COSTIN ROE CONSULTING

CIVIL ENGINEERING REPORT INCORPORATING WATER CYCLE MANAGEMENT STRATEGY

GOW STREET MANUFACTURING AND WAREHOUSE FACILITY

SSDA-71052213

Prepared for:

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Project	Gow Street Manufacturing and Warehouse Facility 15 and 20 Gow Street, Padstow, NSW
Document Title	Civil Engineering Report Incorporating Water Cycle Management Strategy
Project Number	CO14984.00
Description	Civil Engineering Report Incorporating Water Cycle Management Strategy for redevelopment of the existing site to include the refurbishment of an existing warehouse for chemical manufacturing and construction of a new laboratory and warehouse facility for the storage and distribution of products.
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EXECUTIVE SUMMARY

Selleys (Dulux Group Australia Pty Limited) are seeking to construct an industrial development located at 15 and 20 Gow Street, Padstow. No building works is proposed for 20 Gow Street, and as such this is generally excluded from the scope of works of this civil package.

The Proposal is considered State Significant Development (SSD) and accordingly, an Environmental Impact Statement (EIS) has been prepared to support the SSD Application for the Proposal. This Civil Engineering Report has been prepared by Costin Roe Consulting to support the preparation of the EIS and assess the Proposal's impact on the surrounding environment in relation to soils and water including stormwater and stormwater management for both construction and operational phases of the development.

Proposal Overview

The proposed development is for redevelopment of the existing site to include the refurbishment of an existing warehouse for chemical manufacturing and construction of a new laboratory and warehouse facility for the storage and distribution of sealants, adhesives, filers and household cleaning products.

Works will include partial demolition of existing structures, site preparation works, bulk earthworks, provision of services, building construction, and stormwater management.

Access to the development would be made via Gow Street.

Purpose of this Assessment

This Civil Engineering Report has been prepared to address the Secretary's Environmental Assessment Requirements (SEARs) as they related to civil engineering, including:

- Water Management;
- Flooding; and
- Soils

Construction Impacts

During the construction phase, a Sediment and Erosion Control Plan will be in place to ensure the downstream drainage system and receiving waters are protected from sediment laden runoff.

Operational Impacts

During the operational phase of the development, the proposed stormwater quality treatment system incorporating the use of a treatment train of triple interceptor pit (TIP) and site containment tank (SCT) and is proposed to mitigate any increase in stormwater pollutant load generated by the development. Best management practices have been applied to the development to ensure that the quality of stormwater runoff is not detrimental to the receiving environment.

Further it has been confirmed that the development considers flood and overland flow planning requirements. The building will be constructed above the flood planning level. An overland flow path which is existing conveys waters from the M5 Motorway to Salt Pan Creek.

Conclusion

The hydrological assessment of the local site drainage confirms that recommended water quality and quantity measures will ensure that no adverse impacts result on receiving waterways as a result of the development.

The detail contained in this report provides sufficient information to show the consent authority that legal points of discharge and a suitable stormwater management strategy is available for the development and the requirements associated with the strategy. It is recommended the management strategies in this report be approved and incorporated into the future detailed design.

1 INTRODUCTION & SCOPE

1.1 Introduction

Costin Roe Consulting Pty Ltd has been engaged by Vaughan Construction Group (Vaughan) to undertake a Civil Engineering Report & Water Cycle Management Strategy (WCMS) to accompany a State Significant Development Application (SSDA) with the NSW Department of Planning, Housing and Infrastructure (DPHI) for an industrial development on the land.

This report presents a civil engineering assessment of the property at 15 and 20 Gow Street, Padstow, NSW. This report provides an assessment of the civil engineering characteristics of the development site and technical considerations of the following aspects:

- Earthworks & geotechnical considerations;
- Water Cycle Management Strategy (WCMS).

The WCMS comprises several key areas of stormwater and water management which are provided below. These key areas have been established with the aim to reduce impacts from the development on the surrounding environment and neighbouring properties. The water cycle management strategy identifies management measures required to meet the targets set. The key water cycle management areas assessed in this report are:

- Stormwater Quantity;
- Stormwater Quality;
- Water Supply and Reuse;
- Erosion and Sediment Control; and
- Flooding

A request for Planning Secretary's Environmental Assessment Requirements (SEAR's) to the DPHI has been made by the applicant. Reference to **Appendix I** should be made for SSD-71052213 SEAR's dated 18 June 2024. Refer to **Section 1.3** of this report for specific responses to civil engineering and water management related items included in the SEAR's.

1.2 Consultation

Consideration of the various stakeholders has been made in relation to the development, including Council, during the assessment period.

- Consultations with City of Canterbury-Bankstown Council (CBC) has included Stormwater System Report (refer **FIRA**).

1.3 SEARS and Agency Advice Response

This report supports the EIS for the proposal and to address the NSW DPHI SEARS letter dated 18 June 2024, reference SSD-71052213.

We note the below "key issues and documentation" assessments and following key areas in the document:

- Water Management;
- Flooding; and
- Soils

Further reference to the EIS prepared by the town planners should be made for confirmation of how the SEAR's have been addressed for non-civil engineering related items.

Table 1.1 provides a summary of the SEARs Key Issues which relate to civil engineering, and where these have been addressed in this report.

Table 1.1 - SEAR's Response

SEARS Key Item	Response and Where Addressed
Water Management – an integrated water management strategy, including:	
a detailed site water balance including a description of the water demands and breakdown of water supplies, measures to minimise water use and any water licensing requirements	Refer to **Appendix F** for Dulux Group Pty Ltd – Towns and Wastewater Analysis. The towns and wastewater analysis includes predicted reduction in water demands. Refer to **Section 6.3** of this report for stormwater harvesting which includes predicted reduction in non-potable water demands. Refer to **Appendix G** for Dulux Group Pty Ltd Tradewaste Agreement.
description of groundwater and surface water conditions and all works/activities that may intercept, extract, use, divert or receive surface water and/or groundwater (both temporary and permanent)	Refer to **Section 3.5** of this report for groundwater conditions. Refer to **Section 4.2** of this report for existing surface water conditions and **Section 4.3** for proposed surface water conditions.
an assessment of potential surface and groundwater impacts (both quality and quantity) associated with the development, including potential impacts on watercourses, riparian areas, groundwater, and groundwater-dependent communities nearby in accordance with relevant water quality guidelines and the Department of Climate Change, Energy, the Environment and Water	Refer to **Section 3.5** of this report for groundwater impact. Refer to **Section 5** and **Section 6** of this report for surface water impact (quantity and quality).

- Water Group (DCCEEW-Water) Groundwater Toolkit	
details of how the proposed stormwater and wastewater drainage design integrates with existing on-site systems, including details of the capacity of onsite detention system(s), onsite sewage management and measures to treat, reuse or dispose of water	Refer to **Section 4.3** for details of the proposed stormwater drainage design and how it integrates with existing conditions. Wastewater details provided by hydraulic consultant.
a surface water discharge assessment in accordance with relevant EPA guidelines, including an assessment of potential impacts on watercourses and riparian areas, and characterisation of water quality at the point of discharge against the relevant water quality criteria	Refer to **Section 4.3** of this report for proposed surface water discharge requirements.
details of any surface or groundwater mitigation, management and monitoring activities and methodologies	Refer to **Section 4.3** of this report for proposed surface water discharge requirements.
Flooding – a flood impact risk assessment (FIRA) prepared in accordance with the Flood risk management guideline LU01 - Flood impact and risk assessment (2023). **The FIRA must:**	
identify the flood planning level and any flood risk on-site (mainstream and overland) having regard to adopted (available and recent) flood studies, the potential effects of climate change, and any relevant provisions of the NSW Flood Risk Management Manual (2023)	Refer to separate **FIRA** prepared by Costin Roe Consulting.
assess the impacts of the development, including any changes to flood risk on-site or off-site, and detail design solutions and operational procedures to mitigate flood risk where required	Refer to separate **FIRA** prepared by Costin Roe Consulting.
identify flood behaviour, flood constraints and risks on the site and adjoining areas including the potential impacts of climate change for the full range of events up to and including the probable maximum flood (PMF) event	Refer to separate **FIRA** prepared by Costin Roe Consulting.

include details of proposed management measures to minimise the impacts of flooding on the development and flood risk to the community	Refer to separate **FIRA** prepared by Costin Roe Consulting.
detail, where required, an emergency management and response strategy for local catchment (and/or overland) and mainstream flooding, which:	Refer to separate **FIRA** prepared by Costin Roe Consulting.
identifies potential options for emergency management and response, including safe evacuation from the site and/or shelter-in-place, based on adopted flood studies and flood warnings from the Bureau of Meteorology (where available)	Refer to separate **FIRA** prepared by Costin Roe Consulting.
evaluates the performance of safe evacuation from the site, including consideration of possible constraints of existing road networks, potential interruptions of traffic flows, and the lead time for evacuation from existing flood warning services	Refer to separate **FIRA** prepared by Costin Roe Consulting.
identifies the primary emergency management and response approach under significant events, up to and including the PMF event.	Refer to separate **FIRA** prepared by Costin Roe Consulting.
Soils – an assessment of potential impacts on soil resources and riparian areas on and near the site, including:	
impacts on soil erosion, salinity and acid sulfate soil	Refer to **Section 3.4** of this report for soil erosion and embankment stability. Refer to **Section 3.6** of this report for salinity and acid sulfate soil. Refer to **Appendix H** for PSM geotechnical investigation.
details of earthworks, including cut and fill volumes	Refer to **Section 3.2** of this report for earthworks including cut/fill volumes.
description of the proposed erosion and sediment controls during construction.	Refer to **Section 7** of this report for Construction Soil and Water Management.

Table 1.1 provides a summary of the agency items which relate to civil engineering, and where these have been addressed in this report.

