Prepared for
Ampol Australia Petroleum Pty Ltd
ABN: 17 000 032 128

Kurnell Terminal SSD-5544 MOD-7

Appendix I - Surface Water, Wastewater and Flooding

12-May-2025

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Revision 3 – 12-May-2025
Prepared for – Ampol Australia Petroleum Pty Ltd – ABN: 17 000 032 128

Kurnell Terminal SSD-5544 MOD-7

Appendix I - Technical Report - Surface Water, Wastewater and Flooding

Client: Ampol Australia Petroleum Pty Ltd

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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) announced 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 complete the conversion and demolition works.

Ampol intends to consolidate operational infrastructure, remove redundant assets, and undertake remediation and grading. Completion of these works (the 'proposed modification', MOD-7) would continue the safe, viable, and reliable operation of the Kurnell Terminal whilst preparing the Site for future uses. 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 the potential surface water, wastewater, and flooding impacts. 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.

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

Design of the proposed modification has included and/or considered the following mitigation measures to prevent offsite impacts:

- Required earthworks would not remove existing bunding around former bunded tank areas across the eastern side of Zone 2.
- To prevent loss of existing flood storage and to avoid offsite flooding impacts:
  - Where grading is required to facilitate future land uses in the western half of Zone 2 and northern part of Zone 3, a minor reduction in flood storage would be managed through existing stormwater systems for Catchment B & D at the Site
  - Where grading is not required, earthworks and capping would be completed in a manner that does not raise existing surface levels in areas of existing flood storage, in all events up to and including the 1% AEP flood event. For example, areas requiring up to 300 mm of capping that are within areas of flood storage would need to be initially excavated by 300 mm before the capping occurs.
- Two separate OSD systems are proposed in Catchment E to limit post-modification discharge rates back to pre-modification discharge rates along the existing Sir Joseph Banks Drive drainage channel. Caltex Lubricating Oil Refinery (CLOR) pipeways A & B would be utilised for stormwater detention at the north-western corner of Catchment E and a new OSD is proposed in the RPIP area at the south-eastern corner of Catchment E. Preliminary modelling completed as part of this assessment has indicated that a total detention storage volume in the order of 6,100 m^3 would be required across both systems. This volume should be treated as indicative only and would need to be further assessed during the subsequent design phases considering both frequent events and large-rare storm events based on flood modelling assessment.
- Stormwater quality mitigation measures are proposed to mitigate potential water quality impacts on downstream sensitive receptors.

While several measures have been recommended to mitigate and/or eliminate potential surface water, wastewater, water quality and flooding 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, provided that the relevant legislation, polices, 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) announced 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 complete 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 and grading. Completion of these works (the 'proposed modification', MOD-7) would continue the safe, viable, and reliable operation of the Kurnell Terminal, whilst preparing the land for future uses. 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. This *Technical report – Surface Water, Wastewater and Flooding* is one of a number of technical documents that forms part of the Modification Report. In line with the requirements of Section 4.55 of the *Environmental Planning & Assessment Act 1979* (EP&A Act), the Modification Report provides the information required by Section 100 of the *Environmental Planning and Assessment Regulation 2021* (EP&A Regulation).

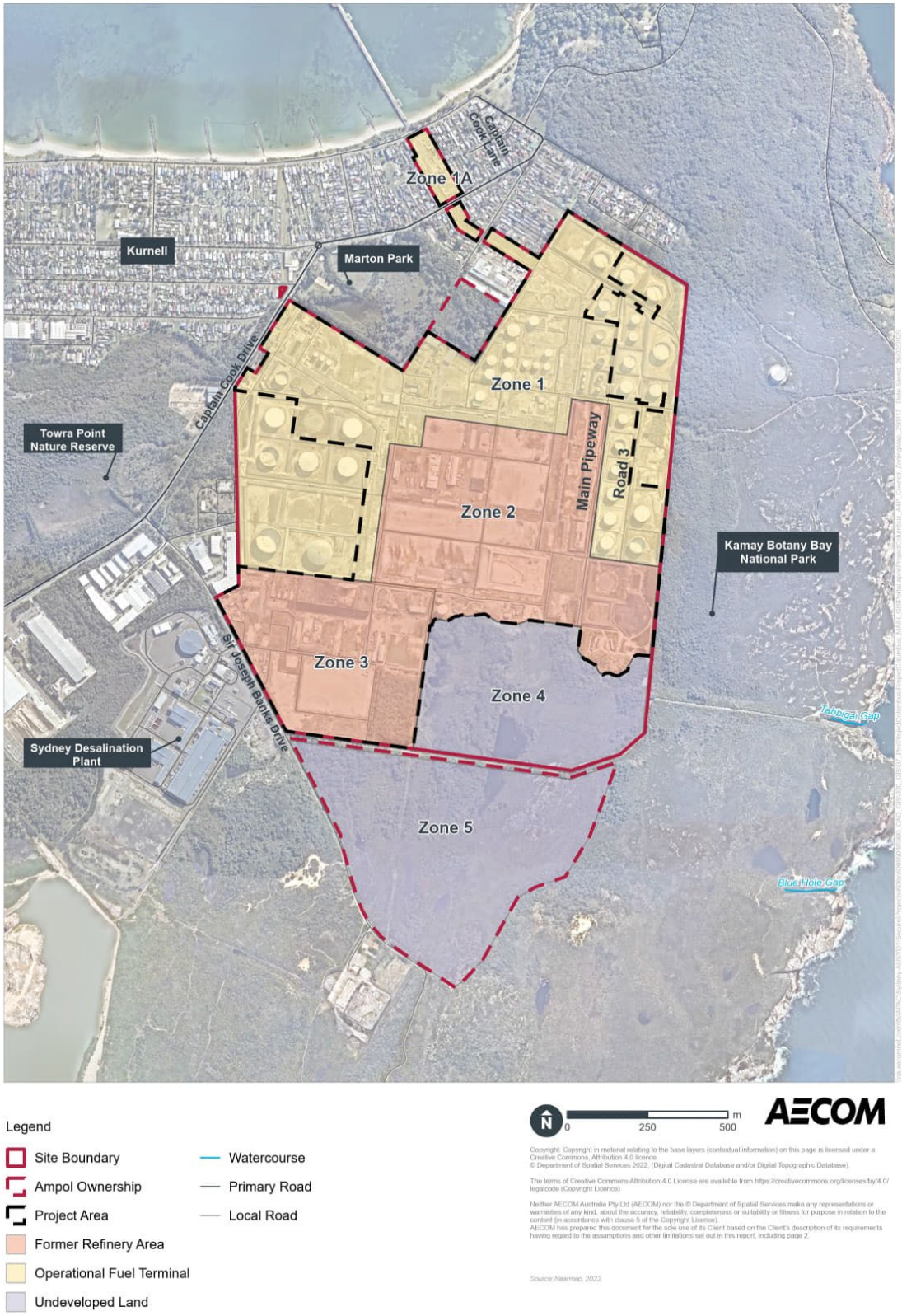


Figure 1-1 Ampol Kurnell Terminal (the Site)

1.2 The proposed modification

1.2.1 Key elements of the proposed modification

To support the continued safe, viable, and reliable operation of the Site and to facilitate the future use of the Site, 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 replacement warehouses
  - Decommissioning and removal of non-operational assets, redundant structures, and electrical assets.
- **Stage 3 – Remediation**: Addressing legacy ground contamination, including asbestos-contaminated soil (ACS).
- **Stage 4 – Grading**: Landforming the Project Area following removal of infrastructure and ground remediation activities and preparing Zones 2 and 3 for future use.
- **Stage 5 – Demobilisation**: Demobilisation of construction and remediation equipment.

These stages may occur sequentially or concurrently, depending on site requirements.

A summary of project elements requiring modification and how they relate to the approved project is provided in Table 1-1. The proposed modification works would be undertaken within the Project Area shown on Figure 1-2. All activities would adhere to the Kurnell Terminal permit to work system to ensure 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	• Prepare the Project Area for the proposed modification works required under Stages 2, 3 and 4 and exclude other parts of the Site from proposed modification works.
Stage 2	Oily water sewer (OWS)	Maintain location in Zones 2 and 3	• Divert surface water runoff from potentially contaminated areas in Zone 2 to Zone 1 via new OWS interception pits/ lines until Stage 3 remediation is complete. • Divert potential leachate from ACS containment cell in Zone 2 to Zone 1 OWS system. • Remove all redundant OWS infrastructure.
	Fire-water systems (FWS)	Maintain location in Zone 2 and 3	• Augment or remove FWS infrastructure from Zones 2 and 3. • If removed from Zone 2, augment existing FWS in Zone 1 with a new firewater tank and pipework to service the terminal infrastructure. • Locate the new firewater tank and pumphouse within the FWS Relocation Area (specific siting selected during detailed design).
	Electrical assets	Maintain location in Zone 2 and 3	• Remove redundant electrical assets in Zones 2 and 3, including five substations.

Stage	Element	Approved project	Modified project
	Structures	Maintain location in Zone 2 and 3	• Demolish remaining structures in Zones 2 and 3. • Construct new 'fit for purpose' warehouse and Oil Spill Equipment Storeroom within Zone 1. • Construct new storage shed in Zone 1A.
Stage 3	Remediation	Removal of ACS from pipeways and either containment onsite or offsite disposal	• Remediate land in Zones 2 and 3 as necessary. • Remediate land in Zone 1 where infrastructure is relocated and/ or augmented as necessary. • Conduct remediation to a commercial/ industrial land use under the ASC NEPM (2013).
Stage 4	OWS	Maintain location in Zones 2 and 3	• Disconnect and remove remaining underground OWS lines from Zones 2 and 3, except for lines connecting to the ACS Containment Cell. • Install a new pump adjacent to the ACS Containment Cell. Two site options have been identified (specific siting selected during detailed design).
Stage 4	Grading	Grading following demolition of structures and removal of infrastructure across the Site and relevant Project Areas	• Construct new onsite detention (OSD) basins in Zone 3 to attenuate runoff and maintain pre-construction surface water flow rates. • Grade Zone 2 following Stage 2 and Stage 3 activities to manage stormwater and prepare for future land uses. • Grade Zones 1 and 3 as necessary.
Stage 5	Demobilisation	Demobilisation of construction equipment.	• Demobilisation of construction equipment.

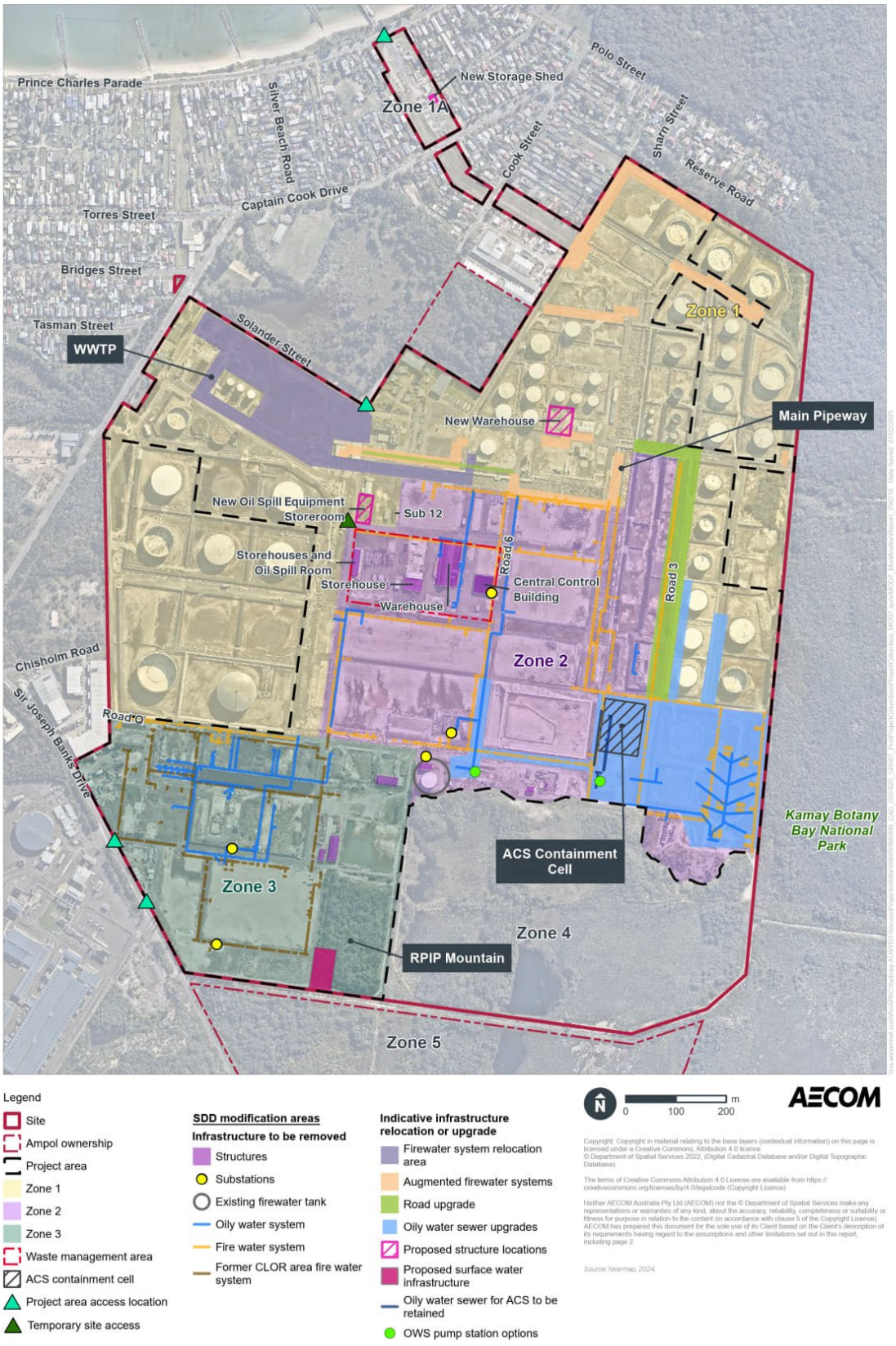


Figure 1-2 The proposed modification

Once the 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.

In line with Figure 1-2, relocated equipment would operate in their new locations.

Grading

Following remediation works, the Project Area would be graded to facilitate the ongoing management of the Kurnell Terminal and/ or future land uses in the western half of Zone 2 and northern part of Zone 3. The levels across the rest of the Project Area would remain the same as existing. Grading would allow stormwater flows across Zones 2 and 3 to be directed to the existing SWS at the Site and for flows in Zone 1 to be managed by either the SWS or the OWS, as required.

The concept landform plan is presented in Figure 1-3.

Surface treatments, such as grassing or temporary pavement, would be provided to help mitigate soil erosion and limit sediment discharging into the existing drainage network.

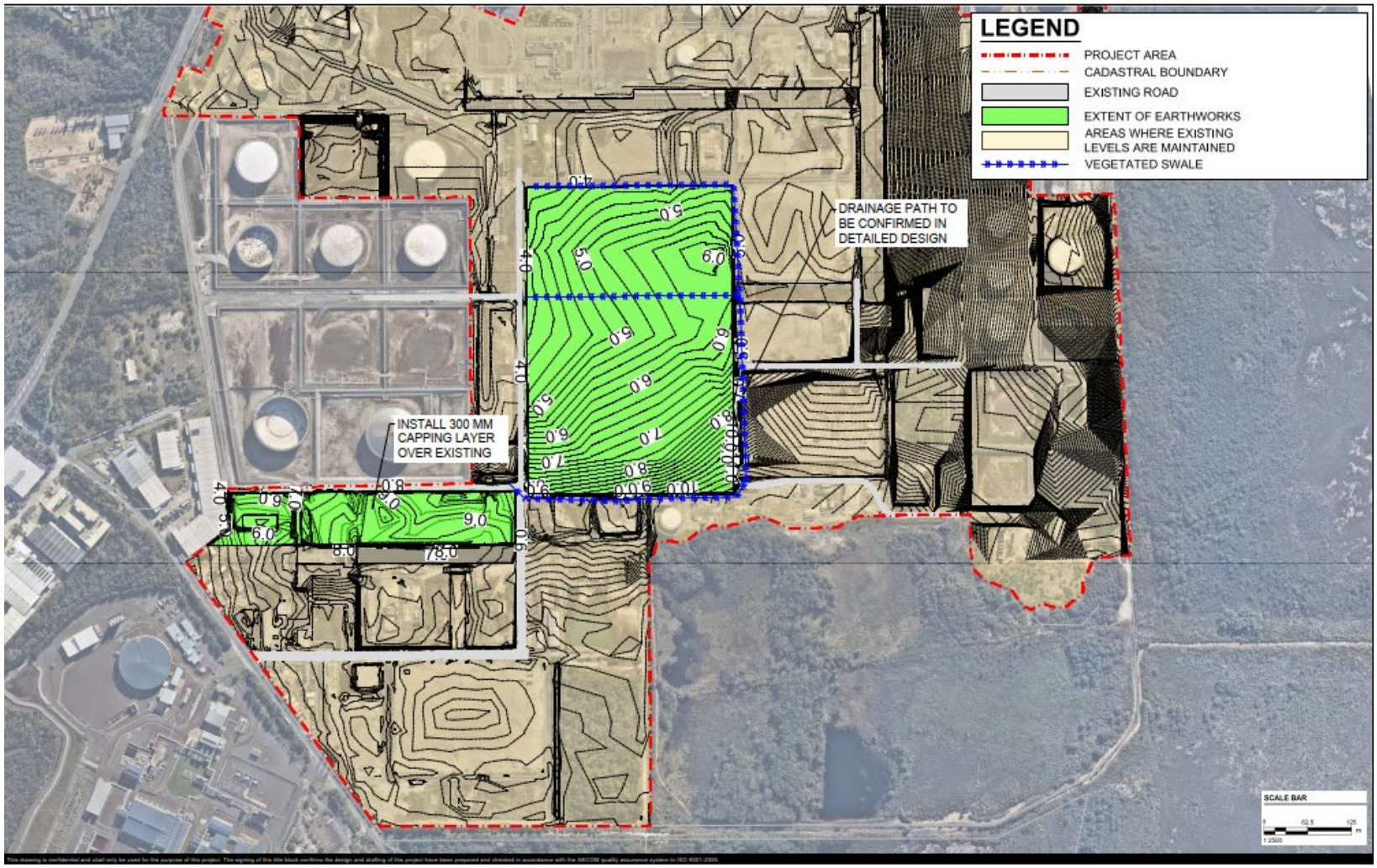


Figure 1-3 Concept landform plan

Note: Levels in AHD

1.2.2 Construction timeline and equipment

Works are planned to commence in August 2025 and would continue for about 12 months for infrastructure removal scopes and up to four years for remediation works in accordance with the schedule in Table 1-2.

In line with Condition C18 of SSD-5544, construction works would comply with following hours:

- Monday to Sunday – 7am to 10pm.

High noise generating construction works, including works within the Eastern Right of Way (Zone 1A), would be confined to less sensitive times of the day and not undertaken on Sundays, public holidays, or outside of the hours 7am and 6pm Monday to Saturday (in line with Condition C19).

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) and 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.

Table 1-2 Proposed modification program

Stage	Timeframe
Stage 1 – Preparation works	August 2025
Stage 2 – Removal and/or relocation of infrastructure[1]	August 2025 – August 2026
Stage 3 – Remediation	August 2025 – July 2029
Stage 4 – Grading	Zone 2: August 2026 – December 2026 Zone 3: up to July 2029
Stage 5 – Demobilisation	September 2026 (for all works except remediation)
[1] Construction in Zone 1A expected to last 3 months.	

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 required per day (all stages except Stage 3)	Maximum number required per day (Stage 3)
Front end loader	6	6
20 t excavator	6	6
Dump truck	6	6
Grader (up to 7 m blade)	-	4
Large crane (60 t)	4	-
Elevated work platform	6	-
Franna crane (30 t)	6	-
Cement truck	6	-
Bobcat	6	2
Water cart	6	6
Concrete crusher	2	-
Telehandler	6	-
Truck and dog (offsite disposal)	6	6
Truck and dog (imported fill)	-	12
Generator	2	2
Biopiling blower	-	8

1.3 Purpose of this report

This *Technical report – Surface Water, Wastewater and Flooding* is one of a number of technical documents that forms part of the Modification Report. The purpose of this report is to understand potential impacts of the proposed modification upon surface water, wastewater and flooding.

2.0 Assessment methodology

2.1 General

An assessment of the potential impacts on surface water, wastewater, and flooding as a result of the proposed modification has been carried out with consideration to the relevant legislation, policies, guidelines and the Site's current Environment Protection Licence (EPL).

The adopted methodology for assessing the potential impacts on surface water, wastewater and flooding includes:

- Consideration of the legislative framework that governs the proposed modification
- A desktop review of existing information to characterise the existing environment, identify surface water receptors, and describe the existing management of surface water, wastewater, and flooding at the Site
- Assessment of potential construction, operational, and cumulative impacts relating to surface water, wastewater, and flooding
- Identification of appropriate mitigation and management measures to manage potential impacts on the environment.

The relevant legislation, policies, and guidelines used to inform this impact assessment, as well as assumptions and limitations to this assessment, have been summarised in the following sections.

2.2 Legislation, policies and guidelines

Various legislation, policies, and guidelines apply to the proposed modification. Those relevant to the management of surface water, wastewater and flooding have informed this assessment.

2.2.1 Relevant legislation and policies

The key legislation and policies have been summarised in Table 2-1.

Table 2-1 Relevant legislation and policies

Legislation/ policy	Relevance
Protection of the Environment Operations Act 1997 The *Protection of the Environment Operations Act 1997* (POEO Act) is the key piece of environment protection legislation used by the NSW Environment Protection Authority (EPA) and other public authorities to prevent, control and investigate pollution in NSW.	The POEO Act provides for the issue of an EPL for scheduled development and activities listed under Section 43 of the Act including scheduled activities pursuant to Section 48 of the POEO Act, in relation to pollution and waste disposal caused by development or the operation of developments. Ampol has an existing EPL (No. 837) for the Site that authorises the scheduled activities, including the treatment requirements for polluted waters prior to discharging offsite. The proposed modification would not change the requirements of the existing EPL and would not introduce a new scheduled activity to the Site.

