



AGL Gas Import Jetty Project

AGL Wholesale Gas Limited

Contaminated Land Assessment

IS210700-EP-RP-007 | Final

28 August 2018



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Project No: IS210700
 Document Title: Contaminated Land Assessment
 Document No.: IS210700-EP-RP-007
 Revision: Final
 Date: 28 August 2018
 Client Name: AGL Wholesale Gas Limited
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 File Name: IS210700-EP-RP-007-Contaminated Land_Final(v2)

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Document history and status

Revision	Date	Description	By	Review	Approved
1	17/07/2018	Final	K. Mattingley	R. Edwards	S. Ada
2	28/08/2018	Final	K. Mattingley	R. Edwards	S. Ada

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Appendix A. Reviewed information

Glossary and abbreviations

Abbreviation	Term	Definition
AGL	AGL Wholesale Gas Limited	The Project proponent
DELWP	Department of Environment, Land, Water and Planning	
DoEE	Department of the Environment and Energy (Commonwealth)	
EPA	Environment Protection Authority (Victoria)	
FSRU	Floating Storage and Regasification Unit	An LNG carrier that is used for floating storage and also has regasification equipment on board that allows it to directly send out high pressure gas.
LNG	Liquefied natural gas	LNG is natural gas (predominantly methane, CH ₄ , with some mixture of ethane C ₂ H ₆) that has been converted to liquid form by chilling for ease of storage or transport

Executive Summary

AGL Wholesale Gas Limited (AGL) is proposing to develop a Liquefied Natural Gas (LNG) import facility, utilising a Floating Storage and Regasification Unit (FSRU) to be located at Crib Point on Victoria's Mornington Peninsula. The project, known as the "AGL Gas Import Jetty Project" (the Project), comprises:

- The continuous mooring of a FSRU at the existing Crib Point Jetty, which will receive LNG carriers of approximately 300 m in length
- The construction of ancillary topside jetty infrastructure (Jetty Infrastructure), including high pressure gas unloading arms and a high pressure gas flowline mounted to the jetty and connecting to a flange on the landside component to allow connection to the Crib Point Pakenham Pipeline Project.

There are several other activities that are related to the Project. These include the Jetty Upgrade and the Crib Point Pakenham Pipeline Project (Pipeline Project) which are the subject of separate assessment and approval processes carried out by separate entities.

The Project's footprint within the landside component, will comprise of the extended gas flow line from the jetty to a flange, connecting it to the natural gas transmission pipeline and a temporary construction laydown area and staff facilities/amenities. The entire landside component of the Project Site (the 'study area') has been included in this assessment.

This report presents the findings from a contamination investigation based on existing information to support the relevant statutory referrals and permits required. The report has been prepared to support:

- Referral under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
- Referral under the Victorian *Environment Effects Act 1978*
- Identification of requirements under the Victorian *Environment Protection Act 1970*.

A detailed desktop review of information available publicly and provided by AGL was undertaken to determine the potential for the Project to have impacts due to contaminated soil or groundwater. This included a review of: previous Environmental Audit reports obtained from Environment Protection Authority as well as environmental investigations undertaken at the Project Site; historical aerial photographs to identify potentially contaminating activities which may have occurred; and publicly available geological, hydrogeological and acid sulfate soil maps. In addition, a site inspection was undertaken to conduct a visual assessment of the current site condition and indicators of potential contamination.

Previous investigations of the study area have identified contamination of soil, sediment and groundwater beneath the site. This is predominantly related to metals, with some hydrocarbons and perfluoralkyl substances (in the presence of perfluorooctanesulfonic acid) identified in isolated areas. Fill soil is present across the study area up to depths of approximately 1 metre, with soil contamination predominantly identified within this unit. Groundwater is present at depths around 6.8 to 7.5 metres and is unlikely to be encountered as part of the Project.

Based on the limited Project activities which will be undertaken in the landside component of the Project Site, minimal disturbance of contamination is likely to occur. Previous investigations undertaken within the study area, most recently by Jacobs (2017), indicated that the site is suitable for ongoing commercial/industrial use proposed for the Project. As such, further investigation of contamination is not recommended.

Additionally, as it is expected that any potential impacts from pre-existing contamination within the study area will be effectively managed during construction and operations and therefore are not considered to trigger the requirements for referral and approval under the *Environment Protection and Biodiversity Conservation Act 1999* or the *Environment Effects Act 1978*.

In order to address statutory requirements and prevent potential impacts from contamination, a Construction Environmental Management Plan which includes appropriate mitigation measures for protection of the environment and human health should be developed and implemented.