Table 1.2 - Agency Response to SEARS

Department of Climate Change, Energy, the Environment and Water **Ref: DOC24/403722**
Water and Soils 6. *The EIS must map the following features relevant to water and soils including:* a. *Acid sulfate soils (Class 1, 2, 3 or 4 on the Acid Sulfate Soil Planning Map).* b. *Rivers, streams, wetlands, estuaries (as described in s4.2 of the Biodiversity Assessment Method).* c. *Wetlands as described in s4.2 of the Biodiversity Assessment Method.* d. *Groundwater* e. *Groundwater dependent ecosystems* f. *Proposed intake and discharge locations* <u>Response</u> a. Refer to **Section 3.6** of this report for salinity and acid sulfate soil. b. Refer to separate **FIRA** which includes description of nearby Salt Pan Creek. c. Biodiversity assessment has been completed by others. d. Refer to Refer to **Section 3.5** of this report for groundwater conditions. e. Groundwater is not expected to be impacted by the proposed development. f. Refer to **Section 4.2** of this report for existing surface water conditions and **Section 4.3** for proposed surface water conditions.
7. *The EIS must describe background conditions for any water resource likely to be affected by the development, including:* a. *Existing surface and groundwater.* b. *Hydrology, including volume, frequency and quality of discharges at proposed intake and discharge locations.* c. *Water Quality Objectives (as endorsed by the NSW Government http://www.environment.nsw.gov.au/ieo/index.htm) including groundwater as appropriate that represent the community's uses and values for the receiving waters.* d. *Indicators and trigger values/criteria for the environmental values identified at (c) in accordance with the ANZECC (2000) Guidelines for Fresh and Marine Water Quality and/or local objectives, criteria or targets endorsed by the NSW Government.*

e. *Risk-based Framework for Considering Waterway Health Outcomes in Strategic Land-use Planning Decisions* http://www.environment.nsw.gov.au/research-and-publications/publications-search/risk-based-framework-for-considering-waterway-health-outcomes-in-strategic-land-use-planning

Response

a. Refer to **Section 4.2** of this report for existing surface water conditions and **Section 4.3** for proposed surface water conditions.

b. Refer to **Section 5.4** of this report for discharge information.

c. Refer to Section 6 of this report for water quality objectives.

d. A Site Containment Tank is currently in place to manage water quality prior to discharge. Refer to the appended Dulux Stormwater Management Plan.

e. As noted above.

8. *The EIS must assess the impact of the development on hydrology, including:*

   a. *Water balance including quantity, quality and source.*

   b. *Effects to downstream rivers, wetlands, estuaries, marine waters and floodplain areas.*

   c. *Effects to downstream water-dependent fauna and flora including groundwater dependent ecosystems.*

   d. *Impacts to natural processes and functions within rivers, wetlands, estuaries and floodplains that affect river system and landscape health such as nutrient flow, aquatic connectivity and access to habitat for spawning and refuge (e.g. river benches).*

   e. *Changes to environmental water availability, both regulated/licensed and unregulated/rules-based sources of such water.*

   f. *Mitigating effects of proposed stormwater and wastewater management during and after construction on hydrological attributes such as volumes, flow rates, management methods and re-use options.*

   g. *Identification of proposed monitoring of hydrological attributes.*

Response

The proposed stormwater management system comprises on-lot site containment tanks and on-lot water quality treatment systems.

Pre and post development flow management is completed on lot.

Stormwater assessments including surface water runoff, water quality and water quantity has been completed. The key stormwater objectives based on relevant water quality criteria, have been set out in **Section 4.1** of the report.

The proposal includes multifunctional stormwater assets and landscaping that supports stormwater management and the broader objectives for waterway health as required of government.

Flooding

9. *The EIS shall include a flood impact and risk assessment (FIRA) in accordance with the Flood Risk Management Guide LU01 Flood Impact and Risk Assessment (2023). As a minimum the FIRA must:*

   a. *Identify any flood risk on-site having regard to adopted (and available and recent) flood studies (overland and mainstream), the potential effects of climate change, and any relevant provisions of the NSW Flood Risk Management Manual (2023).*

   b. *Assess the impacts of the development, including any changes to flood risk on-site or off-site, and detail design solutions and operational procedures to mitigate flood risk where required.*

   c. *Identify flood behaviour, flood constraints and risks on the site and its adjoining areas including the potential impacts of climate change for the full range of events i.e., up to and including the probable maximum flood (PMF) event and confirm compatibility of the proposed use with these flooding characteristics.*

   d. *Propose management measures required to minimise the impacts of flooding on the development and minimise flood risk to the community, including an Emergency Management Plan considering access to and from the site, and evacuation issues during significant flood events including the PMF, from both local (and /or overland) catchments and/or regional (and /or mainstream) catchments.*

   e. *Identify the critical PMF Event for the development site by reviewing the flooding characteristics and risks from mainstream and overland flood studies.*

   f. *Review flooding risks during significant events including the PMF Event and develop an emergency management and response strategy by considering the cumulative flooding impacts from adjoining sites.*

   g. *Evaluate the performance of safe evacuation and identify anticipated risks due to constraints of existing road networks and potential interruptions of traffic flows (such as cut out off bridges) during significant flooding events and the lead time for evacuation from existing flood warning services.*

   h. *Review and identify potential options for the development of an emergency management and response strategy, which may include safe evacuation from the site, shelter-in-place based on flood warnings from the Bureau of Meteorology. Evaluate limitations and benefits of these options prior to selecting the primary risk management option under significant events including the PMF Event.*

Response

Refer to separate Flood Impact and Risk Assessment (FIRA) report by Costin Roe Consulting for a detailed flood assessment and technical supporting information relating to the FIRA.

The FIRA has been undertaken using the two-dimensional TUFLOW modelling engine. Assessment includes pre and post development modelling of the 5% AEP, 1% AEP, 0.5% AEP, 0.2% AEP and the PMF events. Impact assessments have

been included for the 1% AEP, and the 0.5% AEP, 0.2% AEP events assessed as proxies for climate change.

The assessment shows the proposed development is generally clear of the flooding which meet the objectives of the NSW Floodplain Development Manual.

It is noted that the site is outside the Salt Pan Creek flood extent, however is affected by overland flow associated with the M5 motorway within the drainage road corridor. This overland flow presents low hazard to the development and future occupants of the development site.

The assessment shows acceptable outcomes which meet the objectives of the NSW Floodplain Development Manual and the Canterbury Bankstown City Council DCP.

EPA

Ref: DOC24/408069-4

Water

- *Provide details of the project that are essential for predicting and assessing impacts to waters including:*
  a. *the quantity and physio-chemical properties of all potential water pollutants and the risks they pose to the environment and human health, including the risks they pose to Water Quality Objectives in the ambient waters (as defined on http://www.environment.nsw.gov.au/ieo/index.htm, using technical criteria derived from the Australian and New Zealand Guidelines for Fresh and Marine Water Quality, ANZECC 2000)*
  b. *the management of discharges with potential for water impacts*
  c. *drainage works and associated infrastructure; land-forming and excavations; working capacity of structures; and water resource requirements of the proposal.*
- *Outline site layout, demonstrating efforts to avoid proximity to water resources (especially for activities with significant potential impacts e.g. effluent ponds) and showing potential areas of modification of contours, drainage etc.*
- *Outline how total water cycle considerations are to be addressed showing total water balances for the development (with the objective of minimising demands and impacts on water resources). Include water requirements (quantity, quality and source(s)) and proposed storm and wastewater disposal, including type, volumes, proposed treatment and management methods and re-use options.*

Response

The proposed stormwater management system comprises on-lot site containment tanks and on-lot water quality treatment systems.

Stormwater assessments including surface water runoff, water quality and water quantity has been completed. The key stormwater objectives based on relevant water quality criteria, have been set out in **Section 4.1** of the report.

The proposal includes multifunctional stormwater assets and landscaping that supports stormwater management and the broader objectives for waterway health as required of government.

Refer to **Appendix F** for Dulux Group Pty Ltd – Towns and Wastewater Analysis.

The towns and wastewater analysis includes predicted reduction in water demands.

Refer to **Section 6.3** of this report for stormwater harvesting which includes predicted reduction in non-potable water demands.

Refer to **Appendix G** for Dulux Group Pty Ltd Tradewaste Agreement.

- Describe the catchment including proximity of the development to any waterways and provide an assessment of their sensitivity/significance from a public health, ecological and/or economic perspective. The Water Quality and River Flow Objectives on the website: on https://www.environment.nsw.gov.au/ieo/ should be used to identify the agreed environmental values and human uses for any affected waterways. This will help with the description of the local and regional area.

Response

Refer to separate Flood Impact and Risk Assessment (FIRA) report by Costin Roe Consulting for a detailed flood assessment and technical supporting information relating to the FIRA.

The FIRA has been undertaken using the two-dimensional TUFLOW modelling engine. Assessment includes pre and post development modelling of the 5% AEP, 1% AEP, 0.5% AEP, 0.2% AEP and the PMF events. Impact assessments have been included for the 1% AEP, and the 0.5% AEP, 0.2% AEP events assessed as proxies for climate change.

The assessment shows the proposed development is generally clear of the flooding which meet the objectives of the NSW Floodplain Development Manual.

It is noted that the site is outside the Salt Pan Creek flood extent, however is affected by overland flow associated with the M5 motorway within the drainage road corridor. This overland flow presents low hazard to the development and future occupants of the development site.

The assessment shows acceptable outcomes which meet the objectives of the NSW Floodplain Development Manual and the Canterbury Bankstown City Council DCP.

Water

Describe baseline conditions

Describe existing surface and groundwater quality – an assessment needs to be undertaken for any water resource likely to be affected by the proposal and for all conditions (e.g. a wet weather sampling program is needed if runoff events may cause impacts).

Note: Methods of sampling and analysis need to conform with an accepted standard (e.g. Approved Methods for the Sampling and Analysis of Water Pollutants in NSW (EPA 2022) or be approved and analyses undertaken by accredited laboratories).

