

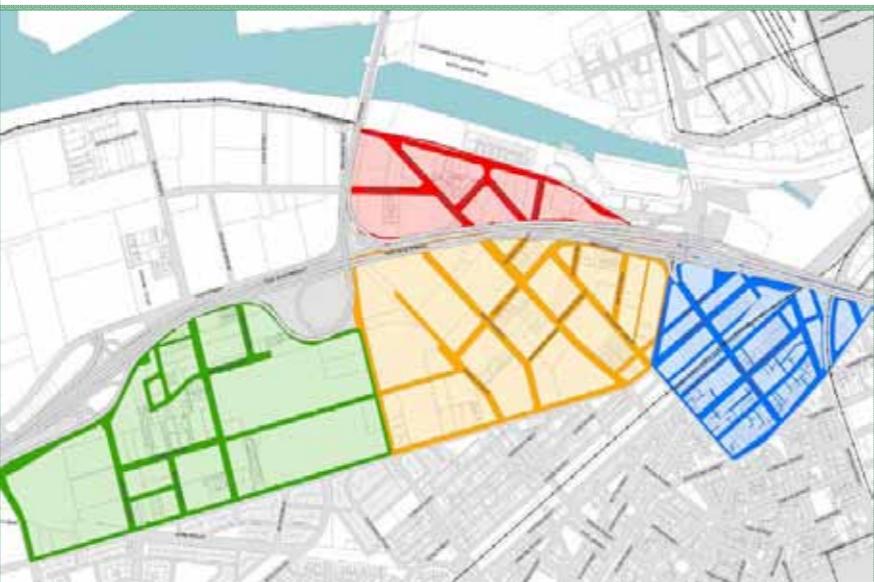


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FISHERMANS BEND PRECINCT PRELIMINARY LAND CONTAMINATION STUDY

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Submitted to:
Mr Geoff Ward
Places Victoria
710 Collins Street
Docklands VIC 3008



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Distribution:
4 Copies: Places Victoria (1 on CD)
1 Copy: Golder Associates Pty Ltd



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1.0 INTRODUCTION

Golder Associates Pty Ltd (Golder Associates) was engaged by Places Victoria to undertake a high level assessment of potential contamination issues within approximately 240 hectares of land within Fishermans Bend (the "Study Area")¹. The Study Area, is sub-divided into four potential development precincts (Plummer Street, Fennell Street, Montague Street and Lorimer Street) which includes part of the suburbs of Port Melbourne, South Melbourne, Southbank, Docklands and South Wharf. A site plan showing the Study Area is presented as Figure 1 of this report.

This report does not form part of any Environmental Audit or Assessment under the Environment Protection Act 1970.

Your attention is drawn to the "Limitations" in Appendix D. The statements presented in that Appendix are intended to advise you of what your realistic expectations of this report should be. That Section is not intended to reduce the level of responsibility accepted by Golder, but rather to ensure that all parties who may rely on this report are aware of the responsibilities each assumes in so doing.

1.1 Background

Places Victoria is facilitating the urban renewal of 240 hectares of land within the Fishermans Bend area with the intention of transforming the area into a mixed use precinct with particular focus on residential use.

Fishermans Bend represents one of the most challenging urban renewal projects in Victoria due to its long industrial history, land reclamation activities, complex underlying geology and the current substantial private land ownership. The successful redevelopment of the designated area requires vision, planning and experience to align the many involved agencies, stakeholders and issues in the challenging Victorian planning and regulatory environment throughout the lifespan of the redevelopment which is anticipated to take 20 to 30 years.

Given the likelihood of extensive contamination across the Study Area, Places Victoria engaged Golder Associates to undertake this high level review of land contamination issues and assess the opportunities, risks and associated liabilities with the redevelopment of the precinct.

1.2 Study Objectives

The objectives of the study are to:

- Undertake a high level review of geotechnical and potential land contamination issues across the Study Area;
- To assess the risks and potential costs associated with those contamination issues given the proposed types of development within the Study Area;
- To identify potential strategies to optimise the approach to contamination for the urban renewal of the Study Area.

Golder Associates understands that this report will be utilised by Places Victoria to support the strategic facilitation of urban renewal along with other discipline reports as part of the overall master planning for the Study Area. It is anticipated that the findings may influence the type of purchase / development / facilitation models that Places Victoria will consider to support the urban renewal process.

¹ The spelling of Fishermans Bend was gazetted by the Victorian Government in March 1998 (GoV, 1998). However several variations of the spelling have historically been used since the area was first abolished in the 1800s (e.g. Fishermens Bend, Fisherman's Bend etc). Throughout this document, the gazetted spelling of "Fishermans Bend" has been used except when specifically referencing a published document where a different spelling has been used (e.g. the geological unit "Fishermens Bend Silt", Geological Survey of Victoria (GSV, 1974)).



1.3 Methodology

1.3.1 Geotechnical

The geotechnical review was conducted to provide a high level overview of the geological setting of the Study Area. When undertaking this review, the following tasks were completed as part of the assessment:

- Review of available existing geological and hydrogeological information in both the published literature and Golder Associates' project records;
- Review and interpretation of selected historical borelogs and topographic data to assess potential fill thicknesses within each of the four precincts; and
- Generation of a Geographical Information System (GIS) to collate and relate data and maps.

These results were then used to identify potential geotechnical issues and constraints as preliminary input for the master planning process, as well as provide general guidance on potential foundation types that would be suitable for the proposed range of mixed use development.

1.3.2 Land Contamination

The land contamination study was undertaken to evaluate the potential contamination risks and remediation costs associated with the development of the precinct. The following tasks were undertaken to support this land assessment study:

- A high level review was undertaken to identify potential land contamination issues within the Study Area. Potential land contamination within the Study Area, both current and historic, have been evaluated based on the data gathered from the following sources of information:
 - Limited 'drive-by' assessment of the Study Area.
 - A high level review of the readily available Environmental Audit reports for completed Statutory Environmental Audit sites within and in the vicinity of the Study Area.
 - Review of selected historical aerial photographs and maps (MMBW and Melways).
 - Review of Golder Associates general records on ground and contamination conditions (Note that client confidentiality prevents the provision of site specific details and limits the manner in which this data can be presented within this report).
 - National Pollution Inventory data for industries within the Study Area.
 - Review of published books (refer to Section 9.0).
- Development of a land contamination risk ranking to assess the likelihood and significance of the remediation required to achieve identified land uses (i) Low Density Residential / School / Kindergarten, ii) High Density Residential iii) Recreational and iv) Commercial / Industrial). The degree of potential land contamination was divided into the four broad and subjective contamination risk categories (High, Medium, Low or Not Applicable (NA)).
- Review and development of a risk-based cost estimates 'bench marked' on a portfolio of Golder Associates remediation projects for inner urban areas to assist Places Victoria assess future land use value opportunities.
- Preparation of indicative preliminary contamination management strategies to support development:
 - General site contamination strategies and remediation options.
 - General classification of soil suitability for use or disposal.



- Land use type remediation strategies.
- Precinct wide strategies, including the identification of potential commencement sites / areas.
- Conclusions and recommendations.

1.4 Information Sources and Structure of this Report

Golder Associates acquired information from a wide range of sources to evaluate the potential nature and extent of the contamination issues and indicative remediation costs for sites within the Study Area. Documents, references and other sources of information used in our review summarised below are listed in Section 9.0. Key information identified during the review as well as supporting tables and text are provided in appendices as follows:

- Appendix A - Documented supporting information relating to the environmental setting including hydrogeological and geotechnical condition of land within the Study Area.
- Appendix B - Summary of historical contamination information for inclusion in the GIS.
- Appendix C - Background remediation cost estimates for Golder Associates projects used to benchmark potential land assessment and remediation costs in the Study Area.

1.5 The Environment Protection Act, Policies and the Audit System

1.5.1 The Environment Protection Act and Policies

The *Environment Protection Act 1970* (the Act) is Victoria's primary environment protection legislation which sets out to prevent pollution and environmental damage. The Act, requires that land must not be polluted, in particular to the extent that this is not "*detrimental to any beneficial use made of the land*". Beneficial uses of the environment are to be protected and are defined in the respective State Environment Protection Policies (SEPPs) for water, air, land and groundwater (GoV 1997, GoV 1999a, GoV 2001, GoV 2002 & GoV 2003).

For land these beneficial uses are set out in the SEPP "*Prevention and Management of Contamination of Land*" (SEPP Land) (GoV, 2002) and include maintenance of ecosystems, human health, buildings and structures, aesthetics and production of food, flora and fibre. The actual or potential land use dictates the degree to which these beneficial uses are to be protected, or in some cases if at all. Indicators of contamination are defined for each beneficial use. For protection of ecosystems and human health, the management objectives are closely linked to the criteria outlined in the National Environment Protection Measure "Assessment of Site Contamination" (NEPC 1999) or subsequent documents to replace it.

Land also needs to be managed in a manner that protects groundwater, surface water and air. For groundwater the beneficial uses to be protected are defined in the SEPP "*Groundwaters of Victoria*" (SEPP Groundwater) as maintenance of ecosystems, potable water supply, potable mineral water, agriculture, parks and gardens, stock watering, industrial water use, primary contact recreation and buildings and structures (GoV, 1997). The background salt levels of the groundwater, measured as total dissolved solids (TDS), define the beneficial uses that are to be protected in a given groundwater body. The higher the salt level, the less beneficial uses there are to be protected. Overriding this is the need to protect the maintenance of ecosystem uses of groundwater for any salt levels. This is critical as the base flow of many of our urban waterways are maintained by groundwater discharge. Other key aspects of the SEPP Groundwater that impact on current practice are that:

- If non-aqueous phase liquid (NAPL) is present in an aquifer, it must be removed unless the EPA is satisfied that there is no unacceptable risk posed to any beneficial use by the non-aqueous phase liquid. Demonstrating "*no unacceptable risk to any beneficial use*" is problematic and in many cases, removal of NAPL is not possible using correctly applied conventional techniques. However, there is an indication of a trend that management of NAPL may be acceptable in the future where its contribution to the overall site risks are low and its mobility can be managed.



- A "groundwater quality restricted use zone" (GQRUZ) can be established where an existing level of contamination of groundwater precludes one or more beneficial uses that would otherwise apply to that groundwater. The SEPP Groundwater defines the specific requirements for such zones related to management, clean up to the extent practicable and periodic review. This enables development of sites to proceed where the clean up of groundwater is determined not practicable by the EPA.

The discharge of water to surface water bodies such as the Bay or the Yarra River directly from the land or indirectly via the groundwater must also be considered. These discharges must not preclude the beneficial uses assigned to the relevant surface water body. These beneficial uses are outlined in the SEPP "*Water's of Victoria*", which also sets water quality objectives that are to be achieved within the water body itself (GoV, 2003). The land assessment also needs to recognise the need to protect the air environment as outlined in the SEPPs "*Ambient Air Quality*" and "*Air Quality Management*" (GoV 1999a & GoV 2001). While these SEPPs do not directly address impacts assisted with air emissions from contaminated land, they set the principles that the quality of the air is to be protected for beneficial uses such as human health. This often triggers the need to consider the impact of volatile chemicals within the soils and groundwater on indoor or ambient air quality.

Contaminated soil must be managed as a Prescribed Industrial Waste where they are to be removed from site. Producers of contaminated soil must categorise their waste into one of four categories, Category A, B, C or clean fill (EPA Publication IWRG621, 2009) (EPA, 2009). Descriptions of the threshold limit values (upper limits) of contaminants for these categories are outlined in EPA Publication IWRG621, Soil Hazard Categorisation and Management, dated June 2009. The options for the management of waste material in these categories are as follows:

- Category A – on-site remediation, off-site remediation or storage pending availability of treatment (i.e. immobilisation). Category A waste cannot be disposed to landfill, as there are currently no Victorian facilities licensed to accept Category A waste.
- Category B or Category C – on-site remediation, off-site remediation or disposal to a licensed facility.

Transport and disposal of Prescribed Industrial Waste is required to be carried out in vehicles licensed to carry such materials utilising EPA Waste Transport Certificates. Landfills accepting Prescribed Industrial Waste will have in place their own processes and procedures to assess the material being received.

In Victoria, it is expected that wastes including Prescribed Industrial Wastes should be managed in accordance with the waste management hierarchy (see the Act):

- a) avoidance
- b) reuse
- c) recycling
- d) recovery of energy
- e) treatment
- f) containment
- g) disposal.

The regulations aim to assist in promoting reuse and recovery of wastes by establishing secondary beneficial use (SBR). SBR is defined as an input or raw material substitute in a commercial, industrial, trade or laboratory activity following any form of treatment or reprocessing. Once the notification is authorised by EPA, the material is managed as a product and exempt from the regulations. For example; a secondary beneficial reuse could apply to contaminated biosolid materials redirected for use as a road embankment construction material or growing medium resource.

The Policy Impact Statement related to SEPP Land (GoV 2002), states that in seeking to apply the principle of the waste hierarchy and in seeking to achieve the best practicable environmental outcome, the following should be noted:

1. There is a preference for on-site treatment or management above off-site treatment, provided an equivalent environmental outcome can be achieved.



2. Where on-site management of contaminated soil is proposed, any ongoing management requirements must be practicable in the context of the proposed land use.
3. There is a strong preference for management approaches that involve treatment of any contamination, such that the soil is suitable for reuse without ongoing management restrictions.

To achieve the higher options on the waste management hierarchy, treatment of contaminated soil is necessary and is clearly the management option preferred by policy. This and other factors will see greater emphasis placed on treatment in favour of the traditional disposal and containment methods that have been used for contaminated soil management over the last decade.

1.5.2 The Environmental Audit System for Contaminated Land

The environmental audit system for contaminated land establishes a process of independent third party review to evaluate the condition of the site and form an opinion on its suitability for use. The independent review is carried by an EPA appointed Environmental Auditor. Environmental Auditors are engaged and paid by proponents, but their primary duty of care is to the Victorian environment and community. The Environmental Auditor is required to make a "total assessment" of the potential for detrimental impacts on the environment from contamination, by considering and applying EPA regulations, policies, and guidelines.

The environmental audit system provides the tool by which planning authorities can satisfy themselves that a proposed use of parcel of land is suitable for its intended use. A 53X audit of the condition of a site may result in the issue of a Certificate or Statement of environmental audit. If a Statement is issued for the site, it will likely place conditions / restrictions on the use of the land. In addition, under Section 53 ZE of the Act, an occupier is required to provide a copy of the Statement to any "potential" occupier of the site.

Under the Victoria Planning Provisions and planning schemes, there is a mechanism by which the Planning Authority can apply an *Environmental Audit Overlay* (EAO) over a parcel or parcels of land to ensure the requirement for an environmental audit under *Ministerial Direction No. 1* (DSE, 2005)) is met before the commencement of the sensitive use or any buildings and works associated with that use.

Overall, the environmental audit system has had a significant influence on improving the quality of site contamination assessment and remediation in Melbourne. Practitioners that are skilled in understanding the assessment-audit process can have a significant influence in achieving an Environmental Audit outcome for clients in a timely and cost effective manner with less uncertainty.

The various phases in this multi-stage assessment-audit process for contamination land comprise:

- Step 1.** Preliminary Assessment (site history review and limited environmental sampling).
- Step 2.** Site Assessment (sampling of soil, soil gas and/or groundwater).
- Step 3.** Potential Further Assessment of soil and groundwater to support Remediation Design (this may involve multiple stages and may need to demonstrate that groundwater has been cleaned up to the extent practicable (CUTEP)).
- Step 4.** Potential Remediation Implementation of soils and /or groundwater.
- Step 5.** Issue of a Certificate or Statement of environmental audit and Environmental Audit Report.
- Step 6.** Possible Ongoing Management and Monitoring.

The stage in the assessment-audit process which can often stall development is Step 3 where polluted groundwater is confirmed and needs to be remediated. Environmental audits cannot be completed until the groundwater condition complies with SEPP (Groundwaters of Victoria) (GoV, 1997) objectives or to the satisfaction of EPA and/or Environmental Auditor guidance. If further assessment can demonstrate to the satisfaction of the Environmental Auditor that the site is not the source of the groundwater pollution, then it is possible that the site developer would not need to:

- remediate the groundwater pollution and/or



- go through a protracted EPA-determined CUTEP process. In this situation the Auditor may be able to determine CUTEP.

The Environmental Auditor for the site would still need to be satisfied that the impacts to groundwater do not present an unacceptable risk to the use of the land (i.e. via vapour inhalation pathway). Under this scenario there may be a restriction on the future use of groundwater from beneath the site which would be identified on the Statement of environmental audit.

2.0 STUDY AREA LOCATION AND PLANNING INFORMATION

The Study Area comprises approximately 240 ha of private, State and Local Government owned land spanning several suburbs, predominantly Port Melbourne and South Melbourne. The Study Area is subdivided into four precincts (Plummer, Fennel, Lorimer and Montague Streets) as outlined in Table 1 below.

The four precincts are located within the municipalities of City of Port Phillip and City of Melbourne. Pursuant to the local planning schemes, Table 1 outlines the planning scheme zones that currently apply to each precinct. The current zoning and overlay maps for the precincts are provided in Appendix B5.

Table 1: Precinct Location and Planning Information

Precinct	Approx. Area (ha)	Precinct Boundary	Suburb	Municipality	Current Zoning*	Current Overlays**
Plummer Street Precinct	90	N: Westgate Fwy E: Graham St S: Plummer St W: Todd Rd	■ Port Melbourne	City of Port Phillip	■ IN1Z ■ B3Z ■ PPRZ ■ PUZ6	■ EAO ■ HO ■ CLPO ■ SBO ■ RXO
Fennel Street Precinct	80	N: Westgate Fwy E: Johnson St S: Williamstown Rd W: Graham St	■ Port Melbourne ■ South Melbourne	City of Port Phillip	■ IN1Z ■ B3Z ■ PPRZ ■ PUZ6	■ HO ■ SBO ■ DDO
Lorimer Street Precinct	45	NE: Lorimer St S: Westgate Fwy W: Graham St	■ Port Melbourne ■ Docklands	City of Melbourne	■ IN1Z ■ B3Z	■ CLPO ■ SBO ■ DDO
Montague Street Precinct	25	N: Westgate Fwy SE: City Rd SW: Boundary St W: Johnson St	■ South Melbourne ■ Southbank ■ South Wharf	City of Port Phillip	■ IN1Z ■ PUZ2 ■ MUZ ■ B1Z ■ PUZ4	■ EAO ■ HO ■ SBO ■ DDO

* Zoning overlays: B1Z, B3Z – Business Zones; IN1Z – Industrial Zones; PPRZ – Public Park and Recreation Zones; PUZ2, PUZ4, PUZ6 - Public Use Zones; and MUZ – Mixed Use Zones.

**Overlay definitions: EAO - Environmental Audit; HO – Heritage; DDO - Design and Development; SBO - Special Building; CLPO – City Link Project; and RXO - Road Closure.

Refer to glossary in the back of this report for more information on zoning and overlay definitions.



3.0 GEOTECHNICAL REVIEW

3.1 Geology of the Study Area

The four precincts are situated within the Yarra Delta in an area of Quaternary aged (< 2 Million years old) sedimentation at the head of Port Phillip Bay. The Yarra Delta consists of several flat lying geological formations, which were formed at the mouth of the Yarra River and together are known as the Yarra Delta Group. The Yarra Delta Group rests on a south-westerly dipping erosion surface which has been cut into the Tertiary and Silurian aged formations which underlie the area. This ancient landscape consisted of an irregular basin of valleys and hills, which was cut by the ancestral Yarra-Maribyrnong river system when sea levels were considerably lower than present (Neilson, 1996). The four precincts are located on the southern edge of this now buried valley system.

3.2 Geological Units

A review of the Melbourne 1:63,360 geological map (Figure 2) and accompanying sections published by the Geological Survey of Victoria (GSV, 1974) indicates the four proposed development precincts are underlain by the following geological units from oldest to youngest:

- Melbourne Formation (S_{ud}) – Siltstone interbedded with Sandstone.
- Werribee Formation (T_w) – dense sand and hard clay in varying proportion of fluvial origin.
- Tertiary Older Volcanics (T_{ov}) – typically weathered, closely jointed basalt flows interbedded with pyroclastic deposits such as tuffs.
- Brighton Group (T_b) – dense to very dense sands and hard clays in varying proportion of fluvial and shallow marine origin.
- Moray Street Gravels (Q_m) – dense to very dense sands with some gravel of fluvial origin.
- Fishermens Bend Silt (Q_f) – firm to stiff, weathered, silty clays of marine origin.
- Coode Island Silt (Q_c) – soft to firm highly compressible clay or silty clay with occasional sand lenses. Organic rich and known to contain gas pockets within the unit.
- Port Melbourne Sand (Q_p) – loose to medium dense clean sands of marine origin.
- Fill – highly variable properties which typically contains varying proportions of waste materials.

A detailed description of each unit is presented in Appendix A.

The near surface stratigraphy for each of the four precincts is anticipated to consist of the Port Melbourne Sand and Coode Island Silt as indicated on the Melbourne map sheet, capped by a layer of fill over much of the area. The surface and sub-surface distribution of the Yarra Delta deposits beneath the fill is anticipated to be variable and relatively complex over the Study Area. Neilson (1996) has attempted to map each of these units using historical borehole information, as outcrops of these units are limited. The Silurian aged Melbourne Formation forms the bedrock beneath each of the four precincts. Relevant sections from this paper are reproduced as Figures 3 and 4, with the section locations shown in plan on Figure 2.

The ancient landscape on which the Yarra Delta Group was deposited had considerable influence on the distribution of the oldest formation of the group (the Moray Street Gravels), which is confined to the lower levels of this landscape and is thickest where depressions in the landscape were the deepest. The thicknesses of the overlying units (the Fishermens Bend Silt and Coode Island Silt) were also subsequently influenced by this buried topography.

Fill thicknesses throughout the four precincts is anticipated to be highly variable but typically will range from 0.5 to 2.0 m. In areas where historical sand quarries and landfills have been in-filled, the depth of fill however



could be considerably greater. Figures 10 to 15 provide a preliminary indication of potential fill thicknesses across each of the four precincts. They have been prepared based on an assessment of Golder Associates existing site investigation information in the area, in conjunction with a review of the existing surface topography.

3.3 Future Geotechnical Implications for Development

Based on our current understanding of the geology of the Study Area, the key geotechnical issues and constraints which will need to be considered in the master planning process are as follows:

- The variable strength, quality and thickness of the fill soils in the four precincts.
- The weak nature of the near surface soils in the four precincts.
- The considerable depth to suitable founding strata for piles over much of the four precincts.
- Variable levels of differential settlement caused by the ongoing secondary consolidation of the Coode Island Silt.
- Connection of services to piled buildings.
- Differential settlement of services and the subsequent need to allow generous falls for gravity flow structures.
- The potential to trigger consolidation of the Coode Island Silt if the groundwater table is lowered during the construction of basement excavations or deep utility trenches.
- The potential for gas build up in basement excavations within the Coode Island Silt.

Given the above constraints, suitable foundation solutions for the proposed mixed use developments are likely to be as follows:

- Shallow spread footings or raft foundations for settlement tolerant buildings ranging in height from one to two storeys.
- Piled foundations for all non-settlement structures. Note that piled foundations may be required for single or two level buildings depending on a particular structure's tolerance for differential settlement.
- Constructing shallow basements for parking or avoiding basement construction by placing parking levels above ground.

A major geotechnical risk associated with low rise structures on the Coode Island Silt is their ongoing creep settlement caused by secondary consolidation. This occurs in the absence of development and can be exacerbated by development. While stand alone, settlement tolerant low rise buildings of small plan dimensions such as 15 m x 15 m, supported on appropriately designed raft slabs may perform satisfactorily, this may not be the case for structures which are not settlement tolerant and/or are of larger plan dimensions. This is due to differential settlement potentially resulting in tilt and cracking of buildings, as well as breakage of services.

The key geotechnical issues that will need to be addressed for shallow footings are:

- Allowable bearing pressures.
- Allowable total and differential settlement, including long term creep settlement.
- Shrinkage/swelling potential.
- Chemical attack on buried concrete.



- Generally shallow depth to groundwater.

For road pavement constructions, the key geotechnical issues will be the potential strength, moisture condition and reactivity of the sub-grade materials, as well as the potential for long term creep settlement, which could impact cross falls and required service gradients beneath the pavements.

Targeted site specific investigations are recommended to better define each of these issues once preliminary master plans have been developed for each precinct.

4.0 LAND CONTAMINATION REVIEW

4.1 General

This section summarises the findings of the land contamination review. Detailed information to support this summary is provided in Appendix B as follows:

Location of Information	Information Source and Type of Information
Appendix B1	Summary Table B1 of historical and current uses that brings together information gathered during review of Melways directories, MMBW Plans, aerial photos and review of publicly available Environmental Audits reports.
Appendix B2	Regulatory review summary table B2 that brings together the findings of the EPA Statutory Environmental Audits and Priority Sites Register. This information has been used to assist in developing the assumptions for the likely contamination risks for the Study Area.
Appendix B3	Aerial photos georeferenced to the Study Area and Table B3 summarising the findings.
Appendix B4	Information regarding environmental management of acid sulfate soils (ASS).
Appendix B5	Council planning and zoning documents.

4.2 Overview of Study Area Development and Land Use

European settlement of the Study Area, including greater Melbourne first occurred in the 1830s. Port Melbourne was originally named Sandridge until the mid 1880s. The portion of the Study Area within South Melbourne (the Lorimer Street Precinct and part of the Montague Street Precinct) was established as an industrial area from the mid to late 1800s, particularly for use for animal and animal product processing including abattoirs, boiling down works, bone mills, manure and glue factories, soap and candle makers. The greater portion of the Study Area, comprising Port Melbourne and the central and western portions of Fishermans Bend was not established as an industrial centre until the late 1920s / early 1930s where vacant undeveloped land was still present in the Plummer Street Precinct as late as the early 1970s as can be seen in the aerial photos (refer to Appendix B3).

Prior to the 1920s, the central and western portions of the Study Area were used for sand quarrying, grazing, a rifle range, a golf course and various air fields. It is understood that uncontrolled sand carting from the area was undertaken until the 1870s when attempts were made for sand quarrying to occur in designated areas (Uren, 1983). These features are noted on Figures 12, 13, 16 and 17 and can be seen in aerial photos Figures B1 to B8 in Appendix B3.

Following the decision to utilise the greater Fishermans Bend area for industrial purposes in the late 1920s / early 1930s, development of the area occurred at a steady rate. Past and present development within the Study Area following this time has included:

- Automotive industries including vehicle manufacturing plants, car dealerships, auto mechanics and other vehicle services (e.g. panel beaters) including fuel merchants.



- Manufacturing industries (including chemical manufacture) for manufacture of soap and cleaning products, rubber works, possible battery manufacture, plastics and packaging manufacturing, paint works, concrete works, timber yards, woollen mill and printing works.
- Engineering and metal manufacturing, refining and finishing works including foundries and heavy engineering firms (e.g. manufacture of heavy machinery), iron, steel and other metals works, electroplating and electrical and electronic equipment manufacturing works.
- Transport and logistics industries including container transport, fleet management, distribution centres storage and warehousing (including Australia Post).
- Waste services and council depots including former landfills (municipal tip), transfer station (former destructor) and scrap metal site.
- Various other industrial and commercial uses.
- Various public infrastructure and facilities including tram depot and workshop, substations, essential services (fire brigade, ambulance), parklands and reserves, railway reserves and roads.
- Limited residential use (Montague and Fennell Street Precincts).
- Pockets of vacant land also exist across each of the precincts.

It is noted that no drycleaners were identified to be currently operating within the Study Area, however they may have existed previously. A former dry cleaning manufacturer is understood to have existed within the Montague Precinct (sub precinct M19).

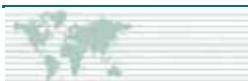
The historic and current land uses are outlined in Table B1, Appendix B1 with key sites shown on Figures 14 to 17.

4.3 Potential Contaminants and Contaminant Sources

Based on the high level contamination review, the 'drive by' of the Study Area along with our experience and knowledge of industries, the potential contaminants and their general sources are listed below. Further details for specific industries are provided in Appendix B1 of this report. Note for the purposes of this assessment, site specific information about the type and nature of operations and specific processes and chemical uses was not assessed and as such the extent of applicability of the below contaminants has not been ascertained.

The following potential contaminants and contaminant sources may be widespread across the Study Area:

- Heavy metals (As, Cd, Cu, Cr, Hg, Pb, Ni, Zn) and metalloids associated with imported fill and various industrial waste streams (e.g. foundries and other metal works, timber works, paint works, printing works, etc).
- Polycyclic aromatic hydrocarbons (PAHs) associated with imported fill (especially gasworks wastes from the nearby South Melbourne and West Melbourne Gasworks), use and storage of fuels and oils, by-products from boiler houses and various industrial waste streams.
- Petroleum hydrocarbons (total petroleum hydrocarbons (TPH), monocyclic aromatic hydrocarbons (MAHs)) and phenols associated with the use and storage of fuels and oils and various industrial waste streams.
- Solvents (non-chlorinated solvents (e.g. kerosene, petroleum ether, white spirit, turpentine, phenol, acetone, MEK, MIBK, MBK) and chlorinated solvents (e.g. PCE, TCE, and breakdown products)) associated with the use and storage of lubricating and hydraulic oils, degreasers and various industrial waste streams.



Other potential contaminants that may be present but less likely to be widespread:

- Acids and caustics associated with imported fill, animal and animal product processing (e.g. soap works) and various industrial waste streams.
- Inorganics (e.g. high salinities (TDS), nutrients (ammonia, nitrate, sulfates)) associated with imported fill (including Coode Island Silt), animal and animal product processing (e.g. soap works) and various industrial waste streams.
- Polychlorinated biphenyls (PCBs) associated with the manufacture and use of transformers and capacitors (may exist in electrical substations) and manufacture of electrical equipment.
- Pesticides / herbicides associated with spraying of weeds and pests.
- Chemicals associated with plastics, adhesives and resins (e.g. polyvinyl acetate, formaldehyde, acrylates, phthalates etc).
- Cyanide associated with imported fill (by products of nearby gasworks), metal treatment and other industrial streams.
- Asbestos associated with the construction and demolition of existing and former buildings.
- Methane and hydrogen sulphide and other landfill gasses associated with landfill sites.
- Other industry specific and "exotic" chemicals that will need to be assessed during site specific site history assessment (see Table B1 in Appendix B1).

4.4 Summary of Potential Contamination Issues

The following section outlines the potential contamination issues and potential liabilities that have been identified across the Study Area. Sub-precinct and site specific issues are discussed in the contamination risk ranking Section 4.5.2.

Risks to Land

- The key contamination risks to soils within the Study Area are primarily associated with the importation of fill and activities carried out on individual sites. To a lesser degree, activities on sites adjacent to the Study Area also have the potential to contaminate soil, via the migration of impacted soil gases and/or groundwater.
- The desk-top review identified that broad scale filling exists across the Study Area, likely to be between 1 and 2 m thick. As outlined in Section 3.2, in areas where historical sand quarries and landfills have been infilled, the depth of fill however could be considerably greater. Figures 10 to 13 provide a preliminary indication of potential fill thicknesses across each of the four precincts. This practice of filling in the inner Melbourne area in the late 1800s typically involved the use of surplus soil from construction works or industrial sites (i.e. local gasworks). It is understood that silt recovered during the deepening of Coode Canal in the late 1800s may have been used for land reclamation in the Fishermans Bend area (Uren, 1983). Our experience in the Port Melbourne and South Melbourne area suggests that imported fill is generally contaminated. The degree of contamination will be variable depending on the sources of fill used at the time. A review of publicly available Environmental Audit reports indicated that fill is impacted with varying concentrations of heavy metals, PAHs and potentially cyanide. The fill is also likely to be aesthetically impacted with inclusions such as building rubble (fragments of brick, glass, wood and possible asbestos containing materials), charcoal, ash and slag along with household wastes such as fragments of ceramics, glass and scrap metals are common.
- The past uses may also have impacted on the soil with areas of more localised contamination around various processes within each industry. A wide range of chemicals, oils and solvents may be used in the manufacturing and other industrial processes. Soil contamination risks mainly arise from production



areas, fuel and energy services, bulk storage and transfer operations associated with underground storage tanks or above aground storage tanks, underground pipework, drains, pits and hazardous materials storage areas. There may be soil contamination risks associated with ancillary activities, such as maintenance workshops, fuel storage, oil storage and pest control etc.

- In addition to the possible presence in fill, as outlined in Section 3.2, the near surface stratigraphy for the Study Area is anticipated to consist of Coode Island Silt in addition to the Port Melbourne Sand. Under anaerobic conditions, soils of the Coode Island Silt formation can be considered potential acid sulfate soils (PASS). The presence of PASS will also need to be managed if the soil is likely to be disturbed (i.e. excavated) which may be the case should a basement or other subsurface infrastructure be proposed. This may also impact on any excavation required for soil remediation. Further information regarding the risks associated with acid sulfate soil (ASS) and management measures is provided in Appendix B4.

Risks to Groundwater

- There is the potential for local extractable groundwater to be present in more than one aquifer across the Study Area (e.g. within the Port Melbourne Sands, Moray Street Gravels, refer to Appendix A).
- The low TDS of the Port Melbourne Sands aquifer means that although there is a reticulating water supply to the area, there is the potential for individuals to install shallow spear point wells to extract groundwater for extractive uses such as irrigation, stock watering and domestic use. A review of the Department of Sustainability and Environment (DSE) Groundwater Resource Database indicated there are 3 registered groundwater bores located within the Study Area for extractive purposes (irrigation). These wells appear to be located within the Port Melbourne Football Oval (Fennell Street Precinct).
- The groundwater in the area is relatively shallow ranging from 1 to 3 m below ground surface (bgs). The presence of shallow groundwater, with possible perched water in the fill horizon, makes it sensitive to potential land contamination impacts from poor site practices or leaching from fill contained leachable contamination.
- Regional groundwater flow direction is inferred to be towards the south to south west. However completed audit reports within and adjacent to the Study Area indicates groundwater flow direction varies widely attributed to local influences to groundwater direction by the presence of man-made features within and adjacent to the Study Area such as the filled quarries and underground infrastructure such as sewers.
- The key contamination risks to groundwater will be associated with on-site activities with possible off-site impacts also forming sources of groundwater contamination. Based on the historical information reviewed to date, the main risks related to groundwater will be from:
 - Potential contamination from metals leaching from fill and contamination from the past use of the site for many metal related industries;
 - Potential contamination from hydrocarbons and / or other stored chemicals from underground storage tanks or above aground storage tanks should these be present on individual sites (several vent pipes indicating the presence of USTs were identified across the Study Area during the drive-by as outlined in Table B1, Appendix B1, however there is potential for others to exist);
 - Potential contamination from chlorinated solvents associated with metal degreasing current to various manufacturing industries associated with tools, electronics, defence and automotive production;
 - Elevated ammonia and methane concentrations due to the anaerobic conditions caused by the historic filling and reclamation activities.



Risks posed to Aesthetics

- The desk-top review identified that there are likely to be potential aesthetic impacts in fill and groundwater (e.g. visual and olfactory contamination such as hydrocarbon staining or building rubble in fill). These issues will still require management during redevelopment by removal of those soils deemed aesthetically unsuitable in sensitive areas such as in low to medium density residential developments with access to soils. However where there will be a separation layer established between aesthetically impacted soils and site occupants by a building envelope (i.e. slab of high density apartment block) this risk can usually be managed.
- Noise and odour generated by currently operating industrial facilities may pose a risk to aesthetic enjoyment in sensitive areas such as residential zones. It is noted that during an Internet based search that the Symex site (located within the Fennell Street Precinct) has been issued with Clean up Notices by EPA in the past relating to noise issues.

Risks to Air

- Potential exists for concentrations of volatile and semi volatile contaminants (e.g. hydrocarbons) in soil and groundwater that could potentially present an unacceptable vapour risk to human health, for residential uses in particular, without management. This would need to be assessed on a site by site basis.

Other Risks - Risks posed by Former Landfills

- Two former landfills exist in the Plummer Street Precinct. In addition to posing a contamination risk to soil and groundwater, former landfills have the potential to pose a risk via potential landfill gas migration. EPA Publication 788.1 'Best Practice Environmental Management: Siting, Design, Operation and Rehabilitation of Landfills' (BPEM), dated September 2010 specifies landfill post-closure buffer distances to manage potential risks associated with landfill gas migration. It is understood that landfills within the Plummer Street Precinct accepted putrescible waste and would therefore be classified as a 'Type 2' landfill. A Type 2 landfill requires a buffer distance of 500 m from buildings or structures for a minimum period of 30 years post closure of the landfill.

The BPEM recommends that:

'in the event that a building or structure is located within the recommended buffer, monitoring will be required in accordance with EPA landfill gas risk assessment requirements'

The BPEM recommends that an Environmental Audit should be conducted under Section 53V of the *Environment Protection Act* to assess the risk of landfill gas migration on structures within the buffer distance. Both of the landfills have been audited and the potential for landfill gas was assessed. The risks posed by landfill gas was considered acceptable in the context of the use of the land as a sports ground (Todd Road former landfill site) and commercial use (Salmon Street former landfill site) with appropriate management measures. On this basis, the risks posed by landfill gas may be acceptable, although further assessment in the context of landfill gas migration and its impact upon sensitive land use will need to be considered in light of the BPEM. The planning authorities (City of Port Phillip and City of Melbourne) are likely to consider the EPA BPEM as part of the planning process for the Study Area.



4.5 Review of Contamination Risks

4.5.1 Approach

Land contamination risks within the Study Area have been evaluated using qualitative risk ranking methodology. The approach involved the following key steps:

- Subdivide the Study Area into land parcels of similar current and/or past land use.
- Assessment of the relative significance of potential soil and/or groundwater impact given the findings of this high level contamination review of current and/or historical use of the land parcels.
- Assessment of the likelihood of significant remediation of soil and/or groundwater impact required to achieve potential land uses;
 - Low Density Residential / School / Kindergarten,
 - High Density Residential,
 - Recreational, and
 - Commercial / Industrial.
- The ranking of potential land contamination was divided into the four broad and subjective contamination risk categories (High, Medium, Low or Not Applicable (NA)).

The subjective factors that were considered as part of assigning contamination risk rankings included the following:

- Former and current precincts site uses / activities (e.g. residential, commercial or industrial).
- For industrial and commercial use, the following factors were considered:
 - Industry type (e.g. manufacturing, oil and gas, waste, non-hazardous commercial);
 - Age, size and date of operations;
 - Likelihood of large volumes of chemicals used on-site including potential underground storage tanks (USTs);
 - Likelihood of more volatile/mobile (organic contamination as chlorinated solvent of fuels) versus less mobile metals contamination;
- Location of landfilling or reclamation activities; and
- Current site condition (note this is based on the observations made during the 'drive-by' inspections).

The risk rankings are based on and limited by the readily available information and our judgement as to the relative potential for land contamination given the current or historic use of a given land parcel within the Study Area. These risk rankings are not quantitative. Further investigation of each land parcel would be required to refine risk rankings and to quantify potential remediation costs.



Table 2: Land Contamination Risk Ranking

Land Contamination Risk Rank	Definition of Risk Rank	Likelihood of Significant Remediation required to Achieve Identified Land Use			
		Low Density Residential / School / Kindergarten	High Density Residential	Recreational	Commercial / Industrial
NA ¹⁾	Soil and Groundwater Contamination is Unlikely ¹⁾	Unlikely	Unlikely	Unlikely	Unlikely
Low	Soil Contamination is Likely & Groundwater Contamination is Possible. The information suggests that there may have been some activities on the site that have resulted in localised contamination of the land but the site is not likely to be a source site for groundwater impact.	Possible	Unlikely	Unlikely	Unlikely
Medium	Soil & Groundwater Contamination is Likely. The information suggests that the site activities may have contaminated the land and/or groundwater. Some remediation of soil will potentially be required and there will be a potential need for groundwater remediation.	Possible with some restrictions	Possible	Possible	Unlikely
High	Soil &/or Groundwater Pollution. The information suggests that the site activities are likely to have caused pollution that would likely require soil remediation and/or active groundwater remediation.	Likely	Likely	Likely	Possible

1) Not Applicable (NA) - has been applied to existing sensitive uses such as low density residential land and kindergartens as it has been assumed for the purposes of this report that the occupancy of these existing sensitive use means that they are already fit of purpose and are unlikely to require significant remediation to be redeveloped for a similar or less sensitive land use.

The risk ranking definitions use the terms "unlikely", "possible" and "likely" to represent an increasing level of risk. The term "pollution" reflects higher risk than "contamination". "Pollution" of soil or groundwater implies that further investigation and possibly remedial action is required irrespective of the proposed land use. This ranking structure has been used to assess **relative risk** based on available "desk top" information. As there has been limited intrusive investigation to confirm our subjective judgements, there is limited evidence that contamination or pollution has actually occurred.

4.5.2 Summary of Potential Contaminants and Impact Areas

Based on the risk ranking methodology outline above, the applied risk rankings are presented on Figures 18 to 21. The sites / sub precincts considered to contain a "High" risk ranking are summarised below.

Plummer Street Precinct:

- Sub precinct P1 – Former landfill and currently operating chemical manufacturing plant Detmold Group (a vent pipe and signage indicating the presence of a UST noted during the drive-by).
- Sub precinct P2 – Former landfill.
- Sub precinct P3 – Former car manufacturing plant (Chrysler) and currently operating Niche transport services (a vent pipe indicating the presence of a UST was noted during the drive-by).



- Sub precinct P5 – Former car manufacturing plant (Chrysler) and currently operating service station.
- Sub precinct P6 – Currently operating timber works Gunnersons (a vent pipe indicating the presence of a UST noted on what appears to be Gunnersons's land during the drive-by).
- Sub precinct P9 – Former lead based paint manufacturers (BALM), currently a self storage facility.

Fennell Street Precinct:

- Sub precinct F2 – Currently operating printing works (Cambridge University Printing Press and Sumo printing services). Also former location of car part manufacturer Disco.
- Sub precinct F3 – Current warehousing site. Unknown former use, however a vent pipe indicating the presence of a UST was noted during the drive-by.
- Sub precinct F5 – Former vehicle manufacturing plant (Toyota) and former chemical manufacturing plants Felton & Grimwade and then Nightingale.
- Sub precinct F11 – Currently operating chemical manufacturing plants (Unilever and Symex).
- Sub precinct F12 – Site currently occupied by AWA (computer services). Unknown former use, however a vent pipe indicating the presence of a UST was noted during the drive-by.
- Sub precinct F14 - City of Port Phillip Resource Recovery Centre (former destructor). Fuel bowsers were noted at the site which is inferred to be occupied by Dyson and Son (transport services).
- Sub precinct F17 – Currently operating Beaurepaires tyre services site which may have previously been operated as a service station site based on the site layout.

Montague Street Precinct:

- Sub precinct M1 – Former Dunlop Rubber manufacturing plant and current Mazda dealership with service centre and Otis Elevator Company.
- Sub precinct M3 – Former Dunlop Rubber manufacturing plant buildings, currently a self storage facility.
- Sub precinct M10 – Former Loconia Woollen Mills, currently unoccupied.
- Sub precinct M14 – Currently operating Print Mint printing works and Classic Blue computer services (a vent pipe indicating the presence of a UST was noted during the site drive-by at the Classic Blue site).
- Sub precinct M20 – Possible former auto mechanic (a vent pipe indicating the presence of a UST was noted during the site drive-by).

Lorimer Street Precinct:

- Sub precinct L4 - Concrete manufacturing works (fuel bowsers were noted during the site drive-by).
- Sub precinct L6 - Timber yards (Auspine).

Roadways in All Precincts:

The contamination risk ranking for roadways including median strips and road verges etc. has not been visually shown on Figures 18 to 21. Due to the broad extent of filling across the Study Area, it is likely that these areas would include contaminated materials. We have assessed that the risks presented by these materials would on average categorise as a low risk for much of the Study Area. Areas of the Study Area where the risks could be relatively higher are those associated with parts of the precinct where the roads historically may have been in private ownership such as within the large industrial land parcels like Toyota (Fennell Street Precinct), Chrysler (Plummer Street Precinct) and Dunlop Rubber (Montague and Fennell



Street Precincts). In these parts of the Study Area the roads may present a higher contamination risk (i.e. medium to high risk) reflecting the assigned risk rankings of the adjacent land parcels.

As noted above, as there has been limited intrusive investigations across the Study Area, if at all, to confirm our subjective judgements, there is no evidence that contamination or pollution has actually occurred. The risk rankings maybe downgraded or upgraded as further information comes to hand.

5.0 POTENTIAL CONTAMINATION COST IMPLICATIONS ON DEVELOPMENT

The development of industrial land to a more sensitive use generally presents a potential cost penalty to developers through the need to investigate and potentially remediate the affected environment. Where potentially contaminated land (i.e. industrial land) is proposed to be rezoned to a sensitive use (i.e. residential uses etc), Environmental Audits under Section 53 of *Environment Protection Act* (GoV, 1970) are used by the planning authority to evaluate that the land is suitable for the intended use. Where the site is to be redeveloped, but to lower sensitive uses (i.e. commercial and/or open space uses etc and not residential), the planning authority may not require an Environmental Audit to verify the assessment and/or remediation phase. The removal of the potential audit stage may reduce the contamination costs on the development. Guidance to planning authorities on identifying contaminated land and determining the appropriate level of assessment is set out in the Department of Sustainability and Environment (DSE) Practice Note (DSE, 2005).

In the main, the potential contamination costs associated with developing contaminated land relate to the following stages:

- Phase 1 and 2 - Soil and Groundwater Assessment
- Phase 3 - Soil and/or Remediation
- Phase 4 - Environmental Audit

Golder Associates has reviewed the contamination costs inclusive of Phase 1 to 4 for a portfolio of our recent remediation projects that have generally supported the issue of Environmental Audits stating that former industrial land is suitable for the intended use. The intended use for these benchmarked sites included low/high density use through to commercial use, therefore representing a mix of end uses. Golder Associates has used this data, which represents 20 remediation sites encompassing over 100 hectares of industrial land, to provide an initial benchmark of the potential contamination costs per hectare at a strategic level for the Fishermans Bend Study Area. The benchmarked remediation costs were also used to assist in calibration of relative remediation risk ranking assigned to land parcels. The bench marked estimates indicate the following average contamination costs:

- Low Risk - average cost of < \$1 M / ha
- Medium Risk – average cost of \$3 M / ha
- High Risk – average cost of > \$6 M / ha²

The estimate of > \$6 M/ha is not an upper limit for high risk sites with a significant soil and/or groundwater remediation issue to address. For example, two of the sites categorised as high risk within the list of benchmarked sites had an approximate contamination cost in excess of \$10 M / ha. The benchmarked remediation costs are presented in Appendix C of this report. It must be recognised that the average cost estimates are indicative for this high level land contamination study only.

² The estimate of >6 M/ha is by no means an upper limit for high risk sites with a significant soil and/or groundwater remediation issue to address.



Further investigations would be required to better quantify the extent of remediation required to achieve particular land uses. In Golder Associates' experience investigation programs for a small industrial site of approximately 0.2 ha (i.e. typical service station site) range from approximately \$100 K to > \$250 K while the larger manufacturing site of approximately 2 hectares range from \$250 K to >\$1 M depending on the proposed land use and degree of contamination encountered.

The cost estimates are highly sensitive to:

- Economies of scale (large remediation sites often lead to lower remediation \$ / hectare);
- Volume of contaminated soil remediated onsite/ removed offsite;
- Vapour phase remediation works; and
- Groundwater remediation works.

The cost estimates include potential costs associated with minor excavation works to support development, however they largely exclude costs associated with removal of excess spoil to support potential basements. The potential costs associated with common contaminated soil disposal scenarios where the development requires a single level basement is outlined below on a cost per square metre basis.

Table 3: Potential Soil Disposal Costs for Excess Contaminated from a Single Level Basement Excavation (\$/m² of basement)

	Depth of Basement (m)	Waste Soil Mass per m ² of Basement (tonne) (density of 1.8 t/m ³)	Estimated Landfill Disposal Cost (2012) (\$ per tonne) (excl. GST)	Soil Disposal Cost Estimate (\$ per m ² of basement)
Category A (high)	3	5.4	\$1,200	\$6,500
Category B	3	5.4	\$750	\$4,050
Category C (low)	3	5.4	\$130	\$700

The potential soil disposal costs for excess contaminated soil from a single level basement are based on the following assumptions:

- The estimated rate for disposal of Category A Waste is based on the assumption that on-site treatment of the material is not possible;.
- Exclude the cost associated with:
 - Remediation excavation;
 - Stockpile classification testing and preparation of off-site disposal waste classification advice;
 - Haulage costs from site to receiving landfill facilities;
 - Disposal of excavated material other than soil including but not limited to rock and demolition waste;
 - Excavation of additional material for the purpose of attaining development design levels;
 - General works tendering, design and other service costs related to the development;
 - Detailed civil excavation costs associated with services, pavements and foundations;
 - Construction of the pavement separation layers, building slabs and foundations;
 - Potential hazardous building material cost constraints, including asbestos and PCB transformer oils;



- Long term environmental management costs; and
- All other development costs not specified above.

To illustrate the additional cost penalty of removing contaminated soil to support a single level basement development we have provided a potential development scenario. For a 0.2 hectare site (2,000 m²) (i.e. typical service station site) where the soil is typically classified as 20% Category B soil and 80% Category C, the cost estimate for soil disposal for a single level basement would be approximately \$2.7 M. This equates to an additional cost of approximately \$13.5 M / ha over and above the costs associated with site remediation.

