



**COSTIN ROE  
CONSULTING**

**CIVIL &  
STRUCTURAL  
ENGINEERS**



# **CONSTRUCTION STORMWATER MANAGEMENT PLAN, INCORPORATING EROSION AND SEDIMENT CONTROL PLAN**

DEVELOPMENT SITE

**SSD 9522**

**MAMRE ROAD & SOUTHERN LINK RD.  
KEMPS CREEK, NSW**

*Prepared for:*

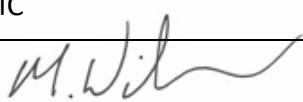
Frasers Property Australia & Altis  
Property Partners  
Level 2, Building C  
1 Homebush Bay Drive  
RHODES NSW 2138

*Prepared by:*

Costin Roe Consulting  
Level 4, 8 Windmill Street  
MILLERS POINT NSW 2000

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<b>Client Contact</b>	Mr Naiem Teghlobi, Frasers Property

	Name	Signature
<b>Prepared by</b>	Mitchell Cross	MC
<b>Checked by</b>	Mark Wilson	
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## 1 INTRODUCTION

### 1.1 Background

Costin Roe Consulting Pty Ltd has been commissioned by Frasers Property Australia and Altis Property Partners to prepare this *Construction Stormwater Management Plan (CSMP)*, incorporating *Erosion and Sediment Control Plan (ESCP)*, for construction of the Mamre West Industrial Estate, as approved by the NSW Department of Planning, Infrastructure & Environment (DPIE) SSD\_9522 (dated 21 December 2020) consent.

The submission of the CSMP and ESCP for approval by DPIE has been completed in accordance with **Conditions of Consent (CoC) B19, B21 through B24, CoC B25 to B29, and B34 to B43**. This CSMP & ESCP forms part of the *Construction Environmental Management Plan (CEMP)* as required of **CoC C2 and C3** and has been prepared in accordance with the requirements of **CoC C1**.

The subject area of this CSMP comprises the earthworks and infrastructure for the estate. These works include road and infrastructure drainage construction throughout the development extent. It is noted that this CSMP sets out the overall requirements of the precinct relating to construction soil and water management measures and that further detailed building specific ESCP's may be necessary throughout the work period subject to detailed building layouts being defined and designed. This CSMP does not include works within Mamre Road which are subject to a separate *Transport for New South Wales (TfNSW)* approval and a separate *Works Authorisation Deed (WAD)* with TfNSW.

It is further noted that this CSMP has been completed with consideration to the *Section 10* of the Costin Roe Consulting "*Civil Engineering Report Incorporating Water Cycle Management Strategy* (Ref: **Co13362.00-20d.rpt**)" included in the approved SSD\_9522. The requirements outlined in this report are consistent with the requirements of *Managing Urban Stormwater - Soils and Construction Volume 1 (Landcom 2004)* as set out in this document.

We also confirm that an *Operational Stormwater Management Plan (OSMP)* for operation of the Mamre West Industrial Estate will be completed in accordance with **Conditions of Consent (CoC) B26 through B29 and will** form part of the *Operational Environmental Management Plan (OEMP)* as required of **CoC C5**. The OSMP is noted to be a separate management plan that will confirm such items as detailed hydraulic calculations for inground drainage, stormwater detention and estate water quality measures to be implemented in operational stage of the project.

### 1.2 Scope

This CSMP provides details of the design principles and construction requirements for soil and water management, as part of a CEMP required for the DPIE submission approval under **CoC B22**.

This plan details the site management procedures to control the severity and extent of soil erosion and pollutant transport during the pre-construction and construction phase of the development as described in **Section 1.1** and **Section 2.2** of this CSMP.

The CSMP will be read in conjunction with the ESCP design package, drawings **Co13362.02-EW200 to EW206** as included in **Appendix A**.

### 1.3 Conditions of Consent Matrix

The CSMP and associated ESCP have been completed in accordance with the approved stormwater management strategy and EIS approved in the NSW DPIE in SSD\_9522.

We provide the following tables which confirms how and where, within the report or respective drawings and models, each of the requirements of SSD\_9522 **CoC B21** through **B29**, and **CoC B34** to **B42**.

#### SSD9952 Consent Condition Matrix

CoC No.	Item	Response
<b>Imported Soil</b>		
B21	<p><i>The Applicant must:</i></p> <ul style="list-style-type: none"> <li><i>a) ensure that only VENM, ENM, or other material approved in writing by EPA is brought onto the site;</i></li> <li><i>b) keep accurate records of the volume and type of fill to be used; and</i></li> <li><i>c) make these records available to the Planning Secretary upon request.</i></li> </ul>	<p>The requirement for VENM and ENM is included in <b>Section 3.4</b> of the <b>CSMP</b>.</p>
<b>Erosion and Sediment Control</b>		
B22	<p><i>Prior to the commencement of any construction or other surface disturbance the Applicant must install and maintain suitable erosion and sediment control measures on-site, in accordance with the relevant requirements of the Managing Urban Stormwater: Soils and Construction - Volume 1: Blue Book (Landcom, 2004) guideline and the Erosion and Sediment Control Plan included in the CEMP required by condition C2.</i></p>	<p>A CSMP and associated ESCP have been prepared per the requirements of CoC B19, and C2 as set out in this document and the guidelines included in <i>Managing Urban Stormwater - Soils and Construction Volume 1 (Landcom 2004)</i>, and per accepted engineering and best practice.</p> <p>The measures set out in this document and associated drawings, if followed, meet the requirements of the <b>CoC B22 &amp; B23</b> and are to be installed prior to commencement of construction, and following approval of this document and CEMP by the Planning Secretary.</p>

<b>CoC No.</b>	<b>Item</b>	<b>Response</b>
B23	<p><i>The Applicant must prepare an Erosion and Sediment Control Plan to the satisfaction of the Planning Secretary. The Plan must form part of a CEMP in accordance with condition C2 and must:</i></p> <ul style="list-style-type: none"> <li><i>a) be prepared by a suitably qualified and experienced person(s);</i></li> <li><i>b) include detailed erosion and sediment controls developed in accordance with the relevant requirements of Managing Urban Stormwater: Soils and Construction - Volume 1: Blue Book (Landcom, 2004) guideline; and</i></li> <li><i>c) include procedures for maintaining erosion and sediment controls in efficient working order for the duration of construction, to ensure compliance with condition B25.</i></li> </ul>	<p>This CSMP and ESCP have been prepared for the applicant by Costin Roe Consulting Pty Ltd, civil and structural consulting engineers. Costin Roe Consulting is experienced in the preparation and implementation of Stormwater Management Plans, and staged <i>Soil and Water Management Plans</i> for industrial developments of similar scope to the development. Recent similar projects include SSD approved developments such as Moorebank Intermodal Precinct, The Eastern Creek Business Park Stages 4 &amp; 5, The Horsley Drive Business Park Stage 1 at Wetherill Park, Altis First Estate at Erskine Park, Prestons Industrial Estate at Prestons and the DEXUS Quarry at Greystanes.</p> <p>The CSMP and associated erosion and sediment control plans have been completed as required of <i>Managing Urban Stormwater - Soils and Construction Volume 1 (Landcom 2004)</i>, Penrith City Council requirements and per accepted engineering and best practice.</p> <p><b>Sections 3 through 8</b> of the CSMP include procedures for maintaining erosion and sediment controls in efficient working order for the duration of construction, to ensure compliance with <b>CoC B25</b></p>
B24	<p><i>Prior to the commencement of bulk earthworks, the Applicant must implement erosion and sediment controls identified by condition B24 and maintain those controls throughout bulk earthworks and construction, to ensure stormwater</i></p>	<p>The CSMP has been reviewed by the <i>Environmental Representative (ER)</i> (to be appointed per <b>CoC A36 to A42</b>). The ER will be required to confirm the erosion and sediment controls set out in this document are operational at the commence of</p>

<b>CoC No.</b>	<b>Item</b>	<b>Response</b>
	<i>flows do not increase in any downstream areas. The ER, appointed in accordance with condition A36, shall make a written statement to the Planning Secretary confirming the erosion and sediment controls are operational, prior to the commencement of bulk earthworks and other construction activities required for the development.</i>	Construction as required of this <b>CoC</b> and the CEMP.
<b>Discharge Limits</b>		
B25	<i>The development must comply with Section 120 of the POEO Act, which prohibits the pollution of waters, except as expressly provided for in an EPL.</i>	<p>Discharge limits for the construction phase of the development have been detailed in <b>Section 3.6</b> of this CSMP. The noted discharge limits are based on those required of <i>Managing Urban Stormwater - Soils and Construction Volume 1 (Landcom 2004)</i>, Penrith City Council requirements and per accepted engineering and best practice.</p> <p>The limits proposed are consistent with accepted discharge criteria for construction sites, and if followed will meet the requirements of <i>Section 120 of the POEO Act</i>, relating to the pollution of waters</p>
<b>Stormwater Management</b>		
B26	<i>Prior to the commencement of construction, the Applicant must prepare a Stormwater Management Plan to the satisfaction of the Planning Secretary. The Plan must form part of the CEMP and OEMP required by conditions C2 and C5 and must:</i>	<p>This CSMP has been prepared for the applicant by Costin Roe Consulting Pty Ltd, civil and structural consulting engineers. Costin Roe Consulting is experienced in the preparation and implementation of <i>Stormwater Management Plans</i> for industrial developments of similar scope to this development. Recent similar</p>

CoC No.	Item	Response
	<p>a) <i>be prepared by a suitably qualified and experienced person(s), in accordance with the design presented in the RtS and in consultation with Council and WaterNSW;</i></p> <p>b) <i>be prepared in accordance with applicable Australian Standards;</i></p> <p>c) <i>be prepared in accordance with the Penrith City Council Development Control Plan 2014 (Part C3) and Council's Water Sensitive Urban Design Standard Drawings;</i></p> <p>d) <i>ensure that the system capacity has been designed in accordance with Australian Rainfall and Runoff (Engineers Australia, 2016) and Managing Urban Stormwater: Council Handbook (EPA, 1997) guidelines; and</i></p> <p>e) <i>demonstrate that the on-site detention basin has been designed to withstand the forces of flood waters, debris and buoyancy forces up to the 1% Annual Exceedance Probability flood event.</i></p>	<p>projects include SSD approved developments such as Moorebank Intermodal Precinct, The Eastern Creek Business Park Stages 4 &amp; 5, The Horsley Drive Business Park Stage 1 at Wetherill Park, Altis First Estate at Erskine Park, Prestons Industrial Estate at Prestons and the DEXUS Quarry at Greystanes.</p> <p>Consultation with Penrith Council and WaterNSW has been undertaken as included in <b>Appendix E</b>.</p> <p>The CSMP and associated ESCP have been prepared in accordance with <i>Managing Urban Stormwater - Soils and Construction Volume 1 (Landcom 2004)</i>. The future separate OSMP would require designs to be completed in accordance with, Australian &amp; New Zealand Standard AS/NZS 3500.3:2003 Plumbing and drainage – Stormwater Drainage, Penrith City Council requirements (including <i>Engineering Construction Specifications for Civil Works, Stormwater Drainage Specification for Building Developments and Design Guidelines for Engineering Works for Subdivisions and Developments</i>) and per accepted engineering and best practice.</p> <p>In addition to the Penrith City Council documents noted above, the CSMP and OSMP design are completed with consideration to <i>Penrith City Council Development Control Plan 2014 (Part C3)</i> and Council's <i>Water Sensitive Urban Design Standard Drawings</i>.</p> <p>The design capacity of the drainage system during earthworks allows for</p>



<b>CoC No.</b>	<b>Item</b>	<b>Response</b>
		<p>conveyance of the 10% AEP as required of <i>Managing Urban Stormwater - Soils and Construction Volume 1 (Landcom 2004)</i> – refer drawings for relevant confirmation of various system elements. The future infrastructure drainage system will be sized to accommodate the 5% AEP inground and 1% AEP overland. All stormflow and hydrological assessments are based on hydrological runoff methods included in <i>Australian Rainfall and Runoff (Engineers Australia, 2016)</i> and hydraulic designs per <i>Managing Urban Stormwater: Council Handbook (EPA, 1997)</i>.</p> <p>The detention system does not form part of the early works construction. Any temporary sediment basins are noted to be positioned clear of the 1% AEP event associated with South Creek floodway.</p>
B27	<p><i>The Applicant must:</i></p> <ul style="list-style-type: none"> <li><i>a) not commence construction until the Stormwater Management Plan required by condition B26 is approved by the Planning Secretary; and</i></li> <li><i>b) implement the most recent version of the Stormwater Management Plan approved by the Planning Secretary for the duration of the development.</i></li> </ul>	<p>Construction is noted to not begin until the CSMP is approved by the planning secretary. The responsibility for compliance of all CoC's required for construction remains with the applicant and the certifier.</p> <p>The most recent version of the CSMP is to be adopted on site by the estate management team and provided to individual property tenants. The responsibility to ensure the most recent version of the CSMP is implemented remains with the applicant</p>
B28	<i>Prior to the commencement of the Sequence 1B upgrade works, detailed design plans and hydraulic</i>	There are no roadworks components (including the

<b>CoC No.</b>	<b>Item</b>	<b>Response</b>
	<i>calculations of any changes to the stormwater drainage system must be submitted to TfNSW for approval.</i>	Sequence 1B upgrade) included in the CSMP or ESCP.  It is noted that this SMP does not include works relating to Mamre Road. Refer separate design and basis of design report by MU Group.
<b>B29</b>	<i>All stormwater drainage infrastructure on the Site, including bio-retention basins, shall remain under the care, control and ownership of the registered proprietor of the lots.</i>	There are no proposed bio-retention basins as part of this CSMP. The future OSMP will confirm ownership of drainage within private lots. Ownership of drainage within publicly dedicated roadways remain the ownership of Council.
<b>Protection of the Warragamba Pipelines Corridor</b>		
<b>B34</b>	<i>Detailed design for the development must demonstrate compliance with the WaterNSW publication Guidelines for development adjacent to the Upper Canal and Warragamba Pipelines.</i>	The detailed design includes a 60m buffer (for future freight rail corridor) between the development and the Warragamba Pipelines.  There are no works proposed within the proximity or zone of influence of the pipeline or the pipeline supporting structure. The proposed development and stormwater drainage designs, as such meet the requirements of the <i>WaterNSW publication Guidelines for development adjacent to the Upper Canal and Warragamba Pipelines</i> .  It is noted that works associated with the Mamre Road upgrade, which would be within the zone of influence of the Warragamba Pipeline do not form part of this document scope or content, and are subject to separate designs by MU Group and approvals by TfNSW. Refer separate design documents relating to Mamre Road Works.  Consultation with <i>WaterNSW</i> has been undertaken and it has been

<b>CoC No.</b>	<b>Item</b>	<b>Response</b>
		confirmed that the proposed works are acceptable to WaterNSW. Refer associated correspondence in <b>Appendix E.</b>
<i>B35</i>	<i>Final levels and design of the development must not result in an increase in overland flow of water into the Warragamba Pipelines corridor of either quantity or velocity, or a decrease in quality. The development must be designed, operated and maintained to ensure post-development flows do not exceed pre-development flows into and through the Warragamba Pipelines corridor.</i>	<p>There are no works proposed within the proximity of the pipeline or the pipeline supporting structure. There are no new flows being directed toward the pipeline corridor throughout the development footprint. As such the final detail design results in no increase to flow quantity or velocity in the pipeline corridor. Further, there would be no reduction in water quality for any stormwater flows within the pipeline corridor given there are no additional flows being directed toward the corridor, and the 60m buffer between the development footprint and the pipeline corridor.</p> <p>The proposed development design has been completed in accordance with the approved flood and overland flow assessment (completed by Costin Roe Consulting Pty Ltd) which confirms no changes in the 1% and 0.2% AEP flood events, and acceptable changes for larger storm events to the PMF.</p> <p>Consultation with <i>WaterNSW</i> has been undertaken and it has been confirmed that the proposed works are acceptable to WaterNSW. Refer associated correspondence in <b>Appendix E.</b></p>
<i>B36</i>	<i>Stormwater directed to or across the Warragamba Pipelines corridor is prohibited, except at approved</i>	There are no works proposed within proximity of the pipeline or the pipeline supporting structure. There are no new flows being

<b>CoC No.</b>	<b>Item</b>	<b>Response</b>
	<i>points of discharge for the development.</i>	directed toward the pipeline corridor throughout the development footprint.
<i>B37</i>	<i>The Applicant must supply a dilapidation report to WaterNSW four weeks prior to the commencement of construction. The dilapidation report must identify the condition of all infrastructure within the Warragamba Pipelines corridor, from Mamre Road to South Creek, with specific attention paid to the Probable Maximum Flood level.</i>	A Dilapidation Report has been completed by MU Group based on an inspection undertaken on 14 January 2021. Refer report by MU Group.
<i>B38</i>	<i>WaterNSW must be consulted should there be any impact on existing drainage structures during the works within or adjacent to the Warragamba Pipelines corridor. Any impacted drainage structures must be reinstated and/or restored on completion of works at the Applicant's expense, to the satisfaction of WaterNSW.</i>	<p>We confirm there are no works proposed within the zone of influence of the pipeline or any changes to existing drainage structures within or adjacent to the pipeline corridor.</p> <p>Consultation with <i>WaterNSW</i> has been undertaken and it has been confirmed that the proposed works are acceptable to WaterNSW. Refer associated correspondence in <b>Appendix E</b>.</p> <p>It is noted that works associated with the Mamre Road upgrade, which could have some minor changes to drainage associated with Mamre Road discharge do not form part of this document scope or content, and are subject to separate designs by MU Group and approvals by TfNSW. Refer separate design documents and consultation relating to Mamre Road Works.</p>
<i>B39</i>	<i>Prior to the commencement of construction, the Applicant must install appropriate boundary identification to be maintained</i>	Boundary fencing is to be provided and is shown on drawings included in <b>Appendix A</b> .

<b>CoC No.</b>	<b>Item</b>	<b>Response</b>
	<i>throughout the construction period.</i>	
<b>B40</b>	<i>The Applicant must install a fence comprising 2.1 m chain mesh plus 3 strand barbed wire on top, for a total height of 2.4 m, along the entire length of the boundary with the Warragamba Pipelines corridor, unless otherwise agreed to in writing by WaterNSW.</i>	Boundary fencing in accordance with this consent condition is to be provided by Frasers/ Altis prior to commencement of construction and has been nominated on the ESCP drawings included in <b>Appendix A</b> .
<b>B41</b>	<i>Access to the Warragamba Pipelines corridor is prohibited unless a written access consent has been obtained from WaterNSW.</i>	This requirement is noted and if access is required, written consent will be procured from WaterNSW by Frasers/ Altis.
<b>B42</b>	<i>All incidents that affect or could affect the Warragamba Pipelines corridor must be reported to WaterNSW on the 24-hour Incident Notification Number 1800 061 069.</i>	This requirement is noted and if there is any potential for incident, or an incident occurs, reporting to WaterNSW will be made by Frasers/ Altis.
<b>Dust Minimisation</b>		
<b>B43</b>	<i>The Applicant must take all reasonable steps to minimise dust generated during all works authorised by this consent.</i>	Dust minimisation requirements are proposed in accordance with Landcom Blue Book as set out in "Dust Control Notes" included on drawing <b>Co13362.02-EW200</b> in <b>Appendix A</b> .
<b>Management Plan Requirements</b>		
<b>C1(a)</b>	<i>Detailed Baseline Data</i>	Detailed baseline data pertaining to soil and water is included in <b>Section 2</b> and <b>Appendices C, D &amp; F</b> of the CSMP.
<b>C1(b)</b>	<i>Details of:</i> <i>(i) The relevant statutory requirements (including relevant</i>	Statutory requirements are included in <b>Section 3.3</b> of the CSMP.

<b>CoC No.</b>	<b>Item</b>	<b>Response</b>
	<p><i>approval, licence or lease conditions);</i></p> <p><i>(ii) Any relevant limits or performance measures and criteria; and</i></p> <p><i>(iii) The specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, the development or any management measures.</i></p>	Discharge control criteria, being the measure of performance and performance indicators, are provided in <b>Section 3.6</b> of the CSMP.
C1(c)	<i>A description of the measures to be implemented to comply with the relevant statutory requirements, limits or performance measures and criteria.</i>	Measures required to be implemented are included in the ESCP in Appendix A, and as per requirements set out in <b>Sections 3.4, 3.6, 6, 7 &amp; 8</b> of the CSMP.
C1(d)	<p><i>A program to monitor and report on the:</i></p> <p><i>(i) Impacts and environmental performance of the development</i></p> <p><i>(ii) Effectiveness of the management measures set out pursuant to paragraph (c) above.</i></p>	<p>Inspection and monitoring requirements have been included in <b>Section 8</b> of the CSMP.</p> <p>Additional reference to <b>Sections 3.7 to 3.11</b> should be made for contingency planning, incident classification and notification, environmental auditing and reporting, non-compliance, non-conformance and actions, and review and improvement requirements, respectively.</p>
C1(e)	<i>A contingency plan to manage any unpredicted impacts and their consequences and to ensure that ongoing impacts reduce to levels below relevant impact assessment criteria as quickly as possible.</i>	Reference to <b>Section 3.7</b> of the CSMP for contingency planning.
C1(f)	<i>A program to investigate and implement ways to improve the environmental performance of the development over time.</i>	Reference to <b>Sections 3.11</b> should be made for review and improvement requirements.



<b>CoC No.</b>	<b>Item</b>	<b>Response</b>
<i>C1(g)</i>	<p><i>A protocol for managing and reporting any:</i></p> <ul style="list-style-type: none"> <li><i>(i) Incident and any non-compliance (specifically including any exceedance of the impact assessment criteria);</i></li> <li><i>(ii) Complaint;</i></li> <li><i>(iii) Failure to comply with statutory requirements;</i></li> </ul>	<p>Reference to <b>Sections 3.8, 3.9 &amp; 3.10</b> should be made for, incident classification and notification, environmental auditing and reporting, non-compliance, non-conformance and actions requirements respectively.</p>
<i>C1(h)</i>	<p><i>A protocol for periodic review of the plan.</i></p>	<p>Reference to <b>Sections 3.11 &amp; 8.3</b> should be made review and improvement requirements.</p>

## 2 DEVELOPMENT SITE

### 2.1 Site Location

The Yards is located at 657-769 Mamre Road, Kemps Creek and is legally described as Lot 34 DP 1118173, Lot X DP 421633, Lot 1 DP 1018318, Lot Y DP 421633 & Lot 22 DP 258414. It is located at the western extent of the WSEA within the Penrith LGA.

The site is bound by the following land uses:

- North – the Water NSW Pipeline and SSD 7173 approved 'First Estate' industrial development, with the Erskine Business Park beyond
- South – rural residential properties
- East – Mamre Road with rural residential properties, schools and age care beyond
- West – South Creek with rural residential properties beyond.

The site has historically been used for low intensity agriculture and is primarily covered with pasture grass and limited stands of vegetation. The site has several dams in the central area and has a gradual fall from east to west towards South Creek.

### 2.2 Site Description

The development is located on a parcel of land on the west of Mamre Road, and to the north and south of Bakers Lane in the suburb of Kemps Creek as shown in **Figure 2.1**.

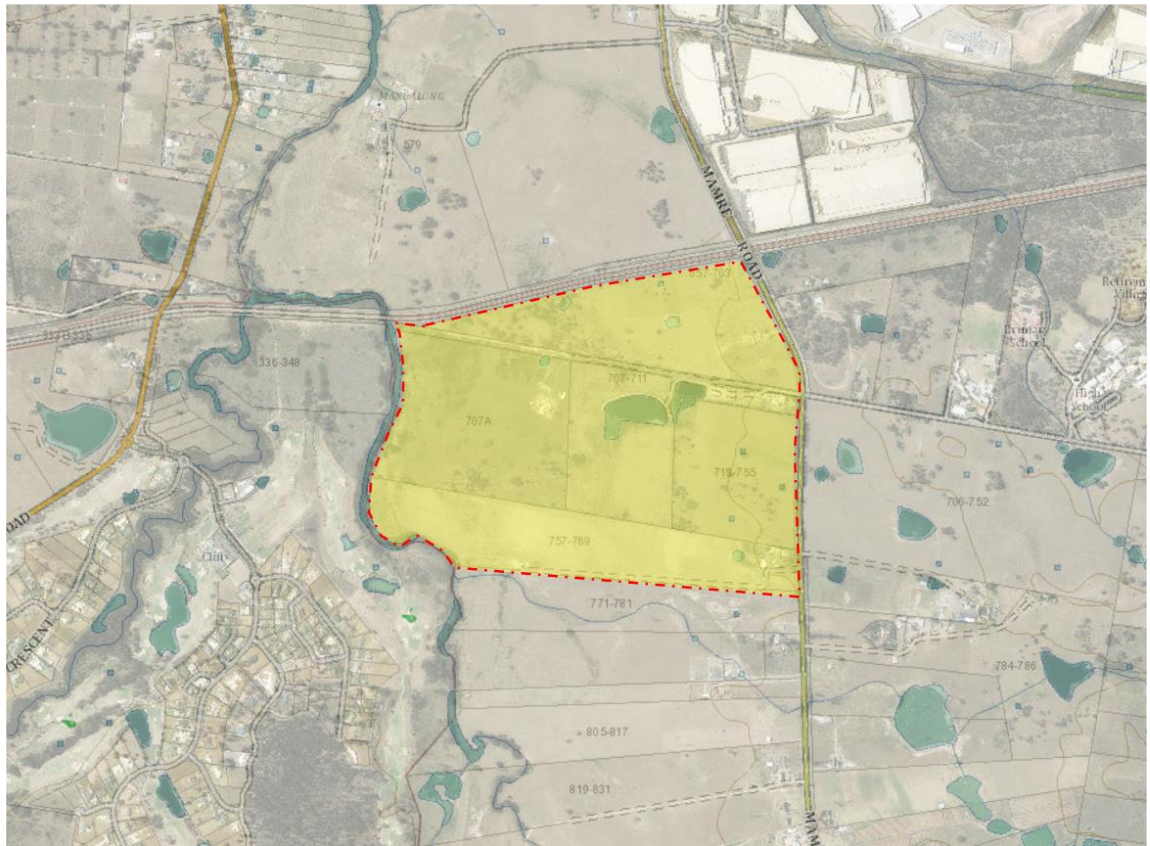
The land comprises a combined area of approximately 118 Ha with development proposed over approximately 89 Ha of the total land.

The highest elevation on the land 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 on adjacent land to the north of the northern property boundary of the study area.

The Altis First Estate industrial subdivision is located immediately to the north of the WaterNSW pipe.



**Figure 2.1 Locality Plan**

South Creek is described in the *Mamre Road Precinct – Assessment of Riparian and Groundwater Ecosystems* (CT Environmental, July 2020) report, included in the EIS, as being a 5<sup>th</sup> Order stream under the Strahler stream ordering system. South Creek is mapped as *Type 1 – highly sensitive habitat*, and being a creek with permanent water flow is a *Class 1 – Major Key Fish Habitat*. CT Environmental also describe the condition “*of the riparian vegetation and creek channel along this reach of South Creek to be considered to range between poor and fair. Historical and current land use practices at the subject land and within the upper catchment have resulted in significant degradation to the waterway and surrounding vegetation community*”.

