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Value in Engineering and Management

CIVIL ENGINEERING REPORT
LOTS 5 &6, MARTIN BROWER FACILITY
HORSLEY DRIVE BUSINESS PARK
DEVELOPMENT APPLICATION

PROPOSED DEVELOPMENT AT
LOT 5 & 6, COWPASTURE ROAD
WETHERILL PARK NSW

Prepared For:
Australand Commercial & Industrial Division
Level 3, 1c Homebush Bay Drive
RHODES NSW 1670

Prepared by:
Costin Roe Consulting
Level 1, 8 Windmill Street
WALSH BAY NSW 2000

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	Name	**Signature**
Prepared by	Mark Wilson	
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1 INTRODUCTION

1.1 Introduction

Australand intend to develop proposed Lots 5 & 6 of the Horsley Drive Business Park, Cowpasture Road for Martin Brower. The property is located within the Horsley Drive Business Park which was approved by the NSW Department of Infrastructure and Environment under State Significant Development Approval SSD-5169 (dated 8 January 2013) and is now subject to an amended Masterplan Layout which is currently being assessed by The Department.

The proposed Development comprises an area of 5.73 Ha and comprises a 15,000m^2 single level warehouse building, truck circulation and loading areas, ancillary office space, car parking areas and landscaping.

The Horsley Drive Business Park is located on the corner of The Horsley Drive and Cowpasture Road, comprises an area of 21.38Ha and is located within the Western Sydney Parkland corridor in the South Western Sydney region.

1.2 Scope

Costin Roe Consulting Pty Ltd has been commissioned by Australand to prepare this Engineering Report in support of the proposed Development Application for the site.

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

- Earthworks;
- Stormwater Management; and
- Erosion Control.

The engineering objectives for the development are to create a site which, based on the proposed architectural layout, responds to the topography and site constraints and to provide an appropriate and economical stormwater management system which incorporates best practice in water sensitive urban design and is consistent with the requirements of council's water quality objectives.

A concept set of drawings have been prepared to show the proposed, erosion and sediment control, stormwater drainage and finished level profiles. The information provided is conceptual only, providing sufficient detail to show that the development can be performed within the policy requirements and the objectives of Fairfield City Council.

1.3 Authority Jurisdiction

The subject site is located within Fairfield City Council area, hence engineering design will need to be completed in accordance with council requirements. The engineering requirements for the development, in particular Stormwater Management, however also need to be completed within the approved strategy defined for the Horsley Drive Business Park estate defined in the documentation submitted for the State Significant Development SSD_5169.

2 DEVELOPMENT SITE

2.1 Existing Site

The property is located within the north-east portion of the proposed Horsley Drive Business Park. It is expected that the proposed Lots 5 & 6 Development will constructed concurrently with the estate infrastructure works or shortly after these works begin. Currently however the proposed site is undeveloped farming/ rural land. Lots 5 & 6 comprise an area of 2.58 Ha of the overall of 21.84 Ha estate. Lots 5 & 6 are bounded by undeveloped Parkland Trust land to the north, Cowpasture Road to the East, future Business Park development to the south and west.

The property currently comprises undeveloped rural land and some residential dwellings. The topography consists of undulating land of grades generally between 2% to 10%. The highest elevation is approximately RL 85m (AHD) and the lowest is at RL 63m.

The existing site is shown in **Figure 2.1** below.

Figure 2.1. Site Location

2.2 Proposed Lot 1 Development

The Lots 5 & 6 development comprises the following elements:

- 15,427m2, single level warehouse building;
- Ancillary office space on the north-east and south-east corner of the warehouse;
- Car parking on the northern, Estate Access Road, property frontage. Access to the carpark is made via the Estate Access Road;
- Truck circulation and loading areas on the eastern property facade;
- Fire brigade access around the full perimeter of the building; and
- Stormwater drainage completed in accordance with the Business Park Stormwater Management Strategy.

The proposed development layout is shown in **Figure 2.2** below.