6.0 POTENTIAL CONTAMINATION STRATEGIES TO SUPPORT DEVELOPMENT

The following sections provide information on potential contamination strategies to support the evaluation of integrated cost effective remediation of the Study Area from site to precinct scale development considerations.

6.1 General Site Specific Contamination Strategies and Remediation Options

According to Section 22 of the *Land SEPP* (GoV, 2012) where contamination has occurred strategies must be consistent with the provisions of the *Environment Protection Act 1970*, to prevent further contamination and where practicable maximise all potential uses of a site. The preferred contamination strategy should be determined with reference to the principle of the waste hierarchy achieving the best practicable environmental outcome; and protection of beneficial uses. To achieve the higher options on the waste hierarchy, treatment of contaminated soil is necessary and is clearly the management option preferred by policy. This and other factors are likely to see greater emphasis placed on onsite treatment in favour of the traditional disposal and containment methods that have been used for contaminated soil management over the last two decades.

The general types of remediation strategies that are adopted to support the redevelopment of industrial sites around Melbourne typically involve one or more of the following:

- Risk assessment
- Source removal
- Capping and/or containment
- Vapour management
- Onsite soil or groundwater treatment to destroy, remove and/or stabilise
- Offsite disposal and/or treatment

Remediation of contaminated soil in Victoria has mainly involved management of soil on site (e.g. under buildings, capping layers and/or containment in mounds) and disposal to landfill either as Category A to C – Prescribed Industrial Waste. In a number of instances large contaminated soil mounds with specially built lining and capping systems have been constructed as part of major remediation projects, e.g. former Albion Explosives Factory (Cairnlea) and the former ADI Footscray site (Edgewater).

The ability to leave contaminated soil on-site under buildings and capping layers has been largely facilitated by the Environmental Audit system where an Environmental Auditor can impose conditions on the land to manage the potential impact of the contamination. This system has worked well for more than a decade although there is some concern that the imposed conditions at many sites may not be fully implemented or



maintained. EPA is giving this matter greater attention and it is likely that Planning Authorities will need to take greater responsibility for management of Environmental Audit conditions with a likely consequence that they will discourage use of conditions, particularly those that are complex.

Although excavation of contaminated soil followed by landfill disposal has been a common technique for remediation, the increasing cost of landfill disposal has seen a shift away from solely relying on landfill disposal for remediation, particularly for the highly contaminated soils. Notwithstanding this, the high differential cost between Category C (Approx. \$130/t) and Category A (Approx. \$1,200/t) has resulted in a greater focus on detailed classification of contaminated soil to minimise the amount that of high level contaminated soil disposed to landfill.

Soil technologies are starting to be introduced to Victoria for the treatment of contaminated soils, particularly for organic contamination. The commonly available treatment technologies for contaminated soils in Victoria include:

- *Bioremediation* – Contaminated soils are mixed with nutrients and/or organic matter to enhance the biodegradation of organic contaminants. Clean-up may be achieved in a few months to several years depending on extent of contamination and recalcitrant nature of the chemicals and volume of soil to be treated.
- *Thermal Desorption* - Thermal treatment encompasses a number of technologies, which are based on using heat to remove and/or destroy the contaminants in the soil. Clean-up may be achieved in a few weeks to months depending on volume of soil and the throughput rate of the technique. Thermal treatment also has lower levels of uncertainty and risk of failure/incomplete success in delivering the remediation objective than many other techniques, although costs can be high. A key advantage of thermal-based treatment technologies is that they are able to remove and destroy almost all common organic contaminants from soil in one treatment, leaving minimal contaminant residue in the soils.
- *Chemical oxidation / reduction treatment* - is applicable to the organic contaminants groups, including TPH and MAH, PAH, organochlorine compounds and other organics and cyanide. The oxidant / reductant needs to be matched to the requirements of the contaminant. Chemical oxidation / reduction is a less common than bioremediation, although may achieve site clean-up more quickly at a higher cost.
- *Soil Immobilisation* - Immobilisation is sometimes also referred to as stabilisation and can also be used to reduce the mobility of metals, PAHs and other organics in contaminated soil using chemical or physical binders, e.g. cement. This treatment technique does not remove the contaminants from the soil medium but reduces the solubility and mobility of the contaminants and therefore the potential for exposure to humans and environment. Therefore, this technique may only be applicable as a pre-treatment for containment, controlled reuse (on site or off site) or disposal as a lower waste category.

Remediation options for groundwater impacts in sedimentary deposits found within the Study Area, with groundwater present at depths of between 1 – 3 mbgl are briefly described below. Note that as site specific data becomes available on fill conditions, depth to Port Melbourne Sands and / or Coode Island Silts, remedial options can be further reviewed. Assessment of the remedial options will also depend on factors such as the location of current and future sensitive receptors, transport mechanisms and nature of contamination present. It is noted that acid sulfate soils are also widespread in the Study Area, which will require assessment and monitoring during groundwater remediation works.

Groundwater contamination remedial options may include:

- Utilisation of a *funnel and gate type groundwater treatment system* - through utilisation of natural groundwater flow directions and directing this flow through an insitu treatment system (whether static or active), groundwater can be effectively remediated whilst reducing drawn down and generation of acid sulfate conditions.



- Establishment of *groundwater extraction across a trench or well network*, with above ground treatment of contaminants. Such an approach would require careful management to ensure induced draw-downs do not generate acid sulfate conditions.
- *Bioremediation* - utilising injection of nutrients to enhance natural attenuation pathways of contaminants present in the groundwater.
- *Insitu chemical oxidation / reduction* - through injection of chemicals which enhance the degradation of contaminants either through an oxidation or reduction pathway. This can be performed insitu, where oxidant / reductant are backfilled in open excavations or may be through pressurised injection into the matrix.
- If light non aqueous phase liquid (LNAPL) or dense non aqueous phase liquid (DNAPL) are present within the aquifer, *targeted extraction through skimming or extraction* would be assessed.

In-situ treatment techniques including, bioventing, air sparging, and soil vapour extraction (SVE) are applicable to TPH and MAH, PAH, organochlorine compounds and other organics and cyanide. The application of these technologies will be reliant on the volatility and biodegradation pathways of the specific contaminant as well as the characteristic of the impacted soil matrix. Less-volatile contaminants may require thermal injection to potentiate SVE. These techniques are available in Victoria for treating soils as well as groundwater.

Remedial options for the management of vapour risks may include:

- A *multiphase extraction* approach which assists with controlling groundwater gradients as well as influencing vapour migration pathways.
- *Soil vapour extraction*, focussing on single phase extraction of vapour either through a trench or below ground well network.
- Building design, working with developers to *integrate vapour management within the building design* and utilising a vapour barrier to protect sensitive receptors.

The strategies and options presented above are based on Golder Associates' local and international experience investigating, remediating and managing contaminated sites. As such the strategies and suitable options will require confirmation by undertaking specific investigations for specific sites and development concepts.

6.2 General Classification for Soil Suitability for Use or Disposal

The EPA guidelines have been used to assist in establishing remedial strategies and off-site disposal requirements (EPA, 2009) for Fill Material, Category A, Category B and Category C soils. At present Fill Material can be disposed of without restriction provided there are no environmental impacts. Category B and C must be disposed of to nominated landfills licensed to accept such waste, while Category A must be pre-treated before disposal. The National Environment Protection Measure (NEPM) also provides criteria for various land uses which can be used to assess remediation scope once more information is available from the further investigation works.

As a guide, contaminated soils (i.e. Category A to C) which do not present a vapour or leachable risk to groundwater may be suitable to remain on site for High Density Residential, Commercial, Open Space and Industrial land uses as long as:

- direct contact with these soils is prevented, i.e. they are located beneath building slabs and footings or they are covered, in open areas, with 0.5 to 1 metres of "clean" top soil;
- these soils do not come into direct contact with groundwater; and
- the risks to human health and environment can be shown to be acceptable for the proposed on site management.



Contaminated soil is generally not suitable to remain on site without remediation or implementation of significant management controls including a long term environmental management plan (EMP) to achieve a site condition that presents an acceptable risk to human health and the environment.

6.3 Land Use Specific Remediation Strategies

These remediation strategies have been outlined in the context of the range of possible land uses that are likely to be part of the proposed mixed used development of the Study Area. The following section outlines land use specific remediation strategies.

Low Density Residential / School / Kindergarten

With these sensitive land uses development typically means that there is less opportunity to manage contamination on the land. It is not as easy to restrict the future owners in terms of excavations that they may do on their land or in terms of where they might position building footings or slabs. Formal planning tools to implement such restrictions can be used, but this can lead to reduced land value and/or increase cost to council or an owners corporation who might be responsible for monitoring adherence to the restrictions. As a result, sensitive use sites particularly low density residential land development often results in the highest level of clean up being required from a practicality point of view. To reflect this, the remediation strategy would typically need to include:

- Remediation of any targeted features within the land parcel.
- Removal, treatment or disposal of any identified Category A, B or C material (refer to Section 6.2).
- Replacement of the volume of material removed with "clean" imported Fill Material.
- Remediation of any source of groundwater pollution to the "extent practicable".
- Remediation of groundwater pollution, if required, such that pollution no longer exists on the land and emanating from the land, if the land was the source of the pollution.

It is noted that there may be more of an opportunity to manage contaminated material in government owned sensitive use sites such as schools where there is a responsible authority to manage potential long term environmental management conditions.

High Density Residential and Commercial / Industrial

High Density residential and Commercial / Industrial land use development typically means that there is more opportunity to manage contamination on that land. The intensity of development in such land uses often means that extensive areas of the land become sealed or capped with pavement or building slabs. These features can help to reduce access to contaminated soils. They also reduce the infiltration of rainwater which has the potential to carry contaminants within the soil to depth including groundwater where they might then migrate off site. As there is usually one owner for a larger portion of land, environment management plans (EMPs) to maintain the long term integrity of any capping system can be implemented and monitored more readily for such developments. To reflect this, the remediation strategy would generally need to include:

- Remediation of any targeted features within the land parcel.
- Removal, treatment or disposal of any identified Contaminated Soil (refer to Section 6.2). We note that on a site specific basis, some contaminated soil may be able to remain depending on the toxicity and mobility of the particular contaminant and soil mixture.
- Replacement of the volume of material removed with "clean" imported fill.
- Remediation of any source of groundwater pollution to the "extent practicable".
- Remediation of groundwater pollution, if required, such that pollution no longer exists on the land and emanating from the land, if the land was the source of the pollution. We note that in some



circumstances, groundwater contamination can be monitored and managed via a Site Environment Management Plan (EMP), which is the responsibility of the owner. This may obviate the need for immediate remediation. This is particularly the case where groundwater is contaminated but not currently "polluted" but may become so in the future if not monitored or controlled.

Open Space

We have assumed that open space areas are likely to become the responsibility of the relevant council subject to appropriate contractual arrangements with Places Victoria (assuming Places Victoria acquires these parcels of land), if they are not already the current under council control. Either way these land parcels will not become privately owned. This is important as these areas have the opportunity to be used to incorporate waste materials generated from the remediation of other land within easements. Feature mounds can be used to consolidate and encapsulate contaminated soils. Notwithstanding this, general remediation of open space areas are likely to be similar to those proposed above for Commercial / Industrial and High Density Residential land uses. However, areas of contaminated soil would need to be covered (i.e with 0.5 to 1 metre thickness) with "clean" fill to reduce the potential for people to make contact with the contamination. Management plans would need to be implemented to control the long term integrity of such caps and any encapsulation mounds.

6.4 Precinct Wide Contamination Strategies

Outlined below is a selection of potential precinct wide contamination strategies that may reduce the potential costs and development delays and further encourage urban renewal in the Study Area.

- *Undertake a Cost Benefit Analysis of Potential Commencement Sites / Areas* – Due to the substantial private ownership of land in the precinct it may be more practical and financially prudent to identify a key anchor site or site(s) to encourage desirable urban development design. Based on the consideration of land contamination and planning considerations, there are a number of potential commencement sites or general areas which may have lower contamination cost:
 - *Any State or Government owned land* - which provide the opportunity for internal government land transfers.
 - *The Plummer Street sub precinct P8 which occupies a large land area that has been subject to relatively lower heavy industrial use.* This sub precinct is located between Salmon Street, Woolboard Road and Graham Street. This history review suggests that the central part of the precinct has largely been used for warehousing activities.
 - *Areas near to existing residential* – This could include the areas around the Williamstown Road, Lorimer Street, precinct fringes.
 - *Sites with large areas and/or sub-precinct areas with single large land owners or small number of land owners that could allow for integration of contamination management* – The sub-precinct land parcels could provide a greater opportunity to create more efficient and cost effective remediation opportunities. This opportunity to reduce costs through integration of contamination management across multiple large parcels may be more difficult in precincts such as the Montague Precinct which currently has the highest density of individual lots and thus is likely to have the greatest number of individual owners.
- *Review Strategic Opportunities to Integrate Land Parcels into Super Lots* – Provides the opportunity to integrate contamination management across multiple land parcels thereby minimising the cost of remediation works and provides greater opportunity to retain contaminated materials within developed sites, rather than disposing of the materials offsite.
- *Undertake a Precinct Wide Hydrogeological and Groundwater Quality Study* – The undertaking of a precinct wide hydrogeological and groundwater quality study could assist with the characterisation of regional properties and conditions that need to be considered by Environmental Auditors as part of their assessment of land suitability for its intended use. The types of information that should be considered



include regional hydrogeology, groundwater flow system and direction(s), background chemistry and quality of the shallow (i.e. some metals etc) and deeper aquifer (i.e. ammonia etc) units. This information should be made public to environmental consultants and land developers. As further information is collected as part of public documents, such as environmental audit reports this information could be pooled and managed by single public entity.

The findings of the study should be used to support a strategic review of likely groundwater uses being used in the Study Area, and consideration of the potential for precinct wide elimination of protected beneficial uses where they have been assessed to not present an unacceptable risk to existing beneficial uses (i.e. maintenance of ecosystems and use of the land, etc). This potential initiative would require engagement and acceptance by EPA. The outcome could be that EPA defines a "groundwater quality restricted use zone" (GQRUZ) across all or part of the Study Area where an existing level of contamination of groundwater precludes one or more beneficial uses that would otherwise apply to that groundwater. This outcome could enable development of sites to proceed where the clean up of groundwater is determined not to be practicable by the EPA.

The described initiatives could assist with the fast tracking of assessment and audit phases of site and sub-precinct scale development. These initiatives have the potential to reduce some of the land contamination related costs for developers particularly in precincts such as Montague Precinct which currently has the highest density of smaller individual lots (i.e. many small automotive garages etc).

- *Encourage Site Owners to "get house in order"* – The individual site operators will often be the owners of the site and the associated contamination legacy issues. These operators have the best knowledge and resources to address contamination issues while they have time between current operations and some potential future divestment and redevelopment opportunity. The earlier some contamination issues are considered, the more options that may be available and often the issue can be treated at a lower cost. Hence, the early undertaking of due diligence assessments by these operators should be encouraged to identify key contamination issues.
- *Progressing the Early Assessment and Remediation of High Risk Sites that are Potential Sources of Offsite Gas or Groundwater Pollution* - The development of sites or land parcels affected by potential source sites can be problematic to development type, costs, timing and the approval process, particularly where;
 - i) It is identified that the potential source site is generating a gas or groundwater plume below a potential development site which presents an unacceptable risk without development re-design, remediation and/or management; or
 - ii) the proposed development site is the only reasonable area (i.e. due to location of the impact or other logistical constraints (i.e. adjacent area built out) that would allow the impact to be remediated now or at some time in the future.
- *Undertake Gas Risk Assessments for all Potential Landfill Sites* – The identification and assessment of all landfill sites that have the potential to affect development sites within the Study Area through the potential generation of unacceptable landfill gases. Investigations should be undertaken in line with BPEM (EPA, 2010). These investigations should be undertaken as a priority if they have not already been undertaken. Without adequate investigations to the satisfaction of the local planning authority there is the potential for adjacent land development sites within defined buffers (i.e. 500 m from active landfill sites) to be required to undertake expensive landfill gas risk assessments for adjacent offsite gas migration risks, leading to potential delays in the granting of planning permits.
- *Review the Planning for Placement of Infrastructure and Services* – When planning large scale infrastructure changes or improvements consideration should be given to the design to either minimise the potentially contaminated fill disturbance or for the return of the fill to the depth and location from which it was removed. Alternatively, consideration should be given to potential opportunities to manage contaminated soils on site with a designated part of the precinct using features such as mounds or reclaimed excavations with protective barriers. Discussion would need to be held with the EPA to seek



a durable long term agreement on the overall approach of maintaining as much of the contaminated soils on the site as is practicable. Such an agreement with EPA could require clarity about eventual patterns / types of land uses on the land parcels, especially over areas occupied by the containment facilities, and about the long term management / monitoring regime for the integrity and functionality of such a facility.

- *Establishment of Agreements with Council/Planning Authority regarding Utilities* - regarding contamination conditions for transfer of roads and services to various authorities.

We understand the State Government of Victoria has no land holdings in the Study area. Whilst council and the Federal government do have some modest land holdings (ignoring council owned roadways and public parks) they are not co-located. Thus any precinct wide contamination strategies will require private owners to collectively agree to any strategies within their land. This may not be easy to achieve, although we are aware of government and private land holders working together to achieve more strategic and efficient redevelopment outcome for multiple land parcels that are co-located. We do however recommend this approach to Places Victoria (and the EPA) as it has the potential to;

- Save a considerable amount in audit and investigations costs.
- Shorten the timeframe for cleanups (if required).
- Allows for a more orderly roll out of "renewal ready" land.
- Provide more certainty around the clean up process.

7.0 CONCLUSIONS AND RECOMMENDATIONS

Golder Associates has undertaken a high level review of potential land contamination issues associated with redevelopment of primarily commercial and industrial land within Fishermans Bend (the "Study Area"). The Study Area, comprises approximately 240 hectares and is sub-divided into four potential development precincts (Plummer Street, Fennell Street, Montague Street and Lorimer Street) which includes part of the suburbs of Port Melbourne, South Melbourne, Southbank, Docklands and South Wharf.

The following points conclude the general findings of this study.

7.1 Land Contamination

7.1.1 Contamination Risk and Potential Remediation Costs

Our review of the Study Area land suggests that in general widespread filling of the low lying swampy land with waste soils and materials from local industrials occurred in the late 1800s and early 1900s. The Study Area has been occupied by a diverse range of commercial to heavy industrials including the automotive industry, animal and animal product processing, chemical manufacturing, various engineering and metal works, timber works, printing works, woollen mill, transport, fuel storage and handling and warehousing.

Land contamination risks have been assessed within the Study Area based a review of readily available public information and professional judgement. For the purposes of this study, the degree of potential contamination was divided into the four broad and subjective contamination risk categories of not applicable, low, moderate and high. Further investigation of each land parcel will be required to refine the risk ranking and to quantify site specific potential contamination liabilities.

Overall most of precinct land parcels were categorised as medium risk which indicates the area is likely to be moderately contaminated, with lesser extent of land parcels assigned low or high contamination risk rankings. Some of land parcels assigned high risk rankings will likely require significant soil remediation and potentially active groundwater remediation. Figures 18 to 21 present the relative risk rankings for land parcels across the Study Area.



Of these sites there is currently only one site with an EPA issued notice (i.e. Pollution Abatement Notice or Clean Up Notice) located in the Montague Precinct at 80 Montague Street. There are also two major former landfills within the Plummer Street Precinct. The landfill located adjacent to Todd Road is understood to have operated approximately 30 years based on the Audit report. It is not known how long the landfill located adjacent to Salmon Street operated for, however aerial photographic review indicates a similar operating timeline to the Todd Road landfill. Under the BPEM (2010), development sites within 500 m of gas generating landfill may require landfill risk assessments. There are also seven industrial sites most of which are located in the Plummer and Lorimer Street precincts which have been audited to support redevelopment. As of April 2012 there is no Statutory Environmental Audits underway within the precincts. However, non-Statutory Environmental Audit assessments for due diligence purposes may be currently ongoing or have been undertaken (not publicly available).

Golder Associates' review of publicly available data and experience in the Study Area suggests the potential for widespread groundwater degradation. The publicly available reports (audited sites) indicate there are exceedances of SEPP(Groundwater) (GoV, 1997) extractive use objectives for metals, ammonia, phenolics and petroleum hydrocarbons. No publicly available data was identified for the Fennell Street precinct, however due to similar filling history, the background groundwater contaminants may be similar. It must be recognised where contamination is assessed to be background contamination, this data may be considered as the assessment objective and not trigger the need to consider the site a source site removing the possible need for active groundwater remediation unless required to address risks to the use of the land. This condition set out the SEPP (Groundwater) highlights the potential value of undertaking a precinct wide study of groundwater condition to support the determination by assessors and Auditors alike; similar precinct wide studies have been undertaken for the landfill precinct in the south eastern part of Melbourne.

Based on this high level review it appears that the Fennell Street, Plummer Street and western portion of the Montague Precincts, which have been utilised by the more intensive large manufacturing industries (in particular the automotive and chemical manufacturing industries) have been assessed to present higher land contamination risks. As discussed earlier, high land contamination risks do not necessarily translate to high remediation costs on a per hectare basis as remediation costs can be more economically managed in larger development sites through economies of scale opportunities.

Golder Associates has reviewed the contamination costs inclusive of (assessment, remediation and audit phase) for a portfolio of our recent remediation projects that have generally supported the issue of Environmental Audits stating the former industrial land is suitable for the intended use. The end use for these benchmarked sites included low/high density use through to commercial use, therefore representing a mix of end uses. Golder Associates has used this data which represents 20 remediation sites encompassing over 100 hectares of industrial land to benchmark the potential contamination costs per hectare at a strategic level for the Fishermans Bend Study Area. The benchmarked remediation costs were also used to assist with the calibration of relative remediation risk ranking assigned to land parcels. The benchmarked estimates indicate the following average contamination costs:

- Low Risk - average cost of <\$1 M / ha
- Medium Risk – average cost of \$3 M / ha
- High Risk – average cost of >\$6 M /ha ³

The estimate of >\$6 M/ha is by no means an upper limit for high risk sites with a significant soil and/or groundwater remediation issue to address. For example, two of the benchmark sites categorised as high risk had a contamination cost in excess of \$10 M / ha. Further investigations would be required to improve these approximate indicative average cost estimates. It must be recognised that the average cost estimates are indicative for this high level land contamination study only.

³ The estimate of >6 M/ha is by no means an upper limit for high risk sites with a significant soil and/or groundwater remediation issue to address.



7.1.2 Land Contamination Strategies

Fishermans Bend represents a challenging urban renewal project due to its long industrial history, land reclamation activities, complex underlying geology and the current substantial private land ownership. These variables mean the remediation cost and time to deliver remediation sites as part of the overall precinct scale renewal will be affected by strategic planning decisions and other supporting government initiatives. Outlined below are a selection of potential strategic initiatives relating to contaminated land to encourage urban renewal in the Study Area.

- *Undertake a Cost Benefit Analysis of Potential Commencement Sites / Areas* – Due to the substantial private ownership of land in the precinct it may be more practical and financially prudent to identify a key anchor site or site(s) to encourage desirable urban development design. Potential sites/areas are listed in Section 6.4 of this report.
- *Review Strategic Opportunities to Integrate Land Parcels into Super Lots* – This provides the opportunity to integrate contamination management across multiple land parcels thereby minimising the cost of remediation works and provides greater opportunity to retain contaminated materials within developed sites, rather than disposing of the materials offsite.
- *Undertake a Precinct Wide Hydrogeological and Groundwater Quality Study* – The undertaking of a precinct wide hydrogeological and groundwater quality study could assist with the characterisation of regional properties and conditions that need to be considered by Environmental Auditors as part of their assessment of land suitability for its intended use. This information should be made public to environmental consultants and land developers. The provision of this information could speed up the assessment and audit phases for site and sub-precinct scale developments.
- *Encourage Site Owners to “get house in order”* – The individual site operators will often be the owners of the site and the associated contamination legacy issues. These operators have the best knowledge and resources to address contamination issues earlier and at a lower cost.
- *Progressing the Early Assessment and Remediation of High Risk Sites that are Potential Sources of Offsite Gas or Groundwater Pollution* - The development of sites or land parcels affected by potential source sites can be problematic to development type, costs, timing and the approval process.
- *Undertake Gas Risk Assessments for all Potential Landfill Sites* – The identification and assessment of all landfill sites that have the potential to affect development sites within the Study Area through the potential generation of unacceptable landfill gases.
- *Review the Planning for Placement of Infrastructure and Services* – When planning large scale infrastructure changes or improvements consideration should be given to the design to either minimise the potentially contaminated fill disturbance or for the return of the fill to the depth and location from which it was removed. Alternatively, consideration should be given to potential opportunities to manage contaminated soils on site with a designated part of the precinct using features such as mounds or reclaimed excavations with protective barriers.
- *Establishment of Agreements with Council/Planning Authority regarding Utilities* - regarding contamination conditions for transfer of roads and services to various authorities.

7.2 Geotechnical Considerations

An initial appraisal of geotechnical issue have been presented. Based on our current understanding of the geology of the Study Area, the key geotechnical issues and constraints which will need to be considered in the master planning process are as follows:

- The variable strength, quality and thickness of the fill soils in the four precincts.
- The weak nature of the near surface soils in the four precincts.



- The considerable depth to suitable founding strata for piles over much of the four precincts.
- Variable levels of differential settlement caused by the ongoing secondary consolidation of the Coode Island Silt.
- Connection of services to piled buildings.
- Differential settlement of services and the subsequent need to allow generous falls for gravity flow structures.
- The potential to trigger consolidation of the Coode Island Silt if the groundwater table is lowered during the construction of basement excavations or deep utility trenches.
- The potential for gas build up in basement excavations within the Coode Island Silt.

Given the above constraints, suitable foundation solutions for the proposed mixed use developments are likely to be as follows:

- Shallow spread footings or raft foundations for settlement tolerant buildings ranging in height from one to two storeys.
- Piled foundations for all non-settlement tolerant structures. Note that piled foundations may be required for single or two level buildings depending on a particular structure's tolerance for differential settlement.
- Constructing shallow basements for parking or avoiding basement construction by placing parking levels above ground.

8.0 RECOMMENDATIONS

8.1 Additional Geotechnical Information

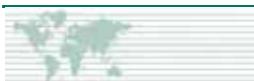
The following additional geotechnical desktop assessment work is recommended to be completed as part of the master planning process:

- Preparation of geotechnical overlay maps which provide a preliminary indication of the depth to the base of the Coode Island Silt, Fishermans Bend Silt, Moray Street Gravels and Silurian bedrock as an input to assist in understanding potential piling depths across the four precincts.
- Preparation of colour coded maps which indicate the different foundation solutions which may apply in each area for a range of mixed use development types.
- Provision of indicative foundation costs for the different foundation solutions being considered in the overlays.
- Preparation of a groundwater contour map to provide a preliminary indication of the approximate depth to the water table across the four precincts and potential ground water flow directions.

8.2 Actions to Support the Contamination Strategy

It is recommended that to further progress the contamination strategy, this information is used in the master planning and revised through the following stages:

- 1) Confirm purchase / development / facilitation models.
- 2) Confirm the planning and legal framework.



- 3) Identify likely development staging and confirm contamination constraints associated with priority development precinct(s) and/or anchor sites within the precincts.
- 4) Devise contamination assessment and management framework and strategy based on this report and reconsider some of the strategic contamination initiatives.
- 5) Undertake land contamination assessments and risk-based remediation cost estimates of priority development precincts and/or anchor sites to assess potential contamination liabilities and facilitate land transactions.

It is recommended that an environmental consultant with strategic land development expertise be engaged throughout the planning process following the Places Victoria's review of the purchase / development / facilitation models for the Study Area.

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Report Signature Page

GOLDER ASSOCIATES PTY LTD

Elizabeth Carey
Senior Environmental Scientist

Christian Wallis
Associate

ELC_CJW/IMK/cjw_ecl

A.B.N. 64 006 107 857

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ABBREVIATIONS

Chemical names

BTEX	Benzene, toluene, ethyl benzene and xylenes
CHC	Chlorinated hydrocarbons
HVOL	Halogenated volatile hydrocarbons
MAH	Monocyclic aromatic hydrocarbons
PAH	Polycyclic aromatic hydrocarbons
MEK	Methyl ethyl ketone
MBK	Methyl isobutyl ketone
MBK	2-Hexanone
PCB	Polychlorinated biphenyls
PCE	Perchloroethene (also known as tetrachloroethene)
TCE	Trichloroethene
TDS	Total dissolved solids
TPH	Total petroleum hydrocarbons

Technical terms

AHD	Australian Height Datum
ANZECC	Australian and New Zealand Environment and Conservation Council
AST	Aboveground storage tank
mbGL	Metres below ground level
mbGS	Metres below ground surface
mg/kg	Milligram per kilogram
mg/L	Milligram per litre
MMBW	Melbourne Metropolitan Board of Works
NAPL	Non aqueous phase liquid
NEPM	National Environment Protection Measures
RL	Reduced level
SEPP	State Environment Protection Policy
UST	Underground storage tank

Planning Scheme zone definitions

- B1Z – Business 1 Zone. The Business 1 Zone applies land to encourage the intensive development of business centres for retailing and other complementary commercial, entertainment and community uses
- B3Z – Business 3 Zone. The Business 3 Zone applies land to encourage the integrated development of offices and manufacturing industries and associated commercial and industrial uses.
- IN1Z – Industrial 1 Zone. The Industrial 1 Zone applies land that has been identified for the manufacturing industry, the storage and distribution of goods and associated uses.
- PPRZ – Public Park and Recreation Zone. The Public Park and Recreation Zone applies to land for public recreation and open space, for protection and conservation areas of significance where appropriate and for commercial uses where appropriate.
- PUZ2 - Public Use Zone 4. The Public Use Zone applies public land use for public utility and community services and facilities, with regards to Education.
- PUZ 4 – Public Use Zone 4. The Public Use Zone 4 applies public land use for public utility and community services and facilities with regards to Transport.



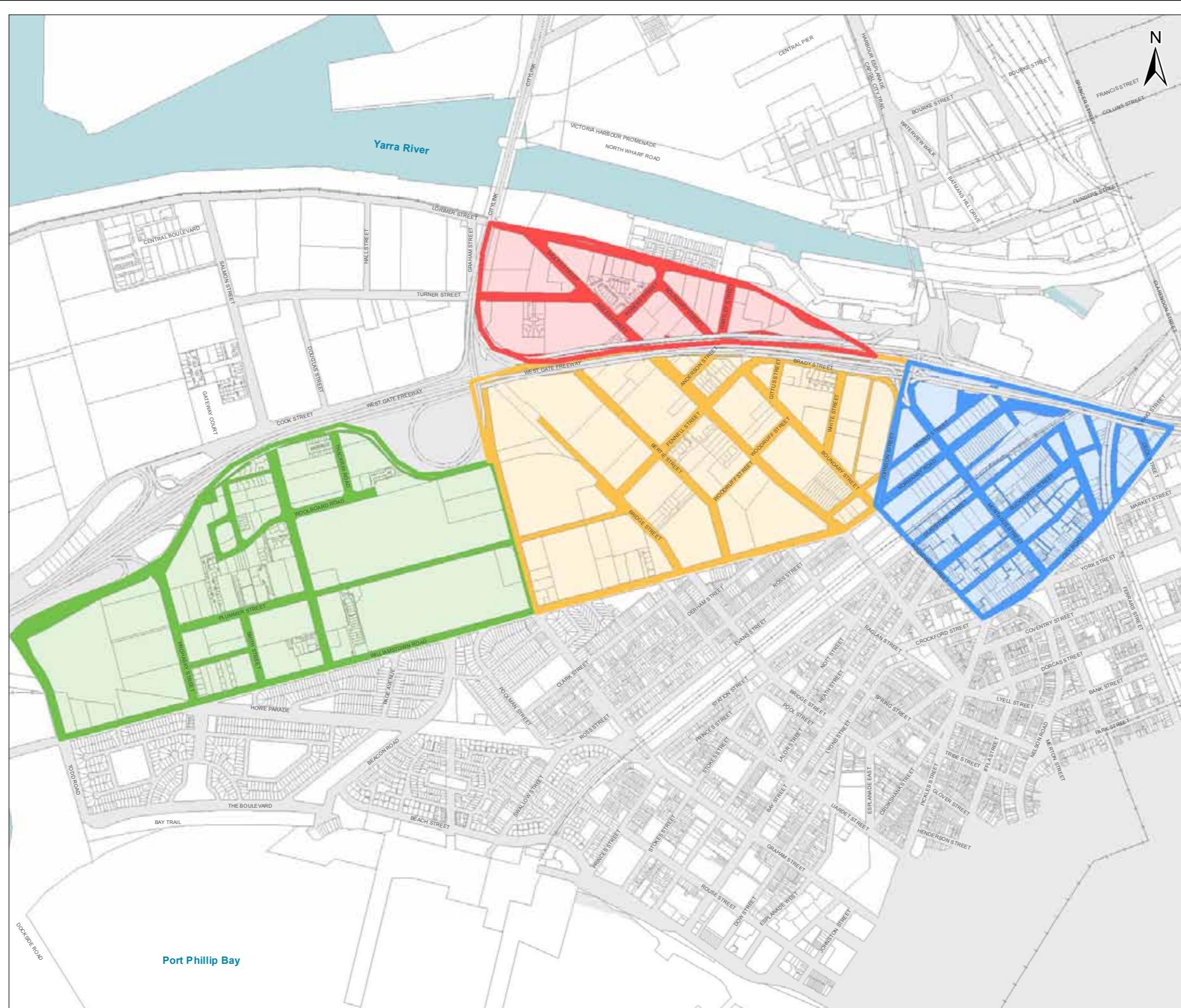
- PUZ6 – Public Use Zone 6. The Public Use Zone applies public land use for public utility and community services and facilities, with regards to Local Government.
- MUZ – Mixed Use Zone. The Mixed Use Zone applies land that has been identified for a range of residential, commercial, industrial and other uses which compliment the mixed use function of the locality and encourages residential development that respects the neighbourhood character

Overlay definitions

- Design and Development Overlay (DDO) identifies areas which are affected by specific requirements relating to the design and built form of new development
- Special Building Overlay (SBO) identifies land in urban areas liable to inundation by overland flows from the urban drainage system as determined by, or in consultation with, the floodplain management authority.
- Environmental Audit Overlay (EAO) identified sites for which A certificate or statement of environmental audit must be issued for the land in accordance with Part IXD of the Environment Protection Act (1970) before a sensitive use (e.g. residential use, childcare centre) can commence.
- Heritage Overlay (HO) identifies protected historically significant buildings or structures.
- Citylink Project (CPO) identifies land on the Melbourne City Link Project for which advertising signs restrictions apply.
- Road Closure (RXO) identifies roads that are closed.



FIGURES



FISHERMANS BEND LAND
CONTAMINATION STUDY
PLACES VICTORIA

STUDY AREA

COMMERCIAL IN
CONFIDENCE

LEGEND

- Plummer
- Fennell
- Montague
- Lorimer

NOTES

Land Parcels based on VicMap information

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0 75 150 300 450 600 metres

SCALE (at A3) 1:12,500

DATUM GDA 94, PROJECTION MGA Zone 55

PROJECT: 127613038

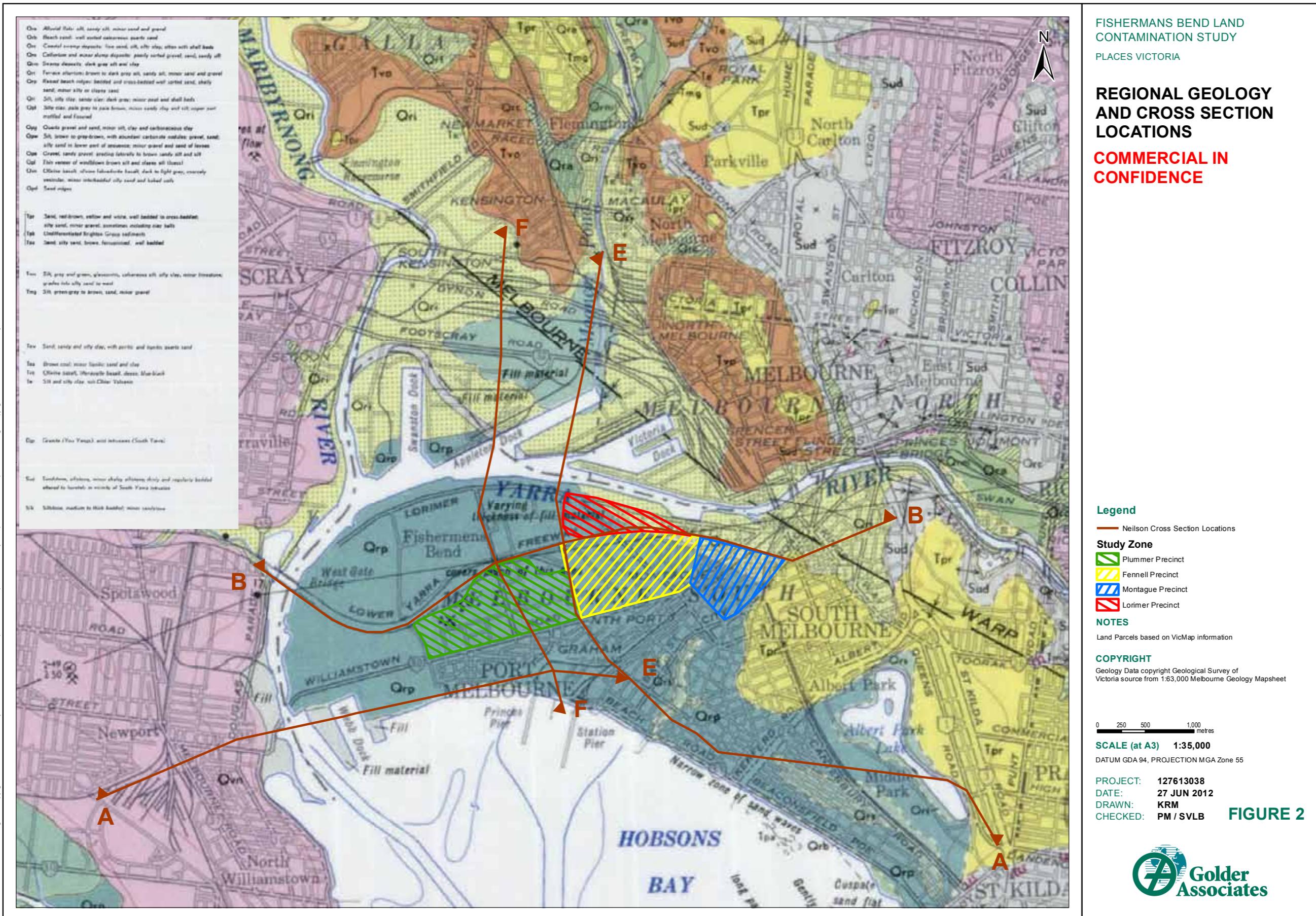
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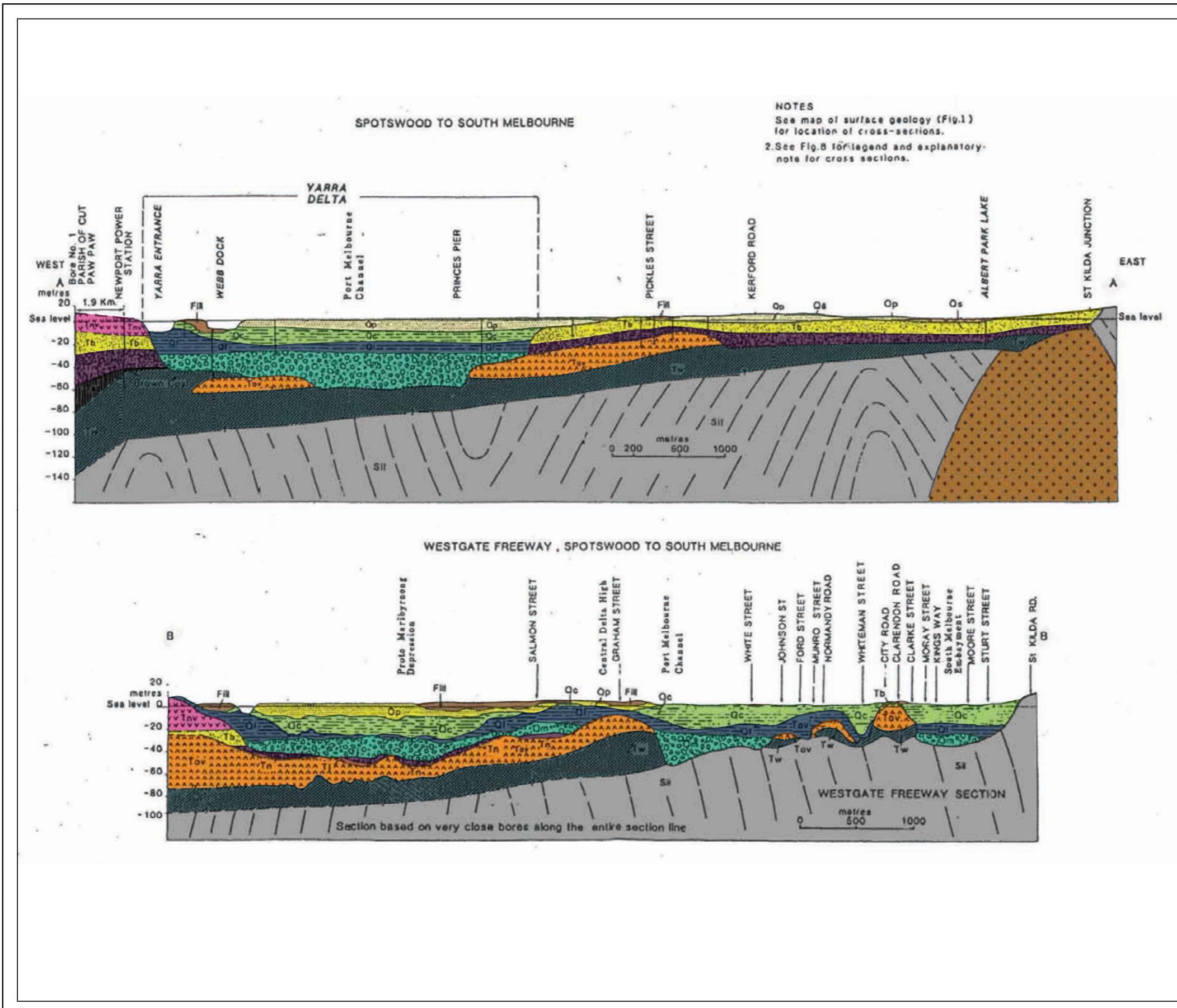
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FIGURE 1







FISHERMANS BEND LAND
CONTAMINATION STUDY

PLACES VICTORIA

CROSS SECTIONS A & B

**COMMERCIAL IN
CONFIDENCE**

LEGEND

	Fill
	Unnamed Swamp and Alluvial Sediments
	Port Melbourne Sands
	Coode Island Silt
	Fishermens Bend Silt
	Moray Street Gravels
	Tertiary Newer Volcanics
	Brighton Group
	Tertiary Newport Formation
	Tertiary Lorimer Street Gravels
	Tertiary Older Volcanics
	Altona Coal Measures
	Werribee Formation
	Melbourne Formation, Siltstone / Sandstone
	Devonian Granite

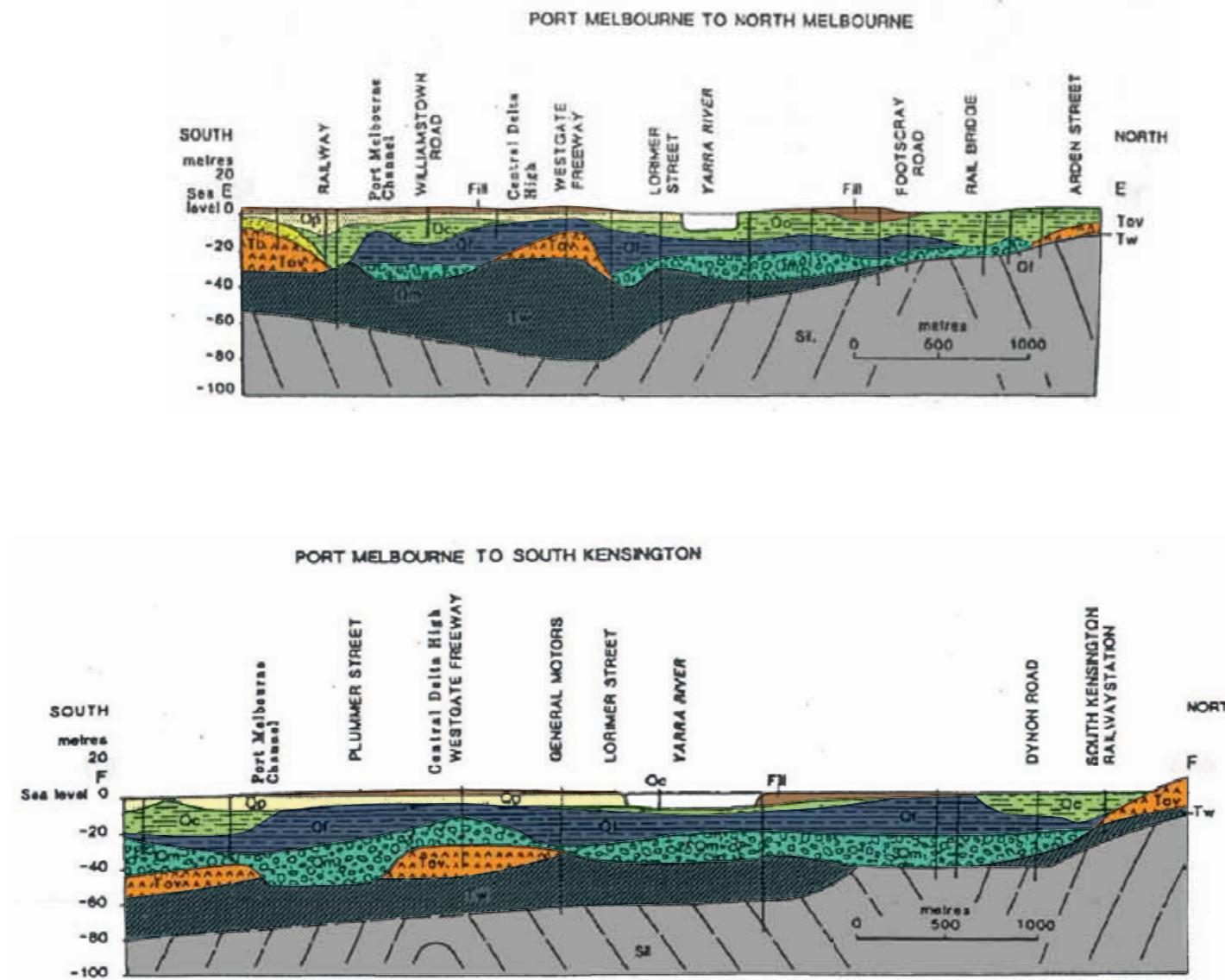
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Data sourced from Neilson (1996).

PROJECT: 127613038
DATE: 28 JUN 2012
DRAWN: RIH
CHECKED: SVLB

FIGURE 3





FISHERMANS BEND LAND
CONTAMINATION STUDY

PLACES VICTORIA

CROSS SECTIONS E & F

**COMMERCIAL IN
CONFIDENCE**

LEGEND

Fill
Qp Port Melbourne Sands
Qc Coode Island Silt
Qf Fishermens Bend Silt
Qm Moray Street Gravels
Tb Brighton Group
Tov Tertiary Older Volcanics
Tw Werribee Formation
Sud Melbourne Formation, Siltstone / Sandstone

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Data sourced from Neilson (1996).

