

Land Capability Assessment

Document no: IS419400-0000-NP-RPT-0001
Revision no: 3

Victorian Planning Authority
COR/22/1403

Melton East Precinct Structure Plan Area
7 July 2023



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Client name: Victorian Planning Authority

Project name: Melton East Precinct Structure Plan Area

Client reference: COR/22/1403 **Project no:** IS419400

Document no: IS419400-0000-NP-RPT-0001 **Project manager:** Michelle Castro

Revision no: 3 **Prepared by:** Various

Date: 7 July 2023 **File name:** Land Capability Assessment Report

Doc status: Revised Final

Document history and status

Revision	Date	Description	Author	Checked	Reviewed	Approved
A	22 April 2022	Internal draft for review	Various	MC	WR	WR
0	25 April 2022	Draft report – Client issue	Various	MC	WR	WR
1	20 June 2022	Final draft – Client issue	Various	MC	WR	WR
2	8 July 2022	Final	Various	MC	WR	WR
3	7 July 2022	Revised Final	Various	MC	WR	WR

Distribution of copies

Revision	Issue approved	Date issued	Issued to	Comments
0	Draft Report	28 April 2022	VPA	Draft report issued for client review and comment.
1	Final Draft Report	20 June 2022	VPA	Final draft report issued to client addressing comments on draft report.
2	Final Report	8 July 2022	VPA	Final report issued to client.
3	Revised Final Report	7 July 2023	VPA	Addressed VPA comments. Re-issued Final Report.

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Acronyms and abbreviations

ANZECC	Australian and New Zealand Environment and Conservation Council
ANZG	Australian and New Zealand Guidelines
DELWP	Department of Environment, Land, Water and Planning
EAO	Environmental Audit Overlay
EPA	Environmental Protection Authority
ESA	Environmental Site Assessment
GDE	Groundwater Dependent Ecosystem
GWZ	Green Wedge Zone
IN1Z	Industrial 1 Zone
LDRZ	Low Density Residential Zone
NEPM	National Environment Protection Measure
PSP	Precinct Structure Plan
PRSA	Preliminary Risk Screening Assessment
SMO	Salinity Management Overlay
TDS	Total Dissolved Solids
UGZ	Urban Growth Zone
VPA	Victorian Planning Authority

1. Introduction

1.1. Background and objectives

Jacobs Group (Australia) Pty Ltd (Jacobs) was commissioned by Victorian Planning Authority (VPA) to undertake a desktop contamination, hydrogeological, hydrological, geomorphological, and geotechnical site assessment of the Melton East Precinct Structure Plan (PSP) area, hereafter referred to as the 'Melton East PSP area'.

The Precinct covers an area of approximately 1,005 hectares and is bounded by Kororoit Creek to the north-east, Western Freeway to the south, Leakes Road to the east and the Melton Highway to the north-west. It is located 30km north-west of Melbourne central business district (CBD), and to the immediate east of the existing Melton township. The precinct is included in the Melbourne Strategic Assessment area and includes Biodiversity Conservation Strategy Conservation Areas along Kororoit Creek (Conservations Area 15). It is understood that much of the precinct will comprise areas set aside for residential and commercial uses.

The aim of this assessment is to identify opportunities and constraints to the proposed land development within the Melton East PSP which may potentially be caused by existing or past land uses, and site and sub-surface conditions. The assessment comprised two stages; Stage 1 being a review of the history of land use at the site and a preliminary desktop review of information, with Stage 2 involving inspections of selected properties within the Melton East PSP area identified as presenting a potential risk. Risk in this regard relates to potential contamination, hydrogeology, hydrology, geomorphology and/or geotechnical issues.

Intrusive site investigations were not conducted at this stage, although site inspections were conducted at selected properties, primarily for the purpose of assessing potential issues relating to contamination. This report includes the findings of both the Stage 1 and 2 assessments completed.

1.2. Scope of works

The following scope of work was undertaken at the site:

- Stage 1 – This desktop assessment stage comprised the gathering of relevant information (including the use of literature sources) for the purposes of identifying potential sources of contamination, hydrogeological, hydrological, geomorphological, and geotechnical issues across the Melton East PSP area; and
- Stage 2 – This assessment included the selective inspection of properties within the Melton East PSP area. This stage predominantly focussed on potential sources of contamination. However, more general observations relating to hydrogeological, hydrological, geomorphological and / or geotechnical precinct / site conditions were also made (for example, areas of observed water logging, soil erosion and other such visual indicators of environmental constraints).

The approach and findings of the assessment, together with supporting information, are documented within this report.

2. Regulatory framework

2.1. Relevant legislation and policies

2.1.1. Planning and Environment Act 1987

The *Planning and Environment Act 1987* sets out the requirements of planning authorities when preparing planning schemes or amendments to planning schemes. The Act requires planning authorities to “take into account any significant effects which it considers the scheme or amendment might have on the environment or which it considers the environment might have on any use or development envisaged in the scheme or amendment”.

Under Section 12 (2) (a) of the *Planning and Environment Act 1987*, the *Ministerial Direction No. 1 – Potentially Contaminated Land* requires planning authorities to satisfy themselves that the environmental conditions of land proposed to be used for a sensitive use, agriculture or public open space are, or will be, suitable for that use. This is generally done through the completion of an environmental site assessment and audit process.

In addition, in accordance with s. 12(2)(b) and s. 60(1)(e) of the *Planning and Environment Act 1987*, planning and responsible authorities must consider: (1) “any significant effects which it considers the scheme or amendment might have on the environment or which it considers the environment might have on any use or development envisaged in the scheme or amendment”; and (2) “any significant effects which the responsible authority considers the use or development may have on the environment or which the responsible authority considers the environment may have on the use or development.”

Planning authorities must satisfy themselves that the site is suitable for its proposed use. Adequate information must be provided by the applicant on the existing potential for contamination to have future adverse effects, to enable the planners to make an informed decision.

2.1.2. Ministerial Direction No. 1 – Potentially Contaminated Land

Where the land is to be rezoned, *Ministerial Direction No. 1 – Potentially Contaminated Land*, requires planning authorities when preparing planning scheme amendments, to satisfy themselves that the environmental conditions of land proposed to be used for a sensitive use, agriculture or public open space are, or will be suitable for that use.

If the land is potentially contaminated and a sensitive use is proposed, *Direction No. 1* provides that a planning authority must satisfy itself that the land is suitable through an environmental audit.

Where approving a planning permit would allow potentially contaminated land to be used for a sensitive use (including a residential site or a children’s service), the responsible authority must require a Certificate of Environmental Audit or a Statement of Environmental Audit, in order to satisfy itself that the land is suitable for the proposed use.

2.1.3. Ministerial Direction No. 19

Ministerial Direction No. 19 came into effect on 18 October 2018. It requires planning authorities to seek early advice from EPA when undertaking strategic planning processes and preparing planning scheme amendments that may significantly impact Victoria’s environment, amenity and/or human health due to pollution and waste. The explanatory report for an amendment must include a statement of how the proposed amendment addresses the views of EPA.

The Ministerial Requirement for information is issued under section 12(1)(f) of the *Planning and Environment Act 1987*. It requires planning authorities to give the Minister for Planning the following information when applying for authorisation to prepare an amendment under sections 8A or 8B of the *Planning and Environment Act 1987*, or preparing an amendment under section 9 of the *Planning and Environment Act 1987*:

- “the written views of EPA, including any supporting information and reports”; and
- “a written explanation of how the proposed amendment addresses any issues or matters raised by EPA”.

2.1.4. Planning Practice Note 30

Planning Practice Note 30 was published by Department of Environment, Land, Water and Planning (DELWP) in July 2021. The purpose of the practice note is to provide guidance for planners and applicants on:

- How to identify potentially contaminated land
- The appropriate level of assessment of contamination that should be conducted in different circumstances
- The appropriate provisions in planning scheme amendments
- Appropriate conditions on planning permits

A list of the land uses that have the potential to contaminate land (categorised as high or medium) are provided in Table 2. This is not an exhaustive list but does include several land uses / activities relevant to rural residential areas such as those associated with the Melton East PSP area.

The practice note also presents an assessment matrix in Table 3 that outlines recommended approaches towards assessing potentially contaminated land under different planning proposals. An extract from Table 3 is presented below.

It is noted that in some circumstances it may be difficult or inappropriate to undertake either the PRSA or the environmental audit at the time of the planning scheme amendment. One such example presented in PPN30 would be when *'the rezoning relates to a large strategic planning exercise or involve multiple sites in separate ownership'*. In such circumstances it is acceptable to defer the requirements (to complete a PRSA and / or environmental audit) until after the planning scheme amendment. This can be achieved through the application of an Environmental Audit Overlay (EAO).

Picture 2-1. Extract from Planning Practice Note 30 (DELWP, 2021)

Extract of Table 3 from Planning Practice Note 30

Planning Proposal		Potential for Contamination	
		High	Medium
Uses defined in Ministerial Direction No. 1, the EAO, and clause 13.04-1S			
<ul style="list-style-type: none"> • Sensitive uses: Residential use, childcare centre, kindergarten, pre-school centre, primary school, even if ancillary to another use. • Children's playground • Secondary school 	New use, or buildings and works associated with a new use	A	B
	Buildings and works associated with an existing use	B	B
Other land use			
Open space Agriculture Retail or office Industry or warehouse	New use, or buildings and works associated with a new or existing use	C	D

	Planning Scheme Amendment	Planning Permit Application
A	PRSA or audit option applies Proceeding directly to an audit is recommended.	PRSA or audit option applies Proceeding directly to an audit is recommended.
B	PRSA or audit option applies PRSA to determine need for audit is recommended.	PRSA or audit option applies PRSA to determine need for audit is recommended.
C	PSI to inform need for audit is recommended	PSI to inform need for audit is recommended
D	Planning authority to document consideration of potential for contamination to impact proposal	Responsible authority to document consideration of potential for contamination to impact proposal

Note: Where land is used for more than one purpose, the most sensitive land use should be used to inform the approach to determining if an audit is required.

Where an EAO has been applied to a parcel of land, this indicates that a decision has been made that the land is potentially contaminated and may not be suitable for a sensitive use without further assessment and remediation. The EAO requires that an environmental audit be undertaken, or a PRSA to determine the need for an environmental audit. All buildings and works associated with a sensitive use (irrespective of how minor) will trigger the need to undertake either the PRSA or the environmental audit (as appropriate). Jacobs notes that no EAO has been identified to exist within the Melton East PSP area.

2.1.5. Environment Protection Act 2017

The Environment Protection Act 2017 (as amended by the Environment Protection Amendment Act 2018) and its subordinate legislation came into effect on 1 July 2021.

The legislation enhances the protection of Victoria's environment and human health through a more proportionate, risk-based environment protection framework that includes:

- A preventative approach through a general environmental duty.
- A tiered system of EPA permissions to support risk based and proportionate regulatory oversight.
- Significant reforms to contaminated land and waste management.
- Increased maximum penalties.
- Requirements for more environmental information to be publicly available.
- Modernising and strengthening EPA's compliance and enforcement powers

Similar to the (now repealed) Environment Protection Act 1970 that it replaces, the Environment Protection Act 2017 provides for environmental audits, which are used to provide an authoritative opinion on the suitability of potentially contaminated land for future use and forms an integral part of the land use planning and approval process. However, the Environment Protection Act 2017 also incorporates a new process – the Preliminary Risk Screening Assessment (PRSA), administered by EPA Victoria.

PRSAs do not replace Environmental Audits – they are used to establish whether there is a need for an Environmental Audit, and if so, the scope of the Environmental Audit. Importantly, the PRSA does not make a conclusion on the suitability of a site for its existing or proposed future use – this remains the outcome of an Environmental Audit. Only EPA-appointed Environmental Auditors can perform PRSAs. Environmental consultants may be involved in the PRSA process through preparing assessment reports that are considered by the Auditor in the PRSA. A PRSA is expected to follow an assessment process consistent with that of the Preliminary Site Investigation (PSI) outlined in the National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013) and may include targeted / limited sampling.

The environmental audit system under the 2017 Act is also administered by EPA Victoria. An Environmental Audit of a site involves the appointment of an EPA accredited Environmental Auditor to undertake an independent assessment of the environmental condition of a site and provide an opinion regarding the site's suitability for feasible or proposed end uses. A range of information including a site history assessment and results of relevant soil and groundwater testing undertaken are evaluated by the Environmental Auditor when forming such an opinion. At the conclusion of the audit a certificate or statement of environmental audit may be issued. A certificate indicates that the use of the land is unrestricted, whereas a statement indicates that particular uses of the land or groundwater are either precluded or suitable only under specified conditions.

2.2. Guidelines and standards for assessment of contaminated land

2.2.1. National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013)

The NEPM is the national guideline for assessing contaminated sites and was prepared by the National Environment Protection Council (NEPC). The NEPM document ensures there is a nationally consistent approach to the assessment of contamination. The NEPM provides guidance on the methods of site contamination assessment, environmental and health-based investigation levels for soil and groundwater contaminants, human and environmental health risk assessment and reporting requirements.

2.2.2. Australian and New Zealand Guidelines for Fresh and Marine Water Quality

The Australian and New Zealand Guidelines for Fresh and Marine Water Quality published by Australian and New Zealand Governments and Australian State and Territory Governments, Canberra ACT (ANZG) in 2018 provide a nationally consistent framework for water quality management. The ANZG (2018) guidelines establish water quality trigger values for the protection of a range of environmental values for water resources, such as drinking water, recreation and ecological values.

The ANZG (2018) guidelines replaced the previous guidelines published in 2000 (commonly referred to as the ANZECC 2000 guidelines) and have been adopted as the most contemporary guidelines when considering the new Environment Reference Standard. However, it should be noted that in many cases the ANZG did not make substantial revision to what was in the ANZECC 2000 guidelines. This is particularly true for most toxicant guideline values and guidelines values for primary industries and aquaculture.

2.2.3. Environment Reference Standards

The Environment Reference Standard came into effect on 1st July 2021 (alongside the Environment Protection Act 2017) and sets out the environmental values of the ambient air, ambient sound, land and water environments that are sought to be achieved or maintained in Victoria and standards to support those values. Environmental values are the uses, attributes and functions of the environment that Victorians value.

Standards for the environmental values are comprised of objectives for supporting different uses of the environment and indicators that can be measured to determine whether those objectives are being met. The indicators and objectives provide a basis for assessment and reporting on environmental conditions in Victoria.

2.2.4. Australian Standard AS1726-2017: Geotechnical Site Investigations

Australian Standard AS1726 sets out minimum requirements for a geotechnical site investigation, as a component in the engineering design, construction, commissioning and operation of civil engineering and building works.

The standard specifies considerations affecting the design and construction of works which must be made in a geotechnical site investigation. Assessment of these factors enables the identification of field and laboratory work to obtain the geotechnical data required to facilitate the engineering design and construction of the works. The standard provides guidance on suitable field and laboratory examination and testing of geotechnical materials and outlines a system of material classification.

The applications of this Standard include assessment of natural or filled ground, new construction, maintenance of existing facilities, the evaluation of post construction performance and the assessment of failure.

3. Methodology

3.1. General assessment approach

3.1.1. Stage 1 Assessment

A Stage 1 assessment (also referred to as a Phase 1 Environmental Site Assessment (ESA)) is typically undertaken to establish site conditions, historical site uses and practices. As part of this Stage 1 assessment the following sources of information have been reviewed:

- Previous reports;
- EPA Victoria information searches including:
 - Priority sites register;
 - Environmental Audit Reports Online Portal;
 - Groundwater Quality Restricted Use Zones Map;
 - EPA Licensed sites; and
 - EPA landfill register.
- Topographical maps;
- Current and historical certificates of title;
- State bore records on the DELWP Water Measurement Information System;
- Geological maps;
- Planning schemes;
- Historical aerial photographs;
- Hydrogeological maps;
- Potential acid sulfate soils (PASS) probability maps; and
- Energy Safe Victoria cathodic protection system database.

The Stage 1 assessment seeks to identify if possible:

- The potential source(s) of on and off site contamination;
- Pathways and receptors of contamination; and
- Areas of environmental concern (contamination, hydrogeological and geotechnical) which will form the basis of subsequent assessments at the site.

A qualitative risk assessment has been undertaken as part of the Stage 1 assessment using a traffic light system which uses colour-coding to classify each PSP area as low, medium or high risk from a contamination, hydrogeological and geotechnical perspective. The outcomes of the risk assessment are subsequently used to confirm the need for Stage 2 assessment for each PSP area (see below).

3.1.2. Stage 2 Assessment

For this particular investigation, the site inspection works are referred to as a Stage 2 assessment. The site inspections undertaken included an inspection of areas (where access is permitted) that have been identified during the Stage 1 assessment as presenting a low, medium or high risk from a contamination, hydrogeological and geotechnical perspective. Those properties identified during the Stage 1 assessment as presenting a very low risk were not inspected.

Based on the findings of the site inspections, the need for further works may be required for some PSP areas to assess the suitability for residential or more sensitive use.

While the completion of these further works does not form part of this scope of work, Section 3.1.3 and Section 3.1.4 below provide an overview of the typical objectives/outcomes of such works.

3.1.3. Stage 3 Assessment (not included in this scope of works)

The Stage 3 intrusive site investigation may be undertaken to characterise the site with respect to contamination, hydrogeology and geotechnical conditions. Note that this stage of site investigation is usually referred to as a Phase 2 ESA. With respect to each of the abovementioned disciplines, the following works may be undertaken as part of a Stage 3 assessment:

Land Capability Assessment

- A contamination assessment will typically assess the level (if any) of contamination present on site, establish the lateral and vertical distribution of contamination and identify the source(s) of on-site and off-site contamination. Prior to undertaking any intrusive soil and/or groundwater investigation, a Sampling and Analysis Plan (SAQP) is generally prepared. The SAQP defines the intended sampling locations and the contaminants which will be tested for, based on the site characteristics as determined in a Phase 1 ESA.
- A geotechnical assessment will typically seek to obtain information on the sub-surface conditions at the site through a geotechnical site investigation comprising a series of boreholes and/or test pits and laboratory testing. Field and laboratory test data is used to develop a site model describing the soil and/or rock profile and the variability across the site. A geotechnical assessment would generally include advice on site classification and allowable bearing capacity for shallow foundation design and comments regarding excavations, foundation systems, pavement design and other items relevant to the proposed development.
- A hydrogeological assessment will typically include determination of the groundwater elevation through the installation of groundwater observation bores. Assessment of aquifer permeability can be undertaken through slug or pumping tests to inform potential groundwater inflow rates for construction of below-ground infrastructure. Water quality samples can be collected to inform disposal options.

3.1.4. Remediation (not included in this scope of works)

If significant contamination is identified at a site, to a level where the beneficial uses of land, surface water or groundwater are at risk or precluded, remediation of the identified contamination may be required in order to allow for a particular land use to continue or commence in future.

4. Precinct description

General information relating to the Melton East PSP areas is presented in Table 4-1 below. Refer to Figure 1 in Appendix A for a site location map and Figure 2 in Appendix A for a site layout plan.

Table 4-1. Overview of Melton East PSP Area

Summary of precinct description details

Item	Details
Location / Address	The Melton East PSP s located 30km north-west of Melbourne central business district (CBD), and to the immediate east of the existing Melton township.
Extent (Approximate)	Centre at 37.700269°S, 144.634548°E North-western extent at (37.681196°S, 144.605727°E South-western extent at 37.725400°S,144.605727°E North-eastern extent at 37.681196°S, 144.662508°E South-eastern extent at 37.725400°S, 144.662508°E
Site Area (ha)	The Melton East PSP area is divided into approximately 85 individual parcels of land 1,005 hectares
Local Council	Melton Shire Council
Current Land Zonings	Under the Melton Shire Planning Scheme, the majority of the Precinct is zoned as Urban Growth Zone (UGZ) except for the areas immediately adjacent to the Kororoit creek at the north-east boundaries of the Precinct which are zoned as Urban Flooding Zone (UFZ).
Zoning of Surrounding Land	Under the Melton Shire Planning Scheme, the Melton East PSP is bounded variously by the following zones: <ul style="list-style-type: none"> ▪ North – Green Wedge Zone (GWZ) ▪ North-west – Low Density Residential Zone (LDRZ) ▪ West – Industrial 1 Zone (IN1Z) ▪ South – Urban Growth Zone 3 (UGZ3), Urban Growth Zone 6 (UGZ7), and Urban Growth Zone 8 (UGZ8) ▪ East – Urban Growth Zone (UGZ), Urban Growth Zone 4 (UGZ4)
Environmental Audit Overlay	There are no sites with an audit overlay within the Precinct areas and within 1 km radius of the Precinct boundaries.
Site Layout	The Melton East PSP comprises an irregularly shaped area of land bounded by Kororoit Creek to the north-east, Western Freeway to the south, Leakes Road to the east, and the Melton Highway to the north-west. It is divided into approximately 85 individual parcels of land.
Current Land Uses	The site is primarily used for agricultural purposes with large areas of open farmland and associated infrastructure (farm buildings, water bores, farm dams etc.). However, there are also some residential and commercial properties identified. An operational service station is located in Lot 62 south of the PSP.
Proposed Land Uses	The Precinct has been identified for future urban development which includes residential and commercial uses. At present, no specific land uses have been allocated to individual parcels of land.
Surrounding Land Uses	The Melton East PSP is surrounded by the following land uses: <ul style="list-style-type: none"> ▪ North – Melton Highway (0 m), followed by open farmlands and residential areas ▪ West – farmland (0 m), followed by the Melton Highway and the Melton CBD ▪ South – Western Freeway (0 m), followed by residential areas ▪ East – Kororoit Creek (0 m), followed by open farmlands and residential areas

5. Environmental setting

Information on the general environmental setting of the Melton East PSP area is outlined in the following sections.

