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CIVIL ENGINEERING REPORT
INCORPORATING
WATER CYCLE MANAGEMENT STRATEGY

SSD-25725029

ARDEX DEVELOPMENT
THE YARDS INDUSTRIAL ESTATE - MAMRE ROAD & SOUTHERN LINK RD. KEMPS CREEK NSW

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***Rev*: D**

DOCUMENT VERIFICATION

Project Title	SSD-25725029, Ardex Development, The Yards - Mamre Road & Southern Link Road, Kemps Creek
Document Title	Civil Engineering Report Incorporating Water Cycle Management Strategy
Project No.	Co13362.05
Description	SSD Submission report for industrial warehouse
Client Contact	Mr Paul Solomon, Frasers Property Mr Stephen O'Conner, Altis

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Prepared by	Daniel Soliman	DS
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Issued by	Daniel Soliman	DS
File Name	13362.05-03d.rpt	

Document History

Date	Revision	Issued to	No. Copies
15 Sept 2021	A	Mr Paul Solomon, Frasers Property Mr Stephen O'Connor, Altis	PDF
21 Sept 2021	B	Mr Paul Solomon, Frasers Property Mr Stephen O'Connor, Altis	PDF
22 Oct 2021	C	Mr Paul Solomon, Frasers Property Mr Stephen O'Connor, Altis	PDF
8 Nov. 2021	D	Mr Paul Solomon, Frasers Property Mr Stephen O'Connor, Altis	PDF

EXECUTIVE SUMMARY

The Frasers Property Australia & Altis Property Partners Joint Venture (The JV) are seeking to establish a warehouse distribution facility on Lot 10 in the 657-769 Mamre Road, Kemps Creek Industrial Estate known as "The Yards".

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 Water and Hydrology Assessment 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 an industrial warehouse, including earthworks and stormwater drainage over an area of 4.4 Ha. Site works will include bulk earthworks, provision of services, and stormwater drainage and has completed in accordance with the Development Masterplan.

Access to the lot would be made via the new Public Access Road being delivered as part of the SSD-9522 approval.

Purpose of this assessment

This Water and Hydrology Impact Assessment has been prepared to address the Secretary's Environmental Assessment Requirements (SEARs) as they related to water and hydrology, including:

- Stormwater Management including stormwater quantity and quality during operation;
- Flooding; and
- Stormwater Management, including Erosion & Sediment Control during construction.

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 site discharges to estate stormwater quality treatment system which incorporates the use of a treatment train of GPT's and bio-retention filtration 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.

The stormwater management solution considers discharge from the development site consistent with the Estate Stormwater Management Strategy and best practice noting the final stormwater management targets will be realised upon implementation of the precinct wetland system by Sydney Water.

Further it has been confirmed that the development meets flood planning requirements and does not impact or encroach on existing flood affected areas (as defined in separate

approval to COUNCIL and associated TUFLOW flooding assessment completed by Costin Roe Consulting). This shows that local post development flows from the site, in conjunction with the flood management measures to be adopted in the flooding assessment demonstrates that the site discharge will not adversely affect any land, drainage system or watercourse as a result of the development.

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.

TABLE OF CONTENTS

1 INTRODUCTION

1.1 Introduction

Costin Roe Consulting Pty Ltd has been commissioned by Frasers Property Australia & Altis Property Partners JV (The JV) to prepare this *Civil Engineering Report & Water Cycle Management Strategy* (WCMS) in support of a proposed development application for a State Significant Development application, SSD-25725029, for a warehouse distribution facility on Lot 10 in the 657-769 Mamre Road, Kemps Creek Industrial Estate known as "The Yards".

The development is proposed to be located in the south-eastern corner of Lot 10. Lot 10 is located in the western portion of The Yards Estate, which was approved as SSD-9522 in December 2020 and being assessed for subsequent modifications, SSD-9522 Mod1 & SSD-9522 Mod2.

The Yards Estate SSD 9522 was approved by The NSW Department of Planning & Environment (DPIE) for development on 24 December 2020 and is currently under construction.

A modification to the approved Masterplan (Mod1) was submitted in March 2021 by The JV to facilitate a specific user on the eastern development lots. The SSD 9522 Mod1 is pending approval at the time of writing this report.

A second modification to the approved Masterplan (Mod2) was submitted in July 2021 for a change to the approved road cross section from those approved in the SSD-9522 approval. The SSD 9522 Mod2 is also pending approval at the time of writing this report. The changes to the road designs have been made based on modelling and reporting which has confirmed the precinct road hierarchy and form and includes revised road reserve, verges and road carriageway arrangements.

1.2 Scope and Project Description

The site is located on the western side of Mamre Road, in the suburb of Kemps Creek, NSW. The proposed development involves construction of a warehouse distribution facility with associated truck loading/unloading areas, material storage silos & staff/customer parking within an approved industrial estate known as The Yards.

This report provides a summary of the design principles and planning objectives for the following civil engineering components of the project:

- Earthworks & Retaining Walls;
- Stormwater Management including stormwater quantity and quality;
- Ecologically Sustainable Development (ESD); and
- Erosion & Sediment Controls.

The engineering objectives for the development are to create a site which, based on the proposed architectural layout considers the approved SSD-9522 Estate Masterplan Layout and requirements, responds to the topography and site constraints, meets flood planning requirements and provides an appropriate and economical stormwater management system which incorporates best practice in water sensitive urban design

consistent with and the requirements of the approved estate stormwater management strategy.

A set of drawings have been prepared to show the proposed civil and stormwater management concept for the proposed industrial development. These drawings are for development approval only and subject to change during detail design.

The consent authority is The DPIE as the proposal considered a State Significant Development (SSD). However as the subject site is located within Penrith City Council (PCC) local government area, the engineering and policy requirements of PCC have also been considered in the design and PCC has been consulted in the civil engineering design of the site.

The projects Planning Secretary's Environmental Assessment Requirements (SEAR's) and associated agency responses for SSD-25725029 were provided on 03 September 2021. **Section 9** of this report provides specific responses to SEAR's *Soil and Water,* and associated agency items. It is noted that the majority of items raised in the SEARs and associated agency letters have been managed and addressed via previous assessments already undertaken as part of the approved SSD-9522 and the associated SSD-9522 Mod1 & Mod2.

1.3 SEAR's and Agency Responses

This section of the report covers items relating to the Planning SEAR's, dated 3 September 2021, and associated agency responses for SSD-25725029.

We provide specific responses to SEAR's *Soil and Water,* and from relevant agencies.

It is noted that the majority of items raised in the SEARs and associated agency letters will be managed and addressed via works and approved assessments already undertaken as part of the approved SSD 9522 and associated SSD 9522 Mod1 & Mod 2 development infrastructure works.

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

Table 1.1. SEARs General Requirements

SEARS – General Requirements
A surface and groundwater assessment that includes: *An assessment of potential surface and groundwater impacts on watercourses, riparian areas, groundwater, groundwater-dependent communities nearby, adjacent licensed water users, and measures proposed to reduce and mitigate these impacts* Response Refer to **Section 6 to 8** of the approved SSD9522 estate *"Water Cycle Management Strategy"* by Costin Roe (*ref: Co13362.00-07k.rpt*) for assessment of water resources, hydrology, watercourses and riparian lands applicable to this development and all sites within The Yards Estate. A link to the SSD9522 WCMS on the NSW DPIE Major Projects website has been provided in **Appendix D** of this report. Refer to **Section 3** of the approved SSD9522 estate *"Water Cycle Management Strategy"* by Costin Roe (*ref: Co13362.00-07k.rpt*)f or assessment of soil resources. Refer to **Section 2 & 3** of the approved SSD9522 estate *"Water Cycle Management Strategy"* by Costin Roe (*ref: Co13362.00-07k.rpt*) for background conditions. There is no identified waterfront land on the property and/ or requirements for controlled activities as such.
A detailed site water balance including a description of the water demands and breakdown of water supplies, and any water licensing requirements Response Water supply for the development will be provided by Sydney Water, an adequate and secure supplier. Measures including rainwater reuse are proposed for non-potable water use with the demand on non-potable being reduced by 80% as detailed in **Section 6.2** of this report. There are no proposed water licenses and adjacent properties are noted to be contemplating similar developments.
Details of stormwater/wastewater management system including the capacity of onsite detention system(s), onsite sewage management and measures to treat, reuse or dispose of water Response Water discharged from the Ardex development site ultimately drains to estate water quality management basins. Characterisation of water quality being discharged from the Yards Estate is described in **Section 6, Section 7 & Section 8** of the approved SSD9522 estate *"Water Cycle Management Strategy"* by Costin Roe (*ref: Co13362.00-07k.rpt*) & subsequent mods. A link to the SSD9522 WCMS on the NSW DPIE Major Projects website has been provided in **Appendix D** of this report. Further, measures incorporating the use of rainwater for non-potable water demand is proposed for the development site, with a target of reducing non-potable reuse by 80%.

Description of the measures to minimise water use Response Measures incorporating the use of rainwater for non-potable water demand is proposed for the development site. Use of harvested rainwater is proposed to reduce potable water demand for landscaping irrigation and toilet flushing by 80% as detailed in **Section 6.2** of this report.
Consideration of the NSW Aquifer Interference Policy (2012), the Guidelines for Controlled Activities on Waterfront Land (2018) and relevant Water Sharing Plans Response There are no identified aquifers on the site and no proposed water uptake requirements. There is no identified waterfront land on the property and/ or requirements for controlled activities as such.
Detailed flooding assessment including the management of flood prone land and potential impacts of the development on flood evacuation. To assess the impacts of the proposed development, information for pre and post-development scenarios including modelling of the local overland flows are to be included Response A detailed flooding assessment has been completed for The Yards estate, in which this proposal sits. Reference should be made to **Section 9** of the approved SSD9522 estate Water Cycle Management Strategy by Costin Roe (*ref: Co13362.00-07k.rpt*) & subsequent mods for detailed flood assessment and **Appendix E** of the same report for technical supporting information relating to the flood assessment. A link to the SSD9522 WCMS on the NSW DPIE Major Projects website has been provided in **Appendix D** of this report. A flood assessment 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 acceptable outcomes which meet the objectives of the NSW Floodplain Development Manual, Penrith City Council DCP and the proposed amendments to the Penrith City Council DCP proposed in the *Exhibition Draft South Creek Floodplain Management Plan 2020*.
Characterisation of water quality at the point of discharge to surface and/or groundwater against the relevant water quality criteria Response Water discharged from the Ardex development site ultimately drains to estate water quality management basins. Characterisation of water quality being discharged from

the Yards Estate is described in **Section 6, Section 7 & Section 8** of the approved SSD9522 estate *"Water Cycle Management Strategy"* by Costin Roe (*ref: Co13362.00-07k.rpt*) & subsequent mods. A link to the SSD9522 WCMS on the NSW DPIE Major Projects website has been provided in **Appendix D** of this report.
A Water Cycle Management Strategy that considers on-lot stormwater management measures, adequate disposal of stormwater and avoids negative impacts downstream Response The site is proposed to discharge to estate level water quality and quantity management basins. The estate water cycle management strategy is described in **Section 6** of the approved SSD9522 *"Water Cycle Management Strategy"* report by Costin Roe (*ref: Co13362.00-07k.rpt*) & subsequent mods. A link to the SSD9522 WCMS on the NSW DPIE Major Projects website has been provided in **Appendix D** of this report. Further, measures incorporating the use of rainwater for non-potable water demand is proposed for the development site, with a target of reducing non-potable reuse by 80%. These measures are detailed in **Section 6.2** of this report.
Modelling undertaken in accordance with the MUSIC modelling toolkit and stormwater quality and flow targets, a flow duration curve spreadsheet and MUSIC model file Response The Ardex site falls with the Yards Industrial Estate which has been approved with an estate wide Stormwater Management Strategy which includes all development lots (including Ardex). These systems are now currently being constructed based on the approval. Reference to **Section 7.4** of the SSD9522 estate *"Water Cycle Management Strategy"* by Costin Roe (*ref: Co13362.00-07k.rpt*) & subsequent mods which discusses, assesses, and provides demonstration of acceptable stream health outcomes for discharge from the estate, consistent with best practice. Given the estate stormwater system, which includes the Ardex facility, has been approved and is currently being constructed, the new EES targets are not considered applicable to the development. We note that the current level of development in the estate achieves the MARV of 2.0ML/Ha/Yr, and this value (based on anticipated development takeup) would not be breached until 4-5yrs in the future. We note the gap between the requested new waterway targets proposed by EES/ DPIE and this estate can be bridged via the precinct wetland solution proposed by Sydney Water are the Waterway Manager for South Creek which is expected to be resolved within the timeframe noted.
Description of the proposed erosion and sediment controls during construction Response Refer to **Section 7** for soil and water management measures, drawings in A**ppendix A** for associated erosion and sediment control drawings, and **Appendix C** for a Draft Soil and Water Management Plan.

These sections show proposed measures, based on the Landcom document *Managing Urban Stormwater – Soils & Construction Volume 1 ('Blue Book')(Landcom, 2004)*, are proposed during the construction of the development. Measures proposed will limit potential for offsite impact associated with water runoff and soils during construction. Consideration to management of salinity and acid sulphate has been made based on the recommendations of the geotechnical investigations and noted Landcom document.

Table 1.2. SEARs Agency Responses

TfNSW – ref:SYD21/00981/01
The EIS shall provide a flood impact assessment to understand the potential impacts of the development on flood evacuation is to be carried out. To assess the impacts of the proposed development, information for pre and post-development scenarios including modelling of the local overland flows are to be provided to allow assessment of the impact of the development. Response Refer to the SSD9522 estate *"Overland Flow Report"* by Costin Roe (*ref: Co13362.00-06i.rpt*). A link to the SSD9522 OFR on the NSW DPIE Major Projects website has been provided in **Appendix D** of this report. The site is noted to be adjacent to the South Creek floodplain (being at higher elevation than the South Creek PMF flood extent). The development sites are noted to be above the 1% AEP and PMF levels related to overland flow in South Creek and as such this presents low hazard to the development and future occupants of the development site. If surrounding low level roadways are affected during flooding, on site refuge is available. The development presents low/ no risk to existing community emergency management arrangements.

DPIE (EES) – ref: DOC21/702026	
Table 3	**Table 3** Stormwater quality targets – Construction Phase

	Construction Phase Target
Total suspended solids (TSS) and pH	All exposed areas greater than 2500 metres must be provided with sediment controls which are designed, implemented and maintained to a standard which would achieve at least 80% of the average annual runoff volume of the contributing catchment treated (i.e. 80% hydrological effectiveness) to 50mg/L Total Suspended Solids (TSS) or less, and pH in the range (6.5–8.5)
Oil, litter and waste contaminants	No release of oil, litter or waste contaminants

	Stabilisation: Prior to completion of works for the development, and prior to removal of sediment controls, all site surfaces must be effectively stabilised including all drainage systems. An effectively stabilised surface is defined as one that does not, or is not likely to result in visible evidence of soil loss caused by sheet, rill or gully erosion or lead to sedimentation water contamination. Response Refer to **Section 7** for soil and water management measures, drawings in A**ppendix A** for associated erosion and sediment control drawings, and **Appendix C** for a Draft Soil and Water Management Plan. These sections show proposed measures, based on the Landcom document *Managing Urban Stormwater – Soils & Construction Volume 1 ('Blue Book')(Landcom, 2004)*, are proposed during the construction of the development. Measures proposed will limit potential for offsite impact associated with water runoff and soils during construction. Consideration to management of salinity and acid sulphate has been made based on the recommendations of the geotechnical investigations and noted Landcom document.
Table 4	**Table 4.** Stormwater quality targets – operational phase Gross Pollutants (anthropogenic litter >5mm and coarse sediment >1mm): 90% reduction (minimum) in mean annual load from unmitigated development Total Suspended Solids (TSS): 90% reduction in mean annual load from unmitigated development Total Phosphorus (TP): 80% reduction in mean annual load from unmitigated development Total Nitrogen (TN): 65% reduction in mean annual load from unmitigated development Response Refer **Section 8** of the SSD9522 estate *"Water Cycle Management Strategy"* by Costin Roe (*ref: Co13362.00-07k.rpt*) for discussion on proposed water quality measures and achieved pollution reductions, and pollution concentrations. The proposed measures and modelling demonstrate the values which can be modelled (TSS, TP, TN) have been achieved for the development. A link to the SSD9522 WCMS on the NSW DPIE Major Projects website has been provided in **Appendix D** of this report. We note the gap between the current proposed targets by EES/DPIE will be bridged by the precinct wetland solution proposed to be implemented by Sydney Water who will be the Waterway Manager for South Creek.

Table 5

Table 5. Stormwater flow targets – operational phase

	Stormwater Flow Target – Operational Phase
Option 1: Mean Annual Runoff	
Mean Annual Runoff Volume (MARV)	≤ 2 ML/ha/year at the point of discharge to the local waterway
90%ile flow	1000 to 5000 L/ha/day at the point of discharge to the local waterway
50%ile flow	5 to 100 L/ha/day at the point of discharge to the local waterway
10%ile flow	0 L/ha/day at the point of discharge to the local waterway
Option 2: Flow Duration Curve Approach	
95%ile flow	3000 to 15000 L/ha/day at the point of discharge to the local waterway
90%ile flow	1000 to 5000 L/ha/day at the point of discharge to the local waterway
75%ile flow	100 to 1000 L/ha/day at the point of discharge to the local waterway
50%ile flow	5 to 100 L/ha/day at the point of discharge to the local waterway
Cease to flow	Cease to flow to be between 10% to 30% of the time

Response

The Ardex site falls with the Yards Industrial Estate which has been approved with an estate wide Stormwater Management Strategy which includes all development lots (including Ardex). These systems are now currently being constructed based on the approval. Reference to **Section 7.4** of the SSD9522 estate *"Water Cycle Management Strategy"* by Costin Roe (*ref: Co13362.00-07k.rpt*) & subsequent mods which discusses, assesses, and provides demonstration of acceptable stream health outcomes for discharge from the estate, consistent with best practice. A link to the SSD9522 WCMS on the NSW DPIE Major Projects website has been provided in **Appendix D** of this report.

Given the estate stormwater system, which includes the Ardex facility, has been approved and is currently being constructed, the new EES targets are not considered applicable to the development.

We note that the current level of development in the estate achieves the MARV of 2.0ML/Ha/Yr, and this value (based on anticipated development takeup) would not be breached until 4-5yrs in the future. We note the gap between the requested new waterway targets proposed by EES/ DPIE and this estate can be bridged via the precinct wetland solution proposed by Sydney Water are the Waterway Manager for South Creek which is expected to be resolved within the timeframe noted.

Item 6	*The EIS must map the following features relevant to water and soils including:*
Item 6a	*Acid sulfate soils (Class 1, 2, 3 or 4 on the Acid Sulfate Soil Planning Map).*

	Response Refer separate geotechnical investigation for mapping by PSM, and **Section 3.6** of the SSD9522 estate *"Water Cycle Management Strategy"* by Costin Roe (*ref: Co13362.00-07k.rpt*) for discussion on acid sulfate soils. A link to the SSD9522 WCMS on the NSW DPIE Major Projects website has been provided in **Appendix D** of this report.
Item 6b	*Rivers, streams, wetlands, estuaries (as described in s4.2 of the Biodiversity Assessment Method)* Response There are no rivers, streams, wetlands or estuaries (as described in s4.2 of the Biodiversity Assessment Method) within the study area.
Item 6c	*Wetlands as described in s4.2 of the Biodiversity Assessment Method.* Response There are no wetlands within the study area.
Item 6d	*Groundwater.* Response Refer separate report by PSM which includes the groundwater assessment and recommendations. **Section 3.5** of the SSD9522 estate *"Water Cycle Management Strategy"* by Costin Roe (*ref: Co13362.00-07k.rpt*) confirms how the civil engineering design includes the recommendations of the groundwater assessment. A link to the SSD9522 WCMS on the NSW DPIE Major Projects website has been provided in **Appendix D** of this report.
Item 6e	*Groundwater dependent ecosystems* Response Refer separate report by PSM which includes the groundwater assessment and recommendations. **Section 3.5** of the SSD9522 estate *"Water Cycle Management Strategy"* by Costin Roe (*ref: Co13362.00-07k.rpt*) confirms how the civil engineering design includes the recommendations of the groundwater assessment. A link to the SSD9522 WCMS on the NSW DPIE Major Projects website has been provided in **Appendix D** of this report.
Item 6f	*Proposed intake and discharge locations* Response There are proposed intake or discharge locations on the project.

Item 7	***The EIS must describe background conditions for any water resource likely to be affected by the development, including:***
Item 7a	*Existing surface and groundwater.* Response Refer **Section 2, 3, 6, 7 & 8** of the SSD9522 estate *"Water Cycle Management Strategy"* by Costin Roe (*ref: Co13362.00-07k.rpt*) for assessment of surface stormwater management including assessments of hydrology, watercourses, and drainage lines. A link to the SSD9522 WCMS on the NSW DPIE Major Projects website has been provided in **Appendix D** of this report.
Item 7b	*Hydrology, including volume, frequency and quality of discharges at proposed intake and discharge locations* Response Refer **Section 2, 3, 6, 7 & 8** of the SSD9522 estate *"Water Cycle Management Strategy"* by Costin Roe (*ref: Co13362.00-07k.rpt*) for assessment of surface stormwater management including assessments of hydrology, watercourses, and drainage lines. A link to the SSD9522 WCMS on the NSW DPIE Major Projects website has been provided in **Appendix D** of this report. There are proposed intake or discharge locations on the project.
Item 7c	*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.* Response Stormwater assessment 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 5.1** and **Section 7.1** of the SSD9522 estate *"Water Cycle Management strategy"* by Costin Roe (*ref: Co13362.00-07k.rpt*). A link to the SSD9522 WCMS on the NSW DPIE Major Projects website has been provided in **Appendix D** of this report. **Section 7** provides demonstration of the key criteria being met as part of the estate-level basins, based on MUSIC modelling..
Item 7d	*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.*

	Response Stormwater assessment 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 5.1** and **Section 7.1** of the SSD9522 estate *"Water Cycle Management strategy"* by Costin Roe (*ref: Co13362.00-07k.rpt*). A link to the SSD9522 WCMS on the NSW DPIE Major Projects website has been provided in **Appendix D** of this report. **Section 7** provides demonstration of the key criteria being met as part of the estate-level basins, based on MUSIC modelling..
Item 7e	*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 Stormwater assessment 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 5.1** and **Section 7.1** of the SSD9522 estate *"Water Cycle Management strategy"* by Costin Roe (*ref: Co13362.00-07k.rpt*). A link to the SSD9522 WCMS on the NSW DPIE Major Projects website has been provided in **Appendix D** of this report. **Section 7** provides demonstration of the key criteria being met as part of the estate-level basins, based on MUSIC modelling.
Item 8	***The EIS must assess the impact of the development on hydrology, including:***
Item 8a	*Water balance including quantity, quality, and source.* Response Refer to **Section 6, 7 & 8** of the SSD9522 estate *"Water Cycle Management strategy"* by Costin Roe (*ref: Co13362.00-07k.rpt*) for assessment of water resources, hydrology (including quality and quantity), watercourses and riparian lands. A link to the SSD9522 WCMS on the NSW DPIE Major Projects website has been provided in **Appendix D** of this report.