PROJECT: 127613038
DATE: 28 JUN 2012
DRAWN: RIH
CHECKED: SVLB

FIGURE 4



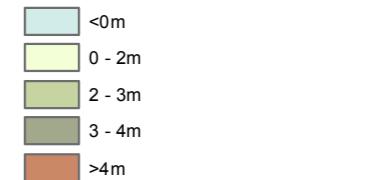


FISHERMANS BEND LAND
CONTAMINATION STUDY
PLACES VICTORIA

**SITE TOPOGRAPHY -
ALL PRECINCTS**
**COMMERCIAL IN
CONFIDENCE**

Legend

Elevation (m AHD)



Study Zones

Land Parcels / Road Boundaries

NOTES

Elevation data supplied by Photo Mapping Services and captured via LIDAR surveys between September 2007-September 2009

Land Parcels based on VicMap information

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0 75 150 300 450 600 metres

SCALE (at A3) 1:12,500

DATUM GDA 94, PROJECTION MGA Zone 55

PROJECT: 127613038

DATE: 27 JUN 2012

DRAWN: KRM

CHECKED: PM / SVLB

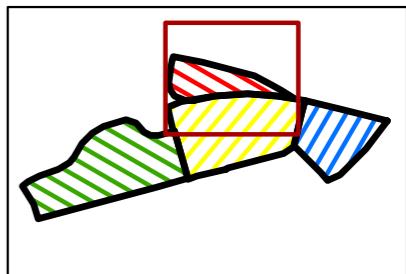
FIGURE 5





FISHERMANS BEND LAND
CONTAMINATION STUDY
PLACES VICTORIA

**SITE TOPOGRAPHY
LORIMER PRECINCT
COMMERCIAL IN
CONFIDENCE**



Legend

Elevation (m AHD)

<0m
0 - 2m
2 - 3m
3 - 4m
>4m

Study Zone

Land Parcels / Road Boundaries

NOTES

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Land Parcels based on VicMap information

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0 20 40 60 80 100 120 140 160 180 200 metres

SCALE (at A3) 1:4,500

DATUM GDA 94, PROJECTION MGA Zone 55

PROJECT: 127613038

DATE: 27 JUN 2012

DRAWN: KRM

CHECKED: PM / SVLB

FIGURE 6





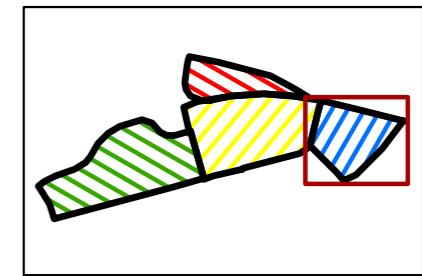
FISHERMANS BEND LAND CONTAMINATION STUDY

PLACES VICTORIA

SITE TOPOGRAPHY

MONTAGUE PRECINCT

**COMMERCIAL IN
CONFIDENCE**



Legend

Elevation (m AHD)



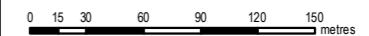
NOTES

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September 2009

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SCALE (at A3) 1:3,500

DAIUM GDA 94, PROJECTION MGA zone 55

PROJECT: 127613038

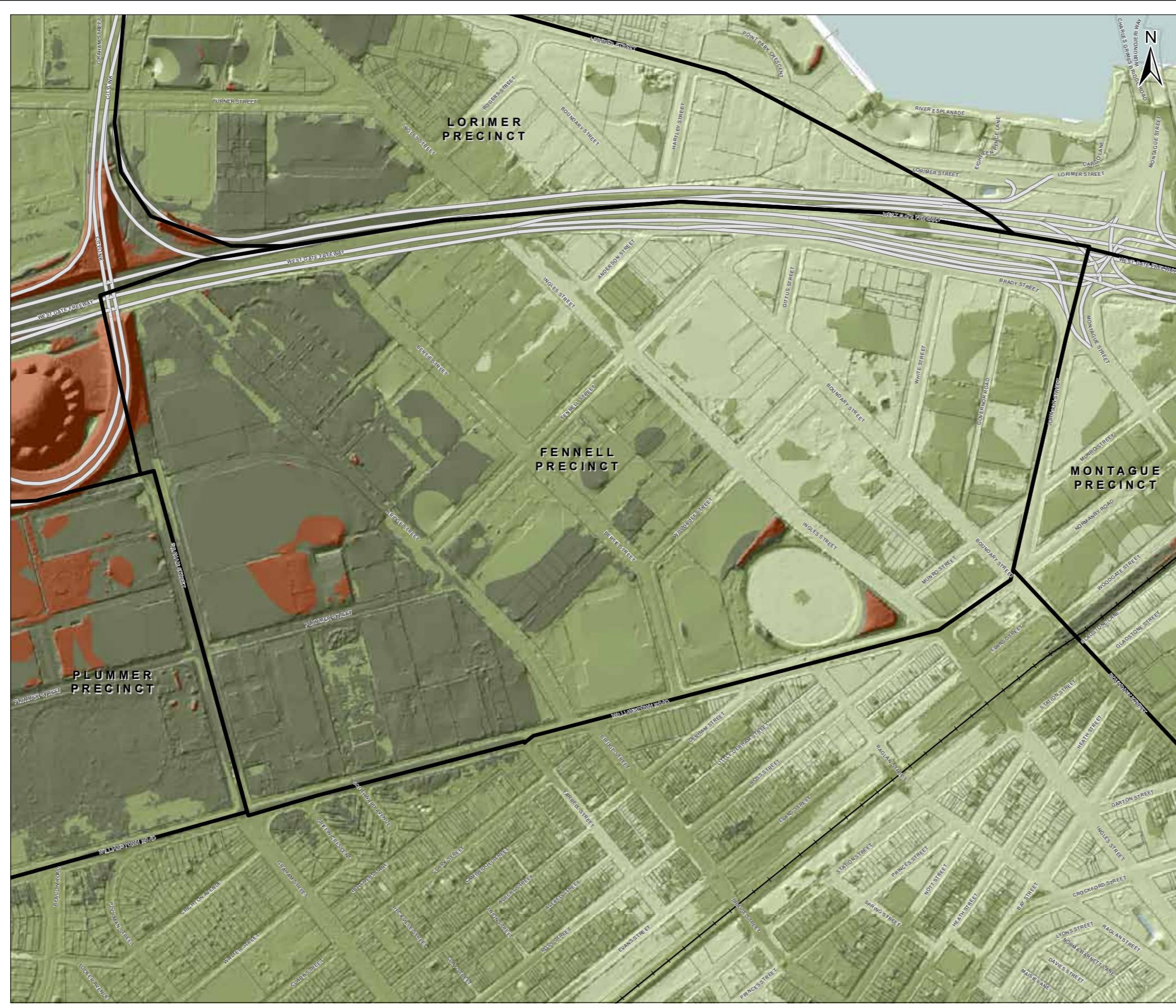
DATE: 27 JUN 2012
DRAWN: KRM

CHECKED: PM / SVLB

FIGURE 7



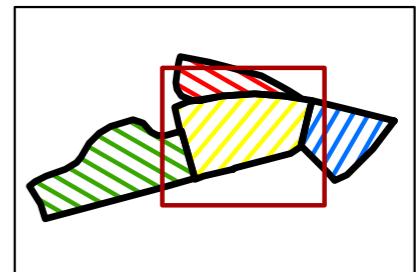
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FISHERMANS BEND LAND CONTAMINATION STUDY

PLACES VICTORIA

**SITE TOPOGRAPHY
FENNELL PRECINCT
COMMERCIAL IN
CONFIDENCE**



Legend

Elevation (m AHD)

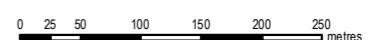


NOTES

Land Parcels based on VicMap information

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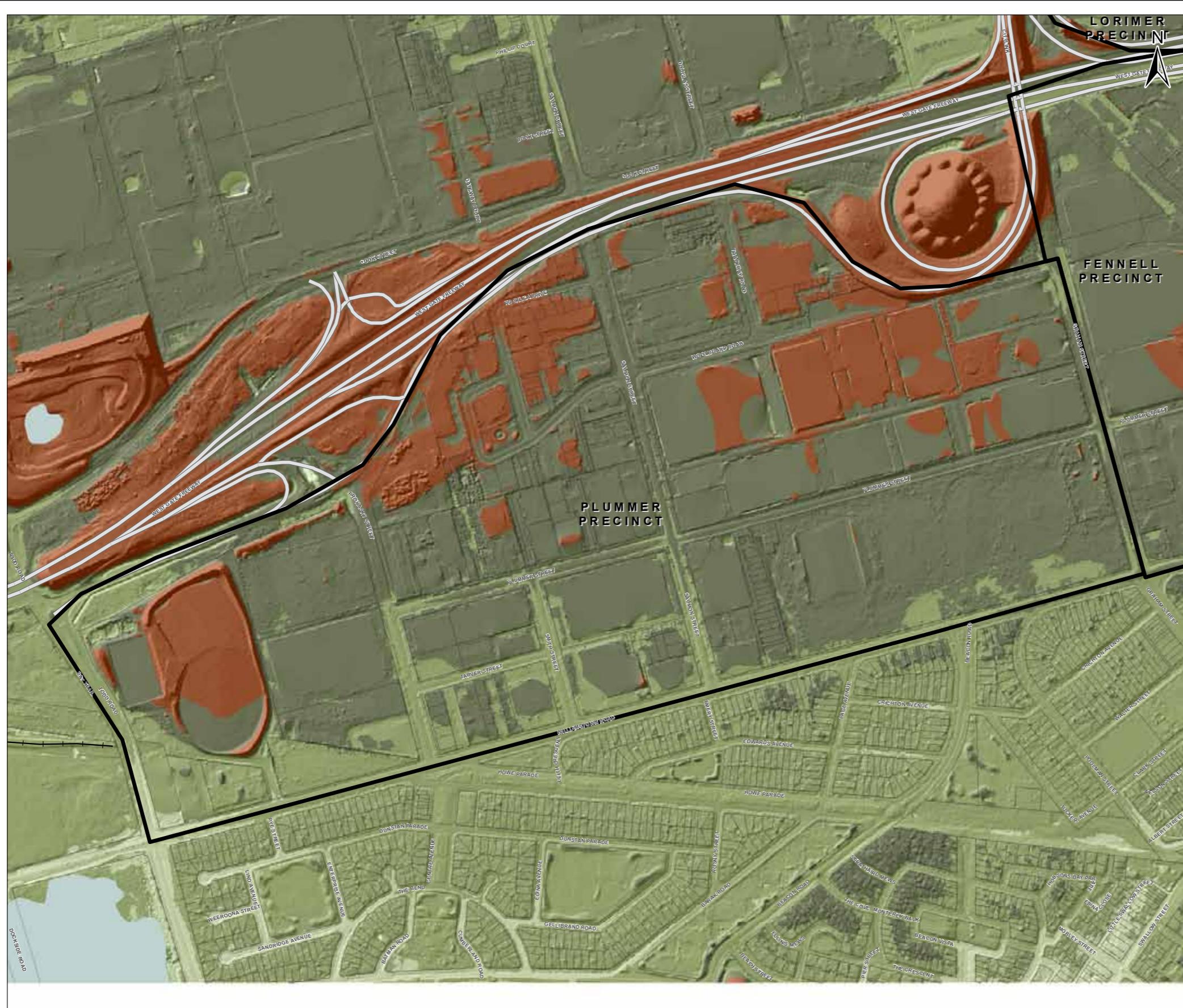


SCALE (at A3) 1:5,500

PROJECT: 127613038
DATE: 27 JUN 2012
DRAWN: KRM
DRAWN BY: KRM

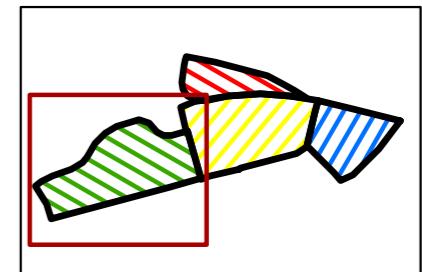
FIGURE 8





FISHERMANS BEND LAND
CONTAMINATION STUDY
PLACES VICTORIA

**SITE TOPOGRAPHY
PLUMMER PRECINCT
COMMERCIAL IN
CONFIDENCE**



Legend

Elevation (m AHD)

<0m
0 - 2m
2 - 3m
3 - 4m
>4m

Study Zone

Land Parcels / Road Boundaries

NOTES

Elevation data supplied by Photo Mapping Services and captured via LIDAR surveys between September 2007-September 2009

Land Parcels based on VicMap information

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0 25 50 100 150 200 250 metres

SCALE (at A3) 1:6,000

DATUM GDA 94, PROJECTION MGA Zone 55

PROJECT: 127613038

DATE: 27 JUN 2012

DRAWN: KRM

CHECKED: PM / SVLB

FIGURE 9

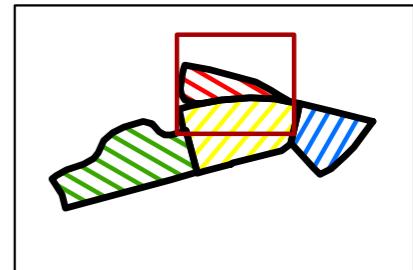




FISHERMANS BEND LAND
CONTAMINATION STUDY
PLACES VICTORIA

**PRELIMINARY ESTIMATES
OF POTENTIAL FILL
THICKNESSES
LORIMER PRECINCT**

**COMMERCIAL IN
CONFIDENCE**



Legend

- Less than 1m Fill
- 1-2m Fill
- 2-3m Fill
- 3-4m Fill
- >4m Fill
- Study Zone
- Land Parcels / Road Boundaries
- Approximate Extent of Historic Quarry

NOTES

1. Elevation data supplied by Photo Mapping Services and captured via LIDAR surveys between September 2007-September 2009
2. Land Parcels based on VicMap information
3. Estimates of potential fill thicknesses have been developed for preliminary master planning purposes only. Site specific geotechnical investigations need to be conducted to assess actual fill thicknesses at each site.
4. Approximate extent of landfill based on interpretation of historic aerial imagery

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0 20 40 60 80 100 120 140 160 180 200 metres

SCALE (at A3) 1:4,500
DATUM GDA 94, PROJECTION MGA Zone 55

PROJECT: 127613038
DATE: 27 JUN 2012
DRAWN: KRM
CHECKED: PM / SVLB

FIGURE 10

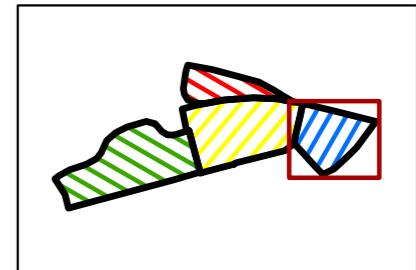




FISHERMANS BEND LAND
CONTAMINATION STUDY
PLACES VICTORIA

**PRELIMINARY ESTIMATES
OF POTENTIAL FILL
THICKNESSES
MONTAGUE PRECINCT**

**COMMERCIAL IN
CONFIDENCE**



Legend

- Less than 1m Fill
- 1-2m Fill
- 2-3m Fill
- 3-4m Fill
- >4m Fill
- Study Zone
- Land Parcels / Road Boundaries
- Approximate Extent of Historic Quarry

NOTES

1. Elevation data supplied by Photo Mapping Services and captured via LIDAR surveys between September 2007-September 2009
2. Land Parcels based on VicMap information
3. Estimates of potential fill thicknesses have been developed for preliminary master planning purposes only. Site specific geotechnical investigations need to be conducted to assess actual fill thicknesses at each site.
4. Approximate extent of landfill based on interpretation of historic aerial imagery

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0 15 30 60 90 120 150 metres

SCALE (at A3) 1:3,500

DATUM GDA 94, PROJECTION MGA Zone 55

PROJECT: 127613038

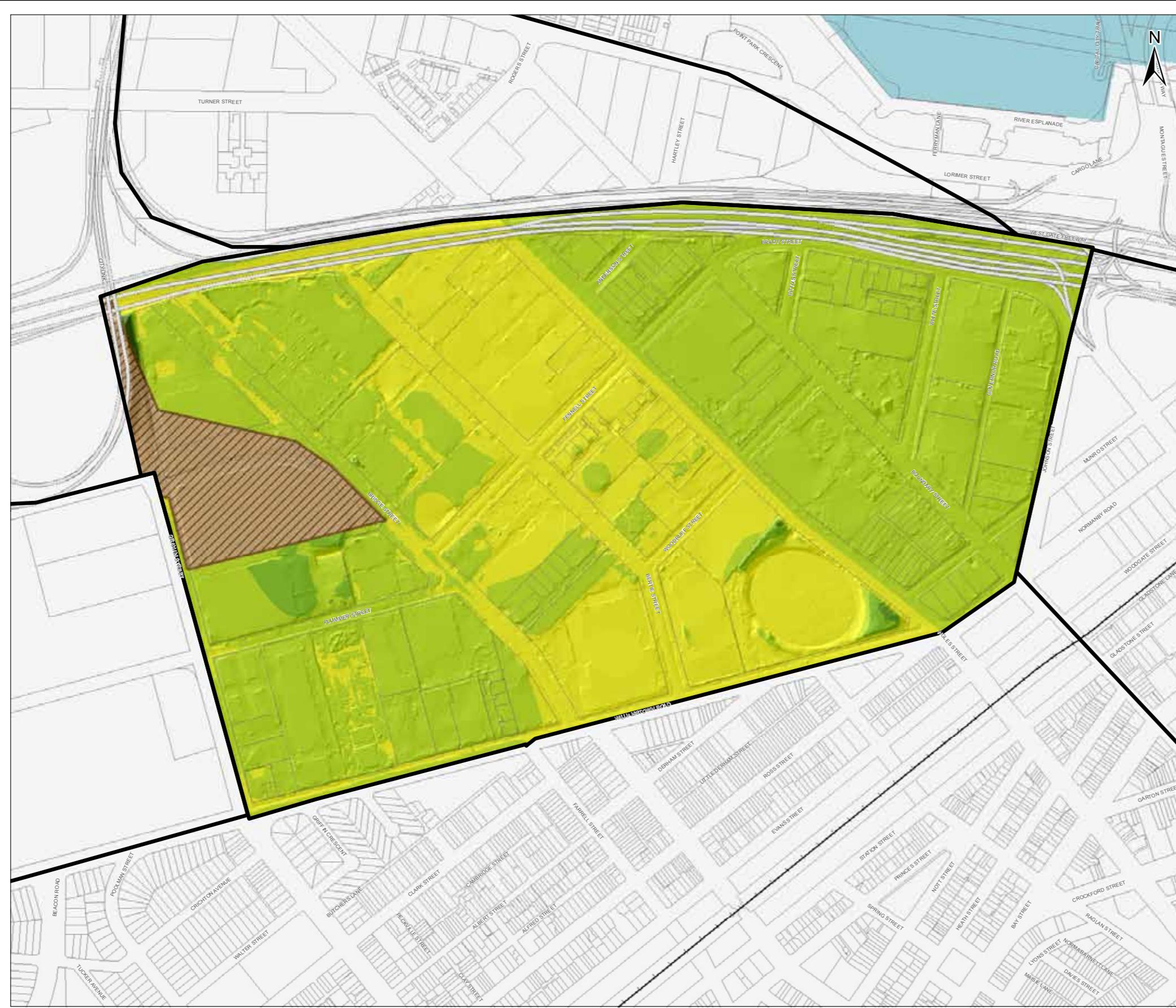
DATE: 27 JUN 2012

DRAWN: KRM

CHECKED: PM / SVLB

FIGURE 11

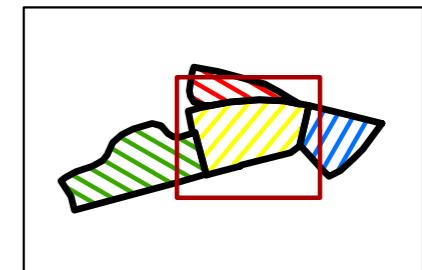




FISHERMANS BEND LAND
CONTAMINATION STUDY
PLACES VICTORIA

**PRELIMINARY ESTIMATES
OF POTENTIAL FILL
THICKNESSES
FENNELL PRECINCT**

**COMMERCIAL IN
CONFIDENCE**



Legend

Yellow	Less than 1m Fill
Light Green	1-2m Fill
Medium Green	2-3m Fill
Dark Green	3-4m Fill
Darkest Green	>4m Fill
Black	Study Zone
White	Land Parcels / Road Boundaries
Brown Hatched	Approximate Extent of Historic Quarry

NOTES

1. Elevation data supplied by Photo Mapping Services and captured via LIDAR surveys between September 2007-September 2009
2. Land Parcels based on VicMap information
3. Estimates of potential fill thicknesses have been developed for preliminary master planning purposes only. Site specific geotechnical investigations need to be conducted to assess actual fill thicknesses at each site.
4. Approximate extent of landfill based on interpretation of historic aerial imagery

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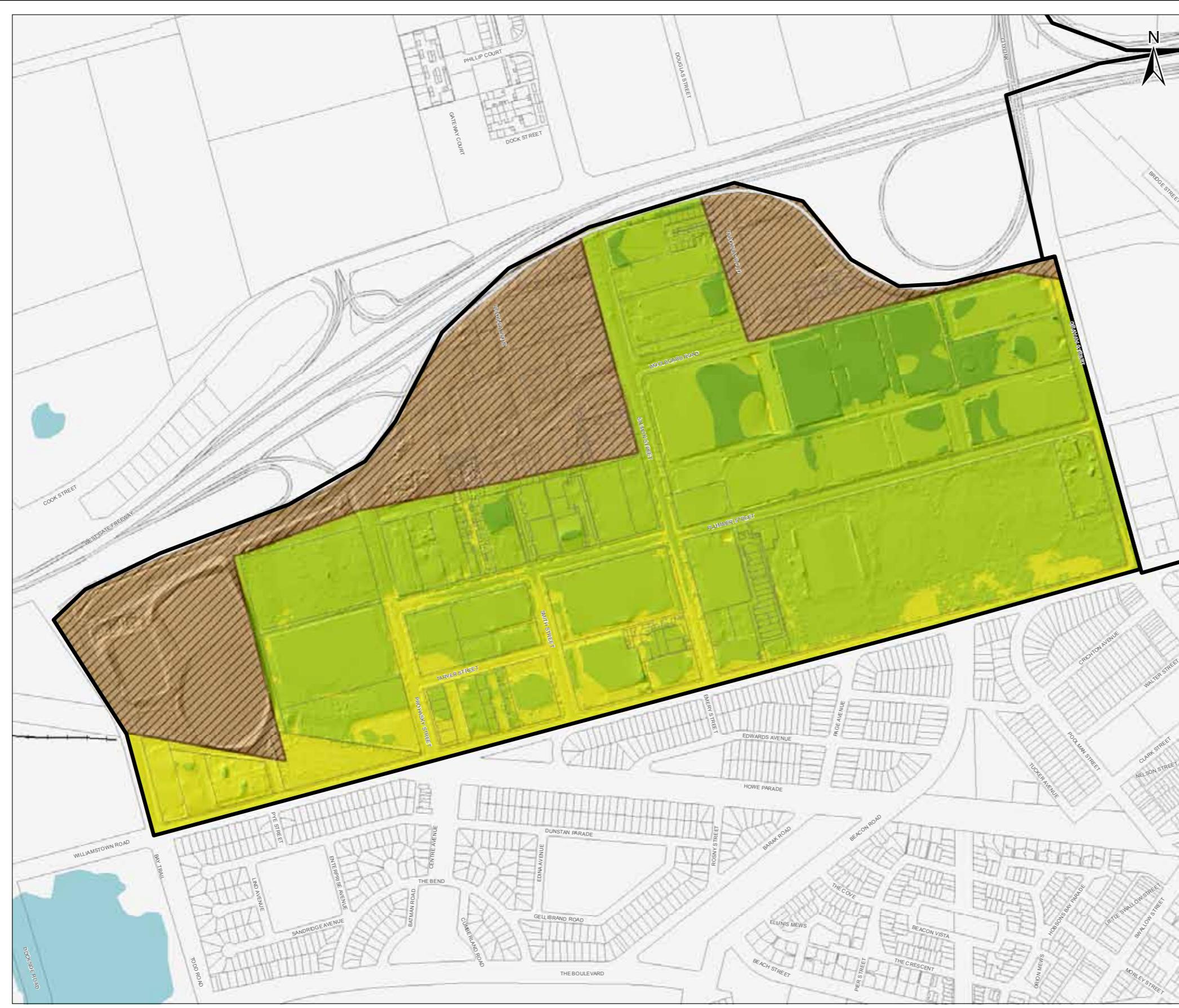
0 25 50 100 150 200 250 metres

SCALE (at A3) 1:5,500
DATUM GDA 94, PROJECTION MGA Zone 55

PROJECT: 127613038
DATE: 27 JUN 2012
DRAWN: KRM
CHECKED: PM / SVLB

FIGURE 12

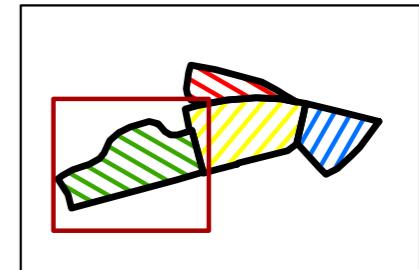




FISHERMANS BEND LAND
CONTAMINATION STUDY
PLACES VICTORIA

**PRELIMINARY ESTIMATES
OF POTENTIAL FILL
THICKNESSES
PLUMMER PRECINCT**

**COMMERCIAL IN
CONFIDENCE**



Legend

Less than 1m Fill
1-2m Fill
2-3m Fill
3-4m Fill
>4m Fill
Study Zone
Land Parcels / Road Boundaries
Approximate Extent of Historic Quarry

NOTES

1. Elevation data supplied by Photo Mapping Services and captured via LIDAR surveys between September 2007-September 2009

2. Land Parcels based on VicMap information

3. Estimates of potential fill thicknesses have been developed for preliminary master planning purposes only. Site specific geotechnical investigations need to be conducted to assess actual fill thicknesses at each site.

4. Approximate extent of landfill based on interpretation of historic aerial imagery

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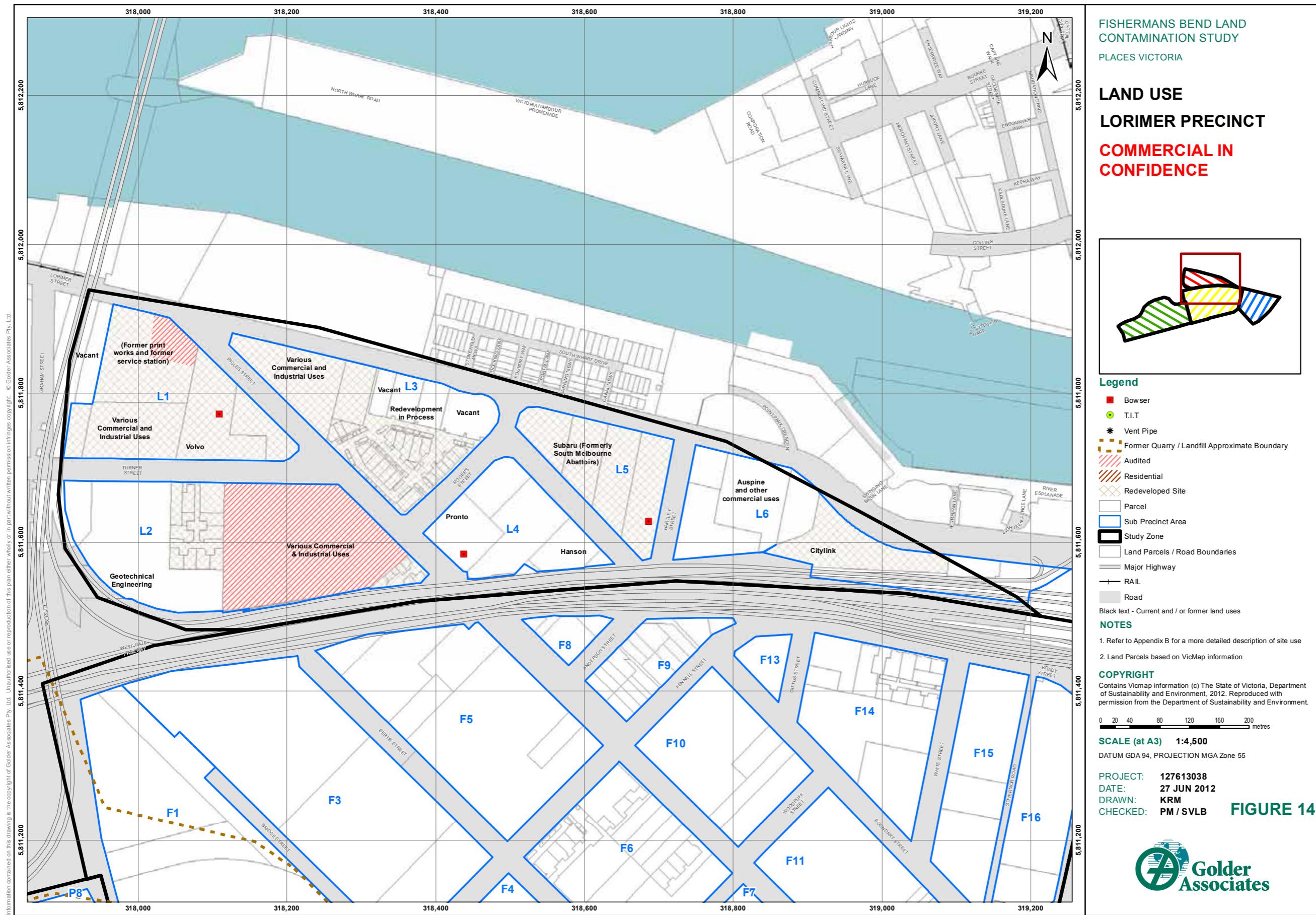
0 25 50 100 150 200 250 metres

SCALE (at A3) 1:6,000
DATUM GDA 94, PROJECTION MGA Zone 55

PROJECT: 127613038
DATE: 27 JUN 2012
DRAWN: KRM
CHECKED: PM / SVLB

FIGURE 13



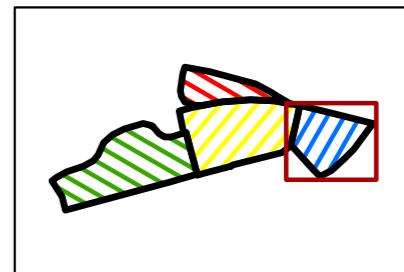




FISHERMANS BEND LAND CONTAMINATION STUDY

PLACES VICTORIA

LAND USE
MONTAGUE PRECINCT
**COMMERCIAL IN
CONFIDENCE**



Legend

Legend for the map:

- Red square: Bowser
- Green circle: T.I.T
- Black asterisk: Vent Pipe
- Yellow dashed square: Former Quarry / Landfill Approximate Boundary
- Red and white striped square: Audited
- Red and black striped square: Residential
- Yellow and black striped square: Redeveloped Site
- Light blue square: Parcel
- Blue square: Sub Precinct Area
- Black square: Study Zone
- Light blue square: Land Parcels / Road Boundaries
- Grey line: Major Highway
- Black line with white dashes: RAIL
- Grey line: Road

Black text - Current and / or former land uses

NOTES

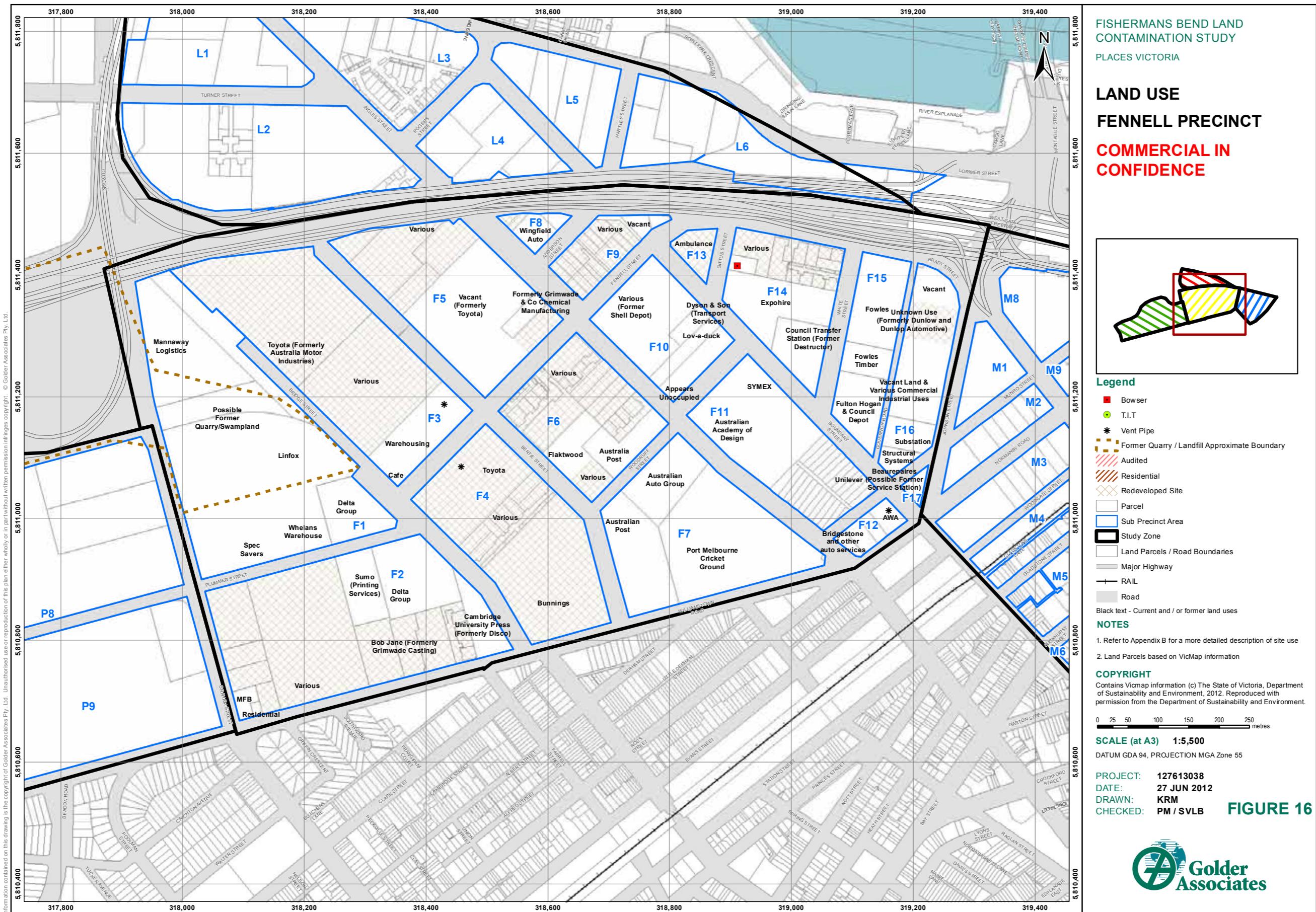
1. Refer to Appendix B for a more detailed description of site use
2. Land Parcels based on VicMap information

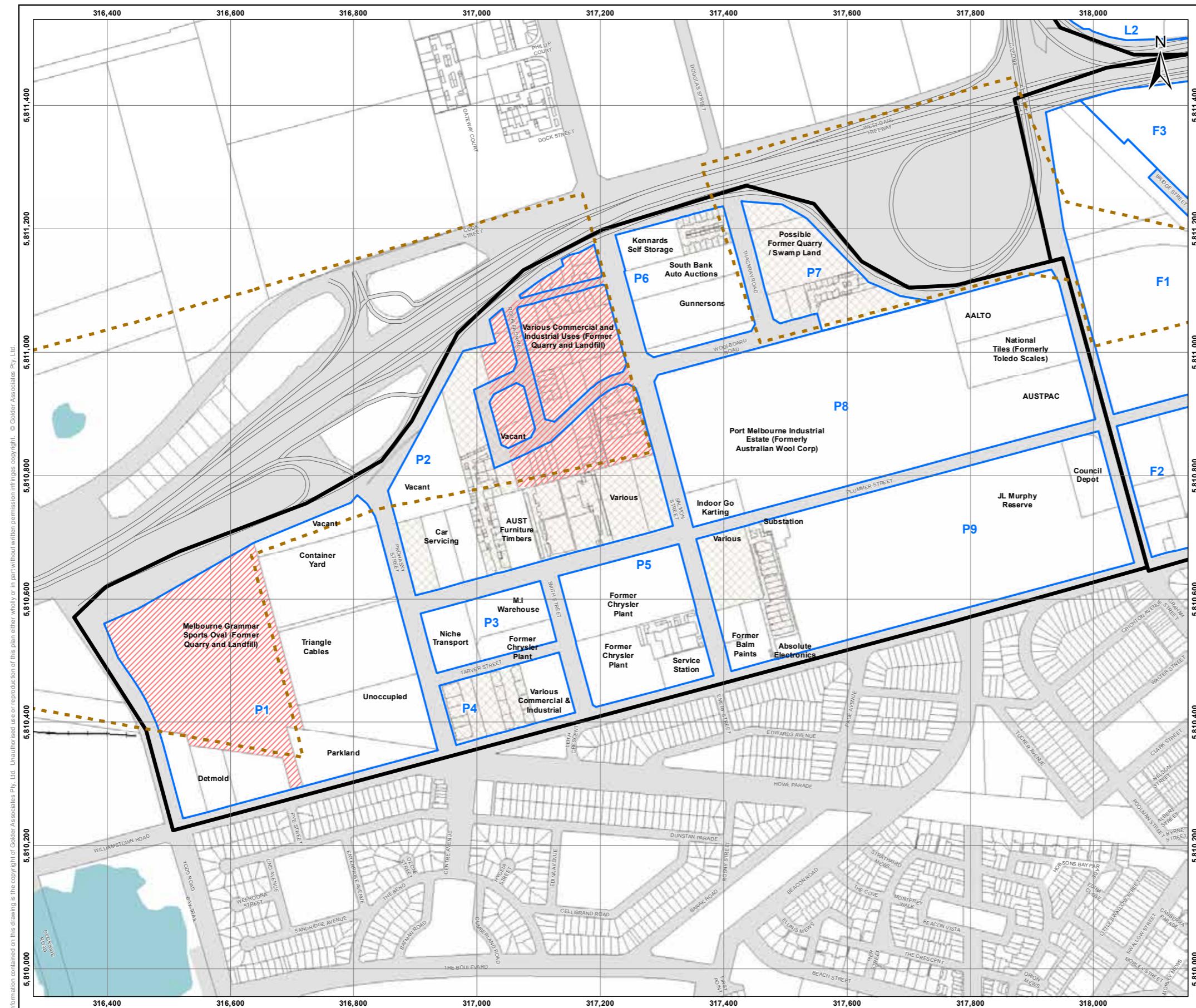
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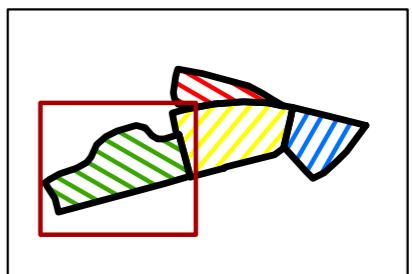
FIGURE 15





FISHERMANS BEND LAND
CONTAMINATION STUDY
PLACES VICTORIA

**LAND USE
PLUMMER PRECINCT
COMMERCIAL IN
CONFIDENCE**



Legend

- Bowser
- T.I.T
- * Vent Pipe
- Former Quarry / Landfill Approximate Boundary
- ▨ Audited
- ▨ Residential
- ▨ Redeveloped Site
- ▨ Parcel
- ▨ Sub Precinct Area
- Study Zone
- ▨ Land Parcels / Road Boundaries
- ▨ Major Highway
- RAIL
- ▨ Road

Black text - Current and / or former land uses

NOTES

1. Refer to Appendix B for a more detailed description of site use
2. Land Parcels based on VicMap information

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0 25 50 100 150 200 250 metres

SCALE (at A3) 1:6,000

DATUM GDA 94, PROJECTION MGA Zone 55

PROJECT: 127613038

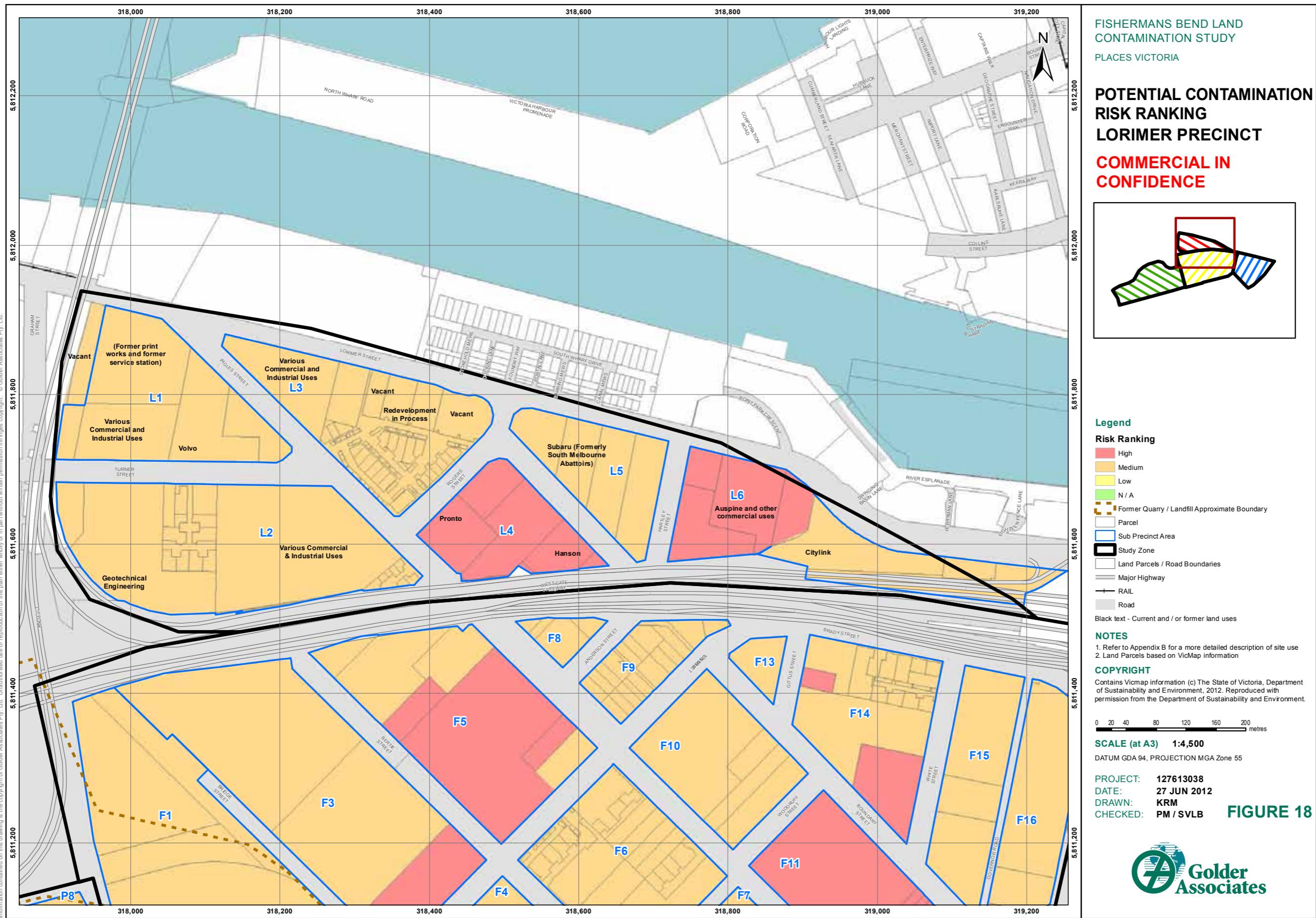
DATE: 27 JUN 2012

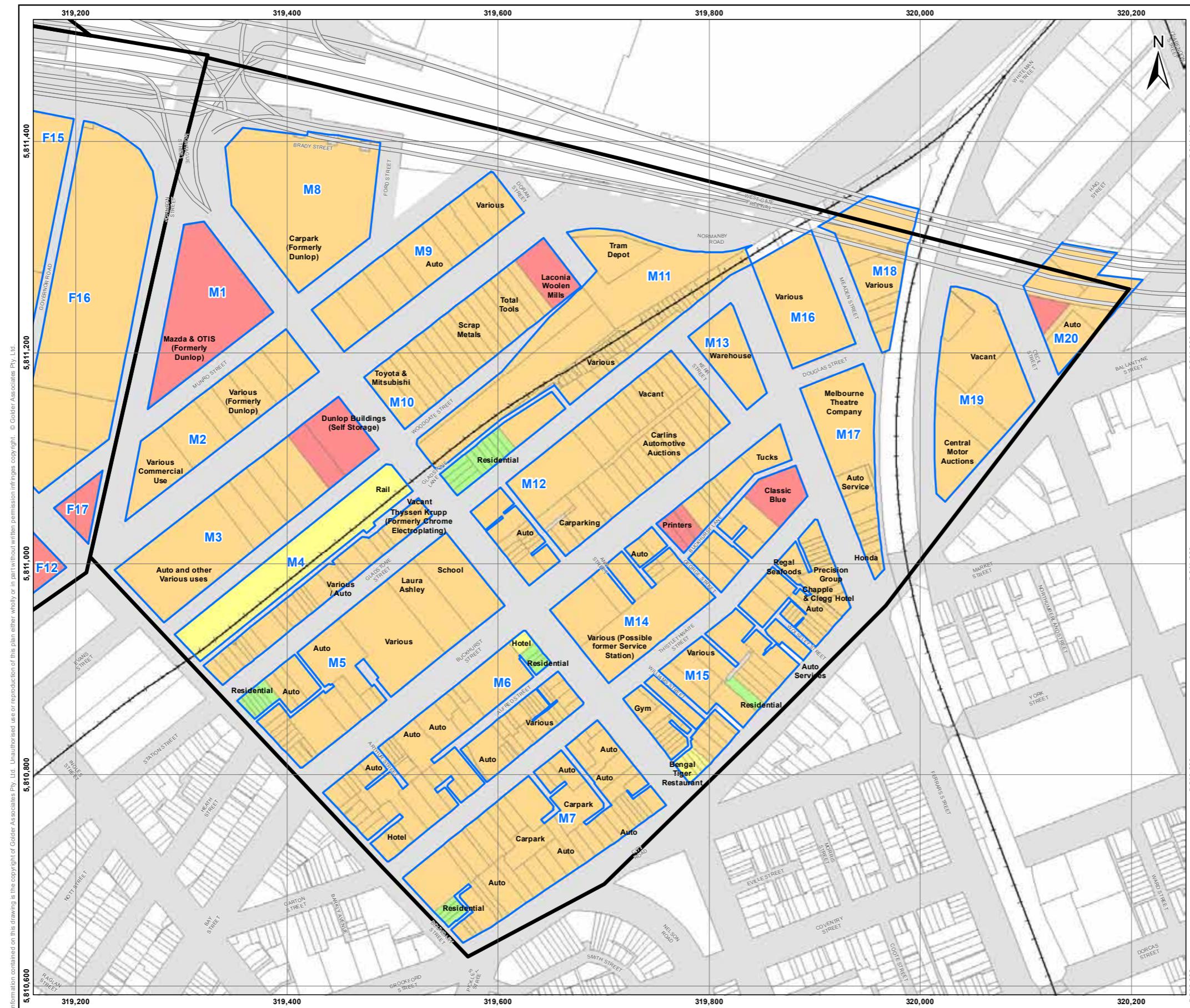
DRAWN: KRM

CHECKED: PM / SVLB

FIGURE 17



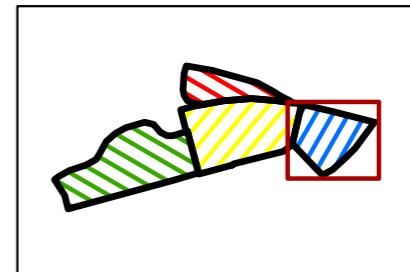




FISHERMANS BEND LAND
CONTAMINATION STUDY
PLACES VICTORIA

**POTENTIAL CONTAMINATION
RISK RANKING
MONTAGUE PRECINCT**

**COMMERCIAL IN
CONFIDENCE**



Legend

Risk Ranking	
High	Red
Medium	Orange
Low	Yellow
N/A	Light Green

Former Quarry / Landfill Approximate Boundary
 Parcel
 Sub Precinct Area
 Study Zone
 Land Parcels / Road Boundaries
 Major Highway
 RAIL
 Road

Black text - Current and / or former land uses

NOTES

1. Refer to Appendix B for a more detailed description of site use
2. Land Parcels based on VicMap information

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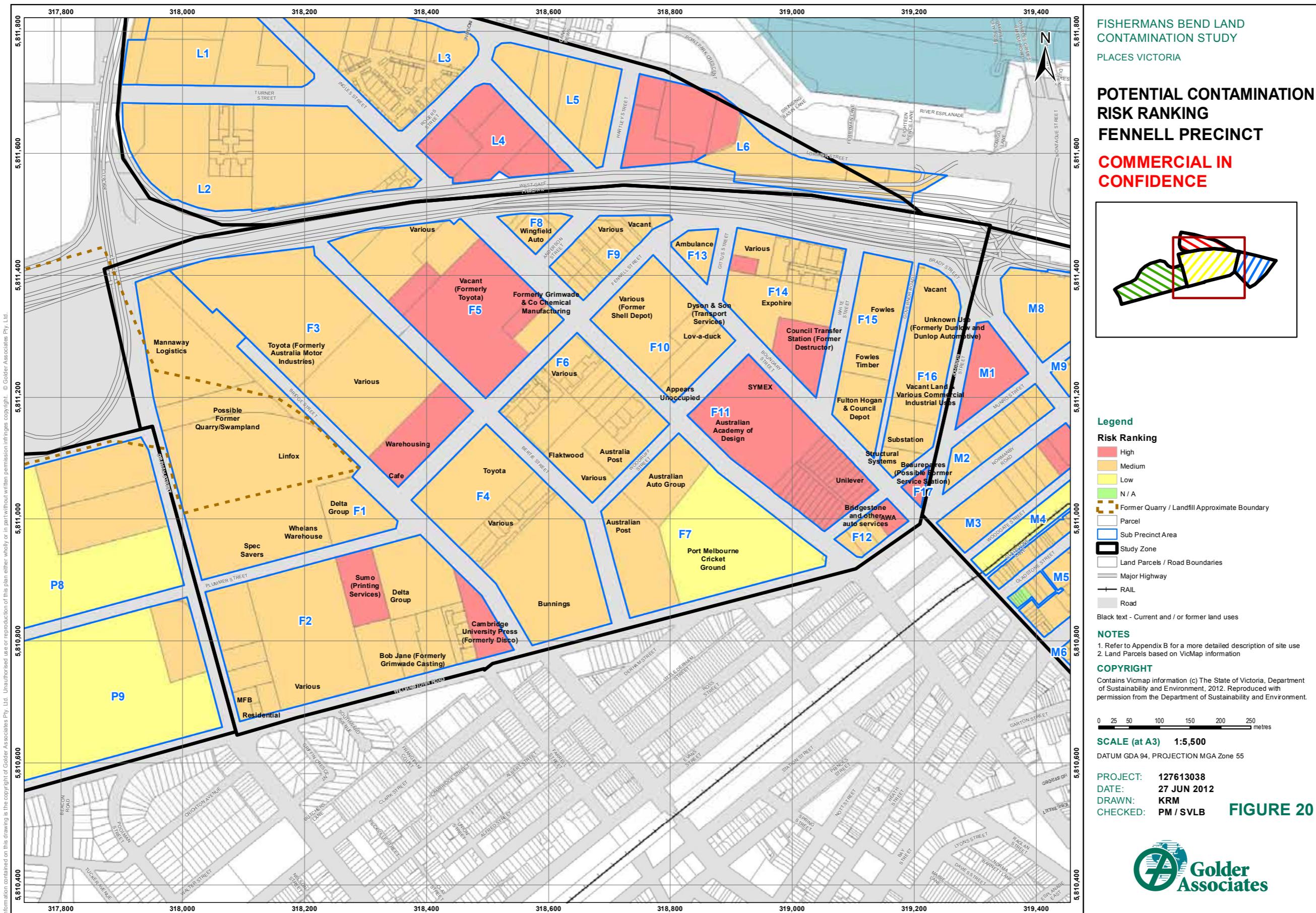
0 15 30 60 90 120 150 metres

SCALE (at A3) 1:3,500
DATUM GDA 94, PROJECTION MGA Zone 55

PROJECT: 127613038
DATE: 27 JUN 2012
DRAWN: KRM
CHECKED: PM / SVLB

FIGURE 19





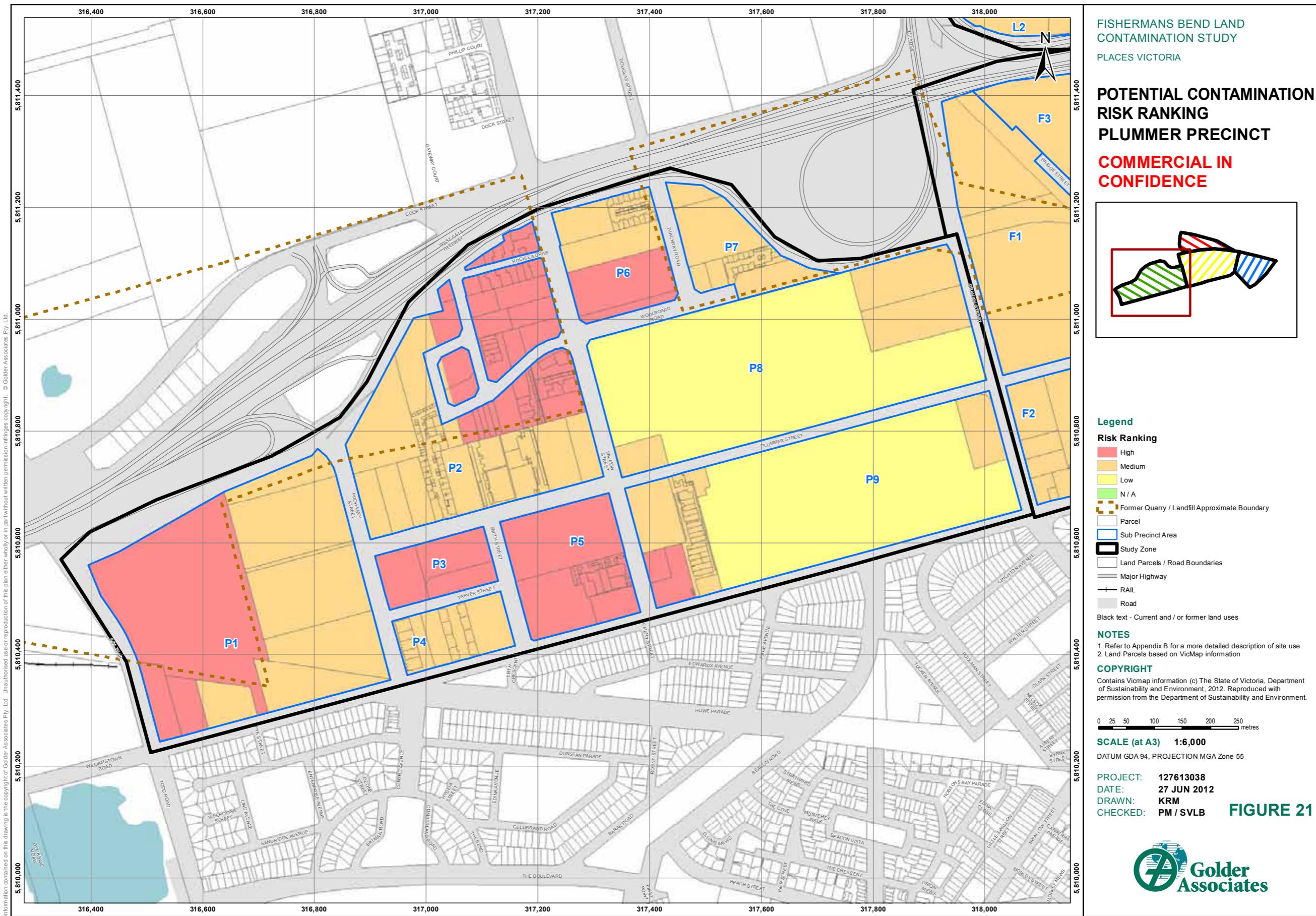


FIGURE 21





ENVIRONMENTAL SETTING

Hydrology and Drainage

The Study Area is situated within the Yarra Delta in an area of Quaternary aged sedimentation at the head of Port Phillip Bay. The Yarra Delta consists of several flat lying geological formations, which were formed at the mouth of the Yarra River. The main discharge environments in the Study Area are the:

- Yarra River located at its nearest point (from the northern extent of the Lorimer Street Precinct) approximately 100 m to the north; and
- Port Phillip Bay located at its nearest point (from the southern extent of the Plummer Street Precinct) approximately 400 m to the south.

