

Kurnell Terminal SSD-5544 MOD-7

Appendix F - Updated Soils, Groundwater, and
Contamination Report

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Glossary and abbreviations

Term	Description
ASC NEPM	National Environment Protection (Assessment of Site Contamination) Measure 2013
ASSMP	Acid Sulfate Soil Management Plan
ASSMAC	Acid Sulfate Soils Management Advisory Committee
AASS	Actual acid sulfate soils
AEC	Areas of environmental concern
ACS	Asbestos contaminated soil
ANZAST	Australian and New Zealand and Australian State and Territory Governments
AMP	Asbestos Management Plan
BTEXN	Benzene, toluene, ethylbenzene, xylenes and naphthalene
CLOR	Caltex Lubrication Oil Refinery
CSM	Conceptual site model
CMP	Contamination Management Plan
CEMP	Construction Environmental Management Plan
COPC	Contaminants of potential concern
DCP	Development control plan
DECC	Department of Environment and Climate Change
DEC	Department of Environment and Conservation
DECCW	Department of Environment, Climate Change and Water
DUAP	Department of Urban Affairs and Planning
EIS	Environmental impact statement
EMP	Environmental Management Plan
EP&A	Environmental Planning & Assessment
FFTA	Former fire training area
GSW	General solid waste
GDE	Groundwater dependant ecosystem
GWMP	Groundwater Management Plan
HEPA	Heads of EPAs Australia and New Zealand
HDPE	High density polyethylene
LNAPL	Light non-aqueous phase liquid
mAHD	Metres Australia Height Datum
mbgl	Metres below ground level
NEPC	National Environment Protection Council

Term	Description
NEPM	National Environment Protection Measure
NOW	NSW Office of Water
OWS	Oily water sewer
OEMP	Operational environmental management plan
PFAS	Per- and polyfluoroalkyl substances
PHC	Petroleum related hydrocarbons
PAHs	Polycyclic aromatic hydrocarbons
PASS	Potential acid sulfate soils
POEO	Protection of the Environment Operations
RAP	Remedial Action Plan
RSW	Restricted soil waste
SWMS	Safe work method statements
SAQP	Sampling and analysis quality plan
SWS	Site stormwater system
SSD	State Significant Development
SSC	Sutherland Shire Council
TRH	Total recoverable hydrocarbons
UPSS	Underground petroleum storage systems
VENM	Virgin excavated natural material
WWTP	Waste water treatment plant
WH&S	Work, health and safety

Executive Summary

The Kurnell Terminal (the Site) is located on the southern side of Botany Bay, in Kurnell, New South Wales (NSW) (Figure 1-1). In 2012, Ampol Refineries (NSW) Pty Ltd (Ampol) decided that the oil refinery and fuel terminal would be converted to a finished product terminal (the approved project), ceasing refinery operations in 2014.

Development consent was received to complete the approved project under State Significant Development (SSD) application reference 5544 (SSD-5544). Ampol has modified SSD-5544 six times to facilitate the conversion and demolition works.

Currently, the operational infrastructure is primarily located in the northern part of the Site (Zones 1 and 1A, as shown in Figure 1-1). Other parts of Ampol's landholdings at Kurnell include largely vacant areas of previously developed land (Zones 2 and 3) and areas of undeveloped land containing extensive native vegetation (Zones 4 and 5).

Ampol intends to consolidate operational infrastructure, remove redundant assets, and undertake targeted remediation of legacy ground contamination. Completion of these works (the proposed modification, MOD-7) would continue the safe, viable, sustainable and reliable operation of the Kurnell Terminal. The location within the Site that these works would occur is referred to as the Project Area.

This Updated Soils, Groundwater and Contamination Report has been produced to address submissions received by agencies during the exhibition of the Modification Report and refinements to the proposed modification. It has been prepared to support the Submissions Report.

A review of existing contamination reports and environmental data undertaken in preparing the Remedial Action Plan (RAP) (refer to Appendix E of the Submissions Report) has identified where remediation would be required and where further investigation is required to inform future refinement of remedial extents and methodologies. The primary contaminants of potential concern (COPC) within the Project Area are petroleum related hydrocarbons (PHC), per- and polyfluoroalkyl substances (PFAS) and asbestos in soil. A range of secondary COPCs (e.g. chlorinated hydrocarbons [CHC], refinery process chemicals) have also been identified onsite within discrete areas based on historic investigations for which appropriate remedial and management strategies would be applied in accordance with regulatory standards for commercial/ industrial land use. The areas of environmental concern (AEC) where these sources are present from historical activities at the Project Area have been outlined in this report and are detailed in the RAP.

Potential acid sulfate soil (PASS) is known to be present at depths below 2 m below ground surface (mbgl) in parts of the Site. A draft Acid Sulfate Soil Management Plan (ASSMP) has been prepared, outlining the framework to manage PASS disturbed during works (refer to Appendix E2 of the Submissions Report). Data gap investigations would include sampling and analysis for PASS and the results would inform further updates to the ASSMP.

Soil remediation works for the proposed modification would comprise a mixture of biopiling and offsite disposal. The proposed remedial extents and estimated remediation volumes would be refined following data gap investigations and documented in one or more Remedial Works Plans (RWPs), which would occur prior to commencement of remediation.

Temporary groundwater dewatering would be required where groundwater accumulates in excavations. Groundwater ingress has been estimated and is presented in Annexure A (Groundwater Assessment). Dewatered groundwater from excavations would be collected, contained, tested for pollutants and, if suitable, sent to the Wastewater Treatment Plant (WWTP) for treatment and disposal under EPL-837 for the Site. Groundwater that cannot be treated at the WWTP would either be pre-treated by another method or disposed to an appropriately licenced liquid waste facility. The specific pre-treatment approach would be dependent on the COPCs present. Active remediation of groundwater during the proposed modification is not proposed.

Temporary groundwater drawdown may occur within GDEs located to the south (in Zone 4 of the Site) and to the east and north east of the Site (just inside the boundary Kamay Botany Bay National Park). Drawdown within the national park would be negligible and within natural groundwater level fluctuations. Towra Point Nature Reserve is located outside the predicted drawdown extent for all proposed excavations indicating that the proposed modification works are not anticipated to impact this GDE.

Further consideration of impacts to the GDEs due to groundwater drawdown has been considered in the Updated BDAR (Appendix I of the Submissions Report). Potential impacts to GDEs due to groundwater drawdown would be temporary and managed through implementation of a Groundwater Management Plan (GWMP). This would outline groundwater monitoring (water levels and quality) requirements, site-specific water level and quality trigger levels, and an associated Trigger Action Response Plan to allow for effective and appropriate responses. Given the temporary nature of the works and the implementation of mitigation measures, it is unlikely that there would be a permanent impact to the identified GDEs.

Where relevant, following remediation and where further management of contamination is required within the Audit Boundary, one or more Environmental Management Plan(s) (EMPs) would be prepared. These plans would fall under and be administered by the Site's existing Operational Environmental Management Plan (OEMP) and would detail groundwater monitoring requirements to confirm that residual COPCs in groundwater are being appropriately managed.

The remediation works would mitigate the risk existing contamination poses by removing or reducing the concentrations of contamination in soils. Provided mitigation measures for construction and operation are implemented, the risk posed by cumulative environmental impacts from other projects related to soil, groundwater, and contamination is considered to be low.

Mitigation measures to be implemented for the construction and operation would be as per the conditions of consent for SDD-5544. This would include preparation and implementation of a Construction Environmental Management Plan (CEMP) for construction and the continued implementation of the OEMP following completion of the proposed modification works. The following additional specific measures would be undertaken for the proposed modification:

- Implementation of the RAP (refer to Appendix E of the Submissions Report), would include undertaking data gap investigations within the Project Area and preparation of RWPs.
- RWPs focussed on specific areas and/or contamination sources, would be prepared. Remediation works would be completed as per each RWP. The RWPs would be supported by a series of environmental management plans. Validation report(s) would be prepared following remediation
- Implementation of a GWMP, as a subplan of the CEMP, which would include dewatering mitigation measures to manage temporary impacts to GDEs.
- Where relevant, following remediation and where further management of contamination is required within the Audit Boundary, one or more Environmental Management Plan(s) (EMPs) would be prepared. These plans would fall under and be administered by the Site's existing OEMP. The OEMP would be updated as required to incorporate new EMP(s). The EMP(s) would be prepared in general accordance with the *NSW EPA EMP Guidelines 2020* and *Consultant Guidelines 2020* (NSW EPA, 2020).

1.0 Introduction

1.1 Overview

The Kurnell Terminal (the Site) is located on the southern side of Botany Bay, in Kurnell, New South Wales (NSW) (Figure 1-1). In 2012, Ampol Refineries (NSW) Pty Ltd (Ampol) decided that the oil refinery and fuel terminal would be converted to a finished product terminal (the approved project), ceasing refinery operations in 2014.

Development consent was received to complete the approved project under State Significant Development (SSD) application reference 5544 (SSD-5544). Ampol has modified SSD-5544 six times to facilitate the conversion and demolition works.

Currently, the operational infrastructure is primarily located in the northern part of the Site (Zones 1 and 1A, as shown in Figure 1-1). Other parts of Ampol's landholdings at Kurnell include largely vacant areas of previously developed land (Zones 2 and 3) and areas of undeveloped land containing extensive native vegetation (Zones 4 and 5).

Ampol intends to consolidate operational infrastructure, remove redundant assets, and undertake targeted remediation of legacy ground contamination. Completion of these works (the proposed modification, MOD-7) would continue the viable, safe, reliable, and sustainable operation of the Kurnell Terminal. The location within the Site that these works would occur is referred to as the Project Area.

A Modification Report was prepared to support a modification application to SSD-5544 and was placed on public exhibition for 23 days from Thursday 10 July 2025 until Friday 1 August 2025 in accordance with the EP&A Act.

The Soils, Groundwater and Contamination Report for the proposed modification was one of a number of technical documents that formed part of the Modification Report. This Updated Soils, Groundwater and Contamination Report has been produced to address submissions received by agencies during the exhibition of the Modification Report and refinements to the proposed modification. It has been prepared to support the Submissions Report.



Legend

- Site Boundary
- Ampol Ownership
- Project Area
- Former Refinery Area
- Operational Fuel Terminal
- Undeveloped Land
- Watercourse
- Primary Road
- Local Road



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Figure 1-1 Ampol Kurnell Terminal (the Site)

1.2 The proposed modification

1.2.1 Key elements of the proposed modification

To support the continued viable, safe, reliable, and sustainable operation of the Kurnell Terminal, the proposed modification works involve:

- **Stage 1 – Preparation works:** Preparing the Project Area for proposed modification works.
- **Stage 2 – Removal, relocation and/or augmentation of infrastructure,** including:
 - Relocation and/ or augmentation of firewater systems (FWS) and oily water sewer (OWS) systems and construction of new operational facilities, including three replacement warehouses in Zone 1 and 1A
 - Decommissioning and removal of non-operational assets, redundant structures and electrical assets
- **Stage 3 – Remediation:** Addressing legacy ground contamination in specific locations across the Site
- **Stage 4 – Demobilisation:** Demobilisation of construction and remediation equipment.

Depending on where different works are required across the Site, these stages may be completed sequentially or concurrently.

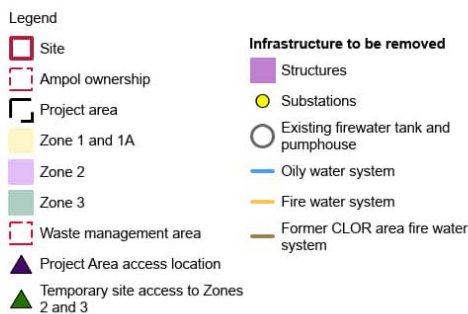
A summary of project elements requiring modification and how they relate to the approved project is provided in Table 1-1. Infrastructure to be removed is presented in Figure 1-2, whilst infrastructure to be relocated or upgraded is presented in Figure 1-3. The proposed modification works would be undertaken within the Project Area.

All activities would adhere to the Kurnell Terminal permit to work system to help ensure compliance with existing environmental and safety protocols.

Table 1-1 Modified project summary table

Stage	Element	Approved project	Modified project
Stage 1	Project Area	Project Area delineation	<ul style="list-style-type: none"> • Prepare the Project Area for the proposed modification works required under Stages 2 and 3 and exclude other parts of the Site from workers involved in the works as required.
Stage 2	Oily water sewer (OWS)	Maintain location in Zones 2 and 3	<ul style="list-style-type: none"> • Divert surface water runoff from potentially contaminated areas in Zone 2 to OWS system in Zone 1 via new OWS interception pits/ lines until Stage 3 remediation is complete • Divert potential leachate from Asbestos Contaminated Soils (ACS) Containment Cell in Zone 2 to Zone 1 OWS system • Install one new pump station and emergency storage tank adjacent to the ACS Containment Cell. Two indicative site options have been identified (refer to Figure 1-3) with specific siting to be selected during detailed design • Once Stage 3 remediation is complete in each specified area, isolate and remove redundant OWS infrastructure from identified areas in Zone 2 and Zone 3. Where complete removal is not feasible, existing pipes would be left in-situ.

Stage	Element	Approved project	Modified project
	Fire-water systems (FWS)	Maintain location in Zone 2 and 3	<ul style="list-style-type: none"> • Augment FWS infrastructure in Zone 1 and the centre of Zone 2 • Excavate and install footings for the new firewater tank, pumphouse, and pipelines • Construct new firewater tank and pumphouse within the FWS Relocation Area. Two indicative site options have been identified (refer to Figure 1-3) with specific siting to be selected during detailed design • Connect relocated firewater tank and pumphouse to existing FWS via new pipework • Commission new firewater tank, pumphouse, and pipework to confirm operation of amended FWS • Isolate and remove redundant FWS infrastructure from Zones 2 and 3 when appropriate.
	Electrical assets	Maintain location in Zone 2 and 3	<ul style="list-style-type: none"> • Isolate and remove redundant electrical assets in Zones 2 and 3, including five substations.
	Structures	Maintain location in Zone 2 and 3	<ul style="list-style-type: none"> • Construct new 'fit for purpose' warehouse to house maintenance supplies and activities in Zone 1 • Construct new Oil Spill Equipment Storeroom within Zone 1 • Construct new storage shed to house boats and emergency aquatic spill response equipment in Zone 1A • Demolish identified structures in Zones 2 and 3.
Stage 3	Remediation	Removal of ACS from pipeways and either containment onsite or offsite disposal	<ul style="list-style-type: none"> • Remediate identified land in Zone 1 to reduce operational site safety risks (refer to Figure 1-4) • If required, remediate land in Zone 1 where infrastructure is proposed to be relocated or augmented • Undertake targeted remediation in Zones 2 and 3 (refer to Figure 1-4) • Return excavated areas to existing ground levels, with the exception of Refining Process Improvement Project (RPIP) Mountain (which would be regraded) and removal of the bund at Source Area Excavation 5.
Stage 4	Demobilisation	Demobilisation of construction equipment.	<ul style="list-style-type: none"> • Demobilisation of construction and remediation equipment.



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Figure 1-2 Proposed modification – Infrastructure to be removed (Stage 2)

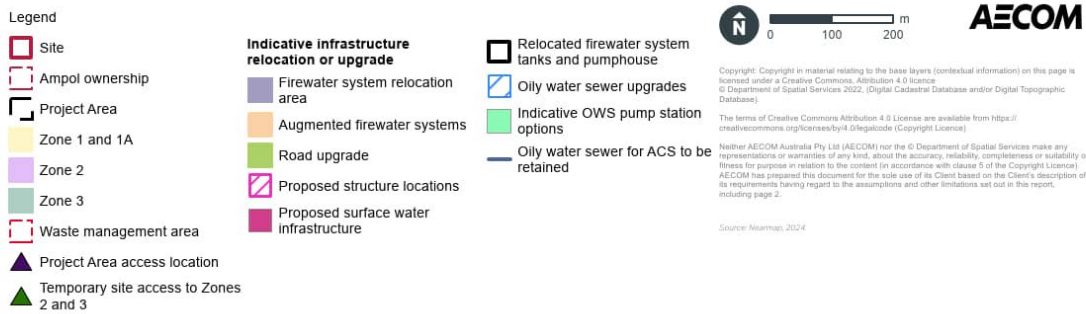


Figure 1-3 Proposed modification – Infrastructure to be relocated/ upgraded (Stage 2)



Figure 1-4 Targeted remediation activities (Stage 3)

Once the modification works are complete, the Site would continue to operate as described in the SSD documentation for the approved project and would be consistent with the development consent for SSD-5544 (as modified).

In line with Figure 1-3, relocated equipment would operate in the new locations.

1.2.2 Construction timeline and equipment

Works would be staged in accordance with the indicative program in Table 1-2. Construction and remediation are anticipated to commence in 2026 and be completed by 2030.

In line with the Interim Construction Noise Guideline (ICNG), construction works would comply with following hours:

- Monday to Friday – 7am to 6pm
- Saturday – 8am to 1pm
- Sunday and public holidays – No work is permitted.

Construction works outside of the work hours identified above would only be undertaken in the following circumstances (in line with Condition C20):

- Works that are inaudible at nearest sensitive land receivers
- Works that are consistent with Ampol's existing maintenance procedures and are in accordance with EPL 837
- Works agreed to in writing by the Environment Protection Authority (EPA) or the Department of Planning, Housing, and Infrastructure (DPHI)
- For the delivery of materials required outside these hours by the NSW Police Force or other authorities for safety reasons
- Where it is required in an emergency to avoid the loss of lives, property and/ or to prevent environmental harm.

In addition, the following activities may be required on a 24-hour basis to support construction activities:

- Biopiling blowers in identified Biopiling Areas (refer to Figure 1-4). Given their proposed location within the Site, noise from the blowers would be inaudible at the nearest noise sensitive receivers.
- Dewatering of excavations. Dewatering would only occur at night in locations where plant would not exceed night-time limits, i.e.:
 - Where it is located a minimum of at least 200 m within the Site boundary; or
 - Where it is located a minimum of 120 m within the Site boundary if temporary noise barriers are positioned as near as practicable to the pumps, and monitoring confirms that nighttime noise limits are not exceeded.

Plant and equipment that would be used to deliver the modification works is shown in Table 1-3.

Table 1-3 Indicative plant and equipment

Plant/ equipment	Maximum number of plant and equipment required per day		
	All stages except Stage 3		Stage 3 (Remediation) only
	Entire Site	Zone 1A	
Front end loader	6	2	6
Excavator	-	2	6
Excavator (including large hydraulic hammer)	6	-	-
Dump truck	6	2	6
Grader (up to 7 m blade)	2	1	4
Large crane (60 t)	4	1	-
Elevated work platform	6	4	-
Franna crane (30 t)	6	1	-
Cement truck	6	2	-
Bobcat	6	2	2
Water cart	6	2	6
Concrete crusher	1	-	-
Telehandler	6	-	-
Truck and dog (offsite disposal)	6	6	6
Truck and dog (imported fill)	-	6	12
Generator	2	1	2
Biopiling blower	-	-	8
Dewatering pump	6	-	6

1.2.3 Other relevant elements of the proposed modification

Earthworks and excavation

The following earthworks and excavation would be required for the proposed modification during construction:

- Diversion and subsequent removal of OWS infrastructure in Zones 2 and 3. These works would require excavation for new OWS interception pits/ lines to a depth of 3.5 mbgl, a new pump station and emergency storage tank within an area of 12 by 34 m and benched to 4.5 mbgl, as well as excavation to remove redundant OWS infrastructure to a depth of 3 mbgl.
- Augmentation, installation, and removal of FWS infrastructure in Zones 1 to 3. Where FWS is augmented or removed, excavation would be required to a depth of 1 mbgl. The FWS tank, and pump system/ pumphouse, and firewater pipework would be relocated to the FWS Relocation Area. Excavation to a depth of 1 mbgl to construct new foundations for the firewater pipework along the length of the pipelines, the firewater tank, and the pumphouse. The firewater tank would require a base of 380 m² (diameter of 22 m) and the pumphouse would require a base of 11 m by 18 m.
- Isolation and removal of redundant electrical assets in Zones 2 and 3, including five substations. These works would require excavation to a depth of 2 mbgl.

- Construction of new warehousing and storage facilities in Zones 1 and 1A, including a maintenance warehouse, oil spill equipment storeroom, and a storage shed for boats and aquatic spill response kits. These works would require excavation to a depth of 1 mbgl to construct footings.
- Demolition of existing structures would occur in Zones 2 and 3, and excavation would be required up to a depth of 2 mbgl.
- Remediation activities within Zone 1 to 3 to address legacy ground contamination identified in specific locations across the Site to support the ongoing viable, safe, reliable, and sustainable use of the Kurnell Terminal. Works would involve subsurface disturbance to remove or treat contaminated soils within works areas in Zone 1 (refer to Excavation 7 in Figure 1-4) and Source Areas in Zones 2 and 3 (refer to Excavations 1 to 6). In Excavations 1 to 6, excavation may be required to depths of up to 4.9 mbgl, but would be largely determined by the depth to groundwater. All remediated areas would be reinstated to existing ground levels, with the exception of RPIP Mountain, which would be regraded.

Excavations required are presented in Figure 1-5.

There is potential for excavations to intercept groundwater and require dewatering. Groundwater ingress has been estimated and presented in Annexure A (Groundwater Assessment). The outcomes are summarised in Section 4.0 (Assessment of construction impacts).

Remediation works

The approach to remediation was presented in the Conceptual RAP (Appendix H of the Modification Report). The Conceptual RAP has been converted to a RAP to address submissions received during the exhibition of the Modification Report and refinements to the proposed modification (refer to Appendix E of the Submissions Report).

As described in the updated description of the proposed modification (refer to Appendix B of the Submissions Report), remediation is required to address the following primary contaminants of potential concern (COPC) in the Project Area:

- Asbestos contaminated soils
- Petroleum related hydrocarbons (PHC)
- Per- and polyfluoroalkyl substances (PFAS).

A range of secondary COPCs (e.g. chlorinated hydrocarbons [CHC], refinery process chemicals) have also been identified onsite within discrete areas based on historic investigations.

A number of Source Areas Excavations have been proposed to address primary and secondary contaminants and remediate the Project Area. The volume of hydrocarbon, chlorinated compounds, asbestos and/or PFAS impacted soil that would require excavation and either treatment or off-site disposal has been estimated at 186,270 cubic metres (m³); however, for the purpose of assessment within this *Updated Soils, Groundwater and Contamination Report*, a contingency soil volume of 94,650 m³ (about 50%) has also been included for assessment (i.e. a total of 280,920 m³).

Excavation volumes and source areas are presented in Table 1-4. Refer to the RAP (Appendix E of the Submissions Report) for further information

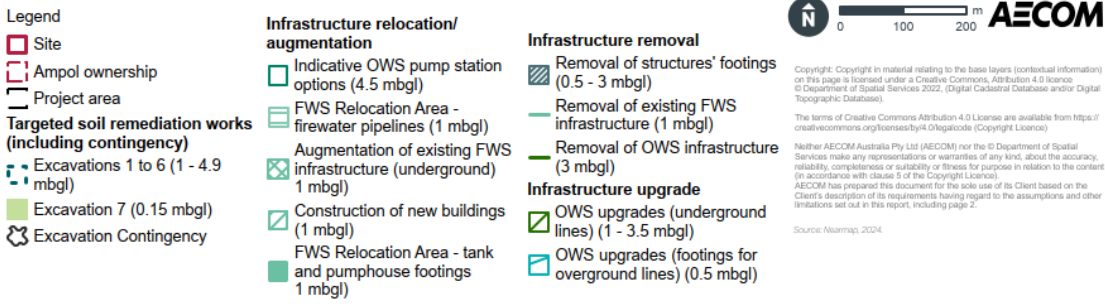
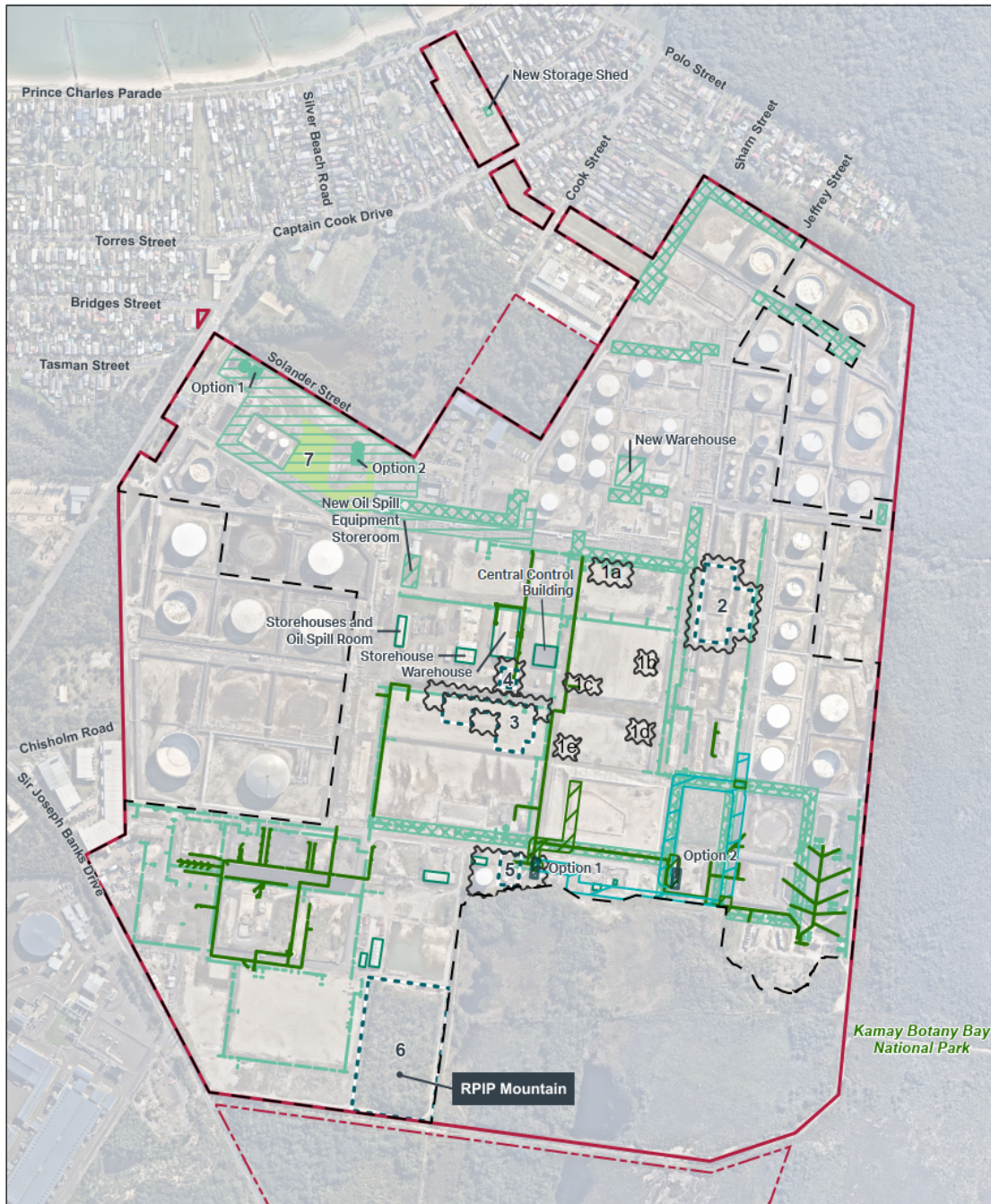


Figure 1-5 Excavations

Table 1-4 Excavation volume and contingency estimates

Excavation Area	Base estimate volumes ¹	Contingency volumes ²	Source
Project Area			
Zone 1 (Infrastructure construction works) Zone 2 and 3 (OWS removal and augmentation) Zone 3 (RPIP OSD)	53,700 m ³	5,370 m ³	FWS and OWS services RPIP drainage channel
Zone 1			
Excavation 7 (Asbestos)	1,380 m ³	690 m ³	Liquefied Petroleum Gas (LGP) Area fill soils
Zone 2			
Source Area Excavation 1 (PHC)	-	18,000 m ³	Former Central Process Unit Area
Source Area Excavation 2 (PHC)	49,250 m ³	39,550 m ³	Eastern Tank Farm and bulk fuel storage
Source Area Excavation 3 (PHC + CHC)	24,640 m ³	19,180 m ³	Former Southern Process Unit Area
Source Area Excavation 4 (CHC)	2,800 m ³	3,360 m ³	Hydro-blast (assumed source)
Source Area Excavation 5 (PFAS)	10,000 m ³	5,000 m ³	Former Fire Training Area (FFTA)
Zone 3			
Source Area Excavation 6 (ACS)	32,500 m ³	16,250 m ³	Refining Process Improvement Project (RPIP) Mountain fill soils
Total	186,270 m³	94,650m³	

Where soil in the Project Area has been assessed as not requiring remediation, this is because the soil and groundwater quality either:

- Already meets the commercial/ industrial standard; and/or
- The remaining conditions either do not pose a risk to human health or the environment or can be managed and mitigated by implementation of existing environmental management procedures for the Site.

The proposed soil remediation methods include:

- **Biopiling:** The majority of soils (estimate of 156,780 m³, including contingency) that are impacted by hydrocarbons would be remediated using biopiling. The nominated areas for biopiling (as shown in Figure 1-4) have all historically been utilised for waste management at the Site. As such they are connected to the Site's OWS, and have electricity connections. Two of these areas have concrete slabs and one does not have a slab present. Prior to setting out the biopiling areas, the area without a slab present would be prepared with a base clay or high-density polyethylene (HDPE) liner. A compacted sand base would be established over the liner to enable adequate air exchange into the biopile. When biopiling, nutrients or other soil amendments would be added and placed in the biopile areas. The biopiles would be covered with an impermeable material to reduce stormwater ingress and dust creation and blowers used to enhance the bioremediation process by increasing the flow of oxygen through the soil. This would stimulate aerobic microbial activity within the soils and promote the biodegradation of hydrocarbons.
- **Off-site disposal:** Contaminated soils or sludges that cannot be treated and reused or managed in situ (primarily asbestos and PFAS impacted soils) would be captured and/or contained onsite before being disposed offsite to an appropriately licenced facility by licenced contractors. An estimate of 100,410 m³ (including contingency) of contaminated soil, fill, or sludge material would require offsite disposal. This material (soil or sludge) may be treated or untreated prior to offsite disposal.

Groundwater

In some areas, groundwater contaminants are present above commercial/ industrial criteria. Refer to the RAP (Appendix E of the Submissions Report) for further information on the investigations undertaken to date. However, such groundwater impacts are considered a secondary source and it is expected that soil remediation works would consequentially reduce residual groundwater concentrations. Where these residual risks are assessed to still be present above criteria after soil remediation activities, contamination would be managed under the Site's Operational Environmental Management Plan (OEMP).

Active remediation of groundwater during the proposed modification is not proposed. The existing quarterly groundwater monitoring program would continue following soil remediation works, allowing for the assessment of the post-remediation groundwater conditions. An EMP (as a subplan of the OEMP) would include groundwater monitoring requirements for Zones 2 and 3, as required, to confirm that residual COPCs in groundwater are being appropriately managed .

Accumulated groundwater in excavated areas would be tested to confirm that it can be appropriately treated in the existing onsite Waste Water Treatment Plant (WWTP). The WWTP treats water that is, or may be, impacted primarily by petroleum products at the Site. Treated water effluent from the Site is discharged via outfall to the Tasman Sea at Yena Gap under the Environment Protection Licence (EPL) 837. Groundwater that cannot be treated at the WWTP would either be pre-treated by another method or disposed to an appropriately licenced liquid waste facility. The specific pre-treatment approach would be dependent on the COPCs present.

Operational activities

The FWS would be relocated within the FWS Relocation Area in Zone 1, including a new firewater tank, firewater pipelines, pumps and pumphouse to allow it to service the terminal infrastructure, with specific siting selected during detailed design.

For the purpose of assessment in this *Updated Soils, Groundwater and Contamination Report*, two indicative locations have been considered for the relocation of the FWS, which have been selected based on optioneering completed in the concept design phase in consultation with key stakeholders, including Firewater and Process Safety Subject Matter Experts. The location of each option is shown Figure 1-6.



1.3 Purpose of this report

This Updated Soils, Groundwater and Contamination Report is one of a number of technical documents that forms part of the Submissions Report. The purpose of this report is to identify and assess potential impacts of the proposed modification upon soils, groundwater, and contamination and identify appropriate mitigation measures where necessary.

2.0 Assessment methodology

2.1 Relevant legislation and guidelines

Applicable legislation, regulation and policy for this soil, groundwater and contamination assessment include:

- *Environmental Planning and Assessment Act 1979*
- *State Environmental Planning Policy (Resilience and Hazards) 2021*
- *National Environment Protection (Assessment of Site Contamination) Measure 2013 (the ASC NEPM)*
- *Contaminated Land Management Act 1997*
- *Protection of the Environment Operations Act 1997 (POEO Act)*
- *The POEO (Waste) Regulation 201*
- *Sutherland Shire Local Environmental Plan 2015*
- *Water Management Act 2000*
- *Water Management (General) Regulation 2018*
- *NSW Aquifer Interference Policy 2012.*

Relevant guidelines for this soil, groundwater, and contamination assessment are listed below:

- Australian and New Zealand and Australian State and Territory Governments (ANZAST), 2018, *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZAST, 2018)
- Heads of EPAs Australia and New Zealand (HEPA), 2025. *PFAS National Environmental Management Plan 3.0* (HEPA, 2025)
- Landcom, 2004. *Managing Urban Stormwater: Soils and Construction* (Landcom, 2004)
- NSW Acid Sulfate Soils Management Advisory Committee (ASSMAC), 1998. *Acid Sulfate Soils Assessment Guidelines*. August 1998 (ASSMAC, 1998)
- NSW Department of Land and Water Conservation, 2002. *Site Investigation for Urban Salinity* (NSW Department of Land and Water Conservation, 2002)
- National Environment Protection Council (NEPC), 1999. *National Environment Protection (Assessment of Site Contamination) Measure 2013* (NEPC, 1999)
- NSW EPA, 2015. *Guidelines on the Duty to Report Contamination under the Contaminated Land Management Act 1997* (NSW EPA, 2015)
- NSW EPA, 2017. *Guidelines for the NSW Site Auditor Scheme (3rd edition)* (NSW EPA, 2017)
- NSW EPA, 2019. *Assessment and management of hazardous ground gases: Contaminated Land Guidelines* (NSW EPA, 2019)
- NSW Department of Environment and Conservation (DEC), 2007. *Guidelines for the Assessment and Management of Groundwater Contamination* (NSW DEC, 2007)
- NSW Department of Environment and Climate Change (DECC), 2009. *Guidelines for Implementing the Protection of the Environment Operations (Underground Petroleum Storage Systems) Regulation 2008* (NSW DECC, 2009)
- NSW Department of Environment, Climate Change and Water (DECCW), 2010. *UPSS Technical Note: Decommissioning, Abandonment and Removal of UPSS* (NSW DECCW, 2010a)
- NSW DECCW, 2010. *UPSS Technical Note: Site Validation Reporting* (NSW DECCW, 2010b)

- NSW Department of Urban Affairs and Planning (DUAP) and NSW EPA, 1998. *Managing Land Contamination, Planning Guidelines SEPP 55-Remediation of Land* (DUAP & EPA, 1998)
- NSW EPA, 2020. *Guidelines for Consultants Reporting on Contaminated Sites* (NSW EPA, 2010)
- NSW EPA, 2014. *Waste Classification Guidelines Part 1 to 4* (NSW EPA, 2014)
- NSW EPA, 2016. *Addendum to the Waste Classification Guidelines (2014, Part 1: Classifying Waste)* (NSW EPA, 2016)
- NSW EPA, 2018. *Guidelines on resource recovery orders and exemptions for the land application of waste materials as fill* (NSW EPA, 2018).

2.2 Methodology

The objective is to provide a desktop assessment to assess the potential impacts of the proposed modification on soils, groundwater, and contamination.

A desktop assessment was undertaken which comprised the review of applicable existing reports for the Project Area. The reports reviewed are listed below:

- URS, 2013. Environmental Impact Statement, Kurnell Refinery Conversion, May 2013 (URS, 2013)
- AECOM, 2026. Remedial Action Plan (RAP) (Appendix E of the Submissions Report), which consolidates and summarises a range of historical investigations and technical reports that have informed this assessment.

3.0 Existing environment

3.1 Topography and drainage

The Site is situated on the Kurnell Peninsula, an elevated plateau of Hawkesbury Sandstone, approximately 18 km in length. The Kurnell landscape is described as gently undulating to rolling coastal dune-fields and relict dunes, with local relief to 15 m; slope gradients 1-10%. North-south oriented dunes with convex narrow crests, broad (1,000-2,000 m) gently inclined concave swales and isolated swamps, and extensive heathland (Port Hacking 9129-4N 1:25000 Topographic Map, 2022). Surface elevations across the Kurnell Township range from 0 metres Australian Height Datum (mAHD) within swamplands at Quibray Bay, to 55 mAHD within the Kamay Botany Bay National Park, south east of the Site. Elevations within the Site range from about 2 to 4 mAHD in Zone 1A and in the north west portions of Zone 1 and Zone 2, and up to ~30 mAHD along the eastern site boundary of Zone 1 (adjacent to the Kamay Botany Bay National Park). The elevation in Zone 3 is about 10 mAHD.

Stormwater generated on Site (from outside of bunded areas) is collected in the Site's stormwater system and discharged to the following receiving environments:

- Quibray Bay
- Botany Bay
- Marton Park Wetland.

Effluent from the WWTP at the Site is discharged via outfall to the Tasman Sea via the Yena Gap pipeline under EPL 837.

3.2 Geology and soils

According to published geological information (Sydney 1:100,00 geological service sheet), the Site is underlain by Quaternary (Pleistocene), wind-blown, medium to fine grained, well-sorted, marine quartz sand. The sandstone is described as medium to coarse-grained, composed predominantly of quartz, with minor lithic fragments, feldspar, mica, and clay pellets. The Site lies on the aeolian Kurnell landscape unit, composed of gently undulating to rolling coastal dune field and relict dunes (NSW Soil Conservation Service Soil Landscape Series, Wollongong – Port Hacking).

From historical investigations at the Site, the bedrock surface elevation rises toward the east and south of the Site, with sandstone outcrops mapped at the northeast and southeast boundaries. Intrusive investigations have identified sandstone bedrock in Zone 3 to be generally shallower in the northern portion with depths ranging from 0.5 to 3.0 mbgl and deeper in the southern portion, generally from 5.5 to 10.50 mbgl. Depth to top of bedrock unit in Zone 2 generally ranges between 0.3 mbgl to 19 mbgl, increasing in depth towards the north-west (recorded greater than 30 mbgl at one location) (AECOM, 2025).

3.3 Acid sulfate soils

Acid sulfate soils (ASS) are naturally occurring sediments commonly found along the NSW coast. Left undisturbed, they do not present any risk. However, when ASS are exposed to air (during activities such as excavation) they react with oxygen to create sulfuric acid, which poses a wide range of environmental hazards, including:

- Severe acidification of soil and drainage waters
- Mobilisation of metals, nutrients, and rare earth metals
- Deoxygenation of waterways and wetlands
- Production of noxious gases
- Production of greenhouse gases
- Scalding of landscapes.

Review of the NSW Acid Sulfate soil (ASS) risk mapping indicates that the Project Area across Zone 1, Zone 2 and the northern portion of Zone 3 is listed as disturbed terrain above 4 mAHD. The southern portion of Zone 3 is mapped as Low Probability above 3 m below ground surface, as shown in Figure 3-1 (NSW eSPADE, 2024).

A recent investigation within Zone 1 related to an upgrade of surface water infrastructure included an ASS assessment to support excavation and trenching works. Soil testing for ASS found no indicators of actual ASS, though potential ASS (PASS) materials, presenting grey staining and sulphurous odours were encountered within areas mapped as L2 low probability areas on the western boundary of the Site, (AECOM, 2024). It is therefore considered possible that ASS/PASS may be encountered during intrusive works. The appropriate management of ASS is discussed in the draft ASSMP (refer to Appendix E2 of the Submissions Report).

3.4 Hydrogeology

Shallow groundwater at the Site is generally encountered at 2 mbgl, with depths ranging between 0.4 mbgl (perched water, overlying shallow rock) and 8.9 mbgl. Within Zone 2 groundwater is at an average of 1.4 mbgl, and within Zone 3 groundwater is at an average of 1.7 mbgl, within an unconfined aquifer in Quaternary sands (the Botany Sands Aquifer). Furthermore, groundwater in Zone 1 lies between 0.66 and 1.4 mbgl (Geo-Environmental Engineering, 2022). No permanent perched groundwater has been identified, though temporary perched conditions could occur following rainfall events, until water has infiltrated into underlying units. Groundwater flow direction at the Site is influenced by an east-west groundwater divide that runs through the northern portion of Zone 3. To the north of the divide, groundwater flow direction is generally to the north west. To the south of the divide, groundwater flow direction is generally to the south west.

The Quaternary aquifer properties (mainly literature values) have been reported as follows:

- Aquifer permeability is ~25 m/day
- Advective velocity is ~133 m/year
- Aquifer porosity is assumed to be 0.4.

The thickness of the Quaternary aquifer is controlled by the underlying Hawksbury sandstone profile, which predominantly acts as imperial flow boundary (aquitard) at the base of the Quaternary sands (Ampol, 2019).

Receiving water bodies for groundwater migrating offsite are Botany Bay to the north and Quibray Bay to the west. Quibray Bay is considered sensitive and parts of it comprise Towra Point Nature Reserve or Towra Point Aquatic Reserve. Groundwater bores for garden irrigation are also present within the surrounding residential area. Additionally, Marton Park Wetland is located on the northern side of the Site (URS, 2013) and wetlands in Zone 4 and 5 located to the south of Zone 2.

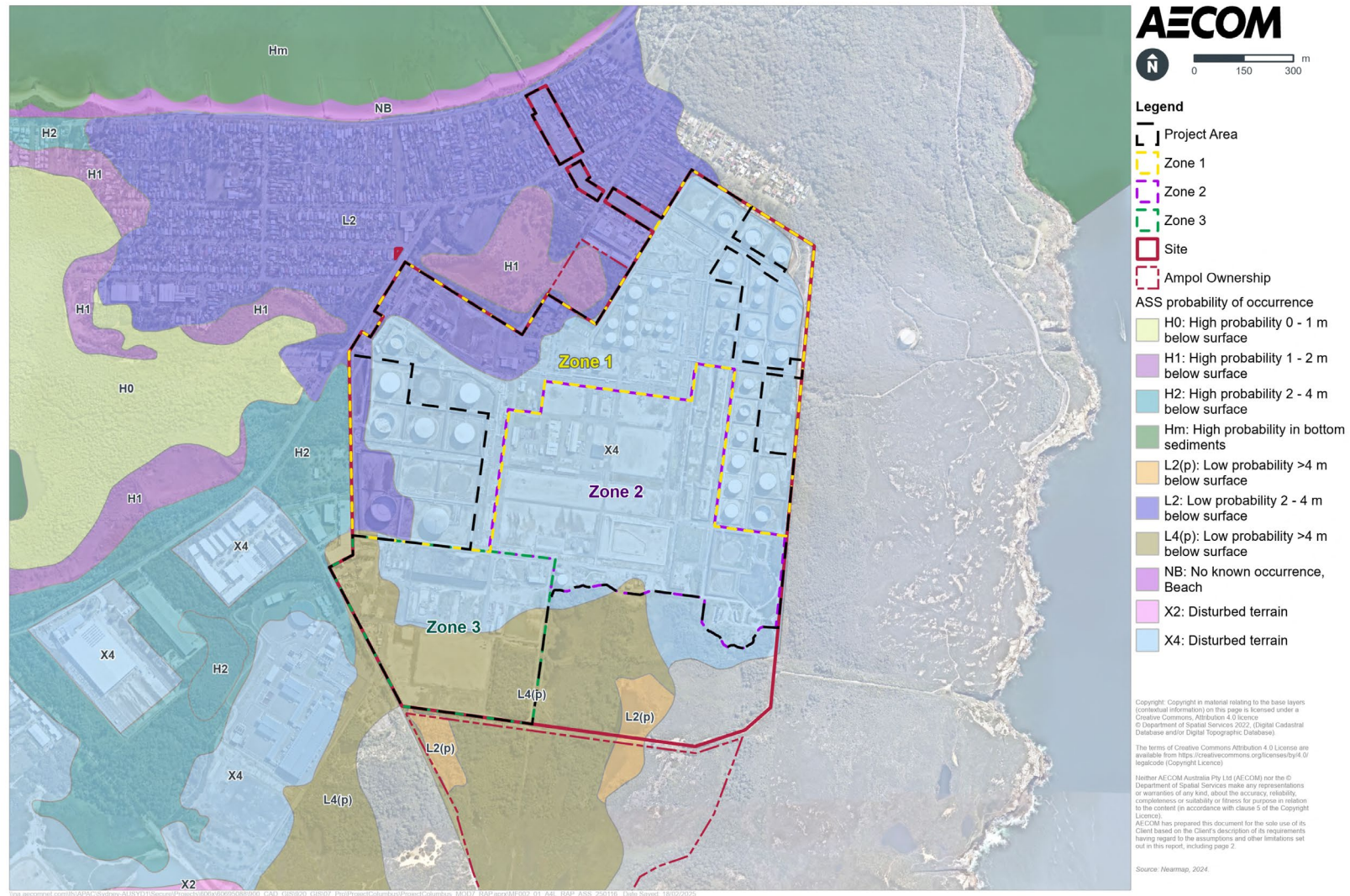


Figure 3-1 Acid sulfate soils

3.5 Groundwater dependent ecosystems

Groundwater dependent ecosystems (GDEs) are ecosystems that rely on groundwater to provide at least some of their water needs. GDEs can be impacted by changes in groundwater quality and water table changes from surrounding urban, agricultural, extractive or industrial land uses.

GDEs have been identified close to the Project Area¹, as shown on Figure 3-2. This mapping indicates that the following ecosystems in proximity to the Site rely on groundwater:

- Marton Park Wetland, to the north. Mapped as a high probability terrestrial GDE and high probability wetland GDE.
 - PCT 4028 Estuarine Swamp Oak Twig-rush Forest was mapped in moderate condition along Solander Street (i.e., along the southern border of Marton Park Wetland) as part of the field investigations supporting the current assessment.
 - The State Vegetation Type Map (NSW DCCEEW 2024a) indicates the potential further presence of PCT 3972 Sydney Creekflat Wetland and PCT 3986 Coastal Sands Swamp Mahogany Rush Forest within Morton Park Wetland.
- Vegetation within Kamay Botany Bay National Park, to the east. The closest areas to the subject land are mapped as medium probability GDEs.
 - The State Vegetation Type Map (NSW DCCEEW 2024a) indicates the potential presence of PCT 3545 Coastal Sands Bloodwood Low Forest within these vegetated areas adjacent to the subject land. This matches the vegetation mapping undertaken by Biosis for areas along the eastern edge of the subject land.
- The wetland area in Zone 4 (mapped as high to medium probability terrestrial GDE and high probability wetland GDE) and Zone 5 (mapped as medium to low probability terrestrial GDE with patches of high probability).
 - PCT 3545 Coastal Sands Bloodwood Forest, PCT 3546 Coastal Sands Littoral Scrub-Forest, PCT 3638 South Coast Sands Bangalay Forest, PCT 3921 Coastal Sydney Sands Saw-sedge Wet Shrubland and PCT 3986 Coastal Sands Swamp Mahogany Rush Forest were mapped in Zone 4 as part of the field investigation supporting the current assessment.
 - The State Vegetation Type Map (NSW DCCEEW 2024a) indicates the potential further presence of PCT 3805 Southern Sandplain Heath, PCT 3812 Sydney Coastal Sandstone Headland Heath and PCT 3922 Sydney Coastal Sand Swamp Scrub.
- A natural retention basin is located in the south of Zone 4.
 - The same PCTs recorded or predicted to occur (via the State Vegetation Type Map) in Zone 4 are likely to occur within Zone 5.

Towra Point Nature Reserve, a listed Ramsar Wetland of international significance. Mapped as a high probability terrestrial GDE and high probability estuarine and near shore marine ecosystems GDE. The mapping also indicates that there is terrestrial vegetation that relies on groundwater within RPIP Mountain (high to medium probability GDE). This vegetation would be removed as part of the proposed modification.

Patches of medium probability GDE are present along the eastern boundary of the Site. The lower two patches were assessed within the Updated Biodiversity Development Assessment Report (BDAR) (Appendix I of the Submissions Report).

¹ Australian Government Bureau of Meteorology Groundwater Dependent Ecosystems Atlas, found at:

<http://www.bom.gov.au/water/groundwater/gde/>

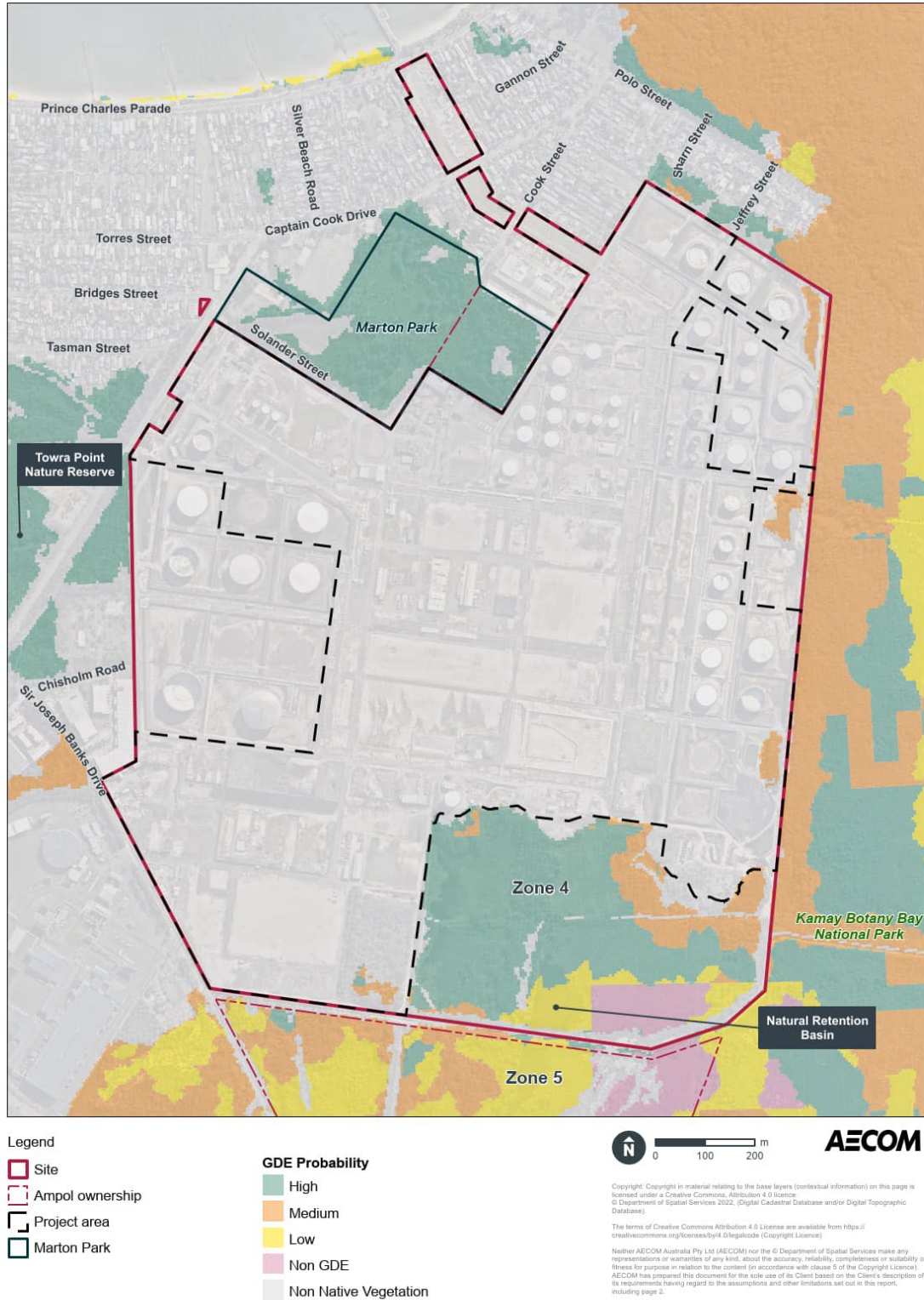


Figure 3-2 GDEs in proximity to the Project Area

3.6 Contamination

The review of Site history, existing data and reports, and the conceptual site model (CSM) is detailed in the RAP (Appendix E of the Submissions Report) and summarised in the following sections. A CSM provides a spatial and temporal overview of the contamination at a Site and its surroundings. The CSM highlights contamination sources, potential receptors, and the potential exposure pathways between the sources and receptors. For a human or ecological receptor to be exposed to a contaminant derived from a site, a complete exposure pathway must exist.

3.6.1 Areas of environmental concern

Areas of environmental concern (AEC) where contamination is known or could be present from former potentially contaminating activities is detailed in the RAP (Appendix E of the Submissions Report). These are summarised in Table 3-1 and are presented spatially on Figure 3-3.

Table 3-1 Areas of environmental concern

Zone	AEC Details
Zone 1 and 2	<p>Eastern Tank Farm</p> <p>The eastern tank farm is located in the eastern portion of Zones 1 and 2. The area includes both active (Zone 1) and former (Zone 2) aboveground storage tanks (AST). There is light non-aqueous phase liquid (LNAPL) present which is the result of a historic spill of product within the tank farm in the early 1990s. The LNAPL plume was remediated through hydraulic removal; however, residual LNAPL is still present within the area (WSP, 2018). Based on the age and lack of primary source for the LNAPL, the contamination is not expanding (Ampol, 2019).</p>
Zone 1	<p>Jet Fuel Remediation Area</p> <p>The Jet Fuel Remediation Area is located within Zone 1, east of the Terminal Operations Building within the Contractors Carpark area. There is ongoing groundwater remediation being undertaken at this AEC (Ampol, 2019). Boundary monitoring (PMW22, PMW45) shows primary contaminants in groundwater are limited to the source area (WSP, 2024)).</p>
Zone 1	<p>North Western Tank Farm</p> <p>The north western tank farm (and the adjacent Tank 124 area to the north) is located in the north of Zone 1. The north western tank farm contains a series of active ASTs, whilst the Tank 124 area is the footprint of now decommissioned water storage tanks and hydrocarbon storage tanks (WSP, 2018). Quarterly groundwater monitoring within this area has identified contamination consistent with the historic fuel storage activities, however concentration trends are stable and there are no exceedances of relevant screening criteria at boundary wells for PHCs (WSP, 2024).</p>
Zone 1	<p>Northern Tank Farm</p> <p>The northern tank farm is in the northernmost corner of the Site within Zone 1. The area contains residual LNAPL and dissolved phase hydrocarbon contamination. There is a bioventing remediation system installed down hydraulic gradient of the northern tank farm, to treat groundwater. The groundwater contamination within the AEC is subject to ongoing management.</p>
Zone 1	<p>Former LPG Area</p> <p>The Former LPG Area is located on the north western portion of the Site immediately west of the main entrance, within Zone 1. The Former LPG Area previously contained the LPG loading area, LPG storage, and a weighbridge, which were all removed during the terminal conversion. There is currently one active aboveground storage tank containing petroleum product within this AEC. Whilst there are no PHC impacts of concern within this area (WSP, 2018), investigations into the presence of asbestos have identified impacts within surface soils which require management or remediation (AECOM, 2023b).</p>

Zone	AEC Details
Zone 2	<p>Former Fire Training Area (FFTA) The FFTA is located on the southern boundary of Zone 2. It consists of a bunded concrete slab with aboveground props which were historically set alight for firefighting exercises. The FFTA is no longer in use. Assessments into the FFTA concrete slab have been completed (Enviropacific, 2022) and have confirmed the presence of PFAS within the concrete but below the General Solid Waste (GSW) classification (NSW EPA, 2014)). Additional works in this area characterised the nature of PFAS in soil and groundwater in this area (WSP, 2025). These studies concluded that PFAS is present in soils below relevant criteria. PFAS is also present in groundwater and surface water as a result of leaching from soil and concrete.</p>
Zone 3	<p>Tank 282, Tank 331, and Flare Compound Geobag Areas The Site has been historically identified as having three geobag areas (each located within Zone 2), which were used for storage and processing of geobags containing tank sludge removed from bases of tanks during the refinery decommissioning and demolition works. Geobags were removed from all three compounds between 2019 and 2023. Subsequent validation sampling has confirmed that the areas are suitable for ongoing industrial use (Ampol, 2023) as defined by the ASC NEPM.</p>
Zone 3	<p>Caltex Lubrication Oil Refinery (CLOR) Tank Farm This area has been used to store hydrocarbon impacted soil waste temporarily. Removal of this waste commenced in 2023 and was completed in 2024. In 2025, OWS services within the former tank farm were partially removed. Sampling has been undertaken following the completion of these works, and reporting is currently under way.</p>
Zone 3	<p>CLOR Landfarm The former CLOR landfarm within the eastern portion of Zone 3 contained hydrocarbon and asbestos waste. This area was used for landfarming prior to construction of a replacement landfarm in the south east corner of Zone 2. The CLOR landfarm was remediated as part of DA20/0104, commencing in 2021 (Ampol, 2023). As part of this work, all former landfarm waste was excavated and disposed offsite. This was followed by validation and backfilling of excavated areas with Virgin Excavated Natural Material (VENM).</p>
Zone 3	<p>CLOR Process Unit Area The CLOR process unit area was initially identified as requiring remediation due to the presence of LNAPL (Ampol, 2019). The area was remediated in 2021 through the excavation and offsite disposal of hydrocarbon contaminated soils, removal of a redundant stormwater basin, as well as two areas of asbestos impacted soils. A validation report was prepared and submitted to Sutherland Shire Council and the NSW EPA in November 2021 (Ampol, 2021). Subsequent groundwater monitoring at this AEC has found that LNAPL is no longer present and PHC contamination in groundwater did not exceed Tier 1 screening criteria (WSP, 2024).</p>
Zone 3	<p>RPIP Mountain The area colloquially known as Refining Process Improvement Project (RPIP) Mountain is located in the south east of Zone 3. This area formerly contained stockpiles of soils from other onsite areas containing asbestos and other contaminants. Over time, the stockpiles have been naturally revegetated in low to regenerating condition. Sampling completed by AECOM in 2022 identified asbestos impacts from surface to 2.0 mbgl. Other analytes test (PFAS, metals, PHC) were below human health criteria (commercial/ industrial) (AECOM, 2023a). Additional soil sampling was completed in 2025 to investigate the nature of deeper soils within RPIP. Fill was noted to vary between 0.1 and 1.5 m in thickness. Chemical analysis identified similar COPC as the shallower investigations. Within soils between 2 and 3 mbgl (soils noted to be wet from ~2.0 m), potential ASS was identified at three of 12 investigation locations.</p>

Zone	AEC Details
Zone 2	<p>Former Limestone Pits</p> <p>This area is located in the south eastern corner of Zone 2. Remedial works were completed in 2012, with remediation completed through stabilisation and containment onsite, and managed through an EMP. Groundwater management is ongoing through a phytoremediation system. It is noted in the Quarterly Groundwater Monitoring Event (GME) report (November 2023) that the Limestone pits area is monitored on a biannual basis. A 2018 review of groundwater data (GHD, 2018) found no exceedances of assessment criteria present.</p>

3.6.2 Contaminants of potential concern

Contaminants of potential concern (COPC) are listed in Table 3-2.

Table 3-2 Contaminants of potential concern (COPC)

Source type	Contaminants of potential concern (COPC)
<p>Primary sources – Includes current and historic infrastructure, containers used for the bulk storage or transport of chemicals, and current and historic site activities (e.g. refuelling, or firefighting training).</p>	<ul style="list-style-type: none"> • Asbestos • Petroleum hydrocarbons comprising <ul style="list-style-type: none"> - Total recoverable hydrocarbons (TRH) - Benzene, toluene, ethylbenzene, xylenes and naphthalene (BTEXN) - Polycyclic aromatic hydrocarbons (PAHs) • PFAS
<p>Secondary sources – Includes soil (including fill of unknown origin) and groundwater (including LNAPL) impacted by petroleum hydrocarbons, chemical solvents, and other chemicals.</p>	<ul style="list-style-type: none"> • Heavy metals (As, Ni, Cu, Zn, Pb, Hg, Cd, Cr) • Organochlorine and Organophosphorus (OCP and OPP) pesticides • Phenols • Polychlorinated Biphenyls (PCBs) • Volatile Organic Contaminants (VOCs) including chlorinated hydrocarbons (CHCs) and Semi Volatile Organic Contaminants (SVOCs) • Fuel refinery additives (MTBE/ TEL) • Refining by-products (cyanide, sulphur, nitrogen)

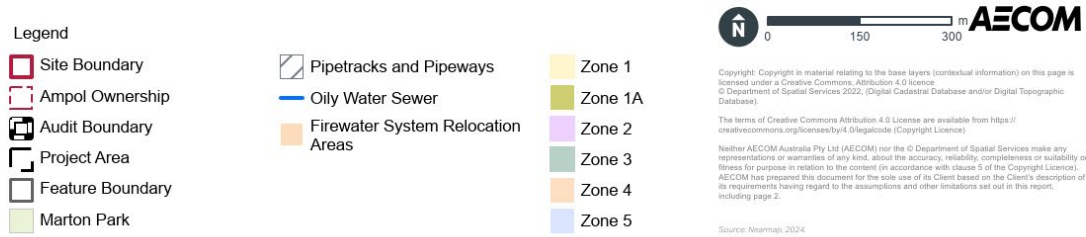
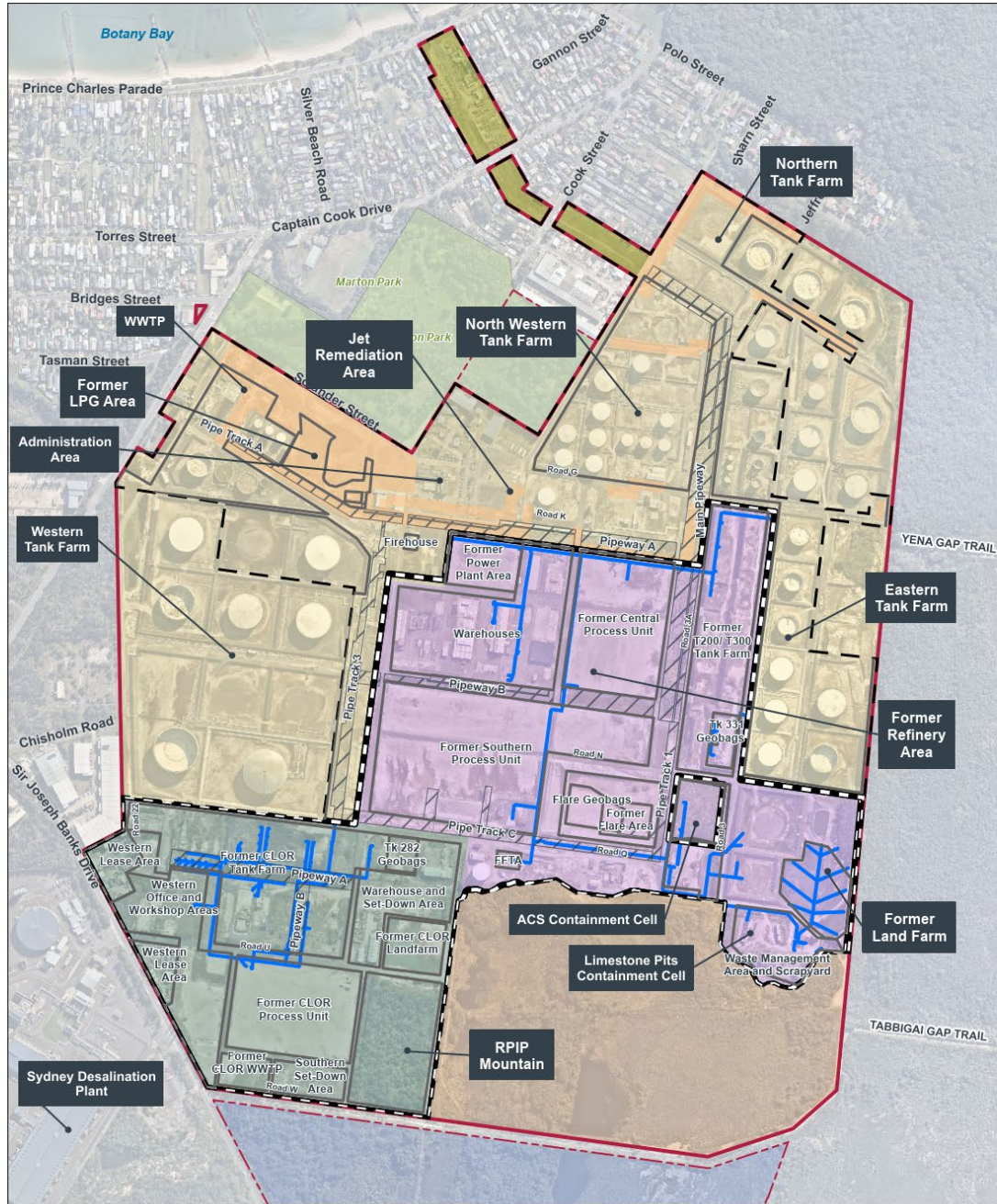


Figure 3-3 Areas of environmental concern

3.6.3 Receptors

Considering the existing land use and surrounding environment, potential human and ecological receptors that may be present onsite and offsite include:

- Onsite workers (commercial / industrial occupants)
- Onsite intrusive maintenance workers
- Onsite ecological receptors (wetlands in southeast of Site)
- Offsite residents (north of the Site)
- Offsite commercial workers (north west and south west of the Site)
- Offsite intrusive maintenance workers
- Offsite ecological receptors (surrounding Site).