Item 8b	*Effects to downstream rivers, wetlands, estuaries, marine waters, and floodplain areas.* Response Refer to **Section 7.4** of the SSD9522 estate *"Water Cycle Management strategy"* by Costin Roe (*ref: Co13362.00-07k.rpt*) for assessment of water resources, hydrology (including quality and quantity), watercourses and riparian lands. A link to the SSD9522 WCMS on the NSW DPIE Major Projects website has been provided in **Appendix D** of this report.
Item 8c	*Effects to downstream water-dependent fauna and flora including groundwater dependent ecosystems.* Response Refer to **Section 7.4** of the SSD9522 estate *"Water Cycle Management strategy"* by Costin Roe (*ref: Co13362.00-07k.rpt*) for assessment of water resources, hydrology (including quality and quantity), watercourses and riparian lands. A link to the SSD9522 WCMS on the NSW DPIE Major Projects website has been provided in **Appendix D** of this report.
Item 8d	*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).* Response Refer to **Section 7.4** of the SSD9522 estate *"Water Cycle Management strategy"* by Costin Roe (*ref: Co13362.00-07k.rpt*) for assessment of water resources, hydrology (including quality and quantity), watercourses and riparian lands. A link to the SSD9522 WCMS on the NSW DPIE Major Projects website has been provided in **Appendix D** of this report.
Item 8e	*Changes to environmental water availability, both regulated/licensed and unregulated/rules-based sources of such water.* Response No changes to environmental water availability are proposed as part of the development.
Item 8f	*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.* Response Refer to **Section 6, 7 & 8** of the SSD9522 estate *"Water Cycle Management strategy"* by Costin Roe (*ref: Co13362.00-07k.rpt*) for assessment of water resources, hydrology (including quality and quantity),

	watercourses and riparian lands during operation. A link to the SSD9522 WCMS on the NSW DPIE Major Projects website has been provided in **Appendix D** of this report. Refer to **Section 8** of this report for soil and water management measures during construction, drawings in A**ppendix A** for associated erosion and sediment control drawings, and **Appendix C** for a Draft Soil and Water Management Plan. These sections show proposed measures, based on the Landcom document *Managing Urban Stormwater – Soils & Construction Volume 1 ('Blue Book')(Landcom, 2004)*, are proposed during the construction of the development. Measures proposed will limit potential for offsite impact associated with water runoff and soils during construction. Consideration to management of salinity and acid sulphate has been made based on the recommendations of the geotechnical investigations and noted Landcom document. Refer to services infrastructure report for discussion relating to wastewater management.
Item 8g	*Identification of proposed monitoring of hydrological attributes.* <u>Response</u> Refer **Appendix B** for DRAFT Maintenance and Monitoring requirements associated with the specified drainage system and water quality measures.
Flooding & Coastal Areas	
Item 9	*The EIS must map the following features relevant to flooding as described in the Floodplain Development Manual 2005 (NSW Government 2005) including:* *a. Flood prone land.* *b. Flood planning area, the area below the flood planning level* *c. Hydraulic categorisation (floodways and flood storage areas)* *d. Flood Hazard.* <u>Response</u> Refer to **Section 9** & **Appendix E** of the SSD9522 estate *"Water Cycle Management strategy"* by Costin Roe (*ref: Co13362.00-07k.rpt*) for detailed flood assessment and for technical supporting information relating to the flood assessment. A link to the SSD9522 WCMS on the NSW DPIE Major Projects website has been provided in **Appendix D** of this report. A flood assessment 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 includes mapping of flood prone land, flood planning areas, hydraulic categorization and flood hazards. It is noted that the site is not within the South Creek floodplain (being at higher elevation than the South Creek PMF flood extent), however is affected by overland flow associated with the first order watercourse on the east of the development. This watercourse presents low hazard to the development and future occupants of the development site, and is noted to not be defined as waterfront land under the act. The assessment shows acceptable outcomes which meet the objectives of the NSW Floodplain Development Manual, Penrith City Council DCP and the proposed amendments to the Penrith City Council DCP proposed in the *Exhibition Draft South Creek Floodplain Management Plan 2020*.
Item 10	*The EIS must describe flood assessment and modelling undertaken in determining the design flood levels for events, including a minimum of the 5% Annual Exceedance Probability (AEP), 1% AEP, flood levels and the probable maximum flood, or an equivalent extreme event.* <u>Response</u> Refer to **Section 9** & **Appendix E** of the SSD9522 estate *"Water Cycle Management strategy"* by Costin Roe (*ref: Co13362.00-07k.rpt*) for detailed flood assessment and for technical supporting information relating to the flood assessment. A link to the SSD9522 WCMS on the NSW DPIE Major Projects website has been provided in **Appendix D** of this report. A flood assessment 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 includes mapping of flood prone land, flood planning areas, hydraulic categorization and flood hazards. It is noted that the site is not within the South Creek floodplain (being at higher elevation than the South Creek PMF flood extent), however is affected by overland flow associated with the first order watercourse on the east of the development. This watercourse presents low hazard to the development and future occupants of the development site, and is noted to not be defined as waterfront land under the act. The assessment shows acceptable outcomes which meet the objectives of the NSW Floodplain Development Manual, Penrith City Council DCP and

	the proposed amendments to the Penrith City Council DCP proposed in the *Exhibition Draft South Creek Floodplain Management Plan 2020*.
Item 11	*The EIS must model the effect of the proposed development (including fill) on the flood behaviour under the following scenarios:* *a. Current flood behaviour for a range of design events as identified above. This includes the 0.5% and 0.2% AEP year flood events as proxies for assessing sensitivity to an increase in rainfall intensity of flood producing rainfall events due to climate change.* <u>Response</u> Refer to **Section 9** & **Appendix E** of the SSD9522 estate *"Water Cycle Management strategy"* by Costin Roe (*ref: Co13362.00-07k.rpt*) for detailed flood assessment and for technical supporting information relating to the flood assessment. A link to the SSD9522 WCMS on the NSW DPIE Major Projects website has been provided in **Appendix D** of this report. A flood assessment 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 includes mapping of flood prone land, flood planning areas, hydraulic categorization and flood hazards. It is noted that the site is not within the South Creek floodplain (being at higher elevation than the South Creek PMF flood extent), however is affected by overland flow associated with the first order watercourse on the east of the development. This watercourse presents low hazard to the development and future occupants of the development site, and is noted to not be defined as waterfront land under the act. The assessment shows acceptable outcomes which meet the objectives of the NSW Floodplain Development Manual, Penrith City Council DCP and the proposed amendments to the Penrith City Council DCP proposed in the *Exhibition Draft South Creek Floodplain Management Plan 2020*.
Item 12a	***Modelling in the EIS must consider and document:*** *Existing council flood studies in the area and examine consistency to the flood behaviour documented in these studies.*

	Response The modelling contemplates existing studies including Penrith Councils *South Creek Flood Study (Advisian 2014)* and Penrith Council *Overview Study – Flood Analysis for Central Urban (Zone 1), Northern Rural (Zone 2), Southern Rural (Zone 3)*" – Cardno 2006
Item 12b	*The impact on existing flood behaviour for a full range of flood events including up to the probable maximum flood, or an equivalent extreme flood.* Response Refer to **Section 9** & **Appendix E** of the SSD9522 estate *"Water Cycle Management strategy"* by Costin Roe (*ref: Co13362.00-07k.rpt*) for detailed flood assessment and for technical supporting information relating to the flood assessment. A link to the SSD9522 WCMS on the NSW DPIE Major Projects website has been provided in **Appendix D** of this report. The assessment includes a range of storms for pre and post development conditions with 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. The 0.5% AEP, 0.2% AEP events assessed as proxies for climate change.
Item 12c	*Impacts of the development on flood behaviour resulting in detrimental changes in potential flood affection of other developments or land. This may include redirection of flow, flow velocities, flood levels, hazard categories and hydraulic categories* Response Refer to **Section 9** & **Appendix E** of the SSD9522 estate *"Water Cycle Management strategy"* by Costin Roe (*ref: Co13362.00-07k.rpt*) for detailed flood assessment and for technical supporting information relating to the flood assessment. A link to the SSD9522 WCMS on the NSW DPIE Major Projects website has been provided in **Appendix D** of this report. The assessment includes a range of storms for pre and post development conditions with 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. The 0.5% AEP, 0.2% AEP events assessed as proxies for climate change.

Item 12d	*Relevant provisions of the NSW Floodplain Development Manual 2005.* Response Refer to **Section 9** & **Appendix E** of the SSD9522 estate *"Water Cycle Management strategy"* by Costin Roe (*ref: Co13362.00-07k.rpt*) for detailed flood assessment and for technical supporting information relating to the flood assessment. A link to the SSD9522 WCMS on the NSW DPIE Major Projects website has been provided in **Appendix D** of this report. The assessment shows acceptable outcomes which meet the objectives of the NSW Floodplain Development Manual, Penrith City Council DCP and the proposed amendments to the Penrith City Council DCP proposed in the *Exhibition Draft South Creek Floodplain Management Plan 2020*.
Item 13a	***The EIS must assess the impacts on the proposed development on flood behaviour, including:*** *Whether there will be detrimental increases in the potential flood affection of other properties, assets and infrastructure.* Response Refer to **Section 9** of the SSD9522 estate *"Water Cycle Management strategy"* by Costin Roe (*ref: Co13362.00-07k.rpt*). The assessment shows acceptable outcomes which meet the objectives of the NSW Floodplain Development Manual, Penrith City Council DCP and the proposed amendments to the Penrith City Council DCP proposed in the *Exhibition Draft South Creek Floodplain Management Plan 2020*. A link to the SSD9522 WCMS on the NSW DPIE Major Projects website has been provided in **Appendix D** of this report.
Item 13b	*Consistency with council floodplain risk management plans.* Response Refer to **Section 9** of the SSD9522 estate *"Water Cycle Management strategy"* by Costin Roe (*ref: Co13362.00-07k.rpt*). The assessment shows acceptable outcomes which meet the objectives of the NSW Floodplain Development Manual, Penrith City Council DCP and the proposed amendments to the Penrith City Council DCP proposed in the *Exhibition Draft South Creek Floodplain Management Plan 2020*. A link to the SSD9522 WCMS on the NSW DPIE Major Projects website has been provided in **Appendix D** of this report.
Item 13c	*Consistency with any rural floodplain management plans.*

	Response Refer to **Section 9** of the SSD9522 estate *"Water Cycle Management strategy"* by Costin Roe (*ref: Co13362.00-07k.rpt*). The assessment shows acceptable outcomes which meet the objectives of the NSW Floodplain Development Manual, Penrith City Council DCP and the proposed amendments to the Penrith City Council DCP proposed in the *Exhibition Draft South Creek Floodplain Management Plan 2020*. A link to the SSD9522 WCMS on the NSW DPIE Major Projects website has been provided in **Appendix D** of this report.
Item 13d	*Compatibility with the flood hazard of the land.* Response Refer to **Section 9** of the SSD9522 estate *"Water Cycle Management strategy"* by Costin Roe (*ref: Co13362.00-07k.rpt*). The assessment shows acceptable outcomes which meet the objectives of the NSW Floodplain Development Manual, Penrith City Council DCP and the proposed amendments to the Penrith City Council DCP proposed in the *Exhibition Draft South Creek Floodplain Management Plan 2020*. A link to the SSD9522 WCMS on the NSW DPIE Major Projects website has been provided in **Appendix D** of this report.
Item 13e	*Compatibility with the hydraulic functions of flow conveyance in floodways and storage in flood storage areas of the land* Response Refer to **Section 9** of the SSD9522 estate *"Water Cycle Management strategy"* by Costin Roe (*ref: Co13362.00-07k.rpt*). The assessment shows acceptable outcomes which meet the objectives of the NSW Floodplain Development Manual, Penrith City Council DCP and the proposed amendments to the Penrith City Council DCP proposed in the *Exhibition Draft South Creek Floodplain Management Plan 2020*. A link to the SSD9522 WCMS on the NSW DPIE Major Projects website has been provided in **Appendix D** of this report.
Item 13f	*Whether there will be adverse effect to beneficial inundation of the floodplain environment, on, adjacent to or downstream of the site.* Response Refer to **Section 9** of the SSD9522 estate *"Water Cycle Management strategy"* by Costin Roe (*ref: Co13362.00-07k.rpt*). The assessment shows acceptable outcomes which meet the objectives of the NSW Floodplain Development Manual, Penrith City Council DCP and the proposed amendments to the Penrith City Council DCP proposed in the *Exhibition Draft South Creek Floodplain Management Plan 2020*. A link to the SSD9522 WCMS on the NSW DPIE Major Projects website has been provided in **Appendix D** of this report.

Item 13g	*Whether there will be direct or indirect increase in erosion, siltation, destruction of riparian vegetation or a reduction in the stability of riverbanks or watercourses.* Response The Ardex site falls with the Yards Industrial Estate which has been approved with an estate wide Stormwater Management Strategy which includes all development lots (including Ardex). These systems are now currently being constructed based on the approval. Reference to **Section 7.4** of the SSD9522 estate *"Water Cycle Management Strategy"* by Costin Roe (*ref: Co13362.00-07k.rpt*) & subsequent mods which discusses, assesses, and provides demonstration of acceptable stream health outcomes for discharge from the estate, consistent with best practice. A link to the SSD9522 WCMS on the NSW DPIE Major Projects website has been provided in **Appendix D** of this report. Given the estate stormwater system, which includes the Ardex facility, has been approved and is currently being constructed, the new EES targets are not considered applicable to the development. We note that the current level of development in the estate achieves the MARV of 2.0ML/Ha/Yr, and this value (based on anticipated development takeup) would not be breached until 4-5yrs in the future. We note the gap between the requested new waterway targets proposed by EES/ DPIE and this estate can be bridged via the precinct wetland solution proposed by Sydney Water are the Waterway Manager for South Creek which is expected to be resolved within the timeframe noted..
Item 13h	*Any impacts the development may have upon existing community emergency management arrangements for flooding. These matters are to be discussed with the NSW SES and Council.* Response Refer to **Section 9** of the SSD9522 estate *"Water Cycle Management strategy"* by Costin Roe (*ref: Co13362.00-07k.rpt*). A link to the SSD9522 WCMS on the NSW DPIE Major Projects website has been provided in **Appendix D** of this report. The site is noted to be adjacent to the South Creek floodplain (being at higher elevation than the South Creek PMF flood extent). The development sites are noted to be above the 1% AEP and PMF levels related to overland flow in the creek and as such this presents low hazard to the development and future occupants of the development site. If surrounding low level roadways are affected during flooding, on site refuge is available. The development presents low/ no risk to existing community emergency management arrangements.

Item 13i	*Whether the proposal incorporates specific measures to manage risk to life from flood. These matters are to be discussed with the NSW SES and Council.* Response Refer to **Section 9** of the SSD9522 estate *"Water Cycle Management strategy"* by Costin Roe (*ref: Co13362.00-07k.rpt*). A link to the SSD9522 WCMS on the NSW DPIE Major Projects website has been provided in **Appendix D** of this report. The site is noted to be adjacent to the South Creek floodplain (being at higher elevation than the South Creek PMF flood extent). The development sites are noted to be above the 1% AEP and PMF levels related to overland flow in the creek and as such this presents low hazard to the development and future occupants of the development site. If surrounding low level roadways are affected during flooding, on site refuge is available. The development presents low/ no risk to existing community emergency management arrangements.
Item 13j	*Emergency management, evacuation and access, and contingency measures for the development considering the full range of flood risk (based upon the probable maximum flood or an equivalent extreme flood event). These matters are to be discussed with and have the support of the Council and the NSW SES.* Response Refer to **Section 9** of the SSD9522 estate *"Water Cycle Management strategy"* by Costin Roe (*ref: Co13362.00-07k.rpt*). A link to the SSD9522 WCMS on the NSW DPIE Major Projects website has been provided in **Appendix D** of this report. The site is noted to be adjacent to the South Creek floodplain (being at higher elevation than the South Creek PMF flood extent). The development sites are noted to be above the 1% AEP and PMF levels related to overland flow in the creek and as such this presents low hazard to the development and future occupants of the development site. If surrounding low level roadways are affected during flooding, on site refuge is available. The development presents low/ no risk to existing community emergency management arrangements.
Item 13k	*Any impacts the development may have on the social and economic costs to the community as consequence of flooding.* Response It is confirmed there is no change in flooding conditions, social or economic cost to community as a result of the development.

NSW EPA – ref: DOC21/744514
The EPA has considered the proposal and provides the information in Attachment A which is required to properly assess the proposal. The EPA's key information requirements for the proposal include an assessment of: *Impacts on water quality* *Wastewater and spill mitigation* • *Storage, treatment, sampling and disposal (including wastewaters generated by the wheel wash).* • *The mitigation measures proposed to be implemented to prevent and mitigate leaks and spills from the plant and other project operations and activities.* • *Appropriate primary and secondary containment systems should be included as a part of the proposal.* • *Details of bunding, isolation, overflow prevention and other controls should be provided to demonstrate spill and leak related risks have been appropriate considered and addressed* <u>Response</u> Refer to the State Environmental Planning Policy no. 33 (SEPP 33) Dangerous Goods report by RiskCon.

DPIE (Water) – ref: OUT21/10840
The identification of an adequate and secure water supply for the life of the project. This includes confirmation that water can be sourced from an appropriately authorised and reliable supply. This is also to include an assessment of the current market depth where water entitlement is required to be purchased. <u>Response</u> Water supply for the development will be provided by Sydney Water, an adequate and secure supplier. No water entitlements are required to be purchased. Refer to the Service Infrastructure Assessment completed by Landpartners.
A detailed and consolidated site water balance. <u>Response</u> Refer to **Section 6 to 8** of the approved SSD9522 estate *"Water Cycle Management Strategy"* by Costin Roe (*ref: Co13362.00-07k.rpt*) for assessment of water resources. A link to the SSD9522 WCMS on the NSW DPIE Major Projects website has been provided in **Appendix D** of this report.

Assessment of impacts on surface and ground water sources (both quality and quantity), related infrastructure, adjacent licensed water users, basic landholder rights, watercourses, riparian land, and groundwater dependent ecosystems, and measures proposed to reduce and mitigate these impacts. Response Refer to **Section 6 to 8** of the approved SSD9522 estate *"Water Cycle Management Strategy"* by Costin Roe (*ref: Co13362.00-07k.rpt*) for assessment of water resources, hydrology, watercourses and riparian lands applicable to this development and all sites within The Yards Estate. A link to the SSD9522 WCMS on the NSW DPIE Major Projects website has been provided in **Appendix D** of this report. Refer to **Section 3** of the approved SSD9522 estate *"Water Cycle Management Strategy"* by Costin Roe (*ref: Co13362.00-07k.rpt*) for assessment of soil resources. Refer to **Section 2 & 3** of the approved SSD9522 estate *"Water Cycle Management Strategy"* by Costin Roe (*ref: Co13362.00-07k.rpt*) for background conditions. Refer to separate report, completed by PSM, in relation to groundwater and groundwater dependent ecosystems. There are no proposed water licenses and adjacent properties are noted to be contemplating similar developments.
Proposed surface and groundwater monitoring activities and methodologies. Response There are no proposed or required surface and groundwater monitoring activities.
Consideration of relevant legislation, policies and guidelines, including the NSW Aquifer Interference Policy (2012), the Guidelines for Controlled Activities on Waterfront Land (2018) and the relevant Water Sharing Plans (available at https://www.industry.nsw.gov.au/water). Response There is no identified waterfront land on the property and/ or requirements for controlled activities as such.

Authority Information Requests
Penrith City Council
The application shall demonstrate how the development complies with the over-arching estate-based water quality and water quantity requirements Response

Stormwater assessment and management strategy, including surface water runoff, water quality and water quantity has been completed. The key stormwater objectives, based on relevant water quality criteria (including those of Penrith City Council), have been set out in **Section 6, 7 & 8** of the approved SSD9522 estate *"Water Cycle Management Strategy"* by Costin Roe (*ref: Co13362.00-07k.rpt*). A link to the SSD9522 WCMS on the NSW DPIE Major Projects website has been provided in **Appendix D** of this report. Coordination with the anticipated drainage connection points and trunk drainage lines on the adjacent sites to the south has also been made. This consultation has been completed in form of meetings between the developers and respective Civil Engineering Consultants, and the sharing of information between the parties which has been used to coordinate alignments of road connections, drainage connections, interfacing of levels on boundaries and ensuring coordination of strategy pertaining to stormwater managements and overall civil works. Refer **Section 1.2** and drawings in **Appendix A**.
The stormwater concept plan shall demonstrate how the development complies with the Mamre Road precinct Draft DCP water quality and water quantity controls for any interim and ultimate developments. <u>Response</u> Stormwater assessment and management strategy, including surface water runoff, water quality and water quantity has been completed. The stormwater strategy has been completed by Costin Roe Consulting, being professional engineers with demonstrated experience in similar industrial projects within Kemps Creek, Penrith City Council LGA and surrounding LGA's including Blacktown, Liverpool, Cumberland and Canterbury Bankstown. The key stormwater objectives, based on relevant water quality criteria (including those of Penrith City Council), have been set out in **Section 5, 6 & 7** of this report and in **Section 6, 7 & 8** of the approved SSD9522 estate *"Water Cycle Management Strategy"* by Costin Roe (*ref: Co13362.00-07k.rpt*). A link to the SSD9522 WCMS on the NSW DPIE Major Projects website has been provided in **Appendix D** of this report.
A water sensitive urban design strategy prepared by a suitably qualified person is to be provided for the site. The strategy shall address water conservation, water quality, water quantity, and operation and maintenance. <u>Response</u> Stormwater assessment and management strategy, including surface water runoff, water quality and water quantity has been completed. The stormwater strategy has been completed by Costin Roe Consulting, being professional engineers with demonstrated experience in similar industrial projects within Kemps Creek, Penrith City Council LGA and surrounding LGA's including Blacktown, Liverpool, Cumberland and Canterbury Bankstown.