## 2.3 Proposed Development Description

The Kemps Creek Warehouse, Logistics and Industrial Facilities Hub (the Yards) is a regional warehouse and distribution complex located at Kemps Creek within the Penrith local government area (LGA) within the Western Sydney Employment Area (WSEA).

Frasers Property Australia Pty Ltd (Frasers) and Altis Bulky Retail Pty Ltd (Altis) jointly identified as ‘the Proponent’ obtained Development Consent SSD (State Significant Development) 9522 on 21 December 2020 from the Department of Planning, Industry and Environment (DPIE) for the ‘Kemps Creek Warehouse, Logistics and Industrial Facilities Hub’ comprising the construction of eight warehouse buildings over eight lots as the first stage of development, with estate works across the broader site comprising bulk earthworks to create building pads for future development, stormwater infrastructure and an internal road network including a north south

distributor road connecting to the adjacent property, intersection upgrades and the widening of Mamre Road.

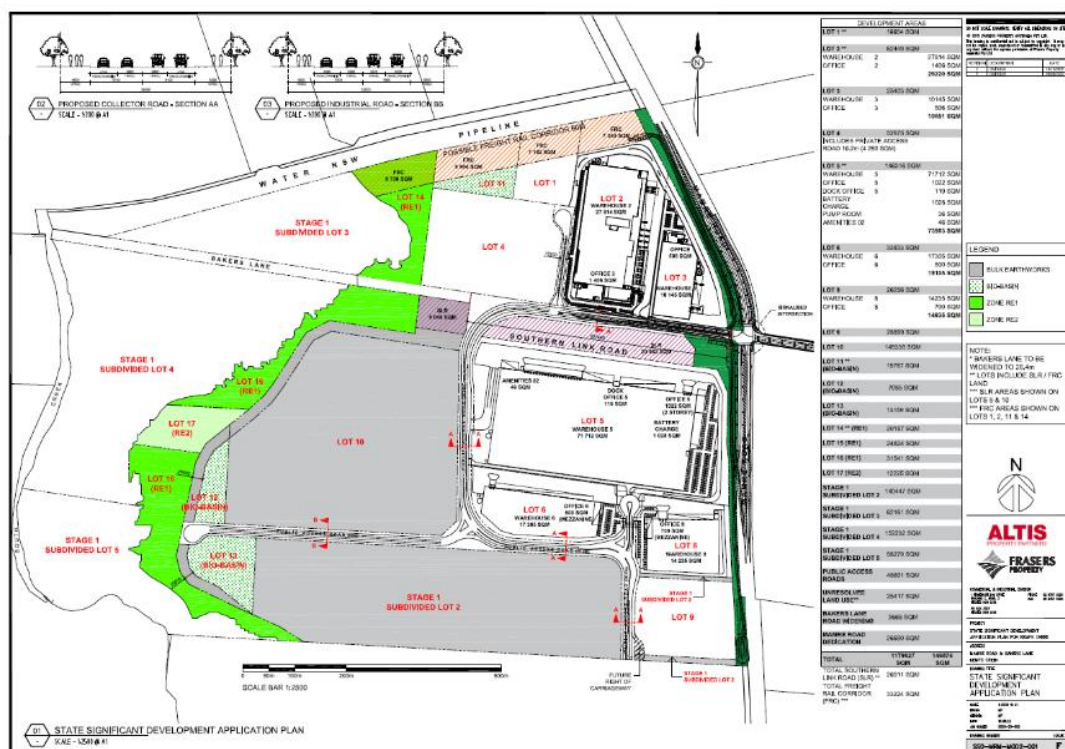
Specifically, SSD 9522 permits the following development:

- Demolition of existing structures, site-wide earthworks, landscaping, stormwater and other infrastructure and an internal road network;
- Construction and operation of eight warehouses comprising 162,355 m<sup>2</sup> of floor space;
- Intersection upgrade works in Mamre Road;
- 744 parking spaces; and
- 21-lot Torrens title subdivision over two stages, being Stage 1 residual lot subdivision (5 lots) and Stage 2 residual and development lot subdivision (17 lots).

The indicative lot layout is shown in **Figures 2.2**. Infrastructure works will include bulk earthworks, provision of services, road & intersection construction, and stormwater management and has completed in accordance with the Development Masterplan.

The masterplan layout provided by Frasers Property shows development lots will vary between 1 Ha and 6 Ha in size. Siting of the development lots will be sympathetic to the topography of the land, access and flood planning requirements. The sites adjacent to South Creek will need to allow for the minimum 500mm freeboard to the 1% AEP flood level of South Creek.

Access to all lots would be made via the new Southern Link Road, Bakers Lane and via a new estate access road from Mamre Road. The new access road and associated intersection will be constructed to Penrith City Council requirements and ownership transferred to Penrith City Council.



**Figure 2.2. Estate Development Masterplan**

## 2.4 Existing Geology & Soils

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.

Topsoil depths are expected to average 200mm. Given, however, the long-standing rural use topsoil with depths of 300-400mm in depth can be expected locally. Topsoil will overly natural soils comprising alluvium and/or residual soils. Given the large site area the overall topsoil volume will comprise a significant portion of the overall earthwork's component. Consideration to provide bury pits within undevelopable land could be made for topsoil containment.

The soils throughout the project site, and expected imported soils (crushed sandstone or clay), are generally classed as Soil Texture Type F and Soil Hydrological Group Type D in accordance with *Landcom Blue Book Section 3.2.7* and *Appendix F* respectively.

Refer **Appendix D** for detailed geotechnical information.

## 2.5 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 centre 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.

Based on the geotechnical investigations, groundwater generally should not be encountered or would be limited to localised areas. In the event that groundwater were to be encountered,



then the management requirements of the CSMP and requirements relevant sub-plans of the CEMP (for example the Acid Sulphate Management Plan, Contamination Management Plan) would need to be applied for dewatering or discharge of water.

## 2.6 Acid Sulphate Soils

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

Reference to the *NSW Land & Water Conservation Acid Sulphate Soils Map 92\_Liverpool* shows the subject land clear of any known occurrence of acid sulphate soils.

An environmental assessment has been undertaken by JBS&G for the development – ref 54963/120704 – as included in the EIS. This report includes assessment of acid sulphate soils (refer Section 2.7 of the JBS&G report).

The JBS&G report showed that the risk of acid sulphate soils were low, and this site is not subject to any policies relating to acid sulphate soils. As such no specific requirements relating to management of these soils are considered necessary. Refer to the JBS&G report for more detail on this.

## 2.7 Climate and Meteorology

The Kemps Creek area experiences relatively mild temperatures and moderate rainfall, with a yearly average rainfall of about 780mm, based on records from the nearest observation site at Horsley Park since 1997 (Station 67119).

Typically, the wettest month (mean rainfall) is February, and driest is September. It is noted that July and August show similar mean rainfall amounts to September.

The annual mean minimum temperature is 12.1°C and the mean maximum temperature is 23.9°C. The hottest month is usually January (mean maximum of 30.1°C) and the coldest month is usually July (mean minimum of 5.8°C).

Climate statistics and average annual rainfall data and rainfall patterns relevant to this site (Horsley Park as sourced from Australian Bureau of Meteorology (BOM)) are included for reference in **Appendix C** of this **CSMP**.

## 2.8 Flooding

The property is located adjacent to South Creek. The property is located approximately midway along South Creek, immediately downstream of the confluence of South Creek with Cosgrove Creek.

The contributing upstream catchment of South Creek is approximately 22,000 Ha (220km<sup>2</sup>) with a mainstream length of 25 km. The catchment generally comprises rural land which is interspersed with residential and industrial areas.

The smaller catchment associated with Cosgrove Creek is approximately 10% of the size of the larger South Creek catchment. The Cosgrove Creek catchment has an area of 2,150 Ha and a mainstream length of 9 km. This catchment is also primarily rural residential land comprising large tracts of pervious areas.



A comprehensive flood assessment has been completed by Costin Roe Consulting and presented in a separate report approved in the SSD9522 submission (refer **Co13362.00-19.rpt**). This study was completed with consultation with Penrith City Council, DPIE and Advisian the consultants who completed The *Updated South Creek Flood Study, Advisian (formerly Worley Parsons), 30 January 2015*.

The *South Creek Study* and assessment by Costin Roe Consulting shows the property is adjacent to the zone of the 1% AEP event and within the floodplain associated with the Probable Maximum Flood (PMF).

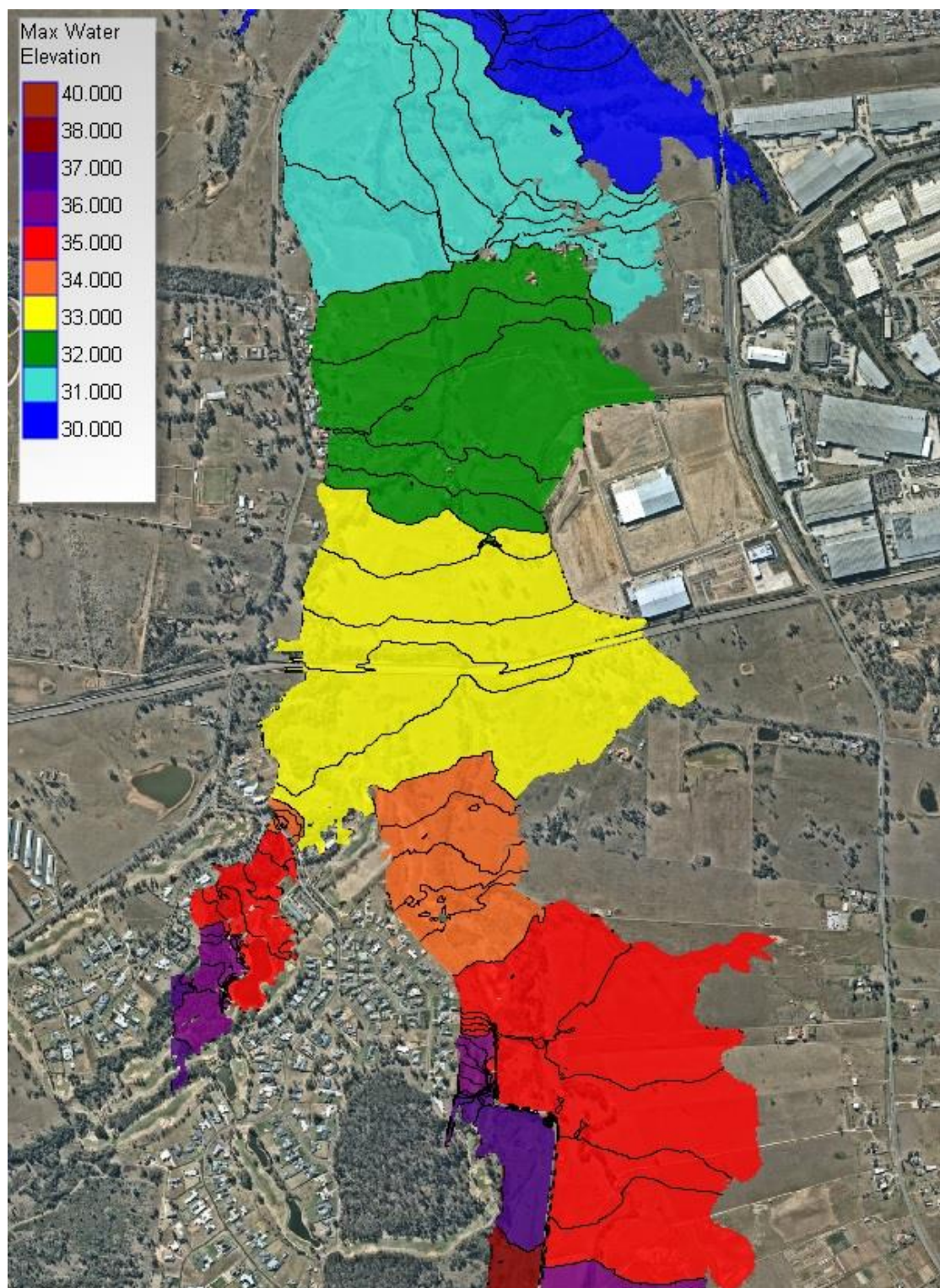
The flood surface extent and level for the 1% AEP storm event, presented at the peak flow, at the upstream boundary of the property can be seen to be 35.2m and 33.8m at the downstream boundary. Allowing for the council required freeboard of 500mm, the corresponding flood planning level for the development varies between RL 35.7m to 34.3m AHD. It is noted that the development footprint approved is clear of and does not impact the 1% AEP event, and that the filling of the site results in all development lots and roads in the estate being above the PMF flood water level.

The following peak flows (based on the *South Creek Study* modelling as adopted in the Costin Roe Consulting assessment) can be anticipated within South Creek adjacent to the site:

- 1330m<sup>3</sup>/s during the 0.2% AEP event;
- 1015m<sup>3</sup>/s during the 1% AEP event; and
- 720m<sup>3</sup>/s during the 5% AEP storm.

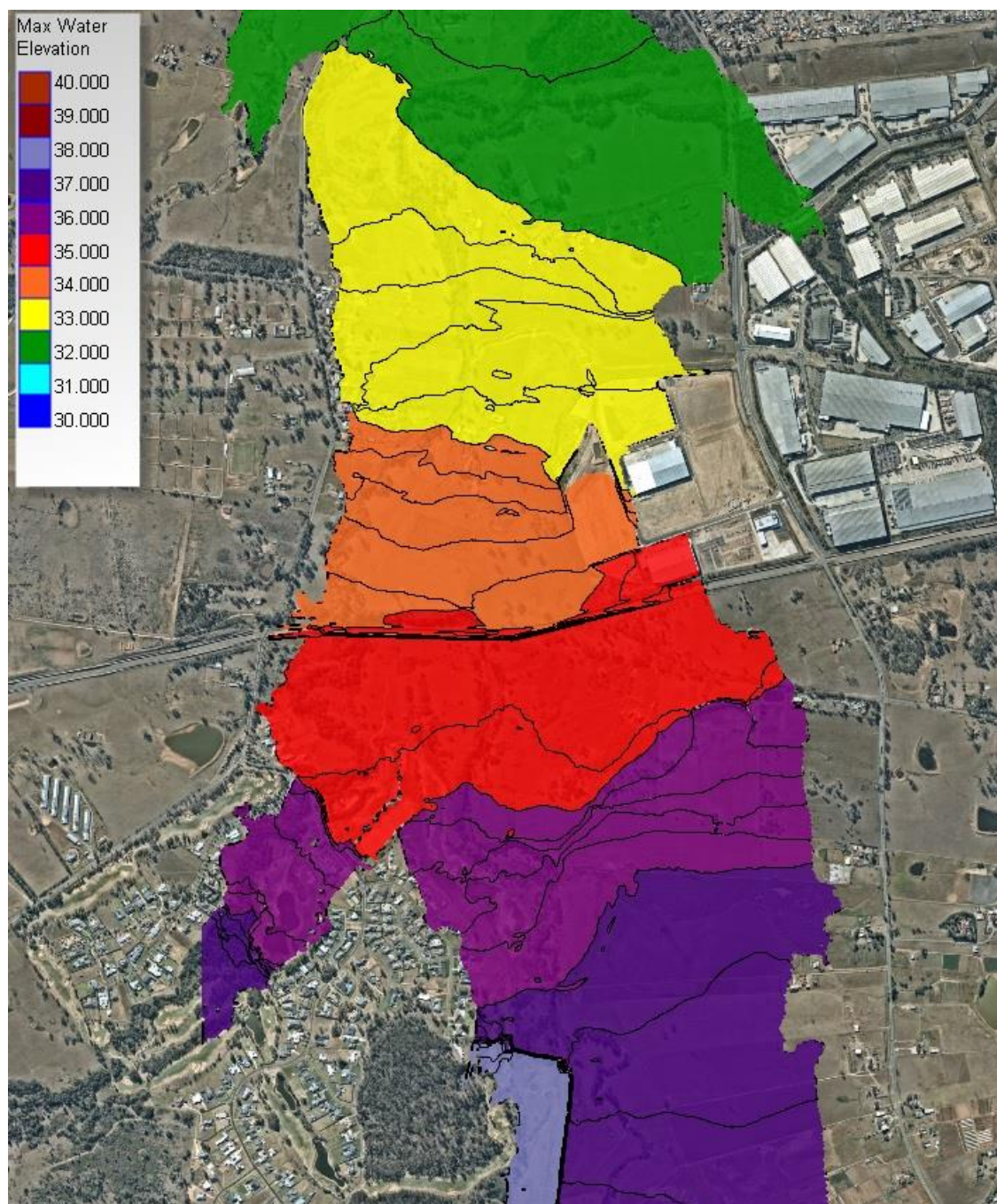
The critical duration for peak flows for the above storms occurs at 22 hours.

Reference to **Figures 2.3** through **Figure 2.6** below should be made for pre and post development flood extent and levels for the 1% AEP and PMF storm events.



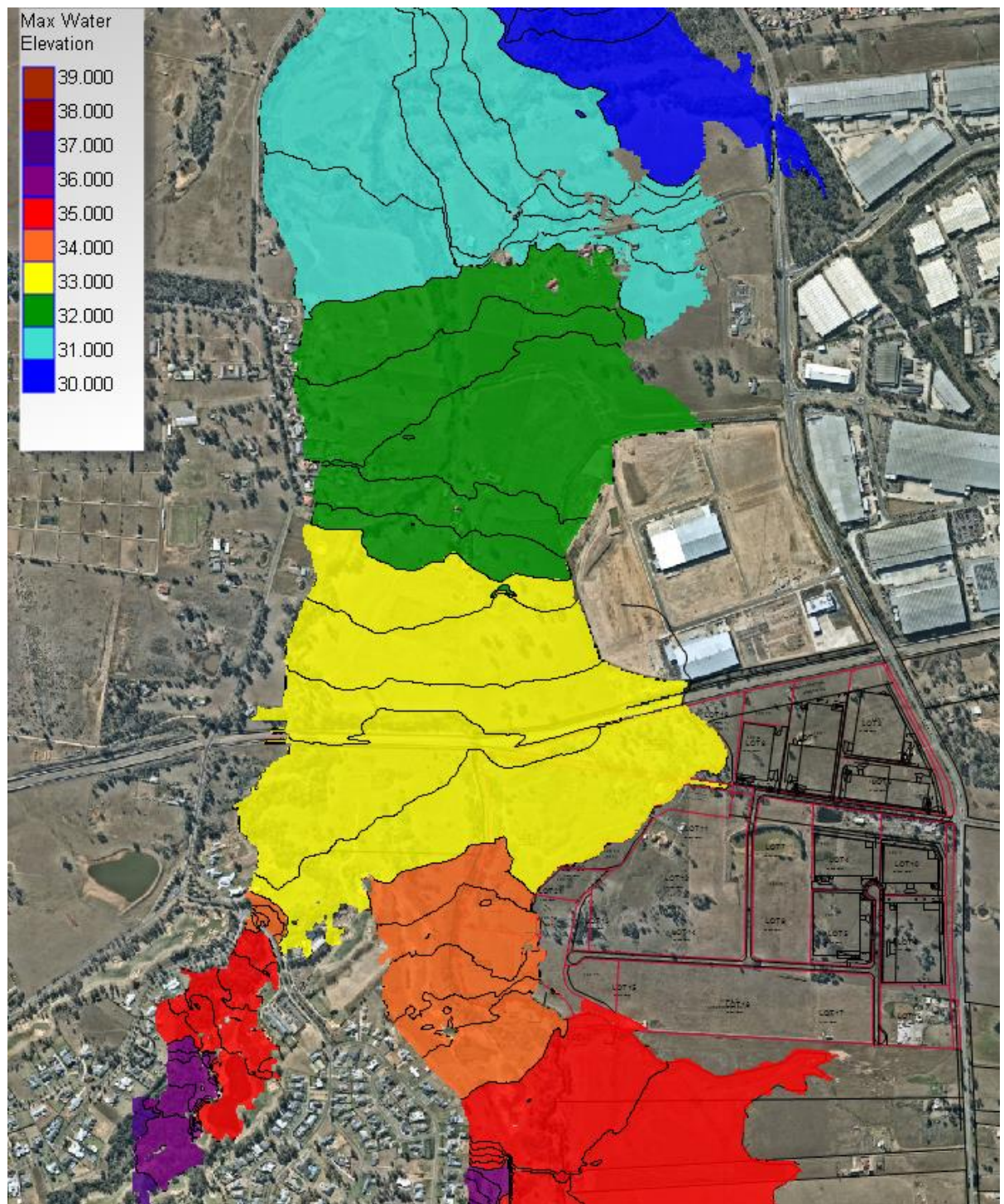
**Figure 2.3 – 1% AEP Flood Levels (Pre-Development)**





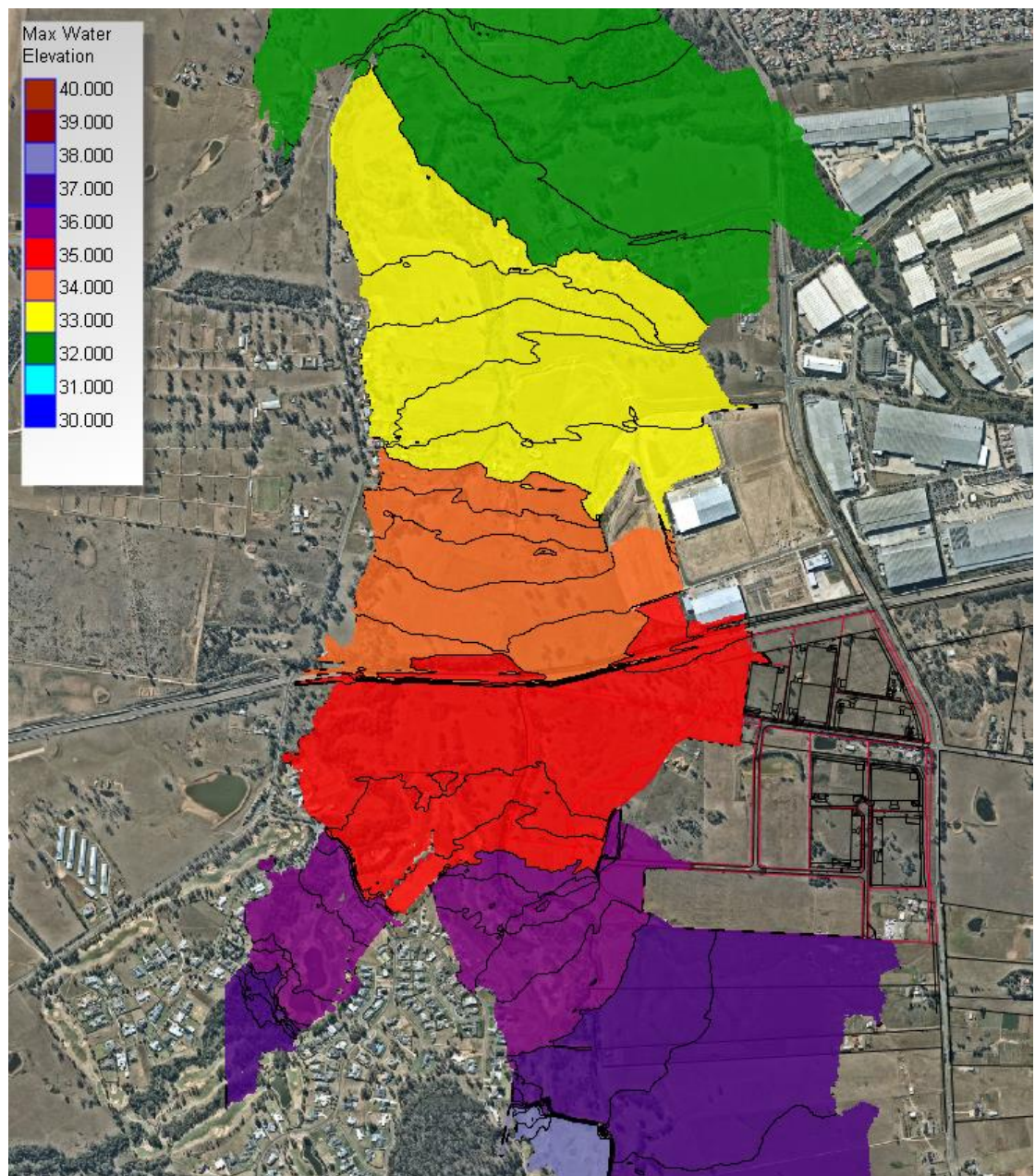
**Figure 2.4 – PMF Flood Levels (Pre-Development)**





**Figure 2.5 – 1% AEP Flood Levels (Post-Development)**





**Figure 2.6 – PMF Flood Levels (Post-Development)**

The 1% Average Exceedance Probability (AEP) flood line, as defined in the above EIS assessment, has also been shown on ESCP drawings in **Appendix A**. This shows that all ESCP measure are located clear and above the 1% AEP flood affected areas, other than items associated with drainage outlets.

Local overland flow relating to site runoff and upstream catchments east of Mamre Road will be managed through provided site drainage measures or diverted around works areas as required.

Given the site is free from regional flooding up to the 1% AEP event, and local overland flow is managed through ESCP measures, flood liability and risk during construction is considered low.

### 3 GENERAL REQUIREMENTS

#### 3.1 Introduction & Reference Documents

This CSMP has been prepared with the purpose of providing a set of site management procedures to control the severity and extent of soil erosion and pollutant transport during the earthworks and construction phase of the SSD9522 development.

This document has been completed in accordance with the guidelines in *Managing Urban Stormwater - Soils and Construction Volume 1 (Landcom 2004)*.

An erosion and sediment control plan (ESCP) is shown on drawings **Co13362.02-EW201 to EW203** with details of various measures shown on drawings **Co13362.00-EW204 to 206** (refer **Appendix A**). This CSMP is to be read in conjunction with the provided drawings.

Contractors will ensure that all soil and water management is undertaken in accordance with this CSMP and the guidelines in *Managing Urban Stormwater - Soils and Construction Volume 1 (Landcom 2004)*. The erosion and sediment control measures are to be adjusted on site by the contractor under the advisement of Costin Roe Consulting in general accordance with CSMP to suit buildability and site constraints. Adjustment to erosion and sediment control measures on site will not require changes to the CSMP and is to be managed by the contractor.

#### 3.2 Roles and Responsibilities

1. All Project Personnel are responsible for the implementation of this CSMP and have the responsibility to stop works if there is potential for a safety or environmental incident to occur.
2. The key roles and responsibilities for the Project personnel in relation to soil and water management are outlined below in **Table 3.1**.