3.6.4 Data gaps

A data gap assessment was undertaken in the RAP (Appendix E of the Submissions Report) to identify where more field and analytical data is required to support the refinement of SAEs (i.e. soil extents and volumes), excavation method/ staging, works controls). The following data gaps still exist:

- **Hydrocarbons:** Further data collection would be completed in areas where access has not been possible (e.g. existing structures in Zone 2) and to confirm, or further refine, presence and/ or concentrations of petroleum hydrocarbons (PHC) present.
- **Other COPCs:** Further sampling for specific process chemicals (such as methyl tert-butyl ether and tetraethyl lead, which are fuel refining additives, and methyl ethyl ketone, which were used in the CLOR refinery process), and chemicals used in the operation of a refinery (such as chlorinated cleaning agents and per and poly-fluoroalkyl substances (PFAS) containing foams/ concentrates) that may have been used at the Site.
- **Services removal:** Sampling around existing services (e.g. OWS or FWS infrastructure) presents safety and accessibility limitations. As these are removed as part of the proposed modification, further investigations would be completed.
- **Validation of historical results:** A large number of ground investigation have been completed across the Site over many years (refer to Appendix E of the Submissions Report). The condition of the soils may have changed since some of these investigations occurred (e.g. due to natural attenuation, or through ongoing operational processes). Where required, additional characterisation would help confirm historical investigations.

These data gaps would be addressed through additional investigations completed to inform the development of the Remedial Works Plan(s) (RWP(s)). These works would allow for the refinement of the Source Area Excavations (i.e. soil extents and volumes) and excavation method/ staging.

4.0 Assessment of construction impacts

This section provides an assessment of the potential construction impacts related to the disturbance of contaminated soil, acid sulfate soil and groundwater, and consideration of waste generation, importation of spoil as well as spills and leaks from construction activities.

4.1 Disturbance of existing contamination

The construction works would include disturbance of contaminated and uncontaminated soils during excavation works undertaken as part of remediation, demolition, and grading works. Without mitigation, there is potential for human and ecological receptors described in Section 3.6.3 to be affected by existing contamination. Potential contamination transport pathways during construction (if mitigation measures were not implemented) include:

- Leaching of soil contaminants into groundwater
- Lateral and vertical migration of contaminants in groundwater
- Dust and sediment from wind and erosion
- Vapour intrusion and migration into underground services and pits, and buildings
- Physical transport during earthworks and vehicle movements
- Dermal contact and incidental ingestion of soil/groundwater/surface water
- Inhalation of soil derived dust or fibres in indoor and/or outdoor air
- Inhalation of soil vapours in indoor air and/or outdoor air.

Based on the physical and chemical parameters of the COPC identified, exposure pathways that may be relevant to each COPC and source pathway receptor linkage assessments have been presented in Table 4-1. Potential adverse impacts that could occur as a result of these contamination transport pathways (if mitigation measures were not implemented) include:

- Potential exposure of the Site and construction workers to contamination present in the soil and groundwater during the works
- Generation of nuisance odours
- Potential for cross-contamination of clean soils with contaminated spoil during construction works from earthmoving and stockpiling activities
- Soil erosion and sedimentation during construction causing contaminated stormwater and/ or sediment to discharge and impact surrounding land and waterways.

However, the completion of remediation works undertaken as part of the modification works would overall have a positive environmental impact by reducing the risk the existing contamination poses to these receptors.

Contamination would be managed through implementation of the RAP (Appendix E) of the Submissions Report). Data gap investigations, proposed in Appendix E, would inform the RWPs to refine remediation extents and methodologies. The contamination would either be reduced to a level that is acceptable for the ongoing terminal use or subject to additional management controls under a CEMP. Mitigation measures for potential impacts related to disturbance of existing contamination are listed in Section 7.0.

Table 4-1 COPC and relevant pathways

Zone and areas	Media	COPCs	Receptors	Complete or potential complete pathway
Zone 1 Areas include: <ul style="list-style-type: none"> • LPG Area • Eastern Tank farm • North western tank farm 	Soil	<ul style="list-style-type: none"> • Asbestos • TRH • BTEXN • PAHs • PFAS • Heavy metals (expanded metals) • OCP and OPP and herbicides • Phenols • PCBs • VOCs (including CHCs) • SVOCs • Fuel refinery additives 	• Onsite workers	• Incomplete, managed by the Site's existing OEMP protocols
			• Onsite maintenance workers	• Incomplete, managed by the Site's existing OEMP protocols
	Groundwater		• Onsite workers	• Incomplete, managed by the Site's existing OEMP protocols
			• Onsite maintenance workers	• Incomplete, managed by the Site's existing OEMP protocols
			• Offsite residents (north of the Site)	• Potentially complete for PFAS related to the use of extracted groundwater for purposes such as irrigation and recreational use*
			• Offsite commercial workers	• Potentially complete for PFAS related to the potential use of extracted groundwater for purposes such as incidental ingestion*
			• Offsite intrusive maintenance workers	• Potentially complete for PFAS related to the potential for incidental ingestion of groundwater during intrusive works*

Zone and areas	Media	COPCs	Receptors	Complete or potential complete pathway
			<ul style="list-style-type: none"> Offsite ecological 	<ul style="list-style-type: none"> Potentially complete for PFAS related to the potential for ingestion of groundwater in groundwater dependant ecosystem* or where a groundwater to surface water connection exists.
<p>Zone 2 and Zone 3</p> <p>Areas include:</p> <ul style="list-style-type: none"> RPIP Mountain Former CLOR Tank Farm Former CLOR Process Unit Former CLOR WWTP Southern Set-down Area Western Office Areas Warehouse and set-down area Former CLOR Landfarm Western Lease Areas Former southern process unit Workshop and garage area Former central process unit Former flare Former Fire Training Area (FFTA) 	Soil	<ul style="list-style-type: none"> Asbestos TRH BTEXN PAHs PFAS Heavy metals (expanded metals) OCP and OPP and herbicides Phenols PCBs VOCs (including CHCs) SVOCs Fuel refinery additives Refinery by-products Refinery process chemicals 	<ul style="list-style-type: none"> Onsite workers 	<ul style="list-style-type: none"> Incomplete, managed by the Site's existing OEMP protocols
			<ul style="list-style-type: none"> Onsite maintenance workers 	<ul style="list-style-type: none"> Incomplete, managed by the Site's existing OEMP protocols
	Groundwater	<ul style="list-style-type: none"> TRH BTEXN PAHs PFAS Heavy metals (expanded metals) OCP and OPP and herbicides Phenols VOCs (including CHCs) SVOCs Fuel refinery additives Refinery by-products Refinery process chemicals 	<ul style="list-style-type: none"> Onsite workers 	<ul style="list-style-type: none"> Incomplete, managed by the Site's existing OEMP protocols
			<ul style="list-style-type: none"> Onsite maintenance workers 	<ul style="list-style-type: none"> Incomplete, managed by the Site's existing OEMP protocols
			<ul style="list-style-type: none"> Offsite ecological (Wetlands to south of Zone 2 boundary, nature reserves east of Zone 2, Ampol owned vegetated areas south of Zone 3) 	<ul style="list-style-type: none"> Potentially complete for PFAS related to the potential for ingestion of groundwater in groundwater dependant ecosystem* or where a groundwater to surface water connection exists.

Zone and areas	Media	COPCs	Receptors	Complete or potential complete pathway
<ul style="list-style-type: none"> • Waste management area • Former eastern tank farm 			<ul style="list-style-type: none"> • Offsite intrusive maintenance workers 	<ul style="list-style-type: none"> • Potentially complete for PFAS related to the potential for incidental ingestion of groundwater during intrusive works*
			<ul style="list-style-type: none"> • Offsite commercial workers 	<ul style="list-style-type: none"> • Potentially complete for PFAS related to the potential use of extracted groundwater for purposes such as incidental ingestion*

* Potentially complete pathway relates to PFAS contaminants which are present in groundwater at the nearest relevant down-hydraulic gradient Site boundary transect.

4.2 Groundwater

A Groundwater Assessment for dewatering activities associated with the proposed modification works has been undertaken (refer to Annexure A). The proposed modification involves excavation of pits and trenches during Stage 2 (Removal, relocation and/or augmentation of infrastructure) and Stage 3 (Remediation). Groundwater is relatively shallow across the Site, with the shallowest depth of 0.2 mbgl recorded in Zone 2. Consequently, groundwater may be intercepted and accumulate within trenches and pits during excavations, requiring temporary dewatering to enable works to be carried out safely.

Any activity that extracts groundwater may cause groundwater drawdown and has potential to impact surrounding GDEs. Temporary groundwater drawdown may occur within GDEs located to the south (in Zone 4 of the Site) and to the east and north east of the Site (just inside the boundary Kamay Botany Bay National Park). Drawdown within the national park would be negligible and within natural groundwater level fluctuations. Whilst the development site is located approximately 150 m from the Towra Point Nature Reserve, which is a listed Ramsar wetland of international importance, the site is outside the predicted drawdown extent for all proposed excavations. Therefore, it is predicted that the proposed modification works would not impact this GDE.

Specific impacts to the GDEs due to groundwater drawdown has been considered in the Updated Biodiversity Development Assessment Report (Appendix I of the Submissions Report). Given the temporary nature of the works and through implementation of mitigation, it is unlikely that there would be a permanent impact to the identified GDEs.

Potential impacts to GDEs due to groundwater drawdown would be temporary and managed by adhering to the Groundwater Management Plan (GWMP), as a subplan of the Construction CEMP. The GWMP would include dewatering management measures for the extraction, storage, movement and treatment of groundwater encountered in excavations. The GWMP would also outline groundwater monitoring (water levels and quality) requirements, site-specific water level and quality trigger levels, and an associated Trigger Action Response Plan to allow for effective and quick responses. Measures would include a staged approach to excavations/ trenching works to ensure required drawdowns are minimised as much as practicable throughout works. This would also include ensuring that excavations/ trenches in closest proximity to GDEs (and therefore with the highest impact on drawdown) are open for the shortest period of time possible.

Dewatered groundwater would be collected and sent to the on-site Waste Water Treatment Plant (WWTP) in accordance with the established Site wastewater management procedures, unless it is tested and is of suitable quality to be directed to stormwater. Testing for COPCs would be undertaken to confirm that this water can be appropriately treated in the WWTP. It is anticipated that the system, including the WWTP, would have sufficient capacity during remediation activities as the WWTP was originally designed to service the refinery which is no longer in operation. It is understood that on a flow and contaminant concentration basis the current loading is well below the WWTP design capacity. Groundwater that cannot be treated at the WWTP would either be pre-treated by another method or disposed to an appropriately licenced liquid waste facility. The specific pre-treatment approach would be dependent on the COPCs present.

Active remediation of groundwater during the proposed modification is not anticipated to be required (other than as a contingency measure). Should it be warranted, changes to groundwater quality would be monitored as part of the GWMP.

Given the temporary nature of the works and through implementation of mitigation, it is unlikely that there would be a permanent impact to the identified GDEs.

A quarterly groundwater monitoring program is implemented by Ampol at the Site as a protection measure to monitor groundwater quality and trends. The monitoring program includes monitoring wells in the central part of the Site, and various boundary monitoring wells along the northern and western boundaries, corresponding to the down gradient direction of groundwater flow. This monitoring program would continue throughout the construction period of the proposed modification to verify the works are not impacting groundwater quality.

Procedures for preventing adverse groundwater impacts from dewatering activities would be included in the GWMP and implemented to manage the testing, dewatering, storage, movement and treatment of any groundwater intercepted during the construction phase. These measures could include bunding of fuel or chemical storage areas onsite and monitoring of dewatering activities adjacent to identified GDEs.

4.3 Acid sulfate soils

PASS could potentially be disturbed in areas where excavations exceed 2 m below the natural ground surface or where groundwater is lowered below the depth of PASS for an extended period. Most excavations are anticipated to be less than 1 mbgl but deeper excavations, between 2 and 4.9 mbgl would occur. Based on the estimated remediation volumes, there is potential for over 1,000 tonnes of PASS to be excavated.

Where excavations intersect groundwater, dewatering would be required. Where dewatering is required in areas where PASS is present, ASS may be encountered in a saturated condition. Leachate may also be generated from stockpiled soils. Untreated leachate or groundwater could potentially harm the environment. Appropriate leachate collection systems and containment bunds would be used to contain stormwater runoff and leachates. A sufficient supply of aglime would be kept onsite at all times, for the treatment of extracted acidic groundwater. Any leachate or extracted water collected would be monitored for treatment as required prior to discharge to the WTP.

Given historical observations of ASS at the Site, a draft Acid Sulfate Soil Management Plan (ASSMP) has been developed (refer to Appendix E2 of the Submissions Report). It provides details on field identifiers, and sampling and analysis guidance. Should ASS be identified at the Site, in line with this plan, quantitative assessments would be undertaken to confirm specific management actions to be implemented at specific locations.

Measures for treatment of ASS would be implemented, in line with the ASSMP.

This would include construction of treatment pads and the addition of aglime to soil to neutralise acid should it be generated.

4.4 Waste

The remediation and construction works would also require some disposal of contaminated soil to landfill where soil cannot be treated for onsite re-use. Disposal to landfill has negative environmental impacts associated with landfilling and transporting the spoil (such as air quality and odour emissions, noise, and traffic). As part of the remedial options assessment in the RAP (Appendix E of the Submissions Report), the hierarchy of remedial options was considered in terms of sustainability and reducing the volume offsite treatment and disposal where possible. Where practical, the first option would be to treat and re-use onsite, with offsite disposal to landfill being the last option.

Mitigation measures to reduce landfill waste would be included in the CEMP. Further assessment of waste impacts was included in Section 7.12 (Other issues) of the Modification Report.

4.5 Importation of spoil

Soil would be required to be imported to the Site to backfill excavations and level areas of the Site. Soil imported to the Site could have negative human health and ecological impacts if it is contaminated with chemicals or asbestos, or has unsuitable physical properties (e.g. pH, salinity). As stated in the RAP (Appendix E of the Submissions Report), imported materials would only be accepted to the Site if they meet the definition of:

- Virgin excavated natural material (VENM) as defined in the POEO Act, 1997 Schedule 1.
- ENM as defined by the Resource Recovery Order under Part 9, Clause 93 of the POEO (Waste) Regulation 2014
- Any other suitable material granted an applicable exemption or order under the NSW EPA resource recovery framework.
- Extractive materials sourced from legal quarries (not considered a waste as defined under the POEO Act, Schedule 1, clause 19).

The material imported to the Site would be accompanied by appropriate documentation that has been verified by the appointed environmental consultant. A validation report would include materials tracking and inspection and test results for validation sampling of imported materials.

4.6 Spills and leaks

Potential contamination of soil and groundwater could occur during construction works from:

- Spills from removal of pipes
- Hydraulic fluid leaks from excavators and other mobile plant
- Spills during plant refuelling
- Spills or leaks of other materials stored and used onsite, including oil and fuel for site plant and vehicles, stored liquid wastes from remediation works, and dewatering activities.

Spills or leaks on unsealed and unbunded surfaces can contaminate underlying soils and migrate into groundwater or stormwater. The CEMP would include spill and leak prevention measures and spill response and reporting procedures. This would involve regular inspection and maintenance of construction equipment to minimise and promptly address leaks, reducing the likelihood of spills (refer to Section 7.0).

5.0 Assessment of operational impacts

This section provides an assessment of the potential impacts related to soils and groundwater, and fuel and chemical storage during operation. The management plans discussed in this assessment are detailed further in Section 7.0.

5.1 Soils and groundwater

Where relevant, following remediation and where further management of contamination is required within the Audit Boundary, one or more Environmental Management Plan(s) (EMPs) would be prepared. These plans would fall under and be administered by the Site's existing OEMP. The OEMP would be updated as required to incorporate new EMP(s). The EMP(s) would be prepared in general accordance with the NSW EPA EMP Guidelines 2020 and Consultant Guidelines 2020 (NSW EPA, 2020).

Following soil remediation, groundwater monitoring would continue to confirm that the soil remediation works were effective. The soil remediation process itself would significantly improve groundwater conditions over the long term, assisted by natural attenuation (this process involves allowing naturally occurring micro-organisms in the ground to biodegrade hydrocarbon contamination). Residual groundwater impacts requiring ongoing management would be addressed as part of an EMP, if necessary.

Following delivery of the proposed modification, the majority of Zones 2 and 3 would be maintained in line with existing operational environmental management procedures. Surface treatments, such as grassing or hydromulch, would be maintained to help mitigate soil erosion and limit the amount of sediment discharging into the existing drainage network. Stormwater flows across Zones 2 and 3 would be directed to the existing stormwater system (SWS) at the Site, and flows in Zone 1 would continue to be managed by either the SWS or the OWS as per current conditions. Refer to the Updated Surface Water, Wastewater, and Flooding Impact Assessment (Appendix G of the Submissions Report) for further information.

As such, the proposed modification is not expected to result in adverse impacts relating to soils and erosion during operation.

5.2 Fuel and chemical storage and handling

Once the proposed modification works are complete, the Site would continue to operate as described in the approval documentation for the approved project and would be consistent with the development consent for SSD-5544. Potential adverse impacts associated with ongoing operations may occur due to loss of containment during storage and transfer activities onsite, if prevention mitigation measures fail. Along with ongoing implementation of the OEMP, planned upgrades to parts of the OWS as part of the proposed modification should further reduce the risk of future impacts.

Continued operation of the Site, including relocated infrastructure, would be subject to environmental conditions of approvals in SSD-5544. As stated in the EIS (URS, 2013), operations would be carried out with applicable federal, state, and local permits, approvals, and regulatory requirements, as managed through the existing environmental management system at the Site.

6.0 Assessment of cumulative impacts

Cumulative impacts have the potential to occur when benefits or impacts from a project overlap or interact with those of other projects, potentially resulting in a larger overall effect (positive or negative) on the environment or local communities. Cumulative impacts may occur when projects are constructed or operated concurrently or consecutively.

Projects were reviewed against the following screening criteria for this cumulative impact assessment:

- Spatially relevant (i.e., the development or activity overlaps with, is adjacent to or within two kilometres of the Project Area)
- Scale (i.e., large-scale major development or infrastructure projects that have the potential to result in cumulative impacts with the proposed modification, as listed on the NSW Government Major Projects website and on the relevant council websites)
- Timing (i.e. the expected timing of its construction and/or operation overlaps or occurs consecutively to construction and/or operation of the proposed modification)
- Status (i.e., projects in development with sufficient publicly available information to inform this environmental impact statement and with an adequate level of detail to assess the potential cumulative impacts).

The following offsite projects were considered to have met the above criteria, with the potential to have cumulative impacts with the proposed modification:

- Kamay Ferry Wharves (350 m north of the Project Area)
- Breen Resource Recovery Facility (2 km west of the Project Area)
- Woolooware to Kurnell Tower Replacement Project (120 m south west of the Project Area).
- Kurnell Planning Proposal (800 m south west of the Project Area).

Since lodgement of the Modification Report, one project, Kurnell Stormwater Separation Improvement Project, has finished construction and has been removed from the cumulative impact assessment. The combined impacts from this project have been addressed as part of the baseline assessment of this Updated Soils, Groundwater, and Contamination Report.

Kamay Ferry Wharves has also completed construction, however, as ferry services have not yet commenced, the project continues to be included in the operational cumulative impact assessment.

The location of the projects are shown in Figure 6-1.



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Figure 6-1 Cumulative development projects

6.1 Construction

Construction of the proposed modification is anticipated to commence in 2026 and be completed in 2030. A comparison of the construction timing of the identified cumulative development projects and the potential impacts related to soil, contamination, and groundwater for the projects are described in Table 6-1.

Table 6-1 Cumulative assessment – Construction

Project	Construction timing	Potential impacts
Breen Resource Recovery Facility (SSD-10412)	Determined in 2024. Construction anticipated to be completed in 2028.	An EIS (Ethos Urban, 2021) was prepared for the construction and continued operation of a resource management facility including resource recovery facility and redevelopment of completed landfill areas into recreational parklands/ community space. The Breen Resource Recovery Facility was a former sand mining operation which was converted into a solid waste landfill in 1990 for VENM and PASS disposal (PASS disposal below water level) and operates under an EPL. According to the EIS, the leachate within groundwater in the landfill area has concentrations of ammonia, heavy metals, and petroleum hydrocarbons typical of an inert landfill and do not appear to be migrating offsite at concentrations greater than background levels typical of the area. Landfill gases also were reported to not be migrating offsite (Ethos Urban, 2021). Soil erosion and subsequent increased sedimentation into Quibray Bay could be a potential negative cumulative impact if appropriate controls not implemented. The project is located outside of the groundwater drawdown extent for the proposed modification works.
Woolooware to Kurnell Tower Replacement Project	Determined in 2024. Construction anticipated to be completed in 2028.	A Review of Environmental Factors (REF) was prepared by Ausgrid for the tower replacement project ² . The replacement of transmission towers could potentially result in localised disturbance of soils within the construction footprint of each tower replacement. The contamination status of soils within the construction footprint is not known. Soil erosion and subsequent increased erosion into Quibray Bay could be a potential negative cumulative impact if appropriate controls not implemented. The project is located outside of the groundwater drawdown extent for the proposed modification works.

² <https://cdn.ausgrid.com.au/In-your-community/Construction-projects/Woolooware-to-Kurnell-Tower-Replacement> - accessed 24 June 2024

Project	Construction timing	Potential impacts
Kurnell Planning Proposal	Currently under assessment. Construction anticipated to occur over 10 to 20 years.	The Planning Proposal is for a 210 hectare area for rezoning for a mixture of residential, commercial, tourism, recreational and cultural land uses. A Stage 1 – Preliminary Site Investigation (PSI) (Coffey, 2023) was prepared for the Kurnell Planning Proposal. The PSI identified limited and low risk of contamination sources from historical activities and concluded further detailed investigation was not required. Given the likely limited contamination within the Kurnell Planning Proposal area, cumulative negative impacts related to contamination are not anticipated. Soil erosion and subsequent increased erosion into Quibray Bay could be a potential negative cumulative impact if appropriate controls not implemented. The project is located outside of the groundwater drawdown extent for the proposed modification works.

Given the likely limited contamination associated with the offsite projects, cumulative negative impacts related to contamination and groundwater quality are not expected. Measures included as part of the Breen Resource Recovery Facility project CEMP should help reduce risk associated with existing soil and groundwater contamination, where present. The other projects have relatively smaller construction footprints and may encounter isolated areas of contamination which could be readily managed through implementation of a CEMP.

Soil erosion and subsequent increased sedimentation into Quibray Bay and Botany Bay, as well as dust generation, could be a potential negative cumulative impact if appropriate controls were not implemented across all projects. All projects would require implementation of a CEMP in accordance with conditions of approvals and therefore would minimise negative impacts associated with sedimentation on surrounding waterways.

The other cumulative projects are located outside the groundwater drawdown extent for the proposed works. There would be potential cumulative impacts if groundwater drawdown cones/ areas associated with excavation dewatering overlap. Based on the available information and anticipated construction activities, this is considered unlikely. As such, cumulative impacts associated with groundwater drawdown are not anticipated.

Overall, negative cumulative impacts related to soil, groundwater, and contamination are not anticipated for these projects. This assumes the implementation of environmental mitigation measures in the respective environmental management plans for the projects.

6.2 Operation

The operations and potential associated impacts for the cumulative development projects related to soil, groundwater and contamination are described in Table 6-2.

Table 6-2 Cumulative assessment – Operation

Project	Operations	Potential impacts
Kamay Ferry Wharves	Kurnell Ferry Wharf	The project involves the operation of a new ferry wharf and associated infrastructure (waiting area, pathways and landscaping) at Kurnell headland. The EIS (ARUP, 2021) identified that there would be potential for spills from ferries and other vessels which would be managed with an Emergency Spill Management Plan. Other potential operational impacts relating to groundwater and contamination were not considered low risk.
Breen Resource Recovery Facility	Resource Recovery Facility, landfill, and park	The Breen Resource Recovery Facility would continue to operate under EPL-4608, including requirements for groundwater, surface water and landfill gas monitoring. Post-closure and redevelopment into recreational parkland/ community land use would require implementation of a landfill closure plan to manage ongoing risk of leachate and landfill gas.
Woolooware to Kurnell Tower Replacement Project	Transmission towers	There are not expected to be additional operational impacts from the replacement of the existing towers relating to soil, contamination and groundwater.
Kurnell Planning Proposal	Future residential, commercial and open space land use	The project if completed would be a significant urban development. The urban design report and development control plan (DCP) proposes development of an integrated green infrastructure system with integrated water management to minimise impacts from the development. There would be commercial and retail development for the town centre, however given the development is largely a residential area, contaminating land uses are not expected.

Overall, there is a low risk of negative cumulative environmental impacts related to soil, groundwater and contamination. Existing contamination would be remediated where required during the construction of the projects, and therefore residual contamination risk would be low. No dewatering activities are proposed following construction and therefore groundwater levels would return to current observation levels. Some of the projects would have ongoing environmental management measures through either implementation of OEMPs (including the Kurnell Terminal) and landfill closure plans (Breen Resource Recovery Facility).

7.0 Management of impacts

Mitigation measures to manage potential contamination, soils, and groundwater impacts of the proposed modification are outlined in Table 7-1. Additional and/ or modified environmental safeguards and management measures to those presented in the approved SSD-5544 are shown in **bold**. Deleted measures, or parts of measures, have been ~~struck out~~. Where approved measures have been consolidated to reduce duplication, previously agreed text that has been brought into existing or new measures has been underlined.

Table 7-1 Management and mitigation measures – Soils, groundwater, and contamination

ID	Issue	Mitigation measure
C1	Soils, groundwater and contamination	<p>A Soils and Erosion and Water Management Plan (SWMP) would be developed as part of the Construction Environmental Management Plan (CEMP) to manage the excavation, testing, stockpiling, reuse, and rehabilitation of soils as well as water management requirements. This plan would be developed in accordance with <u>'The Blue Book' Managing Urban Stormwater – Soils and Construction Volume 1 and 2 (Landcom, 2004)</u> and would outline:</p> <ul style="list-style-type: none"> • The areas where soil disturbance is likely • Soil testing procedures • Soil handling procedures • Locations where soil would be stockpiled on-site for either removal, treatment, or reuse • <u>Locations of potentially contaminated areas</u> • Procedures to reduce erosion and the spread of dust • Restricting traffic to defined roads or tracks where necessary • <u>Measures to manage vehicles leaving the Site to reduce soil on public roads</u> • The rehabilitation of bare soil following completion of the construction works • <u>Inspection program for any erosion control structures and banded areas</u> • <u>How excavations would be staged so that the length of time that excavations are left open and temporary stockpiles are required is minimised</u> • Remediated soils and validated crushed clean concrete slabs would be used as backfill where practicable. Imported material would be classified as virgin excavated natural material (VENM), excavated natural material (ENM) as defined by the ENM Order, 2014, or material covered under an NSW EPA specific Resource Recovery Order (RRO), extractive materials sourced from legal quarries (not considered a waste as defined under the POEO Act, Schedule 1, clause 19). • <u>Measures to protect excavations from increased stormwater runoff (e.g. by using bunds or similar structures where required)</u> • <u>That equipment is to be maintained and operated in a proper and efficient condition to reduce the likelihood of spills or leaks</u> • <u>How the rehabilitation of bare soil would be managed across the Site once areas are returned to grade.</u>

ID	Issue	Mitigation measure
C2	Soils	<p>All materials would be stockpiled in accordance with 'The Blue Book' <i>Managing Urban Stormwater – Soils and Construction Volume 1 and 2</i> (Landcom, 2004). Principal controls would include the following:</p> <ul style="list-style-type: none"> • Silt fences would be installed around stockpiles to reduce erosion and protect vegetation or Site infrastructure as necessary • Silt and sediment traps would be installed across stormwater drains in proximity to excavation areas • Stockpiles would be restricted to cleared areas and not impact any vegetation • Contaminated sStockpiles would be placed on impermeable sheeting surface • Stockpiles would be covered and wetted down in order to reduce dust creation • Stockpiles would not be located in close proximity to any stormwater drainage systems (where possible) • Caltex Ampol would not stockpile in areas that are prone to flooding as identified in Figure 4-10 of Appendix D of the Demolition Works SEE in the Surface water, wastewater, and flooding report (Appendix I of the MOD-7 Modification Report) • Stockpile locations and erosion and sediment control requirements associated with the Project proposed modification would be reviewed by a suitably qualified person to ensure that the recommended measures achieve the environmental outcomes for the Site.
C5	Contamination	<p>Clean materials would be separated from contaminated materials for reuse as backfill where required. A Material Tracking Plan would be implemented to track materials to be reused or removed from the Site.</p>
C8	Contamination	<p>Offsite disposal of any contaminated soils or groundwater (or suspected contaminated material) would be in accordance with Environment Protection Licence (No. 837) (EPL) requirements, NSW DECCW's Waste Classification Guidelines <u>NSW (2014) Waste Classification Guidelines: Part 1: Classifying Waste</u>, and the Contamination Management Plan (CMP) for the Project proposed modification. Contaminated materials to be disposed offsite would be sent to appropriately licensed facilities in accordance with the Contaminated Land Management Act 1997 (NSW).</p>
C9	Acid sulfate soils	<p>If Acid Sulfate Soils (ASS) are encountered during construction or the ACS Modification works, an ASS Management Plan would be prepared in accordance with the ASS Manual (ASS Management Advisory Committee 1998).</p> <p>Detailed investigations within the Project Area would include targeted sampling to identify the presence of Potential Acid Sulfate Soil (PASS) within remediation areas where excavations are anticipated to be greater than 2 metres below ground level (mbgl).</p> <p>The results would be used to inform finalisation of the draft Acid Sulfate Soil Management Plan (ASSMP) (Appendix E2 of the Submissions Report). Processes in the ASSMP would include:</p> <ul style="list-style-type: none"> • Establishment of a suitable area for the assessment and treatment of excavated soils

ID	Issue	Mitigation measure
		<ul style="list-style-type: none"> • Treatment of material containing ASS, such as the addition of lime to neutralise the acid • Validation testing of treated ASS • Manage leachate and wastewater according to procedures • Onsite reuse or offsite disposal of treated ASS • Reporting and documentation.
C10	Groundwater	<p>A Groundwater Management Plan (GWMP) would be developed and included within the CEMP. This plan would outline the measures that would be used to manage the testing, dewatering, storage, movement and treatment of any groundwater intercepted during the construction phase. It would also outline measures to prevent and/ or minimise impacts to groundwater dependent ecosystems (GDEs) within groundwater drawdown areas. Measures would include:</p> <ul style="list-style-type: none"> • <u>Measures for the dewatering, storage, movement and treatment of groundwater encountered in excavations. Dewatered groundwater would be collected and sent to the on-site Wastewater Treatment Plant in accordance with the established Site wastewater management procedures, unless it is tested and is of suitable quality to be directed to stormwater</u> • The use of appropriate drip trays and interception techniques for any construction specific liquids stored on the Site • Bunding of any fuel or chemical storage area at the construction Site • Regular inspection of construction equipment to ensure any leaks are minimised and rectified • Management of vehicles leaving the Site to reduce soil on roads, production of dust and the introduction of contamination to the groundwater and/or stormwater system • Appropriate and timely disposal of any contaminated soil, water or waste generated during construction • Regular inspection of erosion control structures and bunded areas • Regular inspection and testing of containment areas, drainage lines and process pipe work • A plan for corrective action should an unexpected find increase in contaminants of potential concern (COPC) be observed in the groundwater monitoring during the proposed modification. • The anticipated drawdown extents would be reviewed following completion of the construction program. • Excavations/ trenches would be staged to minimise drawdowns during delivery of the works. Excavations/ trenches in closest proximity to GDEs would be open for the shortest period of time possible. • Following review of the drawdown extents, if required, a monitoring program for GDEs within the drawdown areas would be developed. The scope and frequency of the monitoring program would be developed based on the finalised design for excavations/ trenches and the level of drawdown influence, available field data (surface water, groundwater, and mapping of GDE extents and PCTs), and other relevant factors, including the timing and intensity of storm events. The monitoring program would include:

ID	Issue	Mitigation measure
		<ul style="list-style-type: none"> - Establishment of groundwater level and quality triggers, and GDE vegetative triggers, and associated response actions in a Trigger Action Response Plan (TARP) by a suitably qualified ecologist. - Establishment of adaptive management actions to be implemented to minimise prescribed impacts and/ or protect potentially affected GDEs within the area of drawdown influence. - Post-construction survey to confirm no ongoing impacts to GDEs occur. - In the unlikely event that permanent prescribed impacts to GDEs do occur, a Restoration Management Plan would be developed, outlining how affected the GDE community would be rehabilitated.
C11	Contamination	Any runoff that may accumulate in excavations would be periodically tested for elevated levels of contamination. Water that is found to have elevated levels of contaminants would be collected and sent to the onsite Waste Water Treatment Plant in accordance with the established refinery wastewater management procedures.
C15	Contamination	Permits would be required to work in the areas where potential soil and groundwater contamination exists. The work permit includes requirements such as monitoring and personal protective equipment (PPE) . No unauthorised entry into these areas is would be permitted , without a permit.
C16	Contamination	Appropriate inspection, assessment, maintenance and repair programmes that would be implemented as part of the operation of the Project terminal (as modified) . These safeguards would be incorporated into the updated management plans for the proposed terminal. The Project terminal (as modified) would be appropriately licenced under the <i>Protection of the Environment Operations Act 1997</i> and would be managed in accordance with EPL requirements.
C17	Contamination	<p>A Contamination Management Plan would be developed to outline measures for monitoring, handling, storing and managing contaminated soils and contaminated groundwater. It would include the following:</p> <ul style="list-style-type: none"> • <u>Excavated soils would be inspected and if necessary, tested for both contaminants and odour using standard practices</u> • Should elevated levels of contamination or odour (i.e. levels above those expected or planned for in the relevant location) be present in the soils or excavations, work related to the excavation would be suspended until a suitably qualified environmental consultant can instruct on how best to proceed to manage contamination, or vapour, or odour risks to deliver the works and ensure continued achievement of work health and safety and environmental compliance requirements. • During excavation visual and olfactory indicators of impact would be monitored. Where there is potential for volatile organic contaminants (based on known ground conditions) or where hydrocarbons are seen or smelt during excavations, soils would be inspected for hydrocarbon impacts using a PID and/or testing. • Excavated soils would not be used for backfill if they are impacted at levels exceeding commercial/ industrial as defined

ID	Issue	Mitigation measure
		<p>by Schedule B1 Guidelines, Investigation Levels for Soil and Groundwater, National Environment Protection Measure (Assessment of Site Contamination) Amendment Measure 2013.</p> <ul style="list-style-type: none"> • All excavations would be sampled for asbestos. Asbestos assessment would be undertaken in accordance with Schedule B1 Guidelines, Investigation Levels for Soil and Groundwater, National Environment Protection Measure (Assessment of Site Contamination) Amendment Measure 2013 • Asbestos impacted soil not found in the pipeways would be disposed of at the ACS containment cell or removed from the Site as soon as practicable if excavated. If these soils need to be temporarily stockpiled they would be stored at a defined location at the former CLOR site, covered and labelled as asbestos waste. Impacted soil to be disposed of offsite would be classified in accordance with NSW EPA guidelines for transport and disposal at either the ACS Containment Cell or a licensed landfill (and in accordance with the Site waste management system and the Demolition Waste and Resource Management Plan (DWRMP) for the demolition works in accordance with the Remedial Work Plan(s)). The excavation, transport and disposal of asbestos impacted soil would be undertaken by a licenced contractor and comply with NSW WorkCover SafeWork requirements. • Remedial Work Plan(s) would outline when hydrocarbon impacted soil can be temporarily stockpiled adjacent to an excavation. This would depend on the level of hydrocarbon and duration of stockpiling and specific controls in place at each excavation. • Hydrocarbon impacted soil would not be temporarily stockpiled adjacent to the excavation. If these soils need to be temporarily stockpiled, they would be stored at a defined location at the former CLOR site. • Excavated soils would be separated into stockpiles according to odours, staining and other environmental indicators. Soils that are potentially contaminated (following visual and olfactory inspection and or use of monitoring equipment) would be placed on impermeable sheeting surfaces into uniquely identified stockpiles and appropriately banded and managed. The bunds would be impermeable and of sufficient capacity to ensure that runoff from these stockpiles is contained prior to being sent to the WWTP. • Works in the vicinity of the contaminated water would be suspended until the environmental consultant can further assess the impacted groundwater and the associated risks. • Where no contamination issues are identified, excavated material would be used as backfill to bring the excavated area back to grade as soon as practicable. If required, certified VENM, ENM or appropriated remediated material would be used to provide additional backfill material. • If excavated material cannot be re-used or managed onsite then it would be removed off-site as waste to an appropriately licensed facility. • Further, excavated material; would be classified in accordance with EPL condition O5.1 which requires “any liquid and/or non-liquid waste generated and/or stored [at the Site] is assessed

ID	Issue	Mitigation measure
		<p>and classified in accordance with the NSW (2009) Waste Classification Guidelines: Part 1: Classifying Waste, batched and further tested (where required, for example Toxicity Characteristics Leaching Procedure (TCLP) testing) NSW EPA Waste Classification Guidelines as in force from time to time.</p> <ul style="list-style-type: none"> • Where contaminants exceed General and/or Restricted Solid Waste, and/or Hazardous Waste classification, the toxicity characteristics leaching procedure (TCLP) would be conducted to assess the leachable concentration and whether the classification of waste can be reduced. • The method of disposal or reuse would be in line with the materials' classification in accordance with specifications set out in a DWRMP. • Where soils are reused on Site (i.e. are not considered to be impacted at levels exceeding present present a risk to commercial/ industrial receptors as defined by Schedule B1 Guidelines, Investigation Levels for Soil and Groundwater, National Environment Protection Measure (Assessment of Site Contamination) Amendment Measure 2013) a record would be kept (in the Waste Management Database) of where these soils are reused, the volumes reused; the type and levels of contaminants present in the soils and the soil classification.
C20	Contamination	<p>An Asbestos Management Plan would be developed in accordance with the relevant guidelines.</p> <p>Caltex Ampol would utilise existing registers, procedures and plans in place for the Site for the preparation of an Asbestos Management Plan.</p>
C32	Contamination	<p>The OEMP for the Site would be updated to include continue to implement the following measures:</p> <ul style="list-style-type: none"> • Appropriate groundwater monitoring, in accordance with the Site's EPL. • Quarterly groundwater monitoring for two years for the two installed monitoring wells. Following this time, annual groundwater monitoring would be undertaken to provide ongoing demonstration that the containment cell liner is operating effectively. Monitoring of these bores would occur in accordance with the existing groundwater monitoring program for the Site. • Regular inspections of the Containment Cell to monitor the effectiveness of the erosion and sediment control measures incorporated into the design of the containment cell, in line with the Site's existing Inspection Checklist and following heavy rain events.
C33	Contamination	<p>The Remedial Action Plan (RAP) for MOD-7 works would be implemented, which would include:</p> <ol style="list-style-type: none"> Data gap investigations within the Project Area Preparation of one or more Remediation Work Plan(s). <p>The Remediation Work Plan(s) would be prepared in accordance with NSW EPA Contaminated Land Guidelines for Consultants Reporting on Contaminated Sites (NSW EPA, 2020) and be reviewed and endorsed by the Site Auditor.</p>

ID	Issue	Mitigation measure
C34	Contamination	<p>One or more Validation Report(s) would be prepared in accordance with the NSW EPA <i>Contaminated Land Guidelines for Consultants Reporting on Contaminated Sites</i> (NSW EPA, 2020).</p> <p>At the completion of the remedial works under the proposed modification, one or more Interim Audit Advice (IAA) document(s) would be prepared by the Site Auditor in accordance with the Guidelines for the NSW Site Auditor Scheme (3rd edition).</p>
C35	Contamination	<p>Where relevant, following the remediation works, the Site OEMP would be updated (where required) to appropriately manage residual contaminated soil and/or groundwater impacts that do not meet commercial/ industrial standards. The OEMP for the Site may include one or more Groundwater Monitoring Plans (GMP) which would detail groundwater monitoring requirements. The Updated OEMP and new or updated subplan(s) would be provided to the Site Auditor for endorsement.</p>
C36	Contamination	<p>Where reasonable, take practicable measures to prevent more than minimal harm is caused to waterfront land (i.e. within 40 m of mapped coastal wetlands) during excavation, remediation, or temporary stockpile activities.</p>
C37	Contamination and groundwater	<p>Construction personnel would be made aware of the potential presence of Light Non Aqueous Phase Liquids (LNAPL) and would be shown how to identify its presence. The GWMP would include management measures to appropriately deal with any LNAPL found onsite.</p>

8.0 Conclusion

A review of existing contamination reports and environmental data undertaken in preparing the RAP (Appendix E of the Submissions Report) has identified where remediation would be required and where further investigation is required to inform refinement of remedial extents and methodologies. The primary COPC are PHC, PFAS, and asbestos in soil, with secondary COPCs including CHC and refinery process chemicals, for which appropriate remedial and management strategies would be applied in accordance with regulatory standards for commercial/ industrial land use. The AECs where these sources are present from historical activities at the Site have been outlined in this report and detailed in the RAP (Appendix E of the Submissions Report).

The remediation works would mitigate the risk existing contamination poses by removing or reducing the concentrations of contamination in soils and eliminating exposure pathways. Mitigation measures to be implemented for the construction and operation would be as per the conditions of consent for SDD 5544. This would include preparation and implementation of a Construction Environmental Management Plan (CEMP) for construction and continued implementation of the Operational Environmental Management Plan (OEMP) following completion of the proposed modification works. The following additional specific measures would be undertaken for the proposed modification:

- Implementation of the RAP (refer to Appendix E of the Submissions Report), which would include undertaking data gap investigations within the Project Area and preparation of one or more RWP(s) following completion of detailed investigations for the proposed ongoing commercial/ industrial land use.
- Remediation works would be completed as per each RWP. The RWP(s) would be supported by a series of environmental management plans, including a GWMP. Validation report(s) would then be prepared following remediation.
- Implementation of a Groundwater Management Plan (GWMP), as a subplan of the Construction CEMP, which would include dewatering management measures to manage temporary impacts to GDEs. The GWMP would outline groundwater monitoring (water levels and quality) requirements, site-specific water level and quality trigger levels, and an associated Trigger Action Response Plan
- Preparation of an Acid Sulfate Soil Management Plan (ASSMP) in line with the framework presented in Appendix E2 of the Submissions Report
- Following the remediation works, the OEMP would be updated (where required) to appropriately manage residual contaminated soil and/or groundwater. The OEMP for the Site may include one or more GMPs. At the completion of the proposed modification, one or more Site Audit Statement(s) and Site Audit Report(s) would be prepared by the Site Auditor in accordance with the Guidelines for the NSW Site Auditor Scheme (3rd edition). Multiple SASs and SARs may be required depending on the progress of remediation and validation activities within the Audit Boundary in Zone 2 and Zone 3.

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Annexure A

Groundwater Assessment

Kurnell Terminal SSD-5544 MOD-7

Annexure A - Groundwater Assessment

16-Mar-2026

Kurnell Terminal SSD-5544 MOD-7

Annexure A - Groundwater Assessment

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Executive Summary

The Kurnell Terminal (the Site) is located on the southern side of Botany Bay, in Kurnell, New South Wales (NSW). In 2012, Ampol Refineries (NSW) Pty Ltd (Ampol) decided that the oil refinery and fuel terminal would be converted to a finished product terminal (the 'approved project'), ceasing refinery operations in 2014. Development consent was received to complete the approved project under State Significant Development (SSD) application reference 5544 (SSD-5544). Ampol has modified SSD-5544 six times to facilitate the conversion and demolition works.

Ampol intends to consolidate operational infrastructure, remove redundant assets, and undertake remediation. Completion of these works (the proposed modification, MOD-7) would continue the viable, safe, reliable, and sustainable operation of the Kurnell Terminal. The location within the Site that these works would occur is referred to as the Project Area.

This report has reviewed the proposed modification and identified potential groundwater impacts due to construction dewatering activities. Specifically, this report has been prepared to assess the potential impacts of the construction and operation of the proposed modification on the receiving environment, and to identify appropriate safeguards and management measures to address the impacts.

An assessment of estimated groundwater ingress and groundwater drawdown extent during dewatering activities for each excavation was calculated using equations and site-specific parameters. The ingress estimates are high level and provide an initial understanding of the groundwater ingress and associated drawdown. This has been estimated using the indicative construction program. Following preparation of a detailed construction methodology and program, this estimate would be refined.

The excavation of pits and trenches would be required during Stage 2 (Removal, relocation and/or augmentation of infrastructure) and Stage 3 (Remediation) works. Excavations would range between 0.15 and 4.9 metres below ground level (mbgl). Where excavations intercept groundwater, temporary dewatering would be required to enable works to be carried out safely.

The conservative estimate of groundwater take during Stage 2 works is 250 mega litres (ML), and 230 ML during Stage 3 works. Over a five year construction period, this equates to 96 ML per year. As such, a Water Access Licence (WAL) would be required for the duration of each excavation activity.

Groundwater drawdown would be deepest at the point of excavation, and the depth of drawdown reduces with distance from the excavation source. Using recognised groundwater equations, the radius of influence was estimated. This is the extent of groundwater drawdown from the excavation where drawdown is negligible or unobservable. This estimate was used to ascertain whether offsite groundwater dependent ecosystems (GDEs) in proximity to the Site have potential to be affected by the excavation works.

Temporary groundwater drawdown may occur within GDEs located to the south (in Zone 4 of the Site) and to the east and north east of the Site (just inside the boundary Kamay Botany Bay National Park). Drawdown within the national park would be negligible and within natural groundwater level fluctuations. Whilst the development site is located approximately 150 m from the Towra Point Nature Reserve, which is a listed Ramsar wetland of international importance, the site is outside the predicted drawdown extent for all proposed excavations. Therefore, it is predicted that the proposed modification works would not impact this GDE.

Specific impacts to the GDEs due to groundwater drawdown has been considered in the Updated Biodiversity Development Assessment Report (Appendix I of the Submissions Report). Given the temporary nature of the works and through implementation of mitigation, it is unlikely that there would be a permanent impact to the identified GDEs.

Potential impacts to GDEs due to groundwater drawdown would be temporary and managed by adhering to the Groundwater Management Plan (GWMP). The GWMP would include dewatering management measures for the extraction, storage, movement and treatment of groundwater encountered in excavations. Dewatered groundwater would be collected and sent to the on-site Waste Water Treatment Plant (WWTP) in accordance with the established Site wastewater management procedures, unless it is tested and is of suitable quality to be directed to stormwater. The GWMP would also outline groundwater monitoring (water levels and quality) requirements, site-specific water level and quality trigger levels, and an associated Trigger Action Response Plan (TARP) to allow for effective and quick responses.

The recommended safeguards and management measures would be captured in the Construction Environmental Management Plan (CEMP).

While several measures have been recommended to mitigate and/or eliminate potential groundwater impacts from the proposed modification, it is also possible that other suitable measures can achieve the same outcomes. Alternative mitigation/ management measures would be explored during subsequent design phases, following preparation of the detailed construction methodology and program, provided that the relevant legislation, policies, and guidelines can be adhered to, and objectives detailed herein can be achieved.

1.0 Introduction

1.1 Overview

The Kurnell Terminal (the Site) is located on the southern side of Botany Bay, in Kurnell, New South Wales (NSW) (Figure 1-1). In 2012, Ampol Refineries (NSW) Pty Ltd (Ampol) decided that the oil refinery and fuel terminal would be converted to a finished product terminal (the approved project), ceasing refinery operations in 2014.

Development consent was received to complete the approved project under State Significant Development (SSD) application reference 5544 (SSD-5544). Ampol has modified SSD-5544 six times to facilitate the conversion and demolition works.

Currently, the operational infrastructure is primarily located in the northern part of the Site (Zones 1 and 1A, as shown in Figure 1-1). Other parts of Ampol's landholdings at Kurnell include largely vacant areas of previously developed land (Zones 2 and 3) and areas of undeveloped land containing extensive native vegetation (Zones 4 and 5).

Ampol intends to consolidate operational infrastructure, remove redundant assets, and undertake remediation. Completion of these works (the proposed modification, MOD-7) would continue the viable, safe, reliable, and sustainable operation of the Kurnell Terminal. The location within the Site that these works would occur is referred to as the Project Area.

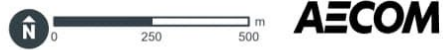
A Modification Report has been prepared to support a modification application to SSD-5544 and was placed on public exhibition for 23 days from Thursday 10 July 2025 until Friday 1 August 2025 in accordance with the *Environmental Planning & Assessment Act 1979* (EP&A Act).

This Groundwater Assessment Report has been produced to address submissions received by agencies during the exhibition of the Modification Report and refinements to the proposed modification. It has been prepared to support the Submissions Report.



Legend

- Site Boundary
- Ampol Ownership
- Project Area
- Former Refinery Area
- Operational Fuel Terminal
- Undeveloped Land
- Watercourse
- Primary Road
- Local Road



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Figure 1-1 Ampol Kurnell Terminal (the Site)

1.2 The proposed modification

1.2.1 Key elements of the proposed modification

To support the viable, safe, reliable, and sustainable operation of the Kurnell Terminal, the proposed modification works involve:

- **Stage 1 – Preparation works:** Preparing the Project Area for proposed modification works
- **Stage 2 – Removal, relocation and/or augmentation of infrastructure,** including:
 - Relocation and/ or augmentation of firewater system (FWS) and oily water sewer (OWS) systems and construction of new operational facilities, including replacement warehouses
 - Decommissioning and removal of non-operational assets, redundant structures and electrical assets
- **Stage 3 – Remediation:** Addressing legacy ground contamination in specific locations across the Site
- **Stage 4 – Demobilisation:** Demobilisation of construction and remediation equipment.

Depending on where different works are required across the Site, these stages may be completed sequentially or concurrently.

A summary of project elements requiring modification and how they relate to the approved project is provided in Table 1-1. Infrastructure to be removed is presented in Figure 1-2, whilst infrastructure to be relocated or upgraded is presented in Figure 1-3. The proposed modification works would be undertaken within the Project Area.

All activities would adhere to the Kurnell Terminal permit to work system to maintain compliance with environmental and safety protocols.

Table 1-1 Modified project summary table

Stage	Element	Approved project	Modified project
Stage 1	Project Area	Project Area delineation	<ul style="list-style-type: none"> • Prepare the Project Area for the proposed modification works required under Stages 2 and 3 and exclude other parts of the Site from workers completing these works as required.
Stage 2	Oily water sewer (OWS)	Maintain location in Zones 2 and 3	<ul style="list-style-type: none"> • Divert surface water runoff from potentially contaminated areas in Zone 2 to OWS system in Zone 1 via new OWS interception pits/ lines until Stage 3 remediation is complete • Divert potential leachate from Asbestos Contaminated Soils (ACS) Containment Cell in Zone 2 to Zone 1 OWS system • Install one new pump station and emergency storage tank adjacent to the ACS Containment Cell. Two indicative site options have been identified (refer to Figure 1-3) with specific siting to be selected during detailed design. • Once Stage 3 remediation is complete in each specified area, isolate and remove redundant OWS infrastructure from identified areas in Zone 2 and Zone 3. Where complete removal is not feasible, existing pipes would be left in-situ.

Stage	Element	Approved project	Modified project
	Firewater systems (FWS)	Maintain location in Zones 1, 2, and 3	<ul style="list-style-type: none"> • Augment FWS infrastructure in Zone 1 and the south of Zone 2 • Excavate and install footings for the new firewater tank, pumphouse, and pipelines • Construct new firewater tank and pumphouse within the FWS Relocation Area. Two indicative site options have been identified (refer to Figure 1-3) with specific siting to be selected during detailed design. • Connect relocated firewater tank and pumphouse to existing FWS via new pipework • Commission new firewater tank, pumphouse, and pipework to confirm operation of amended FWS • Isolate and remove redundant FWS infrastructure from Zones 2 and 3 when appropriate.
	Electrical assets	Maintain location in Zone 2 and 3	<ul style="list-style-type: none"> • Isolate and remove redundant electrical assets in Zones 2 and 3, including five substations.
	Structures	Maintain location in Zone 2 and 3	<ul style="list-style-type: none"> • Construct new 'fit for purpose' warehouse to house maintenance supplies and activities in Zone 1 • Construct new Oil Spill Equipment Storeroom within Zone 1 • Construct new storage shed to house boats and emergency aquatic spill response equipment in Zone 1A. • Demolish identified structures in Zones 2 and 3.
Stage 3	Remediation	Removal of ACS from pipeways and either containment onsite or offsite disposal	<ul style="list-style-type: none"> • Remediate identified land in Zone 1 to reduce operational site safety risks (refer to Figure 1-4) • If required, remediate land in Zone 1 where infrastructure is proposed to be relocated or augmented • Undertake targeted remediation in Zones 2 and 3 (refer to Figure 1-4) • Return excavated areas to existing ground levels, with the exception of RPIP Mountain (which would be regraded) and removal of the bund in Source Area Excavation 5.
Stage 4	Demobilisation	Demobilisation of construction equipment.	<ul style="list-style-type: none"> • Demobilisation of construction and remediation equipment.

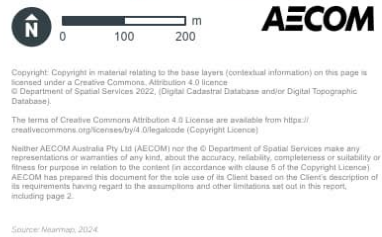
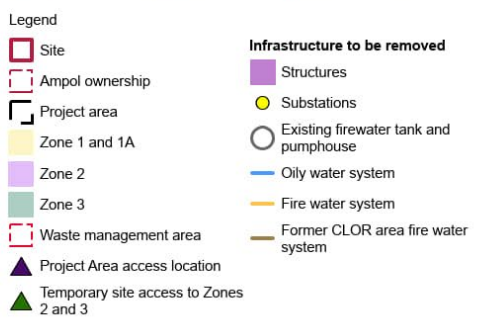


Figure 1-2 Proposed modification – Infrastructure to be removed (Stage 2)

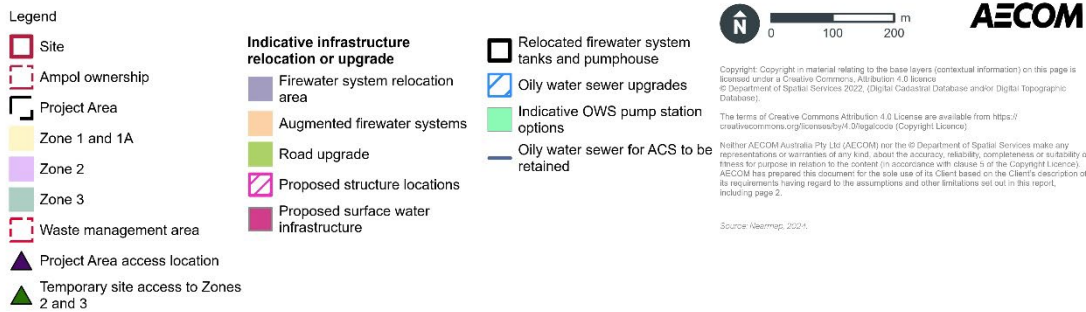


Figure 1-3 Proposed modification – Infrastructure to be relocated/ upgraded (Stage 2)



Figure 1-4 Targeted remediation activities (Stage 3)

Once the modification works are complete, the Site would continue to operate as described in the SSD documentation for the approved project and would be consistent with the development consent for SSD-5544 (as modified).

In line with Figure 1-3, relocated equipment would operate in the new locations.

1.2.2 Construction timeline and equipment

Works would be staged in accordance with the indicative program in Table 1-2. Construction and remediation are anticipated to commence in 2026 and be completed by 2030.

In line with the Interim Construction Noise Guideline (ICNG), construction works would comply with following hours:

- Monday to Friday – 7am to 6pm
- Saturday – 8am to 1pm
- Sunday and public holidays – No work is permitted.

Construction works outside of the work hours identified above would only be undertaken in the following circumstances (in line with Condition C20):

- Works that are inaudible at nearest sensitive land receivers
- Works that are consistent with Ampol's existing maintenance procedures and are in accordance with EPL 837
- Works agreed to in writing by the Environment Protection Authority (EPA) or the Department of Planning, Housing, and Infrastructure (DPHI)
- For the delivery of materials required outside these hours by the NSW Police Force or other authorities for safety reasons
- Where it is required in an emergency to avoid the loss of lives, property and/ or to prevent environmental harm.

In addition, the following activities may be required on a 24-hour basis to support construction activities:

- Biopiling blowers in identified Biopiling Areas (refer to Figure 1-4). Given their proposed location within the Site, noise from the blowers would be inaudible at the nearest noise sensitive receivers.
- Dewatering of excavations: Dewatering would only occur at night in locations where plant would not exceed night-time limits, i.e.:
 - Where it is located a minimum of at least 200 m within the Site boundary; or
 - Where it is located a minimum of 120 m within the Site boundary if temporary noise barriers are positioned as near as practicable to the pumps, and monitoring confirms that nighttime noise limits are not exceeded.

Plant and equipment that would be used to deliver the modification works is shown in Table 1-3.

Table 1-3 Indicative plant and equipment

Plant/ equipment	Maximum number of plant and equipment required per day		
	All stages except Stage 3		Stage 3 (Remediation) only
	Zones 1, 2, and 3	Zone 1A	
Front end loader	6	2	6
Excavator	-	2	6
Excavator (including large hydraulic hammer)	6	-	-
Dump truck	6	2	6
Grader (up to 7 m blade)	2	1	4
Large crane (60 t)	4	1	-
Elevated work platform	6	4	-
Franna crane (30 t)	6	1	-
Cement truck	6	2	-
Bobcat	6	2	2
Water cart	6	2	6
Concrete crusher	1	-	-
Telehandler	6	-	-
Truck and dog (offsite disposal)	6	6	6
Truck and dog (imported fill)	-	6	12
Generator	2	1	2
Biopiling blower	-	-	8
Dewatering pump/s	6	-	6

1.2.3 Other relevant elements of the proposed modification

Construction activities

The elements of the proposed modification that are likely to intersect groundwater and would require dewatering involve the construction of excavation pits and trenches outlined in Table 1-4. These excavations would require temporary dewatering to enable works to be carried out safely. Excavations and subsurface construction would occur within permeable fill and unconsolidated sand underlying the Project Area. Figure 1-5 shows the indicative excavation construction areas with maximum excavation depths.

Potential dewatering activities for excavation contingency areas of remediation, as shown on Figure 1-4, are not included in this assessment. A pre-remediation assessment would be undertaken to refine the remedial requirements for Stage 3.

The OWS pump station and emergency storage tank (either Option 1 or 2) in the south of Zone 2 would be connected to the existing OWS in Zone 1, to the north east of the ACS Containment Cell. The pipeline would lie above and belowground, depending on the topography of the land and the presence of roads; the pipeline would be installed belowground where it crosses the road. For belowground sections, excavations of up to 3.5 mbgl would be required. For aboveground sections, 0.5 m deep footings would be required every 4 m (refer to Figure 1-5). Only belowground sections have been considered in this assessment.

Table 1-4 Indicative construction excavations

Excavation	Excavation dimensions			Estimated area (m ²)	Estimated excavated volume (m ³)
	Estimated Maximum Length (m)	Estimated Maximum Width (m)	Maximum excavation depth (mbgl)		
Targeted soil remediation works					
Source Area Excavations (SAE)					
Source Area Excavation 1 (contingency)	Not assessed – contingency not included in assessment.				
Source Area Excavation 2	135	93	4.9	10,050	49,250
Source Area Excavation 3	165	82	2.8	8,800	24,640
Source Area Excavation 4	33	29	2.8	1,000	2,800
Source Area Excavation 5	57	36	2.0	5,000	10,000
Source Area Excavation 6	Not assessed – unlikely to require dewatering due to envisaged shallow depth of excavation (<1.0 mbgl). The shallowest groundwater level recorded in the vicinity of SAE 6 was 1.03 mbgl (Table 3-3).				
Other asbestos excavation					
Source Area Excavation 7	Not assessed – unlikely to require dewatering due to shallow depth of excavation (0.15 mbgl). The shallowest groundwater level recorded in the vicinity of SAE 7 was 0.86 mbgl (Table 3-3).				
FWS Relocation Area tank and pump house (concrete foundations) (two options)					
Option 1	Not assessed – unlikely to require dewatering due to shallow depth of excavation (<1.0 mbgl). The shallowest groundwater level recorded in the vicinity of the excavation was 1.01 mbgl (Table 3-3).				
Option 2	Not assessed – unlikely to require dewatering due to shallow depth of excavation (<1.0 mbgl). The shallowest groundwater level recorded in the vicinity of excavation was 1.35 mbgl (Table 3-3).				
FWS Relocation Area firewater pipelines (Figure 3-8)					
Option 1A	Not assessed – unlikely to require dewatering due to shallow depth of excavation (<1.0 mbgl). The shallowest groundwater level recorded in the vicinity of excavation was 1.01 mbgl (Table 3-3).				
Option 1B	220	1	1.0	220	220
Option 2	Not assessed – unlikely to require dewatering due to shallow depth of excavation (<1.0 mbgl). The shallowest groundwater level recorded in the vicinity of excavation was 1.05 mbgl (Table 3-3).				
Main Line	400	1	1.0	400	400
OWS pump station and emergency storage tank (south of Zone 2)					
Two options (same excavation dimensions). A benched pit ¹ of around 12 m by 34 m would be required.	34	12	4.5	410	1,512

¹ The pit itself would be 5 m by 28 m. Benches of about 3 m either side of the pit have been assumed.

Excavation	Excavation dimensions			Estimated area (m ²)	Estimated excavated volume (m ³)
	Estimated Maximum Length (m)	Estimated Maximum Width (m)	Maximum excavation depth (mbgl)		
Construction of new buildings (Zones 1 and 1A)					
New Storage Shed (Zone 1A)	Not assessed – unlikely to require dewatering due to shallow depth of excavation (1.0 mbgl). The shallowest groundwater level recorded in the vicinity of excavation was 1.42 mbgl (Table 3-3).				
New Warehouse (Zone 1)	54	47	1.0	2,540	2,540
New Oil Spill Equipment Storeroom (Zone 1)	Not assessed – unlikely to require dewatering due to shallow depth of excavation (1.0 mbgl). The shallowest groundwater level recorded in the vicinity of the excavation was 1.15 mbgl (Table 3-3).				
Removal of structures' footings (Zones 2 and 3)					
Storehouse and Oil Spill Room, Storehouse, Warehouse, Central Control Building, Buildings 1 – 6	Dewatering is not required for the removal of structures' footings and has not been included in this assessment.				
FWS and OWS Pipework					
Removal of OWS infrastructure (Zone 2 and 3)	3,900	1	3.0	3,900	11,700
	Dewatering is not required for the removal of OWS infrastructure in Zone 2F (Figure 3-9), as the infrastructure is approximately 0.5 mbgl and the shallowest groundwater level recorded in Zone 2F was 1.03 mbgl (Table 3-3).				
OWS upgrades (Zone 2)	325	1	1.0 to 3.5	325	1,090
	Dewatering is not required for OWS upgrades in Zone 2J (Figure 3-10), as the excavation is 1.0 mbgl and the shallowest groundwater level recorded in Zone 2J was 2.10 mbgl (Table 3-3).				
Augmentation of FWS pipework (Zone 1)	3,370	1	1.0	1,720	1,720
	Dewatering is not required for augmentation of FWS pipework in Zone 2N (Figure 3-11), as the excavations are 1.0 mbgl and the shallowest groundwater level recorded in Zone 2N was 1.03 mbgl (Table 3-3).				
Removal of FWS pipework (Zones 2 and 3)	Dewatering is not required for the removal of FWS pipework and has not been included in this assessment.				