The application shall include MUSIC modelling (.sqz file) demonstrating compliance with water quality controls of the Mamre Road precinct Draft DCP.*

Response

Stormwater assessment and management strategy, including surface water runoff, water quality and water quantity has been completed as part of the estate infrastructure SSD9522 & subsequent mods. Additional on-lot treatment measures are not proposed as part of the Ardex submission. The key stormwater objectives, based on relevant water quality criteria (including those of Penrith City Council and the DRAFT Mamre Road Precinct DCP), have been set out in **Section 6, 7 & 8** of the approved SSD9522 estate *"Water Cycle Management Strategy"* by Costin Roe (*ref: Co13362.00-07k.rpt*).. A link to the SSD9522 WCMS on the NSW DPIE Major Projects website has been provided in **Appendix D** of this report.

The stormwater strategy has been completed by Costin Roe Consulting, being professional engineers with demonstrated experience in similar industrial projects within Kemps Creek, Penrith City Council LGA and surrounding LGA's including Blacktown, Liverpool, Cumberland and Canterbury Bankstown.

Penrith City Council will not accept the dedication of any estate water quantity or water quality basins. Any estate drainage basins are to be maintained in perpetuity by the estate. It is Council's preference that all water quantity and water quality treatment be provided on the individual lots. Any on-site detention system or water quality system must be within common property and accessible from the street.

Response

Configuration of the proposed measures and stormwater layout concept are shown on the Civil Design Drawings included in **Appendix A**. of the approved SSD9522 estate *"Water Cycle Management Strategy"* by Costin Roe (*ref: Co13362.00-07k.rpt*). No additional water management measures are proposed A link to the SSD9522 WCMS on the NSW DPIE Major Projects website has been provided in **Appendix D** of this report.

Management of basins will be completed by the proponent.

A site cut / fill plan is to be submitted that includes any retaining walls and batter extents.

Response

Configuration of site batters, retaining walls and bulk earthworks cut/fill concepts are shown on the Civil Design Drawings included in **Appendix A**.

No retaining walls or filling is permitted for this development which will impede, divert or concentrate stormwater runoff passing through the site.

Response

The placement of fill and/or retaining walls are noted to not concentrate, impede or divert runoff passing though the site in an uncontrolled manner. Configuration of site

batters, retaining walls and bulk earthworks cut/fill concepts are shown on the Civil Design Drawings included in **Appendix A**.
The location and height of any retaining walls are to be included. The potential impact of any retaining walls upon future development of adjoining lands is to be considered. Response The site is located within The Yards Industrial Estate. Due consideration has been given to adjacent developments without restricting flexibility to the developer. Configuration of site batters, retaining walls and bulk earthworks cut/fill concepts are shown on the Civil Design Drawings included in **Appendix A**.
The environmental impacts associated with the excavation and construction phases of the development need to be addressed, such as water quality, noise, dust/air quality and erosion and sediment control. This can be included in the Statement of Environmental Effects and plans. Response Refer to **Section 7** for soil and water management measures, drawings in **Appendix A** for associated erosion and sediment control drawings, and **Appendix C** for a Draft Soil and Water Management Plan. These sections show proposed measures, based on the Landcom document *Managing Urban Stormwater – Soils & Construction Volume 1 ('Blue Book')(Landcom, 2004)*, are proposed during the construction of the development. Measures proposed will limit potential for offsite impact associated with water runoff and soils during construction. Consideration to management of salinity and acid sulphate has been made based on the recommendations of the geotechnical investigations and noted Landcom document.
Sydney Water
The proponent of development should determine service demands following servicing investigations and demonstrate that satisfactory arrangements for drinking water, wastewater, and recycled water services have been made. Please see Attachment 1 as a guide to complete. Response Refer to infrastructure servicing report by Landpartners for confirmation pertaining to services.
The proponent must obtain endorsement and/or approval from Sydney Water to ensure that the proposed development does not adversely impact on any existing water, wastewater or stormwater main, or other Sydney Water asset, including any easement or property. When determining landscaping options, the proponent should take into account that certain tree species can cause cracking or blockage of Sydney Water pipes and therefore should be avoided.

Response Refer to infrastructure servicing report by Landpartners for confirmation pertaining to services.
Strict requirements for Sydney Water's stormwater assets (for certain types of development) may apply to this site. The proponent should ensure that satisfactory steps/measures been taken to protect existing stormwater assets, such as avoiding building over and/or adjacent to stormwater assets and building bridges over stormwater assets. The proponent should consider taking measures to minimise or eliminate potential flooding, degradation of water quality, and avoid adverse impacts on any heritage items, and create pipeline easements where required. Response Refer to infrastructure servicing report by Landpartners for confirmation pertaining to services.
As this development creates trade wastewater, Sydney Water has trade wastewater requirements which need to be met. By law, the property owner must submit an application requesting permission to discharge trade wastewater to Sydney Water's sewerage system. The proponent must obtain Sydney Water approval for this permit before any business activities can commence. Given this development comprises industrial operations, wastewater may discharge into a sewerage area that is subject to wastewater reuse. Please contact Sydney Water's Business Customer Services to send your permit application or to find out more information. They can be contacted at the following email address: businesscustomers@sydneywater.com.au . Response Refer to infrastructure servicing report by Landpartners for confirmation pertaining to services.
The proponent should outline any sustainability initiatives that will minimise/reduce the demand for drinking water, including any alternative water supply and end uses of drinking and non-drinking water that may be proposed, and demonstrate water sensitive urban design (principles are used), and any water conservation measures that are likely to be proposed. This will allow Sydney Water to determine the impact of the proposed development on our existing services and required system capacity to service the development. Response Refer to infrastructure servicing report by Landpartners for confirmation pertaining to services. We note that it is proposed to provide rainwater reuse in the estate to reduce demand on non-potable water use.

2 SITE CHARACTERISTICS

2.1 Location and Site Description

The Yards estate is located on the western side of Mamre Road in the suburb of Kemps Creek. The proposal site is located on the central-western portion of The Yards development area, south-west of Bakers Lane, as shown in **Figure 2.1.**

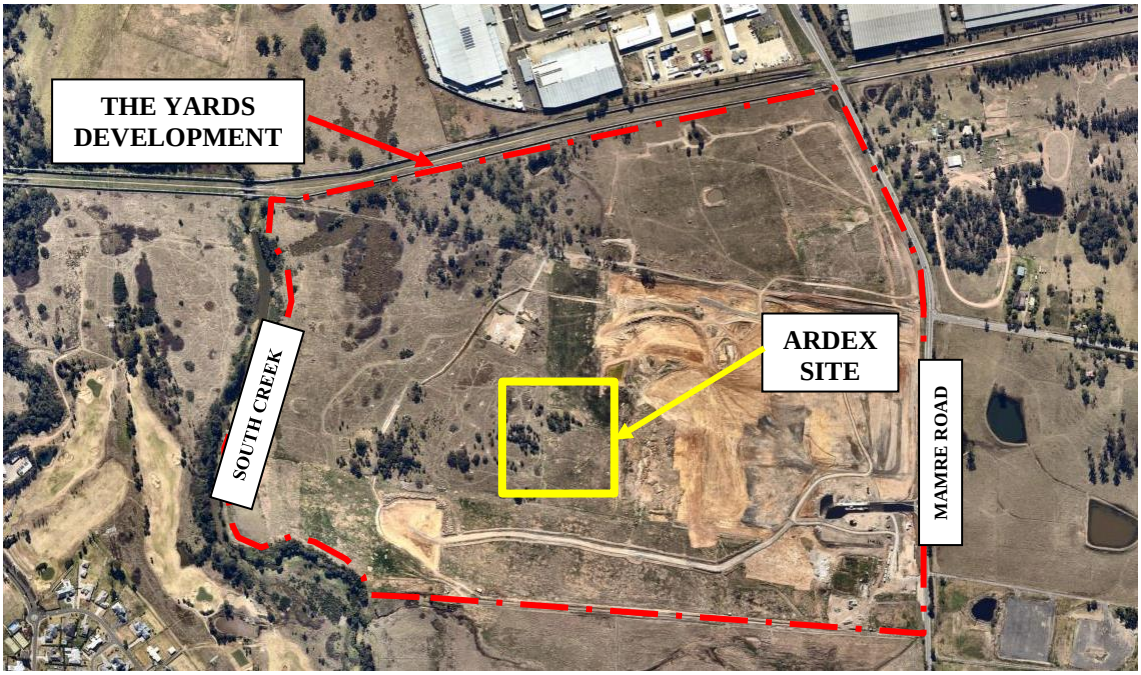

Figure 2.1 Locality Plan

The Yards Estate comprises a combined area of approximately 118 Ha with estate development proposed over approximately 89 Ha of the total land. The pre-existing land-use is predominately rural and rural-residential, noting recent rezoning for industrial use in late 2020.

The highest elevation on The Yards Estate is RL 45m AHD at the intersection of Bakers Lane and Mamre Road. The lowest levels range between RL 30m to RL 34.5m along the western boundary of the site adjacent to South Creek in the South Creek Flood plain.

Grades over the land vary from 0.5% to 2.5% with the grades becoming flatter as you move to the west, away from Mamre Road and toward the South Creek floodplain. South Creek is located on the western boundary of the site.

A major WaterNSW Supply Pipeline is located between on northern property boundary of the study area and the Altis First Estate industrial subdivision is located immediately to the north of the Sydney Water pipe.

Infrastructure works and earthworks are currently being completed as part of the SSD-9522 approvals for the Yards Estate, as described in **Section 2.3** of this report. The SSD-9522 earthworks levels over Lot 10 in which the proposed development will be constructed are between RL 36.5 and RL 38.5m AHD.

2.2 Proposed Development

The proposed construction works for this submission comprises construction of a 27,470m^2 warehouse facility for Ardex GmbH. The development comprises the following elements:

- A steel framed warehouse building, incorporating a main warehousing and training area of 15,390m2, plus a 7,130m2 goods manufacturing space;
- Ancillary office space on the south side of the warehouse building;
- At grade car parking on the southern and eastern side of the building with access from the estate Public Access Road;
- Truck circulation and loading areas on the northern building facade;
- Fire brigade access around the full perimeter of each building and development site; and
- Stormwater drainage and flood management systems completed in accordance with the Estate Stormwater Management Strategy approved under SSD-9522, noting approved estate management systems which are currently under construction will be utilised for management of water quality and quantity.

Refer to **Figure 2.2** for the proposed site layout as produced by Pace Architects.

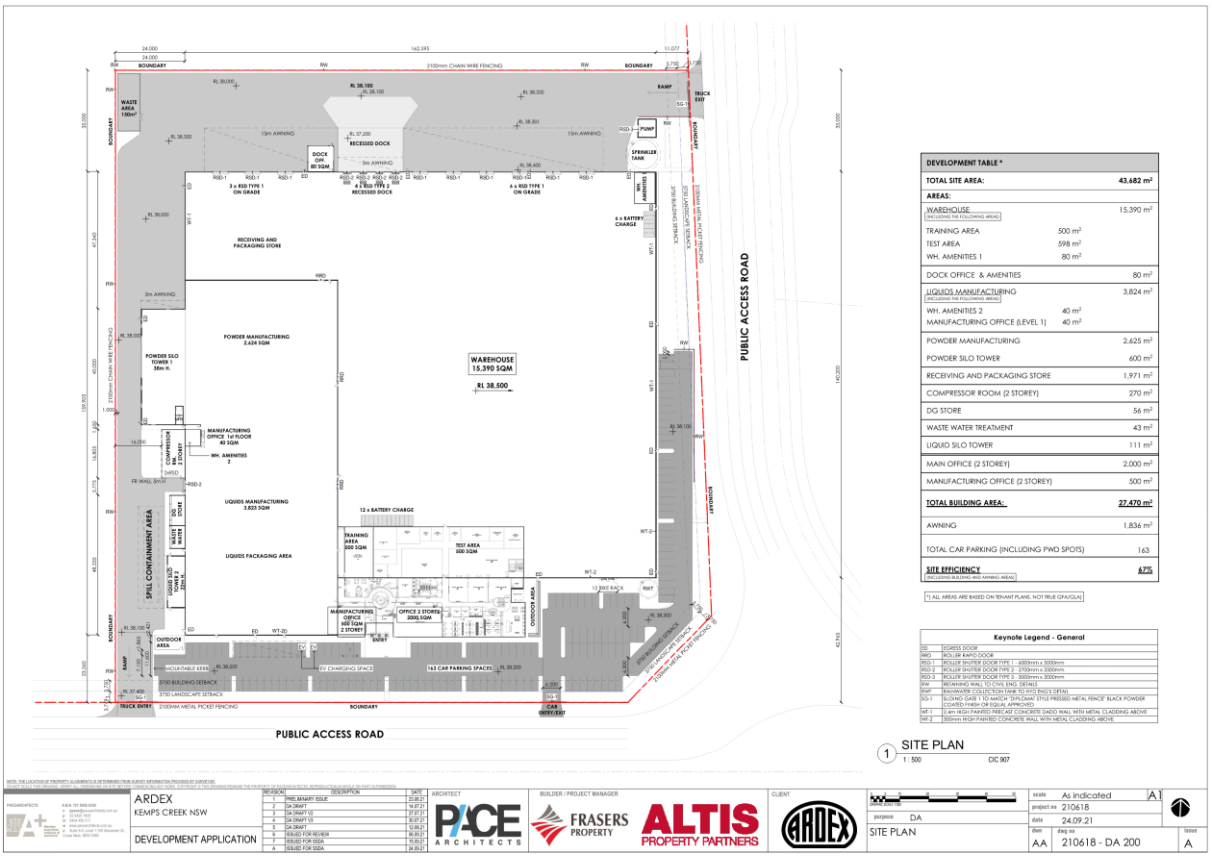

Figure 2.2. Proposed Development Layout

2.3 The Yards Estate Development

As noted, The Yards Estate was approved for development in December 2020. Bulk earthworks, erosion and sediment control works are currently being completed based on that approval. Subsequent Mod1 and Mod2 applications are being assessed by DPIE as described in **Section 1.1** of this report.

The following descriptions of SSD-9522 & associated Mod works are provided for information purposes only as background information for the current Ardex Facility:

- Infrastructure works include bulk earthworks, provision of services, road & intersection construction, and stormwater management basins.
- The preliminary masterplan layout provided by Frasers Property shows development lots will vary between 1 Ha and 16 Ha in size. Siting of the development lots will be sympathetic to the topography of the land, access and flood planning requirements.
- All sites in the Estate are sited at levels which include a minimum of 500mm freeboard to the 1% AEP flood level of South Creek.
- Access to all lots are made via the new north-south distributor road (which includes upgraded Bakers Lane) and via a new estate access road from Mamre Road. The new access road and internal intersection will be constructed to Penrith City Council requirements and ownership transferred to Penrith City Council. Intersections with Mamre Road, and upgrades of Mamre Road, are noted to require TfNSW approval.

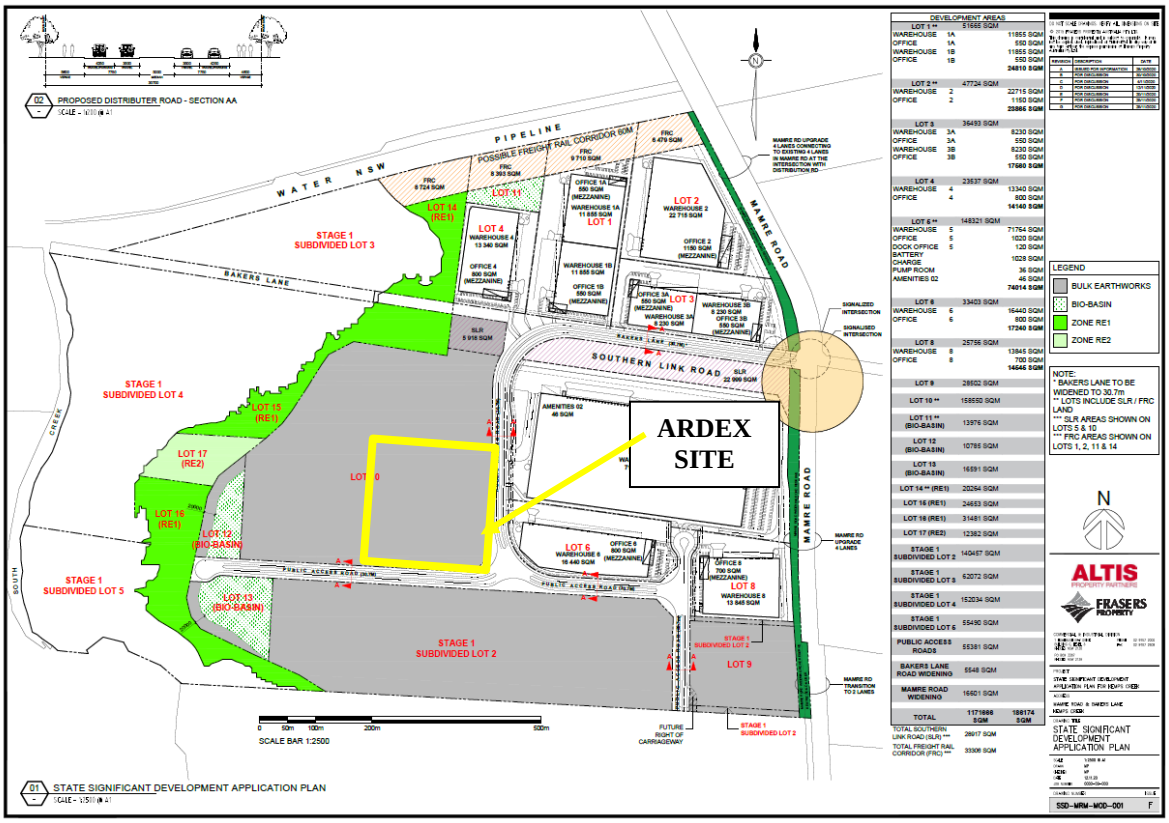

Figure 2.3. SSD-9522 Mod 1 Masterplan Layout and Ardex Location

3 SITE WORKS

3.1 Geotechnical and Geological Profile

A geotechnical report has been provided by Pells Sullivan Meynink dated 9 April 2017.

Based on our knowledge of the area, the site is expected to exhibit characteristics consistent with Bringelly Shale Landscapes.

Geotechnical investigations of surrounding sites reference the Penrith 1:100,000 Geological Series Sheet and the areas to the west of Mamre Road are expected to be underlain by Quaternary fluvial sediments and the eastern half by Bringelly Shale of the Wianamatta Group. Alluvial sediments in and around the South Creek flood plain are described as fine-grained sand, silt and clay. The Bringelly Shale is described as shale, claystone, laminate and lithic sandstone.

Engineering properties of the residual clay soils are that they will be moderately reactive, highly plastic subsoils with poor drainage.

The earthworks completed as part of SSD-9522 require filling between 2 and 3m in depth. Filling is comprised of clay soils and sandstone placed as engineered fill under Level 1 geotechnical supervision as noted below.

3.2 Bulk Earthworks

Extensive earthworks are presently being undertaken under the SSD-9522 approval as noted in **Section 2.3** & **3.1**. The earthworks which are currently being constructed, when completed will provide large near flat development pads, though include 1:200 falls over the development sites. These falls are provided to enable runoff and erosion and sediment control during the period between the estate earthworks being completed, and the site specific development lot earthworks.

Minor filling and trimming earthworks will be required as part of the current application development works. These works would include final trimming and shaping of the site to suit the detailed architectural site layout, final pavement and coordination of subgrade levels with slab profiles and grading to suit drainage requirements.

Details of earthworks would be finalised during detail design/ construction certificate stages of the development. 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) may be required subject to final geotechnical testing, topsoil assessments and bulking/compaction allowances and slab/ pavement profiles.

The primary drivers for the proposed earthworks are reprofiling of the estate earthworks (which have a general 1:200 fall across the site) to suit the architectural layout and a flat building pad, access from the street, and draining the site via gravity.

We note the earthworks estimates noted below, represent on average less than 0.4m of filling over the 4.4Ha development site.

The approximate earthworks volume estimates, as shown on **Co13362.05-SSDA30** are as follows:

Topsoil cut	- NIL	
Raw Cut	- 1,600 m^3	
Raw Fill	+16, 570 m^3	
Detailed Excavation ($1200m^3$/Ha)	- 5,300 m^3	
Difference	+ 9, 670 m^3	*(fill over cut)*

All geotechnical testing and inspections performed during the earthworks operations will be undertaken to Level 1 geotechnical control, in accordance with AS3798-1996.

Soil erosion and sediment control measures including sedimentation basins will also be provided for the development – please refer to the *Soil and Water Management Plan* in **Section 7** of this report. These measures will be completed in conjunction with the overall estate sediment control plan, with adjustments made to suit the specific site layout and construction staging on the site.

3.3 Groundwater

The geotechnical investigations undertaken by PSM Geotechnical did not encounter groundwater in any of the test locations. It could be expected that groundwater may be experienced at depth or around the normal dry weather water level of South Creek, and that this level would have some seasonal variation and variation associated with periods of high rainfall. In any event, groundwater if present would be at depth below the proposed filled pad levels and interaction with existing groundwater paths would be negligible.

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

Surface water management, including conveyance of surface runoff, management of water quantity (through on-site detention) and water quantity (through on-site and estate wide management systems using WSUD principles and best practice pollution reduction objectives) has been proposed in the design.

In relation to groundwater affectation, this is expected to be negligible. The geotechnical investigations undertaken by PSM did no encounter groundwater in any of the test locations. Further, the majority of the site and site earthworks involve filling, hence any interaction with existing groundwater or groundwater flow paths would negligible and hence not be impacted.

3.4 Embankment Stability

To assist in maintaining embankment stability, permanent batter slopes will be no steeper than 3 horizontal to 1 vertical while temporary batters will be no steeper than 2 horizontal to 1 vertical. This is in accordance with the recommended maximum batter slopes for residual clays and shale which are present in the area.

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 Soil and Water Management Plan in **Section 7**.

It is noted that there are no substantial batters proposed for the development, with the majority of batter construction being completed in the estate works under SSD 7664.

4 STORMWATER MANAGEMENT

4.1 Hydrologic Modelling and Analysis

4.1.1 General Design Principles

The design of the stormwater system for this site will be based on relevant national design guidelines, Australian Standard Codes of Practice, Penrith City 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" (2019 Edition), (AR&R).