Legislation/ policy	Relevance
Contaminated Land Management Act 1997 The general objective of the *Contaminated Land Management Act 1997* (CLM Act) is to establish a process for investigating and (where appropriate) remediating land that the New South Wales Environment Protection Authority (EPA) considers to be contaminated enough to require regulation under Division 2 of Part 3 of the CLM Act.	As stated above, the Site operates under an existing EPL-837 and is regulated under the POEO Act. Disturbance of material within the Site as part of the proposed modification has the potential to liberate contaminants and requires further consideration. Potential impacts of contaminated material and mitigation measures are discussed in this report.
Water Management Act 2000 (NSW) The *Water Management Act 2000* (WM Act) governs the issue of water access licences and approvals for those water sources (rivers, lakes, estuaries, and groundwater) in New South Wales where water sharing plans have commenced. If an activity results in a net loss of either groundwater or surface water from a source covered by a water sharing plan, then an approval and/or licence is required.	The Site is located within the area covered by the commenced Water Sharing Plan entitled the 'Greater Metropolitan Region Groundwater Sources' 2011; however, the proposed modification would not impact groundwater resources and thus approval/ licencing under the WM Act is not required.
Coastal Management Act 2016 (NSW) The *Coastal Management Act 2016* (CM Act) establishes a framework for coastal management in NSW. The purpose of the CM Act is to manage the use and development of the coastal environment in an ecologically sustainable manner.	Parts of the Site are located within land zoned as 'Proximity Area for Coastal Wetlands,' as defined by the CM Act.
State Environmental Planning Policy (Resilience and Hazards) 2021 The objective of the *State Environmental Planning Policy (Resilience and Hazards) 2021* (Resilience and Hazards SEPP) is to provide state-wide planning approach to resilience and hazards.	The chapters of the Resilience and Hazard SEPP relevant to the proposed modification, include: • Chapter 2 Coastal management • Chapter 4 Remediation of land. Chapter 2 aims to promote an integrated and coordinated approach to land use planning in the coastal zone in a manner consistent with the objectives of the *Coastal Management Act 2016*. The proposed modification would involve contaminated land remediation. It would also involve the modification of the existing OWS system which could potentially lead to contamination during construction. Section 2.8 of the Resilience and Hazards SEPP states that development consent must not be granted on land identified as a 'Proximity Area for Coastal Wetlands' unless the consent authority is satisfied that the proposed development would not significantly impact on: *(a) the biophysical, hydrological, or ecological integrity of the adjacent coastal wetland or littoral rainforest, or*

Legislation/ policy	Relevance
	(b) the quantity and quality of surface and ground water flows to and from the adjacent coastal wetland or littoral rainforest.
Environment Protection and Biodiversity Conservation Act 1999 The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) provides a framework for protection of the Australian environment, including its biodiversity and its natural and culturally significant places.	Part 3 of the EPBC Act states that an action which has, will have, or is likely to have a significant impact on a Matter of National Environmental Significance (MNES) may not be undertaken without prior approval of the Commonwealth Minister for Environment under the provisions of Part 9 of the Act. Kurnell Terminal 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 Kurnell Peninsula Headland is also included in the National Heritage List (NHL) (listing number: 105812). The NHL was established under the EPBC Act to protect places that have outstanding significance to the nation. Approval from the Minister is required under the EPBC Act for controlled actions which are deemed would have a significant impact on items and places listed under the NHL and on Ramsar Wetlands.
Sutherland Shire Local Environmental Plan 2015 The Sutherland Shire Local Environmental Plan (LEP) 2015 guides planning decisions across the local government area (LGA) of the Sutherland Shire Council through zoning and development controls. More specifically, it provides a local framework for the way land can be developed and used within the LGA.	The Site is located within the Sutherland Shire Council LGA and is therefore subject to the planning controls set out in this LEP. The Site is zoned as 'E5 Heavy Industrial' under this LEP. The LEP has the following surface water requirements: • To provide areas for industries that need to be separated from other land uses: existing stormwater management system on the Site might need to be upgraded and separated from surrounding land uses by better managing contaminated stormwater. • To ensure the efficient and viable use of land for industrial uses: the site to be designed to ensure that contaminated stormwater is kept separate from clean stormwater flows so it can be appropriately managed. • To minimise adverse effect of industry on other land uses: the site to be designed to ensure stormwater runoff from the Site is appropriately treated before leaving the Site.

Legislation/ policy	Relevance
Sutherland Shire Council Development Control Plan 2015 The Sutherland Shire Development Control Plan (DCP) 2015 supports the above LEP and expands on its principal development standards. It provides detailed guidelines for developments located in the Sutherland Shire Council LGA, including specific guidelines for the management of drainage, flooding and water quality. The DCP also references the *Sutherland Shire Environmental Specification – Stormwater Management* (Stormwater Specification) which includes the stormwater management requirements for developments located in the Sutherland Shire Council LGA (Sutherland Shire Council, 2009).	The DCP and associated Stormwater Specification has a number of surface water management requirements that are applicable to the proposed modification. The proposed modification would comply with the requirements and controls detailed in this DCP. Some of the surface water development requirements applicable to the proposed modification include: • Surface water must be managed onsite to ensure the post-development peak discharge rates do not exceed pre-development discharge rates. • Developments must not exacerbate existing flooding conditions. • Developments must reduce pollutants and sediments in surface water discharge to minimise the effect of surface water on the receiving environment, by achieving the following: - 80% retention of the total suspended solids (TSS) average annual load - 40% retention of the total phosphorus (TP) average annual load - 40% retention of the total nitrogen (TN) average annual load - Total retention of oils, greases, and gross pollutants greater than 50 mm in a 1 in 3 month average recurrence interval (ARI) • Developments must also achieve the long-term goal of ensuring the total concentration of TP, TN, and other pollutants discharging offsite meet the ANZECC & ARMCANZ (2000) Guidelines for aquatic ecosystems.

2.2.2 Guidelines

The key guidelines have been summarised in Table 2-2.

Table 2-2 Relevant guidelines

Guidelines	Relevance
National Water Quality Management Strategy (Department of Agriculture and Water Resources, 2018) The National Water Quality Management Strategy (NWQMS) provides nationally agreed policies, processes and guidelines that form part of the national water reform agenda. Its overarching objective is to achieve sustainable use of the nation's water resources by protecting and enhancing their quality while maintaining economic and social development.	The proposed modification has the potential to impact the quality of water discharging offsite, to receiving waterbodies. The water quality values and management goals for these downstream waterbodies have been reviewed in order to devise suitable management strategies for the proposed modification in order to protect receiving water resources systems. Water quality management strategies would adhere to requirements of the relevant ANZG and satisfy the objectives of the NWQMS.

Guidelines	Relevance
One of the primary guidelines for managing water quality under the NWQMS is the Australian and New Zealand Guidelines (ANZG) for Fresh and Marine Water Quality (ANZG, 2018). These guidelines provide a water quality management framework to protect the community values of waterways. These guidelines were first published in 1992 by the Australian and New Zealand Environment and Conservation Council (ANZECC). They were later revised in 2000, in conjunction with the Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ) (ANZECC & ARMCANZ, 2000). This version was then updated and replaced in 2018, in the form of an online platform (ANZG, 2018).	
Managing Urban Stormwater: Soils and Construction (Landcom, 2004) These guidelines, commonly known as the 'Blue Book', provide support for councils and industry to reduce the impacts of land disturbance activities on waterways by better management of soil erosion and sediment control. Enhanced management contributes to the reduction of pollution in receiving waters, minimises land degradation, identifies and implements principles of ecologically sustainable development, and improves the health, ecology, and amenity of urban waterways.	Relevant erosion and sediment controls and water quality management approaches outlined in the Blue Book would be included as appropriate to help mitigate potential impacts on downstream receiving waterways during both construction and operational phases of the proposed modification.
Australian Runoff Quality – A guide to Water Sensitive Urban Design (Engineers Australia, 2006) The Australian Runoff Quality guide provides an overview of best practices for water sensitive urban design (WSUD) in Australia. It includes design guidelines for surface water quality and quantity management practices, procedures for water quality modelling, and advice for integrated urban water cycle management practices.	Expected surface water runoff qualities from the proposed modification, in conjunction with recommendations from these guidelines, were used to inform the recommended mitigation and management measures.
Australian Rainfall and Runoff: A Guide to Flood Estimation (Ball et al., 2019) Australian Rainfall and Runoff (ARR) is the primary technical publication for guiding hydrological estimates and design considerations. The latest issue was finalised in 2019 and was the result of a number of years of updates to the previous version of ARR (Engineers Australia, 1987).	Hydrological assessments and reviews conducted herein were carried out in accordance with the latest ARR guidelines.

2.3 Assumptions and limitations

The following assumptions and limitations apply to this assessment:

- This impact assessment only addresses the potential impacts associated with the proposed modification described in Section 1.0.
- The assessments conducted herein are primarily qualitative in nature and are based on a desktop review of available information. No detailed field investigations or detailed modelling has been conducted as part of this assessment.
- Only preliminary hydraulic (DRAINS) modelling was completed as part of this assessment to quantify the potential surface water impacts and identify suitable mitigation measures. Preliminary results from this modelling should be treated as indicative only and may require further, more detailed analyses during the subsequent design phases.
- The DRAINS models used in this assessment were prepared as part of a previous sitewide surface water assessment completed by MHL (2016). The models were used to assess the potential changes in peak discharge of the proposed modification and inform the selection of mitigation measures. A revised Sitewide surface water assessment was not completed as part of this modelling.
- Site-wide flood modelling results presented in this report were sourced from the Kurnell Stormwater Separation Improvement Project (SSIP). These results were prepared by BPM Projects (2024). The flood modelling results were only used to provide an indication of potential flood storage and flood flow paths across the Site. No updates to this modelling were undertaken as part of this assessment; further information of the use of this model is provided in Section 4.4.

3.0 Environmental setting

This section provides a description of the existing Site and surrounding environment as it relates to surface water, wastewater, and flooding.

3.1 The Site

3.1.1 Location

The Site is located on Sir Joseph Banks Drive, Kurnell NSW, at the eastern end of Kurnell Peninsula, approximately 15 km due south of Sydney's Central Business District (CBD). The Site covers a total area in the order of 187 hectares (ha) and is within the Sutherland Shire Council (Council) Local Government Area (LGA).

The Site is bounded by the Kamay Botany Bay National Park to the east and south east, Captain Cook Drive to the north-west and St Joseph Banks Drive to the south west. The northern boundary of the Site is bounded by Solander Street, Marton Park, and the community of Kurnell which includes light industry and residences. The Kurnell residential area is generally located immediately north and north-west of the Site. There is a fenced Rights of Way passage (Zone 1A) through this residential area, leading directly to the Kurnell Wharf.

3.1.2 Operational activities

Between 1956 and 2014, the Site was used as both an oil refinery and fuel terminal. It was considered to be a highly disturbed site during that time and, as such, there are few remaining areas of ecological significance within the Site. Since the oil refining operations ceased in 2014, the Site has primarily been used as a finished fuel import terminal.

Ampol receives refined petroleum products (gasoline, jet fuel, diesel, sub-industrial fuel oil, and sub-bunker fuel oil) at Kurnell Wharf, stores these products at the Site, and then distributes them via pipelines to various terminals in Sydney and Newcastle.

The Kurnell Terminal currently operates under the approved SSD-5544, which was issued in January 2014.

3.1.3 Zoning

The Site is categorised as a 'liquid fuel depot' under the *Standard Instrument – Principal Local Environment Plan* based on current operations. The Site is zoned as 'E5 Heavy Industrial' and is listed as an archaeological site for the 'Australia Oil Refinery' under the *Sutherland Shire Local Environment Plan 2015*.

3.2 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 BoM's online climate database and are presented in both Table 3-1 and Figure 3-1 (BoM, 2024).

Table 3-1 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.

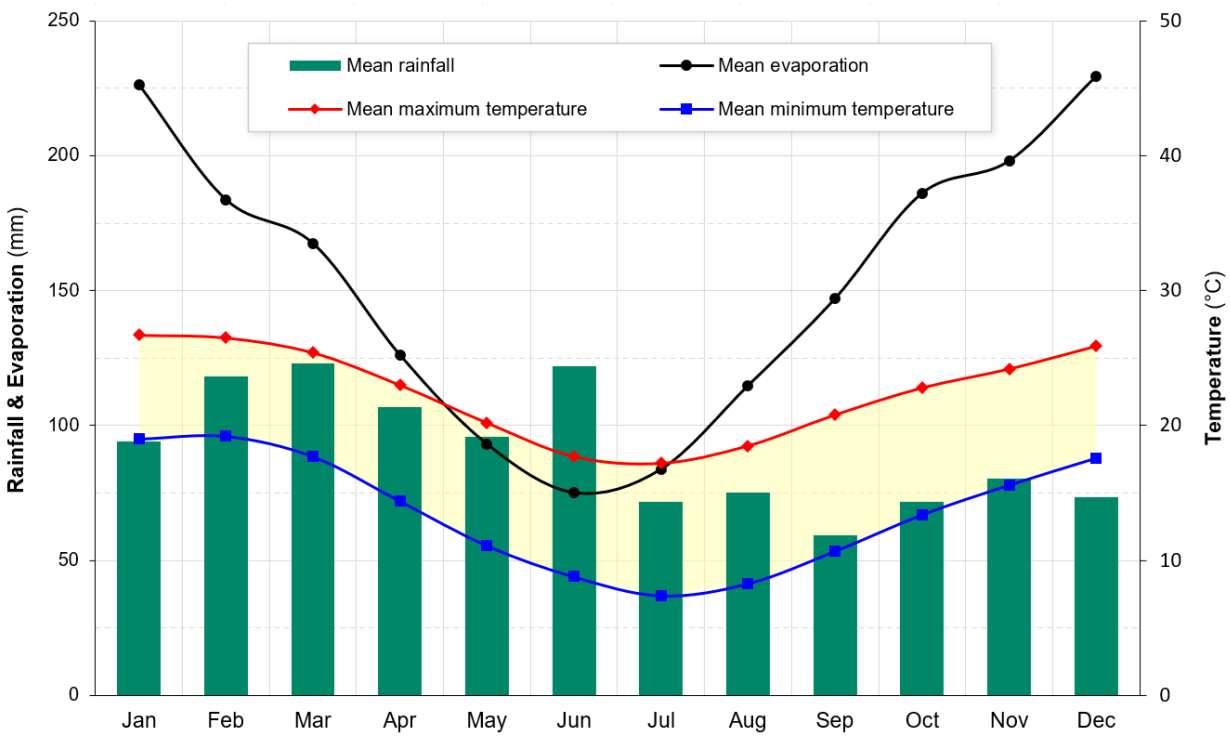


Figure 3-1 Regional climatic patterns

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 rainfall of 1,092 mm per annum.

Temperatures near the coastline are moderated by the ocean’s heat capacity, with moderate to warm summers and 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).

3.3 Catchment

The Site is part of the Botany Bay catchment, which encompasses all areas draining to the Bay. The total catchment area is in the order of 1,165 km^2. The two major waterways in the Botany Bay catchment are the Georges River (84% of the total area) and the Cooks River (9% of the total area). There are two additional sub-catchments: the Woronora River catchment and the Botany Bay (direct discharge) catchment.

The Site is located with the sub-catchment draining directly to Botany Bay, as shown in Figure 3-2 (the pink area).

Botany Bay and its catchment waterways have been subject to ongoing threats arising from polluted surface waters originating at non-agricultural land uses. This is a result of the substantial development across the catchment, with almost 40% of its land being used for urban, industrial, or commercial uses. The main surface water pollutants of concern include nitrogen, phosphorus, and total suspended solids.

Numerous studies and plans have been commissioned through the Botany Bay Water Quality Improvement Program (BBWQIP). This has included the development and implementation of the Botany Bay and Catchment Water Quality Improvement Plan which provides direction to future land use and water quality decisions, with the overarching objective of improving the quality of waters across and discharging to Botany Bay (SMCMA, 2011). The plan includes water quality controls and pollutant reduction targets for urban developments within the catchment.

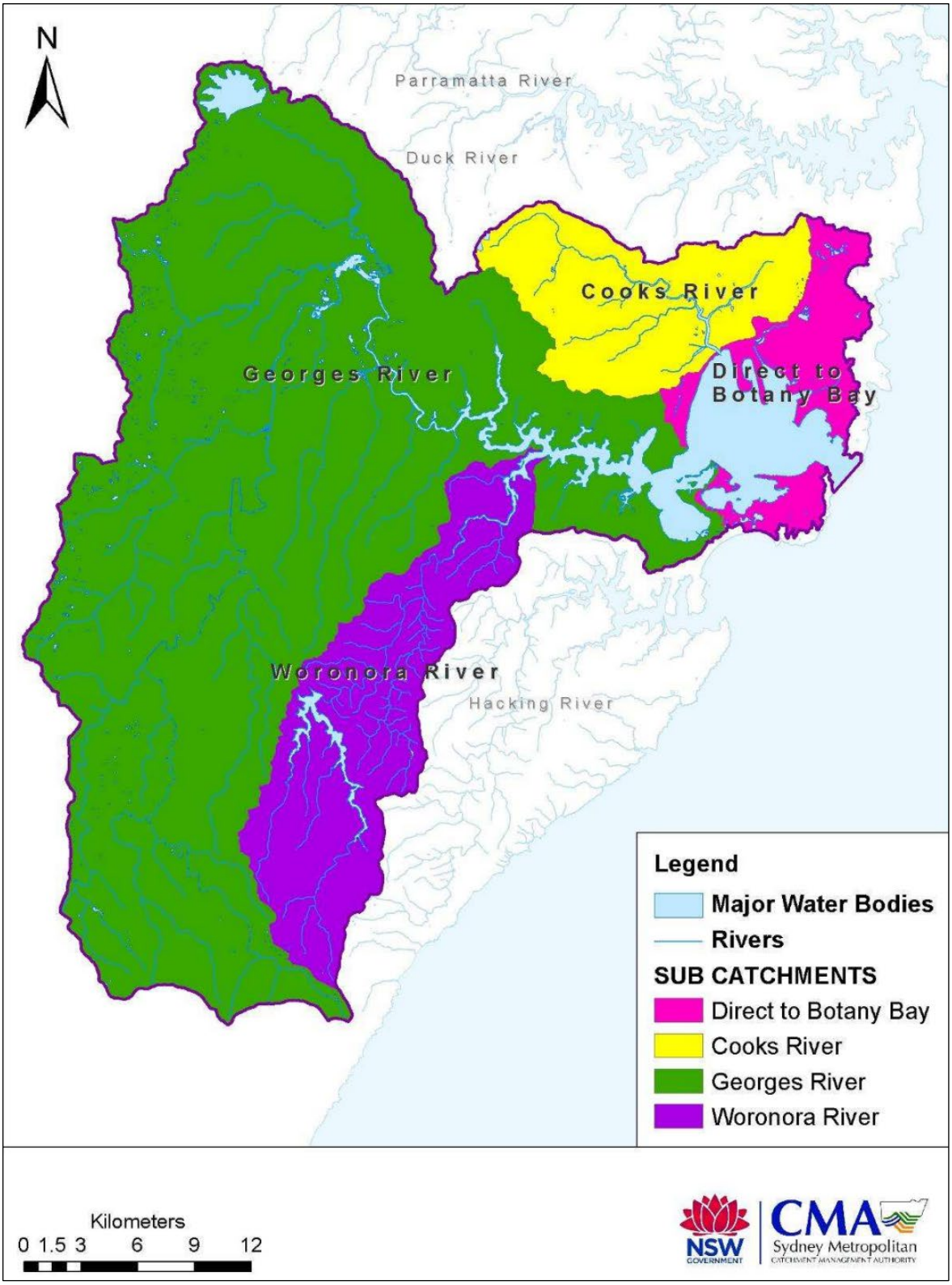


Figure 3-2 Botany Bay sub-catchments (SMCMA, 2011)

3.4 Topography

Existing topography across the Site and surrounding areas is shown in Figure 3-3. 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).

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.

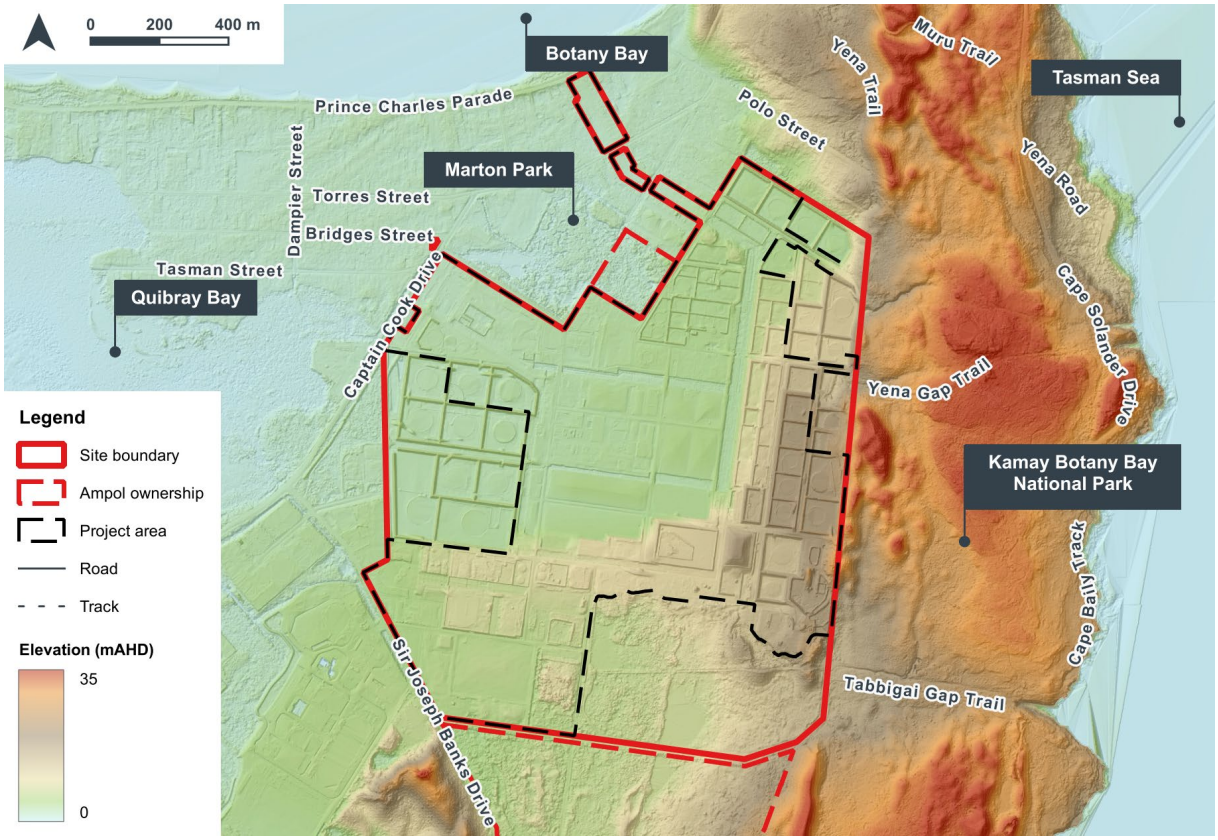


Figure 3-3 Site topography

3.5 Geology

Geology on the western side of the Kurnell Peninsula is characterised by Quaternary gravels, sands, silts, and clays, while the eastern side is characterised by Hawkesbury Sandstone of the Triassic period. The Hawkesbury Sandstone geology rises from west to east, starting below sea level and rising to a height of approximately 40 metres (m) above sea level along the eastern boundary of the Kurnell Peninsula where it forms steep, near vertical cliffs (NSW Government, 2024).

Soils within the Site are generally classified as sandy above the Hawkesbury Sandstone bedrock. Acid sulphate soils (ASS) have also been recorded and classified across the Site.

Potential impacts related to soil, groundwater and acid sulfate soils were assessed in the *Technical Report – Soils, Groundwater and Contamination* (Appendix G of the Modification Report).

3.6 Surface water features

The Site is located near several surface water features that support a range of environmental values and sensitivities, including areas of ecological value. These surface water features, shown in Figure 3-4, and their value have been summarised in Table 3-2.

Table 3-2 Summary of receiving waters

Surface water feature	Location	Description
Botany Bay	500 m north of the Site	Botany Bay is a shallow bay covering a total area of 4,600 ha, approximately 10 kilometres (km) south of Sydney's CBD. It is used to access Sydney's main commercial point (Port Botany) and is a designated Special Port Area. Botany Bay also contains protected areas of saltmarsh, seagrass and mangrove – particularly around the Towra Point Nature Reserve and the Towra Point Aquatic Reserve. It contains 40% of Sydney's remaining mangrove communities and 60% of its remaining saltmarsh communities (DECCW, 2010). It is also host to many important bird species, including many listed international migratory bird agreements with Japan (Japan–Australia Migratory Bird Agreement, JAMBA), China (China–Australia Migratory Bird Agreement, CAMBA) and the Republic of Korea (Republic of Korea–Australia Migratory Bird Agreement, ROKAMBA). As discussed in Section 3.3, Botany Bay and its catchment waterways are subject to ongoing environmental pressures.
Quibray Bay and Weeney Bay	1 km west of the Site	Quibray Bay and the adjoining Weeney Bay are two small bays that are directly connected to Botany Bay. These bays are within the Towra Point Aquatic Reserve. The two bays, in comparison to much of Botany Bay, has a reasonable ecological condition. The bay contains significant seagrass, mangrove and saltmarsh habitat within its waters and around its shoreline (SMCMA, 2011). Surface water runoff from the Site is partly discharged to the Quibray Bay via drainage lines passing through the Towra Point Nature Reserve, as discussed in Section 4.1.