- Provide site drainage details and surface runoff yield.
- State the ambient Water Quality and River Flow Objectives for the receiving waters. These refer to the community's agreed environmental values and human uses endorsed by the Government as goals for the ambient waters. These environmental values are published on the website: https://www.environment.nsw.gov.au/ieo/
- The EIS should state the environmental values listed for the catchment and waterway type relevant to your proposal. NB: A consolidated and approved list of environmental values are not available for groundwater resources. Where groundwater may be affected the EIS should identify appropriate groundwater environmental values and justify the choice.
- State the indicators and associated trigger values or criteria for the identified environmental values. This information should be sourced from the ANZECC 2018 Guidelines for Fresh and Marine Water Quality (http://www.environment.gov.au/water/publications/quality/nwqms-guidelines-4-vol1.html) (Note that, as at 2004, the NSW Water Quality Objectives booklets and website contain technical criteria derived from the 1992 version of the ANZECC Guidelines. The Water Quality Objectives remain as Government Policy, reflecting the community's environmental values and long-term goals, but the technical criteria are replaced by the more recent ANZECC 2018 Guidelines). NB: While specific guidelines for groundwater are not available, the ANCECC 2018 Guidelines endorse the application of the trigger values and decision trees as a tool to assess risk to environmental values in groundwater.
- Where site specific studies are proposed to revise the trigger values supporting the ambient Water Quality and River Flow Objectives, and the results are to be used for regulatory purposes (e.g. to assess whether a licensed discharge impacts on water quality objectives), then prior agreement from the EPA on the approach and study design must be obtained.
- Describe the state of the receiving waters and relate this to the relevant Water Quality and River Flow Objectives (i.e. are Water Quality and River Flow Objectives being achieved?). Proponents are generally only expected to source available data and information. However, proponents of large or high risk developments may be required to collect some ambient water quality / river flow / groundwater data to enable a suitable level of impact assessment. Issues to include in the description of the receiving waters could include:
    a. lake or estuary flushing characteristics
    b. specific human uses (e.g. exact location of drinking water offtake)
    c. sensitive ecosystems or species conservation values
    d. a description of the condition of the local catchment e.g. erosion levels, soils, vegetation cover, etc
    e. an outline of baseline groundwater information, including, but not restricted to, depth to watertable, flow direction and gradient, groundwater quality, reliance on groundwater by surrounding users and by the environment

f. historic river flow data where available for the catchment.

Response

The proposed stormwater management system comprises on-lot site containment tanks and on-lot water quality treatment systems.

Pre and post development flow management is completed on lot.

Stormwater assessments including surface water runoff, water quality and water quantity has been completed. The key stormwater objectives based on relevant water quality criteria, have been set out in **Section 4.1** of the report.

The proposal includes multifunctional stormwater assets and landscaping that supports stormwater management and the broader objectives for waterway health as required of government.

Assess impacts

- No proposal should breach clause 120 of the Protection of the Environment Operations Act 1997 (i.e. pollution of waters is prohibited unless undertaken in accordance with relevant regulations).
- Prepare a water pollution discharge impact assessment in accordance with the EPA Guidance Note Water pollution discharge assessments at: https://www.epa.nsw.gov.au/your-environment/water/managing-water-pollution-in-nsw/environment-protection-licensing/water-pollution-discharge-assessments
- Identify and estimate the quantity of all pollutants that may be introduced into the water cycle by source and discharge point including residual discharges after mitigation measures are implemented.
- Include a rationale, along with relevant calculations, supporting the prediction of the discharges.
- Describe the effects and significance of any pollutant loads on the receiving environment. This should include impacts of residual discharges through modelling, monitoring or both, depending on the scale of the proposal. Determine changes to hydrology (including drainage patterns, surface runoff yield, flow regimes, wetland hydrologic regimes and groundwater).
- Describe water quality impacts resulting from changes to hydrologic flow regimes (such as nutrient enrichment or turbidity resulting from changes in frequency and magnitude of stream flow).
- Identify any potential impacts on quality or quantity of groundwater describing their source.
- Identify potential impacts associated with geomorphological activities with potential to increase surface water and sediment runoff or to reduce surface runoff and sediment transport. Also consider possible impacts such as bed lowering, bank lowering, instream siltation, floodplain erosion and floodplain siltation.
- Identify impacts associated with the disturbance of acid sulfate soils and potential acid sulfate soils.
- Containment of spills and leaks shall be in accordance with EPA's guidelines in relation to Storing and Handling of Liquids at https://www.epa.nsw.gov.au/~/media/EPA/Corporate%20Site/resources/lice

nsing/2007210liquidsManual.ashx and the most recent versions of the Australian Standards referred to in the Guidelines. Containment should be designed for no-discharge.

- The significance of the impacts listed above should be predicted. When doing this it is important to predict the ambient water quality and river flow outcomes associated with the proposal and to demonstrate whether these are acceptable in terms of achieving protection of the Water Quality and River Flow Objectives. In particular the following questions should be answered:
  a. will the proposal protect Water Quality and River Flow Objectives where they are currently achieved in the ambient waters; and
  b. will the proposal contribute towards the achievement of Water Quality and River Flow Objectives over time, where they are not currently achieved in the ambient waters.
- Consult with the EPA as soon as possible if a mixing zone is proposed (a mixing zone could exist where effluent is discharged into a receiving water body, where the quality of the water being discharged does not immediately meet water quality objectives. The mixing zone could result in dilution, assimilation and decay of the effluent to allow water quality objectives to be met further downstream, at the edge of the mixing zone). The EPA will advise the proponent under what conditions a mixing zone will and will not be acceptable, as well as the information and modelling requirements for assessment. Note: The assessment of water quality impacts needs to be undertaken in a total catchment management context to provide a wide perspective on development impacts, in particular cumulative impacts.
- Where a licensed discharge is proposed, provide the rationale as to why it cannot be avoided through application of a reasonable level of performance, using available technology, management practice and industry guidelines.
- Where a licensed discharge is proposed, provide the rationale as to why it represents the best environmental outcome and what measures can be taken to reduce its environmental impact.
- Reference should be made to the relevant guidelines provided in Section B. these include, but are not limited to, Managing Urban Stormwater: Soils and Construction (Landcom, 2004), Guidelines for Fresh and Marine Water Quality ANZECC 2018), Environmental Guidelines: Use of effluent by Irrigation (DEC, 2004).

Response

The proposed stormwater management system comprises on-lot site containment tanks and on-lot water quality treatment systems.

Pre and post development flow management is completed on lot.

Stormwater assessments including surface water runoff, water quality and water quantity has been completed. The key stormwater objectives based on relevant water quality criteria, have been set out in **Section 4.1** of the report.

The proposal includes multifunctional stormwater assets and landscaping that supports stormwater management and the broader objectives for waterway health as required of government.
Describe management and mitigation measures • Outline stormwater management to control pollutants at the source and contain them within the site. Also describe measures for maintaining and monitoring any stormwater controls. • Outline erosion and sediment control measures directed at minimising disturbance of land, minimising water flow through the site and filtering, trapping or detaining sediment. Also include measures to maintain and monitor controls as well as rehabilitation strategies. • Describe wastewater treatment measures that are appropriate to the type and volume of waste water and are based on a hierarchy of avoiding generation of waste water; capturing all contaminated water (including stormwater) on the site; reusing/recycling waste water; and treating any unavoidable discharge from the site to meet specified water quality requirements. • Outline pollution control measures relating to storage of materials, possibility of accidental spills (e.g. preparation of contingency plans), appropriate disposal methods, and generation of leachate. • Describe hydrological impact mitigation measures including: a. site selection (avoiding sites prone to flooding and waterlogging, actively eroding or affected by deposition) b. minimising runoff c. minimising reductions or modifications to flow regimes d. avoiding modifications to groundwater. • Describe groundwater impact mitigation measures including: a. site selection b. retention of native vegetation and revegetation c. artificial recharge d. providing surface storages with impervious linings e. monitoring program. • Describe geomorphological impact mitigation measures including: a. site selection b. erosion and sediment controls c. minimising instream works d. treating existing accelerated erosion and deposition e. monitoring program. • Any proposed monitoring should be undertaken in accordance with the Approved Methods for the Sampling and Analysis of Water Pollutants in NSW (EPA 2022).

Response

The proposed stormwater management system comprises on-lot site containment tanks and on-lot water quality treatment systems.

Pre and post development flow management is completed on lot.

Stormwater assessments including surface water runoff, water quality and water quantity has been completed. The key stormwater objectives based on relevant water quality criteria, have been set out in **Section 4.1** of the report.

The proposal includes multifunctional stormwater assets and landscaping that supports stormwater management and the broader objectives for waterway health as required of government.

2 DEVELOPMENT SITE

2.1 Location

The property 15 and 20 Gow Street Padstow, is located within the City of Canterbury-Bankstown (CBC) local government area (LGA) and locality map of the site location is as shown in **Figure 2.1**.

Figure 2.1 - Locality Map

2.2 Existing Site Description

The proposal applies to land 15 Gow Street, being Lot 100 DP1011185 and 20 Gow Street, being Lot 53 DP1064349 (subject site). The subject site is currently occupied by Dulux Group and Selleys and constitutes an area of approximately 6ha.

The subject site is within IN1 General Industrial zone pursuant to the Canterbury-Bankstown Local Environmental Plan 2023 (CBLEP2023).

The subject site comprises of 15 Gow Street which is occupied by a number of industrial warehouse facilities and administration buildings operated by Dulux and Selleys. The subject site also comprises of 20 Gow Street which is occupied by a car parking facility owned by Dulux Group.

No building works is proposed for 20 Gow Street, and as such this is generally excluded from the scope of works of this civil package.

The 15 Gow Street is located on the south of Gow Street while 20 Gow Street is located on the north of Gow Street between Fairford Road and Salt Pan Creek.

The 15 Gow Street is bounded by Gow Street to the north, Salt Pan Creek to the east, the M5 Motorway to the south and adjoining industrial developments to the west.

The 20 Gow Street is bounded by Gow Street to the south and adjoining industrial developments to the west, north and east.

The site generally grades down from the west towards the east. The highest level is RL10.5m AHD towards the north-west corner of the site. The lowest level on the site is RL1.0m AHD towards the south-east corner of the site. Gow Street, which the site fronts, falls from west (RL10m AHD) to east (RL4m AHD).

The subject site is within the existing Padstow industrial precinct, predominantly characterised by established industrial development of similar scale. Vehicular access to the subject site is currently facilitated via existing access points on Gow Street.

Figure 2.2 – Existing Site Layout (Source: Padstow Stormwater Management Plan)

2.3 Proposed Development

The proposed development is for the redevelopment of the existing site to include the refurbishment of an existing warehouse for chemical manufacturing and construction of a new laboratory and warehouse facility for the storage and distribution of sealants, adhesives, filers and household cleaning products.