1. Introduction

1.1 Project Overview

AGL Wholesale Gas Limited (AGL) is proposing to develop a Liquefied Natural Gas (LNG) import facility, utilising a Floating Storage and Regasification Unit (FSRU) to be located at Crib Point on Victoria's Mornington Peninsula. The project, known as the "AGL Gas Import Jetty Project" (the Project), comprises:

- The continuous mooring of a FSRU at the existing Crib Point Jetty, which will receive LNG carriers of approximately 300 m in length
- The construction of ancillary topside jetty infrastructure (Jetty Infrastructure), including high pressure gas unloading arms and a high pressure gas flowline mounted to the jetty and connecting to a flange on the landside component to allow connection to the Crib Point Pakenham Pipeline Project.

There are several other activities that are related to the Project. These include the Jetty Upgrade and the Crib Point Pakenham Pipeline Project (Pipeline Project) which are the subject of separate assessment and approval processes carried out by separate entities.

1.2 Purpose of this Report

Jacobs Group (Australia) Pty Ltd (Jacobs) was engaged by AGL to prepare this assessment of land and groundwater contamination impacts and their impact on the Project. This report has been prepared to support the:

- Referral under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
- Referral under the Victorian *Environment Effects Act 1978*
- Identification of requirements under the Victorian *Environment Protection Act 1970*.

1.3 Study Area

The study area for the purposes of this assessment encompasses the landside component only of the Project Site, known as allotment 2040 The Esplanade, Crib Point.

The Project's footprint within the landside component, will comprise of the extended gas flow line from the jetty to a flange, connecting it to the natural gas transmission pipeline and a temporary construction laydown area and staff facilities/amenities. The entire landside component of the Project Site (the 'study area') has been included in this assessment. The marine area has been excluded from the study area.

1.4 Limitations

The assessment has been conducted on the landside component of the Project Site. Marine sediment has not been included in this assessment.

For the purposes of assessing the potential for the Project to impact upon contamination, Jacobs has relied upon information provided by AGL regarding their activities at the Project Site.

In addition, reliance has been placed on the information outlined in Section 3.1 as to assessing the current condition of the site and presence of contamination.

2. Legislation, Policy and Guidelines

Legislation, policy and guidelines relevant to the contaminated land assessment for the Project are set out in Table 2.1.

Table 2.1 : Applicable legislation, policy and guidelines

Legislation / Policy / Guideline	Key Policies / Strategies	Implications for this project	Approvals required	Timing/ interdependencies
Commonwealth				
<i>Environment Protection and Biodiversity Conservation Act 1999</i> (EPBC Act)	Significant Impact Guidelines 1.1 – Matters of National Environmental Significance.	<p>The EPBC Act requires that a proponent must determine whether any matters of national environmental significance are likely to be 'significantly' impacted by the proposed works. The Western Port Ramsar Wetland is classified as a Matter of National Environmental Significance.</p> <p>Contaminated soil, sediment or groundwater could impact upon sensitive environments in Western Port if allowed to migrate to these areas. General good practice and implementation of management measures during construction and operation should prevent this from occurring. Impacts on Matters of National Environmental Significance from contamination are considered to be unlikely, and therefore, in this regard does not trigger the requirement for referral under the EPBC Act.</p>	None identified.	N/A
<i>National Environment Protection Council Act 1994</i>	National Environment Protection (Assessment of Site Contamination) Measure	<p>This Act and complementary State and Territory legislation allow the National Environment Protection Council to make National Environment Protection Measures. These measures assist in protecting or managing particular aspects of the environment. The National Environment Protection Measure covering contamination is the National Environment Protection (Assessment of Site Contamination) Measure.</p> <p>This National Environment Protection Measure was updated in 2013 and has been adopted as an amendment to the State Environment Protection Policy (Prevention and Management of Contamination of Land) (see below).</p>	None identified	N/A

Legislation / Policy / Guideline	Key Policies / Strategies	Implications for this project	Approvals required	Timing/ interdependencies
State				
<i>Environment Effects Act 1978</i>	Section 13. Water environments Section 14. Landscape and soils	Consideration of effects to regional groundwater resources and potential disturbance of acid sulfate soils has identified that there are unlikely to be adverse environmental impacts which would require referral. Consideration of effects on Western Port Bay from potential disturbance of contaminated soil, sediment and groundwater has identified that there is unlikely to be long-term change to the ecological character of the Western Port Ramsar wetland, as implementation of general good practice construction and management measures should be sufficient to prevent impacts occurring to Western Port. The referral criteria under the <i>Environment Effects Act 1978</i> therefore are not considered to be triggered based on contamination.	None identified.	N/A
<i>Environment Protection Act 1970</i> and State Environment Protection Policies (SEPPs)	SEPP Waters of Victoria - Schedule F8 'Waters of Western Port and Catchment' (2003) SEPP Prevention and Management of Contamination of Land (2002) SEPP Groundwaters of Victoria (1997)	Protected beneficial uses of land, surface and groundwater must be maintained. Contamination has been identified as present which indicates potential preclusion of protected beneficial uses. The Project should ensure that further impacts do not occur to this effect.	None identified.	N/A
Environment Protection (Industrial Waste Resource) Regulations 2009	Industrial Waste Management Policy, Waste Acid Sulfate Soils (IWMP (WASS))	This policy sets out specific requirements for the management, disposal and re-use of waste acid sulfate soils, and specifies the responsibilities of those involved. The policy applies once acid sulfate soil is disturbed on a site and becomes a waste intended for re-use on that site or for re-use/disposal off-site.	None identified	N/A
<i>Occupational Health and Safety Act 2004</i>	None identified	Employers have general duties under this Act to provide a safe and healthy working environment for workers, any contractors that they hire and others living, working or passing nearby.	None identified	N/A

