

24 April 2020

Tactical Group

Attention: Ms Tracey Davey

Level 15

124 Walker Street

NORTH SYDNEY NSW 2060

Dear Madam

Re: MPW3 Soil and Water Management Plan- SSD 10431

As per your request, we provide this letter pertaining to Moorebank Precinct West (MPW) Stage 3, located at Moorebank Avenue, Moorebank. The purpose of this letter is to provide an assessment on the proposed MPW Stage 3 State Significant development (**SSD 10431**) for the relocation of the existing site works compound.

1 INTRODUCTION

Costin Roe Consulting has been commissioned by Tactical Group, on behalf of Qube, to prepare this letter to accompany the proposed MPW Stage 3 submission. The purpose of the letter being to demonstrate consistency with the approved concept plan (**SSD 5066**) and with the strategies proposed at part of the Moorebank Intermodal Precinct West Stage 2 project approved under **SSD 7709**.

The proposed application is for subdivision of the MPW Site, construction of a works compound and construction and installation of associated ancillary infrastructure. The Project is predominately located in the south of the MPW development site.

Further, this letter confirms consistency with the post approval assessments completed for MPW Stage 2 (**SSD 7709**) including the *Construction Soil and Water Management Plan (CSWMP, Ref: Co13455.07-03a.rpt)* & the *Stormwater Development Design Report (SDDR, Ref: Co13455.07-02b.rpt)* prepared by Costin Roe Consulting (CRC).

An *Environmental Impact Statement Scoping Report* (Ref: J3191223.2) has been prepared for the approval by Aspect Environmental. Reference to this report should be made for detailed site descriptions, project overview, site context and other EIS related impact assessments.

A review of management measures for the compound has been made, noting that management measures for the compound relate only to the construction period measures which are encapsulated in the *Construction Soil and Water Management Plan (CSWMP, Ref: Co13455.07-03a.rpt)* provided as part of post approval documentation for SSD 7709.

A set of drawings has also been produced (refer **Enclosure 1**) which confirm Soil and Water Management measures and Erosion and Sediment Control measures for the Stage 3 works and consistency with the CSWMP.

1.1 PLANNING SECRETARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS (SEAR's)

This SWMP and associated drawings have been completed in accordance with the approved SSD7709 stormwater management strategy for Moorebank Precinct West Stage 2 as documented in the SDDR, and in accordance with the requirements of the CSWMP. The key measures set out in the SDDR and CSWMP will manage runoff from the proposed construction compound as set out in this letter.

We provide the following table which confirms how and where, within the report or respective drawings and models, each of the requirements of SSD_10431 SEAR's have been met:

SSD10431 SEARs Matrix

SEAR No.	Item and Response
7	<i>An assessment of soil and water impacts for the site. The assessment must:</i>
7a	<p><i>Assess impacts on surface and groundwater flows, quality and quantity</i></p> <p><u>Response</u></p> <p>This SWMP and associated drawings have been completed in accordance with the approved SSD7709 stormwater management strategy for Moorebank Precinct West Stage 2 as documented in the SDDR, and in accordance with the requirements of the CSWMP.</p> <p>The key measures set out in the SDDR and CSWMP will manage runoff from the proposed construction compound as set out in this letter. Minor modifications to drainage diversions are required to the ESCP to address layout changes, however sediment basin locations and arrangements as set out in the approved CSWMP remain per approved. No additional measures are required to address operational requirements.</p>
7b	<p><i>Assess flooding impacts and characteristics, to and from the project, with an assessment of the potential changes to flooding behaviour (levels, velocities and direction) and impacts on bed and bank stability, through flood modelling, including:</i></p> <ul style="list-style-type: none"> <i>i. hydraulic modelling for a range of flood events</i> <i>ii. description, justification and assessment of design objectives (including bridge, culvert and embankment design)</i> <i>iii. an assessment of afflux and flood duration (inundation period) on property;</i> <i>iv. consideration of the effects of climate change, including changes to rainfall frequency and/or intensity, including an assessment of the capacity of stormwater drainage structures</i> <i>v. v. relevant provisions of the NSW Floodplain Development Manual 2005</i>

SEAR No.	Item and Response
	<p><u>Response</u></p> <p>A detailed flood assessment has been completed as part of the EIS for SSD7709. This has been summarised in Section 5 of this letter.</p> <p>It is confirmed that the proposed compound is clear of both the 1% AEP and PMF floods, and there is no impact on flooding from the development, nor impact on the development from flooding. A detailed flood assessment is not necessary for the current EIS.</p>
7c	<p><i>Assess effects to downstream rivers, wetlands, estuaries, marine waters and floodplain areas, water dependent fauna and flora (including Groundwater Dependent Ecosystems), having regard to advice received from EESG (see Attachment 1)</i></p> <p><u>Response</u></p> <p>The effect of development to downstream rivers, wetlands, estuaries, marine waters and floodplain areas, water dependent fauna and flora (including Groundwater Dependent Ecosystems) has been completed and confirmed by Cumberland Ecology as part of SSD7709 approvals.</p> <p>It is confirmed that the current application does not change or affect any of the proposed measures included in the SSD7709 approval hence further assessments for the proposed compound are not relevant.</p>
7d	<p><i>Describe any mitigating effects of the proposed stormwater and wastewater management during and after construction on hydrological attributes such as volumes, flow rates, management methods and re-use options</i></p> <p><u>Response</u></p> <p>Per Item 7a response above, this SWMP has been completed in accordance with the requirements of the SDDR, and in accordance with the requirements of the CSWMP. This SWMP does not change or affect any of the proposed measures included in the SSD7709 approval hence further assessments for the proposed compound are not relevant.</p> <p>Reference is to be made to <i>Section 6</i> of the CSWMP for mitigating effects of wastewater management during construction & <i>Sections 4 and 5</i> of the SDDR for mitigating effects of wastewater management after construction.</p>
7e	<p><i>Identify proposed monitoring of hydrological attributes</i></p> <p><u>Response</u></p> <p>Per Item 7a response above, this SWMP has been completed in accordance with the requirements of the SDDR, and in accordance with the requirements of the CSWMP.</p> <p>Reference is to be made to <i>Section 8</i> of the CSWMP for the approved Monitoring requirements to be undertaken during construction. This SWMP does not change or affect any of the proposed measures included</p>

SEAR No.	Item and Response
	in the SSD7709 approval hence further assessments for the proposed compound are not relevant.
7f	<p><i>Address drainage issues associated with the development / site, including the incorporation of Water Sensitive Urban Design measures, stormwater and drainage infrastructure such as on-site detention systems to ensure peak discharges and flow velocities post development must not exceed existing peak flows and velocities</i></p> <p><u>Response</u></p> <p>Per Item 7a response above, this SWMP has been completed in accordance with the requirements of the SDDR, and in accordance with the requirements of the CSWMP.</p> <p>Reference is to be made to <i>Sections 3-5</i> of the SDDR for WSUD measures implemented within the MPW Stage 2 approval. This SWMP does not change or affect any of the proposed measures included in the SSD7709 approval hence further assessments for the proposed compound are not relevant.</p>
7g	<p><i>Undertake an assessment of surface water quality during construction (including reference to water quality objectives for the relevant catchment where objectives have been determined), including an identification of works that may impact water quality, and a summary of proposed monitoring and mitigation measures in accordance with Managing Urban Stormwater – Soils & Construction Volume 1 2004 (Landcom) and Volume 2 (DECC 2008)</i></p> <p><u>Response</u></p> <p>Per Item 7a response above, this SWMP has been completed in accordance with the requirements of the SDDR, and in accordance with the requirements of the CSWMP.</p> <p>Reference is to be made to <i>Sections 3-5</i> of the SDDR for WSUD measures implemented within the MPW Stage 2 approval. This SWMP does not change or affect any of the proposed measures included in the SSD7709 approval hence further assessments for the proposed compound are not relevant.</p>
7h	<p><i>Consideration of stormwater quality and management (including monitoring) during use of the site with the objective of maintaining or improving existing water quality taking into account the Water Quality Objectives</i></p> <p><u>Response</u></p> <p>Per Item 7a response above, this SWMP has been completed in accordance with the requirements of the SDDR, and in accordance with the requirements of the CSWMP.</p> <p>Reference is to be made to <i>Section 8</i> of the CSWMP for the approved Monitoring requirements to be undertaken during construction &</p>

SEAR No.	Item and Response
	<i>Section 6 of the SDDR for the approved Monitoring requirements to be undertaken after construction. This SWMP does not change or affect any of the proposed measures included in the SSD7709 approval hence further assessments for the proposed compound are not relevant.</i>
7i	<p><i>Consider whether the existing sewerage system can cater for the proposal and whether environmental performance of the existing system will be impacted</i></p> <p><u>Response</u></p> <p>Refer to the MPW Stage 2 EIS (by Arcadis) for sewer system response.</p>
7j	<p><i>Identify and assess the soil characteristics and properties that may impact or be impacted by the project, including acid sulfate soils, salinity, erodibility, unstable or unsuitable ground and unrippable rock</i></p> <p><u>Response</u></p> <p>There are no bulk earthworks proposed as part of the compound construction. Refer to SSD7709 documentation for earthworks methodology.</p>
7k	<p><i>Include a bulk earthworks strategy detailing the volume of spoil to be extracted from the site, planned reuse and amount of material to be imported.</i></p> <p><u>Response</u></p> <p>There are no bulk earthworks proposed as part of the compound construction. Refer to SSD7709 SDDR documentation for earthworks methodology.</p>

2 MPW PRECINCT DESCRIPTION

2.1 Pre-Existing Conditions

The MPW site is located approximately 27 kilometers (km) south-west of the Sydney Central Business District (CBD) and approximately 26 km west of Port Botany. The site is situated within the Liverpool Local Government Area (LGA), in Sydney's South West Sub-Region, approximately 2.5 km from the Liverpool City Centre.