Surface water feature	Location	Description
Towra Point Nature Reserve (including the Ramsar wetland area)	150 m west of the Site	Towra Point Nature Reserve is a Ramsar-listed wetland and comprises 600 ha of wetlands that lie on the southern shores of Botany Bay (DECCW, 2010). The most eastern extent of the Ramsar-listed reserve is located on the western side of Captain Cook Drive. The reserve extends in a narrow fringe around both Quibray Bay and Weeney Bay, encompassing a band of remnant saltmarsh.
Towra Point Aquatic Reserve	West of Captain Cook Drive	Towra Point Aquatic Reserve surrounds Towra Point and covers an area of approximately 1,400 ha. The reserve is managed by the Fisheries Section of the NSW Department of Primary Industries (DPI) and is divided into two zones: the aquatic wildlife refuge zone and the 'no-take' sanctuary zone. The 'no-take' sanctuary zone is located within Quibray Bay and Weeney Bay. The reserve supports high levels of aquatic biodiversity, with more than 230 species of fish and over 200 migratory bird species recorded within the reserve (Georges Riverkeeper, 2024).
Coastal wetlands	North, north west, and south of the Site	There are a number of protected coastal wetlands surrounding the Site. While there are no protected coastal wetlands within the Site, there are some parts of the Site that are located within the 'Proximity Area for Coastal Wetlands,' as defined by the CM Act. This is due to the Site's proximity to coastal wetlands in Marton Park, the Towra Point Nature Reserve, and natural retention area immediately south of the Site (Zone 4). The new firewater tank and pumphouse would be located within the FWS Relocation Area, in the Proximity Areas for Coastal Wetlands. The southern and eastern boundaries of Zones 2 and 3, respectively, are located within the Proximity Area for Coastal Wetlands, for the natural retention area immediately south of the Site. Works in this area would require excavation for remediation and installation of the OWS Pump Station. The CM Act and Section 2.8 of the Resilience and Hazards SEPP aim to protect and enhance sensitive coastal environments, habitats and natural processes by strategically managing the risks from coastal hazards, including those introduced by developments.
Coastal zone	West and north of the Site	The proposed modification is located outside the 'Coastal Use' and 'Coastal Environment' areas, as defined by the CM Act. It is however located in proximity and would discharge to these coastal zones surrounding Quibray Bay, the Towra Point Nature Reserve, and along the southern shorelines of Botany Bay. The CM Act and Resilience and Hazards SEPP aim to protect and manage the natural, cultural, recreational and economic attributes of the New South Wales coast through the preservation of a range of coastal values.

Surface water feature	Location	Description
Marton Park Wetland	Immediately north of the Site	Marton Park comprises a wetland area and a small recreational park. The wetland is approximately 10 ha in size. According to the Marton Park Wetland Management Plan, the wetland is currently a freshwater wetland with limited tidal influence (Molino Stewart, 2009). The wetland plays an important role in the drainage of the surrounding area, including the eastern portion of Kurnell, part of the Site and the Kamay Botany Bay National Park. Surface water runoff from some non-industrial areas of the Site (e.g., the administration centre and some car parks) discharge to this wetland via Council-owned drains, as discussed in Section 4.1. A small part of the FWS Relocation Area lies where surface water runoff discharges to the wetland. Marton Park Wetland is recharged by ground water seepage through the sandy bed during dry periods. The interaction between the surface water and the ground water is acknowledged to be potentially high given the sandy nature of the soil (Molino Stewart, 2009).
Kamay Botany Bay National Park	Immediately east of the Site	Kamay Botany Bay National Park is approximately 1 km wide and extends from north to south along the eastern coastline of the Kurnell Peninsula, facing the Tasman Sea. The eastern boundary of the Site interfaces with the National Park. The National Park occupies a total area of approximately 456 ha and supports a diversity of natural resources including threatened species and ecological communities and is recognised for its significant cultural heritage values (DPIE, 2020).

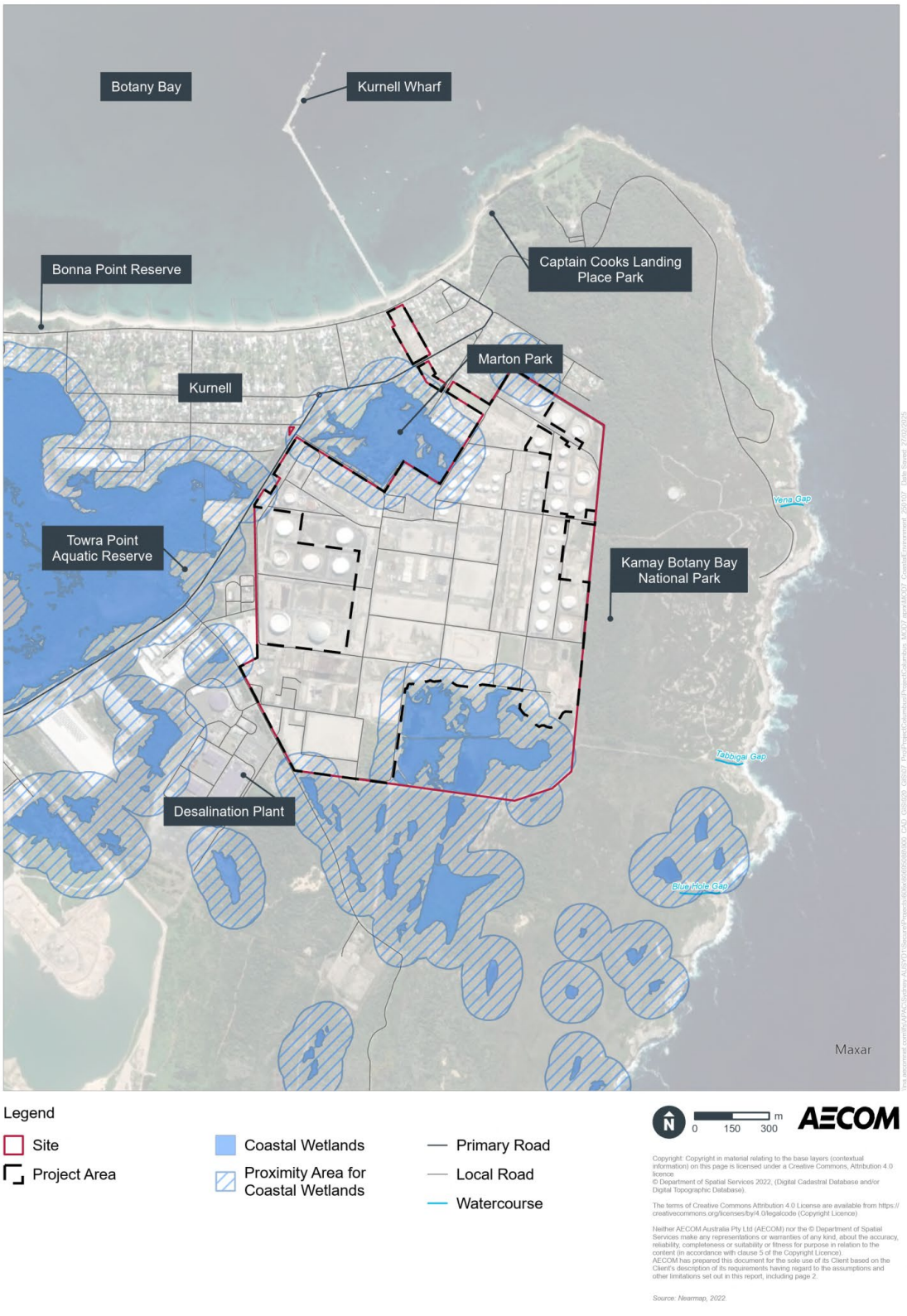


Figure 3-4 Receiving waters

3.7 Water quality objectives

As detailed in Table 2-1, Council's DCP and associated Stormwater Specifications require developments to meet a set of pollutant reduction targets during design, and confirm the stormwater leaving a site meets the Australian and New Zealand Environment and Conservation Council (ANZECC) & Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ) (2000) *Guidelines for aquatic ecosystems*.

Australian and New Zealand Guidelines (ANZG) (2018) now the provide the latest default guideline values (DGVs) for physical and chemical stressors across the nation's river systems and supersedes the ANZECC & ARMCANZ (2000) Guidelines. However, ANZG (2018) does not yet have available DGVs for the Botany Bay catchment/ Georges River estuaries and recommends the continued use of previously published DGVs included in the ANZECC & ARMCANZ (2000) Guidelines where these updated values are not provided.

The complete set of water quality objectives (WQOs), river flow objectives (RFOs), and DGVs to help achieve these objectives for the Georges River estuaries are provided in Annexure A, based on ANZECC & ARMCANZ (2000) Guidelines. The key objectives for improving, or at least maintaining, the current health of the Georges River estuaries include:

- Water quality objectives – Maintain or improve aquatic ecosystems, visual amenity, water quality for primary and secondary contact recreation, and the quality of aquatic foods (suitable for consumption)
- River flow objectives – Protect pools in dry times, protect natural low flows, maintain wetland and floodplain inundation, maintain natural flow variability, and minimise the effects of weirs and other structures.

The WQOs outline the physical and chemical conditions of waterways and their physical flow characteristics for the catchment. These WQOs yield water quality indicators and trigger values (or DGVs) for common pollutants found in surface waters. These derived values are not designed to serve directly as regulatory standards, limits or conditions. They should however be taken into consideration when making informed decisions that could potentially impact the future health of surface waterways or waterbodies. The suggested water quality DGVs for each WQO specific to the Georges River estuaries are detailed in Table A-1 of Annexure A.

All surface water originating from the Site would eventually reach Botany Bay, the estuary associated with the Georges River catchment. The condition of the Georges River estuary and southern parts of Botany Bay is defined as a moderately modified environment with a desired outcome to retain or restore important natural processes/ biodiversity and protect desired public uses.

Oily water and process influent collected in the Site's OWS is transferred to the onsite wastewater treatment plant (WWTP) for treatment. Treated effluent must comply with the water quality criteria stipulated in EPL-837 prior to discharging offsite and into the Tasman Sea via the outfall at Yena Gap. The discharge criteria for the outfall at Yena Gap, as per the conditions of the EPL, are presented in Table 3-3.

Table 3-3 Pollutant concentration limits for effluent discharge at Yena Gap as defined in the EPL-837

Pollutant	Unit of measure	50th percentile	80th percentile	90th percentile	100th percentile
Arsenic	mg/L	-	-	-	0.07
Biochemical oxygen demand (BOD)	mg/L	20	-	-	30
BOD (wet)	mg/L	-	-	-	350
Lead	mg/L	-	-	-	0.025
Nickel	mg/L	-	-	-	0.03
Nitrogen (ammonia)	mg/L	-	-	-	7.5
Oil and grease	mg/L	-	-	10	-
Oil and grease (wet)	mg/L	-	-	-	70
pH	pH	-	-	6.5-8.5	6.0-9.0
Phenols	mg/L	0.3	-	-	2.7
Phenols (wet)	mg/L	-	-	-	5
Polycyclic aromatic hydrocarbons	mg/L	0.03	-	-	0.5
Temperature	°C	-	-	-	40
Total suspended solids (TSS)	mg/L	35	-	-	50
TSS (Wet)	mg/L	-	-	-	100

Table 3-3 only includes the pollutants with a required concentration limit at the Yena Gap outfall and does not include the full list of requirements stipulated in EPL-837, such as the necessary monitoring frequency and sampling methods. The complete EPL can be found on the EPA (NSW) website (https://apps.epa.nsw.gov.au/prpoeoapp).

4.0 Existing conditions

This section describes the existing conditions for surface water, wastewater and flooding at the Site, prior to the proposed modification, which forms a baseline for the impact assessment detailed herein.

4.1 Surface water

Surface water runoff generated by the Site is captured and conveyed by one of two systems:

- Surface water system (SWS) – Collecting surface water runoff from areas that have a designated low risk potential for interaction with petroleum products. Water conveyed by this SWS is considered to be relatively 'clean' in comparison to oily waters at the Site. This water receives some level of treatment prior to discharging offsite and to the receiving waterbodies.
- Oily water sewer (OWS) – Collecting and containing wastewater from previous refinery process areas and surface water that may be impacted by petroleum products. This oily water is directed to the onsite WWTP for treatment before discharging to the Tasman Sea via the Yena Gap under the conditions of EPL-837.

This section focuses on the SWS – more details on the OWS and associated WWTP are provided in Section 4.3.

The SWS is only intended to collect runoff from areas of the Site that have been designated as a low-risk potential for interaction with petroleum products. This generally includes runoff from roadways, hardstand areas, roof areas, and undeveloped/ vacant land. Some external flows from the Kamay Botany Bay National Park also enter the Site and the SWS via the eastern boundary.

The SWS comprises a network of underground pipes and open channels that all eventually discharge to Quibray Bay, Botany Bay, or the Marton Park Wetland.

The Site has seven main catchment areas draining to the existing SWS. These catchments and their discharge points are shown in Figure 4-1.

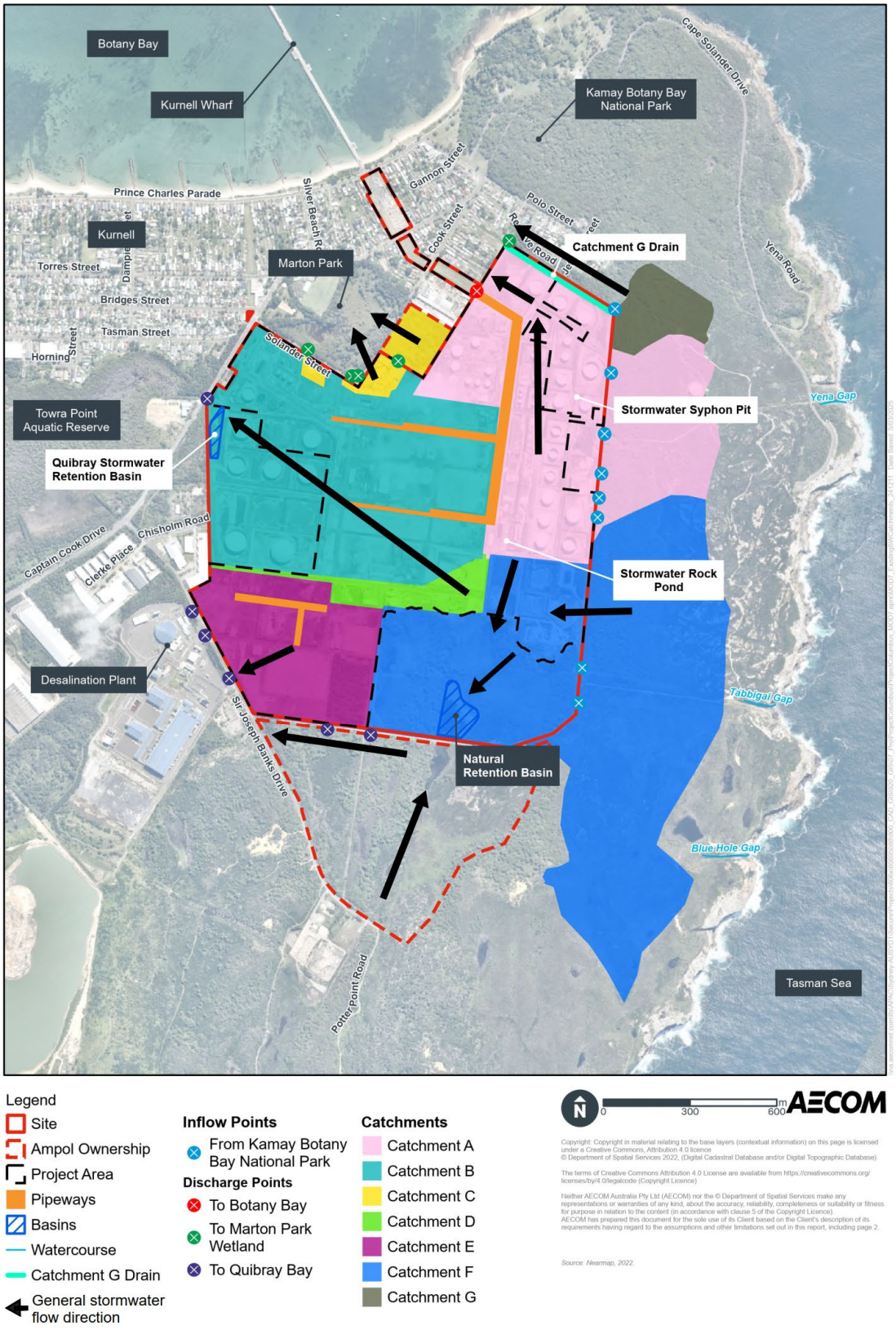


Figure 4-1 Existing surface water catchments and discharge and inflow points

The catchment extents and their contents are described in Table 4-1.

Table 4-1 Existing surface water catchments

Catchment	Area (ha)	Description
A	65	Eastern and northern area of the Site which includes the large eastern tank area.
B	66	Central area of the Site which contains the majority of ex-refinery process areas as well as the central control building, warehouse, storehouses and oil spill room; in addition to the western part of the Site which contains the WWTP, western tank area, the Quibray Bay Stormwater Retention Basin and parking area.
C	1	Northern corner of the Site which includes main offices, former staff houses, gardens, visitor and employee car park, and wetland.
D[1]	6	An area between the former Caltex Lubricating Oil Refinery (CLOR) in the south-west and the former refinery area.
E	26	South-western corner of the Site occupied by the area containing the former CLOR site.
F	107	South eastern corner of the Site, which predominately comprises relatively undeveloped land and a small area of tank compound, the Asbestos Containment Cell, the landfarm area (which is a bioremediation site), a recycling area, and a sludge lagoon.
G	7	North-eastern undeveloped area mostly outside of the Site boundary, which is part of the Kamay Botany Bay National Park.

Notes:

1 – Catchment D is no longer a separate catchment and is now part of Catchment B. It has been maintained as a separate catchment for consistency with previous surface water reports.

The proposed modification would be spread across all catchments except for Catchment G.

There are various retention, retarding, and treatment systems incorporated along the existing SWS. Surface water runoff is treated where necessary via American Petroleum Institute (API) standard oil/ water separators. These treatment systems are designed to treat suspended solids and phase-separated petroleum hydrocarbons. The surface water treatment measures included within each catchment and their discharge points have been summarised in Table 4-2.

Table 4-2 Existing surface water treatment and discharge for each catchment

Catchment	Offsite inflow	Retention	Treatment/ control	Discharge point(s)
A	Inflow from the Kamay Botany Bay National Park at five locations along the eastern boundary	There is a natural retention area present near the eastern boundary, receiving inflow from the National Park and surrounding area.	Skimmer and siphon system, followed by API oil/ water separator. Provision for pipeway isolation and use of skimmer pump to the oily water sewer system. Retention in the south-east part of the catchment.	Botany Bay offshore from Silver Beach
B	Can receive overflow from Catchment A during major storm events, due to the large National Park inflows entering that catchment	Quibray Bay Stormwater Retention Basin.	API separator, retention basin, siphon system, and final discharge pit. Provision for isolation, skimming and diversion of pipeway A & B drainage to intermediate sewer and use of skimmer pump to the oily water sewer system.	Quibray Bay via Captain Cook Drive roadway drains discharging into drainage lines that pass through the mangrove wetland.
C	None	Possibly some in the onsite wetland area.	None identified, though some treatment would be provided in the onsite wetland area.	Marton Park Wetland
D[1]	None	None	Transferred to Catchment B. Treatment as indicated for that catchment.	Transferred to Catchment B. Discharge as indicated for that catchment.
E	None	Some onsite infiltration occurs in the former process area.	Stormwater collected in the former CLOR oily water sewer system is pumped to the refinery oily water sewer system.	Quibray Bay via Sir Joseph Banks Drive and Captain Cook Drive roadway drains discharging into drainage lines that pass through the mangrove wetland.
F	Inflow from the Kamay Botany Bay National Park via two main drainage lines along the eastern boundary	Natural retention basin	Retention	Quibray Bay via Sir Joseph Banks Drive and Captain Cook Drive roadway drains discharging through the mangrove wetland.

Catchment	Offsite inflow	Retention	Treatment/ control	Discharge point(s)
G	Inflow from the Kamay Botany Bay National Park in the north-east corner of the Site	None	None	Council-owned drains, which discharges to Marton Park Wetlands.
Notes:	*1 – Catchment D is no longer a separate catchment and is now part of Catchment B. It has been maintained as a separate catchment for consistency with previous surface water reports.*			

Other water quality management strategies for the Site and its SWS are outlined in the Site's Stormwater Management Plan (2011) and Operational Environmental Management Plan (2021).

These water quality management strategies and existing treatment systems allow for surface water runoff conveyed by the SWS to discharge directly offsite and to the receiving environment in line with EPL 837, since this water can be treated to a standard that is suitable for urban discharge. As the SWS only captures surface water runoff from areas that have a designated low risk potential for interaction with petroleum products, there is a negligible risk for petroleum products to be discharged offsite via the existing SWS. This is evidenced by ongoing monitoring and risk assessments.

While these strategies significantly mitigate risks, rare extreme weather events have historically posed challenges, primarily due to the interaction between surface water and wastewater in the OWS during severe storm events. For instance, in April 2022, the Kurnell Peninsula experienced a flood event estimated to be in the order of a 1% Annual Exceedance Probability (AEP) event (AECOM, 2023), caused by a rare combination of high rainfall intensity, minimal ground absorption, and high tide coinciding with the period of peak rainfall. Stormwater runoff in Kurnell Terminal, which included runoff from the upstream Kamay Botany Bay National Park, inundated the area of the existing wastewater treatment plant (WWTP) and flooded the separators and associated sumps. This event led to wastewater from the OWS entering the SWS and exiting the Site without undergoing the necessary treatment.

Significant upgrades to the Site's SWS and OWS have since been consented as part of the Kurnell Stormwater Separation Improvement Project (SSIP) which will provide resilience against this type of event occurring (AECOM, 2023). Construction is underway and expected to be completed by mid-2025 and have therefore, the project has been considered as part of the baseline conditions of the proposed modification. The modelling results of the Kurnell SSIP upgrades are discussed further in Section 4.4.

4.2 Condition of receiving waterbodies

As described in the previous section, surface water runoff from Catchments E and F discharge to Quibray Bay via drainage lines running along Sir Joseph Banks Drive.

Council commenced water quality monitoring across a number of streams within their LGA, as part of their Strategic Water Monitoring Plan (SWaMP). This included monitoring along the open drainage channel on Sir Joseph Banks Drive (Station No. SSC06), which provides insight into the quality of water discharging from the Site.

Trends in collected water quality data at this station were assessed and ranked against the ANZECC & ARMCANZ (2000) Guidelines for recreational water quality in urban streams. Several pollutant concentrations were monitored over a 7-year period between 1995 and 2002. This included the monitoring of nutrients, metals, total suspended solids, and hydrocarbons. A reduction in most of these monitored pollutant concentrations was reported at this station, such that the concentration values for most of these pollutants were within the ANZECC & ARMCANZ (2000) guideline ranges at the end of the survey period.

In recent years, the overall water quality condition within the Sir Joseph Banks Drive drainage channel has been rated as 'fair' (Council, 2024). This monitoring station has consistently rated the water condition as 'fair' for the past 11 years. It is evident in Figure 4-2 that a decline in the overall water quality condition was recorded between 2007-2008, which coincided with the construction of the Kurnell Desalination Plant. The condition has slowly recovered and is now returning consistent results which indicates that the quality of discharge from the Site is being improved (or at least maintained).