**Table 3.1 Roles and Responsibilities**

Role	Responsibilities
Contractor's Project Manager (Contractor's PM)	<p>Manage the delivery of the construction process in relation to soil and water quality management at the site in conjunction with the Contractor's EM.</p> <p>Provide for training in erosion and sediment control for personnel directly involved with the implementation of this plan, as required.</p> <p>Identify and allocate Project resources to implement the requirements of this plan.</p> <p>Oversee the implementation and maintenance of this plan.</p>
Contractor's Construction Manager (Contractor's CM)	<p>Communicate with all workers including sub-contractors regarding compliance with the CSMP.</p> <p>Record and communicate volume of spoil imported to site to the Principal's Representative on a weekly basis.</p>



Role	Responsibilities
	<p>Coordinate the implementation and maintenance of erosion and sediment controls and provide support for the Contractor's EM.</p>
<p>Contractor Environmental Manager or Site Manager (Contractor's EM)</p>	<p>Co-ordinate to undertake monthly inspections and report on implementation of this plan.</p> <p>Recommend any improvements to the plan and site control measures in conjunction with the engineer.</p> <p>Develop, implement, monitor and update the progressive CESCPS as required.</p> <p>Direct works to be performed in accordance with this plan.</p> <p>Review works proposed within the riparian zone.</p> <p>Maintain site records confirming achievement of water quality objectives prior to discharge.</p> <p>Maintain relevant waste disposal records</p> <p>Co-ordinate the sampling and assessment of waters and sediments in control structures to enable classification and reuse, discharge or disposal in an appropriate manner on or off site.</p> <p>Maintain the site water quality register (8.2)</p> <p>Record environmentally relevant incidents.</p> <p>Manage and respond to reported incidents.</p>
<p>Site Supervisor</p>	<p>Present toolbox talks that include the requirements of this plan.</p> <p>Inform staff of their obligation to comply with EWMS and CESCPS.</p> <p>Communicate the volume of spoil imported to site on a daily basis to the Contractor's CM.</p> <p>Manage and respond to reported incidents.</p> <p>Approval to make new infrastructure operational.</p> <p>Co-ordinate and report on daily and weekly inspections.</p> <p>Co-ordinate inspection and monitoring of equipment washdowns, waste handling and other construction related activities that influence the site's management of soils and water.</p>
<p>All Personnel</p>	<p>Comply with the requirements of this CSMP.</p>

Role	Responsibilities
	<p>Report any observed failure of ERSED infrastructure to the Contractor's EM or Site Supervisor.</p> <p>Report all environmental incidents to the Site Supervisor and/or the Contractor's EM.</p>

### 3.3 Legal and Regulatory Requirements

The below sets out the legislation and planning instruments considered in the preparation of this sub plan. It is noted that the regulatory framework for the project is set out in the *CEMP*.

The Project has been approved under the *Environmental Planning and Assessment Act 1979* (EP&A Act).

The CSMP has been prepared in accordance with the CoC of SSD9952 (as set out in **Section 1.3** of the CSMP) and forms a subsection of the *CEMP*. This plan is to be read in conjunction with the *CEMP* and any statutory requirements and other management measures included in the *CEMP*.

The plan has been completed in accordance with all relevant approvals and regulatory framework.

**Table 3.2** lists regulatory guidelines and documents relevant to the CSMP.

**Table 3.2. Regulatory Documents and Guidelines**

Legislation	Description	Relevance to the CSMP
<i>Environmental Planning and Assessment Act 1979</i>	This Act establishes a system of environmental planning and assessment of development Projects for the State.	The CoCs and obligations issued under Part 4 of the EP&A Act are addressed in this plan.
<i>Protection of the Environment Operations Act 1997</i>	The objectives of this Act relate to the protection of the environment through pollution prevention and cleaner production, among others.	<p>Relevant sections of the Act, including duties to report pollution incidents and disposal regulations have been incorporated into this plan and incident response procedures.</p> <p>A key legislative requirement applicable to construction soil and water management is Section 120 of the Protection of the Environment Operations Act 1997 which relates to pollution of waters and the need to implement all reasonable and feasible measures to minimise the risk of pollution of waters.</p> <p>Part 5.7 of the Act requires that a pollution incident causing or threatening material harm to the environment be notified to EPA and other relevant authorities as outlined in the CEMP. Material harm constitutes actual or potential harm to the health or safety of humans and/or ecosystems that is not trivial, or results in actual or potential loss or property damage of amounts in excess of \$10,000 in total.</p>
<i>Contaminated Land Management Act 1979</i>	The general object of this Act is to establish a process for investigating and (where appropriate) remediating land that the EPA considers to be contaminated significantly enough to require	<p>Contamination on site must be assessed and managed in accordance with this act.</p> <p>Division 2, Part 3, Section 11-17 of this Act details requirements for the Management of Contaminated Land.</p>

Legislation	Description	Relevance to the CSMP
	regulation under Division 2 of Part 3, and to ensure that contaminated land is managed with regard to the principles of ecologically sustainable development.	
<i>Water Management Act 2000</i>	The objects of this Act are to provide for the sustainable and integrated management of the water sources of the State for the benefit of both present and future generations.	Although it is not envisaged that any construction activities would be undertaken on waterfront land, any waterfront activities that do occur would be conducted generally in accordance with the NSW Office of Water's Guidelines for Controlled Activities.
<i>Fisheries Management Act 1994</i>	The objectives of this Act seek to conserve fishery resources, fish stocks and key fish habitats.	This CSMP has been prepared to maintain existing flow regimes surrounding the site and to contain water onsite within sediment basins until discharged with strict water quality requirements. No impacts to fisheries are envisaged as a result of Project construction.
<i>Dangerous Goods Regulation (Road and Rail Transport) 2014</i>	The main objects of this Regulation are to give effect to the standards, requirements and procedures of the Code so far as they apply to the transport of dangerous goods by land transport, and to promote consistency between the standards, requirements and procedures applying to the transport of dangerous goods by land transport and other modes of transport.	Provisions relating to the storage and transport of dangerous good, such as fuelling procedures and fuel storage, are incorporated into this plan.

Legislation	Description	Relevance to the CSMP
<i>Commonwealth Environmental Protection and Biodiversity Conservation Act 1999</i>	The objectives of this Act seek to promote environmental protection, ecologically sustainable development, biodiversity conservation and the promotion of heritage, among others.	

Additional guidelines and standards considered in relation to the management of soil and stormwater include:

- Managing Urban Stormwater – Soils and Construction Volume 1, 4th Edition (Landcom 2004);
- Managing Urban Stormwater: Soils and Construction – Installation of Services, Volume 2A (OEH 2008); and
- Australian Rainfall and Runoff – Volume 1 (2001), Engineers Australia.

### 3.4 General CSMP Requirements

1. This document is noted to form a sub-plan as part of the *CEMP* as required under **CoC C2 to C4**.
2. This document and associated drawings are subject to further periodic review throughout the works period to ensure the requirements and measures set out in this CSMP are fit for purpose and allow for any changes which might occur during construction not envisaged during the initial preparation of the CSMP and associated ESCP.
3. All erosion and sediment control measures will conform to the standards and specifications contained in:
  - (i) This CSMP;
  - (ii) Conditions of Consent;
  - (iii) the approved *CEMP* and supporting documentation; and
  - (iv) the latest version of *Landcom Blue Book* if the standards and specifications are not contained in the approved ESCP.
4. Any works that may cause significant soil disturbance and are ancillary to any activity for which regulatory body approval/ consent is required, will not commence before the issue of that approval/ consent.
5. Additional and/or alternative ESC measures are to be implemented in the event that site inspections, the site's incident response requirements (refer *CEMP*), or the regulatory authority, identifies that unacceptable off-site sedimentation is occurring as a result of the work activities.

6. Land-disturbing activities shall not cause unnecessary soil disturbance if an alternative construction process is available that achieves the same or equivalent outcomes.
7. It is noted that ongoing inspections and monitoring by the EM or ESC engineer/ specialist and the ER will be necessary throughout the works period. These inspections shall be undertaken in accordance with project conditions.
8. Appropriate additional erosion and sediment control measures will be implemented as required on site to suit changing site conditions, or other on-site conditions not included in the design documents, such that all reasonable and practicable measures are being taken to ensure acceptable water quality measures are installed. Only those works necessary to minimise or prevent environmental harm shall be conducted on-site prior to approval of the amended Erosion and Sediment Control Plan (ESCP).
9. Only VENM, ENM, or other imported fill material approved in writing by EPA is to be placed on the site, as required of **CoC B21**. Accurate records of the volume and fill are to be maintained on site, and made available to the Planning Secretary upon request.
10. No construction (including clearing and maintenance access) is permitted within the riparian corridor except for that associated with the two drainage outlets to South Creek. That is activities associated with vegetation and stormwater management.

### 3.5 Erosion and Sediment Control Hazard Assessment

The erosion hazard assessment has been completed per the guidelines of the *Landcom Blue Book*. This assessment identified the proposed development works as posing a high risk to receiving waterways given the proximity of the site to South Creek. The risks to waterways from site construction activities are:

- Exposure of surface and subsurface soils due to the bulk earthworks activities. At this stage cut and fill to create flat sloping pavements and building envelopes above the Regional 100-year ARI flood level is proposed.
- Exposure of subsurface soils due to bulk earthworks.
- As per RUSLE Calculation included in **Section 6.1** and drawing **Co13362.02-EW206** in **Appendix A**, the assessment results in a soil loss of 26 t/Ha/yr, a Soil Loss Class of 1 and resulting “very low” soil loss hazard classification.

Reference to **Table 3.4** should be made for management measures to mitigate risk items listed in the CoC.

**Table 3.4. Environmental Considerations**

<b>Item</b>	<b>Comment</b>	<b>Relevant Reference</b>
<b>(i) Monthly Rainfall Erosivity</b>	Monthly rainfall erosivity assessment has been made per Landcom Blue Book requirements and included in <b>Appendix G</b> . The assessment shows that the highest erosivity potential is realised in the months of January to April, with low potential during June to October.	<b>Appendix G</b>
<b>(ii) Flooding Liability</b>	Risk of flood affectation or liability is low to negligible.  Flood assessments completed as part of the EIS show that the site is clear of the 1% AEP (1 in 100-year ARI) flood extent and also generally above the PMF event.	<b>Section 2.8</b>
<b>(iii) Topography</b>	Existing topography is flat with minimal falls over the property as described in <b>Section 2.1</b> .  Proposed topography (following earthworks and building construction) will generally comprise flat gradients (in the order of 0.5-5%).  Risk associated with topography are mitigated through <b>ESCP</b> measure outlined in this <b>CSMP</b> and <b>ESCP</b> drawings in <b>Appendix A</b> .	<b>Section 2.1</b>  ESCP Drawings in <b>Appendix A</b> .
<b>(iv) Physical and chemical properties of in-situ and imported soils</b>	Physical and chemical properties of in-situ soils are described in Golders Report (appendix D) and Section 2.3 of this CSMP.  Relevant assessments relating to soil and water have been completed as set out in <b>Section 6.1</b> pertaining to erosion runoff potential and RUSLE noting a very	<b>Section 2.3, 2.5, 2.6 and 6.1</b> , drawings in <b>Appendix A</b> and Geotechnical information in <b>Appendix D</b> .



	low hazard classification has been calculated.	
<b>(v) Sensitivity of receiving environment</b>	<p>Assessments completed as part of the EIS shows that the receiving environment (South Creek) are low quality aquatic environments.</p> <p>Management of discharge to receiving environment and potential of discharge affecting the receiving environment is low based on adherence to this CSMP and discharge criteria in <b>Section 3.6</b>.</p>	<b>Section 2.1 &amp; 3.6</b>

### 3.6 Water Discharge Performance Criteria

The quality of discharge from the site/ sediment basins during construction is to satisfy the following Water Quality Objectives (WQOs) per Landcom Blue Book requirements:

- Water pH released from a controlled sediment basin outflow shall be within the range 6.5 to 8.5.
- Suspended Solids released from controlled sediment basin outflows will be no greater than 50mg/L, 75 NTU's (Nephelometric Turbidity Units) or other Turbidity measurement based on confirmed laboratory correlation. Correlation should be confirmed through laboratory assessment and in consultation with the EM or ESC engineer.
- Oils and Grease – no visible films or odour.
- Litter – no visible litter washed or blown from the site.

Records of confirmation of achievement of water quality objectives are to be maintained on site and to be provided on request to the ER and engineer/ ESC Specialist.

Use of NTU to confirm discharge is noted to require suitable calibration prior to use.

### 3.7 Contingency Planning

Reference to the unexpected finds, incident classification and notification protocols, or other contingency controls within the *CEMP* should be made pertaining to contingency planning.

Consideration by the contractor to contingency planning for circumstances during works (such as unacceptable water discharge from site, tracking of dirt onto public roads, dust, spoil import and stockpile management, ongoing stabilisation) should be included in the Contractors environmental management plan, with consideration to the measures and requirements set out in this **CSWMP**.

The Contractors CM or EM is to contact the ER, engineer or ESC specialist prior to forecast rainfall if additional or contingency measures are required to be implemented on site during works.

### **3.8 Incident Classification and Notification**

It is the responsibility of all site personnel to report all environmental incidents to the Site Supervisor and/or the Contractor's EM.

Incident response requirements including classification, responses, external notification and incident review protocol are set out in the *CEMP*. Reference to the *CEMP* should be made pertaining to all incident response protocol.

### **3.9 Environmental Auditing and Reporting**

Auditing and reporting will be undertaken in accordance with the *CEMP*, refer to the *CEMP* for details.

### **3.10 Non-compliance, Non-conformance and Actions**

It is the responsibility of all site personnel to report non-compliances and non-conformances to the Site Supervisor and/or the Contractor's EM.

Non-compliances, non-conformances and corrective and preventative actions will be managed in accordance with the *CEMP*.

### **3.11 Review and Improvement**

The effectiveness of sediment and erosion control measures will be confirmed through monthly inspections, ongoing site inspections by the Construction Contractor, engineer and the ER. Regular review and actions will be raised by the ER and EM during the works. Adjustments as required during the construction period will be made based on confirmed site conditions and effectiveness of the implemented measures and recommended actions from the ER and EM.

Review and improvement of this plan (including the CEMCP contained in **Appendix A**) will be also be undertaken in accordance with the CoCs and the *CEMP*. Continuous improvement will be achieved by the ongoing evaluation of environmental management performance and effectiveness of this plan against environmental policies, objectives and targets.

A copy of the updated plan and changes will be distributed to all relevant stakeholders in accordance with the approved document control procedure. Construction will be undertaken in accordance with the most recent, approved version of this CSMP.

## 4 MANAGEMENT PHASES DURING CONSTRUCTION

### 4.1 Background

The CSMP employs an ESCP which will be implemented to minimise water quality impacts in terms of sediment loading. The ESCP drawings are included in **Appendix A** and listed in **Section 3.1** of this CSMP. The plan includes measures such as sediment fences, cut-off drains for sediment laden stormwater, diversion channels for clean stormwater run-off, sediment control basins, site access controls, limit of works and stockpile areas. The erosion and sediment control measures are to be adjusted on site by the contractor under the advisement of Costin Roe Consulting in general accordance with CSMP to suit buildability and site constraints. Adjustment to erosion and sediment control measures on site will not require changes to the CSMP and is to be managed by the contractor.

The following sections provide information to identify controls and procedures that will be incorporated into the *Erosion and Sediment Control* program.

It is expected that the construction period will be more than 6 months.

### 4.2 Pre-Construction

The following minimum requirements will be met prior to commencement of construction:

- Prior to the commencement of Bulk Earthworks, the contractor is to implement erosion and sediment controls on site, in accordance with Stage 1 ESCP and Landcom Blue Book, as required of **CoC B24**. The ER is to provide written confirmation to the Planning Secretary Prior to commencement of Bulk Earthworks.
- Site access construction.
- Diversion banks (and/ or drains) will be created at the upstream boundaries of construction activities to ensure upstream runoff is diverted around any exposed areas. These diversion banks (and/ or drains) will be sufficiently stable to not contribute sediment or sediment laden water off-site. Catch drains will be created at the downstream boundary of construction activities.
- Sediment fences will be in accordance with *Blue Book Standard drawing SD 6-8* and constructed in locations specified on drawings, and on the upstream edges of the designated buffer strips and at the base of fill embankments.
- Rock check dams and/or gravel bags or sandbags will be placed along the catch drains to slow flow, reduce scour and capture some sediment from internal site water runoff. Refer to drawings for recommended locations.
- Construction of temporary sediment basins will be completed.
- Site personnel will be educated to the sediment and erosion control measures implemented on site.
- Areas for plant and construction material storage will be designated along with associated drains and spillage holding ponds and any contaminated soil management measures if required of a CMP. These areas will remain separate to the CSMP measures and detailed

per the CEMP. Reference to the CEMP will be made pertaining to construction specific management measures and spill procedures.

- Sediment basins will be flocculated prior to any run off being received. An acceptable method is for water to be treated with gypsum at approximately 32 kg per 100m<sup>3</sup> of collected runoff, or as required to achieve the specified water quality targets.
- All exposed soils should be stabilised within 5 days of completion. Acceptable method would be to use a soil binder such as Ground Control (Complete Water Treatment), Stonewall (Vital Industries) or approved equivalent as noted in **Section 5.8**.
- Stockpile management to be completed as set out in ESCP (**Appendix A**) and **Section 5.3**.

#### 4.3 During Construction

The following minimum requirements will be met during construction:

- Progressive re-vegetation of filled areas and filled batters.
- Maintenance of no-go zones and fencing around protected areas.
- Construction activities will be confined to the necessary construction areas.
- The provision of a stabilised site access to minimise the tracking of debris from tyres of vehicles leaving the site onto public roads. Construction exits will be nominated to manage the movement of construction access to defined locations. Refer to *Blue Book Standard Drawing SD 6-14*.
- Topsoil and temporary stockpile location will be nominated to coincide with areas already disturbed. Stockpiles will be sealed with soil binder within 20 days. A sediment fence will be constructed around the downstream side of the stockpile and a diversion drain at the upstream side if required.
- Regular inspection and maintenance of sediment fences, sediment basins and other erosion control measures will be made. Following rainfall events greater than 5mm inspection of erosion control measures and removal of collected material will be undertaken. Replacement of any damaged measures will be performed immediately.
- Spill response to be managed via procedures set out in CEMP and relevant subplans.

Site shutdowns are conducted in a manner that minimises potential environmental harm:

- Existing ground covers are protected from damage and retained as long as practicable.
- Procedures for initiating a long-term site shutdown (e.g. between completion of earthworks and building works) incorporate appropriate revegetation or approved stabilisation (per **Section 5.8**) of all soil disturbances unless otherwise stipulated within an approved site management plan.
- Stabilisation procedures associated with a programmed site shutdown commence at least 30 days prior to the nominated shutdown time.
- Appropriate stabilisation measure to be undertaken for short-term site shutdown (e.g. long weekend, Christmas, Easter) will be in accordance with measures set out in this CSMP and in consultation with the engineer.

- The adopted site stabilisation measures will not rely upon the longevity of non-vegetated erosion control blankets and short-term soil binders.

Soil erosion resulting from rainfall is minimised:

- Soil disturbing activities are programmed to minimise periods of soil exposure.
- Progressive stabilisation will be undertaken following construction and earthworks per **Section 5.8**.
- Appropriate additional measures will be considered and implemented in high risk areas (including batter slopes, temporary work areas, works adjacent to riparian zones, or other sensitive areas) as required during the construction period.

Soil erosion resulting from wind erosion is minimised:

- Erosion control measures used to control wind erosion are commensurate with soil exposure and the expected wind conditions in terms of speed and direction. Refer dust control notes ESCP in **Appendix A**.
- Stockpiles of erodible material (including loosely compacted or granular materials) are covered during periods of strong wind or when strong winds are imminent. Reference to Blue Book Standard drawing SD4-1 will be made pertaining to stockpile requirements including local provisions, covering and stabilisation requirements (refer also *Table 7-1 of Blue Book*). Specific measures for stockpile stabilisation include wetting of surfaces & application of polymer binders. As a minimum, completed work surfaces should be compacted and free of excessive loose sediment. Refer **Section 5.3**.

#### **4.4 Post Construction**

Post construction, maintenance of all erosion and sediment controls are required until permanent stabilisation has occurred.

## 5 EROSION & SEDIMENT CONTROL

### 5.1 Land Disturbance

Where practicable, the soil erosion hazard on the site will be kept as low as possible and as recommended in **Table 5.1**, and as defined in **Section 5.8** and stabilisation requirements included in **Table 5.2**.

**Table 5.1 Limitations to access**

Land Use or Zone	Limitation	Comments
Construction areas	Limited to 5 (preferably 2) metres from the edge of any essential construction activity as shown on the ESC Drawings ( <b>Appendix A</b> ).	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 on site. 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, No Go-Zones, areas outside approved construction or development areas.	Entry prohibited except for essential management works	
Minimise disturbed areas	Land disturbance and land filling activities must be undertaken: a) In a phased manner, b) With no disturbance	Refer stabilisation requirements in <b>Section 5.8</b> , and <b>Table 5.2</b> of the <b>CSMP</b> .

	(including vegetation clearing) of another area (other than the construction of erosion & sediment control measures and associated drainage for the separation of clean and dirty water.	
Riparian Corridors	No construction (including clearing and maintenance access) is permitted within the riparian corridor except for activities associated with vegetation, stormwater management and approved works.	

1. Prior to land clearing, areas of protected vegetation, and significant areas of retained vegetation and other protected areas will be clearly identified (e.g. with high-visibility tape, or light fencing) for the purposes of minimising the risk of unnecessary land clearing.
2. All practicable measures will be taken to minimise the removal of, or disturbance to, those trees, shrubs and ground covers (organic or inorganic) that are intended to be retained.
3. All land clearing will be completed in accordance with the CEMP.
4. Land clearing is limited to the minimum practicable during those periods when soil erosion due to wind, rain or surface water is possible.
5. Land clearing will be delayed as long as practicable and will be undertaken in conjunction with development of each stage of works.
6. All appropriate efforts shall be taken to delay the removal of, or disturbance to, existing ground cover (organic or inorganic) prior to land-disturbing activities.
7. Clearing will occur in a manner that minimises disturbance to existing ground cover (organic or inorganic).
8. Grubbing of the site will be immediately followed by temporary stabilisation measures (e.g. mulching), if required, prior to commencement of each stage of construction works.
9. Disturbance to natural watercourses (including bed and banks) and their associated riparian zones will be limited to the minimum practicable.
10. No land clearing will be undertaken unless preceded by the installation of adequate drainage and sediment control measures, unless such clearing is required for the purpose of installing



such measures, in which case, only the minimum clearing required to install such measures will occur and only commencing following authorisation by the construction manager.

## 5.2 Site access

1. Prior to the commencement of site works and stages, the site entry and associated stabilised site access will be constructed in the specified location on ESCP drawings in **Appendix A**.
2. Site entry to be constructed in accordance with *Blue Book Standard drawing SD 6-14*.
3. Site access will be restricted to a single location and provide for a left in and left out slip lane and entry road. The location is between the south project boundary and Bakers Lane at the agreed location with the DPIE. The proposed site access shown on ESCP drawings in **Appendix A**. Further details relating to access are provided in the *Construction Traffic Management Plan (CTMP)*.
4. Site exit points will be appropriately managed to minimise the risk of sediment being tracked onto sealed, public roadways. The contractor will be required to take all reasonable measures to minimise tracking of sediment and/or dust to public roads.
5. Stormwater runoff from access roads and stabilised entry/exit points will drain to sediment controls shown on ESCP drawings in **Appendix A**.

## 5.3 Soil and stockpile management

1. Stockpiling of topsoil, imported fill and construction materials (sandstone, road base, engineering fill) will be necessary on the project.
2. Nominal locations for stockpiles have been shown on the ESCP's which will be subject to adjustment by the contractor during the works period. Reference to *Bluebook Standard Drawing SD4-1* should be made for best practice measures relating to both general fill and topsoil stockpiling will be implemented throughout the works period, unless superseded by the requirements of the Consent.
3. Stockpiling of imported fill should not occur for longer than 6 months before placement where possible.
4. Stockpiles must:
  - (i) Be preferably 2m or less, though should not exceed an absolute maximum of 10m in height.
  - (ii) Be benched over 4m in height
  - (iii) Have a maximum slope of 1v:3h slopes; and
  - (iv) Be stabilised if not worked on for more than 10 days
5. Additional mitigation measures for stockpile management are as follows:
  - (i) For any stockpile heights greater than 4 m, benching will be implemented.
  - (ii) Where reasonable and feasible, and to minimise the potential for erosion and sedimentation of stockpile(s), stockpile profiles would typically be at angle of repose (the steepest angle at which a sloping surface formed of loose material is stable or

1v:3h) with a slight concave slope to limit the loss of sediments off the slope, or through the profile and the formation of a toe drain.

- (iii) The top surface of the stockpile(s) will be slightly sloped to avoid ponding and increase run off.
- (iv) Topsoil stockpiles will be vegetated or otherwise suitably stabilised to minimise erosion.
- (v) Stockpiles will be protected from upslope stormwater surface flow through the use of catch drains, berms, or similar feature(s) to divert water around the stockpile(s) per *Blue Book SD4-1*. Stockpiles shall be placed at least 2m away from any channelised/concentrated flow paths. Sediment control measures are to be implemented as noted in item (vi) below;
- (vi) A sediment control device, such as a sediment fence, berm, or similar, will be positioned downslope of the stockpile to minimise sediment migration per *Blue Book SD4-1*.
- (vii) Any water seepage from stockpiles will be directed by toe drains at the base of the stockpiles toward the sediment basins or check dams and away from the emplacement or extraction working face.
- (viii) Newly formed stockpiles will be compacted (sealed off) using an effective construction method at the end of each working day to minimise water infiltration.
- (ix) Haul roads would be located alongside the stockpile to the work/tipping area.
- (x) Temporary sediment basins would be established in accordance with the **Section 6** of the **CSMP**.
- (xi) Any imported clean general fill material that would be subject to stockpiling within the Proposal site for more than a 10-day period without being worked on, would be subject to stabilisation works, to minimise the potential for erosion.
- (xii) Where the material being stockpiled is less coarse or has a significant component of fines then surface and slope stabilisation would be undertaken. Methods for slope stabilisation may include one or a combination of the following:
  - Application of a polymer to bind material together
  - Application of hydro-seed or hydromulch
  - Covering batters with mulch to provide ground cover.
  - Covering batters with geofabric
  - Use of a simple sprinkler system for temporary stockpiles, including use of radiating sprinkler nozzles to maintain fine spray over exposed surfaces.
  - Other options identified by the Contractor.
- (xiii) Topsoil stockpiles would be seeded with a grass/legume or nitrogen fixing species to assist in erosion control and reduce loss of beneficial soil nutrients and micro-organisms. The short-term vegetation cover crop is to be approved by the ER, Engineer/ ESC specialist prior to use.

6. All measures shall be taken to obtain the maximum benefit from existing topsoil and vegetation, including:
  - (i) Where the proposed area of soil disturbance does not exceed 2500m<sup>2</sup>, and the topsoil does not contain undesirable weed seed, the top 100mm of soil located within areas of proposed soil disturbance (including stockpile areas) must be stripped and stockpiled separately from the remaining soil.
  - (ii) Where the proposed area of soil disturbance exceeds 2500m<sup>2</sup>, and the topsoil does not contain undesirable weed seed, the top 50mm of soil must be stripped and stockpiled separately from the remaining topsoil, and spread as a final surface soil.
  - (iii) In areas where the topsoil contains undesirable weed seed, the affected soil must be suitably buried or removed from the site in accordance with the CDWMP.
7. Stockpiles of erodible material that has the potential to cause environmental harm if displaced, will be:
  - (i) Appropriately protected from wind, rain, concentrated surface flow and excessive up-slope stormwater surface flows.
  - (ii) Located at least 2m from any hazardous area, retained vegetation, or concentrated drainage line, and separated by appropriate controls.
  - (iii) Located up-slope of an appropriate sediment control measure.
  - (iv) Provided with an appropriate protective cover (synthetic, mulch, vegetative, or spray on polymer) if the materials are likely to be stockpiled for more than 20 days during construction. Refer **Section 5.8**.
  - (v) Provided with an appropriate protective cover (synthetic, mulch or vegetative) if the materials are likely to be stockpiled for more than 10 days during those months that have a high erosion risk.
  - (vi) Provided with an appropriate protective cover (synthetic, mulch or vegetative) if the materials are likely to be stockpiled for more than 5 days during those months that have an extreme erosion risk.
8. A suitable flow diversion system will be established immediately up-slope of a stockpile of erodible material that has the potential to cause environmental harm if displaced, if the up-slope catchment area draining to the stockpile exceeds 1500m<sup>2</sup> or unless otherwise suggest by the EM or ESC inspector based on site-specific risk.