The development is located within The MPW Precinct of the Moorebank Logistics Park. The MPW Precinct development footprint is irregular in shape being bounded by the Georges River on the west, M5 Motorway on the north (and existing ABB Facility), Moorebank Avenue and Moorebank Precinct East (MPE) on the east, and undeveloped crown land to the south. Also, on the eastern extent is Basin 10 (being constructed on the western side of Moorebank Avenue as part of MPE works) and the interstate intermodal terminal and rail sidings.

Access to the MPW Precinct is via Moorebank Avenue, south of the Moorebank Avenue interchange with the M5 Motorway. The MPW Precinct is noted to comprise relatively flat topography. The highest level is RL 17.8m AHD located at the south-east corner of the site. The lowest level is RL 3.0m AHD adjacent to Georges River. Generally, the levels over the site fall between a range of RL 13.5m AHD to RL 7.5m AHD. Site grading is flat to undulating, as noted, however generally falls from east to west at grades of 0.5% to 1%.

It is noted that Moorebank Avenue reaches levels of RL 25.2m AHD at the East Hills Railway Line crossing and associated bridge abutment approach at the southern end of the MPW Precinct development footprint.

Further, it is noted that an existing works compound is located within the northern half of the MPW site, which has been utilised for construction works around the precinct's vicinity.

2.2 MPW Stage 3 Development Description

The proposed MPW Stage 3 works involves and construction of a new site compound. The compound is proposed to be located within the southern portion of MPW Stage 2 development area. The proposed compound is intended to provide office and administrative amenities, and for material stockpile zones, site entry and staging zones for the MPW Stages 1 & 2 approved developments.

The proposed compound design is consistent with the approved original concept plan (**SSD 5066**), albeit in a revised position located within in the southern portion of the MPW site, and will not compromise the intent of the future developments proposed to be built within the Stage 3 Region. Refer to drawings in **Enclosure 1** for the proposed SSD civil works plans and Figure 1 for general layout of the works.

Details of the key components of MPW Stage 3 construction works includes the following:

- The works compound is proposed to be positioned on the eastern portion of the proposed Lot 10.
- Hardstand, laydown and materials stockpile areas have been proposed to be located within the proposed Lots 8 & 9 to facilitate the works of MPW Stages 1 & 2, and future MPW warehouse construction, operation and maintenance phases.

- A materials storage area and car parking regions have been proposed to be positioned within the western region of the proposed Lot 10.
- A Temporary Loop Road and Permanent Ring Road are proposed within the south-western portion of the MPW site. The roads are proposed to facilitate access to all lots throughout MPW Stage 3. It is proposed that Services and utilities are provided under the Permanent Ring Road.
- Vegetation clearing, topsoil stripping and stockpiling and site earthworks and erosion and sediment control works.
- Appropriate importation of clean general fill (VENM/ENM), engineered fill materials and other construction materials.
- Construction and operation of sediment basins to be consistent with the approved concept plan (SSD 5066), the CSWMP.

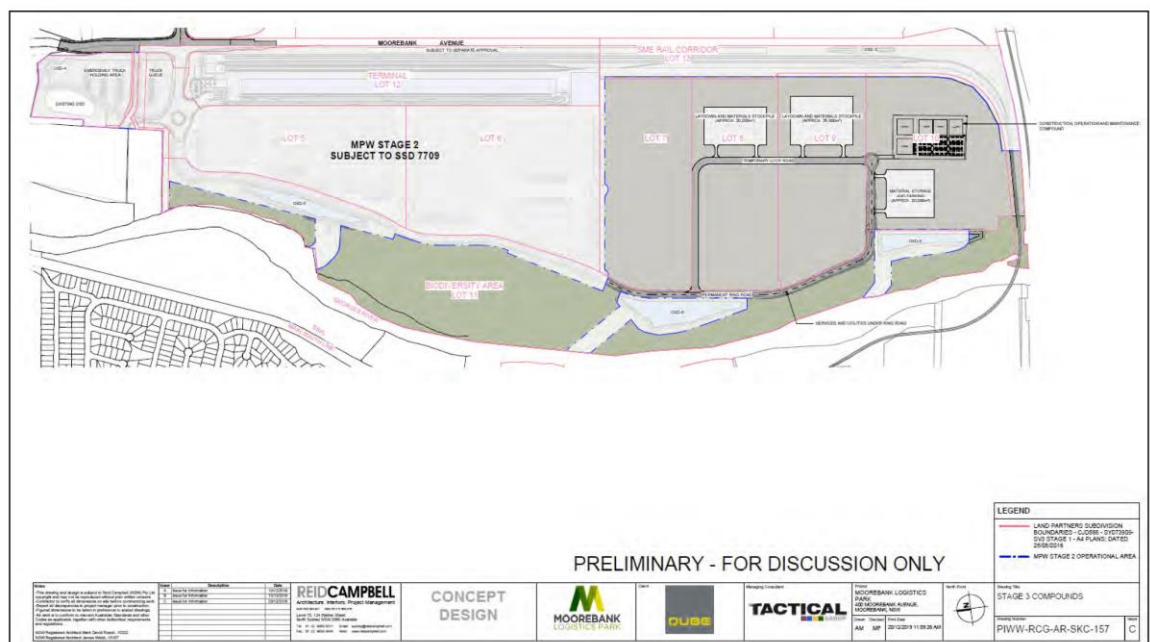


Figure 1. General Layout of Proposed Compound

3 SOIL & EROSION & SEDIMENT CONTROLS

3.1 General Requirements

This section of the letter has been prepared with the purpose of providing the general requirements for site management procedures to control the severity and extent of soil erosion and pollutant transport during the implementation of the new compound.

The requirements for soil and water are to be undertaken and completed in accordance with the guidelines in *Managing Urban Stormwater - Soils and Construction Volume 1 (Landcom 2004)*, the CSWMP, the approved Construction Environmental Management Plan (CEMP) and any compound specific variations as set out in the drawings included in **Enclosure 1**.

3.2 Description of Proposed Soil and Water Management Measures

Management of stormwater runoff from the MPW Stage 3 catchment is proposed to be captured and managed within Sediment Basins 6 & 8. These sediment basins are proposed to be also used during the operational phase of the site's development.

Design of the proposed sediment basins (6 & 8) has been captured in the **CSWMP** and include the area designated for the MPW Stage 3 compound. No additional storage in the proposed sediment basins is required to accommodate the Stage 3 works. Refer to drawings **MPWS3-COS-CV-DWG-0200, 0250 & 0251** in **Enclosure 1** for erosion sediment control plans and details.

The proposed sediment basins (6 & 8) will occupy a similar volume as anticipated for the future open detention basins. The proposed operational basins will be utilised as temporary sediment basins until site stabilisation and construction are completed for Stage 3 works as required by the CSWMP.

3.3 Typical Minimum Management Requirements

Detailed soil and water management requirements are included in the CSWMP as previously discussed in this letter. We provide the following general typical minimum requirements for soil and water management for information purposes only. The below should be read in conjunction with drawings included in **Enclosure 1** and the CSWMP.

Pre-Construction

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

- Construction of stabilised site entry.
- Construction of Sediment fences and other temporary ESC measures as shown on drawings. Sediment fences should also be constructed on the upstream edges of the designated buffer strips and at the base of fill embankments.
- Areas for plant and construction material storage are to be designated along with associated drains and spillage holding ponds.
- Construction of sediment basins.
- Diversion banks are to be created at the upstream boundaries of construction activities to ensure clean upstream runoff is diverted around any exposed areas. Catch drains are to be created at the downstream boundary of construction activities.
- Silt fences and/or sandbags are to be placed along the catch drains to slow flow, reduce scour and capture some sediment from runoff.

- Site personnel are to be educated to the sediment and erosion control measures implemented on site.

During Construction

The following minimum requirements are to be met during construction:

- Progressive re-vegetation of filled areas and filled batters.
- Construction activities are to be confined to the necessary construction areas.
- The provision of a construction exit (truck shaker) to minimise the tracking of debris from tyres of vehicles leaving the site onto public roads. Only one construction exit will be nominated to limit the movement of construction equipment.
- Topsoil and temporary stockpile location will be nominated to coincide with areas already disturbed. A sediment fence is to be constructed around the downstream side of the stockpile and a diversion drain at the upstream side if required.
- Regular inspection and maintenance of silt fences, sediment basins and other erosion control measures are to be made. Following rainfall events greater than 50mm inspection of erosion control measures and removal of collected material should be undertaken. Replacement of any damaged measures should be performed immediately.

4 WATER CYCLE MANAGEMENT & WATER SENSITIVE URBAN DESIGN (WSUD)

4.1 General Requirements

This section of the letter has been prepared with the purpose of providing the general requirements for site management procedures to control the severity and extent of soil erosion and pollutant transport during the implementation of the new compound.

The requirements for water quantity and quality management are to be undertaken and completed in accordance the Stormwater Development Design Report (SDDR), the approved Construction Environmental Management Plan (CEMP) and any compound specific variations as set out in the drawings included in **Enclosure 1**. The Water Cycle Management measures below are consistent with the SDDR noted above.

4.2 Water Cycle Management & WSUD Key Areas and Objectives

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

Developing a WCMS at the SSD stage of the land development process provides guidance on urban water management issues to be addressed for the estate and development as a whole. This assists urban rezoning and estate infrastructure planning for the industrial development proposed on the land.

This WCMS has been prepared to inform the DPIE and stakeholders that the development is able to provide and integrate WCM measures into the stormwater management strategy for the MPW Stage 2. It presents guiding principles for WCM which includes establishing water management targets and identifying management measures required for future building developments to meet these targets.

Several WCM measures have been included in the WCMS and engineering design, which are set out in this report and the attached drawings. The key WCM elements and targets which have been adopted in the design are included in **Table 1** following.

As required of CoC 5 & B9, WSUD principles are to be incorporated within the design.