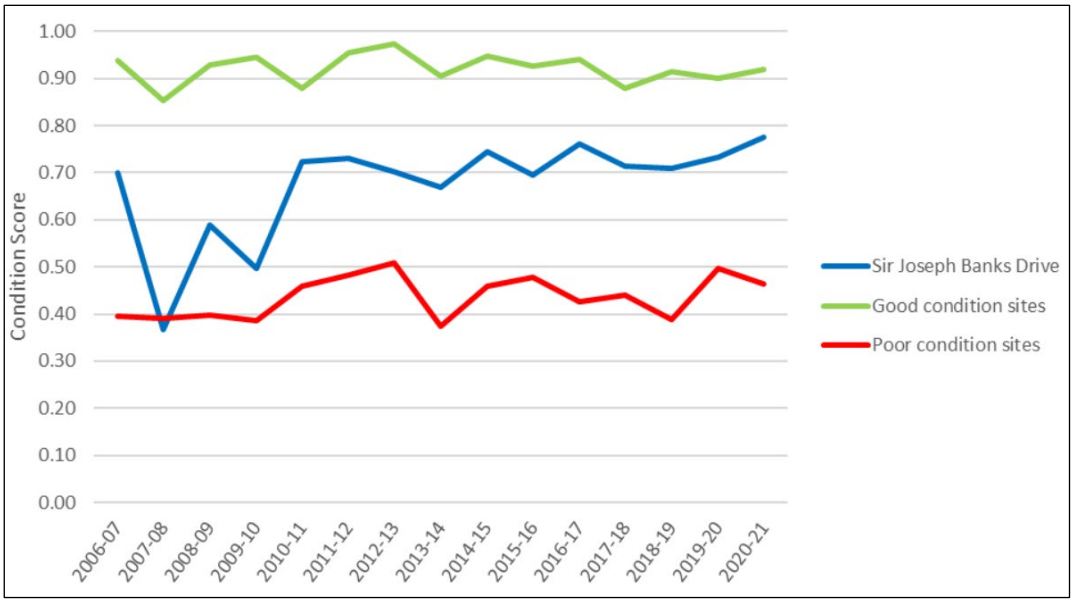


Figure 4-2 Water quality trends of Sir Joseph Banks Drive Channel, Kurnell NSW (Council, 2024)

4.3 Oily water

As described in Section 4.1, the Site has a separate OWS system than collects wastewater and surface water runoff from areas where there is potential for interaction with petroleum products. This oily water is collected in the OWS and transferred to the onsite WWTP. Treated effluent is then discharged to the Tasman Sea via the Yena Gap under the conditions of EPL-837.

Sources of oily water across the Site include:

- Surface water runoff within tank bund areas, near process units and pump slabs
- Fuel released from storage tanks or their associated piping which is contained within the bunded area surrounding the tank
- Firewater used in combating a fire which is contained in the bunded areas
- Hydrocarbon contaminated groundwater from groundwater remediation system
- Landfarm
- Tank dewatering
- Tank washing
- Ballast water
- Pipeline wash water
- Slops from Banksmeadow
- Equipment wash pads
- Surface water that collects in the former CLOR oily water sewer system.

Oily water captured by the OWS is sent to the WWTP for treatment by the biotreator, or is alternatively transferred to a diversion or equalisation tank for storage and treatment in the biotreator at a later time. The WWTP has a bypass system that can be activated during periods of high flow, where the treatment capacity of the biological unit is exceeded and there is insufficient storage capacity. Two additional induced air flotation (IAF) units provide secondary oil and suspended solids removal capacity for the wastewater that bypasses biological treatment.

The operational maximum treatment capacity for the WWTP is notionally 600 kL/hr, with a supplementary wastewater treatment system with capacity of approximately 1,000 kL/hr (including all treatment steps except the biotreator).

Under EPL-837, all wastewater is treated using the WWTP or the oil-water separators/ IAF system. Treated effluent must meet the strict EPL pollutant concentration levels with samples sent to an NATA-accredited lab independent of Ampol. Treated effluent is discharged to the Tasman Sea via the Yena Gap outfall and is also monitored under the conditions of the EPL.

The most recent monitoring data for effluent discharge at the Yena Gap is provided in Annexure B.

4.4 Flooding

The entire suburb of Kurnell is susceptible to flooding as it sits within a large, localised depression and has low-lying topography relative to water levels within Botany Bay and Quibray Bay. Flooding within the Kurnell township catchment and at the Site can occur as a result of the following mechanisms, which may occur in combination or in isolation:

- Coastal flooding – From high tides or storm surges that causes water levels to rise in Botany Bay and Quibray Bay
- Catchment flooding – From intense rainfall over the catchment which causes large flows and a rise in water levels along drainage paths and within low-lying areas. The rise in water level may also be affected by flow constrictions (e.g., culverts, blockages, fences, and buildings).

Two separate flood modelling results have been used to describe existing flooding conditions across the surrounding areas and within the Site. These results have been summarised in the following sections.

4.4.1 Kurnell Township Flood Study (WMAwater, 2009)

Flood modelling and mapping for the Kurnell catchment was first completed as part of the Kurnell Township Flood Study that was prepared by WMAwater for the Sutherland Shire Council (WMAwater, 2009). This study was prepared in accordance with 1987 version of the Australian Rainfall and Runoff (ARR) Guidelines (Pilgrim, 1987). The 1987 ARR Guidelines have since been superseded by the latest (2019) ARR Guidelines (Ball et al., 2019). The flood mapping results presented in this Flood Study have been used for previous flooding assessments for the approved project and still provide an indication of likely flooding extents across the adjaguidecent Kurnell Township and broader catchment.

The flood study modelled the peak flood extents for both rainfall and tide events. The flood mapping for both the 1% AEP rainfall and 1% AEP tide events are shown in Figure 4-3 and Figure 4-4, respectively.

This flood modelling focused on the residential area of Kurnell. While it included flow contributions from upstream areas such as the Site and Kamay Botany Bay National Park, it did not model the flood behaviour across these areas. The results do, however, provide adjacent flood levels and depths along the north and north-western boundaries of the Site.

Figure 4-3 Peak flood levels in a 1% AEP rainfall flood event in the Kurnell catchment (WMAwater, 2009)

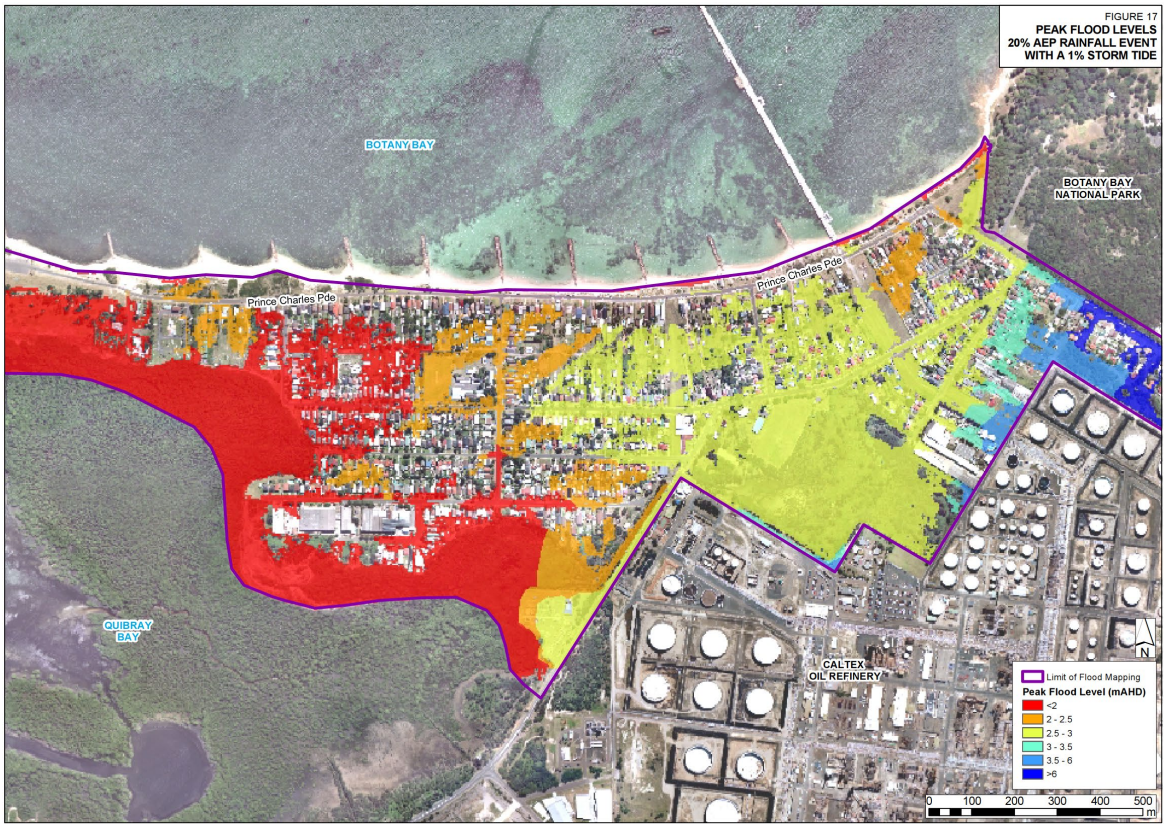


Figure 4-4 Peak flood levels in a 1% AEP tidal flood event in the Kurnell catchment (WMAwater, 2009)

These adjacent flood levels and depths were used to conduct a preliminary analysis of the Site's resilience to external flooding as part of the Water and Wastewater Management component of the EIS that was prepared for the approved project (URS, 2013). Extrapolation of the adjacent flood levels and depths from the Kurnell Township Flood Study indicated that the majority of the Site would be set above external flood levels in the rare 1% AEP event. Under the assessment, the following low-risk areas had potential to be flooded by external sources in this 1% AEP event:

- Limited areas in the north-west part of the Site, as shown in Figure 4-5
- Possibly some very minor flooding (less than 0.1 m deep) across the western boundary of the Site, in the area immediately north of Gate 5
- The area along the north-eastern boundary of the Site (i.e., the area occupied by the first row of tanks only).

The assessment found that the Site is generally elevated above surrounding low-lying areas along the northern and western boundaries, and the onsite bunding around petroleum storage areas effectively increases level of flood protection achieved at these areas (URS, 2013). This bunding minimises the risk of external surface water flows interacting with petroleum products.

Flood hazard mapping was also generated as part of the Kurnell Township Flood Study, based on flood depth and velocity for the 1% AEP and Probable Maximum Flood (PMF) event, which is defined as the largest flood that could potentially occur at a particular location (WMAwater, 2009). The provisional hydraulic hazard mapping shows that most 'high' risk areas across the Kurnell township catchment are contained to the low-lying wetlands, including part of the Quibray Bay and Marton Park wetlands.

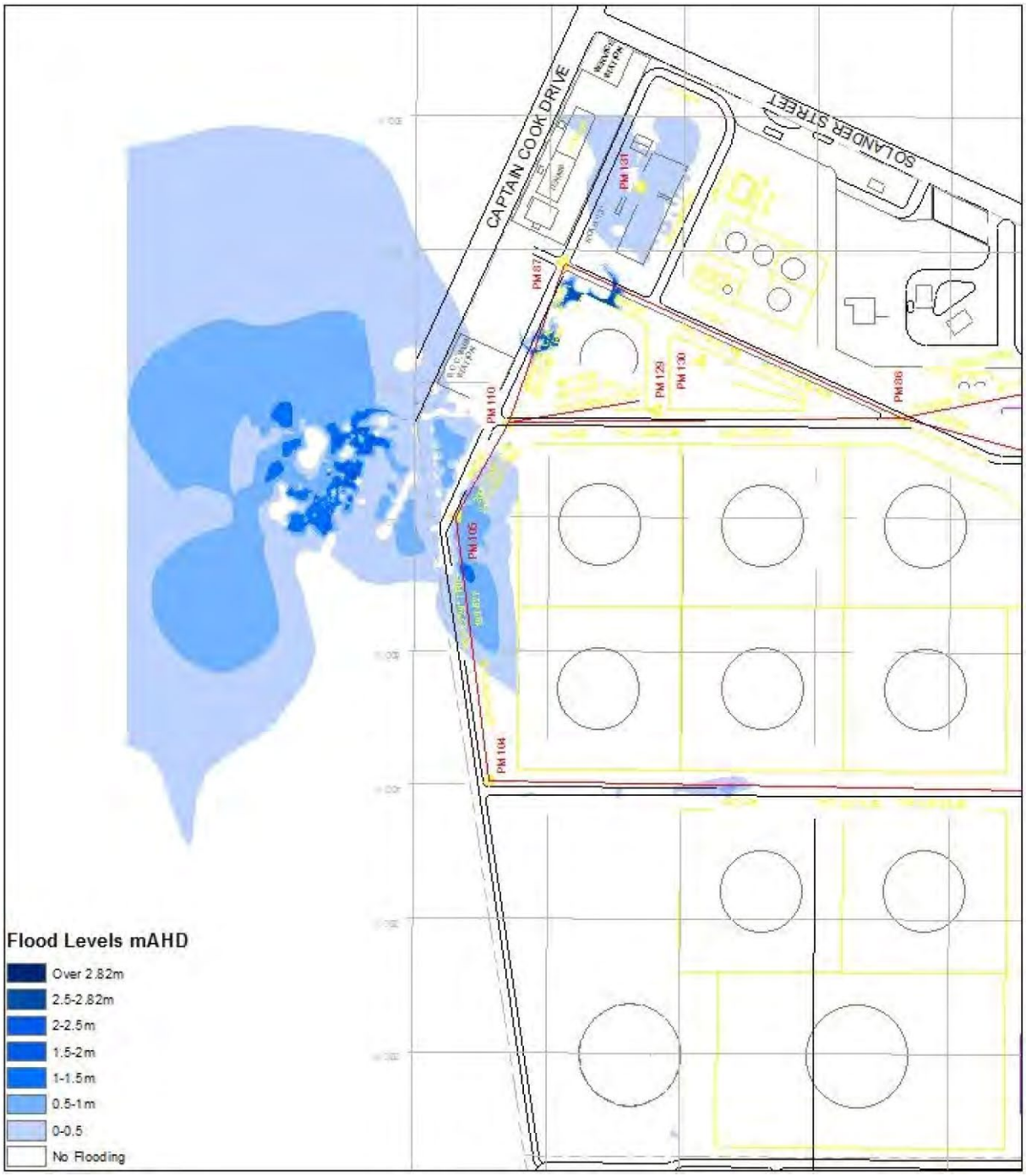


Figure 4-5 Extrapolated 1% AEP flood extents across the north-west corner of the Site (URS, 2013)

4.4.2 AA-004 Kurnell South Area Stormwater Management Project (BPM Projects, 2024)

A recent flood modelling assessment was conducted by BPM Projects for the Kurnell Terminal to simulate the proposed upgrades and to analyse associated flood impacts as part of the proposed SSIP (BPM Projects, 2024)

As described in Section 4.1, the Site was subject to a large flood event in April 2022 which caused wastewater from the OWS to enter the SWS and exit the Site without receiving the appropriate level of treatment. According to AECOM (2023) and BPM Projects (2024), this was caused by three concurrent factors:

- Total rainfall depth of 144 mm over a 6-hour period on 7 April 2022 (close to the 1% AEP design rainfall depth for a 6-hour storm duration)
- Minimal ground absorption of surface water due to well above average rainfall during the preceding months (January, February, and March 2022)
- High tide of approximately 0.8 m AHD coinciding with the rainfall event on 7 April 2022.

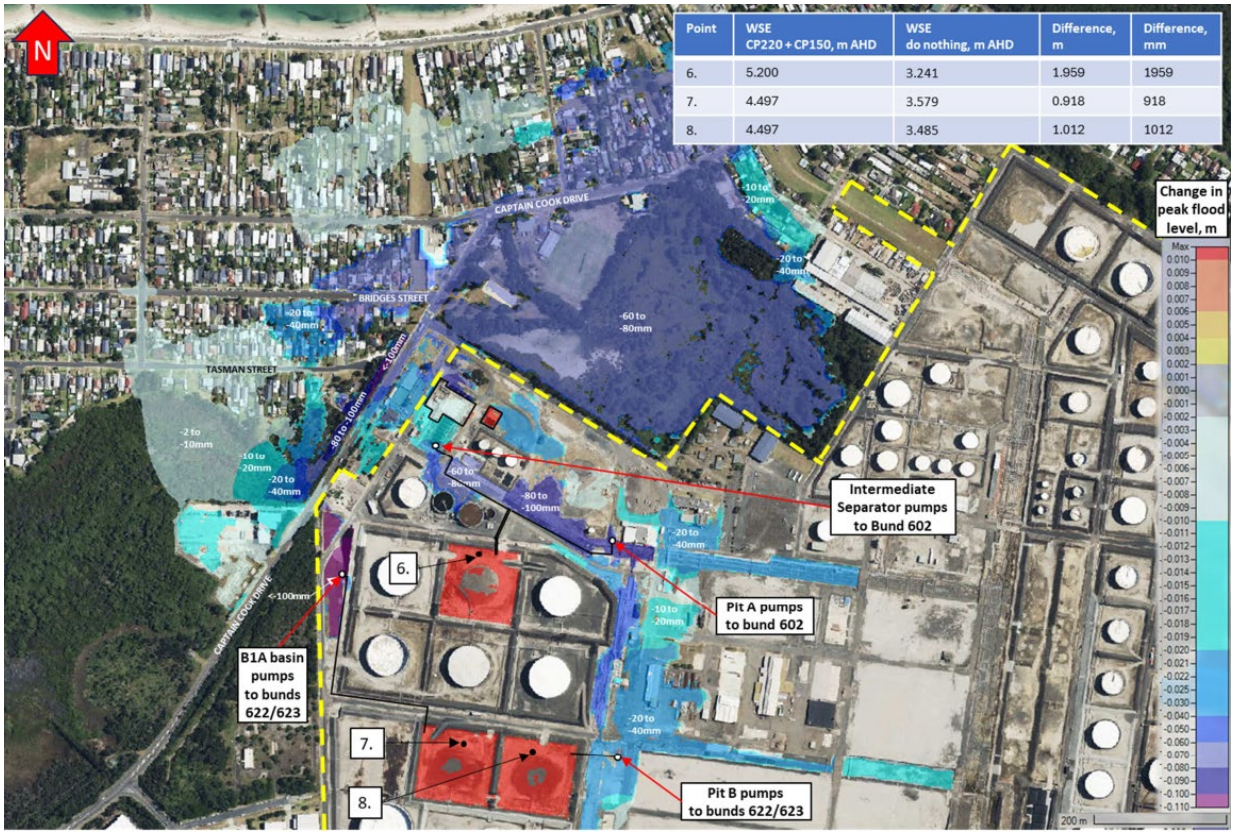
The existing SWS will be upgraded as part of the SSIP to support the segregation and adequate function of the SWS and OWS. These upgrades will reduce the risk of oily waters discharging to the surrounding environment and prevent floodwaters from entering the WWTP (AECOM, 2023). The SSIP upgrades include a 1.5 to 1.8 m high levee around the existing WWTP and adjacent retention basin, and a total of 13 new pumps. These new pump lines would distribute excess surface water away from the WWTP and into three vacant tank compounds, which would serve as retention basins and provide additional flood storage across the Site. The works are due for completion by mid-2025, prior to the commencement of the proposed modification and have therefore been included under existing baseline conditions.

Flood modelling of the proposed upgrades was conducted by BPM Projects as part of the SSIP approvals. The associated flood modelling report prepared by BPM Projects (2024) includes model development details and provides a detailed summary of the modelling results.

Flood modelling results for the SSIP showed the proposed levees around the WWTP and adjacent retention basin would protect these areas from local and external flooding in a 0.2% AEP rainfall event in conjunction with a 1% AEP tide event. It also showed that the proposed pumped systems, directing excess surface water into three vacant tank compounds, will help to reduce peak flood levels across the Site and neighbouring properties in a 1% AEP rainfall event in conjunction with a 1% AEP tide and an allowance for a sea level rise up to the year 2070.

On this basis, the SSIP upgrades will improve existing flood extents across the Site and downstream residential areas by detaining flow within the three vacant tank compounds.

The flood level afflux (change in existing flood levels) resulting from the proposed SSIP for the modelled 1% AEP rainfall event in conjunction with a 1% AEP tide for the year 2070 is shown in Figure 4-6.



Note: The table in the top right corner of the figure shows an increase in peak flood levels across points 6, 7 and 8, as a result of the proposed SSIP, since these points are located inside the vacant tank compounds where excess surface water is being pumped to as part of the proposed SSIP.

Figure 4-6 Flood level afflux resulting from the proposed SSIP upgrades during the combined 1% AEP rainfall event and 1% AEP tide event (BPM Projects, 2024)

The SSIP modelling results showed that an increase in existing flood levels during a 1% AEP event will be confined to the Site flows (BPM Projects, 2024). Additionally, onsite flood level increases will be further confined to the existing retention basin and three tank compounds receiving pumped flows (BPM Projects, 2024). Ultimately, the modelling results for the proposed SSIP showed a reduction of existing flood levels across neighbouring properties and most of the Site in all events up to and including the modelled 1% AEP rainfall event in conjunction with a 1% AEP tide for the year 2070.

The flood depth results were also extracted from the SSIP flood model to provide an indication of local flood flow paths and existing flood storage across the Site. The flood extents for the modelled 1% AEP rainfall event in conjunction with the 1% AEP tide for the year 2070, following the completion of the proposed SSIP, are shown in Figure 4-7 relative to the Site boundary and proposed remediation and grading works (Stages 3 and 4) for the proposed modification.

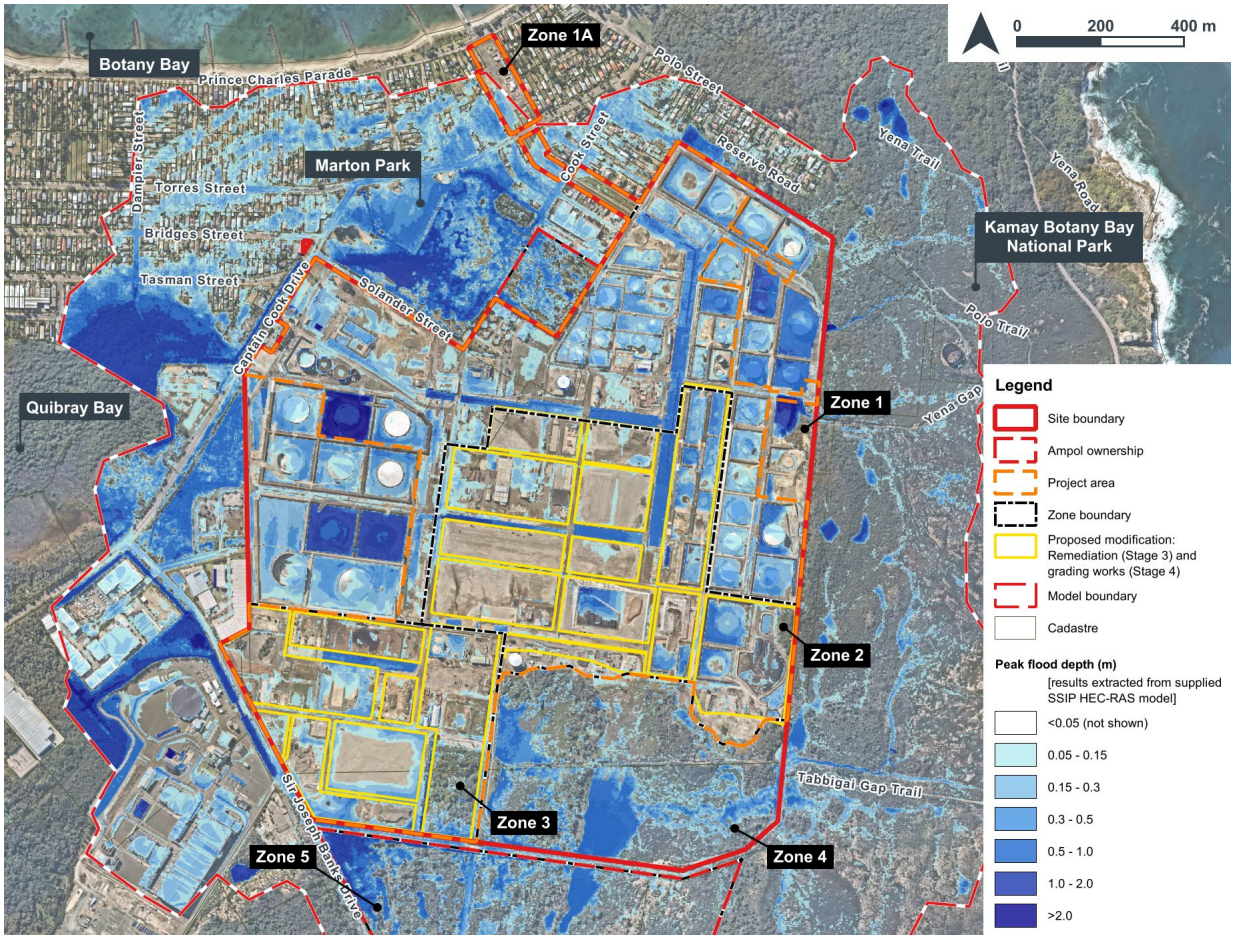


Figure 4-7 Flood depth results with the proposed SSIP upgrades in the combined 1% AEP rainfall event and 1% AEP tide event

It can be seen from the flood extents, shown in Figure 4-7**,** that most overland flows across the Site are contained to the roads and pipeways in the combined 1% AEP rainfall event and 1% AEP tide event. There is some localised flooding across the proposed remediation (Stage 3) and grading (Stage 4) areas, though most of these areas are only subject to relatively shallow (less than 300 mm deep) floodwaters. There are some areas proposed for remediation/ grading along the eastern side of Zone 2 where existing bunded areas currently provide flood storage until water can drain via the existing OWS network. Floodwaters accumulating within these bunded areas are shown to reach peak depths of up to 700-900 mm in the modelled 1% AEP rainfall event in conjunction with a 1% AEP tide event.