#### **5.4 Building Works Management**

1. Land-disturbing activities associated with building works will be undertaken in such a manner that allows for measures to be undertaken to:
  - (i) allow stormwater to pass through the site in a controlled manner and at non-erosive flow velocities up to the specified design storm discharge;
  - (ii) minimise soil erosion resulting from rain, water flow and/or wind;
  - (iii) minimise adverse effects of sediment runoff, including safety issues;

- (iv) prevent, or at least minimise, environmental harm resulting from work-related soil erosion and sediment runoff;
  - (v) ensure that the value and use of land/properties adjacent to the development (including roads) are not diminished as a result of the adopted ESC measures.
  - (vi) All temporary office facilities, compounds and associated activities will be located such that any liquid effluent (e.g. process water, wash-down water, effluent from equipment cleaning, or plant watering), can be totally contained and treated within the site. Refer to CEMP for specific temporary office facility management measures.
2. Sediment (including clay, silt, sand, gravel, soil, mud and other soil-derived waste) deposited off the site as a direct result of an on-site activity, will be collected and the area appropriately cleaned/rehabilitated as part of an environmental incident response. This will be completed based on a site specific ESC program defined at time of the building approval or construction certificate for the building.
  3. Adequate waste collection bins will be provided on-site and maintained such that potential and actual environmental harm resulting from such material waste is minimised. Refer *CEMP* & *CDWMP* for specific site and waste management requirements.
  4. Concrete waste and chemical products, including petroleum and oil-based products, will be prevented from entering an internal water body, or an external drain, stormwater system, or water body. Refer *CEMP* for specific site and waste management requirements.
  5. All flammable and combustible liquids, including all liquid chemicals if such chemicals that could potentially be washed or discharged from the development, are to be stored and handled on-site in accordance with relevant standards (such as *AS1940 The storage and handling of flammable and combustible liquids*). Refer *CEMP* for specific site and waste management requirements.
  6. Trenches not located within roadways shall be backfilled, capped with topsoil, and compacted to a level at least 75mm above adjoining ground level and appropriately stabilised.
  7. All stormwater, sewer line and other service trenches, not located within roadways or other construction areas, will be mulched and seeded, other otherwise appropriately stabilised within 7 days after backfilling.
  8. No more than 150m of a stormwater, sewer line or other service trench will be open at any one time.
  9. Site spoil will be lawfully disposed of in accordance with the approved *CEMP Appendix P* in a manner that does not result in ongoing soil erosion or environmental harm.
  10. Imported fill material placed on site will comprise VENM or ENM per **CoC B21**, and be placed in accordance with the earthwork's specifications.
  11. Construction tracking between finished and unfinished areas is to be restricted to dedicated haul roads and agreed construction pathways. Vehicles entering/exiting the site shall use the dedicated stabilised construction entry/exit. The existing wheel wash facility shall be utilised throughout the construction period in accordance with the CTMP.

## 5.5 Drainage control

1. Stormwater runoff entering the site from external areas, and non-sediment laden (clean) stormwater runoff entering a work area or area of soil disturbance, will be diverted around or through that area in a manner that minimises soil erosion and the contamination of that water for all discharges up to the specified design storm discharge.
2. During the construction period, all measures will be implemented to control flow velocities in such a manner than prevents soil erosion along drainage paths and at the entrance and exit of all drains and drainage pipes during all storms up to the relevant design storm discharge.
3. All waters discharged during the construction phase will discharge onto stable land, in a non-erosive manner, and at a legal point of discharge.
4. “Clean” surface waters will be diverted away from sediment control devices and any untreated, sediment-laden waters.
5. During the construction period, roof water shall be managed in a manner that minimises soil erosion throughout the site, and site wetness within active work areas. Detailed building CSMP and ESC’s will be prepared for individual buildings and site-specific construction requirements.
6. 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 or 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.).
  - Refer to **Section 7** for drainage site discharge and outlet requirements including scour protection.
7. Discharge of stormwater from the development to South Creek is to be undertaken in such a way that ensures that no scour occurs and in accordance with outlet specific ESCP in **Appendix A**.

## 5.6 Erosion control

1. The application of liquid-based dust suppression measures will be undertaken to ensure that sediment-laden runoff resulting from such measures does not create a traffic or environmental hazard in accordance with **Section 5.8**.
2. All temporary earth banks, flow diversion systems, and embankments associated with constructed sediment basins or other flow diversion measures will be machine-compacted and stabilised per details. Bases of diversion drains to be geotextile protected, batters and embankments can be seeded and mulched for the purpose of establishing a temporary vegetative cover within 10 days after grading per **Section 5.8**. Short term drains or

embankments should consider other acceptable stabilisation measures to suit construction program.

3. Unprotected slope lengths will not exceed an LS-Factor of 0.27 and nominal values as noted below (per *Blue Book Table A1*):
  - a. 300m at 1%
  - b. 80m at 1.5%
  - c. 30m at 2%
  - d. 12m at 3%
  - e. 5m at <6%
  - f. All slopes >6% to be stabilised.
4. The construction and stabilisation of earth batters steeper than 6:1 (H:V) must be staged such that no more than 3 vertical-metres of any batter is exposed to rainfall at any instant and that upstream water is diverted away from batters. Apply appropriate stabilisation as noted in **Section 5.6(2)** and **5.8**.
5. All upstream catchments to be diverted (or otherwise managed) to that stormwater runoff does not flow directly down or across batter slopes. This could be achieved by diverting water around the batter or past the batter via an appropriately designed drainage chute.
6. Synthetic reinforced erosion control mats and blankets will not be placed within, or adjacent to, riparian zones and watercourses if such materials are likely to cause environmental harm to wildlife or wildlife habitats.
7. A minimum C-factor of 0.1 will be achieved (refer **Section 5.8**) on all non-completed earthworks exposed to accelerated soil erosion if further construction activities or soil disturbances are likely to be suspended for more than 20 days.

## 5.7 Sediment control

1. Optimum benefit must be made of every opportunity to trap sediment within the work site, and as close as practicable to its source. Sediment controls are to be installed prior to the commencement of work in the contributing catchment area. Sediment control is to be managed using the primary measures as set out in **Sections 5.1-5.7**, with controls to be used as secondary measures to the practices set out in this **CSWMP** and Landcom Blue Book;
2. Sediment fences and basins will be installed and operated to both collect and retain sediment.
3. The potential safety risk of a proposed sediment trap to site workers and the public will be given appropriate consideration, especially those devices located within publicly accessible areas.
4. All measures will be taken to prevent, or at least minimise, the release of sediment from the site.
5. Suitable all-weather maintenance access will be provided to all sediment control devices.

6. Sediment control devices will be de-silted and made fully operational after a sediment-producing event, whether natural or artificial, if the device's sediment retention capacity falls below 70% of its design retention capacity.
7. Materials, whether liquid or solid, removed from sediment control devices during maintenance or decommissioning, will be disposed of in a manner that does not cause ongoing soil erosion or environmental harm.
8. Refer to **Section 6** for management and operational requirements of sediment basins.

## 5.8 Site rehabilitation

1. All disturbed areas will be suitably stabilised per **Table 5.2** in the number of days noted, or prior to anticipated rainfall, whichever is the greater, from completion of formation.

**Table 5.2. Stabilisation Requirements**

Lands	Max. C-factor	Max. No. Days
Waterways and other areas subjected to concentrated flows, post construction	0.05	10 working days
Stockpiles, post construction	0.10	10 workings days
All lands, including waterways and stockpiles, during construction	0.15	20 working days of inactivity
Placed fill must be stabilised if not worked on for more than 10 days	0.10	10 working days of inactivity

2. A minimum C-factor of 0.05 will be achieved on all non-completed earthworks exposed to accelerated soil erosion if further construction activities or soil disturbances are likely to be suspended for more than 20 days.
3. No completed earthwork surface will remain denuded for longer than 60 days.
4. The type of ground cover or stabilisation applied to completed earthworks will be compatible with the anticipated long-term land use, environmental risk, and site rehabilitation measures.
5. Unless otherwise directed by the Site Supervisor or where directed by the approved revegetation plan, topsoil will be placed at a minimum depth of 75mm on slopes 4:1 (H:V) or flatter, and 50mm on slopes steeper than 4:1.
6. The pH level (soil: water 1:5) of topsoil will be adequate to enable establishment and growth of the specified vegetation.
7. Soil ameliorants will be added to the soil in accordance with the approved landscape/revegetation plans and/or soil analysis.
8. Soil density/compaction will be adjusted prior to seeding/planting in accordance with the approved VMP.



9. Temporary site stabilisation procedures must commence at least 30 days prior to the nominated site shutdown date. At least 70% stable cover (C-factor less than 0.05) of all unstable and/or disturbed soil surfaces will be achieved prior to the start of shutdown. The stabilisation works will not rely upon the longevity of non-vegetated erosion control blankets, or temporary soil binders unless appropriate management measures to ensure the required C-Factor can be achieved throughout the duration of the measure's implementation.
10. All unstable or disturbed soil surfaces will be adequately stabilised against erosion using acceptable methods of site stabilisation are set out in *Table A3* of the *Landcom Bluebook* to achieve a C-Factor of less than 0.05.
11. The C-factor, is a ratio which defines soil cover – “the ratio of soil loss from land under specified plant or mulch condition to the corresponding loss from bare soil”.

Acceptable methods to stabilise per *Landcom Blue Book* and to meet the C-factor less than 0.05 are as follows and shown in *Blue Book Table A3*:

- Where warehousing is proposed, constructed pavements/ buildings more than 75% of area (i.e. 48.75 Ha)
- Where warehousing is not proposed:
  - 70% grass cover over the disturbed area.
  - Wood chip at 27 t/Ha
  - 100mm recycled concrete road base.
  - Jute-matting
  - Hydromulching.
  - In-situ cement stabilisation/ lime stab.
  - soil binder such as Ground Control (Complete Water Treatment), Stonewall (Vital Industries). The use of polymer soil binders will be subject to on-site testing and verification, and confirmation of longevity and suitability of the application and specific location. It is expected that maintenance and ongoing re-application will be required if this method is adopted.
  - Other stabilisation per *Landcom Blue Book Table A3*.
- 12. Construction-stage sediment control basins shall be converted to permanent stormwater quantity and quality management devices (i.e. On-Site-Detention Basins & Bio-filtration Basins) following completion of the civil works within the associated basin sub-catchment. The operational features of the permanent stormwater treatment system will be made fully operational (i.e. maintenance and/or reconstruction as required).

## 6 SEDIMENT BASIN OPERATION AND MANAGEMENT

### 6.1 General

1. This section of the report describes the general requirements for Sediment Basin, sizing and operation and management.
2. Sediment basins Type D construction.
3. Soil Hydrological Group D.
4. Basins to operate as wet basins and 5-day cycle. Basins are designed to retain sediment-laden water allowing adequate time for the treatment and gravitational settlement of fine sediment particles. Basins are not to be drained until adequate water quality is obtained in the basin as noted in **Section 6.2(4)**.
5. Sediment basins will be constructed prior to site disturbance to ensure that adequate rainfall runoff mitigation during construction has been made and in accordance with **CoC B24**.
6. Refer drawing **Co13362.02-EW206** for basin sizing calculations and drawings **Co13362.02-EW201 to EW203** for basin locations, spillway details and basin details.
7. Basins shall be constructed in a manner that facilitates conversion to operational water quantity-and-quality management structures.
8. Basin sizing based on RUSLE and following parameters.
 

a. Soil Texture Group	F
b. Soil Hydrological Group	D
c. Design Rainfall Depth	5 days
d. 5-day, 85% percentile Rainfall event	35mm
e. 2yr, 6hr storm intensity	10.0mm/ hr
f. Rainfall Erosivity (R)	2210
g. Soil erodibility (K-factor)	0.075
h. Length/ Gradient Factor (LS-factor)	0.13
i. Erosion Control Practice (P-Factor)	1.3
j. Ground cover (C-Factor)	1
k. Soil Loss Class	1
l. Erosion Hazard	Very Low
9. Constructed sediment basins must be maintained and fully operational throughout the construction period and until each basin's catchment area achieves stabilisation with C-factor of 0.1 or permanent stabilisation per **Section 5.8**.
10. Before starting any clearing or construction, all the necessary materials and components will be on the site to avoid delays in implementing the sediment controls once works begin.
11. Required short-term sediment control measures will be installed downstream of the proposed earthworks to control sediment runoff during construction of the basin.

12. The area to be covered by the embankment, basin borrow pits (if required) and incidental works, together with an area extending beyond the limits of each for a distance not exceeding five (5) metres all around will be cleared of all trees, scrub, stumps, roots, dead timber and rubbish and disposed of in a suitable manner.
13. All holes made by grubbing within the embankment footprint will be filled with sound material, adequately compacted, and finished flush with the natural surface.
14. Spillway sizing has been provided to accommodate capacity for storm flows to the 1 in 10-year ARI storm event per Blue Book Requirements for the anticipated duration of basins being less than 6months. In the event that basins are in place longer than 6months, then the basin spillway should be reviewed and consideration to increasing the capacity to cater for 1 in 20-year ARI should be made.

## **6.2 Sediment Basin Operation**

1. Type D basins will be operated as wet basins with the settled/ treated water decanted from the basin as soon as suitable.
2. Type D basin based on a maximum 5-day cycle. That being the filling, treatment and discharge of the basin is required within a 5-day period following cessation of rainfall.
3. Appropriate coagulation of sediment basins will be undertaken if the contained water does not achieve the specified water quality standard (TSS<50mg/L) within the required 5-day period. Refer notes on drawing **Co13362.02-EW200**.
4. Recommended coagulant/ flocculant is gypsum at a dose rate between 32-50kg/ 100m<sup>3</sup> of sediment water. Dosage rates will be determined on site as required to achieve water quality requirements. Alternate flocculant products can be considered with consultation with the ESC or engineer.
5. Sediment basin water quality samples will be preferably taken at a depth no greater than 200mm above the level of settled sediment.
6. Discharged water will meet the discharge criteria defined in **Section 3.6** of the **CSMP**. Testing to be completed using acceptable (and appropriately calibrated) field instrument or lab testing. Discharge is noted to meet requirements included in **Section 3.6**.
7. Settled sediment will be removed from sediment basins when the volume of the sediment exceeds the designated sediment storage volume (as nominated on the ESCP drawings), or the design maximum sediment storage elevation. Sediment marker and water level indicators to be provided in accordance with Landcom Blue Book requirements as detailed on drawing **Co13362.02-EW204** in **Appendix A**.

## **6.3 Sediment Basin Maintenance**

1. The sediment basin will be inspected during the following periods:
  - a. During construction to determine whether machinery, falling trees, or construction activity has damaged any components of the sediment basin. If damage has occurred, it will be repaired.

- b. After each runoff event. Inspect the erosion damage at flow entry and exit points. If damage has occurred, the necessary repairs will be made.
  - c. At least fortnightly in the absence of (b) above.
  - d. Prior to, and immediately after, periods of “stop work” or site “shutdown”.
- 2. Accumulated sediment will be cleaned out when it reaches the marker board/post, and restore the original storage volume restored. Place sediment in a disposal area or, if appropriate, mix with dry soil on the site.
- 3. Sediment will not be disposed of in a manner that will create an erosion or pollution hazard.
- 4. Removed sediment will be moved to a location for moisture conditioning and reuse as engineered site fill. Sediment intended for re-use should be confirmed as acceptable for use as engineered fill following testing and approval from the geotechnical engineer. The geotechnical engineer shall confirm whether the material conforms to the bulk earthworks filling specification. The location for moisture conditioning will be chosen such that it remains within the catchment of a sediment basin and erosion control system. Alternatively, sediment removed from basins shall be disposed of from site in an approved manner. The material shall be tested for any contaminants and be classified, in accordance with EPA Waste Classification Guidelines, by an environmental consultant prior to disposal and in accordance with the *CEMP & CDWMP*.
- 5. All visible pipe connections will be checked for leaks, and repair, as necessary.
- 6. Fill material in the dam will be checked for excessive settlement, slumping of the slopes or piping between the conduit and the embankment; make all necessary repairs.
- 7. All trash and other debris will be removed from the basin and riser.
- 8. Submerged inflow pipes will be inspected and de-silted (as required) after each inflow event.

#### **6.4 Sediment basin rehabilitation**

- 1. Required drainage, erosion and sediment control measures during the decommissioning and rehabilitation of a sediment basin will comply with same standards specified for the normal construction works.
- 2. Upon decommissioning of a sediment basin, all water and sediment will be removed from the basin prior to removal of the embankment (if any). Any such material, liquid or solid, will be disposed of in a manner that will not create an erosion or pollution hazard.
- 3. A basin’s catchment conditions associated with the staged decommissioning of the basin will comply with the specified sediment control standard.
- 4. If the permanent outlet structure is constructed prior to stabilisation of the up-slope catchment area, then this outlet structure will not be made operational.
- 5. The permanent stormwater treatment features (e.g. vegetation and filtration media) will be appropriately protected from the adverse effects of sediment runoff per the details provided on **Co13362.02-EW200 to EW206**.
- 6. A sediment basin will not be decommissioned until all up-slope site stabilisation measures have been implemented and are appropriately working to control soil erosion and sediment

runoff in accordance with the specified ESC standard and minimum permanent stabilisation works.

7. Immediately prior to the construction of the permanent stormwater treatment device, appropriate flow bypass conditions will be established to prevent sediment-laden water entering the device.
8. Immediately following the construction of the filter media of the permanent stormwater treatment device, the filter media will be covered by heavy-duty filter cloth (minimum Bidim A44 or equivalent) and a minimum 200mm layer of earth or sacrificial filter media. Such earth and filter cloth will not be removed from the device until suitable surface conditions being achieved within the basin's catchment area.
9. Immediately following the construction of the bioretention system an appropriate sediment forebay, filter or straw-bale system will be installed in a manner to prevent sediment intrusion into the device.
10. Plant establishment within the permanent stormwater treatment device will be delayed until sediment intrusion into the device is suitably under control.
11. Upon stabilisation of the contributing catchment being achieved, the operational features of the permanent stormwater treatment system will be made fully operational (i.e. maintenance and/or reconstruction as required).
12. Upon the approval of the engineer or site supervisor, the newly constructed permanent stormwater treatment features of the basin will be made operational if such actions do not prevent the site from operating at the required sediment control standard.



## 7 DRAINAGE DISCHARGE OUTLET REQUIREMENTS

### 7.1 General

The stormwater management for the completed site shall consist of a piped drainage system with on-site detention and pollution control devices as set out in the SMP and CEMP. Reference to outlet specific ESCP drawings in **Appendix A** is to be made for detailed outlet ESC measures.

The sediment and erosion control methodology for the sediment controls are based on a staged process depending on the level of completed construction activities on the site. The basis of the controls are in accordance with Assessment of Erosion Hazard of *LANDCOM, SOILS AND CONSTRUCTION, Volume 1, 4th Edition, March 2004, Managing Urban Stormwater (the Blue Book)* and in relation to the outlet controls are generally as follows:

- No works are to be carried out in the Core Riparian Zone (CRZ) other than those specified in this document and the specified plans specifically relating to the stormwater discharge outlets.
- All land disturbance activities are to be minimised to those that are absolutely necessary to complete the works.
- Hay bales are not be used for the control of sediment run-off.
- All sedimentation basins are to be constructed and operational during outlet construction and establishment periods. As per documents all site filling sediment basins built within the proposed development site away from the watercourse and any remnant vegetation.

In relation to the sensitivity of the receiving environment, South Creek would be considered as being at least a 6<sup>th</sup> order stream as defined in the Strahler Stream Classification system. As such a dedicated riparian buffer is necessary to be maintained to the South Creek and management measures set out for a *Category 1: Environmental Corridor* included in *Table 5* of the *Landcom Blue Book* are necessary for the works.

### 7.2 Core Riparian Zone (CRZ) Works

The core riparian zone has been delineated on the Outlet Erosion and Sediment Control drawings (refer **Appendix A**) and is based on a 40m setback from the defined creek bank and normal water level of South Creek which has been defined by detail survey.

The construction works within the CRZ will be limited to the three stormwater outlets for OSD's. The works will involve mechanical excavation and filling, placing of rockwork for energy dissipation and flow spreading, and the removal and replacement of vegetation.

Works located within the CRZ will adhere to the following:

1. Works will be scheduled to be undertaken during forecasted dry weather.
2. Works and any subsequent land disturbance associated with the construction of the energy dissipater and associated outlet pipe or outlet channel will be limited to within 5m either side of the centreline of the outlet system.
3. The works will be consistent with the NSW Office of Water Guidelines for Controlled Activities for works within riparian corridors.
4. Works are to be sufficiently stabilised to meet regulatory requirements ensuring that minimal erosion will occur during the works.

5. No construction (including clearing and maintenance access) is permitted within the riparian corridor except for that identified on the approved drawings and activities associated with vegetation and stormwater management.

## SITE INSPECTION AND MAINTENANCE

### 7.3 Site Inspection and Monitoring Introduction

Monitoring and reviewing of the effectiveness and condition of controls should be completed by the Construction Contractor's EM as set out in **Section 3.2** and as detailed in the *CEMP*. Auditing - as consistent and detailed within the *CEMP*. Regular inspections will be performed (daily and weekly – refer **Appendix B** for check sheets) by the Construction Contractor's representative in addition to the regular site inspections of performance of controls by the ESC or engineer.

The minimum inspections to be undertaken on the site will be completed per **Section 7.3(1)**.

### 7.4 Water Quality Monitoring

1. All water discharge performance to be in accordance with **Section 3.6** of this CSMP.
2. All water quality data, including dates of rainfall, dates of testing, testing results and dates of water release, must be kept in an on-site register. The register is to be maintained up to date for the duration of the approved works and be available on-site for inspection by environmental representative on request.
3. At nominated water monitoring sites, a minimum of 3 water samples must be taken and analysed, and the average result used to determine quality.
4. All environmentally relevant incidents must be recorded in a field log that must remain accessible to all relevant regulatory authorities.

### 7.5 Site Inspection and Monitoring

1. A self-auditing program (implemented by the Construction Contractor's EM) will be established based on the check sheets shown in **Appendix B**. Surface water monitoring points are indicated on the design drawings. A site inspection using the Check Sheet will be made by the Contractors EM:
  - At least weekly.
  - Immediately before site closure.
  - Immediately following rainfall events in excess of 5mm in any 24-hour period.
2. 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
3. The ESC engineer will complete a monthly inspection. The ESC engineer will oversee the installation and maintenance of all soil and water management works on the site. The ESC

will prepare a monthly written summary that will provide recommendations for site implementation of measures.

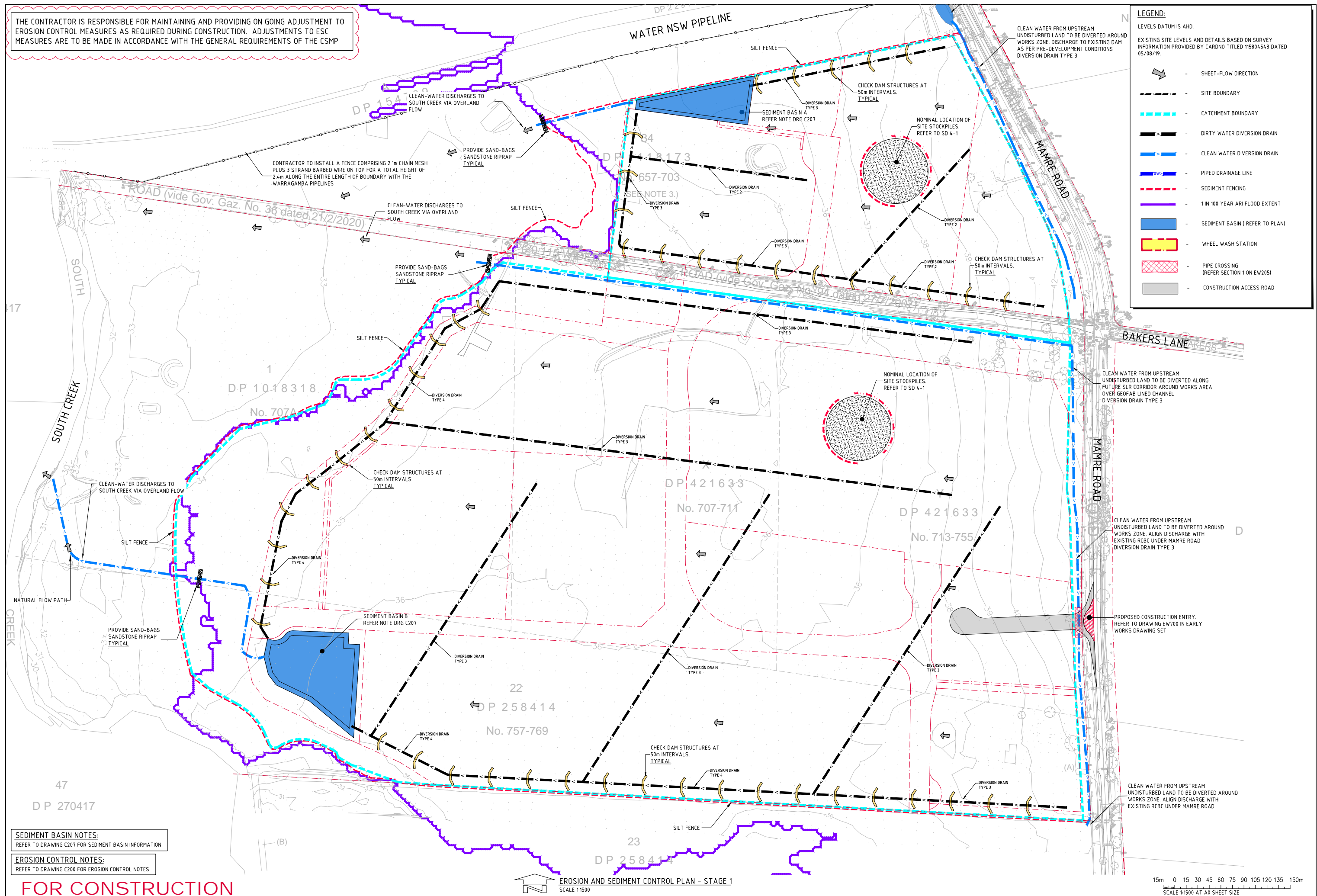
4. The nominated responsible person (Construction Contractor's EM) will need to ensure that:
  - The plan is being implemented correctly
  - Repairs are undertaken as required
  - Essential modifications are made to the plan if and when necessary

The report will carry a certificate that works have been carried out in accordance with the plan.