A summary of the proposed works will include:

- Demolition of the existing structures on site & removal of the debris;
- Strip out and refurbishment of existing warehousing space to create a new manufacturing facility;
- Earthworks involving cut and fill works;
- Site preparation works and servicing;
- Construction of a new building;
- Construction of external tank storage and tanker unloading area;
- External hardstand construction, walls, parking and access road construction and landscaping;
- Construction of stormwater management infrastructure;

The indicative site layout prepared by Watson Young Architects has been included in **Figure 2.2**. A 3-Dimensional schematic of the proposed development is also shown in **Figure 2.3.**

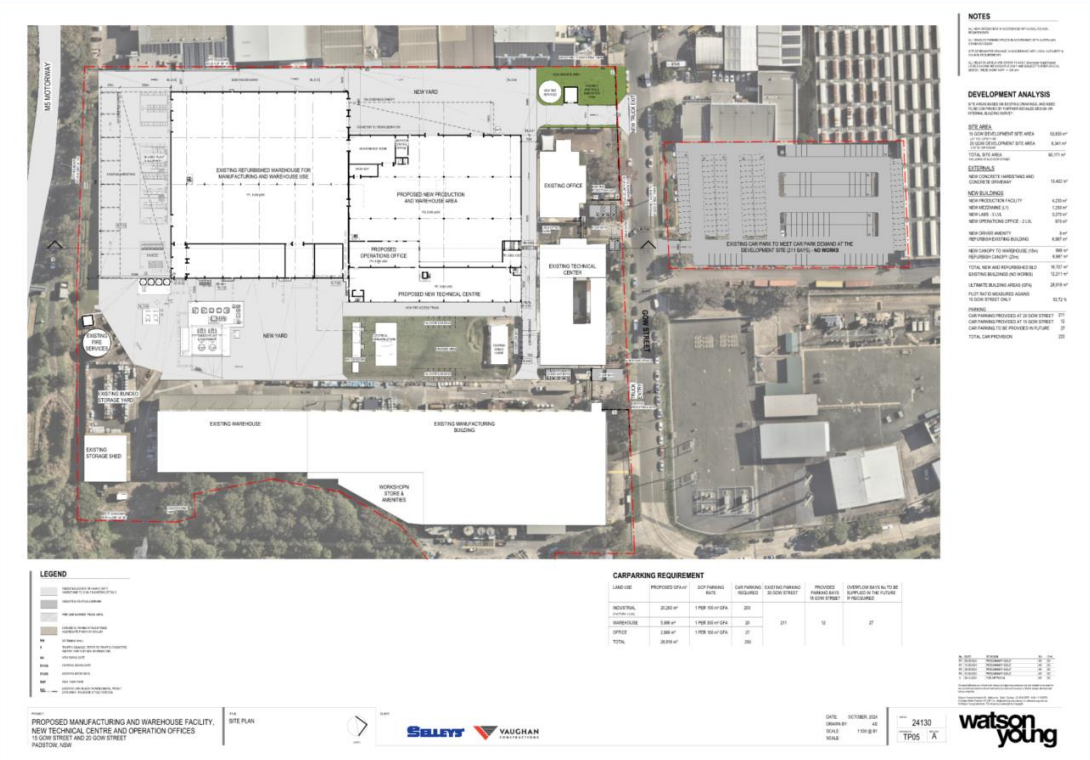

Figure 2.3 - Proposed Development – Site Plan

Figure 2.4 - Proposed Development – Artists Impression Only

3 SITE WORKS

3.1 Soil and Geological Conditions

Assessment relating to soil have been undertaken by PSM Consult Pty Limited (PSM), Results of Geotechnical Investigation – Referenced Project PSM5347-005L dated 29 August 2024 included in **Appendix H**.

As referenced in the investigation by PSM the 1:100 000 Geological Series Sydney Geological Map indicates that the site is predominantly underlain by:

- Holocene sediments consisting of silty to peaty quartz sand, silt and clay. Ferruginous and humic cementation in places. Common shell layers overlaying.
- Ashfield Shale of the Wianamatta Group consisting of black to dark-grey shale and laminate.

The PSM geotechnical investigation includes preliminary geotechnical design advice to enable the site to be redevelopment as outlined in the proposal.

3.2 Bulk Earthworks

Bulk earthworks will be required to facilitate the development of the site for the proposed industrial use. The earthworks will be undertaken to provide a large flat building pad, hardstand area, a car parking area and a new truck entry from Gow Street into the site. A high-level earthwork volume estimate assessment has been completed for the site. The estimated volumes are shown on the Costin Roe drawings in **Appendix A**.

The earthworks analysis has been completed to a level of detail to enable general pad levels to be set and to obtain an order of magnitude cut and fill volume estimate. Given the preliminary nature of the assessment, an upper and lower bound of earthworks volumes has been included to allow for contingency in cost planning estimates.

A detailed assessment of the earthworks level will be completed during detailed design stage and some adjustment to the final pad and building floor levels (within +/-500mm).

A variance in the final adopted floor levels is provided to provide some flexibility in the design to ensure that the concept estimates provide a suitable operational outcome when detail design and all factors are known. This includes variance for integration with existing structures, final geotechnical cut to fill on the site, allowances for spoil generation, access from properties to roadways, drainage and wastewater design and other unknown elements. The intent would be, where possible to maintain the nominated floor level with minimal differences to the nominal level.

The primary drivers for the proposed earthworks levels are achieving a redevelopment which aligns with the existing structures while ensuring the required flood planning levels are met and allowing satisfactory overland flow drainage, sufficient cover above the underground stormwater pipelines while minimising cut as much as practical.

The earthworks volume estimates are included in **Table 3.1.**

Table 3.1 – Earthworks Volume Estimates

	Lower Bound (-15%)	Apparent Volume	Upper Bound (+15%)
Cut (m3) (includes site strip)	-4,675	-5,500	-6,325
Fill (m3)	+4,335	+5,100	+5,865
Detail Excavation (@ 200m3 / Ha)	-4,590	-5,400	-6,210
Balance (m3)	-4,930	-5,800	-6,670

3.3 Retaining Walls

The civil engineering objective is to minimise retaining walls within the constraints of the redevelopment layout, allowable grading to suit industrial development and batters in landscaped areas where possible

Minor retaining walls will be required to interface with existing levels and structures around the redevelopment. These are anticipated to comprise modular masonry block system (Keystone) with reinforced soil backfill or core-filled masonry block with cantilevered footings.

Location and indicative heights of retaining walls are also shown on drawings **CO14984.00-SSDA500**.

3.4 Embankment Stability

To assist in maintaining embankment stability permanent batters in clay will be no steeper than 3 horizontal to 1 vertical while temporary batters will be no steeper than 2 horizontal to 1 vertical.

Permanent batters will also be adequately vegetated or turfed which will assist in maintaining embankment stability.

Stability of batters and reinstatement of vegetation shall be in accordance with the submitted drawings and the Construction Soil and Water Management Plan in **Section 7** of this report.

3.5 Groundwater

Groundwater was identified by PSM at depths between 1.7 – 4.1m below ground level during drilling activities.

A standpipe piezometer has also been installed on site and groundwater was observed at a depth 3.4m below ground near the centre of the site at Borehole BH01.

As there is limited excavation required for the redevelopment and the site is currently developed, impact from groundwater and on groundwater systems are considered negligible.

We confirm that the development does not propose to utilise surface or groundwater resources. An assessment of the impact on these items is not relevant for the warehouse construction.

Surface water management, including conveyance of surface runoff, management of water quantity and water quality (using WSUD principles and best practice pollution reduction objective) has been proposed in the design.

Reference should be made the letter prepared by PSM ref: PSM5347-007L dated 4 September 2024 for geotechnical responses on SEARS Item 12.

3.6 Acid Sulfate Soils and Salinity

An assessment of the potential for salinity and acid sulfate soils has been requested as part of the SEAR's requirements.

We note that the PSM report (ref: PSM5347-005L, dated 29 August 2024) has completed salinity classification on three (3) samples across the site. The results of the investigation indicates that the soils on site are classified as "non-saline".

It is noted that potential acid sulfate soils may be found due to the close proximity from Salt Pan Creek. Further detailed assessment by an environmental consultant may be required.

Reference should be made the letter prepared by PSM ref: PSM5347-008L dated 4 September 2024 for the salinity management plan.

4 WATER CYCLE MANAGEMENT STRATEGY & DRAINAGE METHODOLOGY

4.1 Key Areas and Objectives

Water Cycle Management (WCM) is a holistic approach that addresses competing demands placed on a region's water resources, whilst optimising the social and economic benefits of development in addition to enhancing and protecting the environmental values of receiving waters.

Developing a WCMS at the SSD stage of the land development process provides guidance on urban water management issues. This WCMS has been prepared to inform DPHI, and relevant stakeholders, that the development is able to provide and integrate WCM measures into the stormwater management strategy for the development.

The key WCM targets which have been adopted in the design are included in **Table 4.1** following, and included in the drawings found in **Appendix A.**

Table 4.1 – WCM Targets

Element	Target	Reference
Water Quantity	Minimise flooding from increased stormwater runoff due to development	City of Canterbury-Bankstown DCP 2023
Water Quality	Grease and oil interceptor traps to be installed within piped drainage system	City of Canterbury-Bankstown DCP 2023
Water Supply	Reduce Demand on non-potable water uses. Provide 50-70% reduction of non-potable uses.	
Construction Stormwater Management & Erosion and Sediment Control	A construction stormwater management plan and appropriate associated erosion and sedimentation control measures must be described in the environmental assessment for all stages of construction to mitigate potential impacts to surrounding properties.	Landcom Blue Book City of Canterbury-Bankstown DPHI
Flooding	Buildings set 0.5m above the 1% AEP flood level.	NSW Floodplain Development Manual

A summary of the how each of the WCM objectives will be achieved are described below. Reference to the relevant sections of the report should be made for further and technical details relating to the WCM measures:

- Stormwater Quantity Management (Refer **Section 5**)

  The intent of this criterion is to reduce the impact of urban development on existing drainage system by limiting post-development discharge within the receiving waters to the pre-development peak, and to ensure no affectation of upstream, downstream or adjacent properties.

  Refer to **Section 5** of the document for further discussion pertaining to water quantity management.

- Stormwater Quality Management (Refer **Section 6**)

  There is a need to target pollutants that are present in stormwater runoff to minimise the adverse impact these pollutants could have on downstream receiving waters.