Storm events for the 2 to 100 Year ARI events have been assessed.

4.1.2 Minor/ Major System Design

In accordance with PCC Engineering Guide for Development and generally accepted engineering practice, and the approved SSD-9522 drainage system, the piped stormwater drainage (minor) system has been designed to accommodate the 20-year ARI storm event (Q20). Overland flow paths (major) which will convey all stormwater runoff up to and including the Q100 event have also been provided which will limit major property damage and any risk to the public in the event of a piped system failure for flows above the capacity of the piped system.

Where overland flow paths have not been available, the in-ground systems have been sized to accommodate the 1 in 100 year ARI flow, and allowing for 50% blockage of the inlet structure and pipe/culvert structure proposed to convey the flow.

4.1.3 Rainfall Data

Rainfall intensity Frequency Duration (IFD) data used as a basis for DRAINS modelling for the 5 to 100 Year ARI events, was taken from The Bureau of Meteorology Online IFD Tool.

4.1.4 Runoff Models

In accordance with the recommendations and standards of Pentrith City Council, the calculation of the runoff from storms of the design ARI has been calculated with the catchment modelling software DRAINS.

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:

Model	Model for Design and analysis run	Rational method	
	Rational Method Procedure	ARR87	
	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	
	Inlet Pit Capacity		

Table 4.1. DRAINS Parameters

4.2 Hydraulics

4.2.1 General Requirements

Hydraulic calculations for the estate works have been carried out utilising DRAINS modelling software, see **Appendix C**. The hydraulic calculations for the individual lots will be carried out by DRAINS during the detail design stage. These calculations ensure that all surface and subsurface drainage systems perform to or exceed the required standard.

4.2.2 Pit 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 300mm below the finished floor level of the building/ development pads.

4.2.3 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.

4.2.4 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).

4.2.5 Overland Flow

Dedicated flow paths have been designed to convey all storms up to and including the 100-year ARI. These flow paths will convey stormwater from the site to the estate road system and to Estate Detention Basins.

4.3 Site Drainage

4.3.1 Pre-Development & Yards Site Drainage

The undeveloped Yards site comprises rural land with undulating topography. There is no formal drainage currently on the site however several local depressions and natural gullies are present. There are also several dams which are used for the currently rural farming operations on the land which lie in relation to the natural gullies.

The Yards Estate is affected by overland flow from minor upstream catchments to the east of the site. A catchment of approximately 30 Ha is conveyed around the site via existing infrastructure in Mamre Road, diverting along the southern boundary of the site to South Creek. Two smaller catchments are also required to be conveyed through the site. Management of these upstream catchments is detailed in the approved SSD-9522 design documentation.

Two regional water quality and quantity management basins are being constructed as part of the Yards infrastructure works. Estate Basin 1 is located in the South Western corner of the Yards estate, and Estate Basin 2 is located in the North Western corner. These basins attenuate stormwater from the newly constructed estate and discharges to the council trunk drainage system located to the north of the facility. The Ardex development lies within the Estate Basin 1 catchment area and therefore drains to this basin.

The legal point of discharge for the Ardex development is to a pipe stub located in the south-west corner of the site. The drainage connection stub is being provided as part of the currently-under-construction stormwater system for The Yards estate development.

4.3.2 Proposed Site Drainage

The proposed stormwater system for the current proposal is to consist of a major/ minor system which conveys surface water from the proposed development lots to in-ground drainage connection points provided as part of the infrastructure construction works. Site water ultimately drains via the estate infrastructure to the combined water quality/ detention basin in the south-west corner of the site.

A summary of the main stormwater management measures is provided as follows:

- In-ground drainage system designed to accommodate the 1 in 20 year ARI storm event.
- Overland flow paths to convey the 1 in 100-year ARI storm event from the proposed development site to the Estate Basin (located on the east of the development site).
- Discharge of stormwater to estate infrastructure and estate stormwater management basin to the east of the development site; and
- Rainwater reuse in accordance with the estate development.

Further discussion on the *Stormwater Management Strategy* is provided in **Section 5** and **Section 6** of this report. It is noted that key water quantity and quality management measures are provided via estate management systems.

Reference to drawings **Co13362.05-SSDA40** shows the proposed drainage layout.

4.4 External Catchments and Flooding

Consideration to flooding is required due to the proximity to South Creek. Reference to the *Updated South Creek Flood Study (rp6033rg_crt150128-Updated South Creek Flood Study (FINAL – Volume 1)),* shows flood levels and flood extent associated with overland flow associated with the adjacent South Creek. This report will be referred to as the *South Creek Study* from hereon.

As required by the SEAR's, a comprehensive flood assessment is required for the development. This assessment has been completed by Costin Roe Consulting and presented in a separate report, refer **Co13362.00-19.rpt**, and included as part of the EIS and SSDA9522 submission documents.

As part of the assessment, the requirements of *Section 3.5 of PCC C3 Water Management DCP2014* (defines the requirements for flood liable land and relevant policy documents) have been considered. The requirements for development in flood liable land are based on the NSW Government *Floodplain Development Manual (2005)* document are also considered in the assessment.

The *South Creek Study* shows the property is adjacent to the zone of the 1% AEP event. The flood surface extent and level for the 1% AEP storm event, presented at the peak flow per the *South Creek Flood Study,* at the upstream boundary of the property can be seen to be 35.0m and 33.5m at the downstream boundary. Allowing for the council required freeboard of 500mm, the corresponding flood planning level for the development varies between RL 35.5m to 34.0m AHD.

The assessment by our office confirms the South Creek study levels and utilises a localised study and modelling area to confirm the effect of flooding on the development (ensuring planning levels are accounted), and also the effect of the development on flooding. The intention being to meet Councils DCP Part C3 requirements and to ensure no offsite affectation to upstream, downstream or adjoining properties.

It is noted that the built form development footprint presented in this report is clear of and does not impact the 1% AEP event and that all development lots are above the PMF flood water levels.

It is further noted that there are no changes to the flood impacts or outcomes of the approved modelling associated with this Mod1 Application.

Refer separate report within the SSD-9522 approval (**Co13362.00-19.rpt)** for comprehensive flood assessment and commentary.

5 WATER QUANTITY MANAGEMENT

Penrith City Council 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 LGA downstream from the site.

As part of the approved Yards Estate Stormwater Management Strategy for the SSD9522 (including Mod 1 & Mod 2) development, On-site Detention (OSD) sizing has been designed and approved for the whole estate. OSD sizing is as per Section 3.3.3 of Councils stormwater management policy, which requires that "*it will be necessary to demonstrate that there will be no increase in runoff from the site as a result of the development for all storms up to and including the 100-year Average Recurrence Interval (ARI) event for all storm durations*".

The modelling has shown that, with the provision of a storage volume of 30,150 m^3, within Estate Basin 1, that stormwater flows from the development will be attenuated to pre-development flows.

Detention storage is noted to be fully active. The main detention storage areas are noted to be sited at a level approximately 1m below the bio-retention elements. This will ensure effective discharge of bio-retention filtration, however also assists in ensuring maximum storage capacity can be realised. Further this enables depth of water over the bio-retention elements to be limited.

Attenuation of the overland flow from the northern and western catchments described in the earlier sections of this report have been made to maximise attenuation during storm events, and to ensure that the effect of the removal of pre-existing dams are mitigated.

As all stormwater quantity measures are provided as part of the Estate Management Measures, no additional stormwater quantity management measures are necessary for individual development lots and as such none are proposed or required for this development site.

6 STORMWATER QUALITY, HARVESTING & MAINTENANCE

6.1 Stormwater Quality

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

PCC have nominated, in Section C3 of their *DCP 2014*, the requirements for stormwater quality to be performed on a catchment wide basis. These are presented in terms of annual percentage pollutant reductions on a developed catchment and are as follows:

Gross Pollutants	90%
Total Suspended Solids	85%
Total Phosphorus	60%
Total Nitrogen	45%
Total Hydrocarbons	90%
Free Oil and Grease	90%

Developed impervious areas of the estate, 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 estate are based on a treatment train approach at the estate level to ensure that all the objectives above are met.

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

- Primary treatment of site runoff will be made via one of two Estate GPT's. The Estate GPT's are located at the downstream of the Estate drainage network and immediately upstream of the stormwater management basins.
- Tertiary treatment of site runoff will be made via The Estate bio-retention system which is integrated within the estate stormwater management basins. Management of water quality during construction will also be provided through sediment control measures; and
- A portion of the future building roofs will also provide a level of treatment via rainwater reuse and settlement within the building rainwater tanks.

There are no changes required or proposed to the approved estate stormwater management system, or discharge arrangements from the overall project, as a result of the Ardex Facility development. The overall estate development area of 89 Ha, and associated development coverage for the remains consistent with that approved under SSD 9522, and also of SSD9522 Mod1. We reiterate there will be no change to the assessed management systems and/or discharge arrangements approved under SSD9522 and SSD9522 Mod1.

The SSD 9522 approved stormwater management system incorporates water quantity and quality management systems consistent with accepted practices for the fully

developed catchment, including the Ardex Facility. The approved estate system has been assessed as achieving acceptable stormwater discharge flow rates and water quality outcomes.

EES proposes alternate water quantity and quality measures to those currently approved. Given there are no changes to the estate development areas and impervious surface coverage for the Ardex layout, or proposed to the assessed and approved management systems further assessments of the stormwater management systems are not considered warranted.

As The Estate stormwater management systems, as approved for SSD-9522 and SSD-9522 Mod1, meet all of the required stormwater management objectives, additional on-lot treatment is thereby not required nor proposed as part of the Ardex development.

6.2 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 only, or stormwater where the flow is from all areas of the development.

Rainwater harvesting will be provided for this development with re-use for non-potable applications as part of future individual building development 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 and to satisfy the requirements of PCC DCP2014.

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.

Rainwater tanks are to be sized with reference to the NSW Department of Environment and Conservation document *Managing Urban Stormwater: Harvesting and Reuse,* using a simple water balance analysis to balance the supply and demand, based on the base water demands and a minimum demand reduction of 80%.

The final sizing of rainwater harvesting tanks will need to be assessed once the development layout and reuse demands for the facility are known in accordance with the NSW Department of environment and Conservation document Managing Urban Stormwater: Harvesting and Reuse.

6.3 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 B** to assist in the effective operation and maintenance of the various on-lot stormwater management components.

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

7 SOIL AND WATER MANAGEMENT PLAN

7.1 Soil and Water Management General

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.

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)*.

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 C**.

The sections below outline the proposed controls for management of erosion and sedimentation during construction of the Proposal.

7.2 Typical Management Measures

Sediment Basins

Sediment basins have been sized (based on 5 day 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 F' soils. These soils are fine grained and require a relatively long residence time to allow settling.

Sediment basins for 'Type F' 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.

Sediment Fences

Sediment fences are located around the perimeter of the site to ensure no untreated runoff leaves the site. They have also been located around the existing drainage channels to minimise sediment migration into waterways and sediment basins.

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 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 Details Report has been prepared to support the SSD-25725029 development application for a new warehouse distribution centre for Ardex, within the SSD-9522 approved industrial estate, 'The Yards'.

A civil engineering and infrastructure strategy for the site has been developed which provides a best fit solution within the constraints of the proposed The Yards Industrial Estate and the Stormwater Management Strategy approved under SSD-9522. The proposed engineering strategy for this development has been completed consistent with the approved estate development.

During construction stage, Erosion and Sediment Control Measures are proposed for the site to ensure that all receiving waters are protected from undue pollution and sediment laden stormwater runoff. The site-specific strategy has been completed in conjunction with the broader strategy for the Yards Industrial Estate included in SSD-9522. The strategy comprises erosion control measures consistent with Penrith City Council Policy and the Landcom document Managing Urban Stormwater, Soils and Construction (1998). Provided measures include sediment basins, diversion drains, batter control and site construction entries.

During operational phase the stormwater quality will be performed by an estate-level treatment train approach consisting of primary treatment with an estate GPT unit, to tertiary treatment within bio-retention systems provided in The Yards Stormwater Management Basins. Stormwater quantity management (detention) will also be provided at an estate level within The Yards Stormwater Management Basins. There are no site specific measures required to manage water quality or quantity.

It is recommended that the management strategies mentioned in this report be incorporated into the future detailed design. Detailed design may result in changes to the concept however design criteria will be followed.

It is recommended the management strategies (consistent with those already approved under SSD-9522) in this report be approved and incorporated into the future detailed design.

9 REFERENCES

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);

Managing Urban Stormwater: Soils & Construction – 2004(LANDCOM);

Penrith City Council – *WSUD Technical Guidelines*

Penrith City Council – *Water Sensitive Urban Design (WSUD) Policy*

Penrith City Council – DCP 2010 (Part C3); and

Water Sensitive Urban Design – "Technical Guidelines for Western Sydney" by URS Australia Pty Ltd, May 2004

10 GLOSSARY

Afflux	The rise in water level upstream of a hydraulic structure such as a bridge or culvert, caused by losses incurred from the hydraulic structure. The change in flood surface or depth as a result in a modification or change to the hydraulic flood model scenario.
Australian Height Datum (AHD)	National survey datum corresponding approximately to mean sea level.
Annual Exceedance Probability (AEP)	The chance of a flood of a given size or larger occurring in any one year, generally expressed as percentage probability. For example, a 100 year ARI flood is a 1% AEP flood. An important implication is that when a 1% AEP flood occurs, there is still a 1% probability that it could occur the following year.
Average Recurrence Interval (ARI)	Is statistically the long term average number of years between the occurrence of a flood as big as, or larger than the selected flood event. An ARI is the reciprocal of the AEP.
Catchment	The catchment at a particular point is the area of land which drains to that point.
Depth to velocity value (DV)	A ratio of flow depth and velocity used as a measure of safety for pedestrians and vehicles subject to flood water. Normally a maximum DV of 0.4 is recommended for pedestrian safety and 0.6 for vehicles.
Design floor level	The minimum (lowest) floor level specified for a building.
Design flood	A hypothetical flood representing a specific likelihood of occurrence (for example the 100 year or 1% probability flood). The design flood may comprise two or more single source dominated floods.
Development	Existing or proposed works which may or may not impact upon flooding. Typical works are filling of land, and the construction of roads, floodways and buildings.
Discharge	The rate of flow of water measured in terms of volume over time. It is not the velocity of flow which is a measure of how fast the water is moving rather than how much is moving. Discharge and flow are interchangeable.
Digital Terrain Model (DTM)	A three-dimensional model of the ground surface that can be represented as a series of grids with each cell representing an

	elevation (DEM) or a series of interconnected triangles with elevations (TIN).
Effective warning time	The available time that a community has from receiving a flood warning to when the flood reaches their location.
First Flush	The initial surface runoff of a rainstorm. During this phase, water pollution in areas with high proportions of impervious surfaces is typically more concentrated compared to the remainder of the storm.
Flood	Above average river, creek, channel or other flows which overtop banks and inundate floodplains or urban areas.
Flood awareness	An appreciation of the likely threats and consequences of flooding and an understanding of any flood warning and evacuation procedures. Communities with a high degree of flood awareness respond to flood warnings promptly and efficiently, greatly reducing the potential for damage and loss of life and limb. Communities with a low degree of flood awareness may not fully appreciate the importance of flood warnings and flood preparedness and consequently suffer greater personal and economic losses.
Flood behaviour	The pattern / characteristics / nature of a flood.
Flooding	The State Emergency Service uses the following definitions in flood warnings: *Minor flooding:* causes inconvenience such as closing of minor roads and the submergence of low level bridges *Moderate flooding*: low-lying areas inundated requiring removal of stock and/or evacuation of some houses. Main traffic bridges may be covered. *Major flooding*: extensive rural areas are flooded with properties, villages and towns isolated and/or appreciable urban areas are flooded.
Flood frequency analysis	An analysis of historical flood records to determine estimates of design flood flows.
Flood fringe	Land which may be affected by flooding but is not designated as a floodway or flood storage.
Flood hazard	The potential threat to property or persons due to flooding.

Flood level	The height or elevation of flood waters relative to a datum (typically the Australian Height Datum). Also referred to as "stage".
Flood liable land	Land inundated up to the probable maximum flood – flood prone land.
Floodplain	Land adjacent to a river or creek which is inundated by floods up to the probable maximum flood that is designated as flood prone land.
Flood Planning Levels (FPL)	Are the combinations of flood levels and freeboards selected for planning purposes to account for uncertainty in the estimate of the flood level.
Flood proofing	Measures taken to improve or modify the design, construction and alteration of buildings to minimise or eliminate flood damages and threats to life and limb.
Floodplain Management	The coordinated management of activities which occur on flood liable land.
Floodplain Management Manual	A document by the NSW Government (2001) that provides a guideline for the management of flood liable land. This document describes the process of a floodplain risk management study.
Flood source	The source of the flood waters.
Floodplain Management	A set of conditions and policies which define the benchmark from standard which floodplain management options are compared and assessed.
Flood standard	The flood selected for planning and floodplain management activities. The flood may be an historical or design flood. It should be based on an understanding of the flood behaviour and the associated flood hazard. It should also take into account social, economic and ecological considerations.
Flood storages	Floodplain areas which are important for the temporary storage of flood waters during a flood.
Floodways	Those areas of the floodplain where a significant discharge of flow occurs during floods. They are often aligned with naturally defined channels or overland flow paths. Floodways are areas that, even if they are partially blocked, would cause significant redistribution of flood flows, or a significant increase in flood levels.

Freeboard	A factor of safety usually expressed as a height above the flood standard. Freeboard tends to compensate for the factors such as wave action, localised hydraulic effects, uncertainties in the hydrology, uncertainties in the flood modelling and uncertainties in the design flood levels.
Geographical Information System (GIS)	A form of computer software developed for mapping applications and data storage. Useful for generating terrain models and processing data for input into flood estimation models.
High hazard	Danger to life and limb; evacuation difficult; potential for structural damage, high social disruption and economic losses. High hazard areas are those areas subject to a combination of flood depth and flow velocity that are deemed to cause the above issues to persons or property.
Historical flood	A flood which has actually occurred – Flood of Record.
Hydraulic	The term given to the study of water flow.
Hydrograph	A graph showing how flow rate changes with time.
Hydrology	The term given to the study of the rain-runoff process in catchments.
Low hazard	Flood depths and velocities are sufficiently low that people and their possessions can be evacuated.
Map Grid of Australia (MGA)	A national coordinate system used for the mapping of features on a representation of the earth's surface. Based on the geographic coordinate system 'Geodetic Datum of Australia 1994'.
Peak flood level, flow or velocity	The maximum flood level, flow or velocity occurring during a flood event.
MUSIC	Acronym for Model for Urban Stormwater Improvement Conceptualisation. A computer model which is used to simulate rainfall runoff, associated pollutants within the runoff and expected treatment of the pollutants using different treatment measures.
Probable Maximum Flood (PMF)	An extreme flood deemed to be the maximum statistical flood likely to occur at a particular location.

Probable Maximum Precipitation (PMP)	The greatest statistical depth of rainfall for a given duration meteorologically possible over a particular location. Used to estimate the probable maximum flood.
Probability	A statistical measure of the likely frequency or occurrence of flooding.
Riparian Zone	Areas that are located adjacent to watercourses. Their definition is vague and can be characterised by landform, vegetation, legislation or their function.
Runoff	The amount of rainfall from a catchment which actually ends up as flowing water in the river of creek.
Stage	Equivalent to water level above a specific datum- see flood level.
Treatment train	A term used to describe a series of water quality measures which act in conjunction with one another to provide a combined water quality outcome.
Triangular Irregular Network (TIN)	A mass of interconnected triangles used to model three-dimensional surfaces such as the ground (see DTM) and the surface of a flood.
Velocity	The speed at which the flood waters are moving. Typically, modelled velocities in a river or creek are quoted as the depth and width averaged velocity, i.e. the average velocity across the whole river or creek section

Appendix A

DRAWINGS BY COSTIN ROE CONSULTING

ARDEX DISTRIBUTION CENTRE
MAMRE ROAD, KEMPS CREEK, NSW
STATE SIGNIFICANT DEVELOPMENT APPLICATION

DRAWING LIST

DRAWING NO.	DRAWING TITLE
C013362.05-SSDA10	DRAWING LIST & GENERAL NOTES
C013362.05-SSDA20	EROSION AND SEDIMENT CONTROL PLAN
C013362.05-SSDA25	EROSION AND SEDIMENT CONTROL DETAILS
C013362.05-SSDA30	BULK EARTHWORKS PLAN
C013362.05-SSDA31	CUT/FILL PLAN
C013362.05-SSDA35	BULK EARTHWORKS SECTIONS
C013362.05-SSDA40	STORMWATER DRAINAGE PLAN
C013362.05-SSDA45	STORMWATER DRAINAGE DETAILS - SHEET 1
C013362.05-SSDA46	STORMWATER DRAINAGE DETAILS - SHEET 2
C013362.05-SSDA50	FINISHED LEVELS PLAN

GENERAL NOTES:

1. THESE DRAWINGS SHALL BE READ IN CONJUNCTION WITH ALL ARCHITECTURAL AND OTHER CONSULTANT'S DRAWINGS AND SPECIFICATIONS AND WITH SUCH OTHER WRITTEN INSTRUCTIONS AS MAY BE ISSUED DURING THE COURSE OF THE CONTRACT. ANY DISCREPANCY SHALL BE REFERRED TO THE ENGINEER BEFORE PROCEEDING WITH THE WORK.
2. ALL MATERIALS AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE RELEVANT AND CURRENT STANDARDS AUSTRALIA CODES AND WITH THE BY-LAWS AND ORDINANCES OF THE RELEVANT BUILDING AUTHORITIES EXCEPT WHERE VARIED BY THE PROJECT SPECIFICATION.
3. ALL DIMENSIONS SHOWN SHALL BE VERIFIED BY THE BUILDER ON SITE.
   ENGINEER'S DRAWINGS SHALL NOT BE SCALED FOR DIMENSIONS.
   ENGINEER'S DRAWINGS ISSUED IN ANY ELECTRONIC FORMAT MUST NOT BE USED FOR DIMENSIONAL SETOUT.
   REFER TO THE ARCHITECT'S DRAWINGS FOR ALL DIMENSIONAL SETOUT INFORMATION.
4. DURING CONSTRUCTION THE STRUCTURE SHALL BE MAINTAINED IN A STABLE CONDITION AND NO PART SHALL BE OVERSTRESSED. TEMPORARY BRACING SHALL BE PROVIDED BY THE BUILDER TO KEEP THE WORKS AND EXCAVATIONS STABLE AT ALL TIMES.
5. UNLESS NOTED OTHERWISE ALL LEVELS ARE IN METRES AND ALL DIMENSIONS ARE IN MILLIMETRES.
6. ALL WORKS SHALL BE UNDERTAKEN IN ACCORDANCE WITH ACCEPTABLE SAFETY STANDARDS & APPROPRIATE SAFETY SIGNS SHALL BE INSTALLED AT ALL TIMES DURING THE PROGRESS OF THE JOB.

