Sydney Port Botany Terminal 3 Project
Soil and Water Quality Management Plan

Terms and Definitions

The following terms, abbreviations and definitions are used in this plan:

Terms	Explanation
SPBT3	Sydney Port Botany Terminal 3
ANZECC	Australia New Zealand Environment and Conservation Council
BTEX	Benzene, Toluene, Ethylbenzene, and Xylenes
CEMP	Construction Environmental Management Plan
EM	Environmental Manager
EPA	Environmental Protection Agency
ERAP	Environmental Risk Action Plan
NATA	National Association of Testing Authorities
OEH	Department of Climate Change and Water
PAH	Polycyclic aromatic hydrocarbons
SWQMP	Soil and Water Quality Management Plan
TSS	Total Suspended Solids
EIS	Environmental Impact Statement
MCoA	Ministers Conditions of Approval

Distribution

The master 'controlled' SWQMP document forms part of the project's CEMP as an Appendix. The controlled copy will be retained in TeamBinder, the Laing O'Rourke document management system, where it can be accessed by personnel as necessary.

All paper copies of this SWQMP will be considered as 'uncontrolled' unless they have been allocated a 'copy number' in a colour other than black.

The client representative will be provided with a copy in conjunction with the submission of the CEMP.

Issue, Revision and Re-issue

The initial issue of this SWQMP has been reviewed by Laing O'Rourke's Regional Environmental Manager to ensure it meets the requirements of the current EMS and policy, contract, specifications and standards. The plan is approved for use on the project by the Project Director. Evidence of initial review and approval is by signatures on the cover sheet.

In conjunction with the submission of the SWQMP, Laing O'Rourke will coordinate and facilitate an initial SWQMP Workshop with representatives from the client and Laing O'Rourke to discuss the contents and application of the SWQMP to facilitate the approval of the SWQMP and agree the proposed management measures and controls.

Revisions of this SWQMP may be required throughout the duration of the project to reflect changing circumstances or identified opportunities for improvement.

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Revisions may result from:

- Management Review
- Changes to the Company's standard system
- Audit (either internal or by external parties)
- Client complaints or non-conformance reports.

Revisions shall be reviewed and approved by the Project Manager prior to issue. Updates to this SWQMP are numbered consecutively and transmitted to holders of controlled copies.

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1. Introduction

This Soil and Water Quality Management Plan (SWQMP) has been developed to address the construction activities associated with the Sydney Port Botany Terminal 3 (SPBT3) Project. In particular, the plan has been developed to address the requirement for a Stormwater and Water Management Plan as outlined in the conditions of approval.

Development of Sydney Port Botany Terminal 3 will involve the construction of onshore civil infrastructure including container stacking areas. The proposed Terminals have four berths with a total length of 1,180 m. The approximate Terminal area, excluding the Wharf area is 46 ha.

The key components of the Sydney Port Botany Terminal 3 include:

- Ground treatment and consolidation measures
- Drainage, utilities, services
- Container yard
- HV & LV electrical
- Buildings
- Rail yard.

1.1 Objective

The objective of this SWQMP is to ensure that all risks associated with erosion and sediment control, water quality, site wastewater, potential water contamination and licensing and monitoring issues are considered and managed effectively during construction to avoid any environmental incident.

This SWQMP seeks to ensure that water quality is maintained and that sediment transport and erosion is managed effectively to prevent any negative environmental impact on Botany Bay and associated ecosystems. Appropriately trained personnel and experience gained from previous projects will be used to achieve high environmental performance on the SPBT3 Project.

It is recognised that during construction some specific areas will require alterations to the planned control measures due to changing circumstances. In these situations, the planned control measures will be reviewed, risk assessed and, where appropriate and practical, amended as necessary prior to commencing new or modified activities. These alterations are expected to primarily involve erosion and sediment control issues and will be documented as updated erosion and sediment control plans for different stages of the construction works.

This SWQMP aims to satisfy the following objectives:

- Address the requirements of the planning approval for the SPBT3 Project
- Address the requirements of the Environmental Impact Statement (EIS) for the Port Botany expansion
- Address the requirements outlined in the Aurecon Framework Construction Environmental Management Plan
- Address the requirements of the relevant environmental legislation as it applies to this project
- Address the requirements of the NSW Landcom publication Managing Urban Stormwater - Soils and Construction (4th Edition, March 2004); and Managing Urban Stormwater, EPA 1997
- Address the requirements of the Environment Protection Licence issued for the works undertaken for the SPBT3 Project

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- Summarise potential impacts on the environment from the proposed works
- Document environmental procedures to control potential environmental impacts.
- Address requirements of the Laing O'Rourke Construction Method Statements developed for works within Penrhyn Estuary

Responsibilities for the implementation and management of this SWQMP are in accordance with the Project's Construction Environmental Management Plan.

1.2 Commitment

It is the commitment of Laing O'Rourke to implement all measures discussed in this SWQMP and to meet all relevant criteria to ensure the health of Botany Bay and its surrounds is maintained and that a safe worksite is upheld. Laing O'Rourke is committed to the sustainable development of the Port Botany Expansion and in doing so will utilise captured stormwater as far as practical for dust suppression and construction uses to limit the need for potable water.

1.3 Targets

The following targets have been identified in terms of soil and water management for the project:

- There will be no significant decrease in water quality of the outflow environment during construction
- There will be no degradation of groundwater quality on site
- Water quality shall conform to any approval conditions stipulated by the EIS and the MCOC
- No degradation of water quality off site
- Implementation of best practice erosion, drainage and sediment controls
- Ensure construction activities are managed to meet water quality objectives.
- Minimise erosion on site
- Maximise the trapping of sediment on site
- Prevent contamination of offsite areas and waterways
- Water discharged from site to meet the all relevant requirements
- Prevent mud and litter from being deposited on roadways
- Monitor and promptly maintain erosion and sediment controls through the project
- Monitor the effects of activities and the effectiveness of mitigation measures
- Limit the disturbed area and reinstate as soon as practicable following the completion of works
- Ensure all works with potential risk to surrounding waters are well contained and controlled to minimise impacts to the surrounding waters
- Ensure all personnel are appropriately trained in environmental awareness and the significance of the ongoing health of the surrounding Bay.

1.4 Statutory provisions and guidelines

The following statutory provisions and guidelines are applicable to the Project, with regards to water quality:

- Project Planning Approval

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- Australian Standards, NSW Dangerous Goods (General) Regulations 1999 and NSW EPA guidelines
- Managing Urban Stormwater: Soils and Construction Vol 4 (Landcom)
- POEO Act 1997
- Water Management Act 2000.

1.5 Ministers Conditions of Approval

MCoA's relevant to soil and water quality management are outlined below.

MCoA Reference	MCoA Detail
B2.5	The Applicant shall prepare a Soil and Water Management Plan in consultation with DEC, RTA, DOP, DNR, Botany and Randwick Councils. The Applicant shall address the requirements of these organisations in the Plan. The Applicant shall also consult with the Community Consultative Committee in preparation of the Plan. The Plan must detail erosion and sediment controls, prepared in accordance with Managing Urban Stormwater: Soils and Construction (available from the Department of Housing) and must: • Identify the management responses to activities that could cause soil erosion or result in the discharge of sediments and/or other pollutants from the site; • Specify standards/performance criteria for erosion, sediment, and pollution control including water sediment basin locations and discharge points, for example parameters, frequency, duration location and method; and • Describe what actions and measures will be implemented, the effectiveness these actions and measures and how they will be monitored during the works, clearly indicating who will conduct the monitoring, how the results of this monitoring would be recorded; and, if any non-compliance is detected. The Plan shall be approved by the Director-General prior to commencement of construction.

2. References

- Port Botany Expansion Environmental Impact Statement
- Aurecon Framework Construction Environmental Management Plan Sydney Terminal 3 Sydney International Container Terminals Pty Limited, Revision 3
- NSW Landcom publication Managing Urban Stormwater - Soils and Construction Edition 4 March 2004 (Blue Book).
- NSW EPA (1997), Managing Urban Stormwater – Treatment Techniques
- Penrhyn Estuary Habitat Enhancement Plan
- Botany Bay & Catchment Water Quality Improvement Plan - April 2011
- Reference is also made to the NSW Protection of the Environment Operations Act which integrates into one Act all of the controls necessary to regulate pollution and reduce degradation of the environment. The Act also provides for licensing of scheduled development work, scheduled activities and for offences and prosecution under this Act
- This Act has specific relevance to this plan with regards to the potential for pollution of waters resulting from erosion and sedimentation. In particular, Section 120 of the Act provides for the prohibition of pollution of waters and outlines the associated offence of pollution of waters.

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3. Strategic Approach

3.1 Existing Environment

Approximately 86% of the Botany Bay catchment area is drained by the Georges and Woronora Rivers, about 9% by the Cooks River, and the remaining area by other watercourses, including the Mill Stream and Springvale and Floodvale Drains.

The four catchments assessed in the EIS undertaken for the Project; Mill Pond, Springvale, Floodvale and Foreshore Beach, cover an area of 24.7 km2 and extend over parts or all of the suburbs of Botany, Mascot, Banksmeadow, Daceyville, Eastlakes, Pagewood, Maroubra Junction, Kingsford, Randwick, Kensington, Bondi Junction, Waverley, Paddington and Centennial Park. These catchments are the major sources of stormwater and pollutants that impact on the water quality of Botany Bay in the vicinity of the proposed Port Botany Expansion.

As discussed in the EIS, the major sources of potentially contaminated stormwater discharge in this part of Botany Bay include:

- EPA Licensed Premises – There are about 50 premises within the four catchments licensed by the EPA under the load-based licensing regulations. These premises may generate contaminated runoff which could enter the stormwater system that discharges to Botany Bay.
- Sydney Airport – Runoff from the airport discharges via a number of systems to Botany Bay, the Mill Stream and Cooks River.
- Port Botany – Runoff from the port areas discharges via a number of systems, generally to Brotherson Dock, with some portions discharging to Springvale Drain.
- SWSOOS – The South and Western Suburbs Ocean Outfall Sewer is an asset managed by Sydney Water Corporation. It crosses the Mill Stream upstream of Foreshore Road and is prone to overflowing into the Mill Stream in both dry and wet weather.
- Shallow groundwater contamination – Historical contamination of shallow groundwater from some industrial facilities may be discharging to the stormwater drainage system of the area.
- General contamination due to urban runoff.

The EIS indicates existing water quality has high levels of nutrients and low dissolved oxygen (DO).Total Petroleum Hydrocarbon (TPH) levels are indicated above ANZECC guidelines and the limited data on metals has suggested that Cadmium, Copper, Iron, Lead, Mercury, and Zinc can also greatly exceed ANZECC guidelines.

The EIS shows that Penrhyn Estuary has high levels of nutrients, Biological Oxygen Demand (BOD) and TPH but acceptable levels of DO. Limited data on metals indicate that Aluminium, Cadmium, Copper, Lead, Manganese and Zinc can greatly exceed ANZECC guidelines.

Faecal coliform (Fc) levels in the catchments, Mill Stream, Penrhyn Estuary and Botany Bay receiving waters are indicated to be highly elevated.

The EIS indicates Fc concentration for Foreshore Beach shows the probability of exceedance of the ANZECC (2000) guideline value for primary contact recreation (i.e. swimming) of 150 cfu/100 mL is 20%, i.e. approximately 20% of the time the waters are unsuitable for primary contact recreational use. Reasons for this non-compliance have been related in part to the South and Western Suburbs Ocean Outfall Sewer which crosses the Mill Stream upstream of Foreshore Road and is prone to overflowing into the Mill Stream in both dry and wet weather.

Nutrient concentrations for Botany Bay in the vicinity of Foreshore Beach indicate that Total Nitrogen (TN) levels do not exceed ANZECC (2000) guideline values, while Total Phosphorous (TP) may be slightly exceeded.

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Data provided by the Bureau of Meteorology indicates that average rainfall for the area is in the vicinity of 1200mm. Rainfall shows strong seasonal characteristics with the most significant falls occurring in the late summer and autumn months, with lesser falls during winter and spring. Rainfall during the summer months includes short and medium duration high intensity storms and longer periods of low to medium intensity rainfall.

3.2 Potential Impacts

3.2.1 Permanent Controls Erosion and Sediment Transport

Construction will involve a number of activities with the potential to impact water quality, sedimentation and erosion. These activities will result in the disturbance of the surface immediately adjacent to Botany Bay. These activities will give rise to the potential for erosion and sedimentation of downstream areas and subsequent degradation of water quality.

Considering the sensitivity of the surrounding environment, potential risks resulting from erosion, sedimentation and loss of construction material during the construction phase include the following:

- Construction areas, ground treatment works, drainage works and excavations can be subject to erosion during storm and heavy rainfall events before stabilisation causing siltation, constriction or blockages to the existing drains in this area
- Surface erosion can occur as a result of the removal of stable surfaces and shaping for construction
- Sediment removed during this erosion may block drains or deposit in the adjacent waterway
- Impact to aquatic life due to smothering and decreased light penetration from turbid runoff
- Construction activities may divert water into new areas and subject them to erosion
- Contamination of surface water runoff from the site
- There is a potential for spills and leaks from plant and equipment and onsite fuel storage during construction

3.3 Water Quality Control Measures

Laing O'Rourke understands the close proximity of the works to Botany Bay and the need to prevent pollution to ensure compliance with legislation, address community expectations and ensure the health of the surrounding ecosystems is maintained.