A number of WCM & WSUD measures have been included in the stormwater management strategy and designs, which are set out in this report and the attached drawings. The following key WSUD considerations, specific to stormwater, have been included in the design:

- *Stormwater Quantity Management*
- *Stormwater Quality Management*
- *Flood Management & Large Rainfall Events*
- *Water Demand Reduction/ Rainwater Reuse*

Element	Target	Reference
Water Quantity	Maintaining or improving the volume of stormwater flows to from this site. <i>“it will be necessary to demonstrate that there will be no increase in runoff from the site as a result of the development for the 1 in 1-year ARI and the 1 in 100-year ARI storm events”.</i>	CoC Liverpool Council - Stormwater Management Policy
Stream Erosion Index	A stream erosion index between 3.5-5.0 has been targeted to manage frequent flows resulting from the development.	Best Practice
Water Quality	Load-based pollution reduction targets based on an untreated urbanised catchment: Gross Pollutants 90% Total Suspended Solids 85% Total Phosphorus 60% Total Nitrogen 45% Total Hydrocarbons 90%	Council DCP DPIE
Flooding	Buildings and roads set 500mm above 1% AEP. No affectation to upstream downstream or adjoining properties as a result of development Local overland flow paths to achieve 150mm freeboard to building floor levels	Council DCP. NSW Floodplain Development Manual. Council DCP CoC
Water Supply	Reduce Demand on non-potable water uses by 50%.	Council DCP DPIE
Erosion and Sediment Control	Appropriate erosion and sedimentation control measures must be described in the environmental assessment for all stages of construction to mitigate potential impacts to receiving waters. Refer separate Soil and Water Management Plan (SWMP) by Costin Roe Consulting, Ref: Co13455.03.rpt & this document.	Landcom Blue Book DPIE

Table 1. WCM/ WSUD Targets

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

A brief summary of the management objectives is described below:

- *Stormwater Quantity Management (Refer SDDR Section 4)*

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

Attenuation of stormwater runoff from the development is proposed to be managed via a series of open detention basins provided in strategic locations for each of the development catchments. These detention basins are proposed to be in use during the operational phase of the site's development. As per the consent conditions the objective is to attenuate stormwater flow from the development to pre-developed flows, and to ensure no affectation to upstream, downstream and adjoining properties as a result of the development.

Sizing of the basin systems has been completed using DRAINS modelling software in accordance with the Liverpool City Council Policy and CoC's for the 1 in 1-year ARI to 1 in 100-year ARI storms for various durations. The modelling accounts for the drainage system provided for the adjacent sites.

Refer to **Section 4** of the SDDR for detailed sizing of detention systems.

- *Stormwater Quality Management (Refer SDDR Section 5)*

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

Water quality, and pollution reduction objective shown in **Table 3.1** of the SDDR, are achieved through a treatment train of proprietary gross pollutant traps and natural bio-retention systems. Reference to **Section 5** of the SDDR should be made for detailed Stormwater Quality modelling and measures.

- *Flood Management and Large Rainfall Events*

The proposed development considered flooding and large rainfall events, both from the adjacent Georges River, and from site generated runoff.

The following measures have been incorporated in the design:

- All buildings are sited 500mm above the 1% AEP design flood level of the Georges River.
- Flood storage compensation has been provided where filling in localised pre-developed flood affected areas occurs;
- Stormwater detention measures have been included to manage pre and post development runoff as discussed above and in SDDR **Section 4**; and
- Overland flow paths to manage runoff in large storm events have been included which achieve at least 150mm freeboard to building levels from the flow paths.

4.3 Site Drainage

4.3.1 Pre-Existing and Current Site Drainage

Until recently, the MPW Stage site was operating as part of the School of Military Engineering. The Department of Defence have now vacated the site.

As part of the previous uses on the site, existing remnant in-ground drainage structures are present. These systems will generally become redundant, other than existing drainage discharge locations.

As noted previously four main catchments drain to the west, being G04 (28.94 Ha), G05 (36.96 Ha), G06 (44.13 Ha) and G08 (11.17 Ha), and one to the east, G03 (24.82 Ha). Catchments are as depicted in the SWMP within the EIS (*Figure 5-1*) by Arcadis and reproduced as **Figure 2** below. Refer also to drawing **PIWW-COS-CV-DWG-0420**.

It is also noted that, a catchment of approximately 75 Ha from MPE (IMEX – 62.7 Ha, MPE Basin 9 and part of Warehouse 5 – 12.3 Ha) drains through the site via an existing drainage channel. The existing channel is in a state of poor maintenance and will be upgraded as what has been coined as the “*East-West Culvert*”. Construction of the *East-West Culvert* will comprise reinforced concrete box culverts (RCBC) with base slab extending from the existing Moorebank Avenue crossing to The Georges River. It is proposed that the alignment of the new culvert will be offset, however aligned parallel to the existing culvert (other than the start and end of the culvert) to ensure the existing channel can remain operational during the construction of the new culvert. This will assist in ensuring that potential for scour erosion is minimised and associated environmental impact associated with the construction is also minimised.

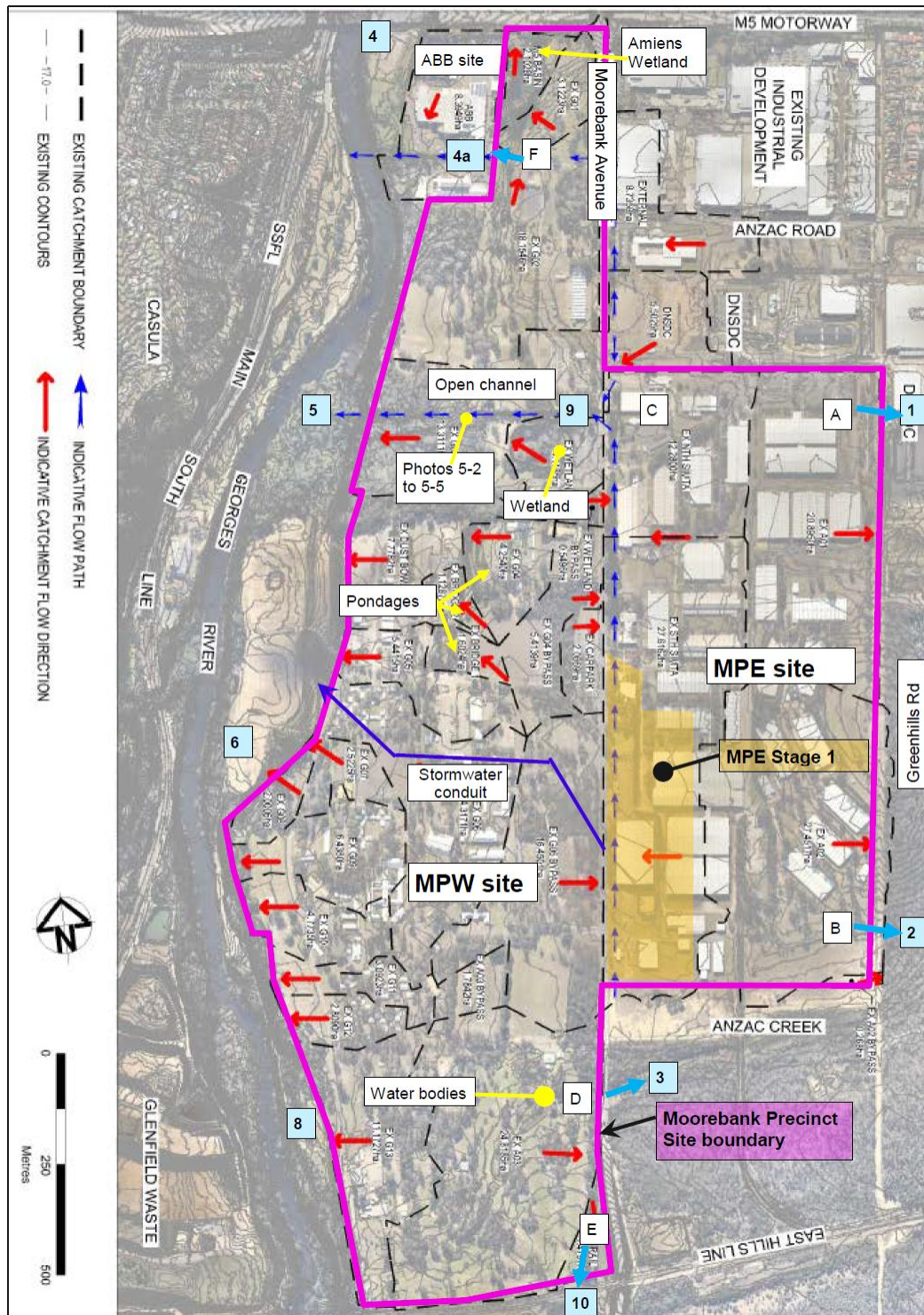


Figure 5-1: Existing Site Conditions (refer also to **Appendix B** Existing Conditions catchment plan)

Figure 2. Existing Catchments (Source: SSD16-7099 SWMP Fig 5-1 Arcadis 2018)

4.3.2 Proposed Infrastructure Drainage

As per general engineering practice, and with reference to LCC guidelines, the proposed stormwater drainage system for the development will comprise a minor and major system to safely and efficiently convey collected stormwater run-off from the development.

The minor system is to consist of a piped drainage system which has been designed to accommodate the 5% AEP or 1 in 20-year ARI storm event (Q20). This results in the piped system being able to convey all stormwater runoff up to and including the 5% AEP event. The major system through new paved areas has been designed to cater for storms up to and including the 1% AEP or 1 in 100-year ARI storm event (Q100). The major system employs the use of defined overland flow paths to safely convey excess run-off from the site to the two discharge points allowing for 350mm of freeboard to building levels, as shown on SDDR drawing **PIWW-COS-CV-DWG-0461 & 0465**. Further consideration of overland flow for events greater than 1% AEP, or in the event of blockage has been made in the design as required of **CoC B5** and **B9**. This includes ensuring a minimum 150mm freeboard is maintained for events greater than 1% AEP, or in the event of blockage.