As described above, the flood modelling completed by BPM Projects (2024) and the results presented in Figure 4-7 were initially developed for the design of the proposed SSIP. These modelling results provide a good indication of flooding behaviour across the Site, therefore additional modelling to reflect the proposed modification was not considered necessary. The results have been used in this assessment to identify key flood flow paths and flood storage areas across the Site, and are considered to be conservative for the following reasons:

- The underground drainage network for the SWS and OWS has not been modelled. Therefore, the results shown in Figure 4-7 are assumed to be slightly conservative, as a portion of overland flows will be captured and conveyed underground via the existing SWS and OWS networks.
- The 1% AEP rainfall event has been modelled in conjunction with a 1% AEP tide. The chance of these two events coinciding with each other is considered rare, as the rainfall event causing peak overland flows is not often the same event causing peak tide levels. It can therefore be considered that the modelled combination of events represents a conservative flooding event larger than a 1% AEP design flood event.

The modelled 1% AEP flood extents shown captures a 6-hour-duration rainfall event which was adopted for the design of the proposed SSIP. The flood extents shown in Figure 4-7 would vary if individual, shorter rainfall durations were modelled.

However, BPM Projects incorporated rainfall intensities for shorter durations into the adopted 6-hour rainfall event by modelling a front-loaded rainfall pattern; this is a conservative approach where peak rainfall intensity occurs at the beginning of the event before gradually tapering off. Through this approach, the flood model developed by BPM Projects is representative of flood conditions, accounting 6-hour design storm event and capturing the potential impact of shorter, high-intensity rainfall events.

4.5 Environmental management

4.5.1 Stormwater management

Stormwater is managed under the Soil and Stormwater Management Plan (SWMP), which was prepared as required by EPL 837 Pollution Reduction Program (PRP) U24.1 Stormwater Catchment and Management Plan (Operational Environmental Management Plan Kurnell Terminal, 2021).

The stormwater system only collects runoff from areas of the Site that have been designated low risk with respect to interaction with petroleum products as described in Section 4.1. As part of the SMP, the following key controls and mitigation measures for the management of surface water are required in order to prevent contamination of stormwater during maintenance works:

- Where practicable, 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, in accordance with EPL 837
- Where practicable, stormwater that is captured in the bunds around contaminated soil stockpiles would be collected and sent to the WWTP
- Regular inspections would be undertaken of soils/excavation areas, particularly after rain events to confirm pooled stormwater does not overflow
- Regular inspections would be undertaken of stormwater drains down hydraulic gradient of disturbed areas
- If stormwater quality is impacted in areas that have been disturbed by excavation work, water would be diverted to the oily water sewer system where practical
- Stormwater within the ACS Containment Cell would be directed to the Oily Water sewer system
- During 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 confirm 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
- During the regular inspections of the surface water management system, issues identified with the control measures, such as silt fencing or ponding of water, corrective actions would be implemented in accordance with this Plan.

4.5.2 Oily water management

As described in Section 4.3, the Site has a separate Oily Water System to handle water that is or may be impacted by petroleum products, including a proportion of stormwater runoff collected from areas where there may be interaction with petroleum products, such as tanks bunds. Oily water is treated in the WWTP, in accordance with strict EPL837 requirements. Treated effluent must meet strict discharge limits with samples sent to a NATA accredited Lab independent of Ampol. Treated effluent is discharged to the Tasman Sea via the Yena Gap outfall under the conditions of the EPL.

5.0 Impact assessment

This section provides an assessment of the potential surface water, wastewater and flooding impacts that could result from the construction and operational phases of the proposed modification (as defined in Section 1.2). It also considers the potential cumulative impacts that may result from other projects occurring concurrently and within the same surface water catchment.

The potential impacts resulting from the proposed modification have been assessed under the four key areas where surface water, wastewater and flooding impacts are most likely to arise if not managed appropriately. These key areas include:

- Drainage – Whether the proposed modification would overload the existing SWS drainage networks and/or alter the rate and volume of discharge to the receiving environment
- Wastewater – Whether the proposed modification would increase the amount of oily water entering the existing OWS and WWTP and/or cause oily water flows to spill to the existing SWS and discharge offsite without the appropriate level of treatment required under the conditions of the EPL-837
- Water quality – Whether the proposed modification would increase pollutant concentrations discharging offsite and entering downstream waters via the existing SWS
- Flooding – Whether the proposed modification would have an impact on existing flood behaviour at both onsite and offsite locations.

The identification of potentially adverse impacts provided in this section has guided the proposed modification amendments to the mitigation and management measures that were included in the approved project, as detailed in Section 6.0.

5.1 Construction

The anticipated construction processes for the proposed modification are described in Section 1.2. If not managed appropriately, some of the proposed construction activities could have an impact on the quality and quantity of water leaving the Site. These risks are more likely to occur during the proposed earthworks, stockpiling, and the introduction of large construction equipment and associated chemicals/ pollutants.

The potential drainage, flooding, water quality and wastewater impacts resulting from anticipated construction works are summarised in the following sections.

5.1.1 Drainage impacts

The existing SWS would remain operational during all stages of the proposed modification works to continue servicing the Site during periods of rainfall.

As described in Section 4.1, the existing SWS networks are generally contained to the internal road network. The proposed modification works would be limited to land located outside of the internal road network, such that there would be no major earthworks along the road network, nor would there be significant alterations to the existing SWS that runs along this road network.

On this basis, the proposed modification works would not alter existing drainage paths across the Site and surface water flows would continue to drain towards the designated surface water treatment and discharge locations for each sub-catchment, as described in Section 4.1.

If the proposed modification works were to block existing SWS infrastructure or block the overland flow paths leading existing drainage paths, surface water flows could be diverted elsewhere, thereby changing the quality and quantity of water leaving the Site. To prevent this, management measures would be implemented to locate stockpiles and other potential flow obstructions away from key drainage paths (e.g., on the high-side of construction areas). Temporary sediment controls would also be installed on the SWS to prevent sediment-laden runoff from blocking the pit and pipe network during construction. The management of potential drainage impacts on surface water runoff during the construction works would be detailed in the Construction Environment Management Plan (CEMP), which would be prepared in accordance with the *Managing Urban Stormwater – Soils and Construction* Guidelines (the Blue Book) (Landcom, 2004). The CEMP would include Site-specific management plans including a SWMP.

The proposed modification works would not be likely to significantly increase surface water runoff during the construction, as there is not expected to be new areas of impervious area introduced. Above-ground structures would only be relocated to areas that were already impervious under pre-proposed modification conditions.

5.1.2 Oily water management

Most of the Project Area is already disconnected from the existing OWS system and therefore would not be impacted by the removal of redundant OWS networks. Areas that currently drain to the OWS network would continue to do so until the proposed diversion line has been constructed (towards the end of Stage 2) or until the area has been remediated (in Stage 3) and can safely drain to the SWS. Retaining the existing OWS infrastructure for as long as necessary during the construction phase would prevent oily water from entering the SWS and bypassing treatment at the WWTP. This would prevent uncontrolled release of wastewater during the construction phase.

The total expected oily water load directed to the WWTP would decrease as a result of the proposed modification. The existing treatment capacity of the WWTP would be capable of containing and treating all onsite wastewater, particularly since large areas are no longer draining to the WWTP.

The WWTP would continue to operate during the construction phase, discharging treated effluent to the Tasman Sea via the Yena Gap under the conditions of the EPL-837.

The existing OWS network and WWTP would also be protected during construction works, to avoid damaging or blocking this existing infrastructure.

5.1.3 Water quality impacts

The pollution of downstream waters and ecosystems may occur from surface water runoff carrying nutrients, sediments, and organic and inorganic contaminants into drains and watercourses.

Build-up and wash-off are the key mechanisms for generating contaminated surface water runoff. Build-up is the process whereby dry deposition of pollutants accumulates on the surface, and wash-off is the process whereby this deposition is removed by rainfall and runoff and then transported into downstream water systems.

Construction activities are likely to disturb or expose existing surfaces and temporarily stored soils and other materials onsite. Loose and exposed materials, as well as accidental leaks or spills, are vulnerable to wash off during periods of rainfall, transporting an array of pollutants into downstream ecosystems. This pollution can lead to turbid waters, alter acidity levels, and introduce toxicants like metals and hydrocarbons – all of which have the potential to harm the health of the downstream aquatic ecosystems.

A summary of proposed construction activities, related concerns, and their potential impacts on surface water features if unmanaged (particularly the sensitive ecological receptors located immediately downstream of the Site, such as Towra Point Nature Reserve, Marton Park Wetland, Quibray Bay, Botany Bay, and areas within Proximity Areas for Coastal Wetlands) is provided in Table 5-1.

Table 5-1 Potential impacts to surface water quality during the construction phase

Stage(s)	Activity	Pollutants of concern	Potential surface water impacts on sensitive receptors
All	Increased onsite traffic due to trucks and other machinery during construction, which have the potential to increase dust, transport sediments, and increase the presence of oils and greases on trafficked surfaces.	Sediments, oils and greases.	Increased influx of sediments to nearby waterbodies can impact aquatic ecosystems. Oils and greases are of concern due to their potential for acute toxicity and bioaccumulation ability.
2	The removal of surface cover and soil exposure increases the potential for erosion and sediment-laden runoff. Excavation works and stockpiling of loose soils could lead to the dispersion of dust, soils, sediments and other sorbed pollutants by wind and interaction with surface water runoff.	Sediments, nutrients, and contaminants.	Increased influx of sediments to nearby waterbodies could result in high turbidity, lower dissolved oxygen levels, and increased toxicant concentrations which could impact aquatic ecosystems. Excess nutrients could lead to eutrophication and prioritise the growth of toxic/ invasive algal species over native flora.
2	Construction works to augment the existing FWS in Zone 1 and relocate FWS (including firewater tank, pumphouse, and pipework), would occur in the Proximity Areas for Coastal Wetlands. These have the potential to increase the dispersion of dust, soils, and sediments, transport sediments, and increase the presence of oils and greases on surface runoff discharge to the Marton Park Wetland.	Sediments, nutrients, oils and greases, and contaminants.	Increased influx of sediments to nearby waterbodies could result in high turbidity, lower dissolved oxygen levels, and increased toxicant concentrations which could impact aquatic ecosystems. Excess nutrients could lead to eutrophication and prioritise the growth of toxic/ invasive algal species over native flora. Oils and greases are of concern due to their potential for acute toxicity and bioaccumulation ability.
2	Dewatering of open excavations and construction basins with potentially contaminated, untreated water being discharged to the receiving environment.	Sediments, nutrients, contaminants, dissimilar pH, oils and greases.	A change in pH levels and toxicant concentrations could lead to fish kills and other undesirable impacts on aquatic ecosystems, livestock, and aquatic foods. Increased influx of sediments to nearby waterbodies could result in high turbidity, lower dissolved oxygen levels, and increased toxicant concentrations which could impact aquatic ecosystems.

Stage(s)	Activity	Pollutants of concern	Potential surface water impacts on sensitive receptors
2	Increased overland flows due to damaged or blocked pits and pipes, or the sudden release of stored fire water during removal/ relocation works. This would increase the risk of surface waters interacting with petroleum products, sediments and other pollutants on the surface.	Sediments, nutrients, oils and greases, and contaminants.	Increased influx of sediments to nearby waterbodies could result in high turbidity, lower dissolved oxygen levels, and increased toxicant concentrations which could impact aquatic ecosystems. Excess nutrients could lead to eutrophication and prioritise the growth of toxic/ invasive algal species over native flora. Oils and greases are of concern due to their potential for acute toxicity and bioaccumulation ability.
2 & 3	Runoff of concrete washout from structure relocation and/or construction of new OWS pits and pipes entering receiving waterbodies. Mobilisation of concrete dust through wind and interaction with surface water runoff. Spills of chemicals used in the treatment and curing of concrete. Spills of excess or waste concrete.	High pH, chromium, contaminants, waste, sediments, and gross pollutants.	Increased alkalinity and toxicant concentrations could impact the health of aquatic ecosystems and lead to fish kills. Increased turbidity in receiving waters.
3 & 4	Construction of OWS pumps along the southern boundary of Zone 2, and remediation in southern and eastern area of Zones 2 and 3, respectively, would occur in the Proximity Areas for Coastal Wetlands, which have the potential to increase the dispersion of dust, soils, sediments dust, transport sediments, and increase the presence of oils and greases on surface runoff discharge to the downstream wetlands.	Sediments, nutrients, oils and greases, and contaminants.	Increased influx of sediments to nearby waterbodies could result in high turbidity, lower dissolved oxygen levels, and increased toxicant concentrations which could impact aquatic ecosystems. Excess nutrients could lead to eutrophication and prioritise the growth of toxic/ invasive algal species over native flora. Oils and greases are of concern due to their potential for acute toxicity and bioaccumulation ability.
2, 3, & 4	Accidental spills of petroleum products, lubricants, wastewater and leachate (from machinery/ equipment, or augmented/ removed/ relocated infrastructure) entering downstream waterways.	Hydrocarbons, oils and greases, hydraulic fluids, contaminants, and hazardous chemicals.	Increased pollutant concentrations could impact aquatic flora and fauna, including fish kills in aquatic ecosystems.

The proposed modification works would be carried out in stages to effectively minimise ground disturbance, soil exposure, and stored waste.

The management of potential impacts on surface water runoff quality during the construction works would be detailed in the Construction Environment Management Plan (CEMP), which would be prepared in accordance with the Blue Book (Landcom, 2004). The CEMP would include Site-specific management plans, including a SWMP.

5.1.4 Flooding impacts

Potential flooding impacts during the construction phase have been considered, including how floodwaters would impact the proposed modification, how the proposed modification would potentially impact existing flood behaviour within the Site, and whether potential impacts would have follow-on effects across downstream locations.

Flooding impacts on construction works

Existing levels across the Project Area would remain the same or be lowered before capping works. As such, the Site's resilience against external floodwaters would not change from that which currently exists. Existing surface levels along the Site boundaries would also remain untouched, thereby maintaining the same level required to keep external floodwaters out of the Site.

As described in Section 4.4, previous flood modelling results have indicated that the Site would be protected from surrounding/ external floodwaters in all events up to, and including a 1% AEP flood event based on the extrapolation of adjacent flood levels from the Kurnell Township Flood Study (WMAwater, 2009). Additional flood protection would be achieved once the proposed SSIP has been completed, before the commencement of construction of the proposed modification (AECOM, 2023).

The management of external flows from the upstream Kamay Botany Bay National Park would be retained during construction. Flood protection would be required around excavated or susceptible construction zones, to divert large external surface flows entering the Site around these construction zones, particularly for works within Zone 2. These diversion works would direct flows around construction zones and back towards the existing SWS to prevent localised flood issues. Proposed earthworks would be staged to minimise the extent of required diversion works at any one time.

However, it is unlikely that significant flow diversion works would be required as the existing road network currently acts as an overland flow path for local and external floodwaters moving through the Site. The proposed modification would not impact the road network and would continue to provide an overland flow path during construction.

Potential impacts of construction works on flooding

Flood modelling completed for the SSIP (BPM Projects, 2024), as shown in Figure 4-7, indicates existing flood storage locations and flood flow paths across the Site. The modelling results indicated that areas to undergo remediation and capping as part of Stage 3 (shown in yellow on Figure 4-7) under existing conditions would be subject to localised flooding in a combined 1% AEP rainfall event and 1% AEP tide event. A detailed description of the capping types is provided in Section 4.2.4 (Stage 4 – Grading) of the Modification Report.

Most of these areas are only subject to small amounts of flooding from local flows exceeding the road network's hydraulic capacity. However, a significant amount of flood storage is provided within the existing bunded areas along the eastern side of Zone 2.

During the remediation and capping as part of Stage 3, existing bunds across the Project Area would be removed, and surface levels would be raised, potentially reducing the flood storage.

Loss of this flood storage could increase existing flood extents at other locations across the Site or even across external areas. To prevent loss of existing flood storage and to avoid offsite flooding impacts, the proposed design has incorporated the following measures:

- Existing bunds would be retained across the eastern side of Zone 2 to continue containing floodwaters generated by these areas. Locations of bunds that would be retained are shown in Figure 5-2

- Where grading is required to facilitate future land uses in the western half of Zone 2 and northern part of Zone 3 (Figure 1-3), a minor reduction in flood storage would be managed through existing stormwater systems for Catchment B & D at the Site
- Where grading is not required, earthworks and capping would be completed in a manner that does not raise existing surface levels in areas of existing flood storage, in all events up to and including the 1% AEP flood event (Figure 5-1). For example, areas requiring up to 300 mm of capping that are within areas of flood storage would need to be initially excavated by 300 mm before the capping occurs.

These measures would prevent significant changes to existing flood storage volumes, which would in turn minimise the likelihood of localised flood impacts resulting from the proposed modification at other onsite or offsite locations.

Figure 5-1 Proposed excavation areas

5.2 Operation

Following the completion of the proposed modification works, the Site would continue to operate as described in the approval documentation for the approved project. Operations would be confined to Zones 1 and 1A, and remediated land across Zones 2 and 3 would remain vacant.

The proposed modification, which includes remediation and the removal of underground OWS lines from certain areas in Zones 2 and 3 upon completion of Stage 3 and grading in Stage 4, and following completion of Stage 5, may lead to potential operational impacts on drainage, wastewater, water quality, and flooding. Potential operational impacts resulting from these changes are described in the following sections.

5.2.1 Drainage impacts

Currently, stormwater in Zones 2 and 3 is collected and processed under either the SWS or OWS systems. Under future operational conditions, following the removal of underground OWS lines from certain areas in Zones 2 and 3, the SWS would collect additional surface water runoff that would have previously been collected by the OWS.

Figure 5-2 illustrates the areas where stormwater is currently collected by the OWS and the areas that would be redirected from the OWS to the SWS as part of the proposed modification. In the existing conditions, stormwater in all green areas is collected by the OWS, treated in the WWTP, and then discharged to the ocean in accordance with the EPL. Stormwater in all white areas is currently collected and discharged via the SWS. Under the proposed design conditions, stormwater from the purple areas (Figure 5-2) would no longer be collected by the OWS and instead discharged to the SWS of the associated catchments. This change would increase the effective catchment area and peak discharge generated in the impacted catchments. In accordance with the Sutherland Shire Council DCP (2015), surface water would be managed onsite to confirm that post-development peak discharge rates do not exceed pre-development rates. The following analysis quantifies potential changes in peak discharge rates for the proposed modification and proposes appropriate stormwater management strategies and mitigation measures.

Following the proposed modification, the stormwater catchment area of Catchments B & D, E, and F would increase. Table 5-2 summarises changes in the catchment area of the OWS and SWS and increases in the stormwater area of each catchment.

Table 5-2 Changes to the catchment area

Catchment	Total area (ha)	Existing condition		Post-construction conditions			
		OWS (ha)	SWS (ha)	OWS (ha)	SWS (ha)	SWS Area Increase (ha)	SWS Area Increase (%)
B&D	72.6	22.0	50.6	19.9	52.7	2.1	4.1%
E	26.0	4.8	21.2	0.0	26.0	4.8	22.8%
F	107	4.1	102.9	0.0	107	4.1	4.0%

The following sections discuss the changes to each catchment under post-proposed modification conditions.

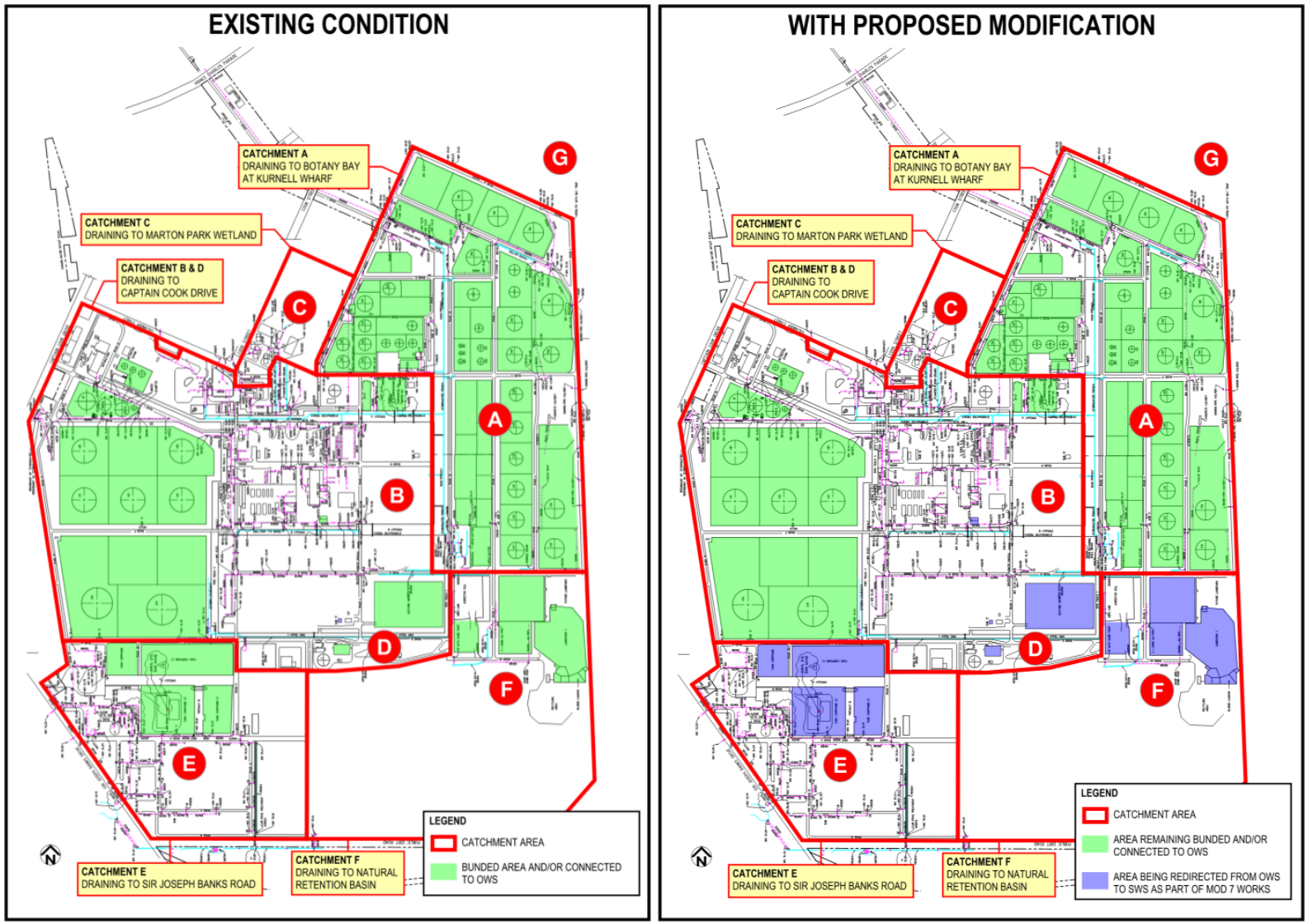


Figure 5-2 Areas being redirected from the OWS to the SWS

Catchment B & D

As previously mentioned in Section 5.1.4, existing bunded areas along the eastern side of Zone 2 would be retained to avoid loss in flood storage across these areas. These bunded areas would continue to retain surface water runoff, thereby preventing this runoff from entering the SWS during a storm event.