5.1. Regional geology

The Geological Survey of Victoria 1:250,000 Seamless Geology map (GSV, 1997) and 1:63,360 Sunbury geological map sheet (GSV, 1973) were reviewed to determine the geological conditions at the Melton East PSP area.

The main geological unit to be encountered during future development of the Melton East PSP is likely to be Tertiary age Newer Volcanics basalt. However, in some localised areas the 1:63k Sunbury sheet indicates more recent Quaternary age swamp deposits may be encountered in local depressions. Quaternary age alluvium is also anticipated to be encountered along the banks of Kororoit Creek, overlying the Newer Volcanics. There is the potential for Quaternary age Darley Gravel to be encountered in the extreme north-west of the site.

The main geological units identified in the Melton East PSP area are outlined below and their locations shown on Figure 5-1.

Alluvial deposits (Qra)

River alluvial deposits are a transported material, and therefore may be variable in nature. The 1:63k Sunbury map identifies Qra as comprising varying levels of sand, silt, sandy silt and gravel. Generally, the material in the base of river channels will vary significantly and will consist of interbedded layers of different sand, silt and gravel. Quaternary (recent) in age and typically the youngest soil deposit in the Melton East PSP area.

Swamp deposits (Qrm)

Swamp deposits have been identified in localised depressions within the Melton East PSP area. The 1:63k Sunbury map identifies Qrm as comprising silt and clay. Generally, swamp deposits are highly compressible/unconsolidated and are therefore generally undesirable as foundation material due to large, anticipated settlements. There is also a potential for Potential Acid Sulfate Soils (PASS) in swamp deposits. Quaternary (recent to Pleistocene) in age and typically the second youngest soil deposit in the Melton East PSP area.

Darley Gravel (Qpe)

Gravel deposits have been identified to the extreme northwest of the Melton East PSP area. The 1:63k Sunbury map identifies Qpe as comprising gravel, sand and gritty silt. Quaternary (Pleistocene) in age and typically the third youngest soil deposit in the Melton East PSP area.

Newer Volcanics Group (Qvn)

The basalt expected to be encountered in the Melton East PSP area is typically a high strength volcanic rock derived from lava that has cooled as it flows over land. It is expected that Qvn will underly soils across the entire project area. Quaternary aged Newer Volcanics basalt is often comprised of multiple flows from multiple eruption events and therefore weathered zones appear in the rock profile between flows of high strength slightly weathered and fresh basalt.

Cooling of the lava results in sub-horizontal and sub-vertical joints in the basalt. Weathering within the basalt mass typically occurs spheroidally, influenced by the location of joints and passage of water through the joints. The deposition and weathering patterns result in a highly variable rock mass. Abrupt changes in fracturing, weathering, and strength are not uncommon within the rock mass.

Residual soil is derived from the complete weathering of the parent rock (basalt within the Melton East PSP area). The residual soil is typically stiff to very stiff high plasticity clay or clayey gravel.

Residual soil derived from Newer Volcanics basalt is typically sensitive to volume changes associated with moisture change and can exhibit high shrink swell properties and may be prone to fissuring. Soil weathered from basalt is also generally alkaline and sodic, resulting in a high potential for dispersion.

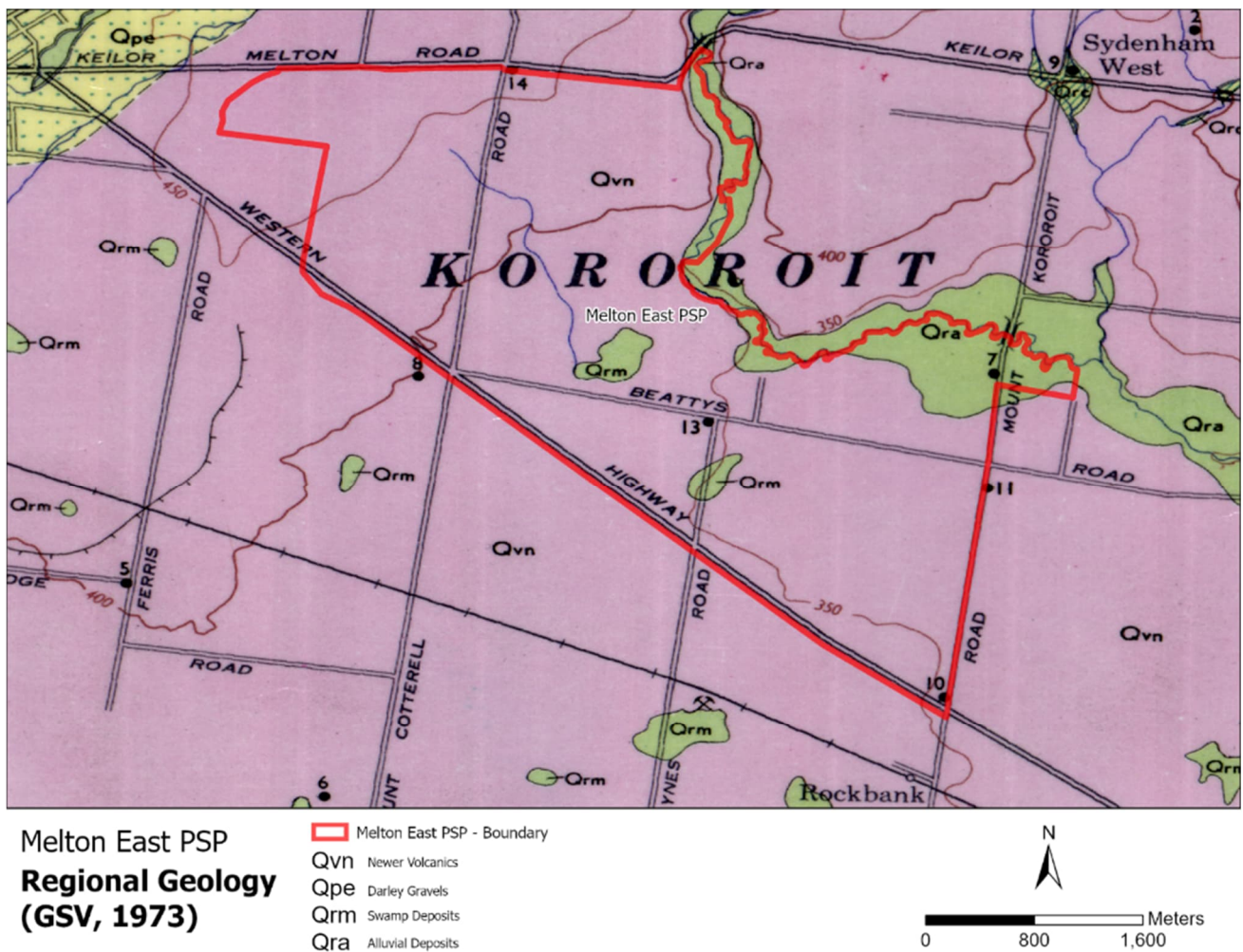


Figure 5-1. Regional Geology

Geology Map extracted from 1:63,360 Sunbury map, GSV, 1973, Not to scale (Qvn = Newer Volcanics, Qpe = Darley Gravels, Qrm = Swamp deposits, Qra = Alluvial deposits). Please note some roads and names have been changed since the map was produced (1973). Approximate project area highlighted in red.

5.2. Regional acid sulfate soils

Based on the March 2022 Lotsearch report, a copy of which is presented in Appendix B (referencing the Atlas of Australian Acid Sulfate Soils), the probability of occurrence of acid soil sulfate within the Melton East PSP area is extremely low (defined as a 1% to 5% chance occurrence in small, localised areas), albeit noting the potential for occurrence in locations of swamp deposits (Qrm, refer Section 5.1).

5.3. Regional hydrology

The Melton East PSP area (shown in Figure 5-2), consists of two Melbourne Water Drainage Schemes – High Street Melton Drainage Scheme (4174) to the west and Kororoit Creek Upper Drainage Scheme (4140) to the east. Kororoit Creek, a designated waterway, follows the boundary of the PSP to the east, while Ryans Creek just north of the PSP. The 1 in 100 Year Flood Extent obtained from the Victorian Flood Database covers Kororoit Creek, as well as north-east sections and two areas that cross the Western Freeway, south of the Melton East PSP boundary. There is a Land Subject to Inundation Overlay (LSIO) covering Kororoit Creek just east of the boundary. LSIOs indicate areas that present higher flood risks as they are susceptible to flooding associated with waterways systems and open drainage (Melbourne Water, 2017).

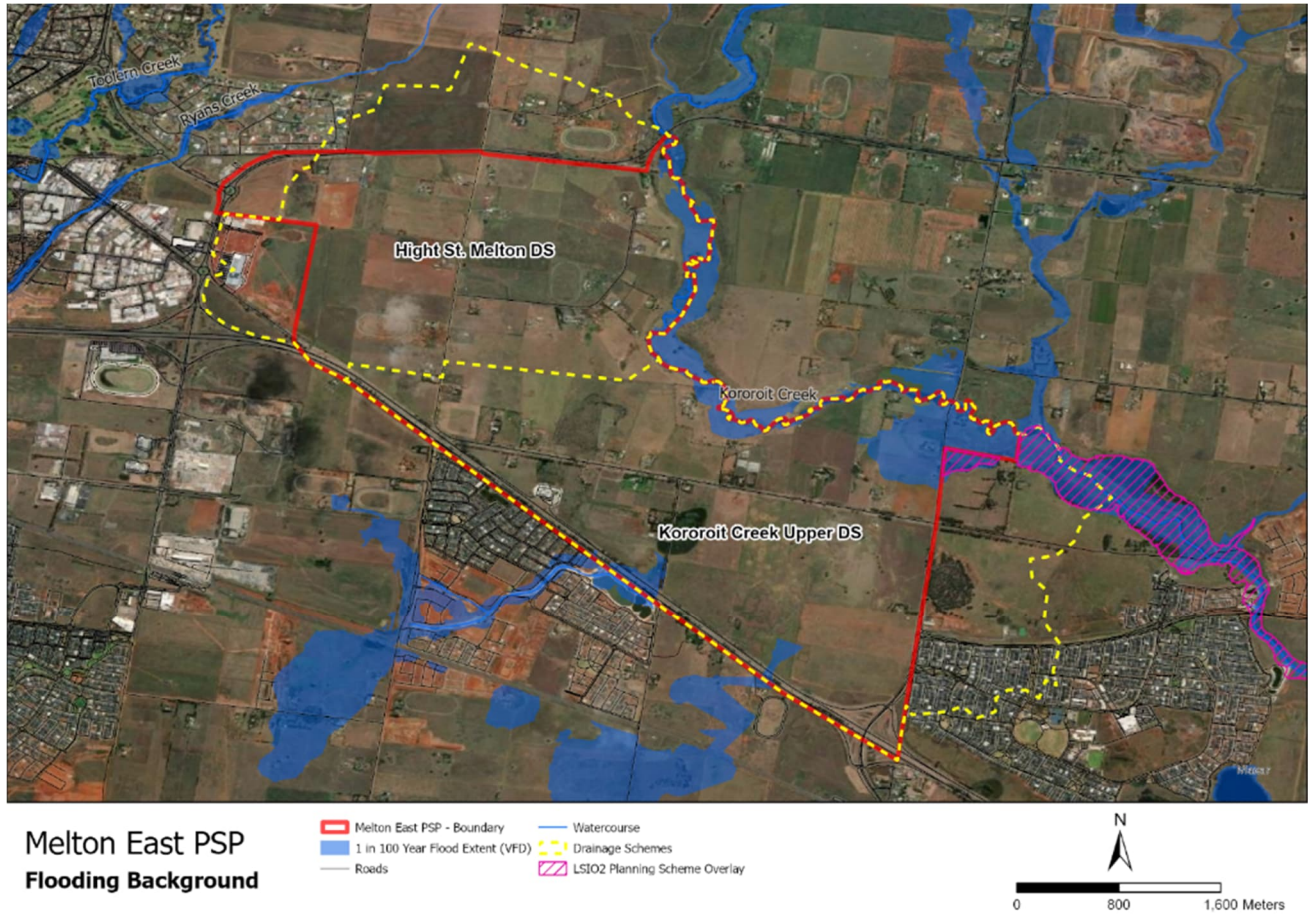


Figure 5-2. Flooding Background for Melton East PSP

Map illustrating the 1 in 100 Year Flood Extent (Victorian Flood Database), relevant drainage schemes (Kororoit Creek Upper Drainage Scheme 4140 and High Street Melton Drainage Scheme 4174).

Overland flows within the High Street Melton Drainage Scheme travel from the west, towards the south until they reach Kororoit Creek Upper Drainage Scheme as shown in Figure 5-3. There are also several farm dams in the area. However, given the size they are likely to have limited impact on surface water flows. No known wetlands of significance are present in the area. Currently, the High Street Melton Drainage Scheme is not yet available however, Melbourne Water indicates that the Drainage Scheme is under development (Melbourne Water, 2021). It should be noted that there is hydrological and hydraulic model of Kororoit Creek – this was developed by GHD in 2002.

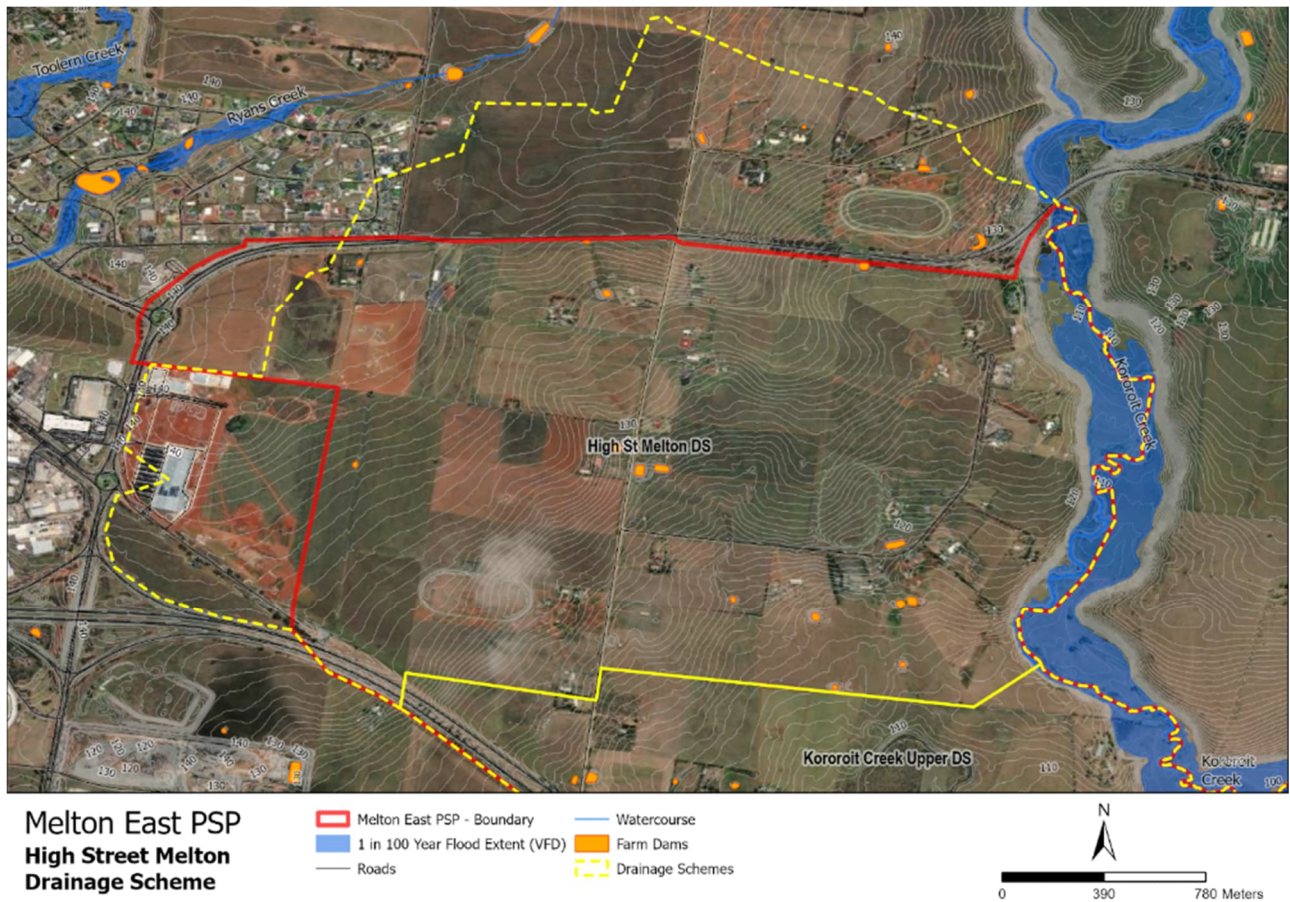


Figure 5-3. Flooding Information – High Street Melton Drainage Scheme (4174)
 Map illustrating an overview of the High Street Melton Drainage Scheme (4174)

Overland flows from the High Street Melton Drainage Scheme travel from west into Kororoit Creek Upper Drainage Scheme, after which water then travels towards the north and discharges at the north-east corner of the Melton East PSP into Kororoit Creek, as shown in Figure 5-4. There are also two Drainage Schemes – Shogaki Drive Drainage Scheme (4173) and Iramoo Circuit Drainage Scheme (4172) that outlet into Kororoit Creek Upper by crossing under Western Freeway. The locations of discharge are indicated by the 1 in 100 Year Flood Extent (in blue) presented in Figure 5-4 below. As with High Street Melton Drainage Scheme, there is no information regarding Drainage Scheme strategy for Kororoit Creek Upper. There are hydrological and hydraulic models that have been developed for Shogaki Drive and Iramoo Circuit Drainage Schemes. The status of these models would need to be confirmed with Melbourne Water.

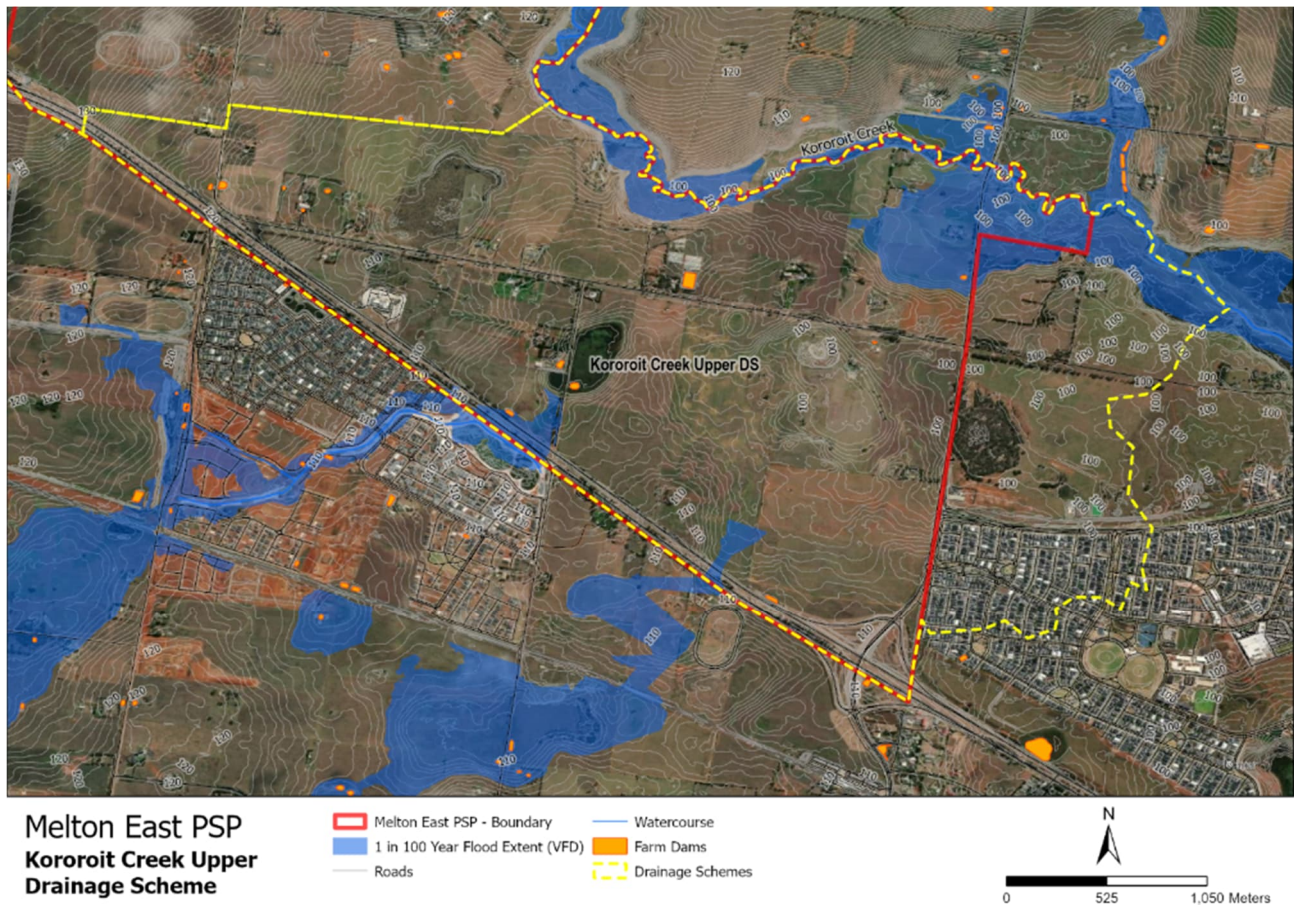


Figure 5-4. Flooding Information – Kororoit Creek Upper Drainage Scheme (4140)
 Map illustrating an overview of the High Street Melton Drainage Scheme (4140)

5.4. Regional geomorphology

The Melton East PSP area covers a volcanic landscape. The geomorphology and topography have been influenced by larva flows and incision of larva by Kororoit Creek. A review of aerial imagery and geological mapping also shows that there are a number of small swamps (refer to areas mapped as Qrm in Figure 5-1). Prior to agricultural development it is expected that there would have been more attenuation of water in the landscape through increased infiltration and runoff being directed to and collecting in depressions and swamps. With agricultural development, it is expected that the topography and drainage patterns have been altered as a result of land levelling, drainage works and construction of farm dams.

