee with greater oversight on the progress of these actions.

The summary below reflects the half year to the March 2024 Audit and Risk Committee Meeting. Following the August 2023 meeting, there were 54 open Internal Audit actions with 13 of those actions classified as overdue. As at the March 2024 meeting, there are 57 open Internal Audit actions with 15 of those actions classified as overdue.

	High Risk	Moderate Risk	Low Risk	Total
Opening Balance of Open Internal Audit Actions (August 2023)	3	37	14	54
New Internal Audit Actions created in the Period	0	30	10	40
Internal Audit Actions Closed in the Period	3	30	4	37
Closing Balance of Open Internal Audit Actions (March 2024)	**0**	**37**	**20**	**57**

4.3 External Audit

The Victorian Auditor-General's Office (VAGO) has appointed RSM Australia as the Audit Service Provider to Knox City Council, replacing BDO Australia. An initial planning meeting was conducted between RSM Australia and Knox City Council on 13 November 2023.

The interim audit will commence on 15 April 2024, with the Interim Management Letter to be provided at the 30 May 2024 Audit & Risk Committee meeting.

The final audit will commence on 22 July 2024. It is expected that a closing meeting will be held between RSM Australia and Knox City Council on 12 August 2024, with the closing report to be discussed at the 22 August 2024 Audit & Risk Committee meeting.

4.4 Risk Management

The Committee received Quarterly Risk Management updates, inclusive of a report summarising significant operational risks (residual rating of high or above), and the Strategic and Operational Risk profile. The committee also received detailed reports into selected Strategic Risks.

4.5 Governance and Compliance Reports

Informing areas of focus by the Committee were various reports including:

- Quarterly Compliance Report detailing ongoing compliance with relevant legislation detailing any compliance breaches and engagement with various oversight bodies including the Office of the Victorian Information Commissions, Ombudsman, Local Government Inspectorate and IBAC
- Councillor Expenses Reports as required by the Local Government Act 2020
- Audit and Risk Committee Self-Assessment Report

The Committee also received reporting which monitors reports released by State based integrity agencies (VAGO, IBAC, Ombudsman Victoria) that may be relevant to Council via Crowe's Curious Eyes Report. Where appropriate management provides comments on the implications of the findings for Council.

4.6 Financial and ICT Reporting

During the period, the Committee received and considered:

- Quarterly Financial Report Statements
- Transformation and Cyber Security Updates.

4.7 Fraud Prevention systems and controls

There were no material matters of fraud and corruption reported to the Committee during the reporting period.

4.8 Reporting to Council

Minutes of Committee meetings are provided to all Councillors as soon as practical after each meeting via Council's online portal.

The Committee reports formally to the Council at least twice per annum. The Committee Chairperson is invited to present to the Council annually.

The Committee's August 2023 Report was presented to the Council Meeting held on 25 September 2023 and this report is scheduled to be subsequently presented to a Council Meeting.

4.9 Summary of Findings and Recommendations

Date	Title	Outcome
7/12/2023	Actions from Previous Audit and Risk Committee Meetings	Noted
7/12/2023	Annual Work Plan 2024	Noted
7/12/2023	Chief Executive Officer Report	Noted
7/12/2023	Transformation and Cyber Security Update (formerly ICT Capital Works Update)	Noted
7/12/2023	Risk and Assurance at Knox City Council	Noted
7/12/2023	Strategic Risk Review – Deep Dive	Noted
7/12/2023	Quarterly Risk Management Update	Noted
7/12/2023	Strategic Risk Review	Noted
7/12/2023	Audit and Risk Committee Self-Assessment Report 2023	Noted
7/12/2023	Interim Strategic Internal Audit Plan 2024-25	Noted
7/12/2023	Actions from Internal Audits	Noted
7/12/2023	Crowe Internal Audit Progress Report - December 2023	Noted
7/12/2023	Tendering Management Internal Audit	Noted
7/12/2023	Parking Administration and Enforcement Internal Audit	Noted
7/12/2023	Curious Eyes Report- July 2023 to September 2023	Noted
7/12/2023	Councillor Expenses – Q1 2023/24	Noted
7/12/2023	Quarterly Compliance Report- December 2023	Noted
7/12/2023	Quarterly Performance Report- December 2023	Noted
14/3/2024	Actions from Previous Audit and Risk Committee Meetings	Noted
14/3/2024	Annual Work Plan 2024	Noted
14/3/2024	Chief Executive Officer Report	Noted
14/3/2024	Strategic Risk Deep Dive Report	Noted
14/3/2024	Insurance Report	Noted
14/3/2024	Risk Management Update – March 2024	Noted
14/3/2024	Strategic Internal Audit Program Update	Noted
14/3/2024	Actions from Internal Audits	Noted
14/3/2024	Asset Management Internal Audit	Noted
14/3/2024	Statutory Building Internal Audit	Noted
14/3/2024	Playground Maintenance Internal Audit	Noted
14/3/2024	Review and Update of External Audit Strategy and Plan	Noted
14/3/2024	Councillor Expenses – Q2 2023/24	Noted
14/3/2024	Quarterly Compliance Report – March 2024	Noted
14/3/2024	Biannual Report of the Audit and Risk Committee - March 2024	Endorsed
14/3/2024	Quarterly Performance Report- March 2024	Noted

5. Conclusion

The Committee benefits from the combined knowledge of Councillor and independent members during meetings. The Committee acknowledges the contribution of all members who perform their responsibilities with diligence and professionalism. The Committee also acknowledges the contribution of audit representatives from VAGO and Crowe, and Council staff supporting the Committee.