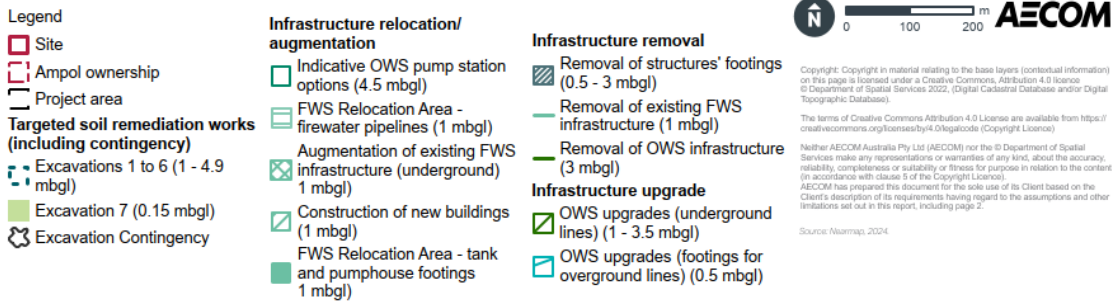
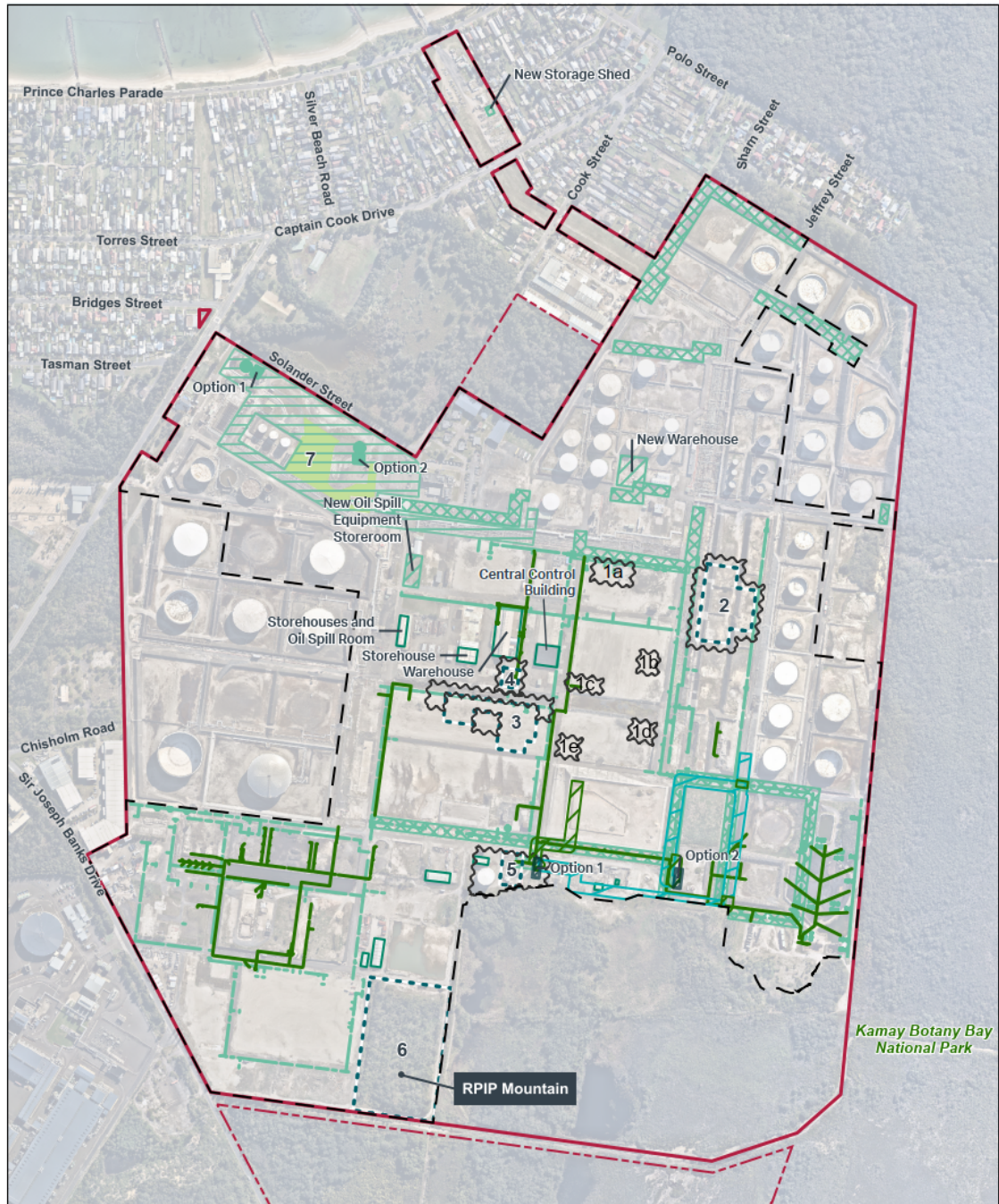


Figure 1-5 Excavations with depths

1.3 Purpose of this report

This Groundwater Assessment is one of several technical documents that forms part of the Submissions Report, and has been prepared to support the Soils, Groundwater and Contamination Report (Appendix F of the Submissions Report). The purpose of this report is to understand potential impacts of the proposed modification upon groundwater resources.

2.0 Assessment methodology

2.1 Relevant legislation and guidelines

Excavation works which intersect an aquifer are recognised as an aquifer interference activity and, therefore, subject to:

- The *Water Management Act 2000* (NSW)
- Relevant water sharing plans
- The NSW Aquifer Interference Policy.

2.1.1 The Water Management Act 2000

The *Water Management Act 2000* is a legislation that regulates the allocation and use of water in New South Wales. The act aims to balance the environmental health of rivers and groundwater systems with the water needs of licence holders and landholders. The act also allows for water trading and separates water licences from land. The act grants basic landholder rights to take water for domestic consumption or stock watering.

The *Water Management Act 2000* defines an aquifer interference activity as that which involves any of the following:

- The penetration of an aquifer
- The interference with water in an aquifer
- The obstruction of the flow of water in an aquifer
- The taking of water from an aquifer in the course of carrying out mining or any other activity prescribed by the regulations
- The disposal of water taken from an aquifer in the course of carrying out mining or any other activity prescribed by the regulations.

Aquifer interference activities may take water from the water source in which they exist. The aquifer interference activities, including large projects which require dewatering such as for the construction, are assessed under the NSW Aquifer Interference Policy².

Appropriate disposal of water extracted as a result of activities also needs to be considered in order to manage impacts on aquifers and river systems as well as to reflect the economic value of that water. Any disposal options will need to also consider any relevant water or land pollution issues as well as waste disposal, as required by the *Protection of the Environment Operations Act 1997* (NSW).

2.1.2 The NSW Aquifer Interference Policy

The purpose of the Aquifer Interference Policy is to explain the role and requirements of the Minister administering the *Water Management Act 2000* in the water licencing and assessment processes for aquifer interference activities.

This policy sets out the Minimal Impact Considerations to be applied to assess the impact of the proposed aquifer interference activity, which for the proposed modification includes excavation and the temporary dewatering of groundwater during the construction of in-ground pits.

Proposed modification related

The underlying hydrostratigraphic unit within the Project Area is the marine sand aquifer. In the NSW Aquifer Interference Policy this aquifer is classified as a Highly Productive Groundwater Source as it is a coastal sands groundwater source (i.e., aquifer contains bores with yields > 5 L/s).

² NSW Aquifer Interference Policy: NSW Government policy for the licensing and assessment of aquifer interference activities

The impact considerations for the groundwater resources at the proposed modification, according to the policy, includes the following:

- The Policy specifies that the cumulative variation in the water table for a Highly Productive Groundwater Source should be less than or equal to 10% to allow for typical climatic change
- High priority groundwater dependent ecosystems and high priority culturally significant sites should not be within 40 m of this variation
- The Policy also specifies that the maximum allowable decline at any water supply source to be no more than 2 m.

Thresholds for Minimal Impact Considerations for Aquifer Interference (maximum allowable decline in drawdown) from around the Project Area is, therefore, considered to be 1.5 m for the Highly Productive Groundwater Source, which is 10% of the ~15 m thick aquifer (Section 3.5.2), and 2 m for water supply sources.

Predictions of groundwater ingress, to be dewatered during construction, allowed for the evaluation of drawdown to assist with the assessment of aquifer interference for the temporary dewatering activities planned for the proposed modification.

2.1.3 Water Licence Application (WAL)

Considering the WaterNSW Fact Sheet 'Water access licence exemption for aquifer interference activities taking 3 ML or less of groundwater per year', a water licence may be required where maximum long term groundwater inflows into a planned excavation during operation is greater than 3 ML/year. For ingress less than 3 ML/year, such developments are considered a minor aquifer interference activity. These developments are generally exempt from requiring a water licence.

The ingress estimations, to assess groundwater extraction volumes, is presented in Section 1.1. Predictions for groundwater recovery, post-construction, are not available (pumping test data is required), however it is assumed groundwater recovery would be rapid based on the highly permeable marine sand aquifer.

SSD projects do not require a water supply work, water use approval, or controlled activity approval under Section 4.41 of the *Environmental Planning & Assessment Act 1979* (NSW).

No groundwater take would occur during operations.

2.2 Key assumptions

The following assumptions were used when assessing potential impacts and estimating groundwater ingress to the excavations. The groundwater ingress estimates allowed for the evaluation of temporary groundwater drawdown. The potential drawdown due to the excavation dewatering was used to assess potential impacts of the conversion and demolition works. The assumptions include:

- The excavations would not include groundwater ingress mitigation measures, such as the installation of cut-off walls around the excavations of soil permeability modifications (e.g., jet grouting or cutter soil mixing). It is noted that these engineering controls could occur, depending on geotechnical stability assessments or to reduce groundwater ingress/ volumes for management onsite.

The unmitigated approach allows for the evaluation of potential impacts and allow for informed decision-making regarding construction methodologies.

- No alteration (to decrease permeability) to the floor of the excavations (jet grouting or cutter soil mixing) has been included in the preliminary excavation designs or ingress estimates.

- Excavations would be dewatered to the maximum depth included in the designs, with the exception of the construction of the OWS pump station, emergency storage tank, and the construction of new buildings. It is assumed that these excavations would be dewatered 0.5 m below the maximum depth/s included in the designs, (i.e., Option 1 and Option 2 OWS pump station and emergency storage tank would be excavation to a depth of 4.5 mbgl, but the dewatering would be required from 5.0 mbgl, to allow works to be undertaken).
- Construction works occurs 24 hours per day for 5.5 days a week (i.e., on a 24-hour basis, Monday to Friday, and until 1 pm on Saturdays). Realistically, dewatering would occur on a continuous 24-hour basis throughout the week, as excavations would not be infilled on Saturdays. Consequently, for the purpose of this assessment, it is assumed that dewatering would occur 24 hours per day for 7 days a week. The assessment does not consider pumping stoppages, including groundwater rebound, and the need to reduce recovered groundwater levels after pumping stoppages.
- The assessment has been based on the indicative program (Table 1-2), available information, and similar projects.
- The assessment is based on each excavation being dewatered separately and not concurrently.
- Open trenches would be backfilled progressively as trenching progresses and would not be open for the entire trench duration of the anticipated construction period.
- Groundwater level interpretation is based solely on the available monitoring data between February 2023 and November 2024, and actual groundwater levels may be shallower than those represented in the assessment during periods of heavy rainfall.

No assessment of the potential for liquefaction, buoyancy, or instability (geotechnical assessments) has been included in this Groundwater Assessment.

2.3 Methodology

The methodology for the Groundwater Assessment is as follows:

- Desktop study, including the review of site geology from available bore logs, mapped geology, onsite historic water level data, offsite registered groundwater bore search, geotechnical studies, surrounding land use and land cover (including mapped sensitive ecosystems/ Groundwater Dependent Ecosystems (GDEs))
- Summary of the proposed construction works including schedule and timing, plans for dewatering (i.e. pumping 24 hours a day), and proposed construction design information
- Conceptual hydrogeological model for the proposed modification (groundwater level fluctuation, hydrostratigraphic units, and aquifer hydraulic parameters – recharge and discharge mechanisms)
- Prediction of the highest groundwater level expected used to evaluate dewatering requirements and ingress estimates
- Selection of hydraulic conductivity using the data obtained from existing hydrogeological and/or geotechnical investigations, and previous dewatering projects at the Site or in Kurnell
- Detail the water quantity assessment approach
- Outline the anticipated dewatering flow rates and estimates of total dewatering volumes based on the duration of the water take during excavations
- The assessment considers the minimal impact considerations in the *NSW Aquifer Interference Policy*, and adverse impacts to GDEs and registered groundwater bore users
- Details to whether dewatering is required or is likely to be required based on forecast weather during excavation activities
- Confirmation of whether a Water Access Licence (WAL) will be required or an exemption applies.

3.0 Existing environment

3.1 Site description

The Site is located at 2 Solander Street, Kurnell, NSW 2231, on the Kurnell Peninsula within the Sutherland Shire Local Government Area (LGA). The Site is typically accessed off Solander Street which is accessed from Captain Cook Drive. Secondary access is also available from Sir Joseph Banks Drive. Table 3-1 lists the allotments within each zone relevant to the Project Area.

Table 3-1 Allotments within the Project Area

Zone	Lots/ DP
Zone 1 (Operational fuel terminal)	Lot 25 (DP 776328), Lots 56, 57, and 62 (DP 908), Lot 1 (DP 1044690), Lots 283 and 570 (DP 752064), Lot 1 (DP 132055)
Zone 1A (Eastern Right of Way)	Lots H, J, and K (DP 362655), Lot D, F, and G (DP 361103), Lots 43-46, 77-79, 122-125 (DP 8135), Lot B (DP 338897)
Zone 2 (Former refinery process areas and scrap yard)	Lot 25 (DP 776328), Lots 56, 57, and 62 (DP 908), Lot 283 (DP 752064)
Zone 3 (Former Caltex Lubrication Oli Refinery)	Lot 1 (DP 215819), Lots 1 and 2 (DP 126647), Lot 2 (DP 215818)

Between 1956 and 2014, the Site was used as both an oil refinery and a fuel terminal, and it was highly disturbed during that time. As such, there are few areas of ecological significance within the Site. Since refining ceased in 2014, the Site has been primarily used as a finished fuel import terminal – the largest in Australia. Ampol receives finished products (gasoline, jet fuel, diesel, sub-industrial fuel oil, and sub-bunker fuel oil) at Kurnell Wharf, stores these fuels at the Site, and then distributes them via pipelines to various terminals in Sydney and Newcastle as well as Sydney Airport.

3.2 Local land use

The Site is located at the eastern end of Kurnell Peninsula, on land zoned as E5 – Heavy Industrial. The Site is bounded by the Kamay Botany Bay National Park to the south, open land to the east, Captain Cook Drive to the north west, and St Joseph Banks Drive to the southwest. The northern Site boundary is bordered by Solander Street, a small southern section of Cook Street, light industry, residences off the eastern side of Cook Street, and undeveloped land on the south side of Reserve Road.

The surrounding land use comprises a range of zones, including areas zoned C1 – National Parks and Reserves, C2 – Environmental Conservation, C4 – Environmental Living, RE1 – Public Recreation, SP2 Infrastructure and E4 – General Industrial.

There are a number of reserves in proximity of the Site. Marton Park, comprising a developed recreational park area and an undeveloped wetland area, is located adjacent to the northern boundary of the Site on the northern side of Solander Street. Captain Cook's Landing Place Park is located approximately 500 m to the north of the Site, while Bonna Point Reserve is located approximately 1.4 km north west of the Site. Towra Point Nature Reserve is a Ramsar wetland and located west of the Site, on the opposite side of Captain Cook Drive. Quibray Bay also includes Towra Point Aquatic Reserve which, whilst not part of Towra Point Nature Reserve or Ramsar wetland, forms a wider ecosystem with it. To the north of Kurnell is Botany Bay, a large bay with a diverse number of uses and habitats and where the Georges and Cooks Rivers meet before joining the Pacific Ocean.

3.3 Climate

A review of nearby weather stations was carried out to determine the regional climatic conditions for the Site. The review was based on historical records at the nearest weather station.

The nearest weather station to the Site, with a continuous record of monthly rainfall, evaporation, and temperature data, is located at the Sydney Airport (station number: 66037) which is approximately 8.5 km north of the Site. Climatic statistics and patterns observed at this weather station over the past 95 years (from 1929 to present) were accessed through the Bureau of Meteorology’s (BoM) online climate database and are presented in both Table 3-2 and Figure 3-1 (BoM, 2024).

Table 3-2 Regional climatic statistics

Statistics	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Rainfall and evaporation													
Mean rainfall (mm)	94	118	123	107	96	122	72	75	60	72	80	73	1,092
Highest rainfall (mm)	400	597	489	476	422	466	344	397	249	271	396	359	-
Mean no. of rain days	11	12	13	11	11	11	9	9	9	11	11	11	129
Mean evaporation (mm) ¹	226	184	167	126	93	75	84	115	147	186	198	229	1,830
Temperature													
Mean maximum (°C) ²	27	27	25	23	20	18	17	19	21	23	24	26	27
Mean minimum (°C) ²	19	19	18	14	11	9	7	8	11	13	16	18	7

Notes:

1 – mean evaporation statistics are only based on 50 years of recorded data, from 1974 to 2024.

2 – mean temperature statistics are only based on 85 years of recorded data, from 1939 to 2024.

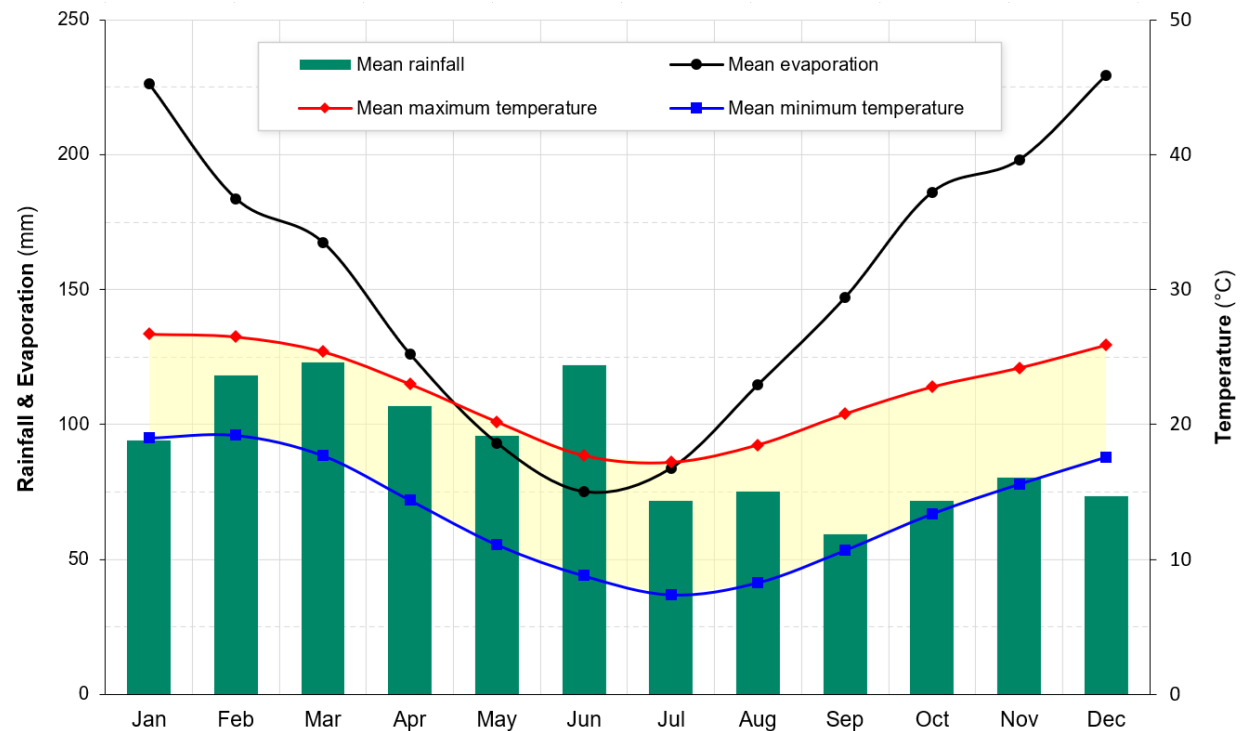


Figure 3-1 Regional climatic patterns

The Site is located within a ‘temperate’ climate zone which is characterised by warm summers and consistent rainfall over the calendar year. While rainfall is heavier during earlier months (from January to June), there are no ‘dry’ periods with zero rainfall. The region has reliable rainfall all year round, with a total average annual rainfall of 1,092 mm per annum.

Temperatures near the coastline are moderated by the ocean’s heat capacity, with moderate to warm summers, slightly dropping to cooler temperatures during the winter. Mean maximum and minimum temperatures range between 18 and 27°C during summer months and 7 and 19°C in winter months. Remaining spring and autumn months experience milder temperatures, with averages ranging between 11 and 25°C.

Regional net water balance can be demonstrated through a comparison of rainfall versus evaporation. Since evaporation (average of 1,830 mm per annum) exceeds total rainfall (average of 1,092 mm per annum) by more than half, there is a water deficit across the region. Pools of water would experience net drying conditions in most months, from July to April, where evaporation exceeds rainfall. Net wetting conditions would only occur in the remaining two months of the year (May and June).

3.4 Topography

Existing topography across the Site and surrounding areas is shown in Figure 3-2. The topography data included in this figure was sourced from the ELVIS online portal and is based on LiDAR data that was collected and processed in 2020 (ICSM, 2024).

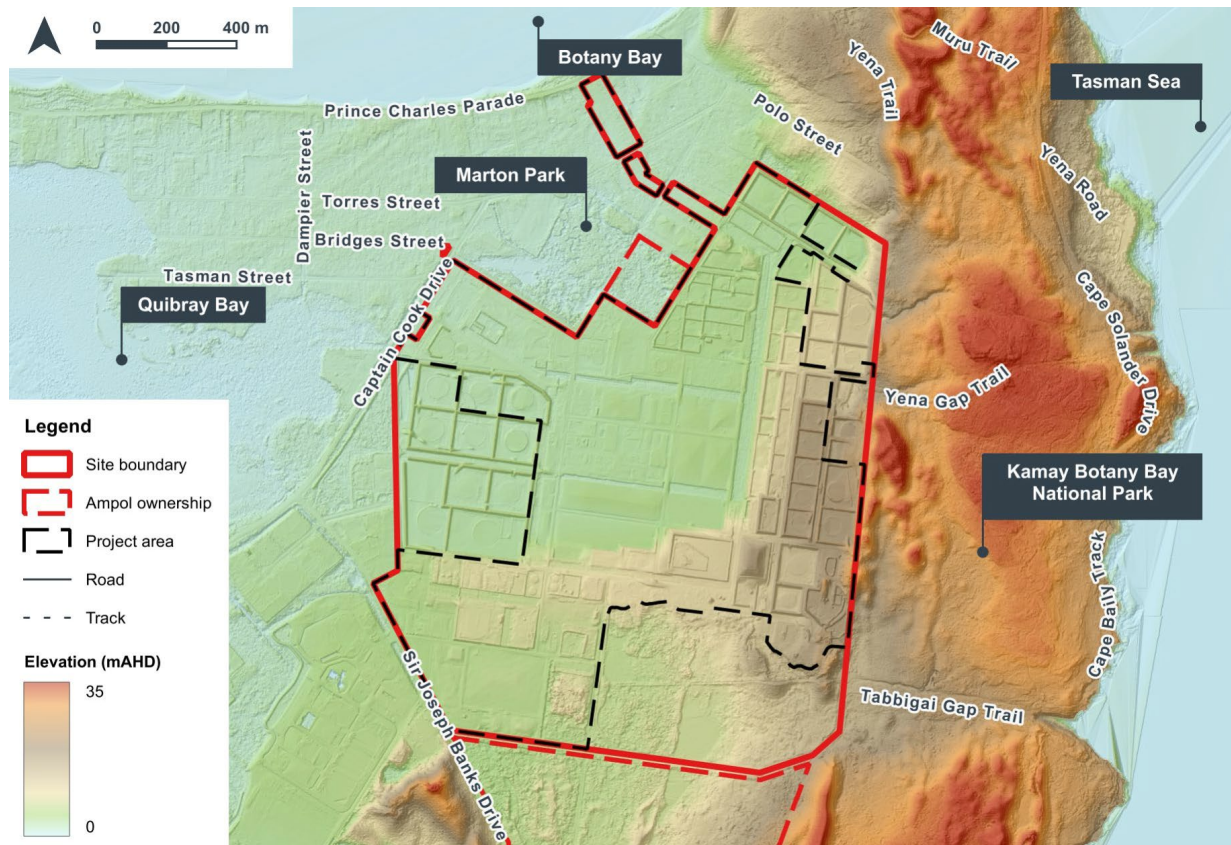


Figure 3-2 Site topography

Topography is relatively flat across most of the Site, with surface levels ranging from 3-5 m above Australian Height Datum (mAHd). There is a 400 m wide strip along the eastern boundary of the Site, where surface levels ramp up to tie-in with the higher natural elevations along the interface with the adjacent Kamay Botany Bay National Park. Peak surface levels within the Site reach up to 20 mAHd along this eastern boundary.

Natural surface levels further east, outside the Site extents and within the National Park, continue rising to a natural ridgeline that is orientated north-south. Peak elevations along this ridgeline reach 35 mAHD. Natural topography, prior to the development of this Site, would have generally fallen from this ridgeline and in a west to east direction, directing surface water runoff towards the Towra Point Nature Reserve and Quibray Bay.

It appears that the Site is generally in cut along its southern and eastern (upstream) boundaries and is in fill along the northern and western (downstream) boundaries.

3.5 Geology

3.5.1 General

The Kurnell Terminal is located on the Kurnell Peninsula, located in the Botany Basin of the Sydney Basin. The western side of the peninsula is characterised by Quaternary gravels, sands, silts, and clays, whilst the east is characterised by Hawkesbury Sandstone of the Triassic period.

The Hawkesbury Sandstone geology rises from west to east from below sea level to a height of approximately 40 m above sea level along the eastern boundary of the Kurnell Peninsula where it forms steep near vertical cliffs (NSW Government, 2023). The sandstone is characterised as medium to coarse-grained, composed predominantly of quartz with minor lithic fragments, feldspar, mica, and clay pellets.

The Kurnell Terminal lies primarily on disturbed terrain, where the original soil typically has been removed, buried, or otherwise greatly disturbed by human activity (Geo-Environmental Engineering, 2022b). From historical investigations at the Site, the bedrock surface elevation rises toward the east and south of the Site, with sandstone outcrops mapped at the northeast and southeast boundaries. Intrusive investigations have identified sandstone bedrock in Zone 3 to be generally shallower in the northern portion with depths ranging from 0.5 meters below ground level (mbgl) to 3.0 mbgl and deeper in the southern portion, generally from 5.5 mbgl to as deep as 14.0 mbgl (Figure 3-3). Depth to top of bedrock unit in Zone 2 generally ranges between 0.3 mbgl to 19 mbgl, increasing in depth towards the north-west (recorded greater than 30 mbgl at one location) (AECOM, 2025b).

For an assessment of potential impacts related to soil, groundwater quality and acid sulfate soils, refer to the *Updated Soils, Groundwater and Contamination Assessment* (Appendix G of the Submissions Report).

3.5.2 WSP and AECOM geotechnical studies

Site specific geological data was compiled from the WSP (2023) Geotechnical Interpretation Report (GIR), AECOM (2025a) Geotechnical Factual Report (GFR), and the AECOM (2025b) GIR, conducted across the terminal, as indicated in Figure 3-4 and Figure 3-5, respectively.

The geotechnical studies allowed for the identification of the geology to be intersected within the excavated pits and trenches, which includes fill and fine to medium grained, predominantly well sorted, unconsolidated sand, overlying weathered to fresh sandstone bedrock, as shown on Figure 3-6.

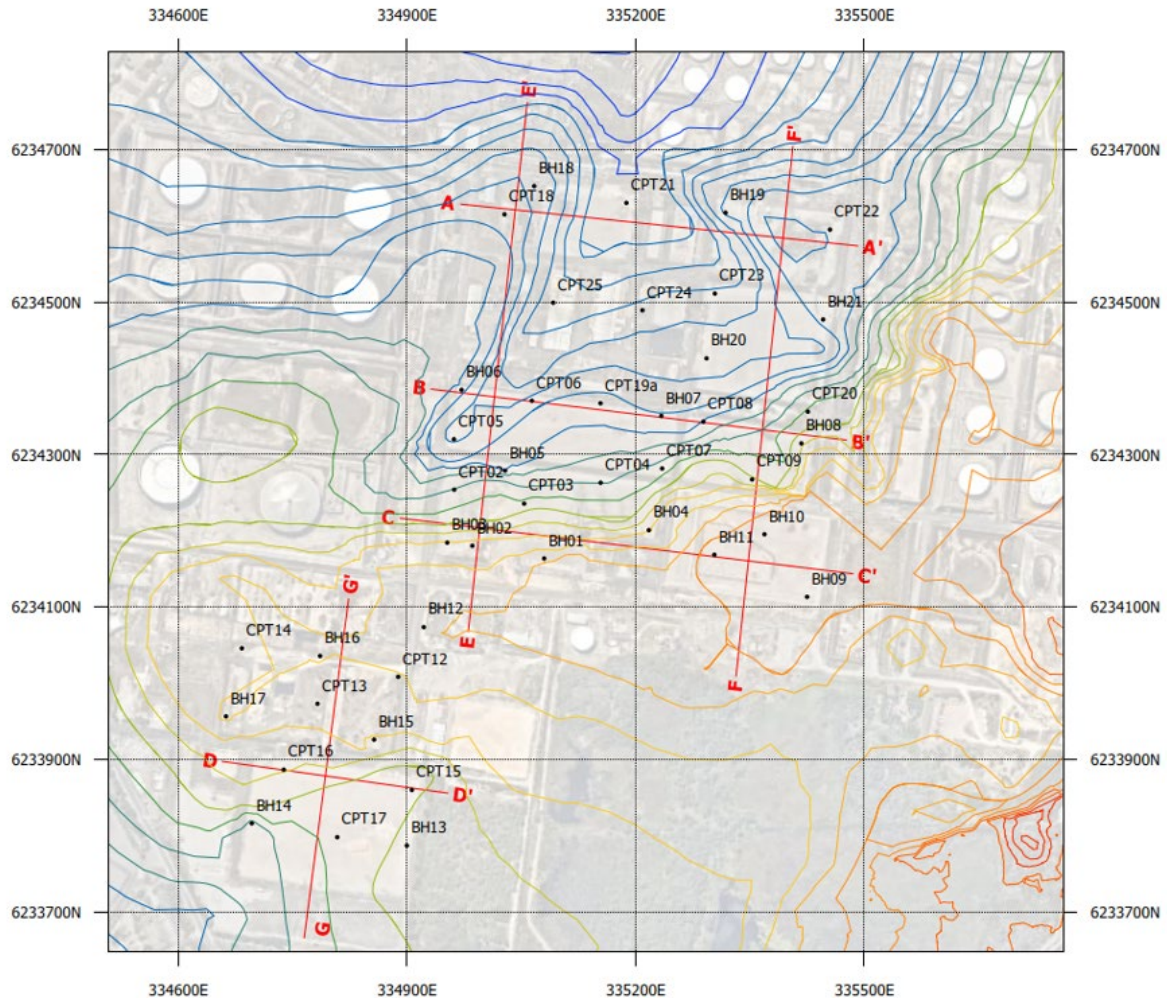


Figure 3-4 Geotechnical drilling layout (WSP, 2023)



Figure 3-5 Geotechnical investigation layout (AECOM, 2025a and 2025b)

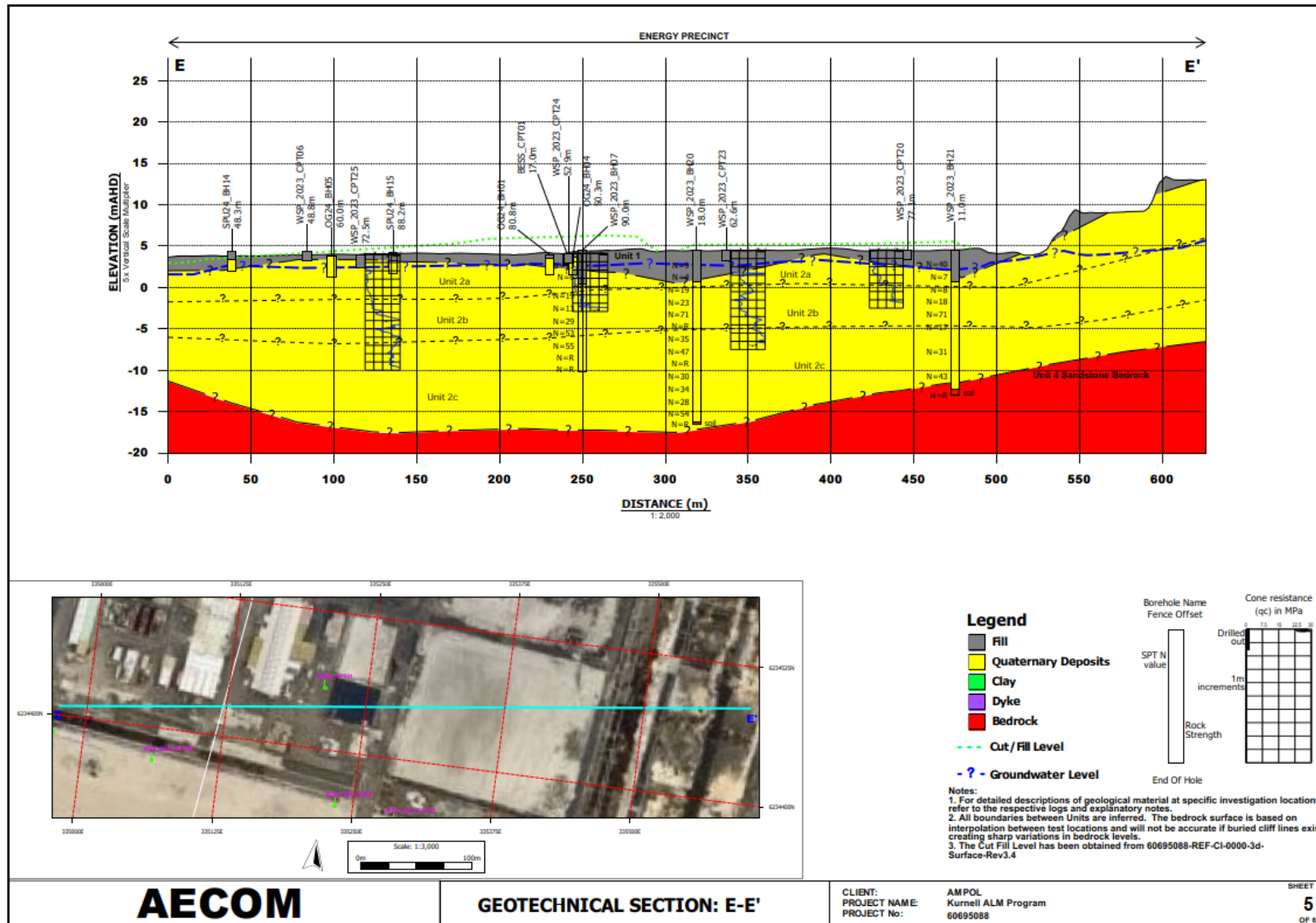


Figure 3-6 Geological cross-section E-E' (AECOM, 2025b)

3.6 Hydrogeology

3.6.1 Recharge and discharge mechanisms

Onsite groundwater recharge occurs primarily through direct rainfall and ponding of surface runoff. Rainfall recharge rates in urbanised areas are generally lower than those in vegetated zones. In addition to rainfall, onsite groundwater is likely recharged by the surrounding wetlands and surface water features, as discussed in Section 3.7. Groundwater in the area ultimately discharges to Botany Bay to the north and the Tasman Sea to the east.

3.6.2 Groundwater levels

Manual groundwater level measurements, collected at regular intervals between February 2023 and November 2024, at the monitoring bore network across the Site were reviewed (Figure 3-7).

A summary of shallowest, deepest, and average groundwater levels within proximity to each key construction element is provided in Table 3-3. The groundwater gauging data is included in Annexure A.

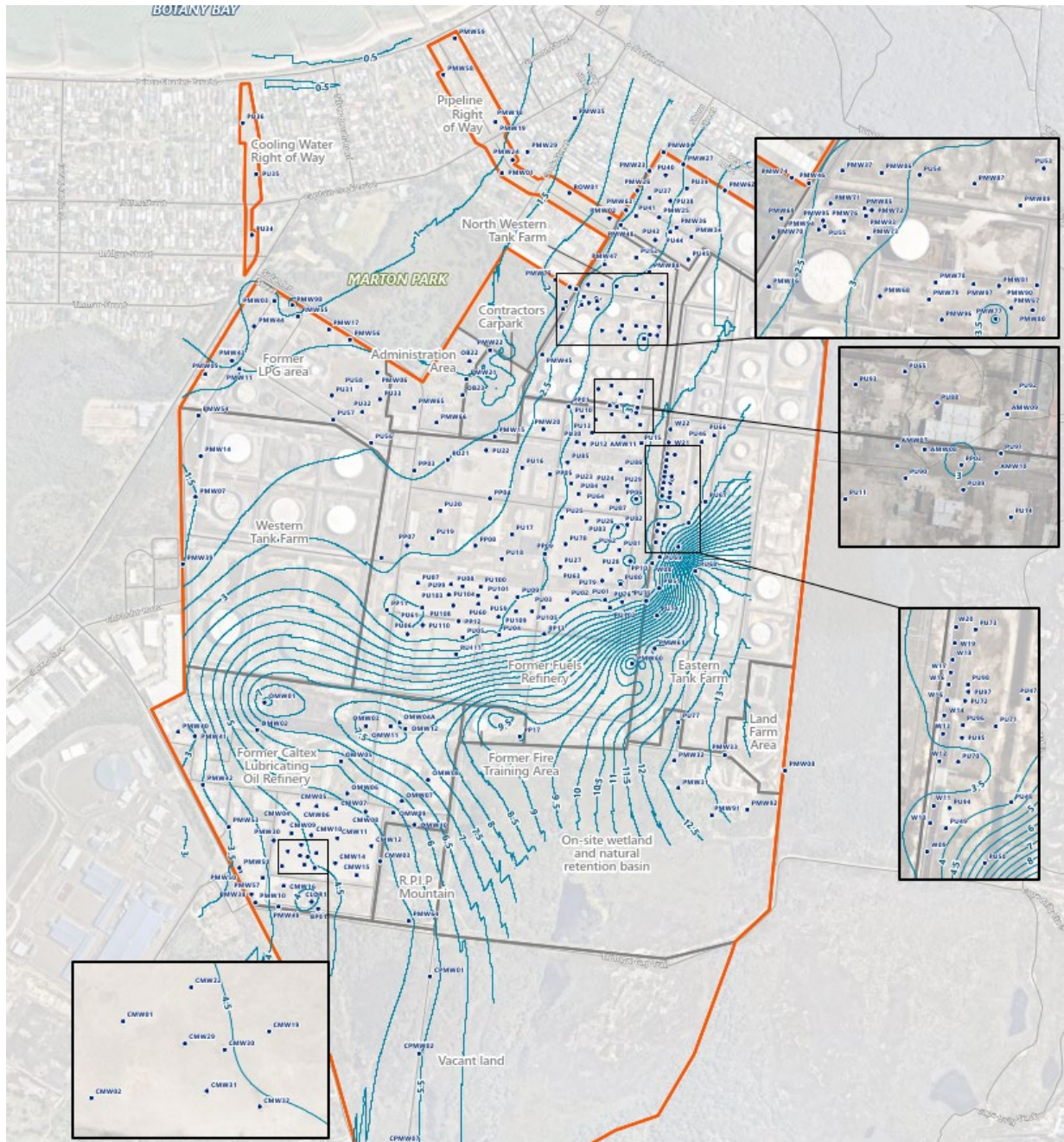


Figure 3-7 Groundwater level contour map – Q1 2024 (WSP, 2024)

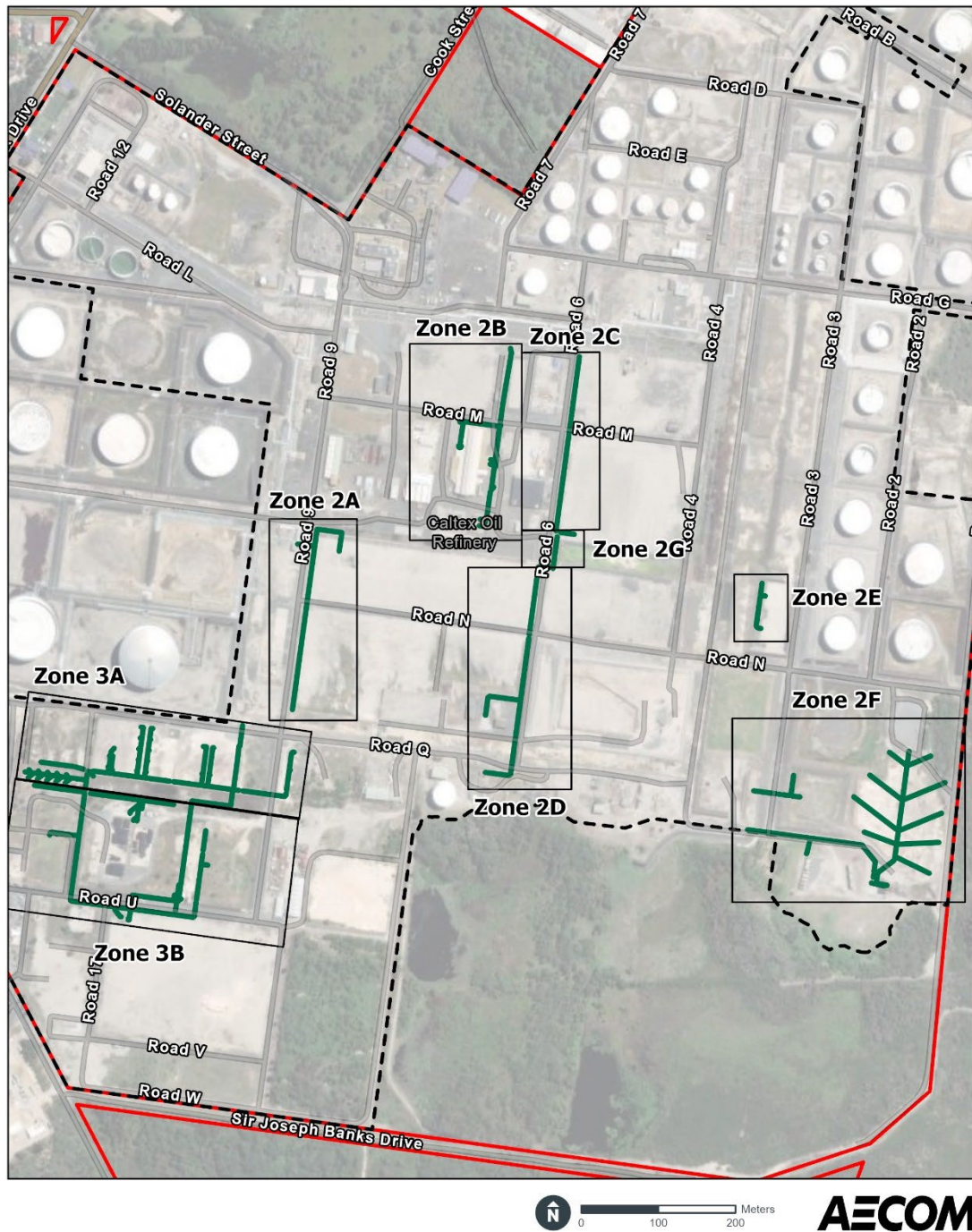
Table 3-3 Groundwater level summary (February 2023 – November 2024)

Area	Shallowest groundwater level (mbgl)	Deepest groundwater level (mbgl)	Average groundwater level (mbgl)	Proximal groundwater monitoring wells
Targeted soil remediation works (Figure 1-5)				
Source Area Excavation (SAE)				
Source Area Excavation 2	2.01	8.57	3.83	W10-W17, PU48, PU49, PU70-PU72, PU94-PU98,
Source Area Excavation 3	1.31	2.33	1.86	PU08, PU09, PU59, PU99, PU100, PU101, PU103, PU109
Source Area Excavation 4	1.25	1.41	1.33	PU18
Source Area Excavation 5	0.73	1.14	0.98	FTA_MW01, FTA_MW02, FTA_MW03
Source Area Excavation 6	1.03	1.49	1.24	CMW03, OMW09, OMW10
Other asbestos excavation				
Source Area Excavation 7	0.86	2.87	1.47	PU31, PU32, PU33, PU58
FWS Relocation Area tank and pump house (concrete foundations) (two options) (Figure 3-8)				
Option 1	1.01	1.84	1.48	PMW03, PMW55
Option 2	1.35	1.86	1.64	PMW06, PU58
FWS Relocation Area Firewater Pipeline (Figure 3-8)				
Option 1A	1.01	1.84	1.48	PMW55, PMW03
Option 1B	0.86	1.69	1.38	PU57, PU31
Option 2	1.05	2.87	1.58	PU32, PU33, PU58, PMW06, PMW56, PMW17, PMW55
Main line	0.17	1.80	1.40	PMW15, PU22, PMW66, PU56
OWS pump station and emergency storage tank (south of Zone 2) (Figure 1-5)				
Option 1	0.73	1.14	0.98	FTA_MW01, FTA_MW02, FTA_MW03
Option 2	0.24	0.42	0.31	SPA_MW02
Construction of new buildings (Zone 1 and Zone 1A) (Figure 1-5)				
New Storage Shed	1.42	1.95	1.67	PMW18, PMW19, PMW58
New Warehouse	0.69	1.33	1.07	PU65, PU93

Area	Shallowest groundwater level (mbgl)	Deepest groundwater level (mbgl)	Average groundwater level (mbgl)	Proximal groundwater monitoring wells
New Oil Spill Equipment Storeroom	1.15	1.49	1.31	PP03
Removal of OWS infrastructure (Zone 2 and Zone 3) (Figure 3-9)				
OWS Pipeline – Zone 2A	0.8	2.01	1.45	PU07, PP11, PU06
OWS Pipeline – Zone 2B	1.25	1.8	1.44	PU16, PU17, PU18, PP04
OWS Pipeline – Zone 2C	1.22	3.05	1.57	PU85, PP05, PU25, PP09
OWS Pipeline – Zone 2D	0.78	1.61	1.26	PU03, PU105, PP13
OWS Pipeline – Zone 2E	2.10	5.68	3.63	PU51, PMW61
OWS Pipeline – Zone 2F	1.03	2.42	1.47	PU77, PMW33
OWS Pipeline – Zone 2G	0.02	1.36	0.87	PU27
OWS Pipeline – Zone 3A	0.27	0.67	0.5	OMW01, OMW03,
OWS Pipeline – Zone 3B	1.00	2.55	1.47	OMW02, OMW05, OMW11, CMW06
OWS upgrades (Figure 3-10)				
Zone 2H	0.73	1.14	0.97	PP13, FTA_MW01, FTA_MW02, FTA_MW03
Zone 2I	0.24	0.42	0.31	SPA_MW02
Zone 2J	2.10	2.44	2.27	PMW61
Zone 2K	0.88	0.88	0.88	SPA_MW11
FWS augmentation (Zone 1 and 2) (Figure 3-11)				
Zone 1A	0.91	2.22	1.54	PMW47, PMW48, PU41, PMW63, PMW26, PMW23, PMW04
Zone 1B	0.62	1.59	1.11	PMW04, PMW27, PMW62, PU40, PU39
Zone 1C	0.92	3.01	1.68	PMW71, PMW37, PMW86, PMW85, PMW72, PU53, PMW89, PMW87, PU54
Zone 1D	0.25	0.73	0.49	PU45
Zone 1E	1.19	1.80	1.50	PMW66, PMW15

Area	Shallowest groundwater level (mbgl)	Deepest groundwater level (mbgl)	Average groundwater level (mbgl)	Proximal groundwater monitoring wells
Zone 1F	0.20	1.56	0.92	PU10, PU11, AMW07, AMW08, PU90, PP02, PU89, AMW10
Zone 1G	0.54	1.48	1.05	PU85, PU86, PU15, PU14
Zone 1H	7.31	8.93	8.30	PU66
Zone 2L	0.73	1.14	0.98	FTA_MW01, FTA_MW02, FTA_MW03
Zone 2M	0.18	0.54	0.31	PMW60, SPA_MW02
Zone 2N	1.03	4.59	2.14	PMW33, SPA_MW01, PMW61, PU77

Notes: mbgl – meters below ground level

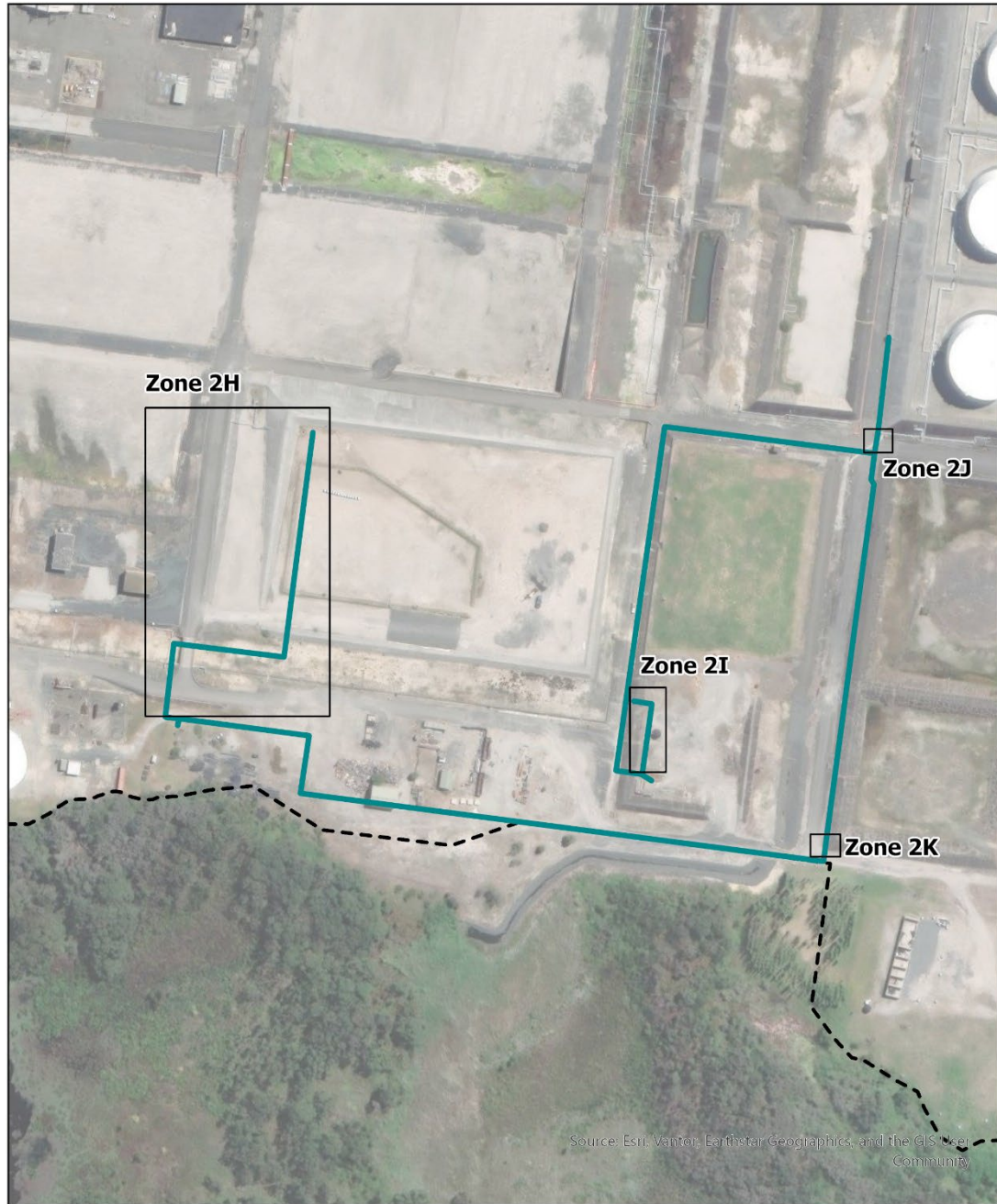


Legend

- Site
- Project Area
- Removal of OWS infrastructure

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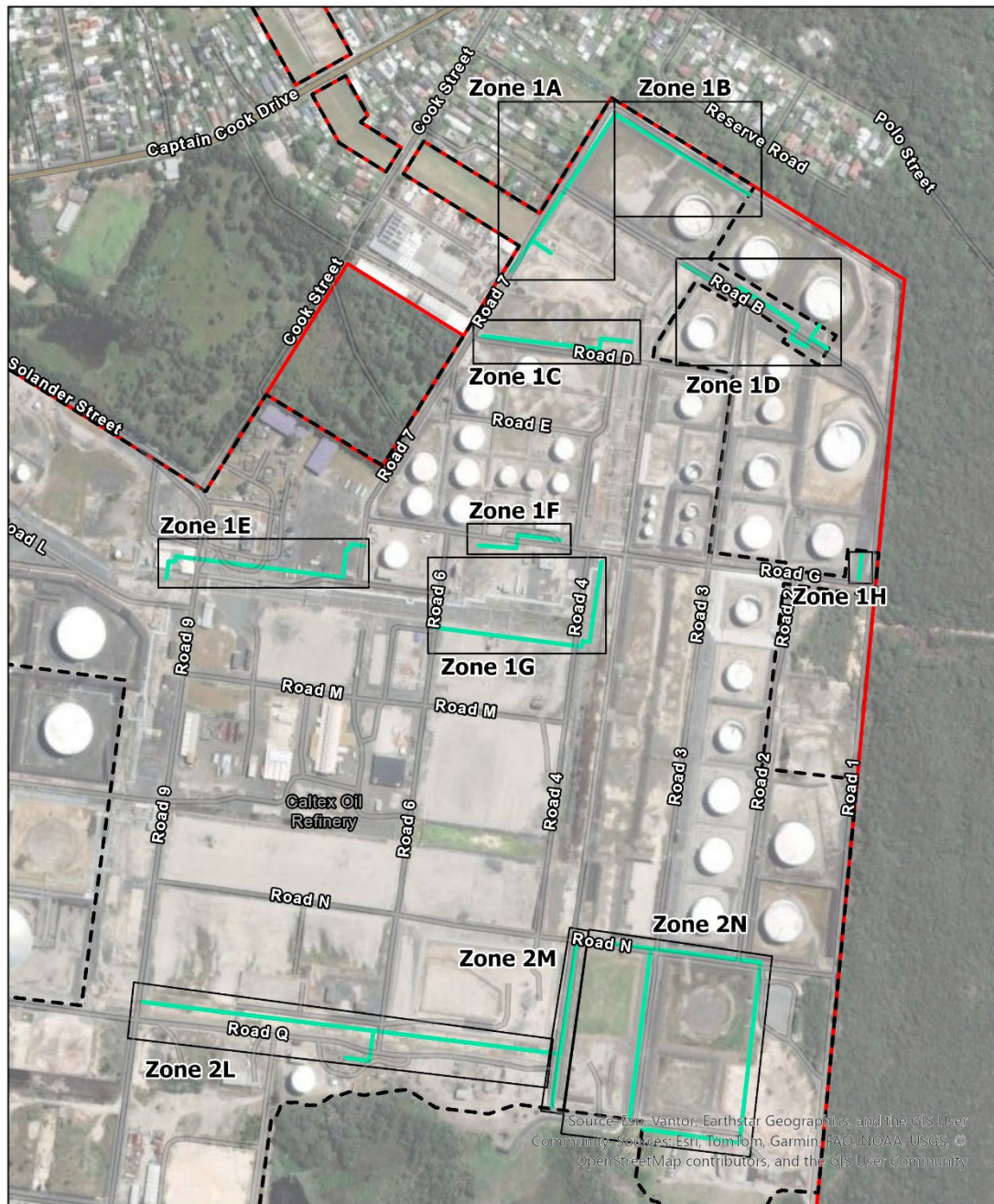
Figure 3-9 Removal of OWS infrastructure



- Legend**
-  Project Area
 -  Site
 -  OWS upgrades

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Figure 3-10 OWS upgrades



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- Legend**
- Site
 - Project Area
 - Augmentation of FWS infrastructure

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Figure 3-11 Augmentation of FWS infrastructure

As an example of rainfall influence on groundwater levels, a water level time series hydrograph was compiled for the depth of groundwater at monitoring well PP11, located in Zone 1 (Table 1-1). The resultant hydrograph indicates that the depth to groundwater becomes shallower after prolonged or intense rainfall events. The rapid response, some 0.2 m, to rain indicates the underlying sand has high recharge in places (land cover related). The rapid water level decline after rain events indicates limited effective storage in the sand aquifer as groundwater discharges readily from the sand aquifer, as submarine discharge and/or discharge to surrounding surface water bodies.

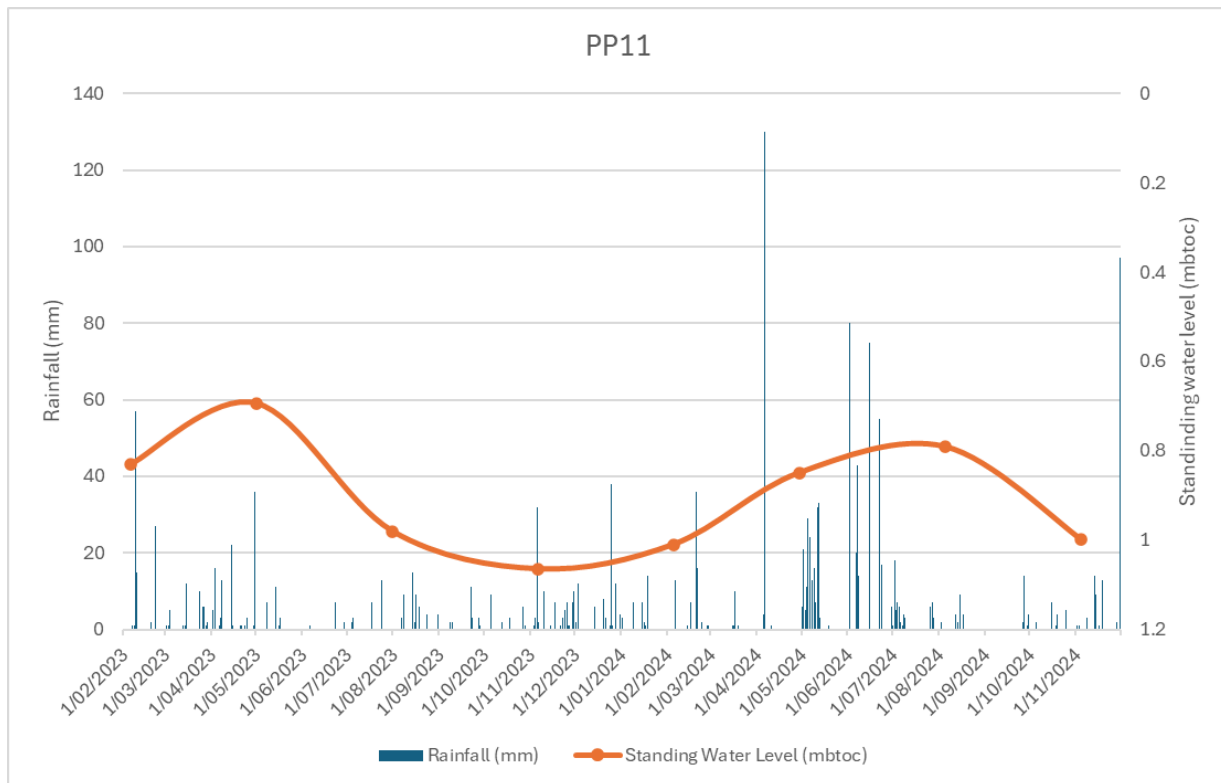


Figure 3-12 PP11 hydrograph and daily rainfall

3.6.3 Groundwater flow

Groundwater flow within Quaternary sediments across the Site is generally to the north west and influenced by the strike and dip of the underlying Hawksbury Sandstone bedrock (Coffey Environments, 2007). Within the Site, there is an east-west groundwater divide within the Quaternary sediments, broadly located along the southern edge of Zones 2 (the former oil refinery) and the Western Tank farm (Caltex, 2013).

To the north of the divide, the groundwater generally flows in a north westerly direction towards Botany Bay. South of the divide, the groundwater generally flows south west towards a stormwater drain, and then north west into Botany Bay via Quibray Bay.

3.6.4 Particle size distribution

To evaluate aquifer hydraulic properties associated with underlying fill and geology, particle size distribution data was obtained from two previous geotechnical studies at the Site, AECOM (2025a) and WSP (2023), as summarised below.

AECOM 2025a

Geotechnical investigations were undertaken by AECOM, commencing in January 2025, to provide information of ground conditions within Zone 2 and Zone 3, as shown on Figure 3-5 (AECOM, 2025a). Particle Size Distribution (PSD) sieve tests were conducted, and an estimate of hydraulic conductivity was calculated using HydrogeoSieveXL³. The resultant assessment is presented in Table 3-4. Table 3-4 includes assessments of hydraulic conductivity of PSD samples logged as sediments (fill and loose to medium sand).

Hydrometer tests were included in the PSD tests for Zone 2 (BH01_3.00-3.30 and BH01_4.5-4.78) and Zone 3 (BH01_N_2.75-3.05) only. Permeability analysis is limited as standard sieve analysis cannot measure particles smaller than 0.075 mm, and therefore permeability may be over- or under-estimated.

Table 3-4 Particle size distribution assessment (AECOM, 2025a)

Sample	PSD description	d10 (mm)	d60 (mm)	Uniformity coefficient ⁴	Mean hydraulic conductivity (m/day)
Zone 2					
BESS_BH01 1.5 to 1.78 mbgl	Uniform sand low in fines	0.230	0.389	1.69	51.14
BESS_BH01 3.0 to 3.3 mbgl	Uniform sand low in fines	0.169	0.323	1.91	30.10
BESS_TP01 1.2 to 1.8 mbgl	Moderately well sorted gravelly sand low in fines	0.171	0.600	3.52	218.08
BESS_TP02 0.0 to 0.5 mbgl	Poorly sorted gravelly sand low in fines	0.058	1.035	17.94	149.37
BESS_TP02 1.5 to 1.8 mbgl	Uniform sand low in fines	0.221	0.379	1.71	48.44
BESS_TP03 0.3 to 0.45 mbgl	Poorly sorted gravelly sand low in fines	0.054	0.533	9.94	22.82
BESS_TP04 0.0 to 0.4 mbgl	Uniform sand low in fines	0.212	0.350	1.65	50.63
BESS_TP04 0.6 to 0.9 mbgl	Moderately well sorted gravelly sand low in fines	0.151	0.549	3.64	48.23
BESS_TP04 1.1 to 1.3 mbgl	Uniform sand low in fines	0.216	0.383	1.78	50.00
BESS_TP06 0.5 to 0.8 mbgl	Moderately well sorted gravelly sand low in fines	0.150	0.432	2.88	16.00
BESS_TP07 0.3 to 0.9 mbgl	Poorly sorted sandy gravel low in fines	0.191	5.307	27.74	333.22
BESS_TP07 1.1 to 1.5 mbgl	Moderately well sorted sand low in fines	0.100	0.374	3.74	30.31
BESS_TP08 0.6 to 1.0 mbgl	Uniform sand low in fines	0.225	0.372	1.65	48.97
BESS_TP09 1.1 to 1.4 mbgl	Poorly sorted sand low in fines	0.022	0.310	14.07	29.36
BESS_TP09 1.6 to 1.8 mbgl	Poorly sorted sand low in fines	0.044	0.468	10.60	32.52

³ HydrogeoSieveXL is a utility aimed at providing a comprehensive means of obtaining hydraulic conductivity (K) estimates from grain size analyses. HydrogeoSieveXL uses and evaluates 15 methods of estimating hydraulic conductivity from grain size analysis. Results that meet the criteria of the 15 equations allow for an estimate of hydraulic conductivity.

⁴ The uniformity coefficient is the ratio of d60 to d10. A value greater than 4 to 6 is well sorted. A value less than 4 is poorly graded or uniformly graded.