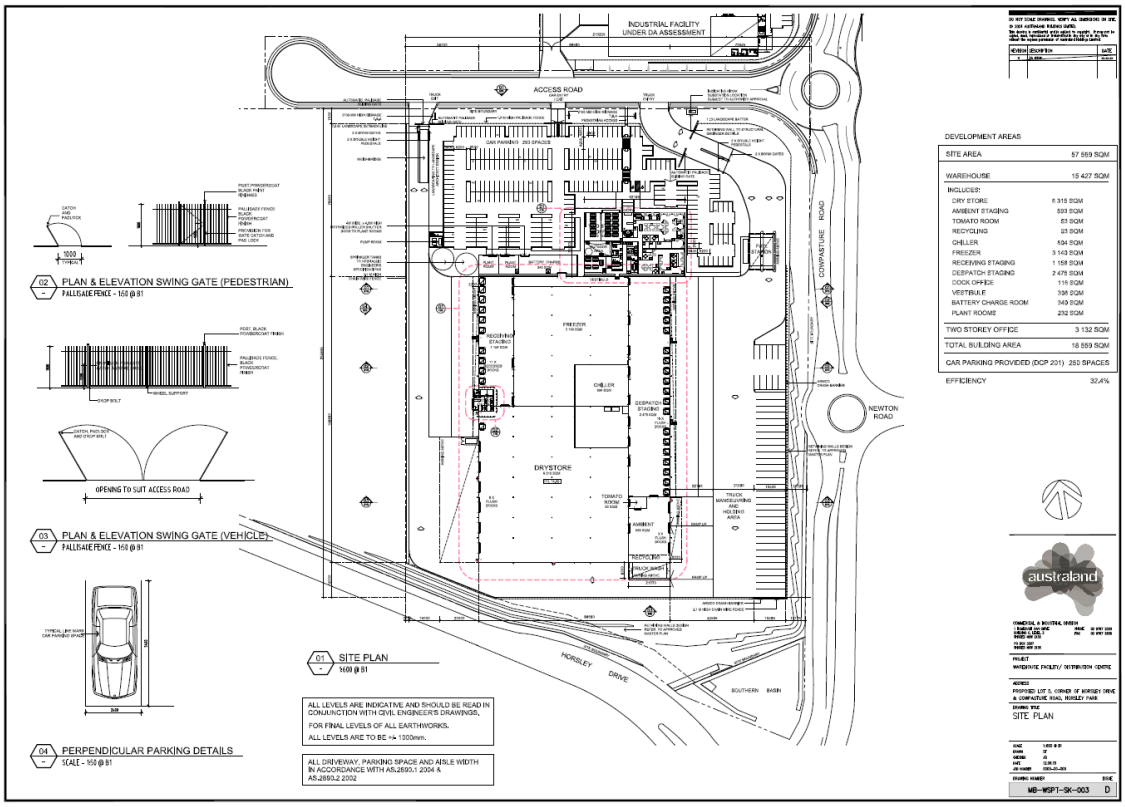

Figure 2.2. Proposed Lot 1 Development Layout

2.3 Proposed Business Park/ Estate Development

As noted above, Lot 5/6 forms part of the proposed Horsley Drive Business Park. The Business Park development is for a 6 lot industrial lease-hold estate and incorporates the following civil engineering elements:

- Earthworks walls to facilitate a local roads and development blocks;

- Local subdivision access road;
- Infrastructure works including stormwater, energy, telecommunications and sewer; and potable water supply;
- Realignment of an overland flow path from an upstream catchment to facilitate the development earthworks; and
- The construction of two stormwater detention/ stormwater quality basins.

The proposed development is shown in **Figure 2.3** below.

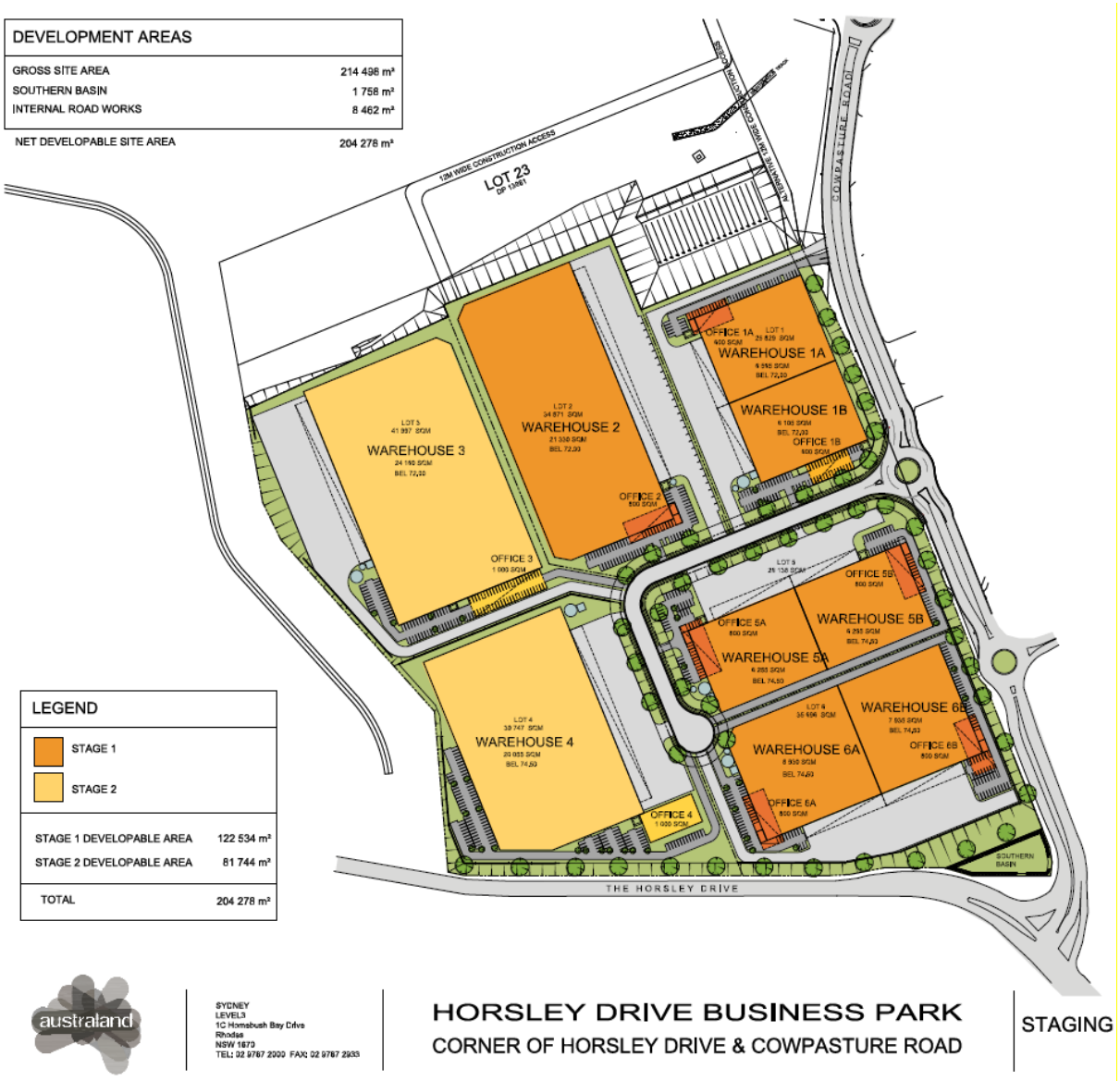

Figure 2.3 Proposed Business Park Development Layout

3 SITE WORKS

3.1 Bulk Earthworks

Extensive earthworks will be completed as part of the Business Park development construction works under SSD_5169. Minor earthworks will be required to be completed over Lots 5 & 6 following this work to finalise the building pad and to trim to the final subgrade levels and architectural layout. This will include allowances for falls to drainage structures, ramps, and finished level profiles.

Details of earthworks would be provided during detail design/ construction certificate stage of the project.

Soil Erosion and Sediment Control measures including sedimentation basins are to be placed in accordance with submitted drawings and the Soil and Water Management Plan in Section 6 of this report.

3.2 Embankment Stability

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

Permanent batters in rock may be formed no steeper than 1 horizontal to 1 vertical while temporary batters will be no steeper than 0.75 horizontal to 1 vertical.