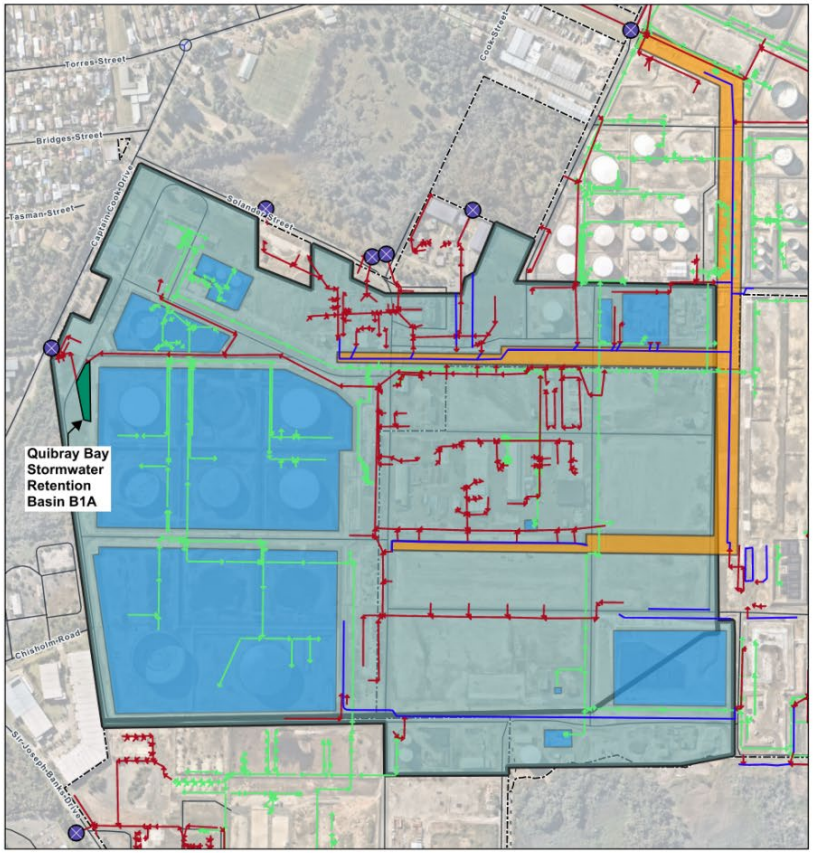
Under existing conditions, the SWS in catchment Catchments B & D is directed to the Quibray Bay Stormwater Retention Basin B1A, as shown in Figure 5-3. The stormwater is retained in the basin to control the discharge rates.

Under the proposed modification, an additional area of 2.1 ha, accounting for 4.1% of the total catchment area (see Table 5-2), would be redirected from the OWS to the SWS (refer to Figure 5-3). Flows from the additional stormwater catchment would travel via stormwater pump P2, which controls the maximum flow into Basin B1A (see Figure 5-4). Flows into the basin exceeding the pump's capacity would be temporarily stored upstream of the pump. Figure 5-4 illustrates the flow direction of the existing stormwater catchment and the additional stormwater catchment under the proposed conditions. It should also be noted that, as part of the approved SSIP, a new pump station has now been commissioned at Basin B1A to redirect excess surface water to three vacant tank compounds, as shown in Figure 4-6 (BPM Projects, 2024). Since the outflow from the Basin 1A is currently (and would continue to be) monitored, regulated, and controlled via its outlet and the new SSIP pump system, an increase in peak flow discharge from Basin B1A to Quibray Bay is not expected, and additional detention controls are not required for Catchments B & D.

Catchment E

Under existing conditions, runoff from Catchment E is collected by the SWS and discharged through three outlets into a drainage channel along Sir Joseph Banks Road, as illustrated in Figure 5-5. Stormwater from the Refining Process Improvement Project (RPIP) area, located at the south-east corner of Catchment E and set to be remediated and capped as part of the proposed modification, is directed to an existing vegetated swale along the southern boundary of the catchment, which eventually discharges into the drainage channel along Sir Joseph Banks Road. Meanwhile, the OWS in Catchment E, covering an area of 4.8 ha (see Table 5-2), collects stormwater and directs it to the WWTP for further treatment, before it is discharged in accordance with the EPL.

Under the proposed modification, the OWS in Catchment E would be removed. Stormwater generated within the OWS area would be redirected to the SWS and eventually discharge into the drainage channel along Sir Joseph Banks Road (Figure 5-5). This would redirect surface water runoff from an additional area of 4.8 ha towards the SWS. Additionally, the proposed modification works within the RPIP would involve removing dense vegetative canopy cover and replacing it with capping surface, which could be temporary vegetative cover. This change has potential to reduce the time it takes for rainfall to convert to runoff and spread across the area, leading to an increase in peak discharge rates from this area, and higher discharge rates into the downstream drainage system along Sir Joseph Banks Drive.



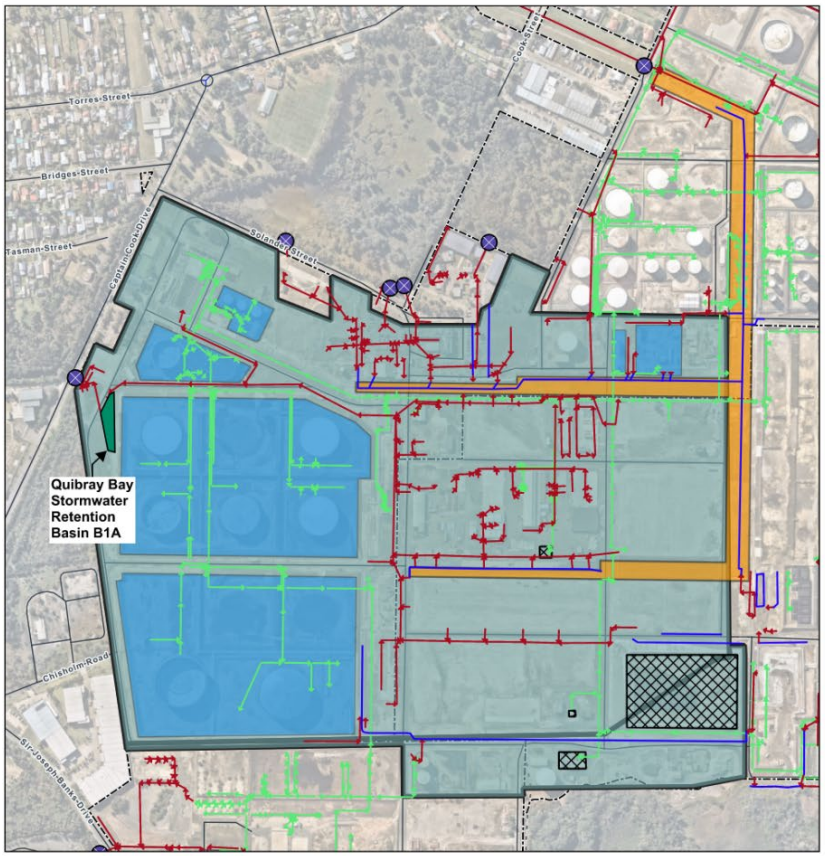
Catchment B & D (Existing Condition)

Legend

- Discharge Points
- Oily Water System
- Surface Water System
- Drainage Channel
- Roads
- Pipeways
- Oily Water System
- Catchment B & D
- Property Boundaries
- Zone Boundary

0 0.1 0.2 km

AECOM



Catchment B & D (Post-Construction Condition)

Legend

- Discharge Points
- Oily Water System
- Surface Water System
- Drainage Channel
- Roads
- Pipeways
- Oily Water System
- OWS to SWS area
- Catchment B & D
- Property Boundaries
- Zone Boundary

0 0.1 0.2 km

AECOM

Figure 5-3 OWS and SWS in Catchment B & D under Existing and Post-Construction Conditions

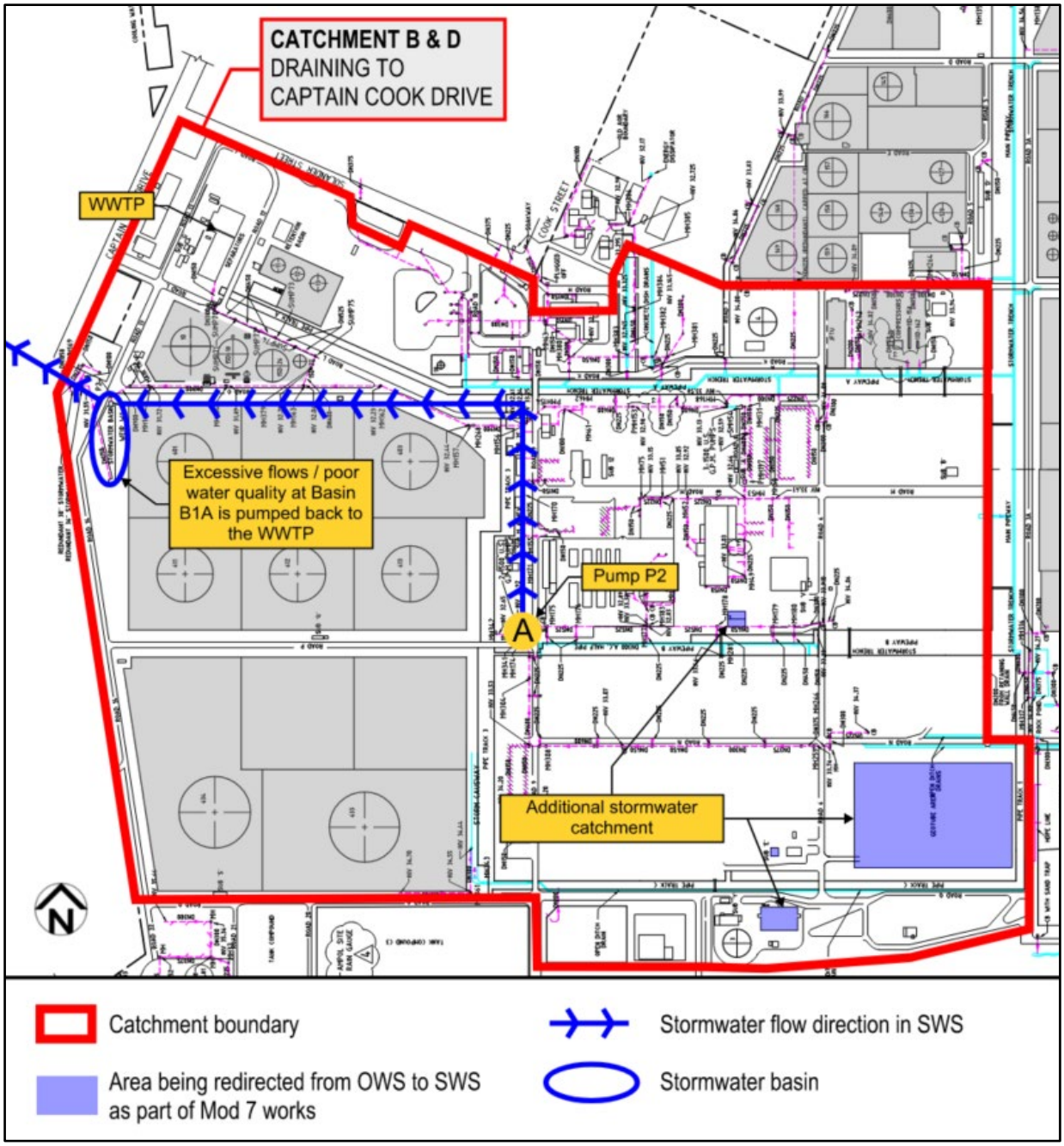


Figure 5-4 Stormwater management in Catchment B & D

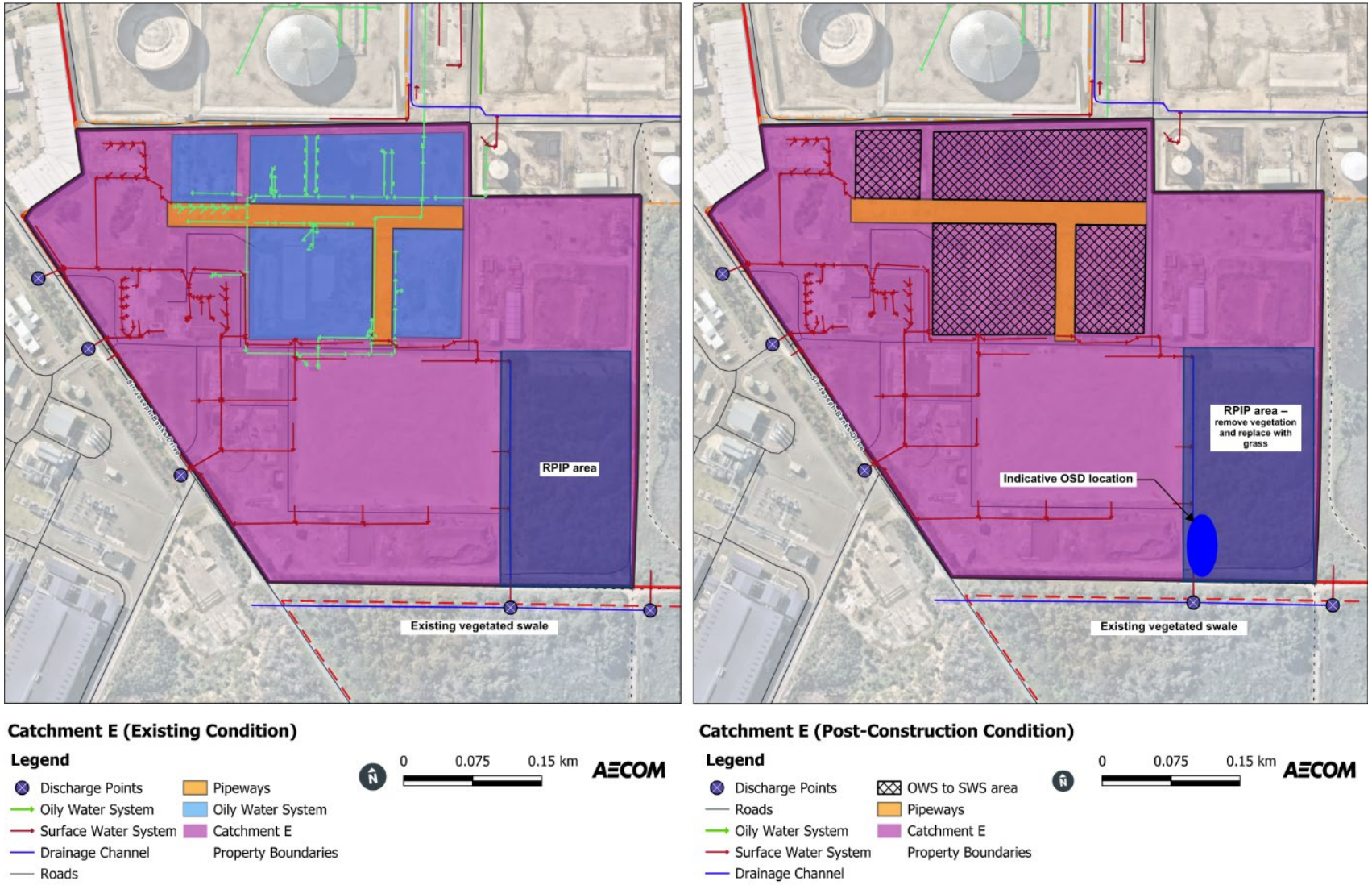


Figure 5-5 OWS and SWS in Catchment E under Existing and Post-Construction Conditions

Preliminary modelling was conducted to assess the increases in peak discharge rates resulting from stormwater catchment changes in Catchment E using the DRAINS model developed by MHL for a Site-wide assessment of the existing OWS and SWS networks, completed in 2016 (MHL, 2016). The results found that redirecting the additional area to the SWS would increase overland flows across the catchment by 1.5 m^3/s in the 1% AEP event. This increase in overland flow is shown to cause a 10-20% increase in the total flow heading north-west along Sir Joseph Banks Drive. This increase in flow has potential to overload or exacerbate existing drainage conditions along Sir Joseph Banks Drive. It could also increase peak flow rates entering Quibray Bay, which would increase overland flow velocities and potentially scour or erode the natural channels leading to the bay.

Peak discharge rates from the RPIP area were estimated to increase by up to 0.6 m^3/s in the 1% AEP event due to the proposed changes in land cover. This increase in discharge would increase the total peak flow rates along Sir Joseph Banks Drive by 3 to 10%, which has potential to overload or exacerbate existing drainage conditions along this channel or across downstream areas.

It is proposed that an onsite detention (OSD) system be constructed in Catchment E to manage discharge rates from this area where surface flows are being redirected from the OWS network to the SWS. For the existing OWS area, modelling results show that a detention storage volume in the order of 5,000 m^3 would be required to limit the exceedance of post-construction discharge rates against pre-construction rates in all events up to and including the 1% AEP design storm event. This estimate is based on preliminary modelling and would need further assessment and refinement during the subsequent design phases. The required OSD storage volume could be provided within the existing Pipeway A & B (CLOR) in Catchment E (Figure 5-6), provided that the surrounding areas can drain towards the pipeway. The required volume could also be achieved by bunding the ends of the pipeway to increase its water holding capacity. The OSD system would then be connected to the downstream SWS network. Design of the OSD system would require an appropriate amount of freeboard above the required storage volume, in addition to a designated spillway that would safely direct overflows towards the Site discharge point.

It is proposed that a separate OSD system is provided along the downstream (western) boundary of RPIP to limit the exceedance of post-construction discharge rates against pre-construction rates, when this area was covered by dense vegetation. Modelling results show that a detention storage volume in the order of 1,100 m^3 would be required. The estimated detention volume is indicative only and would need to be further assessment and refinement during the subsequent design phases.

Figure 5-6 illustrates potential OSD arrangement and the proposed stormwater management system for Catchment E.

It should be noted that the hydrocarbon Pipeway A & B (CLOR) would need to be confirmed as clean prior to converting it to a detention system in order to prevent the contamination of surface waters inflows.

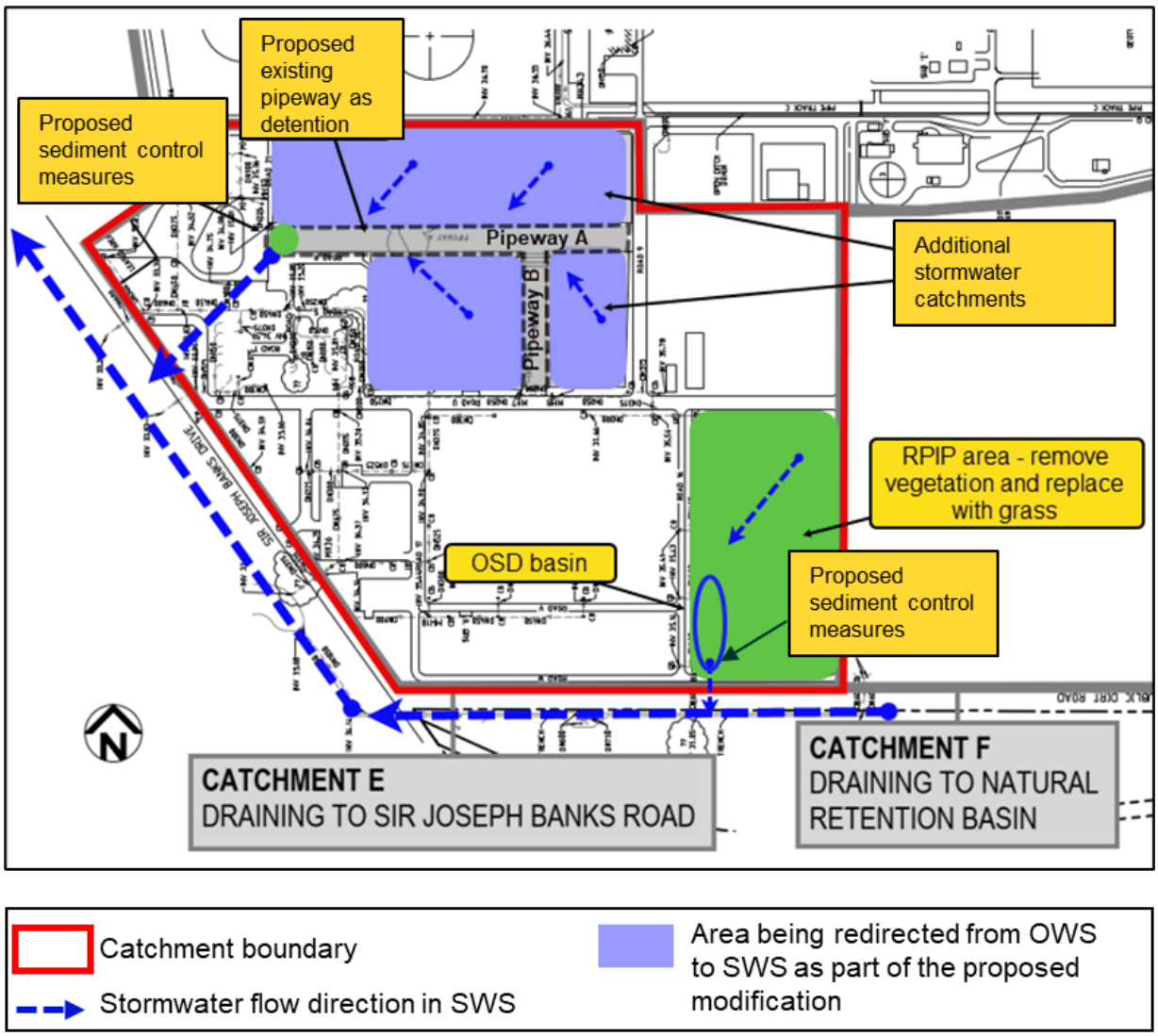


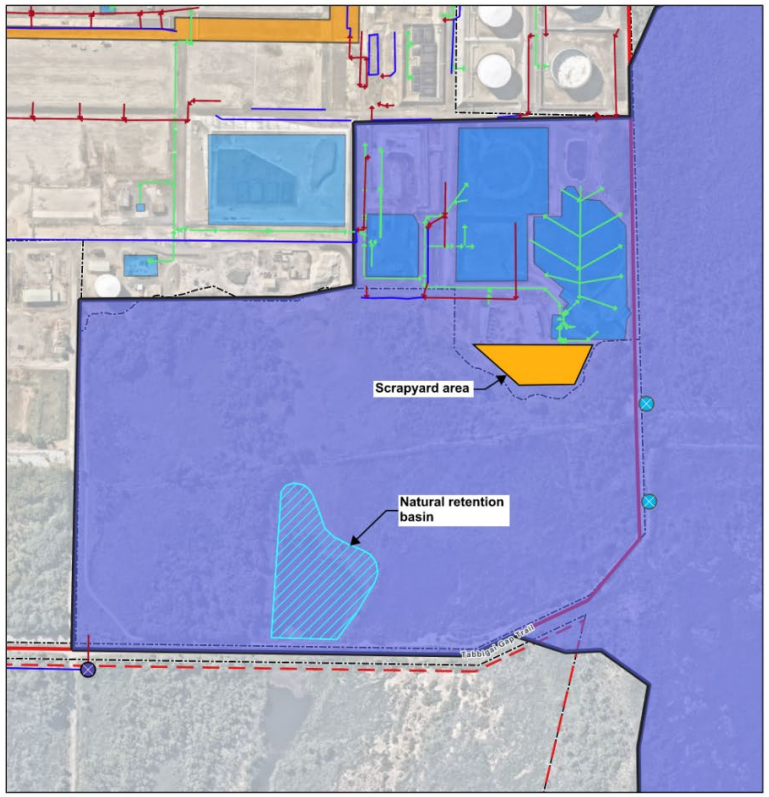
Figure 5-6 Potential OSD arrangement and stormwater management system in Catchment E

Catchment F

Currently, surface runoff from Catchment F is collected by the SWS system and discharged into the wetlands located in Zone 4 at the south-east corner of the Site. This runoff is further retained within the wetland and a natural retention basin before being released into the downstream drainage along Sir Joseph Banks Drive (see Figure 5-7).