The overall stormwater management objectives, including catchment breakdown, water quality objectives and water quantity discharge rates, remain consistent with the Arcadis MPW Flooding and Stormwater Assessment, presented in the EIS for MPW Stage 2, and all of the CoC's. It is noted, however, that the proposed water quantity and quality management measures proposed for construction vary slightly from the approved extent and storage requirements as a result of detail design calculations and hydrological and hydraulic assessments, in consideration to the consent requirements and WCM outcomes.

A summary of the main stormwater measures for the MPW Stage 2 development, with reference to SDDR catchment plans **PIWW-COS-CV-DWG-0420 & 421**, and layout plans **PIWW-COS-CV-DWG-0401 to 0411**, is as follows:

Outlet 3

- Pre-development catchment of 24.82 Ha.
- Post developed catchment of 9.28 Ha proposed to be conveyed to *Outlet 3*. The proposed catchment is a reduction between pre and post development of 63%.
- Water quantity will be managed by a relatively small above ground basin. Due to the substantially reduced post development catchment, the increase in runoff from urbanisation remains at or below the 1 in 1-year ARI storm and the 1 in 100-year storm as required of the CoC at *Outlet 3*. The management basin as such will provide only a water quality and SEI function during operation.
- The open basin has been designed with the provision of 1V:4H batter slopes.
- Primary water quality will be managed by a Vortech style gross pollutant trap (Rocla CDS or approved equivalent) which treats hydrocarbons/ oil and grease, gross pollutants, sediments, some nutrients and litter.
- Tertiary water quality will be managed via a 1,000m² minimum bio-retention system. This system will further target hydrocarbons, fine sediments and nutrients. The minimum bio-retention media area is based on 1% of the contributing 9.28 Ha post development catchment and has a cell of less than 1000m² as required of the CoC.
- The basin discharges to the east to Anzac Creek via existing concrete box culverts underneath Moorebank Avenue.

Outlet 4

- Pre-development catchment of 28.94 Ha.
- Post developed catchment of 3.59 Ha is proposed to be conveyed to *Outlet 4*. The proposed catchment is a reduction between pre and post development of 89%.
- Water quantity will be managed by a relatively small above ground basin. Due to the substantially reduced post development catchment, the increase in runoff from

urbanisation remains at or below the 1 in 1-year ARI storm and the 1 in 100-year storm as required of the CoC at *Outlet 4*. The management basin as such will provide only a water quality and SEI function during operation.

- Primary water quality will be managed by a Vortech style gross pollutant trap (Rocla CDS or approved equivalent) which treats hydrocarbons/ oil and grease, gross pollutants, sediments, some nutrients and litter.
- Tertiary water quality will be managed via a 400m² minimum bio-retention system (within future detention Basin 1 footprint) which will further target hydrocarbons, fine sediments and nutrients. The minimum bio-retention media area is based on 1% of the contributing 3.59 Ha catchment.
- Basin 4 discharges through pits and pipes within an existing easement sited to the north of the MPW site. No discharge works are proposed for this existing infrastructure.

Outlet 5

- Pre-development catchment of 36.96 Ha.
- Post developed catchment of 39.50 Ha proposed to be conveyed to *Outlet 5*.
- Water quantity will be managed by an above ground basin. The basin attenuates peak stormwater runoff from the post-developed catchment to pre-developed catchment for the 1 in 1-year ARI event and the 1 in 100-year ARI event with a maximum active storage in the 1 in 100-year ARI event of 23,200m³.
- The open basin has been designed with the provision of 1V:4H batter slopes.
- Primary water quality will be managed by a Vortech style gross pollutant trap (Rocla CDS or approved equivalent) which treats hydrocarbons/ oil and grease, gross pollutants, sediments, some nutrients and litter.
- Tertiary water quality will be managed via a 4000m² minimum bio-retention system. This system will further target hydrocarbons, fine sediments and nutrients. The minimum bio-retention media area is based on 1% of the contributing 39.50 Ha post development catchment and has been separated into five cells of less than 1000m² as required of the CoC.
- It is also noted that discharge of the East-West Culvert will be made at Outlet 5. Stormwater flows from MPE management systems OSD9 and OSD10 bypass the proposed OSD5, and discharge directly to The Georges River. The contributing catchments of approximately 75 Ha from MPE (IMEX – 62.7 Ha, MPE Basin 9 and part of Warehouse 5 – 12.3 Ha) and peak flow of 7.6m³/s will be conveyed within the *East-West Culvert*.
- The basin outlet, and discharge from the East-West Culvert, to The Georges River has been designed in accordance with NSW Office of Water Guidelines for Riparian Corridors comprising naturalised systems integrated into the existing riverbanks as required of the CoC.

Outlet 6

- Pre-development catchment of 44.13 Ha.
- Post developed catchment of 58.90 Ha proposed to be conveyed to *Outlet 6*.
- Water quantity will be managed by an above ground basin. The basin attenuates peak stormwater runoff from the post-developed catchment to pre-developed catchment for the 1 in 1-year ARI event and the 1 in 100-year ARI event with a maximum active storage in the 1 in 100-year ARI event of 39,790m³.
- The open basin has been designed with the provision of 1V:4H batter slopes.

- Primary water quality will be managed by a Vortech style gross pollutant trap (Rocla CDS or approved equivalent) which treats hydrocarbons/ oil and grease, gross pollutants, sediments, some nutrients and litter.
- Tertiary water quality will be managed via a 5,900m² minimum bio-retention system. This system will further target hydrocarbons, fine sediments and nutrients. The minimum bio-retention media area is based on 1% of the contributing 58.9 Ha post development catchment and has been separated into six cells of less than 1000m² as required of the CoC.
- The basin outlet to The Georges River has been designed in accordance with NSW Office of Water Guidelines for Riparian Corridors comprising naturalised systems integrated into the existing riverbanks as required of the CoC.

Outlet 8

- Pre-development catchment of 11.17 Ha.
- Post developed catchment of 26.5 Ha proposed to be conveyed to *Outlet 8*.
- Water quantity will be managed by an above ground basin. The basin attenuates peak stormwater runoff from the post-developed catchment to pre-developed catchment for the 1 in 1-year ARI event and the 1 in 100-year ARI event with a maximum active storage in the 1 in 100-year ARI event of 20,300m³.
- The open basin has been designed with the provision of 1V:4H batter slopes.
- Primary water quality will be managed by a Vortech style gross pollutant trap (Rocla CDS or approved equivalent) which treats hydrocarbons/ oil and grease, gross pollutants, sediments, some nutrients and litter.
- Tertiary water quality will be managed via a 2,700m² minimum bio-retention system. This system will further target hydrocarbons, fine sediments and nutrients. The minimum bio-retention media area is based on 1% of the contributing 26.5 Ha post development catchment and has been separated into three cells of less than 1000m² as required of the CoC.
- The basin outlet to The Georges River has been designed in accordance with NSW Office of Water Guidelines for Riparian Corridors comprising naturalised systems integrated into the existing riverbanks as required of the CoC.

5 EXTERNAL CATCHMENTS AND FLOODING

The proposed MPW Stage 3 footprint is not affected by any overland flow paths or external catchments. As such no allowance for conveyance of upstream catchments is required in this SSD.

The MPW Stage 3 site is located adjacent to the Georges River hence flood considerations should be made for the development. A flood assessment was completed by Arcadis and formed *Appendix R of the EIS (Moorebank Precinct Intermodal Terminal Facility – MPW Stage 2 Stormwater and Flooding Environmental Assessment)*.

Reference to **Figure 3** and **Table 2** below should be made for flood modelling information and levels.

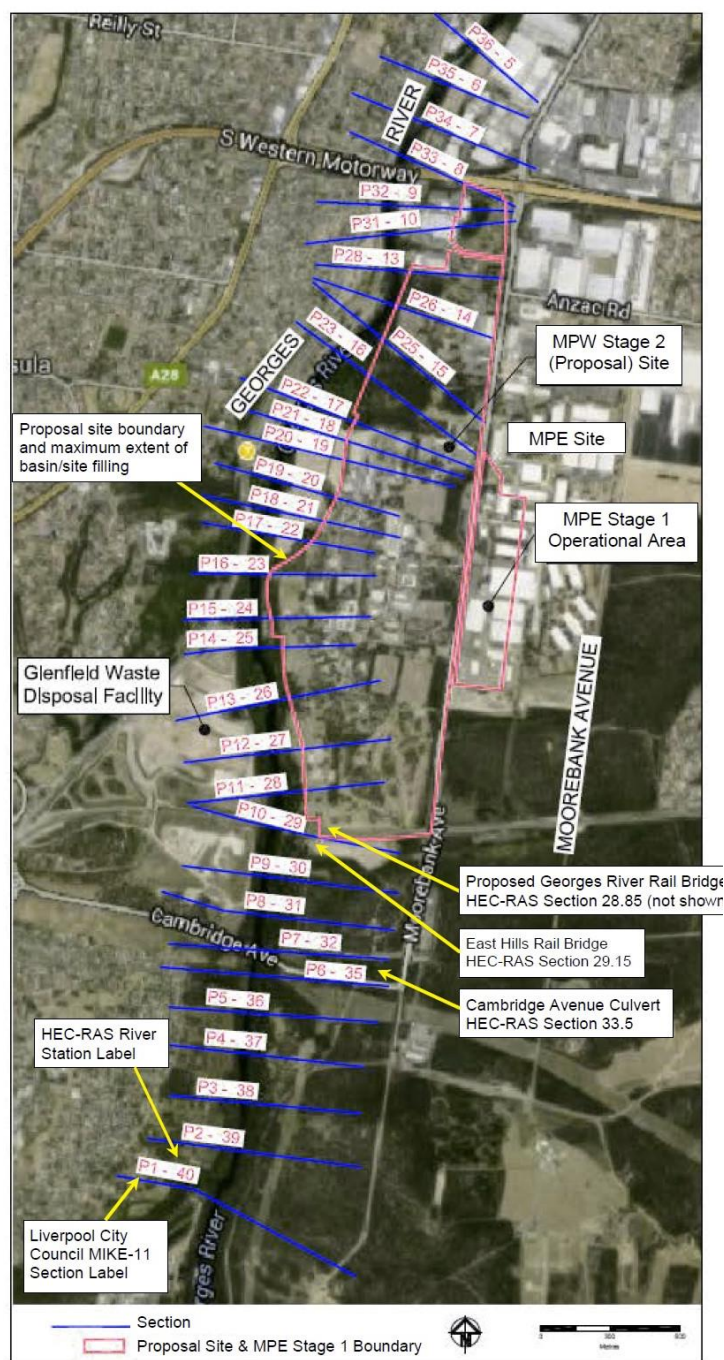


Figure 4-2: Location of HEC-RAS Model Sections

Figure 3. Location of HEC-RAS Flood Model Sections (Source: Arcadis Figure 4-2)