No sites of geological or geomorphological significance are located within the Melton East PSP (Victorian Resources Online 2019). However, a site of regional significance is located east of the Melton East PSP area, just upstream of Beatty’s Road bridge (Figure 5-5). The Kororoit Valley upstream of the bridge is a wide floodplain with abandoned stream channels. Below the bridge, the valley narrows and is incised into enclosing larva flows. The site is considered significant as it illustrates the influence of larva flows on drainage patterns and shows the hydrological complexity of Kororoit Creek. Against this listing is the recommendation that stream channels at the site should not be artificially modified and that the area should be reserved from intensive subdivision and retained for open space.

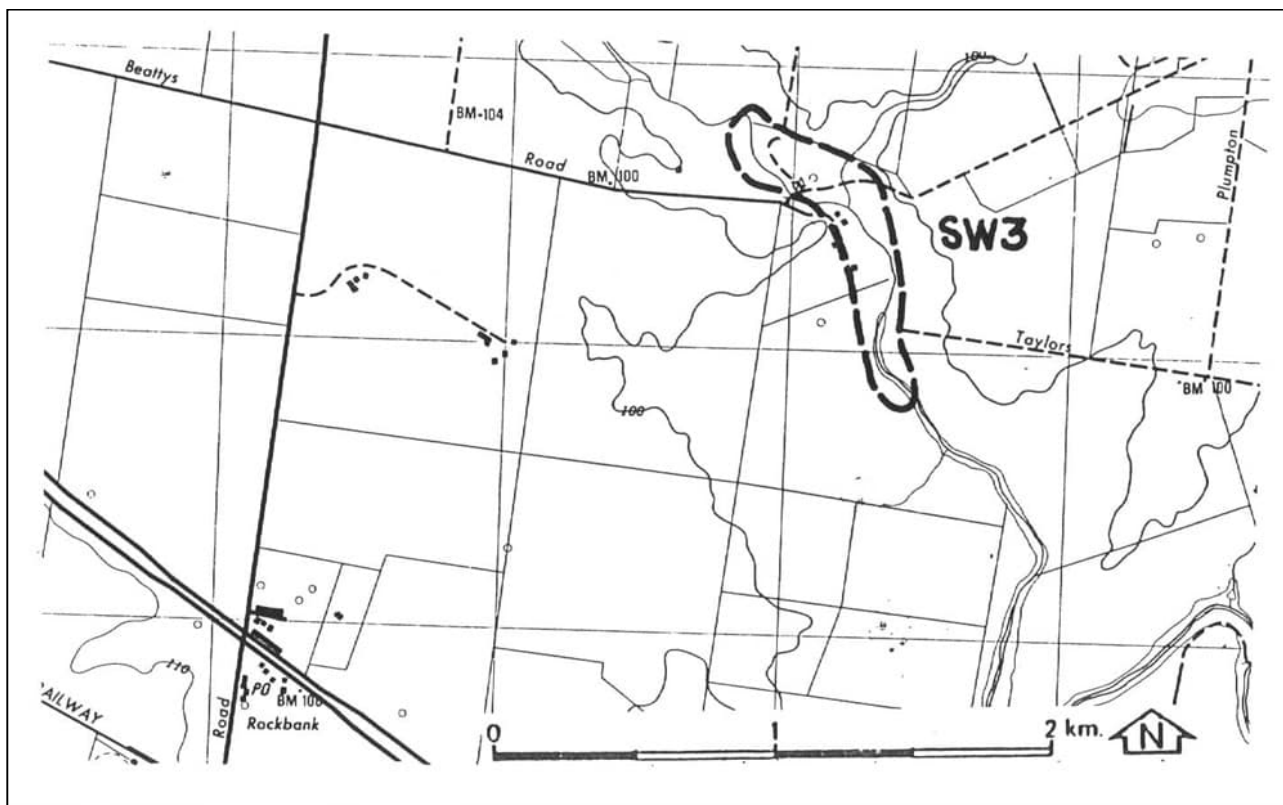


Figure 5-5. Regional Sites of Geomorphological Significance

Map illustrating the location of regional sites of geomorphological significance, specifically SW3 – Rockbank Floodplain. Map source:

http://vro.agriculture.vic.gov.au/dpi/vro/portreg.nsf/pages/werribee_gg_significance_sw3

The precinct area is located on soils that have formed from weathering of local Newer Volcanic Basalt rock. These geologies and associated soil types occur extensively in the north-west of Melbourne (Geological Survey of Victoria 1997). Limited soil mapping exists at an appropriate scale for this area that can be relied upon, but it is considered most likely that the soils are Sodosols based on a review of available soils mapping for Victoria¹ and land system survey report (Jeffrey, 1981). Jeffrey (1981) describes the soils of the volcanic plains as typically red calcareous sodic duplex soils and those of the depressions grey calcareous clays or black clays (Table 5-2).

These soils have a strong texture contrast, with sand to clay loamy surface horizons and dense and coarsely structured subsoil horizons that are sodic. Sodosols are susceptible to problems of waterlogging and erosion as a result of their physical structure and chemical composition. Soil sodicity potentially leads to dispersion, degrading soil structure, which is more frequently a problem with subsoil horizons, that are often relatively impermeable and become prone to gully and tunnel erosion. This erosion risk is increased in circumstances where the surface soil has been removed and the subsoils are then exposed (Jacobs 2020a, 2000b, 2001a, 2001b).

Jeffrey (1981) documents the critical features of the landscape, the processes leading to these forms of soil deterioration and forms within the basalt plains and alluvial depressions. The soils of the basalt plains, can through compaction become impermeable and form hard-setting surfaces, which can lead to increased overland flow and sheet erosion. High water tables, overland flows and periodic waterlogging can also contribute to deterioration of soils in alluvial depressions.

¹ <https://discover.data.vic.gov.au/dataset/victorian-soil-type-mapping>

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Table 5-1. Soil Characteristics and Soil Deterioration Hazard (from Jeffrey, 1981)

Summary of soil characteristics and soil deterioration hazard for current land use as described for the Rockbank Land System.

	Plains	Depressions
Soil Characteristics		
Parent Material	In situ weathered rock	Alluvium
Description	Red calcareous sodic duplex soils, coarse structure	Grey calcareous sodic clay soils, uniform texture, coarse structure. Black clay soils, uniform texture, coarse structure
Surface Texture	Loam – Clay loam	Clay
Permeability	Moderate	Low
Depth (av.) m	1.5	1.5
Land Use	Cereal cropping	Grazing
Soil Deterioration Hazard		
Critical land features	Hard setting surfaces	High watertable, hard setting surfaces
Processes	Overland flow	Overland flow, periodic waterlogging
Forms	Sheet erosion	Surface compaction

Picture 5-1. Site Inspection – Selective Photographs

A selection of photographs that illustrate common observations relating to land use and surface conditions across the Melton East PSP area. Top Left: Example of hard setting surfaces that form at surface. Top Right: Erosion of soils that has been caused by flow release from pipe. Bottom Left: Cracking of soil surface. Bottom Right: Swamp at 66 Paynes Road.



It should be noted that these descriptions of soil deterioration hazard are with respect to current land use (agriculture). The level of disturbance to soils and hazards arising from future urban development is significantly different and has not been previously assessed. There is increasing awareness that urban development in areas that have these geologies and soil types in the Melbourne Region is an issue both through the construction phase and ongoing management of waterways. During the construction phase of development, vegetation is cleared and surface soils may be removed, exposing subsoils to rainfall. Erosion risks are potentially heightened along incised drains and connecting streams, as the amount of runoff to these waterways is increased as a result of increased stormwater runoff from impervious areas (roads, roofs). There is also more pressure on existing streams to drain water from their catchment areas (Duncan et al 2014; Jacobs 2016, 2019).

Picture 5-1 shows selective photos taken of surface conditions whilst completing site inspections in the area. This would appear to be generally consistent with the descriptions of soil characteristics and soil deterioration hazards provided by Jeffrey (1981). No significant areas of erosion were noted during the field inspection. Localised erosion of the subsurface was evident at points where flows have exited from pipes. High water tables and waterlogging was evident at the location of a swamp.

5.5. Regional hydrogeology

5.5.1. Overview of regional hydrogeology

The Melton East PSP area is characterised by two main aquifer units:

- The Quaternary Alluvium (Qra) forms a minor aquifer of variable thickness (typically 1-3m thick) along Kororoit Creek, overlying the Newer Volcanics. The aquifer is comprised of a porous medium aquifer in which groundwater flows through the gaps and pore spaces between the sand particles making up the aquifer. This unit is likely to host the watertable where present along Kororoit Creek and in riparian zones. Darley Gravel deposits identified to the extreme northwest of the project area may host the watertable were present also (GSV, 1997).
- The Newer Volcanics (Qvn) aquifer is a fractured rock aquifer and forms the major local and regional watertable aquifer. Aquifer thickness ranges from 50 to 70m. Regionally, the Newer Volcanics can produce yields up to 6 L/s, with salinity ranging from 1,001 – 7,000 mg/L TDS. Locally, the aquifer provides water suitable for stock and domestic supply with bores typically drawing less than 1 L/s. Bores in the project area indicate a large variability in salinity ranging from 1,000 to 7,000 mg/L TDS (DELWP, 2022). Thickness for the area ranges from 50 to 70m.

Across the site, depth to watertable is variable. State-wide depth to watertable mapping (Federation University, 2022) indicates groundwater is likely to occur within 5m of ground surface towards the southeast of the Melton East PSP area within the Newer Volcanics aquifer and along Kororoit Creek (Figure 5-6). Towards the northwest of the Melton East PSP area where ground elevation increases, depth to groundwater ranges between 10 and 20m below surface.

The primary regional recharge mechanism is surface infiltration and rainfall. Regional groundwater flow is from north to south towards Port Phillip Bay.

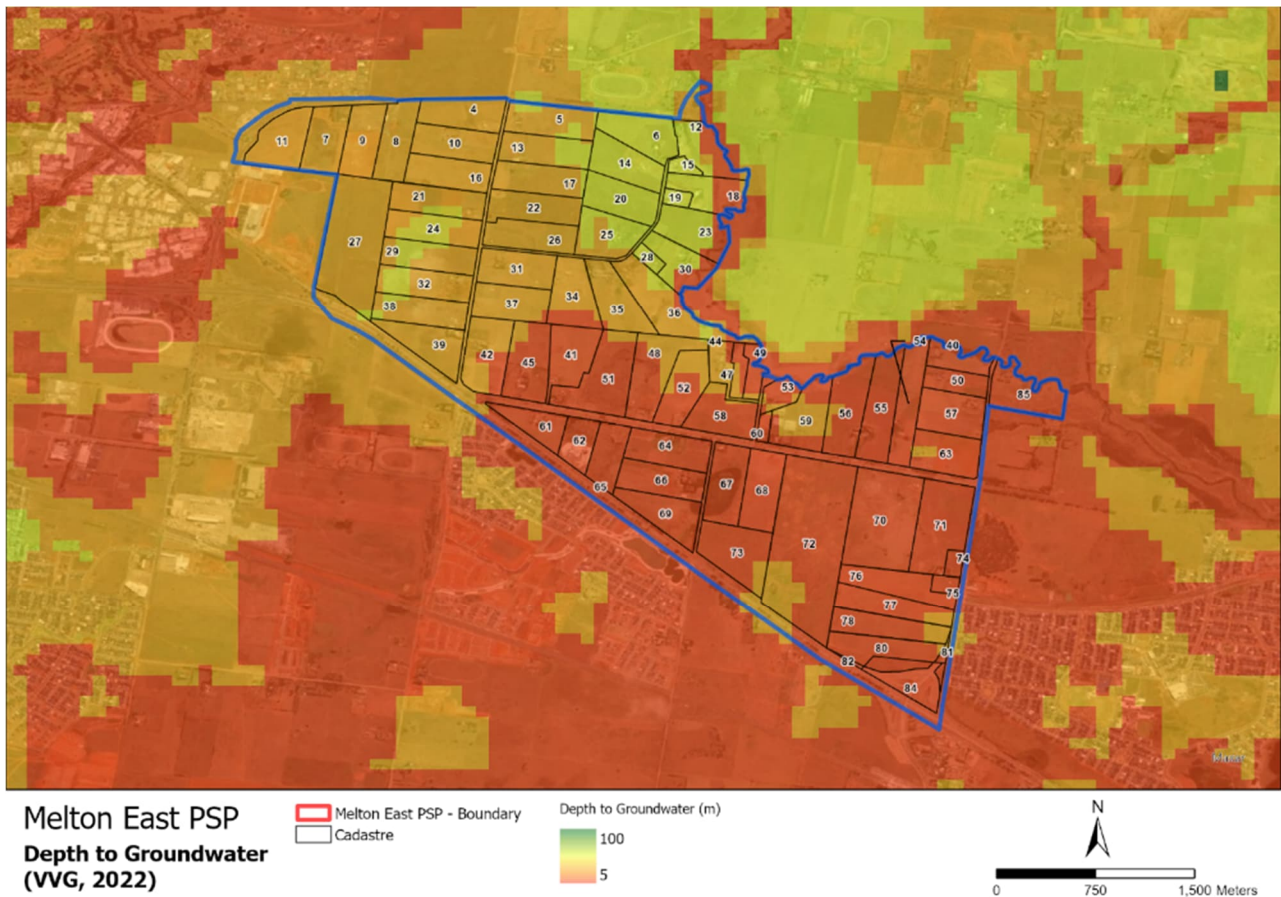


Figure 5-6. Overview of regional hydrogeology
 Map illustrating depth to groundwater across the Melton East PSP area (Federation University, 2022).

5.5.2. Groundwater dependent ecosystems

A review of the Atlas of Groundwater Dependent Ecosystems (GDEs) (BoM, 2012) was undertaken to determine any GDEs regionally and within the Melton East PSP area. Regionally, the Atlas identified that waterways are likely to have a high or moderate potential for groundwater dependence. Locally to the Melton East PSP project area:

- Kororoit Creek is listed as having a high potential for groundwater interaction, as are three wetlands adjacent to Beattys Road in the middle of the PSP area – wetland 55, 67 and 70 (Figure 5-7);
 - Kororoit Creek and its tributaries are part of the Growling Grass Frog conservation areas (DELWP, 2017). The extent of the Creek from Melton Highway to Beattys Road inclusive of wetland 51 is a high priority reach, and from Beattys Road to Leakes Road a low priority reach (Figure 5-8).
- Vegetation on the banks of the Kororoit Creek and towards the middle of the PSP area are listed as having moderate to high potential for groundwater interaction (Figure 5-9).
 - The vegetation supports the Growling Grass Frog habitat and forms part of the conservation area (DELWP, 2017).

Growling Grass Frog "habitat", as described under Commonwealth Government's approvals for urban development in Melbourne Growth corridors, is defined as the areas identified and mapped as Areas of Strategic Importance under the Growling Grass Frog Masterplan (DELWP, 2017). These areas include existing and potential breeding waterbodies and the surrounding terrestrial buffers that provide the closest foraging and refuge habitats. Area of Strategic Importance mapping informs decisions about the location and design of infrastructure within Growling Grass Frog conservation areas. DELWP assesses the likely impacts of proposed infrastructure or boundary changes on Growling Grass Frog outcomes, and particularly on the existing or potential new habitat identified in Areas of Strategic Importance. Figure 5-10 shows the Areas of Strategic Importance local to Melton East PSP:

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- The Areas of Strategic Importance (shaded blue) are the least suitable for infrastructure.
- Terrestrial habitat buffers (shaded green) around the core Areas of Strategic Importance and along waterways may be suitable locations for compatible infrastructure provided that sufficient terrestrial habitat remains in the vicinity of the adjacent Area of Strategic Importance and instream waterbodies.
- Other terrestrial habitat (shaded yellow) is generally the most suitable for compatible infrastructure as it is the furthest from the breeding wetlands and existing aquatic habitat at the core of the Areas of Strategic Importance. Growling Grass Frogs are still likely to use these other terrestrial habitat areas for foraging, over-wintering and dispersal, and conservation area objectives still apply.

Hence consideration of proposed infrastructure and consultation with DELWP will be required for any proposed works within the Area of Strategic Importance shown in Figure 5-10.

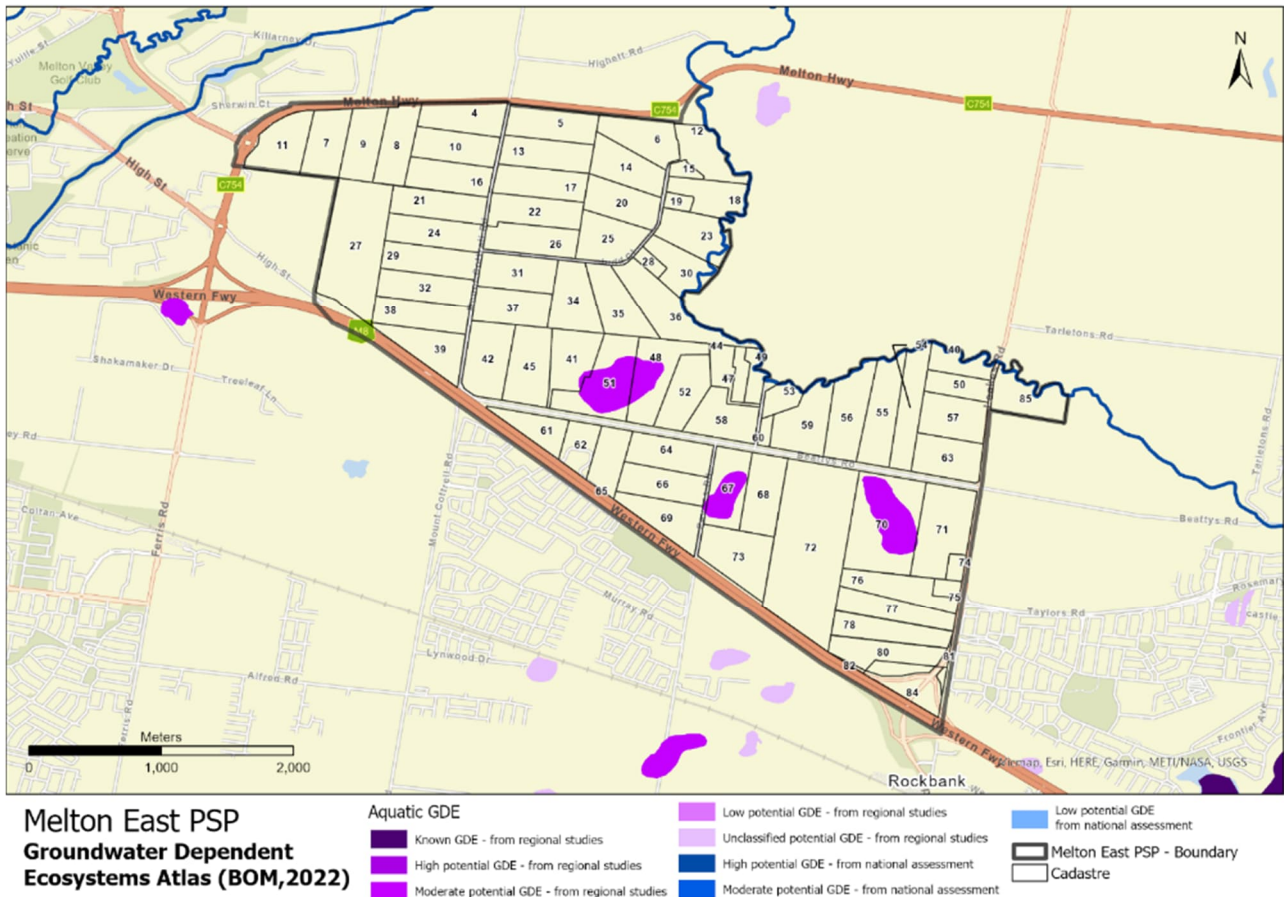


Figure 5-7. Aquatic Groundwater Dependent Ecosystems

Map illustrating the location of aquatic GDEs within the vicinity of the Melton East PSP area. Note PSP boundary is approximate. Map generated from the Bureau of Meteorology Groundwater Dependent Ecosystem Atlas (2012).