We will ensure that control measures which minimise the impact on water quality are implemented on the project to prevent construction activities from impacting upon the surrounding environment. They shall be installed prior to, or in conjunction with, disturbance of any area of work and as per the erosion and sediment control plans developed on site.

The location of these measures may change. This will occur through weekly environmental inspections and documented as a series of working control plans as the work progresses.

Erosion and sediment control plans will be provided with a specific revision number and applicable date or revision to ensure the appropriate plan is utilised. Plans will be regularly reviewed as the works progress to ensure they match the current construction requirements.

Supply of water for the project will be via existing facilities and will not include any extraction from natural watercourses.

Where potential for impacts on marine environments exists, sediment curtains with floatation devices will be utilised (silt curtain pore size in the order of 2 µm). Hose covers and similar controls will be utilised for hydraulics lines on plant and machinery working in close proximity to

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waterways. Floating oil booms will be installed where necessary to ensure no hydrocarbons will be able to escape to the surrounding waters. Also, Panolin biodegradable oils will be utilised as far as practical for plant and machinery working in close proximity to the water to minimise the impacts of any incidents of lost oil on the surrounding environment.

Spill kits will be kept at various locations on site and will cater for both marine and land environments. Emergency response procedures will be developed for any spill into the waterways which will include deployment of oil booms and absorbent materials using a site based boat and equipment. Specific training for site personnel will be undertaken for these tasks.

Specific Construction Method Statements will be developed for all works undertaken within Penrhyn Estuary and reviewed in conjunction with an appropriately qualified ecologist. These will be produced for the installation of the drainage headwalls and drainage corridor scour protection.

3.4 Permanent Controls

3.4.1 Drainage

Stormwater Quality Improvement Devices (SQIDS), catch drains, seepage drains, drainage lines, headwalls and pits will be implemented as per the specifications and drawings for the Terminal 3 expansion project. Permanent drainage will be installed early in the program to ensure a controlled stormwater system is utilised and to allow other works, such as permanent noise wall installation, to proceed.

Inlets and outlets of all drainage structures shall be protected throughout the project.

Any permanent drainage devices on this project shall be constructed as soon as practicable in the program and stabilised to convey clean stormwater through the site.

3.4.2 Drainage Outlets

- To allow installation of the permanent noise wall, the project requires installation of drainage outlets for the site, which also ensures controlled drainage is installed on site as early as possible. These drainage works will allow control of site drainage through environmental controls such as the Stormwater Quality Improvement Devices (SQIDs) and turbidity curtains, minimising the current risk of turbid runoff entering the surrounding bay and estuary. All works within Penrhyn Estuary will require specific Construction Method Statements to be developed and reviewed by an appropriate ecologist. Although there is a separate, detailed work method statement, controls for the outlet installation will be as follows:
    - Install silt curtain around the drainage outlet area to control turbidity propagation. The silt curtain will be installed so that tidal movements will affect the function of the curtain.
    - Install local rock lining scour protection at drainage outlet location.
    - Build a sandbag wall around the drainage pipe location (within the silt curtain) to delineate the work zone from Botany Bay and Penrhyn Estuary tidal influence.
    - Sandbagging will be approximately 1m high by 600mm wide tapering off to the embankment. Infiltrating water from the sump will be pumped back into the sediment pond to be reused onsite for dust suppression.
    - Backfill the pipe and trench with select bedding material. Reinstate the revetment and armour over the pipe stub and behind the new headwall.
    - Remove and relocate sandbags to the next outlet location. Leave and maintain the silt curtain around the outlet for the duration of construction.

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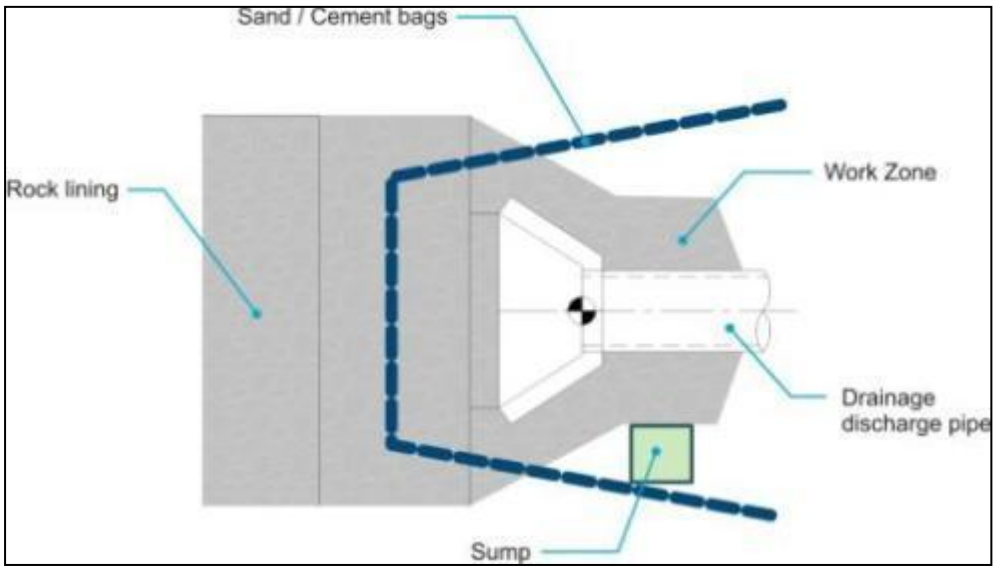

Figure 1- Plan view of drainage outlet construction inside silt curtain

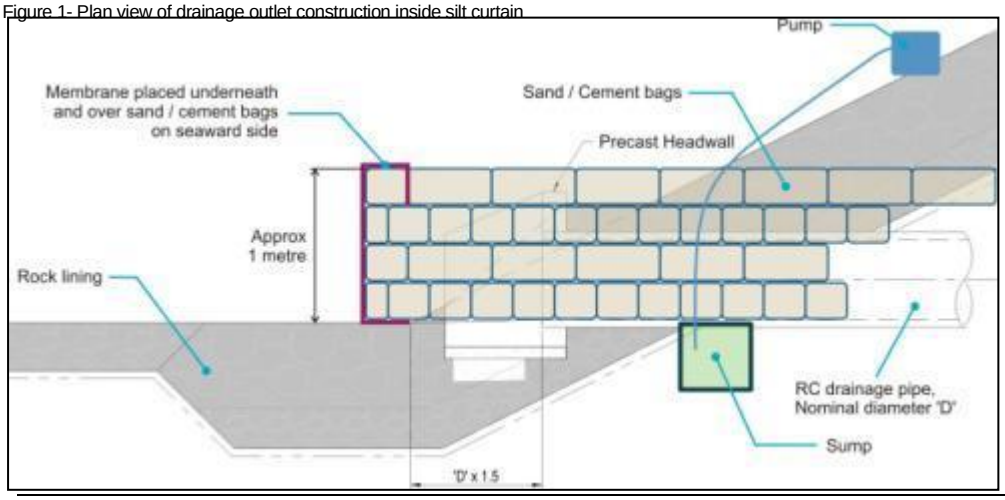

Figure 2 - Section view of drainage outlet construction inside silt curtain

3.4.3 Stormwater Quality Improvement Devices (SQIDs)

- Installation of eleven Stormwater Quality Improvement Devices (SQIDs) including associated drainage outlets and connecting drain runs. The stormwater quality improvement devices are located at various points throughout the site with all drainage passing through a SQID before being discharged to the drainage outlets.

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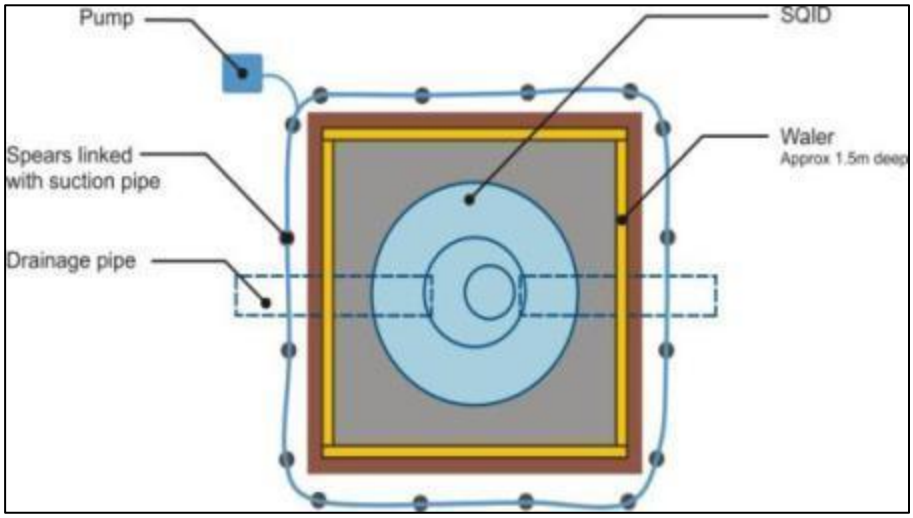

Figure 3 - SQID shoring and dewatering plan view

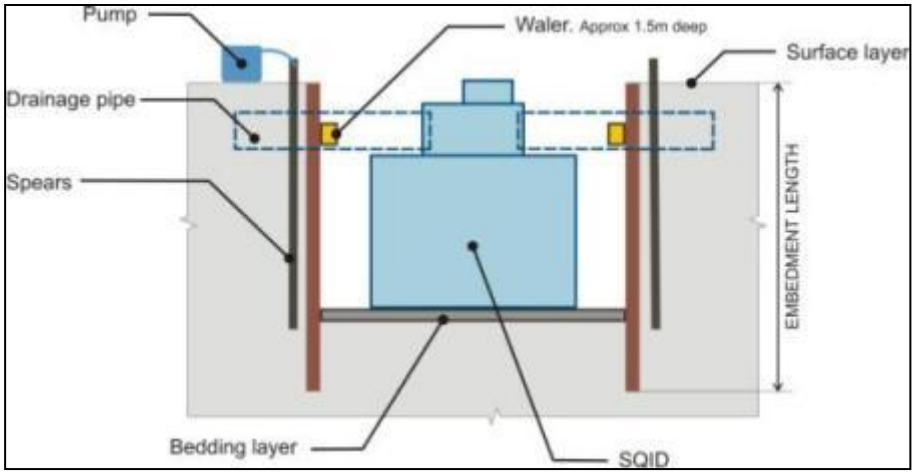

Figure 4 - SQID shoring and dewatering plan section view

- The SQID installation will require shoring and water pumping measures. These measures will provide a dry excavation foundation for the products to be installed as per the manufacturer's instructions.
- The water control measures for installation of the SQID systems will be as follows:
  - Install cofferdam using an excavator with vibratory pile hammer attachment or crane with suspended vibro-hammer around the SQID location.
  - Install spears around the outside of the work area below excavation. Spears will then be connected in a continuous chain with a suction pump on the end. The discharge of this water to the sediment ponds or used as dust suppression.
  - Once the base of the excavation is dry enough to work on, the SQID will be installed as per the manufacturer's instructions and backfilled. Sheet piling will be removed after backfilling for re-use elsewhere on the Project.

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Figure 5 - SQID being installed showing cofferdam and spears

3.4.4 Eastern Scour Protection

- A detailed Construction Method Statement will be developed for the installation of eastern scour protection and will be reviewed by an appropriate ecologist prior to works commencing.
- All requirements of the Penrhyn Estuary Habitat Enhancement Plan will be addressed, including seasonal exclusion zones.
- An ecologist will review the area prior to works to ensure no roosting birds are present.
- Survey works will be completed prior to and post construction.
- Rock lining will be installed on the rock armour bank located at the existing eastern drainage depression to provide scour protection for future drainage works.
- Environmental controls will be installed prior to the works and will include, silt curtains, sediment fencing surrounds, sandbag and sediment socks, pumps and geofabric lining.
- An excavator will be used to install the rock lining material.

Activity specific construction method statements for the installation of the eastern scour protection and drainage headwalls can be found in Appendix 16 of the project CEMP.

3.4.5 Other Drainage Infrastructure

- Other connecting drainage infrastructure will include gated drains, inlet pits, headwalls and rock lined channels on the Penrhyn Estuary side of the site. No works will be undertaken inside exclusion zones in the estuary as stated in the project EIS.

3.5 Temporary Controls

Progressive erosion and sedimentation plans shall be developed prior to the commencement of the particular task and the measures to control erosion and sedimentation installed. This is to ensure that erosion and sedimentation controls are always in the most appropriate locations with regards to the most up-to-date construction methodology.

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3.5.1 Temporary Sediment Ponds

Temporary sediment ponds shall be constructed in accordance with the requirements of the Blue Book.