Permanent batters will also be adequately vegetated or turfed which will assist in maintaining embankment stability. Stability of batters and reinstatement of vegetation shall be in accordance with the submitted drawings and the Soil and Water Management Plan in Section 7.

3.3 Supervision of Earthworks

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

3.4 Retaining Walls

Retaining will be required on the south-east frontage of the site adjacent to Cowpasture Road and the The Horsley Drive. This retaining wall forms part of the infrastructure works completed for the Business Park. The detailed design associated with this proposed development will reduce the heights and overall extent of infrastructure retaining walls. This change will be addressed in the infrastructure drawing set.

Retaining walls will be designed and constructed by suitably qualified engineers as per the requirements of Australian Standard AS4678.

3.5 SEARS Items

Water supply to the proposed site is to be provided from the existing water main along Cowpasture Road. Waste water is to discharge to the existing sewer site connection point provided along Cowpasture Road.

Infrastructure upgrades are proposed along the proposed estate access road for electricity and telecommunications which connect into the existing infrastructure on Cowpasture Road. The proposed infrastructure upgrades are to serve to Lot5/6 site. For cooling and heating requirements refer to the BCA report.

Refer to section 4 of this report for stormwater management and section 6 for erosion control

4 STORMWATER MANAGEMENT

4.1 Hydrologic Modelling and Analysis

4.1.1 General Design Principles

The design of the stormwater system for this site will be based on relevant national design guidelines, Australian Standard Codes of Practice, Fairfield City Council (FCC), the Stormwater Management Strategy defined in the SSD_5169 Development Application and accepted engineering practice.

Runoff from buildings will generally be designed in accordance with AS 3500.3 National Plumbing and Drainage Code Part 3 – Stormwater Drainage.

Overall site runoff and stormwater management will generally be designed in accordance with the Institution of Engineers, Australia publication "Australian Rainfall and Runoff" (1987 Edition), Volumes 1 and 2 (AR&R).

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

4.1.2 Minor/ Major System Design

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

4.1.3 Rainfall Data

Rainfall intensity Frequency Duration (IFD) data used as a basis for ILSAX modelling for the 2 to 100 Year ARI events, was taken from FCC's drainage policy

4.1.4 Runoff Models

In accordance with the recommendations and standards of FCC, the calculation of the runoff from storms of the design ARI will be calculated with the catchment modelling software DRAINS during detail design stage.

The design parameters for the DRAINS/ ILSAX model are to be based on typically accepted parameters for the area and are as follows:

Model	Model for Design and analysis run	Rational method	
	Rational Method Procedure	ARR87	
	Soil Type-Normal	3.0	
	Paved (Impervious) Area Depression Storage	1	mm
	Supplementary Area Depression Storage	1	mm
	Grassed (Pervious) Area Depression Storage	5	mm
AMC	Antecedent Moisture Condition (ARI=1-5 years)	2.5	
AMC	Antecedent Moisture Condition (ARI=10-20 years)	3.0	
AMC	Antecedent Moisture Condition (ARI=50-100 years)	3.5	
	Sag Pit Blocking Factor	0.5	
	On Grade Pit Blocking Factor	0.2	

Table 5.1: DRAINS ILSAX Parameters

4.2 Hydraulics

4.2.1 General Requirements

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

4.2.2 Freeboard

The calculated water surface level in open junctions of the piped stormwater system will not exceed a freeboard level of 150mm below the finished ground level, for the peak runoff from the Minor System runoff. Where the pipes and junctions are sealed, this freeboard would not be required.

Freeboard to buildings during the Major System storm will be 300mm as per council standards and normally accepted freeboard limits.

4.2.3 Public Safety

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

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

4.2.4 Inlet Pit Spacing

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

4.2.5 Overland Flow

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

4.3 Site Drainage

4.3.1 Existing/ Business Park Drainage

The property is currently undeveloped with little to no formal drainage located on site. However extensive infrastructure will be provided as part of the Business Park development. The Lots 5 & 6 drainage has been based on the premise that the infrastructure drainage will be in place at completion of construction of the Lots 5 & 6 Development.

On-site detention will be provided at an estate level as discussed in Section 5.5. Provision for water quality will also be provided as discussed in Section 6.

4.3.2 Proposed Site Drainage

The proposed stormwater drainage layout is shown on drawings **Co11492.09-DA40** and details are on **DA45**. The drainage layout has been designed with the following elements:

- Major (Q100 ARI) overland and Minor (Q20 ARI) in-ground drainage system.
- Discharge from the site is via the infrastructure drainage system on the western property boundary; and
- Rainwater reuse tank shown nominally as a 20kL tank. The exact size will be subject to detail design by Hydraulic Consultant during Construction Certificate stage.

4.4 External Catchments

The site is not affected by overland flows and no provision for external catchment is required in the design.

4.5 On-site Detention

Fairfield City Council limits the runoff discharged from private property into the underground piped drainage system. As part of the Business Park development submitted under SSD1569 and subsequent S96 application (currently being reviewed), detention is proposed with two estate levels basins.

Stormwater flows from part of the proposed development Lot 5 will be conveyed to Basin 2, to the north of the development site, and the proposed development Lot 6 will be conveyed to Basin 1, to the south-east of the development site where water quantity

will be attenuated and also final treatment of stormwater will be performed. The catchment separation boundary is shown on drawing **Co11492.09-DA40** to differentiate the Lot 5 & Lot 6 catchment.

Basin 1 comprises 2450m3 of active storage and attenuates developed site discharge below pre-developed run-off rates. Basin 1 also attenuates stormwater to <140l/s/Ha for the Q100 ARI 9 hour duration storm flow.

Basin 2 comprises 6000m3 of active storage and attenuates developed site discharge below pre-developed run-off rates. Basin 2 also attenuates stormwater to <140l/s/Ha for the Q100 ARI 9 hour duration storm flow.

The inclusion of detention at the estate level means that on-site detention for individual development lots is not required. As such no on-site detention has been proposed for the development.