Table 2. MPW S2 Flood Levels (Source: Arcadis Table 4-1)*Table 4-1: Comparison of 'Base-Case' and 'MPW Stage 2 Proposed Development' Flood Levels*

Location	100 year ARI			PMF		
	Flood Level (mAHD)		Flood Impact (mm)	Flood Level (mAHD)		Flood Impact (mm)
	Base-case Condition*	Proposed Condition		Base-case Condition*	Proposed Condition	
36	12.68	12.67	-0.01	16.24	16.24	0.00
35	12.68	12.67	-0.01	15.98	15.99	0.01
34	12.26	12.26	0.00	15.19	15.20	0.01
Cambridge Ave culvert	-	-	-	-	-	-
33	12.16	12.16	0.00	15.26	15.26	0.00
32	12.06	12.06	0.00	14.98	14.98	0.00
31	11.99	11.99	0.00	14.93	14.93	0.00
30	11.88	11.88	0.00	14.80	14.80	0.00
29.3	11.82	11.81	-0.01	14.72	14.72	0.00
29.2	11.76	11.75	-0.01	14.63	14.63	0.00
Existing Rail Bridge	-	-	-	-	-	-
29.1	11.73	11.73	0.00	14.42	14.43	0.01
29	11.70	11.69	-0.01	14.43	14.43	0.00
28.9	11.72	11.72	0.00	14.43	14.43	0.00
Proposed MPE Stage 1 Rail Bridge	-	-	-	-	-	-
28.8	11.69	11.69	0.00	14.22	14.22	0.00
28.7	11.49	11.49	0.00	13.89	13.89	0.00
28	11.35	11.35	0.00	13.72	13.72	0.00
27	11.35	11.35	0.00	13.83	13.84	0.01
26	11.40	11.40	0.00	13.83	13.83	0.00
25	11.20	11.20	0.00	13.51	13.52	0.01
24	11.11	11.11	0.00	13.36	13.36	0.00
23	10.92	10.92	0.00	12.86	12.86	0.00
22	10.93	10.93	0.00	13.15	13.15	0.00
21	10.99	10.99	0.00	13.25	13.26	0.01
20	10.98	10.98	0.00	13.25	13.25	0.00
19	10.92	10.92	0.00	13.16	13.17	0.01
18	10.82	10.82	0.00	13.00	13.00	0.00
17	10.82	10.82	0.00	12.96	12.96	0.00
16	10.80	10.80	0.00	12.94	12.95	0.01
15	10.73	10.73	0.00	12.85	12.86	0.01
14	10.63	10.63	0.00	12.77	12.77	0.00

* i.e. with MPE Stage 1 Rail link potential flood impact (preliminary only, to be further assessed in MPE Stage 1 design)

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

It is further noted that generally site levels are all higher than the PMF event, hence the site can be considered flood free in relation to the regional flood conditions.

Local flooding relates to site runoff and contributing catchments relating to the MPW Stage 2 development areas and conveyance of runoff in the east-west culvert only.

Local drainage runoff and overland flow is addressed in the ESCP as endorsed by the CPESC.

Given the site is free from regional flooding and local overland flow is managed through ESCP measures, flood liability and risk (SSD 7709 CoC B30(a)(ii)) is considered low to negligible.

6 CONCLUSION

This letter and associated concept drawings (**Enclosure 1**) have been prepared for Tactical Group, on behalf of Qube, to confirm that the proposed MPW Stage 3 works are consistent with the approved original concept plan **SSD 5066**, the **SSD 7709 CSWMP & SDDR**.

This letter provides information to confirm that the civil engineering for the MPW Stage 3 development has been completed in accordance with accepted design practices and policies, and are in accordance with the requirements and management measures defined approved original concept plan **SSD 5066**, **CSWMP** submitted under **SSD 7709**, and the **SDDR** also submitted under **SSD 7709**.

A civil engineering strategy for the project has been developed which provides a best practice solution within the constraints of the existing landform and proposed precinct layout and ultimate constructed arrangement.

The MPW Stage 3 proposes a new site works compound, ancillary infrastructure and progressive subdivision of lots within Stage 3 boundaries. The civil works during Stage 3 are proposed to facilitate the site works within Stages 1 & 2 and for future developments on the MPW land and are consistent with the original concept plan (**SSD 5066**).

Further, an erosion and sediment control strategy has been proposed to remain consistent with the early works approved as per the approved concept plan (**SSD 5066**). The proposed sediment basins are proposed to be consistent with the stormwater management strategy requirements as per the **CSWMP**.