3. Method

3.1 Methodology

Jacobs completed a detailed desktop review of information in order to understand possible implications contaminated soil or groundwater may have on the Project.

The following information available publicly and provided by AGL was reviewed:

- Previous environmental assessment and Environment Protection Authority Audit reports including:
 - Jacobs, 2017, *Baseline Environmental Contamination Investigation, Factual Report*, prepared for Port of Hastings Development Authority, 1 June 2017
 - PPK Environment & Infrastructure Pty Ltd, 1998, *Statements of Environmental Audit, Port of Hastings Sites*, prepared for Department of Treasury and Finance, September 1998.
- Historical aerial photographs obtained from Department of Environment, Land, Water and Planning from 1957, 1968, 1974 and 1990
- Publicly available geological, hydrogeological and acid sulfate soil maps.

In addition, an inspection of the Project Site was conducted on 12 September 2017. A summary of the consolidated findings from the desktop review and site inspection is presented in Section 4.1.

Photographs from the site inspection as well as historic aerial photos and maps are included in Appendix A.

4. Desktop Assessment

4.1 Site History and Existing Conditions

The Crib Point Jetty was established in 1965 for the import of crude oil to the adjacent BP refinery. The refinery was decommissioned in 1985 however import of refined petroleum products continues via pipelines extending from the jetty along the south of the study area. The study area was cleared of vegetation when the jetty was constructed. It is inferred that this area was used for storage or laydown of materials during construction of the jetty. No major spills or environmental incidents have been reported at the site prior to 1998 (PPK, 1998). A significant proportion of the study area remains cleared of vegetation and vacant.

Intrusive investigations have identified fill soil across the study area to depths between 0.4 and 1.0 metres below ground level (mbgl) (Jacobs, 2017). During the site inspection, an area of burnt ground was observed in the central portion of the study area. This appeared to be related to surficial burning of waste or timber.

Soil samples collected during previous investigation at the study area were reported by PPK (1998) and Jacobs (2017). These investigations identified concentrations of metals (arsenic, lead, chromium, zinc and vanadium), polycyclic aromatic hydrocarbons (PAHs) and polychlorinated biphenyls (PCBs). Samples were collected generally in fill soil at depths less than 1 mbgl, with the exception of the sample where the maximum chromium concentration was reported at 6 mbgl. Additionally, perfluorooctanesulfonic acid (PFOS) was reported in a soil sample collected from 0.1 mbgl by Jacobs (2017) in the south-eastern portion of the study area.

Potential acid sulfate soil (PASS) has not been identified within the study area (VRO, 2003; Jacobs, 2017). Areas approximately 50 metres to the north of the study area however have been identified as PASS. No laboratory analysis for PASS has been reviewed in the assessments conducted to-date. However, based on the maps prepared by the Victorian State Government Department of Primary Industries (DPI), the presence of potential acid sulphate soils beneath the Project Site are not identified, however quaternary sediment deposits which underlie the adjacent Jacks Beach Reserve are potential acid sulfate soils (Victorian Resources Online, 2003).

Groundwater is present at approximately 6.8 to 7.5 mbgl and is tidally influenced. Historic groundwater sampling conducted in 2009 and 1997 and summarised in Jacobs (2017) identified the presence of total petroleum hydrocarbons (TPH), monocyclic aromatic hydrocarbons (MAHs) and metals (including aluminium, cobalt, chromium, copper, lead and zinc) in groundwater. More recent groundwater sampling conducted in March 2017 identified concentrations of metals (copper, nickel and zinc), chloride, sodium and total dissolved solids in exceedance of assessment criteria adopted for industrial land use.

There are no registered extractive uses of groundwater in the vicinity of the study area.

4.2 Key Issues

We understand that the following will occur as part of the Project, based on information provided by AGL:

- The Project's footprint within the study area, will be comprised of a gas flow line from the jetty to a flange, connecting to the natural gas transmission pipeline.