  A series of Stormwater quality improvement devices (SQID's) have been incorporated in the design of the development. The proposed management strategy will include the following measures:

  - Primary treatment of external areas will be made via pit baskets fitting within the stormwater collection pits.
  - Secondary treatment of external areas will be made via an end-of-line Triple Interceptor Pit and Site Containment Tank.
  - Some treatment will also be present by provision of rainwater reuse tanks on development sites through reuse and settlement within the tanks.

  Reference to **Section 6** of this document should be made for detailed Stormwater Quality modelling and measures.

- Water Demand Reduction/ Rainwater Reuse (refer **Section 6.6**)

  Rainwater reuse measures will be provided as part of this development design. Rainwater reuse will be required to reduce demand on non-potable uses by 50-70%.

  The reduction in demand will target non-potable uses such as toilet flushing and irrigation. Refer **Section 6.6.**

- Stormwater Management During Construction (refer **Section 7)**

  A construction stormwater management plan and associated erosion and sediment control measures is proposed based on Landcom Blue Book and Council requirements.

  The management measures take a staged approach from initial site establishment, construction stages and the period between the completion of the proposed infrastructure works and development of site.

- Flood Management (refer **FIRA**)

  The proposed development considered flooding and large rainfall events in relation to local runoff and overland flow paths.

  Consideration to flood requirements has been made per Council Flood Management Policy. Refer **FIRA** for details.

The following measures have been incorporated in the design:

- All proposed buildings are sited above the flood planning level.

4.2 Existing Site Drainage

The site is currently a developed industrial property which has been described in **Section 2.2.**

An existing formal inground drainage is currently on the site which carries stormwater runoff from the existing warehouse and surrounds offsite to the Salt Pan Creek. The existing discharge points on the site is in the north-east and south-east corners of the site, into the Salt Pan Creek.

The existing site drainage system will be primarily maintained and integrated with the new proposed development. No new discharge points are proposed as part of this development into the receiving creek system.

4.2.1 Existing Stormwater System Sub-Catchments

The site stormwater over the existing development can be classified into four (4) sub-catchment areas being roadways, landscape areas, roofs and bunded areas. The stormwater system for each of the areas noted above are outlined below:

4.2.1.1 Roadway areas

The extent of the existing roadways on the site are detailed in **Figure 4.1**.

Rainfall over the entrance and exit driveways drains to Gow Street, ultimately discharging to Salt Pan Creek; and rainfall over the general roadways within the site drains to the Site Containment Tank (SCT) in the south east of the site prior to discharge to Salt Pan Creek.

4.2.1.2 Landscape areas

The extent of the existing landscaped areas on the site are detailed in **Figure 4.1**.

Rainfall over the landscaped areas at the front of the site drains to Gow Street, ultimately discharging to Salt Pan Creek; and rainfall over the grassed area in the middle of the site drains to the Site Containment Tank (SCT) via the general roadways.

4.2.1.3 Roof areas

The extent of the roofed areas on the site are detailed in **Figure 4.2**.

Rainfall over the canteen, Dulux office and reception building drain to Gow Street, ultimately discharging to Salt Pan Creek.

Rainfall over the Dulux paint mill, Dulux warehouse, Dulux workshop, Selleys dangerous goods store, Selleys packaging store and Selleys engineering building discharges directly to Salt Pan Creek (bypassing the SCT) via Pit 18 at the south east of the site.

Rainfall over the Selleys factory drains under the drum yard directly to Salt Pan Creek.

4.2.1.4 Bunded areas

The extent of bunded areas on the site are detailed in **Figure 4.3**.

The diesel tank and linseed oil tank bunds are manually pumped through an oil water separator in the Selleys plant services room before the water is discharged to sewer.

The Dulux workshop bund is manually pumped through an oil water separator in the Dulux workshop before the water is discharged to sewer.

The bunded areas listed below are tested for the following parameters:

- Odour test for chlorine;
- 7.0 ≤ pH ≤ 8.5;
- Turbidity < 20 NTU's;
- Hydrocarbons/styrene <1ppm.

If the above criteria are met, the water is discharged to Salt Pan Creek. If one of the criteria is exceeded the water is either manually treated in-situ to bring within acceptable limits or tankered offsite to a treatment facility.

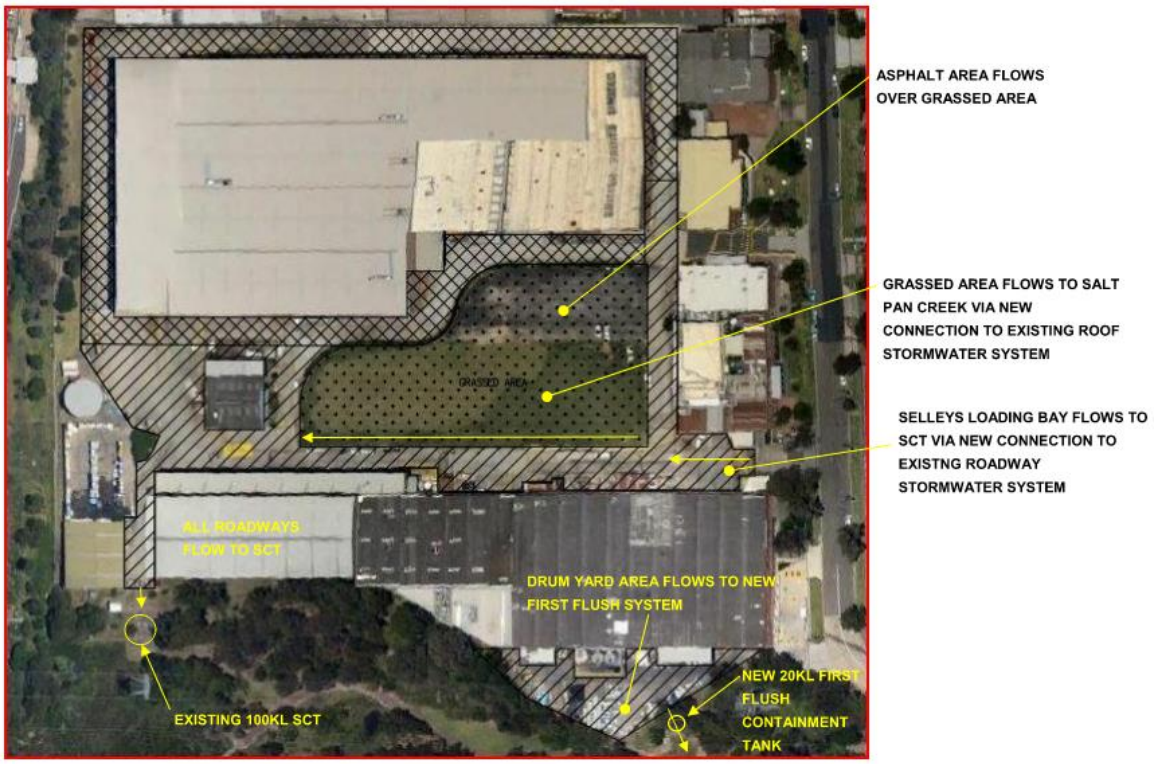

Figure 4.1 – Existing Roadways and Landscape Areas (Source: Padstow Stormwater Management Plan)

Figure 4.2 – Existing Roof Areas

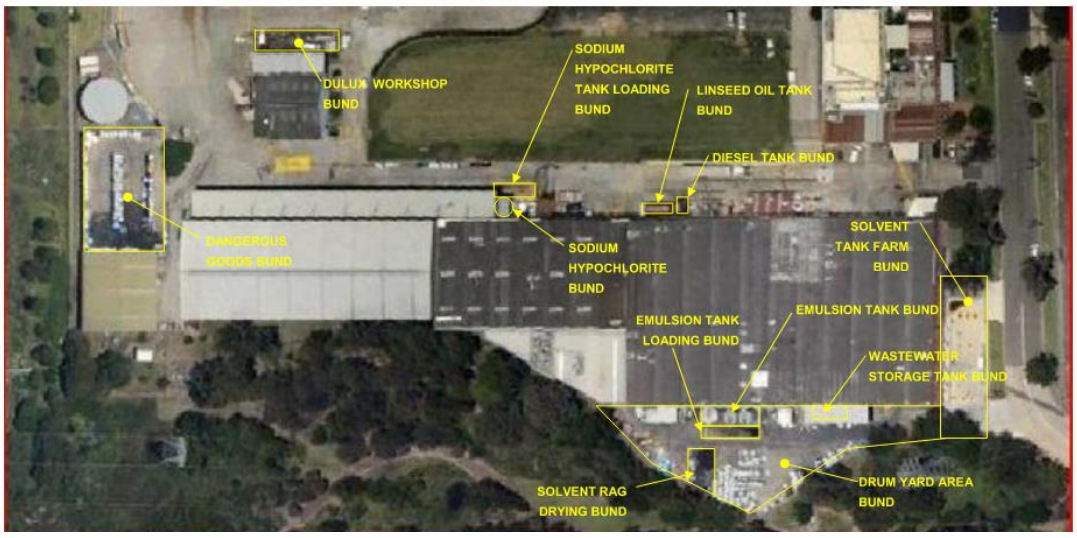

Figure 4.3 – Existing Bunded Areas

4.3 Proposed Surface Water Drainage System

As per general engineering practice and the guidelines of Council, the proposed stormwater drainage system for the development will comprise a minor and major system to safely and efficiently convey collected stormwater run-off from the development to the legal point of discharge.

The minor system is to consist of a piped drainage system which has been designed to accommodate the 1 in 20-year ARI storm event (Q20). This results in the piped system being able to convey all stormwater runoff up to and including the Q20 event. The major system will be designed to cater for storms up to and including the 1 in 100-year ARI storm event (Q100). The major system will employ the use of defined overland flow paths, such as roads and open channels, to safely convey excess run-off from the site.

The design of the stormwater system for this site will be based on relevant national design guidelines, Australian Standard Codes of Practice, the standards of Canterbury-Bankstown Council and accepted engineering practice. Runoff from buildings will generally be designed in accordance with AS 3500.3 National Plumbing and Drainage Code Part 3 – Stormwater Drainage. Overall site runoff and stormwater management will generally be designed in accordance with the Institution of Engineers, Australia publication "Australian Rainfall and Runoff" (2019Edition), Volumes 1 and 2 (AR&R).