Inspection and monitoring of equipment washdowns, waste handling and other construction related activities are to be completed in accordance with *CEMP*. The erosion and sediment control measures are to be adjusted on site by the contractor under the advisement of Costin Roe Consulting in general accordance with CSMP to suit buildability and site constraints. Adjustment to erosion and sediment control measures on site will not require changes to the CSMP and is to be managed by the contractor.

**APPENDIX A**  
**COSTIN ROE CONSULTING ESCP DRAWINGS**

THE CONTRACTOR IS RESPONSIBLE FOR MAINTAINING AND PROVIDING ON GOING ADJUSTMENT TO EROSION CONTROL MEASURES AS REQUIRED DURING CONSTRUCTION. ADJUSTMENTS TO ESC MEASURES ARE TO BE MADE IN ACCORDANCE WITH THE GENERAL REQUIREMENTS OF THE CSMP



**SEDIMENT BASIN NOTES:**  
REFER TO DRAWING C207 FOR SEDIMENT BASIN INFORMATION

EROSION CONTROL NOTES:  
REFER TO DRAWING C200 FOR EROSION CONTROL NOTES

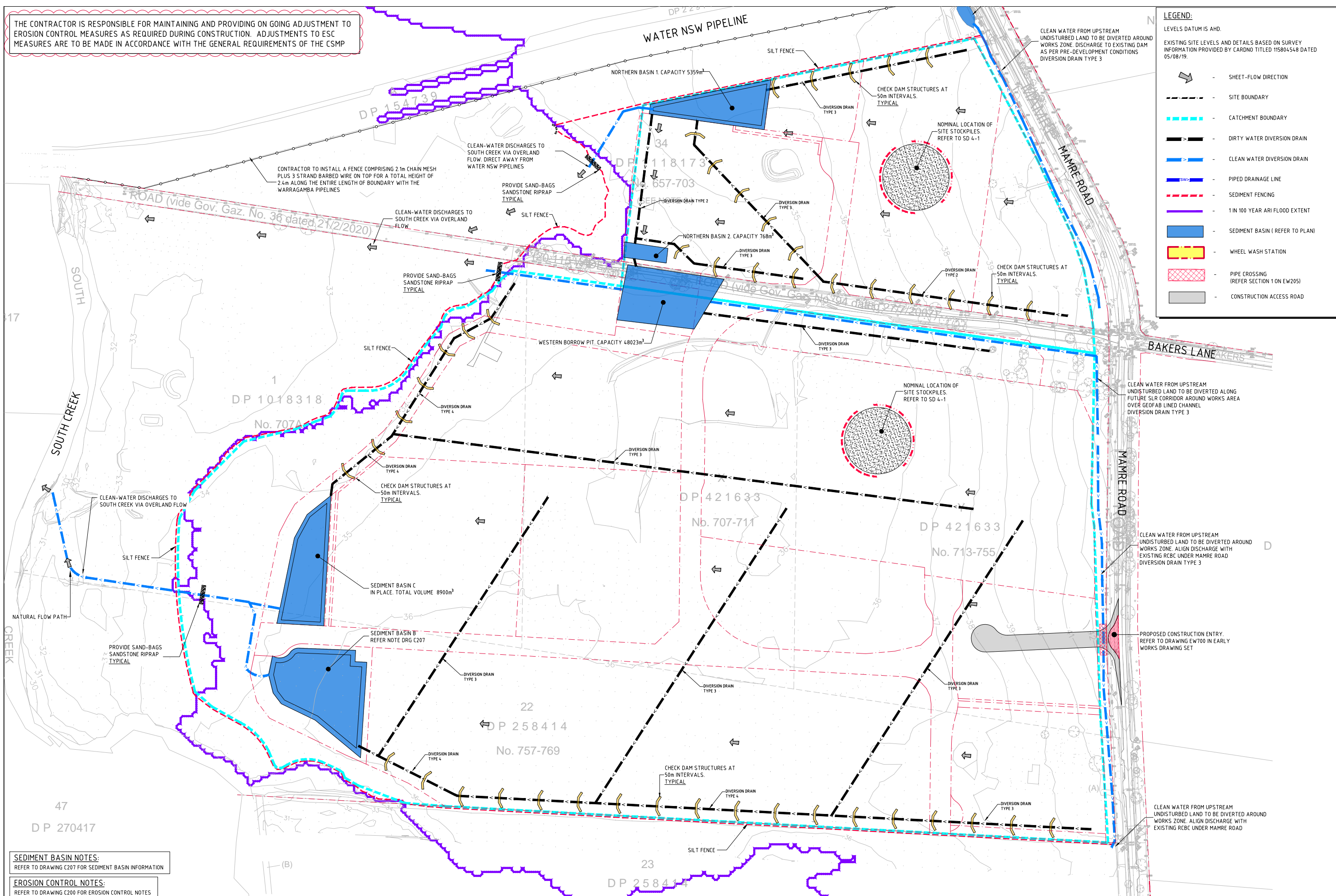
FOR CONSTRUCTION

EROSION AND SEDIMENT CONTROL PLAN - STAGE 1  
SCALE 1:1500

15m 0 15 30 45 60 75 90 105 120 135 150m  
SCALE 1:1500 AT A0 SHEET SIZE



THE CONTRACTOR IS RESPONSIBLE FOR MAINTAINING AND PROVIDING ON GOING ADJUSTMENT TO EROSION CONTROL MEASURES AS REQUIRED DURING CONSTRUCTION. ADJUSTMENTS TO ESC MEASURES ARE TO BE MADE IN ACCORDANCE WITH THE GENERAL REQUIREMENTS OF THE CSMP



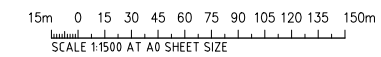
**SEDIMENT BASIN NOTES:**  
REFER TO DRAWING C207 FOR SEDIMENT BASIN INFORMATION

**EROSION CONTROL NOTES:**  
REFER TO DRAWING C200 FOR EROSION CONTROL NOTES

FOR CONSTRUCTION



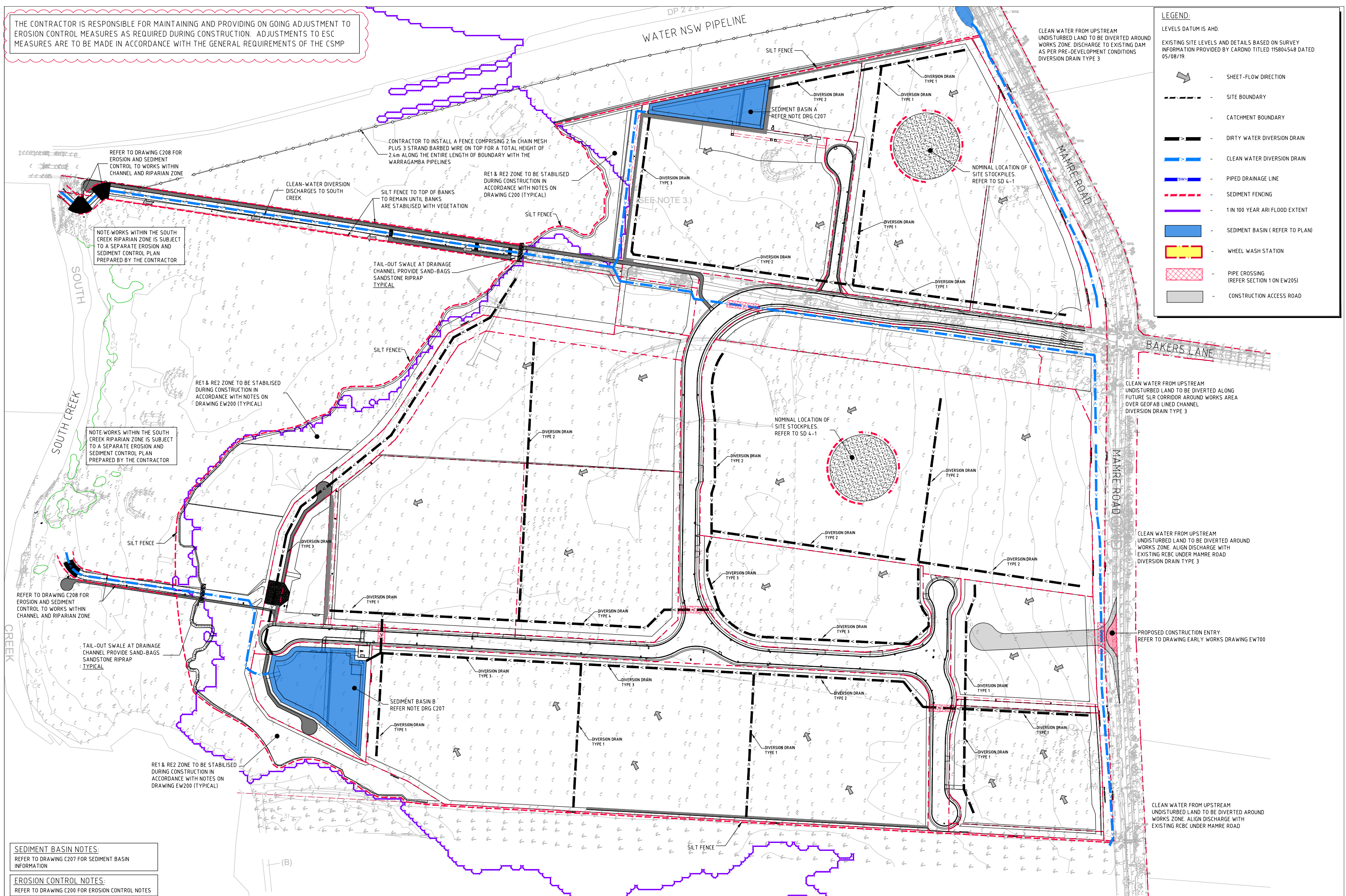
**EROSION AND SEDIMENT CONTROL PLAN - STAGE 1 INTERIM**  
SCALE 1:1500

[illegible]

		<b>PROJECT</b> <b>MAMRE SOUTH PRECINCT</b> 6575 - 708 MAMRE ROAD KEMPS CREEK, 2178, NSW		<b>Costin Roe Consulting Pty Ltd.</b> AIN 50 0033 696 440 PO Box N419 Sydney NSW 1220 Level 4 4 Wood Street, Millers Point NSW 2000 p +61 2 9251 7699 e mail@costinroe.com.au w costinroe.com.au			<b>DRAWING TITLE</b> EROSION AND SEDIMENT CONTROL PLAN STAGE 1 INTERIM PLAN
							<b>DRAWING NO</b> C013362.02-C 2018



THE CONTRACTOR IS RESPONSIBLE FOR MAINTAINING AND PROVIDING ON GOING ADJUSTMENT TO EROSION CONTROL MEASURES AS REQUIRED DURING CONSTRUCTION. ADJUSTMENTS TO ESC MEASURES ARE TO BE MADE IN ACCORDANCE WITH THE GENERAL REQUIREMENTS OF THE CSMP



SEDIMENT BASIN NOTES:  
REFER TO DRAWING C207 FOR SEDIMENT BASIN INFORMATION

EROSION CONTROL NOTES:  
REFER TO DRAWING C200 FOR EROSION CONTROL NOTES

FOR CONSTRUCTION

NOTE ADDED	12.10.22	3
ISSUED FOR CONSTRUCTION	21.09.22	2
REVISED BASIN A	09.05.22	1
ISSUED FOR CONSTRUCTION	17.09.21	0
AMENDMENTS	DATE	ISSUE

AMENDMENTS	DATE	ISSUE	AMENDMENTS	DATE	ISSUE
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EROSION AND SEDIMENT CONTROL PLAN - STAGE 2  
SCALE 1:1500

ALTIS  
PROPERTY PARTNERS

CLIENT  
FRASERS  
PROPERTY

PROJECT  
MAMRE SOUTH PRECINCT  
657 - 708 MAMRE ROAD  
KEMPS CREEK, 2178, NSW

DESIGNED: MW  
DRAWN: MC  
DATE: JUN 21  
CHECKED: MW  
DATE: 20  
SIZE: A0  
SCALE: AS SHOWN  
CAD REF: C01362.02-C



Costin Roe Consulting Pty Ltd.  
ABN 50 003 096 440  
PO Box N410 Sydney NSW 1220  
Level 4 & 5 Windmill Street, Millers Point NSW 2000  
p: +61 2 9251 7899 e: mail@costinroe.com.au w: costinroe.com.au

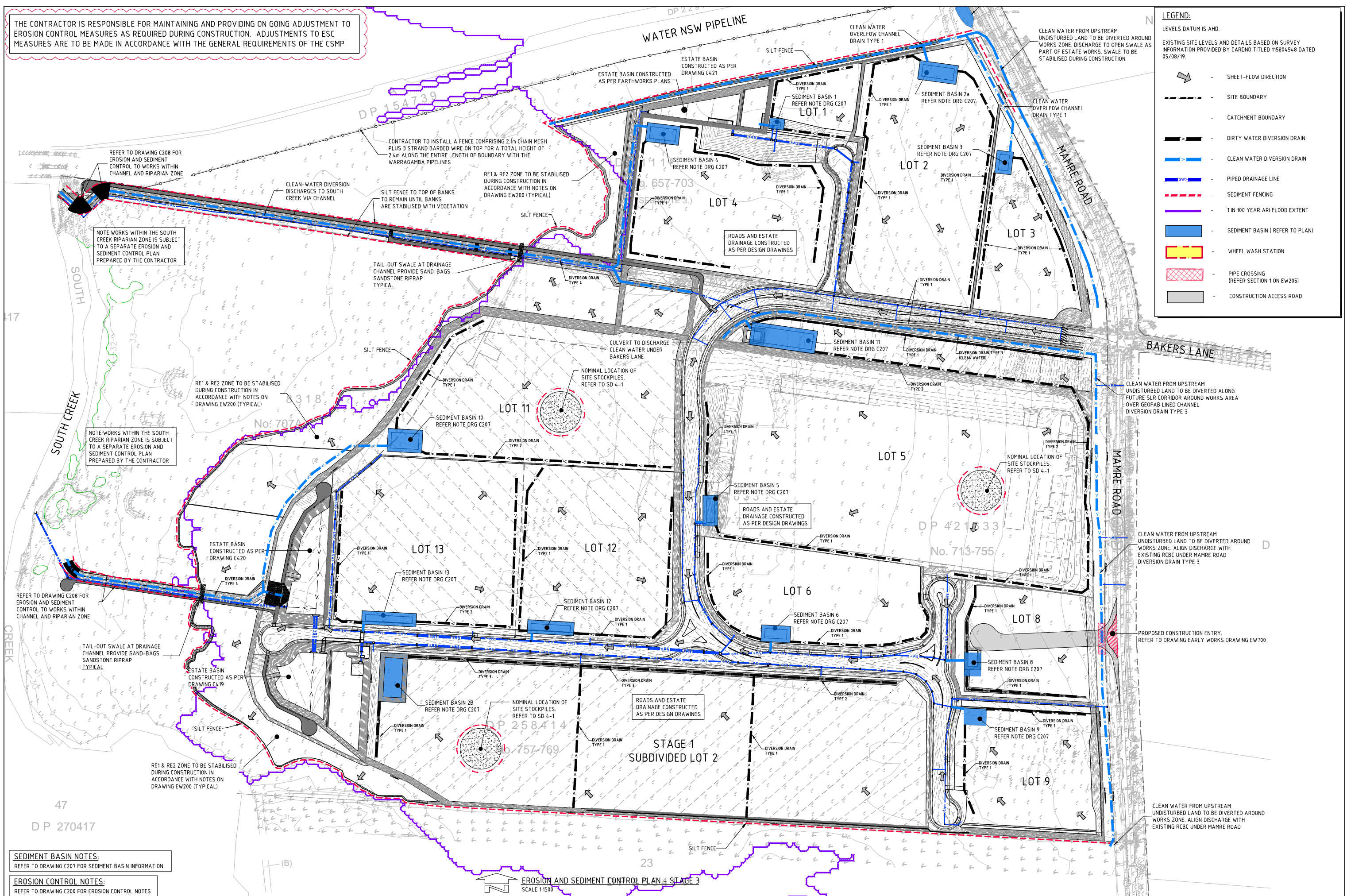
CRC  
COSTIN ROE  
CONSULTING  
CIVIL &  
STRUCTURAL  
ENGINEERS

DRAWING TITLE  
EROSION AND SEDIMENT  
CONTROL PLAN  
STAGE 2  
DRAWING NO: C01362.02-C 202

3



THE CONTRACTOR IS RESPONSIBLE FOR MAINTAINING AND PROVIDING ON GOING ADJUSTMENT TO EROSION CONTROL MEASURES AS REQUIRED DURING CONSTRUCTION. ADJUSTMENTS TO ESC MEASURES ARE TO BE MADE IN ACCORDANCE WITH THE GENERAL REQUIREMENTS OF THE CSMP



**SEDIMENT BASIN NOTES:**  
REFER TO DRAWING C207 FOR SEDIMENT BASIN INFORMATION

**EROSION CONTROL NOTES:**  
REFER TO DRAWING C200 FOR EROSION CONTROL NOTES

FOR CONSTRUCTION

										D
NOTE ADDED	12.10.22	4								
ISSUED FOR CONSTRUCTION	21.09.22	3								
REVISED BASIN & LOT LAYOUTS	09.05.22	2								
ISSUED FOR CONSTRUCTION	20.09.21	1								
ISSUED FOR CONSTRUCTION	17.09.21	0								
AMENDMENTS	DATE	ISSUE	AMENDMENTS	DATE	ISSUE	AMENDMENTS	DATE	ISSUE		



PROJECT  
MAMRE SOUTH PRECINCT  
657 - 708 MAMRE ROAD  
KEMPS CREEK, 2178, NSW

DESIGNED MW	DRAWN MC	DATE JUN 21	CHECKED MW	SIZE A0	SCALE AS SHOWN	CAD REF: C013362.02-C 203
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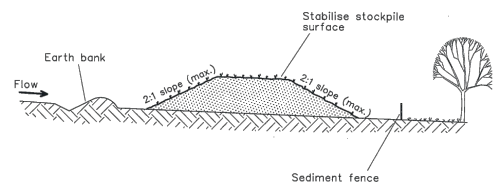
**Costin Roe Consulting Pty Ltd**  
ABN 50 003 696 446

PO Box N419 Sydney NSW 1220  
Level 4, 8 Windmill Street, Millers Point NSW 2000  
p: +61 2 9251 7699 f: +61 2 9241 3731  
e: mail@costinroe.com.au w: costinroe.com.au



DRAWING TITLE	EROSION AND SEDIMENT CONTROL PLAN STAGE 3
DRAWING No	C013362.02-C 203



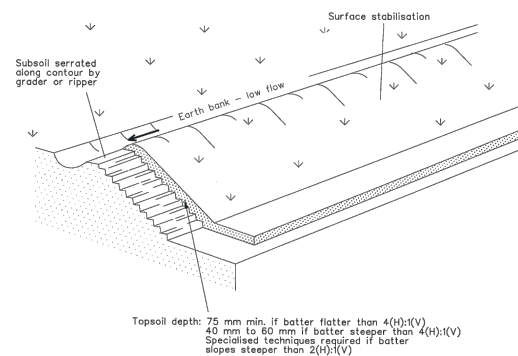


### Construction Notes

1. Place stockpiles more than 2 (preferably 5) metres from existing vegetation, concentrated water flow, roads and hazard areas.
2. Construct on the contour as low, flat, elongated mounds.
3. Where there is sufficient area, topsoil stockpiles shall be less than 2 metres in height.
4. Where there is to be in place for more than 10 days, stabilise following the approved ESCP or SWMP to reduce the C-factor to less than 0.10.
5. Construct earth banks (Standard Drawing 5-5) on the upslope side to divert water around stockpiles and sediment fences (Standard Drawing 6-B) 1 to 2 metres downslope.

## STOCKPILES

SD 4-1

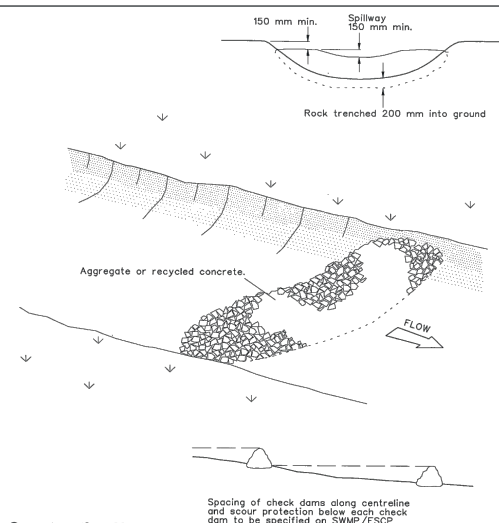


### Construction Notes

1. Scarify the ground surface along the line of the contour to a depth of 50 mm to 100 mm to break up any hardsetting surfaces and to provide a good bond between the respread material and subsoil.
2. Add soil ameliorants as required by the ESCP or SWMP.
3. Rip to a depth of 300 mm if compacted layers occur.
4. Where possible, replace topsoil to a depth of 40 to 60 mm on lands where the slope exceeds 4(H):1(V) and to at least 75 mm on lower gradients.

## REPLACING TOPSOIL

SD 4-2

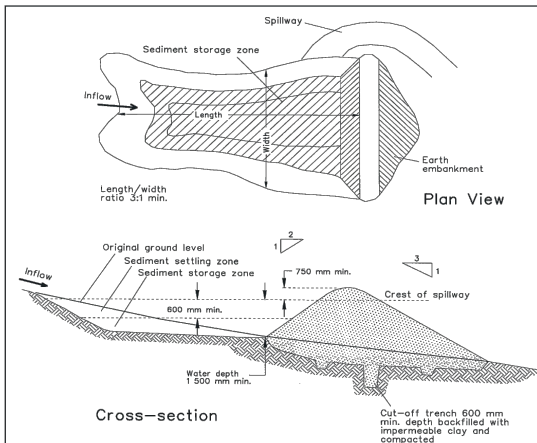


### Construction Notes

1. Check dams must be built with various materials, including rocks, logs, sandbags and straw bales. The maintenance program should ensure their integrity is retained, especially where constructed with straw bales. In the case of bales, this might require their replacement every two to four months.
2. Trench the check dam 200 mm into the ground across its whole width. Where rock is used, fill the trenches to at least 100 mm above the ground surface to reduce the risk of undercutting.
3. Normally, their maximum height should not exceed 600 mm above the gully floor. The centre should act as a spillway, being at least 150 mm lower than the outer edges.
4. Space the dams so the toe of the upstream dam is level with the spillway of the next downstream dam.

## ROCK CHECK DAM

SD 5-4

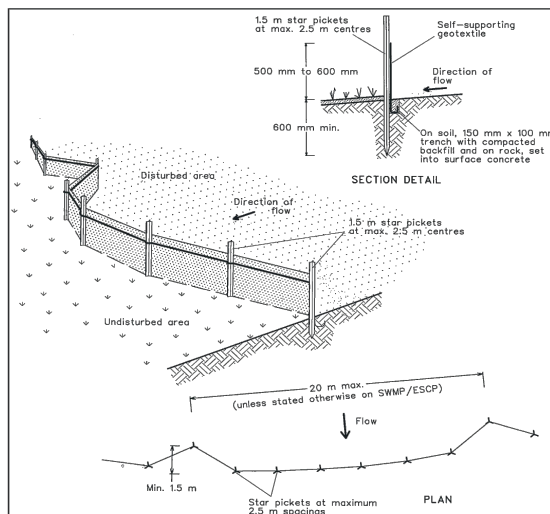


### Construction Notes

1. Remove all vegetation and topsoil from under the dam wall and from within the storage area.
2. Construct a cut-off trench 500 mm deep and 1,200 mm wide along the centreline of the embankment extending to a point on the gully wall level with the riser crest.
3. Maintain the trench free of water and recompact the materials with equipment as specified in the SWMP to 95 per cent Standard Proctor Density.
4. Select fill following the SWMP that is free of roots, wood, rock, large stone or foreign material.
5. Prepare the site under the embankment by ripping to at least 100 mm to help bond compacted fill to the existing substrate.
6. Spread the fill in 100 mm to 150 mm layers and compact it at optimum moisture content following the SWMP.
7. Construct the emergency spillway.
8. Rehabilitate the structure following the SWMP.

**EARTH BASIN - WET**  
(APPLIES TO 'TYPE D' AND 'TYPE F' SOILS ONLY)

SD 6-4

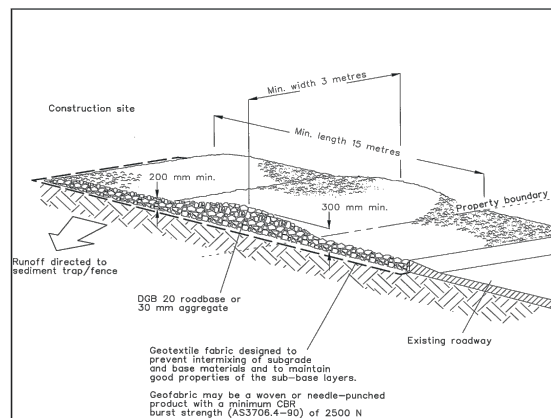


### Construction Notes

- Construct sediment fences as close as possible to be parallel to the contours of the site, but with small returns as shown in the drawing to limit the catchment area of any one section. The catchment area should be small enough to limit water flow if concentrated at one point to a maximum of 150 m<sup>2</sup> in the design storm, usually a 10-year event.
- Cut a 150-mm deep trench along the upslope line of the fence for the bottom of the fabric to be entrenched.
- Drive 1.5 metre long star pickets into ground at 2.5 metre intervals (max) at the downslope edge of the trench. Ensure any star pickets are fitted with safety caps.
- Fix self-supporting geotextile to the upslope side of the posts ensuring it goes to the base of the fence. Fix the geotextile with the staples or as recommended by the manufacturer. Only use geotextile specifically produced for sediment fencing. The use of sheds cloth for this purpose is not satisfactory.
- Join sections of fabric at a support post with a 150-mm overlap.
- Backfill the trench over the base of the fabric and compact it thoroughly over the geotextile.