Sample	PSD description	d10 (mm)	d60 (mm)	Uniformity coefficient ⁴	Mean hydraulic conductivity (m/day)
Zone 2_BH01 3.0 to 3.3 + 4.5 to 4.78 mbgl	Moderately well sorted sand low in fines	0.135	0.354	2.62	18.24
Zone 3					
RPIP_BH02 1.5 to 1.95 mbgl	Uniform sand low in fines	0.218	0.356	1.63	44.71
RPIP_BH03_N 1.5 to 1.95 mbgl	Uniform sand low in fines	0.221	0.355	1.61	45.43
RPIP_BH03_N 3.0 to 3.45 mbgl	Poorly sorted sandy silt low in fines	0.009	0.057	6.00	250.87
RPIP_BH03 4.5 to 4.75 mbgl	Uniform sand low in fines	0.219	0.366	1.67	46.09
RPIP_BH04 1.5 to 1.95 mbgl	Uniform sand low in fines	0.226	0.367	1.63	47.15
RPIP_TP01 1.5 to 2.0 mbgl	Uniform sand low in fines	0.184	0.321	1.74	36.72
RPIP_TP03 2.2 to 3.0 mbgl	Uniform sand low in fines	0.215	0.351	1.63	43.32
RPIP_TP04 0.4 to 0.8 mbgl	Uniform sand low in fines	0.220	0.350	1.59	48.90
RPIP_TP07 0.5 to 1.5 mbgl	Uniform sand low in fines	0.198	0.318	1.60	37.83
PIP_TP08 0.7 to 2.0 mbgl	Uniform sand low in fines	0.221	0.365	1.65	48.84
RPIP_TP10 1.2 to 1.5 mbgl	Uniform sand low in fines	0.186	0.307	1.65	34.28
RPIP_TP11 0.2 to 0.9 mbgl	Poorly sorted sand low in fines	0.068	0.369	5.41	32.53
Zone 3_BH01 1.5 to 1.95 mbgl	Poorly sorted sandy silt low in fines	0.013	0.075	6.00	113.86
Zone 3_BH01 2.75 to 3.05 mbgl	Poorly sorted sand low in fines	0.005	0.368	73.57	5.54
Zone 3_BH04 1.5 to 1.95 mbgl	Poorly sorted sand low in fines	0.047	0.438	9.35	25.86
Zone 3_BH05 1.5 to 1.95 mbgl	Uniform sand low in fines	0.260	0.500	1.92	75.53
Zone 3_BH05 3.0 to 3.3 mbgl	Uniform sand low in fines	0.271	0.483	1.79	79.34
Zone 3_BH06 3.0 to 3.2 mbgl	Uniform sand low in fines	0.218	0.398	1.83	49.83

WSP 2023

PSD sieve tests were conducted within Zone 2 and Zone 3 (WSP, 2023). The data was used to provide an assessment of the fill and loose to medium dense marine sand expected to be intersected within two in-ground pits.

An estimate of hydraulic conductivity was conducted using HydrogeoSieveXL. The resultant assessment is summarised in Table 3-5. Table 3-5 presents assessments of hydraulic conductivity of PSD samples logged as sediments (fill and fine to medium grained, predominantly well sorted, unconsolidated sand).

Note: No hydrometer tests were included in the PSD tests.

Table 3-5 Particle size distribution assessment (WSP, 2023)

Sample	PSD description	d10 (mm)	d60 (mm)	Uniformity coefficient	Mean hydraulic conductivity (m/day)
BH1 1.2 to 1.5 mbgl	Poorly sorted gravelly sand low in fines	0.044	0.495	11.22	17.42
BH2 1.5 to 1.54 mbgl	Moderately well sorted gravelly sand low in fines	0.20	0.571	2.86	45.83
BH4 1.5 to 1.95 mbgl	Uniform sand low in fines	0.221	0.363	1.64	46.56
BH6 3 to 3.45 mbgl	Uniform sand low in fines	0.172	0.308	1.79	27.67
BH6 5.6 to 6.05 mbgl	Uniform sand low in fines	0.224	0.359	1.60	43.64
BH7 3.0 to 3.45 mbgl	Uniform sand low in fines	0.212	0.382	1.8	48.19
BH8 1.5 to 1.95 mbgl	Poorly sorted sand low in fines	0.063	0.425	6.8	32.09
BH13 1.5 to 1.95 mbgl	Uniform sand low in fines	0.212	0.373	1.76	45.41
BH13 4.2 to 4.65 mbgl	Moderately well sorted sand low in fines	0.181	0.368	2.03	37.56
BH14 1.5 to 1.95 mbgl	Uniform sand low in fines	0.200	0.321	1.61	37.89
BH15 2.5 to 3.0 mbgl	Uniform sand low in fines	0.212	0.369	1.74	44.14
BH17 1.4 to 1.5 mbgl	Poorly sorted sand low in fines	0.020	0.284	14.39	27.29
BH18 1.5 to 2.0 mbgl	Uniform sand low in fines	0.218	0.364	1.67	39.58
BH18 12 to 12.45 mbgl	Poorly sorted sand low in fines	0.054	0.363	6.77	15.0
BH19 1.5 to 1.95 mbgl	Uniform gravelly sand low in fines	0.197	0.385	1.96	39.90
BH19 4.5 to 4.95 mbgl	Uniform sand low in fines	0.191	0.356	1.86	35.45
BH20 1.2 to 1.5 mbgl	Moderately well sorted gravelly sand low in fines	0.197	0.406	2.07	60.66

PSD Assessment

These results indicate that the sand below the Project Area is high permeable heterogeneous sand, with hydraulic conductivity ranging between 6 and 333 m/day, depending on the grain size and sorting (i.e., uniform nature of the sand).

Intersecting horizons of uniform coarser sand will result in increased ingress rates into excavations.



Figure 3-13 Geotechnical Investigation Plan – Zone 2 and Zone 3 (WSP, 2023)



Figure 3-14 Geotechnical Investigation Plan – Zone 3 Additional Locations (WSP, 2023)

3.6.5 Variable head tests

Variable head (slug) test data was obtained from two previous hydrogeological studies at the Site, AECOM (2024) and Coffey (2009), as summarised below.

AECOM 2024

Variable head (slug) tests were conducted for the *Kurnell Stormwater Separation Improvement Report* (AECOM, 2024) within selected groundwater monitoring bores located within the Former LPG Area and Former Fuels Refinery (Zone 2). The selected groundwater monitoring bore construction details are included in Table 3-6, the slug test results are included in Table 3-7, and the layout is included in Figure 3-15.

Table 3-6 Selected groundwater monitoring bores

Bore ID	Easting	Northing	Depth of bore (mbgl)	Screen depths (mbgl)
PU32	334876.704	6234736.175	4.00	1.0 to 4.0
PU33	334914.526	6234763.762	4.00	1.0 to 4.0
PU07	334996.160	6234367.763	4.00	1.0 to 4.0
PP11	334929.857	6234310.150	3.00	0.3 to 3.0

Table 3-7 AECOM 2024 slug test results

Well ID	Screen interval	Standing Water Level	Lithology	Hydraulic conductivity		Average hydraulic conductivity
	(mbgl)	(mbtoc)		(m/s)	(m/day)	
PP11	0.3 – 3.0	0.455	No bore log available – assumed to be fine to coarse sand.	3.22E-05	2.78	3.17
				3.49E-05	3.01	
				4.49E-05	3.88	
				3.45E-05	2.98	
PU07	1.0 – 4.0	1.513	Fine to coarse sand	7.93E-05	6.85	2.94
				6.94E-06	0.60	
				3.63E-05	3.13	
				1.64E-05	1.42	
				3.12E-05	2.70	
PU32	1.0 – 4.0	0.419	Fine to coarse sand	6.51E-05	5.63	4.62
				5.55E-05	4.80	
				3.04E-05	2.63	
				6.28E-05	5.42	
PU33	1.0 – 4.0	0.602	Fine to coarse sand	5.69E-05	4.92	4.49
				5.20E-05	4.49	
				4.71E-05	4.07	

Notes:

- Very short duration tests.
- Little or no water level change.

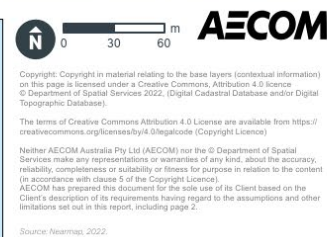
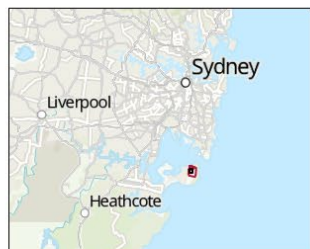


Figure 3-15 Variable head test locations (AECOM, 2024)

Coffey 2009

In 2009, Coffey conducted a series of variable head (slug) tests within the Contractors Carpark and the North Western Tank Farm to assist in their assessment of groundwater conditions at the Site.

Estimates of aquifer hydraulic conductivity were compiled by conducting rising-head slug tests in wells OB1, OB2, OB3, OB12, and OB13 (Figure 3-16) and the data was analysed using Hvorslev and Bouwer & Rice methods. The resultant slug test results are included in Table 3-8.

Table 3-8 Coffey 2009 slug test results

Bore ID	Screen interval (mbgl)	Bouwer & Rice (m/day)	Hvorslev (m/day)	Screened lithology	Notes
OB1	3.0 – 4.1	2.64	3.83	Sand	Duration 90 seconds 0.61 m displacement
OB2	3.0 – 4.1	1.93	2.96	Sand loose sub-angular with peat	Duration 110 seconds 0.78 m displacement
OB3	3.0 – 4.1	0.55	0.63	Sand loose sub-angular with peat	Duration 420 seconds 0.6 m displacement
OB12	3.0 – 4.3	2.24	2.68	Sand loose sub-angular with peat	Duration 135 seconds 0.58 m displacement
OB13	3.0 – 4.3	1.95	2.56	Sand	Duration 96 seconds 0.6 m displacement

Coffey determined that the mean hydraulic conductivity value of 2.26 m/day was typical of fine sand or of poorly sorted coarse sand. The hydraulic conductivity values used in their modelling ranged from 5.0 (shallow) to 2.5 (deep) m/day.

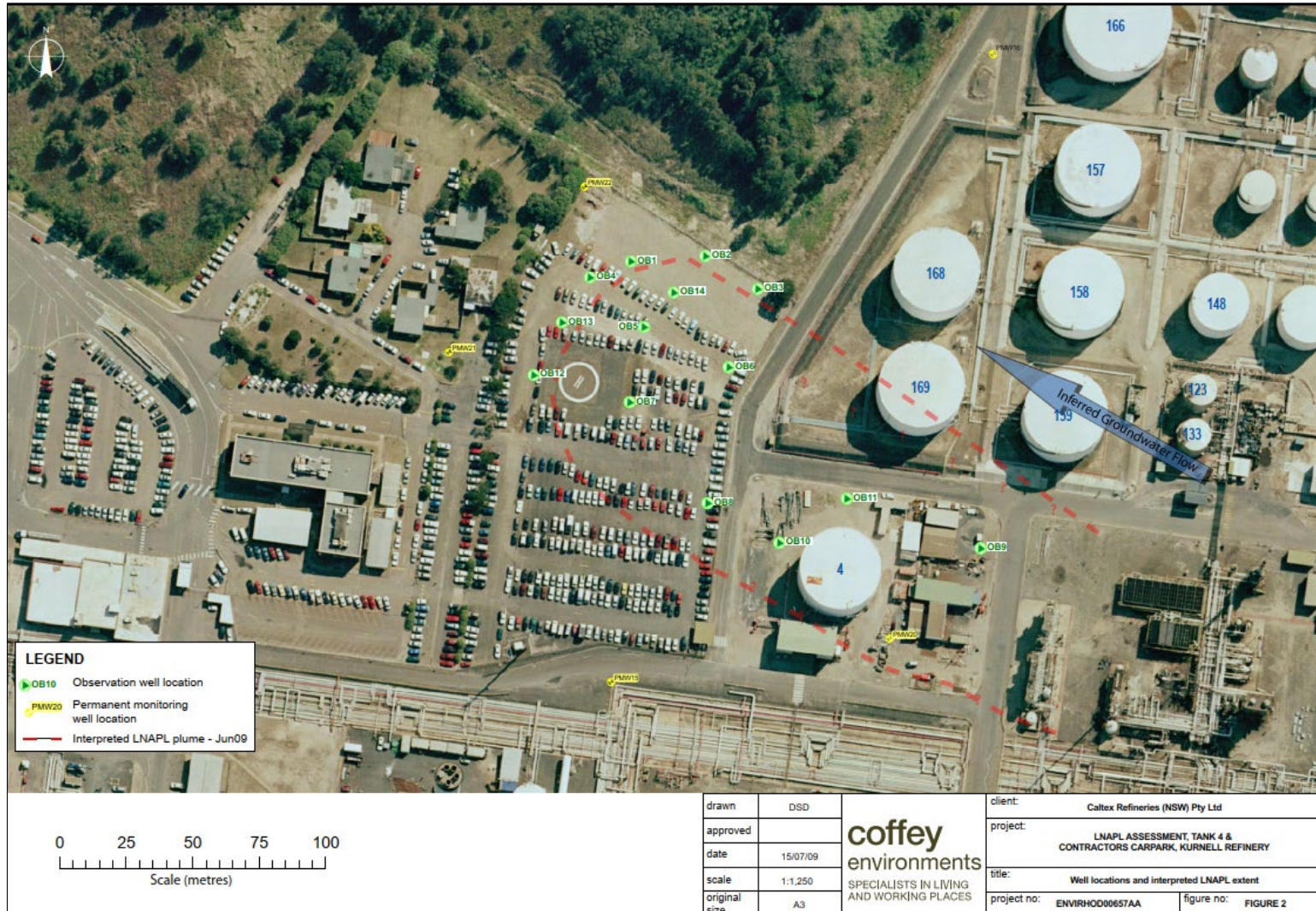


Figure 3-16 Coffey 2009 slug test bore locations

Slug test comments

The short duration and limited water level change during the slug tests, in both the Coffey (2009) and AECOM (2024) slug testing, are considered to **not** be representative of the underlying high permeable sand.

Coffey (2023) conducted a site assessment along Captain Cook Drive, immediately adjacent to the site. The Coffey assessment indicated that the underlying sands have moderate hydraulic conductivity ranging between **50 and 100 m/day** at shallow depths and 1 to 10 m/day at depths close to the Hawkesbury Sandstone bedrock (Coffey, 2023).

The discrepancies between the calculated permeability from in-situ slug tests, estimates from PSD data, and Coffey assessment is likely due to insufficient water level change during the slug tests. The water levels did not vary (rising and falling) greater than 1 m. For testing of high permeable formations, a water level change of greater than 2 m is desired (Palmer, 2015). On this basis it was considered that the in-situ slug test results should be treated as lower bound estimates of permeability.

3.6.6 Previous dewatering at the Site

During SSD-5544 MOD-1 (Kurnell Refinery Demolition), excavations to depths of up to 2 mbgl and 3 mbgl were required for the removal of buildings and pipelines (the Continental Carbon Pipeline, through the centre of Zone 4 and 5) respectively. Detailed assessment and licence applications for dewatering were not triggered for this modification to the approved project.

However, as part of the Kurnell Stormwater Separation Improvement Project (SSIP), two pits were excavated to a depth of 3.9 mbgl. AECOM undertook a high-level groundwater assessment using recognised groundwater equations to provide estimates of groundwater ingress and drawdown to assist with the regulatory requirements and allow for informed decision-making related to the construction approach and water management.

Construction and dewatering of the two pits commenced on 24 January 2025 and ceased on 21 March 2025. Discharge volumes for Pit A, as shown on Figure 3-15, were reported in the *Dewatering Completion Report* (AECOM, 2025b). Between 4 February 2025 and 21 February 2025, dewatering was conducted throughout the work week and ceased each weekend, recontinuing the following work week. Each week, pumping rates stabilised after the first day of dewatering (after the removal of the groundwater head above the pumps which resulted after pumping ceased), with pumping rates ranging between 1,795 and 3,242 kL per day, averaging 2,335 kL per 24 hours, a continuous rate of 27 L/s.

The average pumping rate required to dewater Pit A was 3.6 times more than what was estimated using groundwater equations and estimates of aquifer hydraulic properties for Pit A (7.6 L/s). It is likely that the hydraulic conductivity of 40 m/day, based on the WSP (2023) PSD data, was underestimated noting the heterogeneity of the intersected sand unit. This was considered a reasonable assumption for the assessment based on the data available at the time. The WSP (2023) PSD data had showed relatively consistent hydraulic conductivity values (generally around 20–40 m/day). However, the more recent PSD data from AECOM (2025), which was not available during preparation of the original assessment, indicates a wider range, with some values exceeding 100 m/day, which aligns more closely with SSIP pumping results.

It is considered that the hydraulic conductivity of the sand intersected was higher as a whole or intersected zones of higher permeability than assessed. To reflect the pumping rates provided, it is assumed that the increased pumping rates correlate to an increased hydraulic conductivity, some 3 to 4 times higher (as reflected in the groundwater ingress rates). This indicates hydraulic conductivity of 140 to 150 m/day. This site-specific hydraulic conductivity is more consistent with the Coffey assessment, which indicated hydraulic conductivity ranges between 50 and 100 m/day.

Section 3.6.4 indicates the estimated hydraulic conductivity typically range between 20 and 50 m/day, with five samples indicating that hydraulic conductivity is over 100 m/day. Intersecting these high permeability zones would increase groundwater ingress. To allow for the evaluation of drawdown impacts, these higher hydraulic conductivity values were used in the assessment presented in this report. Groundwater ingress rates would depend on actual sediments intersected, saturated thickness, plus anisotropy (the vertical hydraulic conductivity of the sand). As such, the estimate of groundwater ingress presented in this report has been conservatively overestimated.

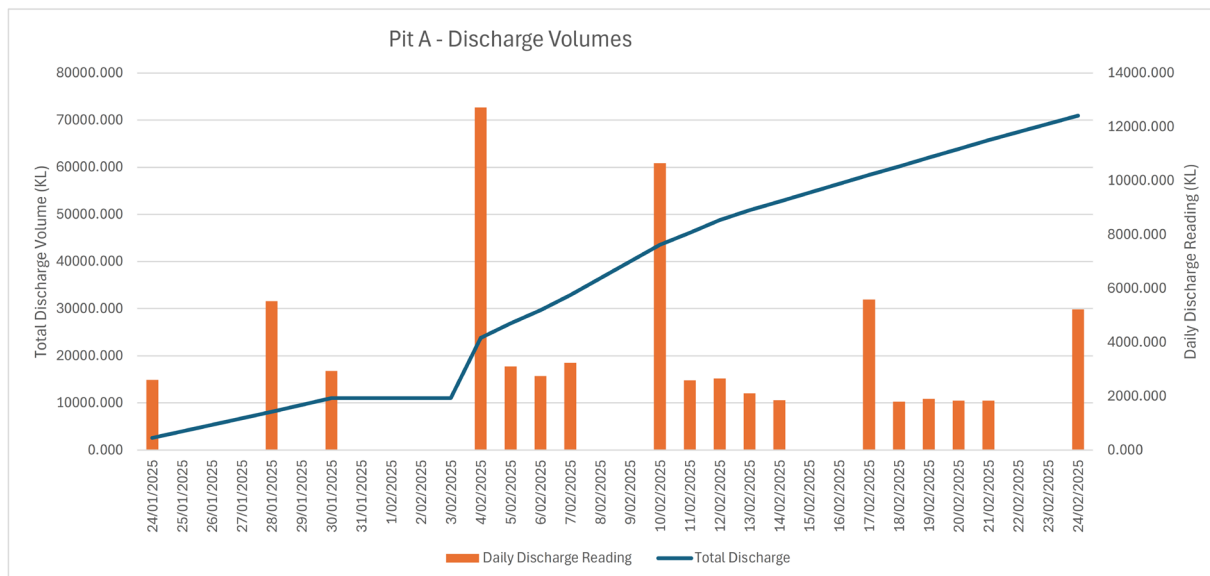


Figure 3-17 Pit A discharge volumes (AECOM, 2025c)

3.7 Surface water features

The Kurnell Peninsula's land area and the surrounding marine and estuarine waters constitute the receiving environment for surface water discharges from the Site. The main water bodies in proximity to the Site include the Tasman Sea, Botany Bay, Quibray Bay, and Marton Park Wetland.

The Site is located within the Botany Bay catchment, which extends across a land area of 1,165 km². The catchment is part of the Greater Sydney Local Land Services region.

The Botany Bay Catchment has four main sub-catchments based on the major rivers that drain to it. These include:

- Georges River catchment
- Cooks River catchment
- Woronora catchment
- Botany Bay (direct discharge) catchment.

The Site is in the catchment area that drains directly to Quibray Bay and Botany Bay. A substantial part of the catchment is highly developed, with almost 40% of its area being used for urban, industrial, or commercial purposes.

3.7.1 Groundwater dependent ecosystems

Groundwater dependent ecosystems (GDEs) are ecosystems that rely on groundwater to provide at least some of their water needs. GDEs have been identified close to the Project Area⁵, as shown on Figure 3-18.

This mapping indicates that the following ecosystems in proximity to the Site rely on groundwater:

- Marton Park Wetland, to the north. Mapped as a high probability terrestrial GDE and high probability wetland GDE
 - PCT 4028 Estuarine Swamp Oak Twig-rush Forest was mapped in moderate condition along Solander Street (i.e., along the southern border of Marton Park Wetland) as part of the field investigations supporting the current assessment

⁵ Australian Government Bureau of Meteorology Groundwater Dependent Ecosystems Atlas, found at:

<http://www.bom.gov.au/water/groundwater/gde/>

- The State Vegetation Type Map (NSW DCCEEW 2024a) indicates the potential further presence of PCT 3972 Sydney Creekflat Wetland and PCT 3986 Coastal Sands Swamp Mahogany Rush Forest within Morton Park Wetland
- Vegetation within Kamay Botany Bay National Park, to the east. The closest areas to the subject land are mapped as medium probability GDEs
 - The State Vegetation Type Map (NSW DCCEEW 2024a) indicates the potential presence of PCT 3545 Coastal Sands Bloodwood Low Forest within these vegetated areas adjacent to the subject land. This matches the vegetation mapping undertaken by Biosis for areas along the eastern edge of the subject land
- The wetland area in Zone 4 (mapped as high to medium probability terrestrial GDE and high probability wetland GDE) and Zone 5 (mapped as medium to low probability terrestrial GDE with patches of high probability)
 - PCT 3545 Coastal Sands Bloodwood Forest, PCT 3546 Coastal Sands Littoral Scrub-Forest, PCT 3638 South Coast Sands Bangalay Forest, PCT 3921 Coastal Sydney Sands Saw-sedge Wet Shrubland and PCT 3986 Coastal Sands Swamp Mahogany Rush Forest were mapped in Zone 4 as part of the field investigation supporting the current assessment
 - The State Vegetation Type Map (NSW DCCEEW 2024a) indicates the potential further presence of PCT 3805 Southern Sandplain Heath, PCT 3812 Sydney Coastal Sandstone Headland Heath and PCT 3922 Sydney Coastal Sand Swamp Scrub
- A natural retention basin is located in the south of Zone
 - The same PCTs recorded or predicted to occur (via the State Vegetation Type Map) in Zone 4 are likely to occur within Zone 5.

Towra Point Nature Reserve, a listed Ramsar Wetland of international significance. Mapped as a high probability terrestrial GDE and high probability estuarine and near shore marine ecosystems GDE.

The mapping also indicates that there is terrestrial vegetation that relies on groundwater within RPIP Mountain (high to medium probability GDE). This vegetation would be removed as part of the proposed modification.

Patches of medium probability GDE are present along the eastern boundary of the Site. The lower two patches were assessed within the Updated Biodiversity Development Assessment Report (Appendix I of the Submissions Report). Both were assessed as PCT 3545 (Coastal Sands Bloodwood Low Forest) (Regenerating).

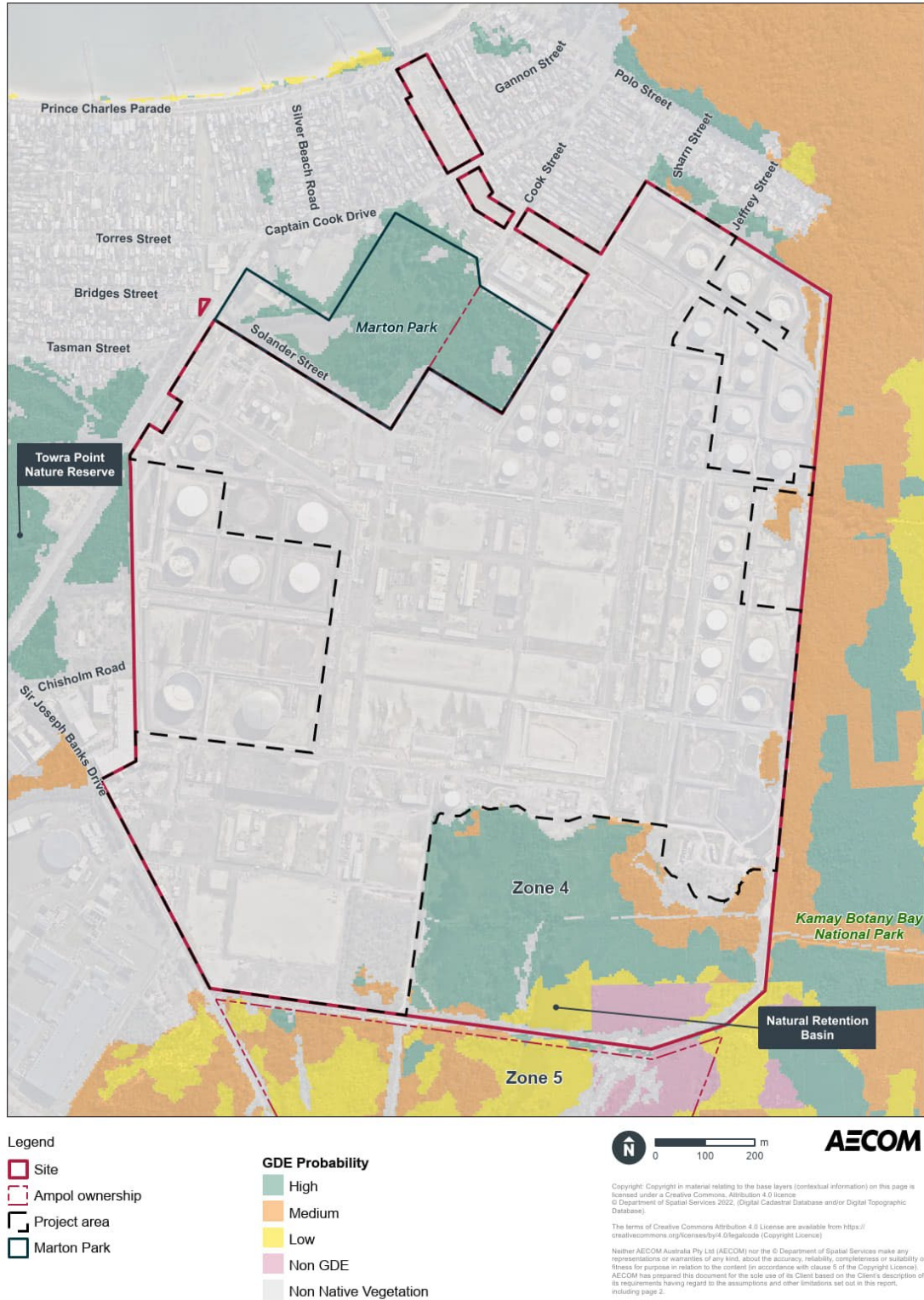


Figure 3-18 GDEs in proximity to the Project Area

4.0 Groundwater ingress estimates

4.1 Equations

4.1.1 Radius of influence

The radius of influence, the extent of groundwater drawdown from the excavation where drawdown is negligible or unobservable, was calculated using Sichardt's formula⁶ for unconfined aquifers

$$R_0 = C \times s_w \times \sqrt{k}$$

Where:

R_0 = radius of influence (m)

C = radial/linear flow conversion factor – 2000 for linear flow in trenches (dimensionless) and 3000 for pits.

s_w = drawdown at trench

K = Hydraulic conductivity (m/s).

Note: The Sichardt's formula is derived from empirical observations rather than a theoretical model and is considered a simplified approach and provides an estimate based on steady-state (continuous pumping) homogeneous conditions.

4.1.2 Pit inflow rate

To estimate the groundwater inflow into excavation pits, the Thiem-Dupuit steady state equation for unconfined aquifers was used (Kruseman & de Ridder, 1991):

$$Q = \frac{\pi k (h_o^2 - h_w^2)}{\ln(R / r_e)}$$

Where:

Q = inflow (m³/day),

k = hydraulic conductivity (m/day)

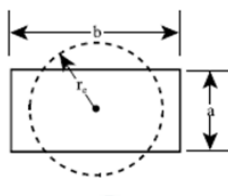
h_o = head at distance R from centre of pit (m),

h_w = head at distance r_e (m) at pit face (seepage face)

R = radius of "influence" or distance to negligible drawdown (m)

r_e = effective radius of "well" (m), which is the equivalent radius based on the size of the trench excavation, calculated as $\sqrt{ab/\pi}$, where a and b are the length and width of the excavation.

$$r_e = \sqrt{\frac{ab}{\pi}}$$



⁶ Sichardt, W. (1930) In Kyrieleis, W., Sichardt, W. – Grundwasserabsenkung bei Fundierungsarbeiten, Springer, Berlin, 1930

4.1.3 Trench inflow rate

Trench inflow rate has been estimated using the calculation from Neville and Wang⁷, adapted from Mansur and Kaufman⁸.

$$Q = K \left(\frac{L}{R_0} \right) (H - H_d)^2 - (H_d - H)^2$$

Where:

L = length of excavation (m)

H = height of the water table at the radius of influence (m)

H_d = height of the water table at the excavation (m)

K = hydraulic conductivity (m/d)

R₀ = radius of influence (m)

The Mansur and Kaufman theory, typically used for confined aquifers, was adapted for unconfined aquifers by considering the difference in head between the top of the aquifer and the bottom of the excavation. Instead of a constant head (as in a confined aquifer), the head at the excavation site is affected by the rising and falling of the water table in the unconfined aquifer.

4.2 Excavation inputs

Based on the available information, including geological logs and groundwater level data, the estimated groundwater ingress and resultant extent of drawdown around each of the excavations were conceptualised to include the following:

- Shallowest groundwater level recorded for each Zone (see Section 3.6.1)
- Hydraulic conductivity for sand = 144 m/day (estimated based on previous dewatering results at the Kurnell site, see Section 3.6.6)
- Hydraulic conductivity for sandstone = 0.1 m/ day (literature value obtained for the Hawksbury Sandstone (Tammetta & Hewitt (2004)).

Excavation dimensions and saturated thickness is outlined in Table 4-1. A full set of groundwater ingress and radius of influence calculations are provided in Annexure B.

⁷ Neville, C.J. and Wang, X (2017). Open Excavation Flow Calculator, <https://sspa.com/open-excavation-flow-calculator/>

⁸ Mansur, C. and Kaufman, R. (1962). Dewatering in Foundation Engineering.

Table 4-1 Inputs – Excavation dimensions and saturated thickness

Excavation	Zone	Excavation dimensions		Estimated excavated volume (m ³)	Shallowest depth to groundwater (mbgl)	Maximum Dewatering depth	Saturated thickness (m) (=dewatering depth shallowest depth of groundwater)
		Estimated Area	Maximum excavation depth (mbgl)				
Targeted soil remediation works (Figure 4-1)							
Source Area Excavations (SAE)							
Source Area Excavation 2	2	10,050	4.9	49,250	2.01	4.9	1.0*
Source Area Excavation 3	2	8,800	2.8	24,640	1.31	2.8	1.49
Source Area Excavation 4	2	1,000	2.8	2,800	1.25	2.8	1.55
Source Area Excavation 5	3	5,000	2.0	10,000	0.78	2.0	1.22
FWS Relocation Area Firewater pipelines (trenching) (Figure 4-3)							
Option 1B	1	220	1.0	220	0.86	1.0	0.14
Main Line	1	400	1.0	400	0.17	1.0	0.83
OWS pump station and emergency storage tank (south of Zone 2) (Figure 4-2)							
Option 1	2	410	4.5	1,840	0.78	5.0	4.22
Option 2	2	410	4.5	1,840	0.24	5.0	4.76
Construction of new buildings (Zones 1 and 1A) (Figure 4-2)							
New Warehouse	1	2,540	1.0	2,540	0.69	1.5	0.81

Notes:

* Excavating only to 1 m below intercepted groundwater level.

Excavation	Zone	Excavation dimensions		Estimated excavated volume (m ³)	Shallowest depth to groundwater (mbgl)	Maximum Dewatering depth	Saturated thickness (m) (=dewatering depth shallowest depth of groundwater)
		Estimated Area	Maximum excavation depth (mbgl)				
FWS and OWS pipework (trenching)							
Removal of OWS infrastructure (Zones 2 and 3) (Figure 4-4)	2A	315	3.0	950	0.8	3.0	2.2
	2B	375	3.0	1,130	1.25	3.0	1.75
	2C	220	3.0	660	1.22	3.0	1.78
	2D	360	3.0	1,080	0.78	3.0	2.22
	2E	70	3.0	210	2.10	3.0	0.9
	2G	70	3.0	210	0.02	3.0	2.98
	3A	832	3.0	2,496	0.27	3.0	2.73
	3B	714	3.0	2,142	1.00	3.0	2.0
OWS upgrades (Figure 4-5)	2H	260	3.5	910	0.73	3.5	2.77
	2I	40	3.5	140	0.24	3.5	3.26
	2K	12.5	2.0	12.5	0.88	2.0	1.12
Augmentation of existing FWS infrastructure (Zone 1 and Zone 2) (Figure 4-6)	1A	267	1.0	267	0.91	1.0	0.09
	1B	198	1.0	198	0.62	1.0	0.38
	1C	202	1.0	202	0.92	1.0	0.08
	1D	270	1.0	270	0.25	1.0	0.75
	1F	119	1.0	119	0.20	1.0	0.8
	1G	348	1.0	348	0.54	1.0	0.46
	2L	530	1.0	530	0.73	1.0	0.27
	2M	220	1.0	220	0.18	1.0	0.82

4.3 Groundwater ingress and drawdown

A summary of the groundwater ingress and radius of influence, using the equations in Section 4.1, is presented in Table 4-2 for excavated pits and Table 4-3 for excavated trenches. A full set of groundwater ingress and radius of influence calculations are provided in Annexure B. As discussed in Section 2.2, it is assumed that each excavation would be dewatered separately. If excavations occur concurrently, this could reduce ingress in shallower excavations next to or within the drawdown extent of the deeper excavations. This should be considered when the detailed construction program becomes available.

Using recognised groundwater equations, the estimated drawdown extent for each excavation is shown on Figure 4-1 to Figure 4-6.

Table 4-2 Groundwater ingress estimates and radius of influence – Pits

Excavation	Zone	Estimated groundwater ingress (Q)		Radius of influence (m)*
		m ³ /day	L/s	
Targeted soil remediation works (Figure 4-1)				
Source Area Excavations (SAE)				
Source Area Excavation 2	2	2,939	34.0	125
Source Area Excavation 3	2	2,238	25.9	185
Source Area Excavation 4	2	1,201	13.9	190
Source Area Excavation 5	3	1,162	13.5	150
OWS pump station and emergency storage tank (south of Zone 2) (Figure 4-2)				
Option 1	2	460	5.3	100
Option 2	2	1,337	15.5	363
Construction of new buildings (Zone 1) (Figure 4-2)				
New Warehouse	1	643	7.4	100

Notes:

* i.e., the distance away from the excavation to negligible drawdown.



<p>Legend</p> <ul style="list-style-type: none"> Site Ampol ownership Project area Source Area Excavation Targeted soil remediation works 		<p>Groundwater Dependent Ecosystems</p> <ul style="list-style-type: none"> Estuarine & near shore marine ecosystems Terrestrial Wetland 	<p>Registered Groundwater Boreholes</p> <ul style="list-style-type: none"> + Commercial and Industrial + Monitoring + Stock and Domestic + Unknown + Water Supply 	<p>AECOM</p> <p>Copyright: Copyright in material relating to the base layers (cartographic information) on this page is licensed under a Creative Commons Attribution 4.0 license © Department of Spatial Services 2022, (Digital Cadastre Database and/or Digital Topographic Database).</p> <p>The terms of Creative Commons Attribution 4.0 License are available from https://creativecommons.org/licenses/by/4.0/ (Copyright License).</p> <p>Neither AECOM Australia Pty Ltd (AECOM) nor the © Department of Spatial Services make any representations or warranties of any kind, about the accuracy, reliability, completeness or suitability or fitness for purpose in relation to the content in accordance with clause 5 of the Copyright License. AECOM has prepared this document for the sole use of its Client based on the Client's description of its requirements having regard to the assumptions and other limitations set out in this report, including page 2.</p> <p>Source: AECOM, 2021.</p>
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Figure 4-1 Radius of influence – Targeted soil remediation works (excavations up to 4.9 mgbl)

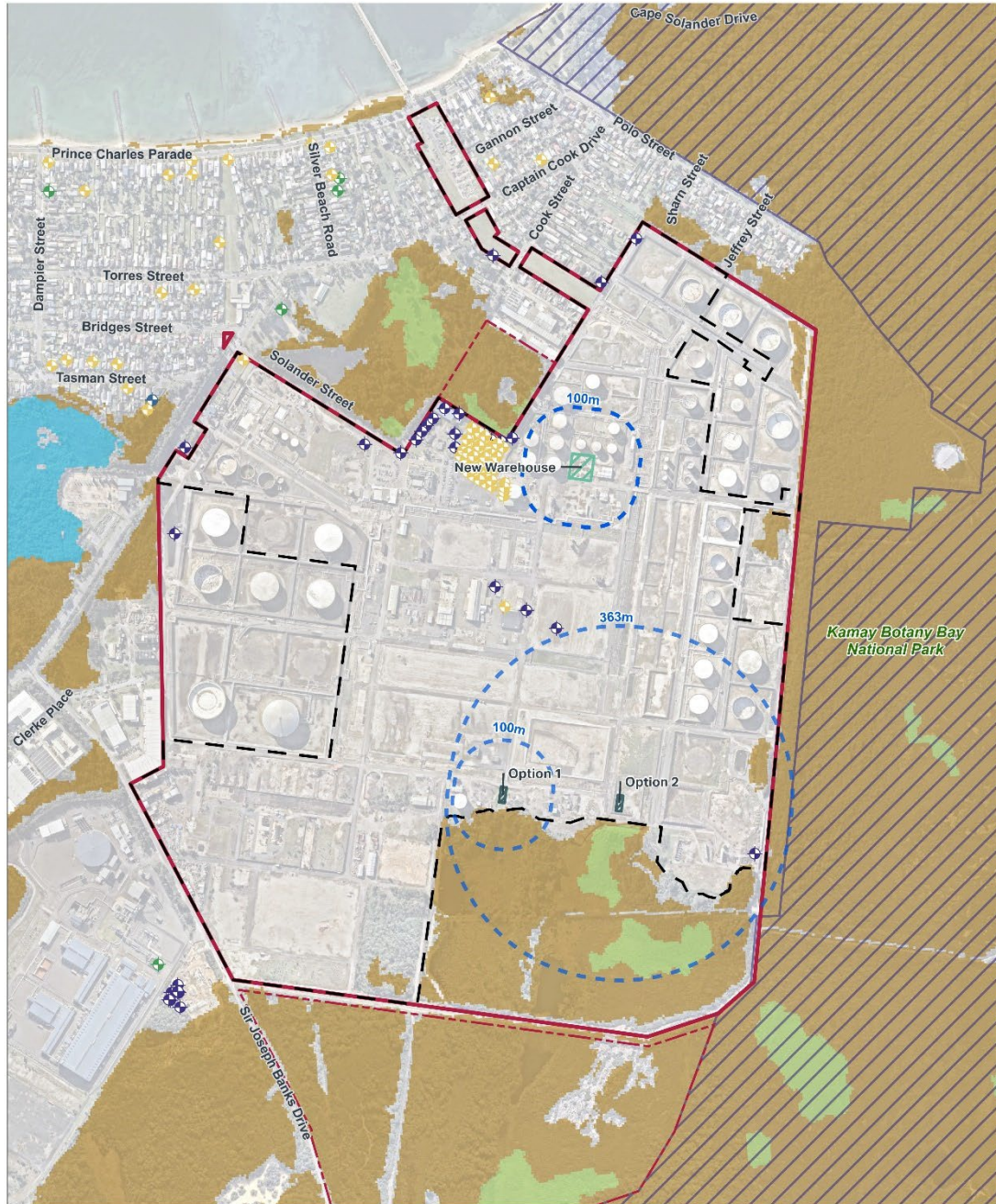


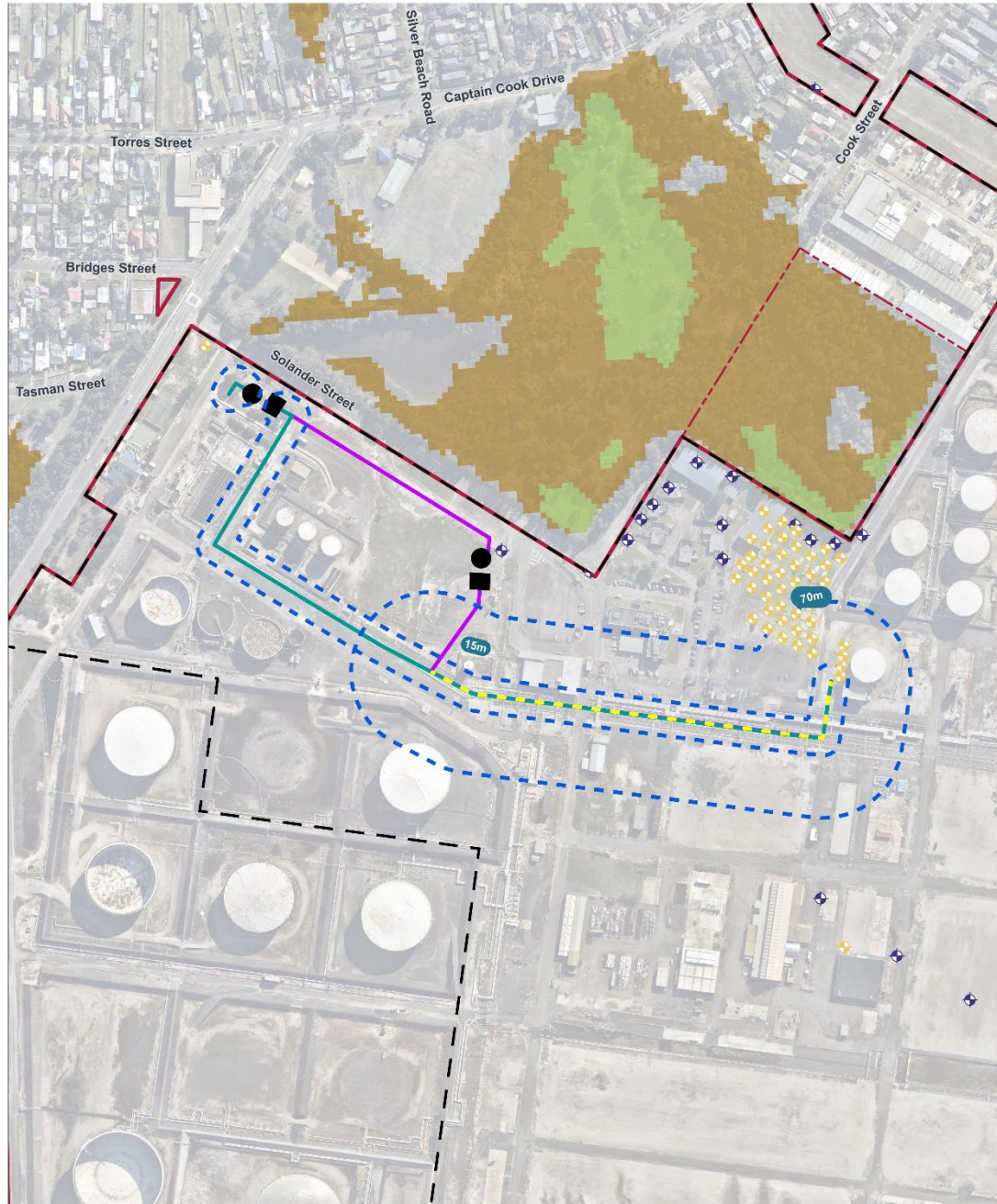
Figure 4-2 Radius of influence – OWS pump station and emergency storage tank (excavations up to 4.5 mbgl) and construction of new buildings (excavation up to 1.0 mbgl)

Table 4-3 Groundwater ingress estimates and radius of influence – Trenches

Trench ID	Length (m)	Estimated groundwater inflows (Q)			Radius of influence (m)*
		L/s/ trench	m ³ / day/ trench	m ³ / day/ 100 m trench	
FWS Relocation Area (Figure 4-3)					
Option 1B	220	0.6	50	23	15
Main Line	400	6.6	573	143	70
Removal of OWS infrastructure (Figure 4-4)					
Zone 2A	315	13.9	1,201	381	180
Zone 2B	375	13.1	1,136	303	145
Zone 2C	220	7.8	678	308	145
Zone 2D	360	16.0	1,386	385	185
Zone 2E	70	1.3	108	154	75
Zone 2G	70	4.2	362	517	245
Zone 3A	830	45.5	3,932	474	225
Zone 3B	715	28.7	2,478	347	165
OWS Upgrades (Figure 4-5)					
Zone 2H	260	14.5	1,250	481	230
Zone 2I	40	2.6	226	565	270
Zone 2K	12.5	0.3	24	192	95
Augmentation of existing FWS infrastructure (Figure 4-6)					
Zone 1A	265	0.4	37	14	8
Zone 1B	200	1.5	128	64	32
Zone 1C	200	0.3	24	12	8
Zone 1D	270	4.0	347	129	62
Zone 1F	120	1.9	165	137	67
Zone 1G	350	3.2	273	78	39
Zone 2L	530	2.8	239	45	23
Zone 2M	220	3.6	310	141	67

Notes:

* i.e., the distance away from the excavation to negligible drawdown.



- Legend**
- Site
 - Ampol ownership
 - Project area
 - Radius of Influence

- Firewater System Relocation Area - Tank and Pumphouse
- Assumed Firewater System Relocation - Main Line
- Assumed Firewater System Relocation - Option 1
- Assumed Firewater System Relocation - Option 2

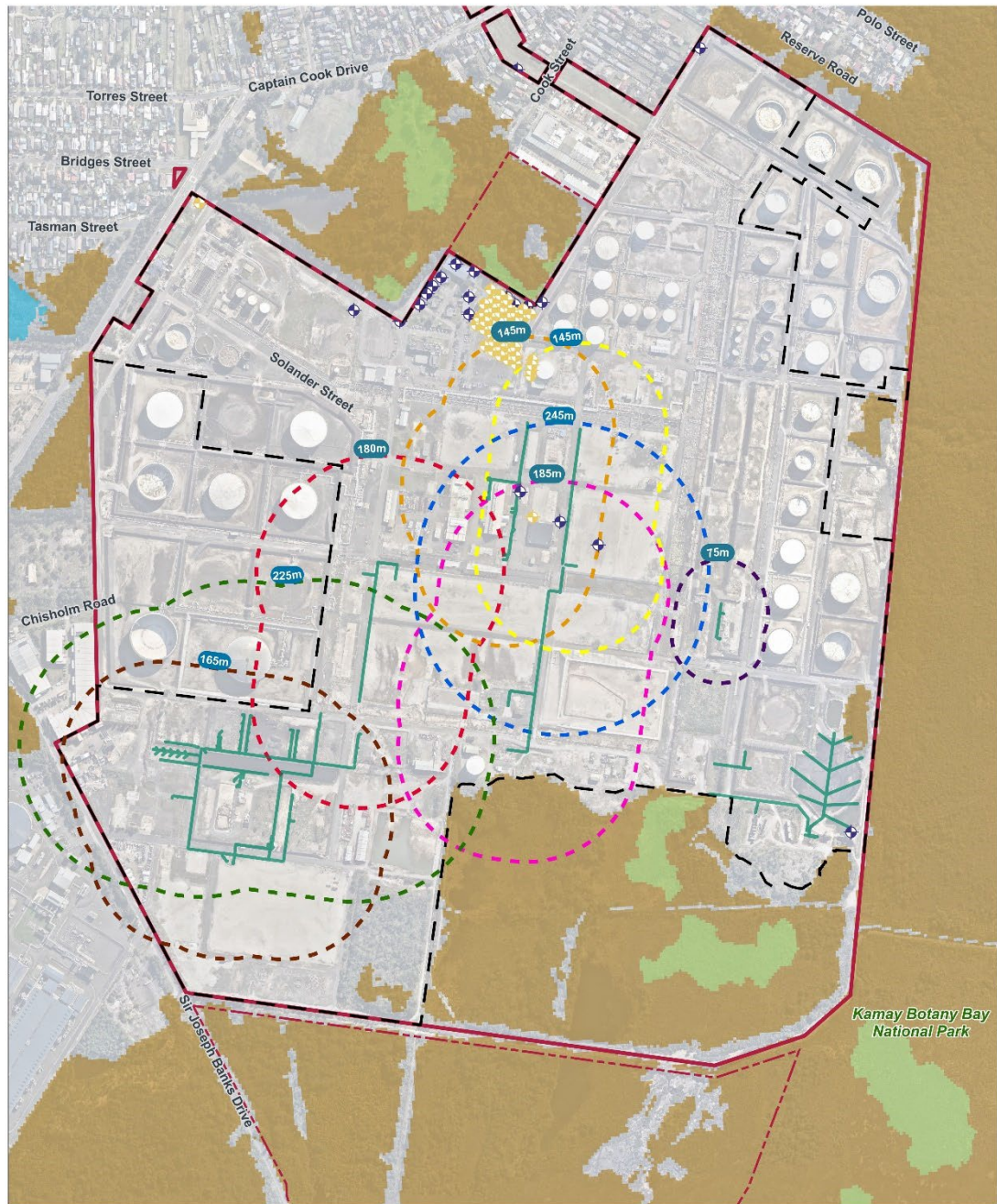
- Registered Groundwater Boreholes**
- Commercial and Industrial
 - Monitoring
 - Water Supply
- Groundwater Dependent Ecosystems**
- Terrestrial
 - Wetland



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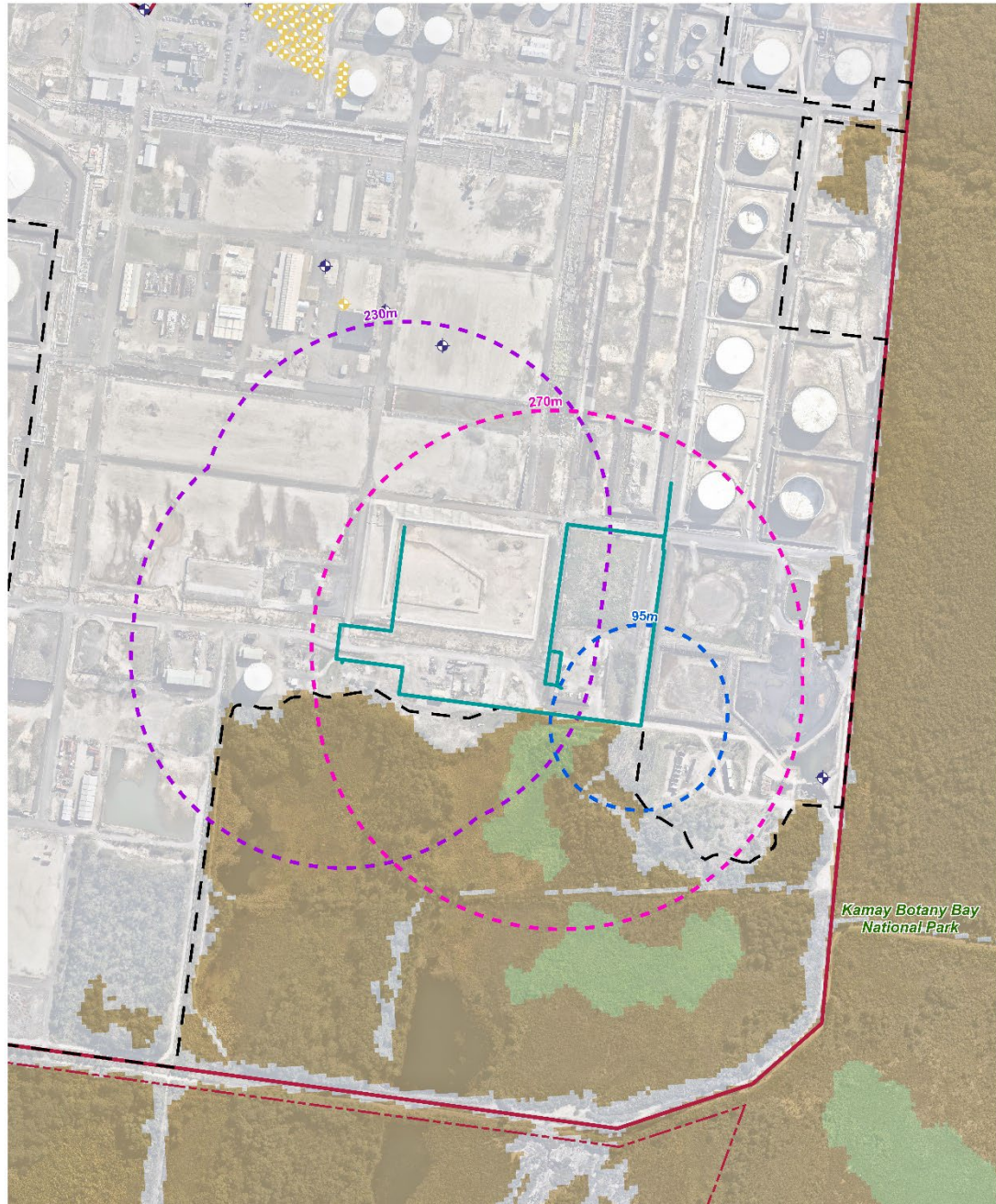
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Figure 4-3 Radius of influence – FWS Relocation Area (excavations up to 1.0 mbgl)



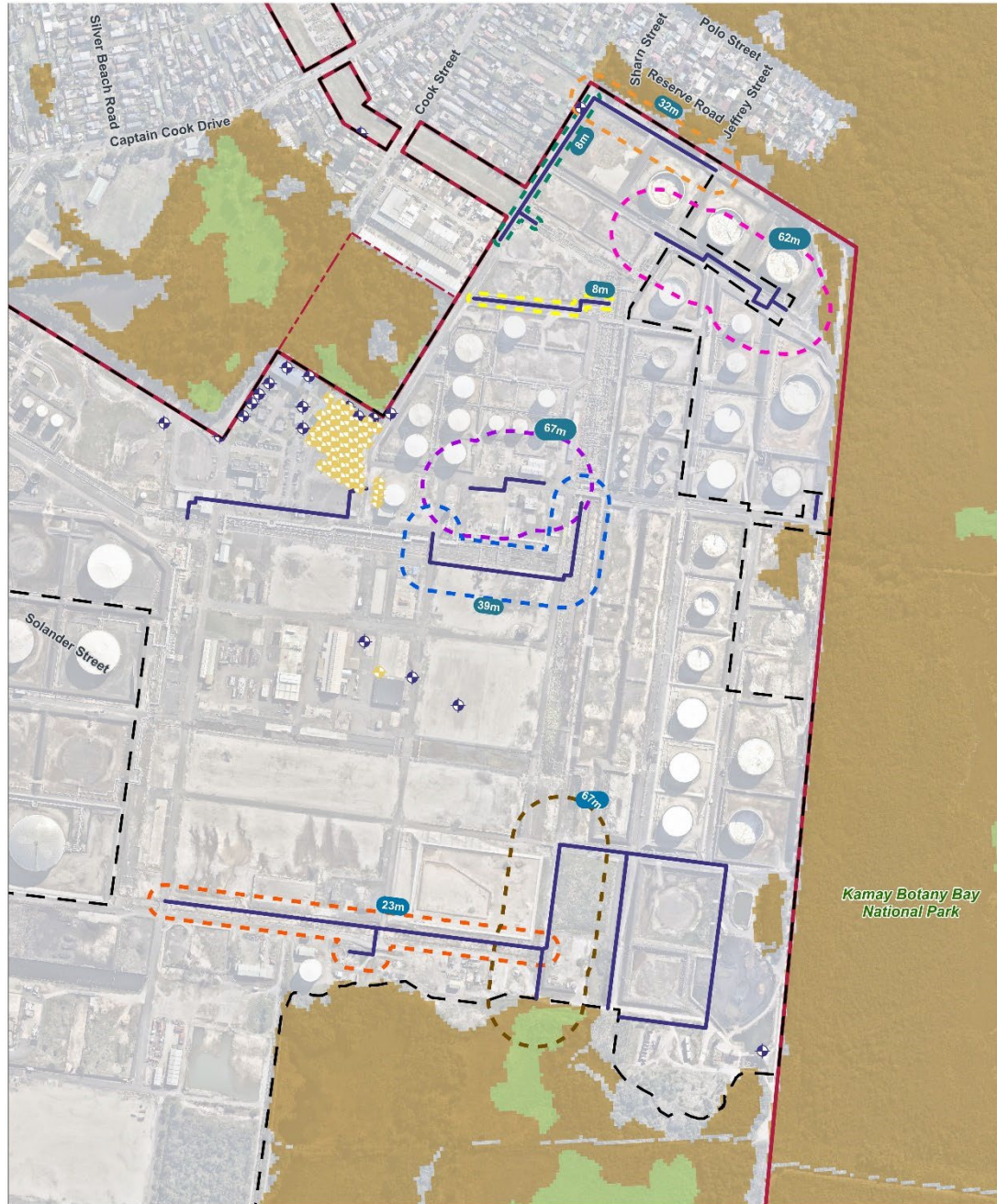
<p>Legend</p> <ul style="list-style-type: none"> Site Ampol ownership Project area Only water system 	<p>Radius of influence (m)</p> <ul style="list-style-type: none"> Zone 2A Zone 2B Zone 2C Zone 2D Zone 2E Zone 2G Zone 3A Zone 3B 	<p>Registered Groundwater Boreholes</p> <ul style="list-style-type: none"> + Commercial and Industrial + Monitoring + Water Supply <p>Groundwater Dependent Ecosystems</p> <ul style="list-style-type: none"> Estuarine & near shore marine ecosystems Terrestrial Wetland 	<div style="display: flex; align-items: center;"> <div style="margin-right: 10px;"> <p>Scale</p> <p>0 50 100 m</p> </div> <div style="text-align: right;"> <p>AECOM</p> <p><small>Copyright: Copyright in material relating to the base layers (contextual information) on this page is licensed under a Creative Commons Attribution 4.0 licence © Department of Spatial Services 2022, (Digital Cadastral Database and/or Digital Topographic Database). The terms of Creative Commons Attribution 4.0 Licence are available from https://creativecommons.org/licenses/by/4.0/ Neither AECOM Australia Pty Ltd (AECOM) nor the © Department of Spatial Services make any representations or warranties of any kind, about the accuracy, reliability, completeness or suitability or fitness for purpose in relation to the content (in accordance with clause 3 of the Copyright License). AECOM has prepared this document for the sole use of its Client based on the Client's description of its requirements having regard to the assumptions and other limitations set out in this report, including page 2. Source: Aesmap, 2021.</small></p> </div> </div>
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Figure 4-4 Radius of influence – Removal of OWS infrastructure (excavations up to 3.0 mg/l)



<p>Legend</p> <ul style="list-style-type: none"> Site Ampol ownership Project area OWS upgrades 	<p>Radius of Influence (m)</p> <ul style="list-style-type: none"> Zone 2H Zone 2I Zone 2K 	<p>Registered Groundwater Boreholes</p> <ul style="list-style-type: none"> + Monitoring + Water Supply <p>Groundwater Dependent Ecosystems</p> <ul style="list-style-type: none"> Terrestrial Wetland 	<div style="display: flex; align-items: center;"> <div style="margin-right: 10px;"> <p>0 50 100</p> <p>m</p> </div> <div style="margin-right: 10px;"> <p>North Arrow</p> </div> <div style="font-weight: bold; font-size: 1.2em;">AECOM</div> </div> <p style="font-size: 0.8em; margin-top: 5px;">Copyright: Copyright (in respect of relating to the base layers (cartographic information) on this page is licensed under a Creative Commons Attribution 4.0 license © Department of Spatial Services 2022, (Digital Cadastre Database and/or Digital Topographic Database).</p> <p style="font-size: 0.8em; margin-top: 5px;">The terms of Creative Commons Attribution 4.0 License are available from https://creativecommons.org/licenses/by/4.0/ (Copyright License).</p> <p style="font-size: 0.8em; margin-top: 5px;">Neither AECOM Australia Pty Ltd (AECOM) nor the © Department of Spatial Services make any representations or warranties of any kind, about the accuracy, reliability, completeness or suitability or fitness for purpose in relation to the content in accordance with clause 5 of the Copyright License. AECOM has prepared this document for the sole use of its Client based on the Client's description of its requirements having regard to the assumptions and other limitations set out in this report, including page 2.</p> <p style="font-size: 0.8em; margin-top: 5px;">Source: Akernep, 2021.</p>
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Figure 4-5 Radius of influence – OWS upgrades (excavations up to 3.5 mbgl)



- Legend**
- Site
 - Ampol ownership
 - Project area

- Radius of influence (m)**
- Zone 1A
 - Zone 1B
 - Zone 1C
 - Zone 1D
 - Zone 1F
 - Zone 1G
 - Zone 2L
 - Zone 2M

- Registered Groundwater Boreholes**
- + Monitoring
 - + Water Supply
- Groundwater Dependent Ecosystems**
- Terrestrial
 - Wetland



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Source: Aesmap, 2021.

Figure 4-6 Radius of influence – Augmentation of existing FWS infrastructure (excavations to 1.0 mbgl)

4.4 Estimated groundwater volumes

Construction works would occur over a period of five years (Table 1-2), working 5.5 days a week to complete (full day on Monday to Friday and half day Saturday). It is assumed that dewatering would occur for 24 hours a day, 7 days a week. For the purposes of assessment, the anticipated number of days for each excavation has been estimated.

4.4.1 Pits

The estimated groundwater volume take from pit excavations are summarised in Table 4-4.

Table 4-4 Estimated groundwater volumes – pits

Excavation	Construction Stage	Estimated groundwater ingress (Q) (m ³ /day)	Anticipated number of days of construction	Total estimated groundwater take (m ³)	Total estimated groundwater take (ML)
Targeted soil remediation works (Figure 4-3)					
Source Area Excavations (SAE)					
Source Area Excavation 2	3	2,939	56 (8 weeks)	164,584	164.6
Source Area Excavation 3	3	2,238	28 (4 weeks)	62,664	62.7
Source Area Excavation 4	3	1,201	14 (2 weeks)	16,814	16.8
Source Area Excavation 5	3	1,162	14 (2 weeks)	16,268	16.3
OWS pump station and emergency storage tank (south of Zone 2) (Figure 4-2)					
Option 1	2	460	42 (6 weeks)	19,320	19.3
Option 2	2	1,337	42 (6 weeks)	56,154	56.1
Construction of new buildings (Zone 1) (Figure 4-2)					
New Warehouse	2	642	7 (1 week)	4,494	4.5

4.4.2 Trenches

Based on the assumptions in Section 2.2 and the length and depth of the trenched sections, the following is assumed:

- Trenches to be excavated 1 to 2 m depth: Construction is anticipated to progress 30 m per day
- Trenches to be excavated 3 to 3.5 m depth: Construction is anticipated to progress 15 m per day.

It is assumed that open trenches would be backfilled daily as trenching progresses and would not be open for the duration of the anticipated construction period. The estimated groundwater volume take from trenches are summarised in Table 4-5 and Table 4-6.

Table 4-5 Estimated groundwater volumes – 1 to 2 m depth trenches

Excavation	Construction stage	Length (m)	Estimated groundwater ingress (Q) (m ³ / day/ trench)	Estimated groundwater ingress (Q) (m ³ / day/ 30 m)	Anticipated number of days of construction	Total estimated groundwater take (m ³)	Total estimated groundwater take (ML)
Augmentation of existing FWS infrastructure (Figure 4-6)							
Zone 1A	2	265	37	4	9	37	0.04
Zone 1B	2	200	128	19	7	128	0.13
Zone 1C	2	200	24	4	7	24	0.02
Zone 1D	2	270	347	39	9	347	0.35
Zone 1F	2	120	165	41	4	165	0.17
Zone 1G	2	350	273	23	12	273	0.27
Zone 2L	2	530	239	14	18	252	0.25
Zone 2M	2	220	310	42	8	336	0.34
FWS Relocation Area (Figure 4-3)							
Option 1B	2	220	50	7	7	50	0.05
Main Line	2	400	573	43	13	573	0.57
OWS upgrades (Figure 4-5)							
Zone 2J	2	12.5	192	192	1	192	0.19

Table 4-6 Estimated groundwater volumes – 3 to 3.5 m depth trenches

Excavation	Construction stage	Length (m)	Estimated groundwater ingress (Q) (m ³ /day/ trench)	Estimated groundwater ingress (Q) (m ³ /day/ 15 m)	Anticipated number of days of construction	Total estimated groundwater take (m ³)	Total estimated groundwater take (ML)
Removal of OWS infrastructure (Figure 4-4)							
Zone 2A	2	315	1,201	57	21	1,197	1.20
Zone 2B	2	375	1,136	45	25	1,125	1.13
Zone 2C	2	290	1,500	78	20	1,560	1.56
Zone 2D	2	360	1,386	58	24	1,392	1.39
Zone 2E	2	70	108	23	5	115	0.12
Zone 3A	2	830	3,932	71	56	3,976	3.98
Zone 3B	2	715	2,478	52	48	2,496	2.50
OWS upgrades (Figure 4-5)							
Zone 2G	2	260	1,250	72	18	1,296	1.30
Zone 2H	2	40	226	85	3	255	0.26

4.4.3 Total estimated groundwater volume

The total estimated groundwater take during Stage 2 works is 250 mega litres (ML), and 230 ML during Stage 3 works. Over a five-year construction period, this equates to 96 ML per year. This assumes that the Option 2 OWS pump station and emergency storage tank (south of Zone 2) is selected, as construction of this option would involve the largest groundwater ingress.