Within the Study Area there are also a number of major man-made features which could affect local drainage and therefore groundwater flow including:

- A landfill (filled quarry) within the Plummer Street Precinct located at the Melbourne Grammar sports ground.
- A landfill (filled quarry) within the Plummer Street Precinct located at the north west end of Salmon Street (to the south of the Westgate Freeway).
- Filled swampland (possible quarry) in the north east portion of the Plummer Street Precinct, extending onto the western area of the Fennel Street Precinct.
- The Western Trunk sewer runs through at least a portion of all precincts (with the exception of the Lorimer Street Precinct).
- Given the shallow depth of groundwater (discussed below), features such as the drainage system and other subsurface infrastructure on individual sites may also influence groundwater flow direction.

The filled quarries may provide a local point of enhanced groundwater recharge if they are not capped. The Environmental Audit report for the former landfill located at the Melbourne Grammar sports ground (SKM, 1999) indicates that the former landfill was partially capped. No information regarding the capping of the Salmon Street former landfill could be identified in the audit report (Lane, 1999).

The former quarries and the trunk sewer may also provide a sink to groundwater if they extend below the groundwater table. The depth of the quarries located at the Melbourne Grammar sports ground and Salmon Street are reported to be approximately 9 metres below ground level (mbgl). Based on information provided by South Eastern Water, the Western trunk sewer exists below the groundwater table at approximately -10 m Australian Height Datum.

Geological and Hydrostratigraphic Units

Table A1 below provides a summary of the main geological and hydrostratigraphic units identified in the Study Area. The hydraulic characteristics of the main hydrostratigraphic units and typical ranges of hydraulic conductivities listed in Table A1 are based on published literature (Leonard, 1992), Golder experience with projects within similar geological/hydrogeological settings and lithology of the main geological units.

Beneath and around the Study Area the Port Melbourne Sands are generally underlain by Coode Island Silt, Fishermens Bend Silt, Moray Street Gravels and Werribee Formation.

APPENDIX A

Documented Supporting Information Relating to the Environmental Setting including Hydrogeological and Geotechnical Condition of Land within the Study Area


APPENDIX A
 SUPPORTING INFORMATION RELATING TO ENVIRONMENTAL SETTING
Table A1: Main Geological Units, Hydrostratigraphic Units and Their Characteristics

Geological Unit	Description	Hydrogeological Classification	Typical Hydraulic Conductivity Ranges
Port Melbourne Sand (Qrp)	Raised beach ridges: bedded and cross bedded, well sorted sand, shelley sand, minor silty or clayey sand.	Aquifer, unconfined, porous medium.	$K - 10^{-6}$ m/s to 10^{-4} m/s
Coode Island Silt (Qc)	Soft clayey sediments with shells and organic materials, and lenses or thin layers of sandy materials.	Aquitard, porous medium, due to presence of sand layers and lenses horizontal hydraulic conductivity (Kh) greater than vertical (Kv).	$Kh - 10^{-8}$ m/s to 10^{-7} m/s $Kv - 10^{-9}$ m/s to 10^{-8} m/s
Fishermans Bent Silt (Qf)	Clay, silt with some sands typically towards the base of the unit (lower Fishermans Bend Silt).	Aquitard, porous medium, due to fissuring vertical hydraulic conductivity may be greater than horizontal.	$Kh - 10^{-9}$ m/s to 10^{-8} m/s $Kv - 10^{-8}$ m/s
Moray Street Gravels (Qm)	Medium to coarse grained quartz sands with minor gravels, clay and silt.	Aquifer, confined, porous medium, high yielding.	$K - 10^{-5}$ m/s to 5×10^{-4} m/s
Brighton Group (Tb)	Sand, sandy clay, clayey sand, silt, clay and occasionally gravel.	Aquifer, unconfined, porous medium, medium yielding aquifer where sandy but aquitard where clayey.	$K - 10^{-7}$ m/s to 5×10^{-6} m/s
Older Volcanics (Tov)	Olivine and pyroxene basalt with abundant volcanic glass, variably weathered and fractured.	Aquifer, confined, fractured rock medium, low (where weathered) to high hydraulic conductivity (where fractured).	$K - 10^{-7}$ m/s to 10^{-5} m/s
Werribee Formation (Tw)	Fluvial quartz sand, minor gravels, silty clays and clays.	Aquifer, confined porous medium, potentially high yielding aquifer (lower zone).	$K - 10^{-8}$ m/s to 10^{-5} m/s
Melbourne Formation (Sud)	Interbedded siltstone and sandstone, folded, fractured and variably weathered.	Aquifer, unconfined to semi-confined, fractured rock medium. (Referred herein as Silurian aquifer).	$K - 10^{-7}$ m/s to 10^{-5} m/s

Kh = horizontal hydraulic conductivity, Kv = vertical hydraulic conductivity

Groundwater Levels

A review of publicly available Statutory Environmental Audit reports within and adjacent to the Study Area indicates that water levels values range from approximately 1 to 3 mbgl (refer to Appendix B2 for list of Audit reports).

Groundwater Quality

It is expected that groundwater quality, as measured by salinity (total dissolved solids (TDS)), will vary across the Study Area depending on whether the observed groundwater is perched (i.e. its quality may be


APPENDIX A
 SUPPORTING INFORMATION RELATING TO ENVIRONMENTAL SETTING

affected more by infiltrating rain water) or connected to the regional groundwater system (affected by the nearby estuarine system and Coode Island Silt where groundwater samples from Coode Island Silt and Moray Street Gravels have typically indicated TDS in excess of 30,000 mg/L).

A review of publicly available Statutory Environmental Audit reports within and adjacent to the Study Area indicates that TDS values range from approximately 150 mg/L at the 844-846 Lorimer Street site (PB, 2006) up to 30,000 mg/L reported at the Salmon Street former Landfill site (Lane, 1999).

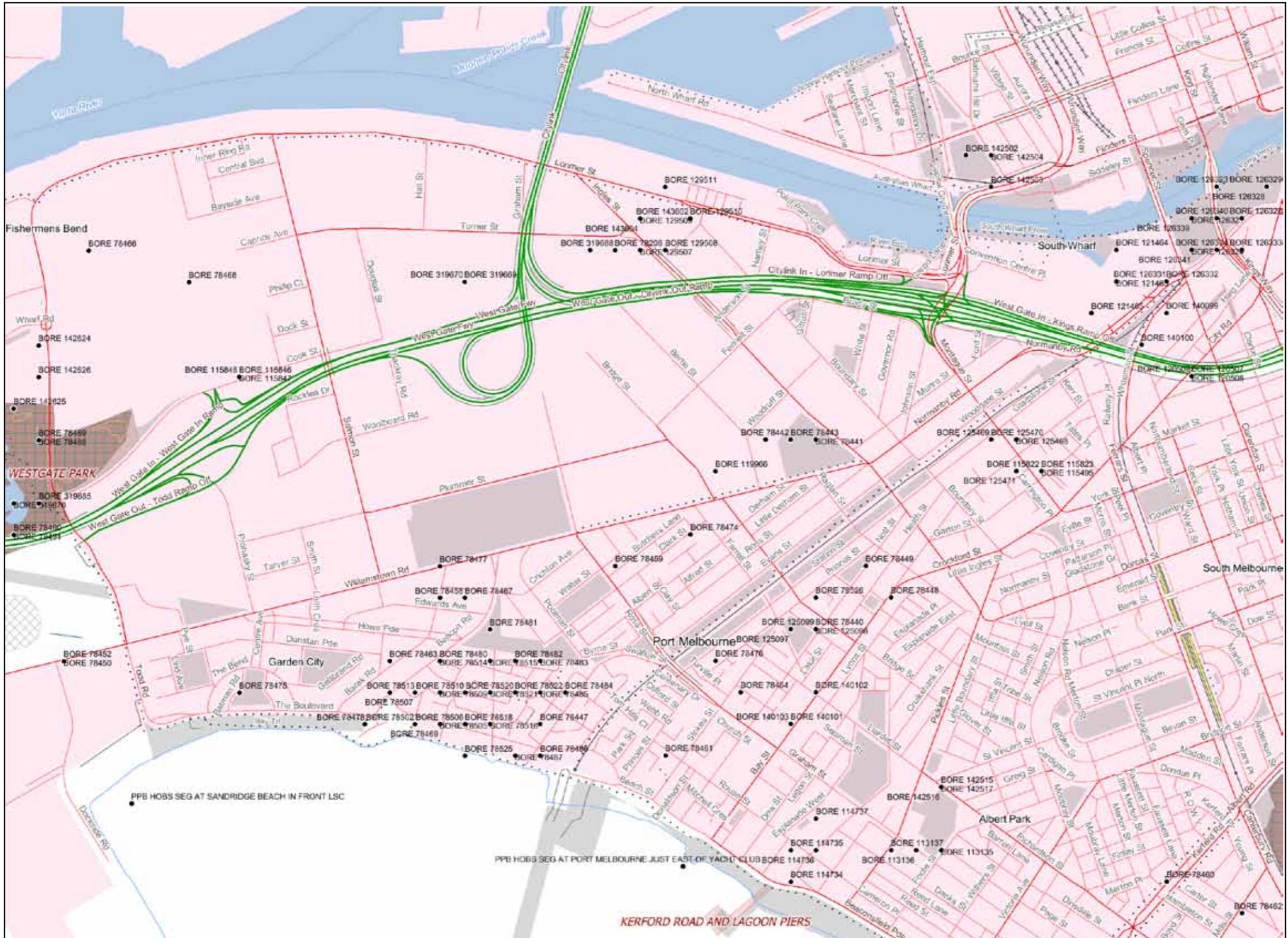
A review of the DSE Water Table Aquifers Beneficial Use map series for South Western Victoria reports the groundwater in the area is likely to be classified as Segment B. Segment B groundwater is characterised by total dissolved solids (TDS) in the range of 1,001 mg/L to 3,500 mg/L. We consider this classification would apply to groundwater within the Port Melbourne Sands rather than Coode Island Silt. In accordance with the *'State Environmental Protection Policy (SEPP) for Groundwater of Victoria'*, dated 1999, the Beneficial Uses that must be protected, applicable to sites that are classified as Segment B include:

- Maintenance of ecosystems;
- Potable mineral water;
- Stock watering;
- Industrial water use;
- Primary contact recreation; and
- Buildings and structures.

Groundwater in the area can therefore be considered to be of moderate to high sensitivity with respect to potential groundwater contamination.

Regional Groundwater Use

A review of the DSE Groundwater Resource Database indicated there are 20 registered groundwater bores located within the Study Area. Information from the groundwater database search is provided at the rear of this appendix. The review of the database indicated there are 3 registered groundwater bores located within the Study Area for extractive purposes (irrigation). These wells appear to be located within the Port Melbourne Football Oval (Fennell Street Precinct). A map and summary table of registered groundwater well locations sourced from the DSE Water Resources Data Warehouse website (<http://www.dse.vic.gov.au/waterdata/>) is provided at the rear of this appendix.



* Refer to page 2 for
legend details

Disclaimer: This map is a snapshot generated from Victorian Government data. This material may be of assistance to you but the State of Victoria does not guarantee that the publication is without flaw of any kind or is wholly appropriate for your particular purposes and therefore disclaims all liability for error, loss or damage which may arise from reliance upon it. All persons accessing this information should make appropriate enquiries to assess the currency of the data.

Generated at <http://nrempa-sc.nre.vic.gov.au/MapShare.v2/>

Map Server: nrempa.nre.vic.gov.au

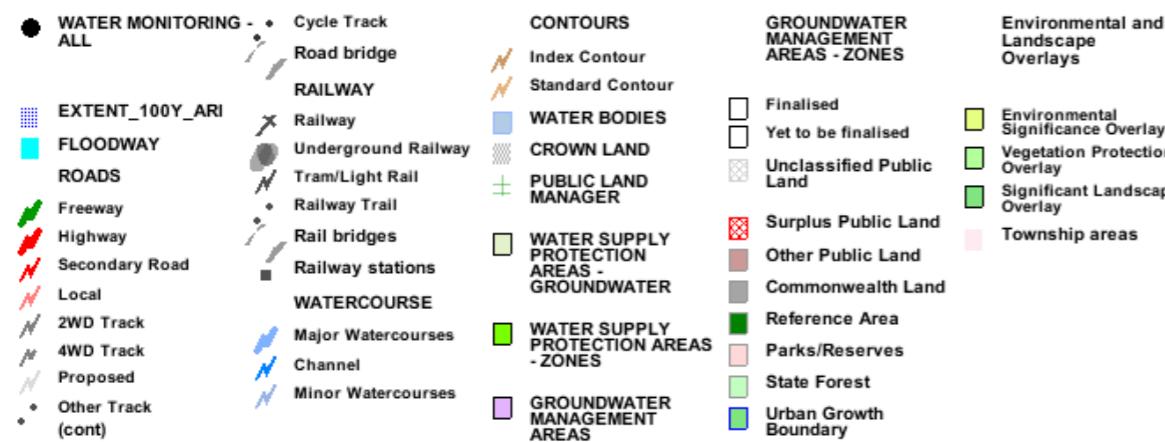
Map Service: wsg_waterresource_v4

Produced on Thu Apr 26 09:41:00 EST 2012

Map Scale 1:13,479
NOT FOR NAVIGATION

GDA
Vicgrid94

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Table A1: Groundwater Database Search
 Places Victoria
 127613038
 Fishermans Bend

Bore Name	Date installed	Latitude	Longitude	Depth	Casing Diameter (mm)	Top of Screen	Bottom of Screen	Use	Bore logs available
City Road Precinct									
B115495	11/01/1993	-37.831506	144.951345	5	50	2	5	IV	Y
B115822	20/02/1993	-37.831533	144.951355	5	50	2	5	IV	Y
B115823	20/02/1993	-37.831351	144.951258	5	50	2	5	IV	Y
B125468	25/08/1994	-37.830201	144.949904	4	50	2	4	IV	Y
B125469	25/08/1994	-37.830376	144.949615	4	50	2	4	IV	Y
B125470	25/08/1994	-37.830728	144.949094	4	50	2	4	IV	Y
B125471	25/08/1994	-37.831199	144.950274	5	50	2.4	4.4	IV	Y
Lorimar Precinct									
B129507	06/12/1996	-37.824156	144.935586	5	50	2	5	IV	Y
B129508	06/12/1996	-37.824132	144.936756	5	50	2	5	IV	Y
B129509	06/12/1996	-37.823257	144.935156	5	50	2	5	IV	Y
B129510	06/12/1996	-37.823234	144.936952	5	50	2	5	NKN (IV)	Y
B129511	17/12/1996	-37.82298	144.936357	4.5	50	1.5	4.5	IV	N
B143602	18/01/2001	-37.823149	144.935216	5	50	2	5	IV	Y
B143604	18/01/2001	-37.823231	144.935259	5	50	2	5	IV	Y
B319688	19/10/1984	-37.824323	144.933252	12				NG	N
Fennell St Precinct									
B78441	31/12/1970	-37.830376	144.941854	6				IR	N
B78442	31/12/1970	-37.830602	144.940326	6				IR	N
B78443	31/12/1970	-37.830917	144.941351	6				IR	N
B119966	11/06/1992	-37.831074	144.937949	6	50	2.2	5.2	IV	Y
Plummer St Precinct									
B78477	17/02/1990	-37.834534	144.927173	14	100	2.2	7.2	NKN	Y
Adjacent to the Study Area									
B78448	08/01/1973	-37.835236	144.945117	6	55	-1	6	IR	Y
B78449	08/01/1973	-37.834936	144.944421	6	55	0	6	IR	Y
B78450	03/07/1975	-37.83729	144.912323	13.07	152	7.92	9.86	MI	Y
B78452	09/07/1975	-37.837102	144.911874	10.6	152	6.92	8.83	MI	Y
B78458	06/04/2005	-37.835343	144.927082	4		3.4	4	DM (ST)	Y
B78459	04/03/1983	-37.834309	144.934337	5	90	4.4	5	DM	Y
B78467	25/03/1986	-37.835416	144.928625	4	38	3.36	3.95	DM	Y
B78474	10/08/1987	-37.833504	144.937768	8.5	100	7	8.5	DM	Y
B78481	24/04/1990	-37.836595	144.929047	8.5	50	5.5	7.5	IV	Y
B78440	31/12/1967	-37.836009	144.941902	6.1	152	4.57	6.1	IR	N
B319669	21/06/1983	-37.825931	144.928401	50				SEC	N
B319670	11/07/1983	-37.825464	144.92846	63				SEC	N
B115846	31/05/1993	-37.828497	144.919558	4.5	50	1.5	4.5	IV	Y
B115847	31/05/1993	-37.82852	144.91932	4.5	50	1.5	4.5	IV	Y
B125097	02/12/1994	-37.83636	144.941381	9	50	6	9	IV	Y
B125098	02/12/1994	-37.836105	144.94224	9	50	6	9	IV	Y
B125099	02/12/1994	-37.83664	144.941885	9	50	6	9	IV	Y

Bore Use Codes:

IV Investigation
 IR Irrigation
 NG Non groundwater
 NKN Not known
 DM Domestic
 ST Stock
 MI Miscellaneous

COMMERCIAL IN CONFIDENCE**FISHERMANS BEND LAND CONTAMINATION STUDY****APPENDIX B****Summary of Historical Contamination Information for inclusion in the GIS**

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FISHERMANS BEND CONTAMINATION STUDY

Table B1 - Summary of Former and Current Site Uses

Place Victoria
127613038

Precinct	Approximate Area (ha)	Precent wide historical use and / or activities	Sub-precinct Historical Use and / or activities	Sub-precinct Current Use and / or activities	Development Status (within the past 20 years)	Environmental Audit Status	Observations made during the drive-bys	Known former and current industries present in sub-precinct (refer to list at the base of this table for associated potential contaminants of interest)												
								Fill	General Industrial	Automotive Industries	Fuel Merchant (bulk storage of fuel)	Timber works	Rubber Processing	Woolen Mill	Animal and animal product processing	Former Landfill / Sand Quarry	Concrete production	Paint manufacturing	Print works	Engineering
Lorimer Street Precinct:																				
L1	4.0	The portion of the Study Area within South Melbourne (the Lorimer Street Precinct and part of the Montague Street Precinct) was established as an industrial area from the mid to late 1800s, particularly for use for animal and animal product processing including abattoirs, boiling down works, bone mills, manure and glue factories, soap and candle makers.	Service station, Charlesworth Rubber, cigarette manufacture, printers	Various commercial and industrial uses including a Volvo car sales and dealership. One area is undergoing redevelopment and one lot is vacant.	All recently redeveloped or currently undergoing redevelopment with exception of one strip of land adjacent to the Bolte Bridge overpass.	One Audit completed (refer to Table B2, Appendix B2)	Bowser noted at Volvo site indicating presence of UST(s)	✓	✓	✓	✓	✓						✓		
L2	6.7		Telecom (PMG storage depot), truck distribution centre, warehouse facilities.	Various commercial and industrial uses including Geotechnical Engineering (engineering firm).	All recently redeveloped	One Audit completed (refer to Table B2, Appendix B2)		✓	✓										✓	
L3	3.9		Service station, Adams Pest Control, CSR (timber mill), Gibson wood turners, possible abattoir.	Various commercial and industrial uses	All recently redeveloped or currently undergoing redevelopment or vacant.	No Audits completed.		✓	✓	✓	✓	✓			✓					
L4	2.3		Unknown	Pronto Mixed Concrete, Hanson Concrete	Does not appear to have been redeveloped recently	No Audits completed.	Bowser area noted at Pronto site indicating presence of USTs	✓	✓	✓							✓			
L5	2.2		South Melbourne Abattoir (MMBW plan dated 1901)	Subaru dealership and servicing	All recently redeveloped	No Audits completed	Bowser noted at Subaru site indicating presence of UST(s)	✓	✓	✓										
L6	4.2		Timber yard	Auspine, plumping supplier, large portion appears vacant. Eastern portion occupied by CityLink.	Eastern portion occupied by CityLink has been redeveloped	No Audits completed.		✓	✓		✓									
Plummer Street Precinct:																				
P1	17.2	Prior to the 1920s, the central and western portions of the Study Area (the Plummer Street and Fennell Street Precincts) were used for sand quarrying, grazing, a rifle range, a golf course and various air fields. It is understood that uncontrolled sand carting from the area was undertaken until the 1870s when attempts were made for sand quarrying to occur in designated areas.	Former sand quarry and municipal tip (landfill).	Melbourne Grammar Sports Oval, Detmold Group (plastics / packaging), parkland, Tricables (cable manufacturers), shipping container yard. Site located at 5 Prohasky Street appears to be unoccupied.	No significant redevelopment	One Audit completed (refer to Table B2, Appendix B2)	A vent pipe and signage indicating the presence of a UST noted at the Detmold Group site.	✓	✓	✓					✓			✓		
P2	13.9		Former sand quarry and landfill, various government uses largely associated with warehousing and storage facilities, fuel storage depot, timber storage (Gunnersons).	Various commercial and industrial uses including Lorbek Luxury Cars (including servicing), Australian Furniture Timber, self storage, print works, some vacant land present.	More than half of the area redeveloped	Various Audits completed (refer to Table B2, Appendix B2)		✓	✓	✓	✓	✓				✓		✓		
P3	2.0		Former Chrysler car manufacturing plant	Niche Transport, M.I. Warehousing	No significant redevelopment	No Audits completed.	A vent pipe indicating the presence of a UST noted at the Niche Transport site.	✓	✓	✓										
P4	2.0		Clarke Mobile Cranes, JMJ Fleet Management	Various commercial and industrial uses. Includes film company mobile vans (e.g. lighting, catering vans).	Predominately redeveloped	No Audits completed.		✓	✓	✓										
P5	4.5		Former Chrysler Car manufacturing plant, service station	Service station, indoor paintball, Tile Liquidators, Auto Sales, On Demand (digital printers), commercial buildings (Intralot). Heritage overlays exist over the service station and over some of the former Chrysler plant buildings.	No significant redevelopment	No Audits completed.	USTs present at service station, vent pipes noted. A further vent pipe indicating the presence of a UST noted near the western boundary (Smith Street side).	✓	✓	✓	✓	✓								
P6	3.8		Former sand quarry, Gunnersons (wood products)	Gunnersons, Southbank Auto Auctions, Direct Dial Cars, Kennards self storage and new business park (various commercial and industrial uses).	New business park in north east portion and a new building in within the Gunnersons site in the 1990s, but otherwise not recently redeveloped.	No Audits completed.	A vent pipe indicating the presence of a UST noted on what appears to be Gunnersons's land.	✓	✓	✓		✓								

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FISHERMANS BEND CONTAMINATION STUDY

Table B1 - Summary of Former and Current Site Uses

Place Victoria
127613038

Precinct	Approximate Area (ha)	Precent wide historical use and / or activities	Sub-precinct Historical Use and / or activities	Sub-precinct Current Use and / or activities	Development Status (within the past 20 years)	Environmental Audit Status	Observations made during the drive-bys	Known former and current industries present in sub-precinct (refer to list at the base of this table for associated potential contaminants of interest)												
								Fill	General Industrial	Automotive Industries	Fuel Merchant (bulk storage of fuel)	Timber works	Rubber Processing	Woolen Mill	Animal and animal product processing	Former Landfill / Sand Quarry	Concrete production	Paint manufacturing	Print works	Engineering
P7	2.9		Possible former quarry, swampland, SEC disposals	Gilbert Transport, various commercial and industrial uses	Predominantly redeveloped	No Audits completed.		✓	✓	✓										
P8	17.1		Former sand quarry in north east area, Australian Wool Corporation, warehousing, Toledo Scales, Refrigeration engineers.	Port Melbourne Industrial Estate (various commercial and industrial uses, predominantly warehousing), Austpac, National Tiles, Aalto (possible metal fabricators), Go Karting.	Predominantly redeveloped (during the mid to late 1980s)	No Audits completed.	Interceptor trap noted at the Aalto site (facing onto Graham Street).	✓	✓										✓	
P9	14.9		JL Murphy Reserve, BALM paints (manufacturers of lead based paints), CSIRO (Division of Mineral Chemistry)	JL Murphy Reserve, self storage facility (within former BALM site), council depot, new business park, Absolute Electronics, substation.	Largely not redeveloped	No Audits completed.		✓	✓								✓		✓	
Fennell Street Precinct:																				
F1	10.7	Prior to the 1920s, the central and western portions of the Study Area (the Plummer Street and Fennell Street Precincts) were used for sand quarrying, grazing, a rifle range, a golf course and various air fields. It is understood that uncontrolled sand carting from the area was undertaken until the 1870s when attempts were made for sand quarrying to occur in designated areas.	Possible sand quarry, swampland, Coles warehouse (storage and transport of food items), Coles Myer, Linfox, Auto workshop.	Delta Group, Whelans Warehouse, Container and freight services (Mannaway), Spec Savers, warehousing (Linfox).	No significant redevelopment	No Audits completed.		✓	✓	✓										
F2	9.3		Grimwade Castings (foundry 1939 - 1984), MFB, Police testing station, Disco (manufacturers of automotive parts), Draffin Bros (printers).	Delta Group, Cambridge University Press, Sumo printing services, Bob Jane, MFB (heritage Overlay), residential (next to MFB), new business park.	Approximately half of block has been redeveloped with redevelopment works currently being undertaken	No Audits completed.		✓	✓	✓									✓	✓
F3	8.0		Australian Motor Industries Group, Toyota.	Toyota, Salford Lads Club (café), new business park (Ericsson, Sharp), warehouse (Globe).	Predominantly redeveloped. Southern portion of block fronting onto Fennell Street has not been redeveloped.	No Audits completed.	A vent pipe indicating the presence of a UST noted on what appears to be the Globe warehouse site.	✓	✓	✓										
F4	5.9		Gas Plant and Equipment P/L (boiler makers), State mail centre.	Bunnings, business park, Toyota.	Predominantly redeveloped, however building running from Bridge street through to Bertie Street appears to be not redeveloped (possibly rendered on Bertie Street side)	No Audits completed.	Bowser noted at site facing onto Fennell Street (appears to be associated with the Toyota site)	✓	✓	✓										
F5	5.5		Australian Motor Industries Group, Toyota, Felton Grimwade & Co (chemical manufacturing), Nightingale Chemicals (disinfectants), United Oil (oil storage).	Power Group, Zax Amusements, various commercial and industrial uses in new business park.	Approximately half of the block has been redeveloped	No Audits completed.		✓	✓	✓	✓									
F6	3.9		Australia Post, Hydro Vacuum Fumigation, Moore Hydraulics	Flaktwoods (industrial fan manufacturers), Toyota Green, various commercial and industrial uses in new business park	More than half of block has been redeveloped, however a development facing onto Fennell Street appears to have maintained part of the original building brick wall.	No Audits completed.		✓	✓	✓									✓	
F7	6.0		Port Melbourne Oval, possibly part of Unilever operations.	Port Melbourne Oval, nursery, Australia Post, Australian Auto Group.	Australia post building appears to be the most recently redeveloped site. Unknown when this occurred.	No Audits completed.		✓	✓	✓					✓					

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FISHERMANS BEND CONTAMINATION STUDY

Table B1 - Summary of Former and Current Site Uses

Place Victoria
127613038

Precinct	Approximate Area (ha)	Precent wide historical use and / or activities	Sub-precinct Historical Use and / or activities	Sub-precinct Current Use and / or activities	Development Status (within the past 20 years)	Environmental Audit Status	Observations made during the drive-bys	Known former and current industries present in sub-precinct (refer to list at the base of this table for associated potential contaminants of interest)											
								Fill	General Industrial	Automotive Industries	Fuel Merchant (bulk storage of fuel)	Timber works	Rubber Processing	Woolen Mill	Animal and animal product processing	Former Landfill / Sand Quarry	Concrete production	Paint manufacturing	Print works
F8	0.4		Valvoline Oil merchants	Winfield Automotive services, various commercial and industrial uses.	Apart from Winfield site, sub-precinct has been redeveloped	No Audits completed to date		✓	✓	✓									
F9	1.2		Unknown	Various commercial and industrial uses in new business park.	All redeveloped with exception of vacant area at eastern end of the sub-precinct.	No Audits completed.		✓	✓										
F10	2.8		Shell Terminal depot, Boral plasterboard	Luv-A-Duck, Dyson and Son P/L (transport services), other various commercial and industrial uses.	Approximately half of the sub-precinct (northern area) has been redeveloped.	No Audits completed.		✓	✓	✓	✓								
F11	3.9		Unilever (formerly Kitchen and Sons and Apollo Candle works).	Unilever, Symex, Australian Academy of Design (all of this sub-precinct has an historic overlay).	Not redeveloped	No Audits completed.	ASTs noted. There is significant potential for USTs to be present.	✓	✓						✓				
F12	0.5		Unknown. In particular former use of now AWA site (with observed vent pipe) is unknown.	Bridgestone Tyre Centre, AWA (computer servicing and logistics).	No significant redevelopment	No Audits completed.	A vent pipe indicating the presence of a UST noted on the AWA site.	✓	✓	✓									
F13	0.4		Unknown	Ambulance	Redeveloped	No Audits completed.		✓	✓										
F14	3.4		Council depot, destructor (incinerator) since at least 1900.	City of Port Phillip depot, Dyson and Son P/L (second site), Expohire, various commercial and industrial uses in new business park.	Partially redeveloped	No Audits completed.	Bowser noted at site which appears to be occupied by Dyson and Son P/L (who also occupy land within sub-precinct F14)	✓	✓	✓									
F15	2.5		Unknown (possibly part of council depot)	Fowels Auctions and timer yard, Fultan Hogan yard, City of Port Phillip depot.	Partially redeveloped	No Audits completed.		✓	✓			✓							
F16	2.6		Dunlop and Dunlop Automotive (storage), Timber yard (not clear if for processing or storage).	Substation, Structural Systems, Staging Rentals, vacant land, various commercial and industrial uses in redeveloped area in north portion.	Northern third of sub-precinct redeveloped	No Audits completed.		✓	✓	✓	✓	✓	✓					✓	
F17	0.1		An historic building and possible former service station.	Beaurepaires	Not redeveloped	No Audits completed.	The layout of the Beaurepaires site indicates it may be a former service station	✓	✓	✓	✓								
Montague Street Precinct:																			
M1	1.0		The portion of the Study Area within South Melbourne (the Lorimer Street Precinct and part of the Montague Street Precinct) was established as an industrial area from the mid to late 1800s, particularly for use for animal and animal product processing including abattoirs, boiling down works, bone mills, manure and glue factories, soap and candle makers.	Dunlop Rubber	Mazda Dealership and servicing, Otis Elevator Company.	Not recently developed. Older style buildings considered likely to be part of former Dunlop Rubber operations.	No Audits completed.		✓	✓	✓			✓				✓	
M2	1.0			Dunlop Rubber	Various commercial and industrial uses within new development	All recently redeveloped	No Audits completed.		✓	✓			✓						
M3	1.7			Dunlop Rubber	Various commercial and industrial uses in new development, self storage (within former Dunlop buildings)	All recently redeveloped with the exception of the eastern end where former Dunlop building remains (under a heritage overlay).	No Audits completed.		✓	✓			✓						
M4	1.6			North side - railway easement, south side generally unknown. Chrome electroplating plant formerly located at 80 Montague Street.	Railway on north side, various commercial uses on south side including car servicing and Tysesen Krupp (elevators). Former chrome electroplating site at 80 Montague street is vacant.	No significant redevelopment	One Audit completed (refer to Table B2, Appendix B2)	Environmental groundwater monitoring wells noted in footpath adjacent to 80 Montague Street.	✓	✓	✓							✓	

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FISHERMANS BEND CONTAMINATION STUDY

Table B1 - Summary of Former and Current Site Uses

Place Victoria
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								Fill	General Industrial	Automotive Industries	Fuel Merchant (bulk storage of fuel)	Timber works	Rubber Processing	Woolen Mill	Animal and animal product processing	Former Landfill / Sand Quarry	Concrete production	Paint manufacturing	Print works
M5	2.1	School, residential, unknown if commercial and industrial sites formerly existed	Various commercial and industrial uses including car servicing. Small pocket of residential use in north west, heritage listed school facing onto Montague Street, car servicing. Possible former hotel on corner of Buckhurst and Boundary Streets (under a heritage overlay).	Only central area of block appears to have been redeveloped	No Audits completed.	Possible use of imported fill under ramp up to carpark facing onto Boundary Street.	✓	✓	✓										
M6	2.0		Residential, unknown if commercial and industrial sites formerly existed	Various commercial and industrial uses including car servicing. Small pocket of residential, hotel (all with heritage overlay).	Only central area of block appears to have been redeveloped	No Audits completed.		✓	✓	✓									
M7	2.1		Residential, unknown if commercial and industrial sites formerly existed.	Various commercial and industrial uses including car servicing. Small pocket of residential (all with heritage overlay) and possible hotel.	No significant redevelopment	No Audits completed.		✓	✓	✓									
M8	1.6		May have formed part of Dunlop Rubber operations	Carpark	No buildings onsite	No Audits completed.		✓	✓			✓							
M9	1.1		Former use unknown	Various commercial and industrial uses including car servicing.	Partially redeveloped	No Audits completed.	Interceptor trap noted on site facing on to Normanby Road	✓	✓	✓									
M10	1.3		Laconia Woollen mills (building still remains)	Total Tools, various commercial and industrial uses including car dealership (Toyota and Mitsubishi) and servicing.	Partially redeveloped	No Audits completed.		✓	✓	✓			✓						
M11	2.5		Tram depot, residential, unknown if commercial and industrial site formerly existed	Car servicing, tram depot and workshop, residential (heritage overlay).	No significant redevelopment	No Audits completed.		✓	✓	✓									
M12	2.1		Possible former service station (west end), McPherson's Machinery	Car servicing, Carlin's auto auctioneer, pest control, Industrial Hub (new commercial use development), car parking.	Partially redeveloped (MAB "Industry Business Hub"), large portion currently vacant	No Audits completed.		✓	✓	✓									
M13	0.3		Unknown	Map Coffee warehouse	Does not appear to have been redeveloped	No Audits completed.		✓	✓										
M14	2.0		Possible former service station, other former uses unknown	Classic Blue, car servicing, Tucks Industrial Packings and Seals, print works and other various commercial and industrial uses.	Partially redeveloped	No Audits completed.	A vent pipe indicating the presence of a UST noted at the Classic Blue site	✓	✓	✓								✓	
M15	1.9		Residential, hotels, former commercial and industrial site uses unknown	Various commercial and industrial uses including car servicing, restaurant, Regal Seafoods, Gym (possible former garage), Precision Group (adhesives, bearings and plastics), Chappell and Clegg Consolidated (power machinery).	No significant redevelopment	No Audits completed.		✓	✓	✓							✓	✓	
M16	0.7		Unknown	Various commercial uses	Existing building appears to have been renovated / refurbished	No Audits completed.		✓	✓										
M17	0.8		Melbourne Theatre Co. (1970 to late 2000s)	Car servicing, Honda lawnmower sales.	No significant redevelopment	No Audits completed.		✓	✓	✓									
M18	0.7		Unknown	Tile sales and other various commercial uses.	Partially redeveloped	No Audits completed.		✓	✓										

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FISHERMANS BEND CONTAMINATION STUDY

Table B1 - Summary of Former and Current Site Uses

Place Victoria
127613038

Precinct	Approximate Area (ha)	Percent wide historical use and / or activities	Sub-precinct Historical Use and / or activities	Sub-precinct Current Use and / or activities	Development Status (within the past 20 years)	Environmental Audit Status	Observations made during the drive-bys	Known former and current industries present in sub-precinct (refer to list at the base of this table for associated potential contaminants of interest)											
								Fill	General Industrial	Automotive Industries	Fuel Merchant (bulk storage of fuel)	Timber works	Rubber Processing	Woolen Mill	Animal and animal product processing	Former Landfill / Sand Quarry	Concrete production	Paint manufacturing	Print works
M19	1.2		Blacksmith, fitting and machine shop, Steel fabrication, Engineering workshop, dry cleaning equipment manufacturers.	Central Motor Auctions, other buildings appear vacant.	No significant redevelopment	No Audits completed.		✓	✓	✓								✓	✓
M20	0.7		Kellow-Faulkner Pty Ltd (car servicing).	Car parking, car servicing, other commercial uses.	No significant redevelopment	No Audits completed.	Possible vent pipe indicating the presence of a UST noted the site facing onto Cecil Street	✓	✓	✓									

Data sourced from 'drive-by' assessment of the Study Area, review of publicly available for completed Statutory Environmental Audits for sites within and in the vicinity of the Precincts, review of historic aerial photographs and maps (Melbourne Metropolitan Board of Works (MMBW), Melways and published books (refer to main report for a full list of references).

Fill:

- Heavy metals (As, Cd, Cu, Cr, Hg, Pb, Ni, Zn) and potentially cyanide
- Polycyclic aromatic hydrocarbons (PAHs)
- Petroleum hydrocarbons (total petroleum hydrocarbons (TPH), monocyclic aromatic hydrocarbons (MAHs) and phenols
- Pesticides / herbicides associated with spraying of weeds and pests
- Asbestos associated with the construction and demolition of existing and former buildings

General Industrial sites:

- Heavy metals (As, Cd, Cu, Cr, Hg, Pb, Ni, Zn) and metalloid associated with imported fill and various industrial waste streams (e.g. foundries and other metal works, timber works, paint works, printing works etc).
- Polycyclic aromatic hydrocarbons (PAHs) associated with imported fill, use and storage of fuels and oils and various industrial waste streams.
- Petroleum hydrocarbons (total petroleum hydrocarbons (TPH), monocyclic aromatic hydrocarbons (MAHs) and phenols associated with the use and storage of fuels and oils and various industrial waste streams.
- Solvents (non-chlorinated solvents (e.g. kerosene, petroleum ether, white spirit, turpentine, phenol, acetone, MEK, MIBK, MBK) and chlorinated solvents (e.g. PCE, TCE, and breakdown products)) associated with the
- Polychlorinated biphenyls (PCBs) associated with substations.

Automotive Industries (includes vehicle manufacturing plants, auto mechanics, service stations and other vehicle services (e.g. panel beaters)

- Those potential contaminants of interest listed for General Industries

Timber Industries

- Those potential contaminants of interest listed for General Industries and CCA (copper, chromium and arsenic), creosotes, solvents and adhesives

Rubber Processing

- Those potential contaminants of interest listed for General Industries and rubber (natural and synthetic) and sulphate

Woolen Mill

- Those potential contaminants of interest listed for General Industries and calcium chloride, naphthalene, creosotes, various acids (e.g. sulfuric)

Animal and Animal Product Processing

- Those potential contaminants of interest listed for General Industries and inorganics including high salinity (TDS), nutrients (ammonia, nitrates, phosphate, sulphates) and caustic and chlorinated chemicals (alkalinity, pH, sodium hypochlorite, phosphates)

Former Landfill

- Those potential contaminants of interest listed for General Industries and methane and hydrogen sulphide and other landfill gasses associated with landfill sites

Concrete Productions

- Those potential contaminants of interest listed for General Industries and high alkalinity (lime)

Paint Manufacturing

- Those potential contaminants of interest listed for General Industries

Print works

- Those potential contaminants of interest listed for General Industries

Engineering / Foundries

- Those potential contaminants of interest listed for General Industries

Drycleaning

- Those potential contaminants of interest listed for General Industries and in particular PCE

Council Depot and other Depots

- Those potential contaminants of interest listed for General Industries



REGULATORY REVIEW

A regulatory review was undertaken, comprising a search of (1) the EPA Priority Sites Register and (2) EPA list of properties for which a certificate or statement of environmental audit has been issued. The purpose of the search was to identify properties of which EPA has knowledge that might be, or have been a source of soil and / or groundwater contamination within and adjacent to the Study Area.

A plan showing the location of the identified sites is provided on Figures 14 to 17. A summary of the audit reports reviewed and the associated findings are presented in Table B2 within this appendix.

Priority Sites Register

Priority Sites are sites for which the Environment Protection Authority (EPA) Victoria has issued a Clean-up Notice pursuant to Section 62A or a Pollution Abatement Notice (relevant to land and/or groundwater) pursuant to Section 31A or 31B of the Victorian *Environment Protection Act 1970*. Typically, these are sites where pollution of land and/or groundwater may present an unacceptable risk to human health or to the environment.

EPA maintains the Priority Sites Register as a listing of all priority sites identified by the EPA as requiring clean up. The Register is available to the public. It is important to note that the Priority Sites Register is not a listing of all contaminated sites in Victoria, nor is it a list of all contaminated sites of which EPA has knowledge.

As at May 2012, only one Priority Site was located within the Study Area: 80 Montague Street, South Melbourne, within the Montague Street Precinct (listed as "Former Industrial Site. Requires assessment and/or clean up"). This site has been assessed and remediated under a Statutory Environment Audit (as discussed below and attached Table B2) and is not considered to form source of contamination within the Study Area. However residual contamination (primarily by chromium) remains which requires ongoing management. An extract of the Priority Sites Register showing this site is provided at the rear of this appendix.

Environmental Audits

The Environmental Audit System was established in Victoria by the EPA as a means by which planning authorities, site owners, purchasers and others are provided with assurance regarding the condition of a property and its suitability for use, frequently in the context of site development.

Each audit completed under Section 53X of the Victorian Environment Protection Act 1970 (as amended) will be issued with either a certificate or statement and be made publicly available. It is important to note that the list is not a register of all contaminated or cleaned sites in Victoria, but rather that it is a list of sites where a statutory audit has been completed. Additional sites may currently be undergoing statutory environmental audit, however the EPA list only includes completed audits. A copy of the list of completed statutory environmental audits for City of Melbourne and City of Port Phillip is provided in at the rear of this appendix.

A statutory environmental audit has been completed at seven sites within the Study Area. Copies of the audit reports were reviewed and information relating to soil and groundwater contamination at each of the sites recorded. This information has been used to assist in developing the assumptions for the likely contamination risks for the Study Area. A summary of the audit reports reviewed and the associated findings are presented in Table B2 within this appendix.