Water quality and re-use are to be considered in the design to ensure that any increase in the detrimental effects of pollution is mitigated, Council Water Quality Objectives are met and that the demand on potable water resources is reduced.

The existing stormwater management system on-site are proposed to be maintained as part of this development. All new roadways and landscape areas are to be drained to the existing triple interceptor pit and site containment tank (sct) while all new roof areas are to discharge directly to Salt Pan Creek.

The site containment tank is provided to act as a first flush system to contain the first 10mm of rainfall over the catchment areas with potential for contamination of runoff as recommended in the Department of Environment, Climate Change and Water's (DECCW) criteria for first flush containment capacity.

The legal point of discharge is a point specified by Council where stormwater from a property can be discharged. The legal point of discharge is usually Council's/ Sydney Water stormwater infrastructure (where available), the street kerb and channel for smaller developments or downstream receiving waters like an existing stream or gully, lake, pond or waterbody. The legal point of discharge for this site is into the existing Salt Pan Creek located on the east of the subject site.

With reference to the drawings in **Appendix A**, the drainage system proposed can be described as follows:

- In-ground piped drainage system designed to the 5% AEP (1 in 20yr ARI).
- Primary treatment of external areas will be made via proposed pit baskets fitting within the stormwater collection pits.
- Secondary treatment of stormwater of non-roofed area surface via an existing triple interceptor pit and site containment tank.
- Site discharge via the existing Salt Pan Creek.

4.4 Hydrological Modelling & Analysis

4.4.1 Rainfall Data

Rainfall intensity Frequency Duration (IFD) data used as a basis for DRAINS modelling and initial pipe sizing based on rational method assessments for the 2 to 100 Year ARI events, was taken from The Bureau of Meteorology Online IFD Tool.

4.4.2 Runoff Models

In accordance with the recommendations and standards of Council, the calculation of the runoff from storms of the design ARI will be calculated with the catchment modelling software DRAINS for internal drainage only as part of future detail designs.

Detailed hydraulic assessment of the internal drainage system will be calculated at detail/ construction certificate stage.

The design parameters for the DRAINS model are to be based on the recommendations as defined by council and parameters for the area and are as follows:

Table 4.2 – DRAINS Parameters

Model	Model for Design and Analysis Run	Rational Method	
	Rational Method Procedure	ARR2019	
	Soil Type-Normal	3.0	
	Paved (Impervious) Area Depression Storage	1	mm
	Supplementary Area Depression Storage	1	mm
	Grassed (Pervious) Area Depression Storage	5	mm
AMC	Antecedent Moisture Condition (ARI=1-5 years)	2.5	
AMC	Antecedent Moisture Condition (ARI=10-20 years)	3.0	
AMC	Antecedent Moisture Condition (ARI=50-100 years)	3.5	
	Sag Pit Blocking Factor (Minor Systems)	0	
	On Grade Pit Blocking Factor (Minor Systems)	0	
	Sag Pit Blocking Factor (Major Systems)	0.5	
	On Grade Pit Blocking Factor (Major Systems)	0.2	

4.5 Hydraulics

4.5.1 General Requirements

Hydraulic calculations will be carried out utilising DRAINS modelling software during the detail design stage to ensure that all surface and subsurface drainage systems perform to or exceed the required standard.

4.5.2 Freeboard

The calculated water surface level in open junctions of the piped stormwater system will not exceed a freeboard level of 150mm below the finished ground/ grate level, for the peak runoff from the Minor System runoff.

The calculated water surface for the peak runoff from the Major System runoff will not exceed a freeboard level of 500mm below the finished floor level of the building.

4.5.3 Public Safety

For all areas subject to pedestrian traffic, the product (dV) of the depth of flow d (in metres) and the velocity of flow V (in metres per second) will be limited to 0.4, for all storms up to the 100-year ARI.

For other areas, the dV product will be limited to 0.6 for stability of vehicular traffic (whether parked or in motion) for all storms up to the 100-year ARI.

4.5.4 Inlet Pit Spacing

The spacing of inlets throughout the site will be such that the depth of flow, for the Major System design storm runoff, will not exceed the top of the kerb (150mm above gutter invert).

4.5.5 Overland Flow (locally within the development site)

Dedicated flow paths have been designed to convey all storms up to and including the100-year ARI. These flow paths will convey stormwater from the site to the stormwater management systems prior to discharge.

5 WATER QUANTITY MANAGEMENT

5.1 General Design Principles

CBC adopts the principles of water quantity management, also known as "On-site Detention (OSD)", to ensure the cumulative effect of development does not have a detrimental effect on the existing stormwater infrastructure and watercourses located within their local government area downstream from the particular site.

Section 10 of Councils Engineering and Drainage Standards Policy 2009 sets out the requirements for water quantity management and OSD. Council may require OSD to be provided "to reduce the potential for local flooding and damage to existing properties by limiting runoff from new developments to pre-development levels". OSD will however "not be required where it is proven that the lack of OSD will not have an adverse effect on downstream drainage systems".

5.2 Methodology

A hydrological analysis was undertaken to estimate the impact of the development of the site on peak flows at the downstream extent of the site. Modelling of stormwater runoff quantity was considered for the pre-existing case and for the operational phase of the development.

In order to assess the existing and operational phase peak discharges from the development site, a DRAINS hydrological model was used to estimate peak flows from catchments on the site for various storm durations for the Q5 year ARI to Q100 year ARI events.

The 5.48 Ha development lot has a single catchment. The proposed drainage system design is based on limiting the runoff from the development to pre-development levels for the design storms nominated above.

5.3 Water Quantity Management Features

5.3.1 Existing

The existing site comprises of residual drainage associated with former uses on the site.

An existing Triple Interceptor Pit (TIP) and a Site Containment Tank (SCT) are located at the end of the existing drainage system prior to discharge into Salt Pan Creek.

The existing run-off is based on a developed impervious condition given the long period on which the contributing catchment has comprised large impervious surface present on the site.

5.3.2 Proposed

There are no proposed water quantity measures based on the outcomes of the assessment included in Section 5.4.

The existing discharge location is proposed to be utilised at the west corner of the Site. Refer drawings in **Appendix A** for discharge location and details.

5.4 Pre-Development & Post-Development Peak Flows

In relation to the water runoff assessment, as discussed in Section 5.3.1, the site is considered to be predominately comprised of impermeable surfaces. Following construction of the Site, the extent of impermeable surface remains consistent with existing, hence the change in peak flows associated with the development is negligible.

Drawing **CO14984.00-SSDA410** shows the existing and developed flows for the development site. This is summarised below in **Table 5.1**. As specified in Council's Engineering and Drainage Standards Policy 2009 storm durations of 10, 20, 30 and 45 minutes have been examined for 5, 10, 20, 50 and 100 year ARI storms.

Table 5.1 – Peak flows calculated using DRAINS modelling software

PEAK FLOW SUMMARY			
		Pre-Development	Post-Development
1	Pervious Catchment Area	1.014 Ha	0.690 Ha
2	Impervious Catchment Area	4.461 Ha	4.785 Ha
3	Total Site Area	5.475 Ha	5.475 Ha
4	Fraction Impervious	81.5%	87.4%
5	Time of Concentration	9mins	9mins
6	Q5	1.52 m³/s	1.56 m³/s
7	Q10	1.75 m³/s	1.78 m³/s
8	Q20	1.99 m³/s	2.03 m³/s
9	Q50	2.21 m³/s	2.24 m³/s
10	Q100	2.44 m³/s	2.46 m³/s

The post development impervious areas will be slightly higher than pre-development impervious areas. As such, the post-development peak flows will be slightly higher than the pre-development levels. Above peak flow summary indicates that the change in peak flow is negligible and within 3% of pre-development condition. No detention is proposed nor required to limit runoff from the new development as the new development will have a negligible impact compared to pre-development runoff levels. Further commentary is included below regarding the site location in relation to the Salt Pan Creek overall catchment.

The site is located in the upper end of the Salt Pan Creek catchment. Local un-attenuated flows will peak in advance of the main flood hydrograph coming from the upstream catchments within the Salt Pan Creek. The combined hydrograph results in double peaks (small initial peak followed by larger extended peak) in the shorter duration storms, which reduces as the storm duration increases. The inclusion of traditional OSD shows that, although local flows would be reduced, the peak of flow from the site is drawn out over a longer period which coincides with that of the larger and delayed peak flow within the Creek. This results in an overall increase in peak flows, hence an adverse effect results. Hence confirmation that there is no impact without OSD and an impact with OSD.

It is considered that the combined peak flow runoff (from the local catchment and larger Salt Pan Creek catchment) in the Creek will not increase as a result of the development (without traditionally sized on-site detention). Hence the development will not adversely impact flooding upstream or downstream of the property.

Based on the assessment it is concluded that additional mitigation measures are not required to mitigate impact associated with water quantity during operational phase of the Proposal.

6 STORMWATER QUALITY, REUSE AND MAINTENANCE

6.1 Stormwater Quality Objectives

There is a need to provide a design which incorporates the principles of Water Sensitive Urban Design (WSUD) and to target pollutants that are present in the stormwater so as to minimise the adverse impact these pollutants could have on receiving waters and to also meet the requirements specified by Canterbury-Bankstown Council.

Canterbury-Bankstown Council has nominated, in Section 6.6 of their Development Engineering Standards Guide 2023, the requirements for stormwater quality to be provided for all new developments with reference to such documents as the EPA's Manual on Managing Urban Stormwater (Treatment Techniques) and relevant Australian Standards.

Stormwater treatment objectives for industrial sites in the Canterbury-Bankstown Council LGA confirm that the following key pollutants should be targeted for this development:

- Coarse and fine sediments;
- Gross pollutants (including organic matter, leaves, rubbish and particles >5mm); and
- Hydrocarbons and oils.

6.2 Proposed Stormwater Treatment System

Developed impervious areas including roof, hardstand, car parking, roads and other extensive impervious areas are required to be treated by the Stormwater Treatment Measures (STM's). The STM's shall be sized according to the whole catchment area of the development. The STM's for the development shall be based on a treatment train approach to ensure that all the objectives above are met.

Components of the treatment train for the development are as follows:

- Primary treatment of external areas will be made via pit baskets fitting within the stormwater collection pits.
- Secondary treatment of external areas will be made via an end-of-line Triple Interceptor Pit and Site Containment Tank.
- A portion of the roof will also be treated via rainwater reuse and settlement within the rainwater tank.