Based on the contamination previously reported at the site, the following hazards have been identified for the Project:

- Disturbance of contaminated soil via excavation. This could result in mobilisation of contaminants into more sensitive environments outside the Project Site unless appropriately managed.
- Disturbance of potential acid sulfate soils and generation of acidic runoff or leaching. This is considered to be a low risk due to the depth to groundwater (greater than 6 mbgl) and that reviewed information has not identified PASS within the Project Site boundary.
- Exposure of construction or maintenance workers to contamination via inhalation of dust or direct contact with contaminated soil, sediment or groundwater.

- Potential requirement for the off-site disposal of excess spoil generated during construction works. Due to the presence of PFOS detected in shallow soil at the site, removal of soil off-site may not be permitted under current EPA legislation.

Previous investigations did not identify contamination which would indicate that the site is unsuitable for the proposed commercial/industrial use for the Project.

4.3 Impact Assessment

4.3.1 Environment Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) promotes the conservation of biodiversity by providing for the protection of threatened species and ecological communities, migratory and marine species and other matters of national environmental significance. The Act is administered by the Commonwealth Department of the Environment and Energy (DoEE).

The EPBC Act requires that a proponent must determine whether any matters of national environmental significance are likely to be 'significantly' impacted by the proposed works. The study area is proximate to Western Port Ramsar wetland, which is listed under the Ramsar Convention and a matter of national environmental significance. The potential for contaminated soil, sediment and groundwater has been identified within the study area which could impact upon sensitive environments if allowed to migrate to these areas as a result of Project activities, in particular during construction. It is considered that this would be able to be managed during construction and operation of the facility in such a way which would prevent impacts to the environment, for example through minimising disturbance of the subsurface and implementation of usual good practice in spoil management. The construction work associated with the Project is not likely to have a significant impact on the Western Port Ramsar wetland.

Should disturbance extend to depths where groundwater is present, further investigation of the potential for acid sulfate soils to be present should be conducted to quantify the risk and management measures which would be required. If present, suitable soil management practices would prevent potential impacts to the environment. At this stage it is understood that disturbance to these depths is not proposed therefore further consideration is not recommended at this time.

4.3.2 Environment Effects Act 1978

The *Environment Effects Act 1978* requires consideration to be given to projects which have significant impacts on the Victorian environment as described in the Act. Under section 8(4) of the Act, a referral is required to be submitted to the Minister for Planning to determine whether an Environment Effects Statement (EES) is required.

A project with potential adverse environmental effects that, individually or in combination, could be significant in a regional or State context should be referred. The criteria for referral are provided in the *Ministerial Guidelines for Assessment of Environmental Effects under the Environment Effects Act 1978*.

This assessment has determined that contaminated land and groundwater effects associated with the Project do not trigger any of the criteria for referral under the *Environment Effects Act 1978*. Criteria related to contaminated land and groundwater are as follows:

- Potential for long-term change to the ecological character of a wetland listed under the Ramsar Convention: the potential for contaminated soil, sediment and groundwater has been identified within the site study area which could impact upon the Ramsar wetland if allowed to migrate to these areas as a result of Project activities, in particular during construction. It is considered that this would be able to be managed during construction and operation of the facility in such a way which would prevent impacts on the Ramsar wetland, for example through minimising disturbance of the subsurface and implementation of usual good practice in spoil management. General good practice and management measures during the construction work and ongoing operation of the facility will prevent impacts from contaminated soil and groundwater occurring in a manner which would potentially cause long term change to the ecological

character of the Ramsar wetland. The referral criterion under the *Environment Effects Act 1978* therefore are not considered to be triggered based on contamination.

- **Potential effects on beneficial uses of groundwater resources:** Previous investigations at the site have identified contamination of groundwater beneath the study area. This is predominantly related to metals. Groundwater is present at depths around 6.8 to 7.5 metres and is not expected to be encountered as part of the Project. There are no registered extractive uses of groundwater in the vicinity of the site.
- **Potential for effects on land stability, acid sulphate soils or highly erodible soils:** Based on the development and low potential for acid sulfate soils to be present, effects on acid sulfate soils are not expected. Should disturbance extend to depths where groundwater is present, further investigation of the potential for acid sulfate soils to be present should be conducted to quantify the risk and management measures which would be required.

4.3.3 Environment Protection Act 1970 and State Environment Protection Policies

Statutory requirements for discharge to the environment are established through the *Environment Protection Act 1970* (the Act). The key features of these requirements are:

- The general provisions of the Act including compliance and enforcement measures
- The establishment of environmental quality objectives through State Environment Protection Policies (SEPPs)
- Licensing and Approval for certain activities as described in the Environment Protection (Scheduled Premises and Exemptions) Regulations 2007
- Directions to be issued by the Environment Protection Authority (EPA) to industry through notices that may require remediation measures to be implemented, monitoring to be undertaken and reporting to EPA.