ELECTRONIC INFORMATION NOTES:

1. THE ISSUED DRAWINGS IN HARD COPY OR PDF FORMAT TAKE PRECEDENCE OVER ANY ELECTRONICALLY ISSUED INFORMATION, LAYOUTS OR DESIGN MODELS.
2. THE CONTRACTOR'S DIRECT AMENDMENT OR MANIPULATION OF THE DATA OR INFORMATION THAT MIGHT BE CONTAINED WITHIN AN ENGINEER-SUPPLIED DIGITAL TERRAIN MODEL AND ITS SUBSEQUENT USE TO UNDERTAKE THE WORKS WILL BE SOLELY AT THE DISCRETION OF AND THE RISK OF THE CONTRACTOR.
3. THE CONTRACTOR IS REQUIRED TO HIGHLIGHT ANY DISCREPANCIES BETWEEN THE DIGITAL TERRAIN MODEL AND INFORMATION PROVIDED IN THE CONTRACT AND/OR DRAWINGS AND IS REQUIRED TO SEEK CLARIFICATION FROM THE SUPERINTENDENT.
4. THE ENGINEER WILL NOT BE LIABLE OR RESPONSIBLE FOR THE POSSIBLE ON-GOING NEED TO UPDATE THE DIGITAL TERRAIN MODEL, SHOULD THERE BE ANY AMENDMENTS OR CHANGES TO THE DRAWINGS OR CONTRACT INITIATED BY THE CONTRACTOR.

SITE PREPARATION NOTES:

1. ALL EARTHWORKS SHALL BE COMPLETED UNDER LEVEL 1 SUPERVISION GENERALLY IN ACCORDANCE WITH THE GUIDELINES SPECIFIED BY THE GEOTECHNICAL ENGINEER PROVIDED BY PELLS SULLIVAN MEYNINK DATED 01/06/2020
2. EXISTING LEVELS ARE BASED ON ESTATE DESIGN INFORMATION PROVIDED BY COSTIN ROE CONSULTING (DWG No. C013362.02-EW301 TO EW309)
3. STRIP ANY TOP SOIL OR DELETERIOUS MATERIAL AND DISPOSE OF FROM SITE OR STORE AS DIRECTED.
4. COMPLETE CUT TO FILL EARTHWORKS TO ACHIEVE THE REQUIRED LEVELS AS INDICATED ON THE DRAWINGS WITHIN A TOLERANCE OF +0mm/-10mm THROUGH BUILDING PADS/PAVEMENTS AND +0mm/-20mm ELSEWHERE.
5. PREPARE STEEP BATTERS TO RECEIVE FILL BY CONSTRUCTING BENCHING TO FACILITATE FILL PLACEMENT AND COMPACTION.
6. AREAS TO RECEIVE FILL (THAT ARE NOT ON BENCHED BATTERS) AND AREAS IN CUT SHALL BE PROOF ROLLED TO IDENTIFY ANY SOFT HEAVING MATERIAL. SOFT MATERIAL SHALL BE BOXED OUT AND REMOVED PRIOR TO FILL PLACEMENT. PROOF ROLLING TO BE INSPECTED BY A GEOTECHNICAL ENGINEER OR THE EARTHWORKS DESIGNER.
7. SITE WON FILL SHALL BE COMPACTED IN MAXIMUM 300mm LAYERS AND TO DRY OR HILF DENSITY RATIOS (STANDARD COMPACTION) OF BETWEEN 98% AND 103%. THE PLACEMENT MOISTURE VARIATION OR HILF MOISTURE VARIATION SHALL BE CONTROLLED TO BE BETWEEN 2% DRY AND 2% WET.
8. IMPORTED FILL SHALL BE COMPACTED IN MAXIMUM 300mm LAYERS AND TO DRY OR HILF DENSITY RATIOS (STANDARD COMPACTION) OF BETWEEN 98% AND 103%. THE PLACEMENT MOISTURE VARIATION OR HILF MOISTURE VARIATION SHALL BE CONTROLLED TO BE BETWEEN 2% DRY AND 2% WET.
9. ALL ENGINEERED FILL PARTICLES SHALL BE ABLE TO BE INCORPORATED WITHIN A SINGLE LAYER. FURTHER, LESS THAN 30% OF PARTICLES SHALL BE RETAINED ON THE 37.5 mm SIEVE. ENGINEERED FILL SHALL BE ABLE TO BE TESTED IN ACCORDANCE WITH THE STANDARD COMPACTION METHOD (AS1289.5.4.1) OR HILF TEST METHOD (AS1289.5.7.1). THESE METHODS REQUIRE LESS THAN 20% RETAINED ON THE 37.5 mm SIEVE. WHERE BETWEEN 20% AND 30% OF PARTICLES ARE RETAINED ON THE 37.5 mm SIEVE THE ABOVE TEST METHODS SHALL STILL BE ADOPTED AND TEST REPORTS ANNOTATED APPROPRIATELY. THESE REQUIREMENTS SHOULD BE MET BY THE MATERIAL AFTER PLACEMENT AND COMPACTION
10. PRIOR TO ANY EARTHWORKS, EROSION CONTROL AS OUTLINED IN THE EROSION AND SEDIMENTATION CONTROL PLAN SHALL BE COMPLETED.
11. EXISTING ROCK, IF ANY, SHALL BE REMOVED BY HEAVY ROCK BREAKING OR RIPPING.
12. MATCH EXISTING LEVELS AT BATTER INTERFACE.
13. CONTRACTOR TO MATCH EXISTING LEVELS AT THE INTERFACE OF EARTHWORKS AND EXISTING SURFACE AT BATTER LOCATIONS OR WHERE NO RETAINING WALLS ARE PRESENT. ANY DISCREPANCY BETWEEN DESIGN AND EXISTING LEVELS TO BE REFERRED TO THE ENGINEER FOR DIRECTION OR ADJUSTMENTS TO DESIGN LEVELS.
14. DURING EARTHWORKS THE CONTRACTOR IS TO ENSURE ALL AREAS ARE FREE DRAINING & WILL NOT RETAIN WATER DURING RAINFALL. PROVIDE TEMPORARY MEASURES AS REQUIRED TO ENSURE FREE FLOWING RUNOFF THROUGH MANAGED DRAINAGE PATHS, DIVERSION DRAINS OR OTHER SUITABLE DISPOSAL METHOD AS AGREED DURING THE WORKS. REFER ANY CONCERNS TO THE ENGINEER. REFER TO EROSION AND SEDIMENT CONTROL DRAWINGS AND NOTES.

LOCALITY PLAN
NTS

STATE SIGNIFICANT DEVELOPMENT APPLICATION

AMENDMENTS	DATE	ISSUE
ISSUED FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION	17.09.21	C
PRELIMINARY ONLY	30.07.21	B
PRELIMINARY ONLY	27.07.21	A

ARCHITECT: PACE ARCHITECTS
CLIENT: FRASERS PROPERTY

PROJECT: ARDEX DISTRIBUTION CENTRE
MAMRE ROAD
KEMPS CREEK NSW 2178

DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
MC	ML	JUN 21	DS	A0	AS SHOWN	C013362.05-SSDA10

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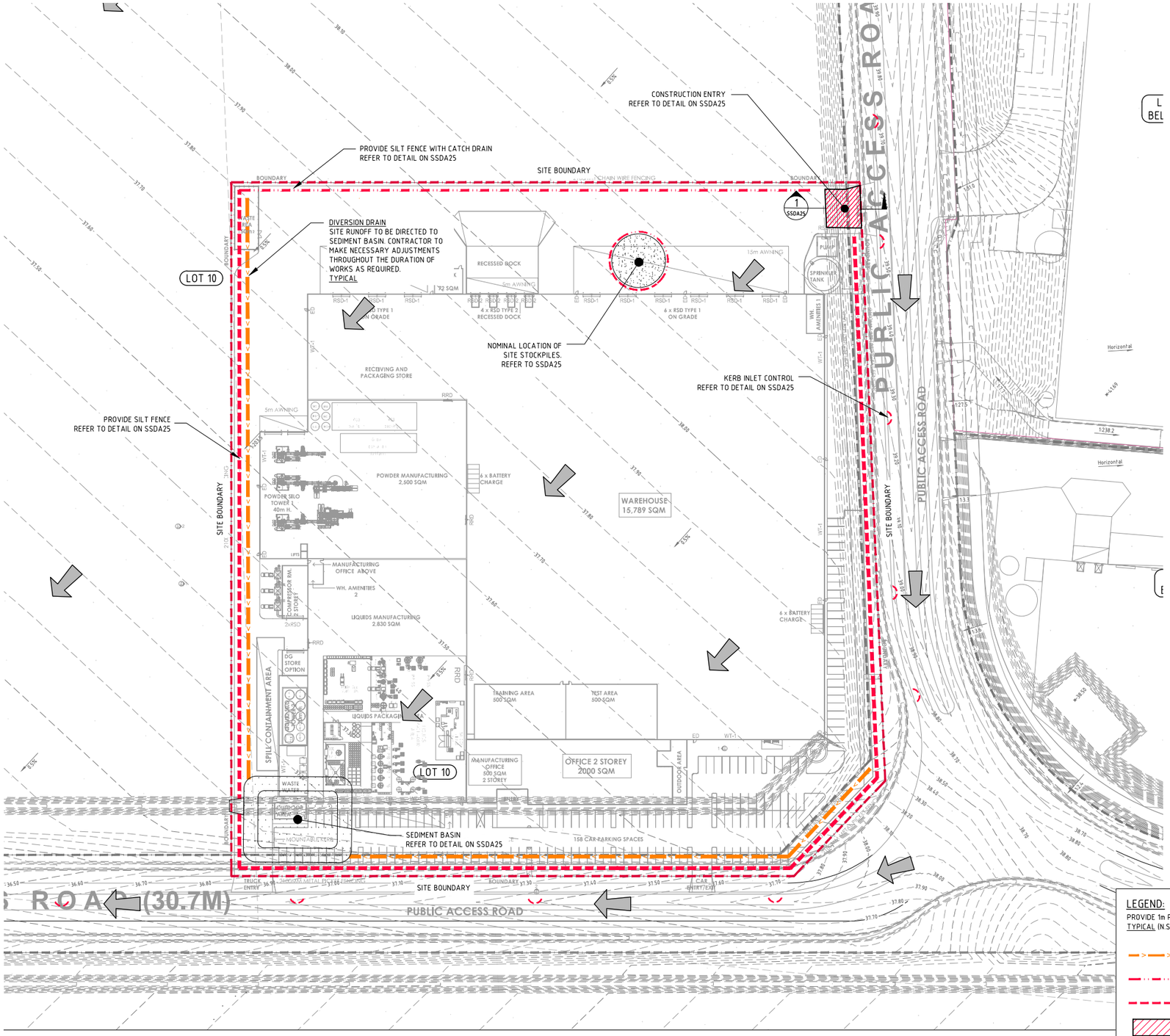
Costin Roe Consulting
PRECISION | COMMUNICATION | ACCOUNTABILITY

DRAWING TITLE: DRAWING LIST & GENERAL NOTES
DRAWING No: C013362.05-SSDA10
ISSUE: C



EROSION AND SEDIMENT CONTROL PLAN
SCALE 1:500

SEDIMENT BASIN DIMENSIONS:

CATCHMENT AREA	= 4.4Ha
DISTURBED AREA	= 4.4Ha
REQUIRED BASIN VOLUME	= 1001m^3
BASE DIMENSIONS (L X B)	= 25m x 18m
TOP DIMENSIONS (L X B)	= 34m x 27m
MAX SIDE SLOPE	= 1V:3H
DEPTH	= 1.5m
PROVIDED BASIN VOLUME	= 1005m^3
Q10 WEIR PEAK FLOW	= 1.2m^3/s

SEDIMENTATION BASIN NOTE:

REFER TO SEDIMENT & EROSION CONTROL NOTES.

FOR SEDIMENT AND EROSION CONTROL DETAILS, REFER TO THE LANDCOM 'BLUE BOOK' AND EXTRACTS ON DRAWING C013362.05-SSDA25.

SEDIMENTATION BASIN SIZING BASED ON RECOMMENDATIONS OF 'SOILS AND CONSTRUCTION, MANAGING URBAN STORMWAER-THE BLUE BOOK'. CAPACITY BASED ON 5-DAY RAINFALL DEPTHS AT 85th PERCENTILE INTENSITY (35mm) IN THE PENRITH CATCHMENT AREA.

NOTES:
1. ASSUME TYPE D SOIL (CLAY/SILTY CLAY)
2. ASSUME GROUP D SOIL (HIGH PLASTICITY AND SHRINK/SWELL PROPERTIES)

EROSION CONTROL NOTES:

ALL CONTROL WORK INCLUDING DIVERSION BANKS AND CATCH DRAINS, V-DRAINS AND SILT FENCES SHALL BE COMPLETED DIRECTLY FOLLOWING THE COMPLETION OF THE EARTHWORKS.

1. SILT FENCES AND SILT FENCE RETURNS SHALL BE ERECTED CONVEX TO THE CONTOUR TO POND WATER.
2. HAY BALE BARRIERS AND GEOFABRIC FENCES ARE TO BE CONSTRUCTED TO TOE OF BATTER, PRIOR TO COMMENCEMENT OF EARTHWORKS, IMMEDIATELY AFTER CLEARING OF VEGETATION AND BEFORE REMOVAL OF TOP SOIL.
3. ALL TEMPORARY EARTH BERMS, DIVERSION AND SILT DAM EMBANKMENTS ARE TO BE MACHINE COMPACTED, SEEDED AND MULCHED FOR TEMPORARY VEGETATION COVER AS SOON AS THEY HAVE BEEN FORMED.
4. CLEAR WATER IS TO BE DIVERTED AWAY FROM DISTURBED GROUND AND INTO THE DRAINAGE SYSTEM.
5. THE CONTRACTOR IS RESPONSIBLE FOR MAINTAINING AND PROVIDING ON GOING ADJUSTMENT TO EROSION CONTROL MEASURES AS REQUIRED DURING CONSTRUCTION.
6. ALL SEDIMENT TRAPPING STRUCTURES AND DEVICES ARE TO BE INSPECTED AFTER STORMS FOR STRUCTURAL DAMAGE OR CLOGGING, TRAPPED MATERIAL IS TO BE REMOVED TO A SAFE, APPROVED LOCATION.
7. ALL FINAL EROSION PREVENTION MEASURES INCLUDING THE ESTABLISHMENT OF GRASSING ARE TO BE MAINTAINED UNTIL THE END OF THE DEFECTS LIABILITY PERIOD.
8. ALL EARTHWORKS AREAS SHALL BE ROLLED ON A REGULAR BASIS TO SEAL THE EARTHWORKS.
9. ALL FILL AREAS ARE TO BE LEFT WITH A BUND AT THE TOP OF THE SLOPE AT THE END OF EACH DAYS EARTHWORKS. THE HEIGHT OF THE BUND SHALL BE A MINIMUM OF 200mm.
10. ALL CUT AND FILL SLOPES ARE TO BE SEEDED AND HYDROMULCHED WITHIN 10 DAYS OF COMPLETION OF FORMATION.
11. AFTER REVEGETATION OF THE SITE IS COMPLETE AND THE SITE IS STABLE IN THE OPINION OF A SUITABLY QUALIFIED PERSON ALL TEMPORARY WORK SUCH AS SILT FENCE, DIVERSION DRAINS ETC SHALL BE REMOVED.
12. ALL TOPSOIL STOCKPILES ARE TO BE SUITABLY COVERED TO THE SATISFACTION OF THE SITE MANAGER TO PREVENT WIND AND WATER EROSION.
13. ANY AREA THAT IS NOT APPROVED BY THE CONTRACT ADMINISTRATOR FOR CLEARING OR DISTURBANCE BY THE CONTRACTOR'S ACTIVITIES SHALL BE CLEARLY MARKED AND SIGN POSTED, FENCED OFF OR OTHERWISE APPROPRIATELY PROTECTED AGAINST ANY SUCH DISTURBANCE.
14. ALL STOCKPILE SITES SHALL BE SITUATED IN AREAS APPROVED FOR SUCH USE BY THE SITE MANAGER. A 6m BUFFER ZONE SHALL EXIST BETWEEN STOCKPILE SITES AND ANY STREAM OR FLOW PATH. ALL STOCKPILES SHALL BE ADEQUATELY PROTECTED FROM EROSION AND CONTAMINATION OF THE SURROUNDING AREA BY USE OF THE MEASURES APPROVED IN THE EROSION AND SEDIMENTATION CONTROL PLAN.
15. ACCESS AND EXIT AREAS SHALL INCLUDE SHAKE-DOWN OR OTHER METHODS APPROVED BY THE SITE MANAGER FOR THE REMOVAL OF SOIL MATERIALS FORM MOTOR VEHICLES.
16. THE CONTRACTOR IS TO ENSURE RUNOFF FROM ALL AREAS WHERE THE NATURAL SURFACE IS DISTURBED BY CONSTRUCTION, INCLUDING ACCESS ROADS, DEPOT AND STOCKPILE SITES, SHALL BE FREE OF POLLUTANTS BEFORE IT IS EITHER DISPERSED TO STABLE AREAS OR DIRECTED TO NATURAL WATERCOURSES.
17. THE CONTRACTOR SHALL PROVIDE AND MAINTAIN SLOPES, CROWNS AND DRAINS ON ALL EXCAVATIONS AND EMBANKMENTS TO ENSURE SATISFACTORY DRAINAGE AT ALL TIMES WATER SHALL NOT BE ALLOWED TO POND ON THE WORKS UNLESS SUCH PONDING IS PART OF AN APPROVED ESCP / SWMP.

LEGEND:

PROVIDE 1m RETURNS TO SILT FENCE AT 30m MAX. INTERVALS.
TYPICAL (N.S.O.P.)

- DENOTES DIVERSION DRAIN
- DENOTES SILT FENCE WITH CATCH DRAIN
- DENOTES SILT FENCE ONLY
- DENOTES CONSTRUCTION ENTRY
- OVERLAND FLOW DIRECTION
- SEDIMENT BASIN (REFER TO PLAN)
- KERB INLET CONTROL

5m 0 10 20 30 40 50m
SCALE 1:500 AT A0 SIZE SHEET

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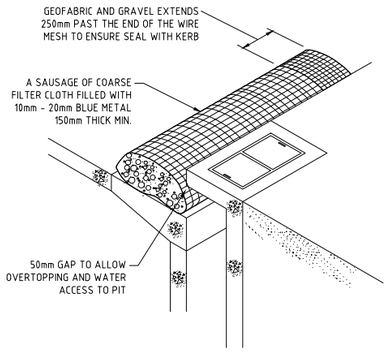
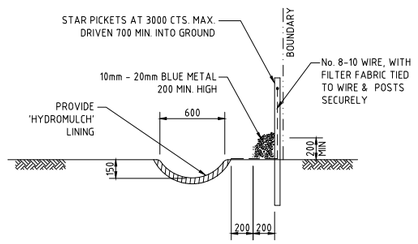
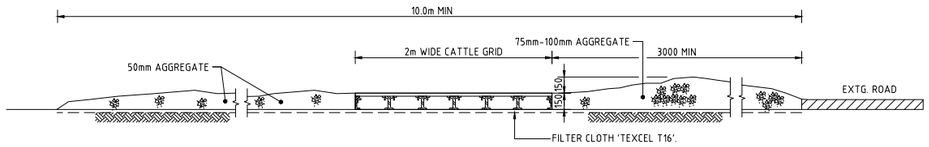
DRAWING TITLE: EROSION AND SEDIMENT CONTROL PLAN
DRAWING No: C013362.05-SSDA20
ISSUE: C



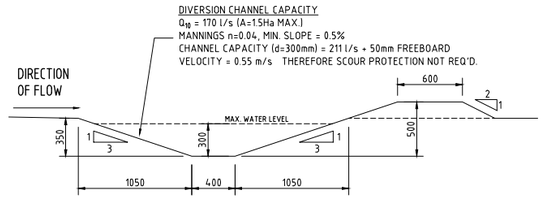
KERB INLET CONTROL
N.T.S



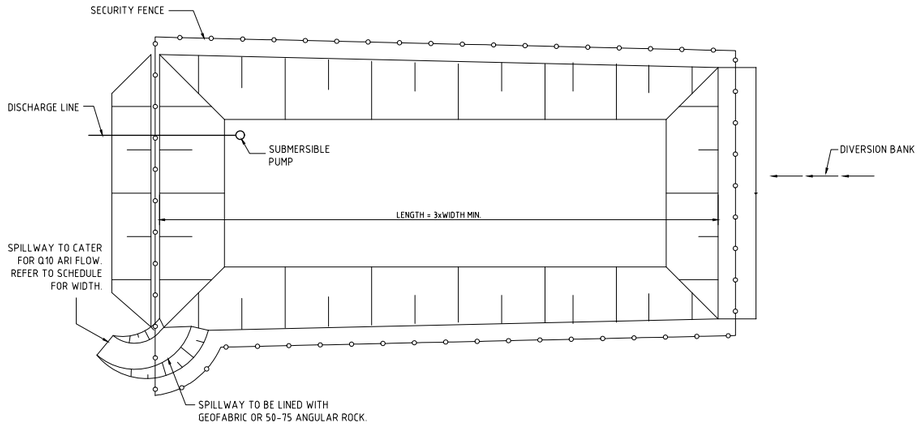
TYPICAL OPEN DRAIN & SILT FENCE
SCALE 1:20



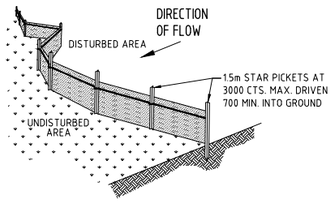
SECTION 1:20 (1 / SSDA26) : STABILISED CONSTRUCTION ENTRANCE 'TRUCK SHAKER'



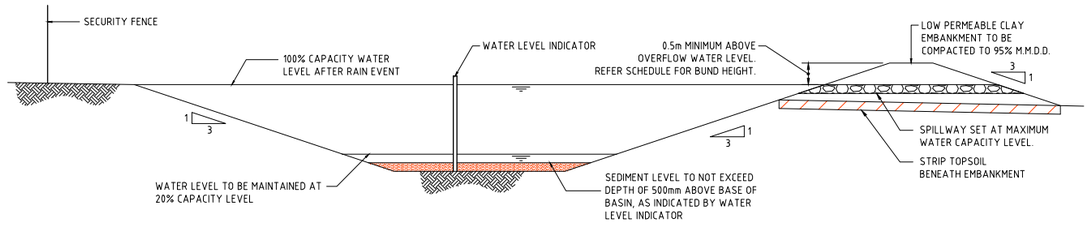
DIVERSION DRAIN SECTION
SCALE 1:20



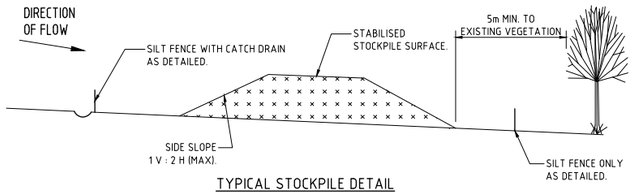
TYPICAL SEDIMENT CONTROL POND PLAN
SCALE 1:250



TYPICAL SILT FENCE DETAIL
N.T.S
NOTE: PROVIDE 1m RETURNS AT 30m INTERVALS. TYPICAL



TYPICAL SEDIMENT CONTROL BASIN SECTION
SCALE 1:50



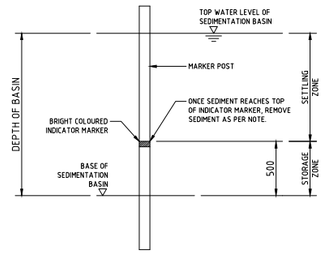
TYPICAL STOCKPILE DETAIL
N.T.S

STOCKPILE NOTES

1. PLACE ALL STOCKPILES IN LOCATIONS MORE THAN 5m FROM EXISTING VEGETATION, ROADS & HAZARD AREAS.
2. CONSTRUCT ON THE CONTOUR AS LOW, FLAT ELONGATED MOUNDS. SIDE SLOPE TO BE 1 V: 2 H MAX.
3. WHERE THERE IS SUFFICIENT AREA, TOPSOIL STOCKPILES SHALL BE LESS THAN 2m IN HEIGHT.
4. WHERE STOCKPILES ARE TO BE IN PLACE FOR MORE THAN 10 DAYS, STABILISE USING WOOD CHIP MULCH - 16 TONNE/Ha.
5. CONSTRUCT SILT FENCE WITH CATCH DRAIN ON UPSLOPE SIDE TO DIVERT WATER AROUND STOCKPILES & SILT FENCE ONLY 1 TO 2m DOWNSLOPE AS SHOWN.