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FISHERMANS BEND CONTAMINATION STUDY
Table B2 - Review of Audit Reports

Place Victoria
 127613038

Site Details							Site History						Soil					
Site Address	Area (m ²)	EPA CARMS No.	Year Audit Completed	Audit type	Environmental Segments Assessed	Audit Outcome	Historical Site Uses.		Site First Developed	Processes and Chemicals Used on Site		USTs or other process infrastructure?	Years of operation	Fill Type	Fill Depth (m)	Natural Soils	Quality/ Category of Fill and Natural Soils	Potential for Contaminated Soil (i.e. following site clean up if undertaken)
Lorimer Street Precinct:																		
844-846 Lorimer Street, Port Melbourne	0.17 ha (part of a 2.5 ha site)	49997-1	11/07/2006	53X	Soil and groundwater	Statement	Golf club (pre World War II), service station (ceased operations 2002). Makes reference to industry and fill in the surrounding area.	Not identified.	TPH, BTEX, VHC's, metals (also tested for PCBs, OCPs / Ops, Phenols, Cyanide and Fluoride).	Yes, (5 USTs identified and associated infrastructure)	Not identified	Sand, crushed rock, silt, sandy clay and some rubble	Ranging from 0.3 to 1.3m below ground surface (bgs)	Clayey Silt to Silty Clay	Soil quality largely assessed to Human Health guidelines protective of Commercial / Industrial beneficial uses. Site remediated to this level with the exception of one area outside the audit area. Site considered satisfactory for Commercial / Industrial beneficial uses.	Some residual VHC's identified at the site outside the audit area. Auditor considers that it was acceptable to leave in-situ.		
Citilink Park, 349 Ingles Street, Port Melbourne																		
	3.3 ha	45435-1	9/03/2001	57AA	Soil and groundwater	Statement	Open space until 1954, warehouse facilities ("PMG Storage Depot"). Makes reference to various industries in the area including "packing cases, storage cotton dressings, chemical suppliers, oil storage, joinery works and disinfectant manufacture. Also refers to fill across the site.	Approx. 1954	Contaminants of concern (CoC) included (largely due to the presence of fill on site): metals, TPH, MAH / BTEX, phenols, VHC / VHH, PCB's, PAH's, Cyanide, OCP and OPP.	None identified.	Approx. 1954 to 2000 (46 yrs)	Mixed sands, silts and clays with crushed rock and building rubble.	Up to 1.7m bgs.	Clayey Sands and Sandy Clays	Fill soils at the site contained concentrations of metals, PAH's and TPH's exceeding the ANZECC B guidelines. Limited samples contained concentrations of lead and PAH's exceeding the NEPM F guidelines. Limited natural soil samples were below ANZECC B guidelines	The audit concludes that while there are contaminants (PAH's, copper, lead and zinc) in the fill that have the "potential to affect ecological conditions and human health if exposed", the site is still suitable for use as commercial / industrial as long as "no in-situ soils are exposed".		
Plummer Street Precinct:																		
Melbourne Grammar, Todd Road (Cnr Williamstown Road)	6.9 ha	37104-1	5/11/1999	57AA	Soil, groundwater and landfill gas	Statement	Prior to 1930's there is no information. From the 1930's to the 1960's the site was used for sand mining and as a municipal tip (concurrent). During the mid 1960's all previously dumped materials were removed and sand mining recommenced with the pit reaching a depth of around 8m. In the 1970's tipping recommenced, which continued until the early 1990's. The tip was largely used for municipal and industrial waste although some council waste (e.g. street sweepings etc) were disposed of at the site. At cessation of dumping, the waste was estimated to be approx. 1 - 2m above ground level. The site was largely capped with imported soil between 1991 and 1994 although some areas were left uncovered.	1930's	Sand mining and landfill. CoC include: metals, TPH, MAH / BTEX, phenols, VHC / VHH, PCB's, PAH's, Cyanide, OCP and OPP, methane from landfill gas generation.	Not specifically identified.	Approx. 1930's until early 1990's	Fill material (capping layer) consisting of up to 8m silty clayey sands. Fill below 3m contained an assortment of waste materials from household waste to car bodies etc.	Up to 8m bgs	Port Melb. Sands generally between 8 - 12m bgs. Coode Island Silt generally between 12 - 33m bgs. Morey Street Gravels generally between 33 - 45m bgs.	Fill soils prior to capping were highly variable and contained a variety of contaminants at concentrations exceeding the adopted criteria including: metals (lead, arsenic, copper and zinc), TPH, PAH, phenols and OCPs. Post capping the audit was of the opinion that soils were still unacceptably contaminated (particularly with Cu, pb, zn and PAH) and required further capping.	The audit concludes that the site is unacceptable for sensitive uses (low to medium density residential, childcare, preschool, primary school) in its current status but that it is suitable for open parklands / recreation, as long as contaminant issues are managed appropriately.		
Lot 1B 69-119 Salmon Street Port Melbourne	2.3 ha	38456-3	11/10/1999	57AA	Soil, groundwater and landfill gas	Statement	Sand quarry and landfill. No details provided in audit report.	Not identified	Sand mining and landfill. CoC include: metals, TPH, MAH / BTEX, phenols, VHC / VHH, PCB's, PAH's, Cyanide, OCP and OPP, methane from landfill gas generation.	Not specifically identified.	Not identified	Fill material up to 11m bgs. Contained a combination of sandy clay and a wide variety of waste materials. Black discolouration, hydrocarbon and sulphurous odours.	Up to 11m bgs.	Natural strata follows the general pattern above (Cnr Todd Rd) - specific depths not noted.	Surface soils contained contamination in the form of metals and PAHs above ANZECC B but below NEHF F human health guidelines. Classified as Low Level Contaminated soils (LLC) (old guidelines) if removed from site. Replacement soils required for areas intended for gardens due to phytotoxicity.	See previous. Areas of exposed soils (e.g. For garden beds) require capping with 0.5m of clean fill.		
Lot 1A 69-119 Salmon Street, Port Melbourne	5.2 ha	38456-1	21/09/1999	57AA	Soil, groundwater and soil gas	Statement	Various government uses largely associated with warehouses and storage facilities. A fuel storage depot was noted.	1960's	CoC included: metals, PAH, TRHs, BTEX, OCP and OPP, organic acids, ammonia and sulphides from nearby landfill and fill materials.	3 USTs identified. Water filled at the time of investigation.	Not identified - likely 30 - 40 years.	Fill highly varied including: clays, silts, sands and gravels with ash, coke, bricks, wood and plaster.	Up to 0.5m bgs	Port Melb. Sands underlying the fill. Natural strata follows general pattern above (Cnr Todd Rd).	Surface soils at the site contained contamination in the form of metals and PAHs (associated with fill). Soils classified as LLC soil for off-site disposal. Replacement soils required for areas intended for gardens due to phytotoxicity.	See previous. Areas of exposed soils (e.g. For garden beds) require capping with 0.5m of clean fill.		
Lot 2 69-119 Salmon Street, Port Melbourne	1.3 ha	38456-2	29/07/1999	57AA	Soil and groundwater	Statement	Various buildings leased by the Coastal Investigations Unit. At the time of the site history investigation the site was leased by Gunnerson's and used for timber storage yard and possibly timber treatment. Site was known to have been filled prior to 1945 as part of land reclamation works in the area.	1960's	CoC included: metals and PAH from fill material, TRHs, BTEX and pb associated with fuels and metals associated with timber presentation.	Not specifically identified.	Not identified - likely 30 - 40 years.	Not specified, although likely to fit a similar profile as above (Lot 1A)	Up to 3m bgs	Not specified although likely to fit a similar profile as above (Lot 1A)	Site contains some contamination in the form of metals and PAHs associated with fill material.	See previous. Areas of exposed soils (e.g. For garden beds) require capping with 0.5m of clean fill.		
Montague Precinct:																		
80 Montague Street, South Melbourne	0.02 ha (200m ²)	50667-1	20/05/2011	53X	Soil and Groundwater	Statement	Historically the primary activity of concern at the site was chrome electroplating. Surrounding land uses unknown.	Privately owned prior to 1913 - site use unknown.	Chrome electroplating. CoC include: TCE, sodium carbonate / sodium phosphate / sodium hydroxide, chromic acid, sulphuric acid, hexavalent chromium, organic solvents, alkaline cleaning agents, various acids and chrome solution, TPHs, metals, refrigerants and antifreeze.	Chrome plating bath.	1950's to 1994 (approx. 40 years)	Brown sand containing brick and rock fragments with yellow sand.	0.0 to 1.0m	Port Melbourne Sands (1.0 to 8.0m) underlain by Coode Island Silt	Soil contaminated with chromium (total) and hexavalent chromium. Approx. 12 tonnes of Cat A material were removed from site (Veolia), approx. 81 tonnes of Cat B material were removed from site (Veolia), approx. 266 tonnes of Cat C (High Quality Landfill).	Following the audit, the site was deemed unsuitable for Parks / Reserves, agricultural, residential, open space rec. and other sensitive uses (e.g. Schools) due to the presence of contamination above the adopted criteria (for those uses). Suitable for commercial / industrial.		
Fennell Street Precinct:																		
No Completed Audits																		

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Groundwater				Vapour	Audit Outcomes	
Bore details	Groundwater Level (m bgl and RL AHD m)	Groundwater flow direction	Potential for Contaminated Groundwater / Groundwater contamination plumes	Vapour issues?	Conditions Placed on Site by Statement of Audit	Other comments
9 groundwater wells installed at site. Indicates 3m screens.	Approx. 2 - 2.8m bgl	Generally in a northerly direction (toward the Yarra). Some mounding around the main excavation.	Heavy metals exceedances identified (assumed to be regional). Elevated VHC's. Remediation not considered necessary to protect beneficial uses.	Not considered	Statement of Audit issued. Land suitable for intended development purpose of Commercial Use subject to the following conditions: 1 - access to the fill should be minimised with placement of a barrier, such as 0.5m clean "fill" or foundation slabs, paving etc. 2 - There should be no abstraction of groundwater at the site.	Site is currently vacant
4 groundwater wells at site. 4 to 5m bgs. 2.5m screens.	No information.	No information.	All results were below detection or the ANZECC irrigation criteria and drinking water guidelines.	Not considered	Statement of Audit issued subject to the following conditions: 1 - suitable for commercial / industrial use as long as soils are contained under construction (i.e. Under foundation slabs), 2 - any exposed areas should be covered with 0.5m of "fill" (EPA Pub448), 3 - Should any alternative sensitive use be proposed, the audit must be reviewed by an approved auditor and written opinion provided.	Site has since been developed into an commercial / industrial estate.
6 Groundwater wells at the site. Up to 3.5m bgs.	Between 2 to 3m bgl.	South to south west towards Hobsons Bay (potential mounding at site)	Contaminants above ANZECC 1992 Marine Ecosystems included: cu, pb, ni, zn and PAHs. TPH detected <25mg/L. Irrigation / Stockwater / Industrial / Protection of Aquatic Ecosystems / PCR beneficial uses are precluded due to groundwater pollution. Concludes that the site has contributed to groundwater pollution although recognises there are a number of nearby sites that may have contributed.	While landfill gas (largely methane) was detected it was determined that this was diminishing and the no risk was posed by methane for the intended use of recreational playing fields (i.e. So long as no buildings were constructed over the site.)	Statement of audit was issued for the site subject to the following conditions: 1 - the site is suitable for open space use or industrial as long as (para phrased), the contamination status of the site is understood, recognised and appropriately managed by the developers / owners.	Site has since been developed into playing fields and associated pavilion infrastructure for / by Melbourne Grammar.
Approx. 11 on site. Depth not specified	Approx. 3m bgl.	Mounding on site. Flow to the north west appears to be affected by a cone of depression caused by groundwater remediation system at a service station facility to the north west. Flow also to the south west.	Groundwater at the site was contaminated with: PAHs, TRHs and metals with trace amounts of PCB, TCE and OCs. Report concludes groundwater at the site should not be extracted. Also notes that TRH contamination may have been influenced by the service station to the north west.	Low level risk due to the presence of landfill gas (diminishing). Indicates that measures to be put in place to reduce risks to workers when drilling / boring / excavating below surface level and for maintenance workers around pits etc.	Statement of audit issued subject to the following conditions (site suitable for commercial / industrial): 1 - measures be taken during construction and maintenance to avoid risk associated with LGF. 2 - future owners / occupiers should be informed as to the contamination status of soils and GW and the presence of LGF at the site. 3 - Soil at the site is considered to be LLC soil and should be managed accordingly. 4 - Areas intended for use as gardens should be capped with 0.5m of clean fill or deeper for plants that might require it. 5 - No groundwater is to be extracted (owners / occupiers need to be informed of this). 6 - All groundwater bores on site should be decommissioned.	Site has since been developed into industrial / commercial (warehouse / office style buildings) complex / estate.
9 wells sampled (unclear as to whether these were all on site)	Not specified.	Not specified.	Concluded that while groundwater at the site was not contaminated, it would not be prudent to pump groundwater (particularly given its brackish characteristics) as this may create inflow of contaminated water from nearby sites.	No methane detected, although the soils near the western boundary (near Lot 1B) are oxygen depleted and carbon dioxide rich which represents an asphyxiation hazard.	Statement of audit issued subject to the following conditions (site suitable for commercial / industrial): 1 - Areas intended for use as gardens should be capped with 0.5m of clean fill or deeper for plants that might require it. 2 - surface soils may be classified as LLC soil and managed accordingly if removed from site. 3 - Future owners should be informed that the groundwater near the north western boundary of the site may be contaminated and that groundwater should not be extracted to avoid inflow of contaminated groundwater from off-site.	Site has since been developed into industrial / commercial (warehouse / office style buildings) complex / estate.
3 wells on site.	Not specified.	Not specified.	Cu, pb and PAH exceeded the ecosystem protection guidelines. However, the auditor concluded that the groundwater was unlikely to be polluted based on the likely Beneficial Uses.	Not considered	Statement of audit issued subject to the following condition (site suitable for commercial / industrial): 1 - Areas intended for use as gardens should be capped with 0.5m of clean fill or deeper for plants that might require it.	Site has since been developed into industrial / commercial (warehouse / office style buildings) complex / estate.
6 bores installed on-site (later destroyed during remediation), up to 30 more installed around site.	Approx. 1m bgl.	Difficult to determine - localised flow patterns appear to be affected by the presence of underground infrastructure (sewer) and seasonal influences.	Groundwater contaminated with chromium. Agriculture / parks / gardens, stock watering, industrial and primary contact recreation are all precluded by contamination.	Not investigated.	Statement of audit issued. Land suitable for use as commercial / industrial subject to the following conditions: 1 - remaining fill at the site is covered by a barrier layer such as concrete to prevent exposure. Barrier to be maintained at all times and repaired or replaced where required. Any gardens are to be provided in a sealed planter. 2 - Site Management Plan (SMP) to be implemented and suitably maintained (i.e. endorsed and revised by an EPA approved auditor) by the site owner / occupier. 3 - Groundwater quality management plan (GQMP) to be implemented and suitably maintained by the site owner / occupier, including ongoing groundwater monitoring. 4 - Groundwater is contaminated and unsuitable for extraction. 5 - Any underground services installed at the site will be installed in a clean corridor (0.5m clean fill between edge of service trench and contaminated fill). 6 - Any copies of the statement of audit must have attached copies of the endorsed SMP and GQMP.	In addition to the removal of contaminated soil from site, a groundwater perimeter cut-off wall was installed into the Coode Island Silt at site to prevent the flow of contaminated groundwater from site.

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Search Found: 176

Issue	CARMS No.	Status	Municipality	Locality	Address	Date Completed
STATEMENT	67335-1	N/A	MELBOURNE CITY COUNCIL	DOCKLANDS	673 LA TROBE STREET	13/02/2012
STATEMENT	68230-2	N/A	MELBOURNE CITY COUNCIL	DOCKLANDS	LOTS 4B & 4D 17-41 VILLAGE STREET	20/01/2012
STATEMENT	69035-1	Available	MELBOURNE CITY COUNCIL	DOCKLANDS	GOODS SHED SOUTH 2-42 VILLAGE STREET	22/12/2011
STATEMENT	68280-1	Available	MELBOURNE CITY COUNCIL	PORT MELBOURNE	87-101 BAY STREET	19/10/2011
STATEMENT	70019-1	Available	MELBOURNE CITY COUNCIL	NORTH MELBOURNE	79-89 LEVESON STREET	14/10/2011
STATEMENT	67374-1	Available	MELBOURNE CITY COUNCIL	NORTH MELBOURNE	104-110 & 112 HAINES STREET	4/10/2011
STATEMENT	51853-1-2	Available	MELBOURNE CITY COUNCIL	DOCKLANDS	WATERFRONT CITY DEVELOPMENT STAGE 5	26/09/2011
STATEMENT	67518-1	Available	MELBOURNE CITY COUNCIL	NORTH MELBOURNE	118 HAINES STREET	19/09/2011
STATEMENT	68230-1	Available	MELBOURNE CITY COUNCIL	DOCKLANDS	LOTS 4A & 4C 17-41 VILLAGE STREET	1/09/2011
STATEMENT	66625-1	Available	MELBOURNE CITY COUNCIL	NORTH MELBOURNE	65-67 ARDEN STREET	29/08/2011
STATEMENT	68727-1	Available	MELBOURNE CITY COUNCIL	SOUTHBANK	63-75 COVENTRY STREET	24/08/2011
STATEMENT	69215-1	Available	MELBOURNE CITY COUNCIL	NORTH MELBOURNE	9 COBDEN STREET	22/06/2011
STATEMENT	69418-1	Available	MELBOURNE CITY COUNCIL	DOCKLANDS	MAB LOT 9 387-395 DOCKLANDS DRIVE	7/06/2011
STATEMENT	56509-1	Available	MELBOURNE CITY COUNCIL	CARLTON	DRUMMOND STREET	13/05/2011
STATEMENT	64547-1	Available	MELBOURNE CITY COUNCIL	DOCKLANDS	700-738 BOURKE STREET	1/04/2011
STATEMENT	62988-1	Available	MELBOURNE CITY COUNCIL	NORTH MELBOURNE	59-101 ALFRED STREET	8/02/2011
STATEMENT	65708-1	Available	MELBOURNE CITY COUNCIL	MELBOURNE	613-649 LONSDALE STREET	16/07/2010
STATEMENT	67491-1	Available	MELBOURNE CITY COUNCIL	FOOTSCRAY	234-240 BARKLY STREET	30/06/2010

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STATEMENT	49200-2	Available	MELBOURNE CITY COUNCIL	DOCKLANDS	STAGE 2, KANGAN BATMAN TAFE 2-48 HARBOUR ESPLANADE	23/06/2010
STATEMENT	65334-1	Available	MELBOURNE CITY COUNCIL	MELBOURNE	COMMON GROUND SUPPORTIVE HOUSING PROJECT 660-674 ELIZABETH STREET	11/05/2010
STATEMENT	51782-1	Available	MELBOURNE CITY COUNCIL	CARLTON	50 RATHDOWNE STREET	29/04/2010
STATEMENT	67139-1	Available	MELBOURNE CITY COUNCIL	KENSINGTON	64-66 SMITH STREET	28/04/2010
STATEMENT	63222-1	Available	MELBOURNE CITY COUNCIL	DOCKLANDS	LOT 1A 349-369 DOCKLANDS DRIVE	26/03/2010
STATEMENT	46025-2	Available	MELBOURNE CITY COUNCIL	DOCKLANDS	MAB NEW QUAY STAGE 1	3/03/2010
STATEMENT	65782-1	Available	MELBOURNE CITY COUNCIL	MELBOURNE	10-14 BENNETTS LANE	19/02/2010
STATEMENT	60780-1	Available	MELBOURNE CITY COUNCIL	SOUTH YARRA	25-27 ST MARTINS LANE	3/02/2010
STATEMENT	63186-1	Available	MELBOURNE CITY COUNCIL	DOCKLANDS	GOODS SHED NORTH 731-735 BOURKE STREET	27/01/2010
STATEMENT	48518-4	Available	MELBOURNE CITY COUNCIL	DOCKLANDS	VICTORIA HARBOUR PRECINCT 789-845 BOURKE STREET	22/01/2010
STATEMENT	56509-2	Available	MELBOURNE CITY COUNCIL	CARLTON	DEVELOPMENT AREA LYGON/RATHDOWNE HOUSING PRECINCT LOTS 1.2 & 3	9/11/2009
STATEMENT	61183-2	Available	MELBOURNE CITY COUNCIL	SOUTHBANK	42-48 CLARENDRON STREET	9/09/2009
STATEMENT	61097-1	Available	MELBOURNE CITY COUNCIL	DOCKLANDS	NORTH WHARF COLLINS STREET	7/09/2009
STATEMENT	51853-11	Available	MELBOURNE CITY COUNCIL	DOCKLANDS	STAGE 2 A WATERFRONT CITY DEVELOPMENT 328 FOOTSCRAY ROAD	31/07/2009
STATEMENT	62816-1	Available	MELBOURNE CITY COUNCIL	DOCKLANDS	MELBOURNE CONVENTION CENTRE	14/07/2009
STATEMENT	61886-3	N/A	MELBOURNE CITY COUNCIL	NORTH MELBOURNE	60-96 MACAULAY ROAD	19/06/2009
STATEMENT	61886-1	Available	MELBOURNE CITY COUNCIL	NORTH MELBOURNE	60-96 MACAULAY ROAD	19/06/2009
STATEMENT	61886-2	N/A	MELBOURNE CITY COUNCIL	NORTH MELBOURNE	STAGE 1 & 2 DEVELOPMENT 60-96 MACAULAY ROAD	19/06/2009
STATEMENT	62450-1	Available	MELBOURNE CITY COUNCIL	SOUTHBANK	174-184 CITY ROAD	5/06/2009
STATEMENT	60843-1	Available	MELBOURNE CITY COUNCIL	NORTH MELBOURNE	15-25 BYRON STREET	20/05/2009
STATEMENT	56513-1	Available	MELBOURNE CITY COUNCIL	CARLTON	FORMER QUEEN ELIZABETH CENTRE 455-495 CARDIGAN STREET	17/04/2009
STATEMENT	63223-1	Available	MELBOURNE CITY COUNCIL	DOCKLANDS	LOT 9 387-395 DOCKLANDS DRIVE	8/04/2009
STATEMENT	62616-1	Available	MELBOURNE CITY COUNCIL	MELBOURNE	108-114 LITTLE LONSDALE STREET	30/03/2009
STATEMENT	58882-1	Available	MELBOURNE CITY COUNCIL	NORTH MELBOURNE	16-28 WRECKYN STREET	23/03/2009
STATEMENT	63202-1	Available	MELBOURNE CITY COUNCIL	DOCKLANDS	380-394 DOCKLANDS DRIVE	6/03/2009
STATEMENT	62990-1	Available	MELBOURNE CITY COUNCIL	WEST MELBOURNE	50-64 JEFFCOTT STREET	29/10/2008
STATEMENT	63691-1	Available	MELBOURNE CITY COUNCIL	WEST MELBOURNE	220 RODEN STREET	16/09/2008
STATEMENT	62809-1	Available	MELBOURNE CITY COUNCIL	DOCKLANDS	715-727 BOURKE STREET	28/07/2008
CERTIFICATE	63005-1	Available	MELBOURNE CITY COUNCIL	PARKVILLE	NEW ROYAL CHILDREN'S HOSPITAL 50 FLEMINGTON ROAD	3/07/2008

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STATEMENT	62760-1	Available	MELBOURNE CITY COUNCIL	DOCKLANDS	75-83 SPENCER STREET	3/07/2008
STATEMENT	51853-3	Available	MELBOURNE CITY COUNCIL	DOCKLANDS	STAGE 1B & 1C WATERFRONT CITY DEVELOPMENT DOCKLANDS DRIVE	13/06/2008
STATEMENT	58383-3	N/A	MELBOURNE CITY COUNCIL	MELBOURNE	AXA CENTRE 750 COLLINS STREET	24/04/2008
STATEMENT	63014-1	Available	MELBOURNE CITY COUNCIL	WEST MELBOURNE	212 RODEN STREET	2/04/2008
STATEMENT	63015-1	Available	MELBOURNE CITY COUNCIL	WEST MELBOURNE	86-90 IRELAND STREET	31/03/2008
STATEMENT	60427-1	Available	MELBOURNE CITY COUNCIL	DOCKLANDS	364-378 DOCKLANDS DRIVE	26/03/2008
STATEMENT	58383-2	Available	MELBOURNE CITY COUNCIL	MELBOURNE	AXA CENTRE 750 COLLINS STREET	19/03/2008
STATEMENT	47089-5	Available	MELBOURNE CITY COUNCIL	SOUTHBANK	STAGE 3A 28 FRESHWATER PLACE	21/02/2008
STATEMENT	48518-3	N/A	MELBOURNE CITY COUNCIL	DOCKLANDS	CENTRAL PRECINCT DEVELOPMENT, VICTORIA HARBOUR PRECINCT BOURKE STREET	11/12/2007
STATEMENT	60157-1	Available	MELBOURNE CITY COUNCIL	MELBOURNE DOCKLANDS	COMMONWEALTH TECHNOLOGY PORT PRECINCT 180-240 HARBOUR ESPLANADE	24/08/2007
STATEMENT	52659-2	Available	MELBOURNE CITY COUNCIL	WEST MELBOURNE	48 JEFFCOTT STREET	27/06/2007
STATEMENT	61179-2	Available	MELBOURNE CITY COUNCIL	DOCKLANDS	737 BOURKE STREET	26/06/2007
STATEMENT	49180-1	Available	MELBOURNE CITY COUNCIL	MELBOURNE	FORMER HERALD & WEEKLY TIMES BUILDING 44-74 FLINDERS STREET	12/06/2007
STATEMENT	60016-1	Available	MELBOURNE CITY COUNCIL	NORTH MELBOURNE	38-40 HOWARD STREET	26/03/2007
STATEMENT	47089-4	Available	MELBOURNE CITY COUNCIL	SOUTHBANK	FRESHWATER PLACE	6/11/2006
STATEMENT	48518-1	Available	MELBOURNE CITY COUNCIL	DOCKLANDS	VICTORIA HARBOUR PRECINCT, MELBOURNE DOCKLANDS DOCKLANDS ESPLANADE	28/09/2006
STATEMENT	48180-1	Available	MELBOURNE CITY COUNCIL	WEST MELBOURNE	47-59-63-79 MACKENZIE ROAD	28/08/2006
STATEMENT	51853-2	Available	MELBOURNE CITY COUNCIL	DOCKLANDS	WATERFRONT CITY DEVELOPMENT 415-451 DOCKLANDS DRIVE	19/05/2006
STATEMENT	55450-1	Available	MELBOURNE CITY COUNCIL	NORTH MELBOURNE	FORMER BULLA CREAM COMPLEX 52 BYRON STREET	8/05/2006
STATEMENT	47828-2	Available	MELBOURNE CITY COUNCIL	DOCKLANDS	767 FOOTSCRAY ROAD, BOURKE STREET & STADIUM DRIVE	2/05/2006
STATEMENT	58383-1	Available	MELBOURNE CITY COUNCIL	DOCKLANDS	750 COLLINS STREET	22/03/2006
STATEMENT	58608-1	Available	MELBOURNE CITY COUNCIL	DOCKLANDS	401 DOCKLANDS DRIVE	2/03/2006
STATEMENT	55787-1	Available	MELBOURNE CITY COUNCIL	CARLTON	97-113 LEICESTER STREET	15/12/2005
STATEMENT	51155-1	Available	MELBOURNE CITY COUNCIL	DOCKLANDS	VICTORIA POINT DEVELOPMENT SITE CNR HARBOUR ESPLANADE & BOURKE ST	29/07/2005
STATEMENT	56352-1	Available	MELBOURNE CITY COUNCIL	NORTH MELBOURNE	42 BYRON STREET	18/07/2005
STATEMENT	54175-1	Available	MELBOURNE CITY COUNCIL	NORTH MELBOURNE	FORMER CALTEX SERVICE STATION 140 PEEL STREET	20/06/2005
STATEMENT	35419-5	Available	MELBOURNE CITY COUNCIL	DOCKLANDS	DOCKLANDS DEVELOPMENT SITE - YARRA WATERS PRECINCT LORIMER STREET	15/02/2005
STATEMENT	51782-2	Available	MELBOURNE CITY COUNCIL	CARLTON	7-17 CARLOW PLACE	22/12/2004

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STATEMENT	49200-1	Available	MELBOURNE CITY COUNCIL	DOCKLANDS	FORMER FFF TRUST SITE STADIUM DRIVE	16/12/2004
STATEMENT	50183-2, 3 & 4	N/A	MELBOURNE CITY COUNCIL	CARLTON	138-150 RATHDOWNE STREET	24/11/2004
STATEMENT	51995-1	Available	MELBOURNE CITY COUNCIL	NORTH MELBOURNE	15-23 LOTHIAN STREET	9/09/2004
STATEMENT	48717-2	Available	MELBOURNE CITY COUNCIL	CARLTON	SEASONS APARTMENTS CORNER SWANSTON & PELHAM STREETS	22/07/2004
STATEMENT	52882-1	Available	MELBOURNE CITY COUNCIL	NORTH MELBOURNE	30-34 WRECKYN STREET	4/05/2004
STATEMENT	50455-1	Available	MELBOURNE CITY COUNCIL	DOCKLANDS	MAB LOT 2, NEWQUAY PRECINCT (FORMERLY BUSINESS PARK PRECINCT)	19/04/2004
STATEMENT	52461-1	Available	MELBOURNE CITY COUNCIL	NORTH MELBOURNE	27 ARDEN STREET	7/01/2004
STATEMENT	47828-1	Available	MELBOURNE CITY COUNCIL	DOCKLANDS	WATERGATE PLACE DEVELOPMENT FOOTSCRAY ROAD, BOURKE STREET & STADIUM DRIVE	10/12/2003
STATEMENT	42748-2	Available	MELBOURNE CITY COUNCIL	PORT MELBOURNE	770 LORIMER STREET	28/11/2003
CERTIFICATE	47158-1	Available	MELBOURNE CITY COUNCIL	PARKVILLE	FORMER ROYAL PARK PSYCHIATRIC HOSPITAL NMH, & MILPARINKA ADULT TRAINING CENTRE CNR PARK & OAK STS	25/11/2003
CERTIFICATE	47158-2	Available	MELBOURNE CITY COUNCIL	PARKVILLE	FORMER ROYAL PARK PSYCHIATRIC HOSPITAL CNR PARK & OAK STS	25/11/2003
STATEMENT	50882-1	Available	MELBOURNE CITY COUNCIL	EAST MELBOURNE	TRIBECA DEVELOPMENT POWLETT STREET	13/11/2003
STATEMENT	51441-1	Available	MELBOURNE CITY COUNCIL	DOCKLANDS	VILLAGE DOCKLANDS DEVELOPMENT WATSON LANE	13/10/2003
STATEMENT	47089-3	Available	MELBOURNE CITY COUNCIL	SOUTHBANK	FRESHWATER PLACE 2-26 SOUTHBANK ROAD	25/09/2003
STATEMENT	51210-1	Available	MELBOURNE CITY COUNCIL	PRAHRAN	ALFRED HOSPITAL CHILDCARE CENTRE CNR ALFRED LANE & BAKER LANE	18/08/2003
STATEMENT	46169-1	Available	MELBOURNE CITY COUNCIL	DOCKLANDS	DNRE LAND CNR BLYTH ST & OLD FOOTSCRAY RD	8/08/2003
STATEMENT	48717-1	Available	MELBOURNE CITY COUNCIL	CARLTON	UROPA APARTMENTS 620-640 SWANSTON STREET	7/08/2003
STATEMENT	51999-1	Available	MELBOURNE CITY COUNCIL	NORTH MELBOURNE	56-58 LOTHIAN STREET	17/07/2003
STATEMENT	51234-1	Available	MELBOURNE CITY COUNCIL	NORTH MELBOURNE	98-104 LEVISON STREET	25/06/2003
STATEMENT	51161-1	Available	MELBOURNE CITY COUNCIL	NORTH MELBOURNE	12-24 TYRONE STREET	17/06/2003
STATEMENT	47089-1 & 2	N/A	MELBOURNE CITY COUNCIL	SOUTHBANK	FRESHWATER PLACE 2-26 SOUTHBANK BOULEVARD	16/06/2003
STATEMENT	49932-1	Available	MELBOURNE CITY COUNCIL	DOCKLANDS	700 COLLINS STREET	6/05/2003
STATEMENT	46717-1	Available	MELBOURNE CITY COUNCIL	DOCKLANDS	VICTORIA HARBOUR PRECINCT, NAB DEVELOPMENT 800 PIGOTT STREET, HARBOUR ESPLANADE & VICTORIA HARBOUR STREET	17/04/2003
STATEMENT	51396-1	Available	MELBOURNE CITY COUNCIL	NORTH MELBOURNE	6 HIGH STREET	4/03/2003
STATEMENT	48835-1	Available	MELBOURNE CITY COUNCIL	NORTH MELBOURNE	23-25 LEVISON STREET	12/02/2003
STATEMENT	51052-1	Available	MELBOURNE CITY COUNCIL	CARLTON	28-32 ORR STREET	23/12/2002
STATEMENT	36567-2 & 3	N/A	MELBOURNE CITY COUNCIL	DOCKLANDS	WEST MELBOURNE GASWORKS SITE	22/11/2002

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STATEMENT	47038-1	Available	MELBOURNE CITY COUNCIL	DOCKLANDS	COMTECHPORT SITE 208-240 LATROBE STREET	18/11/2002
STATEMENT	45914-1 & 2	N/A	MELBOURNE CITY COUNCIL	CARLTON	216-228 ELGIN STREET	4/10/2002
STATEMENT	47421-1, 2 & 3	N/A	MELBOURNE CITY COUNCIL	DOCKLANDS	STUDIO CITY DOCKLANDS DOCKLANDS DRIVE	3/10/2002
STATEMENT	39097-2B	N/A	MELBOURNE CITY COUNCIL	SOUTHBANK	99 WHITEMAN STREET	30/08/2002
STATEMENT	46025-1	Available	MELBOURNE CITY COUNCIL	DOCKLANDS	MAB NEWQUAY 12 CNR PEARL RIVER DRIVE RD & DOCKLANDS DRV	20/05/2002
STATEMENT	41213-1	Available	MELBOURNE CITY COUNCIL	FLEMINGTON	84-104 DYNON ROAD	4/03/2002
STATEMENT	36567-1	Available	MELBOURNE CITY COUNCIL	DOCKLANDS	WEST MELBOURNE GASWORKS SITE	28/02/2002
STATEMENT	32990-1	N/A	MELBOURNE CITY COUNCIL	SOUTH MELBOURNE	CNR GRANT ST & ST KILDA ROAD	25/02/2002
STATEMENT	42152-B	N/A	MELBOURNE CITY COUNCIL	DOCKLANDS	MAB NEWQUAY PRECINCT (BUSINESS PARK PRECINCT), YARRANOVA DEVELOPMENT	19/12/2001
STATEMENT	44867-2	Available	MELBOURNE CITY COUNCIL	WEST MELBOURNE	37-49 ROSSLYN STREET	5/12/2001
STATEMENT	46899-1	Available	MELBOURNE CITY COUNCIL	NORTH MELBOURNE	71 ARDEN STREET	15/11/2001
STATEMENT	42152-A	N/A	MELBOURNE CITY COUNCIL	DOCKLANDS	MAB NEWQUAY PRECINCT (BUSINESS PARK PRECINCT), YARRANOVA DEVELOPMENT	19/10/2001
STATEMENT	45679-1	Available	MELBOURNE CITY COUNCIL	CARLTON NORTH	198 PIGDON STREET	4/09/2001
STATEMENT	46312-1	Available	MELBOURNE CITY COUNCIL	WEST MELBOURNE	3-5 ANDERSON STREET	3/08/2001
STATEMENT	46022-1	Available	MELBOURNE CITY COUNCIL	WEST MELBOURNE	61-63 STANLEY STREET	20/07/2001
STATEMENT	44824-1	Available	MELBOURNE CITY COUNCIL	DOCKLANDS	CHANNEL 7 BROADCAST CENTRE, DOCKLANDS STADIUM PRECINCT CNR DOCKLANDS ESPLANADE & LATROBE ST	8/05/2001
STATEMENT	39097-1	Available	MELBOURNE CITY COUNCIL	SOUTHBANK	83 WHITEMAN STREET	6/04/2001
STATEMENT	44998-1	Available	MELBOURNE CITY COUNCIL	NORTH MELBOURNE	1-13 PURCELL STREET	21/02/2001
STATEMENT	44867-1	Available	MELBOURNE CITY COUNCIL	WEST MELBOURNE	37-49 ROSSLYN STREET	9/02/2001
STATEMENT	37818-1	Available	MELBOURNE CITY COUNCIL	SOUTHBANK	73-79 WHITEMAN STREET	1/12/2000
STATEMENT	43144-1	Available	MELBOURNE CITY COUNCIL	NORTH MELBOURNE	71-75 CAPEL STREET	24/11/2000
STATEMENT	37768-1	Available	MELBOURNE CITY COUNCIL	NORTH MELBOURNE	45 LEVESON STREET	18/10/2000
STATEMENT	41508-1	Available	MELBOURNE CITY COUNCIL	NORTH MELBOURNE	696-710 QUEENSBERRY STREET	3/04/2000
STATEMENT	40492-1	Available	MELBOURNE CITY COUNCIL	DOCKLANDS	BUSINESS PARK PRECINCT	28/03/2000
STATEMENT	41367-1	Available	MELBOURNE CITY COUNCIL	WEST MELBOURNE	10-22 LAURENS STREET	23/03/2000
STATEMENT	35419-1-4	N/A	MELBOURNE CITY COUNCIL	DOCKLANDS	DOCKLANDS DEVELOPMENT SITE - YARRA WATERS PRECINCT LORIMER STREET	5/01/2000
STATEMENT	31965-3	Available	MELBOURNE CITY COUNCIL	MELBOURNE	PUNT ROAD INTERCHANGE CITYLINK PROJECT PUNT ROAD	15/12/1999
STATEMENT	31965-1	Available	MELBOURNE CITY COUNCIL	MELBOURNE	OLYMPIC PARK MELBOURNE CITYLINK PROJECT STURT STREET	15/12/1999

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STATEMENT	31965-4	Available	MELBOURNE CITY COUNCIL	MELBOURNE	SOUTHBANK INTERCHANGE CITYLINK PROJECT STURT STREET	15/12/1999
STATEMENT	31965-2	Available	MELBOURNE CITY COUNCIL	BURNLEY	TRANSFIELD OBAYASHI JOINT VENTURE, BURNLEY RETAINING WALL CITYLINK	15/12/1999
STATEMENT	38721-1	Available	MELBOURNE CITY COUNCIL	CARLTON	102-104 CARDIGAN STREET	16/11/1999
STATEMENT	38088-1	Available	MELBOURNE CITY COUNCIL	NORTH MELBOURNE	16 LOTHIAN STREET	11/10/1999
STATEMENT	34149-1	Available	MELBOURNE CITY COUNCIL	DOCKLANDS	DOCKLANDS STADIUM SITE	30/03/1999
STATEMENT	30682-2	Available	MELBOURNE CITY COUNCIL	NORTH MELBOURNE	215 ARDEN STREET	26/08/1998
STATEMENT	35724-1, 2 & 3	N/A	MELBOURNE CITY COUNCIL	WEST MELBOURNE	220 DUDLEY STREET	19/08/1998
STATEMENT	33807-2	Available	MELBOURNE CITY COUNCIL	SOUTHBANK	30-52 KAVANAGH STREET	22/06/1998
STATEMENT	32409-2	Available	MELBOURNE CITY COUNCIL	FISHERMENS BEND	ASTA FACILITY LORIMER STREET	25/03/1998
STATEMENT	32409-1	Available	MELBOURNE CITY COUNCIL	FISHERMENS BEND	ASTA FACILITY 1 LORIMER STREET	25/03/1998
CERTIFICATE	33462-1	Available	MELBOURNE CITY COUNCIL	NORTH MELBOURNE	173-175 CHETWYND STREET	18/03/1998
STATEMENT	33807-1	Available	MELBOURNE CITY COUNCIL	SOUTHBANK	30-52 KAVANAGH STREET	8/12/1997
STATEMENT	32617-1	Available	MELBOURNE CITY COUNCIL	WEST MELBOURNE	90-98 RAILWAY PLACE	27/10/1997
STATEMENT	23507-1	Available	MELBOURNE CITY COUNCIL	SOUTH MELBOURNE	PRINCE HENRY'S HOSPITAL SITE	20/10/1997
STATEMENT	30515-1	Available	MELBOURNE CITY COUNCIL	SOUTH MELBOURNE	186 CITY ROAD	28/08/1997
STATEMENT	30818-1	Available	MELBOURNE CITY COUNCIL	EAST MELBOURNE	CNR POWLETT ST & VICTORIA PARADE	28/07/1997
STATEMENT	31390-1	Available	MELBOURNE CITY COUNCIL	WEST MELBOURNE	FLAGSTAFF CRISES ACCOMMODATION CENTRE RODEN STREET	2/06/1997
STATEMENT	29613-1	Available	MELBOURNE CITY COUNCIL	NORTH MELBOURNE	125 CHETWYND STREET	18/04/1997
STATEMENT	29896-2	Available	MELBOURNE CITY COUNCIL	MELBOURNE	33 LATROBE STREET	9/04/1997
STATEMENT	30816-1	Available	MELBOURNE CITY COUNCIL	WEST MELBOURNE	CNR DUDLEY ST & KING ST	22/01/1997
STATEMENT	30682-1	Available	MELBOURNE CITY COUNCIL	NORTH MELBOURNE	215 ARDEN STREET	13/01/1997
STATEMENT	29896-1	Available	MELBOURNE CITY COUNCIL	MELBOURNE	33 LATROBE STREET	9/01/1997
STATEMENT	29415-1	Available	MELBOURNE CITY COUNCIL	MELBOURNE	CNR SPENCER & LATROBE STS	22/11/1996
STATEMENT	29416-1	Available	MELBOURNE CITY COUNCIL	MELBOURNE	WORLD TRADE CENTRE FLINDERS STREET	14/08/1996
STATEMENT	28578-1	Available	MELBOURNE CITY COUNCIL	NORTH MELBOURNE	1-11 BEDFORD STREET	4/03/1996
STATEMENT	27071-1	Available	MELBOURNE CITY COUNCIL	WEST MELBOURNE	33 JEFFCOTT STREET	19/09/1995
STATEMENT	25664-1	Available	MELBOURNE CITY COUNCIL	SOUTH MELBOURNE	THE KEEP DODDS STREET	13/09/1995
STATEMENT	26996-1	Available	MELBOURNE CITY COUNCIL	SOUTH MELBOURNE	WELLS STREET	24/08/1995
STATEMENT	24472-1	Available	MELBOURNE CITY COUNCIL	SOUTH MELBOURNE	CNR WELLS & MILES STS	15/08/1995

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STATEMENT	27118-1	Available	MELBOURNE CITY COUNCIL	NORTH MELBOURNE	230-244 ABBOTSFORD STREET	14/08/1995
CERTIFICATE	20890-1,2&3	N/A	MELBOURNE CITY COUNCIL	MELBOURNE	CROWN CASINO SITE CNR WHITEMAN & CLARENDRON STS	9/06/1995
STATEMENT	25857-1	Available	MELBOURNE CITY COUNCIL	SOUTH MELBOURNE	DODDS STREET	1/05/1995
STATEMENT	22961-1	Available	MELBOURNE CITY COUNCIL	CARLTON	228 QUEENSBURY STREET	2/11/1994
STATEMENT	21866-1	Available	MELBOURNE CITY COUNCIL	WEST MELBOURNE	16-30 JEFFCOTT STREET	11/03/1994
STATEMENT	19240-1	Available	MELBOURNE CITY COUNCIL	DOCKLANDS	FORMER WEST MELBOURNE GASWORKS SITE WHARF ROAD	25/01/1994
STATEMENT	21036-1	Available	MELBOURNE CITY COUNCIL	SOUTH MELBOURNE	77-81 COVENTRY STREET	21/12/1993
STATEMENT	20889-1	Available	MELBOURNE CITY COUNCIL	CARLTON	52-58 LEICESTER STREET	10/12/1993
STATEMENT	18334-1	Available	MELBOURNE CITY COUNCIL	SOUTH MELBOURNE	63 COVENTRY STREET	13/07/1993
STATEMENT	17579-2	Available	MELBOURNE CITY COUNCIL	SOUTH MELBOURNE	120-150 STURT STREET	5/07/1993
STATEMENT	18367-1	Available	MELBOURNE CITY COUNCIL	SOUTH MELBOURNE	161-173 STURT STREET	27/05/1993
STATEMENT	17288-1	Available	MELBOURNE CITY COUNCIL	SOUTH MELBOURNE	106-112 SOUTHBANK ROAD	15/12/1992
STATEMENT	22025-1	Available	MELBOURNE CITY COUNCIL	SOUTH MELBOURNE	WELLS STREET	21/10/1992
STATEMENT	22055-1	Available	MELBOURNE CITY COUNCIL	SOUTH MELBOURNE	189-209 STURT STREET	19/10/1992
STATEMENT	22061-1	Available	MELBOURNE CITY COUNCIL	CARLTON	36 DRUMMOND STREET	14/09/1992
CERTIFICATE	22060-1	Available	MELBOURNE CITY COUNCIL	CARLTON	75 DRUMMOND STREET	8/09/1992
CERTIFICATE	17000-1	Available	MELBOURNE CITY COUNCIL	CARLTON NORTH	991-1029 RATHDOWNE STREET	8/10/1991

File Naming Structure**[CARMS No.]_a.pdf = Summary of Statement or Certificate**

The first PDF (CARMS_a.pdf) will contain a copy of the audit report including key figures, maps and tables. It will also include a signed copy of the certificate or statement of environmental audit. A certificate or statement may not be required in all instances and traditionally only applies to audits of potentially contaminated sites.

[CARMS No.]_b.pdf = Audit Report

The second PDF (CARMS_b.pdf) will contain all relevant appendices and attachments that support the audit report, including remediation and monitoring plans, assessors' reports, CUTEP reports, any bore/pit data etc.

[CARMS No.]_c.pdf = Audit Report Appendices

The third PDF (CARMS_c.pdf) will contain an additional extract copy of the signed environmental audit certificate or statement and an executive summary

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Environmental auditors who have conducted an audit pursuant to section IXD of the Act provide the information contained in this list to EPA. EPA does not conduct independent checks on the accuracy of this information. Anyone with a particular interest in a property should make his or her own further enquiries. EPA does not accept any responsibility for any claims, loss or damage of whatsoever kind arising out of any party's reliance on any information contained in or omitted from this list, nor does EPA accept responsibility for any claims, loss or damage arising out of the inclusion of any property on this list.