Water will be captured and sent to the sediment basins via temporary drainage structures and hose lines. The water will be left to allow settlement of solids. If required, treatment of collected site runoff water will be via initial flocculation with a suitable potable grade polyelectrolyte. The current proposal is to utilise Ultrion 7157 polyelectrolyte, a potable grade flocculant. Typical dosage will be 5ppm with a maximum of 20ppm. Final confirmation of the flocculant will be subject to satisfactory jar testing on site. All material safety data sheets are filed within the project safety system and kept inside the storage containers on site.

If required, pH treatment will be achieved through the addition of acid or alkali material to achieve a pH range of 6.5-8.5. Typical pH buffering chemicals include HCl, Lime and Soda Ash. Volumes of this material will be determined on the basis of buffering requirement.

Sediment ponds will be inspected following rainfall events. If required, treatment will be initiated when the capacity has been reduced by >30% and it has been determined through in-situ inspection and testing that water will not meet the discharge requirements.

Preference will be given to utilising the treated water within the ponds for construction water and dust suppression, however where further rainfall events are predicted, it will be discharged off site following testing and approval. The need to discharge water within sediment basins will be reviewed when the basins capacity is reduced by 60%. The Environmental Manager will review the upcoming weather forecast and determine whether water is to be discharged or may be retained for construction applications.

Where water is to be discharged off site from the sediment ponds, it will be tested in accordance with Section 4.2 below. In-situ measurement and laboratory samples for the required water quality criteria will be undertaken prior to discharge.

Sediment ponds shall be de-silted when the sediment storage capacity has been reduced by 60%. Silt from sediment ponds shall be mixed or dried out and incorporated into the works.

3.5.2 Batter Protection

Exposed batters of the site during earthworks represent a significant source of readily erodible material until final stabilisation is achieved. To minimise the potential for the generation of sediment laden run off from exposed batters during the works, material will be compacted and stabilised at the end of each shift.

3.5.3 Sediment Fences

Sediment fences or suitable equivalent operate by slowing the flow of runoff and enabling the coarse suspended solids to settle out and be trapped behind the control structure.

Design limitations are:

- Drainage area ≤0.6 ha
- Maximum grade 1V:2H
- Maximum slope length 60m.

Particular attention must be made to the potential outlet of the sediment fence during high rainfall events and the likely point at which the fence will discharge. To ensure that the fence remains in tack during high flow events and runoff discharges to the appropriate areas, a small reinforced weir may need to be constructed in the fence. This will be reviewed daily during construction. Weirs in sediment fences must outlet to stable areas.

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Details on location of these structures will be verified on site, and incorporated in the working Erosion and Sediment Control Plans.

3.5.4 Sandbags and Sediment Socks

Sandbags and sediment socks are utilised to create a weir or check dam in table drains to slow the runoff water velocity and enable coarse sediment to settle. They can also be used to create diversion drains or bunds walls to contain liquids, or to supplement existing sediment controls and will be placed around any existing live stormwater pits or drop inlets prior to decommissioning of the structure. Locations will be confirmed on site and included in working sediment and erosion control plans.

Initially, sandbags and sediment socks will be provided to protect the existing operational stormwater drainage system until it is decommissioned.

Sediment socks will also be provided at the tow of the jersey barriers to prevent runoff escaping beneath and off the site.

Check dams will be carefully constructed so that they allow runoff to exit the structure via the intended flow path. A specifically constructed low point must be incorporated into the dam to direct runoff and ensure that flow is retained within its intended path.

3.5.5 Dust Control

Water carts fitted with sprays will be used to wet down any unsealed haul roads and fill areas to minimise the amount of dust generated where required.

In-situ water spray systems will be implemented for areas that have not been stabilised.

The number and size of the water carts shall be regularly reviewed by the Environmental Manager, Site Supervisors and the Project Manager to ensure that adequate watering is taking place and dust is kept to a minimum. Care is to be exercised to limit the amount of water used to ensure run off does not occur.

Refer also to the controls nominated in the Air Quality and Dust Management Plan which is provided in the Construction Environmental Management Plan.

3.5.6 Stockpiles

Temporary stockpiles shall be located more than 15m from the Botany Bay edge and as directed on-site.

Sediment barriers shall be erected on the down slope side so that any sediment laden runoff from the stockpile is captured and controlled. On the upslope, berms or catch drains shall be installed, if practicable, to divert clean water away from the stockpile.

Stockpiles will be covered when not in use to minimise erosion and dust.

3.5.7 Site Access

A wheel wash will be implemented at the site exit to prevent the tracking of mud onto public roads. To promote good environmental awareness and recycling initiatives, the wheel wash facility will use rainwater harvested from site and be self-contained – that is, all water will be recycled. A street-sweeper will be available on an on call basis to remove tracked sediment from roadways where required.

3.5.8 Silt Curtain

A geotextile silt curtain will be installed around all stormwater outlets during the construction phase. The silt curtain will be utilised as a final control measure in the event of rainfall in excess

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of the designed capacity of the upstream controls. The silt curtains will be inspected on a weekly basis to ensure correct operation and function.

3.6 Operation and Maintenance

Sediment control structures will be installed as outlined in the proposed concept drawings in the Appendix. These structures and the associated working erosion and sediment control plans shall be modified as required during construction should the construction sequence change or an alternative method of control be required.

Construction water quality structures and sediment controls will be implemented and maintained until such times as disturbed areas have been stabilised.

The Environmental Manager will inspect the site's environmental controls on an at least weekly basis. An inspection of the site will also be undertaken following 20mm of rainfall in any 24 hour period.

The Environmental Manager will also inspect the site prior to RDO weekends or other periods of extended closure.

Permanent and temporary sediment control structures which become blocked or overloaded with sediments will be cleaned out using appropriate methods such as an excavator, backhoe or by manual means.

Cleaning shall be performed prior to or when the accumulated sediment has reduced the capacity of the structure to less than 60%, based on a visual assessment.

Silt collected from cleaning temporary and permanent sediment and erosion control measures shall be mixed with dry material and incorporated into the works.

Detention basins (if used) will be desilted when the capacity of the sediment storage zone has been reduced to less than 60%.

4. SITE WASTEWATER CONTROLS

4.1 Waste Water

All site waste water will be directed to existing site sewerage facilities in compliance with the requirements of the Sydney Water Act 1994.

4.2 Concrete Washout

Where washout of concrete trucks is required on site, the Laing O'Rourke Superintendent or applicable foreman will locate a designated washout area a minimum of 20m away from Botany Bay or drainage lines.

An Environmental Risk Action Plan (ERAP) relating to concrete washout has been included in the Project's Construction Environmental Management Plan. Concrete Washout areas will be set up in accordance with the intent of the NSW EPA guideline 'Environmental Best Management Practice Guideline for Concreting Contractors' (2002).

4.3 Mitigation Measures

Mitigation measures for soil and water quality management for the construction phase of the project are outlined below.

Mitigation Measures	Responsibility	Source of Requirement	Timing
Install and maintain temporary erosion and sedimentation controls, such as sediment fences, diversion drains, etc, where identified by Progressive ESCPs prior to commencing works in each area.	Environment Manger	EIS ch18; 18.5.1	Throughout construction

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Mitigation Measures	Responsibility	Source of Requirement	Timing
	Superintendent		
Limit as far as practicable the total area disturbed at any one time.	Project Engineer	EIS ch37	Throughout construction
Progressively revegetate or seal disturbed areas when works in the area are complete to reduce dust emissions and the total erodible surface.	Environment Manger Superintendent	EIS ch18; 18.5.1	Throughout construction
Minimise traffic volumes on unsealed areas within the construction site. Provide parking and hardstand areas where possible.	Project Manager	EIS ch37; 37.2	Throughout construction
A member of the environmental management team to undertake environmental inspections on a weekly basis or before predicted and after significant rainfall events.	Environment Manger	EIS ch16; 16.8.1	Throughout construction
Provide rumble grids for spoil trucks to pass through prior to leaving the site and accessing public roads.	Project Manager	EIS ch18; 18.5.1	Throughout construction
Store all fuels, oils and chemicals in secure bunded areas. Cover all permanent bunded areas. Use temporary bunds for short-term (<7-10 days) storage where required.	Superintendent	EIS ch16; 16.8.1	Throughout construction
Ensure permanent fuel and chemical bunds have a capacity of 120% of the total volume stored.	Project Engineer	Best Practice	Throughout construction
Train field staff in the contents and use of spill kits.	Environment Manger	EIS ch16; 16.8.1	Throughout construction
Implement the spill management procedure in the event of a land based oil or chemical spill. Procedure contained in Emergency Response Plan.	Environment Manger All Personnel	EIS ch37; 37.2	Throughout construction
Prohibit alterations to the storm water pipes discharging from the Foreshore Beach unless a drainage analysis of the impacts is undertaken.	Project Manager	EIS ch16; 16.8.1	Throughout construction
Maintain drainage at existing public areas throughout construction.	Project Manager	EIS ch37; 37.2	Throughout construction
Minimising the exposure of fill and excavated material to active work fronts	Superintendent	Best Practice	Throughout construction
Locate soil stockpiles away from drainage lines and in cleared areas or areas to be cleared as part of the works, protect drainage lines. Ensure stockpiles are appropriately covered or stabilised to minimise any run-off being impacted by the material.	Superintendent	Best Practice	Throughout construction
Revegetate or stabilise soil stockpiles that will be on site for more than one month	Superintendent	Best Practice	Throughout construction
Divert water around any soil stockpiles and install sediment fences on the downslope side of soil stockpiles	Superintendent	Best Practice	Throughout construction
Maintain temporary erosion and sediment controls so that sediment storage capacity is maximised at all times.	Superintendent Environment Manager	Best Practice	Throughout construction
Test rainwater collected in bunds prior to dewatering. Criteria include pH between 6.5 and 8.5, and no visible oil on the water surface. Keep records of testing in the onsite environmental filing system.	Environment Manager	POEO Act	Throughout construction

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Mitigation Measures	Responsibility	Source of Requirement	Timing
Report spills immediately to the Site Supervisor and Environment Manager	All Personnel	Best Practice	Throughout construction
Report spills reaching water to SPC. Report all spills that cause or are likely to cause environmental harm to OEH's Environment Line (131 555). Report immediately.	Environment Manager	Contract	Throughout construction
Implement spill management procedures in the event of an oil or chemical spill.	Environment Manager	EIS ch37; 37.2;	Throughout construction
Diverting stormwater runoff around disturbed areas of the site where possible to prevent contamination with runoff from the disturbed areas. Where this is not possible, control measures such as diversion drains will be constructed to ensure stormwater runoff does not cause additional erosive impacts	Environment Manager Superintendent	Best Practice	Throughout construction
Ensuring all personnel is appropriately trained in erosion and sediment controls and environmental awareness	Environment Manager	Best Practice	Throughout construction
Washout of concrete trucks will be undertaken in a designated washout area a minimum of 20m away from any watercourses or drainage lines. Concrete is to be reused or recycled at an appropriately licensed waste facility.	Environment Manager Superintendent	Best Practice	Throughout construction
Concrete Washout areas will be set up in accordance with the intent of the NSW EPA guideline 'Environmental Best Management Practice Guideline for Concreting Contractors' (2002).	Environment Manager Superintendent	Environmental Best Management Practice Guideline for Concreting Contractors' (2002).	Throughout construction
Turbidity monitoring will be undertaken throughout construction, along with sediment deposition monitoring at location where the underground fuel tank is to be constructed. A relationship will be established between NTU and PAR and NTU and TSS, which will be regularly verified.	Environment Manager	Aurecon FCEMP	Throughout construction
Removal of soil from vehicle wheels and undercarriages before departing the site to reduce soil carried off site	Superintendent	Best Practice	Throughout construction
Regular inspection of machinery to identify any leaks	Superintendent	Best Practice	Throughout construction
Ensure construction activities are conducted in a manner that minimises the potential for spills or leaks, including the regular inspection and maintenance of plant and equipment, providing bunding or similar spill containment structures for onsite fuel and oil storage. Contain and clean up any spills or leaks as quickly as possible.	Environment Manager Superintendent	EIS	Throughout construction

5. Training

All site personnel shall undergo site specific induction training which will include environmental awareness. It will also include training in effective sediment and erosion control on site. The need for these controls will be emphasised.

Toolbox meetings will also be undertaken as and when required. They will cover specific environmental issues and shall include erosion and sediment control measures.

Personnel directly involved in implementing sediment and erosion control measures on site will be given specific training in the construction, operation and maintenance of the various measures

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to be implemented. Training of site personnel will be ongoing through the project to ensure environmental awareness and competency is incorporated into all work during the project.

Personnel conducting sampling, measuring, monitoring and reporting activities are to be suitably trained or experienced in the activity. Records of all training are to be filed in accordance with the project filing system.

5.1 Water Monitoring

All water quality control and sediment control structures will be regularly inspected and maintained throughout the project using Rainfall Erosion and Sediment Control Inspection Checklist.

Water monitoring will be undertaken as outlined below.