5 STORMWATER QUALITY CONTROLS

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

The Business Park Stormwater Management Strategy has been defined in conjunction with Fairfield City Council during the SSD5169 application. Water quality treatment is to be performed on a catchment wide basis and pollution reductions are presented in terms of annual percentage pollutant reductions on a developed catchment. These are as follows:

Gross Pollutants (GP's)	90%
Total Suspended Solids (TSS)	85%
Total Phosphorus (TP)	65%
Total Nitrogen (TN)	45%
Total Hydrocarbons (TH)	90%

Development lots, verges and road areas are required to be treated by the Stormwater Treatment Measures (STM's). The STM's shall be sized according to the whole catchment area. The STM's for the development shall be based on a treatment train approach to ensure that all of the objectives above are met.

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

- Treatment of gross pollutants on each development lot prior to discharging into the estate stormwater system. Site STM's will need to meet minimum removal rates of 80% of GP's, 70% of TSS, 15% of TP, 0% of TN and 60% of TH.
  Treatment of runoff in this manner is required for pre-treatment of stormwater from developments development sites prior to discharge into the infrastructure drainage system. This will help to ensure that the estate system is free from gross pollutants and coarse sediments and to reduce the potential for early onset sedimentation of the estate bio-retention basin.
  STM's for development site are to be specified based on individual use on each development lot. Typical examples of acceptable site STM's include end-of-line gross pollutants traps (GPT's) such as Ecosol RSF4000, Rocla CDS, Humeceptor and at source methods such as pit inserts (Stormwater360 Enviropods); and
- Estate detention/ bio-retention basins which will act as tertiary treatment for suspended solids, gross pollutants, hydrocarbons and nutrients. The estate basin 1 consists of 2,450m^3 of active storage and 1,150m^2 of bio-retention filtration. The estate basin 2 consists of 6000m^3 of active storage and 2000m^2 of bio-retention filtration.

The proposed Lot 5/6 treatment consists of all surface inlet pits being treated via Stormwater360 S200 Enviropod Pit Inserts prior to discharging to the Business Park infrastructure drainage system. The infrastructure drainage system then conveys

stormwater to a combined detention/ bio-retention basins prior to its ultimate discharge from the estate.

The inclusion of S200 Enviropod Pit Inserts within Lot 5/6 provides the necessary pre-treatment of stormwater prior to discharge to the infrastructure drainage system. Given appropriate maintenance, the pit inserts provide similar levels of treatment to traditional wet-sump type GPT's without the issues of reattainment of pollutants which can be associated with wet-sump type GPT's.

5.1 Stormwater Harvesting

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

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

Rainwater harvesting is proposed for the Lot 5/6 development for re-use of non-potable applications. Internal uses include such applications as toilet flushing while external applications will be used for irrigation. The aim is to reduce the non-potable water demand for the individual future developments in the range of 50-80%.

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

Rainwater falling on roofs is soft, clear and generally low in microbial and chemical contamination. Any contamination of rainwater generally occurs during collection and storage. The use of simple and cost effective rainwater collection and treatment systems ensures reliable operation and water quality for non-potable use. The proposed rainwater treatment will be a first flush diverter in accordance with council engineering guidelines.

Indoor and outdoor water demand and rainwater tanks sizing will be based on individual site requirements. A nominal tank size of 20kL has been nominated on the development drawings however this is subject to detailed analysis during construction certificate stage by the Hydraulic Engineering Consultant.

5.2 Maintenance And Monitoring

It is important that each component of the water quality treatment train is properly operated and maintained. In order to achieve the design treatment objectives, an indicative maintenance schedule has been prepared (refer to **Table 5.1** below) to assist in the effective operation and maintenance of the various water quality components.

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

Table 5.1. Indicative Maintenance Schedule

MAINTENANCE ACTION	FREQUENCY	RESPONSIBILITY	PROCEDURE
SWALES/ LANDSCAPED AREAS			
Check density of vegetation and ensure minimum height of 150mm is maintained. Check for any evidence of weed infestation	Six monthly	Maintenance Contractor	Replant and/or fertilise, weed and water in accordance with landscape consultant specifications
Inspect swale for excessive litter and sediment build up	Six monthly	Maintenance Contractor	Remove sediment and litter and dispose in accordance with local authorities' requirements.
Check for any evidence of channelisation and erosion	Six monthly/ After Major Storm	Maintenance Contractor	Reinstate eroded areas so that original, designed swale profile is maintained
Weed Infestation	Three Monthly	Maintenance Contractor	Remove any weed infestation ensuring all root ball of weed is removed. Replace with vegetation where required.
Inspect swale surface for erosion	Six Monthly	Maintenance Contractor	Replace top soil in eroded area and cover and secure with biodegradable fabric. Cut hole in fabric and revegetate.
INLET & JUNCTION PITS			
Inside of Pit	Six Monthly	Maintenance Contractor	Remove grate and inspect internal walls and base, repair where required. Remove any collected sediment, debris, litter.

MAINTENANCE ACTION	FREQUENCY	RESPONSIBILITY	PROCEDURE
Outside of Pit	Four Monthly/ After Major Storm	Maintenance Contractor	Clean grate of collected sediment, debris, litter and vegetation.
STORMWATER360 ENVIROPOD PIT INSERTS			
Refer to manufacturers Operation & Maintenance Manual	3-6 Monthly and following major storm. As per manufacturers Operation & Maintenance Manual	Maintenance Contractor	Refer to manufacturers Operation & Maintenance Manual
STORMWATER SYSTEM			
General Inspection of complete stormwater drainage system	Bi-annually	Maintenance Contractor	Inspect all drainage structures noting any dilapidation in structures and carry out required repairs.

6 EROSION & SEDIMENT CONTROL PLAN

An erosion and sediment control plan (ESCP) is shown on drawings **Co11492.09-DA20 & DA25**. This has been completed in conjunction with the broader strategy for the Horsley Drive Business Park Estate which comprise erosion control measures consistent with Fairfield City Council Policy and the Landcom document Managing Urban Stormwater, Soils and Construction (1998). These measures include sediment basins, diversion drains, batter control and site construction entries. All stormwater from the Martin Brower Facility will be managed through the site specific and Estate level erosion control measures during the construction phase of the project.

These are conceptual plans only providing sufficient detail to clearly show that the works can proceed without undue pollution to receiving waters. A detailed plan will be prepared once consent is given and before works start.