## SEDIMENT FENCE

SD 6-8

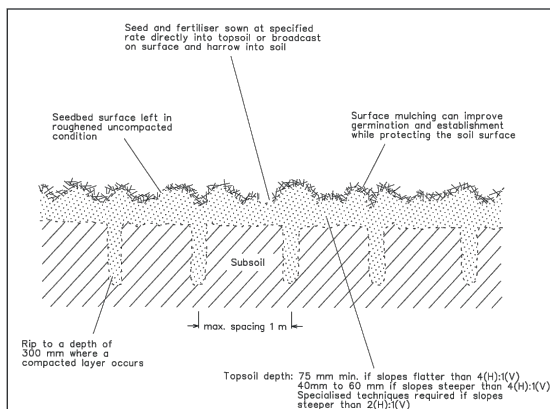


### Construction Notes

1. Strip the topsoil, level the site and compact the subgrade.
2. Cover the area with needle-punched geotextile.
3. Construct a 200-mm thick pad over the geotextile using road base or 30-mm aggregate.
4. Ensure the structure is at least 15 metres long or to building alignment and at least 3 metres wide.
5. Where a sediment fence joins onto the stabilised access, construct a hump in the stabilised access to divert water to the sediment fence

### STABILISED SITE ACCESS

SD 6-14

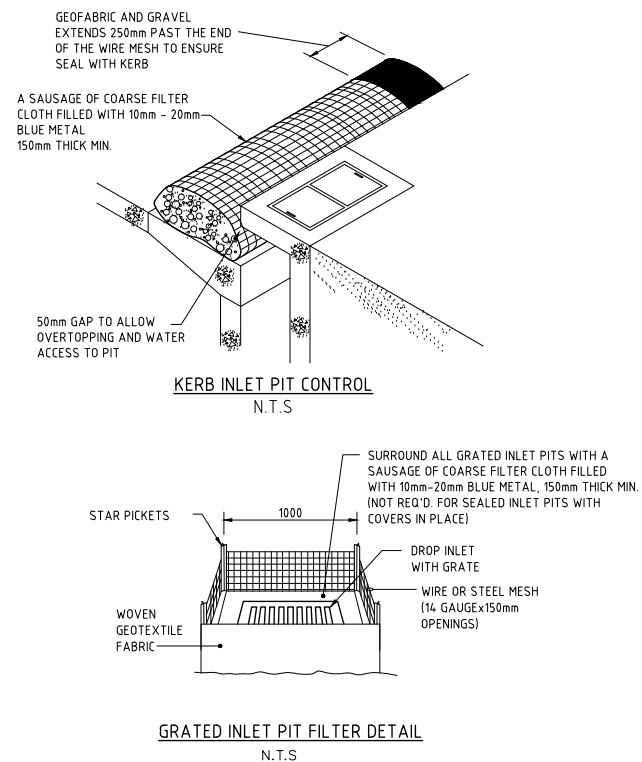


### Construction Notes

1. Loosen compacted soil before sowing any seed. If necessary, rip the soil to a depth of 300 mm. Avoid rotary hoe cultivation.
2. Work the ground only as much as necessary to achieve the desired tilth and prepare a good seedbed.
3. Avoid cultivation in very wet or very dry conditions.
4. Cultivate on or close to the contour where possible, not up and down the slope.

## SEEDBED PREPARATION

SD 7-1

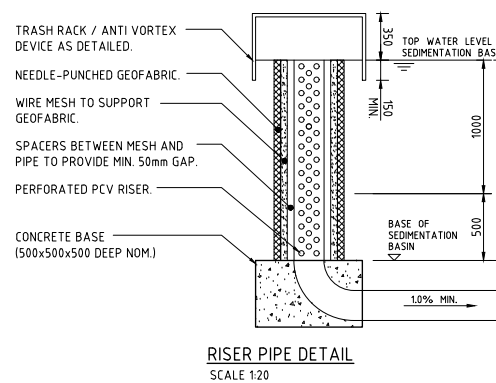
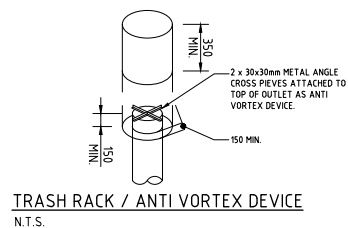
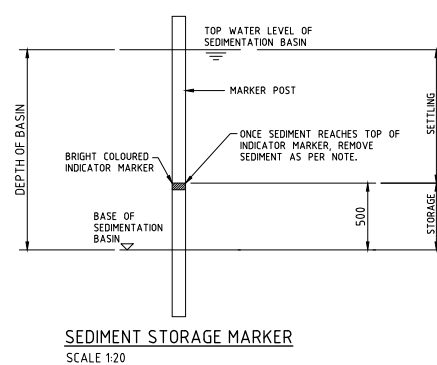
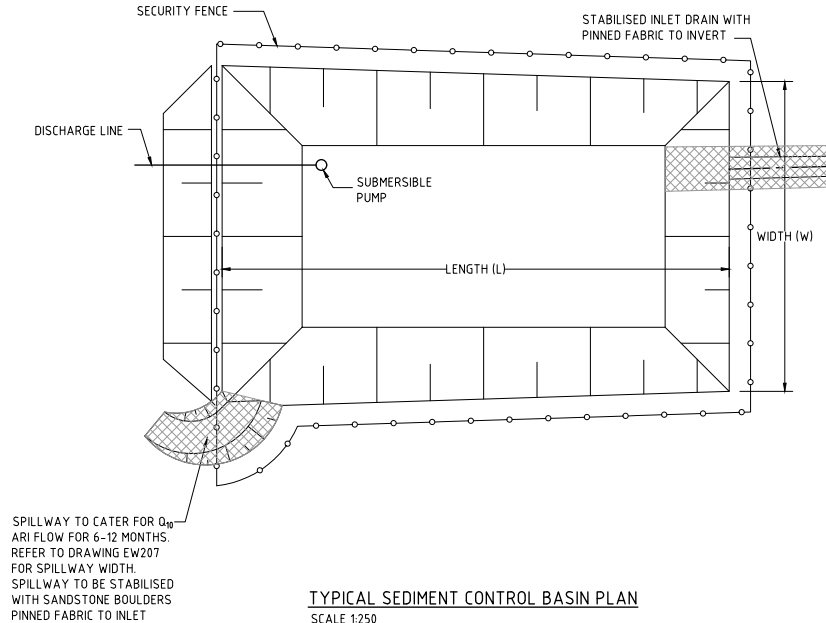
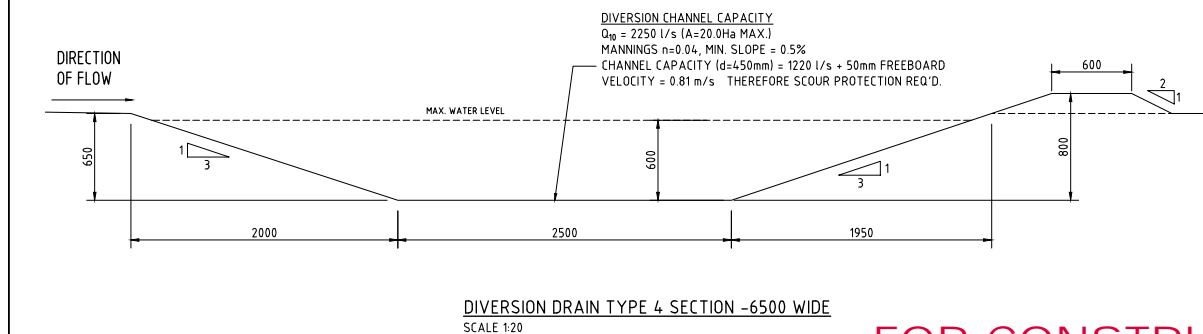
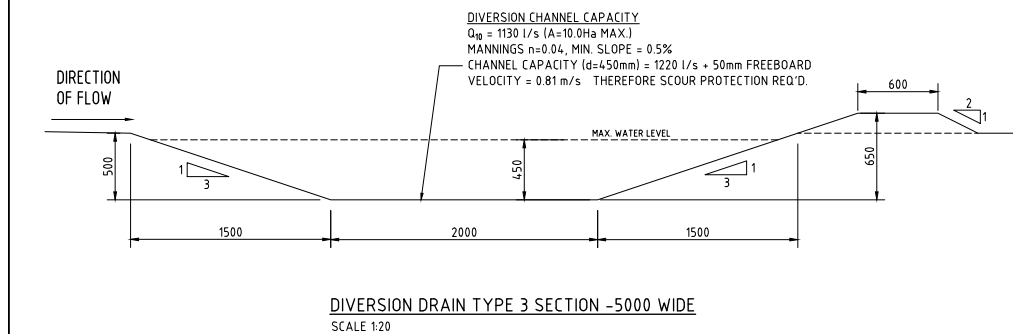
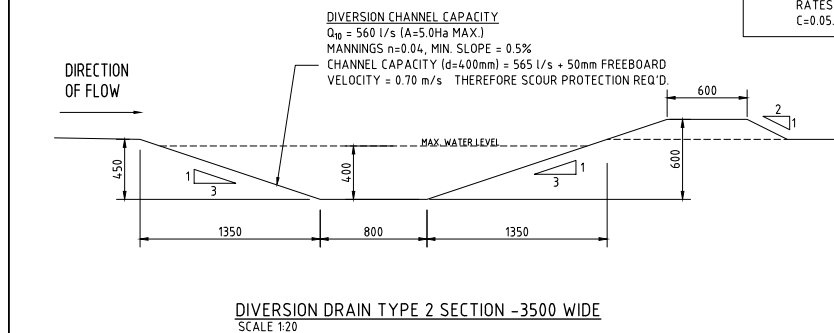
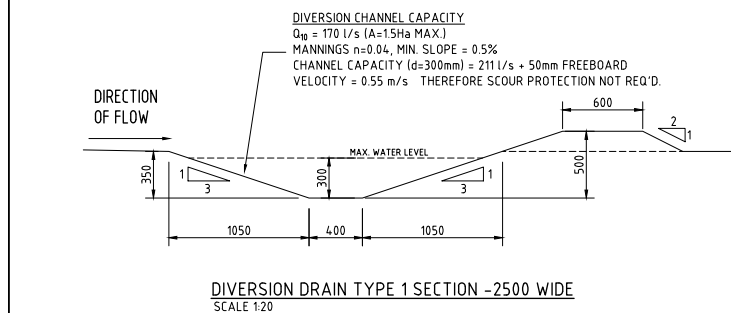
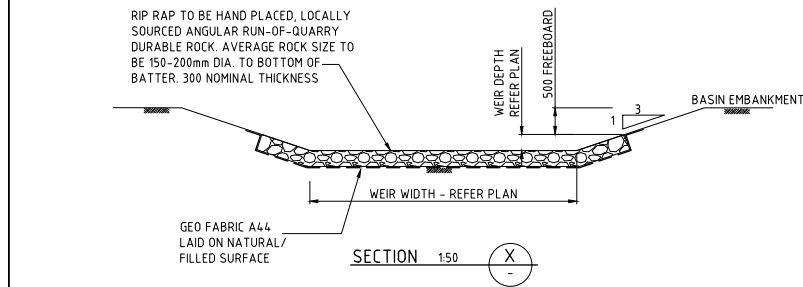
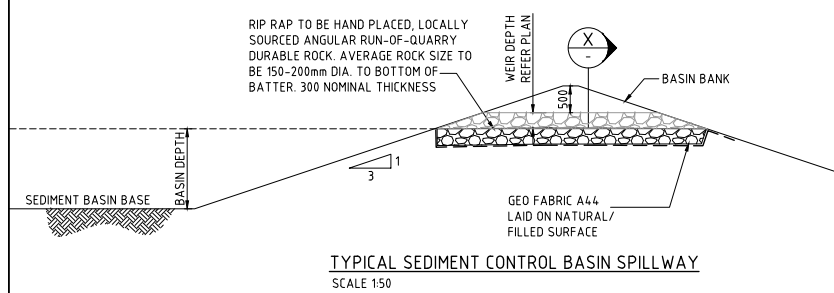


NOTE: ADOPT ABOVE DETAILS AROUND ALL PITS WITHIN AREA ENCOMPASSED BY SILT FENCE & TO PITS ON THE ROAD ADJACENT TO SITE BOUNDARY.

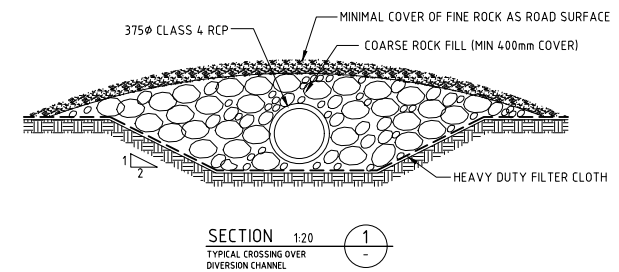
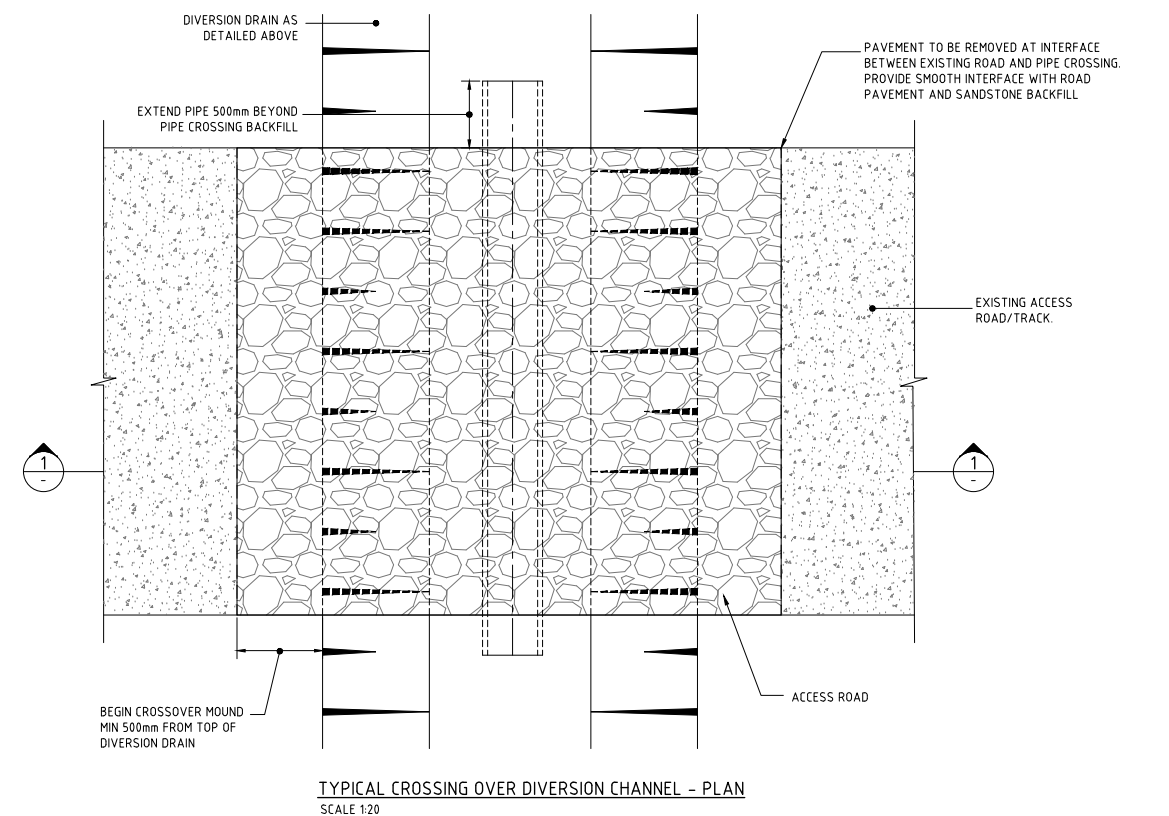
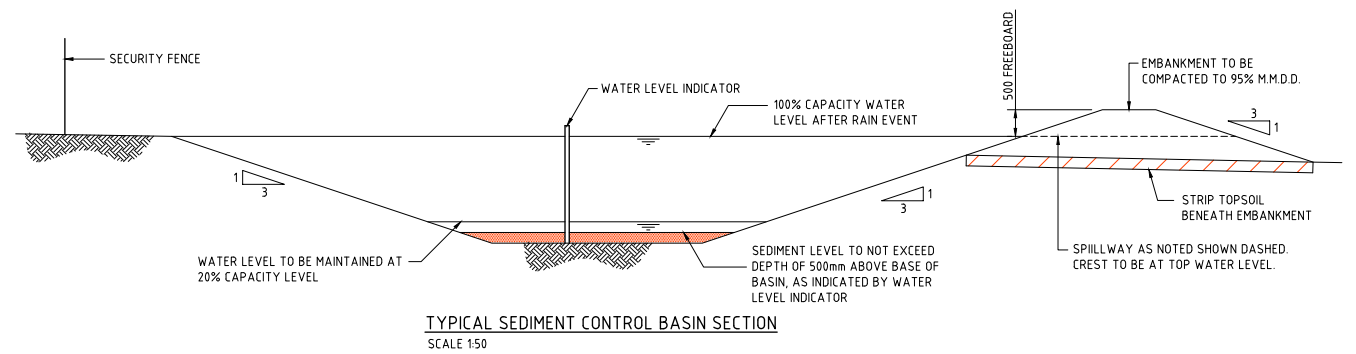
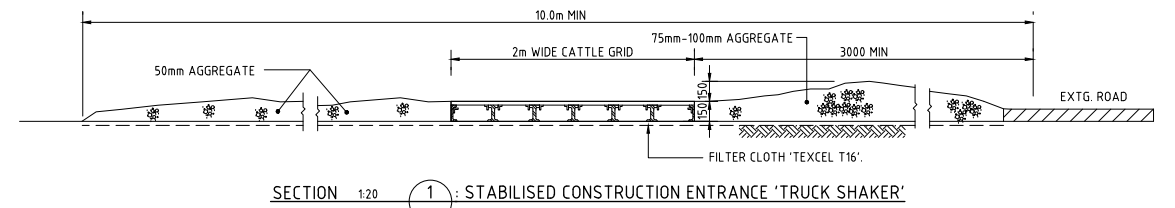
EROSION & SEDIMENT CONTROL NOTES:

REFER TO DRAWING C200 FOR EROSION & SEDIMENT CONTROL NOTES

										 										<div><div>PROJECT</div><div>MAMRE SOUTH PRECINCT 657 - 708 MAMRE ROAD KEMPS CREEK, 2178, NSW</div></div> <div><div>Costin Roe Consulting Pty Ltd. Consulting Engineers Level 1, 6 Windmill Street Wahai Bay, Sydney NSW 2000 Tel: (02) 8251-7899 Fax: (02) 9241-3721 email: mail@costinroe.com.au ©</div></div>										<div><div>DRAWING TITLE</div><div>EROSION &amp; SEDIMENT CONTROL DETAILS - SHEET 1</div></div> <div><div>DRAWING NO</div><div>C013362-02-C204</div></div> <div><div>ISSUE</div><div>06</div></div>									
<div><div>ISSUED FOR CONSTRUCTION</div><div>17 09 21</div><div>0</div></div> <div><div>AMENDMENTS</div><div>DATE</div><div>ISSUE</div></div>										<div><div>PROJECT</div><div>MAMRE SOUTH PRECINCT 657 - 708 MAMRE ROAD KEMPS CREEK, 2178, NSW</div></div> <div><div>Costin Roe Consulting Pty Ltd. Consulting Engineers Level 1, 6 Windmill Street Wahai Bay, Sydney NSW 2000 Tel: (02) 8251-7899 Fax: (02) 9241-3721 email: mail@costinroe.com.au ©</div></div>										<div><div>DRAWING TITLE</div><div>EROSION &amp; SEDIMENT CONTROL DETAILS - SHEET 1</div></div> <div><div>DRAWING NO</div><div>C013362-02-C204</div></div> <div><div>ISSUE</div><div>06</div></div>																			
										<div><div>PRECISION</div><div>COMMUNICATION</div><div>ACCOUNTABILITY</div></div>																													



**NOTES:**  
ALL EROSION & SEDIMENT CONTROL MEASURES TO BE INSPECTED & MAINTAINED DAILY BY SITE MANAGER.  
MINIMISE DISTURBED AREAS.  
ROADS & FOOTPATHS TO BE SWEEP DAILY.  
1.2m TURF TO BE PLACED BEHIND KERBS.  
DUST MINIMISATION CONTROL BY WATERING TO BE IMPLEMENTED BY SITE MANAGER AS REQUIRED OR AS DIRECTED BY THE EPA.



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

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

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

**EROSION & SEDIMENT CONTROL NOTES:**  
REFER TO DRAWING C200 FOR EROSION & SEDIMENT CONTROL NOTES

**FOR CONSTRUCTION**







<b>SEDIMENT BASIN A:</b>		<b>SEDIMENT BASIN B:</b>	
CATCHMENT AREA	= 16.69 ha	CATCHMENT AREA	= 68.36 ha
DISTURBED AREA	= 16.69 ha	DISTURBED AREA	= 68.36 ha
REQUIRED BASIN VOLUME	= 3797m <sup>3</sup>	REQUIRED BASIN VOLUME	= 15551m <sup>3</sup>
BASE DIMENSIONS (L X B)	= 138m x 53m	BASE DIMENSIONS (L X B)	= 109m x 80m
TOP DIMENSIONS (L X B)	= 147m x 62m	TOP DIMENSIONS (L X B)	= 121m x 92m
MAX SIDE SLOPE	= 1V:3H	MAX SIDE SLOPE	= 1V:3H
DEPTH	= 1.5m	DEPTH	= 2.0m
PROVIDED BASIN VOLUME	= 7100m <sup>3</sup>	PROVIDED BASIN VOLUME	= 15850m <sup>3</sup>
Q10 WEIR PEAK FLOW	= 4.24m <sup>3</sup> /s	Q10 WEIR PEAK FLOW	= 17.37m <sup>3</sup> /s
SPILLWAY WIDTH	= 7.2m	SPILLWAY WIDTH	= 30m
SPILLWAY DEPTH	= 0.5m	SPILLWAY DEPTH	= 0.5m

STAGE 1 BASIN INFORMATION – REFER DRAWING C013362.02–C201

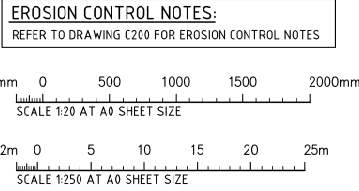
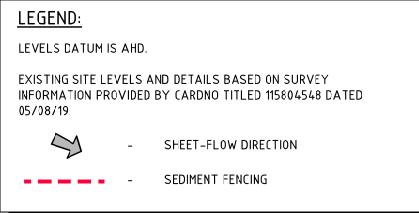
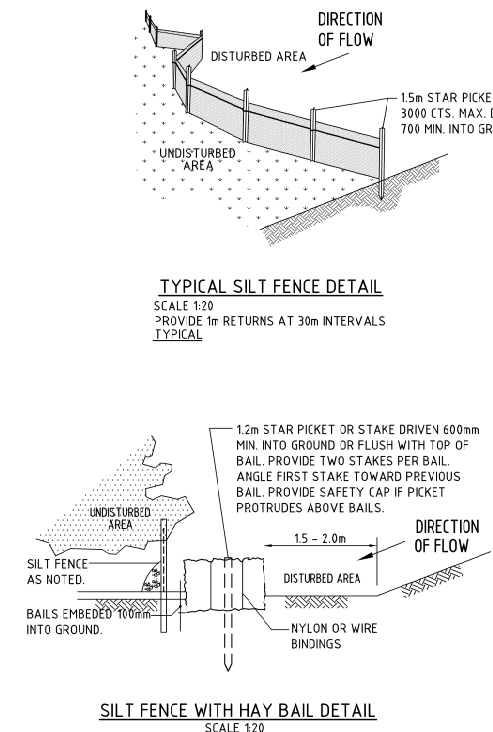
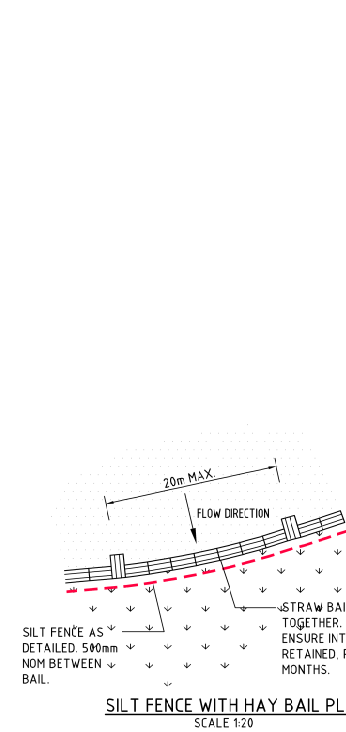
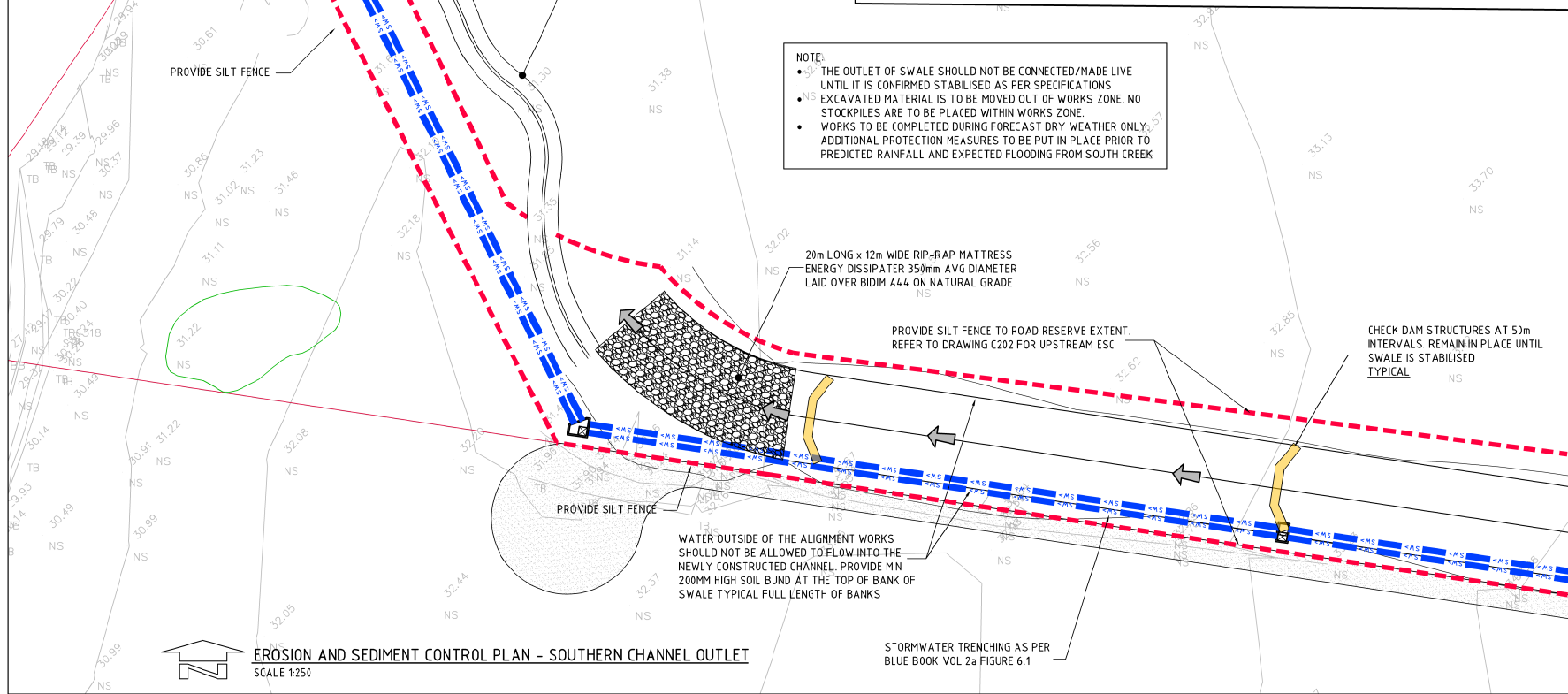
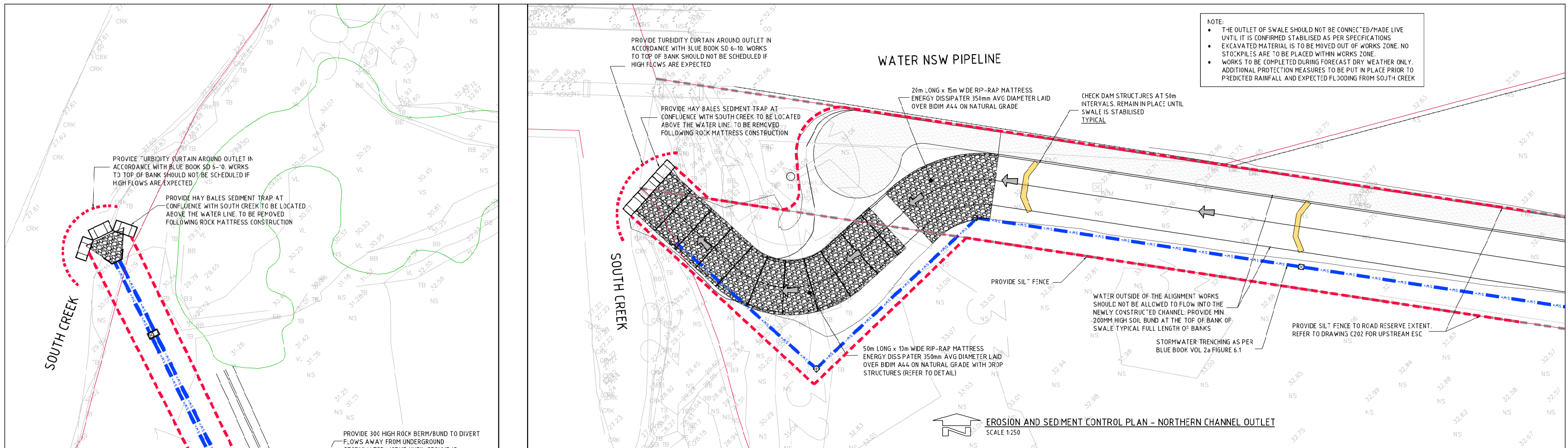
<b>SEDIMENT BASIN A:</b>		<b>SEDIMENT BASIN B:</b>	
CATCHMENT AREA	= 16.69 ha	CATCHMENT AREA	= 68.36 ha
DISTURBED AREA	= 16.69 ha	DISTURBED AREA	= 68.36 ha
REQUIRED BASIN VOLUME	= 3797m <sup>3</sup>	REQUIRED BASIN VOLUME	= 15551m <sup>3</sup>
BASE DIMENSIONS (L X B)	= 138m x 53m	BASE DIMENSIONS (L X B)	= 109m x 80m
TOP DIMENSIONS (L X B)	= 147m x 62m	TOP DIMENSIONS (L X B)	= 121m x 92m
MAX SIDE SLOPE	= 1V:3H	MAX SIDE SLOPE	= 1V:3H
DEPTH	= 1.5m	DEPTH	= 2.0m
PROVIDED BASIN VOLUME	= 7100m <sup>3</sup>	PROVIDED BASIN VOLUME	= 15850m <sup>3</sup>
Q10 WEIR PEAK FLOW	= 4.24m <sup>3</sup> /s	Q10 WEIR PEAK FLOW	= 17.37m <sup>3</sup> /s
SPILLWAY WIDTH	= 7.2m	SPILLWAY WIDTH	= 30m
SPILLWAY DEPTH	= 0.5m	SPILLWAY DEPTH	= 0.5m