Reference to drawing **CO14894.00-SSDA400** shows the location of the proposed STM. The proposed water quality treatment system is consistent with the other industrial developments and provides a suitable level of treatment which meets Council engineering policy.

6.3 Stormwater Harvesting

Stormwater harvesting refers to the collection of stormwater from the developments internal stormwater drainage system for re-use in non-potable applications. Stormwater from the stormwater drainage system can be classified as either rainwater where the flow is from roof areas, or stormwater where the flow is from all areas of the development.

For the purposes of this development, we refer to a rainwater harvesting system, where benefits of collected stormwater from roof areas over a stormwater harvesting system can be made as rainwater is generally less polluted than stormwater drainage.

Rainwater harvesting is proposed for this development with re-use for non-potable applications. Internal uses include such applications as toilet flushing while external applications will be used for irrigation. The aim is to reduce the water demand for the development by 50-70%, subject to detail design.

In general terms the rainwater harvesting system will be an in-line tank for the collection and storage of rainwater. At times when the rainwater storage tank is full rainwater can pass through the tank and continue to be discharged via gravity into the stormwater drainage system. Rainwater from the storage tank will be pumped for distribution throughout the development in a dedicated non-potable water reticulation system. This however would be subject to future detail design.

Rainwater tanks have been designed, using MUSIC software to balance the supply and demand, based on the below base water demands and to provide 50-70% reduction in non-potable water demand. Rainwater tank reuse demands were calculated based on typical water demands of toilets and irrigation of landscaped areas. Water demands for toilets was calculated using 0.1kL/day/ toilet. Water demands for irrigation of landscaped areas was limited on this development not included as part of the rainwater tank sizing.

The above rates result in the following internal non-potable demand:

20 Toilets in new laboratory 2.0 kL/day

6.3.1 Rainwater Tank Sizing

The use of rainwater reduces the mains water demand and the amount of stormwater runoff. By collecting the rainwater run-off from roof areas, rainwater tanks provide a valuable water source suitable for flushing toilets and landscape irrigation.

Rainwater tanks have been designed, using MUSIC software to balance the supply and demand, based on the calculated base water demands and proposed roof catchment areas. Allowances in the MUSIC model have been made for high flow bypass which will be managed by 300mm downpipe roofwater collection configuration along a portion of the northern elevation of the warehouse.

Table 6.1 – Rainwater Tank Reuse Requirements

Roof Catchment (m^2)	Highflow Bypass (m3/s)	Tank Size in MUSIC (kL)	Predicted Demand Reduction (%)	Provided Tank (kL)
3,000	100	15	65	15

The MUSIC model, results summarised in Table 6.3, predicts that the reuse demands of 50-70% will be met for the development with the provision of a minimum 15 kL rainwater tank.

We note that the final configuration and sizing of the rainwater tanks is subject to detail design considerations and optimum site utilisation.

6.4 Maintenance and Monitoring

It is important that each component of the stormwater system and water quality treatment train is properly operated and maintained. In order to achieve the design treatment objectives, an indicative maintenance schedule has been prepared and included as **Appendix C** to assist in the effective operation and maintenance of the various water quality components.

Inspection frequency may vary depending on site specific attributes and rainfall patterns in the area. In addition to the nominated frequency, it is recommended that inspections are made following large storm events.

7 CONSTRUCTION SOIL AND WATER MANAGEMENT

7.1 Soil and Water Management General

Without any mitigation measures and during typical construction activities, site runoff would be expected to convey a significant sediment load. A Soil and Water Management Plan (SWMP) and Erosion and Sediment Control Plan (ESCP), or equivalent, would be implemented for the construction of the Proposal. The SWMP and ESCPs would be developed in accordance with the principles and requirements of Managing Urban Stormwater – Soils & Construction Volume 1 ('Blue Book') (Landcom, 2004) with a staged approach.

In accordance with the principles included in the Blue Book, a number of controls have been incorporated into a preliminary ESCP (refer to accompanying Drawings in **Appendix A**) and draft SWMP in **Appendix B**. The ESCP considers initial site establishment, requirements during construction of the development, and completion of development works.

Section 1 provides a summary of the construction works for the Proposal. While all construction activities have the potential to impact on water quality, the key activities are:

- Erosion and sediment control installation.
- Grading of existing earthworks to suit building layout, drainage layout and pavements.
- Stormwater and drainage works.
- Service installation works.
- Building construction works.

The sections below outline the proposed controls for management of erosion and sedimentation during construction of the Proposal. The approach is noted to consider initial site establishment, construction of the development and the completion of the development, as included in the ESCP drawings **Appendix A**.

7.2 Typical Management Measures

Sediment Basins

Sediment basins have been sized (based on 5-days, 85th percentile rainfall) and located to ensure sediment concentrations in site runoff are within acceptable limits. Preliminary basin sizes have been calculated in accordance with the Blue Book and are based on 'Type D' soils. These soils contain a significant proportion of fine (<0.005mm) "dispersible" materials that will never settle unless flocculated.

Sediment basins for 'Type D' soils are typically wet basins which are pumped out following a rainfall event when suspended solids concentrations of less than 50 mg/L have been achieved.

Refer **CO14984.00-SSDA200** for calculations, per the Blue Book Guidelines Section 6.3.3

Sediment Fences and Diversion Drains

Sediment fences and diversion drains are located along the northern, southern, and western boundary of the site to ensure no untreated runoff leaves the site. They have also been located around the proposed stockpiles on the site.

Stabilised Site Access

For the proposal, stabilised site access is proposed at one location at the entry to the works area. This will limit the risk of sediment being transported onto Gow Street and other public roads.

7.3 Other Management Measures

Other management measures that will be employed are expected to include:

- Minimising the extent of disturbed areas across the site at any one time.
- Progressive stabilisation of disturbed areas or previously completed earthworks to suit the proposal once trimming works are complete.
- Regular monitoring and implementation of remedial works to maintain the efficiency of all controls.

It is noted that the controls included in the preliminary ESCP are expected to be reviewed and updated as the design, staging and construction methodology is further developed for the Proposal.

8 CONCLUSION

This Civil Engineering Report has been prepared to support the State Significant Development Application for a Proposed Development at 15 and 20 Gow Street, Padstow, NSW.

A civil engineering strategy for the site has been developed which provides a best practice solution within the constraints of the existing landform and proposed development layout. Within this strategy a stormwater quantity and quality management strategy has been developed to consider peak flows and reduce pollutant loads in stormwater leaving this site. The stormwater management for the development has been designed in accordance with City of Canterbury-Bankstown requirements and ensuring acceptable impacts relating to the development.

The hydrological assessment shows local post development flows from the site will be consistent with pre-development flows and demonstrates that the site discharge will not adversely affect any land, drainage systems or watercourse as a result of the development.

During the construction phase, a Sediment and Erosion Control Plan will be in place to ensure the downstream drainage system and receiving waters are protected from sediment laden runoff.

During the operational phase of the development, a treatment train incorporating the use of pit baskets (gross pollutant traps) is proposed to mitigate any increase in stormwater pollutant load generated by the development. Best management practices have been applied to the development to ensure that the quality of stormwater runoff is not detrimental to the receiving environment.

It is recommended the management strategies in this report be approved and incorporated into the future detailed design.

9 REFERENCES

- Canterbury-Bankstown Development Control Plan 2023, City of Canterbury-Bankstown
- Stormwater System Report – 15 Gow Street Padstow, City of Canterbury-Bankstown
- NSW Government (2023). Floodplain Development Manual.
- Managing Urban Stormwater: Harvesting and Reuse – 2006 (NSW DEC);
- Managing Urban Stormwater: Source Control – 1998 (NSW EPA);
- Managing Urban Stormwater: Treatment Techniques – 1997 (NSW EPA);
- Landcom (2004). Managing Urban Stormwater – Soils and Construction – 4th Edition.

10 APPENDICES

Appendix A Costin Roe Consulting - Civil Drawings

Appendix B Draft Soil and Water Mangement Plan

A.1 Introduction

An erosion and sediment control plan (ESCP) is shown on drawing **Co14984.00-SSDA200** with details on **SSDA251 and SSDA252.** These are conceptual plans only providing sufficient detail to clearly show that the works can proceed without undue pollution to receiving waters. A detailed plan will be prepared once consent is given and before works start.

The Staged ESCP considers initial site establishment, requirements during construction of roads and infrastructure and estate earthworks, completion of estate works and the period between this and development of individual lots.

A.2 General Conditions

- The ESCP will be read in conjunction with the engineering plans, and any other plans or written instructions that may be issued in relation to development at the subject site.
- Contractors will ensure that all soil and water management works are undertaken as instructed in this specification and constructed following the guidelines stated in:
    - *Best Practice Erosion and Sediment Control document International Erosion Control Association (ICEA*) Australasia – "The White Book".
    - Managing Urban Stormwater – Soils & Construction Volume 1 ('Blue Book')(Landcom, 2004).
- All subcontractors will be informed of their responsibilities in minimising the potential for soil erosion and pollution to down slope areas.

A.3 Land Disturbance

Where practicable, the soil erosion hazard on the site will be kept as low as possible and as recommended in Table A.1.