In Catchment F, there is a 4.1 ha bunded area illustrated in blue in Figure 5-7, which makes up 4% of the catchment area (see Table 5-2). Currently, stormwater is collected by the OWS system and directed to the WWTP.

Under the proposed modification, the existing OWS would be removed, and stormwater from the bunded area would be redirected to the SWS (see Figure 5-7). The bunds would remain following construction, providing a detention function, and therefore, no additional detention is required for Catchment F. However, low-flow pipes or a pumping system and other drainage structures may be required to release stored stormwater (currently being collected by the OWS) from the bunded area during or after storm events. The downstream wetlands and natural retention basin would continue to provide retention. Significant changes in peak discharge rates in Catchment F are not expected after the proposed modification.



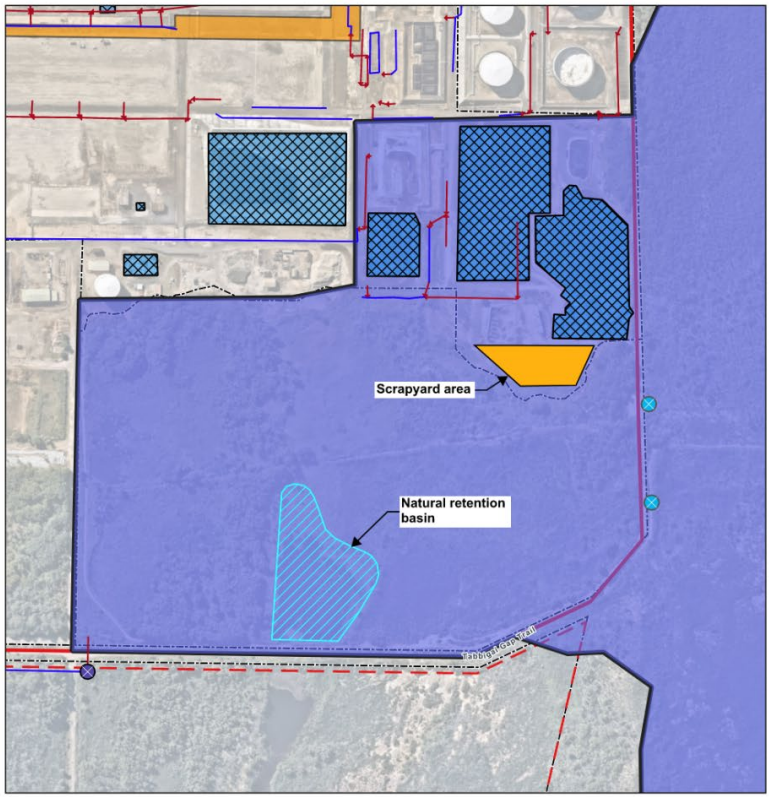


Figure 5-7 OWS and SWS in Catchment F

5.2.2 Oily water management

The existing OWS within Zones 2 and 3, as indicated in Figure 1-2, would be decommissioned and removed in Stage 4. The only remaining OWS network in these zones would be the new OWS diversion line that would collect leachate from the ACS Containment Cell and connect to the existing OWS network along the eastern side of Zone 1. The OWS network in Zone 1 would continue to direct oily water and leachate towards the WWTP for treatment.

The OWS diversion line from the ACS Containment Cell is proposed to be a pumped system and would be designed to, at the very least, maintain (or improve) the hydraulic capacity of the OWS network servicing the ACS Containment Cell. Maintaining the existing hydraulic capacity would ensure that leachate/ contaminated water does not bypass the proposed OWS network and discharge to the receiving environment without treatment. Additionally, the proposed pumping station would incorporate an emergency storage tank to contain leachate from the containment cell in the event of a power outage to minimise the risk of leachate discharging offsite without treatment.

Other bunded areas draining to the existing OWS network along the eastern side of Zone 1 (i.e., where the proposed diversion line would connect in) are equipped with valves on the outlet pipes to control the amount of oily water entering the OWS network. The process of only allowing a few bunded areas to drain to the OWS network at a time by using these valves would confirm that the network is not overloaded, even by introducing additional inflows from the ACS Containment Cell.

The remaining and remediated portions of Zones 2 and 3 would not produce oily water runoff after completion of the proposed modification works, and all surface water runoff from these zones would be of suitable quality for redirection to the existing SWS.

On this basis, the total oily water load from the Site and entering the OWS system and WWTP would be significantly reduced during periods of rainfall. The OWS and WWTP are therefore not likely to be impacted by the proposed modification and would continue to operate as per the approved project.

5.2.3 Water quality impacts

Once the redundant sections of the OWS network in Zones 2 and 3 are decommissioned and removed in Stage 4 and the proposed modification works are complete, leachate from the ACS Containment Cell would continue to drain to the WWTP via the OWS diversion line connected to Zone 1. Disturbed surfaces across the Site would be stabilised and remediated to provide sufficient surface cover, such as hardstand compaction or temporary vegetative cover, until future land uses are developed. It is understood that existing flow controls or water quality treatment devices, such as oil skimmers and PFAS treatment, would remain and be maintained as part of the proposed modification. OSD requirements in the south eastern corner of Zone 3 would be constructed upstream of existing PFAS devices to ensure existing treatment measures are maintained.

In accordance with the Sutherland Shire Council DCP (2015), developments must reduce pollutants and sediments in surface water discharge to minimise environmental impact, achieving the pollutant reduction targets specified in Section 2.2.1. Given the Site's proximity to sensitive aquatic ecosystems like Towra Point Nature Reserve and Marton Park Wetland, stormwater pollutant levels must meet the Water Quality Objectives (WQOs) outlined in the ANZECC (2001) Guidelines for the Protection of Aquatic Ecosystems (Sutherland Shire Council, 2015).

Under the proposed modification, the capping area in Zones 2 and 3 would be stabilised with adequate surface cover, maintaining current stormwater discharge rates through the proposed OSD system. Also, considering the potential reduction in human activities on the remediated area after the construction, it is expected that nutrient loads, heavy metals, or oil and grease levels would decrease. There is likely to be minimal risk for pollution of surface water runoff during the ultimate state of operation, once surface cover/ vegetative cover has been well established.

There is some potential for erosion and sedimentation on the capping area immediately after construction ceases, when surface/ vegetative cover is not yet fully established and these surfaces and loose soils remain exposed. Erosion and sedimentation control measures would need to be implemented at the source until surfaces have been completely stabilised. This could include sediment traps upstream of pumps or outlet pits, or installing a trash rack at the OSD discharge point to prevent gross pollutants from leaving the Site. With these control measures in place, the risk of sediment pollution of stormwater is considered to be minimal.

Short-term post-construction water quality monitoring at main outlets of the catchments would be undertaken to confirm the discharged stormwater pollutant levels meet the required WQOs. Baseline water quality sampling would be conducted at the proposed monitoring locations prior to the construction to define the baseline water quality conditions. Proposed stormwater quality monitoring locations are shown in Figure 5-8.

Table 5-3 summarises proposed stormwater quality mitigation measures for each impacted catchment within the Site. Table 5-4 lists the proposed stormwater quality monitoring parameters in accordance with the ANZECC & ARMCANZ (2000) Guidelines.

By implementing the proposed mitigation measures and the post-construction water quality monitoring scheme, potential water quality impacts on downstream sensitive receptors would be effectively mitigated.

Table 5-3 Proposed stormwater quality mitigation measures for Catchment B & D, Catchment E and Catchment F

Catchment	Proposed stormwater quality mitigation measures
B&D	• At source erosion and sediment control measures to be implemented until remediated surfaces are stabilised • Post stabilisation of landforms – sediment control measures such as sediment traps upstream of pumps or outlet pits • Short-term water quality monitoring at Basin 1B (Location A) during three wet weather events during discharge. In the event of non-compliance, corrective and preventative actions would be identified.
E	• At source sediment control until remediated surfaces are stabilised • Post stabilisation of landforms – sediment control measures, such as sediment traps upstream of OSD discharge proposed at the Pipeway A & B (CLOR) and at the RPIP (see Figure 5-6) • Addition of trash rack at OSD discharge to prevent gross pollutants leaving site • Short-term water quality monitoring at Locations B and C during 3 wet weather events during discharge. In the event of non-compliance, corrective and preventative actions would be identified.
F	• At source sediment control until remediated surfaces are stabilised • Post stabilisation of landforms – Sediment control measures, such as sediment traps upstream of the bunded tank discharge, could be considered. For example, outlet control could consist of a riser pit with a trash rack to manage gross pollutants and an orifice to regulate peak discharge. • Addition of trash rack at bunded tank discharge to prevent gross pollutants leaving site • Short-term water quality monitoring at Location D to monitor water discharged from the proposed orifice during three wet weather events. In the event of non-compliance, corrective and preventative actions would be identified.

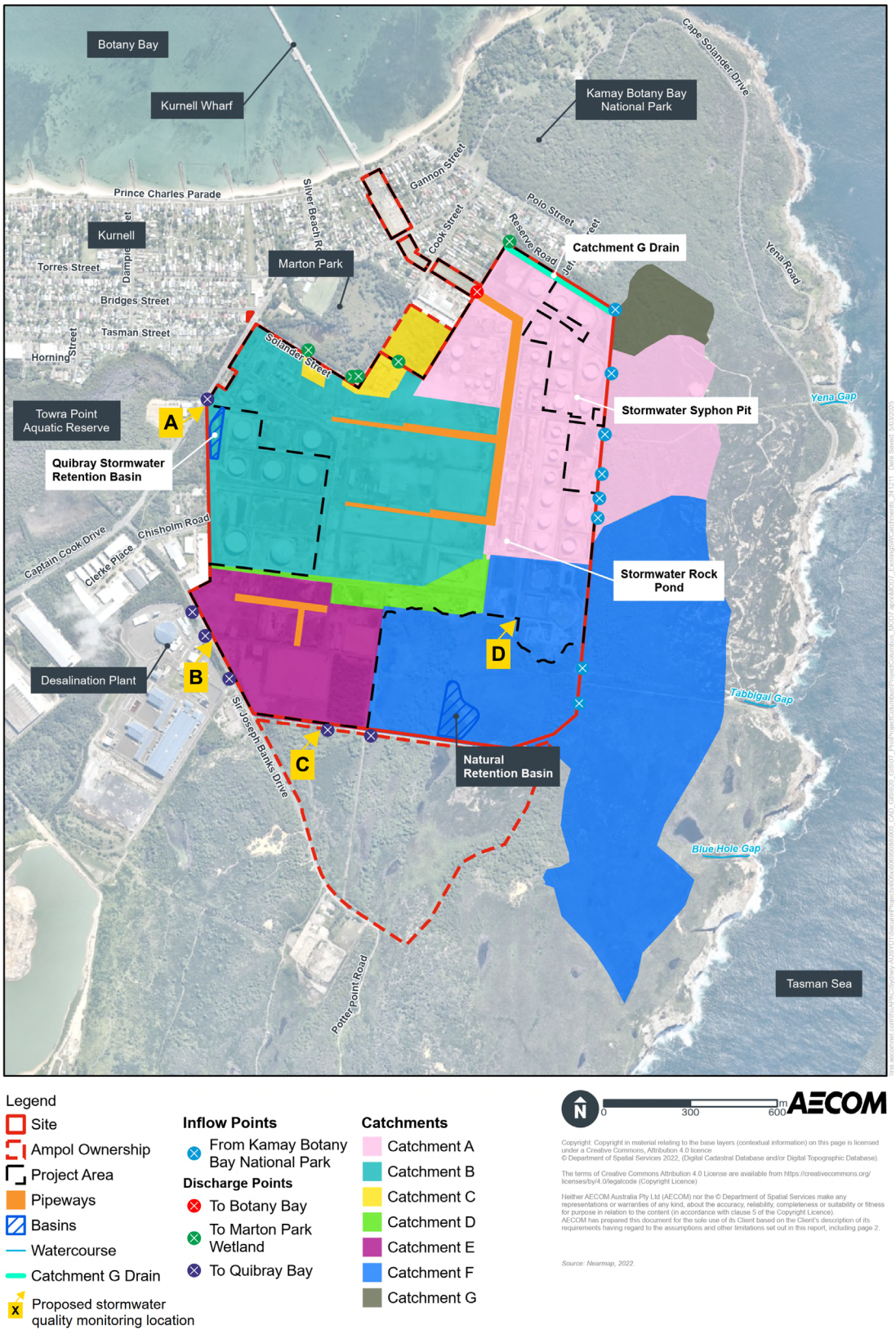


Figure 5-8 Proposed stormwater quality monitoring locations

Table 5-4 Proposed stormwater quality monitoring parameters

Objective	Proposed water quality monitoring parameters	Guideline value
Aquatic ecosystems: maintaining and improving the ecological condition of waterbodies and their riparian zones over the long term	Total Phosphorus (TP) (*ex situ*)	0.03 mg/L
	Total Nitrogen (TN) (*ex situ*)	0.30 mg/L
	Chlorophyll-a (*ex situ*)	0.04 mg/L
	Turbidity (*in situ*)	0.5-10 NTU
	Dissolved oxygen (DO) (*in situ*)	80-110% saturation
	pH (*in situ*)	7.0-8.5

5.2.4 Flooding impacts

The operational phase of the proposed modification is not expected to alter existing flooding conditions on and offsite. The design controls implemented during the construction earthworks, detailed in Section 5.1.4, would confirm that finished surface levels maintain existing flood storages and flood flow paths across the Site.

There are changes to surface levels in several areas with Zone 2, including the Scrapyard at the south east corner of Zone 2 as well as minor changes in the surface levels within Zone 2 and 3 as remediation works occur to prepare the Site for future land uses, which may slightly reduce rainwater attenuation within the Site. However, since most of this area is above the 1% AEP flood level and the flood depth in submerged areas is quite shallow (mainly below 300 mm), the potential changes in flood storage across the Site are insignificant. Additionally, stormwater discharge in Catchments B & D would be regulated by Basin 1A and the associated pumping system proposed as part of the SSIP (BPM Projects, 2024). Therefore, the fill level changes in Zone 2 for future land uses are not anticipated to have an adverse impact on flooding.

The proposed modification would also not alter the paths for external flows coming from the Kamay Botany Bay National Park or overland flow paths across the Site, as these overland flow paths generally follow the existing road network, which would not be impacted by the proposed modification.

5.3 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 proposed modification)
- 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).

Projects that have met the above criteria and were therefore identified as contributing to potential cumulative impacts are shown in Figure 5-9 and have been summarised in Table 5-5.

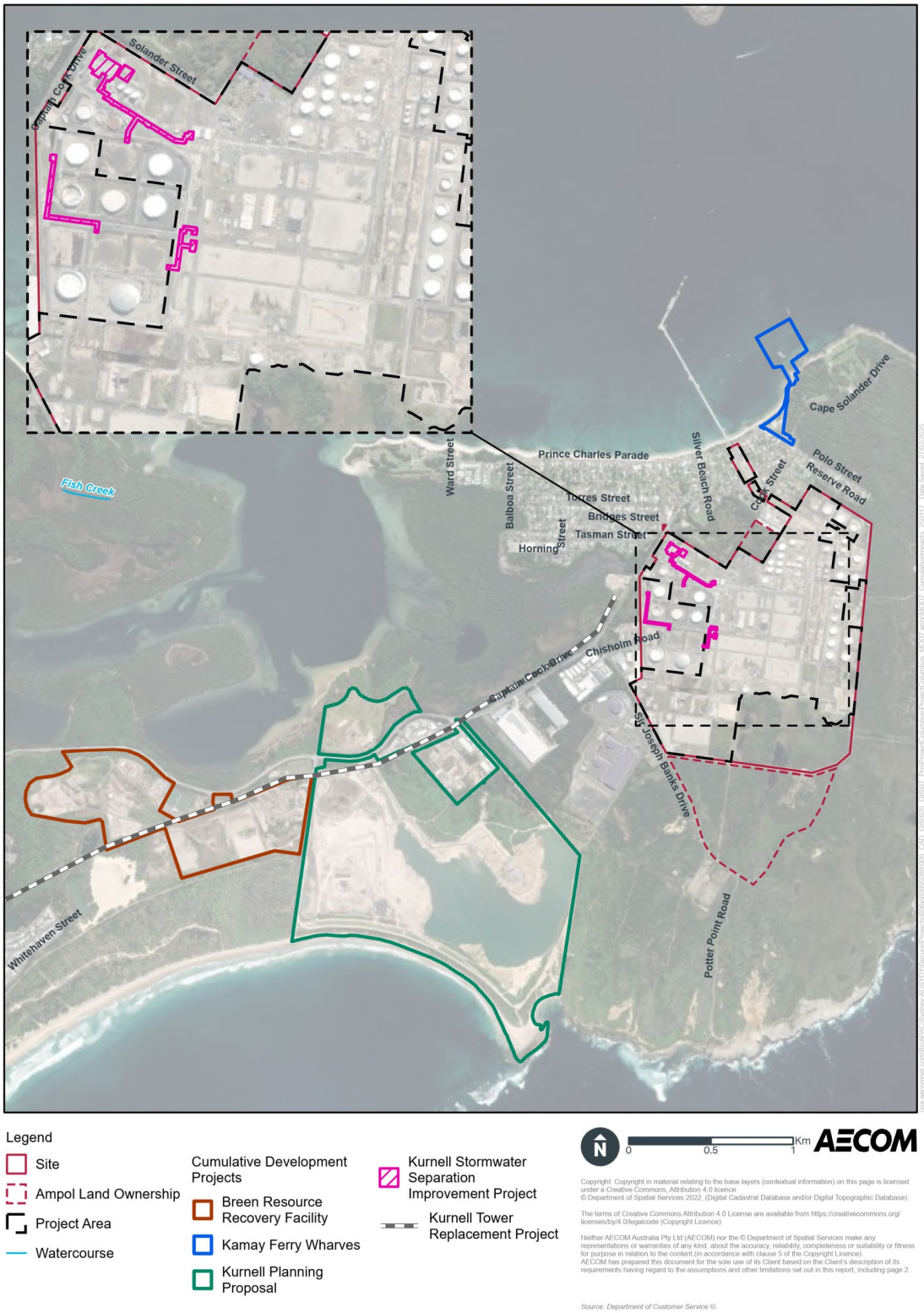


Figure 5-9 Cumulative development projects

Table 5-5 Cumulative development projects

Project	Location	Status/Timing Compared to MOD7	Potential Cumulative Impact
Breen Resource Recovery Facility	2 km west	The project is currently under assessment. Construction overlap with the proposed modification: The project construction is expected to continue until 2028.	Potential for increased sediment/ contaminant load and flows to common surface water receiving environment (Quibray Bay) during construction.
Kamay Ferry Wharves	350 m north, on the coastline of Botany Bay	The project has been approved and is currently under construction. Potential construction overlap with the proposed modification: Under construction until early 2025.	Potential for increased sediment/ contaminant load and flows to common surface water receiving environment (Botany Bay offshore from Silver Beach) during construction.
Kurnell Stormwater Separation Improvement Project	Onsite – At the north west corner in Zone 1	The project was approved in May 2024 (DA24/0008). Construction to be completed mid-2025, prior to the proposed modification works. Operational overlap with the proposed modification construction phase. Project provides baseline conditions of the Site.	Potential for increased sediment/ contaminant load and flows to common surface water receiving environment (Quibray Bay) during construction.
Kurnell Planning Proposal	800 m south west	The project is pending approval. Construction will commence immediately upon approval and will be progressively delivered over approximately 20 years.	Potential for increased sediment/ contaminant load and flows to common surface water receiving environment (Quibray Bay) during construction and operation.
Woolooware to Kurnell Tower Replacement Project	120 m south west	The project is approved. Construction due to be complete prior to commencement of proposed modification construction period.	Potential for increased sediment/ contaminant load and flows to common surface water receiving environment (Quibray Bay) during construction.

All projects listed in Table 5-5 and the proposed modification would wholly or partly discharge to Quibray Bay and Weeney Bay, with the exception of the Kamay Ferry Wharves which would discharge directly to Botany Bay. The combined discharge from all of these projects entering Quibray Bay and Weeney Bay could potentially exacerbate poor surface water quality and increases in flow rates and volumes, which could continually degrade the natural integrity and health of these bays and surrounding environments, including the Towra Point Nature Reserve and Towra Point Aquatic Reserve.

The risk of poor-quality discharge and the uncontrolled release of polluted waters entering Quibray Bay and Weeney Bay would be highest during the construction phase of these projects, when soils are exposed/ disturbed, chemicals, and other harmful substances are stored onsite, and permanent surface water measures are yet to be established. There is an even greater risk of this occurring and having a more harmful effect on the environment during the potential overlap of construction works across these projects.

The projects identified in Table 5-5 would be subject to stringent surface water management measures and monitoring throughout their construction periods in order to mitigate risks to receiving environments and ensure compliance with environmental protection standards. As such, cumulative impacts for surface water are not anticipated.

While the projects located external to the Site would discharge to the same Quibray Bay and Weeney Bay, their discharge flows would approach these bays via separate flow paths. It is therefore not likely that existing drainage paths would be overloaded due to a combined increase in flow from all of these projects since their discharge flows would not merge prior to reaching the downstream bays. Similarly, existing flooding conditions across the Site and nearby township are not likely to be adversely impacted by the other external projects as their discharge flows would have a separate and safe flow path towards Quibray Bay and Weeney Bay.

As mentioned in Section 4.4, the completion of the SSIP prior to the commencement of the proposed modification would be beneficial to the proposed modification, as it would improve existing flooding conditions across the Site. The additional flood storage provided by the SSIP could potentially compensate for the loss of flood storage resulting from the proposed modification. As such, cumulative negative impacts of flooding are not anticipated.

6.0 Management of impacts

Environmental mitigation measures to manage potential surface water, wastewater and flooding impacts of the proposed modification are outlined in Table 6-1. Additional and/ or modified environmental safeguards and management measures to those presented in the approved SSD-5544 are shown in **bold** and deleted measures, or parts of measures, have been ~~struck out~~. Where approved measures have been consolidated to reduce duplication, these have been underlined.