STAGE 2 BASIN INFORMATION – REFER DRAWING C013362.02–C202

<b>SEDIMENT BASIN 1:</b> CATCHMENT AREA = 0.94 ha DISTURBED AREA = 0.94 ha REQUIRED BASIN VOLUME = 220m <sup>3</sup> BASE DIMENSIONS (L X B) = 11m x 5m TOP DIMENSIONS (L X B) = 20m x 14m MAX SIDE SLOPE = 1V:3H DEPTH = 1.5m PROVIDED BASIN VOLUME = 230m <sup>3</sup> Q10 WEIR PEAK FLOW = 0.24m <sup>3</sup> /s SPILLWAY WIDTH = 1.0m SPILLWAY DEPTH = 0.3m	<b>SEDIMENT BASIN 3:</b> CATCHMENT AREA = 2.53 ha DISTURBED AREA = 2.53 ha REQUIRED BASIN VOLUME = 567m <sup>3</sup> BASE DIMENSIONS (L X B) = 20m x 12m TOP DIMENSIONS (L X B) = 29m x 21m MAX SIDE SLOPE = 1V:3H DEPTH = 1.5m PROVIDED BASIN VOLUME = 616m <sup>3</sup> Q10 WEIR PEAK FLOW = 0.696m <sup>3</sup> /s SPILLWAY WIDTH = 2.6m SPILLWAY DEPTH = 0.3m	<b>SEDIMENT BASIN 6:</b> CATCHMENT AREA = 3.39 ha DISTURBED AREA = 3.39 ha REQUIRED BASIN VOLUME = 787m <sup>3</sup> BASE DIMENSIONS (L X B) = 28m x 12m TOP DIMENSIONS (L X B) = 37m x 21m MAX SIDE SLOPE = 1V:3H DEPTH = 1.5m PROVIDED BASIN VOLUME = 812m <sup>3</sup> Q10 WEIR PEAK FLOW = 1.13m <sup>3</sup> /s SPILLWAY WIDTH = 4.5m SPILLWAY DEPTH = 0.3m	<b>SEDIMENT BASIN 10:</b> CATCHMENT AREA = 6.00Ha DISTURBED AREA = 6.00Ha REQUIRED BASIN VOLUME = 1397m <sup>3</sup> BASE DIMENSIONS (L X B) = 35m x 20m TOP DIMENSIONS (L X B) = 44m x 29m MAX SIDE SLOPE = 1V:3H DEPTH = 1.5m PROVIDED BASIN VOLUME = 1461m <sup>3</sup> Q10 WEIR PEAK FLOW = 1.63m <sup>3</sup> /s SPILLWAY WIDTH = 6.0m SPILLWAY DEPTH = 0.3m	<b>SEDIMENT BASIN 13:</b> CATCHMENT AREA = 5.14 ha DISTURBED AREA = 5.014 ha REQUIRED BASIN VOLUME = 1197m <sup>3</sup> BASE DIMENSIONS (L X B) = 60m x 8m TOP DIMENSIONS (L X B) = 69m x 17m MAX SIDE SLOPE = 1V:3H DEPTH = 1.5m PROVIDED BASIN VOLUME = 1202m <sup>3</sup> Q10 WEIR PEAK FLOW = 1.73m <sup>3</sup> /s SPILLWAY WIDTH = 6.4m SPILLWAY DEPTH = 0.3m
<b>SEDIMENT BASIN 2a:</b> CATCHMENT AREA = 5.50 Ha DISTURBED AREA = 5.50 Ha REQUIRED BASIN VOLUME = 1250m <sup>3</sup> BASE DIMENSIONS (L X B) = 20m x 30m TOP DIMENSIONS (L X B) = 29m x 39m MAX SIDE SLOPE = 1V:3H DEPTH = 1.5m PROVIDED BASIN VOLUME = 1277m <sup>3</sup> Q10 WEIR PEAK FLOW = 1.398m <sup>3</sup> /s SPILLWAY WIDTH = 5.0m SPILLWAY DEPTH = 0.3m	<b>SEDIMENT BASIN 4:</b> CATCHMENT AREA = 4.67 Ha DISTURBED AREA = 4.67 Ha REQUIRED BASIN VOLUME = 1087m <sup>3</sup> BASE DIMENSIONS (L X B) = 33m x 15m TOP DIMENSIONS (L X B) = 42m x 24m MAX SIDE SLOPE = 1V:3H DEPTH = 1.5m PROVIDED BASIN VOLUME = 1105m <sup>3</sup> Q10 WEIR PEAK FLOW = 1.343m <sup>3</sup> /s SPILLWAY WIDTH = 5.0m SPILLWAY DEPTH = 0.3m	<b>SEDIMENT BASIN 8:</b> CATCHMENT AREA = 2.57 ha DISTURBED AREA = 2.57 ha REQUIRED BASIN VOLUME = 584m <sup>3</sup> BASE DIMENSIONS (L X B) = 20m x 12m TOP DIMENSIONS (L X B) = 29m x 21m MAX SIDE SLOPE = 1V:3H DEPTH = 1.5m PROVIDED BASIN VOLUME = 616m <sup>3</sup> Q10 WEIR PEAK FLOW = 0.862m <sup>3</sup> /s SPILLWAY WIDTH = 3.2m SPILLWAY DEPTH = 0.3m	<b>SEDIMENT BASIN 11:</b> CATCHMENT AREA = 11.67 Ha DISTURBED AREA = 11.67 Ha REQUIRED BASIN VOLUME = 2717m <sup>3</sup> BASE DIMENSIONS (L X B) = 70m x 20m TOP DIMENSIONS (L X B) = 84m x 29m MAX SIDE SLOPE = 1V:3H DEPTH = 1.5m PROVIDED BASIN VOLUME = 2741m <sup>3</sup> Q10 WEIR PEAK FLOW = 3.913m <sup>3</sup> /s SPILLWAY WIDTH = 7.0m SPILLWAY DEPTH = 0.5m	
<b>SEDIMENT BASIN 2b:</b> CATCHMENT AREA = 13.68 Ha DISTURBED AREA = 13.68 Ha REQUIRED BASIN VOLUME = 3112m <sup>3</sup> BASE DIMENSIONS (L X B) = 50m x 23m TOP DIMENSIONS (L X B) = 62m x 35m MAX SIDE SLOPE = 1V:3H DEPTH = 2.0m PROVIDED BASIN VOLUME = 3226m <sup>3</sup> Q10 WEIR PEAK FLOW = 3.24m <sup>3</sup> /s SPILLWAY WIDTH = 6.6m SPILLWAY DEPTH = 0.5m	<b>SEDIMENT BASIN 5:</b> CATCHMENT AREA = 3.24 Ha DISTURBED AREA = 3.24 Ha REQUIRED BASIN VOLUME = 754m <sup>3</sup> BASE DIMENSIONS (L X B) = 30m x 10m TOP DIMENSIONS (L X B) = 39m x 19m MAX SIDE SLOPE = 1V:3H DEPTH = 1.5m PROVIDED BASIN VOLUME = 756m <sup>3</sup> Q10 WEIR PEAK FLOW = 1.03m <sup>3</sup> /S SPILLWAY WIDTH = 4.0m SPILLWAY DEPTH = 0.3m	<b>SEDIMENT BASIN 9:</b> CATCHMENT AREA = 2.96Ha DISTURBED AREA = 2.96Ha REQUIRED BASIN VOLUME = 673m <sup>3</sup> BASE DIMENSIONS (L X B) = 20m x 14m TOP DIMENSIONS (L X B) = 29m x 23m MAX SIDE SLOPE = 1V:3H DEPTH = 1.5m PROVIDED BASIN VOLUME = 690m <sup>3</sup> Q10 WEIR PEAK FLOW = 1.059m <sup>3</sup> /s SPILLWAY WIDTH = 3.9m SPILLWAY DEPTH = 0.3m	<b>SEDIMENT BASIN 12:</b> CATCHMENT AREA = 4.40 Ha DISTURBED AREA = 4.40 Ha REQUIRED BASIN VOLUME = 1024m <sup>3</sup> BASE DIMENSIONS (L X B) = 20m x 12m TOP DIMENSIONS (L X B) = 29m x 21m MAX SIDE SLOPE = 1V:3H DEPTH = 1.5m PROVIDED BASIN VOLUME = 616m <sup>3</sup> Q10 WEIR PEAK FLOW = 0.868m <sup>3</sup> /s SPILLWAY WIDTH = 3.2m SPILLWAY DEPTH = 0.3m	

STAGE 3 BASIN INFORMATION – REFER DRAWING C013362.02–C203

FOR CONSTRUCTION



**FOR CONSTRUCTION**

REVISION	DATE	ISSUE	AMENDMENTS	DATE	ISSUE	AMENDMENTS
REVISED TO ESC COMMENTS	06/12/21	1				
ISSUED FOR CONSTRUCTION	17/09/21	0				
AMENDMENTS						



PROJECT	MAMRE SOUTH PRECINCT
657 - 708 MAMRE ROAD	
KEMPS CREEK, 2173, NSW	
DESIGNED	MC
CHECKED	MC
DATE	JUN 21
SCALE	A0
AS SHOWN	
CAD REF:	CD 3362.02-C48

Costin Roe Consulting Pty Ltd.  
Consulting Engineers  
Level 1, 8 Windmill Street  
Wahia Bay, Sydney NSW 2000  
Tel: (02) 8251-7899 Fax: (02) 9246-3731  
email: mail@costinroe.com.au

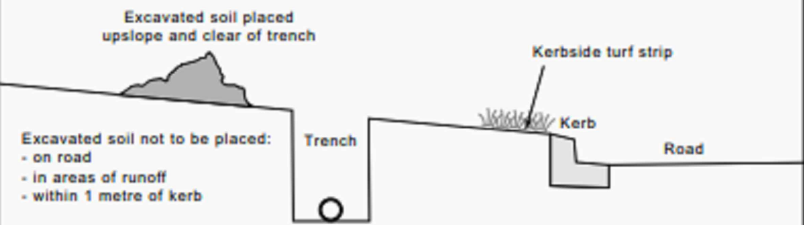
**Costin Roe Consulting**

PRECISION | COMMUNICATION | ACCOUNTABILITY

DRAWING TITLE	EROSION AND SEDIMENT CONTROL PLAN
STORMWATER OUTLETS	
DRAWING NO	C013362.02-C208
FIGURE	1

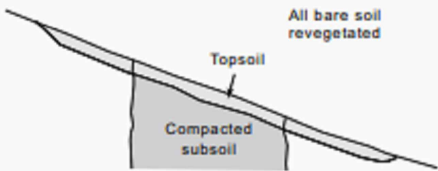


When excavating trench...

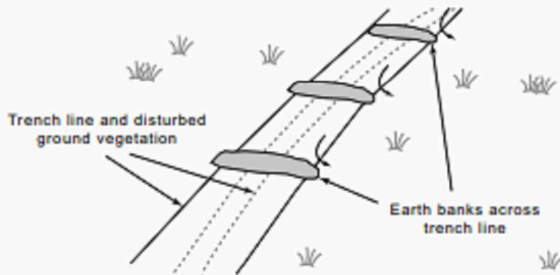


When backfilling trench...

Trench backfilled, compacted to 95 per cent standard compaction, topsoiled, levelled and topped up as necessary should subsidence occur

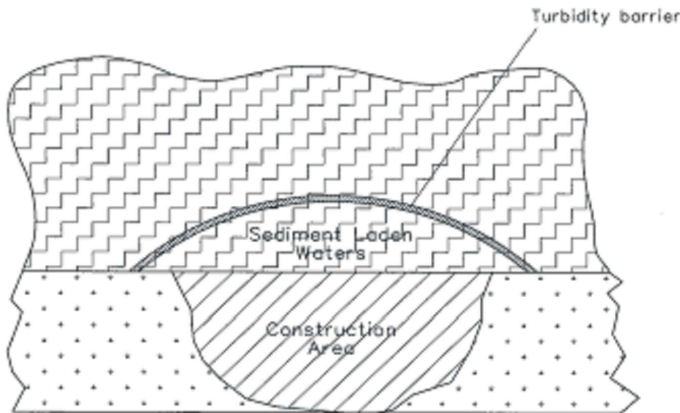
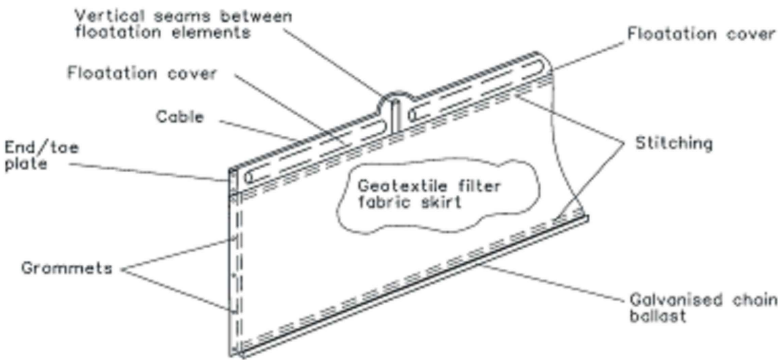


On steep and/or long sections of trench...



- Construction notes for figure 6.1
- 1. Do not open any trench unless it is likely to be closed in three days
  - 2. Place excavated material up-slope of the trench
  - 3. Stockpile topsoil separately from subsoil
  - 4. Divert runoff from the line of the cut with diversions as directed by SD 5-2
  - 5. Rehabilitate in accordance with specification

Figure 6.1 Erosion and sediment control during trenching activities



Construction Notes

- 1. Use turbidity barriers only where high flows are unlikely to remove accumulated sediment and/or move the curtain significantly.
- 2. Where the barrier is to remain in place for more than one month, ensure the floatation cover is a UV-resistant, durable material.
- 3. Use only closed cell foam or foam-filled PVC piping as floatation elements. Do not use unfilled pipes.
- 4. Use only woven or heat-set non woven geotextiles. Needle-punched, non woven geotextiles can become fouled with debris that fray and delaminate them as they move with the waves or currents.
- 5. Remove captured sediment before the barrier is decommissioned.
- 6. In tidal areas, ensure the barrier can rise and fall without being moved from its position.

TURBIDITY BARRIER

SD 6-10

FOR CONSTRUCTION

EROSION & SEDIMENT CONTROL NOTES:  
REFER TO DRAWING C200 FOR EROSION & SEDIMENT CONTROL NOTES

**APPENDIX B**  
**Daily and Weekly Site Inspection Forms**

## Daily Site Inspection

**LOCATION** .....

**SITE SUPERVISOR** ..... **DATE** .....

**SIGNATURE** .....

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

Item	Consideration	Assessment
1	All tradespeople working on the site have been informed of the erosion and sediment control requirements of the site.	.....
2	All required builder identification, safety notices, and pollution (e.g. litter and sediment control) management signs are visible.	.....
3	The work site and all erosion and sediment control measures do not represent a safety risk to tradespeople or the public.	.....
4	Public roadways are clear of sediment.	.....
5	Turfing on the footpath area is clear of sediment, sand and mud.	.....
6	Entry/exit pads are clear of excessive sediment deposition.	.....
7	Entry/exit pads have adequate available void spacing to trap sediment.	.....
8	The construction site is clear of litter and unconfined rubbish.	.....
9	Long-term (> 24 hours) soil/sand stockpiles are protected from wind, rain, and stormwater flow.	.....
10	At end of day, all short-term soil/sand stockpiles located outside the sediment control zone have been removed and cleaned.	.....
11	No dust problems exist on the site.	.....
12	Up-slope "clean" water is being appropriately diverted through the site in a non-erosive manner.	.....
13	Drainage lines are free of soil scour and sediment deposition.	.....
14	Stormwater flow down exposed earth batters does not cause erosion.	.....
15	Appropriate erosion controls of all finished soil disturbances have been discussed with the client.	.....
16	Sediment fences have been correctly installed (e.g. fabric buried and standing up-slope of stakes) and are free of damage.	.....
17	Sediment fences have been installed in a manner that will allow sediment-laden stormwater to temporarily pond and settle behind the fence rather than flow around the fence.	.....

18

	Appropriate sediment controls have been placed adjacent to, or around, stormwater inlets—as appropriate for the type of inlet.	.....
19	All sediment traps are free of excessive sediment deposition.	.....
20	Finished service trenches have been appropriately backfilled, compacted and stabilised.	.....
21	All reasonable and practicable measures are being taken to control sediment runoff from the site.	.....
22	The site is adequately prepared for potential storms.	.....
23	Adequate stockpiles exist of ESC materials, such as extra sediment fence fabric.	.....
24	Temporary downpipes have been correctly connected to any installed roof gutters.	.....



## Weekly Site Inspection

**LOCATION** .....

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

**SIGNATURE** .....

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

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

**APPENDIX C**  
**Monthly Rainfall Data & Climate Statistics**

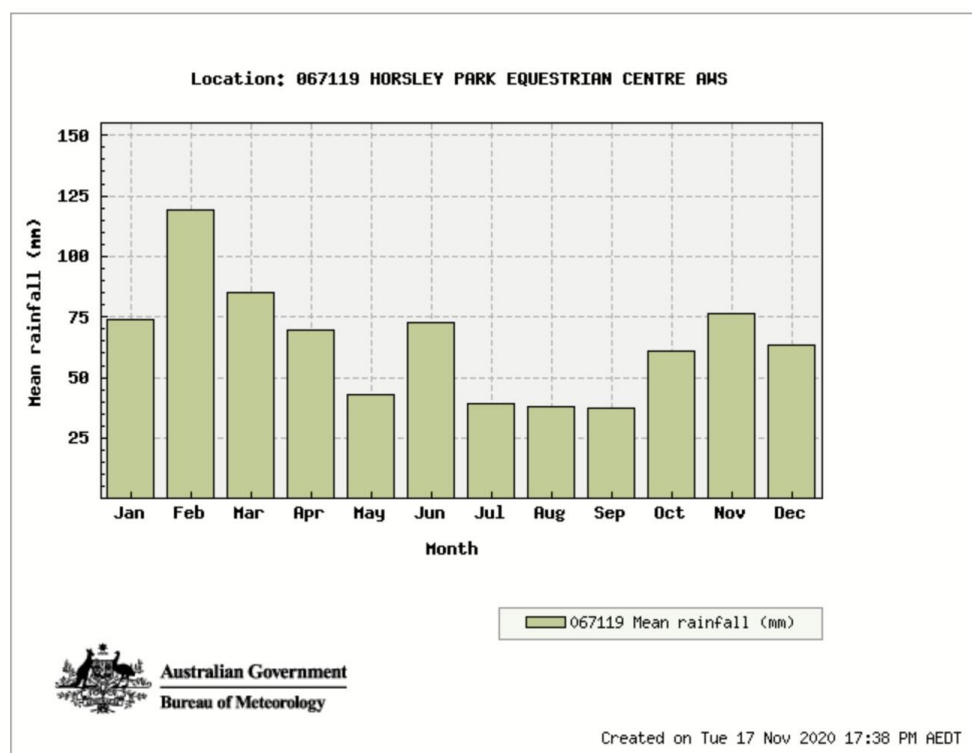
Statistics	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Years	Plot	Map
<b>Temperature</b>																
Mean maximum temperature (°C)	30.1	28.8	26.8	23.9	20.6	17.7	17.4	19.0	22.4	24.8	26.6	28.5	23.9	23	1997 2020	
Mean minimum temperature (°C)	18.0	17.8	16.1	12.9	9.0	7.2	5.8	6.4	9.3	11.8	14.4	16.2	12.1	23	1997 2020	
<b>Rainfall</b>																
Mean rainfall (mm)	73.7	119.2	84.8	69.5	42.7	72.6	39.5	38.2	37.1	61.1	76.1	63.6	748.4	22	1997 2020	
Decile 5 (median) rainfall (mm)	64.2	92.2	60.8	58.0	21.6	52.0	26.0	26.6	26.2	48.7	57.2	61.4	714.7	23	1997 2020	
Mean number of days of rain ≥ 1 mm	7.6	7.2	8.1	6.7	5.1	6.2	5.1	4.0	4.8	5.8	7.0	6.9	74.5	23	1997 2020	
<b>Other daily elements</b>																
Mean daily sunshine (hours)																
Mean number of clear days																
Mean number of cloudy days																
<b>9 am conditions</b>																
Mean 9am temperature (°C)	22.0	21.5	19.4	17.5	13.8	11.1	10.3	12.0	15.6	18.1	19.2	20.9	16.8	13	1997 2010	
Mean 9am relative humidity (%)	73	77	81	76	77	80	78	70	65	61	70	71	73	13	1997 2010	
Mean 9am wind speed (km/h)	10.1	9.7	8.9	10.5	10.7	10.3	10.8	11.7	12.2	12.5	11.8	10.7	10.8	13	1997 2010	
9am wind speed vs direction plot																
<b>3 pm conditions</b>																
Mean 3pm temperature (°C)	28.2	27.1	25.3	22.2	19.2	16.6	16.1	17.8	20.8	22.5	24.2	26.5	22.2	13	1997 2010	
Mean 3pm relative humidity (%)	49	53	54	53	52	55	50	42	42	45	50	48	49	13	1997 2010	
Mean 3pm wind speed (km/h)	19.4	17.0	14.8	14.4	13.0	12.9	13.9	16.1	18.1	19.8	19.5	19.9	16.6	13	1997 2010	
3pm wind speed vs direction plot																

## HORSLEY PARK EQUESTRIAN CENTRE AWS

### Mean rainfall (mm)

<b>Site details</b>			
<b>Site name:</b> HORSLEY PARK EQUESTRIAN CENTRE A	<b>Site number:</b> 067119	<b>Commenced:</b> 1997	
<b>Latitude:</b> 33.85 °S	<b>Longitude:</b> 150.86 °E	<b>Elevation:</b> 100 m	<b>Operational status:</b> Still Open

<b>Yearly data</b>	<b>30 year statistics</b>	<b>Comparison site</b>	<b>First statistic</b>	<b>Second statistic</b>	<b>Note:</b> Only one option can be redrawn at a time
Include data for the year: 2020 ▾ <b>Redraw</b> >>					

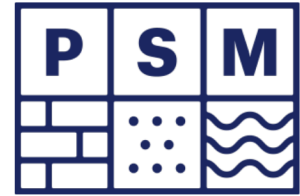


<b>Statistics</b>	<b>Jan</b>	<b>Feb</b>	<b>Mar</b>	<b>Apr</b>	<b>May</b>	<b>Jun</b>	<b>Jul</b>	<b>Aug</b>	<b>Sep</b>	<b>Oct</b>	<b>Nov</b>	<b>Dec</b>	<b>Annual</b>	<b>Years</b>
Mean rainfall (mm) for years 1997 to 2020	73.7	119.2	84.8	69.5	42.7	72.6	39.5	38.2	37.1	61.1	76.1	63.6	778.1	23

12.3 = Not quality controlled

Page created: Tue 17 Nov 2020 17:38:15 PM AEDT

**APPENDIX D**  
**Geotechnical Information**



Our Ref: PSM3276-101L REV2

15 September 2020

Frasers Property  
Level 2, 1C Homebush Bay Drive  
RHODES NSW 2138  
Naiem.Teghlobi@frasersproperty.com.au

G3 56 Delhi Road  
North Ryde NSW 2113  
**P** +61-2 9812 5000  
**F** +61-2 9812 5001  
**E** mailbox@psm.com.au  
**www.psm.com.au**

Attention: Naiem Teghlobi

Dear Naiem

**RE: 657, 707, 707A, 713-755, 769 MAMRE ROAD, KEMPS CREEK  
INTERIM GEOTECHNICAL DESIGN ADVICE**

## **1. Introduction**

This letter provides interim geotechnical design advice (IGDA) for the proposed development at 657, 707, 707A, 713-755, 769 Mamre Road, Kemps Creek. This interim advice will be issued as a final on completion of the bulk earthworks.