The SEPPs elaborate and expand on the objectives of the Act by identifying the environmental values and benefits to the community of various segments of the environment. These values and benefits are referred to as beneficial uses. These beneficial uses are intended to be consistent with the Victorian community's expectations for protection of the environment from the effects of pollution and waste. SEPPs also describe the attainment and management programs necessary to achieve the desired environmental quality. Environmental quality objectives are often established as numerical criteria.

Relevant SEPPs for the Project have been identified as:

- SEPP Waters of Victoria - Schedule F8 'Waters of Western Port and Catchment' (2003)
- SEPP Prevention and Management of Contamination of Land (2002)
- SEPP Groundwaters of Victoria (1997).

Measures should be put in place to ensure that protected beneficial uses as outlined in the SEPPs are not precluded as a result of activities undertaken as part of the Project. Further information on management and mitigation measures is provided in Section 5.

5. Management and Mitigation

Based on the Project activities which will be undertaken on the landside component of the Project Site, minimal disturbance of contamination is likely to occur. It is considered that identified contamination which has the potential to be encountered or disturbed as part of the Project is able to be managed via usual good practices during construction and operation. As such, further investigation of contamination is not considered to be required at this stage.

A Construction Environmental Management Plan, including mitigation measures for management of spoil and storm water, should be developed. This should include sufficient measures to characterise and manage waste soil, groundwater and sediment generated and prevent potential impacts to the surrounding area including properties, vegetation and Western Port.

As the detail of the infrastructure and construction is refined, the need for management can be better refined, including the need for any further investigation, as it relates to generation of waste and impacts associated with potentially contaminated soil, groundwater or sediment.

6. Conclusion

In order to prevent potential impacts from pre-existing contamination and to address statutory requirements, a Construction Environmental Management Plan which includes appropriate mitigation measures for management of waste soil, groundwater and sediment and protection of the environment and human health should be developed and implemented. Mitigation measures utilising usual good practices during construction and operation is considered to be suitable management should the identified contamination be encountered or disturbed. Soil, groundwater and sediment contamination has been identified within the study area, predominantly related to metals, as well as some hydrocarbons and PCBs. PFOS has also been identified in shallow soil and sediment. There is potential therefore for environmental impact or impacts to construction worker health (if subject to prolonged exposure) unless the generation of dust is properly mitigated and managed.

It is expected that any potential impacts from pre-existing contamination within the study area will be effectively managed and will not trigger the requirements for referral and approval under the *Environment Protection and Biodiversity Conservation Act 1999* or the *Environment Effects Act 1978*.

Previous investigations undertaken within the study area, most recently by Jacobs (2017), indicated that the site is suitable for ongoing commercial/industrial use proposed for the Project.

Based on the current Project infrastructure and associated construction activities, further investigation of soil, groundwater or sediment is not recommended. Should further detail become available that allows better definition of areas of disturbance associated with construction activities and potential volumes of waste soil, groundwater or sediment, it may warrant targeted investigation to assess risks and identify management or mitigation measures. Detail obtained from any targeted investigation could then be incorporated into a revision of the Construction Environmental Management Plan.

7. References

Department of Primary Industries. Service provided by <https://www.data.vic.gov.au/data/dataset/coastal-acidsulphate-soils>. Maps accessed on 11 September 2017.

Jacobs, 2017, *Baseline Environmental Contamination Investigation, Factual Report*, prepared for Port of Hastings Development Authority, 1 June 2017

PPK, 1998. Statements of Environmental Audit, Port of Hastings Sites (No. 78J155A-pr29999d M7314). PPK Environment & Infrastructure Pty Ltd, South Melbourne.

State Government of Victoria, 1970, *Environment Protection Act 1970*. Victoria Government Gazette, No. 8056.

State Government of Victoria, 1997, *State Environment Protection Policy (Groundwaters of Victoria)*. Victoria Government Gazette, No. S160.

State Government of Victoria, 2002, *State Environment Protection Policy (Prevention and Management of Contaminated Land)*. Victoria Government Gazette No. S95 Gazette 4 6/2002

State Government of Victoria, 2003, *State Environment Protection Policy (Waters of Victoria)*, Victoria Government Gazette No S 13

Victorian Resources Online (VRO), 2003. Map of Coastal Acid Sulphate Soils. Victorian State Government