Table 6-1 Management and mitigation measures for surface water, wastewater and flooding

ID	Issue	Mitigation/ management measure
F1	Soil and water management	The Construction Environmental Management Plan (CEMP) for the ~~Project~~ **proposed modification** would include a Soil ~~and Erosion~~ **and Water** Management Plan. This plan would include the following measures: • ~~All materials would be stockpiled in accordance with '*The Blue Book' Managing Urban Stormwater – Soils and Construction Volume 1 and 2* (Landcom, 2004)~~ • Silt fences would be installed around stockpiles to reduce erosion and the movement of suspended solids as necessary • Soil stockpiles and any polluted materials would be stored in designated areas which are not in close proximity to any stormwater drainage systems • Erosion control structures, bunded areas, containment areas, drainage lines and interception measures would be subject to regular inspection • Clean materials would be separated from contaminated materials • Soil erosion and sedimentation devices would remain in place until the disturbed ground surface is restored. These devices would also capture any gross pollutants.
F2	Soil and water management	A Soils and Water Management Plan would **include** ~~be developed as a sub-plan to the DEMP~~ **CEMP**. M**m**easures to be ~~included in the plan and~~ implemented during the ~~demolition~~ **construction** works to protect stormwater quality ~~would~~ includ**ing** ~~e~~: • 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/ management measure
		• ~~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.~~
F4	Discharge	Discharges from the Wastewater Treatment Plant would be within existing EPL limits during ~~demolition,~~ construction and operation. ~~Any required change to this Oily Water Management System would be discussed and agreed with NSW EPA.~~
F5	Spills	The measures and processes currently in place at the Site to prevent ~~any~~ loss of contaminant would be maintained throughout the ~~demolition, construction and~~ operation phases of the **terminal (as modified) and during the delivery of the** ~~Project~~ **proposed modification**. This includes appropriate measures to be implemented in the event of a spill, including initial response and containment, notification of emergency services and relevant authorities (as relevant). All bunds on tanks which are retained in service would meet the capacity requirements of *Australian Standard AS1940* during the operation of the ~~Project~~ **terminal (as modified)**.
F8	Surface water management	The following measures would be employed during and following the ~~demolition~~ **remediation and grading** of ~~the refinery process units and associated infrastructure~~ **land within Zones 2 and 3 (see Figure 1-1 of the MOD-7 Modification Report)**: • Appropriate bunding and controls would be put in place to prevent stormwater runoff from ~~the demolition works area~~ **contaminated soils** entering the stormwater system. • Following the completion of the ~~demolition~~ **remediation** works and removal of redundant infrastructure, the ~~former refinery process~~ area **defined in Figure 4-6 of the MOD-7 Modification Report** would be regraded. The regrading would aim to ~~ensure~~ **confirm** that water does not pool in this area. • As part of the regrading works, the surface material in this area would meet the commercial/industrial criteria as defined by Schedule B1 Guidelines, *Investigation Levels for Soil and Groundwater, National Environment Protection Measure (Assessment of Site Contamination) Amendment Measure 2013*. ~~A crushed aggregate made from clean concrete and asphalt from the demolition works would also be spread across the surface to help reduce soil erosion.~~ **Surface treatments, such as grassing or temporary pavement, would be provided to help mitigate soil erosion** Stormwater runoff collected in the stormwater system would be subject to the controls within this system ~~(such as the oily water separators)~~ prior to being discharged.
F9	Soil erosion and sedimentation	• **All** excavation **and capping works** ~~of the pipeways~~ would be staged, effectively minimising the area of disturbance at one time. The ~~ACS Modification~~ **proposed modification** works would be undertaken in a manner to minimise the potential for soil erosion and sedimentation.

ID	Issue	Mitigation/ management measure
F10	Surface water management	Local weather patterns would be monitored to **confirm** ~~ensure~~ that workers completing the ~~ACS Modification~~ **construction** works at the Site were aware of predicted heavy rainfalls so that work could be stopped in the pipeways **and other flood-prone areas** prior to them containing surface water flows.
F12	**Offsite flood risk**	**Earthworks required for MOD-7 works would not remove existing bunding in the Site and would not result in an increased offsite flood risk.**
F13	**Discharge rates**	**Post-MOD-7 construction discharge rates from the Site would not exceed pre-construction discharge rates.**
F14	**Stormwater quality monitoring**	**Stormwater quality monitoring would be carried out pre-construction to establish a baseline, as well as short-term post-construction to confirm the efficacy of stormwater treatments. This water quality monitoring would be undertaken in accordance with the Blue Book (Landcom, 2004) and ANZECC & ARMCANZ (2000) guidelines. In the event of non-compliance, corrective and preventative actions would be identified.**
F15	**Protection of existing infrastructure**	**The existing OWS network would be protected during construction works, to avoid damaging or blocking this existing infrastructure and the WWTP.**

7.0 Conclusion

This *Technical Report – Surface Water, Wastewater and Flooding* has reviewed the proposed modification and identified the potential surface water, wastewater, and flooding impacts. 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 identified.

The following design measures would be implemented for the proposed modification:

- Required earthworks would not remove existing bunding around former bunded tank areas across the eastern side of Zone 2.
- To prevent loss of existing flood storage and to avoid offsite flooding impacts:
  - Where grading is required to facilitate future land uses in the western half of Zone 2 and northern part of Zone 3, a minor reduction in flood storage would be managed through existing stormwater systems for Catchment B & D at the Site
  - Where grading is not required, earthworks and capping would be completed in a manner that does not raise existing surface levels in areas of existing flood storage, in all events up to and including the 1% AEP flood event. For example, areas requiring up to 300 mm of capping that are within areas of flood storage would need to be initially excavated by 300 mm before the capping occurs.
- Two separate OSD system are proposed in Catchment E to maintain post-modification discharge rates at pre-modification levels along the existing Sir Joseph Banks Drive drainage channel. The Caltex Lubricating Oil Refinery (CLOR) pipeways A & B would be utilised for stormwater detention at the north-western corner of Catchment E and a new OSD is proposed in the RPIP area at the south eastern corner of Catchment E. Preliminary modelling completed as part of this assessment has indicated that a total detention storage volume in the order of 6,100 m^3 would be required across both systems. This volume is indicative and would be refined during subsequent design phases.
- Stormwater quality mitigation measures are proposed to mitigate potential water quality impacts on downstream sensitive receptors.

The recommended safeguards and management measures would be captured in the Construction Environmental Management Plan (CEMP). Key supporting documents to this plan would include the Soil and Water Management Plan, which would detail the specific measures required to achieve the outcomes detailed in the mitigation measures.

While several measures have been recommended to mitigate and/or eliminate potential impacts related to surface water, wastewater, water quality and flooding, alternative approaches may also be considered during the detailed design phase. Any such alternative measure would align with applicable legislation, policies and guidelines while maintaining the core environmental protection objectives outlined in this report.

To verify the effectiveness of these mitigation measures, short-term monitoring would be conducted following site stabilisation. This monitoring will help ensure that expected environmental outcomes are achieved, while also allowing for adaptive management strategies where necessary.

8.0 References

AECOM (2023). Kurnell Stormwater Separation Improvement Project – Statement of Environmental Effects. Job No. 60714672. Rev B.

Ampol (2021). Operational Environmental Management Plan Kurnell Terminal. Document No. CD4190.

ANZECC & ARMCANZ [Australian and New Zealand Environment and Conservation Council & Agriculture and Resource Management Council of Australia and New Zealand] (2000). Australian and New Zealand Guidelines for Fresh and Marine Water Quality.

ANZG [Australian and New Zealand Guidelines] (2018). Australian and New Zealand Guidelines for Fresh and Marine Water Quality. Available at: www.waterquality.gov.au/anz-guidelines

Ball J, Babister M, Nathan R, Weeks W, Weinmann E, Retallick M, Testoni I, (2019). Australian Rainfall and Runoff: A Guide to Flood Estimation. Commonwealth of Australia (Geoscience Australia).

BoM [Bureau of Meteorology] (2024). Climate Data Online. Accessed: 16 May 2024. Available at: http://www.bom.gov.au/climate/data/

BPM Projects (2022). AA-004 Kurnell South Area Stormwater Management Project – Peak Flood Difference Modelling (Afflux Model) Report. Document No. AA-004-ENG-REP-0916. Revision C.

Cardno (2013). NSW Tsunami Inundation Modelling and Risk Assessment. Prepared for NSW State Emergency Service and the Office of Environment and Heritage with funding from the National Disaster Mitigation Program. Version 4.0.

Council [Sutherland Shire Council] (2020). Sea Level Rise Policy. Prepared by Asset Services Unity. Version 4.

Council [Sutherland Shire Council] (2024). Sir Joseph Banks Drive Channel, Kurnell. Accessed: 16 May 2024. Available at: https://cms.ssc.nsw.gov.au/Outdoors/Environment/Waterways/Water-Quality/Sir-Joseph-Banks-Drive-Channel-Kurnell

DECCW [Department of Environment, Climate Change and Water] (2010). Towra Point Nature Reserve Ramsar Site Ecological Character Description. For SMCMA: Botany Bay Coastal Catchments Initiative (BBCCI).

DPIE [Department of Planning, Industry and Environment] (2020). Kamay Botany Bay National Park – Plan of Management.

Engineers Australia (2006). Australian Runoff Quality – A guide to Water Sensitive Urban Design. Editor-in-chief: THF Wong.

Georges Riverkeeper (2024). Towra Point Aquatic Reserve. Accessed: 16 May 2024. Available at: https://georgesriver.org.au/learn-about-the-river/towra-point-aquatic-reserve

ICSM [Intergovernmental Committee on Surverying and Mapping] (2024). ELVIS – Elevation and Depth – Foundation Spatial Data. https://elevation.fsdf.org.au/. Accessed: 16 May 2024.

Landcom (2004). Managing Urban Stormwater: Soils and construction – Volume 1 (4th edition).

MHL (2016). Caltex Kurnell – Stormwater Management Options Report. Prepared for Caltex Refineries NSW Pty Ltd. Report MHL2506. Draft Revision.

Molino Stewart (2009). Marton Park Wetland Management Plan. Final Report. Prepared for the Sutherland Shire Council.

NSW Government (2024). The Central Resource for Sharing and Enabling Environmental Data (SEED) NSW. Accessed: 16 May 2024. Available at: https://geo.seed.nsw.gov.au/Public_Viewer/index.html?viewer=Public_Viewer&locale=en-AU

Pilgrim DH (ed) (1987). Australian Rainfall and Runoff – A Guide to Flood Estimation. Institution of Engineers, Australia.

SMCMA [Sydney Metropolitan Catchment Management Authority] (2007). Modelling the Catchments of Botany Bay.

SMCMA [Sydney Metropolitan Catchment Management Authority] (2011). Botany Bay & Catchment Water Quality Improvement Plan.

Sutherland Shire Council (2009). Sutherland Shire Environmental Specification 2009 – Stormwater Management. Date in effect: 14/12/2009.

URS (2013). Report – Water and Wastewater Management. Prepared for Caltex Refineries (NSW) Pty Ltd. Reference: 43177836/Water/2. Status: Final.

WMAwater (2009). Sutherland Shire Council Kurnell Township Flood Study. Final Report.

WMAwater (2012). Sutherland Shire Council Kurnell Floodplain Risk Management Plan. Final Study.

Glossary and abbreviations

Term	Description
ACS	Asbestos Contaminated Soil
AEP	Annual Exceedance Probability
AHD	Australian Height Datum
ANZECC	Australian and New Zealand Environment and Conservation Council
ANZG	Australian and New Zealand Guidelines
API	American Petroleum Institute
ARI	Average Recurrence Interval
ARMCANZ	Agriculture and Resource Management Council of Australia and New Zealand
ARR	Australian Rainfall and Runoff
ASS	Acid Sulfate Soils
BBWQIP	Botany Bay Water Quality Improvement Program
(the) Blue Book	Managing Urban Stormwater: Soils and Construction (Landcom, 2004)
BOD	Biochemical Oxygen Demand
BoM	Bureau of Meteorology
CBD	Central Business District
CEMP	Construction Environmental Management Plan
CLM Act	*Contaminated Land Management Act 1997*
CLOR	Caltex Lubricating Oil Refinery
Council	Sutherland Shire Council
CM Act	*Coastal Management Act 2016*
COB	Central Operations Buildings
DCP	Development Control Plan
DEM	Digital Elevation Model
DPI	Department of Primary Industries
EIS	Environmental Impact Statement
EPA	Environment Protection Authority
EPA&A Act	*Environmental Planning and Assessment Act 1979*
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
EPL	Environment Protection Licence
ESCP	Erosion and Sediment Control Plan
GDE	Groundwater dependent ecosystem
HAT	Highest Astronomical Tide
IAF	Induced Air Flotation
IPCC	International Panel of Climate Change
LEP	Local Environmental Plan

Term	Description
LGA	Local Government Area
MNES	Matter of National Environmental Significance
NHL	National Heritage List
NWQMS	National Water Quality Management Strategy
OWS	Oily Water Sewer
PMF	Probable Maximum Flood
POEO Act	*Protection of the Environment Operations Act 1997*
SEARs	Secretary's Environmental Assessment Requirements
SEPP	State Environmental Planning Policy
SSD	State Significant Development
SSIP	Stormwater Separation Improvement Project
SWaMP	Strategic Water Monitoring Plan
SWMP	Soil and Water Management Plan
SWS	Surface Water System
TSS	Total Suspended Solids
WM Act	*Water Management Act 2000*
WQO	Water Quality Objective
WSUD	Water Sensitive Urban Design
WWTP	Wastewater treatment plant

Annexure A

Georges River Estuarine Water Quality Objectives

Table A-1 Water Quality Objectives for estuaries within the Georges River Catchment (ANZECC & ARMCANZ, 2000)

Objective	Indicator	Guideline value
Aquatic ecosystems: maintaining and improving the ecological condition of waterbodies and their riparian zones over the long term	Total Phosphorus (TP)	0.03 mg/L
	Total Nitrogen (TN)	0.30 mg/L
	Turbidity	0.5-10 NTU
	Chlorophyll-a	0.04 mg/L
	Salinity	Not applicable
	Dissolved oxygen (DO)	80-110% saturation
	pH	7.0-8.5
	Temperature	Default trigger values are defined by the upper and lower low-risk trigger values, using the 80th and 20th percentile, respectively, of ecosystem temperature distribution
	Toxicants	Toxicant default guideline values (95% level of protection for slightly to moderately disturbed ecosystems and 99% level of protection for toxicants that bioaccumulate) unless discharge criteria are agreed with relevant authorities
Visual amenity: aesthetic qualities of waters	Visual clarity and colour	Natural visual clarity should not be reduced by more than 20%. Natural hue of water should not be changed by more than 10 points on the Munsell Scale. The natural reflectance of the water should not be changed by more than 50%
	Surface films and debris	Oils and petrochemicals should not be noticeable as a visible film on the water, nor should they be detectable by odour. Waters should be free from floating debris and litter (no quantitative value specified)
	Nuisance organisms	Macrophytes, phytoplankton scums, filamentous algal mats, blue-green algae, sewage fungus and leeches should not be present in unsightly amounts (no quantitative value specified)
Primary contact recreation: maintaining or improving water quality for activities such as swimming where there is a high probability of water being swallowed	Faecal coliforms, enterococci, algae and blue-green algae	As per the ANZECC & ARMCANZ (2000) guidelines for managing risks in recreational water
	Protozoans	Pathogenic free-living protozoans should be absent from bodies of fresh water
	Chemical contaminants	Waters containing chemicals that are either toxic or irritating to the skin or mucus membranes are unsuitable for recreation. Toxic substances should not exceed values in not exceed the concentrations provided in Tables 5.2.3 and 5.2.4 of the ANZECC & ARMCANZ (2000) guidelines.
	Visual clarity and colour	As per the visual amenity guidelines
	Temperature	15°-35°C for prolonged exposure

Objective	Indicator	Guideline value
Secondary contact recreation: maintaining or improving water quality of activities such as boating and wading, where there is a low probability of water being swallowed	Faecal coliforms, enterococci, algae and blue-green algae	As per the ANZECC & ARMCANZ (2000) guidelines for managing risks in recreational water
	Nuisance organisms	As per the visual amenity guidelines. Large numbers of midges and aquatic worms are undesirable
	Chemical contaminants	Waters containing chemicals that are either toxic or irritating to the skin or mucous membranes are unsuitable of recreation. Toxic substances should not exceed values in Tables 5.2.3 and 5.2.4 of the ANZECC & ARMCANZ (2000) guidelines.
	Visual clarity and colour	As per the visual amenity guidelines
	Surface films	As per the visual amenity guidelines
Aquatic foods: protecting water quality so that it is suitable for production of aquatic foods for human consumption and aquaculture activities	Algae and blue-green algae	No guideline is directly applicable, but toxins present in blue green algae may accumulated in other aquatic organisms
	Faecal coliforms	Guideline in water for shellfish: The median faecal coliform concentration should not exceed 14 MPN/100mL; with no more than 10% of the samples exceeding 43 MPN/100mL. Standard in edible tissue: Fish destined for human consumption should not exceed a limit of 2.3 MPN E Coli/g of flesh with a standard plate count of 100,000 organisms/g
	Toxicants (as applied to aquaculture activities)	Metals: • Copper – less than 0.005 mg/L • Mercury – less than 0.001 mg/L • Zinc – less than 0.005 mg/L • Organochlorines: • Chlordane – less than 0.004 mg/L (saltwater production) • PCBs – less than 0.002 mg/L
	Physico-chemical indicators	Suspended solids: less than 0.04 mg/L Temperature: less than 2°C change over one hour

Table A-2 River Flow Objectives for estuaries within the Georges River Catchment (ANZECC & ARMCANZ, 2000)

Objective	Description
Protect pools in dry times: Protect natural water levels in pools of creeks and rivers and wetlands during periods of no flow.	During dry times, some streams stop flowing and form pools. Pools and wetlands are refuges for aquatic plants and animals. Pumping water from these areas can make it more difficult for many species to recover after a drought.
Protect natural low flows: Protect natural low flows.	Water extraction and storage are high in dry times and impose long artificial droughts that increase the stress on aquatic plants and animals.
Maintain wetland and floodplain inundation: Maintain or restore the natural inundation patterns and distribution of floodwaters supporting natural wetland and floodplain ecosystems.	Floodplain and wetland ecosystems develop in response to flow patterns and the nature of the landscape between the river and wetlands or floodplains. Floodplain works can change the flooding patterns, which would lead to changes in habitat and vegetation. These changes can be expected to reduce or change the diversity and abundance (or both) of species in the ecosystem. In particular, they can lead to reduced numbers of native fish and to water quality problems.
Maintain natural flow variability: Maintain or mimic natural flow variability in all streams.	Australia's rainfall and river flows are naturally variable. The way we currently store and divert river water can reduce natural pulsing of water down rivers and maintain artificially high or stable river heights. In urban areas and other places where the ability of the land to absorb or detain rainfall is reduced, more water runs off rapidly, so water levels would rise higher. These changes often create problems with streambank stability, biodiversity and signals for breeding and migration.
Minimise effects of weirs and other structures: Minimise the impact of instream structures.	Most instream structures (e.g., weirs) convert flowing water to still water, thus altering habitat and increasing the risk of algal blooms or other water quality problems. Barriers restrict the passage of plant propagules (e.g., seeds) and animals.

Annexure B

Yearly Summary Monitoring Data at Yara Gap (2021-22)

AMPOL

Yearly summary monitoring data

Licence Details: Ampol Refineries (NSW) Pty Ltd, 2 Solander St, Kurnell, NSW, 2231, EPL # 837

		EPA Point	Point 27, Yena Gap Effluent, Normal Operating Conditions										
		Pollutant	**Temperature**	**pH**	**Volumetric Flowrate**	**Oil and Grease**	**Phenols**	**Sulfide (un-ionised hydrogen**	**Nitrogen (ammonia)**	**Total Suspended Solids**	**Biochemical Oxygen Demand**		
		Unit of Measure	°C		kl/day	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l		
		Monitoring Frequency Required by Licence	Continuous	Continuous	Continuous	Once during any discharge	Once during any discharge	Once during any discharge	Once during any discharge	Once during any discharge	Once during any discharge		
Reporting Period		Averaging Period	1 Hour Block	6 Minute Rolling	1 Day Block	Grab Sample	Grab Sample	Grab Sample	Grab Sample	Grab Sample	Grab Sample	Date last data were obtained	Publishing Date
2 May 2021-1 May 2022	No. Samples Collected		8760	525600	365	45	45	45	45	45	45	4-May-22	16-May-22
	100%tile	**Licence Limit**	**40**	**6.0 - 9.0**	**None**	**None**	**2.7**	**None**	**7.5**	**50**	**30**		
		Lowest	18.0	6.5	0	<5	<0.05	<0.1	<0.01	2	<2		
		Mean	21.5	7.0	5523	<5	<0.05	<0.1	<0.01	6	<2		
		Highest	26.6	7.9	30156	7	<0.05	0.1	0.07	17	8		
		Exceedance (yes/no)	**No**	**No**	**N/A**	**N/A**	**No**	**N/A**	**No**	**No**	**No**		
	90%tile	**Licence Limit**		**6.5 - 8.5**		**10**							
		Lowest		6.5		<5							
		Mean		7.0		<5							
		Highest		7.5		<5							
		Exceedance (yes/no)		**No**		**No**							
	50%tile	**Licence Limit**					**0.3**			**35**	**20**		
		Lowest					<0.05			2	<2		
		Mean					<0.05			4	<2		
		Highest					<0.05			6	<2		
		Exceedance (yes/no)					**No**			**No**	**No**		

AMPOL

Yearly summary monitoring data

Licence Details: Ampol Refineries (NSW) Pty Ltd, 2 Solander St, Kurnell, NSW, 2231, EPL # 837

		EPA Point	Point 27, Yena Gap Effluent, Wet Weather By-Pass Conditions					
		Pollutant	**Oil and Grease (Wet)**	**Phenols (Wet)**	**Total Suspended Solids (Wet)**	**Biochemical oxygen demand (Wet)**		
		Unit of Measure	mg/l	mg/l	mg/l	mg/l		
		Monitoring Frequency Required by Licence	Daily only during any discharge under bypass conditions of the biotreater wastewater treatment plant					
Reporting Period		Averaging Period	Grab Sample	Grab Sample	Grab Sample	Grab Sample	Date last data were obtained	Publishing Date
2 May 2021-1 May 2022	No. Samples Collected		6	6	6	6	4-May-22	16-May-22
	100%tile	**Licence Limit**	**70**	**5**	**100**	**350**		
		Lowest	<5	<0.05	9	<2		
		Mean	<5	<0.05	14	6		
		Highest	5	0.05	29	8		
		Exceedance (yes/no)	**No**	**No**	**No**	**No**		

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Yearly summary monitoring data

Licence Details: Ampol Refineries (NSW) Pty Ltd, 2 Solander St, Kurnell, NSW, 2231, EPL # 837

Reporting Period		EPA Point	Point 27, Yena Gap Effluent, Normal Operating Conditions											
		Pollutant	**Arsenic**	**Ethyl Benzene**	**Lead**	**Naphthalene**	**Nickel**	**Phenanthrene**	**Benzene**	**Toluene**	**Polycyclic Aromatic Hydrocarbons**	**2,4-Dimethylphenol**		
		Unit of Measure	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l		
		Monitoring Frequency Required by Licence	Monthly	Monthly	Monthly	Monthly	Monthly	Monthly	Monthly	Monthly	Monthly	Monthly		
		Averaging Period	Grab Sample	Grab Sample	Grab Sample	Grab Sample	Grab Sample	Grab Sample	Grab Sample	Grab Sample	Grab Sample	Grab Sample	Date last data were obtained	Publishing Date
2 May 2021-1 May 2022	No. Samples Collected		12	12	12	12	12	12	12	12	12	12	4-May-22	16-May-22
	100%tile	**Licence Limit**	**0.07**	**None**	**0.025**	**None**	**0.03**	**None**	**None**	**None**	**0.5**	**None**		
		Lowest	<0.001	<0.002	<0.001	<0.0002	<0.001	<0.0002	<0.001	<0.002	<0.0002	<0.0002		
		Mean	0.001	<0.002	<0.001	<0.0002	0.001	<0.0002	<0.001	<0.002	<0.0002	<0.0002		
		Highest	0.002	<0.002	<0.001	<0.0002	0.003	<0.0002	<0.001	<0.002	<0.0002	0.001		
		Exceedance (yes/no)	**No**	**N/A**	**No**	**N/A**	**No**	**N/A**	**N/A**	**N/A**	**No**	**N/A**		
	50%tile	**Licence Limit**									**0.03**			
		Lowest									<0.0002			
		Mean									<0.0002			
		Highest									<0.0002			
		Exceedance (yes/no)									**No**			