Aspect	Criteria	Means	Location	Construction Stage	Time-frame	Action by:
Ambient water quality during construction	No pollution of waters. In-situ turbidity measurements outside of silt curtain <25ntu, (or as described in the EIS for various weather conditions), pH 6.5-8.5, no visible oil and grease.	In-situ measurement using site water quality meter Laboratory testing and assessment where required	Outside turbidity curtain as active drainage outlet construction and scour protection works progress.	Whole Project	Prior to any discharge from site. Weekly monitoring outside of the turbidity curtains during active drainage works, monthly during other works.	Environment Manager
Discharge water quality	No pollution of waters. Turbidity <25ntu, (or as described in the EIS for various weather conditions), pH 6.5-8.5, no visible oil and grease.	In-situ measurement using site water quality meter Laboratory testing and assessment where required	Sediment basins, Water treatment tanks, Excavations.	Whole Project	Prior to any discharge from site. Weekly monitoring of sediment basins to determine performance.	Environment Manager

Results using the water quality meter are to be used to provide real time data on water quality and to allow the efficient discharge of water collected in detention basins on site. An empirical correlation would be established during the initial works between the in-situ measured turbidity and laboratory TSS samples to confirm that an in-situ measurement of 25 ntu is appropriate to achieve 50mg/L. A set of 5 initial samples will be compared to establish the correlation. The correlation will be verified on a bimonthly basis. Further notes on Turbidity and TSS correlation will be utilised from http://el.erdc.usace.army.mil/elpubs/pdf/doere8.pdf.

Laboratory analysis is required to determine the concentrations of the nominated chemical parameters. Appropriate sample bottles and preservatives shall be used and guidance for sampling method obtained from applicable parts of AS 5667.1 and AS 5667.6. Analysis will be undertaken by a NATA registered laboratory that is certified to perform the applicable analysis. QA/QC samples shall also be taken in accordance with the nominated standards. These samples will be taken from the final stage of the sediment basin facility where the water will be discharged.

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Methods of sampling and analysis of water quality shall be in accordance with applicable method listed in the NSW EPA published Approved Methods for the Sampling and Analysis of Water Pollutants in New South Wales.

Where results indicate non-compliance with the specified water quality parameters, the water will be retreated and further testing undertaken. Retreated water will not be discharged from site until compliance with the requirements is achieved.

5.2 Monitoring of Controls

Items that require repair or action will be documented on the weekly checklist or on form F 1228 as seen in the CEMP. Items that require specific and detailed action will be recorded on the Project's Corrective Action Register.

The Environmental Manager will conduct a detailed documented inspection at least once per week and after any rainfall event greater than 20mm in 24hrs. An inspection of the site will also be undertaken prior to RDO weekends and other times where the site will be closed for an extended period. The inspections will focus on the integrity, capacity and performance of the site control measures.

A detailed inspection will also be conducted three to four days prior to long weekends, RDO weekends or other periods when the site will be shut down for a lengthy time period. This will enable items requiring attention to be identified, raised on an Environmental Improvement Request (EIR) (Form F 1228) and implemented. An example of an EIR is seen in the CEMP.

The Superintendent will be responsible for providing appropriate resources in terms of labour, plant and equipment to enable the items to be rectified in the nominated timeframes.

Inspections to be recorded on Form 1227 Weekly Environmental Inspection Checklist. If deemed necessary, additional sedimentation control measures will be implemented to ensure that water quality is maintained throughout the works.

Improvement requests received from the Client's Environmental Representative or other appropriate agencies shall be assessed and responded to within 24 hours if the issue is not environmentally threatening.

The following forms and check sheets shall be utilised to inspect, monitor and record erosion and sediment controls and water quality on this project and filed in accordance with the project filing system.

- Form F 1227 Weekly Environmental Checklist
- Form F 1228 Environmental Improvement Request
- F 1298 Water Sampling Record
- Checklist Rainfall Erosion and Sediment Control Inspection Checklist.

5.3 Emergency Response

For emergency response to oil or chemical spills adjacent waterways suitably trained personnel will deploy an emergency response craft that will contain an oil boom and marine specific absorbent materials. If any spill is able to make its way beyond the permanent silt curtain/floating boom, then the emergency response crew will be present to contain and clean up the affected area. All used materials will be collected, stored on site and disposed at an appropriately licensed waste facility.

All incidents will be recorded on the Laing O'Rourke F 1222 Environmental Incident Complaint Report form. An investigation will be undertaken into the causes of the incident, potential environmental and safety impacts, improvements that can be made to the construction

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methodology and actions given to personnel. The incident investigation is outlined further in the CEMP.

Training will be given to site personnel in spill response and reporting. The training will focus on safety of all personnel, which spill materials are to be used for land and marine spills, the most effective way of stopping further contamination and who to report the incident too.

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Appendix 1 Standard Drawings

- NSW Landcom Standard Drawing SD 4-1 Stockpiles
- NSW Landcom Standard Drawing SD 5-4 Rock Check Dam
- NSW Landcom Standard Drawing SD 5-5 Earth Bank (Low Flow)
- NSW Landcom Standard Drawing SD 6-9 Alternative Sediment Fence
- NSW Landcom Standard Drawing SD 6-11 Mesh and Gravel Inlet Filter
- NSW Landcom Standard Drawing SD 6-12 Geotextile Inlet Filter

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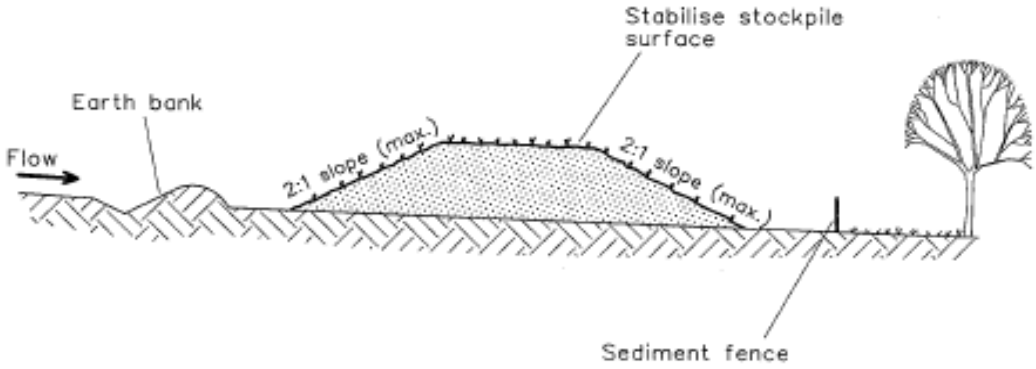

Construction Notes

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 they are 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 6-8) 1 to 2 metres downslope.

STOCKPILES **SD 4-1**

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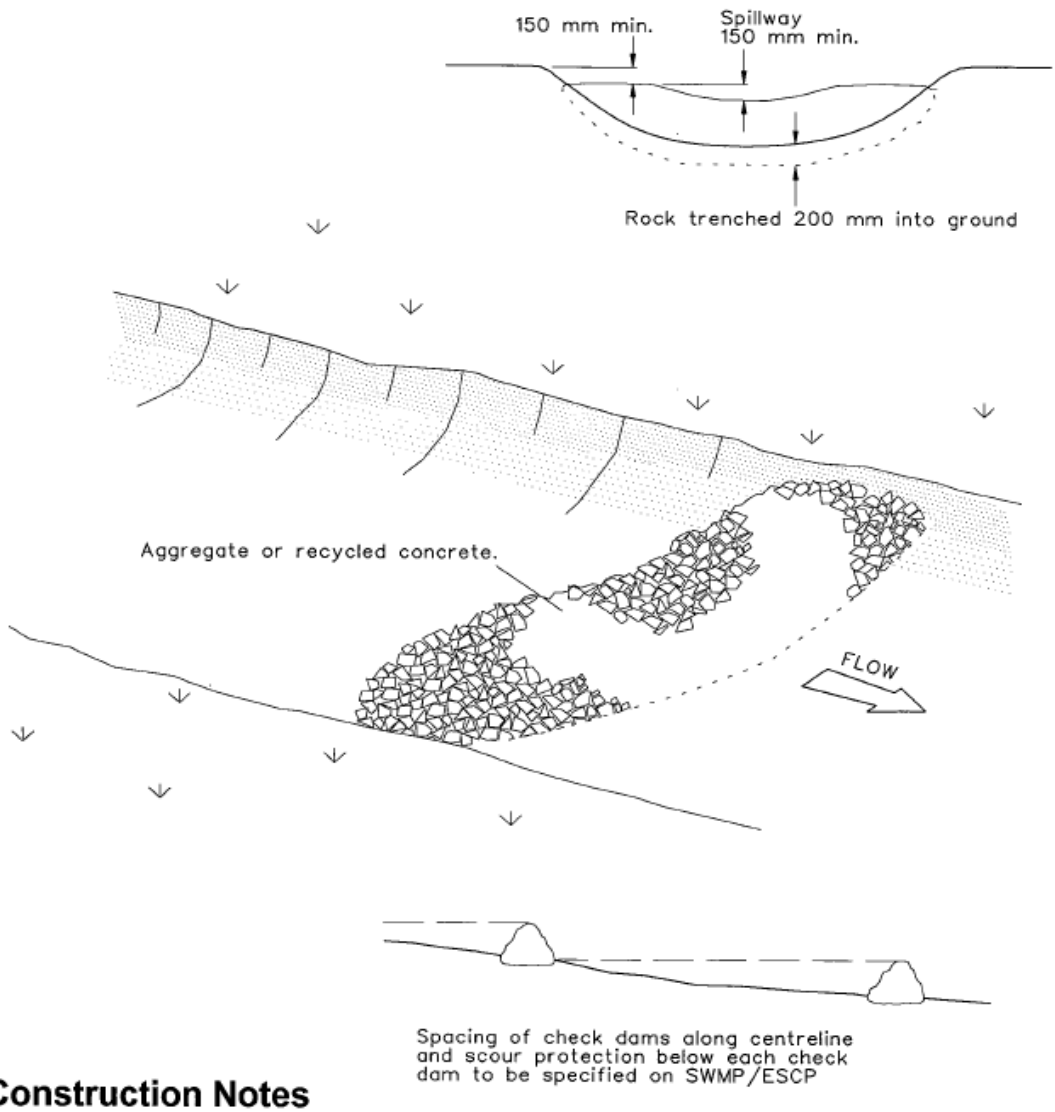

Construction Notes

1. Check dams can 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 each 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

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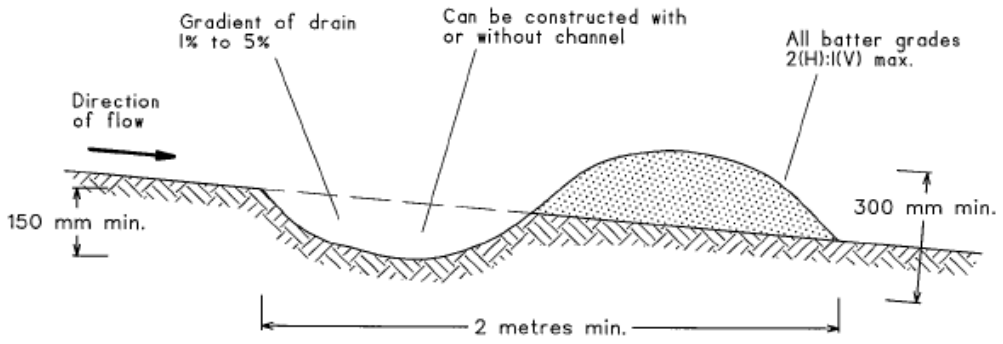

NOTE: Only to be used as temporary bank where maximum upslope length is 80 metres.

Construction Notes

1. Build with gradients between 1 percent and 5 percent.
2. Avoid removing trees and shrubs if possible - work around them.
3. Ensure the structures are free of projections or other irregularities that could impede water flow.
4. Build the drains with circular, parabolic or trapezoidal cross sections, not V shaped.
5. Ensure the banks are properly compacted to prevent failure.
6. Complete permanent or temporary stabilisation within 10 days of construction.

EARTH BANK (LOW FLOW) SD 5-5

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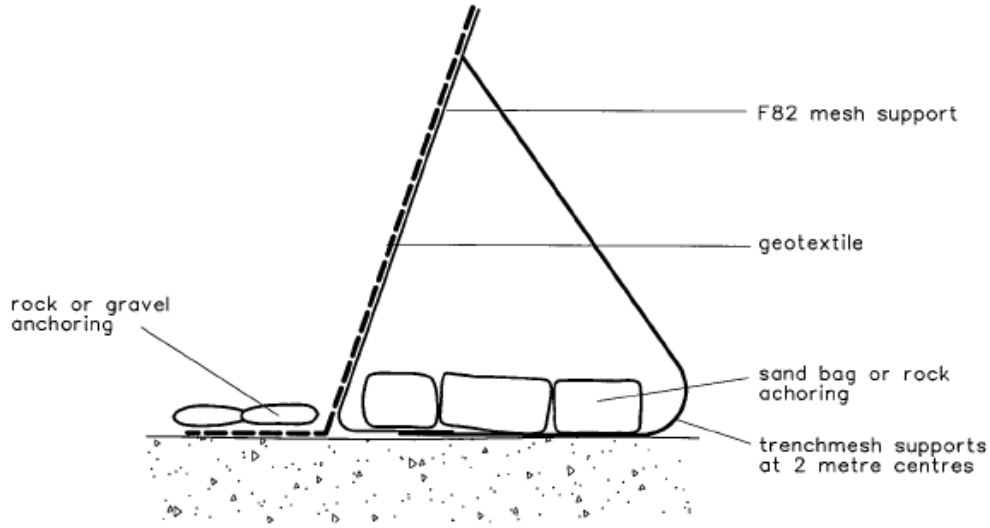

Construction Notes

1. Install this type of sediment fence when use of support posts is not desirable or not possible. Such conditions might apply, for example, where approval is granted from the appropriate authorities to place these fences in highly sensitive estuarine areas.
2. Use bent trench mesh to support the F82 welded mesh facing as shown on the drawing above. Attach the geotextile to the welded mesh facing using UV resistant cable ties.
3. Stabilise the whole structure with sandbag or rock anchoring over the trench mesh and the leading edge of the geotextile. The anchoring should be sufficiently large to ensure stability of the structure in the design storm event, usually the 10 year event.