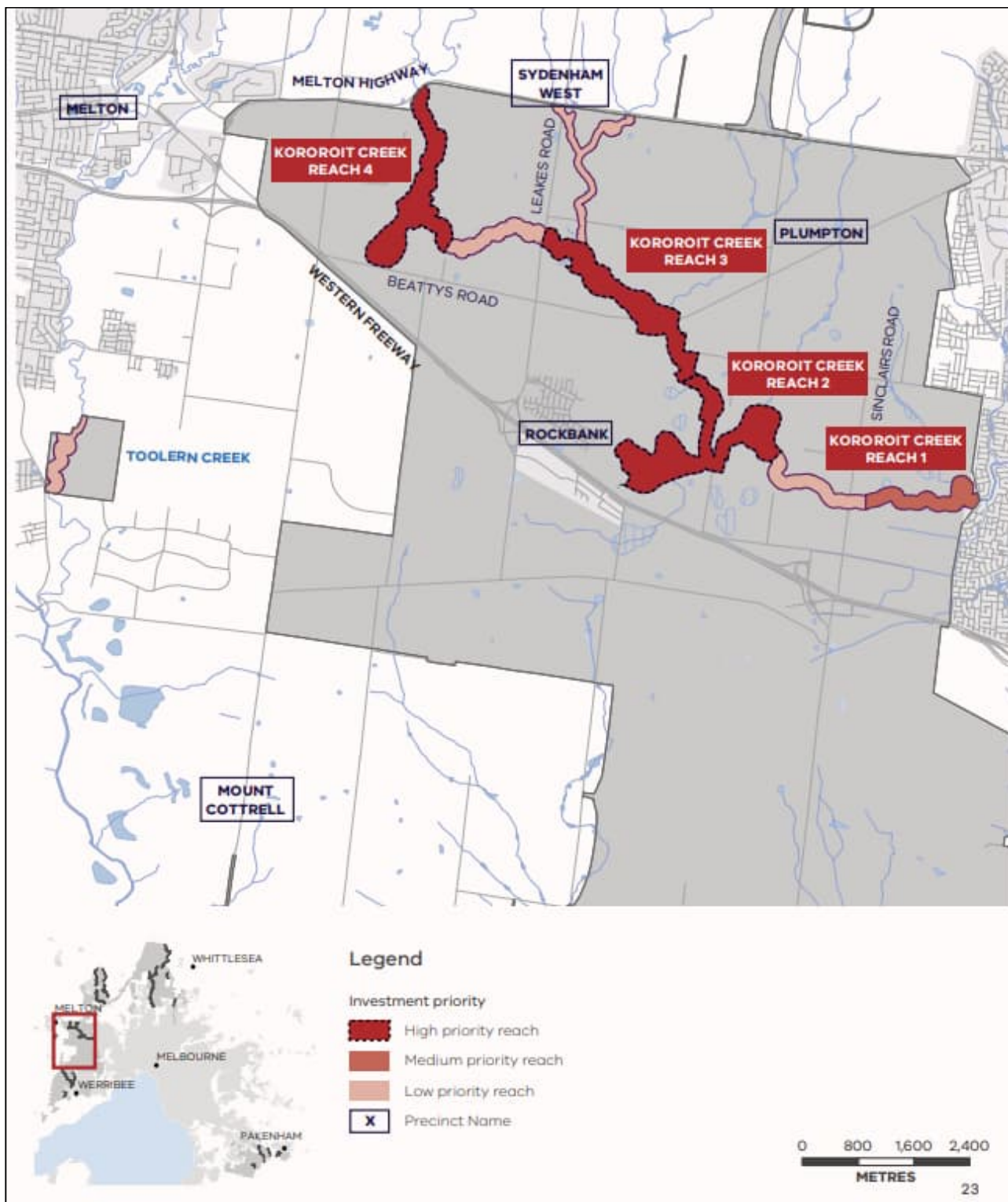


Figure 5-8. Growling Grass Frog conservation areas
 Map showing Growling Grass Frog conservation areas in the area of Melton east PSP (DELWP, 2017).

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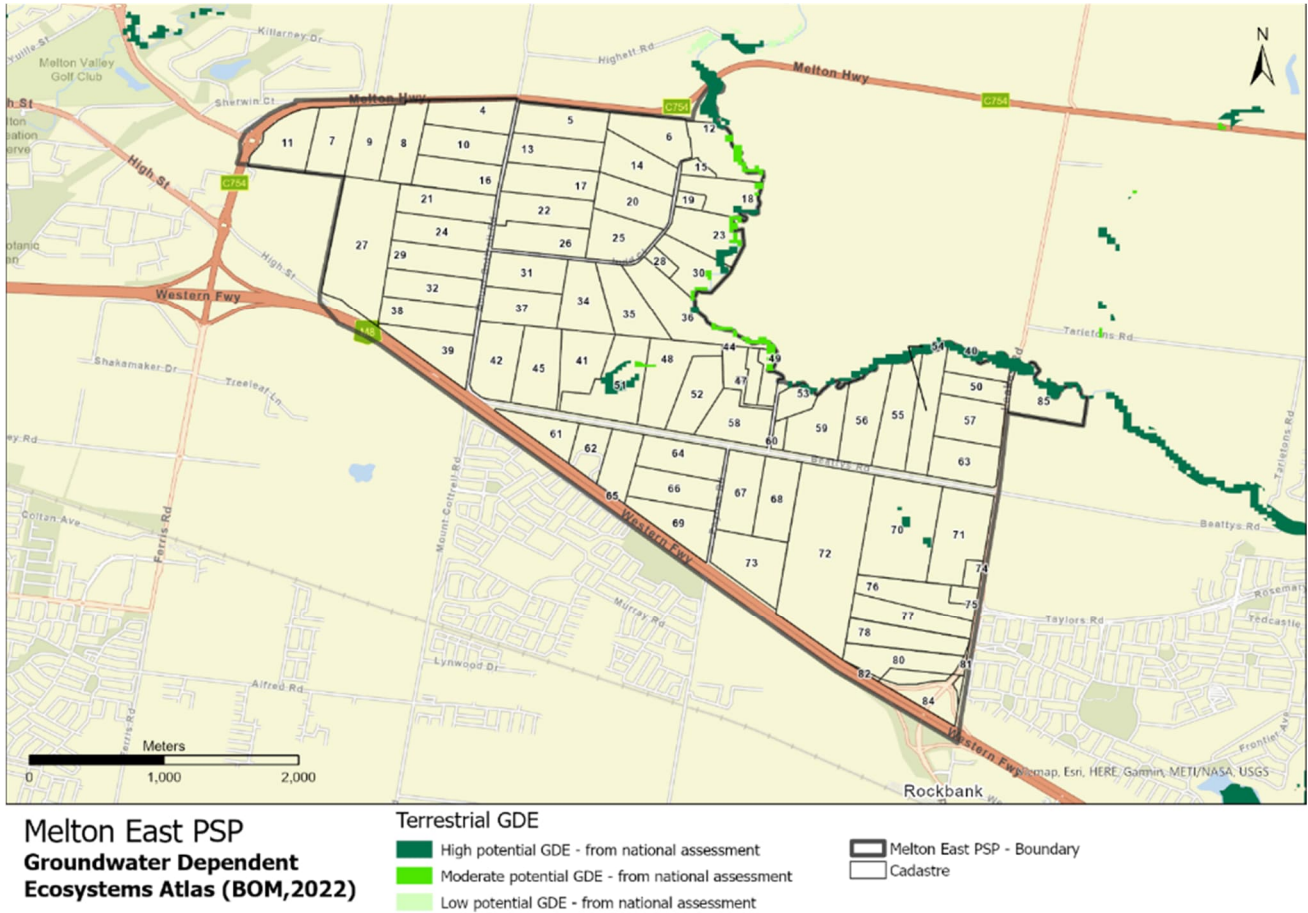


Figure 5-9. Terrestrial Groundwater Dependent Ecosystems

Map illustrating the location of terrestrial GDEs within the vicinity of the Melton East PSP area. Note PSP boundary is approximate. Map generated from the Bureau of Meteorology Groundwater Dependent Ecosystem Atlas (2012).

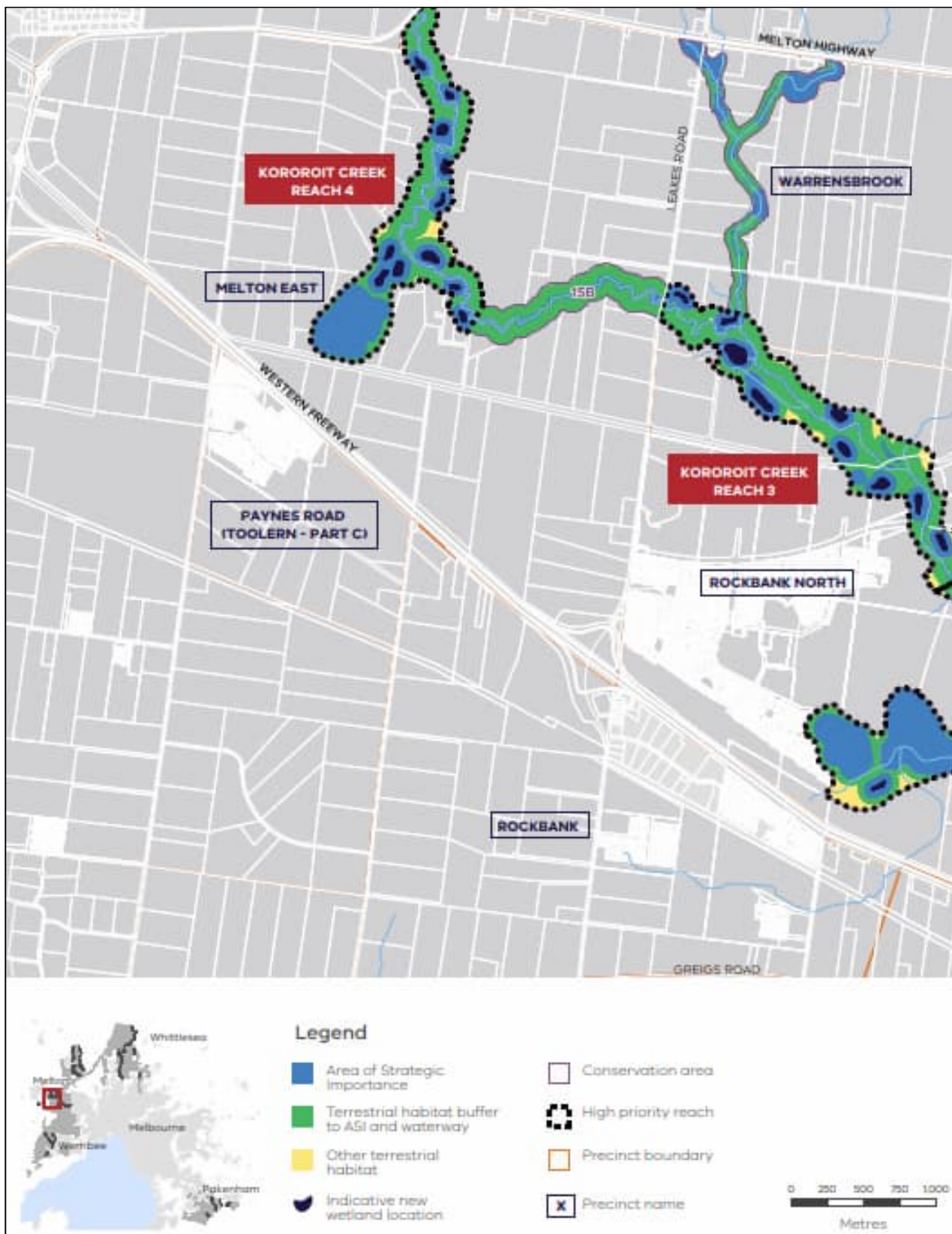


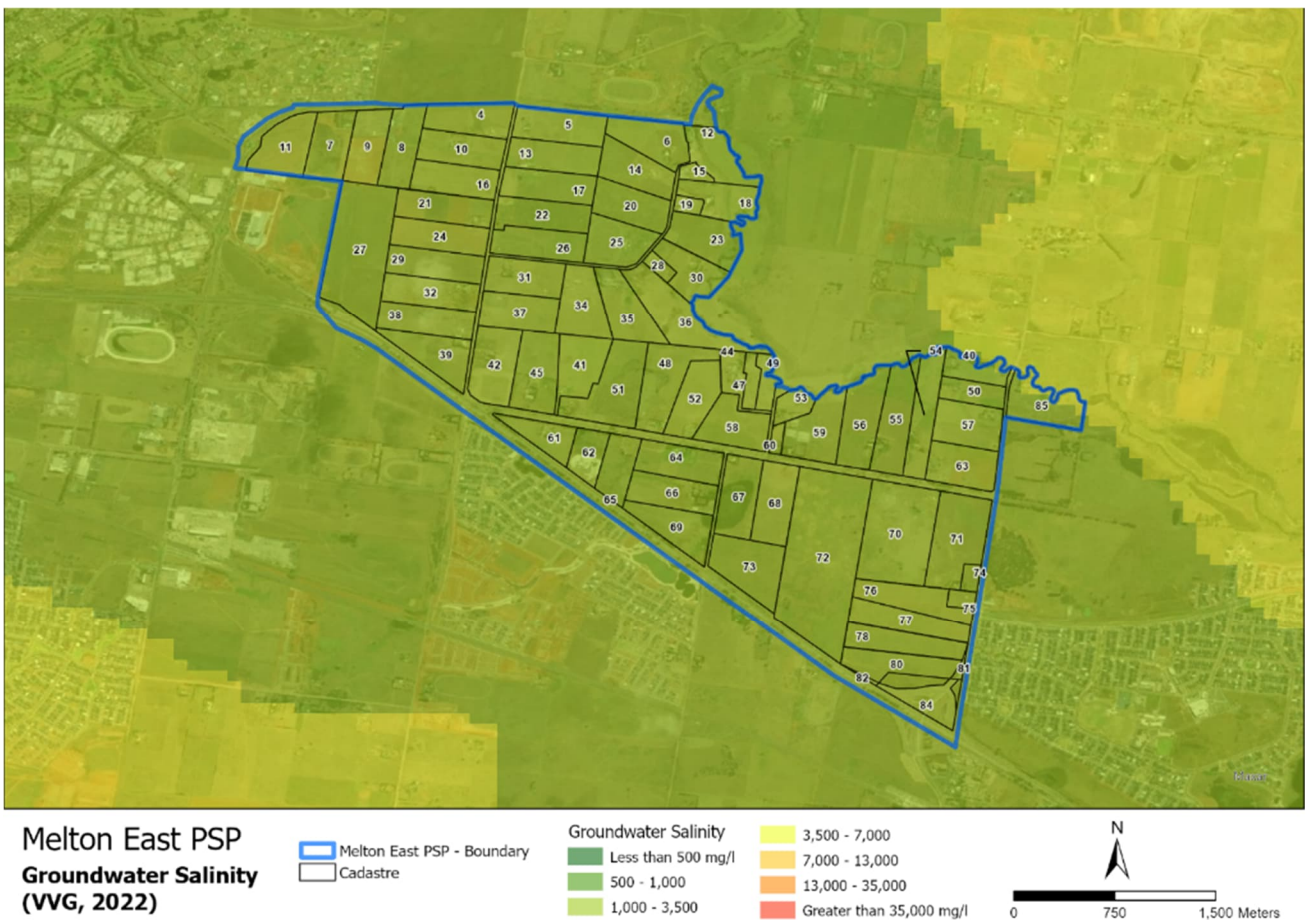
Figure 5-10. Growling Grass Frog Areas for Strategic Importance
 Map showing areas and buffers relevant to Growling Grass Frog habitat (DELWP, 2017)

5.5.3. Groundwater quality

State-wide groundwater salinity mapping indicates that groundwater within the Melton East PSP area will be variable, ranging between 1,000 to 3,500 mg/L TDS (Federation University, 2022). The environmental value of groundwater is classed into segments, as defined in the Environment Reference Standard (Victorian Government, 2021). Based on the lowest salinity data, the environmental value of groundwater is classed into Segment A2² (601 – 1,200 mg/L TDS). Figure 5-11 below shows the groundwater salinity mapping for the project area and regionally.

Salinity Management Overly (SMO) planning data has been reviewed and there is no SMO within the project area.

The brackish nature of the groundwater may require careful monitoring if dewatering or extraction is required, particularly for the consideration of the disposal of water. The aggressivity of groundwater cannot be assessed with available data; groundwater quality sampling is recommended to understand potential for groundwater impact on below ground infrastructure, if required.



² Segment A2 indicates environmental value to be protected include potable water supply, water dependent ecosystems, potable mineral water supply, irrigation, stock watering, Industrial and commercial use, water-based recreation, traditional owners' cultural values, building and structures, and geothermal properties.

Figure 5-11. Regional Groundwater Salinity

Map illustrating the regional groundwater salinity within the vicinity of the Melton East PSP area (Visualising Victoria’s Groundwater, 2022). Note PSP boundary is approximate.

5.5.4. Groundwater use

The water authority responsible for groundwater licensing within the eastern portion of the study area is Southern Rural Water. Groundwater in the Melton East PSP area falls within an Unincorporated³ groundwater management area. Groundwater bores across the site are primarily intended for stock and domestic use which is broadly consistent with expectations of aquifer units present (typical low yield and salinity most suitable for stock watering). A total of 102 bores were identified on the state database. Of the 102, 69 were identified to have an unknown purpose. A large number of these bores were drilled to depths less than 10m which indicates that they were likely investigation boreholes only. A summary of local registered groundwater users is provided in Table 5-2. Additional information is provided in Appendix C. Given the significant number of sites, it is recommended that Southern Rural Water is contacted to confirm the existence of the bores and currency of licenses.

Table 5-2. Summary of Known Groundwater Uses

Table summarising the known groundwater uses across the Melton East PSP area. Data obtained from DEWLP..

Unit	No. Bores	Uses	Bore Depth Range (mbgl)	Bore Yield (L/s)
Newer Volcanics aquifer	30	Stock and Domestic	0 – 50.5	1.3 – 3.6
	69	Unknown	0.65 – 79	0.2
	3	Groundwater Investigation	20 – 23.5	N/A

³ Unincorporated Areas are areas where no significant development of the groundwater resource has occurred. This is usually because the resource is low yielding, or its quality has traditionally severely limited its use.

6. Information review

This section summarises the various sources of information, records and reports reviewed as part of the Stage 1 desktop assessment.

6.1. Certificate of Title information

Certificates of title were reviewed to ascertain information on the current and historical land uses within the Melton East PSP area. A copy of the title records is provided in Appendix B – Lotsearch report. A review of the titles revealed that the majority of historical title documents suggest that the Melton East PSP area has been used for agricultural purposes and rural residential use, as anticipated. No other notable land uses were identified.

Current title documents suggest the Melton East PSP area is predominantly used for agricultural purposes or rural residences.

6.2. Historical aerial imagery

Aerial photographs from 1946 to 2018 were reviewed for land use changes. Observations are summarised in table below. Copies of aerial photographs are provided in the Lotsearch report in Appendix B – Lotsearch report.

Table 6-1. Summary of Review of Historical Aerial Imagery

Table presenting a summary of observations based on the review of available current and historical aerial imagery across the Melton East PSP area.

Year	Description	Source
1961	<p>On Site:</p> <ul style="list-style-type: none"> Roads within the PSP areas are apparent which are currently the Leakes Road, Beattys Road, and Paynes Road. Subdivision of lands is noted. Structures (likely farm residences and associated buildings) noted in the area where Lots 12, 44, 45 are currently located <p>Off Site:</p> <ul style="list-style-type: none"> Roads immediately adjacent to the north and south boundaries, currently Melton Highway and Western Freeway, respectively, are apparent. Structures (likely farm residences and associated buildings) south of Lot 39 across the road (now Western Freeway) is noted. A racetrack is apparent at the north of Lot 8 Structures (likely farm residences and associated buildings) are noted to the north-west of the PSP. 	Vicmap
1968	<p>On Site: No notable changes are evident since 1961</p> <p>Off Site:</p> <ul style="list-style-type: none"> Structures (likely farm residences and associated buildings) south of Lot 39 across the road (now Western Freeway) are noted. Structures (likely farm residences and associated buildings) are noted at the north-west of the PSP. A racetrack is apparent at the north of Lot 8 	Vicmap
1974	<p>On Site: No notable changes are evident since 1968</p> <p>Off Site: No notable changes are evident since 1968</p>	Vicmap
1985	<p>On Site: No notable changes are evident since 1974 except for stockpiling of cars observed in the area where the Lot 53 is currently located</p> <p>Off Site:</p>	Vicmap

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Year	Description	Source
	<ul style="list-style-type: none"> Structures where the current Melton East CBD is located are apparent. The current layout of the Melton Freeway is apparent 	
1990	<p>On Site:</p> <ul style="list-style-type: none"> Structures (likely farm residences and associated buildings) are observed in the areas where Lots 7, 4, and 10 are located. Further expansion of urban structures are noted at the centre areas of the PSP. <p>Off Site:</p> <ul style="list-style-type: none"> Structures within the current Melton CBD have expanded Clear image of completion of Melton Highway Two racetracks are located to the north-east of the PSP across the Melton Highway and apparent commencement of residential development in these areas are observed Ongoing excavation at the area where the current Melton Recycling Facility is located 	Vicmap
2009	<p>On Site:</p> <ul style="list-style-type: none"> More structures (likely farm residences and associated buildings) across the Melton East PSP A racetrack is noted each at the area where Lot 32 and Lot 25 are currently located. Stockpiling of cars apparent in Lots 17 and 22 Stockpiling of miscellaneous items in Lots 64 and 69 <p>Off Site:</p> <ul style="list-style-type: none"> The racetrack north of Lot 8 has been replaced by the expansion of residential areas to the northwest of the PSP Expansion of residential areas at the north-east More racetracks with some structures (more likely residential) to the south of the PSP 	Vicmap
2013	<p>On Site: No notable changes are evident since 2009</p> <p>Off Site: No notable changes since 2009</p>	Vicmap
2017	<p>On Site: No notable changes are evident since 2009</p> <p>Off Site:</p> <ul style="list-style-type: none"> Residential areas to the south of the PSP has expanded. A service station was located in Lot 62. 	Vicmap
2021	<p>On Site:</p> <ul style="list-style-type: none"> A dam/swamp appears to have been constructed in Lot 67 <p>Off Site:</p> <ul style="list-style-type: none"> Buildings (likely industrial) were built immediately adjacent to the south of Lot 11 No notable changes observed at the other areas. 	Vicmap

Review of the historical aerial photographs identifies the majority of land forming the Melton East PSP area has been used for agricultural purposes for an extended period of time. Several potential sources of contamination have been identified within the PSP areas which include land uses associated with agriculture and septic tank systems; farm residences and associated buildings; imported fill, fly tipped waste and stockpiled materials, and the operational service station.