Based on the estimated total groundwater take being greater than 3 ML/year (see Section 2.1.3), a WAL would be required for the duration of each excavation activity.

The ingress estimates are high level and provide an initial understanding of the groundwater ingress and associated drawdown. As described in Section 3.6.6, these estimates have been conservatively overestimated as higher hydraulic conductivity values have been used in the assessment presented in this report.

5.0 Assessment of construction impacts

This section provides an assessment of the potential impact that the proposed modification works could have on the groundwater regime during construction due to dewatering activities.

5.1 Groundwater drawdown impacts

5.1.1 Groundwater dependent ecosystems

Figure 5-1 shows an example of the expected drawdown curve for trenches of 1 m depth. Trenches of 1 m depth have been estimated to result in a radius of influence of 245 m. At this point, groundwater would no longer be intercepted.

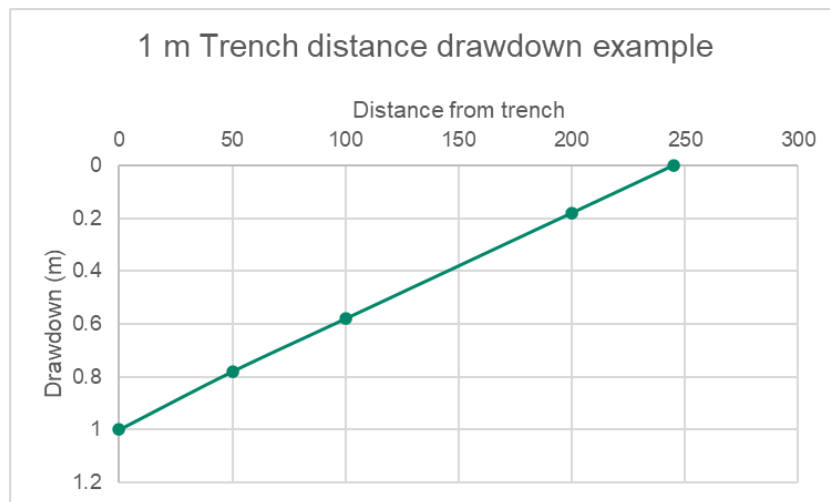


Figure 5-1 Distance drawdown curve example for a 1 m trench

Similarly, Figure 5-2 shows an example of the expected drawdown curve for pits of 4 m depth. Pits of a depth of 4 m radius have been estimated to result in a radius of influence of 606 m.

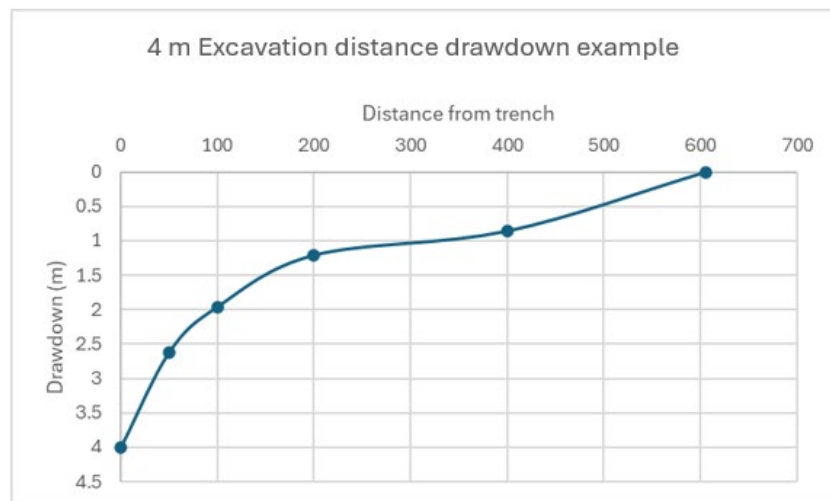


Figure 5-2 Distance drawdown curve example for a 4 m deep pit

The radius of influence was used to ascertain whether offsite groundwater dependent ecosystems (GDEs) in proximity to the Site may be affected by the excavation works. As can be seen from Figure 4-1 to Figure 4-6, where temporary groundwater drawdown would occur within GDEs.

Table 5-1 summarises which GDEs would lie within the radius of influence for each excavation. Should groundwater drawdown occur within GDEs, there is potential for flora and fauna that are dependent on the supply of groundwater to be affected.

Table 5-1 GDEs within the extent of groundwater drawdown

Excavation	GDEs within the area of influence
Targeted soil remediation works (Figure 4-1)	
Soil Area Excavations (SAE)	
Excavation 2	No GDEs within the area of influence.
Excavation 3	No GDEs within the area of influence.
Excavation 4	No GDEs within the area of influence.
Excavation 5	South: Medium to high probability terrestrial GDEs (within Zone 4 of the Site).
OWS pump station and emergency storage tank (Figure 4-2)	
Option 1	South: Low to high probability terrestrial GDEs (within Zone 4 of the Site).
Option 2	South: Low to high probability terrestrial GDEs and high probability wetland GDEs (within Zone 4 of the Site). East: Medium probability terrestrial GDEs, extending 4 m into the Kamay Botany Bay National Park. Drawdown within the national park would be negligible (see example Figure 5-2) and within natural groundwater level fluctuations (Section 3.6.2).
Construction of new buildings (Zone 1) (Figure 4-2)	
New Warehouse	No GDEs within the area of influence.
FWS Relocation Area (Figure 4-3)	
Option 1B	No GDEs within the area of influence.
Main Line	No GDEs within the area of influence.
Removal of OWS infrastructure (Figure 4-4)	
Zone 2A	No GDEs within the area of influence.
Zone 2B	No GDEs within the area of influence.
Zone 2C	No GDEs within the area of influence.
Zone 2D	South: Medium to high probability terrestrial GDEs (within Zone 4 of the Site).
Zone 2E	No GDEs within the area of influence.
Zone 2G	No GDEs within the area of influence.
Zone 3A	South: Medium to high probability terrestrial GDEs (within Zone 4 of the Site).
Zone 3B	No GDEs within the area of influence.
OWS upgrades (Figure 4-5)	
Zone 2H	South: Medium to high probability terrestrial GDEs (within Zone 4 of the Site).
Zone 2I	South: Medium to high probability terrestrial GDEs and high probability wetland GDEs (within Zone 4 of the Site).
Zone 2K	South: Medium to high probability terrestrial GDEs and high probability wetland GDEs (within Zone 4 of the Site).
Augmentation of existing FWS infrastructure (Figure 4-6)	
Zone 1A	No GDEs within the area of influence.
Zone 1B	North: Medium to high probability terrestrial GDEs.

Excavation	GDEs within the area of influence
Zone 1C	No GDEs within the area of influence.
Zone 1D	No GDEs within the area of influence.
Zone 1F	No GDEs within the area of influence.
Zone 1G	No GDEs within the area of influence.
Zone 2L	No GDEs within the area of influence.
Zone 2M	South: Medium to high probability terrestrial GDEs and high probability wetland GDEs (within Zone 4 of the Site).

The risk of impacts to GDEs due to groundwater drawdown would be managed through implementation of a Groundwater Management Plan (GWMP). The GWMP would include dewatering management measures for the extraction, storage, movement and treatment of groundwater encountered in excavations. Dewatered groundwater would be collected and sent to the on-site Waste Water Treatment Plant (WWTP) in accordance with the established Site wastewater management procedures, unless it is tested and is of suitable quality to be directed to stormwater. The GWMP would also outline groundwater monitoring (water levels and quality) requirements, site-specific water level and quality trigger levels, and an associated Trigger Action Response Plan to allow for effective and quick responses.

Specific impacts to the GDEs due to groundwater drawdown has been considered in Appendix I (Updated Biodiversity Development Assessment Report) of the Submissions Report. Given the temporary nature of the works and through implementation of mitigation, it is unlikely that there would be a permanent impact to the identified GDEs.

5.1.2 Private registered groundwater users

A review of the groundwater bore database included in WaterNSW Water Information Hub (<https://realtimedata.waternsw.com.au/water.stm>) was conducted.

Registered bores located within proximity to the proposed modification works are used for household, industrial, mining activities, monitoring, livestock and water supply purposes. All offsite registered bores are outside the predicted drawdown extent associated with the excavations, except for Source Area Excavation 5 (maximum 4 m depth) proposed for the targeted soil remediation works for Stage 3, as shown on Figure 4-1. Potentially affected bores include eight bores registered for monitoring and one for mining activities, located south east of the Project Area within the properties owned by J&B Civil Infrastructure and the Sydney Desalination Plant.

No bores used for water supply purposes would be affected by the proposed modification works.

5.1.3 Ramsar wetlands

The Site is located approximately 150 m from the Towra Point Nature Reserve, a listed Ramsar Wetland of international significance and national heritage place (listing number 106162).

The wetland is outside the predicted drawdown extent for all proposed excavations and therefore it is not anticipated that the proposed modification works would affect the wetland.

5.1.4 Aquifer Interference Policy minimal impact considerations

The NSW aquifer Interference Policy (Section 2.1.2) includes a set of minimal impact considerations for assessing aquifer interference activities.

Table 5-2 includes the minimal impact considerations for the groundwater resources at the Site.

Table 5-2 Minimal Impact Considerations

Minimal Impact Considerations	Assessment
<p><u>Water Table</u> Less than or equal to 10% cumulative variation in the water table, allowing for typical climatic 'post-water sharing plan' variations, 40 m from any high priority:</p> <ul style="list-style-type: none"> • Groundwater dependent ecosystems • Culturally significant site • Listed in the schedule of the relevant water sharing plan. 	<p>Variation is likely to exceed 10 percent variation. While Marton Park Wetland and other GDEs are mapped within the predicted drawdown extent, as discussed in Section 5.1.1, the GDEs are not considered a 'high priority' GDEs under Schedule 4 of the Water Sharing Plan for the Greater Metropolitan Region Groundwater Sources 2023.</p> <p>There are no culturally significant sites within the Project Area or the zones of influence for the excavations.</p>
<p><u>Water pressure</u> A cumulative water pressure head decline of no more than 2 m at any water supply work.</p>	<p>The identified water supply bores are not predicted to be impacted by drawdown generated during construction dewatering, as discussed in Section 5.1.2.</p>
<p><u>Water quality</u> Any change in groundwater quality should not lower the beneficial use category of the groundwater source beyond 40 m of the activity.</p>	<p>All groundwater intersected during excavation works would be sent to the WWTP, as per the GWMP.</p>

5.1.5 Other potential drawdown impacts

Other impacts of proposed construction activities below groundwater level/s, that have not been included in this assessment, may include the following:

- Dewatering settlement:
 - The dewatering of the sand aquifer would cause localised drawdown within the vicinity of the proposed excavations. Some ground settlement would occur when groundwater levels are lowered by groundwater control operations. In most cases, the ground settlements would be so small that no distortion or damage is apparent in nearby structures.
- Liquefaction:
 - Due to the nature of the uniform sand at the base of the excavations, there is potential for liquefaction. The base can become unstable if the pore water pressure is close to the vertical total stress (due to the weight of the sand) so that the vertical effective stress approaches zero (Ciria, 2016).
- Construction settlement:
 - Possible ground movement/ settlement can occur adjacent to the excavations during excavation and construction works
 - The potential for these ground movements on neighbouring structures would need to be considered by the structural engineer
 - Construction settlement can occur when groundwater ingress mitigation measures, such as sheet piles, are installed.

5.2 Groundwater flow

Dewatering can lead to localised groundwater drawdown and cause the surrounding groundwater to flow towards the excavations. All dewatering work would be temporary, required only whilst the construction activity is being carried out to provide safe working conditions. As such, significant, permanent impacts to groundwater flow are not anticipated.

6.0 Assessment of operational impacts

The proposed modification includes for the consolidation of operational infrastructure, removal of redundant assets, and undertaking remediation. No active dewatering is required after the completion of these activities.

As no dewatering activities are proposed following construction, groundwater levels and flow are expected to return to current observation levels, as noted in Section 3.6.1 and 3.6.3.

7.0 Assessment of cumulative impacts

Cumulative impacts have the potential to occur when benefits or impacts from a project overlap or interact with those of other projects, potentially resulting in a larger overall effect (positive or negative) on the environment or local communities. Cumulative impacts may occur when projects are constructed or operated concurrently or consecutively.

Projects were reviewed against the following screening criteria for this cumulative impact assessment:

- Spatially relevant (i.e., the development or activity overlaps with, is adjacent to or within two kilometres of the Project Area)
- Scale (i.e., large-scale major development or infrastructure projects that have the potential to result in cumulative impacts with the proposed modification, as listed on the NSW Government Major Projects website and on the relevant council websites)
- Timing (i.e. the expected timing of its construction and/or operation overlaps or occurs consecutively to construction and/or operation of the proposed modification)
- Status (i.e., projects in development with sufficient publicly available information to inform this environmental impact statement and with an adequate level of detail to assess the potential cumulative impacts).

The following offsite projects were considered to have met the above criteria, with the potential to have cumulative impacts with the proposed modification:

- Kamay Ferry Wharves (350 m north of the Project Area)
- Breen Resource Recovery Facility (2 km west of the Project Area)
- Woolooware to Kurnell Tower Replacement Project (120 m south west of the Project Area).
- Kurnell Planning Proposal (800 m south west of the Project Area).

Kamay Ferry Wharves has also completed construction. However, as ferry services have not yet commenced, the project continues to be included in the operational cumulative impact assessment.

The location of the projects are shown on Figure 7-1.



Figure 7-1 Cumulative development projects

7.1 Construction

The cumulative impact assessment focuses on potential impacts related to groundwater take, including the extent to which cumulative dewatering activities from multiple projects in the area could affect GDEs and groundwater users. Project related concurrent excavation dewatering onsite can result in superposition of drawdown, where the drawdown radius of influence overlap. This would result in deeper drawdown at that location than estimated for individual excavation dewatering activities.

The Breen Resource Recovery Facility Groundwater Impact Assessment concluded that the proposed works are unlikely to interact with the groundwater table and, therefore, dewatering would not be required (GHD, 2021). Accordingly, no cumulative groundwater impacts are anticipated from this project.

Assessments for the Woolooware to Kurnell Tower Replacement Project and Kurnell Planning Proposal indicate that groundwater may be encountered during excavation activities and that dewatering may be required (Ausgrid, 2024 ; Tetra Tech Coffey, 2023) (Tetra Tech Coffey, 2023; Ausgrid , 2024). While detailed information regarding the extent and duration of any dewatering for these projects is limited, provided that the mitigation measures outlined in Section 7.1 are implemented, the potential for cumulative groundwater impacts is considered unlikely.

The GWMP would include dewatering management measures for the extraction, storage, movement and treatment of groundwater encountered in excavations, that would further mitigate the risk of cumulative impacts. The project-specific GWMP would also outline groundwater monitoring (water levels and quality) requirements, site-specific water level and quality trigger levels, and an associated Trigger Action Response Plan (TARP) to allow for effective and quick responses.

7.2 Operation

No dewatering activities are proposed following construction and therefore groundwater levels are expected to return to current observation levels, as noted in Section 3.6.1.

8.0 Management of impacts

Mitigation measures to manage potential groundwater impacts of the proposed modification are outlined in Table 8-1.

Additional and/ or modified environmental safeguards and management measures to those presented in the approved SSD-5544 are shown in **bold**. Deleted measures, or parts of measures, have been ~~struck out~~. Where approved measures have been consolidated to reduce duplication, previously agreed text that has been brought into existing or new measures has been underlined.

Table 8-1 Mitigation measures – Groundwater

ID	Issue	Mitigation measure
C8	Contaminated groundwater offsite disposal – if required	<p>Offsite disposal of any contaminated soils or groundwater (or suspected contaminated material) would be in accordance with Environment Protection Licence (No. 837) (EPL) requirements, and NSW DECCW's Waste Classification Guidelines <u>NSW EPA Waste Classification Guidelines: Part 1: Classifying Waste (2014)</u>, and the Contamination Management Plan (CMP) for the Project proposed modification. Contaminated materials to be disposed offsite would be sent to appropriately licensed facilities in accordance with the <i>Contaminated Land Management Act 1997</i>.</p>
C10	Groundwater management	<p>A Groundwater Management Plan (GWMP) would be developed and included within the CEMP. This plan would outline the measures that would be used to manage the testing, dewatering, storage, movement and treatment of any groundwater intercepted during the construction phase. It would also outline measures to prevent and/ or minimise impacts to GDEs within groundwater drawdown areas. Measures would include:</p> <ul style="list-style-type: none"> • <u>Measures for the dewatering, storage, movement and treatment of groundwater encountered in excavations. Dewatered groundwater would be collected and sent to the on-site Wastewater Treatment Plant in accordance with the established Site wastewater management procedures, unless it is tested and is of suitable quality to be directed to stormwater</u> • The use of appropriate drip trays and interception techniques for any construction specific liquids stored on the Site • Bunding of any fuel or chemical storage area at the construction Site • Regular inspection of construction equipment to ensure any leaks are minimised and rectified • Management of vehicles leaving the Site to reduce soil on roads, production of dust and the introduction of contamination to the groundwater and/or stormwater system • Appropriate and timely disposal of any contaminated soil, water or waste generated during construction • Regular inspection of erosion control structures and bunded areas • Regular inspection and testing of containment areas, drainage lines and process pipe work • A plan for corrective action should an unexpected find increase in contaminants of potential concern (COPC) be observed in the groundwater monitoring during the proposed modification. • The anticipated drawdown extents would be reviewed following completion of the construction program. • Excavations/ trenches would be staged to minimise drawdowns during delivery of the works. Excavations/

ID	Issue	Mitigation measure
		<p>trenches in closest proximity to GDEs would be open for the shortest period of time possible.</p> <ul style="list-style-type: none"> • Following review of the drawdown extents, if required, a monitoring program for GDEs within the drawdown areas would be developed. The scope and frequency of the monitoring program would be developed based on the finalised design for excavations/ trenches and the level of drawdown influence, available field data (surface water, groundwater, and mapping of GDE extents and PCTs), and other relevant factors, including the timing and intensity of storm events. The monitoring program would include: <ul style="list-style-type: none"> - Establishment of groundwater level and quality triggers, and GDE vegetative triggers, and associated response actions in a Trigger Action Response Plan (TARP) by a suitably qualified ecologist. - Establishment of adaptive management actions to be implemented to minimise prescribed impacts and/ or protect potentially affected GDEs within the area of drawdown influence. - Post-construction survey to confirm no ongoing impacts to GDEs occur. - In the unlikely event that permanent prescribed impacts to GDEs do occur, a Restoration Management Plan would be developed, outlining how affected the GDE community would be rehabilitated.
C11	Surface water runoff into excavations	Any runoff that may accumulate in excavations would be periodically tested for elevated levels of contamination. Water that is found to have elevated levels of contaminants would be collected and sent to the onsite Waste Water Treatment Plant in accordance with the established refinery wastewater management procedures.
F2	Surface water runoff into excavations	<p>A Soils and Water Management Plan (SaWMP) would include be developed as a sub-plan to the DEMP-CEMP. M measures to be included in the plan and implemented during the demolition construction works to protect stormwater quality would including e:</p> <ul style="list-style-type: none"> • Stormwater or groundwater ponded in excavations would be sent to the WWTP, unless it is tested and is of suitable quality to be directed to stormwater • Stormwater that is captured in the bunds around the contaminated soil stockpiles would be collected and sent to the WWTP • Silt fencing and/or alternate sediment control measures would be installed around soil stockpiles and disturbed areas or areas where dust suppression is being undertaken • Regular inspection would be undertaken of soil stockpiles/ and excavation areas, including following rainfall events • Regular inspection of excavation areas and containment cell area, including following rainfall events • Regular inspections would be undertaken of stormwater drains down hydraulic gradient of disturbed areas. • Stormwater management measures incorporated into the design of the containment cell would be regularly inspected during operation in line with the Site's existing Inspection Checklist and following heavy rain events;

ID	Issue	Mitigation measure
		<ul style="list-style-type: none"> • If stormwater quality is impacted during the demolition works and ACS Modification works in areas that have been disturbed, water would be diverted to the intermediate sewer system; and During the demolition works and ACS Modification works, following notable but prolonged rainfall events (over three days) or following heavy rainfall events over a shorter timescale, water sampling would be completed at the stormwater retention basin to ensure that the quality of the water is of an appropriate standard to be discharged from the Site. Water that is not of an appropriate quality would be either treated in situ or directed to the WWTP.
C35	Groundwater drawdown and quality	<p>Where relevant, following remediation and where further management of contamination is required within the Audit Boundary, one or more Environmental Management Plan(s) (EMPs) would be prepared. These plans would fall under and be administered by the Site's existing OEMP. The OEMP would be updated as required to incorporate new EMP(s). The EMP(s) would be prepared in general accordance with the NSW EPA EMP Guidelines 2020 and Consultant Guidelines 2020 (NSW EPA, 2020).</p>

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Annexure A

Groundwater gauging
data

Zone	Location Code	Monitoring Zone	x coord	y coord	Top of Casing Elevation (m AHD)	Ground Level (mAHD)	Date	Top Screen Depth	Bottom Screen Depth	Depth to Water (m BTOC)	Depth to Water (mbgl)	Groundwater Elevation (mAHD)	Product Corrected Water Level (m AHD)
Zone 2	FTA_MW01		335157.336	6234082.725	10.552	10.678	13/02/2023	0.35	1.1		0.783	9.895	
Zone 2	FTA_MW01		335157.336	6234082.725	10.552	10.678	7/08/2023	0.35	1.1		1.005	9.673	
Zone 2	FTA_MW01		335157.336	6234082.725	10.552	10.678	12/02/2024	0.35	1.1		0.964	9.714	
Zone 2	FTA_MW01		335157.336	6234082.725	10.552	10.678	13/08/2024	0.35	1.1		0.847	9.831	
Zone 2	FTA_MW01		335157.336	6234082.725	10.552	10.678	7/11/2024	0.35	1.1		1.038	9.64	
Zone 2	FTA_MW02		335199.813	6234076.896	10.522	10.608	13/02/2023	0.4	1.5		0.731	9.877	
Zone 2	FTA_MW02		335199.813	6234076.896	10.522	10.608	7/08/2023	0.4	1.5		1.142	9.466	
Zone 2	FTA_MW02		335199.813	6234076.896	10.522	10.608	12/02/2024	0.4	1.5		1.096	9.512	
Zone 2	FTA_MW02		335199.813	6234076.896	10.522	10.608	13/08/2024	0.4	1.5		0.9	9.708	
Zone 2	FTA_MW02		335199.813	6234076.896	10.522	10.608	7/11/2024	0.4	1.5		1.143	9.465	
Zone 2	FTA_MW03		335172.793	6234067.419	10.54	10.607	13/02/2023	0.4	1.6		0.796	9.811	
Zone 2	FTA_MW03		335172.793	6234067.419	10.54	10.607	7/08/2023	0.4	1.6		1.105	9.502	
Zone 2	FTA_MW03		335172.793	6234067.419	10.54	10.607	12/02/2024	0.4	1.6		1.043	9.564	
Zone 2	FTA_MW03		335172.793	6234067.419	10.54	10.607	13/08/2024	0.4	1.6		0.93	9.677	
Zone 2	FTA_MW03		335172.793	6234067.419	10.54	10.607	7/11/2024	0.4	1.6		1.107	9.5	
Zone 2	SPA_MW01		335669.517	6233967.046	17.848	17.791	16/02/2023	3	6		3.504	14.287	
Zone 2	SPA_MW01		335669.517	6233967.046	17.848	17.791	13/02/2024	3	6		4.593	13.198	
Zone 2	SPA_MW01		335669.517	6233967.046	17.848	17.791	16/08/2024	3	6		3.187	14.604	
Zone 2	SPA_MW02		335451.496	6234026.521	12.687	12.152	16/02/2023	1	1.5		0.24	11.912	
Zone 2	SPA_MW02		335451.496	6234026.521	12.687	12.152	10/08/2023	1	1.5		0.242	11.91	
Zone 2	SPA_MW02		335451.496	6234026.521	12.687	12.152	13/02/2024	1	1.5		0.345	11.807	
Zone 2	SPA_MW02		335451.496	6234026.521	12.687	12.152	16/08/2024	1	1.5		0.42	11.732	
Zone 2	SPA_MW11		335521.088	6234023.168	14.124	13.277	16/02/2023	0.5	2.4		0.878	12.399	
Zone 1	WSP2024_AMW01	Zone 1 NW Tank Farm	335496.565	6234891.931	5.523	4.548	13/08/2024			1.88	0.91	3.64	3.64
Zone 1	WSP2024_AMW02	Zone 1 NW Tank Farm	335464.847	6234905.934	4.395	4.56	13/08/2024			0.87	1.04	3.52	3.52
Zone 1	WSP2024_AMW03	Zone 1 NW Tank Farm	335461.19	6234892.255	5.403	4.413	13/08/2024			1.95	0.96	3.45	3.55
Zone 1	WSP2024_AMW04	Zone 1 NW Tank Farm	335446.573	6234912.945	4.468	4.593	13/08/2024			1.02	1.15	3.45	3.45
Zone 1	WSP2024_AMW05	Zone 1 NW Tank Farm	335428.249	6234898.224	5.187		13/08/2024			1.68		3.50	3.50
Zone 1	WSP2024_AMW06	North Western Tank Farm			5.15		8/08/2024			2.65		2.50	2.50
Zone 2	WSP2024_AMW07	Former Fuel Refinery					13/02/2024			1.25			
Zone 2	WSP2024_AMW07	Former Fuel Refinery					6/05/2024			0.75			
Zone 2	WSP2024_AMW07	Former Fuel Refinery					13/08/2024			0.92			
Zone 2	WSP2024_AMW07	Former Fuel Refinery					5/11/2024			1.18			
Zone 2	WSP2024_AMW08	Zone 1 NW Tank Farm	335424.724	6234748.172	3.793	3.938	13/02/2024			0.54	0.69	3.25	3.25
Zone 2	WSP2024_AMW08	Zone 1 NW Tank Farm	335424.724	6234748.172	3.793	3.938	6/05/2024			0.05	0.20	3.74	3.74
Zone 2	WSP2024_AMW08	Zone 1 NW Tank Farm	335424.724	6234748.172	3.793	3.938	13/08/2024			0.22	0.37	3.57	3.57
Zone 2	WSP2024_AMW08	Zone 1 NW Tank Farm	335424.724	6234748.172	3.793	3.938	5/11/2024			0.48	0.62	3.32	3.32
Zone 2	WSP2024_AMW09	Zone 1 NW Tank Farm	335472.822	6234768.526	4.529	4.649	13/02/2024			1.24	1.36	3.29	3.29
Zone 2	WSP2024_AMW09	Zone 1 NW Tank Farm	335472.822	6234768.526	4.529	4.649	6/05/2024			0.70	0.82	3.83	3.83
Zone 2	WSP2024_AMW09	Zone 1 NW Tank Farm	335472.822	6234768.526	4.529	4.649	13/08/2024			0.82	0.94	3.71	3.71
Zone 2	WSP2024_AMW09	Zone 1 NW Tank Farm	335472.822	6234768.526	4.529	4.649	5/11/2024			1.12	1.24	3.41	3.41
Zone 2	WSP2024_AMW10	Zone 1 NW Tank Farm	335466.268	6234734.647	4.661	4.781	13/02/2024			1.33	1.45	3.33	3.33
Zone 2	WSP2024_AMW10	Zone 1 NW Tank Farm	335466.268	6234734.647	4.661	4.781	6/05/2024			0.86	0.98	3.80	3.80
Zone 2	WSP2024_AMW10	Zone 1 NW Tank Farm	335466.268	6234734.647	4.661	4.781	13/08/2024			0.98	1.10	3.68	3.68
Zone 2	WSP2024_AMW10	Zone 1 NW Tank Farm	335466.268	6234734.647	4.661	4.781	5/11/2024			1.26	1.38	3.40	3.40
Zone 2	WSP2024_AMW11	Zone 1 NW Tank Farm	335439.141	6234682.626	4.343	4.498	13/02/2024			1.04	1.20	3.30	3.30
Zone 2	WSP2024_AMW11	Zone 1 NW Tank Farm	335439.141	6234682.626	4.343	4.498	6/05/2024			0.56	0.71	3.79	3.79
Zone 3	WSP2024_BP01	DU05	334781.634	6233666.492	6.685	5.878	12/02/2024	0.5	3.5	2.28	1.48	4.40	4.40
Zone 3	WSP2024_BP01	DU05	334781.634	6233666.492	6.685	5.878	6/05/2024	0.5	3.5	1.44	0.63	5.25	5.25
Zone 3	WSP2024_BP01	DU05	334781.634	6233666.492	6.685	5.878	12/08/2024	0.5	3.5	1.84	1.03	4.85	4.85
Zone 3	WSP2024_BP01	DU05	334781.634	6233666.492	6.685	5.878	11/11/2024	0.5	3.5	2.07	1.27	4.61	4.61
Zone 3	WSP2024_CLOR1	DU04	334767.47	6233681.407	6.568	6.39	12/02/2024	1	4	2.96	2.78	3.61	3.61
Zone 3	WSP2024_CLOR1	DU04	334767.47	6233681.407	6.568	6.39	6/05/2024	1	4	2.07	1.89	4.50	4.50
Zone 3	WSP2024_CLOR1	DU04	334767.47	6233681.407	6.568	6.39	12/08/2024	1	4	2.53	2.35	4.04	4.04
Zone 3	WSP2024_CLOR1	DU04	334767.47	6233681.407	6.568	6.39	11/11/2024	1	4	2.75	2.57	3.82	3.82
Zone 3	WSP2024_CMW01	DU03	334716.588	6233790.233	7.003	6.203	13/02/2024	1	4	2.67	1.87	4.33	4.33
Zone 3	WSP2024_CMW01	DU03	334716.588	6233790.233	7.003	6.203	2/05/2024	1	4	2.29	1.49	4.72	4.72
Zone 3	WSP2024_CMW01	DU03	334716.588	6233790.233	7.003	6.203	5/08/2024	1	4	2.18	1.38	4.83	4.83
Zone 3	WSP2024_CMW01	DU03	334716.588	6233790.233	7.003	6.203	4/11/2024	1	4	2.50	1.70	4.50	4.50
Zone 3	WSP2024_CMW02	DU03	334703.318	6233758.159	6.709	5.879	13/02/2024	1	4	2.46	1.63	4.25	4.25
Zone 3	WSP2024_CMW02	DU03	334703.318	6233758.159	6.709	5.879	2/05/2024	1	4	1.77	0.94	4.94	4.94
Zone 3	WSP2024_CMW02	DU03	334703.318	6233758.159	6.709	5.879	5/08/2024	1	4	1.96	1.13	4.75	4.75

Zone	Location Code	Monitoring Zone	x coord	y coord	Top of Casing Elevation (m AHD)	Ground Level (m AHD)	Date	Top Screen Depth	Bottom Screen Depth	Depth to Water (m BTOC)	Depth to Water (mbgl)	Groundwater Elevation (m AHD)	Product Corrected Water Level (m AHD)
Zone 3	WSP2024_CMW02	DU03	334703.318	6233758.159	6.709	5.879	4/11/2024	1	4	2.26	1.43	4.45	4.45
Zone 3	WSP2024_CMW03	DU01	334914.892	6233768.699	6.816	6.077	13/02/2024	1	4	1.97	1.24	4.84	4.84
Zone 3	WSP2024_CMW03	DU01	334914.892	6233768.699	6.816	6.077	2/05/2024	1	4	1.77	1.03	5.05	5.05
Zone 3	WSP2024_CMW03	DU01	334914.892	6233768.699	6.816	6.077	5/08/2024	1	4	1.84	1.10	4.97	4.97
Zone 3	WSP2024_CMW03	DU01	334914.892	6233768.699	6.816	6.077	11/11/2024	1	4	1.88	1.15	4.93	4.93
Zone 3	WSP2024_CMW04	DU03	334706.348	6233854.672	6.765	5.915	13/02/2024	1	4	2.42	1.57	4.35	4.35
Zone 3	WSP2024_CMW04	DU03	334706.348	6233854.672	6.765	5.915	2/05/2024	1	4	2.12	1.27	4.65	4.65
Zone 3	WSP2024_CMW04	DU03	334706.348	6233854.672	6.765	5.915	5/08/2024	1	4	1.90	1.05	4.87	4.87
Zone 3	WSP2024_CMW04	DU03	334706.348	6233854.672	6.765	5.915	11/11/2024	1	4	2.24	1.39	4.53	4.53
Zone 3	WSP2024_CMW06	DU03	334778.272	6233886.886	7.014	6.072	13/02/2024	1	4	2.31	1.36	4.71	4.71
Zone 3	WSP2024_CMW06	DU03	334778.272	6233886.886	7.014	6.072	2/05/2024	1	4	2.09	1.15	4.92	4.92
Zone 3	WSP2024_CMW06	DU03	334778.272	6233886.886	7.014	6.072	5/08/2024	1	4	1.97	1.03	5.04	5.04
Zone 3	WSP2024_CMW06	DU03	334778.272	6233886.886	7.014	6.072	11/11/2024	1	4	2.14	1.20	4.87	4.87
Zone 3	WSP2024_CMW07	DU03	334820.405	6233881.907	6.831	5.932	13/02/2024	1	4	2.03	1.13	4.80	4.80
Zone 3	WSP2024_CMW07	DU03	334820.405	6233881.907	6.831	5.932	2/05/2024	1	4	1.73	0.83	5.10	5.10
Zone 3	WSP2024_CMW07	DU03	334820.405	6233881.907	6.831	5.932	5/08/2024	1	4	1.65	0.75	5.18	5.18
Zone 3	WSP2024_CMW07	DU03	334820.405	6233881.907	6.831	5.932	11/11/2024	1	4	1.85	0.95	4.98	4.98
Zone 3	WSP2024_CMW08	DU03	334883.372	6233875.255	6.979	5.971	13/02/2024	1	4	1.95	0.94	5.03	5.03
Zone 3	WSP2024_CMW08	DU03	334883.372	6233875.255	6.979	5.971	2/05/2024	1	4	1.49	0.48	5.49	5.49
Zone 3	WSP2024_CMW08	DU03	334883.372	6233875.255	6.979	5.971	5/08/2024	1	4	1.51	0.50	5.47	5.47
Zone 3	WSP2024_CMW08	DU03	334883.372	6233875.255	6.979	5.971	11/11/2024	1	4	1.73	0.72	5.25	5.25
Zone 3	WSP2024_CMW09	DU03	334724.385	6233828.858	7.027	6.235	13/02/2024	1	4	2.64	1.85	4.39	4.39
Zone 3	WSP2024_CMW09	DU03	334724.385	6233828.858	7.027	6.235	2/05/2024	1	4	2.37	1.58	4.66	4.66
Zone 3	WSP2024_CMW09	DU03	334724.385	6233828.858	7.027	6.235	5/08/2024	1	4	2.15	1.35	4.88	4.88
Zone 3	WSP2024_CMW09	DU03	334724.385	6233828.858	7.027	6.235	11/11/2024	1	4	2.45	1.66	4.58	4.58
Zone 3	WSP2024_CMW10	DU03	334766.81	6233824.839	7.679	6.807	13/02/2024	1	4	3.11	2.24	4.57	4.57
Zone 3	WSP2024_CMW10	DU03	334766.81	6233824.839	7.679	6.807	2/05/2024	1	4	2.82	1.95	4.86	4.86
Zone 3	WSP2024_CMW10	DU03	334766.81	6233824.839	7.679	6.807	5/08/2024	1	4	2.65	1.78	5.03	5.03
Zone 3	WSP2024_CMW10	DU03	334766.81	6233824.839	7.679	6.807	11/11/2024	1	4	2.92	2.04	4.76	4.76
Zone 3	WSP2024_CMW11	DU03	334822.956	6233818.359	7.673	6.811	13/02/2024	1	4	2.95	2.09	4.72	4.72
Zone 3	WSP2024_CMW11	DU03	334822.956	6233818.359	7.673	6.811	2/05/2024	1	4	2.77	1.91	4.91	4.91
Zone 3	WSP2024_CMW11	DU03	334822.956	6233818.359	7.673	6.811	5/08/2024	1	4	2.50	1.63	5.18	5.18
Zone 3	WSP2024_CMW11	DU03	334822.956	6233818.359	7.673	6.811	11/11/2024	1	4	2.73	1.87	4.95	4.95
Zone 3	WSP2024_CMW12	DU03	334896.543	6233801.519	7.043	6.087	13/02/2024	1	4	2.18	1.22	4.87	4.87
Zone 3	WSP2024_CMW12	DU03	334896.543	6233801.519	7.043	6.087	2/05/2024	1	4	1.86	0.90	5.19	5.19
Zone 3	WSP2024_CMW12	DU03	334896.543	6233801.519	7.043	6.087	5/08/2024	1	4	1.89	0.93	5.15	5.15
Zone 3	WSP2024_CMW12	DU03	334896.543	6233801.519	7.043	6.087	11/11/2024	1	4	2.02	1.06	5.03	5.03
Zone 3	WSP2024_CMW14	DU03	334818.387	6233764.956	7.203	6.24	13/02/2024	1	4	2.58	1.62	4.63	4.63
Zone 3	WSP2024_CMW14	DU03	334818.387	6233764.956	7.203	6.24	2/05/2024	1	4	2.21	1.25	4.99	4.99
Zone 3	WSP2024_CMW14	DU03	334818.387	6233764.956	7.203	6.24	5/08/2024	1	4	2.11	1.15	5.09	5.09
Zone 3	WSP2024_CMW14	DU03	334818.387	6233764.956	7.203	6.24	11/11/2024	1	4	2.34	1.38	4.86	4.86
Zone 3	WSP2024_CMW15	DU03	334864.244	6233738.48	6.782	5.926	13/02/2024	1	4	2.06	1.20	4.73	4.73
Zone 3	WSP2024_CMW15	DU03	334864.244	6233738.48	6.782	5.926	2/05/2024	1	4	1.59	0.74	5.19	5.19
Zone 3	WSP2024_CMW15	DU03	334864.244	6233738.48	6.782	5.926	5/08/2024	1	4	1.62	0.77	5.16	5.16
Zone 3	WSP2024_CMW15	DU03	334864.244	6233738.48	6.782	5.926	11/11/2024	1	4	1.83	0.98	4.95	4.95
Zone 3	WSP2024_CMW16	DU04	334707.332	6233715.451	6.422	5.585	13/02/2024	1	4	2.15	1.32	4.27	4.27
Zone 3	WSP2024_CMW16	DU04	334707.332	6233715.451	6.422	5.585	2/05/2024	1	4	1.32	0.48	5.11	5.11
Zone 3	WSP2024_CMW16	DU04	334707.332	6233715.451	6.422	5.585	5/08/2024	1	4	1.67	0.83	4.76	4.76
Zone 3	WSP2024_CMW16	DU04	334707.332	6233715.451	6.422	5.585	4/11/2024	1	4	1.96	1.12	4.46	4.46
Zone 3	WSP2024_CMW19	DU03	334777.812	6233786.077	6.336	6.442	13/02/2024	1	4	1.78	1.89	4.55	4.55
Zone 3	WSP2024_CMW19	DU03	334777.812	6233786.077	6.336	6.442	2/05/2024	1	4	1.37	1.48	4.96	4.96
Zone 3	WSP2024_CMW19	DU03	334777.812	6233786.077	6.336	6.442	5/08/2024	1	4	1.29	1.40	5.04	5.04
Zone 3	WSP2024_CMW19	DU03	334777.812	6233786.077	6.336	6.442	11/11/2024	1	4	1.56	1.66	4.78	4.78
Zone 3	WSP2024_CMW22	DU03	334745.202	6233804.528	7.555	6.578	13/02/2024	1	4	3.11	2.14	4.44	4.44
Zone 3	WSP2024_CMW22	DU03	334745.202	6233804.528	7.555	6.578	2/05/2024	1	4	2.83	1.85	4.73	4.73
Zone 3	WSP2024_CMW22	DU03	334745.202	6233804.528	7.555	6.578	5/08/2024	1	4	2.62	1.64	4.94	4.94
Zone 3	WSP2024_CMW22	DU03	334745.202	6233804.528	7.555	6.578	4/11/2024	1	4	2.95	1.97	4.61	4.61
Zone 3	WSP2024_CMW29	DU03	334742.522	6233780.919	7.168	6.266	13/02/2024	1	4.5	2.78	1.87	4.39	4.39
Zone 3	WSP2024_CMW29	DU03	334742.522	6233780.919	7.168	6.266	2/05/2024	1	4.5	2.46	1.56	4.71	4.71
Zone 3	WSP2024_CMW29	DU03	334742.522	6233780.919	7.168	6.266	5/08/2024	1	4.5	2.28	1.38	4.89	4.89
Zone 3	WSP2024_CMW29	DU03	334742.522	6233780.919	7.168	6.266	4/11/2024	1	4.5	2.63	1.73	4.54	4.54
Zone 3	WSP2024_CMW30	DU03	334759.138	6233778.35	7.209	6.285	13/02/2024	1	4.5	2.72	1.80	4.49	4.49

Zone	Location Code	Monitoring Zone	x coord	y coord	Top of Casing Elevation (m AHD)	Ground Level (mAHD)	Date	Top Screen Depth	Bottom Screen Depth	Depth to Water (m BTOC)	Depth to Water (mbgl)	Groundwater Elevation (mAHD)	Product Corrected Water Level (m AHD)
Zone 3	WSP2024_CMW30	DU03	334759.138	6233778.35	7.209	6.285	2/05/2024	1	4.5	2.53	1.60	4.68	4.68
Zone 3	WSP2024_CMW30	DU03	334759.138	6233778.35	7.209	6.285	5/08/2024	1	4.5	2.27	1.35	4.94	4.94
Zone 3	WSP2024_CMW30	DU03	334759.138	6233778.35	7.209	6.285	11/11/2024	1	4.5	2.53	1.61	4.68	4.68
Zone 3	WSP2024_CMW31	DU03	334751.759	6233761.032	7.174	6.176	13/02/2024	1	4.5	2.76	1.76	4.42	4.42
Zone 3	WSP2024_CMW31	DU03	334751.759	6233761.032	7.174	6.176	2/05/2024	1	4.5	2.40	1.41	4.77	4.77
Zone 3	WSP2024_CMW31	DU03	334751.759	6233761.032	7.174	6.176	5/08/2024	1	4.5	2.27	1.27	4.91	4.91
Zone 3	WSP2024_CMW31	DU03	334751.759	6233761.032	7.174	6.176	11/11/2024	1	4.5	2.56	1.56	4.62	4.62
Zone 3	WSP2024_CMW32	DU03	334773.841	6233754.48	6.855	5.997	13/02/2024	1	4.5	2.38	1.52	4.48	4.48
Zone 3	WSP2024_CMW32	DU03	334773.841	6233754.48	6.855	5.997	2/05/2024	1	4.5	1.97	1.11	4.88	4.88
Zone 3	WSP2024_CMW32	DU03	334773.841	6233754.48	6.855	5.997	5/08/2024	1	4.5	1.88	1.03	4.97	4.97
Zone 3	WSP2024_CMW32	DU03	334773.841	6233754.48	6.855	5.997	11/11/2024	1	4.5	2.16	1.30	4.70	4.70
Zone 1	WSP2024_OB22	Zone 1 admin	335107.387	6234845.7	3.532	3.61	14/02/2024	1	4	2.09	2.17	1.44	1.44
Zone 1	WSP2024_OB22	Zone 1 admin	335107.387	6234845.7	3.532	3.61	7/05/2024	1	4	1.51	1.59	2.03	2.03
Zone 1	WSP2024_OB22	Zone 1 admin	335107.387	6234845.7	3.532	3.61	20/08/2024	1	4	1.93	2.01	1.60	1.60
Zone 1	WSP2024_OB22	Zone 1 admin	335107.387	6234845.7	3.532	3.61	12/11/2024	1	4	2.06	2.14	1.47	1.47
Zone 1	WSP2024_OB23	Zone 1 admin	335092.562	6234772.762	3.512	3.581	14/02/2024	1	4	1.91	1.98	1.60	1.60
Zone 1	WSP2024_OB23	Zone 1 admin	335092.562	6234772.762	3.512	3.581	7/05/2024	1	4	1.44	1.51	2.07	2.07
Zone 1	WSP2024_OB23	Zone 1 admin	335092.562	6234772.762	3.512	3.581	20/08/2024	1	4	1.72	1.79	1.79	1.79
Zone 1	WSP2024_OB23	Zone 1 admin	335092.562	6234772.762	3.512	3.581	12/11/2024	1	4	1.85	1.92	1.66	1.66
Zone 3	WSP2024_OMW01	DU02	334666.074	6234110.607	9.238	8.174	6/02/2024	0.5	0.9	1.56	0.50	7.68	7.68
Zone 3	WSP2024_OMW01	DU02	334666.074	6234110.607	9.238	8.174	30/04/2024	0.5	0.9	1.62	0.55	7.62	7.62
Zone 3	WSP2024_OMW01	DU02	334666.074	6234110.607	9.238	8.174	6/08/2024	0.5	0.9	1.53	0.46	7.71	7.71
Zone 3	WSP2024_OMW01	DU02	334666.074	6234110.607	9.238	8.174	5/11/2024	0.5	0.9	1.74	0.67	7.50	7.50
Zone 3	WSP2024_OMW02	DU02	334649.942	6234051.943	7.876	7.013	6/02/2024	0.5	1.2	1.97	1.11	5.91	5.91
Zone 3	WSP2024_OMW02	DU02	334649.942	6234051.943	7.876	7.013	30/04/2024	0.5	1.2	1.91	1.04	5.97	5.97
Zone 3	WSP2024_OMW02	DU02	334649.942	6234051.943	7.876	7.013	6/08/2024	0.5	1.2	1.86	1.00	6.02	6.02
Zone 3	WSP2024_OMW02	DU02	334649.942	6234051.943	7.876	7.013	5/11/2024	0.5	1.2	1.93	1.07	5.95	5.95
Zone 3	WSP2024_OMW03	DU02	334884.527	6234059.664	9.423	8.517	6/02/2024	0.5	1.25	1.41	0.50	8.02	8.02
Zone 3	WSP2024_OMW03	DU02	334884.527	6234059.664	9.423	8.517	30/04/2024	0.5	1.25	1.33	0.42	8.10	8.10
Zone 3	WSP2024_OMW03	DU02	334884.527	6234059.664	9.423	8.517	6/08/2024	0.5	1.25	1.18	0.27	8.24	8.24
Zone 3	WSP2024_OMW03	DU02	334884.527	6234059.664	9.423	8.517	5/11/2024	0.5	1.25	1.51	0.60	7.91	7.91
Zone 3	WSP2024_OMW04A	Former CLOR					6/02/2024					1.98	
Zone 3	WSP2024_OMW04A	Former CLOR					30/04/2024					1.36	
Zone 3	WSP2024_OMW04A	Former CLOR					6/08/2024					1.24	
Zone 3	WSP2024_OMW04A	Former CLOR					5/11/2024					2.15	
Zone 3	WSP2024_OMW05	DU02	334830.877	6233984.049	8.879	8.139	6/02/2024	1.5	3.9	3.29	2.55	5.59	5.59
Zone 3	WSP2024_OMW05	DU02	334830.877	6233984.049	8.879	8.139	30/04/2024	1.5	3.9	3.00	2.26	5.88	5.88
Zone 3	WSP2024_OMW05	DU02	334830.877	6233984.049	8.879	8.139	6/08/2024	1.5	3.9	2.64	1.90	6.24	6.24
Zone 3	WSP2024_OMW05	DU02	334830.877	6233984.049	8.879	8.139	5/11/2024	1.5	3.9	3.23	2.49	5.65	5.65
Zone 3	WSP2024_OMW06	DU02	334843.996	6233914.681	9.121	8.179	6/02/2024	1.8	4.35	3.92	2.97	5.21	5.21
Zone 3	WSP2024_OMW06	DU02	334843.996	6233914.681	9.121	8.179	30/04/2024	1.8	4.35	3.71	2.77	5.41	5.41
Zone 3	WSP2024_OMW06	DU02	334843.996	6233914.681	9.121	8.179	6/08/2024	1.8	4.35	3.78	2.83	5.35	5.35
Zone 3	WSP2024_OMW06	DU02	334843.996	6233914.681	9.121	8.179	5/11/2024	1.8	4.35	3.80	2.85	5.33	5.33
Zone 3	WSP2024_OMW09	DU01	334943.014	6233872.929	7.654	6.769	6/02/2024	1.2	3.7	2.37	1.49	5.28	5.28
Zone 3	WSP2024_OMW09	DU01	334943.014	6233872.929	7.654	6.769	30/04/2024	1.2	3.7	2.22	1.34	5.43	5.43
Zone 3	WSP2024_OMW09	DU01	334943.014	6233872.929	7.654	6.769	6/08/2024	1.2	3.7	2.20	1.32	5.45	5.45
Zone 3	WSP2024_OMW09	DU01	334943.014	6233872.929	7.654	6.769	5/11/2024	1.2	3.7	2.37	1.48	5.29	5.29
Zone 3	WSP2024_OMW10	DU01	334988.824	6233847.143	7.906	6.796	6/02/2024	0.5	3.5	2.20	1.09	5.70	5.70
Zone 3	WSP2024_OMW10	DU01	334988.824	6233847.143	7.906	6.796	30/04/2024	0.5	3.5	2.39	1.28	5.51	5.51
Zone 3	WSP2024_OMW10	DU01	334988.824	6233847.143	7.906	6.796	6/08/2024	0.5	3.5	2.20	1.09	5.71	5.71
Zone 3	WSP2024_OMW10	DU01	334988.824	6233847.143	7.906	6.796	5/11/2024	0.5	3.5	2.38	1.27	5.52	5.52
Zone 3	WSP2024_OMW11	DU07	334937.525	6234059.353	10.271	9.418	6/02/2024	0.5	1.7	2.44	1.58	7.84	7.84
Zone 3	WSP2024_OMW11	DU07	334937.525	6234059.353	10.271	9.418	30/04/2024	0.5	1.7	1.95	1.10	8.32	8.32
Zone 3	WSP2024_OMW11	DU07	334937.525	6234059.353	10.271	9.418	6/08/2024	0.5	1.7	2.00	1.14	8.28	8.28
Zone 3	WSP2024_OMW11	DU07	334937.525	6234059.353	10.271	9.418	5/11/2024	0.5	1.7	2.43	1.57	7.85	7.85
Zone 3	WSP2024_OMW12	DU07	334969.483	6234053.794	9.879	9.047	30/04/2024	0.5	0.8	1.32	0.49	8.56	8.56
Zone 3	WSP2024_OMW12	DU07	334969.483	6234053.794	9.879	9.047	6/08/2024	0.5	0.8	1.35	0.52	8.53	8.53
Zone 2	WSP2024_PMW03	Zone 1 WWTP	334687.3205	6234975.307	3.609	2.64	29/04/2024	1	3.7	2.17	1.20	1.44	1.44
Zone 2	WSP2024_PMW03	Zone 1 WWTP	334687.3205	6234975.307	3.609	2.64	2/05/2024	1	3.7	2.40	1.43	1.21	1.21
Zone 2	WSP2024_PMW03	Zone 1 WWTP	334687.3205	6234975.307	3.609	2.64	5/08/2024	1	3.7	2.00	1.03	1.61	1.61
Zone 2	WSP2024_PMW03	Zone 1 WWTP	334687.3205	6234975.307	3.609	2.64	4/11/2024	1	3.7	2.38	1.41	1.23	1.23
Zone 2	WSP2024_PMW03	Zone 1 WWTP	334687.3205	6234975.307	3.609	2.64	6/02/2023	1	3.7	2.292	1.32		

Zone	Location Code	Monitoring Zone	x coord	y coord	Top of Casing Elevation (m AHD)	Ground Level (mAHD)	Date	Top Screen Depth	Bottom Screen Depth	Depth to Water (m BTOC)	Depth to Water (m bgl)	Groundwater Elevation (mAHD)	Product Corrected Water Level (m AHD)
Zone 2	WSP2024_PMW03	Zone 1 WWTP	334687.3205	6234975.307	3.609	2.64	1/05/2023	1	3.7	1.975	1.01		
Zone 2	WSP2024_PMW03	Zone 1 WWTP	334687.3205	6234975.307	3.609	2.64	31/07/2023	1	3.7	2.345	1.38		
Zone 2	WSP2024_PMW03	Zone 1 WWTP	334687.3205	6234975.307	3.609	2.64	6/11/2023	1	3.7	2.403	1.43		
Zone 1	WSP2024_PMW04	Zone 1 NE Tank Farm	335525.009	6235295.713	5.352	4.358	7/02/2024	1	3.8	2.58	1.59	2.77	2.77
Zone 1	WSP2024_PMW04	Zone 1 NE Tank Farm	335525.009	6235295.713	5.352	4.358	1/05/2024	1	3.8	2.24	1.25	3.11	3.11
Zone 1	WSP2024_PMW04	Zone 1 NE Tank Farm	335525.009	6235295.713	5.352	4.358	7/08/2024	1	3.8	2.28	1.29	3.07	3.07
Zone 1	WSP2024_PMW04	Zone 1 NE Tank Farm	335525.009	6235295.713	5.352	4.358	6/11/2024	1	3.8	2.51	1.51	2.85	2.85
Zone 2	WSP2024_PMW05	Zone 1 WWTP	334538.886	6234817.434	3.467	2.53	29/04/2024	0.5	4.5	1.87	0.93	1.60	1.60
Zone 2	WSP2024_PMW05	Zone 1 WWTP	334538.886	6234817.434	3.467	2.53	2/05/2024	0.5	4.5	2.13	1.19	1.34	1.34
Zone 2	WSP2024_PMW05	Zone 1 WWTP	334538.886	6234817.434	3.467	2.53	5/08/2024	0.5	4.5	1.67	0.73	1.80	1.80
Zone 2	WSP2024_PMW05	Zone 1 WWTP	334538.886	6234817.434	3.467	2.53	4/11/2024	0.5	4.5	2.11	1.17	1.36	1.36
Zone 2	WSP2024_PMW05	Zone 1 WWTP	334538.886	6234817.434	3.467	2.53	6/02/2023	0.5	4.5	1.995	1.06		
Zone 2	WSP2024_PMW05	Zone 1 WWTP	334538.886	6234817.434	3.467	2.53	1/05/2023	0.5	4.5	1.618	0.68		
Zone 2	WSP2024_PMW05	Zone 1 WWTP	334538.886	6234817.434	3.467	2.53	31/07/2023	0.5	4.5	2.071	1.13		
Zone 2	WSP2024_PMW05	Zone 1 WWTP	334538.886	6234817.434	3.467	2.53	6/11/2023	0.5	4.5	2.158	1.22		
Zone 2	WSP2024_PMW06	Zone 1 LPG	334908.561	6234821.58	4.407	3.375	29/04/2024	1	3.7	2.54	1.51	1.87	1.87
Zone 2	WSP2024_PMW06	Zone 1 LPG	334908.561	6234821.58	4.407	3.375	2/05/2024	1	3.7	2.79	1.76	1.61	1.61
Zone 2	WSP2024_PMW06	Zone 1 LPG	334908.561	6234821.58	4.407	3.375	5/08/2024	1	3.7	2.46	1.43	1.95	1.95
Zone 2	WSP2024_PMW06	Zone 1 LPG	334908.561	6234821.58	4.407	3.375	4/11/2024	1	3.7	2.78	1.74	1.63	1.63
Zone 2	WSP2024_PMW06	Zone 1 LPG	334908.561	6234821.58	4.407	3.375	6/02/2023	1	3.7	2.689	1.66		
Zone 2	WSP2024_PMW06	Zone 1 LPG	334908.561	6234821.58	4.407	3.375	1/05/2023	1	3.7	2.491	1.46		
Zone 2	WSP2024_PMW06	Zone 1 LPG	334908.561	6234821.58	4.407	3.375	31/07/2023	1	3.7	2.806	1.77		
Zone 2	WSP2024_PMW06	Zone 1 LPG	334908.561	6234821.58	4.407	3.375	6/11/2023	1	3.7	2.885	1.85		
Zone 2	WSP2024_PMW08	DU15	335786.168	6233963.838	19.034	18.157	8/08/2024	1.5	5	2.58	1.70	16.46	16.46
Zone 2	WSP2024_PMW08	DU15	335786.168	6233963.838	19.034	18.157	7/11/2024	1.5	5	3.35	2.47	15.69	15.69
Zone 3	WSP2024_PMW10	DU06	334646.491	6233679.514	6.343	5.553	12/02/2024	5.7	8.7	2.70	1.91	3.65	3.65
Zone 3	WSP2024_PMW10	DU06	334646.491	6233679.514	6.343	5.553	6/05/2024	5.7	8.7	1.70	0.91	4.64	4.64
Zone 3	WSP2024_PMW10	DU06	334646.491	6233679.514	6.343	5.553	12/08/2024	5.7	8.7	2.16	1.37	4.19	4.19
Zone 3	WSP2024_PMW10	DU06	334646.491	6233679.514	6.343	5.553	11/11/2024	5.7	8.7	2.41	1.62	3.93	3.93
Zone 2	WSP2024_PMW100	DU15	335710.208	6233890.724	22.439	21.509	6/02/2024	3.2	9.2	9.15	8.22	13.29	13.29
Zone 2	WSP2024_PMW100	DU15	335710.208	6233890.724	22.439	21.509	30/04/2024	3.2	9.2	9.02	8.09	13.42	13.42
Zone 2	WSP2024_PMW100	DU15	335710.208	6233890.724	22.439	21.509	6/08/2024	3.2	9.2	7.63	6.70	14.81	14.81
Zone 2	WSP2024_PMW100	DU15	335710.208	6233890.724	22.439	21.509	5/11/2024	3.2	9.2	8.26	7.33	14.18	14.18
Zone 2	WSP2024_PMW101	DU15	335711.691	6233876.88	22.698	21.888	6/02/2024	3.2	9.2	9.43	8.62	13.27	13.27
Zone 2	WSP2024_PMW101	DU15	335711.691	6233876.88	22.698	21.888	30/04/2024	3.2	9.2	9.29	8.48	13.41	13.41
Zone 2	WSP2024_PMW101	DU15	335711.691	6233876.88	22.698	21.888	6/08/2024	3.2	9.2	7.91	7.10	14.79	14.79
Zone 2	WSP2024_PMW101	DU15	335711.691	6233876.88	22.698	21.888	5/11/2024	3.2	9.2	8.52	7.71	14.18	14.18
Zone 2	WSP2024_PMW102	DU15	335700.077	6233866.289	22.743	21.843	6/02/2024	3.6	9.6	9.53	8.63	13.21	13.21
Zone 2	WSP2024_PMW102	DU15	335700.077	6233866.289	22.743	21.843	30/04/2024	3.6	9.6	9.39	8.49	13.35	13.35
Zone 2	WSP2024_PMW102	DU15	335700.077	6233866.289	22.743	21.843	6/08/2024	3.6	9.6	8.09	7.19	14.66	14.66
Zone 2	WSP2024_PMW102	DU15	335700.077	6233866.289	22.743	21.843	6/11/2024	3.6	9.6	8.68	7.78	14.07	14.07
Zone 2	WSP2024_PMW103	DU15	335666.201	6233851.571	20.088	19.088	30/04/2024	3.3	9.3	6.89	5.89	13.20	13.20
Zone 2	WSP2024_PMW103	DU15	335666.201	6233851.571	20.088	19.088	6/08/2024	3.3	9.3	5.77	4.77	14.32	14.32
Zone 2	WSP2024_PMW103	DU15	335666.201	6233851.571	20.088	19.088	5/11/2024	3.3	9.3	6.32	5.32	13.77	13.77
Zone 2	WSP2024_PMW104	DU15	335646.221	6233897.425	19.829	18.949	6/02/2024	3.8	9.8	6.81	5.93	13.02	13.02
Zone 2	WSP2024_PMW104	DU15	335646.221	6233897.425	19.829	18.949	30/04/2024	3.8	9.8	6.72	5.84	13.11	13.11
Zone 2	WSP2024_PMW104	DU15	335646.221	6233897.425	19.829	18.949	6/08/2024	3.8	9.8	5.72	4.84	14.11	14.11
Zone 2	WSP2024_PMW104	DU15	335646.221	6233897.425	19.829	18.949	5/11/2024	3.8	9.8	6.16	5.28	13.67	13.67
Zone 2	WSP2024_PMW105	DU15	335648.467	6233918.042	19.423	18.463	6/02/2024	3.3	9.3	6.40	5.44	13.02	13.02
Zone 2	WSP2024_PMW105	DU15	335648.467	6233918.042	19.423	18.463	30/04/2024	3.3	9.3	6.33	5.37	13.09	13.09
Zone 2	WSP2024_PMW105	DU15	335648.467	6233918.042	19.423	18.463	6/08/2024	3.3	9.3	5.29	4.33	14.13	14.13
Zone 2	WSP2024_PMW105	DU15	335648.467	6233918.042	19.423	18.463	5/11/2024	3.3	9.3	5.74	4.78	13.69	13.69
Zone 2	WSP2024_PMW106	DU15	335574.26	6233905.388	17.312	16.282	6/02/2024	2	6	4.53	3.50	12.79	12.79
Zone 2	WSP2024_PMW106	DU15	335574.26	6233905.388	17.312	16.282	30/04/2024	2	6	4.48	3.45	12.83	12.83
Zone 2	WSP2024_PMW106	DU15	335574.26	6233905.388	17.312	16.282	6/08/2024	2	6	3.89	2.86	13.42	13.42
Zone 2	WSP2024_PMW106	DU15	335574.26	6233905.388	17.312	16.282	5/11/2024	2	6	4.19	3.16	13.12	13.12
Zone 2	WSP2024_PMW11	Zone 1 WWTP	334612.215	6234828.768	3.513	3.463	29/04/2024	1.5	4.5	1.70	1.65	1.81	1.81
Zone 2	WSP2024_PMW11	Zone 1 WWTP	334612.215	6234828.768	3.513	3.463	2/05/2024	1.5	4.5	2.03	1.98	1.49	1.49
Zone 2	WSP2024_PMW11	Zone 1 WWTP	334612.215	6234828.768	3.513	3.463	5/08/2024	1.5	4.5	1.56	1.51	1.95	1.95
Zone 2	WSP2024_PMW11	Zone 1 WWTP	334612.215	6234828.768	3.513	3.463	4/11/2024	1.5	4.5	2.01	1.96	1.50	1.50
Zone 2	WSP2024_PMW11	Zone 1 WWTP	334612.215	6234828.768	3.513	3.463	6/02/2023	1.5	4.5	1.865	1.82		
Zone 2	WSP2024_PMW11	Zone 1 WWTP	334612.215	6234828.768	3.513	3.463	31/07/2023	1.5	4.5	1.93	1.88		