ALTERNATIVE SEDIMENT FENCE **SD 6-9**

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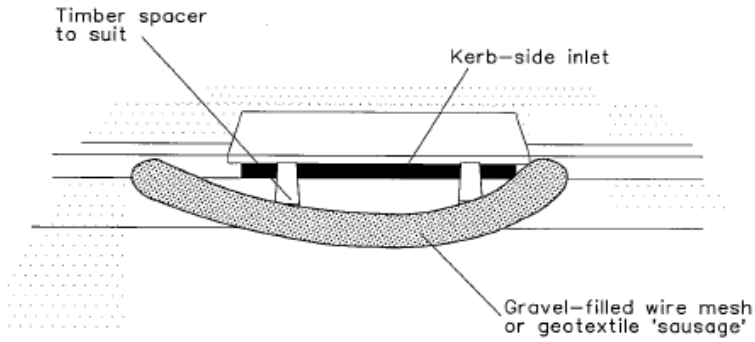

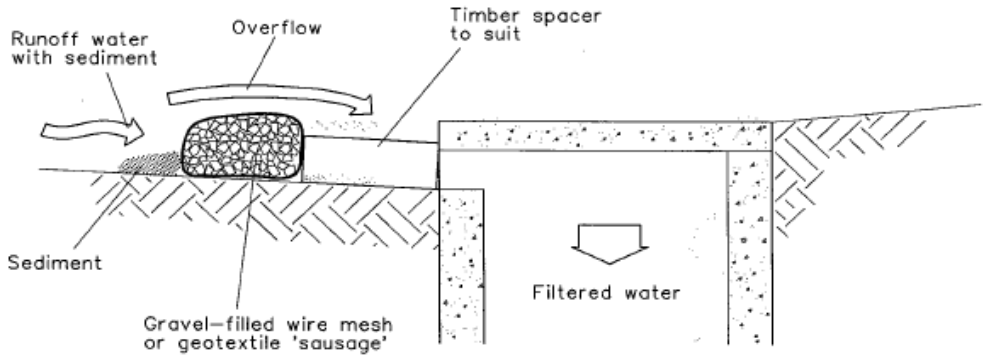

NOTE: This practice only to be used where specified in an approved SWMP/ESCP.

Construction Notes

1. Install filters to kerb inlets only at sag points.
2. Fabricate a sleeve made from geotextile or wire mesh longer than the length of the inlet pit and fill it with 25 mm to 50 mm gravel.
3. Form an elliptical cross-section about 150 mm high x 400 mm wide.
4. Place the filter at the opening leaving at least a 100-mm space between it and the kerb inlet. Maintain the opening with spacer blocks.
5. Form a seal with the kerb to prevent sediment bypassing the filter.
6. Sandbags filled with gravel can substitute for the mesh or geotextile providing they are placed so that they firmly abut each other and sediment-laden waters cannot pass between.

MESH AND GRAVEL INLET FILTER SD 6-11

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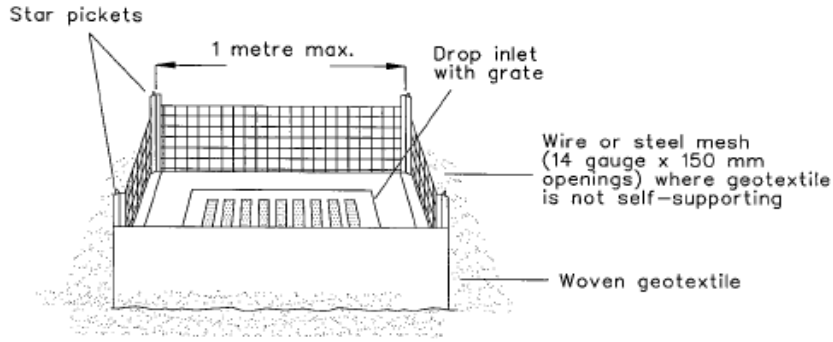

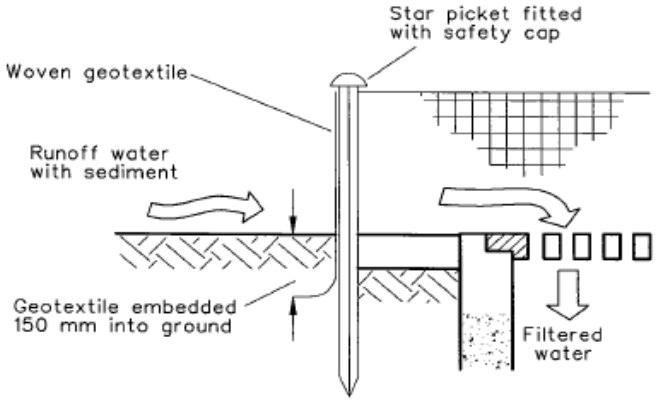

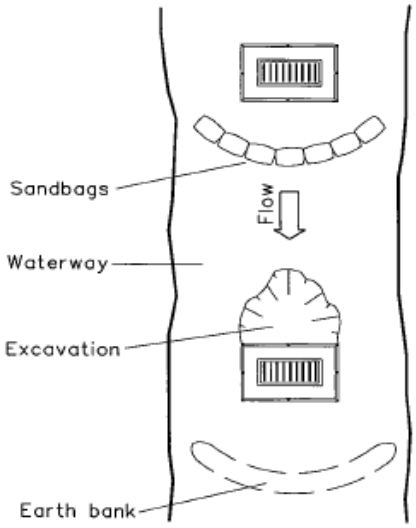

For drop inlets at non-sag points, sandbags, earth bank or excavation used to create artificial sag point

Construction Notes

1. Fabricate a sediment barrier made from geotextile or straw bales.
2. Follow Standard Drawing 6-7 and Standard Drawing 6-8 for installation procedures for the straw bales or geofabric. Reduce the picket spacing to 1 metre centres.
3. In waterways, artificial sag points can be created with sandbags or earth banks as shown in the drawing.
4. Do not cover the inlet with geotextile unless the design is adequate to allow for all waters to bypass it.

GEOTEXTILE INLET FILTER — SD 6-12

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Appendix 2 Forms

CL SA40- 900-2 Rainfall Erosion and Sediment Control Inspection Checklist

A. LAING O'ROURKE	RAINFALL EROSION AND SEDIMENT CONTROL INSPECTION CHECKLIST

PROJECT:	**Contract No.**
Inspected by: Date:	Time:

ITEM	DESCRIPTION	NO	YES	REMARKS
1	Have weather conditions changed since last inspection?			
2	Has rainfall occurred?			How much? mm
3	Are there any areas where runoff discharges from the site without control measures?			
4	If yes, what additional control measures have been implemented? (sediment fences, straw bales, sand bags) List locations and additional control measures:			
5	Are sediment tanks, erosion devices and catch drains damaged and/or in need of maintenance or desilting?			
6	Are all pumps and temporary drainage structures fully operational?			
7	If yes, list locations and maintenance measures undertaken:			
8	Do the sediment tanks need emptying?			
9	Is visible oil present in sediment tanks?			
10	Does the site Erosion and Sediment Control Plan require updating?			

If a 'Tick' is given in the right hand column for any of the above inspections, details must be provided or referenced in the remarks column.

Environmental Manager (or Delegate): ..... Date: .....

GENERAL COMMENTS:

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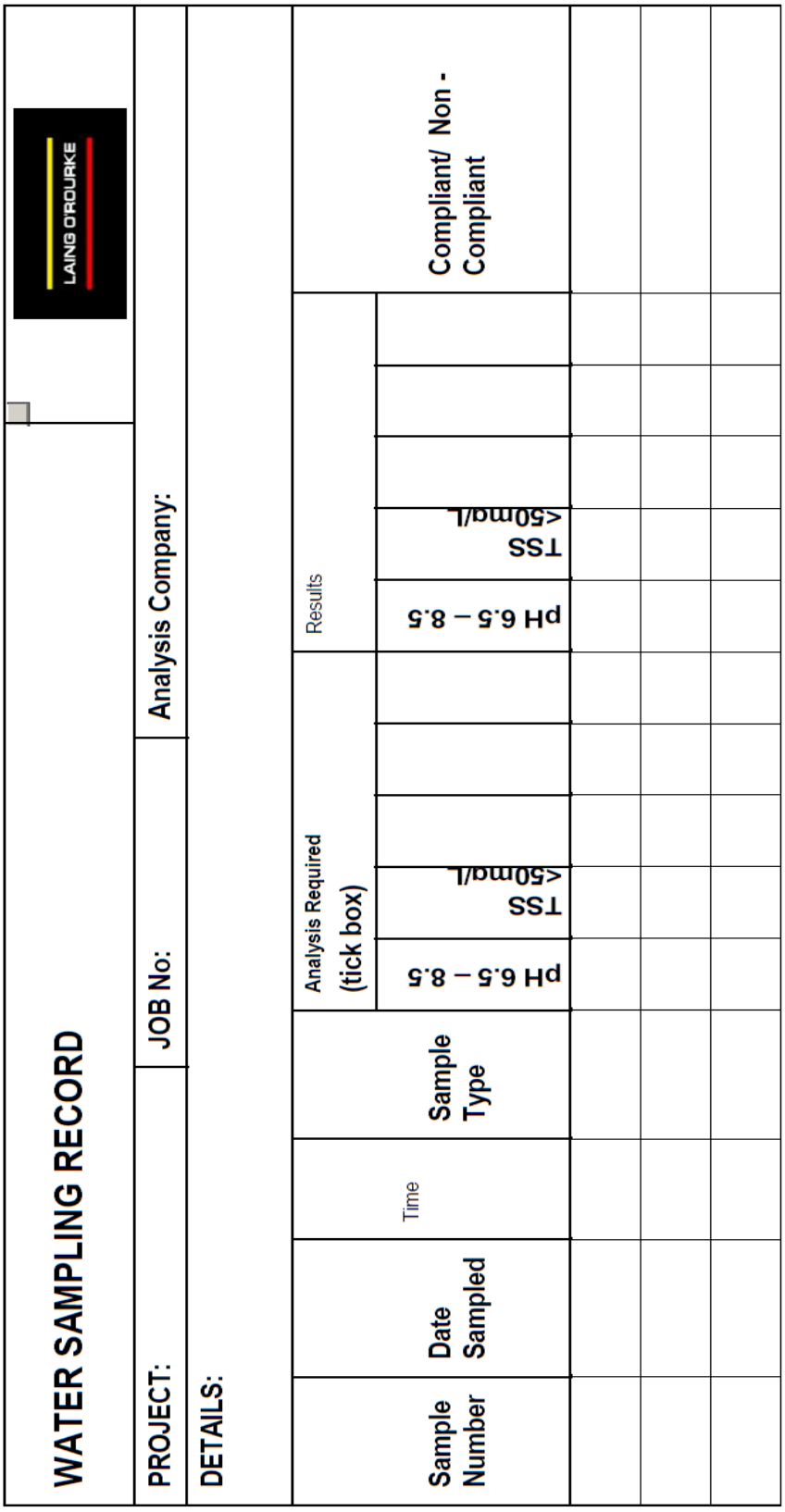
F 1298 Water Sampling Record



WATER SAMPLING RECORD

PROJECT: | JOB No: | Analysis Company:

DETAILS:

Sample Number	Date Sampled	Time	Sample Type	Analysis Required (tick box)							Results					Compliant/ Non - Compliant
				pH 6.5 – 8.5	TSS <50mg/L						pH 6.5 – 8.5	TSS <50mg/L				