6.3. EPA Victoria Records

6.3.1. Priority sites register

The Lotsearch report (March 2022) reported no records of lots listed in the Register within the Melton East PSP area. However, a priority site with multiple notices is located within 1 km radius from the PSP boundary. Details are summarised in Table 6-2 below.

Table 6-2. Summary of EPA Victoria Priority Sites

Table presenting a summary of EPA Victoria Priority Sites located within 1km of the Melton East PSP boundary.

Notice Number	Address	Suburb	Issue	Distance
90008182	43 - 67 FERRIS RD	Cobblebank	Industrial waste has been dumped at the site. Requires assessment and/or clean up.	715 m west
90012106			Solid inert waste has been dumped at the site. Requires assessment and/or clean up.	

The potential for the above priority site to impact upon the Melton East PSP area is considered to be low given the considerable distance to the site.

A list of former EPA priority sites and other pollution notices within 1 km radius of the PSP are also included in the report and are listed in Table 6-3. This list is not expected to be exhaustive since notices are being revoked and removed from published lists.

The EPA Victoria database results are provided in Appendix B – Lotsearch report.

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Table 6-3. Former EPA Victoria Priority Sites and Other Pollution Notices

Table presenting a summary of previous EPA Victoria Priority Sites and other Pollution Notices located within 1km of the Melton East PSP boundary.

Notice Number	Notice Type	Company	Address	Suburb	Status	Issue	Date Issued	Distance
90001153	Clean up notice	Private individual	662-684 LEAKES RD	Bonnie Brook	Previous Pollution Notice		11/05/2020	142 m east
NO1414	62A(1)	M&A SALIBA HIRE P/L	ALLOTMENT 2 CNR TARLETONS RD & LEAKES RD	Rockbank	Legacy EPA Database Pollution Notice		30/08/1999	226 m east
90011300 90011301 90011302	Pollution Abatement Notice	Melton Walk-in Bins (Melton)	48-80 Treeleaf Lane	Melton South	Previous Pollution Notice		02/07/2020	672 m east
90008014	Previous Priority Notice		43 FERRIS ROAD	Cobblebank	Previous Priority Notice	Industrial waste has been dumped at the site. Requires assessment and/or clean up.		715 m west

The potential for the above sites to impact upon the Melton East PSP area is considered to be low given the distance to the site.

6.3.2. Licenced activities and works approvals

There are no records of current EPA licensed activities within the Melton East PSP area. However, one site was recorded having an existing EPA Works Approval. Details are summarised in Table 6-4 below.

Table 6-4. Summary of EPA Works Approval (Within the PSP Boundary)

Summary of EPA Works Approvals that exist within the Melton East PSP area boundary

Transaction No.	Organisation	Address	Suburb	Scheduled Categories	Description
1000980	R P PETROLEUM PTY LTD [ROCKBANK]	1267 BEATTYS RD ROCKBANK VIC 3335	ROCKBANK	A03 Sewage Treatment	Construction of 18,000 L/day Sewage Treatment Plant

The above site represents the location of an active service station that was recently constructed at property number 62.

Beyond the Melton East PSP boundary, a former licensed site was recorded within 1 km radius. and the details are summarised in Table 6-5 below.

Table 6-5. Summary of Former EPA Licences Activities (Beyond the PSP Boundary)

Summary of Former EPA Licenced Activities that exist beyond the Melton East PSP area boundary

Transaction No.	Organisation	Address	Suburb	Scheduled Categories	Distance
10711	COOPER BROS HOLDINGS PTY LTD [MELTON]	1267 BEATTYS RD ROCKBANK VIC 3335	MELTON VIC 3337	A03 Sewage Treatment	891 m west

6.3.3. Environmental audit sites

There are no records of any EPA Environmental Audits conducted within the Melton East PSP area. A Section 53X Environmental Audit was completed in May 2015 at the former "Waste Dump 2" located at 1992-2106 Western Highway, Rockbank, Victoria - 155 m southeast of the eastern boundary of the PSP. The site has an area of 2,992 m² and was reported to have been used as a waste dump for inert waste including asbestos containing materials (ACM). A certificate of environmental audit was issued following the audit concluding that the condition of the site "is neither detrimental nor potentially detrimental to any beneficial use of the site."

6.3.4. Groundwater quality restricted use zones

No GORUZ sites exist either within the boundary of the PSP, or within a 1 km radius of the Precinct boundary.

6.4. Waste management facilities and landfills

There are no records of landfills within the Melton East PSP boundary. However, Melton Recycling Facility (a national / state-wide waste management facility) operated by Melton City Council is located 272 m south of the PSP area. This site is operated as a municipal solid waste (MSW) transfer station. EPA publication 1518 *Recommended separation distances for industrial residual air emissions* (EPA Victoria, 2013) recommends a separation distance of 250m between waste transfer stations and sensitive land uses. On this basis, the recommended buffer around the Melton Recycling Facility waste transfer station would not encroach on the Melton East PSP area.

Six further EPA prescribed industrial waste treaters, disposers, and permitted transporter were also located within 1 km radius of the Precinct boundaries, the closest of which is located 446 m to the north-west of the PSP boundary. EPA publication 1518 provides recommended buffers for several different types of waste

management facility, including permanent contaminated soil treatment facility (500m buffer), prescribed industrial waste treatment facility (500m buffer), as well as landfills, green waste composting facilities and material recovery and recycling facilities (variable buffer distances, defined on a case-by-case basis).

Only one of the six sites that lies within 1km of the Melton East PSP area is licenced to treat or dispose of prescribed industrial waste. This business (Cooper Bros Holdings Pty Ltd, located 891m west of the Melton East PSP area) is permitted to treat / dispose of prescribed industrial waste. This business is located within an industrial complex at 27-29 Norton Drive, Melton. Based on review of aerial images the nature of the surrounding land uses, there is no evidence that indicates the nature of this business activity would represent an activity for which a buffer that would encroach upon the Melton East PSP area would apply.

The remaining five businesses are only licenced to transport prescribed industrial waste. On this basis, the buffer distances nominated EPA publication 1518 would not apply (as these are applied to activities involved in the treatment / disposal of waste, rather than simply permitted transporters).

The EPA database results are provided in Appendix B – Lotsearch report.

6.5. Other reviewed reports

A Preliminary Site Investigation (PSI) report was prepared by SMEC Australia Pty Ltd (SMEC) in November 2019 for the Melton East PSP. SMEC was commissioned by 3L Alliance which owns 23 land parcels within the PSP equivalent to a total of 260 hectares. The aim of the investigation was to understand the nature and extent of any potential contamination on property parcels within the overall PSP area and assess the potential risk to human health and the environment associated with contamination sources both on site and off site in accordance with Ministerial Direction No. 1 – Potentially Contaminated Land, the NEPM (2013) and Ministerial Direction No. 19. The PSI, which involved a desktop site history investigation and a site walkover, reported the following:

- The potential sources of contamination identified within the Melton East PSP are related to the following land uses: agriculture; fuel and storage use; importation of fill, illegal dumping, and stockpiling, livestock carcasses and burial pits; septic tanks and grey water tanks; service station and main road corridors.
- The potential sources of contamination identified outside the PSP boundaries are related to the landfilling activities at the Melton Recycling Centre; and the current Rockbank residential development which was reportedly formerly used by the Defence Force (the report, however, noted that the land used by the Defence Force is not listed in the UXO register).
- The potential for contamination based on the land uses, and the corresponding assessment required for further investigation based on the DSE 2005 Assessment Matrix for proposed dwellings and residential buildings are summarized below:
 - Lands associated with the use for grazing and agricultural purposes were categorized having medium potential for contamination, triggering the requirement for a site assessment to determine if an audit is required.
 - Lot 62, which has an operational service station, was categorised as having a high potential for contamination and identified required a site assessment instead of an Environmental Audit Overlay citing the age of the service station and the likelihood of complying with stringent guideline during construction as the reasons for the less conservative approach.
 - Low potential for contamination was assigned to the remaining land uses wherein only compliance duty of care is required.
- Majority of the Melton East PSP was assessed to be generally suitable for the proposed future land use.

The report is available in Appendix D -Previous Reports.

7. Site characterisation

7.1. Site contamination assessment

Each parcel of land within the boundary of the Melton East PSP area was evaluated as part of the desktop study (Stage 1 assessment). The purpose of this evaluation was to establish current and historical land uses, and then make a determination as to the potential for those activities to contaminate land. This evaluation was guided by comparing the current and / or historic land uses with those presented in Table 2 of Planning Practice Note 30 (PPN30) (DELWLP, 2021). Table 2 of PPN30 defines the potential for different land uses to contaminate land as either 'high' or 'medium'. Jacobs has applied professional judgement when evaluating land uses and the resultant contamination potential. For the purposes of this assessment, Jacobs has determined that any land uses that are not clearly defined as either a 'high' or 'medium' potential for contamination in PPN30 is considered either (unless determined otherwise based on professional judgement):

- Land use with a 'low' potential for contamination. This would apply to properties where highly localised areas of interest are identified (i.e. septic tanks, or farm buildings with only minor (small volume) chemical storage).
- Land use with a 'very low' potential for contamination. This would apply to properties where no evidence of potentially contaminative activities has been identified (i.e. open paddocks with no history of intensive agriculture, buildings or structures present).

A site inspection (Stage 2 assessment) was then undertaken at selected properties to verify the assigned potential for contamination. While the site inspection focused more on specific areas of interest, Jacobs also assessed the wider site extent to confirm land uses, where practicable.

The outcomes of the Stage 1 and Stage 2 assessment are presented in:

- Table 7-1, which presents a summary of the overall number of parcels within the Melton East PSP that were characterised as either presenting a 'high', 'medium' or 'low' potential to contaminate land
- Appendix E which presents the evaluation outcome for each of the 84 parcels of land within the Melton East PSP area.
- Figure 3 in Appendix A, which spatially represents the evaluation outcome

Off-site potential sources of contamination were also inspected during the Stage 2 assessment (where possible). These too were assigned a qualitative contamination potential rating based on the likelihood of the contamination representing a potential constraint to future development of the Melton East PSP area.

While each identified property is slightly different with respect to the potential for contamination, there are some land uses that are commonly present across the Melton East PSP area. The potential sources of contamination observed within the Melton East PSP area include general agricultural land use, septic tank systems, farm residences and associated buildings and stockpiled materials (including imported fill, miscellaneous items, and general waste). While the evaluation completed has sought to identify potential contaminants of concern relevant to each parcel assessed, the presence of other contaminants of concern cannot be ruled out at this stage owing to the limited assessment of each individual property (i.e. generally targeted observations, with no intrusive sampling conducted).

Common land uses are discussed below as well as general comments relating to the Melton East PSP area and surrounding land use.

7.1.1. General precinct-wide observations

7.1.1.1. Agricultural land use and septic tank systems

The majority of land forming the Melton East PSP area has been used for agricultural purposes for an extended period of time. As such, there is likely to be a long history of general agricultural processes within the PSP area. The most notable of these is crop spraying and grazing. Contaminants of concern associated with this process typically include metals, pesticides, herbicides and fungicides as well as potentially nutrients (from manure, slurry application and other fertilizers) and biological contaminants (from buried animals).

Since the residences can be fairly isolated, the use of septic tanks for sewerage purposes rather than mains sewerage is fairly common. Since these are underground, they can be difficult to identify during the site inspection. However, conversation with landowners suggests septic tank systems appears to be common in the Melton East PSP area. Contaminants of concern can also include biological contaminants and nutrients associated with leakages from septic tank systems.

General agricultural use and rural septic tank systems are generally considered to present a 'low' potential to contaminate land. At some locations however, contamination potential has been determined to be higher - such properties are identified in Appendix E.

7.1.1.2. Farm residences and associated buildings

Farm residences and associated buildings are the most common potential source of contamination across the Melton East PSP area. These areas are typically used for storage of farm machinery (both operational and non-operational), materials, vehicles and many other miscellaneous items. Buildings and structures may also include fuel storage areas for refuelling farm machinery (typically in above-ground storage tanks) as well as storage areas for items such as agricultural chemicals (pesticides, herbicides etc.), oils, lubricants and solvents for machinery maintenance.

Based on the above, the most likely sources of contamination include spillages of fuels and chemicals on soils from general machinery/equipment storage and maintenance of farm vehicles. However, spillages of other agricultural chemicals may also impact upon soils. Given that such chemicals are typically stored in small volumes impacts are therefore likely to be localised in extent.

Asbestos was also commonly used as a building material with several applications in Australia as early as the 1880s (although more frequently in the mid to late 1900s). While asbestos presents a limited risk while it remains in a bonded matrix (i.e., as bonded asbestos cement sheeting), free fibres can present a greater potential risk. Mobilisation can occur through a number of processes including (but not limited to) abrasion, sanding and cutting that can result in the release of fibres. Asbestos is also likely to be encountered in building material during demolition of old buildings and sites where buried or imported waste has been reported.

7.1.1.3. Imported fill, fly tipped waste and stockpiled material

The presence of imported fill can be difficult to identify without undertaking intrusive investigations, particularly in areas that are heavily vegetated. Fill material is most likely to be found in locations where previous construction/development works have been undertaken.

Wastes can also be generated and deposited on-site, the type and volume of wastes are contingent on the activities and processes being performed. In addition, illegal dumping of wastes and importation of wastes (albeit the latter is less common as it typically requires EPA approval) may also occur.

Potential contaminants of concern associated with fill material, fly-tipped waste and stockpiled materials can vary significantly depending on their source and time at which they were deposited. Since such information is rarely available specific contaminants of concern often cannot be adequately identified without laboratory analysis (although visual and olfactory observations can provide limited information). However, the most encountered contaminant groups include total petroleum hydrocarbons (TPH), polycyclic aromatic hydrocarbons (PAHs) and metals. However, asbestos is also a contaminant of concern, particularly in building-derived waste.

7.1.1.4. Surrounding land uses

Sites located immediately outside of the Melton East PSP boundary were also considered during the Stage 1 assessment in order to identify any potentially contaminating land uses that may impact upon the future uses of land within the PSP area. Off-site sources identified in the vicinity of the PSP areas are summarised in Table 7-2. Sites listed in this table were inspected from the closest publicly accessible areas during the Stage 2 assessment.

The site located outside of the PSP areas with the highest risk ranking was the existing service station sites located to the west of the Melton East PSP area. While all of these sites would warrant a contamination potential ranking of 'high', the potential for impact on the Melton East PSP is considered to be low due to:

- Prevailing groundwater direction is believed to be towards the south, meaning that any contamination of groundwater (if present) would be unlikely to impact materially on the PSP.
- The closest service station site has only recently been constructed (less than two years). On this basis, the potential for contamination to be present is low.

The remaining off-site properties generally comprised small farms, rural residences, and small-scale commercial properties. There are also some industrial premises on the eastern fringe of Melton (between High Street and the Western Freeway) but based on their proximity to the Melton East PSP area as well as the nature of the operations observed, the potential for contamination of the PSP areas was perceived to be either low or very low.

7.1.2. Site characterisation

The potential on-site sources of contamination were selectively assessed (where access was permitted) during the site inspection of the Melton East PSP areas on 14th and 19th April 2022. Several properties were also inspected from the closest publicly accessible areas due to access restrictions (or other practical reasons).

The potential sources of on-site contamination identified during the Stage 1 and 2 assessments are presented in Appendix E and depicted in Figure 3 in Appendix A. The overall summary of numbers of 'very low', 'low', 'medium' and 'high' ranked sites are also presented in Table 7-1.

General farm homesteads were the most frequently observed potential contamination sources within the Melton East PSP areas. As described previously, these typically included fuel storage as well as storage of other miscellaneous chemicals albeit typically in small volumes - impacts are likely to be localised. On this basis, these properties were generally allocated a low potential for contamination, unless otherwise noted in Appendix E.

Examples of observed surface waste material and other features / observations of interest are presented in Picture 7-1 below. In some instances, access to the property itself was not considered necessary and instead the owner of the property was contacted with questions relating to land use observations made by Jacobs for the purpose of verifying features / activities of interest. Records of access and other such correspondence with landowners is presented in Appendix E.

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Picture 7-1. Site Inspection – Selective Photographs

A selection of photographs that illustrate common observations relating to land use across the Melton East PSP area. Top left: Example of general surface waste. Top Right: Example of general surface waste. Bottom Right: Drums of empty Chrlormax Ultra (cleaning product) Bottom Left: Sheep spray infrastructure



Table 7-1. Summary of On-Site Characterisation – Potential for Contamination

Table summarising the contamination potential for sites within the Melton East PSP, based on the land uses with potential to contaminate land presented in Table 2 of Planning Practice Note 30 (DELWP, 2021). Proposed further assessment is based on the approach presented in Table 3 of PPN30, assuming sensitive future use and a new use.

No Sites	Contamination Potential	Recommended Further Action
5	High	Environmental Audit
11	Medium	PRSA to determine the need for an Environmental Audit
51	Low	No further action required – General Environmental Duty applies
12	Very Low	No further action required – General Environmental Duty applies

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Table 7-2. Summary of Off-Site Characterisation – Potential for Contamination

Table summarising the contamination potential for sites within the vicinity of the Melton East PSP, based on the land uses with potential to contaminate land presented in Table 2 of Planning Practice Note 30 (DELWP, 2021). This includes a qualitative evaluation of the potential impact on sites within the Melton East PSP area.

Address	Land Use	Contamination Potential	Potential Impact on Properties within Melton East PSP
2231 Melton Highway, Melton VIC 3337	Ampol Service Station Site	High	Located to the immediate north-west of the PSP boundary, on the western side of the Melton Highway. Groundwater is likely to be flowing to the south, limiting the potential for contamination (if present) to impact upon the Melton East PSP area.
2259 Melton Highway, Melton VIC 3337	Ampol Service Station Site	High	Located to the immediate west of the PSP boundary on the eastern side of the Melton Highway. Recently constructed, therefore low potential for impacts on the PSP area.
66-84 High Street, Melton VIC 3337	Caltex Service Station Site	High	Located 150m to the west of the PSP boundary, on the western side of the Melton Highway. Groundwater is likely to be flowing to the south, limiting the potential for contamination (if present) to impact upon the Melton East PSP area.

7.2. Geotechnical assessment

7.2.1. Variation in ground model

Variable ground conditions are expected at the proposed sites within the project area which comprise four regional geological formations such as Newer Volcanics Group, recent alluvium, recent swap deposits and recent gravel deposits.

Alluvial soils along the banks of Kororoit Creek are anticipated to comprise an interbedded sequence of sand, gravel, silt and sandy silt. The ground profile in this unit will be highly variable, with layers of soft silt and loose sand contained within denser/harder sand and silt layers.

Swamp deposits are expected to consist of unconsolidated silt and clay that may be highly compressible. The depth of and spatial extents of the swamp deposits indicated to be within the project area are not currently known, nor are the mechanical properties of these soils.

Newer Volcanics Basalt typically comprises residual soil and extremely weathered to fresh basalt characterised by clay of high plasticity with occasional gravel. The high plasticity clay is usually subjected to high shrinkage and swell by absorbing water.

The depth to weathered rock in the Newer Volcanics group can be highly variable over short horizontal distances. Weathering within the basalt profile is generally extremely weathered to slightly weathered with fresh rock. The strength of the rock encountered at the rock head is generally medium to extremely high depending on the degree of weathering. It is also common to encounter basalt 'floaters' which represent basalt ejected at surface level which is then contained within the upper weathering profile. Excavations should consider the potential to intercept competent basalt boulders and cobbles within the residual soil profile.

7.2.2. Soil reactivity

The residual soil of the Newer Volcanic Group is typically highly reactivity and prone to shrinkage and swelling due to the seasonal changes to the moisture content of the soil. Australian Standard AS2870-2011 "Residential Slabs and Footings – Construction" indicates that Melton is in a Climatic Zone 3 with respect to shrink swell movements. The depth of design suction changes in Climatic Zone 3 can be up to 2.3m below ground level.

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Based on the Melbourne climatic zones indicators and the classification system presented in Table D1 of AS2870-2011, an indicative site classification of Class "H2 to E" (Highly reactive to extremely reactive clay site) could be adopted for design purposes, where the depth of clay over massive rock is larger than 1.5 m. Although this classification would depend on the depth, thickness and reactivity of the clay material in this area, a characteristic surface movement (γ_s) of between 60 mm to larger than 75 mm could be expected as per Table 2.3 of AS2870-2011.

The thickness of the residual soil profile in the Newer Volcanics is likely to be highly variable, and it is our experience in this area and with this geological unit that the depth to basalt can vary significantly over relatively short horizontal distances.