Zone	Location Code	Monitoring Zone	x coord	y coord	Top of Casing Elevation (m AHD)	Ground Level (m AHD)	Date	Top Screen Depth	Bottom Screen Depth	Depth to Water (m BTOC)	Depth to Water (m bgl)	Groundwater Elevation (m AHD)	Product Corrected Water Level (m AHD)
Zone 2	WSP2024 PMW11	Zone 1 WWTP	334612.215	6234828.768	3.513	3.463	6/11/2023	1.5	4.5	2.12	2.07		
Zone 2	WSP2024 PMW13	Zone 1 W Tank Farm	334917.469	6234422.317	4.29	3.92	5/08/2024	1.5	4.5	1.44	1.07	2.85	2.85
Zone 2	WSP2024 PMW13	Zone 1 W Tank Farm	334917.469	6234422.317	4.29	3.92	4/11/2024	1.5	4.5	1.87	1.50	2.43	2.43
Zone 2	WSP2024 PMW15	Zone 1 carpark	335161.581	6234682.984	4.31	3.863	29/04/2024	1.4	4.4	2.07	1.62	2.24	2.24
Zone 2	WSP2024 PMW15	Zone 1 carpark	335161.581	6234682.984	4.31	3.863	2/05/2024	1.4	4.4	2.25	1.80	2.06	2.06
Zone 2	WSP2024 PMW15	Zone 1 carpark	335161.581	6234682.984	4.31	3.863	5/08/2024	1.4	4.4	1.95	1.50	2.36	2.36
Zone 2	WSP2024 PMW15	Zone 1 carpark	335161.581	6234682.984	4.31	3.863	4/11/2024	1.4	4.4	2.16	1.71	2.16	2.16
Zone 1	WSP2024 PMW16	Zone 1 NW Tank Farm	335305.145	6234919.332	5.125	4.309	7/02/2024	1.8	4.8	2.83	2.01	2.30	2.30
Zone 1	WSP2024 PMW16	Zone 1 NW Tank Farm	335305.145	6234919.332	5.125	4.309	1/05/2024	1.8	4.8	2.47	1.66	2.65	2.65
Zone 1	WSP2024 PMW16	Zone 1 NW Tank Farm	335305.145	6234919.332	5.125	4.309	7/08/2024	1.8	4.8	2.50	1.68	2.63	2.63
Zone 1	WSP2024 PMW16	Zone 1 NW Tank Farm	335305.145	6234919.332	5.125	4.309	6/11/2024	1.8	4.8	2.81	2.00	2.31	2.31
Zone 2	WSP2024 PMW17	Zone 1 LPG	334804.562	6234913.709	3.434	2.902	29/04/2024	3	7.5	1.64	1.11	1.79	1.79
Zone 2	WSP2024 PMW17	Zone 1 LPG	334804.562	6234913.709	3.434	2.902	2/05/2024	3	7.5	2.06	1.53	1.37	1.37
Zone 2	WSP2024 PMW17	Zone 1 LPG	334804.562	6234913.709	3.434	2.902	5/08/2024	3	7.5	1.80	1.26	1.64	1.64
Zone 2	WSP2024 PMW17	Zone 1 LPG	334804.562	6234913.709	3.434	2.902	4/11/2024	3	7.5	2.11	1.58	1.32	1.32
Zone 2	WSP2024 PMW17	Former LPG Area			3.434	2.902	6/02/2023			1.937	1.41		
Zone 2	WSP2024 PMW17	Former LPG Area			3.434	2.902	1/05/2023			1.702	1.17		
Zone 2	WSP2024 PMW17	Former LPG Area			3.434	2.902	31/07/2023			2.056	1.52		
Zone 2	WSP2024 PMW17	Former LPG Area			3.434	2.902	6/11/2023			2.102	1.57		
Zone 1A	WSP2024 PMW18	Pipeline ROW	335161.698	6235363.999	3.707	2.757	7/11/2024			2.903	1.95	0.80	0.804
Zone 1A	WSP2024 PMW18	Pipeline ROW	335161.698	6235363.999	3.707	2.757	8/08/2024			2.605	1.66	1.10	1.102
Zone 1A	WSP2024 PMW18	Pipeline ROW	335161.698	6235363.999	3.707	2.757	02/05/2024			2.413	1.46	1.29	1.294
Zone 1A	WSP2024 PMW19	Pipeline ROW	335163.311	6235361.031	3.744	2.814	7/11/2024			2.837	1.91	0.91	0.907
Zone 1A	WSP2024 PMW19	Pipeline ROW	335163.311	6235361.031	3.744	2.814	8/08/2024			2.544	1.61	1.20	1.200
Zone 1A	WSP2024 PMW19	Pipeline ROW	335163.311	6235361.031	3.744	2.814	02/05/2024			2.350	1.42	1.39	1.394
Zone 2	WSP2024 PMW20	Zone 1 NW Tank Farm	335266.324	6234699.144	5.163	4.434	29/04/2024	1	4	2.27	1.54	2.89	2.89
Zone 2	WSP2024 PMW20	Zone 1 NW Tank Farm	335266.324	6234699.144	5.163	4.434	2/05/2024	1	4	1.37	0.64	3.79	3.79
Zone 2	WSP2024 PMW20	Zone 1 NW Tank Farm	335266.324	6234699.144	5.163	4.434	5/08/2024	1	4	2.16	1.43	3.00	3.00
Zone 2	WSP2024 PMW20	Zone 1 NW Tank Farm	335266.324	6234699.144	5.163	4.434	4/11/2024	1	4	2.31	1.58	2.85	2.85
Zone 1	WSP2024 PMW21	Zone 1 admin	335100.648	6234807.065	4.477	3.762	29/04/2024	1	4	2.81	2.09	1.67	1.67
Zone 1	WSP2024 PMW21	Zone 1 admin	335100.648	6234807.065	4.477	3.762	2/05/2024	1	4	2.96	2.25	1.52	1.52
Zone 1	WSP2024 PMW21	Zone 1 admin	335100.648	6234807.065	4.477	3.762	5/08/2024	1	4	2.74	2.03	1.74	1.74
Zone 1	WSP2024 PMW21	Zone 1 admin	335100.648	6234807.065	4.477	3.762	4/11/2024	1	4	2.88	2.17	1.60	1.60
Zone 1	WSP2024 PMW22	Zone 1 admin	335151.658	6234869.459	4.444	3.73	29/04/2024	1.2	4.2	2.88	2.16	1.57	1.57
Zone 1	WSP2024 PMW22	Zone 1 admin	335151.658	6234869.459	4.444	3.73	2/05/2024	1.2	4.2	3.00	2.28	1.45	1.45
Zone 1	WSP2024 PMW22	Zone 1 admin	335151.658	6234869.459	4.444	3.73	5/08/2024	1.2	4.2	2.79	2.08	1.65	1.65
Zone 1	WSP2024 PMW22	Zone 1 admin	335151.658	6234869.459	4.444	3.73	4/11/2024	1.2	4.2	2.99	2.27	1.46	1.46
Zone 1	WSP2024 PMW23	Zone 1 NE Tank Farm	335494.836	6235255.686	4.829	4.353	7/02/2024	1	4	2.29	1.81	2.54	2.54
Zone 1	WSP2024 PMW23	Zone 1 NE Tank Farm	335494.836	6235255.686	4.829	4.353	1/05/2024	1	4	1.80	1.33	3.03	3.03
Zone 1	WSP2024 PMW23	Zone 1 NE Tank Farm	335494.836	6235255.686	4.829	4.353	7/08/2024	1	4	1.85	1.38	2.98	2.98
Zone 1	WSP2024 PMW23	Zone 1 NE Tank Farm	335494.836	6235255.686	4.829	4.353	6/11/2024	1	4	2.16	1.68	2.67	2.67
Zone 1	WSP2024 PMW25	Zone 1 NE Tank Farm	335515.475	6235155.544	4.231	4.323	7/02/2024	1	4	1.34	1.43	2.90	2.90
Zone 1	WSP2024 PMW25	Zone 1 NE Tank Farm	335515.475	6235155.544	4.231	4.323	1/05/2024	1	4	0.69	0.78	3.54	3.54
Zone 1	WSP2024 PMW25	Zone 1 NE Tank Farm	335515.475	6235155.544	4.231	4.323	7/08/2024	1	4	0.94	1.03	3.29	3.29
Zone 1	WSP2024 PMW25	Zone 1 NE Tank Farm	335515.475	6235155.544	4.231	4.323	6/11/2024	1	4	1.19	1.29	3.04	3.04
Zone 1	WSP2024 PMW26	Zone 1 NE Tank Farm	335468.5	6235213.242	5.248	4.387	7/02/2024	1.5	3	2.82	1.96	2.43	2.43
Zone 1	WSP2024 PMW26	Zone 1 NE Tank Farm	335468.5	6235213.242	5.248	4.387	1/05/2024	1.5	3	2.33	1.47	2.92	2.92
Zone 1	WSP2024 PMW26	Zone 1 NE Tank Farm	335468.5	6235213.242	5.248	4.387	7/08/2024	1.5	3	2.32	1.46	2.93	2.93
Zone 1	WSP2024 PMW26	Zone 1 NE Tank Farm	335468.5	6235213.242	5.248	4.387	6/11/2024	1.5	3	2.70	1.83	2.55	2.55
Zone 1	WSP2024 PMW27	Zone 1 NE Tank Farm	335567.751	6235269.67	5.013	4.415	7/02/2024	1.5	3	2.02	1.42	3.00	3.00
Zone 1	WSP2024 PMW27	Zone 1 NE Tank Farm	335567.751	6235269.67	5.013	4.415	1/05/2024	1.5	3	1.65	1.05	3.37	3.37
Zone 1	WSP2024 PMW27	Zone 1 NE Tank Farm	335567.751	6235269.67	5.013	4.415	7/08/2024	1.5	3	1.74	1.14	3.28	3.28
Zone 1	WSP2024 PMW27	Zone 1 NE Tank Farm	335567.751	6235269.67	5.013	4.415	6/11/2024	1.5	3	1.90	1.30	3.11	3.11
Zone 3	WSP2024 PMW30	DU03	334685.799	6233813.398	5.66	5.831	12/02/2024	2.7	5.7	1.48	1.65	4.19	4.19
Zone 3	WSP2024 PMW30	DU03	334685.799	6233813.398	5.66	5.831	6/05/2024	2.7	5.7	0.67	0.84	4.99	4.99
Zone 3	WSP2024 PMW30	DU03	334685.799	6233813.398	5.66	5.831	12/08/2024	2.7	5.7	1.07	1.24	4.59	4.59
Zone 3	WSP2024 PMW30	DU03	334685.799	6233813.398	5.66	5.831	11/11/2024	2.7	5.7	1.29	1.46	4.37	4.37
Zone 2	WSP2024 PMW31	DU15	335557.1275	6233926.397	13.63	13.51	8/02/2024	1.8	4.8	0.98	0.86	12.65	12.65
Zone 2	WSP2024 PMW31	DU15	335557.1275	6233926.397	13.63	13.51	2/05/2024	1.8	4.8	0.70	0.58	12.93	12.93
Zone 2	WSP2024 PMW31	DU15	335557.1275	6233926.397	13.63	13.51	8/08/2024	1.8	4.8	0.33	0.21	13.30	13.30
Zone 2	WSP2024 PMW31	DU15	335557.1275	6233926.397	13.63	13.51	7/11/2024	1.8	4.8	0.62	0.50	13.01	13.01
Zone 2	WSP2024 PMW33	DU16	335656.695	6233997.23	15.631	15.616	8/02/2024	2.9	5.9	2.43	2.42	13.20	13.20

Zone	Location Code	Monitoring Zone	x coord	y coord	Top of Casing Elevation (m AHD)	Ground Level (mAHD)	Date	Top Screen Depth	Bottom Screen Depth	Depth to Water (m BTOC)	Depth to Water (mbgl)	Groundwater Elevation (mAHD)	Product Corrected Water Level (m AHD)
Zone 2	WSP2024_PMW33	DU16	335656.695	6233997.23	15.631	15.616	2/05/2024	2.9	5.9	2.29	2.27	13.35	13.35
Zone 2	WSP2024_PMW33	DU16	335656.695	6233997.23	15.631	15.616	8/08/2024	2.9	5.9	1.09	1.08	14.54	14.54
Zone 2	WSP2024_PMW33	DU16	335656.695	6233997.23	15.631	15.616	7/11/2024	2.9	5.9	1.37	1.37	14.25	14.25
Zone 1	WSP2024_PMW34	Zone 1 NE Tank Farm	335585.099	6235113.355	4.979	4.133	7/02/2024	0.6	3.6	1.86	1.01	3.12	3.12
Zone 1	WSP2024_PMW34	Zone 1 NE Tank Farm	335585.099	6235113.355	4.979	4.133	1/05/2024	0.6	3.6	1.38	0.54	3.60	3.60
Zone 1	WSP2024_PMW34	Zone 1 NE Tank Farm	335585.099	6235113.355	4.979	4.133	7/08/2024	0.6	3.6	1.43	0.58	3.55	3.55
Zone 1	WSP2024_PMW34	Zone 1 NE Tank Farm	335585.099	6235113.355	4.979	4.133	6/11/2024	0.6	3.6	1.73	0.88	3.25	3.25
Zone 1	WSP2024_PMW36	Zone 1 NE Tank Farm	335552.611	6235133.558	5.101	4.255	7/02/2024	0.5	5.2	2.05	1.20	3.05	3.05
Zone 1	WSP2024_PMW36	Zone 1 NE Tank Farm	335552.611	6235133.558	5.101	4.255	1/05/2024	0.5	5.2	1.67	0.83	3.43	3.43
Zone 1	WSP2024_PMW36	Zone 1 NE Tank Farm	335552.611	6235133.558	5.101	4.255	7/08/2024	0.5	5.2	1.58	0.73	3.52	3.52
Zone 1	WSP2024_PMW36	Zone 1 NE Tank Farm	335552.611	6235133.558	5.101	4.255	6/11/2024	0.5	5.2	1.91	1.06	3.19	3.19
Zone 1	WSP2024_PMW37	Zone 1 NW Tank Farm	335362.903	6235010.722	4.843	4.403	7/02/2024	0.9	5.1	2.20	1.76	2.64	2.64
Zone 1	WSP2024_PMW37	Zone 1 NW Tank Farm	335362.903	6235010.722	4.843	4.403	1/05/2024	0.9	5.1	1.96	1.52	2.88	2.88
Zone 1	WSP2024_PMW37	Zone 1 NW Tank Farm	335362.903	6235010.722	4.843	4.403	7/08/2024	0.9	5.1	1.86	1.42	2.98	2.98
Zone 1	WSP2024_PMW37	Zone 1 NW Tank Farm	335362.903	6235010.722	4.843	4.403	6/11/2024	0.9	5.1	2.19	1.75	2.65	2.65
Zone 3	WSP2024_PMW38	DU06	334638.008	6233697.75	6.358	5.448	12/02/2024	10.5	13.5	2.70	1.79	3.66	3.66
Zone 3	WSP2024_PMW38	DU06	334638.008	6233697.75	6.358	5.448	6/05/2024	10.5	13.5	1.90	0.99	4.46	4.46
Zone 3	WSP2024_PMW38	DU06	334638.008	6233697.75	6.358	5.448	12/08/2024	10.5	13.5	2.17	1.26	4.19	4.19
Zone 3	WSP2024_PMW38	DU06	334638.008	6233697.75	6.358	5.448	11/11/2024	10.5	13.5	2.41	1.50	3.95	3.95
Zone 3	WSP2024_PMW41	DU06	334516.281	6234038.145	5.854	5.175	12/02/2024	0.6	2.4	2.92	2.24	2.94	2.94
Zone 3	WSP2024_PMW41	DU06	334516.281	6234038.145	5.854	5.175	6/05/2024	0.6	2.4	2.01	1.33	3.85	3.85
Zone 3	WSP2024_PMW41	DU06	334516.281	6234038.145	5.854	5.175	12/08/2024	0.6	2.4	2.32	1.64	3.54	3.54
Zone 3	WSP2024_PMW41	DU06	334516.281	6234038.145	5.854	5.175	11/11/2024	0.6	2.4	2.74	2.06	3.11	3.11
Zone 3	WSP2024_PMW42	DU09	334533.686	6233933.328	5.954	5.16	12/02/2024	0.9	4.4	2.43	1.64	3.52	3.52
Zone 3	WSP2024_PMW42	DU09	334533.686	6233933.328	5.954	5.16	6/05/2024	0.9	4.4	1.79	0.99	4.17	4.17
Zone 3	WSP2024_PMW42	DU09	334533.686	6233933.328	5.954	5.16	12/08/2024	0.9	4.4	2.20	1.41	3.75	3.75
Zone 3	WSP2024_PMW42	DU09	334533.686	6233933.328	5.954	5.16	11/11/2024	0.9	4.4	2.44	1.64	3.52	3.52
Zone 2	WSP2024_PMW43	Zone 1 WWTP	334595.982	6234846.87	3.437	3.442	29/04/2024	1	4.5	2.53	2.54	0.91	0.91
Zone 2	WSP2024_PMW43	Zone 1 WWTP	334595.982	6234846.87	3.437	3.442	2/05/2024	1	4.5	2.85	2.86	0.58	0.58
Zone 2	WSP2024_PMW43	Zone 1 WWTP	334595.982	6234846.87	3.437	3.442	5/08/2024	1	4.5	2.44	2.44	1.00	1.00
Zone 2	WSP2024_PMW43	Zone 1 WWTP	334595.982	6234846.87	3.437	3.442	4/11/2024	1	4.5	2.84	2.84	0.60	0.60
Zone 2	WSP2024_PMW43	Zone 1 WWTP	334595.982	6234846.87	3.437	3.442	6/02/2023	1	4.5	2.74	2.72		
Zone 2	WSP2024_PMW43	Zone 1 WWTP	334595.982	6234846.87	3.437	3.442	1/05/2023	1	4.5	2.393	2.40		
Zone 2	WSP2024_PMW43	Zone 1 WWTP	334595.982	6234846.87	3.437	3.442	31/07/2023	1	4.5	2.833	2.84		
Zone 2	WSP2024_PMW43	Zone 1 WWTP	334595.982	6234846.87	3.437	3.442	6/11/2023	1	4.5	2.927	2.93		
Zone 1	WSP2024_PMW45	Zone 1 NW Tank Farm	335264.141	6234859.703	3.976	4.113	7/02/2024	1	4.5	1.59	1.73	2.39	2.39
Zone 1	WSP2024_PMW45	Zone 1 NW Tank Farm	335264.141	6234859.703	3.976	4.113	1/05/2024	1	4.5	1.31	1.44	2.67	2.67
Zone 1	WSP2024_PMW45	Zone 1 NW Tank Farm	335264.141	6234859.703	3.976	4.113	7/08/2024	1	4.5	1.27	1.41	2.70	2.70
Zone 1	WSP2024_PMW45	Zone 1 NW Tank Farm	335264.141	6234859.703	3.976	4.113	6/11/2024	1	4.5	1.54	1.68	2.44	2.44
Zone 1	WSP2024_PMW46	Zone 1 NW Tank Farm	335336.71	6235000.741	5.536	4.571	7/02/2024	1	4.5	3.13	2.17	2.40	2.40
Zone 1	WSP2024_PMW46	Zone 1 NW Tank Farm	335336.71	6235000.741	5.536	4.571	1/05/2024	1	4.5	2.82	1.86	2.71	2.71
Zone 1	WSP2024_PMW46	Zone 1 NW Tank Farm	335336.71	6235000.741	5.536	4.571	7/08/2024	1	4.5	2.75	1.79	2.79	2.79
Zone 1	WSP2024_PMW46	Zone 1 NW Tank Farm	335336.71	6235000.741	5.536	4.571	6/11/2024	1	4.5	3.05	2.08	2.49	2.49
Zone 1	WSP2024_PMW47	Zone 1 NE Tank Farm	335397.784	6235053.941	4.63	4.734	7/02/2024	1	4.5	2.12	2.22	2.51	2.51
Zone 1	WSP2024_PMW47	Zone 1 NE Tank Farm	335397.784	6235053.941	4.63	4.734	1/05/2024	1	4.5	1.70	1.80	2.93	2.93
Zone 1	WSP2024_PMW47	Zone 1 NE Tank Farm	335397.784	6235053.941	4.63	4.734	7/08/2024	1	4.5	1.61	1.71	3.02	3.02
Zone 1	WSP2024_PMW47	Zone 1 NE Tank Farm	335397.784	6235053.941	4.63	4.734	6/11/2024	1	4.5	1.91	2.02	2.72	2.72
Zone 1	WSP2024_PMW48	Zone 1 NE Tank Farm	335432.986	6235139.271	4.224	4.29	7/02/2024	1	4	1.68	1.74	2.55	2.55
Zone 1	WSP2024_PMW48	Zone 1 NE Tank Farm	335432.986	6235139.271	4.224	4.29	1/05/2024	1	4	1.32	1.38	2.91	2.91
Zone 1	WSP2024_PMW48	Zone 1 NE Tank Farm	335432.986	6235139.271	4.224	4.29	7/08/2024	1	4	1.27	1.34	2.95	2.95
Zone 1	WSP2024_PMW48	Zone 1 NE Tank Farm	335432.986	6235139.271	4.224	4.29	6/11/2024	1	4	1.57	1.64	2.65	2.65
Zone 3	WSP2024_PMW49	DU04	334696.076	6233670.825	6.651	5.806	12/02/2024	0.5	3.5	2.46	1.62	4.19	4.19
Zone 3	WSP2024_PMW49	DU04	334696.076	6233670.825	6.651	5.806	6/05/2024	0.5	3.5	1.14	0.30	5.51	5.51
Zone 3	WSP2024_PMW49	DU04	334696.076	6233670.825	6.651	5.806	12/08/2024	0.5	3.5	2.14	1.30	4.51	4.51
Zone 3	WSP2024_PMW49	DU04	334696.076	6233670.825	6.651	5.806	11/11/2024	0.5	3.5	2.33	1.48	4.32	4.32
Zone 3	WSP2024_PMW50	DU06	334613.943	6233747.782	6.424	5.436	12/02/2024	0.5	3.5	2.84	1.86	3.58	3.58
Zone 3	WSP2024_PMW50	DU06	334613.943	6233747.782	6.424	5.436	6/05/2024	0.5	3.5	1.83	0.84	4.60	4.60
Zone 3	WSP2024_PMW50	DU06	334613.943	6233747.782	6.424	5.436	12/08/2024	0.5	3.5	2.41	1.43	4.01	4.01
Zone 3	WSP2024_PMW50	DU06	334613.943	6233747.782	6.424	5.436	11/11/2024	0.5	3.5	2.61	1.63	3.81	3.81
Zone 3	WSP2024_PMW51	DU06	334612.255	6233754.417	6.303	5.417	12/02/2024	4.5	7.5	2.72	1.84	3.58	3.58
Zone 3	WSP2024_PMW51	DU06	334612.255	6233754.417	6.303	5.417	6/05/2024	4.5	7.5	2.70	1.81	3.61	3.61
Zone 3	WSP2024_PMW51	DU06	334612.255	6233754.417	6.303	5.417	12/08/2024	4.5	7.5	2.30	1.41	4.00	4.00

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Zone 3	WSP2024_PMW51	DU06	334612.255	6233754.417	6.303	5.417	11/11/2024	4.5	7.5	2.50	1.61	3.81	3.81
Zone 3	WSP2024_PMW53	DU06	334588.975	6233842.436	6.28	5.408	12/02/2024	0.7	3.7	2.79	1.92	3.49	3.49
Zone 3	WSP2024_PMW53	DU06	334588.975	6233842.436	6.28	5.408	6/05/2024	0.7	3.7	1.75	0.88	4.53	4.53
Zone 3	WSP2024_PMW53	DU06	334588.975	6233842.436	6.28	5.408	12/08/2024	0.7	3.7	2.54	1.67	3.74	3.74
Zone 3	WSP2024_PMW53	DU06	334588.975	6233842.436	6.28	5.408	11/11/2024	0.7	3.7	2.71	1.83	3.57	3.57
Zone 2	WSP2024_PMW55	Zone 1 WWTP	334738.049	6234942.199	3.996	3.053	29/04/2024	0.7	3.7	2.51	1.57	1.48	1.48
Zone 2	WSP2024_PMW55	Zone 1 WWTP	334738.049	6234942.199	3.996	3.053	2/05/2024	0.7	3.7	2.74	1.80	1.25	1.25
Zone 2	WSP2024_PMW55	Zone 1 WWTP	334738.049	6234942.199	3.996	3.053	5/08/2024	0.7	3.7	2.49	1.55	1.51	1.51
Zone 2	WSP2024_PMW55	Zone 1 WWTP	334738.049	6234942.199	3.996	3.053	4/11/2024	0.7	3.7	2.73	1.79	1.27	1.27
Zone 2	WSP2024_PMW55	Zone 1 WWTP	334738.049	6234942.199	3.996	3.053	6/02/2023	0.7	3.7	2.621	1.68		
Zone 2	WSP2024_PMW55	Zone 1 WWTP	334738.049	6234942.199	3.996	3.053	1/05/2023	0.7	3.7	2.373	1.43		
Zone 2	WSP2024_PMW55	Zone 1 WWTP	334738.049	6234942.199	3.996	3.053	31/07/2023	0.7	3.7	2.75	1.81		
Zone 2	WSP2024_PMW55	Zone 1 WWTP	334738.049	6234942.199	3.996	3.053	6/11/2023	0.7	3.7	2.778	1.84		
Zone 2	WSP2024_PMW56	Zone 1 LPG	334849.854	6234892.047	4.251	3.306	29/04/2024	0.7	3.7	2.53	1.58	1.73	1.73
Zone 2	WSP2024_PMW56	Zone 1 LPG	334849.854	6234892.047	4.251	3.306	2/05/2024	0.7	3.7	2.78	1.84	1.47	1.47
Zone 2	WSP2024_PMW56	Zone 1 LPG	334849.854	6234892.047	4.251	3.306	5/08/2024	0.7	3.7	2.42	1.47	1.84	1.84
Zone 2	WSP2024_PMW56	Zone 1 LPG	334849.854	6234892.047	4.251	3.306	4/11/2024	0.7	3.7	2.77	1.82	1.48	1.48
Zone 2	WSP2024_PMW56	Zone 1 LPG	334849.854	6234892.047	4.251	3.306	6/02/2023	0.7	3.7	2.545	1.60		
Zone 2	WSP2024_PMW56	Zone 1 LPG	334849.854	6234892.047	4.251	3.306	1/05/2023	0.7	3.7	2.396	1.45		
Zone 2	WSP2024_PMW56	Zone 1 LPG	334849.854	6234892.047	4.251	3.306	31/07/2023	0.7	3.7	2.768	1.82		
Zone 2	WSP2024_PMW56	Zone 1 LPG	334849.854	6234892.047	4.251	3.306	6/11/2023	0.7	3.7	2.83	1.89		
Zone 3	WSP2024_PMW57	DU06	334662.282	6233732.974	6.748	5.922	12/02/2024	0.5	3.5	2.87	2.05	3.88	3.88
Zone 3	WSP2024_PMW57	DU06	334662.282	6233732.974	6.748	5.922	6/05/2024	0.5	3.5	1.90	1.07	4.85	4.85
Zone 3	WSP2024_PMW57	DU06	334662.282	6233732.974	6.748	5.922	12/08/2024	0.5	3.5	2.45	1.62	4.30	4.30
Zone 3	WSP2024_PMW57	DU06	334662.282	6233732.974	6.748	5.922	11/11/2024	0.5	3.5	2.66	1.83	4.09	4.09
Zone 1A	WSP2024_PMW58	Pipeline ROW	335051.115	6235462.984	3.485	2.547	7/11/2024			2.833	1.90	0.65	0.652
Zone 1A	WSP2024_PMW58	Pipeline ROW	335051.115	6235462.984	3.485	2.547	8/08/2024			2.607	1.67	0.88	0.878
Zone 1A	WSP2024_PMW58	Pipeline ROW	335051.115	6235462.984	3.485	2.547	02/05/2024			2.433	1.50	1.05	1.052
Zone 2	WSP2024_PMW60	DU13	335457.031	6234194.502	12.298	12.377	8/02/2024	0.5	4.5	0.46	0.54	11.84	11.84
Zone 2	WSP2024_PMW60	DU13	335457.031	6234194.502	12.298	12.377	8/08/2024	0.5	4.5	0.15	0.23	12.15	12.15
Zone 2	WSP2024_PMW60	DU13	335457.031	6234194.502	12.298	12.377	7/11/2024	0.5	4.5	0.10	0.18	12.20	12.20
Zone 2	WSP2024_PMW61	DU16	335505.982	6234226.912	13.509	13.611	8/02/2024	1	4	2.21	2.31	11.30	11.30
Zone 2	WSP2024_PMW61	DU16	335505.982	6234226.912	13.509	13.611	2/05/2024	1	4	2.14	2.24	11.37	11.37
Zone 2	WSP2024_PMW61	DU16	335505.982	6234226.912	13.509	13.611	8/08/2024	1	4	2.00	2.10	11.51	11.51
Zone 2	WSP2024_PMW61	DU16	335505.982	6234226.912	13.509	13.611	7/11/2024	1	4	2.34	2.44	11.17	11.17
Zone 1	WSP2024_PMW62	Zone 1 NE Tank Farm	335656.848	6235213.469	5.624	4.728	7/02/2024	1	4	2.00	1.10	3.63	3.63
Zone 1	WSP2024_PMW62	Zone 1 NE Tank Farm	335656.848	6235213.469	5.624	4.728	1/05/2024	1	4	1.72	0.82	3.91	3.91
Zone 1	WSP2024_PMW62	Zone 1 NE Tank Farm	335656.848	6235213.469	5.624	4.728	7/08/2024	1	4	1.71	0.82	3.91	3.91
Zone 1	WSP2024_PMW62	Zone 1 NE Tank Farm	335656.848	6235213.469	5.624	4.728	6/11/2024	1	4	2.11	1.21	3.51	3.51
Zone 1	WSP2024_PMW63	Zone 1 NE Tank Farm	335444.251	6235171.328	4.196	4.273	7/02/2024	1	4	1.79	1.87	2.40	2.40
Zone 1	WSP2024_PMW63	Zone 1 NE Tank Farm	335444.251	6235171.328	4.196	4.273	1/05/2024	1	4	1.32	1.39	2.88	2.88
Zone 1	WSP2024_PMW63	Zone 1 NE Tank Farm	335444.251	6235171.328	4.196	4.273	7/08/2024	1	4	1.35	1.43	2.85	2.85
Zone 1	WSP2024_PMW63	Zone 1 NE Tank Farm	335444.251	6235171.328	4.196	4.273	6/11/2024	1	4	1.67	1.74	2.53	2.53
Zone 3	WSP2024_PMW64	DU01	334976.301	6233640.21	6.832	5.951	12/02/2024	1	4	1.94	1.06	4.89	4.89
Zone 3	WSP2024_PMW64	DU01	334976.301	6233640.21	6.832	5.951	6/05/2024	1	4	1.05	0.17	5.78	5.78
Zone 3	WSP2024_PMW64	DU01	334976.301	6233640.21	6.832	5.951	12/08/2024	1	4	1.61	0.72	5.23	5.23
Zone 3	WSP2024_PMW64	DU01	334976.301	6233640.21	6.832	5.951	11/11/2024	1	4	1.71	0.83	5.12	5.12
Zone 2	WSP2024_PMW65	Zone 1 LPG	334988.466	6234745.802	3.514	3.594	29/04/2024	1	4	1.54	1.62	1.97	1.97
Zone 2	WSP2024_PMW65	Zone 1 LPG	334988.466	6234745.802	3.514	3.594	2/05/2024	1	4	1.78	1.86	1.73	1.73
Zone 2	WSP2024_PMW65	Zone 1 LPG	334988.466	6234745.802	3.514	3.594	5/08/2024	1	4	1.45	1.53	2.06	2.06
Zone 2	WSP2024_PMW65	Zone 1 LPG	334988.466	6234745.802	3.514	3.594	4/11/2024	1	4	1.71	1.79	1.80	1.80
Zone 1	WSP2024_PMW66	Zone 1 admin	335036.364	6234713.416	3.241	3.301	29/04/2024	1	4	1.24	1.30	2.00	2.00
Zone 1	WSP2024_PMW66	Zone 1 admin	335036.364	6234713.416	3.241	3.301	2/05/2024	1	4	1.44	1.50	1.80	1.80
Zone 1	WSP2024_PMW66	Zone 1 admin	335036.364	6234713.416	3.241	3.301	5/08/2024	1	4	1.13	1.19	2.11	2.11
Zone 1	WSP2024_PMW66	Zone 1 admin	335036.364	6234713.416	3.241	3.301	4/11/2024	1	4	1.36	1.42	1.89	1.89
Zone 1	WSP2024_PMW68	Zone 1 NW Tank Farm	335392.286	6234912.041	5.218	4.29	9/02/2024	1	4	1.99	1.06	3.23	3.23
Zone 1	WSP2024_PMW68	Zone 1 NW Tank Farm	335392.286	6234912.041	5.218	4.29	3/05/2024	1	4	1.48	0.56	3.74	3.74
Zone 1	WSP2024_PMW68	Zone 1 NW Tank Farm	335392.286	6234912.041	5.218	4.29	9/08/2024	1	4	1.80	0.87	3.42	3.42
Zone 1	WSP2024_PMW68	Zone 1 NW Tank Farm	335392.286	6234912.041	5.218	4.29	11/08/2024	1	4	2.13	1.20	3.09	3.09
Zone 1	WSP2024_PMW69	Zone 1 NW Tank Farm	335315.149	6234973.262	5.067	5.068	9/02/2024	1	4	2.93	2.93	2.14	2.14
Zone 1	WSP2024_PMW69	Zone 1 NW Tank Farm	335315.149	6234973.262	5.067	5.068	2/05/2024	1	4	2.34	2.34	2.73	2.73
Zone 1	WSP2024_PMW69	Zone 1 NW Tank Farm	335315.149	6234973.262	5.067	5.068	8/08/2024	1	4	2.47	2.47	2.59	2.59

Zone	Location Code	Monitoring Zone	x coord	y coord	Top of Casing Elevation (m AHD)	Ground Level (mAHD)	Date	Top Screen Depth	Bottom Screen Depth	Depth to Water (m BTOC)	Depth to Water (mbgl)	Groundwater Elevation (mAHD)	Product Corrected Water Level (m AHD)
Zone 1	WSP2024_PMW69	Zone 1 NW Tank Farm	335315.149	6234973.262	5.067	5.068	11/08/2024	1	4	2.82	2.82	2.24	2.24
Zone 1	WSP2024_PMW70	Zone 1 NW Tank Farm	335308.678	6234958.205	4.962	4.415	9/02/2024	1	4	2.88	2.33	2.08	2.08
Zone 1	WSP2024_PMW70	Zone 1 NW Tank Farm	335308.678	6234958.205	4.962	4.415	2/05/2024	1	4	2.32	1.77	2.64	2.64
Zone 1	WSP2024_PMW70	Zone 1 NW Tank Farm	335308.678	6234958.205	4.962	4.415	8/08/2024	1	4	2.47	1.92	2.50	2.50
Zone 1	WSP2024_PMW70	Zone 1 NW Tank Farm	335308.678	6234958.205	4.962	4.415	11/08/2024	1	4	2.79	2.25	2.17	2.17
Zone 1	WSP2024_PMW71	Zone 1 NW Tank Farm	335353.449	6234984.909	5.963	5.146	7/02/2024	1	4	3.20	2.38	2.77	2.77
Zone 1	WSP2024_PMW71	Zone 1 NW Tank Farm	335353.449	6234984.909	5.963	5.146	1/05/2024	1	4	2.97	2.16	2.99	2.99
Zone 1	WSP2024_PMW71	Zone 1 NW Tank Farm	335353.449	6234984.909	5.963	5.146	7/08/2024	1	4	2.89	2.07	3.08	3.08
Zone 1	WSP2024_PMW72	Zone 1 NW Tank Farm	335386.028	6234979.593	5.363	4.496	7/02/2024	1	4	2.90	2.03	2.46	2.66
Zone 1	WSP2024_PMW72	Zone 1 NW Tank Farm	335386.028	6234979.593	5.363	4.496	1/05/2024	1	4	2.36	1.49	3.01	3.06
Zone 1	WSP2024_PMW72	Zone 1 NW Tank Farm	335386.028	6234979.593	5.363	4.496	7/08/2024	1	4	2.21	1.34	3.15	3.20
Zone 1	WSP2024_PMW73	Zone 1 NW Tank Farm	335383.278	6234957.893	5.309	4.501	7/02/2024	1	4	2.43	1.62	2.88	2.88
Zone 1	WSP2024_PMW73	Zone 1 NW Tank Farm	335383.278	6234957.893	5.309	4.501	1/05/2024	1	4	2.05	1.24	3.26	3.26
Zone 1	WSP2024_PMW73	Zone 1 NW Tank Farm	335383.278	6234957.893	5.309	4.501	7/08/2024	1	4	2.00	1.19	3.31	3.31
Zone 1	WSP2024_PMW76	Zone 1 NW Tank Farm	335364.028	6234971.286	5.562	4.566	7/02/2024	1	4	2.81	1.82	2.75	2.75
Zone 1	WSP2024_PMW76	Zone 1 NW Tank Farm	335364.028	6234971.286	5.562	4.566	1/05/2024	1	4	2.44	1.44	3.12	3.12
Zone 1	WSP2024_PMW76	Zone 1 NW Tank Farm	335364.028	6234971.286	5.562	4.566	7/08/2024	1	4	2.39	1.39	3.18	3.18
Zone 1	WSP2024_PMW77	Zone 1 NW Tank Farm	335483.244	6234894.258	5.54	4.582	9/02/2024	1	4	1.35	0.39	4.19	4.19
Zone 1	WSP2024_PMW77	Zone 1 NW Tank Farm	335483.244	6234894.258	5.54	4.582	3/05/2024	1	4	0.62	-0.34	4.92	4.92
Zone 1	WSP2024_PMW77	Zone 1 NW Tank Farm	335483.244	6234894.258	5.54	4.582	9/08/2024	1	4	0.88	-0.08	4.66	4.66
Zone 1	WSP2024_PMW77	Zone 1 NW Tank Farm	335483.244	6234894.258	5.54	4.582	11/08/2024	1	4	1.18	0.22	4.37	4.37
Zone 1	WSP2024_PMW78	Zone 1 NW Tank Farm	335436.147	6234922.811	5.367	4.271	9/02/2024	1	4	1.87	0.77	3.50	3.50
Zone 1	WSP2024_PMW78	Zone 1 NW Tank Farm	335436.147	6234922.811	5.367	4.271	3/05/2024	1	4	1.31	0.22	4.06	4.06
Zone 1	WSP2024_PMW78	Zone 1 NW Tank Farm	335436.147	6234922.811	5.367	4.271	9/08/2024	1	4	1.58	0.49	3.79	3.79
Zone 1	WSP2024_PMW78	Zone 1 NW Tank Farm	335436.147	6234922.811	5.367	4.271	11/08/2024	1	4	1.86	0.76	3.51	3.51
Zone 1	WSP2024_PMW79	Zone 1 NW Tank Farm	335430.961	6234909.462	5.214	4.399	9/02/2024	1	4	2.12	1.30	3.10	3.10
Zone 1	WSP2024_PMW79	Zone 1 NW Tank Farm	335430.961	6234909.462	5.214	4.399	3/05/2024	1	4	1.42	0.61	3.79	3.79
Zone 1	WSP2024_PMW79	Zone 1 NW Tank Farm	335430.961	6234909.462	5.214	4.399	9/08/2024	1	4	1.73	0.91	3.49	3.49
Zone 1	WSP2024_PMW79	Zone 1 NW Tank Farm	335430.961	6234909.462	5.214	4.399	11/08/2024	1	4	2.06	1.24	3.16	3.16
Zone 1	WSP2024_PMW80	Zone 1 NW Tank Farm	335512.16	6234901.029	5.85	5.921	9/02/2024	1	4	2.87	2.94	2.98	3.22
Zone 1	WSP2024_PMW80	Zone 1 NW Tank Farm	335512.16	6234901.029	5.85	5.921	3/05/2024	1	4	2.26	2.33	3.59	3.67
Zone 1	WSP2024_PMW80	Zone 1 NW Tank Farm	335512.16	6234901.029	5.85	5.921	9/08/2024	1	4	2.74	2.81	3.11	3.55
Zone 1	WSP2024_PMW80	Zone 1 NW Tank Farm	335512.16	6234901.029	5.85	5.921	11/08/2024	1	4	2.78	2.85	3.07	3.29
Zone 1	WSP2024_PMW81	Zone 1 NW Tank Farm	335485.719	6234920.188	5.108	4.284	9/02/2024	1	4	2.25	1.43	2.86	3.09
Zone 1	WSP2024_PMW81	Zone 1 NW Tank Farm	335485.719	6234920.188	5.108	4.284	3/05/2024	1	4	2.13	1.30	2.98	3.56
Zone 1	WSP2024_PMW81	Zone 1 NW Tank Farm	335485.719	6234920.188	5.108	4.284	9/08/2024	1	4	2.19	1.37	2.92	3.44
Zone 1	WSP2024_PMW81	Zone 1 NW Tank Farm	335485.719	6234920.188	5.108	4.284	11/08/2024	1	4	2.23	1.41	2.88	3.46
Zone 1	WSP2024_PMW85	Zone 1 NW Tank Farm	335380.096	6234980.96	5.483	4.533	7/02/2024	1	5	2.76	1.81	2.73	2.73
Zone 1	WSP2024_PMW85	Zone 1 NW Tank Farm	335380.096	6234980.96	5.483	4.533	1/05/2024	1	5	2.40	1.45	3.08	3.08
Zone 1	WSP2024_PMW85	Zone 1 NW Tank Farm	335380.096	6234980.96	5.483	4.533	7/08/2024	1	5	2.31	1.36	3.18	3.18
Zone 1	WSP2024_PMW86	Zone 1 NW Tank Farm	335393.75	6235008.829	5.41	4.382	7/02/2024	1	4	2.71	1.68	2.70	2.70
Zone 1	WSP2024_PMW86	Zone 1 NW Tank Farm	335393.75	6235008.829	5.41	4.382	1/05/2024	1	4	2.36	1.34	3.05	3.05
Zone 1	WSP2024_PMW86	Zone 1 NW Tank Farm	335393.75	6235008.829	5.41	4.382	7/08/2024	1	4	2.30	1.27	3.11	3.11
Zone 1	WSP2024_PMW86	Zone 1 NW Tank Farm	335393.75	6235008.829	5.41	4.382	6/11/2024	1	4	2.61	1.58	2.80	2.80
Zone 1	WSP2024_PMW87	Zone 1 NW Tank Farm	335466.641	6235000.323	5.427	4.426	7/02/2024	1	4	2.40	1.40	3.03	3.03
Zone 1	WSP2024_PMW87	Zone 1 NW Tank Farm	335466.641	6235000.323	5.427	4.426	1/05/2024	1	4	2.14	1.14	3.29	3.29
Zone 1	WSP2024_PMW87	Zone 1 NW Tank Farm	335466.641	6235000.323	5.427	4.426	7/08/2024	1	4	2.07	1.07	3.36	3.36
Zone 1	WSP2024_PMW87	Zone 1 NW Tank Farm	335466.641	6235000.323	5.427	4.426	6/11/2024	1	4	2.36	1.35	3.07	3.07
Zone 1	WSP2024_PMW88	Zone 1 NW Tank Farm	335494.532	6235038.211	7.161	6.069	7/02/2024	1.5	4.5	4.15	3.05	3.02	3.02
Zone 1	WSP2024_PMW88	Zone 1 NW Tank Farm	335494.532	6235038.211	7.161	6.069	1/05/2024	1.5	4.5	3.84	2.74	3.33	3.33
Zone 1	WSP2024_PMW88	Zone 1 NW Tank Farm	335494.532	6235038.211	7.161	6.069	7/08/2024	1.5	4.5	3.79	2.69	3.38	3.38
Zone 1	WSP2024_PMW88	Zone 1 NW Tank Farm	335494.532	6235038.211	7.161	6.069	6/11/2024	1.5	4.5	4.06	2.96	3.11	3.11
Zone 1	WSP2024_PMW89	Zone 1 NW Tank Farm	335502.697	6234983.275	5.469	4.506	9/02/2024	1.5	4.5	2.40	1.44	3.07	3.07
Zone 1	WSP2024_PMW89	Zone 1 NW Tank Farm	335502.697	6234983.275	5.469	4.506	3/05/2024	1.5	4.5	1.88	0.92	3.59	3.59
Zone 1	WSP2024_PMW89	Zone 1 NW Tank Farm	335502.697	6234983.275	5.469	4.506	9/08/2024	1.5	4.5	2.03	1.07	3.44	3.44
Zone 1	WSP2024_PMW89	Zone 1 NW Tank Farm	335502.697	6234983.275	5.469	4.506	11/08/2024	1.5	4.5	2.29	1.33	3.18	3.18
Zone 1	WSP2024_PMW90	Zone 1 NW Tank Farm	335515.535	6234920.582	5.861	5.961	9/02/2024	1.5	6	2.67	2.77	3.19	3.19
Zone 1	WSP2024_PMW90	Zone 1 NW Tank Farm	335515.535	6234920.582	5.861	5.961	3/05/2024	1.5	6	2.21	2.21	3.65	3.65
Zone 1	WSP2024_PMW90	Zone 1 NW Tank Farm	335515.535	6234920.582	5.861	5.961	9/08/2024	1.5	6	3.00	3.10	2.86	2.86
Zone 1	WSP2024_PMW90	Zone 1 NW Tank Farm	335515.535	6234920.582	5.861	5.961	11/08/2024	1.5	6	2.59	2.69	3.28	3.28
Zone 2	WSP2024_PMW91	DU15	335629.045	6233867.324	19.587	18.538	30/04/2024	4	8.14	6.55	5.50	13.04	13.04
Zone 2	WSP2024_PMW91	DU15	335629.045	6233867.324	19.587	18.538	6/08/2024	4	8.14	5.68	4.63	13.91	13.91

Zone	Location Code	Monitoring Zone	x coord	y coord	Top of Casing Elevation (m AHD)	Ground Level (mAHD)	Date	Top Screen Depth	Bottom Screen Depth	Depth to Water (m BTOC)	Depth to Water (mbgl)	Groundwater Elevation (mAHD)	Product Corrected Water Level (m AHD)
Zone 2	WSP2024_PMW91	DU15	335629.045	6233867.324	19.587	18.538	5/11/2024	4	8.14	6.06	5.01	13.53	13.53
Zone 1	WSP2024_PMW93	Zone 1 NW Tank Farm	335381.305	6234975.12	5.631	4.632	7/02/2024	1	4	3.10	2.10	2.53	2.74
Zone 1	WSP2024_PMW93	Zone 1 NW Tank Farm	335381.305	6234975.12	5.631	4.632	1/05/2024	1	4	2.54	1.55	3.09	3.13
Zone 1	WSP2024_PMW93	Zone 1 NW Tank Farm	335381.305	6234975.12	5.631	4.632	7/08/2024	1	4	2.48	1.48	3.15	3.21
Zone 1	WSP2024_PMW94	North Western Tank Farm			5.195		7/02/2024			2.50	-2.70	2.70	2.70
Zone 1	WSP2024_PMW94	North Western Tank Farm			5.195		1/05/2024			2.05	-3.15	3.15	3.15
Zone 1	WSP2024_PMW94	North Western Tank Farm			5.195		7/08/2024			1.08	-4.11	4.11	4.11
Zone 1	WSP2024_PMW95	North Western Tank Farm			5.273		7/02/2024			2.61	-2.66	2.66	2.66
Zone 1	WSP2024_PMW95	North Western Tank Farm			5.273		1/05/2024			2.12	-3.16	3.16	3.16
Zone 1	WSP2024_PMW95	North Western Tank Farm			5.273		7/08/2024			1.27	-4.00	4.00	4.00
Zone 1	WSP2024_PMW96	Zone 1 NW Tank Farm	335440.925	6234893.591	5.109	4.26	9/02/2024	0.5	4	1.96	1.11	3.15	3.15
Zone 1	WSP2024_PMW96	Zone 1 NW Tank Farm	335440.925	6234893.591	5.109	4.26	3/05/2024	0.5	4	1.26	0.41	3.85	3.88
Zone 1	WSP2024_PMW96	Zone 1 NW Tank Farm	335440.925	6234893.591	5.109	4.26	9/08/2024	0.5	4	2.10	1.25	3.01	3.43
Zone 1	WSP2024_PMW96	Zone 1 NW Tank Farm	335440.925	6234893.591	5.109	4.26	11/08/2024	0.5	4	1.89	1.04	3.22	3.22
Zone 1	WSP2024_PMW97	Zone 1 NW Tank Farm	335465.898	6234921.48	5.27	4.368	9/02/2024	0.5	4	2.30	1.40	2.97	3.07
Zone 1	WSP2024_PMW97	Zone 1 NW Tank Farm	335465.898	6234921.48	5.27	4.368	3/05/2024	0.5	4	2.21	1.31	3.06	3.59
Zone 1	WSP2024_PMW97	Zone 1 NW Tank Farm	335465.898	6234921.48	5.27	4.368	9/08/2024	0.5	4	1.91	1.01	3.36	3.49
Zone 1	WSP2024_PMW97	Zone 1 NW Tank Farm	335465.898	6234921.48	5.27	4.368	11/08/2024	0.5	4	2.15	1.25	3.12	3.16
Zone 2	WSP2024_PMW98	Former LPG Area					29/04/2024						
Zone 2	WSP2024_PMW98	Former LPG Area					2/05/2024						
Zone 2	WSP2024_PMW98	Former LPG Area					5/08/2024						
Zone 2	WSP2024_PMW98	Former LPG Area					4/11/2024						
Zone 2	WSP2024_PP01	NW Tank Farm	335320.97	6234747.896	4.314	4.393	12/02/2024	1	4	1.32	1.40	2.99	2.99
Zone 2	WSP2024_PP01	NW Tank Farm	335320.97	6234747.896	4.314	4.393	6/05/2024	1	4	1.23	1.31	3.08	3.08
Zone 2	WSP2024_PP01	NW Tank Farm	335320.97	6234747.896	4.314	4.393	12/08/2024	1	4	1.14	1.22	3.17	3.17
Zone 2	WSP2024_PP01	NW Tank Farm	335320.97	6234747.896	4.314	4.393	11/11/2024	1	4	1.36	1.44	2.95	2.95
Zone 2	WSP2024_PP02	NW Tank Farm	335446.011	6234739.238	4.273	4.342	12/02/2024	0.3	3	1.49	1.56	2.78	2.78
Zone 2	WSP2024_PP02	NW Tank Farm	335446.011	6234739.238	4.273	4.342	6/05/2024	0.3	3	0.61	0.67	3.67	3.67
Zone 2	WSP2024_PP02	NW Tank Farm	335446.011	6234739.238	4.273	4.342	11/11/2024	0.3	3	0.88	0.95	3.40	3.40
Zone 2	WSP2024_PP03	Zone 1 Firestation	334988.542	6234610.022	3.319	3.429	6/02/2024	0.5	3.5	1.38	1.49	1.94	1.94
Zone 2	WSP2024_PP03	Zone 1 Firestation	334988.542	6234610.022	3.319	3.429	30/04/2024	0.5	3.5	1.11	1.22	2.21	2.21
Zone 2	WSP2024_PP03	Zone 1 Firestation	334988.542	6234610.022	3.319	3.429	6/08/2024	0.5	3.5	1.04	1.15	2.28	2.28
Zone 2	WSP2024_PP03	Zone 1 Firestation	334988.542	6234610.022	3.319	3.429	5/11/2024	0.5	3.5	1.28	1.39	2.04	2.04
Zone 2	WSP2024_PP04	DU11	335151.395	6234550.089	3.777	3.872	6/02/2024	0.5	3.5	1.43	1.53	2.35	2.35
Zone 2	WSP2024_PP04	DU11	335151.395	6234550.089	3.777	3.872	30/04/2024	0.5	3.5	1.24	1.33	2.54	2.54
Zone 2	WSP2024_PP04	DU11	335151.395	6234550.089	3.777	3.872	6/08/2024	0.5	3.5	1.19	1.29	2.59	2.59
Zone 2	WSP2024_PP04	DU11	335151.395	6234550.089	3.777	3.872	5/11/2024	0.5	3.5	1.38	1.47	2.40	2.40
Zone 2	WSP2024_PP05	DU11	335280.431	6234602.186	4.401	4.451	6/02/2024	1	4	1.60	1.65	2.81	2.81
Zone 2	WSP2024_PP05	DU11	335280.431	6234602.186	4.401	4.451	30/04/2024	1	4	2.48	2.53	1.92	1.92
Zone 2	WSP2024_PP05	DU11	335280.431	6234602.186	4.401	4.451	6/08/2024	1	4	1.40	1.45	3.00	3.00
Zone 2	WSP2024_PP05	DU11	335280.431	6234602.186	4.401	4.451	5/11/2024	1	4	1.54	1.59	2.86	2.86
Zone 2	WSP2024_PP06	DU12	335465.966	6234549.356	4.537	4.672	9/02/2024	0.5	3.5	1.71	1.84	2.83	2.83
Zone 2	WSP2024_PP06	DU12	335465.966	6234549.356	4.537	4.672	3/05/2024	0.5	3.5	0.88	1.02	3.66	3.66
Zone 2	WSP2024_PP06	DU12	335465.966	6234549.356	4.537	4.672	9/08/2024	0.5	3.5	0.84	0.98	3.70	3.70
Zone 2	WSP2024_PP06	DU12	335465.966	6234549.356	4.537	4.672	11/08/2024	0.5	3.5	1.10	1.24	3.44	3.44
Zone 2	WSP2024_PP07	DU11	334972.983	6234448.633	3.627	3.722	6/02/2024	1	4	1.17	1.27	2.45	2.45
Zone 2	WSP2024_PP07	DU11	334972.983	6234448.633	3.627	3.722	30/04/2024	1	4	1.07	1.17	2.56	2.56
Zone 2	WSP2024_PP07	DU11	334972.983	6234448.633	3.627	3.722	6/08/2024	1	4	0.99	1.09	2.64	2.64
Zone 2	WSP2024_PP07	DU11	334972.983	6234448.633	3.627	3.722	5/11/2024	1	4	1.20	1.29	2.43	2.43
Zone 2	WSP2024_PP07	DU11	334972.983	6234448.633	3.627	3.722	7/02/2023	1	4	1.146	1.24		
Zone 2	WSP2024_PP07	DU11	334972.983	6234448.633	3.627	3.722	2/05/2023	1	4	1.015	1.11		
Zone 2	WSP2024_PP07	DU11	334972.983	6234448.633	3.627	3.722	1/08/2023	1	4	1.25	1.35		
Zone 2	WSP2024_PP07	DU11	334972.983	6234448.633	3.627	3.722	6/11/2023	1	4	1.281	1.38		
Zone 2	WSP2024_PP08	DU11	335119.81	6234448.449	3.932	4.043	7/02/2024	0.5	3.5	1.37	1.48	2.56	2.56
Zone 2	WSP2024_PP08	DU11	335119.81	6234448.449	3.932	4.043	1/05/2024	0.5	3.5	1.22	1.33	2.72	2.72
Zone 2	WSP2024_PP08	DU11	335119.81	6234448.449	3.932	4.043	7/08/2024	0.5	3.5	1.14	1.25	2.79	2.79
Zone 2	WSP2024_PP08	DU11	335119.81	6234448.449	3.932	4.043	6/11/2024	0.5	3.5	1.31	1.42	2.62	2.62
Zone 2	WSP2024_PP09	DU11	335269.558	6234430.742	4.314	4.404	6/02/2024	0.5	3.5	1.30	1.39	3.02	3.02
Zone 2	WSP2024_PP09	DU11	335269.558	6234430.742	4.314	4.404	30/04/2024	0.5	3.5	1.22	1.31	3.10	3.10
Zone 2	WSP2024_PP09	DU11	335269.558	6234430.742	4.314	4.404	6/08/2024	0.5	3.5	1.13	1.22	3.19	3.19
Zone 2	WSP2024_PP09	DU11	335269.558	6234430.742	4.314	4.404	5/11/2024	0.5	3.5	1.26	1.35	3.06	3.06
Zone 2	WSP2024_PP10	DU12	335453.645	6234415.056	4.596	4.706	9/02/2024	0.5	3.5	1.03	1.14	3.57	3.57

Zone	Location Code	Monitoring Zone	x coord	y coord	Top of Casing Elevation (m AHD)	Ground Level (mAHD)	Date	Top Screen Depth	Bottom Screen Depth	Depth to Water (m BTOC)	Depth to Water (mbgl)	Groundwater Elevation (mAHD)	Product Corrected Water Level (m AHD)
Zone 2	WSP2024_PP10	DU12	335453.645	6234415.056	4.596	4.706	3/05/2024	0.5	3.5	0.88	0.99	3.72	3.72
Zone 2	WSP2024_PP10	DU12	335453.645	6234415.056	4.596	4.706	9/08/2024	0.5	3.5	0.95	1.06	3.65	3.65
Zone 2	WSP2024_PP10	DU12	335453.645	6234415.056	4.596	4.706	11/08/2024	0.5	3.5	1.03	1.14	3.56	3.56
Zone 2	WSP2024_PP11	DU10	334929.857	6234310.15	3.454	3.564	29/04/2024	0.3	3	0.85	0.96	2.60	2.60
Zone 2	WSP2024_PP11	DU10	334929.857	6234310.15	3.454	3.564	2/05/2024	0.3	3	1.01	1.12	2.44	2.44
Zone 2	WSP2024_PP11	DU10	334929.857	6234310.15	3.454	3.564	5/08/2024	0.3	3	0.79	0.90	2.66	2.66
Zone 2	WSP2024_PP11	DU10	334929.857	6234310.15	3.454	3.564	4/11/2024	0.3	3	1.00	1.11	2.46	2.46
Zone 2	WSP2024_PP11	DU10	334929.857	6234310.15	3.454	3.564	6/02/2023	0.3	3	0.83	0.94		
Zone 2	WSP2024_PP11	DU10	334929.857	6234310.15	3.454	3.564	1/05/2023	0.3	3	0.694	0.80		
Zone 2	WSP2024_PP11	DU10	334929.857	6234310.15	3.454	3.564	31/07/2023	0.3	3	0.98	1.09		
Zone 2	WSP2024_PP11	DU10	334929.857	6234310.15	3.454	3.564	6/11/2023	0.3	3	1.065	1.18		
Zone 2	WSP2024_PP12	DU10	335083.875	6234285.918	3.939	4.004	29/04/2024	1	4	1.12	1.18	2.82	2.82
Zone 2	WSP2024_PP12	DU10	335083.875	6234285.918	3.939	4.004	2/05/2024	1	4	1.25	1.32	2.69	2.69
Zone 2	WSP2024_PP12	DU10	335083.875	6234285.918	3.939	4.004	5/08/2024	1	4	1.24	1.31	2.70	2.70
Zone 2	WSP2024_PP12	DU10	335083.875	6234285.918	3.939	4.004	4/11/2024	1	4	1.21	1.28	2.73	2.73
Zone 2	WSP2024_PP13	DU12	335267.918	6234257.895	4.264	4.374	29/04/2024	0.3	3	0.87	0.98	3.39	3.39
Zone 2	WSP2024_PP13	DU12	335267.918	6234257.895	4.264	4.374	2/05/2024	0.3	3	0.95	1.06	3.31	3.31
Zone 2	WSP2024_PP13	DU12	335267.918	6234257.895	4.264	4.374	5/08/2024	0.3	3	0.67	0.78	3.59	3.59
Zone 2	WSP2024_PP13	DU12	335267.918	6234257.895	4.264	4.374	4/11/2024	0.3	3	0.94	1.05	3.32	3.32
Zone 2	WSP2024_PP17	DU14	335215.377	6234037.643	11.623	10.715	29/04/2024	0.3	2	2.59	1.68	9.03	9.03
Zone 2	WSP2024_PP17	DU14	335215.377	6234037.643	11.623	10.715	2/05/2024	0.3	2	2.67	1.76	8.95	8.95
Zone 2	WSP2024_PP17	DU14	335215.377	6234037.643	11.623	10.715	5/08/2024	0.3	2	2.47	1.56	9.15	9.15
Zone 2	WSP2024_PU01	DU12	335399.292	6234331.509	5.231	4.386	29/04/2024	1	4	1.76	0.92	3.47	3.47
Zone 2	WSP2024_PU01	DU12	335399.292	6234331.509	5.231	4.386	2/05/2024	1	4	1.76	0.92	3.47	3.47
Zone 2	WSP2024_PU01	DU12	335399.292	6234331.509	5.231	4.386	5/08/2024	1	4	1.61	0.77	3.62	3.62
Zone 2	WSP2024_PU01	DU12	335399.292	6234331.509	5.231	4.386	4/11/2024	1	4	1.71	0.86	3.53	3.53
Zone 2	WSP2024_PU02	DU12	335317.649	6234331.376	5.391	4.445	29/04/2024	1	4	2.15	1.20	3.24	3.24
Zone 2	WSP2024_PU02	DU12	335317.649	6234331.376	5.391	4.445	2/05/2024	1	4	2.20	1.25	3.19	3.19
Zone 2	WSP2024_PU02	DU12	335317.649	6234331.376	5.391	4.445	5/08/2024	1	4	2.97	2.03	2.42	2.42
Zone 2	WSP2024_PU02	DU12	335317.649	6234331.376	5.391	4.445	4/11/2024	1	4	2.15	1.20	3.24	3.24
Zone 2	WSP2024_PU03	Zone 1 Firestation	335266.684	6234315.319	5.362	4.517	29/04/2024	1	4	2.17	1.32	3.19	3.19
Zone 2	WSP2024_PU03	Zone 1 Firestation	335266.684	6234315.319	5.362	4.517	2/05/2024	1	4	2.23	1.39	3.13	3.13
Zone 2	WSP2024_PU03	Zone 1 Firestation	335266.684	6234315.319	5.362	4.517	5/08/2024	1	4	2.15	1.30	3.22	3.22
Zone 2	WSP2024_PU03	Zone 1 Firestation	335266.684	6234315.319	5.362	4.517	4/11/2024	1	4	2.19	1.35	3.17	3.17
Zone 2	WSP2024_PU04	DU10	335171.238	6234256.089	5.327	4.347	29/04/2024	1	4	2.19	1.21	3.14	3.14
Zone 2	WSP2024_PU04	DU10	335171.238	6234256.089	5.327	4.347	2/05/2024	1	4	2.29	1.31	3.04	3.04
Zone 2	WSP2024_PU04	DU10	335171.238	6234256.089	5.327	4.347	5/08/2024	1	4	2.03	1.05	3.30	3.30
Zone 2	WSP2024_PU04	DU10	335171.238	6234256.089	5.327	4.347	4/11/2024	1	4	2.29	1.31	3.04	3.04
Zone 2	WSP2024_PU05	DU10	335093.102	6234250.884	5.262	4.366	29/04/2024	1	4	2.37	1.48	2.89	2.89
Zone 2	WSP2024_PU05	DU10	335093.102	6234250.884	5.262	4.366	2/05/2024	1	4	2.45	1.55	2.81	2.81
Zone 2	WSP2024_PU05	DU10	335093.102	6234250.884	5.262	4.366	5/08/2024	1	4	2.62	1.73	2.64	2.64
Zone 2	WSP2024_PU05	DU10	335093.102	6234250.884	5.262	4.366	4/11/2024	1	4	2.46	1.56	2.80	2.80
Zone 2	WSP2024_PU06	DU10	334973.724	6234257.761	5.194	4.212	29/04/2024	1	4	2.51	1.53	2.68	2.68
Zone 2	WSP2024_PU06	DU10	334973.724	6234257.761	5.194	4.212	2/05/2024	1	4	2.63	1.64	2.57	2.57
Zone 2	WSP2024_PU06	DU10	334973.724	6234257.761	5.194	4.212	5/08/2024	1	4	2.30	1.32	2.89	2.89
Zone 2	WSP2024_PU06	DU10	334973.724	6234257.761	5.194	4.212	4/11/2024	1	4	3.00	2.01	2.20	2.20
Zone 2	WSP2024_PU07	DU10	334996.16	6234367.763	5.268	4.328	29/04/2024	1	4	2.81	1.87	2.46	2.46
Zone 2	WSP2024_PU07	DU10	334996.16	6234367.763	5.268	4.328	2/05/2024	1	4	2.41	1.47	2.86	2.86
Zone 2	WSP2024_PU07	DU10	334996.16	6234367.763	5.268	4.328	5/08/2024	1	4	2.69	1.75	2.58	2.58
Zone 2	WSP2024_PU07	DU10	334996.16	6234367.763	5.268	4.328	4/11/2024	1	4	2.83	1.89	2.44	2.44
Zone 2	WSP2024_PU07	DU10	334996.16	6234367.763	5.268	4.328	6/02/2023	1	4	2.782	1.84		
Zone 2	WSP2024_PU07	DU10	334996.16	6234367.763	5.268	4.328	1/05/2023	1	4	2.62	1.68		
Zone 2	WSP2024_PU07	DU10	334996.16	6234367.763	5.268	4.328	31/07/2023	1	4	2.871	1.93		
Zone 2	WSP2024_PU07	DU10	334996.16	6234367.763	5.268	4.328	6/11/2023	1	4	2.915	1.98		
Zone 2	WSP2024_PU08	DU10	335092.67	6234361.072	5.634	4.684	29/04/2024	1	4	2.93	1.98	2.70	2.70
Zone 2	WSP2024_PU08	DU10	335092.67	6234361.072	5.634	4.684	2/05/2024	1	4	3.01	2.06	2.63	2.63
Zone 2	WSP2024_PU08	DU10	335092.67	6234361.072	5.634	4.684	5/08/2024	1	4	2.79	1.84	2.84	2.84
Zone 2	WSP2024_PU08	DU10	335092.67	6234361.072	5.634	4.684	4/11/2024	1	4	2.98	2.03	2.66	2.66
Zone 2	WSP2024_PU09	DU10	335211.159	6234337.612	5.845	4.915	29/04/2024	1	4	2.79	1.86	3.06	3.06
Zone 2	WSP2024_PU09	DU10	335211.159	6234337.612	5.845	4.915	2/05/2024	1	4	2.85	1.92	3.00	3.00
Zone 2	WSP2024_PU09	DU10	335211.159	6234337.612	5.845	4.915	5/08/2024	1	4	2.62	1.69	3.22	3.22
Zone 2	WSP2024_PU09	DU10	335211.159	6234337.612	5.845	4.915	4/11/2024	1	4	2.80	1.87	3.05	3.05