SPILLWAY SCHEDULE

CATCHMENT (Ha)	FLOW (m^3/s)	WIDTH (m)	FLOW DEPTH (m)	ROCK SIZE (mm)	BUND HEIGHT ABOVE SPILLWAY (m)
1	0.3	2	0.20	200	0.70
2	0.6	4	0.20	200	0.70
5	1.4	5	0.30	200	0.80
10	2.8	8	0.35	200	0.85
20	5.5	14	0.40	250	0.90
40	11.0	20	0.50	250	1.00



SEDIMENT STORAGE MARKER
SCALE 1:20

2m 0 5 10 15 20 25m
SCALE 1:250 AT A0 SIZE SHEET

500mm 0 1 2 3 4 5m
SCALE 1:50 AT A0 SIZE SHEET

200mm 0 500 1000 1500 2000mm
SCALE 1:20 AT A0 SIZE SHEET

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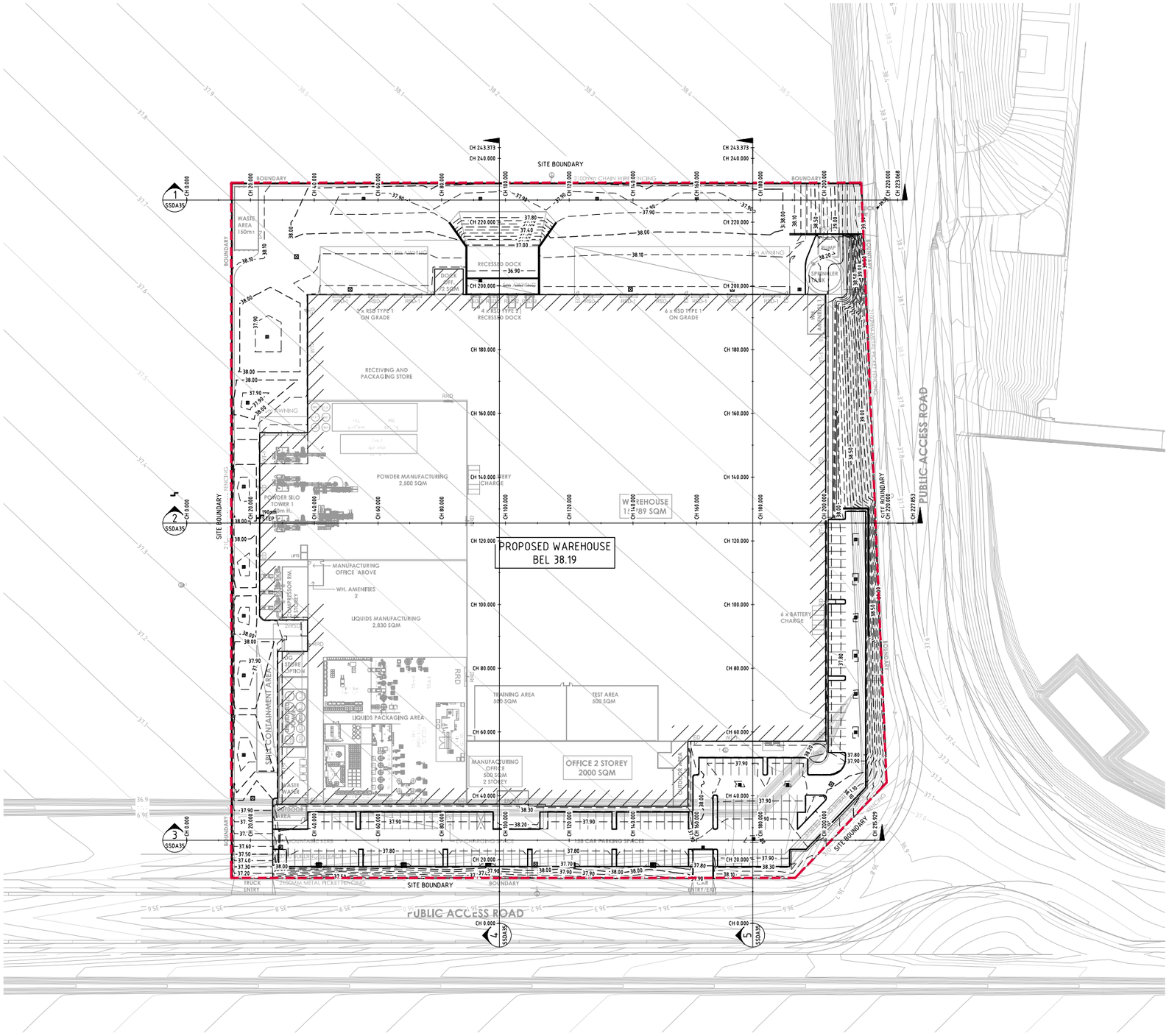
DRAWING TITLE: EROSION & SEDIMENT CONTROL DETAILS
DRAWING NO: C013362.05-SSDA25 ISSUE: B

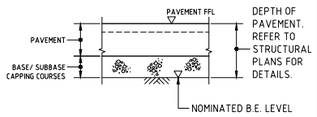


BULK EARTHWORKS PLAN
SCALE 1:500

LEGEND:

LEVELS DATUM IS AHD.

- 38.00 – EXISTING CONTOUR
- 38.00 – B.E.L. CONTOUR (MAJOR 0.5m)
- 38.10 – B.E.L. CONTOUR (MINOR 0.1m)
- 38.50 – B.E.L. SPOT LEVEL



NOMINATED B.E.L. DETAIL
NTS.

PAVEMENT DEPTHS:

WAREHOUSE SLAB	310mm
HARDSTAND PAVEMENT	275mm
CARPARK PAVEMENT	320mm
PEDESTRIAN PAVEMENT	175mm
LANDSCAPED AREAS	100mm
SPRINKLER TANK SLAB	300mm

EARTHWORKS VOLUME ESTIMATE

SITE AREA = 4.4 Ha

CUT	= -1,600m³
FILL	= +16,570m³
DETAILED EXCAVATION (1,200m³/Ha)	= -5,300m³
BALANCE	= +9,670m³ (i.e. IMPORT)

NOTE:
EARTHWORK VOLUMES ARE APPROXIMATE ONLY.
NO ALLOWANCE HAS BEEN MADE FOR DELETERIOUS MATERIAL, EROSION AND SEDIMENT CONTROL, BULKING OR COMPACTION OF FILLED SOILS.

THE EXISTING SURFACE IS BASED ON ESTATE DESIGN BY COSTIN ROE CONSULTING (DWG No. C013362.02-EW301 TO EW309). THIS SURFACE USED IS THE MOST CURRENT AVAILABLE INFORMATION HOWEVER IT MAY NOT ACCURATELY REFLECT ACTUAL GROUND LEVELS OR STOCKPILES ETC ON SITE. IT IS THE CONTRACTORS RESPONSIBILITY TO CONFIRM VOLUMES AND ALLOWANCES FOR EARTHWORKS.

SITE PREPARATION NOTES:

1. ALL EARTHWORKS SHALL BE COMPLETED UNDER LEVEL 1 SUPERVISION GENERALLY IN ACCORDANCE WITH THE GUIDELINES SPECIFIED BY THE GEOTECHNICAL ENGINEER PROVIDED BY PELLS SULLIVAN MEYNINK DATED 01/06/2020
2. EXISTING LEVELS ARE BASED ON ESTATE DESIGN INFORMATION PROVIDED BY COSTIN ROE CONSULTING (DWG No. 13362.02-EW301 TO EW309)
3. STRIP ANY TOP SOIL OR DELETERIOUS MATERIAL AND DISPOSE OF FROM SITE OR STORE AS DIRECTED.
4. COMPLETE CUT TO FILL EARTHWORKS TO ACHIEVE THE REQUIRED LEVELS AS INDICATED ON THE DRAWINGS WITHIN A TOLERANCE OF +0mm/-10mm THROUGH BUILDING PADS/PAVEMENTS AND +0mm/-20mm ELSEWHERE.
5. PREPARE STEEP BATTERS TO RECEIVE FILL BY CONSTRUCTING BENCHING TO FACILITATE FILL PLACEMENT AND COMPACTION.
6. AREAS TO RECEIVE FILL (THAT ARE NOT ON BENCHED BATTERS) AND AREAS IN CUT SHALL BE PROOF ROLLED TO IDENTIFY ANY SOFT HEAVING MATERIAL. SOFT MATERIAL SHALL BE BOXED OUT AND REMOVED PRIOR TO FILL PLACEMENT. PROOF ROLLING TO BE INSPECTED BY A GEOTECHNICAL ENGINEER OR THE EARTHWORKS DESIGNER.
7. SITE WON FILL SHALL BE COMPACTED IN MAXIMUM 300mm LAYERS AND TO DRY OR HILF DENSITY RATIOS (STANDARD COMPACTION) OF BETWEEN 98% AND 103%. THE PLACEMENT MOISTURE VARIATION OR HILF MOISTURE VARIATION SHALL BE CONTROLLED TO BE BETWEEN 2% DRY AND 2% WET.
8. IMPORTED FILL SHALL BE COMPACTED IN MAXIMUM 300mm LAYERS AND TO DRY OR HILF DENSITY RATIOS (STANDARD COMPACTION) OF BETWEEN 98% AND 103%. THE PLACEMENT MOISTURE VARIATION OR HILF MOISTURE VARIATION SHALL BE CONTROLLED TO BE BETWEEN 2% DRY AND 2% WET.
9. ALL ENGINEERED FILL PARTICLES SHALL BE ABLE TO BE INCORPORATED WITHIN A SINGLE LAYER. FURTHER, LESS THAN 30% OF PARTICLES SHALL BE RETAINED ON THE 37.5 mm SIEVE. ENGINEERED FILL SHALL BE ABLE TO BE TESTED IN ACCORDANCE WITH THE STANDARD COMPACTION METHOD (AS1289.5.4.1) OR HILF TEST METHOD (AS1289.5.7.1). THESE METHODS REQUIRE LESS THAN 20% RETAINED ON THE 37.5 mm SIEVE. WHERE BETWEEN 20% AND 30% OF PARTICLES ARE RETAINED ON THE 37.5 mm SIEVE THE ABOVE TEST METHODS SHALL STILL BE ADOPTED AND TEST REPORTS ANNOTATED APPROPRIATELY. THESE REQUIREMENTS SHOULD BE MET BY THE MATERIAL AFTER PLACEMENT AND COMPACTION
10. PRIOR TO ANY EARTHWORKS, EROSION CONTROL AS OUTLINED IN THE EROSION AND SEDIMENTATION CONTROL PLAN SHALL BE COMPLETED.
11. EXISTING ROCK, IF ANY, SHALL BE REMOVED BY HEAVY ROCK BREAKING OR RIPPING.
12. MATCH EXISTING LEVELS AT BATTER INTERFACE.
13. CONTRACTOR TO MATCH EXISTING LEVELS AT THE INTERFACE OF EARTHWORKS AND EXISTING SURFACE AT BATTER LOCATIONS OR WHERE NO RETAINING WALLS ARE PRESENT. ANY DISCREPANCY BETWEEN DESIGN AND EXISTING LEVELS TO BE REFERRED TO THE ENGINEER FOR DIRECTION OR ADJUSTMENTS TO DESIGN LEVELS.
14. DURING EARTHWORKS THE CONTRACTOR IS TO ENSURE ALL AREAS ARE FREE DRAINING & WILL NOT RETAIN WATER DURING RAINFALL. PROVIDE TEMPORARY MEASURES AS REQUIRED TO ENSURE FREE FLOWING RUNOFF THROUGH MANAGED DRAINAGE PATHS, DIVERSION DRAINS OR OTHER SUITABLE DISPOSAL METHOD AS AGREED DURING THE WORKS. REFER ANY CONCERNS TO THE ENGINEER. REFER TO EROSION AND SEDIMENT CONTROL DRAWINGS AND NOTES.

5m 0 10 20 30 40 50m
SCALE 1:500 AT A0 SIZE SHEET

STATE SIGNIFICANT DEVELOPMENT APPLICATION

AMENDMENTS	DATE	ISSUE
ISSUED FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION	17.09.21	C
PRELIMINARY ONLY	30.07.21	B
PRELIMINARY ONLY	27.07.21	A

ARCHITECT: PACE ARCHITECTS
CLIENT: FRASERS PROPERTY

PROJECT
ARDEX DISTRIBUTION CENTRE
MAMRE ROAD
KEMPS CREEK NSW 2178

DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
MC	ML	JUN 21	DS	A0	AS SHOWN	C013362.05-SSDA30

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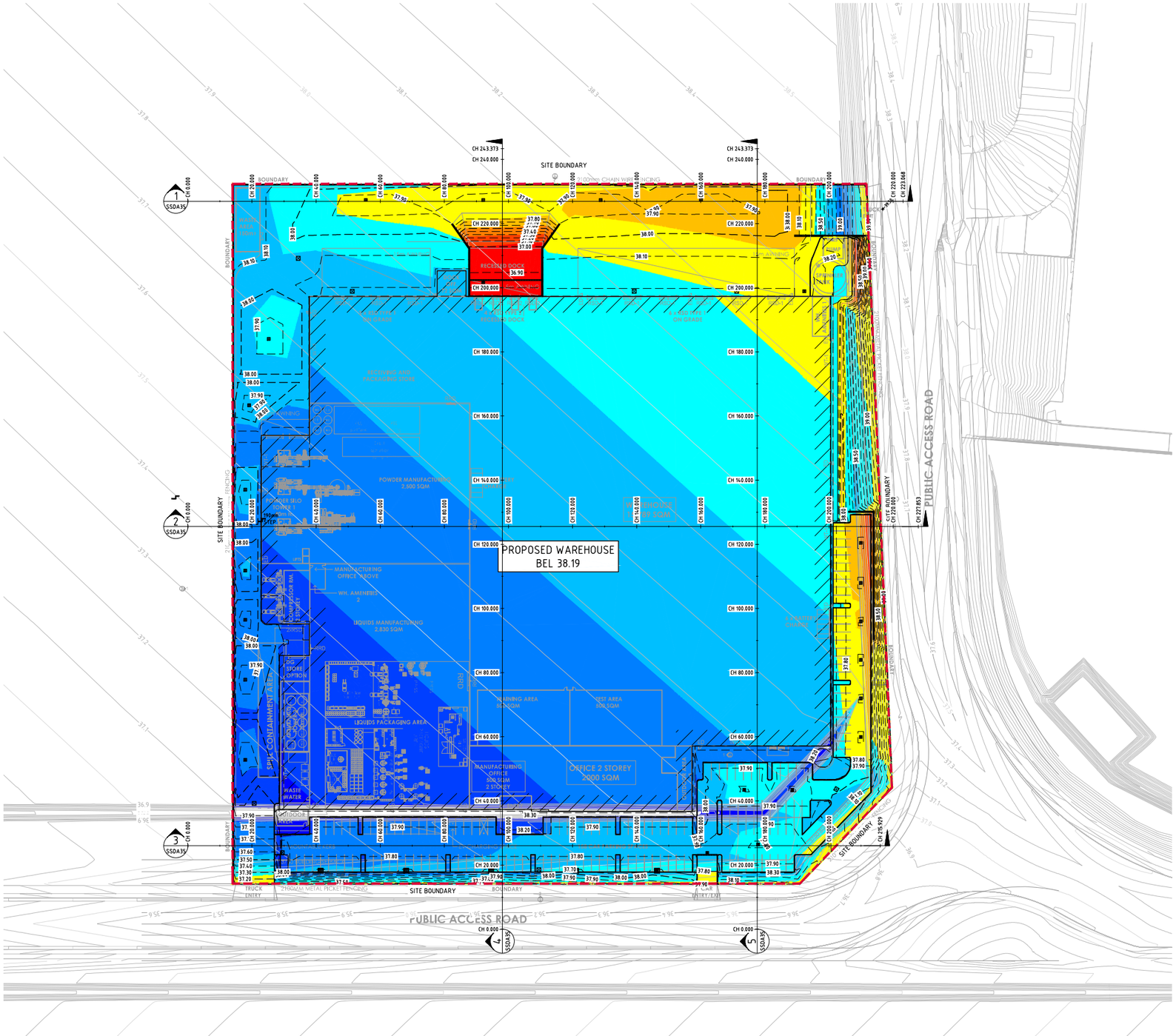
Costin Roe Consulting
PRECISION | COMMUNICATION | ACCOUNTABILITY

DRAWING TITLE: BULK EARTHWORKS PLAN
DRAWING No: C013362.05-SSDA30
ISSUE: C



BULK EARTHWORKS CUT/FILL PLAN
SCALE 1:500

DEPTH RANGE				
No.	FROM DEPTH	TO DEPTH	COLOUR	
1	-1.250	-1.000		CUT
2	-1.000	-0.750		
3	-0.750	-0.500		
4	-0.500	-0.250		
5	-0.250	0.000		
6	0.000	0.250		FILL
7	0.250	0.500		
8	0.500	0.750		
9	0.750	1.000		
10	1.000	1.250		

5m 0 10 20 30 40 50m
SCALE 1:500 AT A0 SIZE SHEET

STATE SIGNIFICANT DEVELOPMENT APPLICATION

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PRELIMINARY ONLY	27.07.21	A

ARCHITECT: PACE ARCHITECTS
CLIENT: FRASERS PROPERTY

PROJECT
ARDEX DISTRIBUTION CENTRE
MAMRE ROAD
KEMPS CREEK NSW 2178

DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
MC	ML	JUN 21	DS	A0	AS SHOWN	C013362.05-SSDA31

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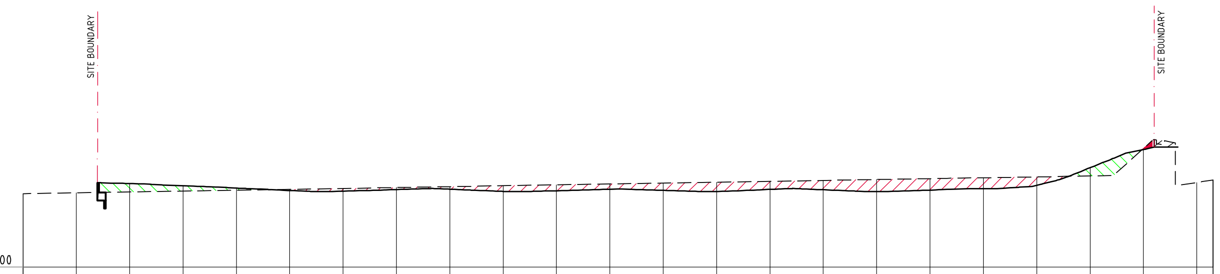
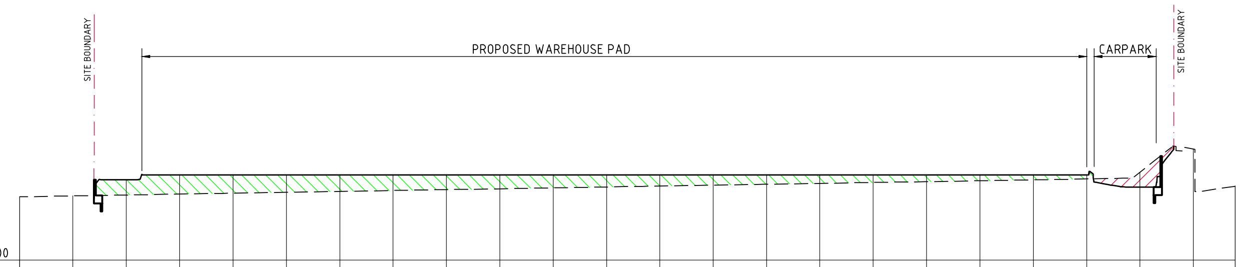
DRAWING TITLE: BULK EARTHWORKS CUT/FILL PLAN
DRAWING NO: C013362.05-SSDA31
ISSUE: C