4.4 Proposed Transfer of Lease - 90 Station Street Ferntree Gully

Final Report Destination: Council
Paper Type: For Decision
Author: Property Officer, Tracy Vervoort
Manager: Manager Strategic Procurement and Property, Shelly Starrenburg
Executive: Chief Financial Officer, Navec Lorkin

SUMMARY
The current tenant at 90 Station Street Ferntree Gully, Rachel Murray, has sold the business to Nikolaos Kolatis. This report recommends transferring the lease from Rachel Murray (current tenant) to Nikolaos Kolatis (proposed tenant).

RECOMMENDATION
That Council resolves to:

1. Agree to the transfer of the lease for 90 Station street from Rachel Murray (current tenant) to Nikolaos Kolatis (proposed tenant) in accordance with the current terms and conditions, commencing 1 July 2024.
2. Authorise the Chief Executive Officer (or such person as the Chief Executive Officer selects) to execute all lease documentation required to execute the transfer of lease; and
3. Authorise the Chief Executive Officer (or such person as the Chief Executive Officer selects) to negotiate and execute the extension option available on the lease of 3 years.

1. DISCUSSION
Council is the owner and landlord of the premises at 90 Station Street, Ferntree Gully; a shop currently leased as a cafe.

The shop has been leased to Rachel Murray (current tenant) commencing 14 December 2021 and operates as a café called 'Larder & Thyme'. Rachel Murray has sold Larder & Thyme to Nikolaos Kolatis (proposed tenant), who intends to continue operating the business as a café from the premises. The settlement date for the transfer of business ownership is 30 June 2024.

Under the Retail Leases Act 2003, a landlord has a statutory time period of 28 days to respond to any request for a transfer of lease. Councils' Leasing and Licensing Policy requires Council to approve all Leases. This report comes to Council to consider the transfer of the Lease.

All the terms and conditions of the current lease transfer to the Proposed Tenant, including the permitted use of a café and takeaway (retail).

Due diligence has been undertaken by the property agent, Camerons, along with Council officers, including references, financial statements, and consideration of relevant business experience. The proposed new tenant has demonstrated the ability to fulfil their obligations under the lease.

The Retail Lease Act 2003 stipulates that a landlord can only withhold consent to transfer of lease under the following conditions:

- The proposed tenant wants to use the premises in a way that is not permitted under the lease;
- lack of experience; or
- is not financially stable.

The due diligence carried out demonstrates that the proposed new tenant suitably meets all these criteria.

The 28 days to approve the transfer of the lease expires on 24 June 2024; with no response to the proposed tenant constituting acceptance of the transfer of the lease.

Council officers have not identified any grounds to deny the transfer per the three conditions listed above.

2. ENGAGEMENT
Council officers have been working with the agent acting on the Council's behalf and with the current and proposed future tenant.

As the lease is less than 10 years and the annual rent is less than $100,000, there is no requirement under the Local Government Act 2020 to undertake community consultation, nor advertise.

3. SOCIAL IMPLICATIONS
There are no social implications for this report.

4. CLIMATE CHANGE CONSIDERATIONS
Implementation of the recommendation is considered to have no direct implications or has no direct impacts upon Council's Net Zero 2030 target, the Community Net Zero 2040, exposure to climate risks or climate change adaptation.

5. ENVIRONMENTAL IMPLICATIONS
There are no environmental implications for this report.

6. FINANCIAL AND RESOURCE IMPLICATIONS
The proposed transfer of lease for 90 Station Street, Ferntree Gully is for the balance of the remaining lease term. This is approximately 2 years and 5 months at the time of this report (14 December 2026). A further 3-year extension option is available.

The agreed rental as per the current lease is $21,218 per annum (plus outgoings, plus GST). The rent increases 3% annually on the anniversary of the contract, which is 14 December.

There is a market review in lease, should the 3-year option be exercised in 2026.

The transfer of lease meets the strategic intent of the site and is therefore a recommended use of the building.

7. RISKS

If the transfer of the lease is not approved, 90 Station Street, Ferntree Gully may become vacant which would mean a loss of revenue for the Council, and possible vandalism of a Council asset.

8. KNOX COMMUNITY AND COUNCIL PLAN 2021-2025

Opportunity & Innovation

Strategy 1.1 - Maximise the local economy by supporting existing businesses and attracting new investment.

Civic Engagement & Integrity

Strategy 5.3 - Ensure our processes are transparent and decisions are accountable.

9. CONFLICT OF INTEREST

The officers contributing to and responsible for this report have no conflicts of interest requiring disclosure under Chapter 5 of the Governance Rules of Knox City Council.

10. STATEMENT OF COMPATIBILITY

There are no legislative obligations under the Human Rights Charter, Child Safe Standards or the Gender Equity Act that are incompatible with the recommendation in this report.

11. CONFIDENTIALITY

There is no content in this report that meets the definition of confidential information in the Local Government Act 2020.

ATTACHMENTS

Nil

5 Notices of Motion

6 Supplementary Items

7 Urgent Business

8 Confidential Items