Zone	Location Code	Monitoring Zone	x coord	y coord	Top of Casing Elevation (m AHD)	Ground Level (mAHD)	Date	Top Screen Depth	Bottom Screen Depth	Depth to Water (m BTOC)	Depth to Water (mbgl)	Groundwater Elevation (mAHD)	Product Corrected Water Level (m AHD)
Zone 2	WSP2024_PU10	NW Tank Farm	335351.349	6234726.422	4.244	4.332	12/02/2024	1	4	1.13	1.22	3.11	3.11
Zone 2	WSP2024_PU10	NW Tank Farm	335351.349	6234726.422	4.244	4.332	6/05/2024	1	4	0.70	0.79	3.54	3.54
Zone 2	WSP2024_PU10	NW Tank Farm	335351.349	6234726.422	4.244	4.332	12/08/2024	1	4	0.89	0.98	3.35	3.35
Zone 2	WSP2024_PU10	NW Tank Farm	335351.349	6234726.422	4.244	4.332	11/11/2024	1	4	1.06	1.14	3.19	3.19
Zone 2	WSP2024_PU100	DU10	335131.38	6234359.707	5.537	4.627	13/02/2024			2.78	1.87	2.76	2.76
Zone 2	WSP2024_PU100	DU10	335131.38	6234359.707	5.537	4.627	6/05/2024			2.45	1.54	3.09	3.09
Zone 2	WSP2024_PU100	DU10	335131.38	6234359.707	5.537	4.627	13/08/2024			2.63	1.72	2.91	2.91
Zone 2	WSP2024_PU100	DU10	335131.38	6234359.707	5.537	4.627	5/11/2024			2.77	1.86	2.77	2.77
Zone 2	WSP2024_PU101	DU10	335165.784	6234336.69	5.754	4.854	13/02/2024			2.87	1.97	2.88	2.88
Zone 2	WSP2024_PU101	DU10	335165.784	6234336.69	5.754	4.854	6/05/2024			2.62	1.72	3.13	3.13
Zone 2	WSP2024_PU101	DU10	335165.784	6234336.69	5.754	4.854	13/08/2024			2.69	1.79	3.06	3.06
Zone 2	WSP2024_PU101	DU10	335165.784	6234336.69	5.754	4.854	5/11/2024			2.84	1.94	2.91	2.91
Zone 2	WSP2024_PU102	DU12	335409.694	6234314.564	5.369	4.509	13/02/2024			1.70	0.84	3.67	3.67
Zone 2	WSP2024_PU102	DU12	335409.694	6234314.564	5.369	4.509	6/05/2024			1.32	0.46	4.05	4.05
Zone 2	WSP2024_PU102	DU12	335409.694	6234314.564	5.369	4.509	13/08/2024			1.62	0.76	3.75	3.75
Zone 2	WSP2024_PU102	DU12	335409.694	6234314.564	5.369	4.509	5/11/2024			1.71	0.85	3.66	3.66
Zone 2	WSP2024_PU103	DU10	335062.998	6234342.514	5.861	4.951	13/02/2024			3.23	2.32	2.63	2.63
Zone 2	WSP2024_PU103	DU10	335062.998	6234342.514	5.861	4.951	6/05/2024			2.97	2.06	2.89	2.89
Zone 2	WSP2024_PU103	DU10	335062.998	6234342.514	5.861	4.951	13/08/2024			3.07	2.16	2.79	2.79
Zone 2	WSP2024_PU103	DU10	335062.998	6234342.514	5.861	4.951	5/11/2024			3.24	2.33	2.63	2.63
Zone 2	WSP2024_PU104	DU10	335125.611	6234341.372	5.758	4.838	13/02/2024			3.03	2.11	2.73	2.73
Zone 2	WSP2024_PU104	DU10	335125.611	6234341.372	5.758	4.838	6/05/2024			2.76	1.84	3.00	3.00
Zone 2	WSP2024_PU104	DU10	335125.611	6234341.372	5.758	4.838	13/08/2024			2.83	1.91	2.93	2.93
Zone 2	WSP2024_PU104	DU10	335125.611	6234341.372	5.758	4.838	5/11/2024			2.98	2.06	2.77	2.77
Zone 2	WSP2024_PU105	DU10	335242.103	6234306.984	5.577	4.727	13/02/2024			2.46	1.61	3.12	3.12
Zone 2	WSP2024_PU105	DU10	335242.103	6234306.984	5.577	4.727	6/05/2024			2.15	1.30	3.43	3.43
Zone 2	WSP2024_PU105	DU10	335242.103	6234306.984	5.577	4.727	13/08/2024			2.26	1.41	3.32	3.32
Zone 2	WSP2024_PU105	DU10	335242.103	6234306.984	5.577	4.727	5/11/2024			2.42	1.57	3.16	3.16
Zone 2	WSP2024_PU108	DU10	335072.39	6234319.493	5.649	4.589	13/02/2024			2.98	1.92	2.67	2.67
Zone 2	WSP2024_PU108	DU10	335072.39	6234319.493	5.649	4.589	6/05/2024			2.66	1.60	2.99	2.99
Zone 2	WSP2024_PU108	DU10	335072.39	6234319.493	5.649	4.589	13/08/2024			2.78	1.72	2.87	2.87
Zone 2	WSP2024_PU108	DU10	335072.39	6234319.493	5.649	4.589	5/11/2024			2.96	1.90	2.69	2.69
Zone 2	WSP2024_PU109	DU10	335207.307	6234307.185	5.824	4.904	13/02/2024			2.77	1.85	3.06	3.06
Zone 2	WSP2024_PU109	DU10	335207.307	6234307.185	5.824	4.904	6/05/2024			2.50	1.58	3.32	3.32
Zone 2	WSP2024_PU109	DU10	335207.307	6234307.185	5.824	4.904	13/08/2024			2.58	1.66	3.24	3.24
Zone 2	WSP2024_PU109	DU10	335207.307	6234307.185	5.824	4.904	5/11/2024			2.74	1.82	3.08	3.08
Zone 2	WSP2024_PU11	NW Tank Farm	335378.711	6234719.333	5.223	4.316	12/02/2024	1	4	2.06	1.15	3.17	3.17
Zone 2	WSP2024_PU11	NW Tank Farm	335378.711	6234719.333	5.223	4.316	6/05/2024	1	4	1.58	0.67	3.65	3.65
Zone 2	WSP2024_PU11	NW Tank Farm	335378.711	6234719.333	5.223	4.316	12/08/2024	1	4	1.81	0.90	3.42	3.42
Zone 2	WSP2024_PU11	NW Tank Farm	335378.711	6234719.333	5.223	4.316	11/11/2024	1	4	2.00	1.09	3.23	3.23
Zone 2	WSP2024_PU110	DU10	335006.574	6234277.212	4.968	4.028	13/02/2024			2.40	1.46	2.57	2.57
Zone 2	WSP2024_PU110	DU10	335006.574	6234277.212	4.968	4.028	6/05/2024			1.99	1.05	2.98	2.98
Zone 2	WSP2024_PU110	DU10	335006.574	6234277.212	4.968	4.028	13/08/2024			2.18	1.24	2.79	2.79
Zone 2	WSP2024_PU110	DU10	335006.574	6234277.212	4.968	4.028	5/11/2024			2.37	1.43	2.60	2.60
Zone 2	WSP2024_PU111	DU10	335078.627	6234214.575	5.755	4.755	13/02/2024			2.05	1.05	3.71	3.71
Zone 2	WSP2024_PU111	DU10	335078.627	6234214.575	5.755	4.755	6/05/2024			1.67	0.67	4.08	4.08
Zone 2	WSP2024_PU111	DU10	335078.627	6234214.575	5.755	4.755	13/08/2024			1.88	0.88	3.87	3.87
Zone 2	WSP2024_PU111	DU10	335078.627	6234214.575	5.755	4.755	5/11/2024			2.05	1.05	3.70	3.70
Zone 2	WSP2024_PU12	NW Tank Farm	335354.221	6234667.379	5.092	4.302	12/02/2024	1	4	2.02	1.23	3.07	3.07
Zone 2	WSP2024_PU12	NW Tank Farm	335354.221	6234667.379	5.092	4.302	6/05/2024	1	4	1.52	0.73	3.57	3.57
Zone 2	WSP2024_PU12	NW Tank Farm	335354.221	6234667.379	5.092	4.302	12/08/2024	1	4	1.73	0.94	3.36	3.36
Zone 2	WSP2024_PU12	NW Tank Farm	335354.221	6234667.379	5.092	4.302	11/11/2024	1	4	1.95	1.16	3.14	3.14
Zone 2	WSP2024_PU13	NW Tank Farm	335371.306	6234691.863	4.193	4.311	12/02/2024	1	4	1.10	1.21	3.10	3.10
Zone 2	WSP2024_PU13	NW Tank Farm	335371.306	6234691.863	4.193	4.311	6/05/2024	1	4	0.61	0.73	3.58	3.58
Zone 2	WSP2024_PU13	NW Tank Farm	335371.306	6234691.863	4.193	4.311	12/08/2024	1	4	0.89	1.01	3.31	3.31
Zone 2	WSP2024_PU13	NW Tank Farm	335371.306	6234691.863	4.193	4.311	11/11/2024	1	4	1.04	1.16	3.16	3.16
Zone 2	WSP2024_PU14	NW Tank Farm	335474.818	6234708.87	5.257	4.463	12/02/2024	1	4	1.87	1.07	3.39	3.39
Zone 2	WSP2024_PU14	NW Tank Farm	335474.818	6234708.87	5.257	4.463	6/05/2024	1	4	1.34	0.54	3.92	3.92
Zone 2	WSP2024_PU14	NW Tank Farm	335474.818	6234708.87	5.257	4.463	11/11/2024	1	4	1.79	1.00	3.47	3.47
Zone 2	WSP2024_PU15	NW Tank Farm	335477.495	6234669.123	5.484	4.518	12/02/2024	1	4	2.05	1.09	3.43	3.43
Zone 2	WSP2024_PU15	NW Tank Farm	335477.495	6234669.123	5.484	4.518	6/05/2024	1	4	1.61	0.64	3.87	3.87
Zone 2	WSP2024_PU15	NW Tank Farm	335477.495	6234669.123	5.484	4.518	11/11/2024	1	4	2.01	1.04	3.48	3.48

Zone	Location Code	Monitoring Zone	x coord	y coord	Top of Casing Elevation (m AHD)	Ground Level (mAHD)	Date	Top Screen Depth	Bottom Screen Depth	Depth to Water (m BTOC)	Depth to Water (mbgl)	Groundwater Elevation (mAHD)	Product Corrected Water Level (m AHD)
Zone 2	WSP2024_PU16	DU11	335220.545	6234616.344	4.319	4.389	9/02/2024	1	4	1.73	1.80	2.59	2.59
Zone 2	WSP2024_PU16	DU11	335220.545	6234616.344	4.319	4.389	3/05/2024	1	4	1.47	1.54	2.85	2.85
Zone 2	WSP2024_PU16	DU11	335220.545	6234616.344	4.319	4.389	9/08/2024	1	4	1.52	1.59	2.80	2.80
Zone 2	WSP2024_PU17	DU11	335198.713	6234472.897	3.919	4.16	7/02/2024	1	4	1.26	1.50	2.66	2.66
Zone 2	WSP2024_PU17	DU11	335198.713	6234472.897	3.919	4.16	1/05/2024	1	4	1.17	1.41	2.75	2.75
Zone 2	WSP2024_PU17	DU11	335198.713	6234472.897	3.919	4.16	7/08/2024	1	4	1.09	1.33	2.83	2.83
Zone 2	WSP2024_PU17	DU11	335198.713	6234472.897	3.919	4.16	6/11/2024	1	4	1.23	1.47	2.69	2.69
Zone 2	WSP2024_PU18	DU11	335177.095	6234419.956	4.093	4.178	7/02/2024	1	4	1.32	1.41	2.77	2.77
Zone 2	WSP2024_PU18	DU11	335177.095	6234419.956	4.093	4.178	1/05/2024	1	4	1.21	1.30	2.88	2.88
Zone 2	WSP2024_PU18	DU11	335177.095	6234419.956	4.093	4.178	7/08/2024	1	4	1.17	1.25	2.93	2.93
Zone 2	WSP2024_PU18	DU11	335177.095	6234419.956	4.093	4.178	6/11/2024	1	4	1.28	1.37	2.81	2.81
Zone 2	WSP2024_PU19	DU11	335027.698	6234463.916	3.605	3.69	7/02/2024	1	4	1.29	1.38	2.32	2.32
Zone 2	WSP2024_PU19	DU11	335027.698	6234463.916	3.605	3.69	1/05/2024	1	4	1.13	1.22	2.48	2.48
Zone 2	WSP2024_PU19	DU11	335027.698	6234463.916	3.605	3.69	7/08/2024	1	4	1.01	1.10	2.60	2.60
Zone 2	WSP2024_PU19	DU11	335027.698	6234463.916	3.605	3.69	6/11/2024	1	4	1.21	1.30	2.40	2.40
Zone 2	WSP2024_PU20	DU11	335044.381	6234523.848	4.826	3.951	1/05/2024	1	4	2.32	1.45	2.51	2.51
Zone 2	WSP2024_PU20	DU11	335044.381	6234523.848	4.826	3.951	7/08/2024	1	4	2.26	1.39	2.56	2.56
Zone 2	WSP2024_PU20	DU11	335044.381	6234523.848	4.826	3.951	6/11/2024	1	4	2.50	1.63	2.33	2.33
Zone 2	WSP2024_PU21	Zone 1 Firestation	335060.344	6234633.549	4.927	3.857	9/02/2024	1	4	2.93	1.86	2.00	2.00
Zone 2	WSP2024_PU21	Zone 1 Firestation	335060.344	6234633.549	4.927	3.857	3/05/2024	1	4	2.32	1.25	2.60	2.60
Zone 2	WSP2024_PU21	Zone 1 Firestation	335060.344	6234633.549	4.927	3.857	9/08/2024	1	4	1.52	2.33	2.33	2.33
Zone 2	WSP2024_PU21	Zone 1 Firestation	335060.344	6234633.549	4.927	3.857	4/11/2024	1	4	2.90	1.83	2.03	2.03
Zone 2	WSP2024_PU22	DU11	335143.312	6234653.959	4.77	3.77	9/02/2024	1	4	2.62	1.62	2.15	2.15
Zone 2	WSP2024_PU22	DU11	335143.312	6234653.959	4.77	3.77	3/05/2024	1	4	1.17	0.17	3.60	3.60
Zone 2	WSP2024_PU22	DU11	335143.312	6234653.959	4.77	3.77	9/08/2024	1	4	2.34	1.34	2.43	2.43
Zone 2	WSP2024_PU22	DU11	335143.312	6234653.959	4.77	3.77	11/08/2024	1	4	2.54	1.54	2.23	2.23
Zone 2	WSP2024_PU23	DU12	335326.638	6234582.509	5.658	4.668	9/02/2024	1	4	2.61	1.62	3.05	3.05
Zone 2	WSP2024_PU23	DU12	335326.638	6234582.509	5.658	4.668	3/05/2024	1	4	2.38	1.39	3.28	3.28
Zone 2	WSP2024_PU23	DU12	335326.638	6234582.509	5.658	4.668	9/08/2024	1	4	2.41	1.42	3.25	3.25
Zone 2	WSP2024_PU23	DU12	335326.638	6234582.509	5.658	4.668	11/08/2024	1	4	2.59	1.60	3.07	3.07
Zone 2	WSP2024_PU24	DU12	335399.481	6234577.477	5.496	4.611	9/02/2024	0.5	3.5	2.11	1.23	3.39	3.39
Zone 2	WSP2024_PU24	DU12	335399.481	6234577.477	5.496	4.611	3/05/2024	0.5	3.5	1.88	1.00	3.61	3.61
Zone 2	WSP2024_PU24	DU12	335399.481	6234577.477	5.496	4.611	9/08/2024	0.5	3.5	1.95	1.07	3.55	3.55
Zone 2	WSP2024_PU24	DU12	335399.481	6234577.477	5.496	4.611	11/08/2024	0.5	3.5	2.19	1.31	3.31	3.31
Zone 2	WSP2024_PU25	DU12	335306.087	6234509.69	5.487	4.522	9/02/2024	1	4	4.02	3.05	1.47	1.47
Zone 2	WSP2024_PU25	DU12	335306.087	6234509.69	5.487	4.522	3/05/2024	1	4	2.32	1.36	3.17	3.17
Zone 2	WSP2024_PU25	DU12	335306.087	6234509.69	5.487	4.522	9/08/2024	1	4	2.28	1.31	3.21	3.21
Zone 2	WSP2024_PU25	DU12	335306.087	6234509.69	5.487	4.522	11/08/2024	1	4	2.42	1.46	3.07	3.07
Zone 2	WSP2024_PU26	DU12	335426.683	6234488.049	5.809	4.882	9/02/2024	1	4	2.25	1.32	3.56	3.56
Zone 2	WSP2024_PU26	DU12	335426.683	6234488.049	5.809	4.882	3/05/2024	1	4	2.13	1.21	3.68	3.68
Zone 2	WSP2024_PU26	DU12	335426.683	6234488.049	5.809	4.882	9/08/2024	1	4	2.23	1.30	3.58	3.58
Zone 2	WSP2024_PU26	DU12	335426.683	6234488.049	5.809	4.882	11/08/2024	1	4	2.39	1.46	3.42	3.42
Zone 2	WSP2024_PU27	DU12	335302.295	6234403.019	5.52	4.538	9/02/2024	1	4	1.00	0.02	4.52	4.52
Zone 2	WSP2024_PU27	DU12	335302.295	6234403.019	5.52	4.538	3/05/2024	1	4	2.10	1.12	3.42	3.42
Zone 2	WSP2024_PU27	DU12	335302.295	6234403.019	5.52	4.538	9/08/2024	1	4	1.96	0.97	3.56	3.56
Zone 2	WSP2024_PU27	DU12	335302.295	6234403.019	5.52	4.538	11/08/2024	1	4	2.34	1.36	3.18	3.18
Zone 2	WSP2024_PU28	DU12	335411.665	6234397.257	5.621	4.761	9/02/2024	1	4	2.17	1.31	3.45	3.45
Zone 2	WSP2024_PU28	DU12	335411.665	6234397.257	5.621	4.761	3/05/2024	1	4	1.95	1.09	3.67	3.67
Zone 2	WSP2024_PU28	DU12	335411.665	6234397.257	5.621	4.761	9/08/2024	1	4	2.04	1.18	3.58	3.58
Zone 2	WSP2024_PU28	DU12	335411.665	6234397.257	5.621	4.761	11/08/2024	1	4	2.23	1.37	3.39	3.39
Zone 2	WSP2024_PU29	DU12	335446.997	6234577.686	5.692	4.831	9/02/2024	1	4	2.32	1.46	3.37	3.37
Zone 2	WSP2024_PU29	DU12	335446.997	6234577.686	5.692	4.831	3/05/2024	1	4	2.03	1.17	3.66	3.66
Zone 2	WSP2024_PU29	DU12	335446.997	6234577.686	5.692	4.831	9/08/2024	1	4	2.01	1.15	3.68	3.68
Zone 2	WSP2024_PU29	DU12	335446.997	6234577.686	5.692	4.831	11/08/2024	1	4	2.27	1.41	3.42	3.42
Zone 2	WSP2024_PU30	Zone 1 NW Tank Farm	335338.351	6234671.783	4.259	4.34	12/02/2024	1	4	1.20	1.28	3.06	3.06
Zone 2	WSP2024_PU30	Zone 1 NW Tank Farm	335338.351	6234671.783	4.259	4.34	6/05/2024	1	4	0.79	0.87	3.47	3.47
Zone 2	WSP2024_PU30	Zone 1 NW Tank Farm	335338.351	6234671.783	4.259	4.34	12/08/2024	1	4	1.03	1.11	3.23	3.23
Zone 2	WSP2024_PU30	Zone 1 NW Tank Farm	335338.351	6234671.783	4.259	4.34	11/11/2024	1	4	1.16	1.24	3.10	3.10
Zone 2	WSP2024_PU31	Zone 1 LPG	334810.827	6234772.047	4.082	3.117	29/04/2024	1	4	2.02	1.06	2.06	2.06
Zone 2	WSP2024_PU31	Zone 1 LPG	334810.827	6234772.047	4.082	3.117	2/05/2024	1	4	2.33	1.37	1.75	1.75
Zone 2	WSP2024_PU31	Zone 1 LPG	334810.827	6234772.047	4.082	3.117	5/08/2024	1	4	1.83	0.86	2.26	2.26
Zone 2	WSP2024_PU31	Zone 1 LPG	334810.827	6234772.047	4.082	3.117	4/11/2024	1	4	2.34	1.37	1.75	1.75

Zone	Location Code	Monitoring Zone	x coord	y coord	Top of Casing Elevation (m AHD)	Ground Level (mAHD)	Date	Top Screen Depth	Bottom Screen Depth	Depth to Water (m BTOC)	Depth to Water (mbgl)	Groundwater Elevation (mAHD)	Product Corrected Water Level (m AHD)
Zone 2	WSP2024_PU31	Zone 1 LPG	334810.827	6234772.047	4.082	3.117	6/02/2023	1	4	2.177	1.21		
Zone 2	WSP2024_PU31	Zone 1 LPG	334810.827	6234772.047	4.082	3.117	31/07/2023	1	4	2.321	1.36		
Zone 2	WSP2024_PU31	Zone 1 LPG	334810.827	6234772.047	4.082	3.117	6/11/2023	1	4	2.37	1.41		
Zone 2	WSP2024_PU32	Zone 1 LPG	334876.704	6234736.175	4.178	3.252	29/04/2024	1	4	2.04	1.12	2.14	2.14
Zone 2	WSP2024_PU32	Zone 1 LPG	334876.704	6234736.175	4.178	3.252	2/05/2024	1	4	2.37	1.44	1.81	1.81
Zone 2	WSP2024_PU32	Zone 1 LPG	334876.704	6234736.175	4.178	3.252	5/08/2024	1	4	1.98	1.05	2.20	2.20
Zone 2	WSP2024_PU32	Zone 1 LPG	334876.704	6234736.175	4.178	3.252	4/11/2024	1	4	2.34	1.41	1.84	1.84
Zone 2	WSP2024_PU32	Former LPG Area			4.178	3.252	31/07/2023			2.38	1.45		
Zone 2	WSP2024_PU32	Former LPG Area			4.178	3.252	6/11/2023			2.427	1.50		
Zone 2	WSP2024_PU33	Zone 1 LPG	334914.526	6234763.762	3.232	3.31	29/04/2024	1	4	1.20	1.28	2.03	2.03
Zone 2	WSP2024_PU33	Zone 1 LPG	334914.526	6234763.762	3.232	3.31	2/05/2024	1	4	1.46	1.54	1.77	1.77
Zone 2	WSP2024_PU33	Zone 1 LPG	334914.526	6234763.762	3.232	3.31	5/08/2024	1	4	1.10	1.18	2.13	2.13
Zone 2	WSP2024_PU33	Zone 1 LPG	334914.526	6234763.762	3.232	3.31	4/11/2024	1	4	2.79	2.87	0.44	0.44
Zone 2	WSP2024_PU33	Former LPG Area			3.232	3.31	6/02/2023			1.358	1.44		
Zone 2	WSP2024_PU33	Former LPG Area			3.232	3.31	31/07/2023			1.495	1.57		
Zone 2	WSP2024_PU33	Former LPG Area			3.232	3.31	6/11/2023			1.546	1.62		
Zone 1	WSP2024_PU37	Zone 1 NE Tank Farm	335495.272	6235197.351	4.906	3.987	7/02/2024	1	4	2.23	1.31	2.68	2.68
Zone 1	WSP2024_PU37	Zone 1 NE Tank Farm	335495.272	6235197.351	4.906	3.987	1/05/2024	1	4	1.79	0.87	3.12	3.12
Zone 1	WSP2024_PU37	Zone 1 NE Tank Farm	335495.272	6235197.351	4.906	3.987	7/08/2024	1	4	1.79	0.87	3.12	3.12
Zone 1	WSP2024_PU37	Zone 1 NE Tank Farm	335495.272	6235197.351	4.906	3.987	6/11/2024	1	4	2.08	1.16	2.82	2.82
Zone 1	WSP2024_PU38	Zone 1 NE Tank Farm	335539.965	6235191.021	5.301	4.42	7/02/2024	1	4	2.33	1.45	2.97	2.97
Zone 1	WSP2024_PU38	Zone 1 NE Tank Farm	335539.965	6235191.021	5.301	4.42	1/05/2024	1	4	1.94	1.06	3.36	3.36
Zone 1	WSP2024_PU38	Zone 1 NE Tank Farm	335539.965	6235191.021	5.301	4.42	7/08/2024	1	4	1.89	1.01	3.41	3.41
Zone 1	WSP2024_PU38	Zone 1 NE Tank Farm	335539.965	6235191.021	5.301	4.42	6/11/2024	1	4	2.19	1.31	3.12	3.12
Zone 1	WSP2024_PU39	Zone 1 NE Tank Farm	335574.878	6235217.89	5.075	4.185	7/02/2024	1	4	2.05	1.16	3.03	3.03
Zone 1	WSP2024_PU39	Zone 1 NE Tank Farm	335574.878	6235217.89	5.075	4.185	1/05/2024	1	4	1.51	0.62	3.57	3.57
Zone 1	WSP2024_PU39	Zone 1 NE Tank Farm	335574.878	6235217.89	5.075	4.185	7/08/2024	1	4	1.65	0.75	3.43	3.43
Zone 1	WSP2024_PU39	Zone 1 NE Tank Farm	335574.878	6235217.89	5.075	4.185	6/11/2024	1	4	1.87	0.98	3.20	3.20
Zone 1	WSP2024_PU40	Zone 1 NE Tank Farm	335529.633	6235246.649	4.927	4.097	7/02/2024	1	4	2.15	1.32	2.78	2.78
Zone 1	WSP2024_PU40	Zone 1 NE Tank Farm	335529.633	6235246.649	4.927	4.097	1/05/2024	1	4	1.68	0.85	3.25	3.25
Zone 1	WSP2024_PU40	Zone 1 NE Tank Farm	335529.633	6235246.649	4.927	4.097	7/08/2024	1	4	1.70	0.87	3.23	3.23
Zone 1	WSP2024_PU40	Zone 1 NE Tank Farm	335529.633	6235246.649	4.927	4.097	6/11/2024	1	4	1.97	1.14	2.96	2.96
Zone 1	WSP2024_PU41	Zone 1 NE Tank Farm	335465.754	6235158.349	4.829	3.926	7/02/2024	1	4	2.24	1.33	2.59	2.59
Zone 1	WSP2024_PU41	Zone 1 NE Tank Farm	335465.754	6235158.349	4.829	3.926	1/05/2024	1	4	1.86	0.96	2.97	2.97
Zone 1	WSP2024_PU41	Zone 1 NE Tank Farm	335465.754	6235158.349	4.829	3.926	7/08/2024	1	4	1.82	0.91	3.01	3.01
Zone 1	WSP2024_PU41	Zone 1 NE Tank Farm	335465.754	6235158.349	4.829	3.926	6/11/2024	1	4	2.11	1.21	2.72	2.72
Zone 1	WSP2024_PU43	Zone 1 NE Tank Farm	335507.138	6235106.717	4.605	3.707	7/02/2024	1	4	1.70	0.80	2.91	2.91
Zone 1	WSP2024_PU43	Zone 1 NE Tank Farm	335507.138	6235106.717	4.605	3.707	1/05/2024	1	4	1.07	0.17	3.54	3.54
Zone 1	WSP2024_PU43	Zone 1 NE Tank Farm	335507.138	6235106.717	4.605	3.707	7/08/2024	1	4	1.29	0.39	3.32	3.32
Zone 1	WSP2024_PU43	Zone 1 NE Tank Farm	335507.138	6235106.717	4.605	3.707	6/11/2024	1	4	1.56	0.66	3.05	3.05
Zone 1	WSP2024_PU44	Zone 1 NE Tank Farm	335539.452	6235123.948	4.889	3.913	7/02/2024	1	4	1.86	0.88	3.03	3.03
Zone 1	WSP2024_PU44	Zone 1 NE Tank Farm	335539.452	6235123.948	4.889	3.913	1/05/2024	1	4	1.45	0.48	3.44	3.44
Zone 1	WSP2024_PU44	Zone 1 NE Tank Farm	335539.452	6235123.948	4.889	3.913	7/08/2024	1	4	1.53	0.55	3.36	3.36
Zone 1	WSP2024_PU44	Zone 1 NE Tank Farm	335539.452	6235123.948	4.889	3.913	6/11/2024	1	4	1.74	0.77	3.15	3.15
Zone 1	WSP2024_PU45	Zone 1 NE Tank Farm	335578.119	6235064.509	4.907	3.882	7/02/2024	1	4	1.76	0.73	3.15	3.15
Zone 1	WSP2024_PU45	Zone 1 NE Tank Farm	335578.119	6235064.509	4.907	3.882	1/05/2024	1	4	1.27	0.25	3.63	3.63
Zone 1	WSP2024_PU45	Zone 1 NE Tank Farm	335578.119	6235064.509	4.907	3.882	7/08/2024	1	4	1.38	0.36	3.52	3.52
Zone 1	WSP2024_PU45	Zone 1 NE Tank Farm	335578.119	6235064.509	4.907	3.882	6/11/2024	1	4	1.63	0.61	3.27	3.27
Zone 2	WSP2024_PU46	DU16	335607.551	6234671.613	13.195	12.339	8/02/2024	6.5	12.5	9.41	8.55	3.79	3.79
Zone 2	WSP2024_PU46	DU16	335607.551	6234671.613	13.195	12.339	2/05/2024	6.5	12.5	8.91	8.05	4.29	4.29
Zone 2	WSP2024_PU46	DU16	335607.551	6234671.613	13.195	12.339	8/08/2024	6.5	12.5	8.16	7.31	5.03	5.03
Zone 2	WSP2024_PU46	DU16	335607.551	6234671.613	13.195	12.339	7/11/2024	6.5	12.5	9.15	8.29	4.05	4.05
Zone 2	WSP2024_PU47	DU16	335594.017	6234585.137	13.327	12.558	8/02/2024	7	13	9.44	8.67	3.89	3.89
Zone 2	WSP2024_PU47	DU16	335594.017	6234585.137	13.327	12.558	2/05/2024	7	13	8.91	8.14	4.42	4.42
Zone 2	WSP2024_PU47	DU16	335594.017	6234585.137	13.327	12.558	8/08/2024	7	13	8.06	7.29	5.27	5.27
Zone 2	WSP2024_PU47	DU16	335594.017	6234585.137	13.327	12.558	7/11/2024	7	13	9.28	8.51	4.05	4.05
Zone 2	WSP2024_PU48	DU16	335579.468	6234497.553	13.503	12.487	8/02/2024	4	10	9.59	8.57	3.92	3.92
Zone 2	WSP2024_PU48	DU16	335579.468	6234497.553	13.503	12.487	2/05/2024	4	10	9.06	8.04	4.44	4.44
Zone 2	WSP2024_PU48	DU16	335579.468	6234497.553	13.503	12.487	8/08/2024	4	10	8.68	7.66	4.82	4.82
Zone 2	WSP2024_PU48	DU16	335579.468	6234497.553	13.503	12.487	7/11/2024	4	10	9.53	8.52	3.97	3.97
Zone 2	WSP2024_PU49	DU16	335524.112	6234475.489	9.778	8.855	8/02/2024	4	10	6.04	5.11	3.74	3.74
Zone 2	WSP2024_PU49	DU16	335524.112	6234475.489	9.778	8.855	2/05/2024	4	10	5.68	4.75	4.10	4.10

Zone	Location Code	Monitoring Zone	x coord	y coord	Top of Casing Elevation (m AHD)	Ground Level (mAHD)	Date	Top Screen Depth	Bottom Screen Depth	Depth to Water (m BTOC)	Depth to Water (mbgl)	Groundwater Elevation (mAHD)	Product Corrected Water Level (m AHD)
Zone 2	WSP2024_PU49	DU16	335524.112	6234475.489	9.778	8.855	8/08/2024	4	10	5.68	4.76	4.10	4.10
Zone 2	WSP2024_PU49	DU16	335524.112	6234475.489	9.778	8.855	7/11/2024	4	10	6.02	5.10	3.76	3.76
Zone 2	WSP2024_PU51	DU16	335515.531	6234356.798	10.708	9.897	8/02/2024	3.2	6	6.50	5.68	4.21	4.21
Zone 2	WSP2024_PU51	DU16	335515.531	6234356.798	10.708	9.897	2/05/2024	3.2	6	5.85	5.04	4.86	4.86
Zone 2	WSP2024_PU51	DU16	335515.531	6234356.798	10.708	9.897	8/08/2024	3.2	6	6.43	5.62	4.28	4.28
Zone 2	WSP2024_PU51	DU16	335515.531	6234356.798	10.708	9.897	7/11/2024	3.2	6	6.51	5.70	4.20	4.20
Zone 1	WSP2024_PU52	Zone 1 NW Tank Farm	335466.58	6235068.851	5.193	4.254	7/02/2024	1	4	2.33	1.39	2.87	2.87
Zone 1	WSP2024_PU52	Zone 1 NW Tank Farm	335466.58	6235068.851	5.193	4.254	1/05/2024	1	4	1.96	1.02	3.24	3.24
Zone 1	WSP2024_PU52	Zone 1 NW Tank Farm	335466.58	6235068.851	5.193	4.254	7/08/2024	1	4	1.94	1.00	3.25	3.25
Zone 1	WSP2024_PU52	Zone 1 NW Tank Farm	335466.58	6235068.851	5.193	4.254	6/11/2024	1	4	2.26	1.33	2.93	2.93
Zone 1	WSP2024_PU53	Zone 1 NW Tank Farm	335520.978	6235012.45	7.058	6.127	7/02/2024	2	7	3.95	3.01	3.11	3.11
Zone 1	WSP2024_PU53	Zone 1 NW Tank Farm	335520.978	6235012.45	7.058	6.127	1/05/2024	2	7	3.62	2.68	3.44	3.44
Zone 1	WSP2024_PU53	Zone 1 NW Tank Farm	335520.978	6235012.45	7.058	6.127	7/08/2024	2	7	3.61	2.67	3.45	3.45
Zone 1	WSP2024_PU53	Zone 1 NW Tank Farm	335520.978	6235012.45	7.058	6.127	7/11/2024	2	7	3.87	2.94	3.19	3.19
Zone 1	WSP2024_PU54	Zone 1 NW Tank Farm	335423.596	6235007.327	5.372	4.575	7/02/2024	1	4	2.16	1.36	3.22	3.22
Zone 1	WSP2024_PU54	Zone 1 NW Tank Farm	335423.596	6235007.327	5.372	4.575	1/05/2024	1	4	2.24	1.44	3.13	3.13
Zone 1	WSP2024_PU54	Zone 1 NW Tank Farm	335423.596	6235007.327	5.372	4.575	7/08/2024	1	4	2.13	1.34	3.24	3.24
Zone 1	WSP2024_PU54	Zone 1 NW Tank Farm	335423.596	6235007.327	5.372	4.575	6/11/2024	1	4	2.43	1.64	2.94	2.94
Zone 1	WSP2024_PU55	Zone 1 NW Tank Farm	335349.037	6234966.879	5.056	4.347	7/02/2024	1	5	2.40	1.69	2.65	2.65
Zone 1	WSP2024_PU55	Zone 1 NW Tank Farm	335349.037	6234966.879	5.056	4.347	1/05/2024	1	5	1.85	1.14	3.21	3.21
Zone 2	WSP2024_PU56	Zone 1 W Tank Farm	334895.722	6234669.996	3.364	3.442	6/02/2024	1	4	1.37	1.45	1.99	1.99
Zone 2	WSP2024_PU56	Zone 1 W Tank Farm	334895.722	6234669.996	3.364	3.442	29/04/2024	1	4	1.11	1.18	2.26	2.26
Zone 2	WSP2024_PU56	Zone 1 W Tank Farm	334895.722	6234669.996	3.364	3.442	5/08/2024	1	4	1.19	1.27	2.17	2.17
Zone 2	WSP2024_PU56	Zone 1 W Tank Farm	334895.722	6234669.996	3.364	3.442	4/11/2024	1	4	1.49	1.57	1.87	1.87
Zone 2	WSP2024_PU56	Zone 1 W Tank Farm	334895.722	6234669.996	3.364	3.442	6/02/2023	1	4	1.399	1.48		
Zone 2	WSP2024_PU56	Zone 1 W Tank Farm	334895.722	6234669.996	3.364	3.442	1/05/2023	1	4	1.104	1.18		
Zone 2	WSP2024_PU56	Zone 1 W Tank Farm	334895.722	6234669.996	3.364	3.442	31/07/2023	1	4	1.461	1.54		
Zone 2	WSP2024_PU56	Zone 1 W Tank Farm	334895.722	6234669.996	3.364	3.442	6/11/2023	1	4	1.515	1.59		
Zone 2	WSP2024_PU57	Zone 1 W Tank Farm	334813.985	6234719.38	3.351	3.461	29/04/2024	1	4	1.21	1.32	2.14	2.14
Zone 2	WSP2024_PU57	Zone 1 W Tank Farm	334813.985	6234719.38	3.351	3.461	2/05/2024	1	4	1.54	1.65	1.81	1.81
Zone 2	WSP2024_PU57	Zone 1 W Tank Farm	334813.985	6234719.38	3.351	3.461	5/08/2024	1	4	1.20	1.31	2.15	2.15
Zone 2	WSP2024_PU57	Zone 1 W Tank Farm	334813.985	6234719.38	3.351	3.461	4/11/2024	1	4	1.56	1.67	1.79	1.79
Zone 2	WSP2024_PU57	Zone 1 W Tank Farm	334813.985	6234719.38	3.351	3.461	6/02/2023	1	4	1.419	1.53		
Zone 2	WSP2024_PU57	Zone 1 W Tank Farm	334813.985	6234719.38	3.351	3.461	1/05/2023	1	4	1.087	1.20		
Zone 2	WSP2024_PU57	Zone 1 W Tank Farm	334813.985	6234719.38	3.351	3.461	31/07/2023	1	4	1.571	1.68		
Zone 2	WSP2024_PU57	Zone 1 W Tank Farm	334813.985	6234719.38	3.351	3.461	6/11/2023	1	4	1.58	1.69		
Zone 2	WSP2024_PU58	Zone 1 LPG	334886.218	6234790.61	4.272	3.437	29/04/2024	1	4	2.36	1.52	1.92	1.92
Zone 2	WSP2024_PU58	Zone 1 LPG	334886.218	6234790.61	4.272	3.437	2/05/2024	1	4	2.64	1.81	1.63	1.63
Zone 2	WSP2024_PU58	Zone 1 LPG	334886.218	6234790.61	4.272	3.437	5/08/2024	1	4	2.18	1.35	2.09	2.09
Zone 2	WSP2024_PU58	Zone 1 LPG	334886.218	6234790.61	4.272	3.437	6/02/2023	1	4	2.511	1.68		
Zone 2	WSP2024_PU58	Zone 1 LPG	334886.218	6234790.61	4.272	3.437	2/05/2023	1	4	2.282	1.45		
Zone 2	WSP2024_PU58	Zone 1 LPG	334886.218	6234790.61	4.272	3.437	31/07/2023	1	4	2.651	1.82		
Zone 2	WSP2024_PU58	Zone 1 LPG	334886.218	6234790.61	4.272	3.437	6/11/2023	1	4	2.695	1.86		
Zone 2	WSP2024_PU59	DU10	335169.801	6234294.975	5.427	4.522	29/04/2024	1	4	2.35	1.45	3.07	3.07
Zone 2	WSP2024_PU59	DU10	335169.801	6234294.975	5.427	4.522	2/05/2024	1	4	2.44	1.54	2.99	2.99
Zone 2	WSP2024_PU59	DU10	335169.801	6234294.975	5.427	4.522	5/08/2024	1	4	2.21	1.31	3.22	3.22
Zone 2	WSP2024_PU59	DU10	335169.801	6234294.975	5.427	4.522	4/11/2024	1	4	2.42	1.51	3.01	3.01
Zone 2	WSP2024_PU60	DU10	335126.627	6234322.71	5.816	4.816	29/04/2024	1	4	3.00	2.00	2.82	2.82
Zone 2	WSP2024_PU60	DU10	335126.627	6234322.71	5.816	4.816	2/05/2024	1	4	3.01	2.01	2.81	2.81
Zone 2	WSP2024_PU60	DU10	335126.627	6234322.71	5.816	4.816	5/08/2024	1	4	2.79	1.79	3.03	3.03
Zone 2	WSP2024_PU61	DU10	335005.818	6234314.715	5.046	4.111	29/04/2024	1	4	2.43	1.50	2.62	2.62
Zone 2	WSP2024_PU61	DU10	335005.818	6234314.715	5.046	4.111	2/05/2024	1	4	2.54	1.61	2.50	2.50
Zone 2	WSP2024_PU61	DU10	335005.818	6234314.715	5.046	4.111	5/08/2024	1	4	2.31	1.38	2.73	2.73
Zone 2	WSP2024_PU61	DU10	335005.818	6234314.715	5.046	4.111	6/02/2023	1	4	2.387	1.45		
Zone 2	WSP2024_PU61	DU10	335005.818	6234314.715	5.046	4.111	1/05/2023	1	4	2.235	1.30		
Zone 2	WSP2024_PU61	DU10	335005.818	6234314.715	5.046	4.111	31/07/2023	1	4	2.471	1.54		
Zone 2	WSP2024_PU61	DU10	335005.818	6234314.715	5.046	4.111	6/11/2023	1	4	2.567	1.63		
Zone 2	WSP2024_PU62	DU12	335376.673	6234444.995	5.502	4.592	9/02/2024	1	4	1.95	1.04	3.55	3.55
Zone 2	WSP2024_PU62	DU12	335376.673	6234444.995	5.502	4.592	3/05/2024	1	4	2.03	1.12	3.48	3.48
Zone 2	WSP2024_PU62	DU12	335376.673	6234444.995	5.502	4.592	9/08/2024	1	4	2.07	1.16	3.43	3.43
Zone 2	WSP2024_PU62	DU12	335376.673	6234444.995	5.502	4.592	11/08/2024	1	4	2.22	1.31	3.28	3.28
Zone 2	WSP2024_PU63	DU12	335355.357	6234398.345	5.414	4.519	9/02/2024	1	4	2.15	1.26	3.26	3.26

Zone	Location Code	Monitoring Zone	x coord	y coord	Top of Casing Elevation (m AHD)	Ground Level (mAHD)	Date	Top Screen Depth	Bottom Screen Depth	Depth to Water (m BTOC)	Depth to Water (mbgl)	Groundwater Elevation (mAHD)	Product Corrected Water Level (m AHD)
Zone 2	WSP2024_PU63	DU12	335355.357	6234398.345	5.414	4.519	3/05/2024	1	4	1.93	1.04	3.48	3.48
Zone 2	WSP2024_PU63	DU12	335355.357	6234398.345	5.414	4.519	9/08/2024	1	4	2.01	1.12	3.40	3.40
Zone 2	WSP2024_PU63	DU12	335355.357	6234398.345	5.414	4.519	11/08/2024	1	4	2.17	1.27	3.25	3.25
Zone 2	WSP2024_PU64	DU12	335378.751	6234535.921	5.496	4.636	9/02/2024	1	4	2.37	1.51	3.13	3.13
Zone 2	WSP2024_PU64	DU12	335378.751	6234535.921	5.496	4.636	3/05/2024	1	4	2.17	1.31	3.33	3.33
Zone 2	WSP2024_PU64	DU12	335378.751	6234535.921	5.496	4.636	9/08/2024	1	4	2.21	1.35	3.29	3.29
Zone 2	WSP2024_PU64	DU12	335378.751	6234535.921	5.496	4.636	11/08/2024	1	4	2.34	1.48	3.16	3.16
Zone 1	WSP2024_PU65	NW Tank Farm	335413.207	6234793.311	5.374	4.538	12/02/2024	1	4	2.17	1.33	3.20	3.20
Zone 1	WSP2024_PU65	NW Tank Farm	335413.207	6234793.311	5.374	4.538	6/05/2024	1	4	1.53	0.69	3.85	3.85
Zone 1	WSP2024_PU65	NW Tank Farm	335413.207	6234793.311	5.374	4.538	12/08/2024	1	4	1.86	1.02	3.52	3.52
Zone 1	WSP2024_PU65	NW Tank Farm	335413.207	6234793.311	5.374	4.538	11/11/2024	1	4	2.10	1.27	3.27	3.27
Zone 2	WSP2024_PU66	DU16	335633.885	6234685.37	13.676	12.808	8/02/2024	6.5	12.5	9.80	8.93	3.88	3.88
Zone 2	WSP2024_PU66	DU16	335633.885	6234685.37	13.676	12.808	2/05/2024	6.5	12.5	9.23	8.36	4.44	4.44
Zone 2	WSP2024_PU66	DU16	335633.885	6234685.37	13.676	12.808	8/08/2024	6.5	12.5	8.18	7.31	5.50	5.50
Zone 2	WSP2024_PU66	DU16	335633.885	6234685.37	13.676	12.808	7/11/2024	6.5	12.5	9.46	8.59	4.22	4.22
Zone 2	WSP2024_PU67	DU16	335614.951	6234543.151	13.778	12.795	8/02/2024	6.5	12.5	9.69	8.71	4.09	4.09
Zone 2	WSP2024_PU67	DU16	335614.951	6234543.151	13.778	12.795	2/05/2024	6.5	12.5	9.03	8.05	4.75	4.75
Zone 2	WSP2024_PU67	DU16	335614.951	6234543.151	13.778	12.795	8/08/2024	6.5	12.5	8.41	7.43	5.37	5.37
Zone 2	WSP2024_PU67	DU16	335614.951	6234543.151	13.778	12.795	7/11/2024	6.5	12.5	9.67	8.69	4.11	4.11
Zone 2	WSP2024_PU68	DU16	335593.538	6234393.675	14.566	13.682	8/02/2024	0.5	1.5	1.61	0.73	12.96	12.96
Zone 2	WSP2024_PU68	DU16	335593.538	6234393.675	14.566	13.682	2/05/2024	0.5	1.5	1.29	0.41	13.27	13.27
Zone 2	WSP2024_PU68	DU16	335593.538	6234393.675	14.566	13.682	8/08/2024	0.5	1.5	1.60	0.72	12.97	12.97
Zone 2	WSP2024_PU68	DU16	335593.538	6234393.675	14.566	13.682	7/11/2024	0.5	1.5	1.65	0.77	12.92	12.92
Zone 2	WSP2024_PU69	DU16	335517.023	6234423.788	9.835	9.071	8/02/2024	3.8	9.8	6.12	5.36	3.71	3.71
Zone 2	WSP2024_PU69	DU16	335517.023	6234423.788	9.835	9.071	2/05/2024	3.8	9.8	5.87	5.10	3.97	3.97
Zone 2	WSP2024_PU69	DU16	335517.023	6234423.788	9.835	9.071	8/08/2024	3.8	9.8	5.80	5.04	4.04	4.04
Zone 2	WSP2024_PU69	DU16	335517.023	6234423.788	9.835	9.071	7/11/2024	3.8	9.8	6.10	5.34	3.74	3.74
Zone 2	WSP2024_PU70	DU16	335534.482	6234531.865	8.962	8.179	8/02/2024	4	10	5.87	5.08	3.10	3.10
Zone 2	WSP2024_PU70	DU16	335534.482	6234531.865	8.962	8.179	2/05/2024	4	10	4.80	4.02	4.16	4.16
Zone 2	WSP2024_PU70	DU16	335534.482	6234531.865	8.962	8.179	8/08/2024	4	10	4.49	3.71	4.47	4.47
Zone 2	WSP2024_PU70	DU16	335534.482	6234531.865	8.962	8.179	7/11/2024	4	10	5.91	5.13	3.05	3.05
Zone 2	WSP2024_PU71	DU16	335566.421	6234562.044	9.488	8.457	8/02/2024	4	10	5.64	4.60	3.85	3.85
Zone 2	WSP2024_PU71	DU16	335566.421	6234562.044	9.488	8.457	2/05/2024	4	10	5.17	4.14	4.32	4.32
Zone 2	WSP2024_PU71	DU16	335566.421	6234562.044	9.488	8.457	8/08/2024	4	10	4.62	3.59	4.87	4.87
Zone 2	WSP2024_PU71	DU16	335566.421	6234562.044	9.488	8.457	7/11/2024	4	10	6.00	4.97	3.49	3.49
Zone 2	WSP2024_PU72	DU16	335540.183	6234583.583	9.037	8.201	8/02/2024	4	10	5.28	4.44	3.76	3.76
Zone 2	WSP2024_PU72	DU16	335540.183	6234583.583	9.037	8.201	2/05/2024	4	10	4.86	4.02	4.18	4.18
Zone 2	WSP2024_PU72	DU16	335540.183	6234583.583	9.037	8.201	8/08/2024	4	10	4.42	3.59	4.61	4.61
Zone 2	WSP2024_PU72	DU16	335540.183	6234583.583	9.037	8.201	7/11/2024	4	10	5.17	4.33	3.87	3.87
Zone 2	WSP2024_PU73	DU16	335549.22	6234644.224	9.014	8.252	8/02/2024	4	10	5.32	4.55	3.70	3.70
Zone 2	WSP2024_PU73	DU16	335549.22	6234644.224	9.014	8.252	2/05/2024	4	10	4.90	4.14	4.12	4.12
Zone 2	WSP2024_PU73	DU16	335549.22	6234644.224	9.014	8.252	8/08/2024	4	10	4.48	3.72	4.53	4.53
Zone 2	WSP2024_PU73	DU16	335549.22	6234644.224	9.014	8.252	7/11/2024	4	10	5.20	4.44	3.81	3.81
Zone 2	WSP2024_PU75	DU16	335487.476	6234329.629	6.37	6.444	6/02/2024	2.5	5.5	2.29	2.36	4.08	4.08
Zone 2	WSP2024_PU75	DU16	335487.476	6234329.629	6.37	6.444	30/04/2024	2.5	5.5	2.30	2.37	4.07	4.07
Zone 2	WSP2024_PU75	DU16	335487.476	6234329.629	6.37	6.444	6/08/2024	2.5	5.5	2.12	2.20	4.25	4.25
Zone 2	WSP2024_PU75	DU16	335487.476	6234329.629	6.37	6.444	5/11/2024	2.5	5.5	2.37	2.45	4.00	4.00
Zone 2	WSP2024_PU76	DU12	335436.177	6234327.372	5.292	5.402	6/02/2024	1	4.5	1.65	1.76	3.64	3.64
Zone 2	WSP2024_PU76	DU12	335436.177	6234327.372	5.292	5.402	30/04/2024	1	4.5	1.60	1.71	3.70	3.70
Zone 2	WSP2024_PU76	DU12	335436.177	6234327.372	5.292	5.402	6/08/2024	1	4.5	1.56	1.67	3.74	3.74
Zone 2	WSP2024_PU76	DU12	335436.177	6234327.372	5.292	5.402	5/11/2024	1	4.5	1.75	1.86	3.54	3.54
Zone 2	WSP2024_PU77	DU15	335556.643	6234067.894	13.693	13.752	8/02/2024	0.5	3.5	1.21	1.26	12.49	12.49
Zone 2	WSP2024_PU77	DU15	335556.643	6234067.894	13.693	13.752	2/05/2024	0.5	3.5	1.06	1.12	12.63	12.63
Zone 2	WSP2024_PU77	DU15	335556.643	6234067.894	13.693	13.752	8/08/2024	0.5	3.5	0.98	1.03	12.72	12.72
Zone 2	WSP2024_PU77	DU15	335556.643	6234067.894	13.693	13.752	7/11/2024	0.5	3.5	1.15	1.20	12.55	12.55
Zone 2	WSP2024_PU78	DU12	335313.927	6234451.724	5.737	4.897	9/02/2024	1	4	2.66	1.82	3.08	3.08
Zone 2	WSP2024_PU78	DU12	335313.927	6234451.724	5.737	4.897	3/05/2024	1	4	2.42	1.58	3.32	3.32
Zone 2	WSP2024_PU78	DU12	335313.927	6234451.724	5.737	4.897	9/08/2024	1	4	2.45	1.61	3.29	3.29
Zone 2	WSP2024_PU78	DU12	335313.927	6234451.724	5.737	4.897	11/08/2024	1	4	2.59	1.75	3.15	3.15
Zone 2	WSP2024_PU79	DU12	335392.858	6234372.852	5.255	4.41	9/02/2024	1	4	1.84	0.99	3.42	3.42
Zone 2	WSP2024_PU79	DU12	335392.858	6234372.852	5.255	4.41	3/05/2024	1	4	1.61	0.76	3.65	3.65
Zone 2	WSP2024_PU79	DU12	335392.858	6234372.852	5.255	4.41	9/08/2024	1	4	1.71	0.87	3.55	3.55

Zone	Location Code	Monitoring Zone	x coord	y coord	Top of Casing Elevation (m AHD)	Ground Level (mAHD)	Date	Top Screen Depth	Bottom Screen Depth	Depth to Water (m BTOC)	Depth to Water (mbgl)	Groundwater Elevation (mAHD)	Product Corrected Water Level (m AHD)
Zone 2	WSP2024_PU79	DU12	335392.858	6234372.852	5.255	4.41	11/08/2024	1	4	1.84	1.00	3.42	3.42
Zone 2	WSP2024_PU80	DU12	335432.265	6234365.576	5.31	4.396	9/02/2024	1	4	1.77	0.85	3.54	3.54
Zone 2	WSP2024_PU80	DU12	335432.265	6234365.576	5.31	4.396	3/05/2024	1	4	1.57	0.65	3.75	3.75
Zone 2	WSP2024_PU80	DU12	335432.265	6234365.576	5.31	4.396	9/08/2024	1	4	1.67	0.75	3.64	3.64
Zone 2	WSP2024_PU80	DU12	335432.265	6234365.576	5.31	4.396	11/08/2024	1	4	1.79	0.87	3.53	3.53
Zone 2	WSP2024_PU81	DU12	335430.272	6234439.231	5.843	4.995	9/02/2024	1	4	2.39	1.54	3.45	3.45
Zone 2	WSP2024_PU81	DU12	335430.272	6234439.231	5.843	4.995	3/05/2024	1	4	2.23	1.38	3.61	3.61
Zone 2	WSP2024_PU81	DU12	335430.272	6234439.231	5.843	4.995	9/08/2024	1	4	2.23	1.38	3.62	3.62
Zone 2	WSP2024_PU81	DU12	335430.272	6234439.231	5.843	4.995	11/08/2024	1	4	2.41	1.56	3.43	3.43
Zone 2	WSP2024_PU82	DU12	335447.126	6234493.415	5.741	4.86	9/02/2024	1	4	2.26	1.38	3.48	3.48
Zone 2	WSP2024_PU82	DU12	335447.126	6234493.415	5.741	4.86	3/05/2024	1	4	1.93	1.05	3.81	3.81
Zone 2	WSP2024_PU82	DU12	335447.126	6234493.415	5.741	4.86	9/08/2024	1	4	2.09	1.21	3.65	3.65
Zone 2	WSP2024_PU82	DU12	335447.126	6234493.415	5.741	4.86	11/08/2024	1	4	2.23	1.35	3.51	3.51
Zone 2	WSP2024_PU83	DU12	335358.308	6234501.731	5.578	4.76	9/02/2024	1	4	2.43	1.61	3.15	3.15
Zone 2	WSP2024_PU83	DU12	335358.308	6234501.731	5.578	4.76	3/05/2024	1	4	2.26	1.44	3.32	3.32
Zone 2	WSP2024_PU83	DU12	335358.308	6234501.731	5.578	4.76	9/08/2024	1	4	2.27	1.46	3.31	3.31
Zone 2	WSP2024_PU83	DU12	335358.308	6234501.731	5.578	4.76	11/08/2024	1	4	1.45	0.63	4.13	4.13
Zone 2	WSP2024_PU84	DU12	335341.823	6234559.69	5.593	4.721	9/02/2024	1	4	2.54	1.66	3.06	3.06
Zone 2	WSP2024_PU84	DU12	335341.823	6234559.69	5.593	4.721	3/05/2024	1	4	2.35	1.47	3.25	3.25
Zone 2	WSP2024_PU84	DU12	335341.823	6234559.69	5.593	4.721	9/08/2024	1	4	2.37	1.49	3.23	3.23
Zone 2	WSP2024_PU84	DU12	335341.823	6234559.69	5.593	4.721	11/08/2024	1	4	2.25	1.38	3.34	3.34
Zone 2	WSP2024_PU85	DU12	335318.413	6234628.211	5.385	4.489	9/02/2024	1	4	2.29	1.39	3.10	3.10
Zone 2	WSP2024_PU85	DU12	335318.413	6234628.211	5.385	4.489	3/05/2024	1	4	2.13	1.24	3.25	3.25
Zone 2	WSP2024_PU85	DU12	335318.413	6234628.211	5.385	4.489	9/08/2024	1	4	2.23	1.33	3.16	3.16
Zone 2	WSP2024_PU85	DU12	335318.413	6234628.211	5.385	4.489	11/08/2024	1	4	2.38	1.48	3.01	3.01
Zone 2	WSP2024_PU86	DU12	335433.222	6234612.884	5.364	4.508	9/02/2024	1	4	2.01	1.16	3.35	3.35
Zone 2	WSP2024_PU86	DU12	335433.222	6234612.884	5.364	4.508	3/05/2024	1	4	1.56	0.70	3.80	3.80
Zone 2	WSP2024_PU86	DU12	335433.222	6234612.884	5.364	4.508	9/08/2024	1	4	1.72	0.87	3.64	3.64
Zone 2	WSP2024_PU86	DU12	335433.222	6234612.884	5.364	4.508	11/08/2024	1	4	1.99	1.13	3.37	3.37
Zone 2	WSP2024_PU87	DU12	335426.596	6234546.685	5.372	4.501	9/02/2024	1	4	2.01	1.14	3.36	3.36
Zone 2	WSP2024_PU87	DU12	335426.596	6234546.685	5.372	4.501	3/05/2024	1	4	1.50	0.62	3.88	3.88
Zone 2	WSP2024_PU87	DU12	335426.596	6234546.685	5.372	4.501	9/08/2024	1	4	1.76	0.89	3.61	3.61
Zone 2	WSP2024_PU87	DU12	335426.596	6234546.685	5.372	4.501	11/08/2024	1	4	2.04	1.17	3.33	3.33
Zone 1	WSP2024_PU88	NW Tank Farm	335432.023	6234775.151	5.475	4.42	12/02/2024	1	4	2.32	1.27	3.16	3.16
Zone 1	WSP2024_PU88	NW Tank Farm	335432.023	6234775.151	5.475	4.42	6/05/2024	1	4	1.71	0.66	3.76	3.76
Zone 1	WSP2024_PU88	NW Tank Farm	335432.023	6234775.151	5.475	4.42	12/08/2024	1	4	1.93	0.87	3.55	3.55
Zone 1	WSP2024_PU88	NW Tank Farm	335432.023	6234775.151	5.475	4.42	11/11/2024	1	4	2.16	1.11	3.31	3.31
Zone 2	WSP2024_PU89	NW Tank Farm	335447.198	6234724.8	4.378	4.468	12/02/2024	1	4	1.13	1.22	3.25	3.25
Zone 2	WSP2024_PU89	NW Tank Farm	335447.198	6234724.8	4.378	4.468	6/05/2024	1	4	0.63	0.72	3.75	3.75
Zone 2	WSP2024_PU89	NW Tank Farm	335447.198	6234724.8	4.378	4.468	11/11/2024	1	4	0.99	1.08	3.39	3.39
Zone 2	WSP2024_PU90	NW Tank Farm	335413.751	6234731.553	5.23	4.263	12/02/2024	1	4	1.99	1.02	3.24	3.24
Zone 2	WSP2024_PU90	NW Tank Farm	335413.751	6234731.553	5.23	4.263	6/05/2024	1	4	1.52	0.56	3.71	3.71
Zone 2	WSP2024_PU90	NW Tank Farm	335413.751	6234731.553	5.23	4.263	12/08/2024	1	4	1.70	0.73	3.53	3.53
Zone 2	WSP2024_PU90	NW Tank Farm	335413.751	6234731.553	5.23	4.263	11/11/2024	1	4	1.91	0.94	3.32	3.32
Zone 2	WSP2024_PU91	NW Tank Farm	335469.095	6234745.931	4.515	4.605	12/02/2024	1	4	1.26	1.35	3.26	3.26
Zone 2	WSP2024_PU91	NW Tank Farm	335469.095	6234745.931	4.515	4.605	6/05/2024	1	4	0.78	0.87	3.73	3.73
Zone 2	WSP2024_PU91	NW Tank Farm	335469.095	6234745.931	4.515	4.605	12/08/2024	1	4	0.87	0.96	3.65	3.65
Zone 2	WSP2024_PU91	NW Tank Farm	335469.095	6234745.931	4.515	4.605	11/11/2024	1	4	1.12	1.21	3.39	3.39
Zone 1	WSP2024_PU92	NW Tank Farm	335477.396	6234781.38	4.298	4.398	12/02/2024	1	4	0.99	1.09	3.31	3.31
Zone 1	WSP2024_PU92	NW Tank Farm	335477.396	6234781.38	4.298	4.398	6/05/2024	1	4	0.49	0.59	3.81	3.81
Zone 1	WSP2024_PU92	NW Tank Farm	335477.396	6234781.38	4.298	4.398	12/08/2024	1	4	0.62	0.72	3.68	3.68
Zone 1	WSP2024_PU92	NW Tank Farm	335477.396	6234781.38	4.298	4.398	11/11/2024	1	4	0.89	0.99	3.41	3.41
Zone 1	WSP2024_PU93	NW Tank Farm	335384.657	6234785.836	5.423	4.401	12/02/2024	1	4	2.29	1.27	3.13	3.13
Zone 1	WSP2024_PU93	NW Tank Farm	335384.657	6234785.836	5.423	4.401	6/05/2024	1	4	1.81	0.79	3.61	3.61
Zone 1	WSP2024_PU93	NW Tank Farm	335384.657	6234785.836	5.423	4.401	12/08/2024	1	4	2.01	0.98	3.42	3.42
Zone 1	WSP2024_PU93	NW Tank Farm	335384.657	6234785.836	5.423	4.401	11/11/2024	1	4	2.22	1.20	3.21	3.21
Zone 2	WSP2024_PU94	DU16	335527.14	6234492.722	10.127	9.169	8/02/2024	6	9	6.39	5.43	3.74	3.74
Zone 2	WSP2024_PU94	DU16	335527.14	6234492.722	10.127	9.169	2/05/2024	6	9	6.06	5.11	4.06	4.06
Zone 2	WSP2024_PU94	DU16	335527.14	6234492.722	10.127	9.169	8/08/2024	6	9	5.96	5.00	4.17	4.17
Zone 2	WSP2024_PU94	DU16	335527.14	6234492.722	10.127	9.169	7/11/2024	6	9	6.35	5.39	3.78	3.78
Zone 2	WSP2024_PU95	DU16	335537.658	6234552.328	9.112	8.189	8/02/2024	4.1	7.6	5.33	4.41	3.78	3.78
Zone 2	WSP2024_PU95	DU16	335537.658	6234552.328	9.112	8.189	2/05/2024	4.1	7.6	4.97	4.05	4.14	4.14