Yours faithfully,

COSTIN ROE CONSULTING PTY LTD



MARK WILSON MIEAust CPEng NER

Director

Enc. Drawings by Costin Roe Consulting

ENCLOSURE 1
DRAWINGS BY COSTIN ROE CONSULTING

MOOREBANK PRECINCT WEST-STAGE 3

MOOREBANK AVENUE, MOOREBANK, NSW

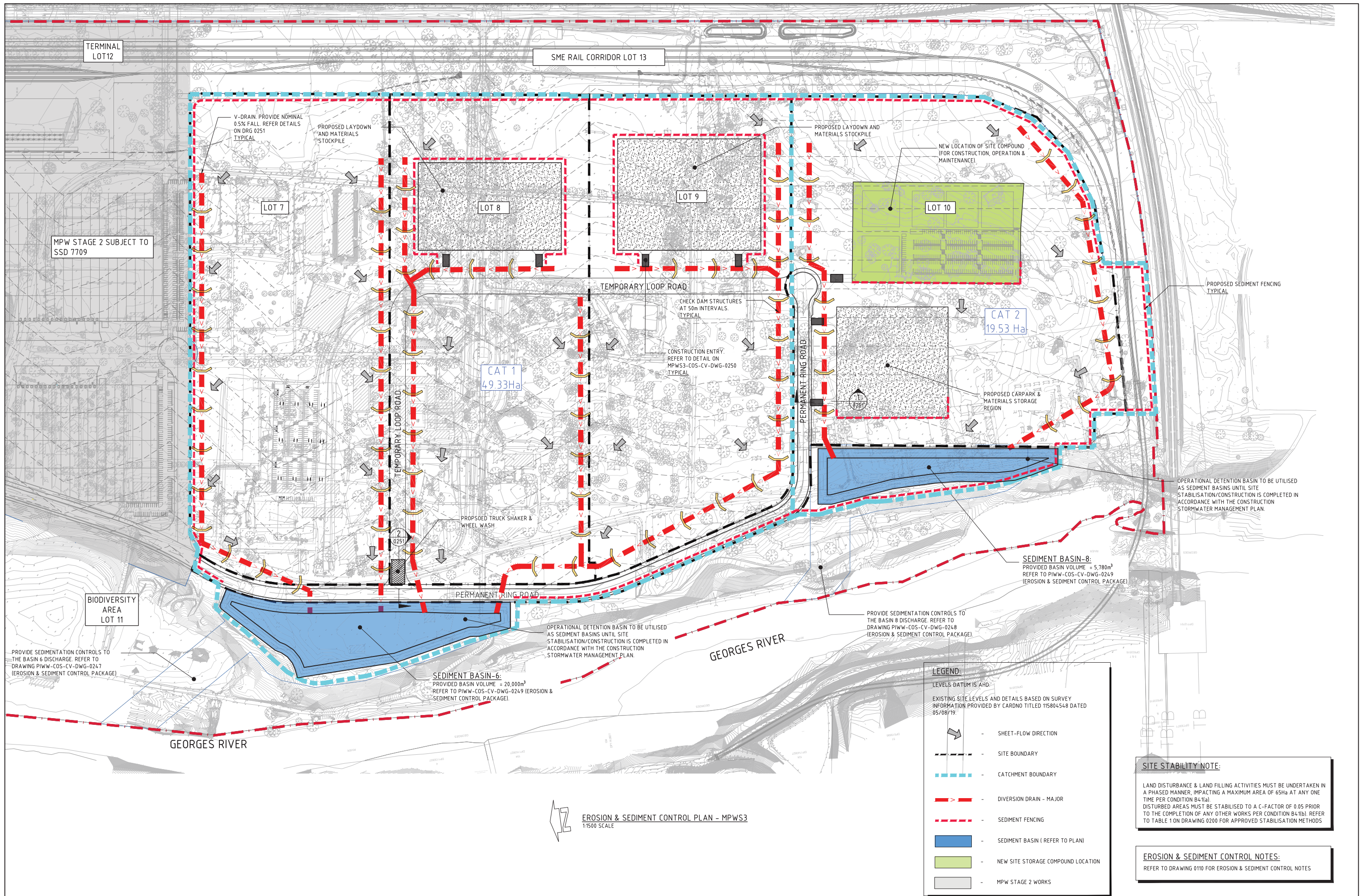
SSD CIVIL WORKS PACKAGE



LOCALITY PLAN
NOT TO SCALE

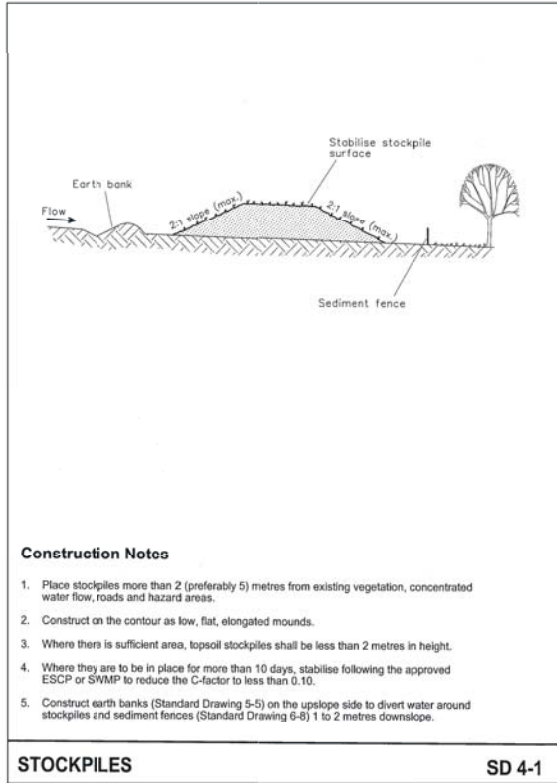
FOR INFORMATION ONLY

				DEVELOPER		ARCHITECT		PROJECT MANAGER		PROJECT		DRAWING TITLE	
												MOOREBANK PRECINCT WEST -S3 LOCALITY PLAN	
ISSUED FOR INFORMATION ONLY				27.02.20		A				Costin Roe Consulting Pty Ltd. Consulting Engineers		D	
AMENDMENTS				DATE		ISSUE				Level 1, 8 Windmill Street Walsh Bay, Sydney NSW 2000 Tel: (02) 8551-7889 Fax: (02) 8541-3721 email: mail@costinroe.com.au		PRECISION COMMUNICATION ACCOUNTABILITY	
												DRAWING No	
												MPWS3-COS-CV-DWG-0100	
												ISSUE	
												A	

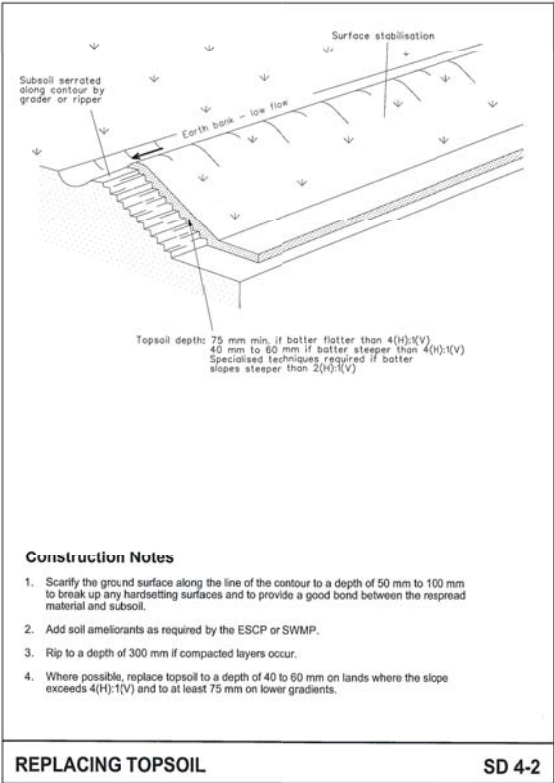


EROSION & SEDIMENT CONTROL PLAN - MPWS3
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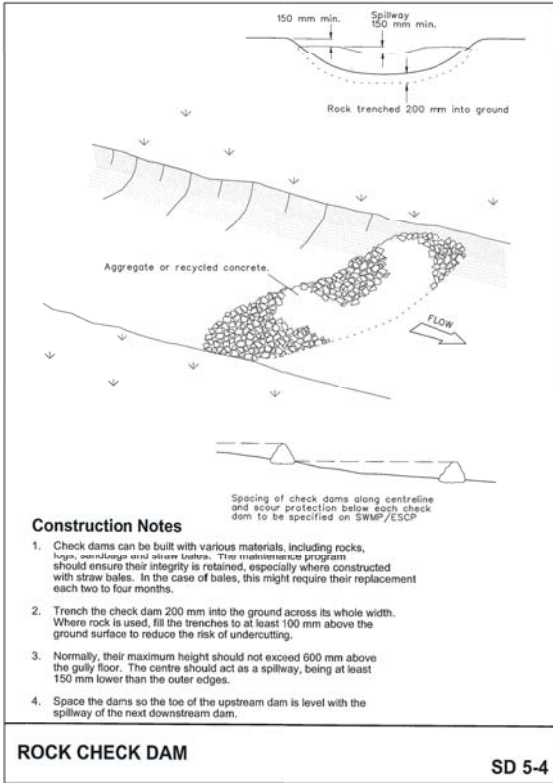
FOR INFORMATION ONLY



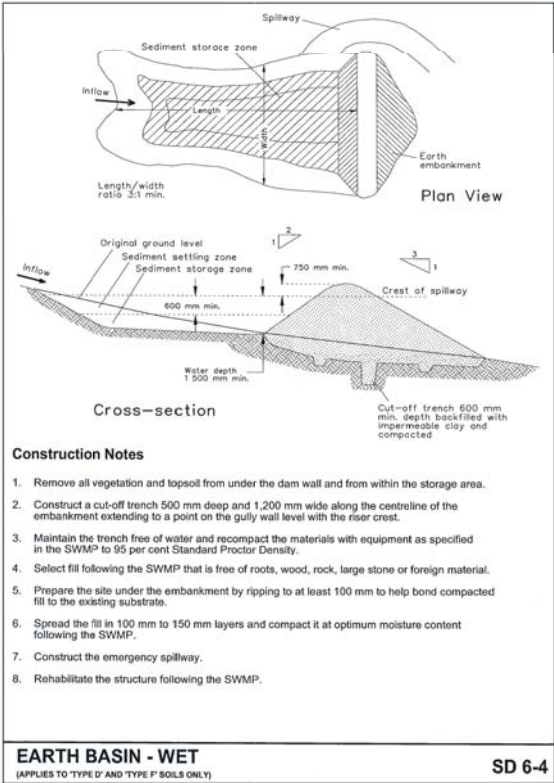
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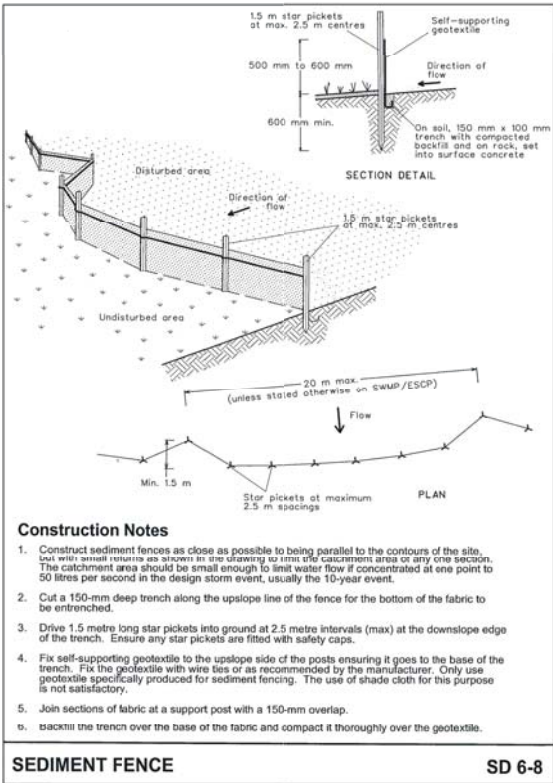
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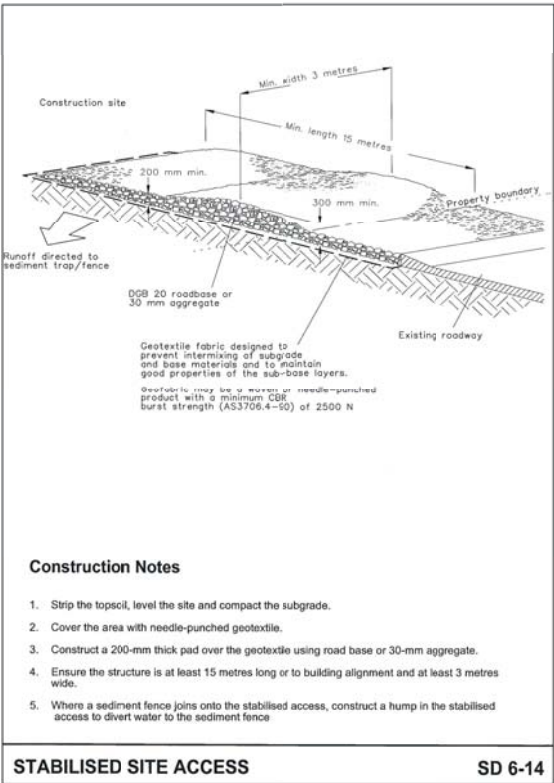
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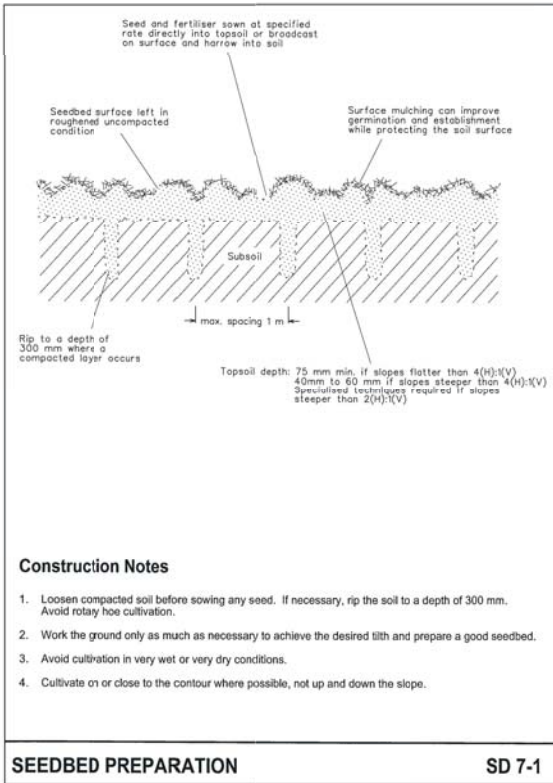
6-19