6.1 General Conditions

1. The ESCP will be read in conjunction with the engineering plans, and any other plans or written instructions that may be issued in relation to development at the subject site.
2. Contractors will ensure that all soil and water management works are undertaken as instructed in this specification and constructed following the guidelines stated in Managing Urban Stormwater, Soils and Construction (1998) and Fairfield Council specifications.
3. All subcontractors will be informed of their responsibilities in minimising the potential for soil erosion and pollution to down slope areas.

6.2 Land Disturbance

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

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

Table 7.1 Limitations to access

6.3 Work Schedule Conditions

Works will be undertaken in the following sequence. The management of water and soil for the proposed development is to be staged in conjunction with the proposed construction sequence to ensure that minimal land disturbance occurs. Each subsequent stage is not to be commenced until the previous one is completed.

Works

The proposed works are detailed on drawing Co11492.07-DA20 (refer to Appendix) and are to be carried out in the following sequence:

1. Installation of stabilised site entry.
2. Installation of sediment fencing and construction of catch drains.
3. Construction of diversion channels and direction of dirty water to the estate/ Business Park sedimentation basin.
4. Grading of site to Bulk Earthworks Levels
5. Construction of buildings, pavements and stormwater drainage system.
6. The estate sediment basin is to remain until such time that the disturbed areas are stabilised and/ or building works take place.

6.4 Erosion Control Conditions

1. Clearly visible barrier fencing shall be installed as shown on the plan and elsewhere at the discretion of the site superintendent to ensure traffic control and prohibit unnecessary site disturbance. Vehicular access to the site shall be limited to only those essential for construction work and they shall enter the site only through the stabilised access points.
2. Soil materials will be replaced in the same order they are removed from the ground. It is particularly important that all subsoils are buried and topsoils remain on the surface at the completion of works.
3. Where practicable, schedule the construction program so that the time from starting land disturbance to stabilisation has a duration of less than six months.
4. Notwithstanding this, schedule works so that the duration from the conclusion of land shaping to completion of final stabilisation is less than 20 working days.
5. Land recently established with grass species will be watered regularly until an effective cover has properly established and plants are growing vigorously. Further application of seed might be necessary later in areas of inadequate vegetation establishment.
6. Where practical, foot and vehicular traffic will be kept away from all recently established areas
7. Earth batters shall be constructed in accordance with the Geotechnical Engineers Report or with as law a gradient as practical but not steeper than:

- 2H:1V where slope length is less than 7 meters
- 2.5H:1V where slope length is between 7 and 10 meters
- 3H:1V where slope length is between 10 and 12 meters
- 4H:1V where slope length is between 12 and 18 meters
- 5H:1V where slope length is between 18 and 27 meters
- 6H:1V where slope length is greater than 27 meters

8. All earthworks, including waterways/drains/spillways and their outlets, will be constructed to be stable in at least the design storm event.
9. During windy weather, large, unprotected areas will be kept moist (not wet) by sprinkling with water to keep dust under control. In the event water is not available in sufficient quantities, soil binders and/or dust retardants will be used or the surface will be left in a cloddy state that resists removal by wind.

6.5 Pollution Control Conditions

1. Stockpiles will not be located within 5 meters of hazard areas, including likely areas of high velocity flows such as waterways, paved areas and driveways.
2. Sediment fences will:
   a) Be installed where shown on the drawings, and elsewhere at the discretion of the site superintendent to contain the coarser sediment fraction (including aggregated fines) as near as possible to their source.
   b) Have a catchment area not exceeding 720 square meters, a storage depth (including both settling and settled zones) of at least 0.6 meters, and internal dimensions that provide maximum surface area for settling, and
   c) Provide a return of 1 meter upslope at intervals along the fence where catchment area exceeds 720 square meters, to limit discharge reaching each section to 10 litres/second in a maximum 20 year t_c discharge.
3. Sediment removed from any trapping device will be disposed in locations where further erosion and consequent pollution to down slope lands and waterways will not occur.
4. Water will be prevented from directly entering the permanent drainage system unless it is relatively sediment free (i.e. the catchment area has been permanently landscaped and/or likely sediment has been treated in an approved device). Nevertheless, stormwater inlets will be protected.
5. Temporary soil and water management structures will be removed only after the lands they are protecting are stabilised.

6.6 Waste Management Conditions

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

6.7 Site Inspection and Maintenance

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

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

    The report shall carry a certificate that works have been carried out in accordance with the plan.
3. Waste bins will be emptied as necessary. Disposal of waste will be in a manner approved by the Site Superintendent.
4. Proper drainage will be maintained. To this end drains (including inlet and outlet works) will be checked to ensure that they are operating as intended, especially that,
    - No low points exist that can overtop in a large storm event
    - Areas of erosion are repaired (e.g. lined with a suitable material) and/or velocity of flow is reduced appropriately through construction of small check dams of installing additional diversion upslope.
    - Blockages are cleared (these night occur because of sediment pollution, sand/soil/spoil being deposited in or too close to them, breached by vehicle wheels, etc.).
5. Sand/soil/spoil materials placed closer than 2 meters from hazard areas will be removed. Such hazard areas include and areas of high velocity water flows (e.g. waterways and gutters), paved areas and driveways.

6. Recently stabilised lands will be checked to ensure that erosion hazard has been effectively reduced. Any repairs will be initiated as appropriate.
7. Excessive vegetation growth will be controlled through mowing or slashing.
8. All sediment detention systems will be kept in good, working condition. In particular, attention will be given to:
    a) Recent works to ensure they have not resulted in diversion of sediment laden water away from them
    b) Degradable products to ensure they are replaced as required, and
    c) Sediment removal, to ensure the design capacity or less remains in the settling zone.
9. Any pollutants removed from sediment basins or litter traps will be disposed of in areas where further pollution to down slope lands and waterways should not occur.
10. Additional erosion and/or sediment control works will be constructed as necessary to ensure the desired protection is given to down slope lands and waterways, i.e. make ongoing changes to the plan where it proves inadequate in practice or is subjected to changes in conditions at the work site or elsewhere in the catchment.
11. Erosion and sediment control measures will be maintained in a functioning condition until all earthwork activities are completed and the site stabilised
12. Litter, debris and sediment will be removed from the gross pollutant traps and trash racks as required.