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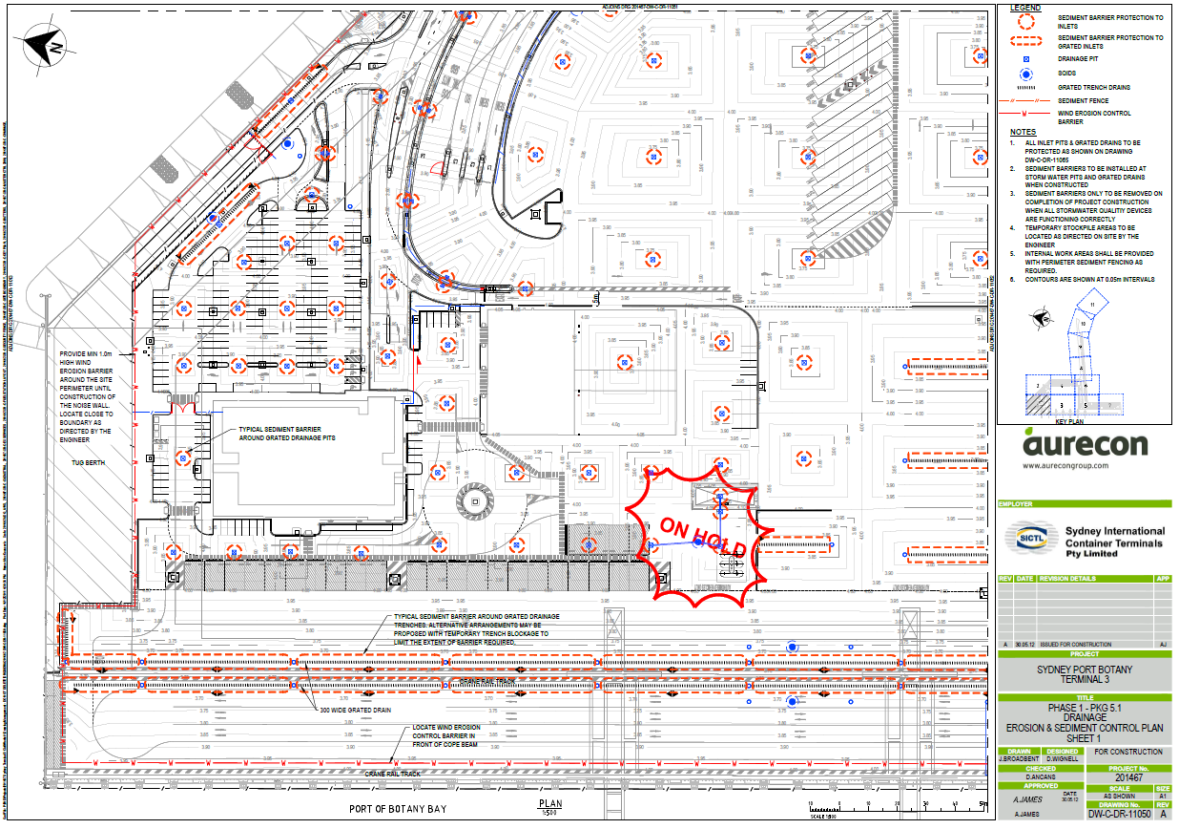
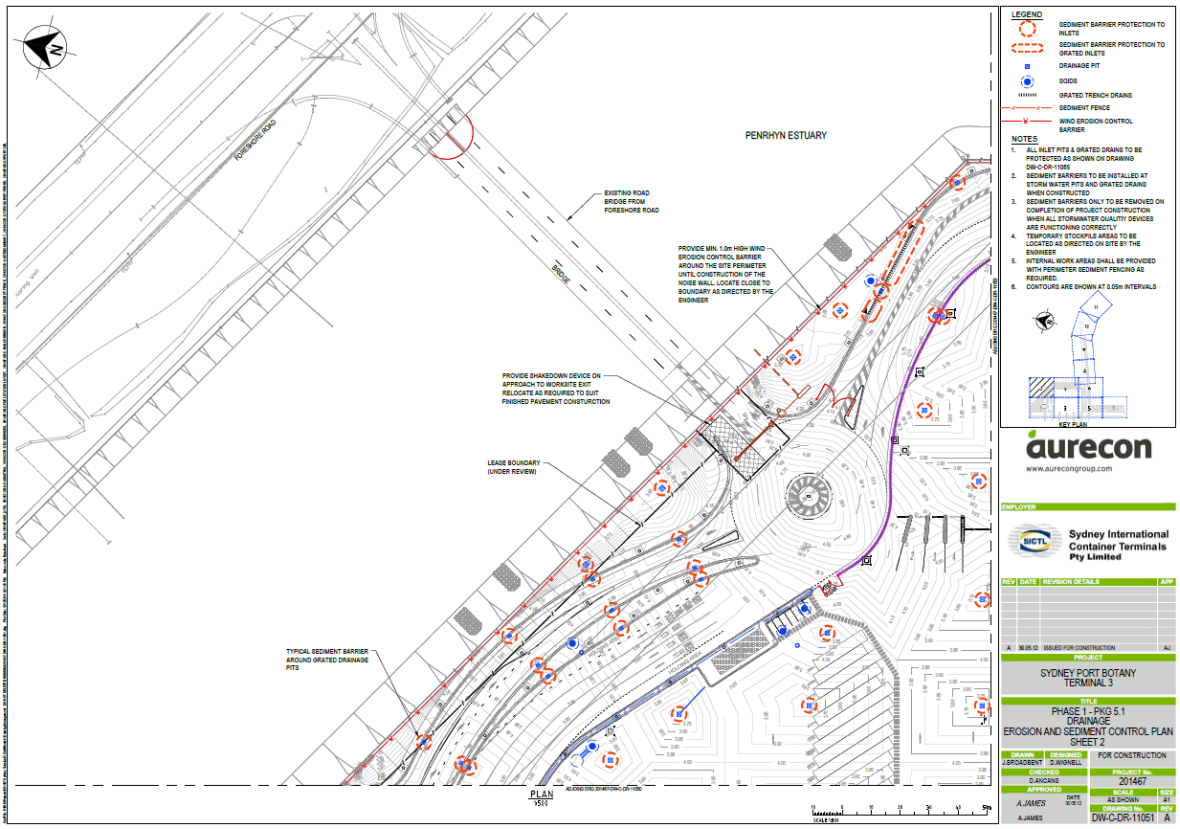
Appendix 3 Concept Erosion and Sediment Control Plans

Note; Each work activity will have a specific Erosion and Sediment Control Plan.





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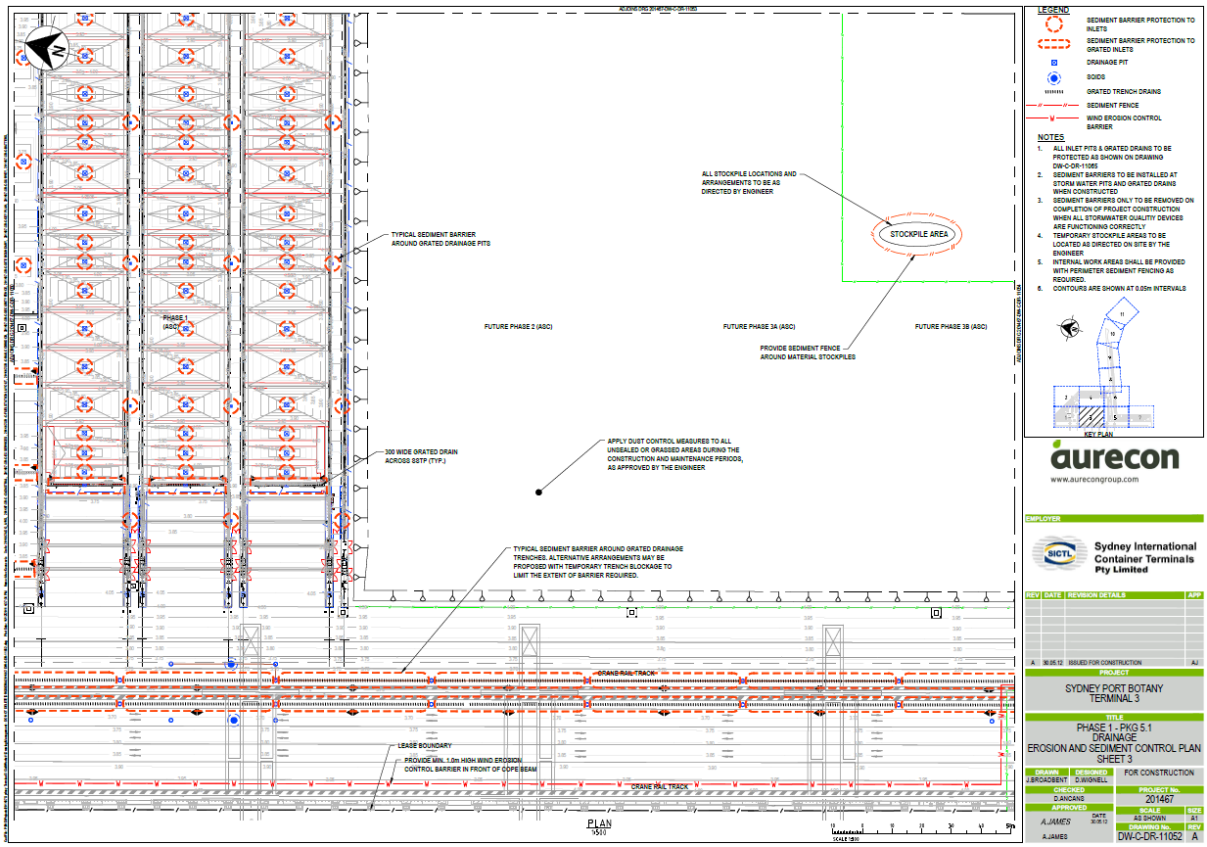