Zone	Location Code	Monitoring Zone	x coord	y coord	Top of Casing Elevation (m AHD)	Ground Level (mAHD)	Date	Top Screen Depth	Bottom Screen Depth	Depth to Water (m BTOC)	Depth to Water (mbgl)	Groundwater Elevation (mAHD)	Product Corrected Water Level (m AHD)
Zone 2	WSP2024_PU95	DU16	335537.658	6234552.328	9.112	8.189	8/08/2024	4.1	7.6	4.54	3.62	4.57	4.57
Zone 2	WSP2024_PU95	DU16	335537.658	6234552.328	9.112	8.189	7/11/2024	4.1	7.6	5.23	4.31	3.88	3.88
Zone 2	WSP2024_PU96	DU16	335538.479	6234563.006	9.11	8.264	8/02/2024	4.9	7.9	5.34	4.49	3.78	3.78
Zone 2	WSP2024_PU96	DU16	335538.479	6234563.006	9.11	8.264	2/05/2024	4.9	7.9	4.93	4.09	4.18	4.18
Zone 2	WSP2024_PU96	DU16	335538.479	6234563.006	9.11	8.264	8/08/2024	4.9	7.9	4.51	3.66	4.60	4.60
Zone 2	WSP2024_PU96	DU16	335538.479	6234563.006	9.11	8.264	7/11/2024	4.9	7.9	5.22	4.38	3.89	3.89
Zone 2	WSP2024_PU97	DU16	335543.161	6234591.321	9.368	8.313	8/02/2024	6	9	5.61	4.56	3.76	3.76
Zone 2	WSP2024_PU97	DU16	335543.161	6234591.321	9.368	8.313	2/05/2024	6	9	5.16	4.10	4.21	4.21
Zone 2	WSP2024_PU97	DU16	335543.161	6234591.321	9.368	8.313	8/08/2024	6	9	4.69	3.63	4.68	4.68
Zone 2	WSP2024_PU97	DU16	335543.161	6234591.321	9.368	8.313	7/11/2024	6	9	5.48	4.43	3.89	3.89
Zone 2	WSP2024_PU98	DU16	335542.91	6234597.404	9.099	8.205	8/02/2024	5	8	5.35	4.46	3.75	3.75
Zone 2	WSP2024_PU98	DU16	335542.91	6234597.404	9.099	8.205	2/05/2024	5	8	4.92	4.02	4.18	4.18
Zone 2	WSP2024_PU98	DU16	335542.91	6234597.404	9.099	8.205	8/08/2024	5	8	4.46	3.57	4.64	4.64
Zone 2	WSP2024_PU98	DU16	335542.91	6234597.404	9.099	8.205	7/11/2024	5	8	5.22	4.32	3.88	3.88
Zone 2	WSP2024_PU99	DU10	335067.884	6234364.969	5.709	4.709	13/02/2024			3.11	2.11	2.60	2.60
Zone 2	WSP2024_PU99	DU10	335067.884	6234364.969	5.709	4.709	6/05/2024			2.82	1.82	2.89	2.89
Zone 2	WSP2024_PU99	DU10	335067.884	6234364.969	5.709	4.709	13/08/2024			2.93	1.93	2.78	2.78
Zone 2	WSP2024_PU99	DU10	335067.884	6234364.969	5.709	4.709	5/11/2024			3.10	2.10	2.61	2.61
Zone 2	WSP2024_PV20	Former Fuel Refinery			4.826		7/02/2024			2.59		2.23	2.23
Zone 2	WSP2024_W08	DU16	335500.822	6234410.513	7.212	6.458	6/02/2024	1	8	3.52	2.77	3.69	3.69
Zone 2	WSP2024_W08	DU16	335500.822	6234410.513	7.212	6.458	30/04/2024	1	8	3.45	2.69	3.77	3.77
Zone 2	WSP2024_W08	DU16	335500.822	6234410.513	7.212	6.458	6/08/2024	1	8	3.42	2.66	3.80	3.80
Zone 2	WSP2024_W08	DU16	335500.822	6234410.513	7.212	6.458	5/11/2024	1	8	3.57	2.82	3.64	3.64
Zone 2	WSP2024_W09	DU16	335508.025	6234455.662	7.436	6.567	6/02/2024	1	8	3.73	2.86	3.71	3.71
Zone 2	WSP2024_W09	DU16	335508.025	6234455.662	7.436	6.567	30/04/2024	1	8	3.62	2.75	3.82	3.82
Zone 2	WSP2024_W09	DU16	335508.025	6234455.662	7.436	6.567	6/08/2024	1	8	3.55	2.68	3.89	3.89
Zone 2	WSP2024_W09	DU16	335508.025	6234455.662	7.436	6.567	5/11/2024	1	8	4.03	3.16	3.41	3.41
Zone 2	WSP2024_W10	DU16	335510.747	6234479.834	6.797	6.484	6/02/2024	1	4.5	3.10	2.79	3.70	3.70
Zone 2	WSP2024_W10	DU16	335510.747	6234479.834	6.797	6.484	30/04/2024	1	4.5	2.96	2.64	3.84	3.84
Zone 2	WSP2024_W10	DU16	335510.747	6234479.834	6.797	6.484	6/08/2024	1	4.5	2.85	2.54	3.95	3.95
Zone 2	WSP2024_W10	DU16	335510.747	6234479.834	6.797	6.484	5/11/2024	1	4.5	3.10	2.78	3.70	3.70
Zone 2	WSP2024_W11	DU16	335513.634	6234494.397	7.451	6.551	6/02/2024	1	8	3.77	2.87	3.69	3.69
Zone 2	WSP2024_W11	DU16	335513.634	6234494.397	7.451	6.551	30/04/2024	1	8	3.60	2.70	3.85	3.85
Zone 2	WSP2024_W11	DU16	335513.634	6234494.397	7.451	6.551	6/08/2024	1	8	3.45	2.55	4.00	4.00
Zone 2	WSP2024_W11	DU16	335513.634	6234494.397	7.451	6.551	5/11/2024	1	8	3.75	2.85	3.70	3.70
Zone 2	WSP2024_W12	DU16	335518.467	6234532.389	7.396	6.478	6/02/2024	1	8	3.72	2.81	3.67	3.67
Zone 2	WSP2024_W12	DU16	335518.467	6234532.389	7.396	6.478	30/04/2024	1	8	3.45	2.54	3.94	3.94
Zone 2	WSP2024_W12	DU16	335518.467	6234532.389	7.396	6.478	6/08/2024	1	8	3.09	2.18	4.30	4.30
Zone 2	WSP2024_W12	DU16	335518.467	6234532.389	7.396	6.478	5/11/2024	1	8	3.68	2.76	3.72	3.72
Zone 2	WSP2024_W13	DU16	335521.541	6234555.715	6.998	6.45	6/02/2024	1	8.5	3.26	2.71	3.74	3.74
Zone 2	WSP2024_W13	DU16	335521.541	6234555.715	6.998	6.45	30/04/2024	1	8.5	2.99	2.44	4.01	4.01
Zone 2	WSP2024_W13	DU16	335521.541	6234555.715	6.998	6.45	6/08/2024	1	8.5	2.55	2.01	4.45	4.45
Zone 2	WSP2024_W13	DU16	335521.541	6234555.715	6.998	6.45	5/11/2024	1	8.5	3.21	2.66	3.79	3.79
Zone 2	WSP2024_W14	DU16	335522.555	6234571.308	7.365	6.414	6/02/2024	1	8	3.95	3.00	3.42	3.64
Zone 2	WSP2024_W14	DU16	335522.555	6234571.308	7.365	6.414	30/04/2024	1	8	3.77	2.82	3.59	3.91
Zone 2	WSP2024_W14	DU16	335522.555	6234571.308	7.365	6.414	6/08/2024	1	8	3.00	2.05	4.36	4.42
Zone 2	WSP2024_W14	DU16	335522.555	6234571.308	7.365	6.414	5/11/2024	1	8	3.61	2.66	3.75	3.75
Zone 2	WSP2024_W15	DU16	335525.195	6234583.964	7.176	6.496	6/02/2024	1	8.5	3.75	3.07	3.43	3.66
Zone 2	WSP2024_W15	DU16	335525.195	6234583.964	7.176	6.496	30/04/2024	1	8.5	3.50	2.82	3.68	3.92
Zone 2	WSP2024_W15	DU16	335525.195	6234583.964	7.176	6.496	6/08/2024	1	8.5	3.13	2.45	4.05	4.38
Zone 2	WSP2024_W15	DU16	335525.195	6234583.964	7.176	6.496	5/11/2024	1	8.5	3.33	2.65	3.85	3.85
Zone 2	WSP2024_W16	DU16	335526.493	6234597.539	6.869	6.508	6/02/2024	1	8.5	3.22	2.86	3.65	3.70
Zone 2	WSP2024_W16	DU16	335526.493	6234597.539	6.869	6.508	30/04/2024	1	8.5	3.02	2.66	3.85	3.96
Zone 2	WSP2024_W16	DU16	335526.493	6234597.539	6.869	6.508	6/08/2024	1	8.5	2.49	2.13	4.38	4.47
Zone 2	WSP2024_W16	DU16	335526.493	6234597.539	6.869	6.508	5/11/2024	1	8.5	3.04	2.68	3.83	3.87
Zone 2	WSP2024_W17	DU16	335528.082	6234607.786	7.335	6.482	6/02/2024	1	8	3.64	2.79	3.70	3.70
Zone 2	WSP2024_W17	DU16	335528.082	6234607.786	7.335	6.482	30/04/2024	1	8	3.37	2.52	3.96	3.96
Zone 2	WSP2024_W17	DU16	335528.082	6234607.786	7.335	6.482	6/08/2024	1	8	2.91	2.06	4.43	4.43
Zone 2	WSP2024_W18	DU16	335529.782	6234618.519	6.994	6.453	6/02/2024	1	8.5	3.30	2.75	3.70	3.70
Zone 2	WSP2024_W18	DU16	335529.782	6234618.519	6.994	6.453	30/04/2024	1	8.5	3.00	2.45	4.00	4.00
Zone 2	WSP2024_W18	DU16	335529.782	6234618.519	6.994	6.453	6/08/2024	1	8.5	2.52	1.98	4.47	4.47
Zone 2	WSP2024_W18	DU16	335529.782	6234618.519	6.994	6.453	5/11/2024	1	8.5	3.17	2.63	3.82	3.82

Zone	Location Code	Monitoring Zone	x coord	y coord	Top of Casing Elevation (m AHD)	Ground Level (m AHD)	Date	Top Screen Depth	Bottom Screen Depth	Depth to Water (m BTOC)	Depth to Water (mbgl)	Groundwater Elevation (m AHD)	Product Corrected Water Level (m AHD)
Zone 2	WSP2024_W19	DU16	335531.477	6234632.668	6.95	6.435	6/02/2024	1	7	3.29	2.77	3.66	3.66
Zone 2	WSP2024_W19	DU16	335531.477	6234632.668	6.95	6.435	30/04/2024	1	7	3.01	2.50	3.94	3.94
Zone 2	WSP2024_W19	DU16	335531.477	6234632.668	6.95	6.435	6/08/2024	1	7	2.49	1.98	4.46	4.46
Zone 2	WSP2024_W19	DU16	335531.477	6234632.668	6.95	6.435	5/11/2024	1	7	3.14	2.63	3.81	3.81
Zone 2	WSP2024_W20	DU16	335532.666	6234646.207	7.275	6.408	6/02/2024	1	8	3.63	2.76	3.65	3.65
Zone 2	WSP2024_W20	DU16	335532.666	6234646.207	7.275	6.408	30/04/2024	1	8	3.37	2.50	3.91	3.91
Zone 2	WSP2024_W20	DU16	335532.666	6234646.207	7.275	6.408	6/08/2024	1	8	2.94	2.07	4.33	4.33
Zone 2	WSP2024_W20	DU16	335532.666	6234646.207	7.275	6.408	5/11/2024	1	8	3.60	2.73	3.67	3.67
Zone 2	WSP2024_W21	DU16	335535.938	6234670.847	6.827	6.395	6/02/2024	1	8.5	3.19	2.76	3.64	3.64
Zone 2	WSP2024_W21	DU16	335535.938	6234670.847	6.827	6.395	30/04/2024	1	8.5	3.03	2.59	3.80	3.80
Zone 2	WSP2024_W21	DU16	335535.938	6234670.847	6.827	6.395	6/08/2024	1	8.5	2.60	2.17	4.23	4.23
Zone 2	WSP2024_W21	DU16	335535.938	6234670.847	6.827	6.395	5/11/2024	1	8.5	3.21	2.77	3.62	3.62
Zone 2	WSP2024_W22	DU16	335540.274	6234698.963	6.777	6.607	6/02/2024	1	8.5	3.20	3.03	3.57	3.57
Zone 2	WSP2024_W22	DU16	335540.274	6234698.963	6.777	6.607	30/04/2024	1	8.5	3.05	2.88	3.73	3.73
Zone 2	WSP2024_W22	DU16	335540.274	6234698.963	6.777	6.607	6/08/2024	1	8.5	2.68	2.51	4.10	4.10
Zone 2	WSP2024_W22	DU16	335540.274	6234698.963	6.777	6.607	5/11/2024	1	8.5	3.18	3.01	3.60	3.60

Annexure B

Calculations

Calculations - Pits

SAE 2

Inferred hydraulic conductivity	K	144 m/day
Inferred hydraulic conductivity	K	0.001667 m/s
Initial groundwater elevation	H	2.01 mbgl
Lowered groundwater elevation	h	3.01 mbgl
Change in water level		1 m
Length		m
Width		m
Area		10050 m ²
Effective radius	r	56.55983 m
Radius of influence during dewatering	R	122.4741 m
Groundwater ingress	Q	2939.416 m ³ /day
Groundwater ingress	Q	34.0211 L/s

SAE 3

Inferred hydraulic conductivity	K	144 m/day
Inferred hydraulic conductivity	K	0.001667 m/s
Initial groundwater elevation	H	1.31 mbgl
Lowered groundwater elevation	h	2.8 mbgl
Change in water level		1.49 m
Length		m
Width		m
Area		8800 m ²
Effective radius	r	52.92567 m
Radius of influence during dewatering	R	182.4864 m
Groundwater ingress	Q	2238.177 m ³ /day
Groundwater ingress	Q	25.90489 L/s

SAE 4

Inferred hydraulic conductivity	K	144 m/day
Inferred hydraulic conductivity	K	0.001667 m/s
Initial groundwater elevation	H	1.25 mbgl
Lowered groundwater elevation	h	2.8 mbgl
Change in water level		1.55 m
Area		1000 m ²
Effective radius	r	17.84124 m
Radius of influence during dewatering	R	189.8348 m
Groundwater ingress	Q	1200.974 m ³ /day
Groundwater ingress	Q	13.9002 L/s

SAE 5

Inferred hydraulic conductivity	K	144 m/day
Inferred hydraulic conductivity	K	0.001667 m/s
Initial groundwater elevation	H	0.783 mbgl
Lowered groundwater elevation	h	2 mbgl
Change in water level		1.217 m
Area		5000 m ²
Effective radius	r	39.89423 m
Radius of influence during dewatering	R	149.051 m
Groundwater ingress	Q	1162.471 m ³ /day
Groundwater ingress	Q	13.45455 L/s

OWS Pump Station - Option 1 (SAND)

Inferred hydraulic conductivity	K	144 m/day
Inferred hydraulic conductivity	K	0.0016667 m/s
Initial groundwater elevation	H	0.783 mbgl
Lowered groundwater elevation	h	1.6 mbgl
Change in water level		0.817 m
Length		34 m
Width		12 m
Area		408 m ²
Effective radius	r	11.396071 m
Radius of influence during dewatering	R	100.06134 m
Groundwater ingress	Q	405.4112 m ³ /day
Groundwater ingress	Q	4.6922697 L/s

OWS Pump Station - Option 1 (SANDSTONE)

Inferred hydraulic conductivity	K	8.64E-02 m/day
Inferred hydraulic conductivity	K	1.00E-06 m/s
Initial groundwater elevation	H	1.6 mbgl
Lowered groundwater elevation	h	5 mbgl
Change in water level		3.4 m
Length		34 m
Width		12 m
Area		408 m ²
Effective radius	r	11.396071 m
Radius of influence during dewatering	R	10.2 m
Groundwater ingress	Q	54.93 m ³ /day
Groundwater ingress	Q	0.6357987 L/s

OWS Pump Station - Option 2 - SAND

Inferred hydraulic conductivity	K	144 m/day
Inferred hydraulic conductivity	K	0.0016667 m/s
Initial groundwater elevation	H	0.24 mbgl
Lowered groundwater elevation	h	3.2 mbgl
Change in water level		2.96 m
Length		34 m
Width		12 m
Area		408 m ²
Effective radius	r	11.396071 m
Radius of influence during dewatering	R	362.52332 m
Groundwater ingress	Q	1331.4013 m ³ /day
Groundwater ingress	Q	15.409772 L/s

OWS Pump Station - Option 2 - SANDSTONE

Inferred hydraulic conductivity	K	8.64E-02 m/day
Inferred hydraulic conductivity	K	1.00E-06 m/s
Initial groundwater elevation	H	3.2 mbgl
Lowered groundwater elevation	h	5 mbgl
Change in water level		1.8 m
Length		34 m
Width		12 m
Area		408 m ²
Effective radius	r	11.396071 m
Radius of influence during dewatering	R	5.4 m
Groundwater ingress	Q	5.36 m ³ /day
Groundwater ingress	Q	0.0620862 L/s

New Warehouse

Inferred hydraulic conductivity	K	144 m/day
Inferred hydraulic conductivity	K	0.001667 m/s
Initial groundwater elevation	H	0.69 mbgl
Lowered groundwater elevation	h	1.5 mbgl
Change in water level		0.81 m
Length		54.2 m
Width		46.9 m
Area		2541.98 m ²
Effective radius	r	28.44534 m
Radius of influence during dewatering	R	99.20402 m
Groundwater ingress	Q	642.4089 m ³ /day
	Q	7.435305 L/s

Calculations - Tranches

FWS Relocation Area - Option 1B

Unconfined flow into a trench, both directions.

After Neville and Wang

Adapted from Mansur and Kaufman (1962)

$$Q = K \left(\frac{L}{R_0} \right) (H - H_d)^2 - (H_d - h)^2$$

	Expected	Min	Max	
Hydraulic conductivity	K 1.67E-03			m/s
Elevation of base of aquifer	h 0.0			m
Radius of influence (from Sichardt)	R ₀ 12.4			m
Width of aquifer transverse to groundwater flow	L 221.0			m
Head at the constant-head boundary	H 0.1			m
Head in the excavation	H _d 0.0			m
Width of trench	1.0			m
Result				
Calculated inflow	Q 5.81E-04			m ³ /s
	49.59628			m ³ /d
	0.57403			L/s

Mansur and Kaufman (1962) - Dewatering in *Foundation Engineering*

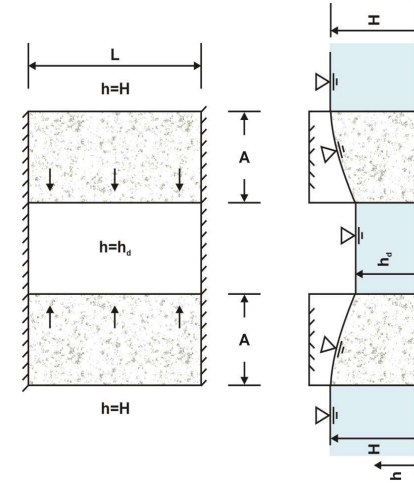
$$Q = -k \frac{(H^2 - h_d^2)}{A} L$$

Data Sources

K	_____
h	_____
R ₀	_____
L	_____
H	_____
H _d	_____

A - distance to constant head boundary

Essential input
Optional input
Calculated



Radius of Influence (Sichardt)

$$R_0 = Cs\sqrt{K}$$

	Expected	min	max
Drawdown in well	s 0.1		
Hydraulic conductivity	K 1.67E-03		
	143.9991		
	m/d		
Factor	C 2000		
	3000 for radial flow		
	1500-2000 for line flow to trenches or wellpoints		
Radius influence	11.43		
	m		

Essential input
Optional input
Calculated

FWS Relocation Area - Main Line

Unconfined flow into a trench, both directions.

After Neville and Wang

Adapted from Mansur and Kaufman (1962)

$$Q = K \left(\frac{L}{R_0} \right) (H - H_d)^2 - (H_d - h)^2$$

	Expected	Min	Max	
Hydraulic conductivity	K 1.67E-03			m/s
Elevation of base of aquifer	h 0.0			m
Radius of influence (from Sichardt)	R ₀ 68.8			m
Width of aquifer transverse to groundwater flow	L 402.0			m
Head at the constant-head boundary	H 0.8			m
Head in the excavation	H _d 0.0			m
Width of trench	1.0			m
Result				
Calculated inflow	Q 6.71E-03			m ³ /s
	573.18310			m ³ /d
	6.63406			L/s

Mansur and Kaufman (1962) - Dewatering in *Foundation Engineering*

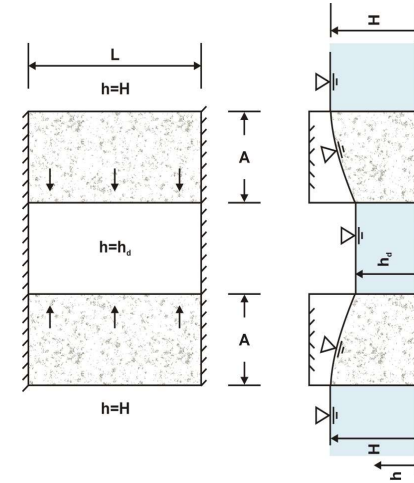
$$Q = -k \frac{(H^2 - h_d^2)}{A} L$$

Data Sources

K _____
 h _____
 R₀ _____
 L _____
 H _____
 H_d _____

A - distance to constant head boundary

Essential input
Optional input
Calculated



Radius of Influence (Sichardt)

$$R_0 = Cs\sqrt{K}$$

	Expected	min	max
Drawdown in well	s 0.8		
Hydraulic conductivity	K 1.67E-03		
	143.9991		
	m/d		
Factor	C 2000		
	3000 for radial flow		
	1500-2000 for line flow to trenches or wellpoints		
Radius influence	67.77		
	m		

Essential input
Optional input
Calculated

Removal of OWS infrastructure - Zone 2A

Unconfined flow into a trench, both directions.

After Neville and Wang

Adapted from Mansur and Kaufman (1962)

$$Q = K \left(\frac{L}{R_0} \right) (H - H_d)^2 - (H_d - h)^2$$

	Expected	Min	Max	
Hydraulic conductivity	K 1.67E-03			m/s
Elevation of base of aquifer	h 0.0			m
Radius of influence (from Sichardt)	R ₀ 180.6			m
Width of aquifer transverse to groundwater flow	L 315.0			m
Head at the constant-head boundary	H 2.2			m
Head in the excavation	H _d 0.0			m
Width of trench	1.0			m
Result				
Calculated inflow	Q 1.41E-02			m ³ /s
	1201.35972			m ³ /d
	13.90463			L/s

Mansur and Kaufman (1962) - Dewatering in *Foundation Engineering*

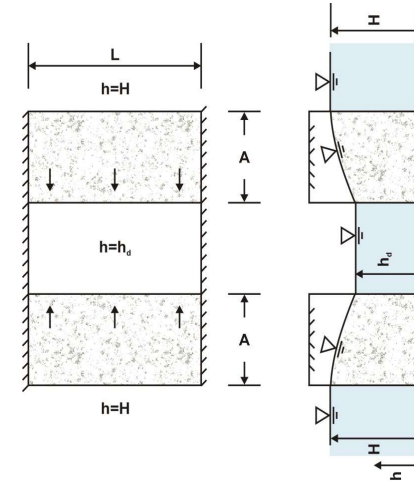
$$Q = -k \frac{(H^2 - h_d^2)}{A} L$$

Data Sources

K _____
 h _____
 R₀ _____
 L _____
 H _____
 H_d _____

A - distance to constant head boundary

Essential input
Optional input
Calculated



Radius of Influence (Sichardt)

$$R_0 = Cs\sqrt{K}$$

	Expected	min	max
Drawdown in well	s 2.2		
Hydraulic conductivity	K 1.67E-03		
	143.9991		
Factor	C 2000		
	3000 for radial flow		
	1500-2000 for line flow to trenches or wellpoints		
Radius influence	179.63		

Essential input
Optional input
Calculated

Removal of OWS infrastructure - Zone 2B

Unconfined flow into a trench, both directions.

After Neville and Wang

Adapted from Mansur and Kaufman (1962)

$$Q = K \left(\frac{L}{R_0} \right) (H - H_d)^2 - (H_d - h)^2$$

	Expected	Min	Max	
Hydraulic conductivity	K 1.67E-03			m/s
Elevation of base of aquifer	h 0.0			m
Radius of influence (from Sichardt)	R ₀ 143.9			m
Width of aquifer transverse to groundwater flow	L 375.0			m
Head at the constant-head boundary	H 1.8			m
Head in the excavation	H _d 0.0			m
Width of trench	1.0			m
Result				
Calculated inflow	Q 1.33E-02			m ³ /s
	1136.03399			m ³ /d
	13.14854			L/s

Mansur and Kaufman (1962) - Dewatering in *Foundation Engineering*

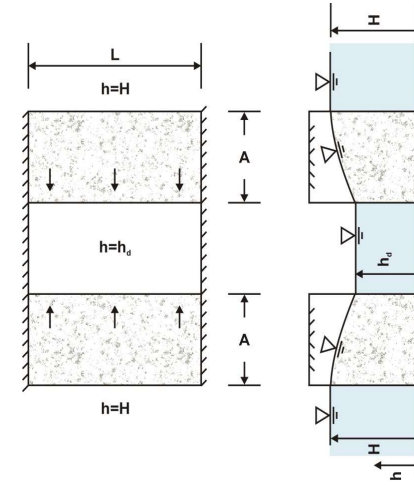
$$Q = -k \frac{(H^2 - h_d^2)}{A} L$$

Data Sources

K	_____
h	_____
R ₀	_____
L	_____
H	_____
H _d	_____

A - distance to constant head boundary

Essential input
Optional input
Calculated



Radius of Influence (Sichardt)

$$R_0 = Cs\sqrt{K}$$

	Expected	min	max
Drawdown in well	s 1.8		
Hydraulic conductivity	K 1.67E-03		
	143.9991		
Factor	C 2000		
	3000 for radial flow		
	1500-2000 for line flow to trenches or wellpoints		
Radius influence	142.89		

Essential input
Optional input
Calculated

Removal of OWS infrastructure - Zone 2C

Unconfined flow into a trench, both directions.

After Neville and Wang

Adapted from Mansur and Kaufman (1962)

$$Q = K \left(\frac{L}{R_0} \right) (H - H_d)^2 - (H_d - h)^2$$

	Expected	Min	Max	
Hydraulic conductivity	K 1.67E-03			m/s
Elevation of base of aquifer	h 0.0			m
Radius of influence (from Sichardt)	R ₀ 146.3			m
Width of aquifer transverse to groundwater flow	L 220.0			m
Head at the constant-head boundary	H 1.8			m
Head in the excavation	H _d 0.0			m
Width of trench	1.0			m
Result				
Calculated inflow	Q 7.94E-03			m ³ /s
	677.97794			m ³ /d
	7.84697			L/s

Mansur and Kaufman (1962) - Dewatering in *Foundation Engineering*

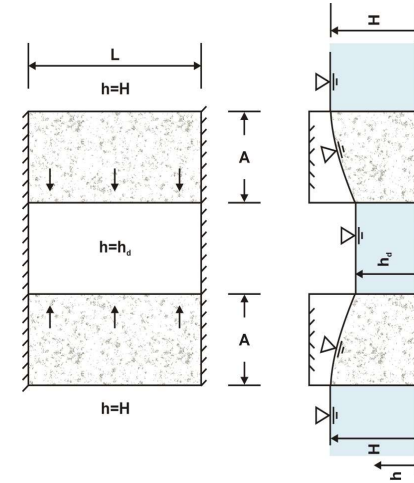
$$Q = -k \frac{(H^2 - h_d^2)}{A} L$$

Data Sources

K	_____
h	_____
R ₀	_____
L	_____
H	_____
H _d	_____

A - distance to constant head boundary

Essential input
Optional input
Calculated



Radius of Influence (Sichardt)

$$R_0 = Cs\sqrt{K}$$

	Expected	min	max
Drawdown in well	s 1.8		
Hydraulic conductivity	K 1.67E-03		
	143.9991		
Factor	C 2000		
	3000 for radial flow 1500-2000 for line flow to trenches or wellpoints		
Radius influence	145.34		

Essential input
Optional input
Calculated

Removal of OWS infrastructure - Zone 2D

Unconfined flow into a trench, both directions.

After Neville and Wang

Adapted from Mansur and Kaufman (1962)

$$Q = K \left(\frac{L}{R_0} \right) (H - H_d)^2 - (H_d - h)^2$$

	Expected	Min	Max	
Hydraulic conductivity	K 1.67E-03			m/s
Elevation of base of aquifer	h 0.0			m
Radius of influence (from Sichardt)	R ₀ 182.3			m
Width of aquifer transverse to groundwater flow	L 360.0			m
Head at the constant-head boundary	H 2.2			m
Head in the excavation	H _d 0.0			m
Width of trench	1.0			m
Result				
Calculated inflow	Q 1.62E-02			m ³ /s
	1385.53330			m ³ /d
	16.03627			L/s

Mansur and Kaufman (1962) - Dewatering in *Foundation Engineering*

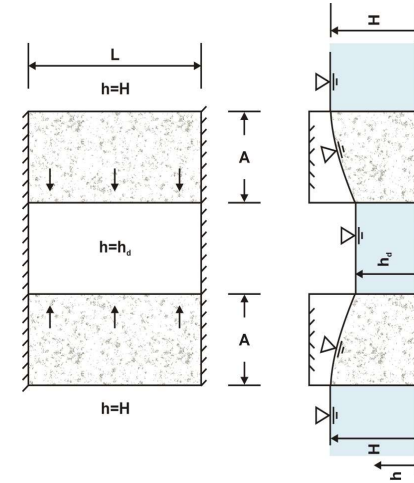
$$Q = -k \frac{(H^2 - h_d^2)}{A} L$$

Data Sources

K _____
 h _____
 R₀ _____
 L _____
 H _____
 H_d _____

A - distance to constant head boundary

Essential input
Optional input
Calculated



Radius of Influence (Sichardt)

$$R_0 = Cs\sqrt{K}$$

	Expected	min	max
Drawdown in well	s 2.2		
Hydraulic conductivity	K 1.67E-03		
	143.9991		
Factor	C 2000		
	3000 for radial flow		
	1500-2000 for line flow to trenches or wellpoints		
Radius influence	181.26		

Essential input
Optional input
Calculated

Removal of OWS infrastructure - Zone 2E

Unconfined flow into a trench, both directions.

After Neville and Wang

Adapted from Mansur and Kaufman (1962)

$$Q = K \left(\frac{L}{R_0} \right) (H - H_d)^2 - (H_d - h)^2$$

	Expected	Min	Max	
Hydraulic conductivity	K 1.67E-03			m/s
Elevation of base of aquifer	h 0.0			m
Radius of influence (from Sichardt)	R ₀ 74.5			m
Width of aquifer transverse to groundwater flow	L 70.0			m
Head at the constant-head boundary	H 0.9			m
Head in the excavation	H _d 0.0			m
Width of trench	1.0			m
Result				
Calculated inflow	Q 1.27E-03			m ³ /s
	108.34809			m ³ /d
	1.25403			L/s

Mansur and Kaufman (1962) - Dewatering in *Foundation Engineering*

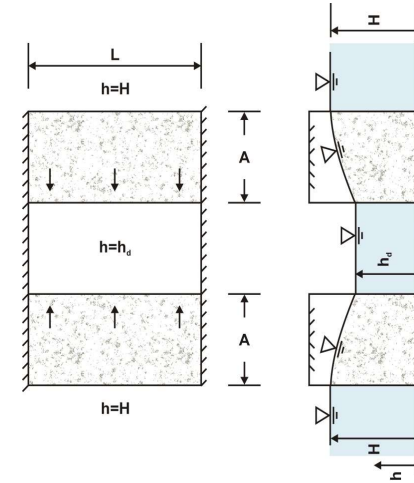
$$Q = -k \frac{(H^2 - h_d^2)}{A} L$$

Data Sources

K _____
h _____
R₀ _____
L _____
H _____
H_d _____

A - distance to constant head boundary

Essential input
Optional input
Calculated



Radius of Influence (Sichardt)

$$R_0 = Cs\sqrt{K}$$

	Expected	min	max
Drawdown in well	s 0.9		
Hydraulic conductivity	K 1.67E-03		
	143.9991		
Factor	C 2000		
	3000 for radial flow		
	1500-2000 for line flow to trenches or wellpoints		
Radius influence	73.48		

Essential input
Optional input
Calculated

Removal of OWS infrastructure - Zone 2F

Unconfined flow into a trench, both directions.

After Neville and Wang

Adapted from Mansur and Kaufman (1962)

$$Q = K \left(\frac{L}{R_0} \right) (H - H_d)^2 - (H_d - h)^2$$

	Expected	Min	Max	
Hydraulic conductivity	K 1.67E-03			m/s
Elevation of base of aquifer	h 0.0			m
Radius of influence (from Sichardt)	R ₀ 161.8			m
Width of aquifer transverse to groundwater flow	L 655.0			m
Head at the constant-head boundary	H 2.0			m
Head in the excavation	H _d 0.0			m
Width of trench	1.0			m
Result				
Calculated inflow	Q 2.62E-02			m ³ /s
	2235.45914			m ³ /d
	25.87337			L/s

Mansur and Kaufman (1962) - Dewatering in *Foundation Engineering*

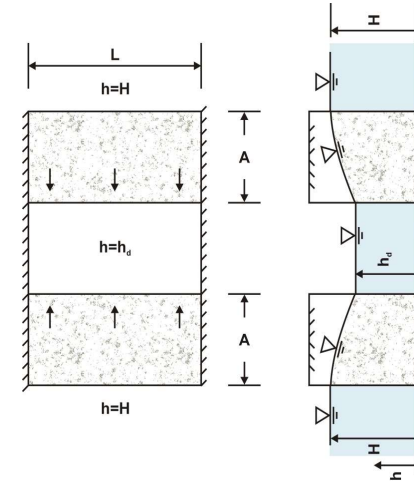
$$Q = -k \frac{(H^2 - h_d^2)}{A} L$$

Data Sources

K _____
 h _____
 R₀ _____
 L _____
 H _____
 H_d _____

A - distance to constant head boundary

Essential input
Optional input
Calculated



Radius of Influence (Sichardt)

$$R_0 = Cs\sqrt{K}$$

	Expected	min	max
Drawdown in well	s 2.0		
Hydraulic conductivity	K 1.67E-03		
	143.9991		
Factor	C 2000		
	3000 for radial flow		
	1500-2000 for line flow to trenches or wellpoints		
Radius influence	160.85		

Essential input
Optional input
Calculated

Removal of OWS infrastructure - Zone 2G

Unconfined flow into a trench, both directions.

After Neville and Wang

Adapted from Mansur and Kaufman (1962)

$$Q = K \left(\frac{L}{R_0} \right) (H - H_d)^2 - (H_d - h)^2$$

	Expected	Min	Max	
Hydraulic conductivity	K 1.67E-03			m/s
Elevation of base of aquifer	h 0.0			m
Radius of influence (from Sichardt)	R ₀ 244.3			m
Width of aquifer transverse to groundwater flow	L 70.0			m
Head at the constant-head boundary	H 3.0			m
Head in the excavation	H _d 0.0			m
Width of trench	1.0			m
Result				
Calculated inflow	Q 4.24E-03			m ³ /s
	362.14619			m ³ /d
	4.19151			L/s

Mansur and Kaufman (1962) - Dewatering in *Foundation Engineering*

$$Q = -k \frac{(H^2 - h_d^2)}{A} L$$

Data Sources

K

h

R₀

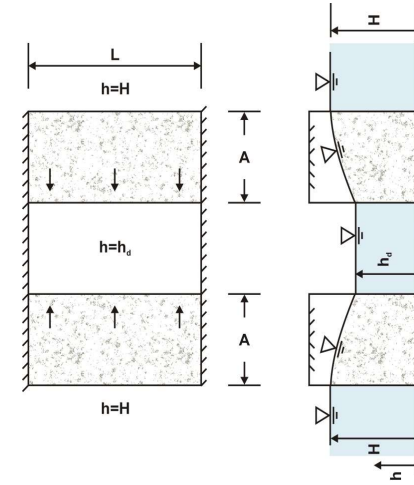
L

H

H_d

A - distance to constant head boundary

Essential input
Optional input
Calculated



Radius of Influence (Sichardt)

$$R_0 = Cs\sqrt{K}$$

	Expected	min	max
Drawdown in well	s 3.0		
Hydraulic conductivity	K 1.67E-03		
	143.9991		
	m/d		
Factor	C 2000		
	3000 for radial flow		
	1500-2000 for line flow to trenches or wellpoints		
Radius influence	243.32		
	m		

Essential input
Optional input
Calculated

Removal of OWS infrastructure - Zone 2P

Unconfined flow into a trench, both directions.

After Neville and Wang

Adapted from Mansur and Kaufman (1962)

$$Q = K \left(\frac{L}{R_0} \right) (H - H_d)^2 - (H_d - h)^2$$

	Expected	Min	Max	
Hydraulic conductivity	K 1.67E-03			m/s
Elevation of base of aquifer	h 0.0			m
Radius of influence (from Sichardt)	R ₀ 22.2			m
Width of aquifer transverse to groundwater flow	L 130.0			m
Head at the constant-head boundary	H 0.3			m
Head in the excavation	H _d 0.0			m
Width of trench	1.0			m
Result				
Calculated inflow	Q 6.59E-04			m ³ /s
	56.27001			m ³ /d
	0.65127			L/s

Mansur and Kaufman (1962) - Dewatering in *Foundation Engineering*

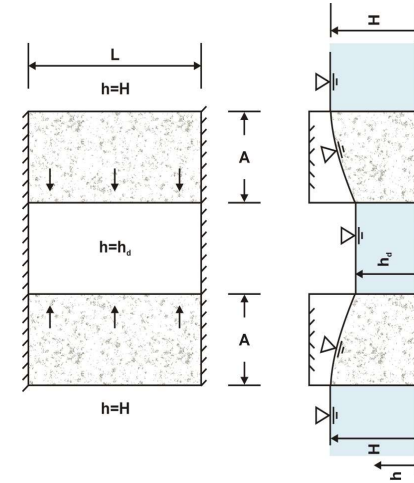
$$Q = -k \frac{(H^2 - h_d^2)}{A} L$$

Data Sources

K	_____
h	_____
R ₀	_____
L	_____
H	_____
H _d	_____

A - distance to constant head boundary

Essential input
Optional input
Calculated



Radius of Influence (Sichardt)

$$R_0 = Cs\sqrt{K}$$

	Expected	min	max
Drawdown in well	s 0.3		
Hydraulic conductivity	K 1.67E-03		
	143.9991		
Factor	C 2000		
	3000 for radial flow 1500-2000 for line flow to trenches or wellpoints		
Radius influence	21.23		

Essential input
Optional input
Calculated

Removal of OWS infrastructure - Zone 3A

Unconfined flow into a trench, both directions.

After Neville and Wang

Adapted from Mansur and Kaufman (1962)

$$Q = K \left(\frac{L}{R_0} \right) (H - H_d)^2 - (H_d - h)^2$$

	Expected	Min	Max	
Hydraulic conductivity	K 1.67E-03			m/s
Elevation of base of aquifer	h 0.0			m
Radius of influence (from Sichardt)	R ₀ 223.9			m
Width of aquifer transverse to groundwater flow	L 830.0			m
Head at the constant-head boundary	H 2.7			m
Head in the excavation	H _d 0.0			m
Width of trench	1.0			m
Result				
Calculated inflow	Q 4.60E-02			m ³ /s
	3932.30866			m ³ /d
	45.51283			L/s

Mansur and Kaufman (1962) - Dewatering in *Foundation Engineering*

$$Q = -k \frac{(H^2 - h_d^2)}{A} L$$

Data Sources

K

h

R₀

L

H

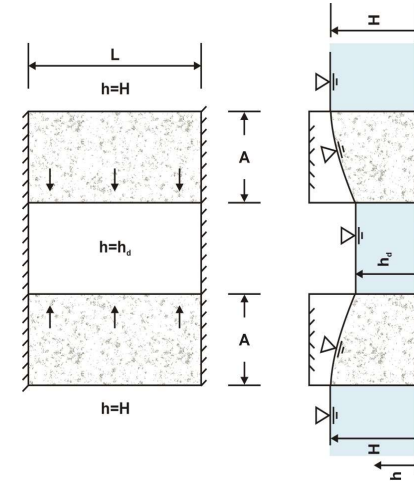
H_d

A - distance to constant head boundary

Essential input

Optional input

Calculated



Radius of Influence (Sichardt)

$$R_0 = Cs\sqrt{K}$$

	Expected	min	max
Drawdown in well	s 2.7		
Hydraulic conductivity	K 1.67E-03		
	143.9991		
Factor	C 2000		
		3000 for radial flow 1500-2000 for line flow to trenches or wellpoints	
Radius influence	222.90		

Essential input

Optional input

Calculated

Removal of OWS infrastructure - Zone 3B

Unconfined flow into a trench, both directions.

After Neville and Wang

Adapted from Mansur and Kaufman (1962)

$$Q = K \left(\frac{L}{R_0} \right) (H - H_d)^2 - (H_d - h)^2$$

	Expected	Min	Max	
Hydraulic conductivity	K 1.67E-03			m/s
Elevation of base of aquifer	h 0.0			m
Radius of influence (from Sichardt)	R ₀ 164.3			m
Width of aquifer transverse to groundwater flow	L 715.0			m
Head at the constant-head boundary	H 2.0			m
Head in the excavation	H _d 0.0			m
Width of trench	1.0			m
Result				
Calculated inflow	Q 2.90E-02			m ³ /s
	2477.62457			m ³ /d
	28.67621			L/s

Mansur and Kaufman (1962) - Dewatering in *Foundation Engineering*

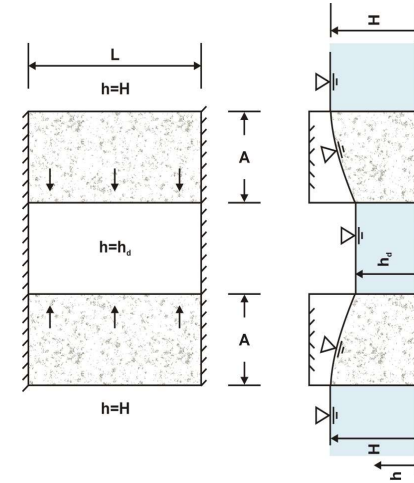
$$Q = -k \frac{(H^2 - h_d^2)}{A} L$$

Data Sources

K	_____
h	_____
R ₀	_____
L	_____
H	_____
H _d	_____

A - distance to constant head boundary

Essential input
Optional input
Calculated



Radius of Influence (Sichardt)

$$R_0 = Cs\sqrt{K}$$

	Expected	min	max
Drawdown in well	s 2.0		
Hydraulic conductivity	K 1.67E-03		
	143.9991		
	m/d		
Factor	C 2000		
	3000 for radial flow		
	1500-2000 for line flow to trenches or wellpoints		
Radius influence	163.30		
	m		

Essential input
Optional input
Calculated

OWS Upgrade - Zone 2H

Unconfined flow into a trench, both directions.

After Neville and Wang

Adapted from Mansur and Kaufman (1962)

$$Q = K \left(\frac{L}{R_0} \right) (H - H_d)^2 - (H_d - h)^2$$

	Expected	Min	Max	
Hydraulic conductivity	K 1.67E-03			m/s
Elevation of base of aquifer	h 0.0			m
Radius of influence (from Sichardt)	R ₀ 227.2			m
Width of aquifer transverse to groundwater flow	L 260.0			m
Head at the constant-head boundary	H 2.8			m
Head in the excavation	H _d 0.0			m
Width of trench	1.0			m
Result				
Calculated inflow	Q 1.46E-02			m ³ /s
	1249.93661			m ³ /d
	14.46686			L/s

Mansur and Kaufman (1962) - Dewatering in *Foundation Engineering*

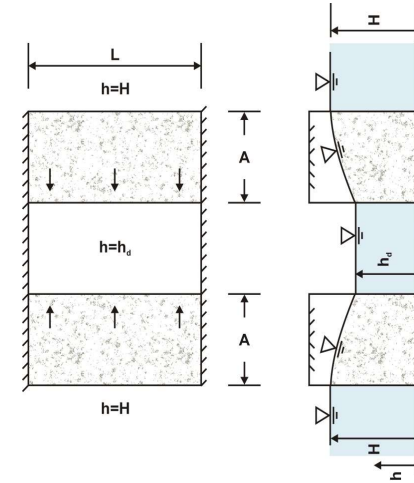
$$Q = -k \frac{(H^2 - h_d^2)}{A} L$$

Data Sources

K _____
h _____
R₀ _____
L _____
H _____
H_d _____

A - distance to constant head boundary

Essential input
Optional input
Calculated



Radius of Influence (Sichardt)

$$R_0 = Cs\sqrt{K}$$

	Expected	min	max
Drawdown in well	s 2.8		
Hydraulic conductivity	K 1.67E-03		
	143.9991		
Factor	C 2000		
	3000 for radial flow		
	1500-2000 for line flow to trenches or wellpoints		
Radius influence	226.17		

Essential input
Optional input
Calculated

OWS Upgrade - Zone 21

Unconfined flow into a trench, both directions.

After Neville and Wang

Adapted from Mansur and Kaufman (1962)

$$Q = K \left(\frac{L}{R_0} \right) (H - H_d)^2 - (H_d - h)^2$$

	Expected	Min	Max	
Hydraulic conductivity	K 1.67E-03			m/s
Elevation of base of aquifer	h 0.0			m
Radius of influence (from Sichardt)	R ₀ 267.2			m
Width of aquifer transverse to groundwater flow	L 40.0			m
Head at the constant-head boundary	H 3.3			m
Head in the excavation	H _d 0.0			m
Width of trench	1.0			m
Result				
Calculated inflow	Q 2.65E-03			m ³ /s
	226.46438			m ³ /d
	2.62112			L/s

Mansur and Kaufman (1962) - Dewatering in *Foundation Engineering*

$$Q = -k \frac{(H^2 - h_d^2)}{A} L$$

Data Sources

K

h

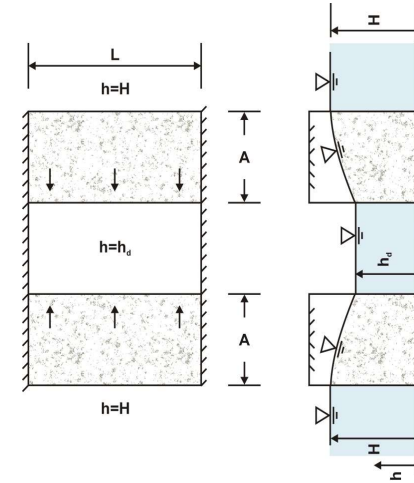
R₀

L

H

H_d

A - distance to constant head boundary



Radius of Influence (Sichardt)

$$R_0 = Cs\sqrt{K}$$

	Expected	min	max
Drawdown in well	s 3.3		
Hydraulic conductivity	K 1.67E-03		
	143.9991		
	m/d		
Factor	C 2000		
	3000 for radial flow		
	1500-2000 for line flow to trenches or wellpoints		
Radius influence	266.18		
	m		

Essential input

Optional input

Calculated

OWS Upgrade - Zone 2K

Unconfined flow into a trench, both directions.

After Neville and Wang

Adapted from Mansur and Kaufman (1962)

$$Q = K \left(\frac{L}{R_0} \right) (H - H_d)^2 - (H_d - h)^2$$

	Expected	Min	Max	
Hydraulic conductivity	K 1.67E-03			m/s
Elevation of base of aquifer	h 0.0			m
Radius of influence (from Sichardt)	R ₀ 92.4			m
Width of aquifer transverse to groundwater flow	L 12.5			m
Head at the constant-head boundary	H 1.1			m
Head in the excavation	H _d 0.0			m
Width of trench	1.0			m
Result				
Calculated inflow	Q 2.83E-04			m ³ /s
	24.14102			m ³ /d
	0.27941			L/s

Mansur and Kaufman (1962) - Dewatering in *Foundation Engineering*

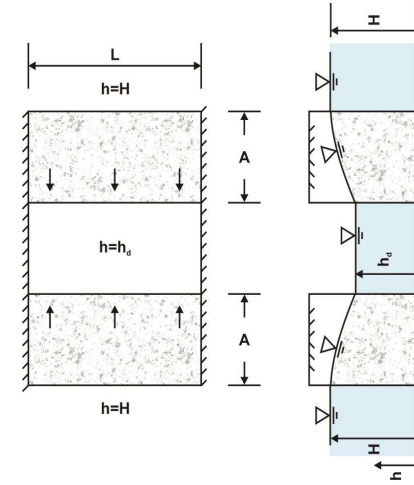
$$Q = -k \frac{(H^2 - h_d^2)}{A} L$$

Data Sources

K _____
 h _____
 R₀ _____
 L _____
 H _____
 H_d _____

A - distance to constant head boundary

Essential input
Optional input
Calculated



Radius of Influence (Sichardt)

$$R_0 = Cs\sqrt{K}$$

	Expected	min	max
Drawdown in well	s 1.1		
Hydraulic conductivity	K 1.67E-03		
	143.9991		
Factor	C 2000		
	3000 for radial flow		
	1500-2000 for line flow to trenches or wellpoints		
Radius influence	91.45		

Essential input
Optional input
Calculated

FWS Augmentation - Zone 1A

Unconfined flow into a trench, both directions.

After Neville and Wang

Adapted from Mansur and Kaufman (1962)

$$Q = K \left(\frac{L}{R_0} \right) (H - H_d)^2 - (H_d - h)^2$$

	Expected	Min	Max	
Hydraulic conductivity	K 1.67E-03			m/s
Elevation of base of aquifer	h 0.0			m
Radius of influence (from Sichardt)	R ₀ 8.3			m
Width of aquifer transverse to groundwater flow	L 265.0			m
Head at the constant-head boundary	H 0.1			m
Head in the excavation	H _d 0.0			m
Width of trench	1.0			m
Result				
Calculated inflow	Q 4.29E-04			m ³ /s
	36.59562			m ³ /d
	0.42356			L/s

Mansur and Kaufman (1962) - Dewatering in *Foundation Engineering*

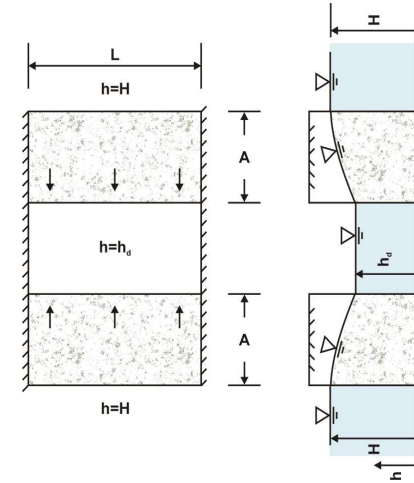
$$Q = -k \frac{(H^2 - h_d^2)}{A} L$$

Data Sources

K _____
 h _____
 R₀ _____
 L _____
 H _____
 H_d _____

A - distance to constant head boundary

Essential input
Optional input
Calculated



Radius of Influence (Sichardt)

$$R_0 = Cs\sqrt{K}$$

	Expected	min	max
Drawdown in well	s 0.1		
Hydraulic conductivity	K 1.67E-03		
	143.9991		
Factor	C 2000		
		3000 for radial flow 1500-2000 for line flow to trenches or wellpoints	
Radius influence	7.35		

Essential input
Optional input
Calculated

FWS Augmentation - Zone 1B

Unconfined flow into a trench, both directions.

After Neville and Wang

Adapted from Mansur and Kaufman (1962)

$$Q = K \left(\frac{L}{R_0} \right) (H - H_d)^2 - (H_d - h)^2$$

	Expected	Min	Max	
Hydraulic conductivity	K 1.67E-03			m/s
Elevation of base of aquifer	h 0.0			m
Radius of influence (from Sichardt)	R ₀ 32.0			m
Width of aquifer transverse to groundwater flow	L 200.0			m
Head at the constant-head boundary	H 0.4			m
Head in the excavation	H _d 0.0			m
Width of trench	1.0			m
Result				
Calculated inflow	Q 1.50E-03			m ³ /s
	128.34764			m ³ /d
	1.48551			L/s

Mansur and Kaufman (1962) - Dewatering in *Foundation Engineering*

$$Q = -k \frac{(H^2 - h_d^2)}{A} L$$

Data Sources

K

h

R₀

L

H

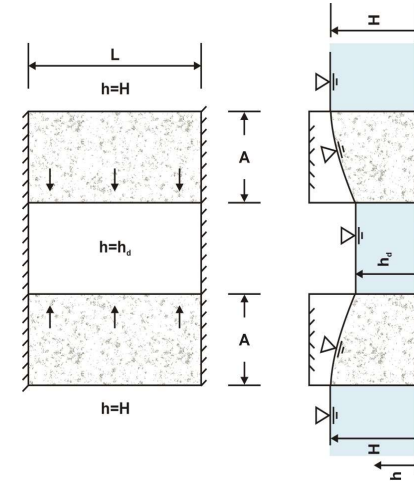
H_d

A - distance to constant head boundary

Essential input

Optional input

Calculated



Radius of Influence (Sichardt)

$$R_0 = Cs\sqrt{K}$$

	Expected	min	max
Drawdown in well	s 0.4		
Hydraulic conductivity	K 1.67E-03		
	143.9991		
	m/d		
Factor	C 2000		
	3000 for radial flow		
	1500-2000 for line flow to trenches or wellpoints		
Radius influence	31.03		
	m		

Essential input

Optional input

Calculated

FWS Augmentation - Zone 1C

Unconfined flow into a trench, both directions.

After Neville and Wang

Adapted from Mansur and Kaufman (1962)

$$Q = K \left(\frac{L}{R_0} \right) (H - H_d)^2 - (H_d - h)^2$$

	Expected	Min	Max	
Hydraulic conductivity	K 1.67E-03			m/s
Elevation of base of aquifer	h 0.0			m
Radius of influence (from Sichardt)	R ₀ 7.5			m
Width of aquifer transverse to groundwater flow	L 200.0			m
Head at the constant-head boundary	H 0.1			m
Head in the excavation	H _d 0.0			m
Width of trench	1.0			m
Result				
Calculated inflow	Q 2.83E-04			m ³ /s
	24.18835			m ³ /d
	0.27996			L/s

Mansur and Kaufman (1962) - Dewatering in *Foundation Engineering*

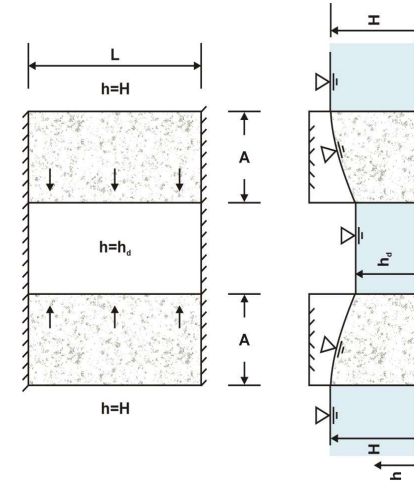
$$Q = -k \frac{(H^2 - h_d^2)}{A} L$$

Data Sources

K	_____
h	_____
R ₀	_____
L	_____
H	_____
H _d	_____

A - distance to constant head boundary

Essential input
Optional input
Calculated



Radius of Influence (Sichardt)

$$R_0 = Cs\sqrt{K}$$

	Expected	min	max
Drawdown in well	s 0.1		
Hydraulic conductivity	K 1.67E-03		
	143.9991		
	m/d		
Factor	C 2000		
	3000 for radial flow		
	1500-2000 for line flow to trenches or wellpoints		
Radius influence	6.53		
	m		

Essential input
Optional input
Calculated

FWS Augmentation - Zone 1D

Unconfined flow into a trench, both directions.

After Neville and Wang

Adapted from Mansur and Kaufman (1962)

$$Q = K \left(\frac{L}{R_0} \right) (H - H_d)^2 - (H_d - h)^2$$

	Expected	Min	Max	
Hydraulic conductivity	K 1.67E-03			m/s
Elevation of base of aquifer	h 0.0			m
Radius of influence (from Sichardt)	R ₀ 62.2			m
Width of aquifer transverse to groundwater flow	L 270.0			m
Head at the constant-head boundary	H 0.8			m
Head in the excavation	H _d 0.0			m
Width of trench	1.0			m
Result				
Calculated inflow	Q 4.07E-03			m ³ /s
	347.32908			m ³ /d
	4.02001			L/s

Mansur and Kaufman (1962) - Dewatering in *Foundation Engineering*

$$Q = -k \frac{(H^2 - h_d^2)}{A} L$$

Data Sources

K

h

R₀

L

H

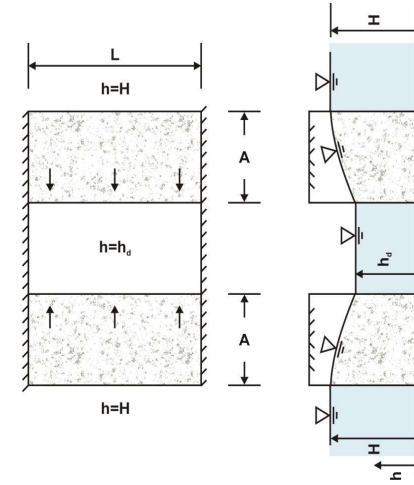
H_d

A - distance to constant head boundary

Essential input

Optional input

Calculated



Radius of Influence (Sichardt)

$$R_0 = Cs\sqrt{K}$$

	Expected	min	max
Drawdown in well	s 0.8		
Hydraulic conductivity	K 1.67E-03		
	143.9991		
	m/d		
Factor	C 2000		
	3000 for radial flow		
	1500-2000 for line flow to trenches or wellpoints		
Radius influence	61.24		
	m		

Essential input

Optional input

Calculated

FWS Augmentation - Zone 1F

Unconfined flow into a trench, both directions.

After Neville and Wang

Adapted from Mansur and Kaufman (1962)

$$Q = K \left(\frac{L}{R_0} \right) (H - H_d)^2 - (H_d - h)^2$$

	Expected	Min	Max	
Hydraulic conductivity	K 1.67E-03			m/s
Elevation of base of aquifer	h 0.0			m
Radius of influence (from Sichardt)	R ₀ 66.3			m
Width of aquifer transverse to groundwater flow	L 120.0			m
Head at the constant-head boundary	H 0.8			m
Head in the excavation	H _d 0.0			m
Width of trench	1.0			m
Result				
Calculated inflow	Q 1.93E-03			m ³ /s
	164.82523			m ³ /d
	1.90770			L/s

Mansur and Kaufman (1962) - Dewatering in *Foundation Engineering*

$$Q = -k \frac{(H^2 - h_d^2)}{A} L$$

Data Sources

K

h

R₀

L

H

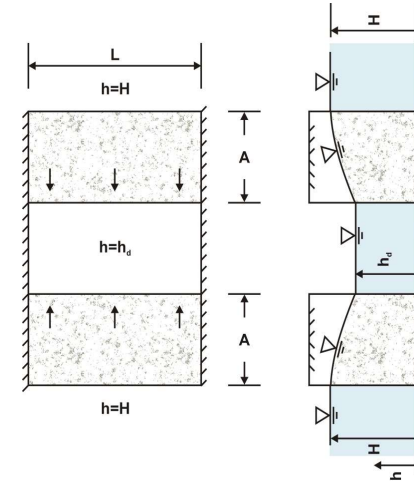
H_d

A - distance to constant head boundary

Essential input

Optional input

Calculated



Radius of Influence (Sichardt)

$$R_0 = Cs\sqrt{K}$$

	Expected	min	max
Drawdown in well	s 0.8		
Hydraulic conductivity	K 1.67E-03		
	143.9991		
	m/d		
Factor	C 2000		
	3000 for radial flow		
	1500-2000 for line flow to trenches or wellpoints		
Radius influence	65.32		
	m		

Essential input

Optional input

Calculated

FWS Augmentation - Zone 1G

Unconfined flow into a trench, both directions.

After Neville and Wang

Adapted from Mansur and Kaufman (1962)

$$Q = K \left(\frac{L}{R_0} \right) (H - H_d)^2 - (H_d - h)^2$$

	Expected	Min	Max	
Hydraulic conductivity	K 1.67E-03			m/s
Elevation of base of aquifer	h 0.0			m
Radius of influence (from Sichardt)	R ₀ 38.6			m
Width of aquifer transverse to groundwater flow	L 350.0			m
Head at the constant-head boundary	H 0.5			m
Head in the excavation	H _d 0.0			m
Width of trench	1.0			m
Result				
Calculated inflow	Q 3.20E-03			m ³ /s
	273.37885			m ³ /d
	3.16411			L/s

Mansur and Kaufman (1962) - Dewatering in *Foundation Engineering*

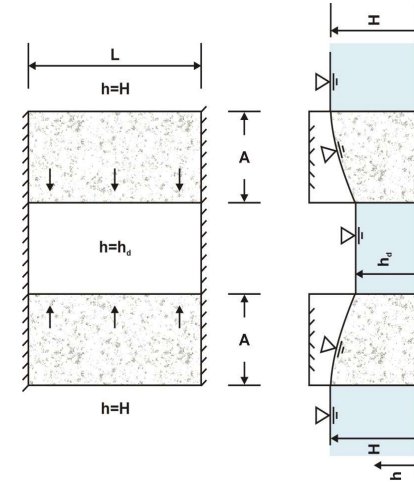
$$Q = -k \frac{(H^2 - h_d^2)}{A} L$$

Data Sources

K _____
 h _____
 R₀ _____
 L _____
 H _____
 H_d _____

A - distance to constant head boundary

Essential input
Optional input
Calculated



Radius of Influence (Sichardt)

$$R_0 = Cs\sqrt{K}$$

	Expected	min	max
Drawdown in well	s 0.5		
Hydraulic conductivity	K 1.67E-03		
	143.9991		
	m/d		
Factor	C 2000		
	3000 for radial flow		
	1500-2000 for line flow to trenches or wellpoints		
Radius influence	37.56		
	m		

Essential input
Optional input
Calculated

FWS Augmentation - Zone 2L

Unconfined flow into a trench, both directions.

After Neville and Wang

Adapted from Mansur and Kaufman (1962)

$$Q = K \left(\frac{L}{R_0} \right) (H - H_d)^2 - (H_d - h)^2$$

	Expected	Min	Max	
Hydraulic conductivity	K 1.67E-03			m/s
Elevation of base of aquifer	h 0.0			m
Radius of influence (from Sichardt)	R ₀ 23.0			m
Width of aquifer transverse to groundwater flow	L 530.0			m
Head at the constant-head boundary	H 0.3			m
Head in the excavation	H _d 0.0			m
Width of trench	1.0			m
Result				
Calculated inflow	Q 2.79E-03			m ³ /s
	238.62952			m ³ /d
	2.76192			L/s

Mansur and Kaufman (1962) - Dewatering in *Foundation Engineering*

$$Q = -k \frac{(H^2 - h_d^2)}{A} L$$

Data Sources

K

h

R₀

L

H

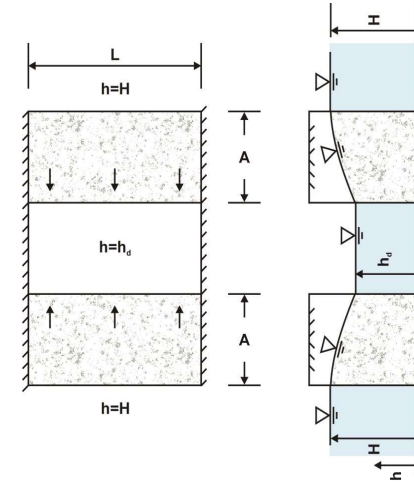
H_d

A - distance to constant head boundary

Essential input

Optional input

Calculated



Radius of Influence (Sichardt)

$$R_0 = Cs\sqrt{K}$$

	Expected	min	max
Drawdown in well	s 0.3		
Hydraulic conductivity	K 1.67E-03		
	143.9991		
	m/d		
Factor	C 2000		
	3000 for radial flow		
	1500-2000 for line flow to trenches or wellpoints		
Radius influence	22.05		
	m		

Essential input

Optional input

Calculated

FWS Augmentation - Zone 2M

Unconfined flow into a trench, both directions.

After Neville and Wang

Adapted from Mansur and Kaufman (1962)

$$Q = K \left(\frac{L}{R_0} \right) (H - H_d)^2 - (H_d - h)^2$$

	Expected	Min	Max	
Hydraulic conductivity	K 1.67E-03			m/s
Elevation of base of aquifer	h 0.0			m
Radius of influence (from Sichardt)	R ₀ 68.0			m
Width of aquifer transverse to groundwater flow	L 220.0			m
Head at the constant-head boundary	H 0.8			m
Head in the excavation	H _d 0.0			m
Width of trench	1.0			m
Result				
Calculated inflow	Q 3.63E-03			m ³ /s
	309.84804			m ³ /d
	3.58620			L/s

Mansur and Kaufman (1962) - Dewatering in *Foundation Engineering*

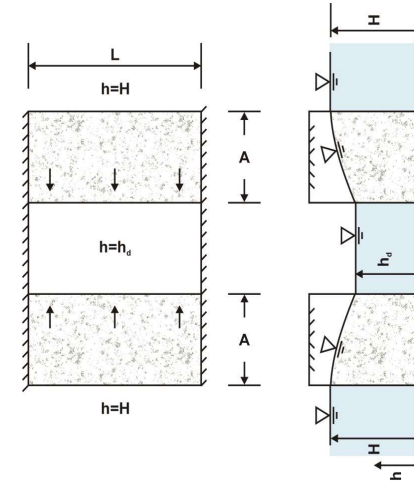
$$Q = -k \frac{(H^2 - h_d^2)}{A} L$$

Data Sources

K _____
 h _____
 R₀ _____
 L _____
 H _____
 H_d _____

A - distance to constant head boundary

Essential input
Optional input
Calculated



Radius of Influence (Sichardt)

$$R_0 = Cs\sqrt{K}$$

	Expected	min	max
Drawdown in well	s 0.8		
Hydraulic conductivity	K 1.67E-03		
	143.9991		
	m/d		
Factor	C 2000		
	3000 for radial flow		
	1500-2000 for line flow to trenches or wellpoints		
Radius influence	66.95		
	m		

Essential input
Optional input
Calculated