7 CONCLUSION

This Civil Engineering Details Report has been prepared to support a Development Application for the proposed Lot 5/6 warehouse development at Cowpasture Road, Wetherill Park.

A civil engineering and infrastructure strategy for the site has been developed which provides a best fit solution within the constraints of the proposed Horsley Drive Business Park Estate and the Stormwater Management Strategy approved under SSD5169. The proposed engineering strategy for Lot 5/6 will remain consistent with the approved Business Park development.

During construction stage, Erosion and Sediment Control Measures are proposed for the site to ensure that all receiving waters are protected from undue pollution and sediment laden stormwater runoff. The site specific strategy has been completed in conjunction with the broader strategy for the Horsley Drive Business Park Estate which comprise erosion control measures consistent with Fairfield City Council Policy and the Landcom document Managing Urban Stormwater, Soils and Construction (1998). These measures include sediment basins, diversion drains, batter control and site construction entries.

During operational phase the stormwater quality will be performed by a treatment train approach of primary treatment of hardstand and other paved surfaces prior to tertiary treatment within bio-retention systems provided in The Business Park Stormwater Management Basins. Stormwater quantity management (detention) will also be provided at an estate level within the Business Park Stormwater Management Basins.

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

8 REFERENCES

- Fairfield City Council Development Control Plan.
- Fairfield City Council Urban Area On-Site Detention Handbook, 1997.
- Managing Urban Stormwater: Harvesting and Reuse – 2006 (NSW DEC);
- Managing Urban Stormwater: Source Control – 1998 (NSW EPA);
- Managing Urban Stormwater: Treatment Techniques – 1997 (NSW EPA);
- Managing Urban Stormwater: Soils & Construction – 2004(LANDCOM);
- WSUD: Basic Procedures for 'Source Control of Stormwater', John R Argue, 2008.
- Water Sensitive Urban Design – "Technical Guidelines for Western Sydney" by URS Australia Pty Ltd, May 2004

Appendix A

DRAWINGS BY COSTIN ROE CONSULTING

MARTIN BROWER FACILITY
CRN HORSLEY DRIVE & COWPASTURE ROAD
WETHERILL PARK NSW

DRAWING LIST:

DRAWING NO.	DRAWING TITLE
C011492.09-DA10	DRAWING LIST & GENERAL NOTES
C011492.09-DA20	EROSION & SEDIMENT CONTROL PLAN
C011492.09-DA25	EROSION & SEDIMENT CONTROL DETAILS
C011492.09-DA40	CONCEPT STORMWATER DRAINAGE PLAN
C011492.09-DA45	CONCEPT STORMWATER DETAILS - SHEET 1
C011492.09-DA46	CONCEPT STORMWATER DETAILS - SHEET 2
C011492.09-DA50	FINISHED LEVELS PLAN

GENERAL NOTES:

G1 THESE DRAWINGS SHALL BE READ IN CONJUNCTION WITH ALL ARCHITECTURAL AND OTHER CONSULTANTS' DRAWINGS AND SPECIFICATIONS AND WITH SUCH OTHER WRITTEN INSTRUCTIONS AS MAY BE ISSUED DURING THE COURSE OF THE CONTRACT. ANY DISCREPANCY SHALL BE REFERRED TO THE ENGINEER BEFORE PROCEEDING WITH THE WORK.

G2 ALL MATERIALS AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE RELEVANT AND CURRENT STANDARDS AUSTRALIA CODES AND WITH THE BY-LAWS AND ORDINANCES OF THE RELEVANT BUILDING AUTHORITIES EXCEPT WHERE VARIED BY THE PROJECT SPECIFICATION.

G3 ALL DIMENSIONS SHOWN SHALL BE VERIFIED BY THE BUILDER ON SITE.
ENGINEER'S DRAWINGS SHALL NOT BE SCALED FOR DIMENSIONS.
ENGINEER'S DRAWINGS ISSUED IN ANY ELECTRONIC FORMAT MUST NOT BE USED FOR DIMENSIONAL SETOUT.
REFER TO THE ARCHITECT'S DRAWINGS FOR ALL DIMENSIONAL SETOUT INFORMATION.

G4 DURING CONSTRUCTION THE STRUCTURE SHALL BE MAINTAINED IN A STABLE CONDITION AND NO PART SHALL BE OVERSTRESSED. TEMPORARY BRACING SHALL BE PROVIDED BY THE BUILDER TO KEEP THE WORKS AND EXCAVATIONS STABLE AT ALL TIMES.

G5 UNLESS NOTED OTHERWISE ALL LEVELS ARE IN METRES AND ALL DIMENSIONS ARE IN MILLIMETRES.

G6 ALL WORKS SHALL BE UNDERTAKEN IN ACCORDANCE WITH ACCEPTABLE SAFETY STANDARDS & APPROPRIATE SAFETY SIGNS SHALL BE INSTALLED AT ALL TIMES DURING THE PROGRESS OF THE JOB.

ELECTRONIC INFORMATION NOTES:

1. THE ISSUED DRAWINGS IN HARD COPY OR PDF FORMAT TAKE PRECEDENCE OVER ANY ELECTRONICALLY ISSUED INFORMATION, LAYOUTS OR DESIGN MODELS.

2. THE CONTRACTOR'S DIRECT AMENDMENT OR MANIPULATION OF THE DATA OR INFORMATION THAT MIGHT BE CONTAINED WITHIN AN ENGINEER-SUPPLIED DIGITAL TERRAIN MODEL AND ITS SUBSEQUENT USE TO UNDERTAKE THE WORKS WILL BE SOLELY AT THE DISCRETION OF AND THE RISK OF THE CONTRACTOR.

3. THE CONTRACTOR IS REQUIRED TO HIGHLIGHT ANY DISCREPANCIES BETWEEN THE DIGITAL TERRAIN MODEL AND INFORMATION PROVIDED IN THE CONTRACT AND/OR DRAWINGS AND IS REQUIRED TO SEEK CLARIFICATION FROM THE SUPERINTENDENT.