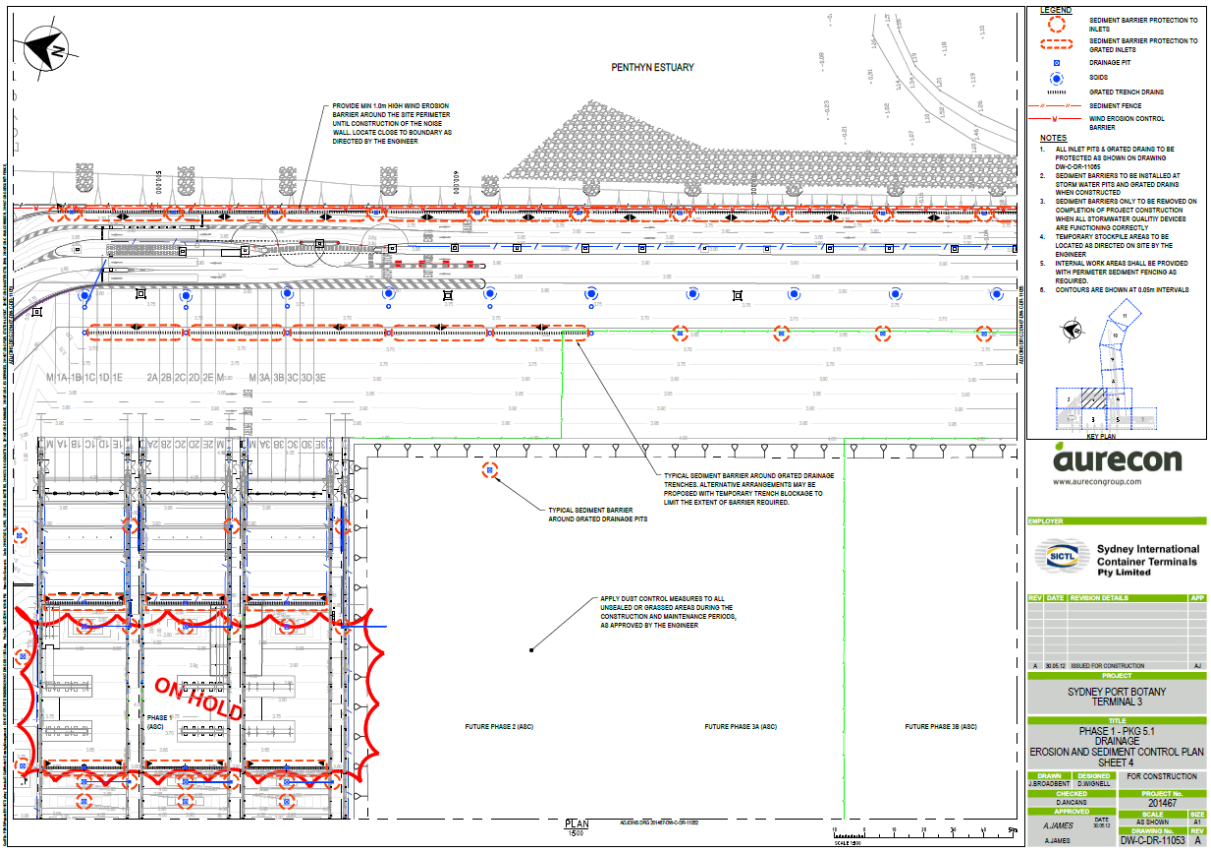

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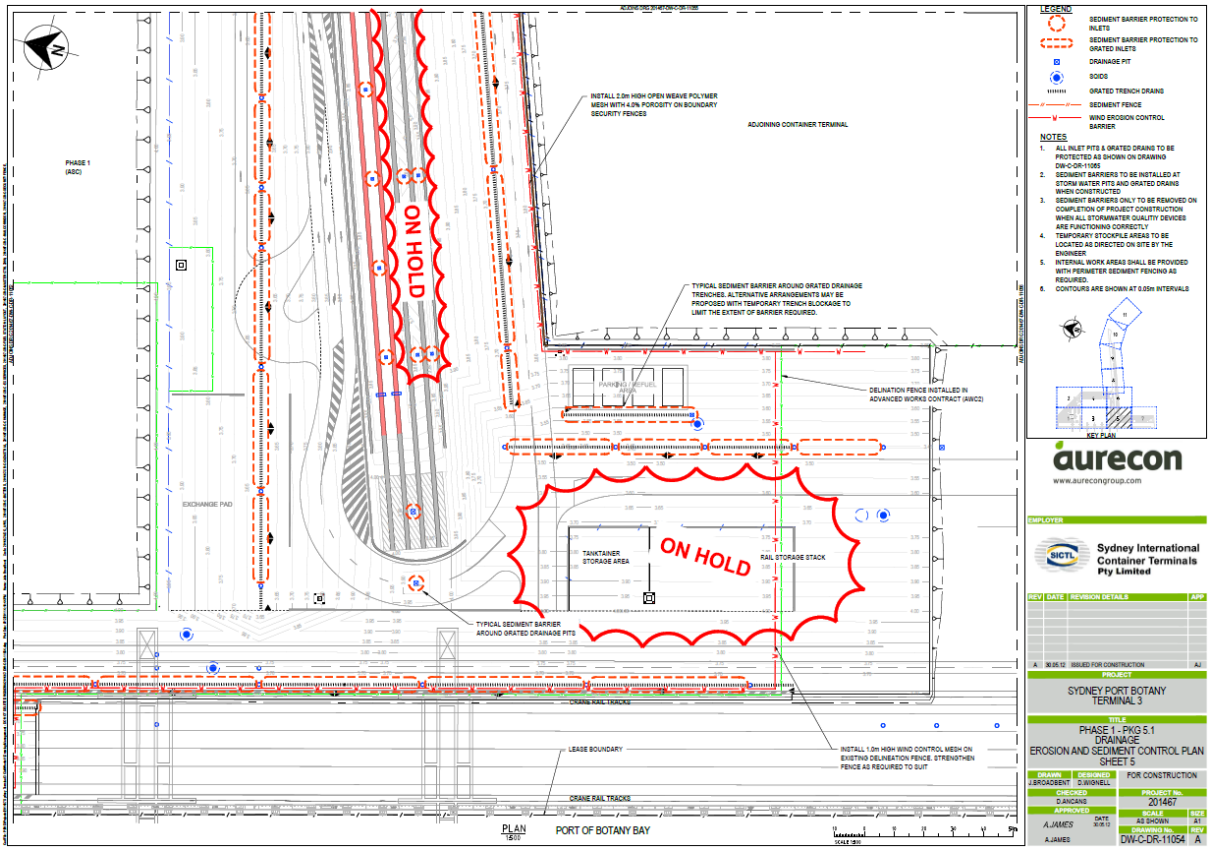

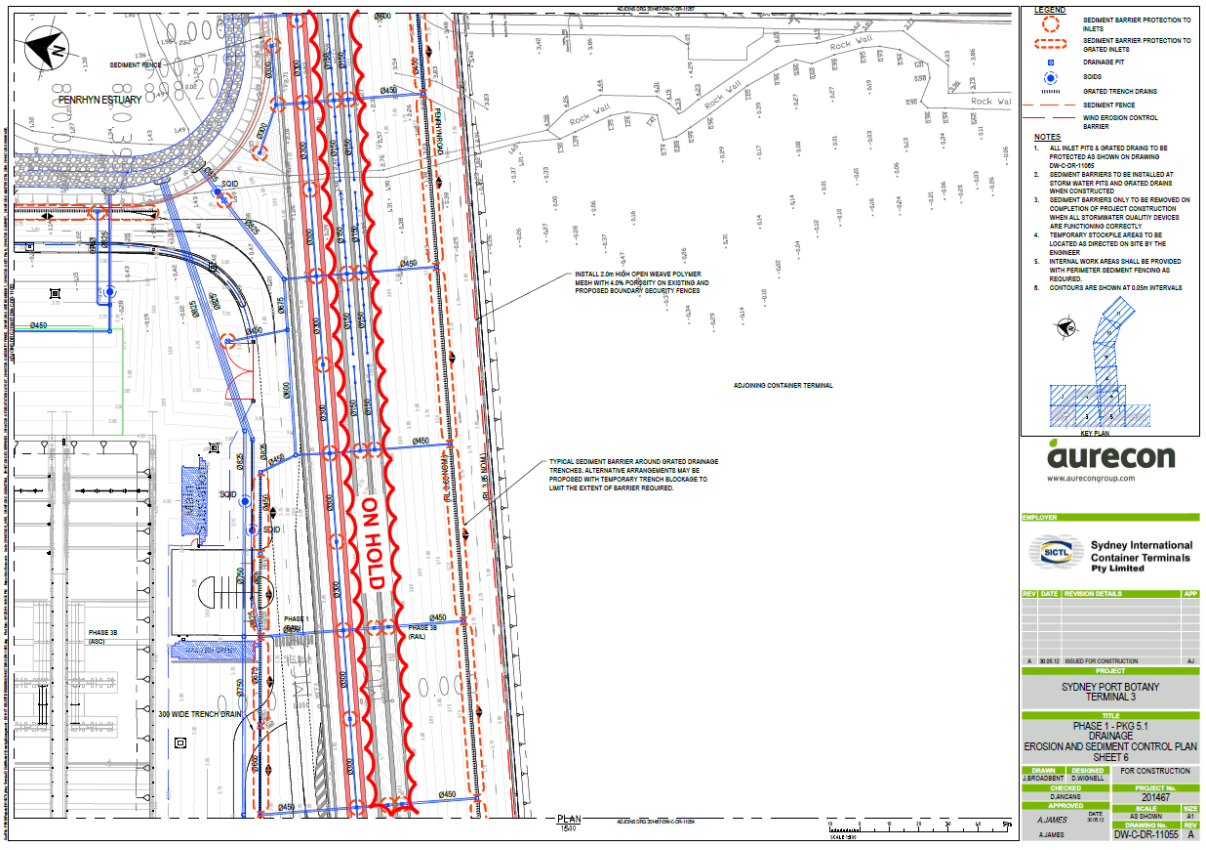

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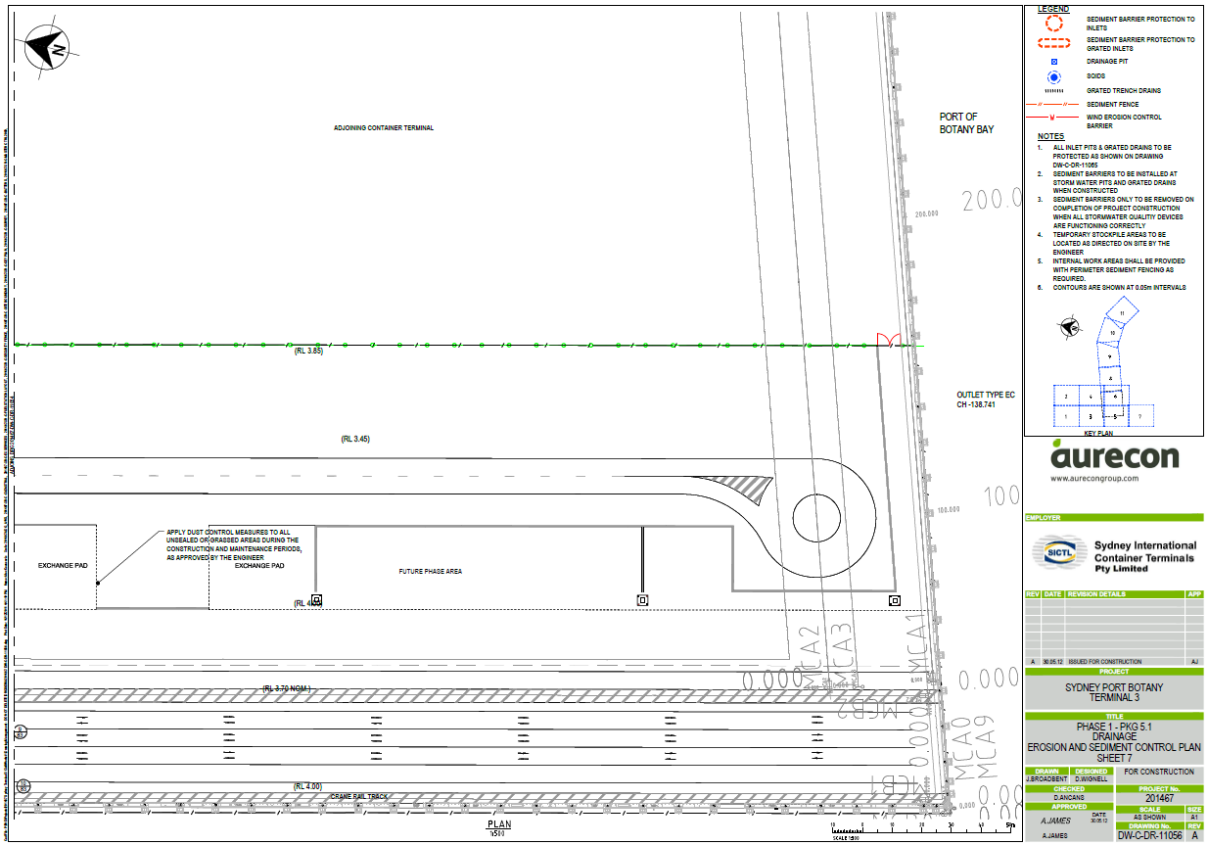