6-36



6-48



7-7

EROSION & SEDIMENT CONTROL NOTES:
REFER TO DRAWING 0110 FOR EROSION & SEDIMENT CONTROL NOTES

FOR INFORMATION ONLY

ISSUED FOR INFORMATION ONLY	27.02.20	A	AMENDMENTS	DATE	ISSUE
AMENDMENTS					

DEVELOPER	 
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ARCHITECT	
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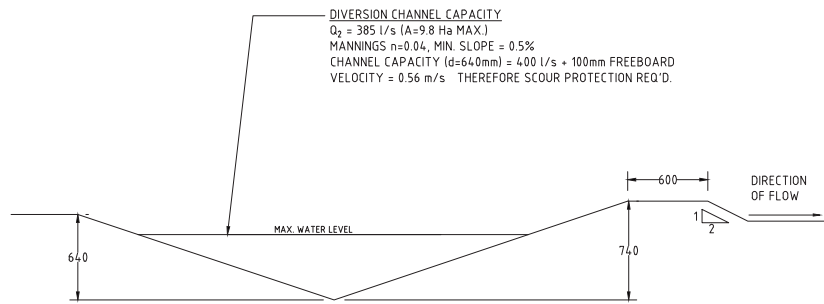
PROJECT MANAGER	
-----------------	---

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DESIGNED	DATE: FEB 20
CHECKED	DATE: FEB 20
SCALE	A3 AS SHOWN
CAD REF:	PIW-COS-CV-DWG-0250

CONSULTANT	
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Costin Roe Consulting	
Level 1, 8 Widdall Street Wahah Bay, Sydney NSW 2000 Tel: (02) 8551-7889 Fax: (02) 8541-3721 email: mail@costinroe.com.au	
PRECISION COMMUNICATION ACCOUNTABILITY	

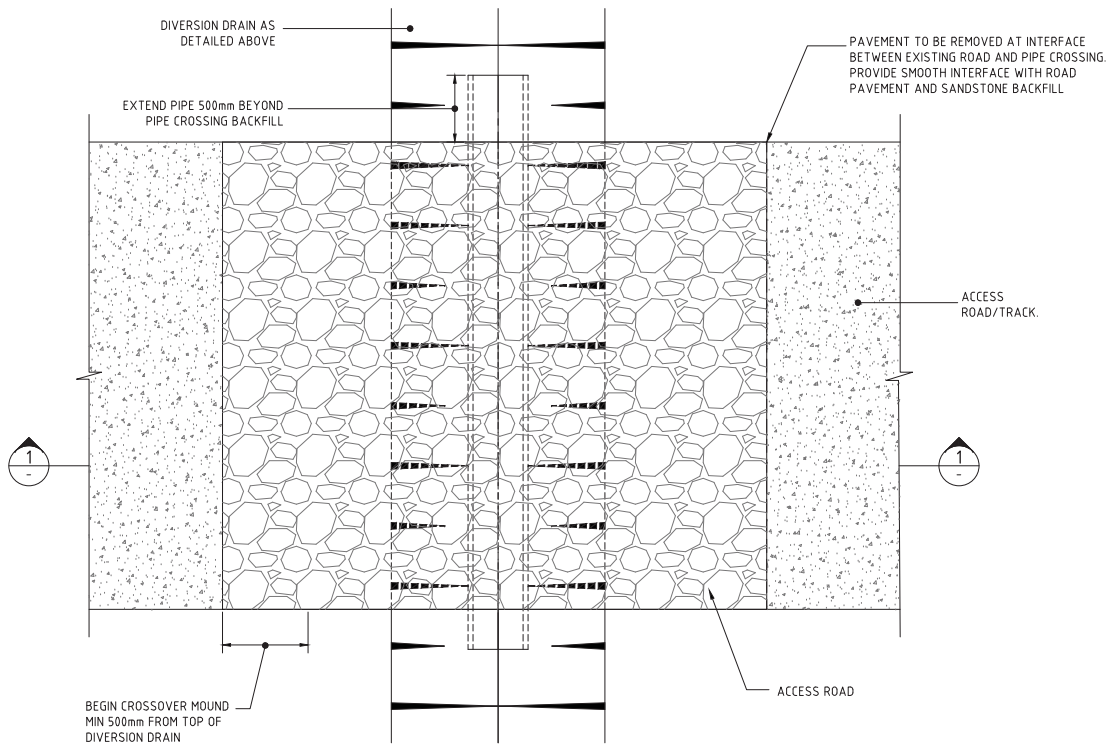
DRAWING TITLE	EROSION & SEDIMENT CONTROL DETAILS - SHEET 1
DRAWING No	MPWS3-COS-CV-DWG-0250
ISSUE	A



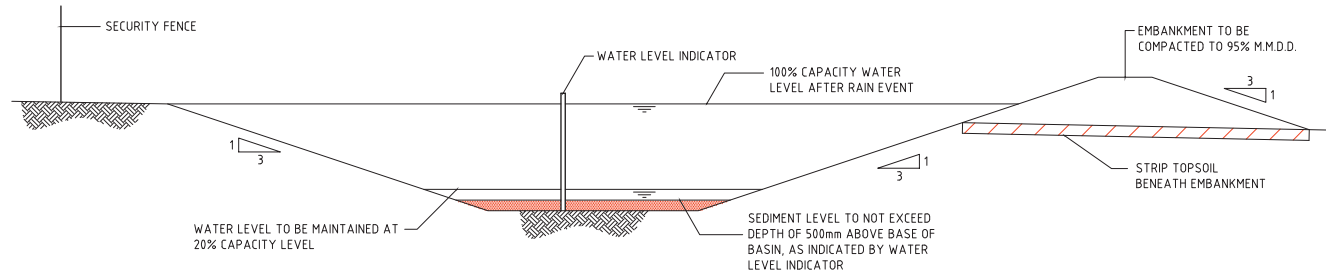
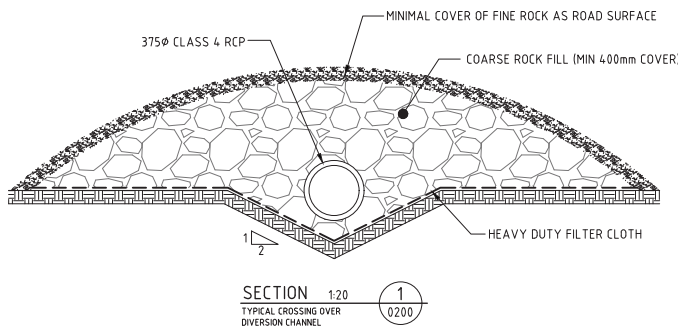
DIVERSION DRAIN SECTION
SCALE 1:20

TEMPORARILY PROTECT THE SWALE FROM EROSION DURING CONSTRUCTION.

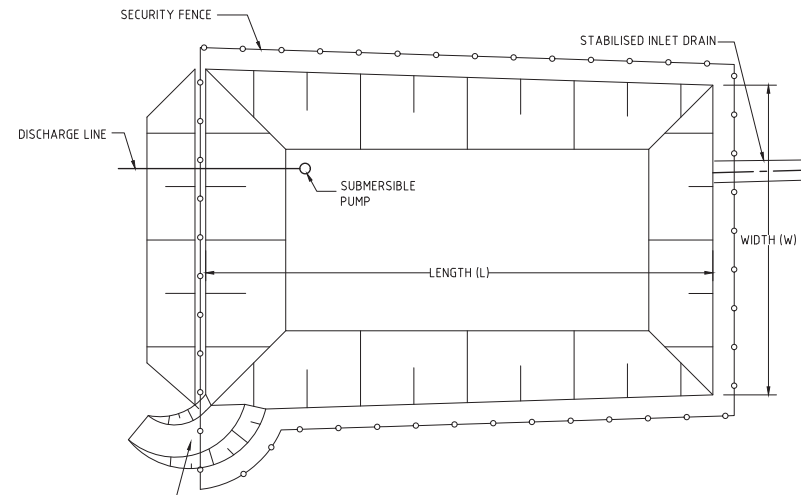
- TEMPORARY DIVERSION DRAINS SHALL BE STABILISED BY A 3000mm WIDE SECTION OF BIODEGRADABLE JUTE OPEN WEAVE MESH. JUTE TO BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATION
- EARTHEN CLEAN WATER DIVERSION DRAINS SHALL BE STABILISED BY:
 - TURF REINFORCEMENT, OR
 - GEOTEXTILE LINER, OR
 - POLYMER HYDRAULIC SOIL STABILISER. DOSAGE TO BE TO MANUFACTURER'S SPECIFICATION FOR FLOW RATES NOMINATED. DOSAGE SHALL BE SUCH THAT $C=0.05$.