The above site classification is based on regional geological information and is intended for preliminary consideration only. Site specific geotechnical site investigations which may include soil sampling and laboratory testing should be undertaken prior to the design and construction of any footing systems, pavements and associated civil infrastructure as part of any future building permit application.

It should also be noted that the residual basaltic clay is expected to be alkaline and sodic, resulting in increased risk of dispersion, blocking of drainage systems etc.

7.2.3. Geotechnical risk assessment

A preliminary assessment of the geotechnical risks associated with the land suitability assessment has been undertaken. A risk assessment matrix considering the likelihood and consequence, as shown below has been used to characterise risks. The risk ranking presented Table 7-3 below has been undertaken based on the available desktop information to date.

Table 7-3. Design Geotechnical Risk Summary

Summary of the geotechnical risk associated with the Melton East PSP, including the relevant risk matrix

Risk	Risk Rating	Risk Description	Potential Mitigation Measures	Mitigated Risk Rating
Uncertainty of ground conditions	H (HL x ME)	Lack of information leading to incorrect ground models. Unduly conservative design Potential construction delays to revise design	Carry out site specific additional ground investigation and laboratory testing	L (LL x MI)
Instability of excavation	M (LL x S)	Potential instability of soils Collapse of excavation Excessive inflow of perched water	Open cut excavations up to 1.5m height shall be battered to a slope no steeper than 1V:2H. Dewatering to be designed, installed and managed properly.	L (LL x MI)
Surface movement of shallow foundations due to shrinkage and swelling of expansive soil	M (L x ME)	Excessive surface movement due to shrinkage and swelling of the potential expansive soil subjected to seasonal changes in moisture content.	Excavate the expansive soil and replace with blinding concrete to base of concrete. If shallow rock is expected, remove all expansive soil and found the structure on weathered rock.	L (LL x MI)
Bearing capacity of shallow foundations	M (LL x ME)	Bearing capacity failure of shallow foundations, excessive settlement and damage to structures/equipment (particularly regarding swamp sediments)	Ensure that weight of structures does not exceed the bearing capacity of the soil If bearing capacity of soil is not adequate, remove any soft ground and replace with either blinding concrete or selected cohesive and non-porous fill	L (LL x MI)

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Risk	Risk Rating	Risk Description	Potential Mitigation Measures	Mitigated Risk Rating
Damage to adjacent properties	L (LL x MI)	Ensure existing utilities have been cleared and diverted from excavation location Excavation may lead to excessive vibration and induce structural damage to the adjacent properties.	Undertake pre-construction survey of adjacent properties Contractor to undertake vibration assessment and select appropriate machinery for excavation. Contractor to monitor vibration level during excavation and minimise damage.	VL (UL x MI)

Legend and Risk Matrix

Risk Matrix	Consequence (CO)			
	S	Me	Mi	M
HL	VH	H	M	M
L	H	M	M	L
LL	M	M	L	VL
UL	M	L	VL	VL

<u>PR - Probability</u>	<u>CO - Consequence</u>	<u>RI - Risk</u>
HL - Highly Likely	S - Severe	VH - Very high risk
L - Likely	ME - Medium	H - High Risk
LL - Low likelihood	Mi - Mild	M - Moderate risk
UL - Unlikely	M - Minor	L - Low risk
		VL - very low risk

7.3. Hydrogeological assessment

Based on the available hydrogeological information and bore data in the vicinity of the site, a summary of the conceptual hydrogeological model for Melton East PSP area is detailed below:

- The local hydrogeology is defined by two main units – The Newer Volcanics (which is a regional aquifer) and the Quaternary Alluvium (which is predominately associated with Kororoit Creek and local watercourses);
- The Newer Volcanics forms the major aquifer at the site. It is likely the Quaternary alluvial units are thin and overlying the Newer Volcanics;
- Local aquifers are recharged by direct infiltration of rainfall and surface water. As such, all areas of the site are potential groundwater recharge areas. Locally, flooding around the creek and the swamp deposits at times of high surface water flow will most likely also contribute to groundwater recharge;
- The watertable is expected to be shallow in parts of the Melton East PSP. Groundwater is likely to be intersected within 5m of ground surface towards the southeast of the project area and along Kororoit Creek, and 10-20 m below surface in the northwest.
- State-wide salinity groundwater salinity mapping indicates that groundwater within the project area will be variable ranging between 1,000 to 3,500 mg/L TDS, which equates to Segment A2 in the Environmental Reference Standard;
- A review of the Atlas of Groundwater Dependent Ecosystems (GDEs) (BoM, 2012) was undertaken to determine any GDEs within the PSP areas. The Atlas identified Kororoit Creek, adjacent vegetation and wetland 51, have been identified as having a high potential for groundwater dependence and are part of the Growling Grass Frog Masterplan Areas of Strategic Importance (DELWP, 2017), which limits extent and type of infrastructure that can be built in the nominated Area of Strategic Importance (Kororoit Creek Reach 4). Two other wetlands in the eastern portion of the PSP were identified as having high potential for groundwater dependence, which also indicates shallow groundwater depth.
- A review of the state bore database indicates numerous stock and domestic bores located across the PSP area. Given the significant number of sites, it is recommended that Southern Rural Water is contacted to confirm the existence of the bores and whether take and use licences are current.

In summary, in terms of land suitability, proposed works will need to be planned, constructed and managed with respect to the groundwater conditions expected and environmental value of the resource.

8. Development opportunities & constraints

8.1. Land contamination

The following issues require consideration in the planning and design of any development and may be assessed through further contamination investigation:

- Based on the information described in this report, there do not appear to be any significant constraints from a site contamination perspective which would render the land unsuitable for any feasible land use. However, there are specific areas which have been identified where current and / or former uses present a 'medium' to 'high' potential for contamination of land (refer to Appendix E and depicted in Figure 3 in Appendix A) and for these properties further assessment will be required to better characterise the nature of contamination (if any) present.
- In accordance with Planning Practice Note 30 (PPN30), and assuming that all areas within the Melton East PSP are to be assessed on the assumption that they may be used in the future for a sensitive use:
 - Those sites that have been identified where current and / or former uses present a 'medium' potential for contamination of land should be assessed further through a Preliminary Risk Screening Assessment (PRSA). The PRSA process will determine whether an Environmental Audit is required, and if so, the scope of that audit.
 - Those sites that have been identified where current and / or former uses present a 'high' potential for contamination of land should proceed directly to an Environmental Audit.

If the PRSA and / or Environmental Audit process were to be conducted as part of the planning stages for the Melton East PSP rezoning conducted by VPA (rather than representing a requirement of the developer of the site in the future) this may be considered a potential constraint due to the time and costs required to complete this assessment process.

However, it is noted that in some circumstances it may be difficult or inappropriate to undertake either the PRSA or the environmental audit at the time of the planning scheme amendment, for example when *'the rezoning relates to a large strategic planning exercise or involve multiple sites in separate ownership'* (extract from PPN30 – DELWP, 2021). In such circumstances (which is consistent with the circumstances of this planning scheme amendment) it is acceptable to defer the requirements to complete a PRSA and / or environmental audit until after the planning scheme amendment has occurred. This can be achieved through the application of an Environmental Audit Overlay (EAO).

- It is likely that identified areas of concern will comprise discrete or localised areas of contamination that can be cost-effectively managed or remediated as part of the site development process (unless the additional assessments recommended for 'medium' and 'high' contamination potential site above establish otherwise). For example:
 - Septic tank systems associated with the rural residences are likely to be present within the Melton East PSP area which have the potential to cause localised subsurface contamination. As such, it is recommended that any septic tank system should be identified, excavated and validated as part of future site development activities.
 - Miscellaneous small stockpiles and areas of discarded material / equipment on the ground surface were observed as some properties. These stockpiles / materials may not be suitable to remain on site under the future land use scenario, in which case they should be identified and removed to a suitably licenced disposal facility, and the areas that they were located appropriately validated. This may be undertaken as part of future site development activities.

It is anticipated that minor management activities such as the above could be adequately controlled during development through the implementation of a robust Construction Environmental Management Plan (CEMP) with suitable provisions for the management of unexpected finds. Where necessary, the advice of a suitably qualified environmental professional should be sought by the developer.

8.2. Geotechnical

The following issues require consideration in the planning and design of any development and should be assessed through a geotechnical site investigation.

Variable ground conditions

- The depth and reactivity of the Newer Volcanics residual clay which forms the surface geology across the majority of the project area is unknown. Alluvium depth and reactivity along Kororoit Creek is also unknown. It is expected that the site would generally be considered highly reactive (Class "H2 to E") for residential footing design. It is noted that a geotechnical site investigation is recommended to characterise the site classification across the site.
- The variable thickness of the soil horizon over relatively short horizontal distances can lead to differential settlement of structures. As such, a geotechnical investigation is required to assess the depth to rock across the site.
- Samples acquired through the geotechnical investigation can be used to determine the presence of PASS, in addition to sodium content, pH and dispersion characteristic of encountered soils.
- The site investigation is recommended to determine the location, extent, depth and mechanical properties of identified swamp sediment deposits which may be unsuitable for use as foundation material.

Excavatability & stability of temporary excavations

- The variable geological conditions across the site can lead to sudden change of ground conditions for excavation. Excavation in sand, gravel and fill, or excavations extending below the water table may be unstable and should be battered or shored. This will need to be assessed at the time of construction; however, a conservative approach should be adopted when considering stability of short-term batter slopes.
- The excavation of any surficial fill, alluvium and natural soils is expected to be possible with standard bucket excavation method utilising a traditional excavator of suitable capacity.
- Excavation within granular Alluvium (if encountered adjacent Kororoit Creek or Melton) will post a risk of caving and collapse. Alternative ground collapse control measures during excavation (e.g. benching / battering, shoring, shielding, etc.) shall be considered to ensure that sidewall and overall integrity of the excavation is maintained.
- Excavations in Newer Volcanics and can vary between relatively easy excavations in residual soils to difficult excavation in weathered rock. It is expected that the existing natural soils may be excavated using conventional excavation equipment such as tracked excavators. Excavators equipped with ripper attachments or hydraulic impact breakers may be required to loosen any weathered basalt that is encountered, prior to excavation. Blasting may be required for excavation in very high strength, fresh or slightly weathered basalt rock.
- Construction adjacent or near the crest of the riverbank (Kororoit Creek) will post a number of risks including slope failure, overturning of machinery. Ground Investigation and riverbank inspection are recommended to confirm the strength of soil and stability of the riverbank during construction and serviceability. The bearing capacity of footings constructed at the top of slopes would also require assessment, ensuring sufficient bearing capacity is available to the foundation soil.
- Temporary open cut trenches less than 1.5 m depth maybe constructed by battering the side of the excavation. Temporary batter slopes should not be steeper than 1V:2H in the cohesive alluvial deposits. High plasticity clays may be fissured and have weak shear planes, where soil block failures could occur, and this should also be allowed for.
- Dispersive soils may be encountered throughout the project area. Dispersive soils easily collapse, and are susceptible to erosion and washing away. Theses soils may not be suitable for use as fill material as part of an engineered fill to support foundations or pavements. Gypsum treatment for soil used to line drainage systems such as swale drains may be required. The dispersive nature of the soils should be tested as part of any investigation programme.

Foundation design

- Construction of shallow footings above alluvium and swamp sediments will post a risk of structural damage due to insufficient bearing capacity and excessive settlement. Ground Investigation is recommended to confirm the ground conditions, and assess the composition, thickness, strength and compressibility characteristics of the underlying soil.
- Shallow footings of private and residential development constructing above residual basaltic soil may be subjected to large seasonal surface movement due to shrinkage and swelling of expansive clay. Care should be taken during the foundation design to minimise the impact of soil shrinkage and swelling and limit the change in moisture content of the reactive soil (i.e. implementing drainage systems during bulk earthworks).

- Design of roads, drainage works and underground assets would require consideration of the highly reactive and potentially dispersive nature of the clays to ensure serviceable performance and minimise on-going maintenance requirements.
- Fill material, which may be present on site, is expected to be uncontrolled and may not be suitable as a founding material in its current state.
-

8.3. Hydrogeology

The following issues require consideration in the planning and design of any development and may be assessed through further hydrogeological investigation:

- The location and type of infrastructure located near and within 'Kororoit Creek Reach 4 Area of Strategic Importance' nominated in the Growling Grass Frog Masterplan (DELWP, 2017) will require consideration and approval by DELWP. Site specific groundwater impact assessments will be required for works within or adjacent to other groundwater receptors (other wetlands, groundwater users, contamination sources) depending on location, footprint and extent of works below surface / within the watertable.
- Construction in low lying areas may be difficult during wet months. Where saturated conditions occur during construction/investigation then the site soils may become boggy and difficult to traverse.
- Dewatering during construction may be required if excavations encounter the watertable (which in some areas is expected to be within 5m of ground surface). It is possible that sand lenses (within alluvium deposits) that offer a higher permeability compared to fine grained soils may provide an additional ingress for water into the excavation near to Kororoit Creek. The recharge, direction and magnitudes of flow are unknown; however, provided only shallow infrastructure construction is proposed, a sump and pump type arrangement could provide satisfactory management of groundwater locally.
 - Works requiring dewatering will require site specific assessment prior to and during any excavation to prevent impacts to groundwater receptors (GDEs and users). This will include, as a minimum, analytical assessment to determine the extent of groundwater drawdown to achieve dry conditions and whether the cone of depression will interact with groundwater receptors or sensitive sites. If impacts are identified, consideration to the proposed construction method and timing to minimise or eliminate impacts is required. If there is high uncertainty or if impacts cannot be mitigated through design and timing, field investigations will be required with the aim of determining groundwater level, groundwater quality and hydraulic conductivity. A field monitoring program will require design and implementation during construction to ensure outcomes of assessment are followed in the field.
 - Consideration of disposal options for discharged groundwater will be required. Discharge of groundwater should be in accordance with the relevant authorities and conditions on permits obtained.
- Areas subject to poor drainage may comprise soft material which provides low bearing capacity for foundations.
- Opportunities for potential use of extracted groundwater include dust suppression during construction, and garden watering and irrigation of parks and ovals following development. However, depending on the salinity of the groundwater, it may need to be shandied with potable water to improve the quality for the intended purpose.

8.4. Hydrology

Melbourne Water is in the process of developing drainage schemes for High St Melton and Kororoit Creek Upper. Given this, flooding information for the region – including the drainage schemes and planning overlays referred to in this report – may change in the near future.

The majority of the Melton East PSP boundary is free from hydrological constraints significant enough to constrain development, however there are flood hazards present. The Land Subject to Inundation Overlay (LSIO) near the north-east side potentially impacting development in this area. Under the LSIO, a permit is required to construct a building or carry out works, and to subdivide land. In addition to this, any works at or near waterways require the appropriate planning approvals.

8.5. Geomorphology

The Melton East PSP Area is located on soils that have formed from weathering of local New Volcanic Basalt rock. They may have characteristics that are similar to sodic/dispersive soils that previously been assessed by Jacobs in the Northern Growth Corridor.

Topsoils are generally expected to have better structural stability, but subsoils have the potential to be sodic/dispersive and susceptible to erosion, particularly in instances where the topsoil is removed or if there are drainage works, which then result in rainfall and runoff making contact with and eroding these soils. Development in these areas may require very careful planning, staging of works to minimise disturbance and possible remediation of soils to enhance their stability.

With proposed urban development there will be a significant change in runoff to waterways – which in turn will heighten erosion risks. It is expected that with development of drainage services scheme Melbourne Water will want further advice as to how future development and the drainage services scheme can be prepared so as manage erosion risks and provide appropriate for protection to waterways, including swamps that are present in the precinct area.

9. Conclusions

9.1. Contamination

Based on the information gathered during the Stage 1 and Stage 2 assessments, the following conclusions can be made in relation to the Melton East PSP:

- The site history assessment found that the site has a long history of agricultural land uses, with much of the areas remaining under cultivation to the present day.
- Based on the available information, including a site walkover and site history assessment, properties can be categorised as follows:
 - Current and / or former activities at a total of five properties were assessed as presenting a high potential for contamination. These include:
 - Property number 62 (parcel 1\PS537638) which represents an operational service station, likely established within the last 5 years, with bulk fuel storage tanks on its premises;
 - Property number 63 (parcel 1\LP127283) where extensive surface wastes appear to be scattered across the south-western portion of the property. Evidence of stockpiled soil and a likely waste disposal area was noted;
 - Property number 28 (parcel 2\PS520699) which features a rural residence with adjoining automotive repair shop. In addition, stockpiles of fill materials were present and generally disturbed ground;
 - Property number 35 (parcel 9\LP218298) is a residential area with multiple agricultural outbuildings. Extensive surface wastes were scattered and a waste disposal pit was observed; and
 - Property number 51 (parcel 4\LP217378) represents several farm buildings where widespread agricultural wastes including presence of chemical containers and building rubble were noted. Lastly, two separate disposal areas of unknown wastes were also noted within this area.
 - Current and / or former activities at a total of 11 properties present a medium potential for contamination. These include:
 - Property number 59 (parcel 1\TP542527) features a market garden where landowner indicates use of pesticides in the process of growing the crops or produce;
 - Property number 8 (parcel 5\LP200559) represents a rural residence with a metal workshop in one of the outbuildings and had presence of some surface wastes onsite;
 - The remaining properties, with property numbers 13, 17, 34, 36, 44, 50, 53, 69 and 70, are locations typically represented by relatively widespread or more substantial areas of potential contamination associated with stockpiles and general dumped materials. At some of these properties, there were evidence of presence of stock dips. Moreover these locations are mostly farm residences with few outbuildings.
 - Current and / or former activities at a total of 52 properties present a low potential for contamination. Such properties typically represented locations where highly localised areas of potential contamination associated with stockpiles and general dumped materials were observed, where septic systems are likely to be present or other such potential sources that could be managed through modest / straightforward management actions.
 - Current and / or former activities at a total of 12 properties present a very low potential for contamination. Such properties typically represented locations where no evidence of current or former potentially contaminative activities were identified (i.e. paddocks with no evidence of buildings or structures and no evidence of intensive agricultural land use that may be indicative of widespread and intensive commercial use of pesticides).

Appendix E provides a summary table relating to the risk rating of potential for contamination per property. In addition, Appendix E also reflects the current site use, onsite findings, which properties have undergone actual site reconnaissance, and recommended further actions.

- A number of off-site sources of potential contamination have been identified in the vicinity of the Melton East PSP area. Based on the nature of the site uses, the greatest risk to the PSP areas is likely to be

presented by the existing service stations to the immediate west of the PSP area. However, the risk presented by these service stations to the Melton East PSP is considered to be low, since:

- Prevailing groundwater direction is believed to be towards the south, meaning that any contamination of groundwater (if present) would be unlikely to impact materially on the PSP.
- The closest service station site has only recently been constructed (less than two years). On this basis, the potential for contamination to be present is low.

Based on the information obtained from the sources described in this report, with the exception of the identified localised areas of potential contamination associated with current and/or former land uses identified above, there do not appear to be any significant risks from a site contamination perspective which would render the land unsuitable for residential or other sensitive land uses. Any areas of localised contamination are likely to be able to be effectively managed or remediated during any future site development.

9.2. Geotechnical

Based on the available geological information the Melton East project site is likely to be characterised by highly reactive residual basaltic clay overlying basalt rock of the Newer Volcanics Group. Alluvium may also be encountered adjacent Kororoit Creek, in addition to potentially highly compressible and weak swamp sediments found in localised depressions. An indicative site classification of Class "H2 to E" has been assessed in accordance with Table D1, AS2870-2011.

Key geotechnical issues associated with development of the site include the depth and reactivity of the basaltic clay and alluvium in terms of its influence on site classification, change and interface of variable ground conditions, foundation selection, differential settlement, subgrade performance, excavations and site accessibility. Fill material, if present, is expected to be uncontrolled and may not be suitable for development in its present state. Areas subject to poor drainage may comprise soft material which provides low bearing capacity for foundations.

Subsurface conditions may present a critical issue for design of the structures and foundations, and therefore there is likely to be a benefit in obtaining geotechnical data at targeted locations.

The results of the geotechnical investigation would form the basis of the geotechnical model for the site, which would be used to assess subgrade conditions, confirm the site classes, foundation design parameters, excavations and recommendations on earthworks.

9.3. Hydrogeology

Based on the regional hydrogeological information and bore data in the vicinity of the site, the Newer Volcanics and the Quaternary alluvial aquifer (where present) are likely to host the watertable across the Melton East PSP area.

Across the Melton East PSP area, the following issues require consideration in the planning and design of any development:

- Shallow depth to groundwater is likely to exist in some areas of the site, specifically near to Kororoit Creek and in the southeast.
- Kororoit Creek, adjacent vegetation and wetland 51, have been identified as having potential for groundwater dependence and are part of the Growling Grass Frog Masterplan Areas of Strategic Importance (DELWP, 2017), which limits extent and type of infrastructure that can be built in the nominated Area of Strategic Importance (Kororoit Creek Reach 4).
- Shallow watertable may cause groundwater inflow to excavations and may impact on site drainage (i.e. cause waterlogging).
- The brackish nature of the groundwater may require careful monitoring if dewatering or extraction is required, particularly for the consideration of the disposal of water.
- Decreased local groundwater recharge in winter and early spring as the result of dewatering or extraction associated with development has the potential to reduce discharge to nearby surface water features, which could potentially have a negative impact on the ecological health of local waterways (specifically Kororoit Creek and associated wetlands).

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- There are numerous registered stock and domestic bores that require consideration to prevent unacceptable impacts during construction.
- There may be areas that have poor sub-soil drainage and are susceptible to water-logging.