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Issue	CARMS No.	Status	Municipality	Locality	Address	Date Completed
STATEMENT	62611-3	N/A	PORT PHILLIP CITY COUNCIL	ST KILDA	433 INKERMAN STREET	13/01/2012
STATEMENT	69430-1	Available	PORT PHILLIP CITY COUNCIL	PORT MELBOURNE	40 & 5 BEACH AND BAY STREETS	19/09/2011
STATEMENT	67078	N/A	PORT PHILLIP CITY COUNCIL	SOUTH MELBOURNE	80 MONTAGUE STREET	20/05/2011
STATEMENT	68898-1	Available	PORT PHILLIP CITY COUNCIL	ST KILDA	141 CHAPEL STREET	22/02/2011
STATEMENT	67368-1	Available	PORT PHILLIP CITY COUNCIL	PORT MELBOURNE	121 LIARDET STREET	15/02/2011
STATEMENT	62618-2	Available	PORT PHILLIP CITY COUNCIL	ALBERT PARK	ALBERT PARK COLLEGE 83-85 DANKS STREET	25/11/2010
CERTIFICATE	64370-2	Available	PORT PHILLIP CITY COUNCIL	PORT MELBOURNE	77 NOTT STREET	28/09/2010
STATEMENT	57641-2	Available	PORT PHILLIP CITY COUNCIL	PORT MELBOURNE	102-128 BAY STREET	22/07/2010
STATEMENT	67247-1	Available	PORT PHILLIP CITY COUNCIL	ST KILDA	126 CHAPEL STREET	13/07/2010
STATEMENT	54733-1	Available	PORT PHILLIP CITY COUNCIL	ALBERT PARK	FORMER MOBIL SERVICE STATION 178 VICTORIA AVENUE	15/12/2009
CERTIFICATE	62287-1	Available	PORT PHILLIP CITY COUNCIL	PORT MELBOURNE	216 ROUSE STREET	19/08/2009
STATEMENT	62851-1	Available	PORT PHILLIP CITY COUNCIL	ST KILDA	12,14,18 MARTIN STREET	17/07/2009
STATEMENT	51126-2	Available	PORT PHILLIP CITY COUNCIL	PORT MELBOURNE	105 NOTT STREET	25/06/2009
CERTIFICATE	57849-1	Available	PORT PHILLIP CITY COUNCIL	PORT MELBOURNE	71 BEACH STREET	15/06/2009
STATEMENT	64661-1	Available	PORT PHILLIP CITY COUNCIL	PORT MELBOURNE	222-224 ROUSE STREET	26/02/2009
STATEMENT	62298-1	Available	PORT PHILLIP CITY COUNCIL	PORT MELBOURNE	97-101 STOKES STREET	16/02/2009
STATEMENT	64157-1	Available	PORT PHILLIP CITY COUNCIL	PORT MELBOURNE	226-242 ROUSE STREET	2/02/2009
STATEMENT	62590-1	Available	PORT PHILLIP CITY COUNCIL	ST KILDA	4B UPTON ROAD	4/12/2008

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STATEMENT	41206-2	Available	PORT PHILLIP CITY COUNCIL	ST KILDA	62 INKERMAN STREET	13/10/2008
STATEMENT	33458-8	Available	PORT PHILLIP CITY COUNCIL	ALBERT PARK	FORMER PORT MELBOURNE GASWORKS METER SHOP SITE PICKLES STREET	11/08/2008
STATEMENT	64174-1	Available	PORT PHILLIP CITY COUNCIL	PORT MELBOURNE	39-45 JOHNSTON STREET	16/07/2008
CERTIFICATE	62448-1	Available	PORT PHILLIP CITY COUNCIL	ST KILDA	38 INKERMAN STREET	10/07/2008
STATEMENT	58258-2	N/A	PORT PHILLIP CITY COUNCIL	ELWOOD	475A ST KILDA STREET	10/12/2007
STATEMENT	60706-1	Available	PORT PHILLIP CITY COUNCIL	ST KILDA	30 THE ESPLANADE	5/04/2007
CERTIFICATE	58315-1	Available	PORT PHILLIP CITY COUNCIL	PORT MELBOURNE	28-30 BEACONSFIELD PARADE	21/09/2006
STATEMENT	58599-1	Available	PORT PHILLIP CITY COUNCIL	ST KILDA	135 INKERMAN STREET	26/07/2006
STATEMENT	49997-1	Available	PORT PHILLIP CITY COUNCIL	PORT MELBOURNE	844-846 LORIMER STREET	11/07/2006
STATEMENT	58884-1	Available	PORT PHILLIP CITY COUNCIL	ST KILDA	58 INKERMAN STREET	27/04/2006
STATEMENT	53754-1, 2 & 3	N/A	PORT PHILLIP CITY COUNCIL	ST KILDA	63 ACKLAND STREET	17/02/2006
STATEMENT	52303-1	Available	PORT PHILLIP CITY COUNCIL	PORT MELBOURNE	53 JOHNSTON STREET	19/09/2005
STATEMENT	52543-1	Available	PORT PHILLIP CITY COUNCIL	ST KILDA	163-169 INKERMAN STREET	15/08/2005
STATEMENT	57424-1	Available	PORT PHILLIP CITY COUNCIL	PORT MELBOURNE	47 JOHNSTON STREET	29/06/2005
STATEMENT	56798-1	Available	PORT PHILLIP CITY COUNCIL	ST KILDA	104 BARKLY STREET	4/01/2005
STATEMENT	47866-1	Available	PORT PHILLIP CITY COUNCIL	PORT MELBOURNE	45-53 BAY STREET	10/12/2004
STATEMENT	48129-1	Available	PORT PHILLIP CITY COUNCIL	SOUTH MELBOURNE	306 DORCAS STREET	27/10/2004
STATEMENT	52192-1	Available	PORT PHILLIP CITY COUNCIL	SOUTH MELBOURNE	333 COVENTRY STREET	17/05/2004
STATEMENT	52835-1	Available	PORT PHILLIP CITY COUNCIL	PORT MELBOURNE	95-101 NOTT STREET	19/03/2004
STATEMENT	48664-1	Available	PORT PHILLIP CITY COUNCIL	PORT MELBOURNE	55 DANKS STREET	16/12/2003
STATEMENT	50783-1	Available	PORT PHILLIP CITY COUNCIL	ST KILDA	8 CHARLES STREET	17/09/2003
STATEMENT	51996-1	Available	PORT PHILLIP CITY COUNCIL	PORT MELBOURNE	54-60 NOTT STREET	9/07/2003
STATEMENT	50623-1	Available	PORT PHILLIP CITY COUNCIL	PORT MELBOURNE	CNR PICKLES & DANKS STS	2/06/2003
STATEMENT	49588-1	Available	PORT PHILLIP CITY COUNCIL	PORT MELBOURNE	21 BEACONSFIELD PARADE	20/12/2002
STATEMENT	45936-1	Available	PORT PHILLIP CITY COUNCIL	PORT MELBOURNE	49-54 BEACH STREET	8/05/2002
STATEMENT	46939-1	Available	PORT PHILLIP CITY COUNCIL	PORT MELBOURNE	23-26 BEACONSFIELD PARADE	22/04/2002
STATEMENT	41800-2	Available	PORT PHILLIP CITY COUNCIL	PORT MELBOURNE	97-107 CRUIKSHANK STREET	20/03/2002
STATEMENT	46738-1	Available	PORT PHILLIP CITY COUNCIL	BALACLAVA	70 ALEXANDRA STREET	6/02/2002
STATEMENT	45425-1	Available	PORT PHILLIP CITY COUNCIL	PORT MELBOURNE	78-92 BAY STREET	8/11/2001

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CERTIFICATE	44896-1	Available	PORT PHILLIP CITY COUNCIL	PORT MELBOURNE	518 WILLIAMSTOWN ROAD	28/09/2001
STATEMENT	33458-6A	N/A	PORT PHILLIP CITY COUNCIL	PORT MELBOURNE	FORMER PORT MELBOURNE GASWORKS METER SHOP SITE PICKLES, DANKS, GRAHAM & FOOTS STREETS	10/09/2001
STATEMENT	38787-4	Available	PORT PHILLIP CITY COUNCIL	SOUTH MELBOURNE	CAPRI APARTMENTS 32-58 BANK STREET	29/08/2001
STATEMENT	42595-1	Available	PORT PHILLIP CITY COUNCIL	ELWOOD	123-125 ORMOND ROAD	12/07/2001
CERTIFICATE	45816-1	Available	PORT PHILLIP CITY COUNCIL	SOUTH MELBOURNE	CNR MORAY & RAGLAN STS	22/05/2001
STATEMENT	43599-1	Available	PORT PHILLIP CITY COUNCIL	PORT MELBOURNE	187-195 GRAHAM STREET	23/04/2001
STATEMENT	45131-1	Available	PORT PHILLIP CITY COUNCIL	ST KILDA	12 PAKINGTON STREET	9/04/2001
STATEMENT	45381-1	Available	PORT PHILLIP CITY COUNCIL	ST KILDA	2-8 INKERMAN GROVE	6/04/2001
STATEMENT	38787-3	Available	PORT PHILLIP CITY COUNCIL	SOUTH MELBOURNE	METRO APARTMENTS 47-71 DORCAS STREET	23/03/2001
STATEMENT	45257-1	Available	PORT PHILLIP CITY COUNCIL	ST KILDA	60 INKERMAN STREET	9/03/2001
STATEMENT	45435-1	Available	PORT PHILLIP CITY COUNCIL	PORT MELBOURNE	CITYLINK OFFICE/WAREHOUSE DEVELOPMENT 349 INGLES STREET	9/03/2001
STATEMENT	43358-1	Available	PORT PHILLIP CITY COUNCIL	PORT MELBOURNE	78 NOTT STREET	6/02/2001
STATEMENT	38787-2	Available	PORT PHILLIP CITY COUNCIL	SOUTH MELBOURNE	PARKSIDE APARTMENTS 2-30 BANKS STREET	10/11/2000
STATEMENT	35795-2	Available	PORT PHILLIP CITY COUNCIL	PORT MELBOURNE	200-202 BAY STREET	31/10/2000
STATEMENT	42206-1	Available	PORT PHILLIP CITY COUNCIL	ST KILDA	1-3 VALE STREET	10/10/2000
STATEMENT	38787-1	Available	PORT PHILLIP CITY COUNCIL	SOUTH MELBOURNE	MELBOURNE CONDOS 29-45 DORCAS STREET	6/10/2000
STATEMENT	33458-5	Available	PORT PHILLIP CITY COUNCIL	PORT MELBOURNE	50 JOHNSTON STREET	15/09/2000
STATEMENT	27917-5	N/A	PORT PHILLIP CITY COUNCIL	PORT MELBOURNE	FORMER HMAS LONSDALE SITE ROUSE ST, ESPLANADE WEST, GRAHAM ST & ESPLANADE EAST	7/09/2000
STATEMENT	41739-1	Available	PORT PHILLIP CITY COUNCIL	ELWOOD	130-132 TENNYSON STREET	24/08/2000
STATEMENT	30369-2	Available	PORT PHILLIP CITY COUNCIL	ST KILDA	FORMER MUNICIPAL DEPOT 33 INKERMAN STREET	14/04/2000
STATEMENT	41002-1	Available	PORT PHILLIP CITY COUNCIL	EAST ST KILDA	126 CARLISLE STREET	29/02/2000
STATEMENT	40480-1	Available	PORT PHILLIP CITY COUNCIL	ST KILDA	9-11 VALE STREET	17/12/1999
STATEMENT	38999-1	Available	PORT PHILLIP CITY COUNCIL	PORT MELBOURNE	52 GARTON STREET	9/12/1999
STATEMENT	40479-1	Available	PORT PHILLIP CITY COUNCIL	ST KILDA	57 INKERMAN STREET	24/11/1999
STATEMENT	35795-1	Available	PORT PHILLIP CITY COUNCIL	PORT MELBOURNE	200-202 BAY STREET	18/11/1999
STATEMENT	37104-1	Available	PORT PHILLIP CITY COUNCIL	PORT MELBOURNE	CNR TODD RD & WILLIAMSTOWN RD	5/11/1999
STATEMENT	38456-3	Available	PORT PHILLIP CITY COUNCIL	PORT MELBOURNE	69-119 SALMON STREET	11/10/1999
STATEMENT	33458-1	N/A	PORT PHILLIP CITY COUNCIL	PORT MELBOURNE	FORMER GASWORKS SITE PICKLES, DANKS, GRAHAM AND FOOTE STREETS	5/10/1999

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STATEMENT	38960-1	Available	PORT PHILLIP CITY COUNCIL	PORT MELBOURNE	38 ROUSE STREET	29/09/1999
STATEMENT	38456-1	Available	PORT PHILLIP CITY COUNCIL	PORT MELBOURNE	69-119 SALMON STREET	21/09/1999
STATEMENT	35027-1	Available	PORT PHILLIP CITY COUNCIL	MELBOURNE	582-584 ST KILDA ROAD	14/09/1999
STATEMENT	38727-1	Available	PORT PHILLIP CITY COUNCIL	PORT MELBOURNE	20-24 STOKES STREET	20/08/1999
STATEMENT	35926-1	Available	PORT PHILLIP CITY COUNCIL	ELWOOD	FORMER SHELL SERVICE STATION 133 ORMOND ESPLANADE	2/08/1999
STATEMENT	38456-2	Available	PORT PHILLIP CITY COUNCIL	PORT MELBOURNE	69-119 SALMON STREET	29/07/1999
STATEMENT	36665-1	Available	PORT PHILLIP CITY COUNCIL	PORT MELBOURNE	181-189 BAY STREET	15/07/1999
STATEMENT	35209-1	Available	PORT PHILLIP CITY COUNCIL	SOUTH MELBOURNE	7-11 FRANCIS STREET	5/07/1999
STATEMENT	33350-1	Available	PORT PHILLIP CITY COUNCIL	ST KILDA	181-189 BARKLY STREET	30/06/1999
STATEMENT	36757-1	Available	PORT PHILLIP CITY COUNCIL	ELWOOD	29-31 SCOTT STREET	15/06/1999
STATEMENT	36172-1	Available	PORT PHILLIP CITY COUNCIL	ALBERT PARK	341 FERRARS STREET	6/04/1999
STATEMENT	34274-1	Available	PORT PHILLIP CITY COUNCIL	PORT MELBOURNE	55-62 BEACH STREET	31/01/1999
STATEMENT	33458-4	Available	PORT PHILLIP CITY COUNCIL	PORT MELBOURNE	FORMER GASWORKS SITE FORMER LABORATORY SITE LIARDET AND PICKLES STREETS	30/01/1999
STATEMENT	33458-3	Available	PORT PHILLIP CITY COUNCIL	PORT MELBOURNE	FORMER GASWORKS SITE HOLDER YARD NO 2 PICKLES AND GRAHAM STREETS, AND ESPLANADE EAST	30/01/1999
STATEMENT	33458-2	Available	PORT PHILLIP CITY COUNCIL	PORT MELBOURNE	FORMER PORT MELBOURNE GASWORKS GASHOLDER NO.1 SITE PICKLES, GRAHAM, JOHNSON & DANKS STREETS	25/01/1999
STATEMENT	37271-1	Available	PORT PHILLIP CITY COUNCIL	ST KILDA	FORMER SERVICE STATION FACILITY CNR BARKLY & MITFORD STS	7/01/1999
STATEMENT	24467-2	Available	PORT PHILLIP CITY COUNCIL	PORT MELBOURNE	65 BEACH STREET	16/12/1998
STATEMENT	35722-1	Available	PORT PHILLIP CITY COUNCIL	ST KILDA	128-140 CHAPEL STREET	30/09/1998
STATEMENT	35620-1	Available	PORT PHILLIP CITY COUNCIL	ST KILDA	120-124 CARLISLE STREET	16/09/1998
STATEMENT	27917-4	Available	PORT PHILLIP CITY COUNCIL	PORT MELBOURNE	FORMER HMAS LONSDALE SITE ROUSE ST, ESPLANADE WEST, GRAHAM ST & ESPLANADE EAST	3/07/1998
STATEMENT	35209-2	Available	PORT PHILLIP CITY COUNCIL	SOUTH MELBOURNE	8 UNION STREET	20/05/1998
STATEMENT	35209-2	Available	PORT PHILLIP CITY COUNCIL	SOUTH MELBOURNE	FRANCIS STREET	20/05/1998
STATEMENT	32480-1	Available	PORT PHILLIP CITY COUNCIL	SOUTH MELBOURNE	21-27 PARK STREET	14/05/1998
STATEMENT	34465-1	Available	PORT PHILLIP CITY COUNCIL	SOUTH MELBOURNE	106 TOPE STREET	31/03/1998
STATEMENT	32481-1	Available	PORT PHILLIP CITY COUNCIL	ST KILDA	3 BLANCHE STREET	12/01/1998
STATEMENT	32870-1	Available	PORT PHILLIP CITY COUNCIL	ST KILDA	58-60 JACKSON STREET	19/11/1997
STATEMENT	32621-1	Available	PORT PHILLIP CITY COUNCIL	SOUTH MELBOURNE	FORMER SOUTH MELBOURNE PRIMARY SCHOOL DORCAS STREET	28/10/1997
STATEMENT	32350-1	Available	PORT PHILLIP CITY COUNCIL	PORT MELBOURNE	FORMER SERVICE STATION SITE 380 ROSS STREET	22/08/1997

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STATEMENT	32157-1	Available	PORT PHILLIP CITY COUNCIL	MELBOURNE	632 ST KILDA ROAD	16/07/1997
STATEMENT	27917-3	Available	PORT PHILLIP CITY COUNCIL	PORT MELBOURNE	FORMER HMAS LONSDALE SITE ROUSE ST, ESPLANADE WEST, GRAHAM ST & ESPLANADE EAST	30/06/1997
STATEMENT	31919-1	Available	PORT PHILLIP CITY COUNCIL	ST KILDA	6 VALE STREET	27/05/1997
STATEMENT	27917-2	Available	PORT PHILLIP CITY COUNCIL	PORT MELBOURNE	FORMER HMAS LONSDALE SITE	16/04/1997
STATEMENT	31460-1	Available	PORT PHILLIP CITY COUNCIL	PORT MELBOURNE	THE ANCHORAGE RESIDENTIAL DEVELOPMENT CNR BEACH ST & PRINCES ST	8/04/1997
STATEMENT	30368-1	Available	PORT PHILLIP CITY COUNCIL	ELWOOD	73 GLENHUNTRY ROAD	13/02/1997
STATEMENT	29805-1	Available	PORT PHILLIP CITY COUNCIL	SOUTH MELBOURNE	88 PARK STREET	12/12/1996
STATEMENT	30612-1	Available	PORT PHILLIP CITY COUNCIL	ST KILDA	9 SOMERSET STREET	6/12/1996
STATEMENT	29829-1	Available	PORT PHILLIP CITY COUNCIL	PORT MELBOURNE	60 STOKES STREET	22/11/1996
STATEMENT	28401-1	Available	PORT PHILLIP CITY COUNCIL	PORT MELBOURNE	PORT PHILLIP PRIMARY SCHOOL SITE FARRELL STREET	29/08/1996
CERTIFICATE	26919-1	Available	PORT PHILLIP CITY COUNCIL	PORT MELBOURNE	FORMER ADI MARIBYRNONG FACILITY CNR WILLIAMSTOWN RD & DERHAM STS	22/12/1995
STATEMENT	27917-1	Available	PORT PHILLIP CITY COUNCIL	PORT MELBOURNE	S CNR ESPLANADE WEST & ROUSE STREET	15/12/1995
STATEMENT	27221-2	Available	PORT PHILLIP CITY COUNCIL	PORT MELBOURNE	30-44 STOKES STREET	8/11/1995
STATEMENT	26662-1	Available	PORT PHILLIP CITY COUNCIL	ST KILDA	CNR HAVELOCK & BARKLY STS	10/08/1995
CERTIFICATE	26366-4	Available	PORT PHILLIP CITY COUNCIL	PORT MELBOURNE	BEACH & PRINCES STREETS, HOWE PARADE & BEACON ROAD	26/07/1995
STATEMENT	25529-2	Available	PORT PHILLIP CITY COUNCIL	PORT MELBOURNE	3-5 ROUSE STREET	25/07/1995
STATEMENT	25529-1	Available	PORT PHILLIP CITY COUNCIL	PORT MELBOURNE	3-5 ROUSE STREET	14/02/1995
CERTIFICATE	23390-1	Available	PORT PHILLIP CITY COUNCIL	WINDSOR	MCIWAICK STREET	7/10/1994
STATEMENT	24326-1	Available	PORT PHILLIP CITY COUNCIL	PORT MELBOURNE	10 PRINCES STREET	26/09/1994
CERTIFICATE	23263-1	Available	PORT PHILLIP CITY COUNCIL	ST KILDA	CANTERBURY ROAD	4/07/1994
STATEMENT	22683-1	Available	PORT PHILLIP CITY COUNCIL	SOUTH MELBOURNE	217 FERRARS STREET	14/06/1994
STATEMENT	17562-1	Available	PORT PHILLIP CITY COUNCIL	PORT MELBOURNE	30-42 LORIMER STREET	28/05/1993
CERTIFICATE	16075-1	Available	PORT PHILLIP CITY COUNCIL	PORT MELBOURNE	BAYSIDE 7 CNR BEACH & PRINCES STS	29/05/1992
CERTIFICATE	09154-3	Available	PORT PHILLIP CITY COUNCIL	PORT MELBOURNE	BAYSIDE 4 BEACH & PRINCES STREETS, HOWE PARADE & BEACON ROAD	1/08/1991
CERTIFICATE	09154-1	Available	PORT PHILLIP CITY COUNCIL	PORT MELBOURNE	BAYSIDE 3 BEACH & PRINCES STREETS, HOWE PARADE & BEACON ROAD	27/06/1991
CERTIFICATE	09154-2	Available	PORT PHILLIP CITY COUNCIL	PORT MELBOURNE	BAYSIDE 2 BEACH & PRINCES STREETS, HOWE PARADE & BEACON ROAD	14/06/1991
CERTIFICATE	08335-1	N/A	PORT PHILLIP CITY COUNCIL	PORT MELBOURNE	BAYSIDE 1 BEACH & PRINCES STREETS, HOWE PARADE & BEACON ROAD	21/02/1991

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The first PDF (CARMS_a.pdf) will contain a copy of the audit report including key figures, maps and tables. It will also include a signed copy of the certificate or statement of environmental audit. A certificate or statement may not be required in all instances and traditionally only applies to audits of potentially contaminated sites.

[CARMS No.]_b.pdf = Audit Report

The second PDF (CARMS_b.pdf) will contain all relevant appendices and attachments that support the audit report, including remediation and monitoring plans, assessors' reports, CUTEP reports, any bore/pit data etc.

[CARMS No.]_c.pdf = Audit Report Appendices

The third PDF (CARMS_c.pdf) will contain an additional extract copy of the signed environmental audit certificate or statement and an executive summary

Disclaimer

Environmental auditors who have conducted an audit pursuant to section IXD of the Act provide the information contained in this list to EPA. EPA does not conduct independent checks on the accuracy of this information. Anyone with a particular interest in a property should make his or her own further enquiries. EPA does not accept any responsibility for any claims, loss or damage of whatsoever kind arising out of any party's reliance on any information contained in or omitted from this list, nor does EPA accept responsibility for any claims, loss or damage arising out of the inclusion of any property on this list.

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Last updated: 18 October, 2011

[Victoria](#)
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Priority Sites Register

Date Generated 30/03/2012

BACKGROUND

EPA has a key responsibility in protecting beneficial uses of land. Many of these uses are regulated or controlled through a range of measures to prevent contamination of land and groundwater. Land contaminated by former waste disposal, industrial and similar activities is frequently discovered during changes to land use - for example, from industrial to residential use. In most cases these can be managed at the time that the change of land use occurs. Some sites however, present a potential risk to human health or to the environment and must be dealt with as a priority. Such sites are typically subject to clean-up and/or management under EPA directions.

WHAT ARE PRIORITY SITES?

Priority Sites are sites for which EPA has issued a Clean-up Notice pursuant to section 62A, or a Pollution Abatement Notice pursuant to section 31A or 31B (relevant to land and/or groundwater) of the Environment Protection Act 1970. Typically these are sites where pollution of land and/or groundwater presents a potential risk to human health or to the environment. The condition of these sites is not compatible with the current or approved use of the site without active management to reduce the risk to human health and the environment. Such management can include clean-up, monitoring and/or institutional controls.

The Priority Sites Register does not list sites managed by voluntary agreements or sites subject to management by planning controls (eg. sites managed in accordance with a section 173 agreement under the Planning and Environment Act 1987). Land purchasers should be aware of these limitations and make their own enquiries. A site is listed on the Priority Sites Register when EPA issues a Clean-up Notice or a Pollution Abatement Notice (relevant to land and/or groundwater). A notice is a means by which EPA formalises requirements to manage pollution. Sites are removed from the Priority Sites Register once all conditions of a Notice have been complied with. This is formalised through a Notice of Revocation pursuant to section 60B of the Act.

FURTHER INFORMATION

Additional information is available from:
 EPA Information Centre
 200 Victoria Street
 Carlton VIC 3053
 Tel: 03 9695 2722 Fax: 03 9695 2610
 Media Enquiries: 03 9695 2704
 EPA internet site: www.epa.vic.gov.au

NOTICE ID	MUNICIPALITY	LOCALITY	ADDRESS	ISSUE
NO8948	Ararat Rural City Council	ARARAT	169 ELIZABETH ST	Current Industrial Site. Requires assessment and/or clean up.
NO7393	Ararat Rural City Council	ARARAT	26 GRANO ST	Former Industrial Site. Requires assessment and/or clean up.
NO7420	Ararat Rural City Council	ARARAT	MCLELLAN ST	Railway yard. Requires assessment and/or clean up.
NO7801	Ballarat City Council	BALLARAT	1003 HUMFFRAY ST SOUTH	Former Industrial Site. Requires assessment and/or clean up.
NO8038	Ballarat City Council	BALLARAT	BALLARAT AERODROME VOLUME 6747 FOLIO 250	Current Industrial Site. Requires assessment and/or clean up.



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NOTICE ID	MUNICIPALITY	LOCALITY	ADDRESS	ISSUE
NO10248	Nillumbik Shire Council	ELTHAM	197 SHERBOURNE RD	Former petroleum storage site. Requires assessment and/or clean up.
NO1752	Nillumbik Shire Council	KANGAROO GROUND	GRAHAM RD	Former Landfill. Requires on-going management.
NO2218	Nillumbik Shire Council	PANTON HILL	165 MOTSCHALLS RD	Current Industrial Site. Requires on-going management.
NO8535	Nillumbik Shire Council	PANTON HILL	165 MOTSCHALLS RD	Industrial waste has been dumped at the site. Requires assessment and/or clean up.
NO8720	Northern Grampians Shire Council	STA WELL	25-39 HORSHAM RD	Former Industrial Site. Requires on-going management.
NO8718	Northern Grampians Shire Council	STA WELL	25-39 HORSHAM RD	Former Industrial Site. Requires on-going management.
NO9784	Port Phillip City Council	ELWOOD	54A MARINE PDE	Current Service Station. Requires assessment and/or clean up.
NO3531	Port Phillip City Council	SOUTH MELBOURNE	82 MONTAGUE ST	Former Industrial Site. Requires assessment and/or clean up.
NO3723	South Gippsland Shire Council	FOSTER	SOUTH GIPPSLAND HWY	Former Landfill. Requires on-going management.
NO8469	Southern Grampians Shire Council	HAMILTON	358 GLENELG HWY	Industrial waste has been dumped at the site. Requires assessment and/or clean up.
NO9361	Strathbogie Shire Council	NAGAMBIE	ALLOTMENT 19 PARISH OF BUNGANAIL KIRWANS BRIDGE-LONGWOOD RD	Current Industrial Site. Requires on-going management.
NO9602	Strathbogie Shire Council	TABILK	ALLOT. 16 TABILK-MONEA RD	Current Industrial Site. Requires on-going management.
NO9409	Strathbogie Shire Council	VIOLET TOWN	154 HIGH ST	Industrial waste has been dumped at the site. Requires assessment and/or clean up.
NO8155	Surf Coast Shire Council	WINCHELSEA	114 TREBECK CT	Illegal dumping. Requires assessment and/or clean up.
NO4949	Swan Hill Rural City Council	SWAN HILL	3 HASTINGS ST	Current petroleum storage site. Requires assessment and/or clean up.
NO9763	Swan Hill Rural City Council	SWAN HILL	HAPPY VALLEY TRACK HAPPY VALLEY (CA 2A (PART OF) 2B & 2C PARRISH OF BUMBANG	Illegal dumping. Requires assessment and/or clean up.
NO2699	Swan Hill Rural City Council	SWAN HILL	CNR HASTINGS ST & NARETHA ST	Current petroleum storage site. Requires on-going management.
NO9156	Swan Hill Rural City Council	TOL TOL	3216 MURRAY VALLEY HWY	Industrial waste has been dumped at the site. Requires assessment and/or clean up.
NO1396	Towong Shire Council	BETHANGA	MARTINS RD	Former Landfill. Requires on-going management.
NO7364	Wangaratta Rural City Council	WANGARATTA	29-35 ROWAN ST	Former Service Station. Requires assessment and/or clean up.
NO10362	Wangaratta Rural City Council	WANGARATTA	31-33 SANDFORD RD	Industrial waste has been dumped at the site. Requires assessment and/or clean up.

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APPENDIX B3 Summary of Aerial Photo Review

Photo Details	Precinct	Observation of Study Area (S.A)	Observation of Surrounding Area
1931 Scale 1:181860, Height 11000ft, Film 60, Run 9, Photo 2831- 2832	Lorimer	Largely unoccupied with unpaved paths, scattered trees/shrubs/grasslands. Inferred industry / commercial present to the east of Boundary Street.	East: Photo does not show area east of S.A. South and west of the S.A. land appears unoccupied, containing unpaved paths, scattered trees/shrubs, and some disturbance to the land (potential sand quarrying)
	Plummer	Minimal development, no buildings visible. There appears to have been extensive surface disturbance (inferred sand quarrying) across the majority of the precinct. Williamstown Road and Prohasky Street are visible.	
	Fennell	Inferred industrial development was present in a strip along the western side of Ingles Street, east of what is now Bertie Street. The land east of Ingles Street was largely occupied by (inferred) industry. Sporting oval was present at the inner corner of Ingles Street and Williamstown Road Inferred factories and / or warehouses were present in the two blocks adjacent to the oval on Williamstown Road. The remainder of the precinct, in the south west, appears to have been vacant with extensive surface disturbance (inferred sand quarrying), lessening to the north where land appears to have been subdivided into lots with unpaved paths. Oval shaped track was present on south side of Ingles Street, at the north end of precinct. A building was present in north west of precinct, possibly associated with the rifle range which extended approximately 1200 yards west from (the future) Graham Street (J.L. Kepert 1993 & The Argus 1901) and was in use from 1901 to 1937 (The Victorian Rifle Association, 2005).	South of Williamstown road (along the eastern section) is some residential development, stopping around Barak and Beacon Roads.
	Montague	No photo available from DSE that covered this precinct.	Train/tram line extends south from the Montague precinct, ending at the wharfs at Station Pier. Princess Pier lies west of Station Pier.
1942 Scale 1:12000, Height 800ft, Film N/AV, Run 13, Photo 72268- 72269	Lorimer	Industry (inferred) had spread west of boundary road to Ingles street as well as a pocket of buildings and what appears to be tents (potentially military) in the land bound by Ingles, Turner (future) & Graham (future) Streets.	Largely the same as 1931, however two large buildings/shelters and a number of smaller adjacent buildings constructed South of Lorimer Street on what is now Hall street.
	Plummer	Area west of Salmon Street not visible on photos with the exception of a small portion in the south western corner (Salmon Street and Williamstown Road), which appears to have been occupied by (inferred) industrial buildings. East of Salmon Street: Salmon Street was at this time clearly visible and some twenty-five large rectangular buildings (inferred to be warehouses) were present in the	

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APPENDIX B3 Summary of Aerial Photo Review

Photo Details	Precinct	Observation of Study Area (S.A)	Observation of Surrounding Area
		<p>block north east of the Plummer Street/Salmon Street intersection. North and east of these buildings land was unoccupied. Two large areas which appear to be swamp land is visible, one directly north of the buildings and one to the north east, extending into the Fennell Street precinct.</p> <p>Unoccupied / open land was present south of the buildings, north of Williamstown Road, west of Graham Street, with the exception of a block of inferred industrial / commercial buildings on the corner of Salmon Street and Williamstown Road.</p>	
	Fennell	<p>Tents (inferred) appear to have been present on the sporting oval (corner of Ingles Street and Williamstown Road). There were also several inferred tents present to the east of the 25 buildings in the Plummer Street precinct.</p> <p>An inferred quarry extended from the Plummer Precinct into the Fennell Precinct in the west.</p> <p>New industrial (inferred) buildings were present along Williamstown Road.</p> <p>Majority of the area south west of Ingles Street was still vacant, the land marked with unpaved paths and surface disturbance. Possible filling of newly subdivided blocks on Williamstown Road.</p>	
	Montague	<p>Western tip of the precinct not visible in photo.</p> <p>Appears to have been a mix of residential and industrial development south of the railway and largely industrial development north of the railway.</p> <p>Precinct appears to have been well established by this time.</p>	
1945 Scale 1:6000, Height 10200, Film 180, Run 21, Photos 58552- 58558 & 58560	Lorimer	No photo available from DSE that covered this precinct.	An airstrip was present in an 'X' formation, the centre of which is north west of the body of water in the Plummer precinct.
	Plummer	<p>Industrial development increased west of Salmon Street. However, there were areas, particularly west of Prohasky Street, that were highly disturbed with tracks, paths and what appears to be swamp land. An inferred quarry was present in the north western portion of the precinct, extending out of precinct boundaries</p> <p>East of Salmon Street: Land between Salmon Street and Graham Street was largely as it was in 1942.</p>	An inferred quarry, lay west of Todd Road, south of Williamstown road (block of land opposite the south west corner of the Plummer
	Fennell	<p>Tents no longer present.</p> <p>While there was increased development (inferred industrial), particularly along</p>	

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APPENDIX B3
Summary of Aerial Photo Review

Photo Details	Precinct	Observation of Study Area (S.A)	Observation of Surrounding Area
	Montague	Williamstown Road comprised large, long, rectangular buildings, there were still large areas undeveloped at this time. Two adjacent long oval roads were present in the central west zone of precinct.	precinct) Residential development south of Williamstown Road at this time extended to Todd Road
1951 Scale 1:12000, Height 12200ft, Film 1417 , Run 17, Photos 101-103	Lorimer	Majority of precinct was developed, with the exception of two areas which were altered from relatively undeveloped land (trees, unpaved paths) to excavated sites. One was located on the corner block, west of Ingles Street and south of Turner Street (LP1), the other was in the triangle block bound by Lorimer, and Ingles (LP2).	Inferred quarries and what appears to be swampland lie directly east as well as south of the centre point of the X shaped airstrip (above the western side of the Plummer precinct).
	Plummer	West of Salmon Street: Minimal change since 1945 East of Salmon Street: The footprint of the inferred quarry north of the 25 buildings on Salmon Street appears to have been extended east.	Industrial development extended almost all the way along Lorimer Street except where airstrip was present.
	Fennell	Bertie Street was visible at this time. Two large buildings were present in the vicinity of long oval roads seen in 1945. There was a large land marking in the central north section of precinct, land appears to have been cleared, this extends slightly into the Plummer precinct.	
	Montague	Minimal change	
1960 Scale 1:9600, Height 8200ft, Film 1094, Run 20, Photos 29 & 31	Lorimer	Not visible on photograph	Minimal change
	Plummer	West of Salmon Street: further developed between Williamstown Road and Plummer Street as well as blocks north of Plummer Street (blocks developed and roads sealed). Of note is the block between Prohasky and Smith Streets which appears to have been filled and levelled. The inferred industrial strip along Salmon Street was extended and roads sealed. The north west corner of the precinct appears to remain as swamp land., East of Salmon Street: The block on the north east intersection of Plummer and Graham Streets still contains twenty-five buildings. The inferred quarry has been altered and appears larger than in 1951. A block north of the buildings, on Salmon Street, has been levelled and built upon and water now sits further east. The north east corner of the precinct has been mostly levelled, making way for a saw tooth roofed building.	

COMMERCIAL IN CONFIDENCE



APPENDIX B3
Summary of Aerial Photo Review

Photo Details	Precinct	Observation of Study Area (S.A)	Observation of Surrounding Area
1966 Scale 1:19200, Height 9800ft, Film 1933, Run 11A, Photos 118-120	Fennell	Roads have been developed and paved, running north west to south east. Graham Street is now defined and sealed and land east of Graham Street appears to have been filled and levelled (over the location of the 'large land marking' noted in the 1951 photo). This area has been built upon in the east and south, predominantly between Bridge and Bertie Streets.	Inferred quarries on the eastern side of the X shaped airstrip (above the western side of the Plummer precinct) appear to have been levelled, or filled in. An inferred quarry at the southern tip of the airstrip was present. The block of land opposite the south west corner of the Plummer precinct appears to have been a quarry at this time
	Montague	Minimal change	
	Lorimer	LP1 (refer 1951 above) has been built upon, LP2 (refer 1951 above) was still vacant West of Salmon Street: Remains relatively unchanged from 1960. East of Salmon Street: Largely unchanged in the south. More filling/levelling in the north east with another large building constructed north of the saw tooth building which appeared in the 1960 photo. The inferred quarry was still present (larger than in 1960) above levelled area in north east (some of which is outside of precinct).	
	Plummer	Fennell	
	Fennell	Land between Bridge and Bertie Streets was largely developed by this time. The only vacant block sits between Graham and Bridge Streets.	
	Montague	Minimal change	
1970 Scale 1:9600, Height 5100ft, Film 2353, Run 39, Photos 169-172	Lorimer	North section of precinct not visible, south appears almost unchanged. Some land south of turner street was sealed for car parking or possibly storage.	Preparations for construction of freeway underway. The airstrip appears to have been converted into roadways, the section running North to South becoming Todd road as it known today.
	Plummer	West of Salmon Street: Freeway works underway across northern border of precinct. The inferred quarry is in most western block of precinct, on Todd Road, and in the blocks directly south of the freeway East of Salmon Street: The inferred quarry in the north east appears to have been filled, and partially developed over.	
	Fennell	The precinct appears to be fully developed. Westgate Freeway works underway. Outdoor storage on Ingles, just south of the freeway.	
	Montague	Minimal change	

COMMERCIAL IN CONFIDENCE



APPENDIX B3
Summary of Aerial Photo Review

Photo Details	Precinct	Observation of Study Area (S.A)	Observation of Surrounding Area
1972 Scale 1:9600, Height 5700ft, Film 2622, Run 39, Photos 115, 117 & 119	Lorimer	Minimal change	The inferred quarry at what used to be the southern tip of the airstrip (now south of the freeway, west of Todd road) was still present at this time, as was the inferred quarry south of the centre point of the former airstrip. Freeway works had progressed and toll stations are visible.
	Plummer	West of Salmon Street: Filling has occurred in the inferred quarry directly south of the freeway. The inferred quarry next to Todd Road was still visible. East of Salmon Street: Minimal change	
	Fennell	Minimal change	
	Montague	Minimal change	
1976 Scale 1:10000, Height 5000, Film 3052, Run 31, Photo 34, 36 & 37	Lorimer	Minimal change	Minimal Change
	Plummer	West of Salmon Street: More filling and levelling blocks directly south of the freeway. The inferred quarry next to Todd Road has altered in shape; some filling appears to have occurred. East of Salmon Street: Minimal change	
	Fennell	Minimal change	
	Montague	Minimal change	
1982 Scale 1:10000, Height 5400ft, Film 3620, Run 6, Photos 110, 111 & 113	Lorimer	Minimal change	There was at this time another inferred quarry north of the east to west portion of the former airstrip. The freeway entry/exit loop at the north east corner of the Plummer precinct had been constructed
	Plummer	West of Salmon Street: The inferred quarry next to Todd Road appears to have been filled and some blocks directly south of the freeway were developed. East of Salmon Street: Works on 'loop' entry to freeway have been undertaken north east of the precinct. Six of the twenty-five buildings, on Salmon Street, from the 1940s have been removed and replaced.	
	Fennell	Kings Way/Montague Street ramp portion of freeway were being developed at this time.	
	Montague	Kings Way/Montague Street ramp portion of freeway were being developed at this time.	
1990 Scale 1:25000,	Lorimer	Minimal change	Minimal change
	Plummer	West of Salmon Street: Minimal change, more blocks directly south of the freeway	

COMMERCIAL IN CONFIDENCE



APPENDIX B3 Summary of Aerial Photo Review

Photo Details	Precinct	Observation of Study Area (S.A)	Observation of Surrounding Area
Height 12500ft, Film 4331, Run 2, Photo 147		were developed. East of Salmon Street: Remainder of the twenty-five buildings from 1940s, except two on the corner of Salmon Street & Williamstown Road, have been removed and replaced with new buildings.	
	Fennell	Minimal change	
	Montague	Minimal change	

References

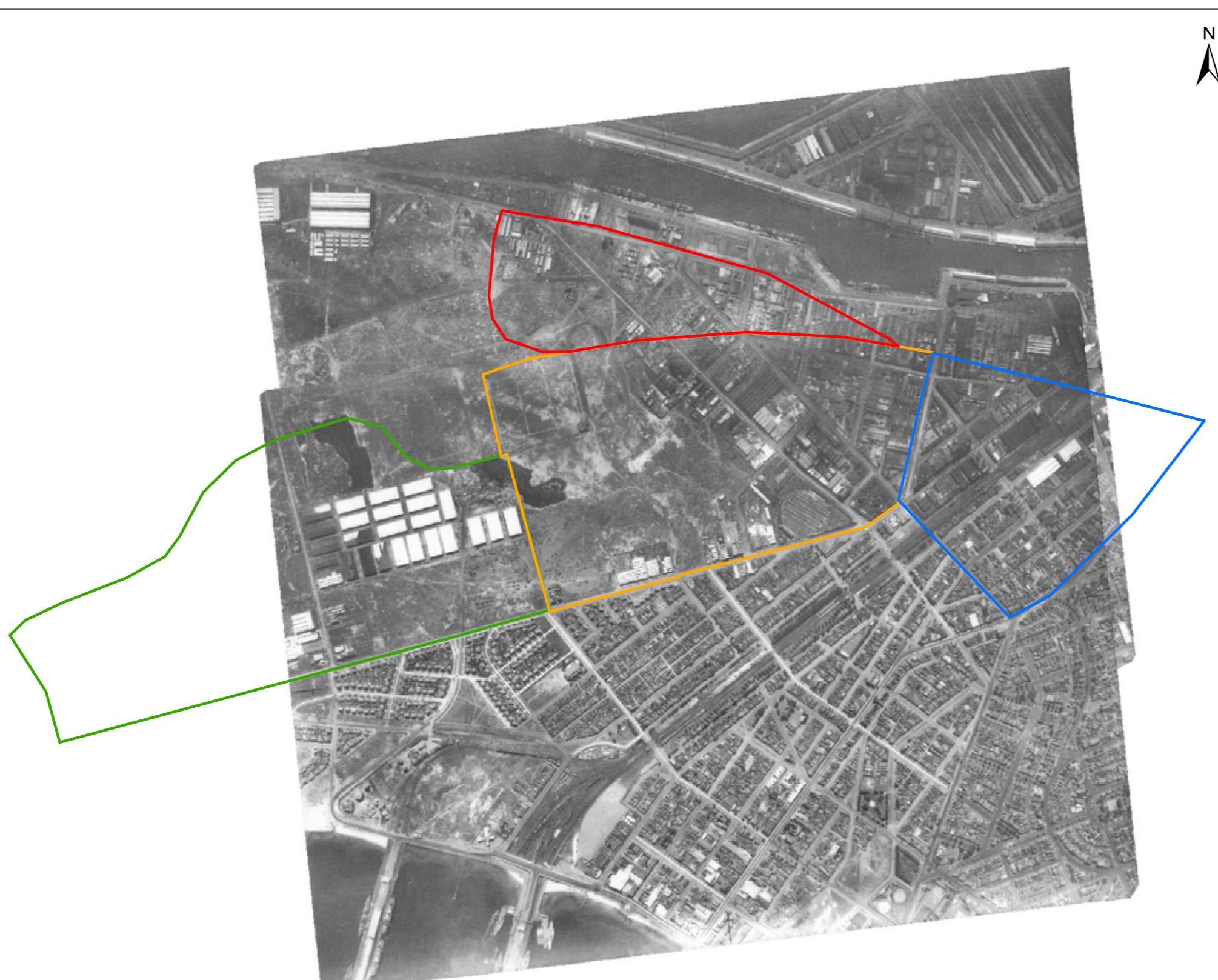
J.L. Kepert 1993, *Fishermens Bend – A Centre of Australian Aviation*, General Document 39, Department of Defence - Defence Science and Technology Organisation – Aeronautical Research Laboratory, Australian Government Publishing Services, Canberra ACT.

The Victorian Rifle Association. 2005, *The History of Full bore Target Rifle Competition in Victoria*, viewed 11 April 2012, <<http://www.vra.asn.au/history.shtml>>.

The Argus 1901, 'The Rifle Club Movement', *The Argus*, 26 January, viewed 11 April 2012, <<http://trove.nla.gov.au/ndp/del/article/10531746>>



FIGURE B1



FISHERMANS BEND LAND
CONTAMINATION STUDY
PLACES VICTORIA

**HISTORICAL
PHOTOGRAPH
1942**

**COMMERCIAL IN
CONFIDENCE**

Legend

Precincts

- Plummer
- Fennel
- Montague
- Lorimer

NOTES

The image was georeferenced using NearMap imagery from 2012.

Spatial accuracy is approximate only.

Full extent of Study Area not shown as some earlier photos were not available at DSE.

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0 125 250 500 750 metres

SCALE (at A3) 1:13,000

DATUM GDA 94, PROJECTION MGA Zone 55

PROJECT: 127613038

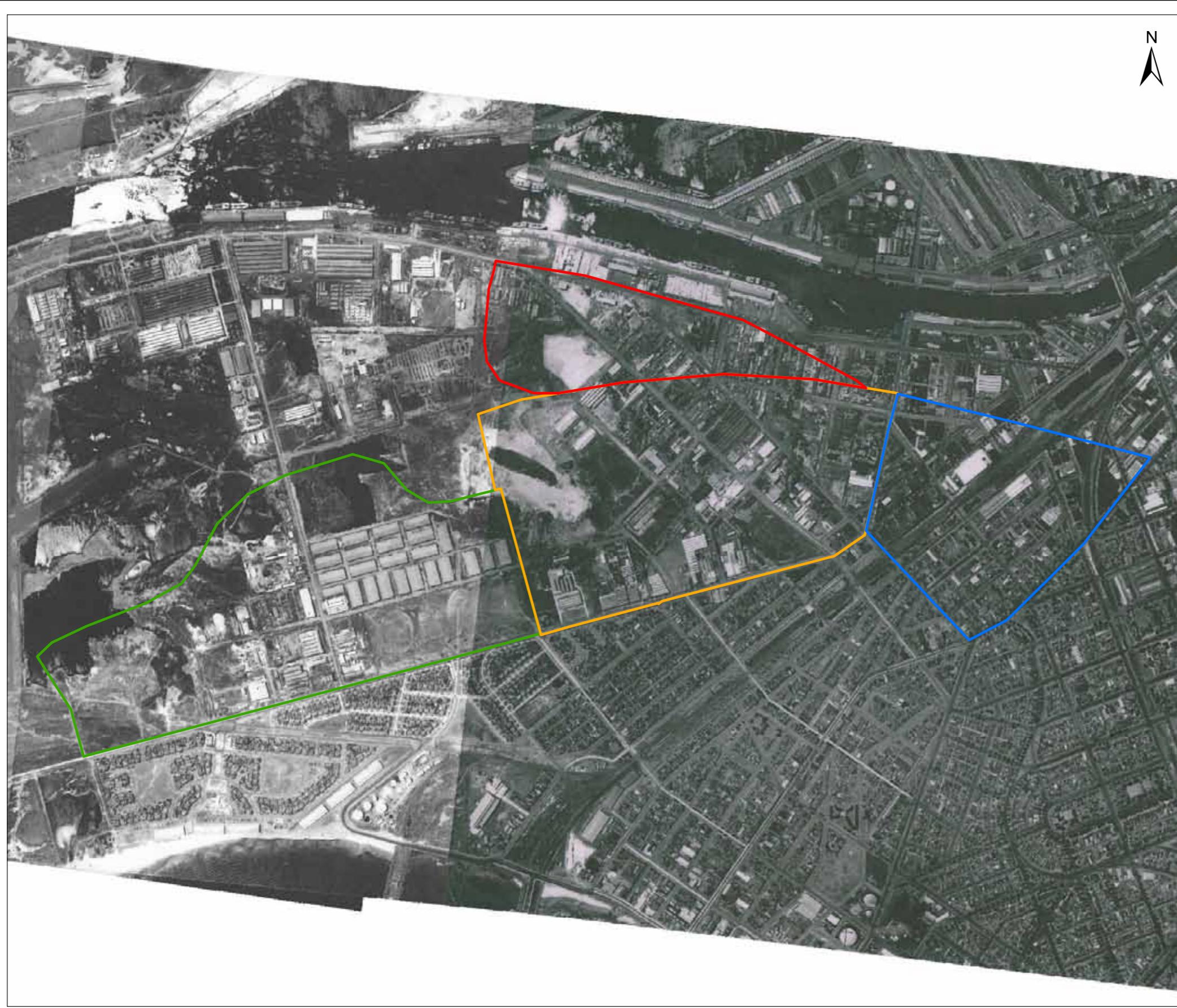
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FIGURE B2

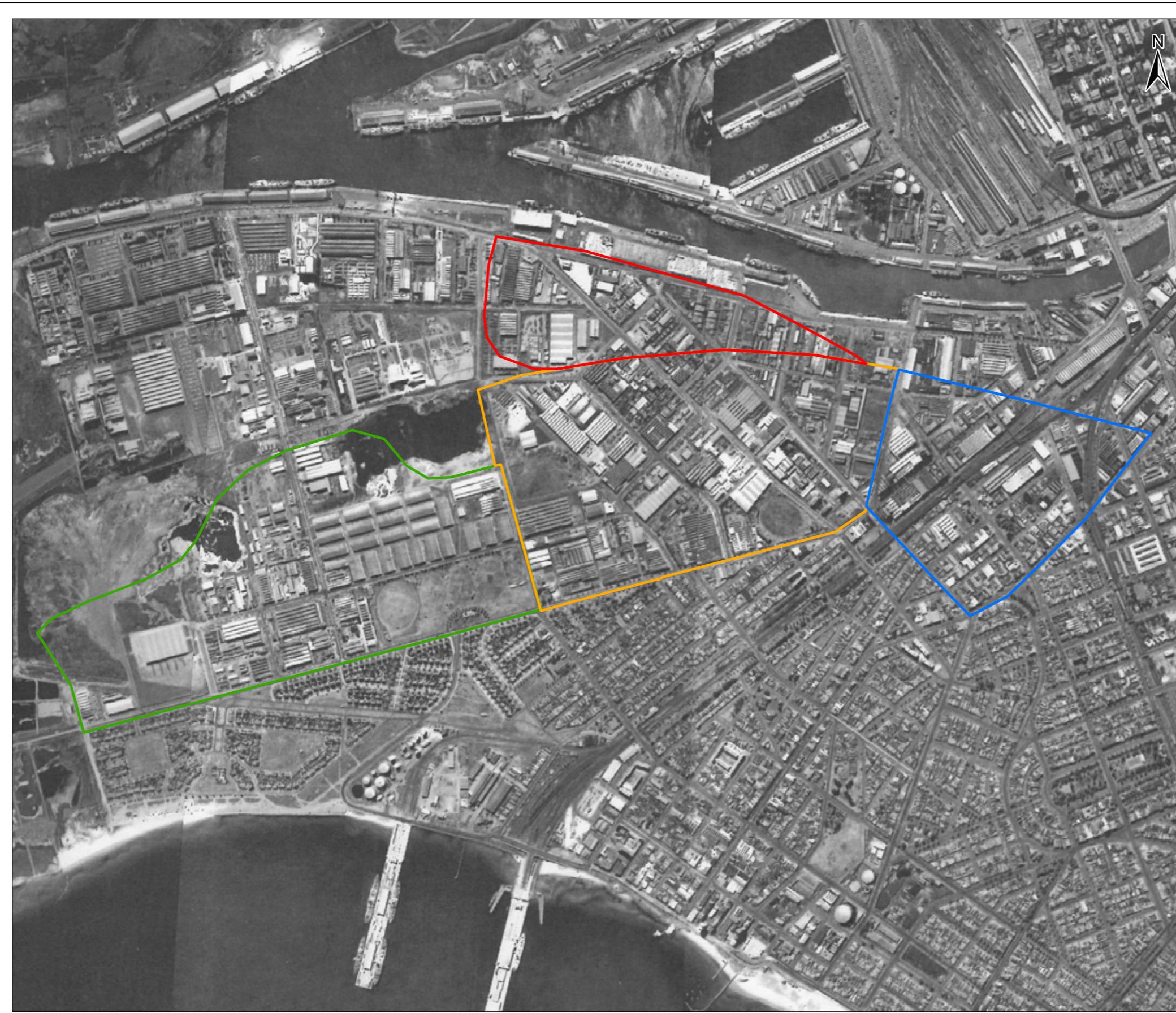




FISHERMANS BEND LAND
CONTAMINATION STUDY
PLACES VICTORIA

FIGURE B3





FISHERMANS BEND LAND
CONTAMINATION STUDY
PLACES VICTORIA

**HISTORICAL
PHOTOGRAPH
1966**

**COMMERCIAL IN
CONFIDENCE**

Legend

Precincts

- Plummer
- Fennel
- Montague
- Lorimer

NOTES

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0 125 250 500 750 metres

SCALE (at A3) 1:13,000

DATUM GDA 94, PROJECTION MGA Zone 55

PROJECT: 127613038
DATE: 27 JUN 2012
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FIGURE B4





FISHERMANS BEND LAND
CONTAMINATION STUDY
PLACES VICTORIA

**HISTORICAL
PHOTOGRAPH
1970**

**COMMERCIAL IN
CONFIDENCE**

Legend

Precincts

- Plummer
- Fennel
- Montague
- Lorimer

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Full extent of Study Area not shown as some earlier photos were not available at DSE.