TYPICAL CROSSING OVER DIVERSION CHANNEL - PLAN
SCALE 1:20

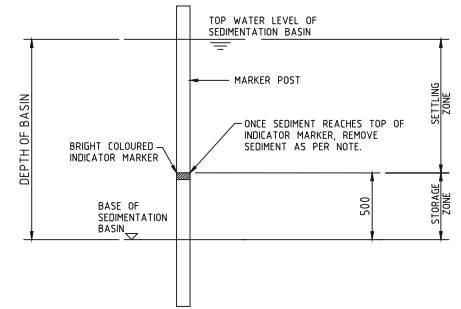


TYPICAL SEDIMENT CONTROL BASIN SECTION
SCALE 1:50

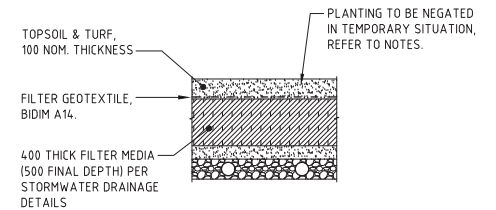


SPILLWAY TO CATER FOR Q_2 ARI FLOW FOR 6-12 MONTHS. REFER TO PLAN FOR SPILLWAY WIDTH. SPILLWAY TO BE STABILISED WITH SANDSTONE BOULDERS

TYPICAL SEDIMENT CONTROL POND PLAN
SCALE 1:250



SEDIMENT STORAGE MARKER
SCALE 1:20



TEMPORARY BIO-RETENTION PROTECTION DETAIL
SCALE 1:20

TEMPORARY CONSTRUCTION REQUIREMENT DETAIL - PROVIDE 100mm TOPSOIL AND TEMPORARY EROSION PROTECTION (JUTEMASTER OR EQUIV) TO SWALE BATTER SLOPES AND ADJACENT LANDSCAPED AREAS. NOTE THAT NO TOPSOIL IS TO BE PLACED OVER FILTRATION MEDIA. PROVIDE SILT FENCE TO TOP OF BANK UNTIL SUCH TIME AS THIS STABILISING AND VEGETATION HAS BEEN COMPLETED.

BIO-RETENTION TO BE PARTIALLY INSTALLED, FOLLOWING COMPLETION OF ROADWORKS, WITH THE TOP 75-100mm OF FILTER MEDIA REPLACED WITH A FINE TO COARSE SAND UNDERLAIN WITH A GEOTEXTILE LAYER (PER ABOVE DETAIL). FOLLOWING COMPLETION OF THE UPSTREAM DEVELOPMENT AND SITE STABILISATION, THE SAND IS TO BE REMOVED, REPLACED WITH FILTER MATERIAL AND PLANTED OUT. REFER TO BIO-RETENTION NOTES ON DRAWING PIWW-COS-CV-DWG-0453

TEMPORARY BIO-RETENTION BASIN PROTECTION DETAILS

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.

EROSION & SEDIMENT CONTROL NOTES:
REFER TO DRAWING 0110 FOR EROSION & SEDIMENT CONTROL NOTES

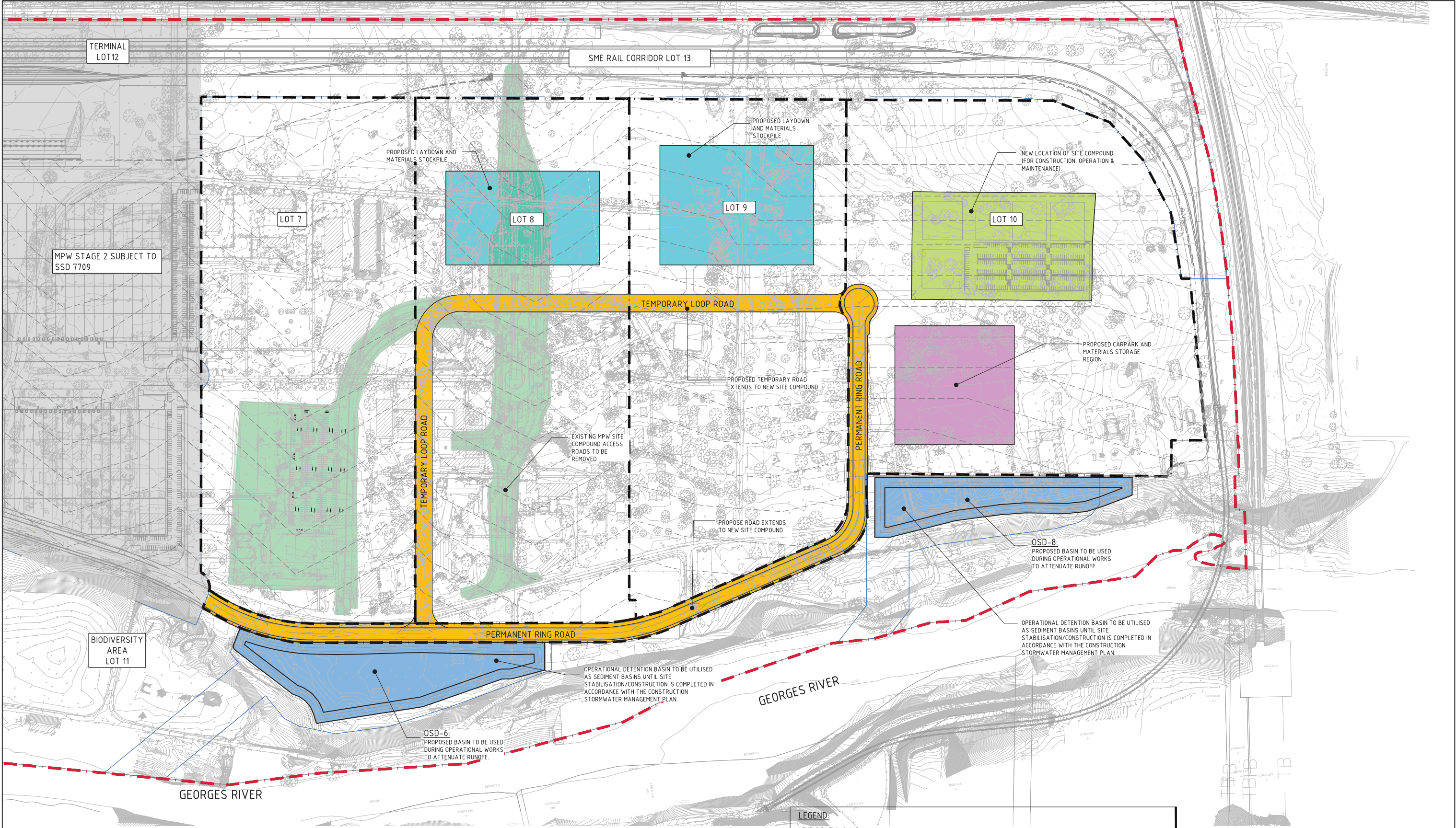
2m 0 5 10 15 20 25m
SCALE 1:250 AT A0 SHEET SIZE

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

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						<div>DEVELOPER</div> <div><div><div>MOOREBANK</div></div><div><div>QUBE</div></div></div>			<div>ARCHITECT</div> <div><div>REIDCAMPBELL</div><div>Architects, Interiors, Project Management</div><div>101-103 E. 124 Waterloo Street Level 15, 124 Waterloo Street North Sydney NSW 2060 Australia Tel: 01 02 9554 4511 Email: info@reidcampbell.com Fax: 01 02 9554 4512 Email: info@reidcampbell.com</div></div>			<div>PROJECT MANAGER</div> <div><div>TACTICAL</div><div>GROUP</div></div>			<div>PROJECT</div> <div>PRECINCT INFRASTRUCTURE WORKS WEST MOOREBANK AVENUE, MOOREBANK</div> <div><div><div>COSTIN ROE CONSULTING</div></div><div>Costin Roe Consulting Pty Ltd. Consulting Engineers Level 1, 8 Windmill Street Wahbi Bay, Sydney NSW 2000 Tel: (02) 9551-7890 Fax: (02) 941-3721 email: mail@costinroe.com.au</div></div>			<div>DRAWING TITLE</div> <div>EROSION & SEDIMENT CONTROL DETAILS - SHEET 2</div>					
<div>ISSUED FOR INFORMATION ONLY</div> <div>27.02.20</div> <div>A</div>												<div>DRAWING NO.</div> <div>MPWS3-COS-CV-DWG-0251</div>											
<div>AMENDMENTS</div> <div>DATE</div> <div>ISSUE</div>			<div>AMENDMENTS</div> <div>DATE</div> <div>ISSUE</div>			<div>DESIGNED (DRAWN)</div> <div>D.S.</div> <div>A0</div>			<div>CHECKED</div> <div>A.S. SHOWN</div> <div>1:20</div>			<div>SCALE</div> <div>1:20</div>			<div>CAD REF.</div> <div>PMW-COS-DWG-451</div>			<div>PRECISION COMMUNICATION ACCOUNTABILITY</div>			<div>ISSUE A</div>		



MPWS3 CIVIL WORKS PLAN
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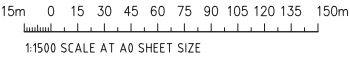
LEGEND:
LEVELS DATUM IS AHD.

EXISTING SITE LEVELS AND DETAILS BASED ON SURVEY
INFORMATION PROVIDED BY CARDNO TITLED 115804548 DATED 05/08/19.

	- SHEET-FLOW DIRECTION		- NEW SITE STORAGE COMPOUND LOCATION
	- SITE BOUNDARY		- LAYDOWN & MATERIALS STOCKPILE
	- EXISTING MPW SITE STORAGE COMPOUND		- CARPARK & MATERIALS STORAGE
	- PROPOSED ROADS		- MPW STAGE 2 WORKS

SITE STABILITY NOTE:

LAND DISTURBANCE & LAND FILLING ACTIVITIES MUST BE UNDERTAKEN IN A PHASED MANNER, IMPACTING A MAXIMUM AREA OF 65Ha AT ANY ONE TIME PER CONDITION B4-1(a).
DISTURBED AREAS MUST BE STABILISED TO A C-FACTOR OF 0.05 PRIOR TO THE COMPLETION OF ANY OTHER WORKS PER CONDITION B4-1(b). REFER TO TABLE 1 ON DRAWING 0200 FOR APPROVED STABILISATION METHODS



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