Table A.1 Limitations to Access

Land Use	Limitation	Comments
Construction areas	Limited to 5 (preferably 2) metres from the edge of any essential construction activity as shown on the engineering plans.	All site workers will clearly recognise these areas that, where appropriate, are identified with barrier fencing (upslope) and sediment fencing (downslope), or similar materials.
Access areas	Limited to a maximum width of 5 metres	The site manager will determine and mark the location of these zones onsite. They can vary in position so as to best conserve existing vegetation and protect downstream areas while being considerate of the needs of efficient works activities. All site workers will clearly recognise these boundaries.
Remaining lands	Entry prohibited except for essential management works	

A.4 Erosion Control Conditions

1. Clearly visible barrier fencing shall be installed as shown on the plan and elsewhere at the discretion of the site superintendent to ensure traffic control and prohibit unnecessary site disturbance. Vehicular access to the site shall be limited to only those essential for construction work and they shall enter the site only through the stabilised access points.
2. Soil materials will be replaced in the same order they are removed from the ground. It is particularly important that all subsoils are buried and topsoils remain on the surface at the completion of works.
3. Where practicable, schedule the construction program so that the time from starting land disturbance to stabilisation has a duration of less than six months.
4. Notwithstanding this, schedule works so that the duration from the conclusion of land shaping to completion of final stabilisation is less than 20 working days.
5. Land recently established with grass species will be watered regularly until an effective cover has properly established and plants are growing vigorously. Further application of seed might be necessary later in areas of inadequate vegetation establishment.
6. Where practical, foot and vehicular traffic will be kept away from all recently established areas
7. Earth batters shall be constructed in accordance with the Geotechnical Engineers Report or with as law a gradient as practical but not steeper than:
    - 2H:1V where slope length is less than 7 metres
    - 2.5H:1V where slope length is between 7 and 10 metres
    - 3H:1V where slope length is between 10 and 12 metres
    - 4H:1V where slope length is between 12 and 18 metres
    - 5H:1V where slope length is between 18 and 27 metres
    - 6H:1V where slope length is greater than 27 metres
8. All earthworks, including waterways/drains/spillways and their outlets, will be constructed to be stable in at least the design storm event.
9. During windy weather, large, unprotected areas will be kept moist (not wet) by sprinkling with water to keep dust under control. In the event water is not available in sufficient quantities, soil binders and/or dust retardants will be used or the surface will be left in a cloddy state that resists removal by wind.

A.5 Pollution Control Conditions

1. Stockpiles will not be located within 5 metres of hazard areas, including likely areas of high velocity flows such as waterways, paved areas and driveways. Silt/ sediment fences and appropriate stabilisation of stockpiles are to be provided as detailed on the drawings.
2. Sediment fences will:
    a. Be installed where shown on the drawings, and elsewhere at the discretion of the site superintendent to contain the coarser sediment fraction (including aggregated fines) as near as possible to their source.
    a. Have a catchment area not exceeding 720 square meters, a storage depth (including both settling and settled zones) of at least 0.6 meters,

and internal dimensions that provide maximum surface area for settling, and

b. Provide a return of 1 metre upslope at intervals along the fence where catchment area exceeds 720 square meters, to limit discharge reaching each section to 10 litres/second in a maximum 20-year tc discharge.

2. Sediment removed from any trapping device will be disposed in locations where further erosion and consequent pollution to down slope lands and waterways will not occur.
3. Water will be prevented from directly entering the permanent drainage system unless it is relatively sediment free (i.e. the catchment area has been permanently landscaped and/or likely sediment has been treated in an approved device). Nevertheless, stormwater inlets will be protected.
4. Temporary soil and water management structures will be removed only after the lands they are protecting are stabilised.

A.6 Waste Management Conditions

Acceptable bind will be provided for any concrete and mortar slurries, paints, acid washings, lightweight waste materials and litter. Clearance service will be provided at least weekly.

A.7 Site Inspection and Maintenance

1. A self-auditing program will be established based on a Check Sheet. A site inspection using the Check Sheet will be made by the site manager:
    - At least weekly.
    - Immediately before site closure.
    - Immediately following rainfall events in excess of 5mm in any 24-hour period.

    The self-audit will include:

    - Recording the condition of every sediment control device
    - Recording maintenance requirements (if any) for each sediment control device
    - Recording the volumes of sediment removed from sediment retention systems, where applicable
    - Recording the site where sediment is disposed
    - Forwarding a signed duplicate of the completed Check Sheet to the project manager/developer for their information
2. In addition, a suitably qualified person will be required to oversee the installation and maintenance of all soil and water management works on the site. The person shall be required to provide a short monthly written report. The responsible person will ensure that:
    - The plan is being implemented correctly
    - Repairs are undertaken as required
    - Essential modifications are made to the plan if and when necessary
- The report shall carry a certificate that works have been carried out in accordance with the plan.

3. Waste bins will be emptied as necessary. Disposal of waste will be in a manner approved by the Site Superintendent.
4. Proper drainage will be maintained. To this end drains (including inlet and outlet works) will be checked to ensure that they are operating as intended, especially that,
    a. No low points exist that can overtop in a large storm event
    b. Areas of erosion are repaired (e.g. lined with a suitable material) and/or velocity of flow is reduced appropriately through construction of small check dams of installing additional diversion upslope.
    c. Blockages are cleared (these might occur because of sediment pollution, sand/soil/spoil being deposited in or too close to them, breached by vehicle wheels, etc.).
5. Sand/soil/spoil materials placed closer than 2 meters from hazard areas will be removed. Such hazard areas include and areas of high velocity water flows (e.g. waterways and gutters), paved areas and driveways
6. Recently stabilised lands will be checked to ensure that erosion hazard has been effectively reduced. Any repairs will be initiated as appropriate.
7. Excessive vegetation growth will be controlled through mowing or slashing.
8. All sediment detention systems will be kept in good, working condition. In particular, attention will be given to:
    a. Recent works to ensure they have not resulted in diversion of sediment laden water away from them
    b. Degradable products to ensure they are replaced as required, and
    c. Sediment removal, to ensure the design capacity or less remains in the settling zone.
9. Any pollutants removed from sediment basins or litter traps will be disposed of in areas where further pollution to down slope lands and waterways should not occur.
10. Additional erosion and/or sediment control works will be constructed as necessary to ensure the desired protection is given to down slope lands and waterways, i.e. make ongoing changes to the plan where it proves inadequate in practice or is subjected to changes in conditions at the work site or elsewhere in the catchment.
11. Erosion and sediment control measures will be maintained in a functioning condition until all earthwork activities are completed and the site stabilised
12. Litter, debris and sediment will be removed from the gross pollutant traps and trash racks as required.

EROSION AND SEDIMENT CONTROL

WEEKLY SITE INSPECTION SHEET

LOCATION . . . . . .

INSPECTION OFFICER . . . . . DATE . . . . . .

SIGNATURE . . . . . .

Legend: □ OK □ Not OK N/A Not applicable

Item	Consideration	Assessment
1	Public roadways clear of sediment.	. . . . .
2	Entry/exit pads clear of excessive sediment deposition.	. . . . .
3	Entry/exit pads have adequate void spacing to trap sediment.	. . . . .
4	The construction site is clear of litter and unconfined rubbish.	. . . . .
5	Adequate stockpiles of emergency ESC materials exist on site.	. . . . .
6	Site dust is being adequately controlled.	. . . . .
7	Appropriate drainage and sediment controls have been installed prior to new areas being cleared or disturbed.	. . . . .
8	Up-slope "clean" water is being appropriately diverted around/through the site.	. . . . .
9	Drainage lines are free of soil scour and sediment deposition.	. . . . .
10	No areas of exposed soil are in need of erosion control.	. . . . .
11	Earth batters are free of "rill" erosion.	. . . . .
12	Erosion control mulch is not being displaced by wind or water.	. . . . .
13	Long-term soil stockpiles are protected from wind, rain and stormwater flow with appropriate drainage and erosion controls.	. . . . .
14	Sediment fences are free from damage.	. . . . .
15	Sediment-laden stormwater is not simply flowing "around" the sediment fences or other sediment traps.	. . . . .
16	Sediment controls placed up-slope/around stormwater inlets are appropriate for the type of inlet structure.	. . . . .
17	All sediment traps are free of excessive sediment deposition.	. . . . .
18	The settled sediment layer within a sediment basin is clearly visible through the supernatant prior to discharge such water.	. . . . .
19	All reasonable and practicable measures are being taken to control sediment runoff from the site.	. . . . .
20	All soil surfaces are being appropriately prepared (i.e. pH, nutrients, roughness and density) prior to revegetation.	. . . . .
21	Stabilised surfaces have a minimum 70% soil coverage.	. . . . .
22	The site is adequately prepared for imminent storms.	. . . . .
23	All ESC measures are in proper working order.	. . . . .

Appendix C Draft Maintenance Schedule

Maintenance Action	Frequency	Responsibility	Procedure
Swales/Landscaped Areas			
Check density of vegetation and ensure minimum height of 150mm is maintained. Check for any evidence of weed infestation	Six monthly	Maintenance Contractor	Replant and/or fertilise, weed and water in accordance with landscape consultant specifications
Inspect swale for excessive litter and sediment build up	Six monthly	Maintenance Contractor	Remove sediment and litter and dispose in accordance with local authorities' requirements.
Check for any evidence of channelisation and erosion	Six monthly/ After Major Storm	Maintenance Contractor	Reinstate eroded areas so that original, designed swale profile is maintained
Weed Infestation	Three Monthly	Maintenance Contractor	Remove any weed infestation ensuring all root ball of weed is removed. Replace with vegetation where required.
Inspect swale surface for erosion	Six Monthly	Maintenance Contractor	Replace top soil in eroded area and cover and secure with biodegradable fabric. Cut hole in fabric and revegetate.
Inlet & Junction Pits			
Inside of pits	Six Monthly	Maintenance Contractor	Remove grate and inspect internal walls and base, repair where required. Remove any collected sediment, debris, litter.
Outside of pits	Four Monthly/ After Major Storm	Maintenance Contractor	Clean grate of collected sediment,

			debris, litter and vegetation.
Proprietary Treatment Devices (OceanSave Pit Baskets)			
Refer to Manufacturers Operation and Maintenance Manuel	Annually	Maintenance Contractor	Refer to Manufacturers Operation and Maintenance Manuel
Rainwater Tanks			
Check for any clogging and blockage of the first flush device	Monthly	Maintenance Contractor	First flush device to be cleaned out
Check for any clogging and blockage of the tank inlet -leaf/litter screen	Six monthly	Maintenance Contractor	Leaves and debris to be removed from the inlet leaf/litter screen
Check the level of sediment within the tank	Every two years	Maintenance Contractor	Sediment and debris to be removed from rainwater tank floor if sediment level is greater than the maximum allowable depth as specified by the hydraulic consultant
Stormwater System			
General Inspection of complete stormwater drainage system	Bi-annually	Maintenance Contractor	Inspect all drainage structures noting any dilapidation in structures and carry out required repairs.

Appendix D Frank M Mason & Co - Topographic Survey

Appendix E Dulux Group Pty Ltd – Padstow Site Stormwater Management Plan

Appendix F Dulux Group Pty Ltd – Towns and Wastewater Analysis

Appendix G Dulux Group Pty Ltd – Tradewaste Agreement

Appendix H PSM - Geotechnical Investigation

Appendix I SEARs


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