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0 125 250 500 750 metres

SCALE (at A3) 1:13,000

DATUM GDA 94, PROJECTION MGA Zone 55

PROJECT: 127613038

DATE: 27 JUN 2012

DRAWN: JPH

CHECKED: ELC / PM

FIGURE B5





FISHERMANS BEND LAND
CONTAMINATION STUDY
PLACES VICTORIA

**HISTORICAL
PHOTOGRAPH
1976**

**COMMERCIAL IN
CONFIDENCE**

Legend

Precincts

- Plummer
- Fennel
- Montague
- Lorimer

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0 125 250 500 750 metres

SCALE (at A3) 1:13,000
DATUM GDA 94, PROJECTION MGA Zone 55

PROJECT: 127613038
DATE: 27 JUN 2012
DRAWN: JPH
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FIGURE B6





FIGURE B7

FISHERMANS BEND LAND
CONTAMINATION STUDY
PLACES VICTORIA

**FIGURE B8**



ACID SULFATE SOIL

Potential Acid Sulfate Soil

Acid sulfate soils (ASS) in Australia are commonly found in Holocene age sediments where the natural surface elevation is less than 5 mAHD and may be deeply deposited and covered by other sediments. Potential acid sulfate soils (PASS) contain iron pyrite which is stable in an un-oxidised state although can present a potential acid leachate risk if exposed to air, resulting in production of sulphuric acid by oxidation. These oxidising soils are commonly referred to as actual acid sulfate soils (AASS).

In general, the potential for soils to generate acid is a function of the geological history of the soils, and geomorphologic landscape within a given region (White, 1995). Furthermore the Victorian Department of Primary Industries (DPI) has produced a series of maps illustrating the extent of estimated Coastal Acid Sulphate Soils along Victorian coastal regions.

Management of Acid Sulfate Soils (ASS) and Rock (ASR)

EPA Government Gazette, "Industrial Waste Management Policy on Waste Acid Sulphate Soils", dated 1999 and EPA Information Bulletin Publication 655.1 "Acid Sulfate Soil and Rock" dated July 2009 provide specific guidance on the identification, assessment and management of Acid Sulfate Soils (ASS). The policy requires that a person must not cause or permit the disposal or re-use of waste ASS at any premises, except where the occupier of the premises:

- 1) Is licensed under the Environment Protection Act 1970 to dispose of that type of waste; or
- 2) Has an environment management plan prepared in accordance with the IWMP "Waste Acid Sulphate Soils" and approved by the Authority.

In situations where acid sulfate soils may be disturbed during development (such as excavation, exposure, dewatering or placement of fill), the Victorian EPA guidelines (EPA Information Bulletin 665.1) require that the site be managed to avoid and control adverse environmental impacts. The hierarchy for management is:

- 1) Avoid disturbance
- 2) Minimise disturbance
- 3) Prevent oxidation
- 4) Treat to reduce or neutralise acidity
- 5) Offsite reuse or disposal

Presence of Probable Acid Sulfate Soils

To assign for the presence of probable acid sulfate soils we reviewed the following information:

- Victorian Department of Primary Industries (DPI) series *Melbourne-T7822* map sheet illustrating the extent of estimated Coastal Acid Sulphate Soils around Melbourne and along Victorian coastal regions;
- Available published information on the site geology and geomorphology; and
- Available information relating to the presence of ASS, the regional topography and likely depth of groundwater.

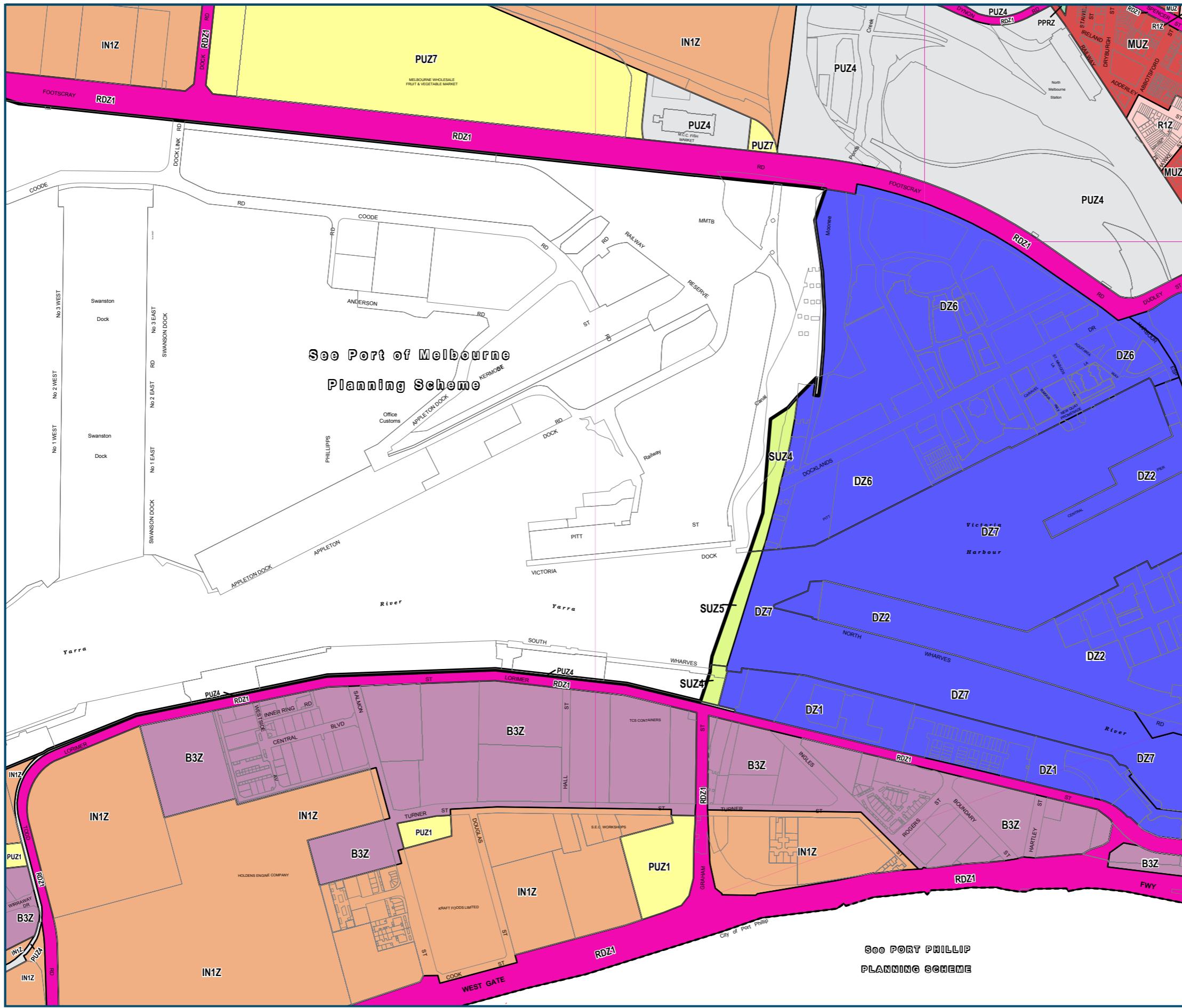
The Quaternary Yarra Delta sediments (all quaternary units except the Newer Volcanic unit), specifically the Coode Island Silt (Qri) and potentially the Fishermens Bend Silt (Qpf), may be probably acid sulfate soils



given their depositional conditions, geomorphology and DPI mapping. EPA Information Bulletin 655.1 "Acid Sulfate Soil and Rock", (July 2009).

Based on the review of the geology of the project area (see Section 3.0 of the main report), ASS across the site are likely to be associated with the Coode Island Silt materials both in natural form and in reworked form as part of the fill soils. Given the geology, the low elevation of the assessment area and the shallow groundwater at the site, there is a high likelihood of encountering ASS during ground intrusive works with the Study Area.

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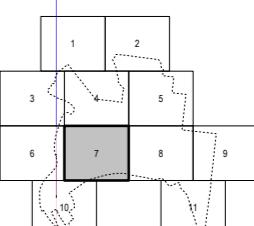


ZONES

Business	
BSZ	Business 3 Zone
Industrial	
INIZ	Industrial 1 Zone
Public Land	
PPRZ	Public Park And Recreation Zone
PULZ	Public Use Zone - Other Public Use
PUIZ	Public Use Zone - Service And Utility
PUSA	Public Use Zone - Transport
Residential	
MUZ	Mixed Use Zone
R1Z	Residential 1 Zone
Special Purpose	
DZ1	Docklands Zone - Schedule 1
DZ2	Docklands Zone - Schedule 2
DZ3	Docklands Zone - Schedule 5
DZ4	Docklands Zone - Schedule 6
DZ7	Docklands Zone - Schedule 7
SU4Z	Special Use Zone - Schedule 4
SU5Z	Special Use Zone - Schedule 5
Unknown Category	
RCdZ	Unknown Code RdZ!

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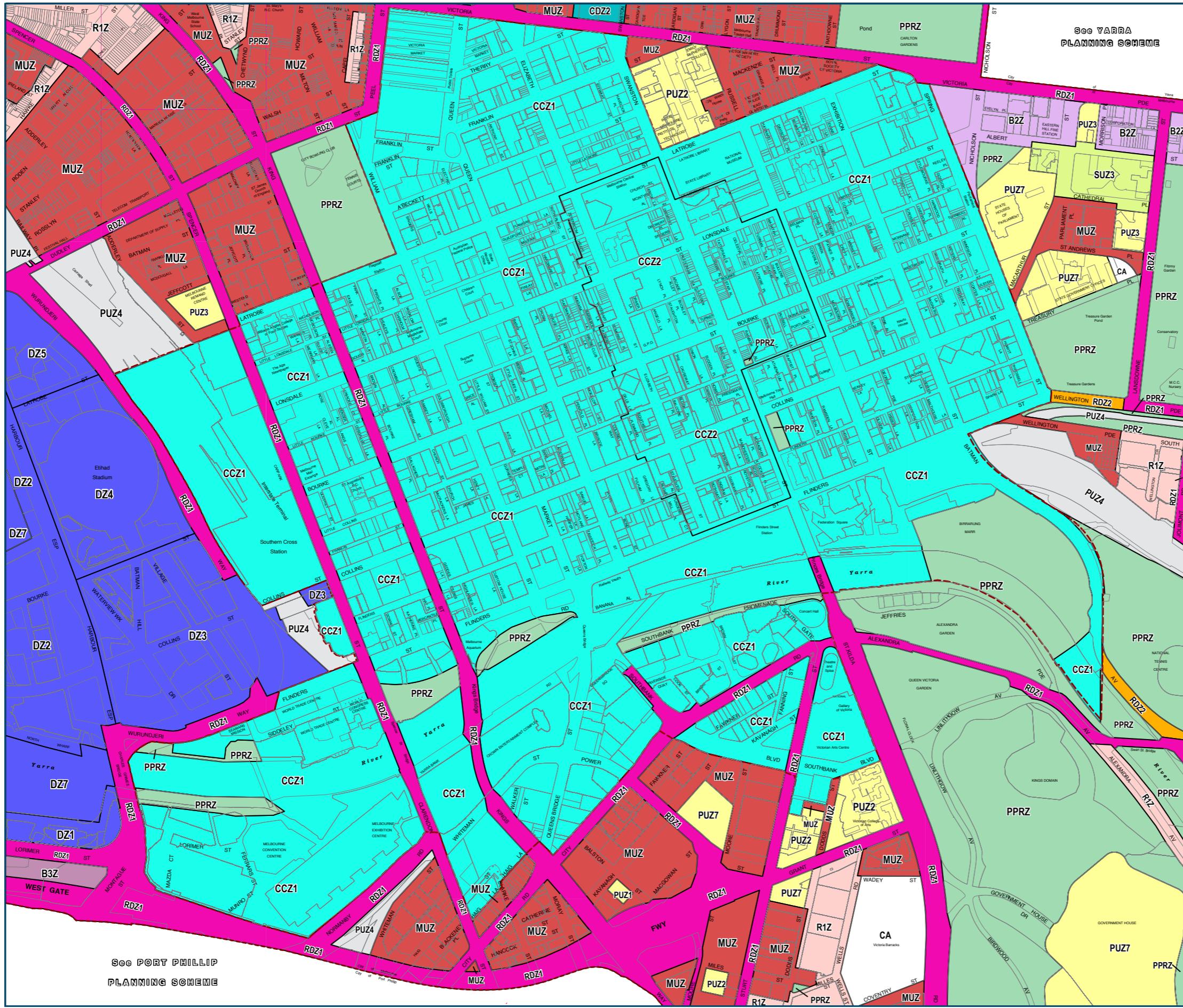


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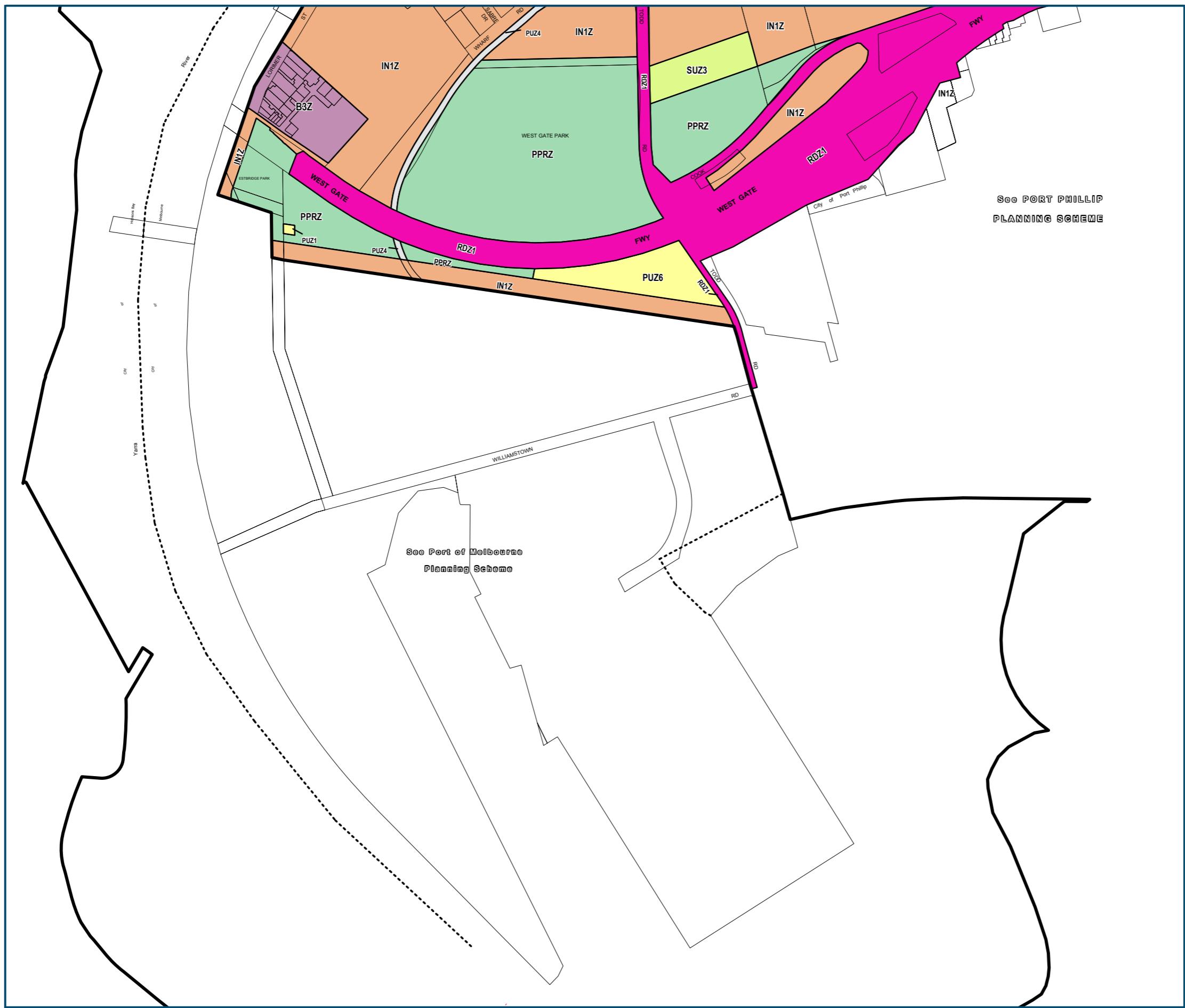
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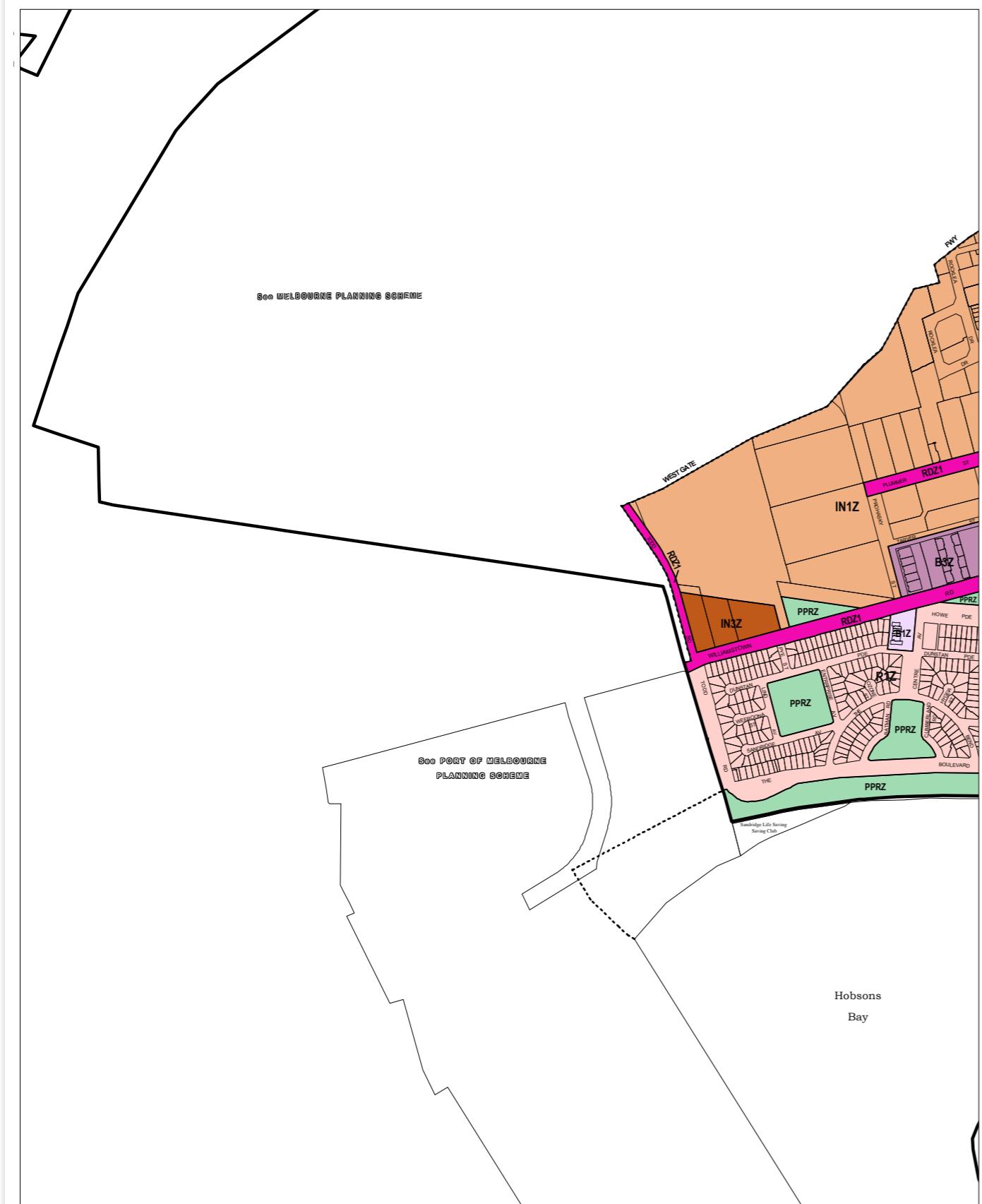


State of Victoria

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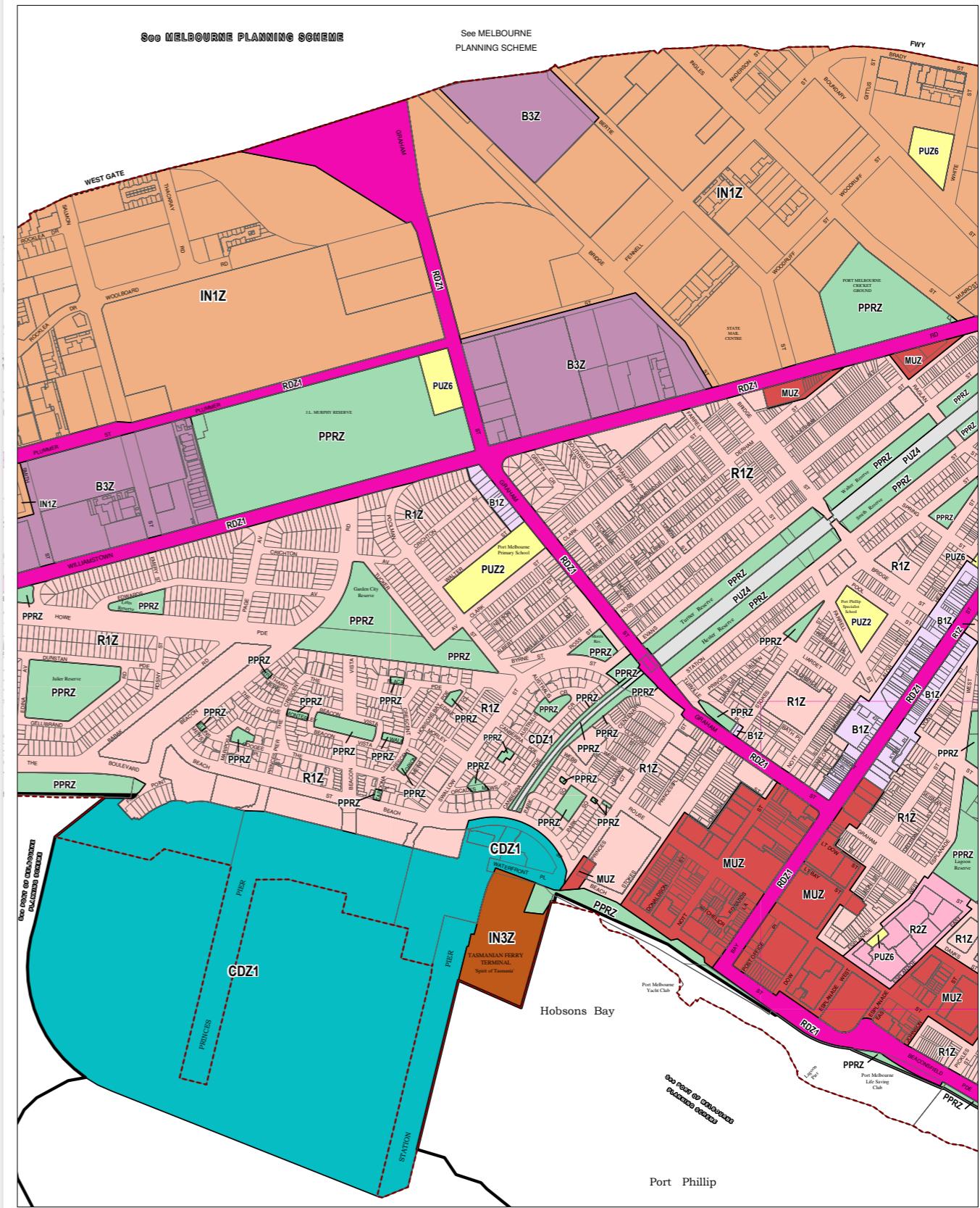
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Business	Business 1 Zone	Business 3 Zone
Industrial	Industrial 1 Zone	Industrial 3 Zone
Public Land	Public Park And Recreation Zone	
Residential	Road Zone, Category 1	
	Residential 1 Zone	

ZONES

MAP No 1

PORT PHILLIP PLANNING SCHEME - LOCAL PROVISION



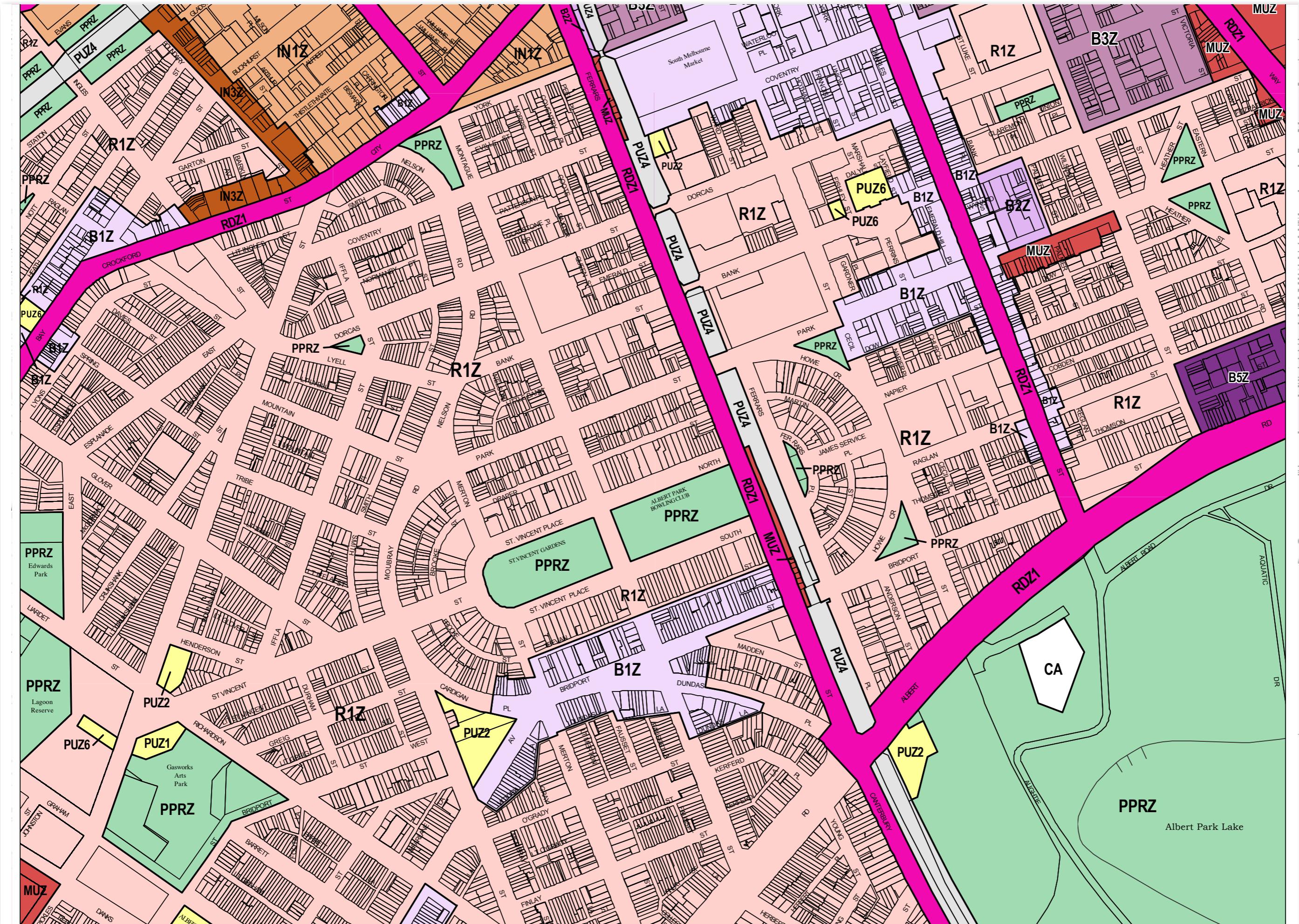
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Business	Business 1 Zone	Road Zone - Category 1
Industrial	Industrial 1 Zone	Mixed Use Zone
Public Land	Industrial 3 Zone	Industrial 1 Zone
Residential	Public Park And Recreation Zone	Industrial 3 Zone
	Road Zone, Category 1	Public Use Zone - Education
	Residential 1 Zone	Public Use Zone - Local Government

ZONES

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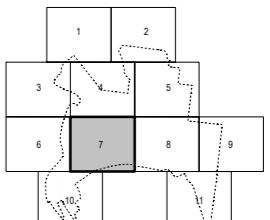


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CITY LINK PROJECT OVERLAY

Overlays

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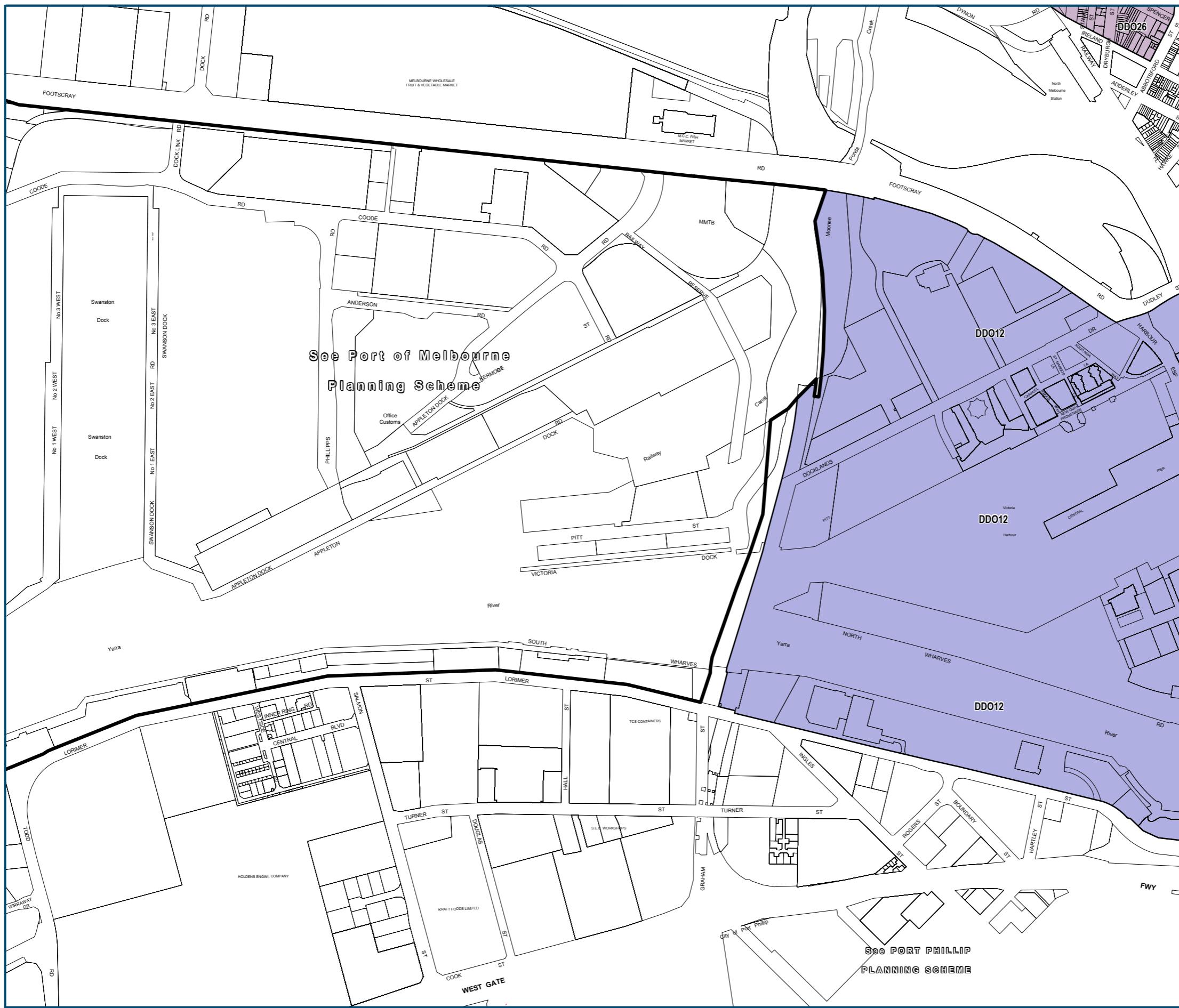


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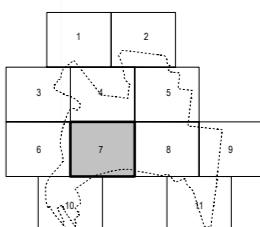
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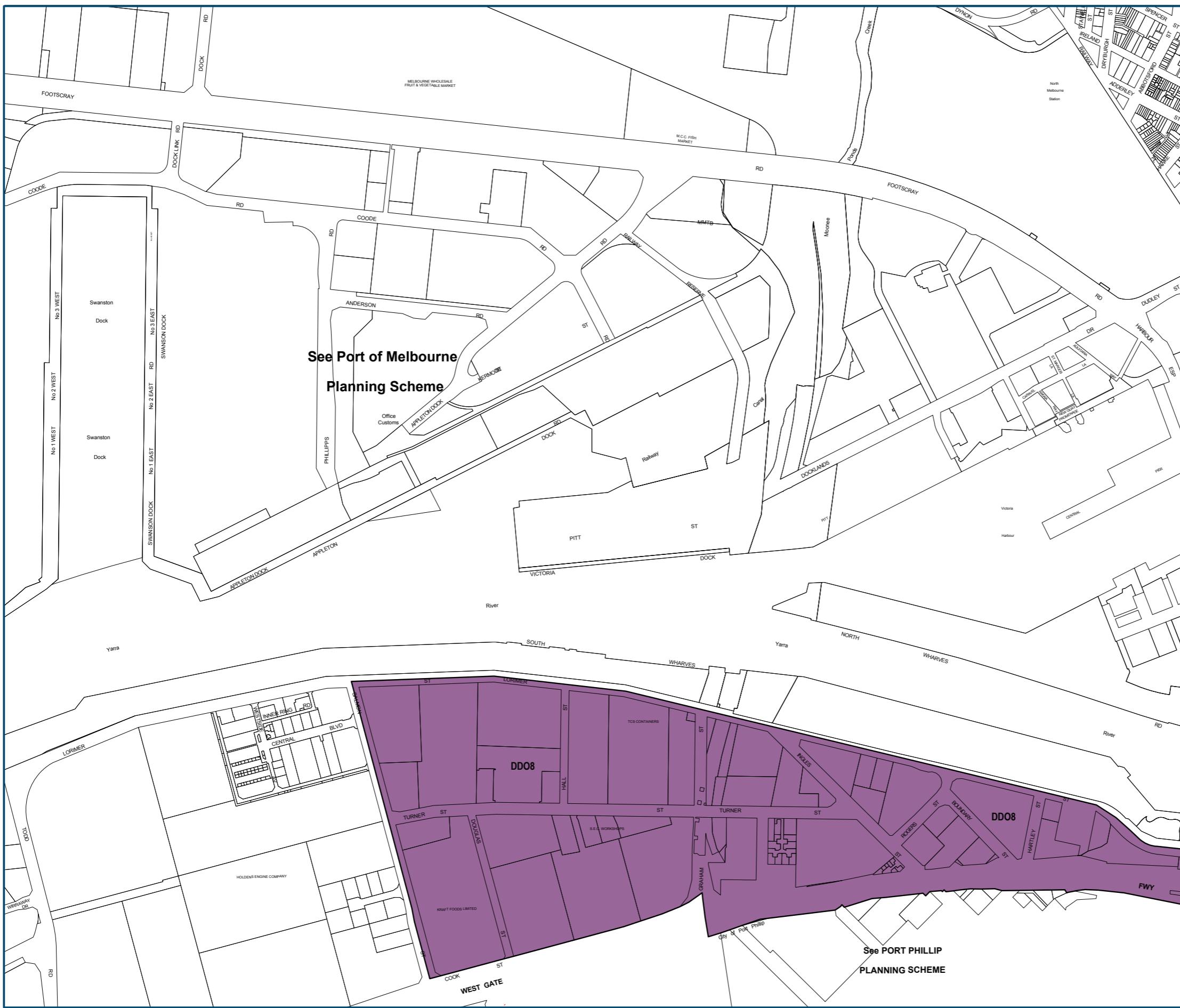


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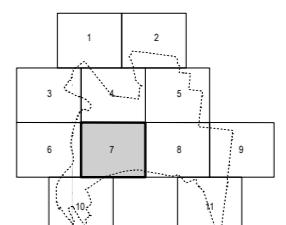
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JOINING MARS



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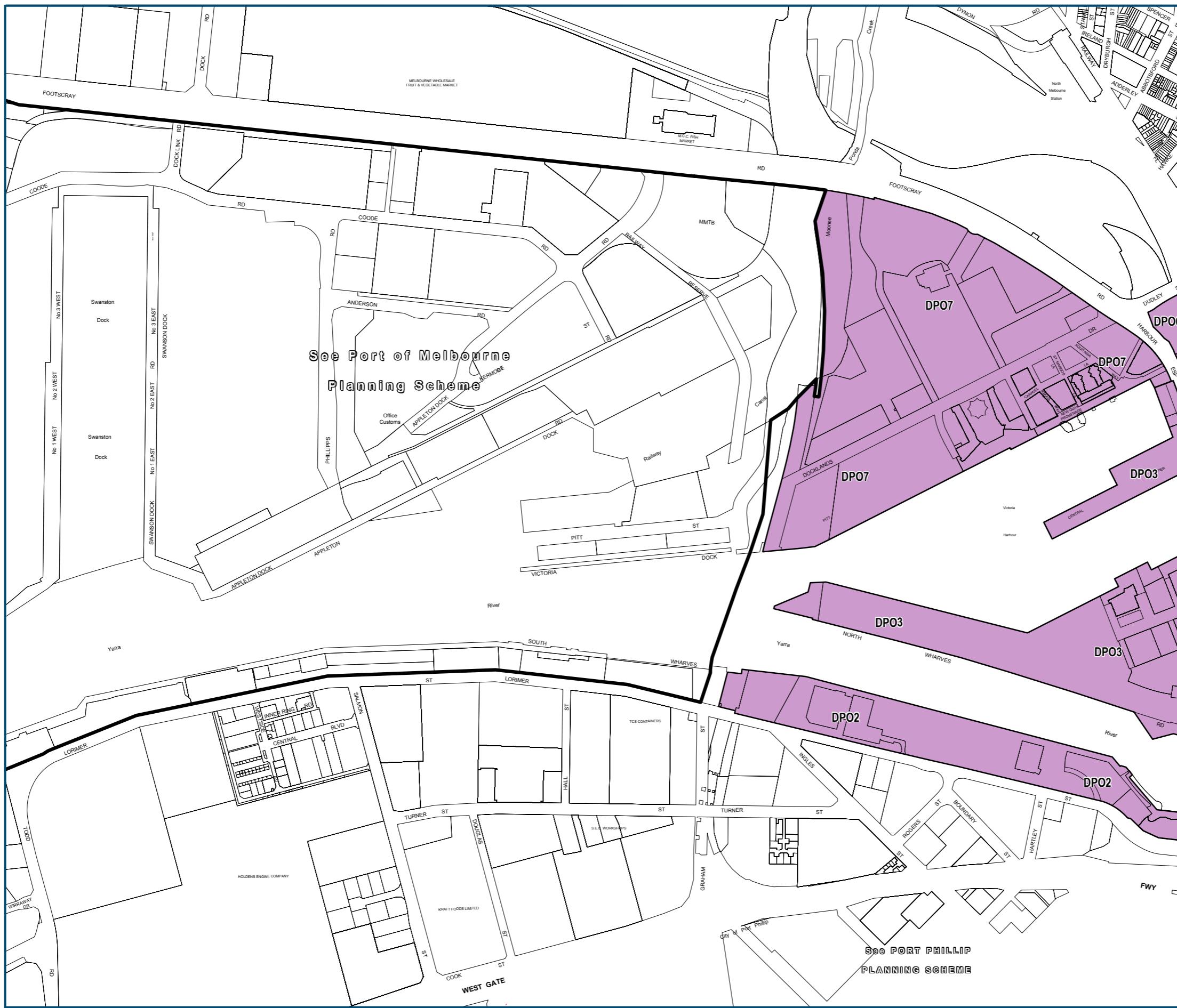
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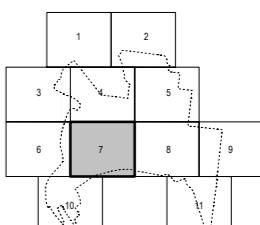
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200 100 200 m



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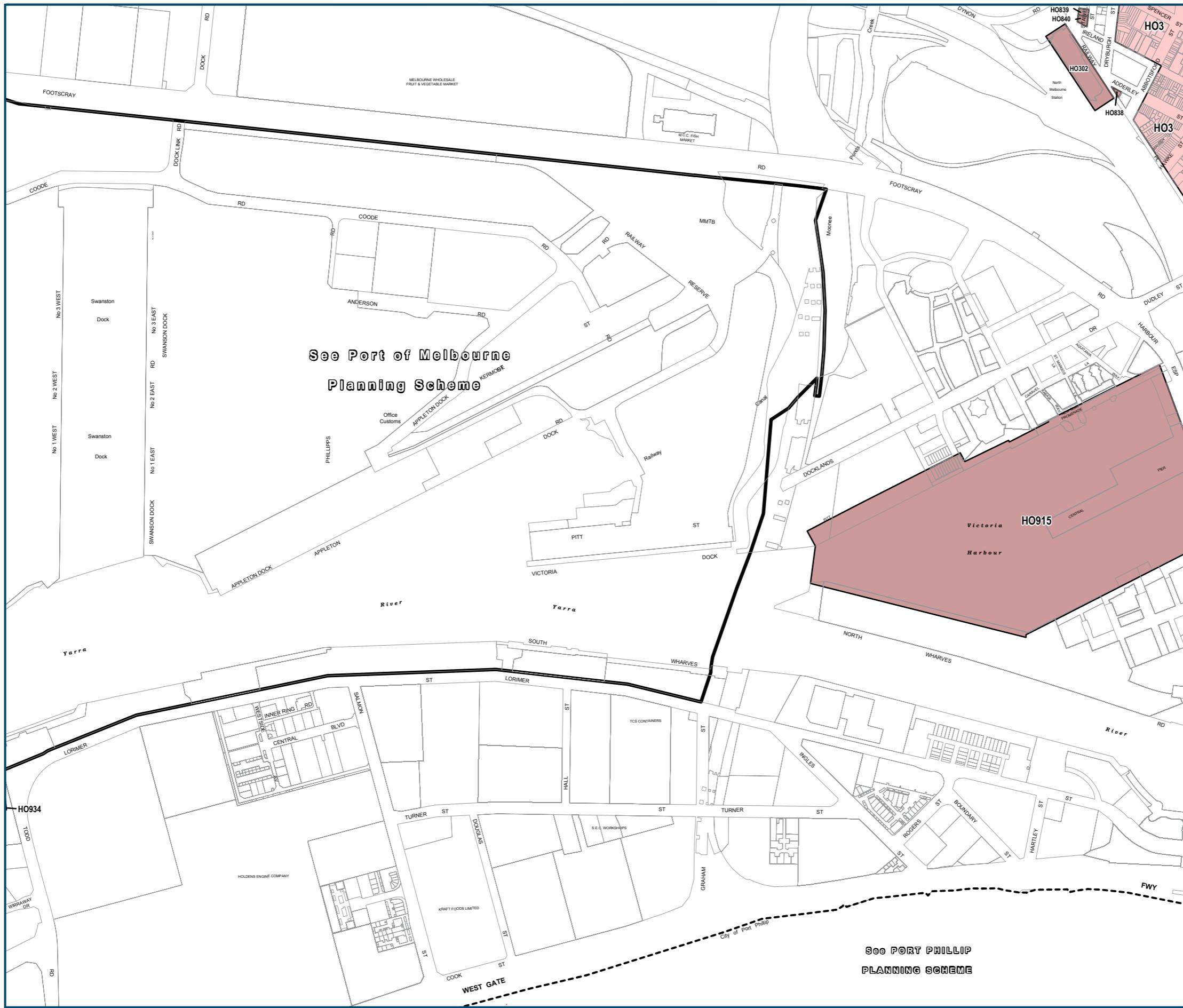


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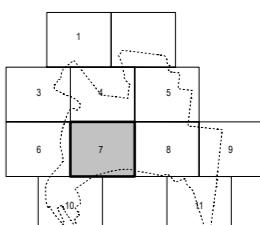
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Overlays
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200 10 200 m



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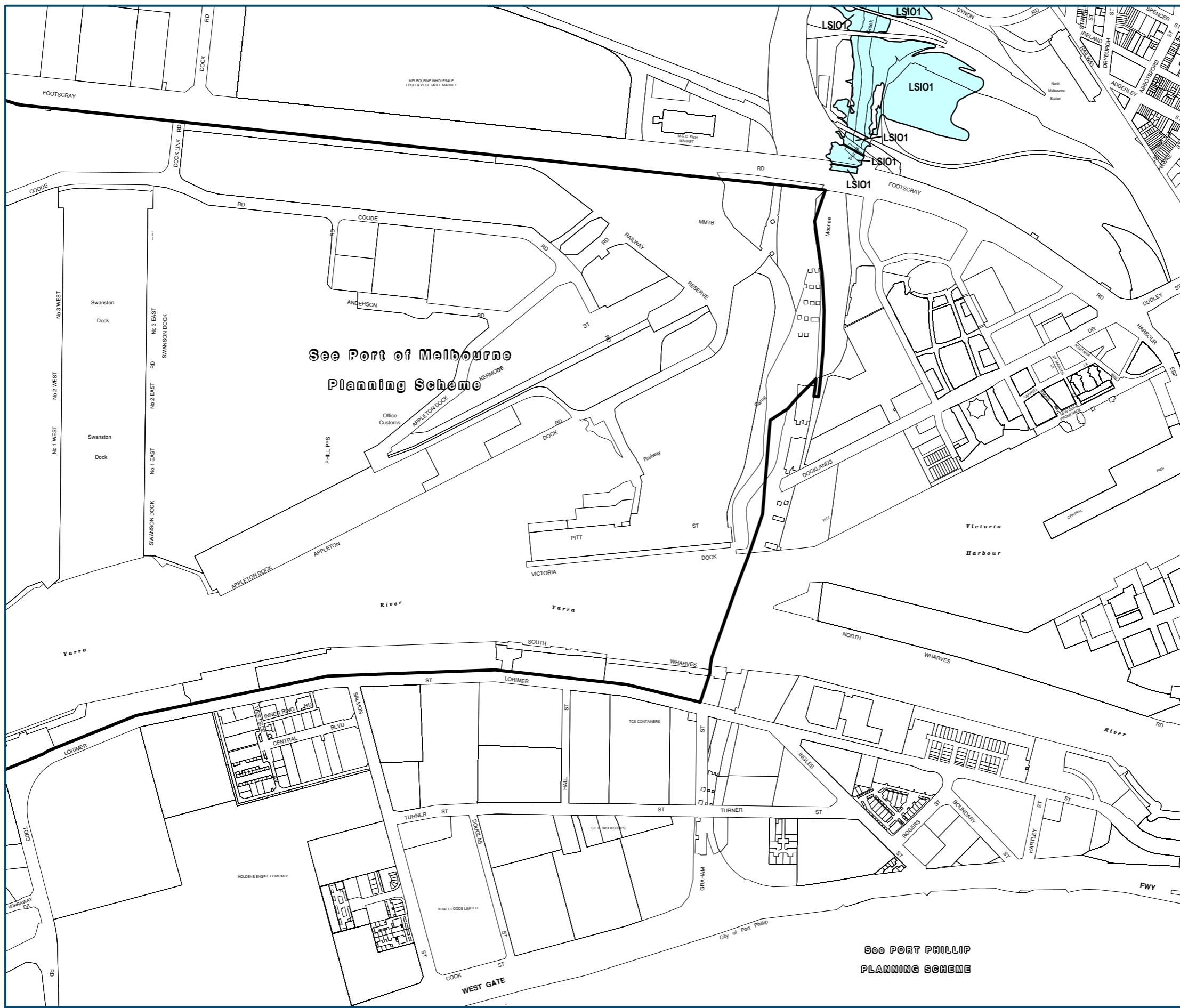