Figure 1 presents the locality plan.

We are not aware of any performance requirements for the proposed development.

## **2. Bulk Earthworks**

The design advice in the following sections is provided on the basis that:

- The bulk earthworks on site to be completed in accordance with a PSM Specification, currently PSM3276-102S REV1 (The Specification)
- PSM to audit the earthworks to confirm the advice in this letter at the completion of the bulk earthworks.

The Specification allows for a broad range of fill to be incorporated into the earthworks. Fill placed in accordance with the Specification will be well compacted under tight site supervision. The subgrade will be stiff or better.

The Specification complies with the intent of AS 3798-2007 "Guidelines on earthworks for commercial and residential developments" and is intended to specify the minimum requirements to achieve a fill with the properties provided in Section 3 of this letter. The Specification is generally in accordance with AS3798-2007, but for this site it allows Blended Topsoil Fill.

The Specification requires close inspection, frequent testing and external auditing of the earthworks to provide a high level of confidence that the completed work complies with the Specification. The Specification will only be varied with the consent of PSM to ensure that this interim design advice is able to be confirmed at the completion of the earthworks.



We have based our assessment of moduli on numerous plate load tests (PLTs) completed on VENM / ENM fills by PSM.

If the structural or civil engineer requires engineering properties different to those provided in Section 3 then the specification can be modified such that these properties will be obtained in the final earthworks.

This allows the additional cost of the earthworks to be balanced against any economies achieved in other parts of the works.

### **3. Design Advice**

#### **3.1 All Areas**

This section provides interim design advice for all areas where the bulk earthworks has been undertaken in accordance with the Specification. Note, this advice allows for Blended Topsoil Fill (PSM3276-102S REV1).

#### **3.2 Site Classification**

While the proposed development is out of scope of AS2870-2011 "Residential slabs and footings", we assess that, for the natural site, cut and fill placed in accordance with the Specification, the characteristic surface movement,  $y_s$ , would be in the range 40 mm to 60 mm and thus would classify the site as Class H1. The civil and structural engineers should consider likely heave / settlement due to the effect of climatic factors in their designs.

We recommend that all structures and services be detailed such that they preclude any local wetting up or drying out of the subgrade after initial equilibrium is reached following construction of the slab and that the subgrade be within specification at the time of construction of the slab. We note that normal mounding or sagging away from the perimeter of covered areas will still occur and perimeters, or open joints, will still respond to environmental changes.

For effectively sealed areas away from the perimeter, the design should allow for the following:

- Differential mound movement,  $y_m = 20$  mm. We note that this is not the total heave or settlement but the estimated local heave or settlement due to fill variability
- Tilts of up to approximately 1 in 300.

Mounds at perimeters or penetrations of slabs open to the environment can be taken to be as per AS2870-2011 for  $y_s = 55$  mm.

The designer should consider variation of fill depth across any area. It is our opinion that creep settlements can be ignored for fill of this depth placed in accordance with the Specification. Further the designer should consider the impact of any delay in construction of slabs and pavements following completion of the bulk earthworks.

#### **3.3 Foundations**

The following section provides advice and parameters that may be used when proportioning footings.

Where adjacent foundation details differ (e.g. pile and pad, differing loads or ground conditions) differential settlement will need to be assessed.

##### **3.3.1 Pad Footings**

Pad footings can be proportioned on the basis of an allowable bearing pressure (ABP) for centric vertical loads presented in Table 1.

**Table 1 – Engineering Parameters of Inferred Geotechnical Units**

Inferred Unit	Bulk Unit Weight (kN/m <sup>3</sup> )	Soil Effective Strength Parameters		Ultimate Bearing Pressure Under Vertical Centric Loading (kPa)	Allowable Bearing Pressure under Vertical Centric Loading (kPa)	Elastic Parameters	
		c' (kPa)	Φ' (deg)			Young's Modulus (MPa)	Poisson's Ratio
SOIL UNITS, EG. ENGINEERED FILL / NATURAL SOIL	18	0	30	420*	150*	10	0.3
BEDROCK	22	N.A.	N.A.	3000***	700**	100	0.25

Note: \* Minimum plan dimension of 1 m and embedment depth of at least 0.5 m

\*\* ABP for BEDROCK assumes a settlement of approximately 1% of the least footing dimension for footings in rock.

\*\*\* UBP for BEDROCK assumes a settlement of approximately 5% of the least footing dimension for footings in rock.

Higher ABPs may be available, but these depend on the size, depth, loads, etc. and would be subject to specific advice.

Footing settlement can be assessed based on the subgrade Young's moduli provided in Table 1. We recommend that PSM inspect a representative sample of the footings during construction, to confirm the advice provided in this letter.

### 3.3.2 Slabs

The design of the slabs for the warehouse can be based on a subgrade with the Young's moduli in Table 1. The short-term Young's modulus for SOIL units can be taken to be 15 MPa.

The design of the slabs on ground should consider the effects of differential settlement due to varying founding conditions, pattern loading, and the shrink swell effects discussed in Section 3.2.

## 3.4 Permanent and Temporary Batters

The batter slope angles shown in Table 2 are recommended for the design of batters up to 4 m height and above the groundwater table; subject to the following recommendations:

1. All batters shall be protected from erosion.
2. Permanent batters shall be drained.
3. Temporary batters shall not be left unsupported for more than 1 month without further advice, and inspection by a geotechnical engineer should be undertaken following significant rain events.
4. Where loads are imposed or structures/services are located within one batter height of the crest of the batter, further advice should be sought.

**Table 2 – Batter Slope Angles**

Unit	Temporary	Permanent
Engineered Fill / Natural Soil	2.0H : 1V	2.5H : 1V
Bedrock	1.0H: 1V	1.5H : 1V

If the conditions above cannot be met, further advice should be sought.

Steeper batters may be possible subject to further advice, likely including inspection during construction.

### 3.5 Retaining Structures

The selection of the appropriate retention system is a matter of design. The designer should consider the following factors in making its selection:

- Technical factors:
  - Performance
  - Ground conditions (this is addressed below with the design parameters)
  - Surcharge loading and,
  - Proximity of structures, buildings and roads, etc.
- Non-technical factors:
  - Cost (to build and to maintain)
  - Other constraints such as real estate, neighbouring site / boundary, aesthetics, legislation, etc.

The design of these structures should be based on the following:

- Proposed wall geometry
- Effective strength parameters in Table 1 when assessing the earth pressure on retaining structures
- Surcharge loads behind retention
- Water pressure (depending on the type of structure).

Note that design of retention systems may be based on either  $K_a$  or  $K_o$  earth pressures. Design using active earth pressures provides the minimum lateral earth pressure that must be supported to avoid failure and requires a wall that can rotate or translate to allow the pressures to reduce to these values (vertical and lateral movements up to 2% of height may occur, typical movements will be much less).

Where the design is based on  $K_o$  pressures, construction should be carefully controlled to avoid unwanted effects. It should be noted that designing for  $K_o$  pressures do not, of themselves, ensure that movement does not occur. Movements are controlled by the construction method, especially sequence.

Both surface and sub-surface drainage needs to be designed and constructed properly to prevent pore water pressures from building up behind the retaining walls or appropriate water pressures must be included in the design.

### 3.6 Pavements

Results of CBR testing indicated a soaked CBR value between 2.0% and 4.5% (Ref. PSM3276-100L REV1 Appendix D).

We recommend a design CBR value of 2.0% is adopted for pavement design. Particular attention should be paid to preserving the equilibrium moisture content in the subgrade as zones that become saturated may exhibit lower CBR strengths.

Higher values, particularly in areas of significant cut, may be provided on completion of testing on the finished bulk earthworks or if, on request, the Specification is varied to obtain such higher value on fill.

### 3.7 General

We note that the final bulk earthworks subgrade will require proof rolling and plate load testing to confirm the properties provided and may require some boxing out and refilling, etc. Plate load testing during the filling will be required where blended topsoil has been used.

We understand that the structural engineer should be able to design an efficient slab and shallow footings for these geotechnical conditions. If assessed deformation and settlement is an issue, then our advice can be further refined if required.

We note that desiccation and/or wetting up of the pad surface is possible should it be exposed to the elements for an extended period of time, particularly at completion of the bulk earthworks prior to the builder taking responsibility for the pad. To reduce the likelihood of this and preserve the pad condition we recommend the following should be considered following completion of the bulk earthworks:

- Placement of a sacrificial layer comprising road base or other equivalent material
- Grade the pad surface to reduce the extent and severity of standing water during and after weather events
- Minimise the time between the completion of earthworks and the builder commencing construction of the warehouse roof
- Limit vehicular and plant access until a roof has been installed.

Alternately, the developer or builder may have to undertake some surficial remediation if the pad is to comply with the requirements of this IGDA (i.e. comply with the PSM Specification) at the time of construction.

It is PSM's opinion that it should be the builder's responsibility to maintain the condition of the pad after the handover date and accept the risk that comes with modifying excavation levels and weather. There should be a strict transfer of the risk. We recommend that building tenderers be required to indicate how they intend to manage this risk.

Should there be any queries, do not hesitate to contact the undersigned.

For and on behalf of  
**PELLS SULLIVAN MEYNINK**



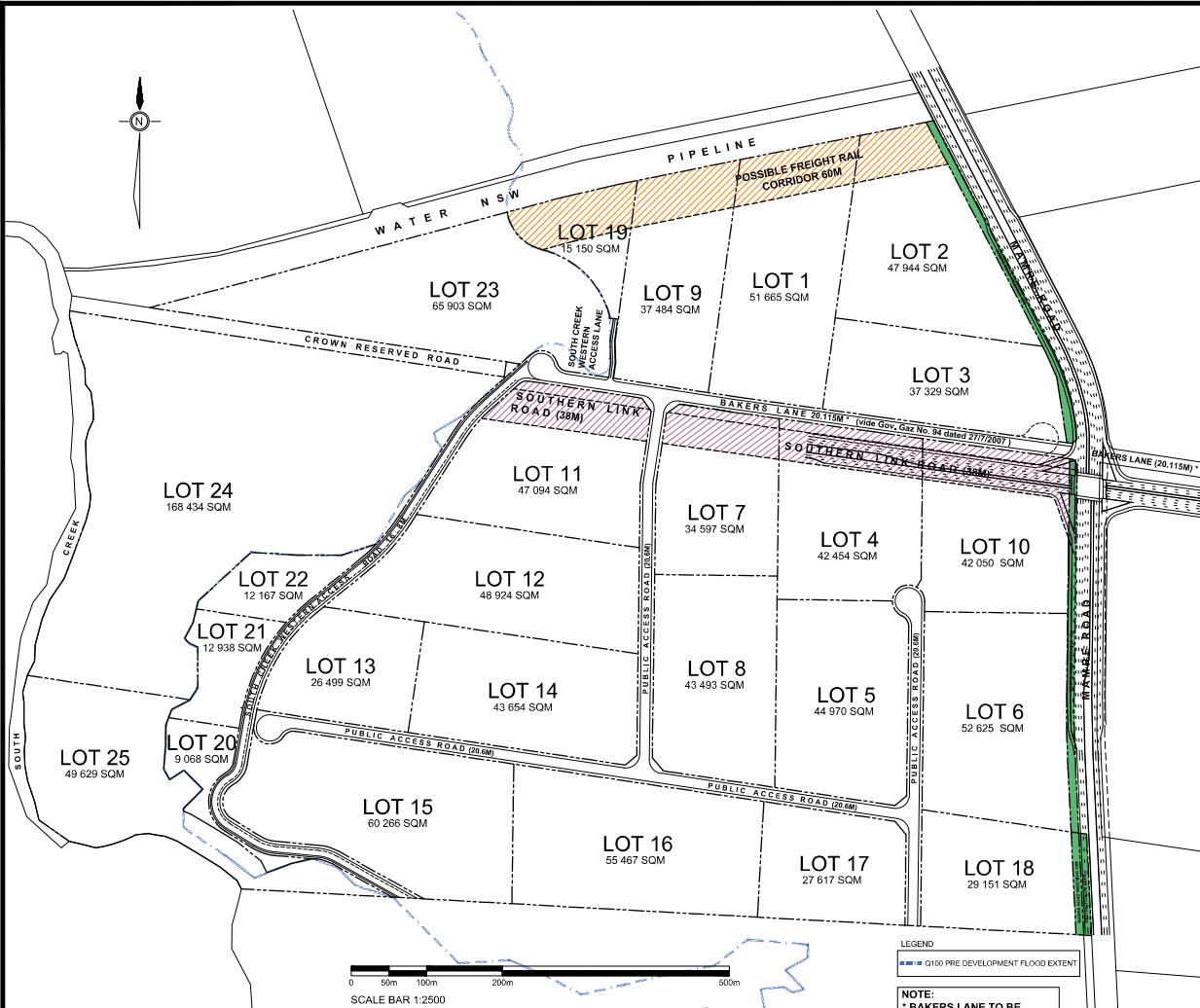
**MATIAS BRAGA**  
**GEOTECHNICAL ENGINEER**



**AGUSTRIA SALIM**  
**PRINCIPAL**

Encl.

Figure 1      Locality Plan



01 SUBDIVISION PLAN  
SCALE - 1:2500 @ A1

DO NOT SCALE DRAWINGS. VERIFY ALL DIMENSIONS ON SITE.  
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REVISION	DESCRIPTION	DATE
A	DA ISSUE	27/03/2015

EXISTING LOTS	
LOT 34	261803 SQM
DP1118173	
LOT X	192538 SQM
DP421633	
LOT Y	170023 SQM
DP421633	
LOT 22	266392 SQM
DP258414	
LOT 1	288160 SQM
DP1018318	
TOTAL	1178916 SQM

PROPOSED NEW LOTS	
LOT 1	51665 SQM
LOT 2	47944 SQM
LOT 3	37329 SQM
LOT 4	42454 SQM
LOT 5	44970 SQM
LOT 6	52625 SQM
LOT 7	34597 SQM
LOT 8	43493 SQM
LOT 9	37484 SQM
LOT 10	42050 SQM
LOT 11	47094 SQM
LOT 12	48924 SQM
LOT 13	26499 SQM
LOT 14	43654 SQM
LOT 15	60266 SQM
LOT 16	55467 SQM
LOT 17	27617 SQM
LOT 18	29151 SQM
LOT 19	15150 SQM
RETENTION BIO-BASIN (RE1)	
LOT 20	9068 SQM
LOT 21 PUBLIC RECREATION AREA (RE1)	12938 SQM
LOT 22 BUILT FORM AMENITY AREA (RE2)	12167 SQM
LOT 23	65903 SQM
LOT 24	168434 SQM
LOT 25	496229 SQM
PUBLIC ACCESS ROADS	39357 SQM
WESTERN SOUTH CREEK ACCESS ROAD	19430 SQM
WESTERN SOUTH CREEK ACCESS LANE	510 SQM
BAKERS LANE ROAD WIDENING	364 SQM
MAMRE ROAD WIDENING	12683 SQM
TOTAL	1178916 SQM

LEGEND  
Q100 PRE DEVELOPMENT FLOOD EXTENT  
NOTE:  
\* BAKERS LANE TO BE WIDENED TO 20.6m

N

**ALTIS**  
PROPERTY PARTNERS

**FRASERS**  
PROPERTY

COMMERCIAL & INDUSTRIAL DIVISION  
1 LINDSEY STREET  
SUITE 10, LEVEL 1  
PO BOX 920  
MELBOURNE VIC 3001

15 NOV 2015  
F14  
12 NOV 2014

PROJECT  
SUBDIVISION PLAN FOR KEMP'S CREEK

ADDRESS  
MAMRE ROAD & BAKERS LANE  
KEMP'S CREEK

DRAWING TITLE  
SUBDIVISION PLAN

DRAWING NUMBER  
SP-MRM-DA-006

12554  
A

**APPENDIX E**  
**CONSULTATION WITH PENRITH COUNCIL & WaterNSW**



## PENRITH COUNCIL CORRESPONDENCE

**From:** Naiem Teghlobi <[Naiem.Teghlobi@frasersproperty.com.au](mailto:Naiem.Teghlobi@frasersproperty.com.au)>  
**Date:** 24 February 2021 at 4:39:00 pm AEDT  
**To:** Peter Wood <[Peter.Wood@penrith.city](mailto:Peter.Wood@penrith.city)>, Alison Veron <[alison.veron@penrith.city](mailto:alison.veron@penrith.city)>  
**Cc:** Michaela Leerdam <[Michaela.Leerdam@frasersproperty.com.au](mailto:Michaela.Leerdam@frasersproperty.com.au)>  
**Subject:** Kemps Creek - SSD-9522 Consent Condition B26 a [SWMP]

Hi Peter and Alison

Please see attached via download link SWMP issued to you in accordance with condition B26 a. Please review and let me know if you have comments.

Citrix Attachments	Expires March 26, 2021
Co13362.02-02a.rpt.pdf	17.3 MB
<a href="#">Download Attachments</a>	
Naiem Teghlobi uses Citrix Files to share documents securely.	

Regards

**Naiem Teghlobi**  
 Senior Project Manager  
**Frasers Property Industrial**

**T** +61 2 9767 2110 **M** +61 417 665 167  
**E** [Naiem.Teghlobi@frasersproperty.com.au](mailto:Naiem.Teghlobi@frasersproperty.com.au)  
 Level 2, 1C Homebush Bay Drive, Rhodes NSW 2138 Australia  
[www.FrasersPropertyIndustrial.com](http://www.FrasersPropertyIndustrial.com) [LinkedIn](#)

We've changed the way we work to accommodate COVID-19. For details visit our [website](#).

## WaterNSW CORRESPONDENCE

Dear Naiem

Thank you for allowing WaterNSW the opportunity to comment on the draft CEMP for soil and water management. WaterNSW has reviewed the document and subsequent response to queries and is satisfied that the mitigation measures proposed and the separation of works from the pipelines corridor will avoid impact.

As such WaterNSW has no particular comment to make.

Thank you to Mitchell and Mark for providing the additional information.

If you have any questions please call or email.

Regards

**Justine Clarke**

Catchment and Asset Protection Adviser

*Please note: I am currently working from home. I can be reached via email or 0457 535 955*



Level 14, 169 Macquarie Street

PO Box 398

Parramatta NSW 2150

**M:** 0457 535 955

[justine.clarke@waternsw.com.au](mailto:justine.clarke@waternsw.com.au)

[www.waternsw.com.au](http://www.waternsw.com.au)

**From:** Naiem Teghlobi <[Naiem.Teghlobi@frasersproperty.com.au](mailto:Naiem.Teghlobi@frasersproperty.com.au)>

**Sent:** Monday, 8 February 2021 7:12 PM

**To:** Justine Clarke <[Justine.Clarke@waternsw.com.au](mailto:Justine.Clarke@waternsw.com.au)>

**Cc:** Mitchell Cross <[Mitchell.Cross@costinroe.com.au](mailto:Mitchell.Cross@costinroe.com.au)>; Mark Wilson <[Mark@costinroe.com.au](mailto:Mark@costinroe.com.au)>

**Subject:** ARK: RE: Kemps Creek - SSDA 9522 Water NSW Consultation

Hi Justine

Did Mark's email answer WaterNSW comments?

Please let me know next step to close out this review process.

Regards

NT

**From:** Mark Wilson <[Mark@costinroe.com.au](mailto:Mark@costinroe.com.au)>  
**Sent:** Friday, 5 February 2021 1:23 PM  
**To:** Naiem Teghlobi <[Naiem.Teghlobi@frasersproperty.com.au](mailto:Naiem.Teghlobi@frasersproperty.com.au)>  
**Cc:** Justine Clarke <[Justine.Clarke@waternsw.com.au](mailto:Justine.Clarke@waternsw.com.au)>; Mitchell Cross <[Mitchell.Cross@costinroe.com.au](mailto:Mitchell.Cross@costinroe.com.au)>  
**Subject:** RE: Kemps Creek - SSDA 9522 Water NSW Consultation

Naiem,

Dam dewatering would take place in two dams highlighted below, plus some other very minor dams within the site. These dams are not within the proximity of the pipeline.

Existing dams within the freight corridor (adjacent to the Warragamba pipelines) will remain.

Discharge of sediment basin water will be made to South Creek in accordance with the Blue Book/ Penrith Council and managed per included in Section 3.6 of the Construction Stormwater Management Plan (refer following). No sediment discharge will be directed toward or through the pipeline corridor. Further reference to Section 6 of the Construction Stormwater Management Plan should be made for sediment basin operation and management.

*The quality of discharge from the site to satisfy the following Water Quality Objectives (WQOs) per Landcom Blue Book requirements:*

- *Water pH released from a controlled sediment basin outflow shall be within the range 6.5 to 8.5.*
- *Suspended Solids released from controlled sediment basin outflows will be no greater than 50mg/L, 75 NTU's (Nephelometric Turbidity Units) or other Turbidity measurement based on confirmed laboratory correlation. Correlation should be confirmed through laboratory assessment and in consultation with the EM or ESC engineer.*
- *Oils and Grease – no visible films or odour.*
- *Litter – no visible litter washed or blown from the site.*

*Records of confirmation of achievement of water quality objectives are to be maintained on site and to be provided on request to the ER and engineer.*



**Best Regards,  
Mark Wilson  
Director**



PRECISION | COMMUNICATION | ACCOUNTABILITY

Costin Roe Consulting Pty Ltd  
ABN 50 003 696 446  
Newcastle Office:  
Suite 2, 173-179 Pacific Highway Charlestown NSW 2290  
PO Box 239, Charlestown NSW 2290  
tel: +61 2 4946 2061 fax: N/A mobile: 0421-847-808

Sydney Office:  
Level 1, 8 Windmill Street, Walsh Bay  
PO Box N419, Sydney, NSW 1220 Australia  
tel: +61 2 9251 7699 fax: +61 2 9241 3731  
email: [Mark@costinroe.com.au](mailto:Mark@costinroe.com.au)  
web: [www.costinroe.com.au](http://www.costinroe.com.au)  
Postal address: PO Box N419, Sydney NSW 1220  
Phone: 02-9251 7699 Fax: 02-9241 3731  
Email: [mail@costinroe.com.au](mailto:mail@costinroe.com.au) Email: [mail@strataeng.com.au](mailto:mail@strataeng.com.au) Web: [www.costinroe.com.au](http://www.costinroe.com.au)

Offices in Sydney, Adelaide, Brisbane, Melbourne, Newcastle and Wollongong.

**From:** Naiem Teghlobi <[Naiem.Teghlobi@frasersproperty.com.au](mailto:Naiem.Teghlobi@frasersproperty.com.au)>  
**Sent:** Friday, 5 February 2021 12:31 PM  
**To:** Mark Wilson <[Mark@costinroe.com.au](mailto:Mark@costinroe.com.au)>; Mitchell Cross <[Mitchell.Cross@costinroe.com.au](mailto:Mitchell.Cross@costinroe.com.au)>

**Cc:** Justine Clarke <[Justine.Clarke@waternsw.com.au](mailto:Justine.Clarke@waternsw.com.au)>  
**Subject:** RE: Kemps Creek - SSDA 9522 Water NSW Consultation

Mark/Mitch

Please see below additional information required from WaterNSW for your action.

Regards

NT

**From:** Justine Clarke <[Justine.Clarke@waternsw.com.au](mailto:Justine.Clarke@waternsw.com.au)>  
**Sent:** Friday, 5 February 2021 12:24 PM  
**To:** Naiem Teghlobi <[Naiem.Teghlobi@frasersproperty.com.au](mailto:Naiem.Teghlobi@frasersproperty.com.au)>  
**Subject:** RE: Kemps Creek - SSDA 9522 Water NSW Consultation

Hi Naiem

I'm afraid 1 week to review wasn't enough time, as I need to put through the engineers.

I have had a quick look and question where dam dewatering fits into the picture, should the plan relate to this document.

Also, what is the process for planned sediment basin discharges (i.e. if they become full from storm events)

Could you provide the drawings (attachment A) to aid in document assessment.

Regards Justine

**Justine Clarke**  
Catchment and Asset Protection Adviser

**Please note:** I am currently working from home. I can be reached via email or 0457 535 955



Level 14, 169 Macquarie Street

PO Box 398  
Parramatta NSW 2150

**M:** 0457 535 955

[justine.clarke@waternsw.com.au](mailto:justine.clarke@waternsw.com.au)  
[www.waternsw.com.au](http://www.waternsw.com.au)

**From:** Naiem Teghlobi <[Naiem.Teghlobi@frasersproperty.com.au](mailto:Naiem.Teghlobi@frasersproperty.com.au)>  
**Sent:** Friday, 5 February 2021 11:55 AM  
**To:** Justine Clarke <[Justine.Clarke@waternsw.com.au](mailto:Justine.Clarke@waternsw.com.au)>  
**Subject:** RE: Kemps Creek - SSDA 9522 Water NSW Consultation

Hi Justine

Following up on this one. How is the review going and are there any comments?

Regards

NT

**From:** Naiem Teghlobi <[Naiem.Teghlobi@frasersproperty.com.au](mailto:Naiem.Teghlobi@frasersproperty.com.au)>  
**Sent:** Wednesday, 27 January 2021 1:34 PM  
**To:** Justine Clarke <[Justine.Clarke@waternsw.com.au](mailto:Justine.Clarke@waternsw.com.au)>  
**Subject:** RE: Kemps Creek - SSDA 9522 Water NSW Consultation

Hi Justine

Attached is our draft Construction Stormwater Management Plan incorporating Erosion and Sediment Control Plan issued for your review and consultation.

This document satisfies conditions B26, B34, B35, B36, B38 relating to the commencement of our internal estate works which kicks off with bulk earthworks only (ie excluding Mamre Rd widening works which are subject to their own process with TfNSW and WaterNSW).

We welcome any comments so we could finalise this document by end of next week.

Regards,

**Naiem Teghlobi**  
Senior Project Manager  
**Frasers Property Industrial**

T +61 2 9767 2110 M +61 417 665 167  
E [Naiem.Teghlobi@frasersproperty.com.au](mailto:Naiem.Teghlobi@frasersproperty.com.au)  
Level 2, 1C Homebush Bay Drive, Rhodes NSW 2138 Australia  
[www.FrasersPropertyIndustrial.com](http://www.FrasersPropertyIndustrial.com) [LinkedIn](#)



## APPENDIX F

### Monthly Rainfall Erosivity

#### Monthly Rainfall Erosivity Factor

Liverpool (Whitlam Centre, 1981-2001)

data extracted from bom.gov.au

MFI Calculation			
	Monthly rainfall (p)	Total Annual Rainfall (P)	$p^2/P$
January	88.1	876.2	8.86
February	98.4	876.2	11.05
March	90.2	876.2	9.29
April	103.1	876.2	12.13
May	73.1	876.2	6.10
June	54.8	876.2	3.43
July	48.2	876.2	2.65
August	63.0	876.2	4.53
September	46.4	876.2	2.46
October	59.8	876.2	4.08
November	82.0	876.2	7.67
December	67.6	876.2	5.22
		<b>TOTAL</b>	<b>77.46</b>
			<b>81.33</b>

$MFI = \sum p^2/P$

$R = 1.05 \cdot MFI$

# APPENDIX F

## Construction Stormwater Management Plan and Erosion and Sediment Control Plan