DATUM 35.00

CHAINAGE	EXISTING SURFACE LEVEL	BULK EARTHWORKS LEVEL	CUT/FILL DEPTH
0.000			
10.000	37.785		
20.000	37.818	38.135	0.317
30.000	37.851	38.053	0.201
40.000	37.885	37.966	0.081
50.000	37.918	37.874	-0.044
60.000	37.952	37.847	-0.105
70.000	37.985	37.908	-0.077
80.000	38.018	37.922	-0.097
90.000	38.052	37.838	-0.214
100.000	38.085	37.864	-0.221
110.000	38.119	37.918	-0.200
120.000	38.152	37.878	-0.274
130.000	38.185	37.833	-0.353
140.000	38.219	37.914	-0.305
150.000	38.252	37.901	-0.351
160.000	38.285	37.833	-0.452
170.000	38.318	37.889	-0.429
180.000	38.351	37.949	-0.402
190.000	38.383	38.065	-0.319
200.000	38.416	38.727	0.311
210.000	39.444	39.405	-0.039
220.000	38.173		
223.068			

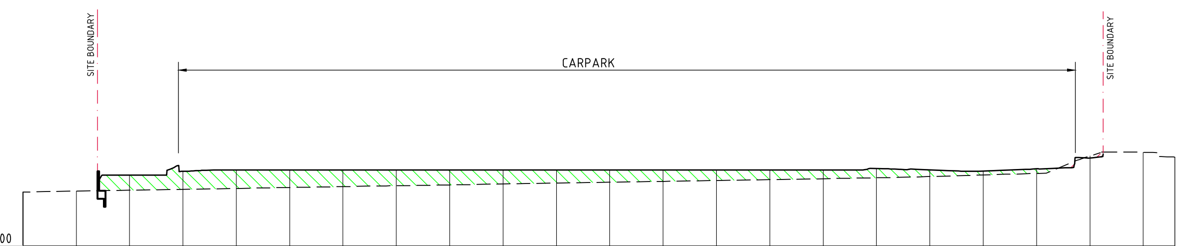
SECTION 1
HORIZONTAL SCALE 1:500
VERTICAL SCALE 1:100



DATUM 35.00

CHAINAGE	EXISTING SURFACE LEVEL	BULK EARTHWORKS LEVEL	CUT/FILL DEPTH
0.000			
10.000	37.410		
20.000	37.443	38.011	0.568
30.000	37.477	38.190	0.713
40.000	37.510	38.190	0.680
50.000	37.544	38.190	0.646
60.000	37.577	38.190	0.613
70.000	37.610	38.190	0.580
80.000	37.644	38.190	0.546
90.000	37.677	38.190	0.513
100.000	37.711	38.190	0.479
110.000	37.744	38.190	0.446
120.000	37.777	38.190	0.413
130.000	37.811	38.190	0.379
140.000	37.844	38.190	0.346
150.000	37.878	38.190	0.312
160.000	37.911	38.190	0.279
170.000	37.944	38.190	0.246
180.000	37.977	38.190	0.213
190.000	38.010	38.190	0.180
200.000	38.043	38.190	0.147
210.000	38.294	37.737	-0.557
220.000	39.161		
227.853			

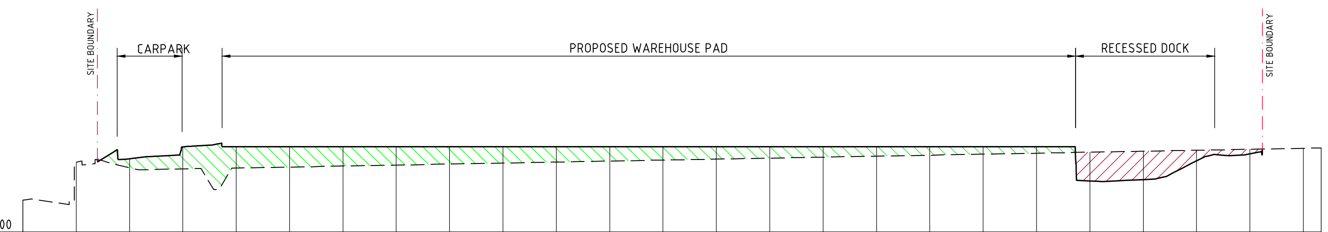
SECTION 2
HORIZONTAL SCALE 1:500
VERTICAL SCALE 1:100



DATUM 35.00

CHAINAGE	EXISTING SURFACE LEVEL	BULK EARTHWORKS LEVEL	CUT/FILL DEPTH
0.000			
10.000	37.047		
20.000	37.080	37.648	0.567
30.000	37.114	37.788	0.674
40.000	37.147	37.842	0.694
50.000	37.181	37.842	0.661
60.000	37.214	37.842	0.628
70.000	37.247	37.842	0.594
80.000	37.280	37.842	0.561
90.000	37.313	37.842	0.528
100.000	37.346	37.842	0.495
110.000	37.379	37.842	0.463
120.000	37.412	37.842	0.430
130.000	37.445	37.842	0.397
140.000	37.478	37.842	0.364
150.000	37.511	37.842	0.331
160.000	37.544	37.893	0.349
170.000	37.593	37.842	0.249
180.000	37.651	37.795	0.144
190.000	37.707	37.878	0.170
200.000	38.362	38.287	-0.075
210.000	38.502		
215.929			

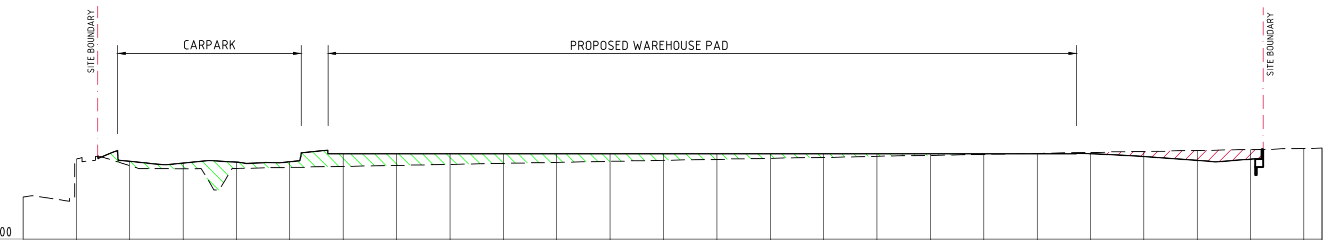
SECTION 3
HORIZONTAL SCALE 1:500
VERTICAL SCALE 1:100



DATUM 35.00

CHAINAGE	EXISTING SURFACE LEVEL	BULK EARTHWORKS LEVEL	CUT/FILL DEPTH
0.000			
10.000	37.608		
20.000	37.398	37.733	0.335
30.000	37.359	38.179	0.821
40.000	37.384	38.190	0.806
50.000	37.422	38.190	0.768
60.000	37.460	38.190	0.730
70.000	37.497	38.190	0.693
80.000	37.535	38.190	0.655
90.000	37.573	38.190	0.617
100.000	37.610	38.190	0.580
110.000	37.647	38.190	0.543
120.000	37.684	38.190	0.506
130.000	37.721	38.190	0.469
140.000	37.758	38.190	0.432
150.000	37.795	38.190	0.395
160.000	37.832	38.190	0.358
170.000	37.869	38.190	0.321
180.000	37.905	38.190	0.285
190.000	37.942	38.190	0.248
200.000	37.979	36.900	-1.079
210.000	38.016	36.953	-1.063
220.000	38.053	37.657	-0.396
230.000	38.090	37.917	-0.173
240.000	38.127		
243.373			

SECTION 4
HORIZONTAL SCALE 1:500
VERTICAL SCALE 1:100



DATUM 35.00

CHAINAGE	EXISTING SURFACE LEVEL	BULK EARTHWORKS LEVEL	CUT/FILL DEPTH
0.000			
10.000	38.005		
20.000	37.748	37.909	0.160
30.000	37.634	37.848	0.214
40.000	37.647	37.881	0.234
50.000	37.684	37.897	0.213
60.000	37.722	38.190	0.468
70.000	37.760	38.190	0.430
80.000	37.797	38.190	0.393
90.000	37.835	38.190	0.355
100.000	37.873	38.190	0.317
110.000	37.910	38.190	0.280
120.000	37.948	38.190	0.242
130.000	37.986	38.190	0.204
140.000	38.023	38.190	0.167
150.000	38.060	38.190	0.130
160.000	38.097	38.190	0.093
170.000	38.134	38.190	0.056
180.000	38.171	38.190	0.019
190.000	38.208	38.190	-0.018
200.000	38.245	38.198	-0.047
210.000	38.281	38.092	-0.189
220.000	38.317	37.945	-0.373
230.000	38.354	37.991	-0.363
240.000	38.390		
243.373			

SECTION 5
HORIZONTAL SCALE 1:500
VERTICAL SCALE 1:100

LEGEND:

- DENOTES BULK EARTHWORKS PROFILE
- DENOTES EXISTING PROFILE
- DENOTES AREA IN CUT
- DENOTES AREA IN FILL

5m 0 10 20 30 40 50m
SCALE 1:500 AT A0 SIZE SHEET

1m 0 1 2 3 4 5 6 7 8 9 10m
SCALE 1:100 AT A0 SIZE SHEET

STATE SIGNIFICANT DEVELOPMENT APPLICATION

AMENDMENTS	DATE	ISSUE
ISSUED FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION	17.09.21	C
PRELIMINARY ONLY	30.07.21	B
PRELIMINARY ONLY	27.07.21	A

ARCHITECT: PACE ARCHITECTS

CLIENT: FRASERS PROPERTY

PROJECT: ARDEX DISTRIBUTION CENTRE
MAMRE ROAD
KEMPS CREEK NSW 2178

DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
MC	ML	JUN 21	DS	A0	AS SHOWN	C013362.05-SSDA35

CONSULT AUSTRALIA

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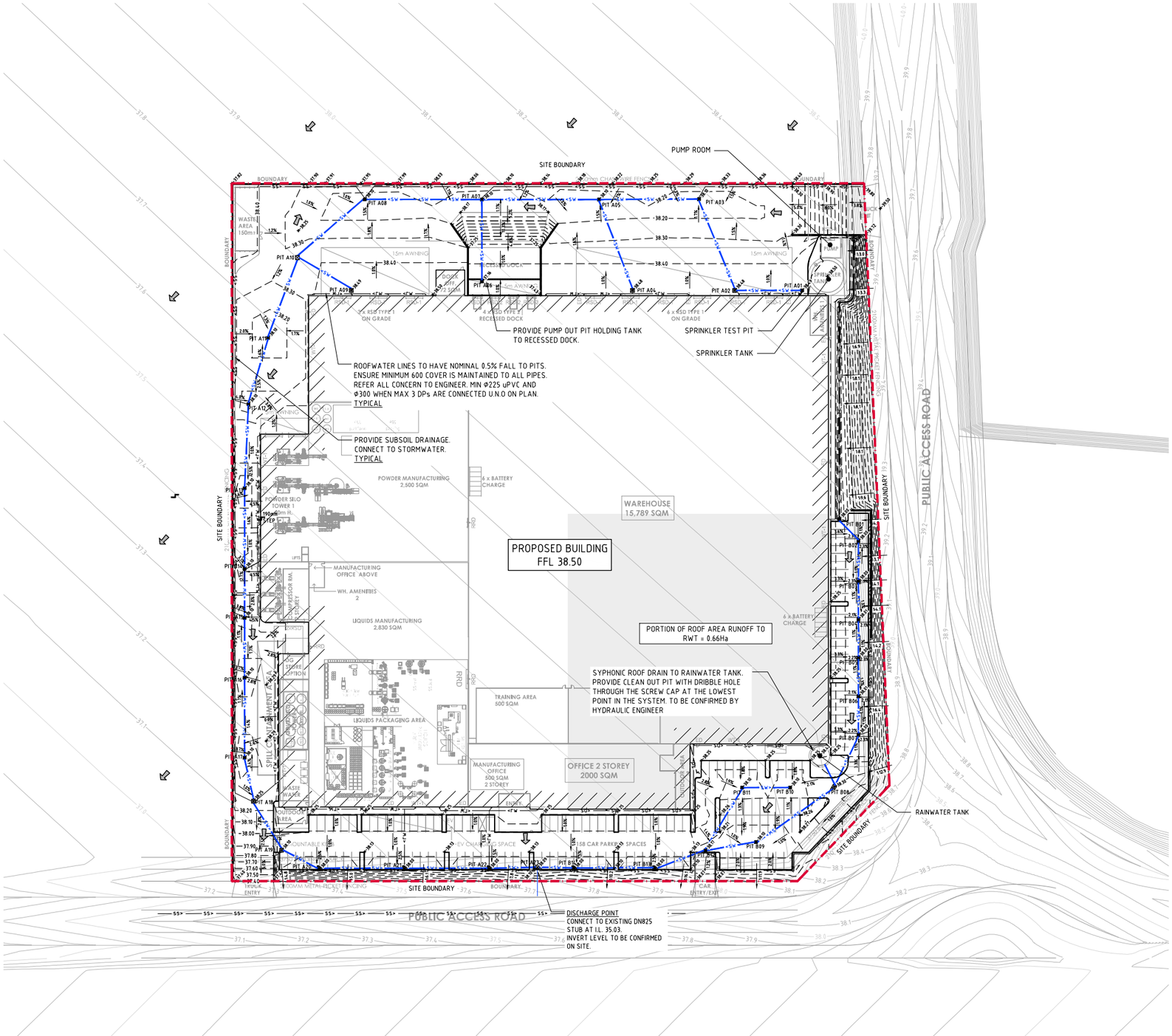
DRAWING TITLE: BULK EARTHWORKS SECTIONS

DRAWING No: C013362.05-SSDA35 ISSUE: C



STORMWATER DRAINAGE PLAN
SCALE 1:500

LEGEND:

LEVELS DATUM IS AHD.

EXISTING SITE LEVELS AND DETAILS BASED ON ESTATE DESIGN INFORMATION PROVIDED BY COSTIN ROE CONSULTING (DWG No. C013362.02-EW301 TO EW309).

- SGGP, SINGLE GRATED GULLY PIT
- SJP, SEALED JUNCTION PIT
- GD, GRATED DRAIN (300W x 225D UNO)
- SW – PROPOSED DRAINAGE LINE
- DP – ROOFWATER DOWNPIPE (INDICATIVE)
- RW – ROOFWATER LINE
- SS – SUBSOIL LINE
- SD – SYPHONIC LINE
- STORMWATER SWALE
- OVERLAND FLOW DIRECTION
- 38.00 – FINISHED PAVEMENT CONTOUR (MAJOR) 0.5m INTERVALS
- 38.10 – FINISHED PAVEMENT CONTOUR (MINOR) 0.1m INTERVALS

STORMWATER DRAINAGE NOTES:

1. ALL STORMWATER WORKS TO BE COMPLETED IN ACCORDANCE WITH AUSTRALIAN STANDARD AS3500.3:2018 PLUMBING AND DRAINAGE, PART 3: STORMWATER DRAINAGE.
2. THE MINOR (PIPED) SYSTEM HAS BEEN DESIGNED FOR THE 1 IN 20 YEAR ARI STORM EVENT AND THE MAJOR (OVERLAND) SYSTEM HAS BEEN DESIGNED FOR THE 1 IN 100 YEAR ARI STORM EVENT.
3. ALL FINISHED PAVEMENT LEVELS SHALL BE AS INDICATED ON FINISHED LEVELS PLANS C013362.05-C50.
4. PIT SIZES SHALL BE AS INDICATED IN THE SCHEDULE WHILE PIPE SIZES AND DETAILS ARE PROVIDED ON PLAN.
5. EXISTING STORMWATER PIT LOCATIONS AND INVERT LEVELS TO BE CONFIRMED BY SURVEY PRIOR TO COMMENCING WORKS ON SITE.
6. ALL STORMWATER PIPES Ø375 OR GREATER SHALL BE CLASS 2 (WITH HS2 SUPPORT) REINFORCED CONCRETE WITH RUBBER RING JOINTS UNLESS NOTED OTHERWISE.
7. ALL PIPES UP TO AND INCLUDING Ø300 TO BE uPVC GRADE SN8 UNO.
8. PIPE CLASS NOMINATED ARE FOR IN-SERVICE LOADING CONDITIONS ONLY. CONTRACTOR IS TO MAKE ANY NECESSARY ADJUSTMENTS REQUIRED FOR CONSTRUCTION CONDITIONS.
9. ALL CONCRETE PITS GREATER THAN 1000mm DEEP SHALL BE REINFORCED USING N12-200 EACH WAY CENTERED IN WALL AND BASE. LAP MINIMUM 300mm WHERE REQUIRED. ALL CONCRETE FOR PITS SHALL BE F'c=25 MPa. PRECAST PITS MAY BE USED WITH THE APPROVAL OF THE ENGINEER.
10. IN ADDITION TO ITEM 6 ABOVE, ALL CONCRETE PITS GREATER THAN 3000mm DEEP SHALL HAVE WALLS AND BASE THICKNESS INCREASED TO 200mm.
11. PIPES SHALL BE LAID AS PER PIPE LAYING DETAILS. PARTICULAR CARE SHALL BE TAKEN TO ENSURE THAT THE PIPE IS FULLY AND EVENLY SUPPORTED. RAM AND PACK FILLING AROUND AND UNDER BACK OF PIPES AND PIPE FAUCETS, WITH NARROW EDGED RAMMERS OR OTHER SUITABLE TAMPING DETAILS.
12. CONCRETE PIPES UNDER, OR WITHIN THE ZONE OF INFLUENCE OF PAVED AREAS SHALL BE LAID USING HS2 TYPE SUPPORT, AS A MINIMUM, IN ACCORDANCE WITH AS 3725. AGGREGATE BACKFILL SHALL NOT BE USED FOR PIPE BEDDING AND OR HAUNCH/SIDE SUPPORT.
13. WHERE PIPE LINES ENTER PITS, PROVIDE 2m LENGTH OF STOCKING WRAPPED SLOTTED Ø100 uPVC TO EACH SIDE OF PIPE.
14. ALL SUBSOIL DRAINAGE LINES SHALL BE Ø100 SLOTTED uPVC WITH APPROVED FILTER WRAP LAID IN 300mm WIDE GRANULAR FILTER UNLESS NOTED OTHERWISE. LAY SUBSOIL LINES TO MATCH FALLS OF LAND AND/OR 1 IN 200 MINIMUM. PROVIDE CAPPED CLEANING EYE (RODDING POINT) AT UPSTREAM END OF LINE AND AT 30m MAX. CTS. PROVIDE SUBSOIL LINES TO ALL PAVEMENT/ LANDSCAPED INTERFACES, TO REAR OF RETAINING WALLS.
(AS NOMINATED BY STRUCTURAL ENGINEER) AND AS SHOWN ON PLAN.
15. ALL PIPE GRADES 1 IN 200 MINIMUM UNO.
16. PROVIDE STEP IRONS IN PITS DEEPER THAN 1000mm.
17. MIN. 600 COVER TO PIPE OBVERT BENEATH ROADS & MIN. 400 COVER BENEATH LANDSCAPED AND PEDESTRIAN AREAS.
18. PIT COVERS IN TRAFFICABLE PAVEMENT SHALL BE CLASS D 'HEAVY DUTY', THOSE LOCATED IN NON-TRAFFICABLE AREAS SHALL BE CLASS B 'MEDIUM DUTY' U.N.O.
19. PROVIDE CLEANING EYES (RODDING POINTS) TO PIPES AT ALL CORNERS AND T-JUNCTIONS WHERE NO PITS ARE PRESENT.
20. DOWN PIPES (DP) TO BE AS PER HYDRAULIC ENGINEERS DETAILS WITH CONNECTOR TO MATCH DP SIZE U.N.O. ON PLAN. PROVIDE CLEANING EYE AT GROUND LEVEL.
21. PIPE LENGTHS NOMINATED ON PLAN OR LONGSECTIONS ARE MEASURED FROM CENTER OF PITS TO THE NEAREST 0.5m AND DO NOT REPRESENT ACTUAL LENGTH. THE CONTRACTOR IS TO ALLOW FOR THIS.
22. WHERE CONNECTION TO EXISTING INGROUND DRAINAGE SYSTEMS, OPEN SWALES, CHANNELS OR ANY OTHER EXISTING SYSTEM, IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY THE LOCATION AND INVERT ON SITE AT THE BEGINNING OF THE CONSTRUCTION PERIOD. REFER ANY VARIANCE FROM DOCUMENTATION OR SURVEYS TO THE ENGINEER FOR CLARIFICATION.