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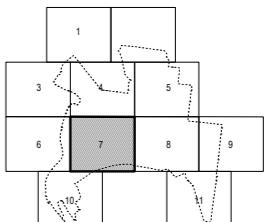
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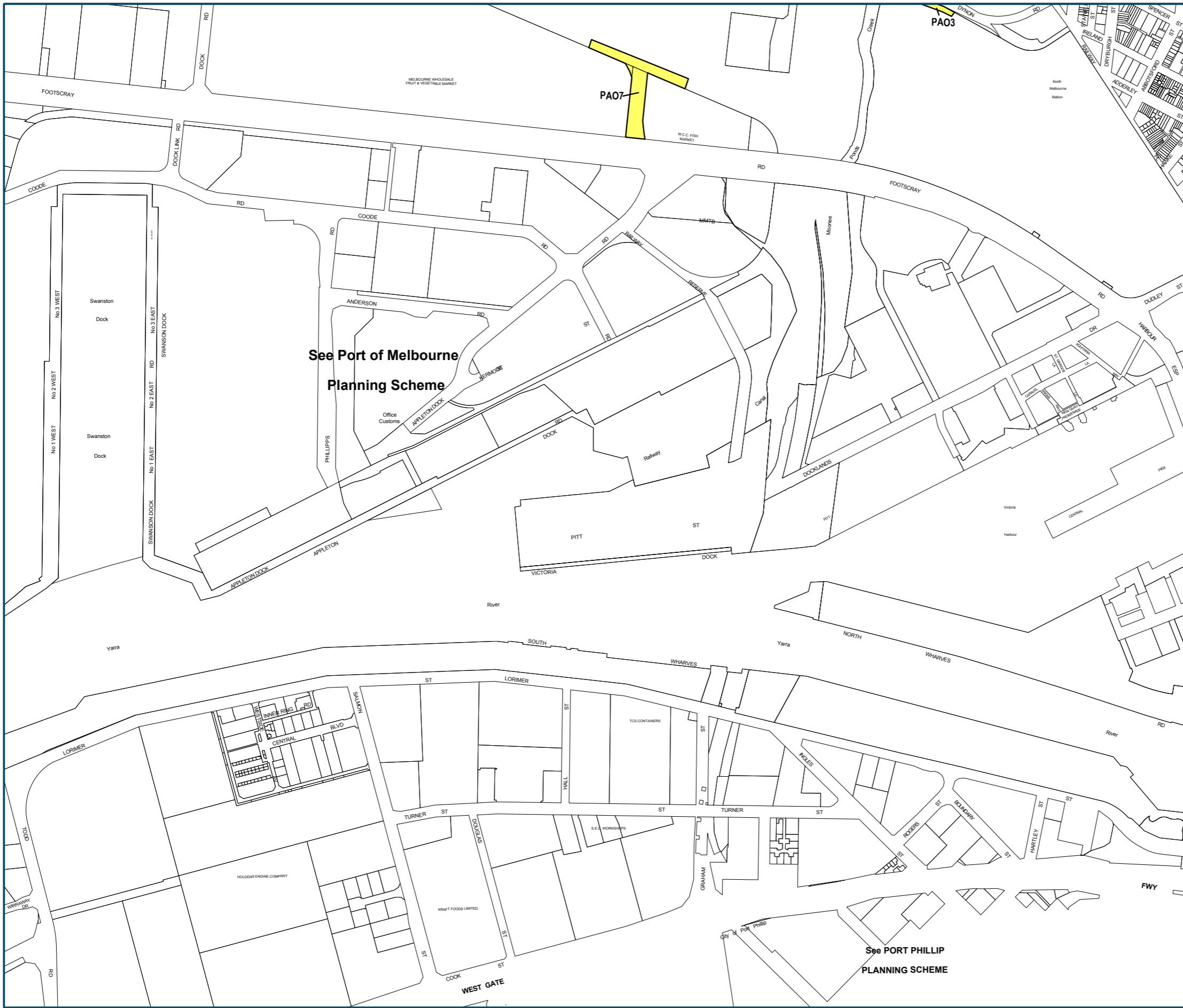


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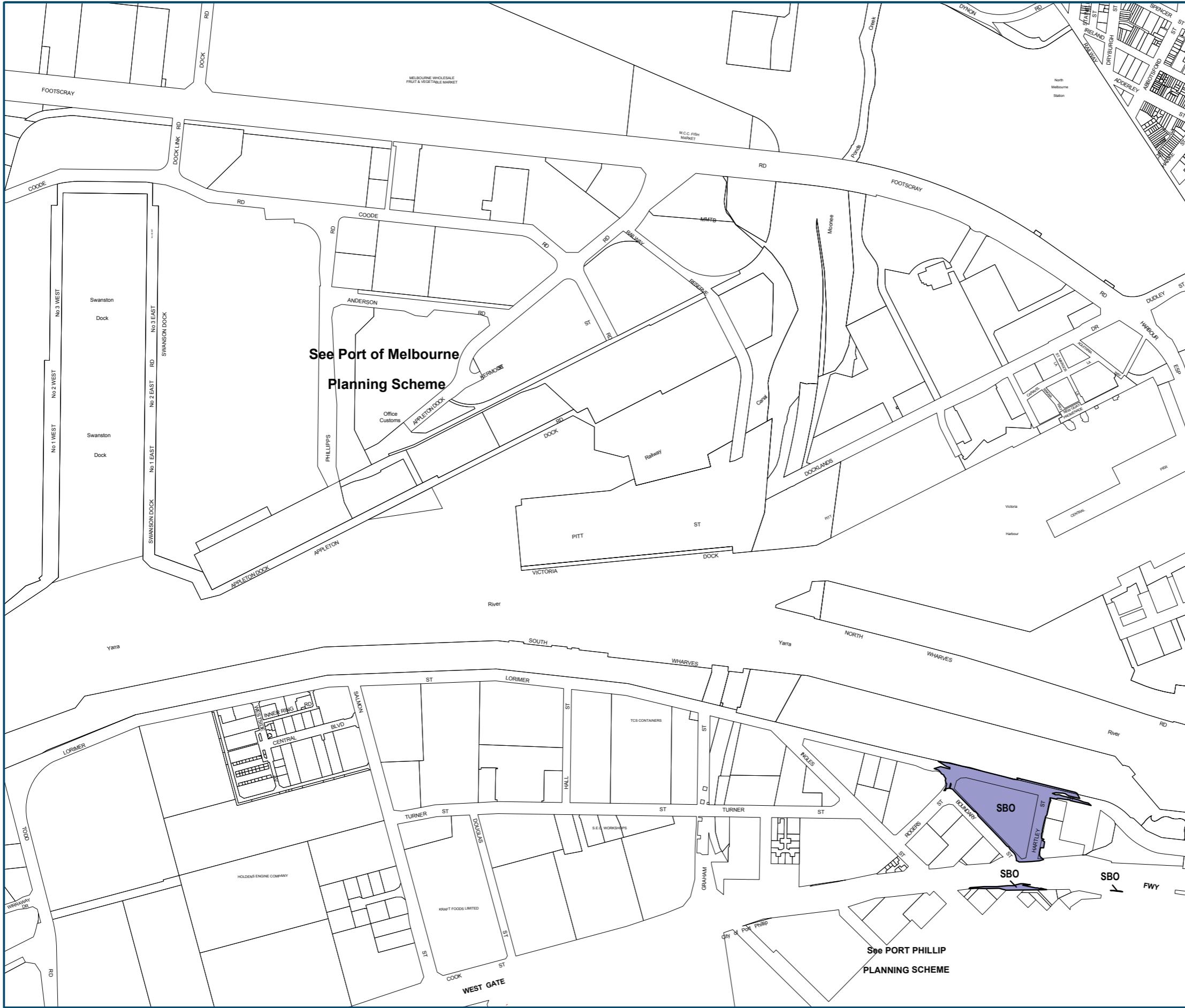
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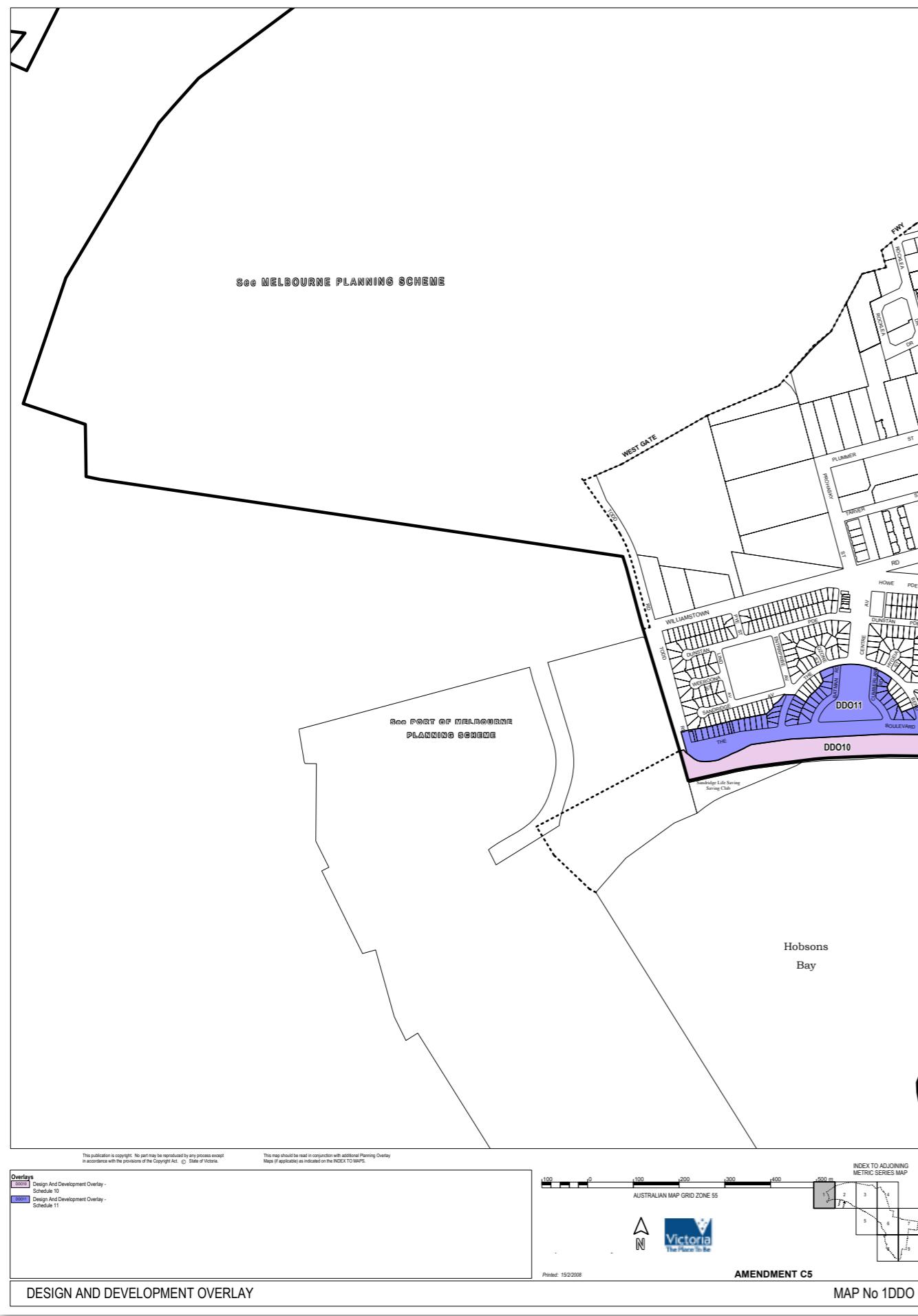
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PA07 Public Acquisition Overlay 7

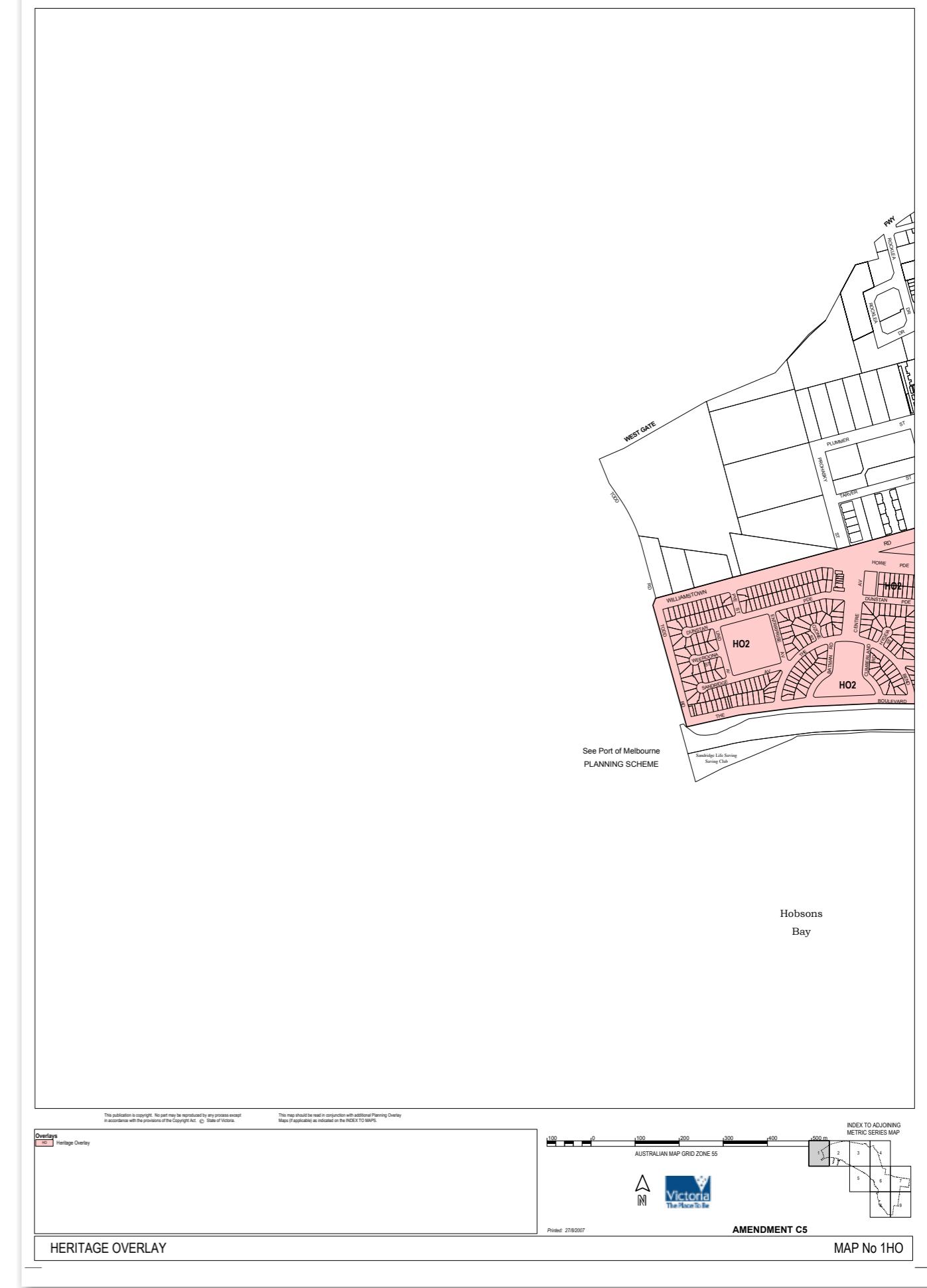
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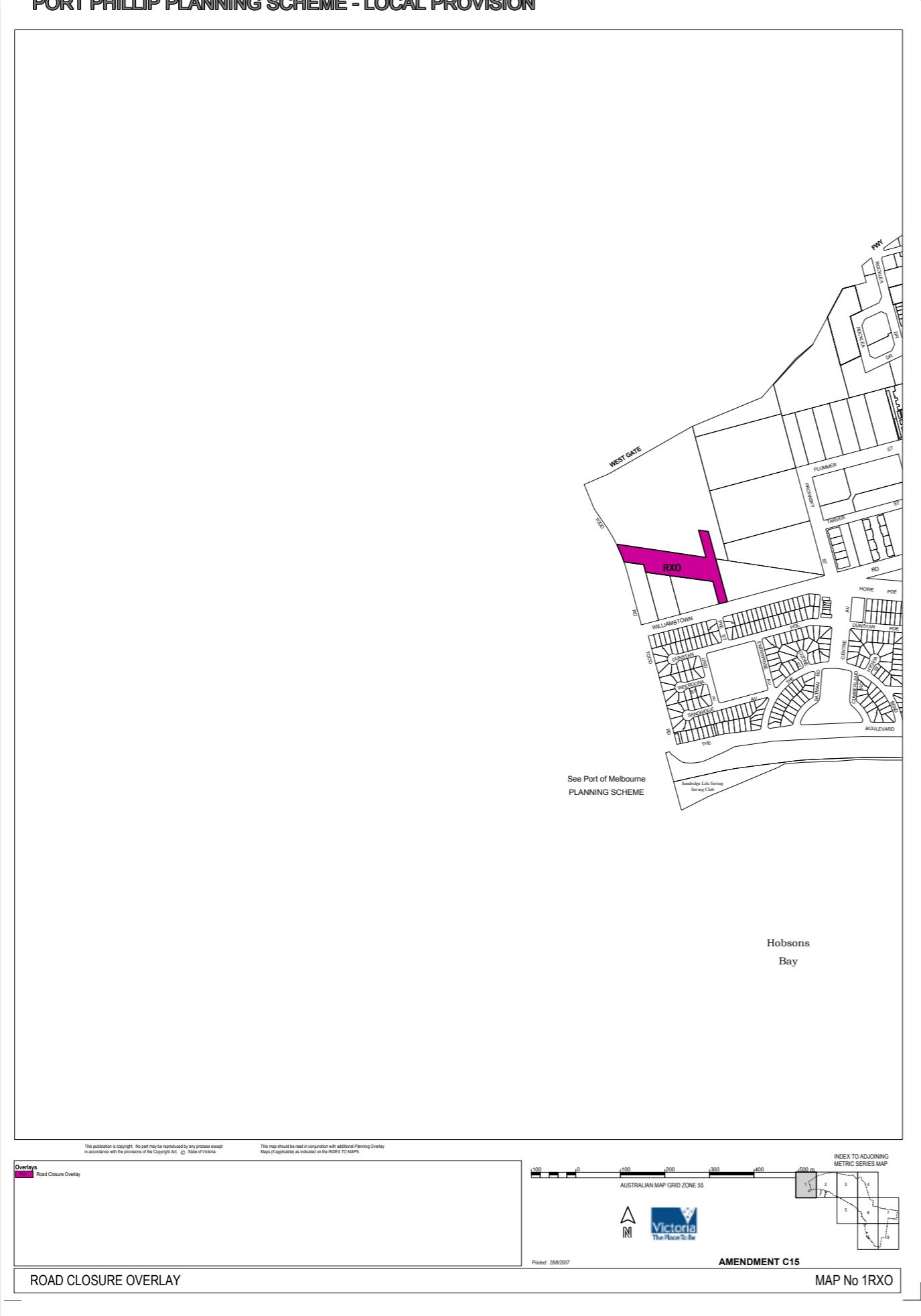
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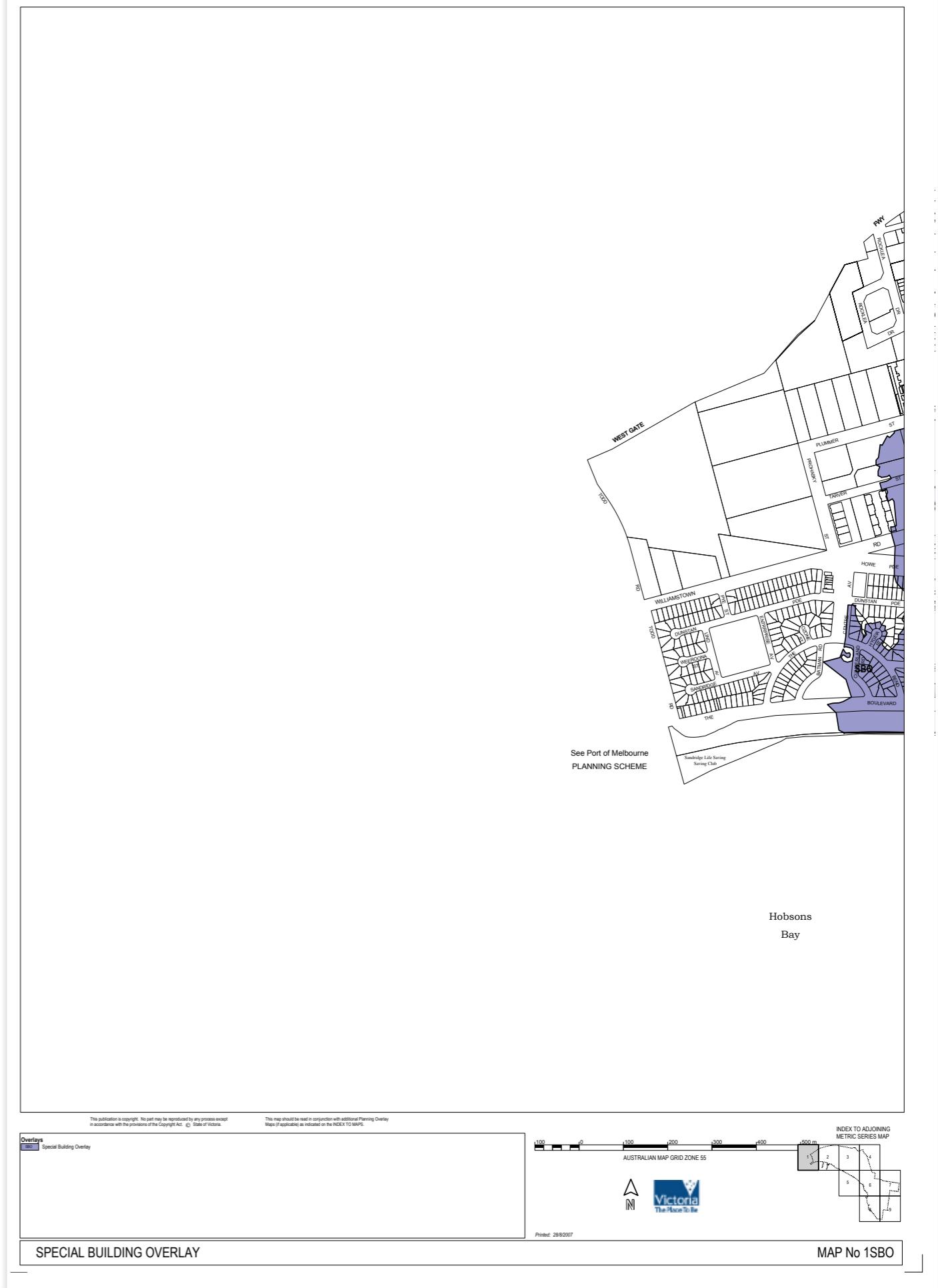
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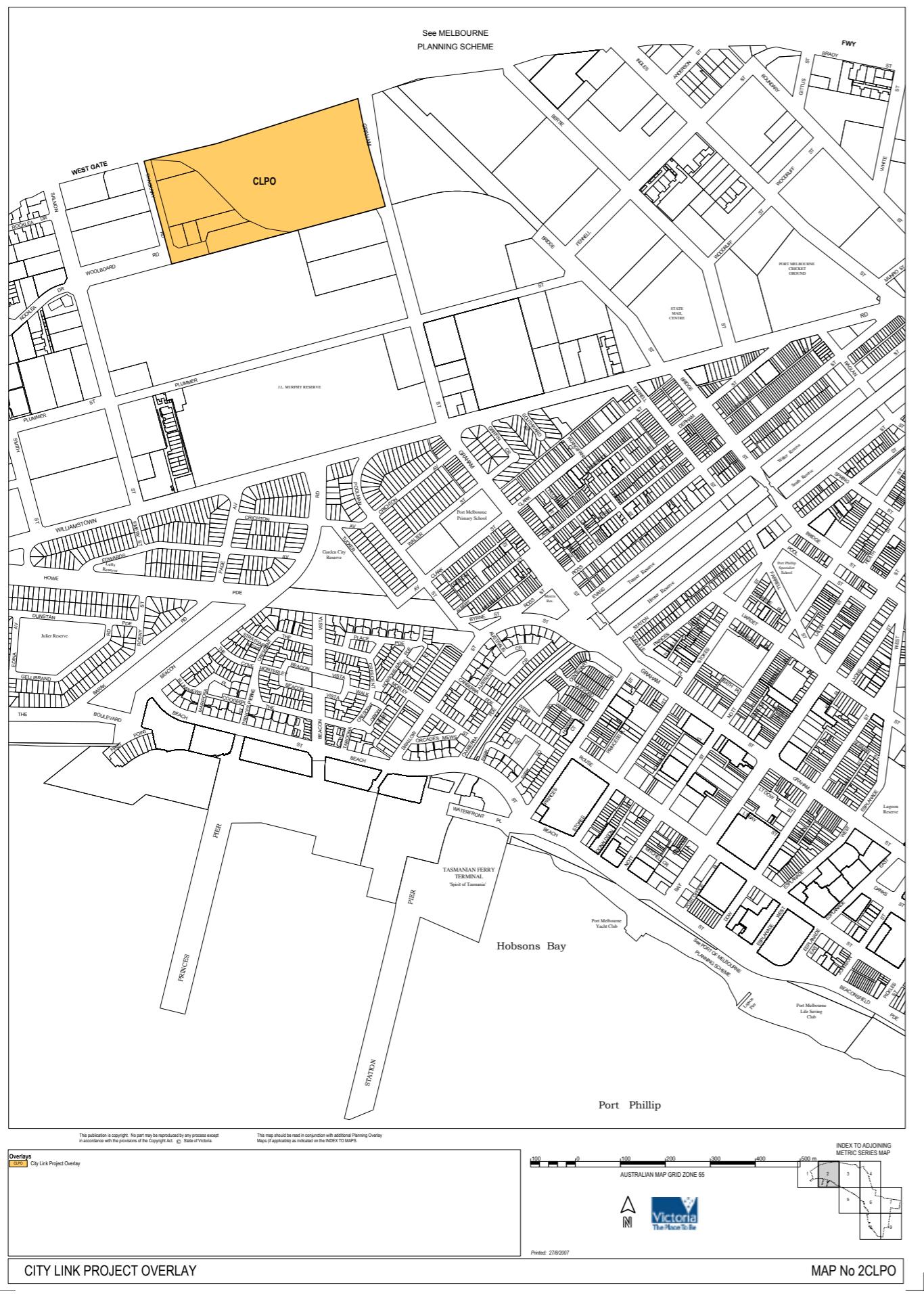
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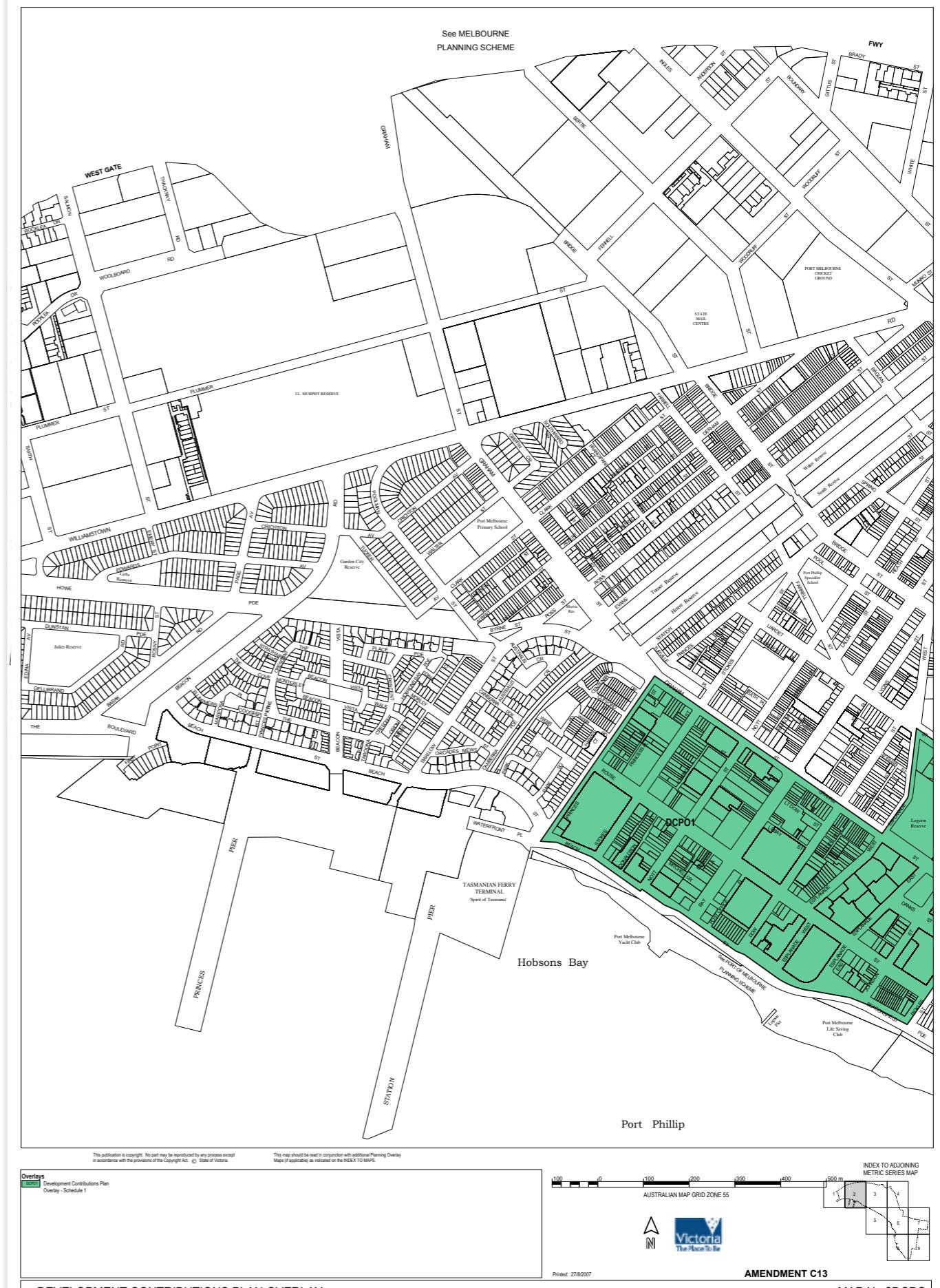
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PORT PHILLIP PLANNING SCHEME - LOCAL PROVISION



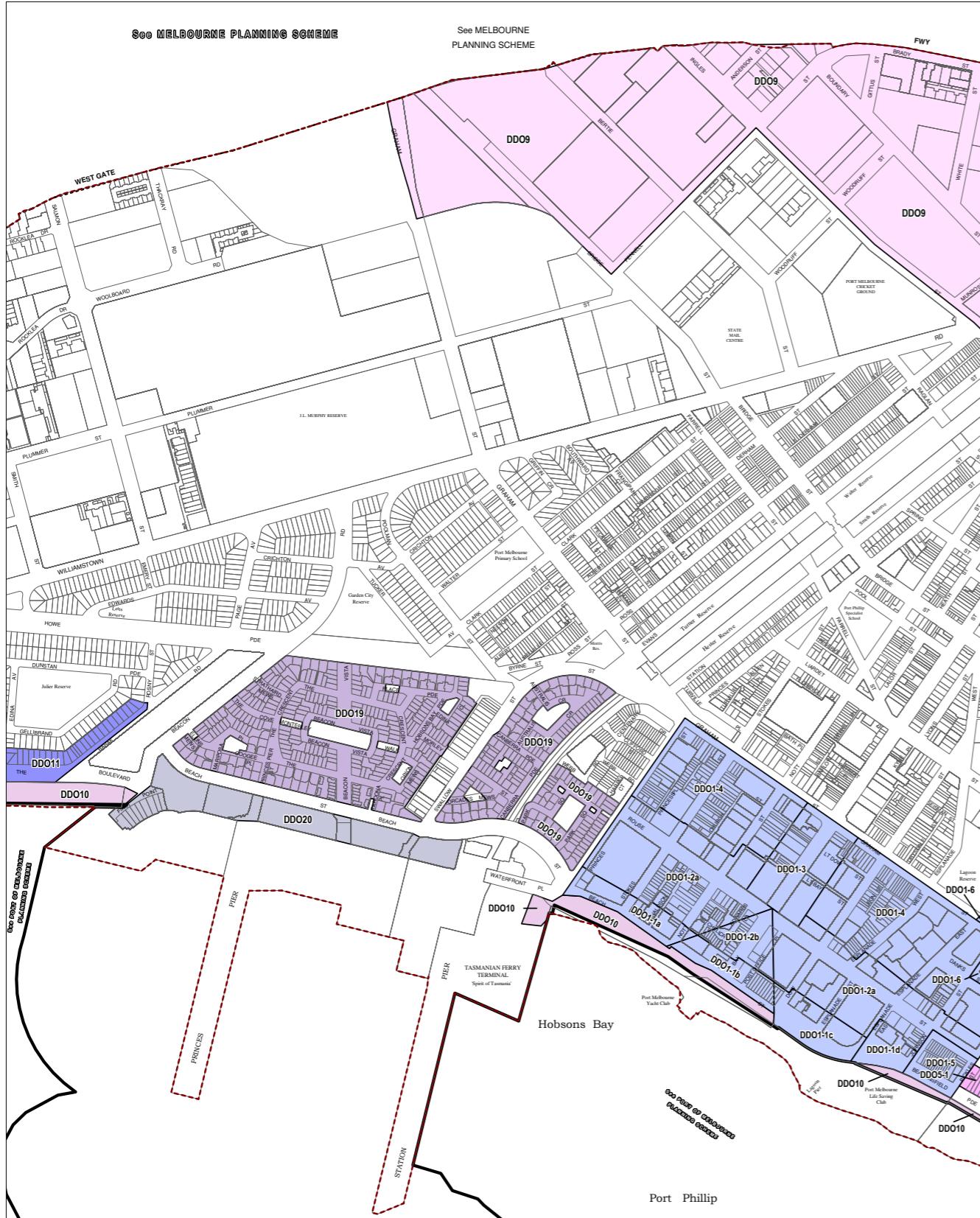
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PORT PHILLIP PLANNING SCHEME - LOCAL PROVISION

See MELBOURNE PLANNING SCHEME

See MELBOURNE
PLANNING SCHEME



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DESIGN AND DEVELOPMENT OVERLAY

PORT PHILLIP PLANNING SCHEME - LOCAL PROVISION



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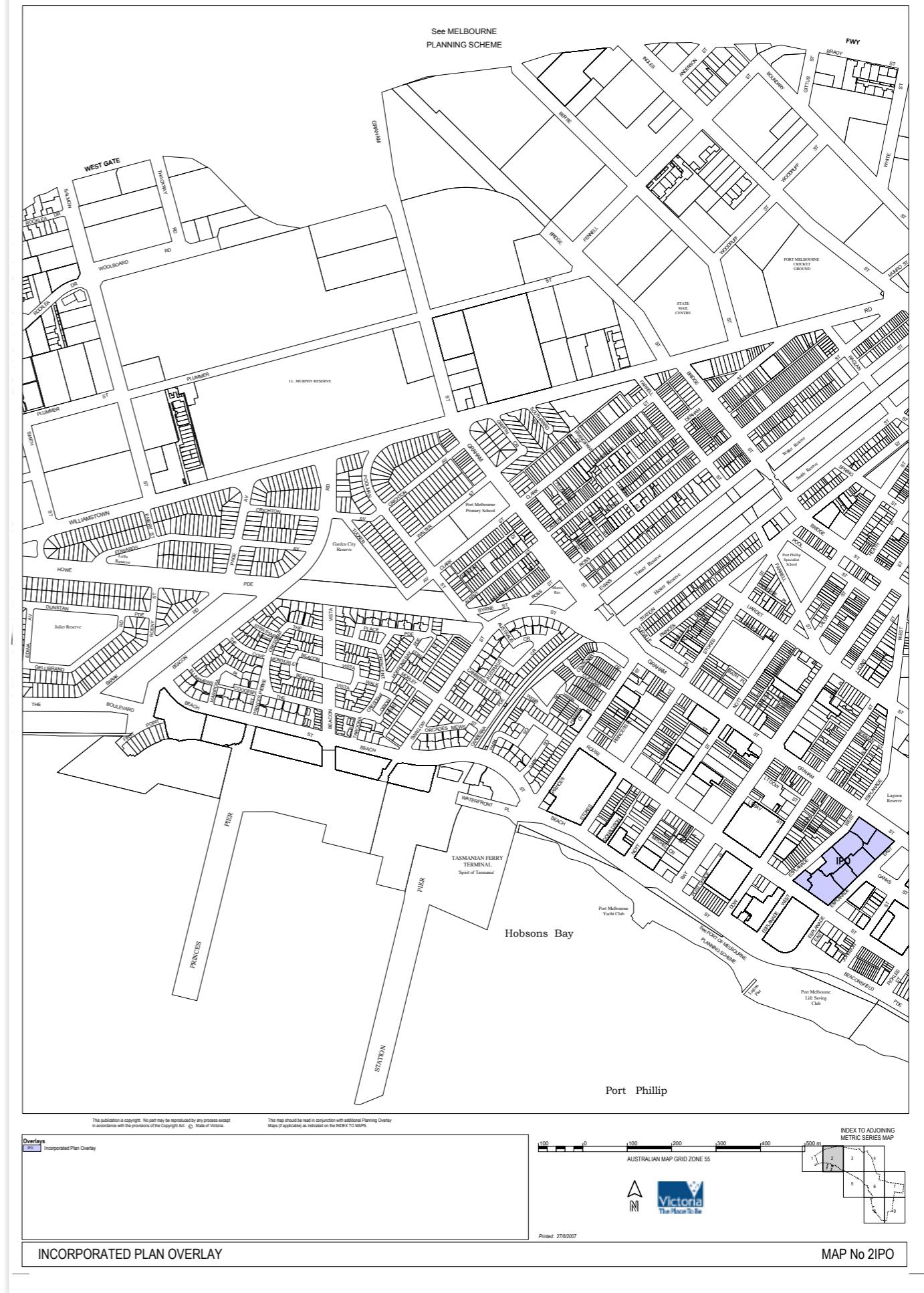
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MAP No 2EA0

PORT PHILLIP PLANNING SCHEME - LOCAL PROVISION



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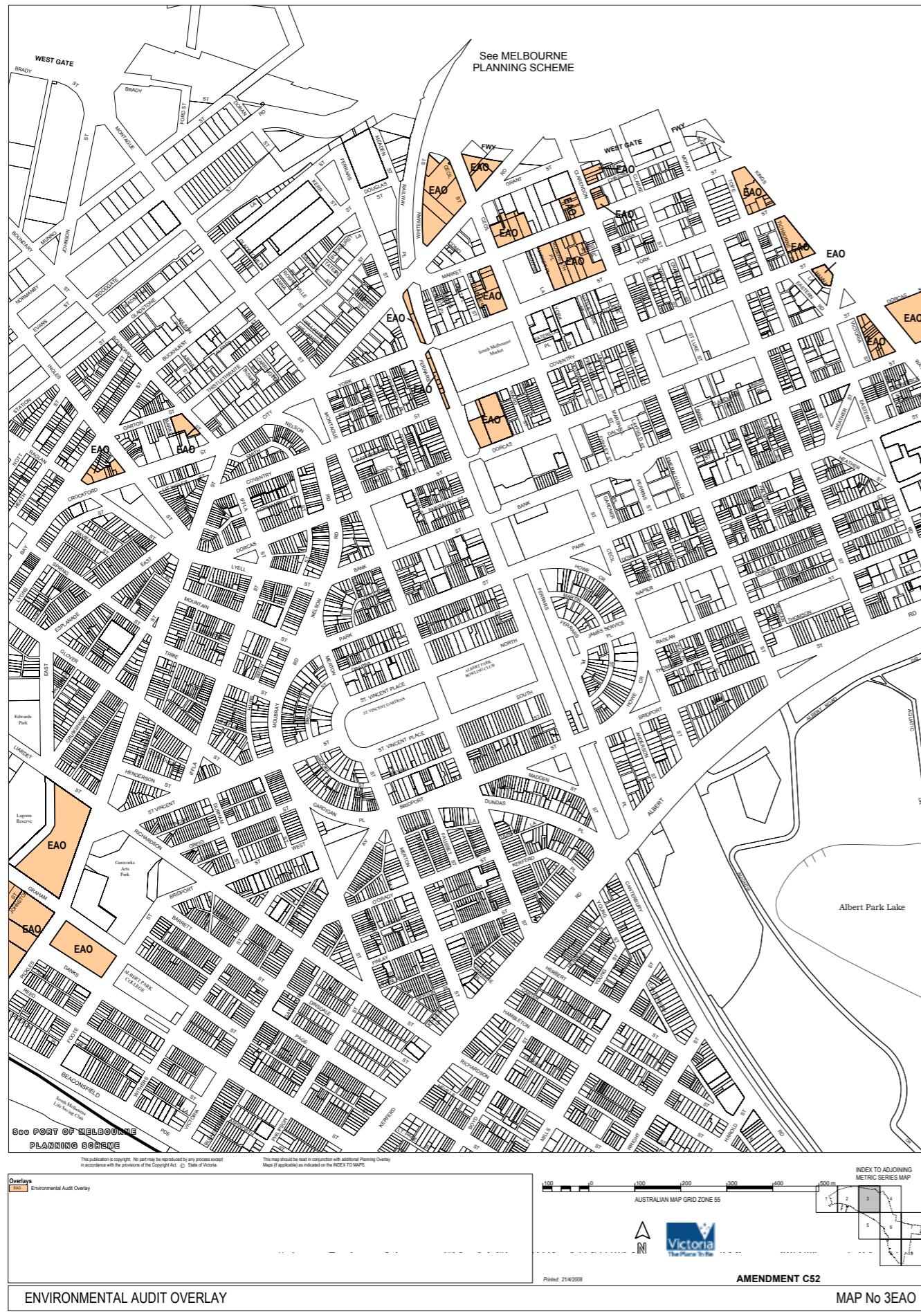
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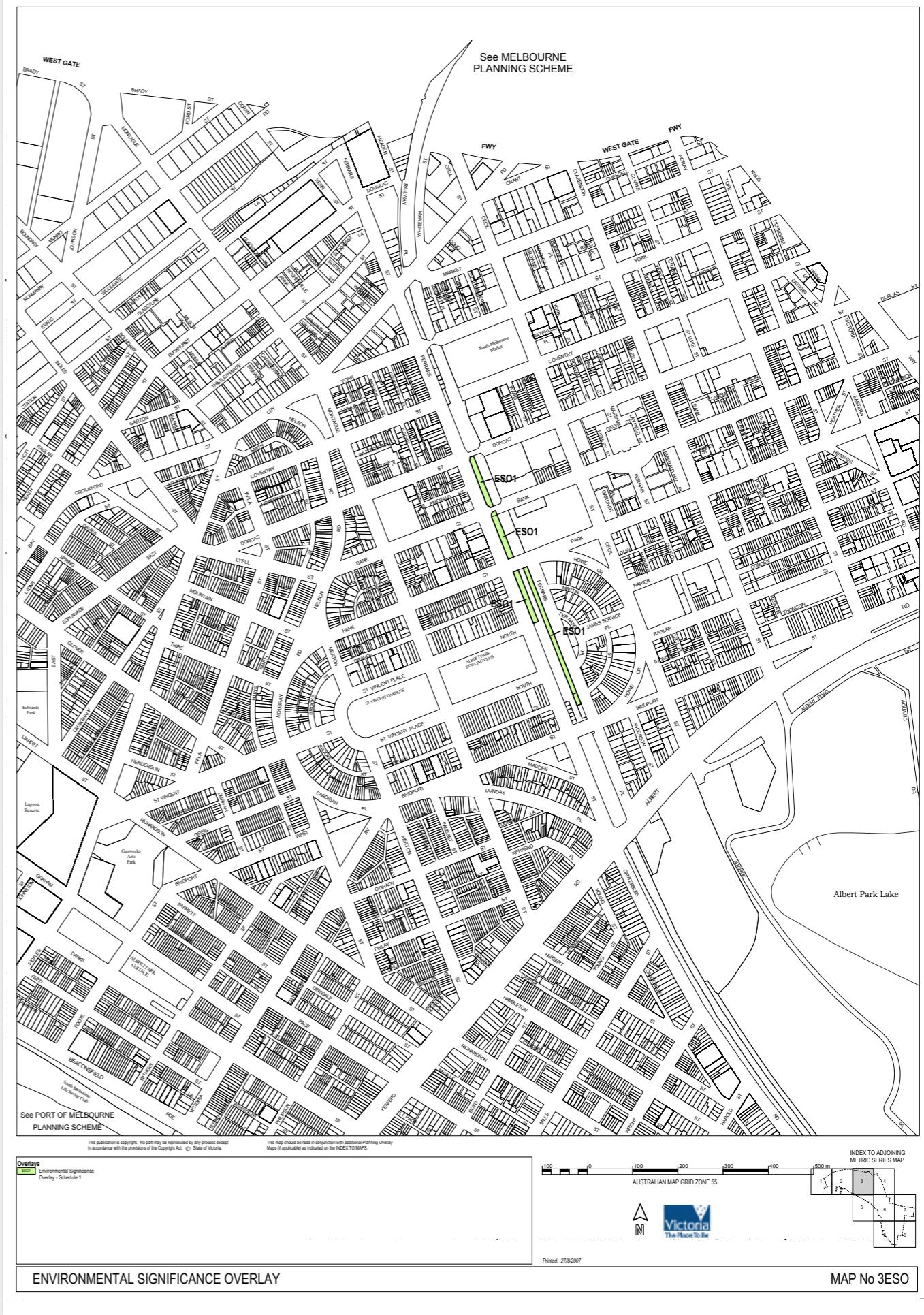
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PORT PHILLIP PLANNING SCHEME - LOCAL PROVISION





The total contamination costs associated with developing contaminated land relate to the following stages:

- Phase 1 and 2 - Soil and Groundwater Assessment
- Phase 3 - Soil and/or Remediation
- Phase 4 - Environmental Audit

Golder Associates has reviewed the contamination costs inclusive of Phase 1 to 4 for a portfolio of our recent remediation projects that have generally supported the issue of Environmental Audits stating the former industrial land is suitable for the intended use. The benchmarked sites included low/high density use through to commercial use, therefore representing a mix of end uses. Golder Associates has used this data which represents 20 remediation sites encompassing over 100 hectares of industrial land to benchmark the potential contamination costs per hectare at a strategic level for the Fishermans Bend Study Area.

The sample set for the benchmarked remediation costs are presented in Table C1 below.

Table C1 – Summary of Total Contamination Costs / Hectare for Benchmarked Golder Remediation Sites, Victoria

SITE LOCATION	AREA (HA)	TOTAL COST	APPROX. COST PER HA
Inner East Industrial	3	\$ 11 M	\$ 3.7 M
Inner North Former Manufacturing	30	\$ 20 M	\$ 0.7 M
Outer Eastern Suburb Industrial	8	\$ 10 M	\$ 1.25 M
South Eastern Suburbs Gasworks	6	\$ 17 M	\$ 2.85 M
Manufacturing, Outer Eastern Suburbs	8	\$ 4.9 M	\$ 0.61 M
Inner-North Industrial Transport Service Facility	0.7	\$ 2.5 M	\$ 3.57 M
Inner-North Industrial Transport Service Facility	0.5	\$ 1 M	\$ 2 M
Inner-West Industrial Transport Manufacturing Facility	5	\$ 5.35 M	\$ 1.07 M
Transport Component Manufacturing, Inner West Melbourne	5	\$ 10 M	\$ 2 M
Inner North Melbourne	1	\$ 15 M	\$ 15 M
Inner South, Melbourne	0.8	\$ 9.4 M	\$ 11.75 M
Inner City	0.2	\$ 1.2 M	\$ 6 M
Commercial Facility, Eastern Suburbs	56	\$ 7 M	\$ 0.12 M
Industrial Facility, Inner Western Suburbs	3	\$ 10 M	\$ 3.3 M
Inner East Depot Site	2	500K	0.25 M
Outer West Shooting Range	4.7	1 M	0.21 M
Inner West Industrial Site	0.3	900 K	2.5 M
Inner East Commercial and Depot Complex	2.5	2.5	1.0 M
Inner East Mixed use Manufacturing Site	3	\$9 M	\$3M
Inner East Depot and Service Station Site	0.3	2.75M	9.2 M

APPENDIX C

Background Remediation Cost Estimates for Golder Projects used to Benchmark Potential Land Assessment and Remediation Costs in the Study Area

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FISHERMANS BEND LAND CONTAMINATION STUDY

APPENDIX D

Limitations

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Africa	+ 27 11 254 4800
Asia	+ 86 21 6256 5522
Australasia	+ 61 3 8862 3500
Europe	+ 356 21 42 30 20
North America	+ 1 800 275 3281
South America	+ 55 21 3095 9500

solutions@golder.com
www.golder.com

Golder Associates Pty Ltd
Building 7, Botanicca Corporate Park
570 – 588 Swan Street
Richmond Victoria 3121
Australia
T: +61 3 8862 3500