Appendix A. Reviewed information

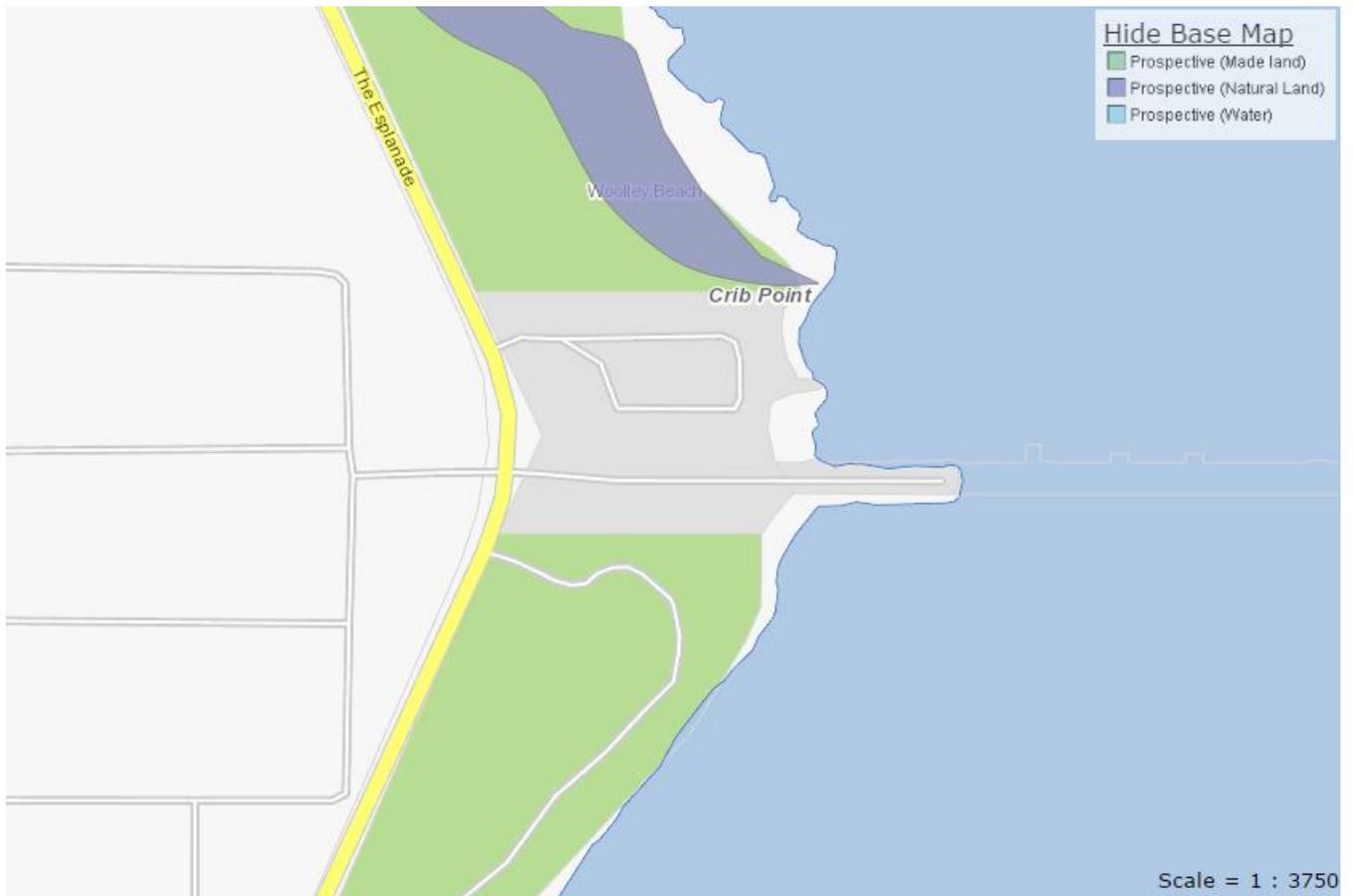


Figure A.1 : Potential Acid Sulfate Soil Distribution (Victorian Resources Online, 2003)