5m 0 10 20 30 40 50m
SCALE 1:500 AT A0 SIZE SHEET

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ARCHITECT: PACE ARCHITECTS
CLIENT: FRASERS PROPERTY

PROJECT
ARDEX DISTRIBUTION CENTRE
MAMRE ROAD
KEMPS CREEK NSW 2178

DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
MC	ML	JUN 21	DS	A0	AS SHOWN	C013362.05-SSDA40

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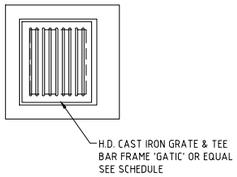
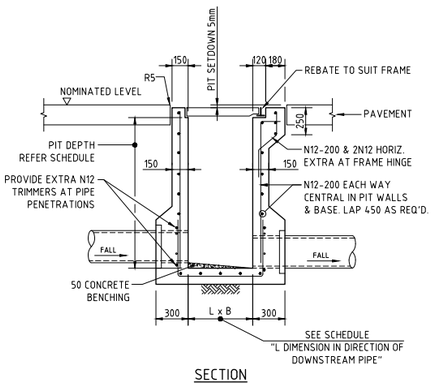
DRAWING TITLE: STORMWATER DRAINAGE PLAN
DRAWING No: C013362.05-SSDA40
ISSUE: C

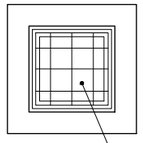


PLAN
SCALE 1:20

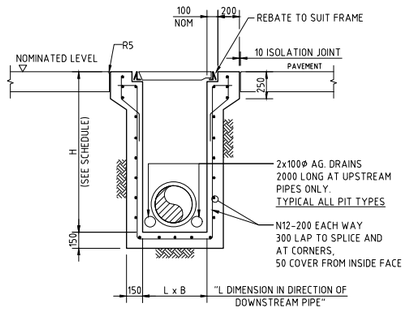


SECTION
SCALE 1:20

SINGLE GRATED GULLY PIT - SGGP

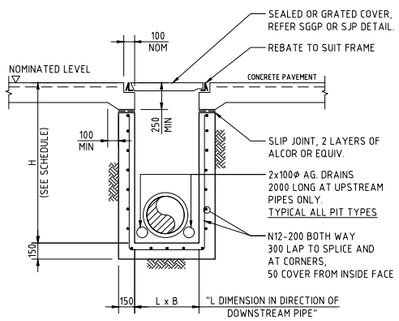


PLAN
SCALE 1:20



SECTION
SCALE 1:20

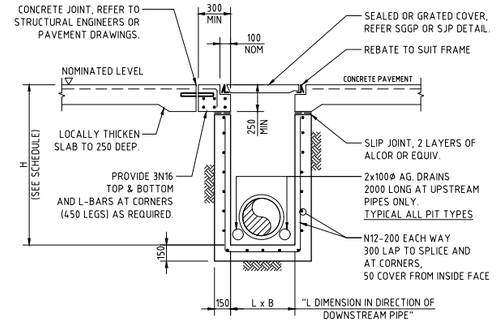
SEALED PIT - SP



SECTION
SCALE 1:20

SJP/CIS & SGGP/CIS (CAST IN SLAB) PIT DETAIL
GRATE/COVER SUPPORT
CAST-INTO PAVEMENT SLAB

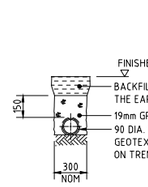
(ADOPT IN CONCRETE PAVEMENTS FOR SGGP's & SJP's, WHERE JOINTS ARE NOT LOCATED WITHIN PROXIMITY OF THE GRATE)



SECTION
SCALE 1:20

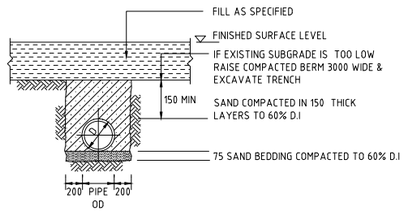
SJP/CIS & SGGP/CIS (CAST IN SLAB) PIT DETAIL
GRATE/COVER SUPPORT
CAST-INTO PAVEMENT SLAB

(ADOPT IN CONCRETE PAVEMENT FOR SGGP's & SJP's, WHERE PITS ARE LOCATED IN THE CORNER OF SLAB PANELS OR ADJACENT TO SLAB PANEL JOINTS)



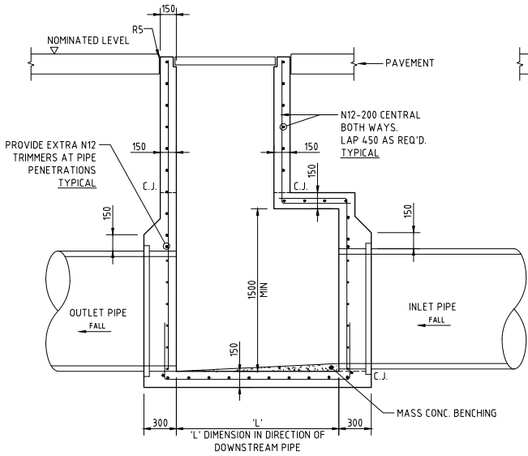
SUPPORT TO AGRICULTURAL DRAIN

SCALE 1:20

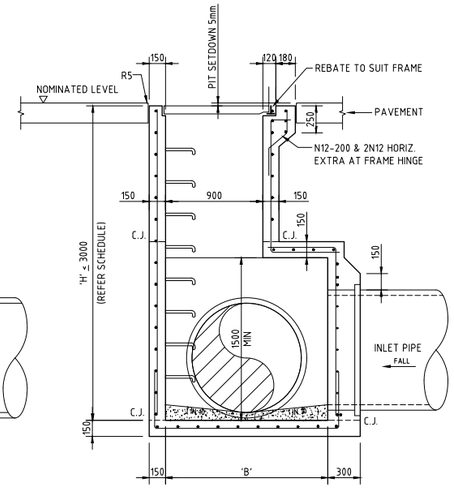


SUPPORT TO uPVC PIPES

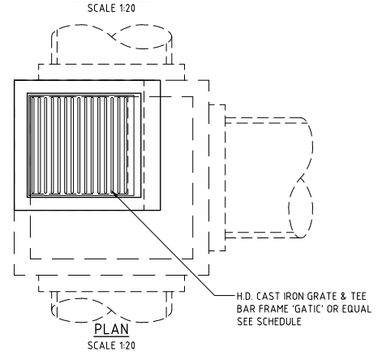
SCALE 1:20



LONG SECTION
SCALE 1:20



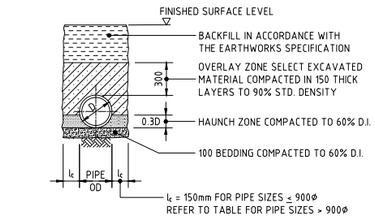
CROSS SECTION
SCALE 1:20



PLAN
SCALE 1:20

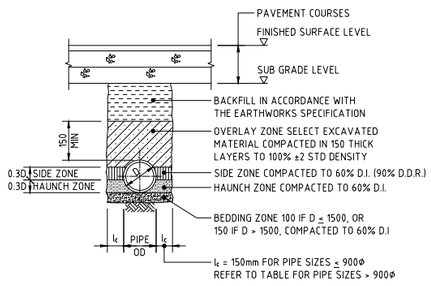
TAPERED SINGLE GRATED GULLY PIT - SGGP

SUBSOIL NOT SHOWN
FOR CLARITY



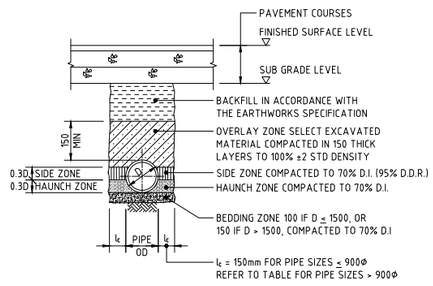
TYPE H1 SUPPORT TO CONCRETE PIPES AT LANDSCAPED AREAS

SCALE 1:20



TYPE HS2 SUPPORT TO CONCRETE PIPES UNDER PAVEMENT

SCALE 1:20
D ≤ 1350, MAX FILL = 4.0m
D > 1350, MAX FILL = 3.0m



TYPE HS3 SUPPORT TO CONCRETE PIPES UNDER PAVEMENT

SCALE 1:20
D ≤ 1050, MAX FILL = 6.0m
D > 1050, MAX FILL = 4.8m

BEDDING & HAUNCH MATERIAL GRADING	
SIEVE SIZE (mm)	WEIGHT PASSING (%)
19.0	100
2.36	100 TO 50
0.60	90 TO 50
0.30	60 TO 10
0.15	25 TO 0
0.075	10 TO 0

SIDE ZONE WIDTH	
PIPE SIZE (mm)	l_c (mm)
≤ 900Φ	150
1050Φ	175
1200Φ	200
1350Φ	225
1500Φ	250
1650Φ	275
1800Φ	300
ENGINEER TO SPECIFY TRENCH WIDTHS FOR PIPE SIZES GREATER THAN 1800Φ	

SIDE ZONE MATERIAL GRADING	
SIEVE SIZE (mm)	WEIGHT PASSING (%)
19.0	100
9.5	100 TO 50
2.6	100 TO 30
0.60	50 TO 15
0.075	25 TO 0
SELECT FILL MATERIAL IN ACCORDANCE WITH TABLE 1 AS 3725	

200mm 0 500 1000 1500 2000mm
SCALE 1:20 AT A0 SIZE SHEET

STATE SIGNIFICANT DEVELOPMENT APPLICATION

AMENDMENTS	DATE	ISSUE
ISSUED FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION	17.09.21	B
PRELIMINARY ONLY	27.07.21	A

AMENDMENTS DATE ISSUE | AMENDMENTS DATE ISSUE

ARCHITECT: PACE ARCHITECTS
CLIENT: FRASERS PROPERTY

PROJECT: ARDEX DISTRIBUTION CENTRE
MAMRE ROAD
KEMPS CREEK NSW 2178

DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
MC	ML	JUN 21	DS	A0	AS SHOWN	C013362.05-SSDA45

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Walsh Bay, Sydney NSW 2000
Tel (02) 9251-7600 Fax: (02) 8241-3731
email: mail@costinroe.com.au ©

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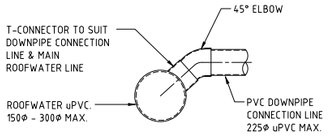
DRAWING TITLE: STORMWATER DRAINAGE DETAILS SHEET 1

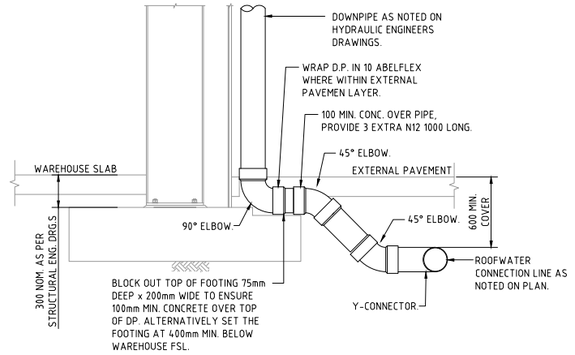
DRAWING No: C013362.05-SSDA45 ISSUE: B



DOWN PIPE CONNECTION TO uPVC PIPE

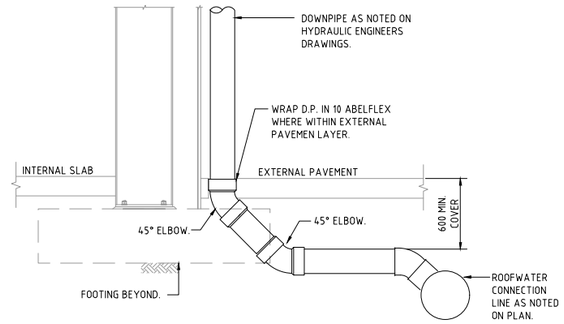
SCALE 1:20

1. PROPRIETARY T-PIECE CONNECTORS SHALL BE USED TO WHERE DIRECT CONNECTIONS ARE REQUIRED TO uPVC PIPES .
2. ALL JOINTS TO BE SEALED WITH SOLVENT WELDED JOINTS.
3. THE PVC PIPE SHALL NOT PROTUDE BEYOND THE INNER SURFACE OF THE STORMWATER PIPE.



DOWNPIPE TURN-UP DETAIL A

(AT FOOTING LOCATION)
SCALE 1:20



DOWNPIPE TURN-UP DETAIL B

(CLEAR OF FOOTING)
SCALE 1:20

200mm 0 500 1000 1500 2000mm

SCALE 1:20 AT A0 SIZE SHEET

STATE SIGNIFICANT DEVELOPMENT APPLICATION

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ISSUED FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION	17.09.21	B
PRELIMINARY ONLY	27.07.21	A

ARCHITECT: PACE ARCHITECTS

CLIENT: FRASERS PROPERTY

PROJECT: ARDEX DISTRIBUTION CENTRE
MAMRE ROAD
KEMPS CREEK NSW 2178

DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
MC	ML	JUN 21	DS	A0	AS SHOWN	C013362.05-SSDA46

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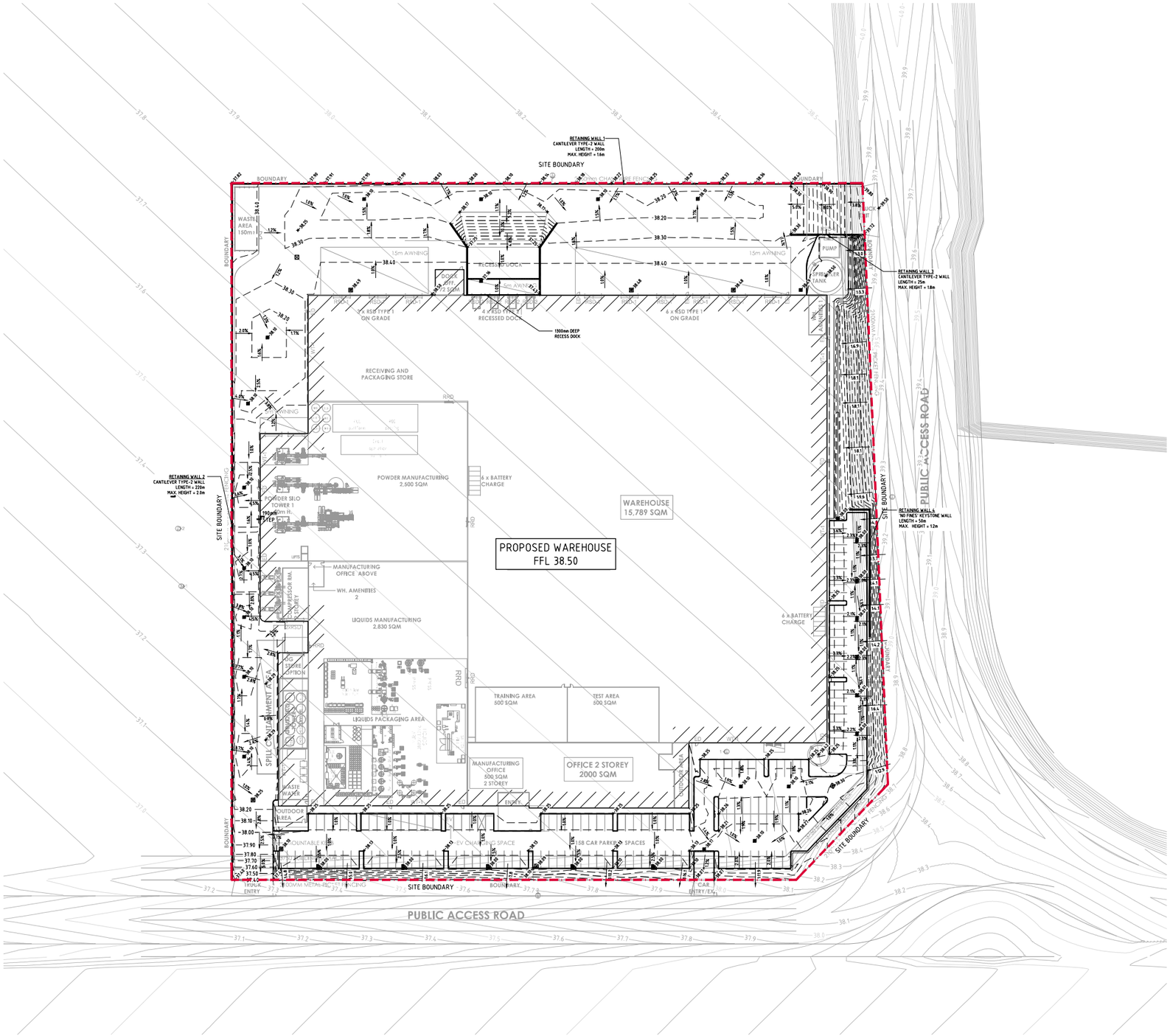
DRAWING TITLE: STORMWATER DRAINAGE DETAILS SHEET 2

DRAWING No: C013362.05-SSDA46 ISSUE: B



FINISHED LEVELS PLAN
SCALE 1:500

LEGEND:

LEVELS DATUM IS AHD.

- SGGP, SINGLE GRATED GULLY PIT
- SJP, SEALED JUNCTION PIT
- GD, GRATED DRAIN (300W x 225D UNO)
- 50.00 - FINISHED PAVEMENT CONTOUR (MAJOR) 0.5m INTERVALS
- 50.10 - FINISHED PAVEMENT CONTOUR (MINOR) 0.1m INTERVALS

FINISHED LEVELS PLAN NOTES:

1. LEVELS DATUM IS AUSTRALIAN HEIGHT DATUM (A.H.D.).
2. GRADING REQUIREMENTS TO BE COMPLETED IN ACCORDANCE WITH AUSTRALIAN STANDARD AS2890.1, AS2890.2 AND AS2890.6.
3. ALL CONTOUR LINES & SPOT LEVELS INDICATE FINISHED PAVEMENT LEVELS U.N.O. ON PLAN.
4. CONTOUR INTERVALS
   - THE MINOR CONTOUR INTERVAL IS 0.1m.
   - THE MAJOR CONTOUR INTERVAL IS 0.5m.
5. HARDSTAND GRADING
   - MINIMUM PAVEMENT GRADE IS TO BE 1:100 (1%).
   - GRADING OF ON-GRADE DOCKS TO BE 1:100 (1%) FALL AWAY FROM THE DOCK FACE FOR A LENGTH OF 15m U.N.O.
   - GRADING OF TRUCK CIRCULATION ZONES TO BE MINIMUM AS NOTED ABOVE, 3-4% NOMINAL AND MAX. 5%.
6. CAR PARKING AREA GRADES
   - MINIMUM PAVEMENT GRADE IS TO BE 1:100 (1%), DESIRABLE MINIMUM GRADE 1:50 (2%).
   - MAXIMUM PAVEMENT GRADE IS TO BE 1:20 (5%) IN CARPARKING AREAS AND 1:25 (4%) ELSEWHERE.
   - DISABLED ACCESS PARKING ZONES AND SHARED SPACE TO BE MAXIMUM OF 1:33 (3%) IN ASPHALT PAVEMENT AND MAXIMUM OF 1:40 (2.5%) IN CONCRETE PAVEMENT.
   - CARPARK RAMP GRADES TO BE MAX 1:5 WITH 2.5m SMOOTH TRANSITION AT TOP AND BOTTOM U.N.O.
7. TRUCK RAMP GRADES
   - MAXIMUM B-DOUBLE OR 19.0m AV RAMP GRADES ARE TO BE 1:8.3 (12%) U.N.O. ON PLAN
   - PROVIDE MINIMUM 4.0m LONG TRANSITION WHERE CHANGES OF GRADE EXCEED 1:20 (5%) AT A CREST U.N.O.
   - PROVIDE MINIMUM 3.0m LONG TRANSITION WHERE CHANGE OF GRADE EXCEED 1:20 (5%) AT A SAG U.N.O.
   - TRANSITIONS ARE TO PROVIDE A SMOOTH CONTINOUS CIRCULAR AND TANGENTIAL CHANGE IN GRADE TO ENSURE NO SHARP OR ACUTE CHANGES IN GRADE ARE PRESENT.
8. WHERE FIRE BRIGADE ACCESS IS REQUIRED, MAXIMUM RAMP GRADIENTS ARE TO BE 1:6 (16.6%), DESIRABLE RAMP GRADIENTS ARE TO BE 1:8 (12.5%) WITH 7m TRANSITION TOP AND BOTTOM U.N.O. ON PLAN.
9. PERMANENT BATTER SLOPES ARE TO HAVE A MAXIMUM GRADE OF 1V:3H U.N.O. BASED ON GEOTECHNICAL ASSESSMENT. PROVIDE MINIMUM 0.5m BERM BETWEEN THE BACK OF KERB OR PAVEMENT EDGES AND THE TOP OR TOE OF A BATTER.
10. ALL BATTER SLOPE WITH GRADES AT OR EXCEEDING 1V:6H ARE TO BE TURFED IMMEDIATELY OR APPROPRIATE EROSION CONTROL IS TO BE PROVIDED TO THE SATISFACTION OF THE ENGINEER.
11. ALL FOOTPATHS ARE TO FALL AWAY FROM THE BUILDING AT 2.5% NOMINAL. GRADE.
12. ALL PAVEMENTS ARE TO BE SET AT 30mm BELOW THE FINISHED FLOOR LEVEL OF THE WAREHOUSE AND OFFICE AREAS UNO ON PLAN. PROVIDE LOCAL FEATHERING AT DOORWAYS OR ROLLER SHUTTERS TO PROVIDE FLUSH FINISH AS REQUIRED.
13. WHERE NEW AND EXISTING INTERFACING IS REQUIRED, MATCH EXISTING LEVELS AND PROVIDE SMOOTH INTERFACE BETWEEN NEW AND EXISTING GRADIENTS. REFER ANY CONCERNS TO THE ENGINEER.

5m 0 10 20 30 40 50m
SCALE 1:500 AT A0 SIZE SHEET

STATE SIGNIFICANT DEVELOPMENT APPLICATION

AMENDMENTS	DATE	ISSUE
ISSUED FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION	17.09.21	C
PRELIMINARY ONLY	31.07.21	B
PRELIMINARY ONLY	27.07.21	A

ARCHITECT: PACE ARCHITECTS
CLIENT: FRASERS PROPERTY

PROJECT: ARDEX DISTRIBUTION CENTRE
MAMRE ROAD
KEMPS CREEK NSW 2178

DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
MC	ML	JUN 21	DS	A0	AS SHOWN	C013362.05-SSDA50

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DRAWING TITLE: FINISHED LEVELS PLAN
DRAWING No: C013362.05-SSDA50
ISSUE: C

Appendix B

DRAFT STORMWATER MAINTENANCE PLAN

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.
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

MAINTENANCE ACTION	FREQUENCY	RESPONSIBILITY	PROCEDURE
			depth as specified by the hydraulic consultant
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.
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 C

DRAFT EROSION AND SEDIMENT CONTROL PLAN & EROSION CONTROL CHECK SHEET

C.1 Introduction

An erosion and sediment control plan (ESCP) is shown on drawing **Co13362.05-SSDA20** with details on **SSDA25**. 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.

C.2 General Conditions

1. 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.
2. Contractors will ensure that all soil and water management works are undertaken as instructed in this specification and constructed following the guidelines stated in *Managing Urban Stormwater, Soils and Construction (1998) "The Blue Book"* and Penrith City Council specifications.
3. All subcontractors will be informed of their responsibilities in minimising the potential for soil erosion and pollution to down slope areas.

C.3 Land Disturbance

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

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	

Table C.1 Limitations to access

C.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.

C.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.
   b) 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
   c) 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 t_c discharge.
3. 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.
4. 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.
5. Temporary soil and water management structures will be removed only after the lands they are protecting are stabilised.

C.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.

C.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,
   - No low points exist that can overtop in a large storm event
   - 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.
   - 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 D

ESTATE CIVIL ENGINEERING REPORT LINKS

SSD9522 estate "W*ater Cycle Management Strategy*" (**Ref: *Co13362.00-07k.rpt***):
https://www.planningportal.nsw.gov.au/major-projects/project/10376

SSD9522 estate *"Overland Flow Report"* by Costin Roe (***ref: Co13362.00-06i.rpt***):
https://www.planningportal.nsw.gov.au/major-projects/project/10376

SSD9522 Mod 1 Estate *"Water Cycle Management Strategy"* (**Ref: *Co13362.00-27a.rpt***):
https://www.planningportal.nsw.gov.au/major-projects/project/41256