Opportunities for potential use of extracted groundwater include dust suppression during construction, and garden watering and irrigation of parks and ovals following development. However, depending on the salinity of the groundwater, it may need to be shandied with potable water to improve the quality for the intended purpose.

It is recommended that a field investigation into groundwater elevation and quality be undertaken to confirm the findings of this desktop study. This may include:

- Sampling of existing local bores for water quality and water level; and
- Drilling and construction of test bores for ongoing observation to determine seasonal fluctuations in water level and quality if required.

Groundwater field investigations are expected to become high priority where excavations are likely to exceed 5m in depth or are adjacent to groundwater sensitive sites (Area of Strategic Importance Kororoit Creek Reach 4 and other wetlands). For large or deep excavations, groundwater investigations can be used to inform the quantity, quality and impact of dewatering.

9.4. Hydrology

The 1 in 100 Year Flood Extent associated with the Kororoit Creek covers the north-east section of the Melton East PSP boundary and two areas that cross the Western Freeway, south of the PSP boundary. The flooding stems from overbank flooding associated with Kororoit Creek as well as flow from upstream northern Drainage Schemes – Shogaki Drive and Iramoo Circuit. However, the majority of the Melton East PSP boundary is free from hydrological constraints significant enough to constrain development. It is noted that there are flood hazards present.

Melbourne Water is in the process of developing drainage schemes for High Street Melton and Kororoit Creek Upper. Given this, flooding information for the region – including the drainage schemes and planning overlays referred to in this report – may change in the near future.

9.5. Geomorphology

The Melton East PSP area is located on soils that have formed from weathering of local New Volcanic Basalt rock. Topsoils typically have better structural stability but subsoils may be sodic/dispersive and susceptible to erosion, particularly in instances where the topsoil is removed or if there are drainage works, which then result in rainfall and runoff making contact with and eroding these soils.

10. Recommendations

We understand that the proposed future use of the site is as a broad ranging urban development and is likely thus to include sensitive uses such as residential, schools and community centres in addition to open space, retail and business uses. However, since specific future land uses within the Melton East PSP boundary are yet to be confirmed, this assessment has been completed based on the assumption that residential or other sensitive uses will be the probable land future uses across the Melton East PSP area.

The following further works are recommended, including recommended timings:

- Completion of Preliminary Risk Screening Assessments at all properties where current and / or former land uses were assessed as presenting a 'medium' potential for contamination. These PRSAs will determine whether an Environmental Audit is required at the property, and the scope of the Environmental Audit (if deemed necessary). This recommendation would apply to 11 properties, specifically 8, 13, 17, 34, 36, 44, 50, 53, 59, 69 and 70. These assessments may include the completion of targeted / limited sampling and should be completed in accordance with EPA Victoria publication 2021 *Guidelines for Conducting Preliminary Risk Screening Assessments* and EPA Victoria publication 2022 *Environmental Auditor Guidelines – Provision of Statements and Reports for Environmental Audits and Preliminary Risk Screen Assessments*. The PRSA may only be conducted by an Environmental Auditor. *Timing: These additional assessments may either be conducted as part of the planning process, or deferred until future development of the land occurs through the application of an Environmental Audit Overlay.*
- Application of an Environmental Audit Overlay to the five property where current and / or former land use has been assessed as presenting a 'high' potential for contamination, namely properties 28, 35, 51, 62 and 63. The application of an EAO recognises that if this land is to be used in the future for a sensitive use, an Environmental Audit will be required in order to determine the suitability of the land for that use. *Timing: This should form part of the planning process.*
- Completion of a hazardous materials assessment for existing properties to confirm the potential presence of asbestos containing materials and lead based paints and to identify controls that should be implemented during future development to prevent exposure by site workers or future users of the site. *Timing: It is recommended that this task be undertaken prior to the commencement of site demolition works on a site-by-site basis.*
- Excavation and removal of underground storage tanks (USTs), soil remediation and tank pit validation if USTs are found on properties. *Timing: This task should be undertaken on a site-by-site basis during future site development.*
- Removal of existing septic tanks followed by soil validation. Should the soil impacts indicate the septic tank is likely to impact groundwater, intrusive groundwater investigation should also be considered. *Timing: This task should be undertaken on a site-by-site basis during future site development.*
- Classification and appropriate removal (if required) of various stockpiles and dumped materials observed at the former egg farm (Lots 2 – 4) and present at any sites across the PSP areas. This includes subsequent validation following removal. It is noted that sampling of some stockpiles of soil observed may indicate that the material is suitable for re-use as part of future development and as such removal may not be required in all instances. *Timing: This task should be undertaken on a site-by-site basis during future site development.*
- It is recommended that a geotechnical investigation comprising soil and rock sampling, and geotechnical laboratory testing is undertaken. This will lead to the determination of the ground conditions, design constraints and geotechnical design parameters for temporary excavation, building foundation and road design. *Timing: This task should be undertaken on a site-by-site basis during future development as part of the building permit application process.*
- Groundwater level and quality monitoring on existing groundwater bores can be conducted to confirm groundwater conditions based on the risk of the proposed land use affecting groundwater, or the potential for groundwater to impact on below ground infrastructure (in terms of aggressivity). Groundwater hydraulic testing (slug tests) may also be undertaken to determine aquifer properties. This assumes existing wells are in a suitable condition for such an assessment. *Timing: This task should be undertaken on a site-by-site basis during design to inform risk to groundwater. Alternatively, groundwater investigations can be undertaken concurrently with geotechnical investigations by installing observation bores to measure groundwater level, quality and aquifer permeability.*
- It is recommended that the local registered bores identified in this assessment are confirmed with Southern Rural Water to understand whether they have active licences for groundwater use or whether they have been or should be decommissioned to prevent contamination of the aquifer.

- It is recommended that further site investigation, sampling, laboratory analysis and characterisation of soils is undertaken to confirm their erodibility and develop a plan to stabilise the soils (options include chemical treatment of soils, careful staging of works). The scope of this work would be similar to the Sodic Soils Assessment previously completed by Jacobs for Beveridge North-West, Shenstone Park, Wallan South and Wallan East (Part 1). We recommend a gridded program is adopted for collection of soil samples, with one sampling site per 10 hectares. In previous Sodic Soils Assessment completed for VPA we have typically cored to 1.5m, sampled topsoil and subsoil at each location and then at a selection of boreholes sampled at deeper increments (up to 3m depth). We think a similar strategy would be appropriate in Melton East. *Timing: This task should be undertaken across the precinct area as part of the planning stage for the PSP. The outcomes of this work will assist in providing strategic advice on issues relating to sodic soils and how to manage these with future development.*
- A geomorphological assessment of waterways is recommended to assess their current condition and how this is likely to change with changes in hydrology and hydraulics for future development scenarios. The scope of this assessment should be agreed with Melbourne Water and it is expected that this would be completed as an engagement by Melbourne Water. The outcomes of this work would inform further design and development of the drainage services scheme. Jacobs have recently completed such investigations for the Werribee Junction PSP (Jacobs 2019) and Beveridge North West (Jacobs 2022). *Timing: This task should be undertaken across the precinct area as part of the planning stage for the PSP. The outcomes of this work will assist in providing strategic advice on issues relating to the stability of waterways and how to manage these with future development.*

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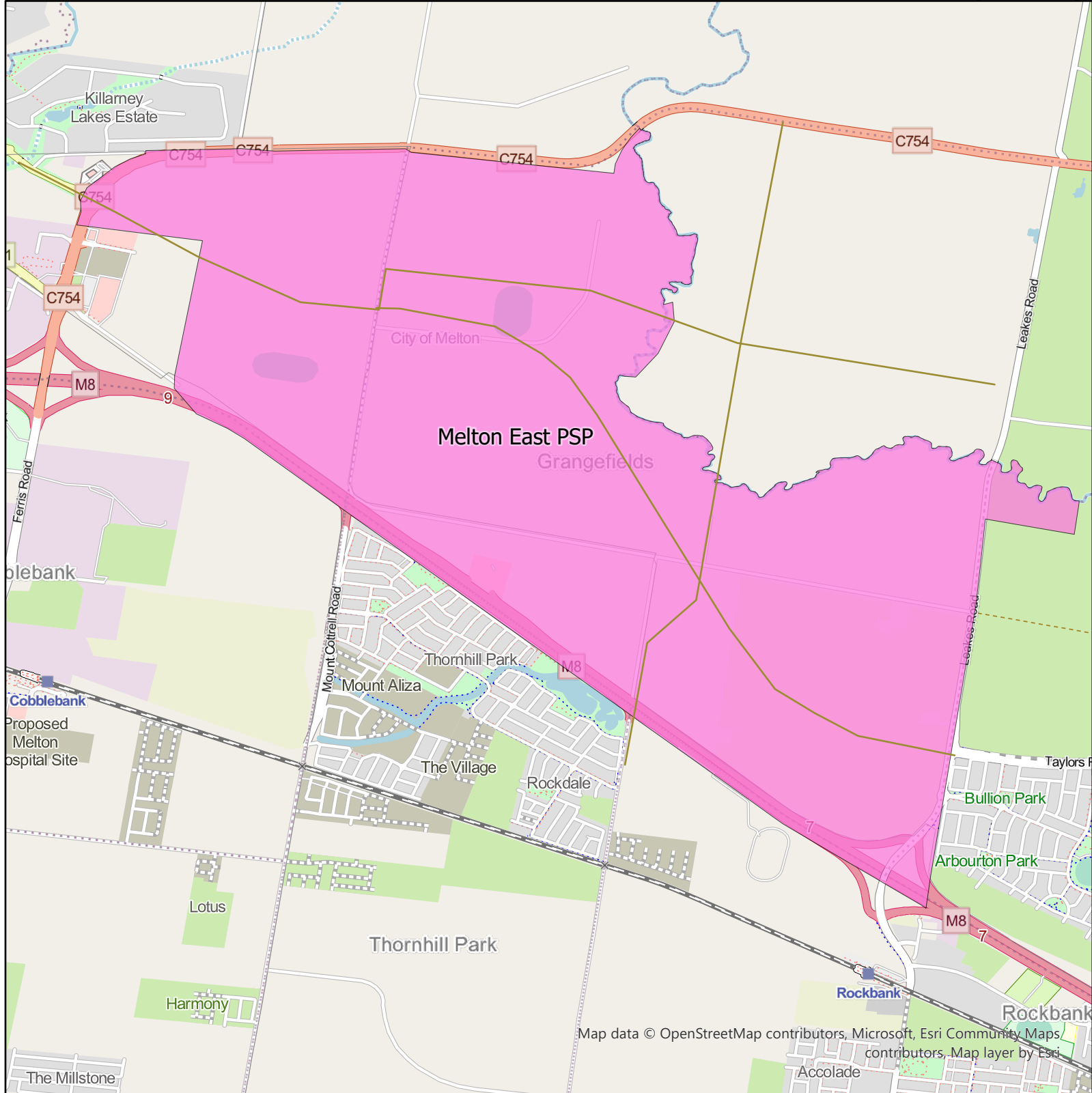
Appendix A – Figures

The following figures are presented below:

- Figure 1 – Site Location
- Figure 2 – Site Layout
- Figure 3 – Site Characterisation – Potential for Contamination of Land

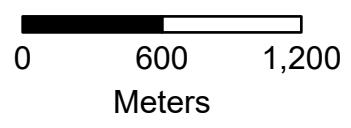
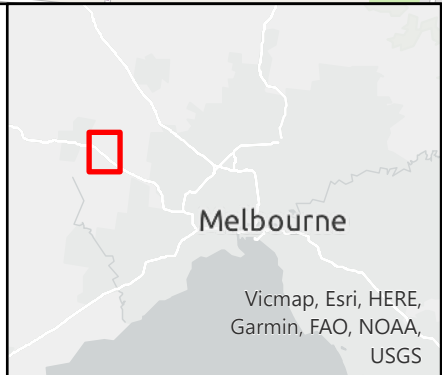
Figure 1. Site Locality Plan

Melton East Land Capability



Map data © OpenStreetMap contributors, Microsoft, Esri Community Maps contributors, Map layer by Esri

- Roads
- Melton East PSP - Boundary

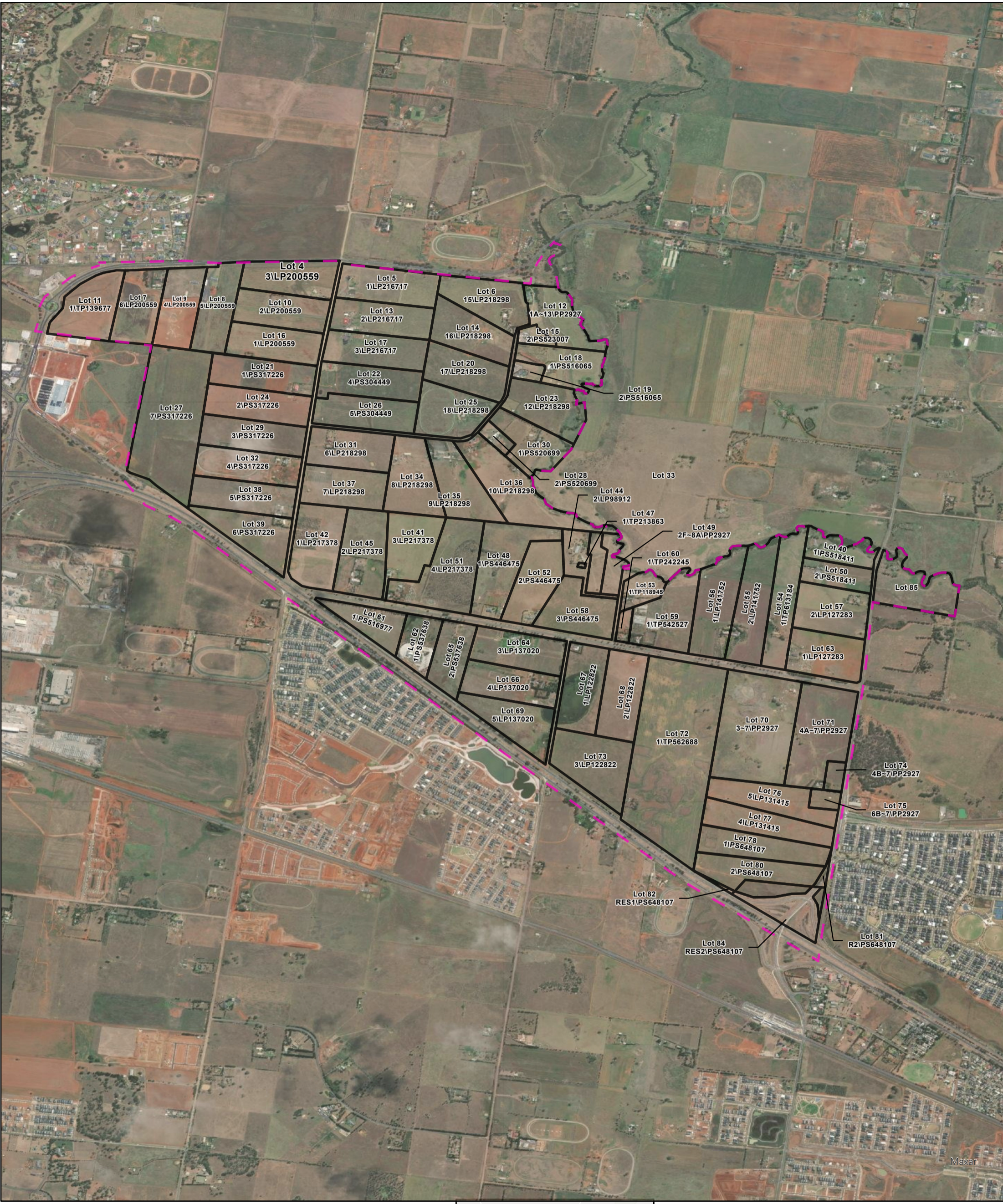


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Vicmap, Esri, HERE, Garmin, FAO, NOAA, USGS

Figure 2. Melton East PSP

Melton East Land Capability



Legend

-  Melton East PSP - Boundary
-  Cadastre

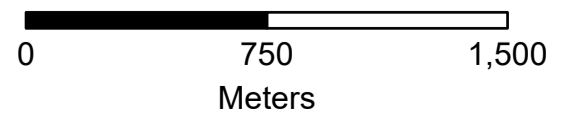
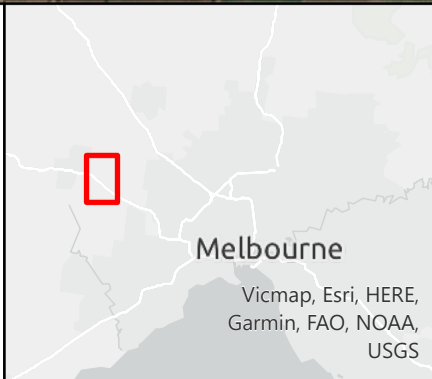
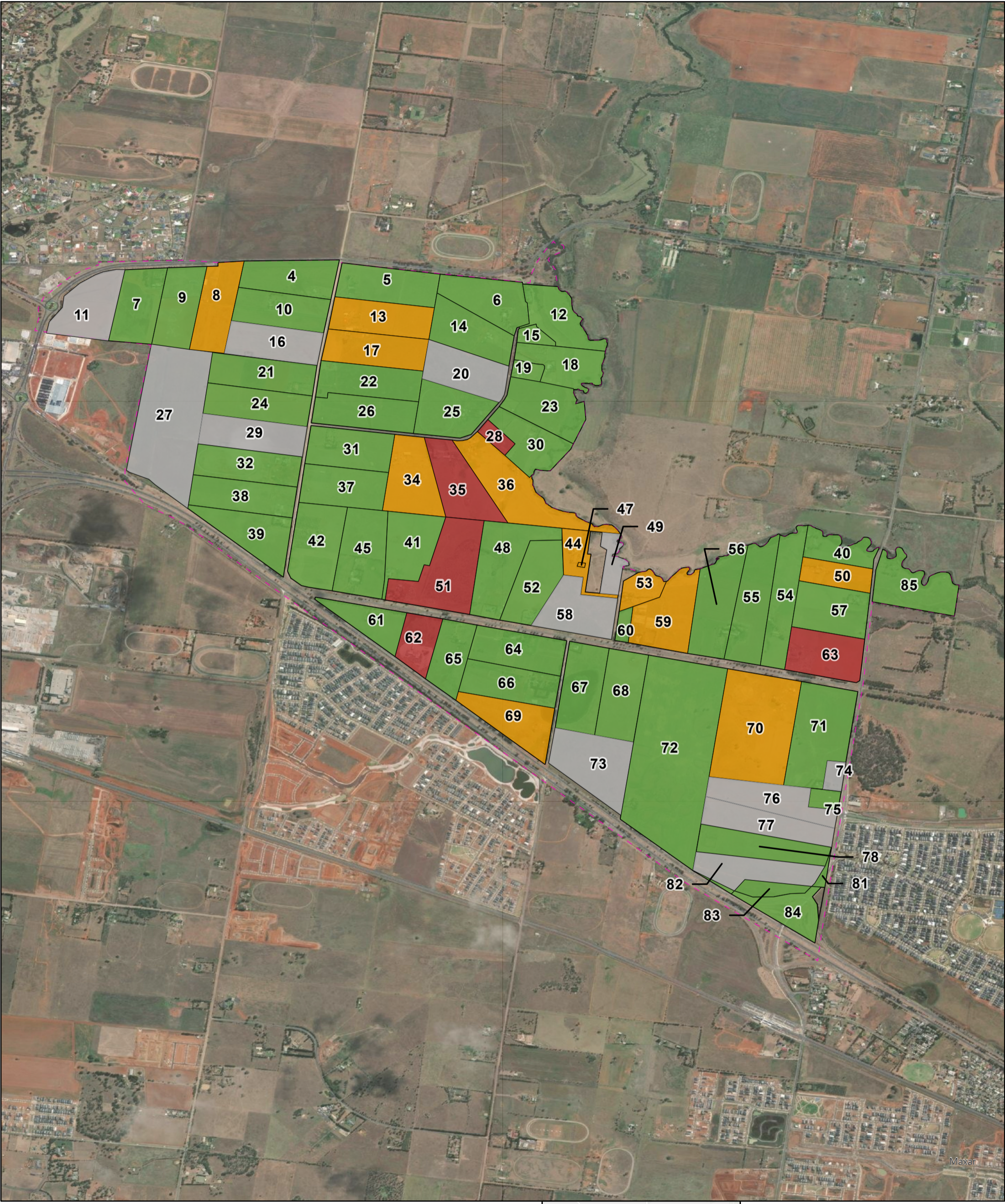
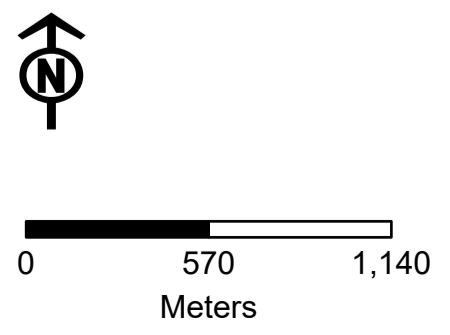


Figure 3. Potential for Contamination



- Melton East PSP - Boundary
- Cadastre
- Potential for Contamination
 - High
 - Low
 - Medium
 - Medium
 - Very Low
- Property No.