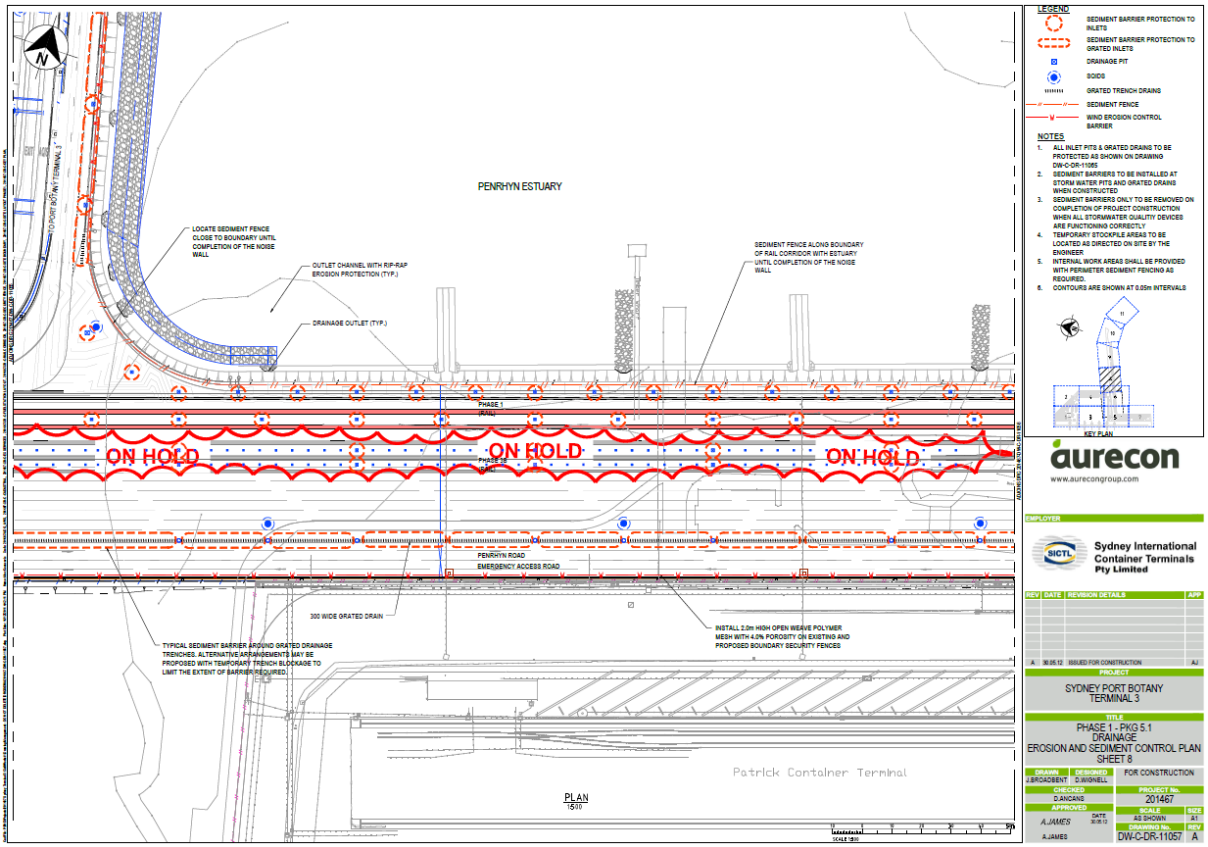

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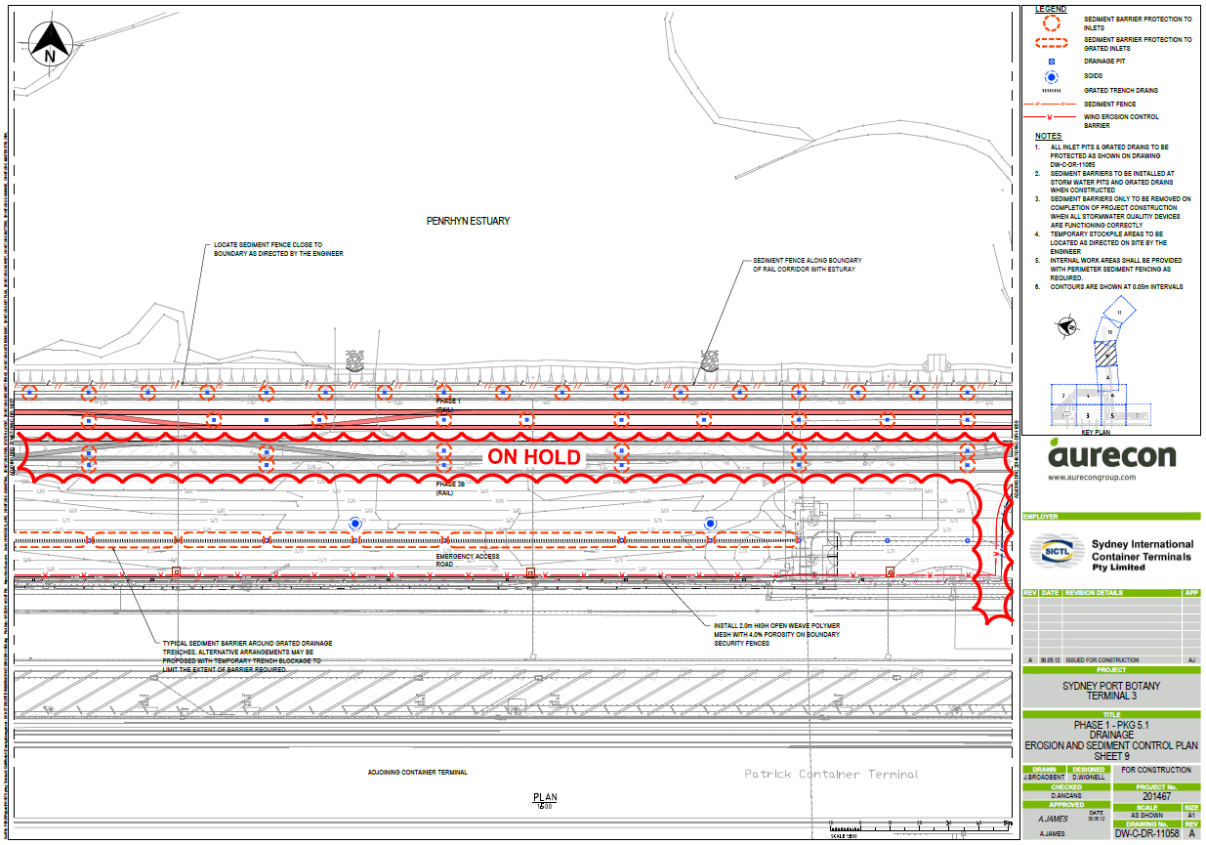

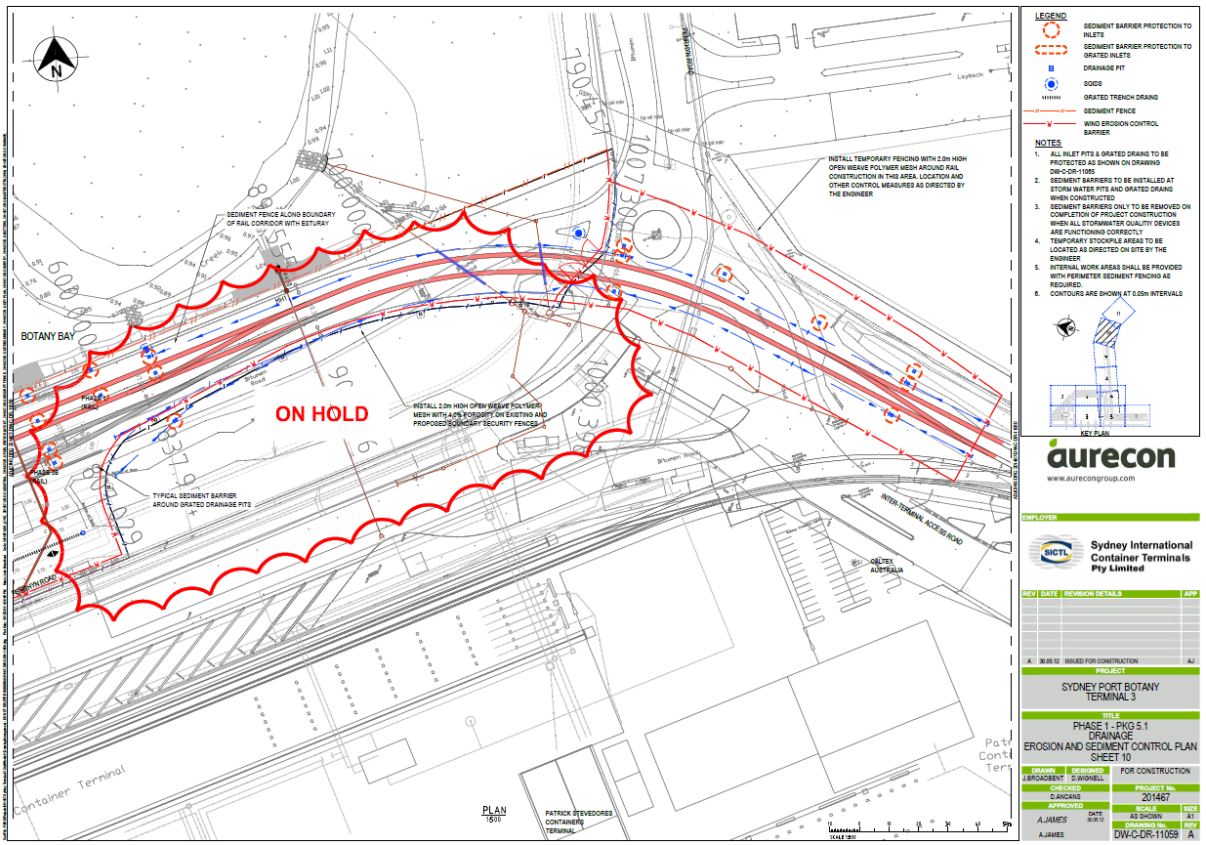

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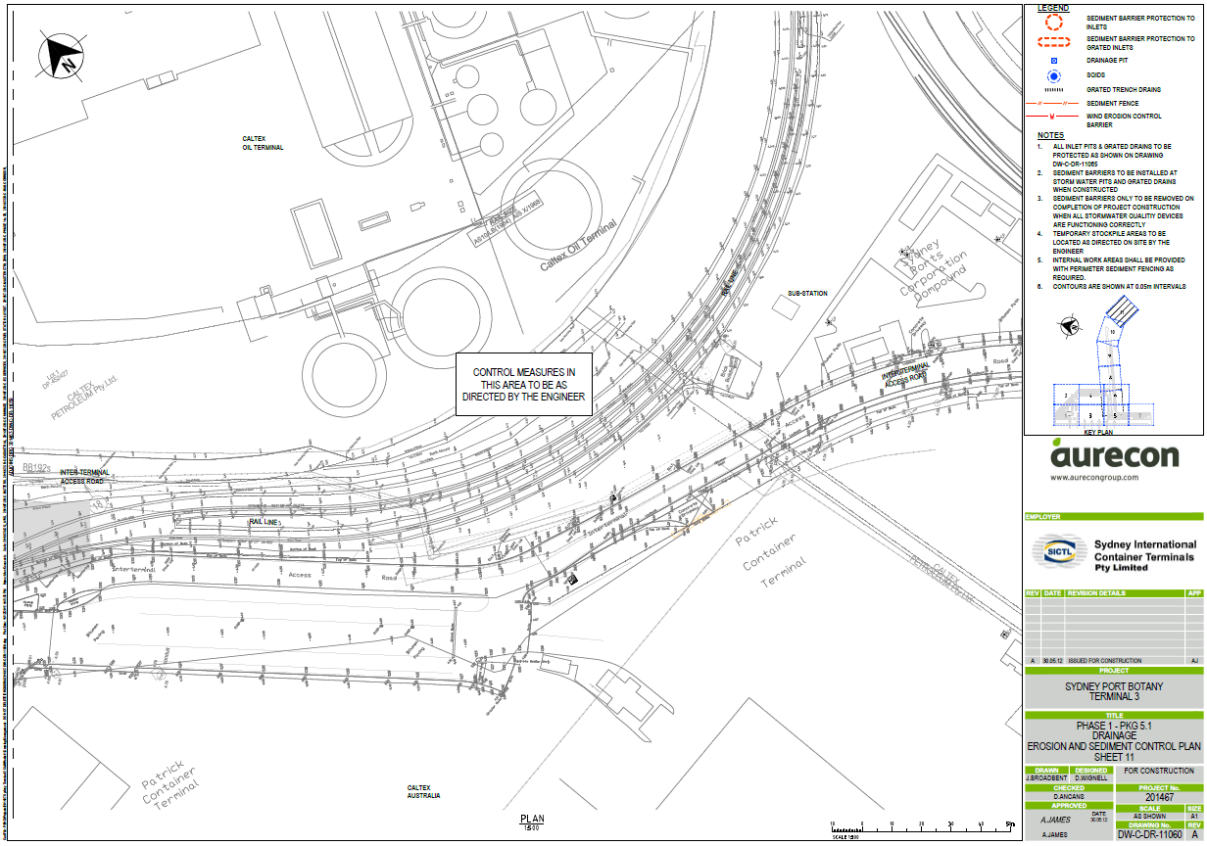

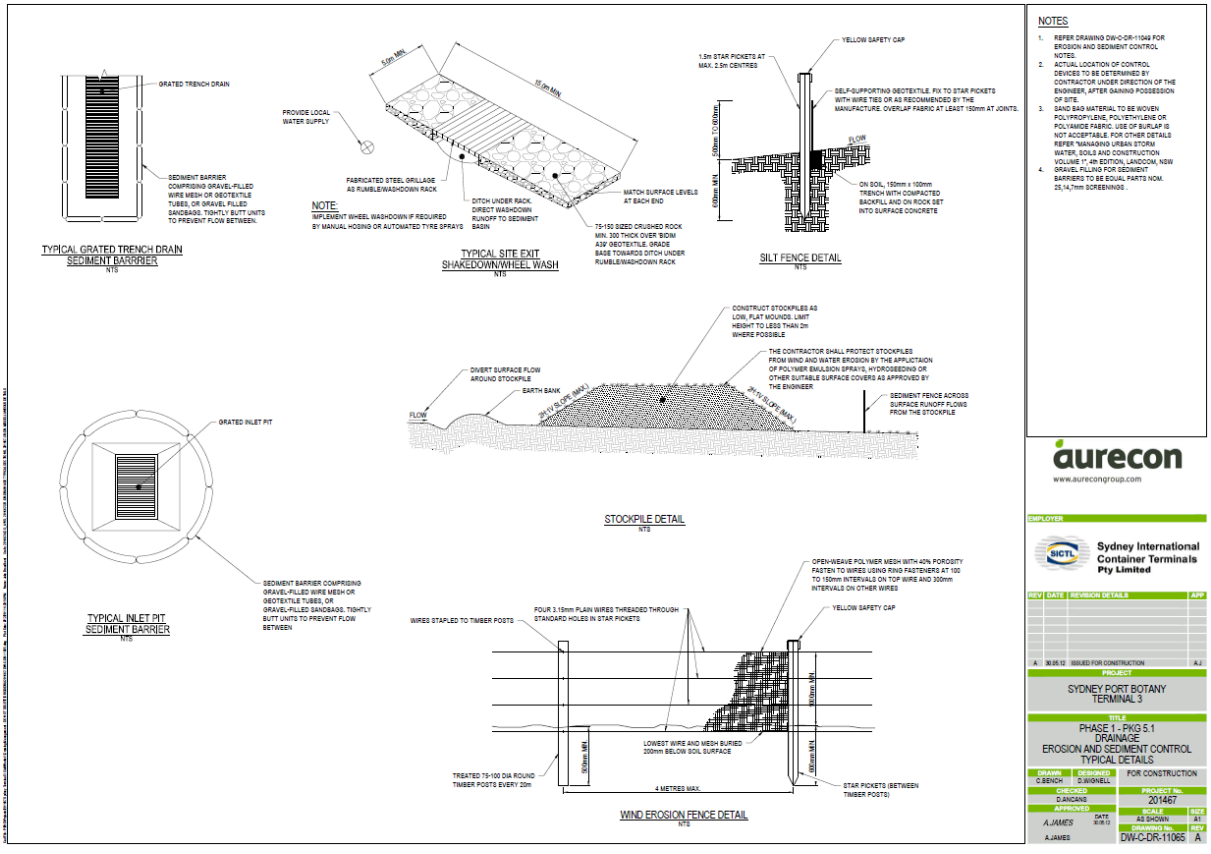

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