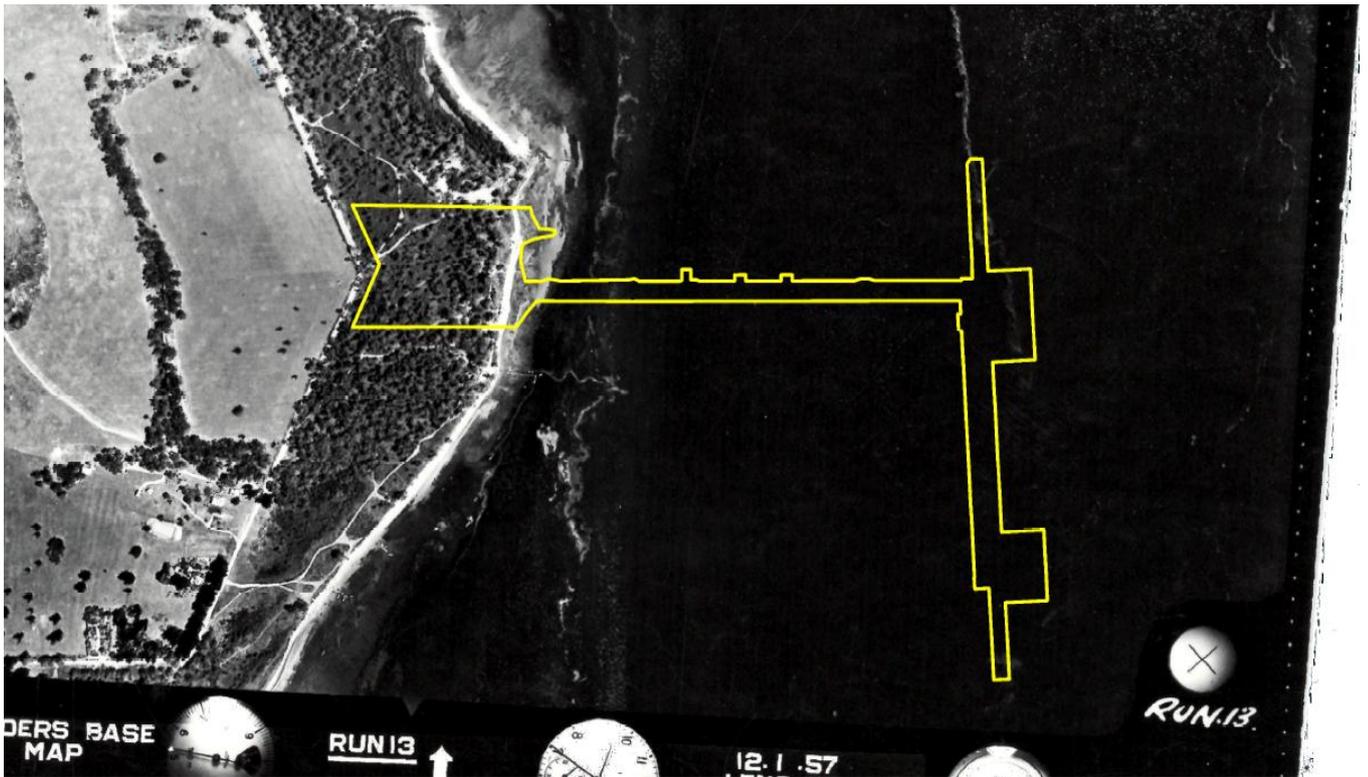


Figure A.2 : 1957 Aerial Photograph

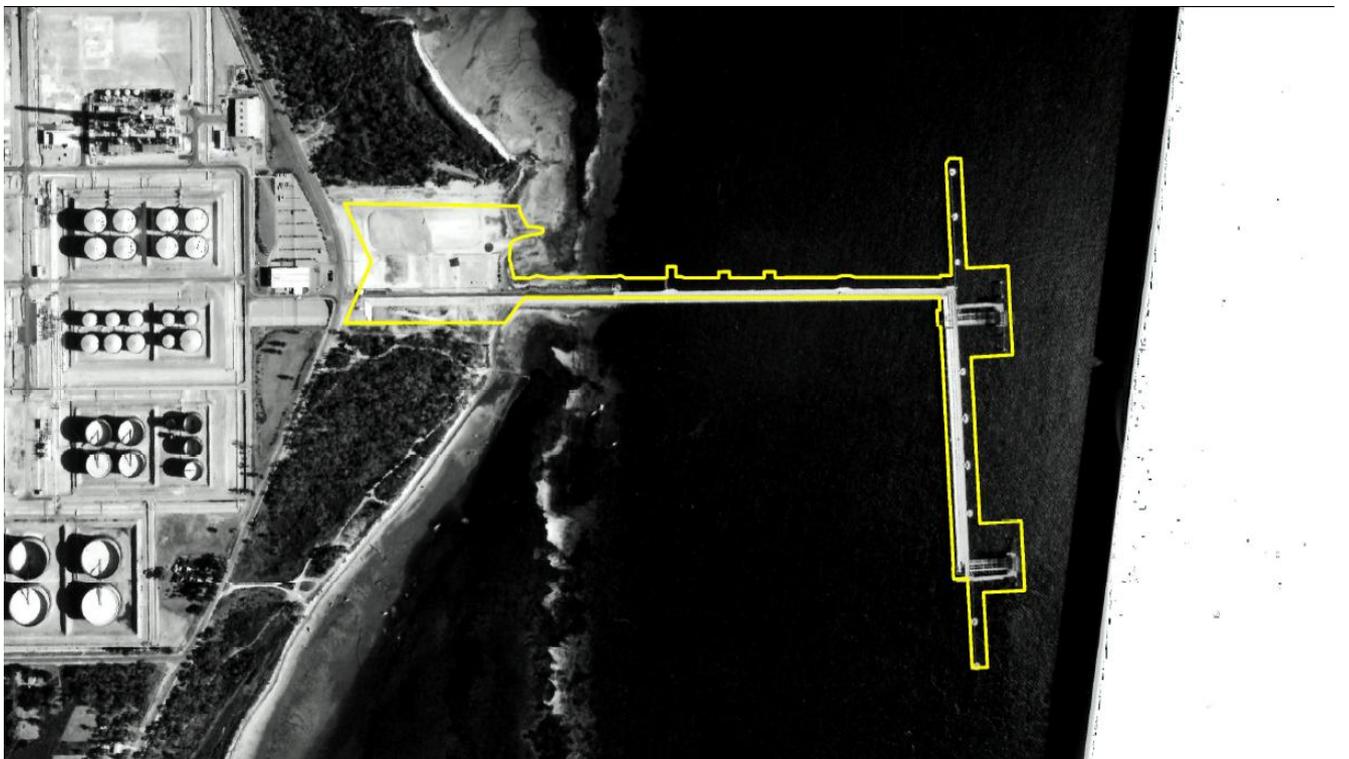


Figure A.3 : 1968 Aerial Photograph

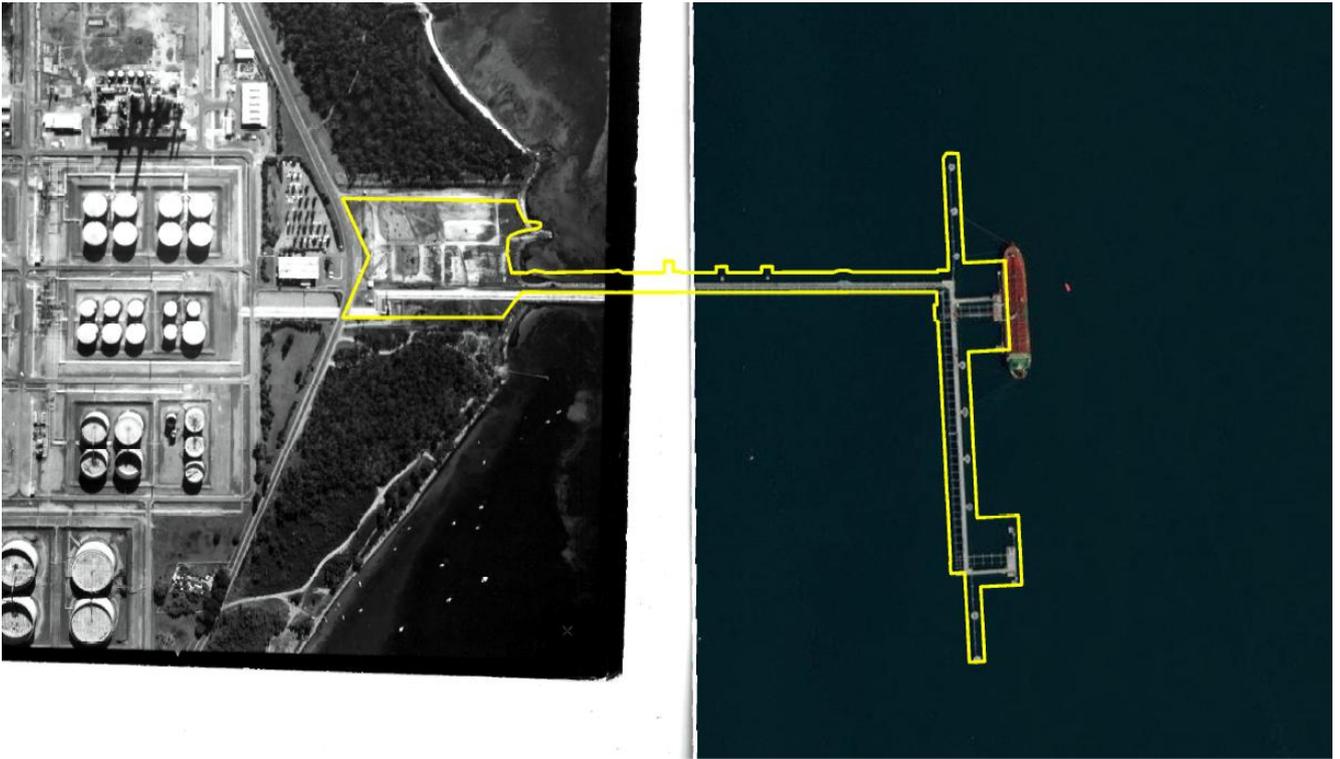


Figure A.4 : 1974 Aerial Photograph (left portion of figure)



Figure A.5 : 1990 Aerial Photograph

Table A.1 : Site inspection photographs (12/9/17)



Study area looking south-east towards the jetty



Area of burnt ground within Study Area



Storage on Study Area, looking west



Study Area looking west towards the existing pipeline pump station