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Appendix B – Lotsearch report

Appendix C – Groundwater bores

Table 0-1. Summary of registered groundwater bores
Summary of registered groundwater bores within the Melton East PSP area

Bore ID	Depth	Uses	Easting	Northing
112660	21.34	Stock	290633.1	5826204.2
129589	25.5	Stock	293133.1	5825084.2
132477	36	Domestic	293193.1	5825304.2
135898	34.5	Unknown	292333.1	5822514.2
139979	55	Unknown	290913.1	5824734.2
143995	54	Unknown	290498.1	5823284.2
145066	31	Unknown	291613.1	5823854.2
311290	64.31	Unknown	293365.1	5823666.2
311292	60.96	Unknown	291732.1	5824115.2
311293	79.24	Unknown	290565.1	5826718.2
311297	1.2	Unknown	290335.1	5825175.2
311298	0.85	Unknown	290388.1	5825634.2
311299	0.7	Unknown	290434.1	5826150.2
311300	0.65	Unknown	290508.1	5826669.2
311313	1.82	Unknown	289043.1	5826700.2
311314	1.96	Unknown	289486.1	5826722.2
311320	0.7	Unknown	290264.1	5824464.2
311321	0.75	Unknown	290215.1	5823960.2
311322	1.75	Unknown	290169.1	5823439.2
311323	0.76	Unknown	290102.1	5822975.2
311324	0.65	Unknown	290042.1	5822472.2
311333	0.65	Unknown	289270.1	5822358.2
311334	1.35	Unknown	289654.1	5822313.2
60506	24	Unknown	289663.1	5822309.2
73197	16.76	Unknown	293425.1	5824567.2
73198	52.42	Unknown	290111.1	5824500.2
73202	0	Unknown	289668.1	5824670.2
73203	51.2	Unknown	289757.1	5824689.2
73204	30.4	Stock	291254.1	5824971.2
73210	45.7	Unknown	292573.1	5826789.2
73222	36.5	Unknown	290982.1	5824270.2
73223	21.3	Domestic	292073.1	5824596.2
73224	16.7	Domestic	292043.1	5824397.2
73225	8.5	Domestic	292386.1	5825103.2
73227	29.2	Stock	292909.1	5826745.2
73229	0	Domestic	292024.1	5826485.2
73230	30.4	Stock	291496.1	5825788.2
73231	33.5	Stock	290622.1	5826680.2
73232	12.2	Domestic	291448.1	5826465.2
73235	30.4	Stock	289794.1	5825611.2
73238	19.5	Unknown	290860.1	5824674.2

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Bore ID	Depth	Uses	Easting	Northing
73239	41.1	Stock	289642.1	5826559.2
73248	24.4	Domestic	291933.1	5822941.2
73249	13.7	Unknown	291773.1	5822793.2
73250	15.8	Unknown	291768.1	5823036.2
73253	0	Unknown	289504.1	5823593.2
73254	27.4	Unknown	289340.1	5823685.2
73257	21.3	Stock	291397.1	5824926.2
73264	0	Unknown	291675.1	5824713.2
73265	0	Unknown	291147.1	5824070.2
73266	0	Unknown	293235.1	5823350.2
73272	18.89	Unknown	293305.1	5825178.2
73273	12.19	Unknown	292090.1	5824382.2
73275	50.5	Unknown	292357.1	5826788.2
73276	60.96	Unknown	293180.1	5826576.2
73277	34	Unknown	293273.1	5825750.2
73278	84	Unknown	290153.1	5822634.2
73279	31	Domestic	290153.1	5822604.2
73280	41	Unknown	293363.1	5826624.2
73281	23	Domestic	289363.1	5822734.2
73289	26	Unknown	289393.1	5822314.2
73290	25.9	Unknown	291713.1	5822784.2
73292	25	Unknown	291613.1	5822724.2
73298	13.71	Unknown	291703.1	5823584.2
73302	27	Unknown	291513.1	5824434.2
73305	30	Unknown	293233.1	5824139.2
73306	85	Unknown	289433.1	5824684.2
73309	45.1	Unknown	289383.1	5823954.2
73310	25.2	Unknown	289763.1	5823894.2
73311	45	Unknown	290113.1	5823854.2
73312	25.16	Unknown	290063.1	5823414.2
73313	45.27	Unknown	290003.1	5822974.2
73314	25.1	Unknown	289673.1	5823104.2
73315	45.1	Unknown	289323.1	5823244.2
73316	25.04	Unknown	289353.1	5823574.2
73317	25.1	Unknown	289053.1	5824754.2
73319	36	Unknown	290193.1	5822424.2
73324	30	Domestic	291563.1	5824154.2
73325	50	Unknown	290283.1	5823574.2
73331	80	Unknown	289733.1	5822484.2
73333	70	Unknown	292196.1	5823282.2
73336	21.9	Stock	291917.1	5823284.2
9038906	50.5	Domestic and Stock	290166	5824399
WRK097316	20	Groundwater Investigation	288971	5826637
WRK097319	20.5	Groundwater Investigation	288931	5826513
WRK105585	23.3	Groundwater Investigation	289060	5825659

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Bore ID	Depth	Uses	Easting	Northing
WRK956884	9999	Unknown	293203	5825184
WRK956885	9999	Unknown	293166	5825151
WRK956889	9999	Unknown	293408	5824267
WRK956890	9999	Unknown	293085	5824857
WRK956891	9999	Unknown	293447	5824796
WRK964417	39	Domestic and Stock	291705.1	5822633.2
WRK966525	35	Domestic and Stock	291504.4	5826151.7
WRK970782	30	Domestic and Stock	292543	5824341
WRK970783	30	Domestic and Stock	291873	5824166
WRK971271	16.5	Domestic and Stock	292501	5824347
WRK973266	40	Domestic and Stock	292278	5822598
WRK973267	28	Domestic and Stock	290860	5824832
WRK978969	23	Domestic and Stock	291640	5824398
WRK979005	46	Domestic and Stock	290292	5825867
WRK985303	150	Unknown	290716	5826612
WRK992493	150	Unknown	290151	5824458

Appendix D – Previous Reports

Appendix E - Summary of Potential for Contamination

Table 0-1. Summary of Site Characterisation – Potential for Contamination

Table summarising the contamination potential for each site within the Melton East PSP, based on the land uses with potential to contaminate land presented in Table 2 of Planning Practice Note 30 (DELWP, 2021). Proposed further assessment is based on the approach presented in Table 3 of PPN30, assuming sensitive future use and a new use

Property No.	Site Use / Activity	Description / Findings	Site Inspection ¹	Potential for Contamination	Recommended Further Action
1	Vacant land	No features evident on the site, aside from what may be very light ground disturbance adjacent to Melton Highway	No	Low	No further action required - General Environmental Duty Applies
2	<i>Lot not identified within the Melton East PSP area.</i>				
3	Vacant land	No features evident on the site, aside from what may be very light ground disturbance adjacent to Melton Highway	No	Low	No further action required - General Environmental Duty Applies
4	Farm residence and buildings	Farm residence with nearby agricultural buildings and adjacent paddocks. Very minor ground disturbance.	No	Low	No further action required - General Environmental Duty Applies
5	Rural residence with small orchard	Rural residence with generally no evidence of notable waste or other potential contamination	Attempted	Low	No further action required - General Environmental Duty Applies
6	Rural residence with adjoining paddock	Rural residence with adjoining paddock. No evidence of notable disturbance.	No	Low	No further action required - General Environmental Duty Applies
7	Rural residence with adjoining paddock	Rural residence with adjoining paddock. No evidence of notable disturbance.	No	Low	No further action required - General Environmental Duty Applies
8	Rural residence with workshops	Rural residence with various outbuildings present. Includes a metal workshop. Some surface waste present on the site.	Yes	Medium	Proceed to Preliminary Risk Screening Assessment
9	Rural residence	Rural residence with adjoining paddock. Residence and machinery shed present only.	Yes	Low	No further action required - General Environmental Duty Applies
10	Rural residence with adjoining paddock	Rural residence with a number of small outbuildings, surrounded by vacant paddocks. Some localised evidence of surface waste near the buildings.	No	Low	No further action required - General Environmental Duty Applies
11	Vacant paddock	Vacant paddock with no evidence of disturbance.	No	Very Low	No further action required - General Environmental Duty Applies
12	Rural residence	Rural residence with agricultural outbuilding towards the south, accompanied by stock pens. No evidence of stock dips.	No	Low	No further action required - General Environmental Duty Applies
13	Farm property / buildings	Various farm buildings / workshops present with evidence of relatively widespread surface waste. No indication of sub-surface filling (all appears to be surface)	No	Medium	Proceed to Preliminary Risk Screening Assessment
14	Farm property / buildings	Rural residence with farm outbuildings. Some minor and localised surface waste evident.	No	Low	No further action required - General Environmental Duty Applies
15	Rural residence	Rural residence with adjoining paddocks. No stock dips present. Areas of ground disturbance, but don't appear to be used for filling.	Call	Low	No further action required - General Environmental Duty Applies
16	Agricultural land	Open paddock with small stock pen towards south-west corner. Dip not evident.	Call	Very Low	No further action required - General Environmental Duty Applies
17	Farm property / buildings	Residence and large outbuildings present at the site. Evidence of surface waste (relatively isolated). Possible stock dip but cannot be confirmed.	No	Medium	Proceed to Preliminary Risk Screening Assessment
18	Rural residence with small orchard	Rural residence with adjoining small orchard. Confirmed no use of pesticides.	Call	Low	No further action required - General Environmental Duty Applies
19	Rural residence with adjoining paddock	Rural residence with adjoining paddock. Small outbuildings evident, and minor ground disturbance.	No	Low	No further action required - General Environmental Duty Applies
20	Vacant paddock	Vacant paddock with no evidence of disturbance.	No	Very Low	No further action required - General Environmental Duty Applies
21	Rural residence	Rural residence with adjoining vacant paddock. Very minor surface waste.	No	Low	No further action required - General Environmental Duty Applies
22	Rural residence with adjoining paddock	Rural residence with adjoining paddock. Small outbuildings evident, and minor ground disturbance and surface waste.	No	Low	No further action required - General Environmental Duty Applies
23	Paddock with outbuildings	Open paddock with single outbuilding (machinery shed) in the south-west corner. Small quantities of localised surface waste evident.	No	Low	No further action required - General Environmental Duty Applies
24	Vacant paddock	Vacant paddock with evidence of localised surface waste in centre of paddock.	No	Low	No further action required - General Environmental Duty Applies
25	Farm property / buildings	Rural residence with farm outbuildings, trotting track and localised surface waste.	No	Low	No further action required - General Environmental Duty Applies
26	Paddock	Paddock with a small outbuilding (machinery shed) and orchard in the south-west corner. Evidence of localised surface waste and minor ground disturbance.	No	Low	No further action required - General Environmental Duty Applies
27	Vacant paddock	Vacant paddock with no evidence of disturbance.	No	Very Low	No further action required - General Environmental Duty Applies

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Property No.	Site Use / Activity	Description / Findings	Site Inspection ¹	Potential for Contamination	Recommended Further Action
28	Automotive repairs and fill	Rural residence with adjoining automotive repair business. Evidence of stockpiles of fill material on the site / general disturbed ground.	No	High	Proceed to Environmental Audit
29	Vacant paddock	Vacant paddock with no evidence of disturbance.	No	Very Low	No further action required - General Environmental Duty Applies
30	Rural residence with adjoining paddock	Rural residence with adjoining paddock. Small outbuildings evident, and minor ground disturbance and surface waste.	No	Low	No further action required - General Environmental Duty Applies
31	Rural residence	Rural residence with adjoining vacant paddock.	No	Low	No further action required - General Environmental Duty Applies
32	Farm property / buildings	Rural residence with farm outbuildings, trotting track and localised surface waste.	No	Low	No further action required - General Environmental Duty Applies
33	<i>Forms part of Lot 46 (refer record below). Located beyond the Melton East PSP boundary</i>				
34	Farm property / buildings	Rural residence with accompanying agricultural outbuildings. Various items were scattered across the site, with relatively widespread surface waste present. Possible soil stockpiles also present.	No	Medium	Proceed to Preliminary Risk Screening Assessment
35	Agricultural land use and haulage	Rural residence along with multiple agricultural outbuildings. Evidence of widespread surface waste disposal and various items scattered across the site. Waste disposal pit towards south of property.	No	High	Proceed to Environmental Audit
36	Farm property / buildings	Rural residence with adjoining farm buildings (likely workshop). Further stock handling towards the south of the property. Possible stock dip present but can't be confirmed.	No	Medium	Proceed to Preliminary Risk Screening Assessment
37	Farm outbuildings and small orchard	Small farm outbuildings present with small orchard. Based on conversation with owner, no known use of pesticides. Small stock pens present. No evidence of stock dip.	Call	Low	No further action required - General Environmental Duty Applies
38	Rural residence	Small rural residence and outbuildings. Paddocks (with small livestock shelters / pens) adjoining.	No	Low	No further action required - General Environmental Duty Applies
39	Rural residence	Small rural residence and outbuildings. Paddocks (with small livestock shelters / pens) adjoining.	No	Low	No further action required - General Environmental Duty Applies
40	Rural residence and adjoining paddock	Rural residence with adjoining paddocks. No evidence of notable disturbance.	No	Low	No further action required - General Environmental Duty Applies
41	Rural residence with adjoining paddock	Rural residence with adjoining paddock. Small outbuildings evident, and minor ground disturbance and surface waste.	No	Low	No further action required - General Environmental Duty Applies
42	Rural residence with small orchard	Rural residence surrounded by a small orchard. Contacted owner - no pesticide use. Surrounding paddocks are unoccupied.	Call	Low	No further action required - General Environmental Duty Applies
43	<i>Lot not identified within the Melton East PSP area.</i>				
44	Farm outbuildings and stockpiles	Large farm building present (use unknown) and stockpiles of soil evident towards the eastern edge of the site.	No	Medium	Proceed to Preliminary Risk Screening Assessment
45	Rural residence with small orchard	Rural residence with a small orchard on site. Also evident is some surface waste and possible localised stockpiles of miscellaneous material. Outbuildings / sheds also present - use unknown.	No	Low	No further action required - General Environmental Duty Applies
46	<i>Lot 46 comprises three lots – two of which are located within the PSP boundary (44 and 49). Refer to these line items for characterisation.</i>				
47	Rural residence	Small parcel of land comprising a rural residence. Limited (localised) surface waste material present.	No	Low	No further action required - General Environmental Duty Applies
48	Rural residence and market garden	Market garden no longer operational (owner confirms no use of pesticides). Some surface waste present, and minor site- derived soil stockpiles. Small area of surface waste to north of property.	Yes	Low	No further action required - General Environmental Duty Applies
49	Vacant paddock	Vacant paddock with no evidence of disturbance.	No	Very Low	No further action required - General Environmental Duty Applies
50	Farm property / buildings	Surface waste present (drums, building materials etc). No stock dip. Septic tank likely present.	Yes	Medium	Proceed to Preliminary Risk Screening Assessment
51	Farm property / buildings	Widespread agricultural waste present near buildings, including chemicals and building rubble. Two separate disposal areas (unknown waste) present on the property.	Yes	High	Proceed to Environmental Audit
52	Rural residence and farm buildings	Rural residence with adjoining farm buildings, and adjacent paddocks. Owner confirmed no stock dips present.	Call	Low	No further action required - General Environmental Duty Applies
53	Rural residential property	Rural residential property in what appears to be a dilapidated condition. Widespread surface waste evident, as well as stockpiles of soil (origin unknown).	No	Medium	Proceed to Preliminary Risk Screening Assessment
54	Farm property / buildings	Surface waste present (drums, building materials etc). No stock dip. Septic tank likely present.	Yes	Low	No further action required - General Environmental Duty Applies
55	Rural residence and adjoining paddock	Rural residence with adjoining paddocks. No evidence of notable disturbance.	No	Low	No further action required - General Environmental Duty Applies

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Property No.	Site Use / Activity	Description / Findings	Site Inspection ¹	Potential for Contamination	Recommended Further Action
56	Rural residence and adjoining paddock	Rural residence with adjoining paddocks. Single outbuilding to north of property with localised surface waste, and stock pens to the south-west.	No	Low	No further action required - General Environmental Duty Applies
57	Rural residence and adjoining paddock	Rural residence with adjoining paddocks. Limited surface waste near residence, but otherwise limited evidence of notable disturbance.	No	Low	No further action required - General Environmental Duty Applies
58	Vacant paddock	Vacant paddock with no evidence of disturbance.	No	Very Low	No further action required - General Environmental Duty Applies
59	Market garden	Partially operational market garden. Landowner suggests use of pesticides. No evidence of notable ground disturbance across adjoining paddock.	Attempted	Medium	Proceed to Preliminary Risk Screening Assessment
60	Rural residence	Rural residential property adjoining an open paddock with evidence of new building activity. Stockpiles of soil but appear to be site-derived.	No	Low	No further action required - General Environmental Duty Applies
61	Rural residence with adjoining paddock	Rural residence with adjoining outbuildings and an adjacent paddock. No notable evidence of disturbance.	No	Low	No further action required - General Environmental Duty Applies
62	Active Service Station	Active service station site with vacant land to the north. Possible sewage treatment on site.	No	High	Proceed to Environmental Audit
63	Farm property / buildings	Extensive surface waste evident across the south-west corner of the site, as well as evidence of stockpiled soil. Further south and east is evidence of a pit of some sort for waste disposal. Various items were scattered across the site.	No	High	Proceed to Environmental Audit
64	Rural residence with adjoining paddock	Rural residence with adjoining outbuildings and an adjacent paddock. Minor evidence of disturbance.	No	Low	No further action required - General Environmental Duty Applies
65	Rural residence with adjoining paddock	Rural residence with adjoining outbuildings and an adjacent paddock. Minor evidence of disturbance and limited surface waste	No	Low	No further action required - General Environmental Duty Applies
66	Rural residence with adjoining paddock	Rural residence with adjoining outbuildings and an adjacent paddock. Minor evidence of disturbance and limited surface waste	No	Low	No further action required - General Environmental Duty Applies
67	Rural residence with adjoining paddock	Rural residence with adjoining outbuildings and an adjacent paddock. No notable evidence of disturbance.	No	Low	No further action required - General Environmental Duty Applies
68	Rural residence with adjoining paddock	Rural residence with adjoining outbuildings and an adjacent paddock. No notable evidence of disturbance.	No	Low	No further action required - General Environmental Duty Applies
69	Paddock with minor localised waste.	Paddock with some localised agricultural waste evident on the surface (timber, metal, plastic). Water being pumped from Thornhill Park opposite on to the site.	Yes	Medium	Proceed to Preliminary Risk Screening Assessment
70	Farm property / buildings	Rural residence and accompanying outbuildings, some of which appear to be in a state of disrepair. Possible fill material stockpiled on site. Relatively widespread surface waste. No evidence of disturbance across broader paddock.	Attempted	Medium	Proceed to Preliminary Risk Screening Assessment
71	Rural residence with adjoining paddock	Rural residence with adjoining outbuildings and an adjacent paddock. No notable evidence of disturbance.	No	Low	No further action required - General Environmental Duty Applies
72	Rural residence with adjoining paddock	Rural residence with adjoining outbuildings and an adjacent paddock. No notable evidence of disturbance.	No	Low	No further action required - General Environmental Duty Applies
73	Vacant paddock	Vacant paddock with no evidence of disturbance.	No	Very Low	No further action required - General Environmental Duty Applies
74	Vacant portion of a paddock	Part of a broader paddock with no evidence of notable disturbance.	No	Very Low	No further action required - General Environmental Duty Applies
75	Small paddock with single outbuilding	Small paddock with a single small outbuilding located in the centre. No notable signs of disturbance.	No	Low	No further action required - General Environmental Duty Applies
76	Vacant paddock	Vacant paddock with no evidence of disturbance.	No	Very Low	No further action required - General Environmental Duty Applies
77	Vacant paddock	Vacant paddock with no evidence of disturbance.	No	Very Low	No further action required - General Environmental Duty Applies
78	Vacant paddock	Vacant paddock with no evidence of disturbance. Possible tyres on the ground surface to the western edge of the site.	No	Low	No further action required - General Environmental Duty Applies
79	<i>Lot not identified within PSP area.</i>				
80	Vacant paddock	Vacant paddock with no evidence of disturbance.	No	Very Low	No further action required - General Environmental Duty Applies
81	Vacant land	No features evident on the site, aside from what may be very light ground disturbance adjacent to Leakes Road	No	Low	No further action required - General Environmental Duty Applies

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Property No.	Site Use / Activity	Description / Findings	Site Inspection ¹	Potential for Contamination	Recommended Further Action
82	Vacant land	Dam / detention basin evident on land. Otherwise vacant with what may be very light ground disturbance adjacent to Western Freeway	No	Low	No further action required - General Environmental Duty Applies
83	Vacant land	No features evident on the site, aside from what may be very light ground disturbance adjacent to Western Freeway and Leakes Road	No	Low	No further action required - General Environmental Duty Applies
84	Vacant land	No features evident on the site, aside from what may be very light ground disturbance adjacent to Western Freeway and Leakes Road	No	Low	No further action required - General Environmental Duty Applies
85	Rural residence and adjoining paddock	Rural residence with adjoining paddocks. No evidence of notable disturbance.	No	Low	No further action required - General Environmental Duty Applies

NOTES:

Yes – denotes properties that were accessed for the purposes of completing a site inspection (with landowner permission)

Attempted – denotes properties where permission to access the site was granted by the landowner, but there was nobody home at the time of the scheduled inspection

No – denotes properties that were not directly accessed for the purposes of completing a site inspection, but where observations may have been made via publicly accessible areas

Call – denotes properties where a site inspection was not completed, but the landowner was contacted with questions regarding current / former land uses.