4. THE ENGINEER WILL NOT BE LIABLE OR RESPONSIBLE FOR THE POSSIBLE ON-GOING NEED TO UPDATE THE DIGITAL TERRAIN MODEL, SHOULD THERE BE ANY AMENDMENTS OR CHANGES TO THE DRAWINGS OR CONTRACT INITIATED BY THE CONTRACTOR.

STORMWATER DRAINAGE NOTES:

1. ALL STORMWATER WORKS TO BE COMPLETED IN ACCORDANCE WITH AUSTRALIAN STANDARD AS3500.3:2003 PLUMBING AND DRAINAGE, PART 3: STORMWATER DRAINAGE.
2. THE MINOR (PIPED) SYSTEM HAS BEEN DESIGNED FOR THE 1 IN 20 YEAR ARI STORM EVENT AND THE MAJOR (OVERLAND) SYSTEM HAS BEEN DESIGNED FOR THE 1 IN 100 YEAR ARI STORM EVENT.
3. ALL FINISHED PAVEMENT LEVELS SHALL BE AS INDICATED ON FINISHED LEVELS PLANS.
4. PIT SIZES SHALL BE AS INDICATED IN THE SCHEDULE WHILE PIPE SIZES AND DETAILS ARE PROVIDED ON PLAN.
5. EXISTING STORMWATER PIT LOCATIONS AND INVERT LEVELS TO BE CONFIRMED BY SURVEY PRIOR TO COMMENCING WORKS ON SITE.
6. ALL STORMWATER PIPES ⌀375 OR GREATER SHALL BE CLASS 2 REINFORCED CONCRETE WITH RUBBER RING JOINTS UNLESS NOTED OTHERWISE.
7. ALL PIPES UP TO AND INCLUDING ⌀300 TO BE uPVC GRADE SN8.
8. ALL CONCRETE PITS GREATER THAN 1000mm DEEP SHALL BE REINFORCED USING N12-200 EACH WAY CENTERED IN WALL AND BASE. LAP MINIMUM 300mm WHERE REQUIRED. ALL CONCRETE FOR PITS SHALL BE F'c 32 MPA. PRECAST PITS MAY BE USED WITH THE APPROVAL OF THE ENGINEER.
9. IN ADDITION TO ITEM 6 ABOVE, ALL CONCRETE PITS GREATER THAN 3000mm DEEP SHALL HAVE WALLS AND BASE THICKNESS INCREASED TO 200mm.
10. PIPES SHALL BE LAID AS PER PIPE LAYING DETAILS. PARTICULAR CARE SHALL BE TAKEN TO ENSURE THAT THE PIPE IS FULLY AND EVENLY SUPPORTED. RAM AND PACK FILLING AROUND AND UNDER BACK OF PIPES AND PIPE FAUCETS, WITH NARROW EDGED RAMMERS OR OTHER SUITABLE TAMPING DETAILS.
11. WHERE PIPE LINES ENTER PITS, PROVIDE 2m LENGTH OF STOCKING WRAPPED SLOTTED ⌀100 uPVC TO EACH SIDE OF PIPE.
12. ALL SUBSOIL DRAINAGE LINES SHALL BE ⌀100 SLOTTED uPVC WITH APPROVED FILTER WRAP LAID IN 300mm WIDE GRANULAR FILTER UNLESS NOTED OTHERWISE. LAY SUBSOIL LINES TO MATCH FALLS OF LAND AND/OR 1 IN 200 MINIMUM. PROVIDE CAPPED CLEANING EYE (RODDING POINT) AT UPSTREAM END OF LINE AND AT 30m MAX. CTS. PROVIDE SUBSOIL LINES TO ALL PAVEMENT/ LANDSCAPED INTERFACES, TO REAR OF RETAINING WALLS (AS NOMINATED BY STRUCTURAL ENGINEER) AND AS SHOWN ON PLAN.
13. ALL PIPE GRADES 1 IN 100 MINIMUM UNO.
14. PROVIDE STEP IRONS IN PITS DEEPER THAN 1000mm.
15. MIN. 600 COVER TO PIPE OBVERT BENEATH ROADS & MIN. 400 COVER BENEATH LANDSCAPED AND PEDESTRIAN AREAS.
16. PIT COVERS IN TRAFFICABLE PAVEMENT SHALL BE CLASS D 'HEAVY DUTY', THOSE LOCATED IN NON-TRAFFICABLE AREAS SHALL BE CLASS B 'MEDIUM DUTY' U.N.O.
17. PROVIDE CLEANING EYES (RODDING POINTS) TO PIPES AT ALL CORNERS AND T-JUNCTIONS WHERE NO PITS ARE PRESENT.
18. DOWN PIPES (DP) TO BE AS PER HYDRAULIC ENGINEERS DETAILS WITH CONNECTOR TO MATCH DP SIZE U.N.O. ON PLAN. PROVIDE CLEANING EYE AT GROUND LEVEL.
19. PIPE LENGTHS NOMINATED ON PLAN OR LONGSECTIONS ARE MEASURED FROM CENTER OF PITS TO THE NEAREST 0.5m AND DO NOT REPRESENT ACTUAL LENGTH. THE CONTRACTOR IS TO ALLOW FOR THIS.

EROSION CONTROL NOTES

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

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

SURVEY NOTE:

EXISTING SITE LEVELS AND DETAILS BASED ON A PLAN OF SURVEY SY073101.000 BY LAND PARTNERS SURVEYORS 6/4/12.
COORDINATES BASED ON MGA COORDINATES AS NOMINATED ON DRAWING 73101-3D-DETAIL BY LAND PARTNERS DATED 6/4/12

SITE PREPARATION NOTES:

1. ALL EARTHWORKS SHALL BE COMPLETED GENERALLY IN ACCORDANCE WITH THE GUIDELINES SPECIFIED BY THE GEOTECHNICAL REPORT PSM2343-004R PROVIDED BY PELLS SULLIVAN MEYNINK DATED FEB 2014.
2. EXISTING LEVELS ARE BASED ON INFORMATION PROVIDED BY LAND PARTNERS CONSULTANTS TITLED SY073101.000 DATED 01 JUNE 2012.
3. STRIP ANY TOP SOIL OR DELETERIOUS MATERIAL AND BLEND INTO BATTER TOPSOIL MATERIAL OR STORE AS DIRECTED.
4. COMPLETE CUT TO FILL EARTHWORKS TO ACHIEVE THE REQUIRED LEVELS AS INDICATED ON THE DRAWINGS WITHIN A TOLERANCE OF +0mm/-10mm THROUGH BUILDING PADS/PAVEMENTS AND +0mm/-20mm ELSEWHERE.
5. TOP 1000mm ROCK BELOW BULK EARTHWORKS LEVEL (BEL) IN AREAS OF CUT TO BE RIPPED AND RECOMPACTED IN ACCORDANCE WITH GEOTECHNICAL ADVICE AS 'SITE WON FILL'.
6. IN AREAS OF FILL, THE TOP 500mm IS TO COMPRISE OF SELECT CRUSHED ROCK, SITE WON FROM AREAS OF CUT IN ROCK.
7. PREPARE STEEP BATTERS TO RECEIVE FILL BY CONSTRUCTING BENCHING TO FACILITATE FILL PLACEMENT AND COMPACTION.
8. AREAS TO RECEIVE FILL (THAT ARE NOT ON BENCHED BATTERS) AND AREAS IN CUT SHALL BE PROOF ROLLED TO IDENTIFY ANY SOFT HEAVING MATERIAL. SOFT MATERIAL SHALL BE BOXED OUT AND REMOVED PRIOR TO FILL PLACEMENT.
9. SITE WON FILL TO BE PLACED IN MAXIMUM 300mm LOOSE LAYERS AND COMPACTED TO 100% STANDARD AND WITHIN 2% OF OPTIMUM MOISTURE CONTENT.
10. IMPORTED FILL SHALL BE PLACED IN MAXIMUM 300mm LOOSE LAYERS AND COMPACTED TO 100% STANDARD AND WITHIN 2% OF OPTIMUM MOISTURE CONTENT.
11. MAXIMUM PARTICLE SIZE TO BE THE SMALLER OF 150mm OR HALF THE (LOOSE) LAYER THICKNESS AND/OR TWO THIRDS THE LAYER THICKNESS AFTER COMPACTION.
12. ALL EARTHWORKS SHALL BE COMPLETED UNDER LEVEL 1 CONTROL IN ACCORDANCE WITH AS 3798-2007.
13. PRIOR TO ANY EARTHWORKS, EROSION CONTROL AS OUTLINED IN THE EROSION AND SEDIMENTATION CONTROL PLAN SHALL BE COMPLETED.
14. EXISTING ROCK, IF ANY, SHALL BE REMOVED BY HEAVY ROCK BREAKING OR RIPPING.
15. MATCH EXISTING LEVELS AT BATTER INTERFACE.
16. CONTRACTOR TO MATCH EXISTING LEVELS AT THE INTERFACE OF EARTHWORKS AND EXISTING SURFACE AT BATTER LOCATIONS OR WHERE NO RETAINING WALLS ARE PRESENT. ANY DISCREPANCY BETWEEN DESIGN AND EXISTING LEVELS TO BE REFERRED TO THE ENGINEER FOR DIRECTION OR ADJUSTMENTS TO DESIGN LEVELS.

FINISHED LEVELS PLAN NOTES:

1. LEVELS DATUM IS A.H.D.
2. ALL CONTOUR LINES & SPOT LEVELS INDICATE FINISHED PAVEMENT LEVELS U.N.O. ON PLAN.
3. THE MAJOR CONTOUR INTERVAL IS 0.5m
4. THE MINOR CONTOUR INTERVAL IS 0.1m.
5. MINIMUM PAVEMENT GRADE IS TO BE 1:100 (1%).
6. MAXIMUM PAVEMENT GRADE IS TO BE 1:20 (5%) IN CARPARKING AREAS AND 1:25 (4%) ELSEWHERE.
7. MAXIMUM RAMP GRADES ARE TO BE 1:12 (8.3%) U.N.O. ON PLAN
8. PROVIDE MINIMUM 3.0m LONG TRANSITION WHERE CHANGES GRADE EXCEDE 1:20 (5%).
9. PERMANENT BATTER SLOPES ARE TO HAVE A MAXIMUM GRADE OF 1V:3H.
10. ALL BATTER SLOPE WITH GRADES AT OR EXCEDING 1V:6H ARE TO BE TURFED IMMEDIATELY OR APPROPRIATE EROSION CONTROL IS TO BE PROVIDED TO THE SATISFACTION OF THE ENGINEER.
11. THE ACCESS ROAD TO THE HARDSTAND AREA IS TO HAVE A CROSSFALL OF 2% AS INDICATED ON PLAN.
12. ALL FOOTPATHS ARE TO FALL AWAY FROM THE BUILDING AT 2.5% NOMINAL. GRADE.
13. ALL PAVEMENTS ARE TO BE SET AT 50mm BELOW THE FINISHED FLOOR LEVEL OF THE WAREHOUSE AND OFFICE AREAS.

FOR DEVELOPMENT APPLICATION

AMENDMENTS	DATE	ISSUE
FOR DEVELOPMENT APPLICATION	03.07.15	C
FOR DEVELOPMENT APPLICATION	30.06.15	B
PRELIMINARY ISSUE	26.06.15	A

AMENDMENTS DATE ISSUE

CLIENT: australand
COMMERCIAL & INDUSTRIAL DIVISION
1 HOMEBUSH BAY DRIVE BUILDING C, LEVEL 3 RHODES NSW 2138
PHONE 02 8767 2000
FAX 02 8767 2900
PO BOX 2307 RHODES NSW 2138
1800 829 877

PROJECT: MARTIN BROWER FACILITY - HDBP
CNR THE HORSELY DV. & COWPASTURE RD
WETHERILL PARK, NSW

CONSULT AUSTRALIA

DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
M.C	M.C	24.06.15	M.W	A1	AS SHOWN	C011492.09- DA10

Costin Roe Consulting Pty Ltd.
Consulting Engineers ACN 003 886 448
Level 1, 8 Windmill Street
Walsh Bay, Sydney NSW 2000
Tel: (02) 9251-7699 Fax: (02) 9241-3731
email: mail@costinroe.com.au ©

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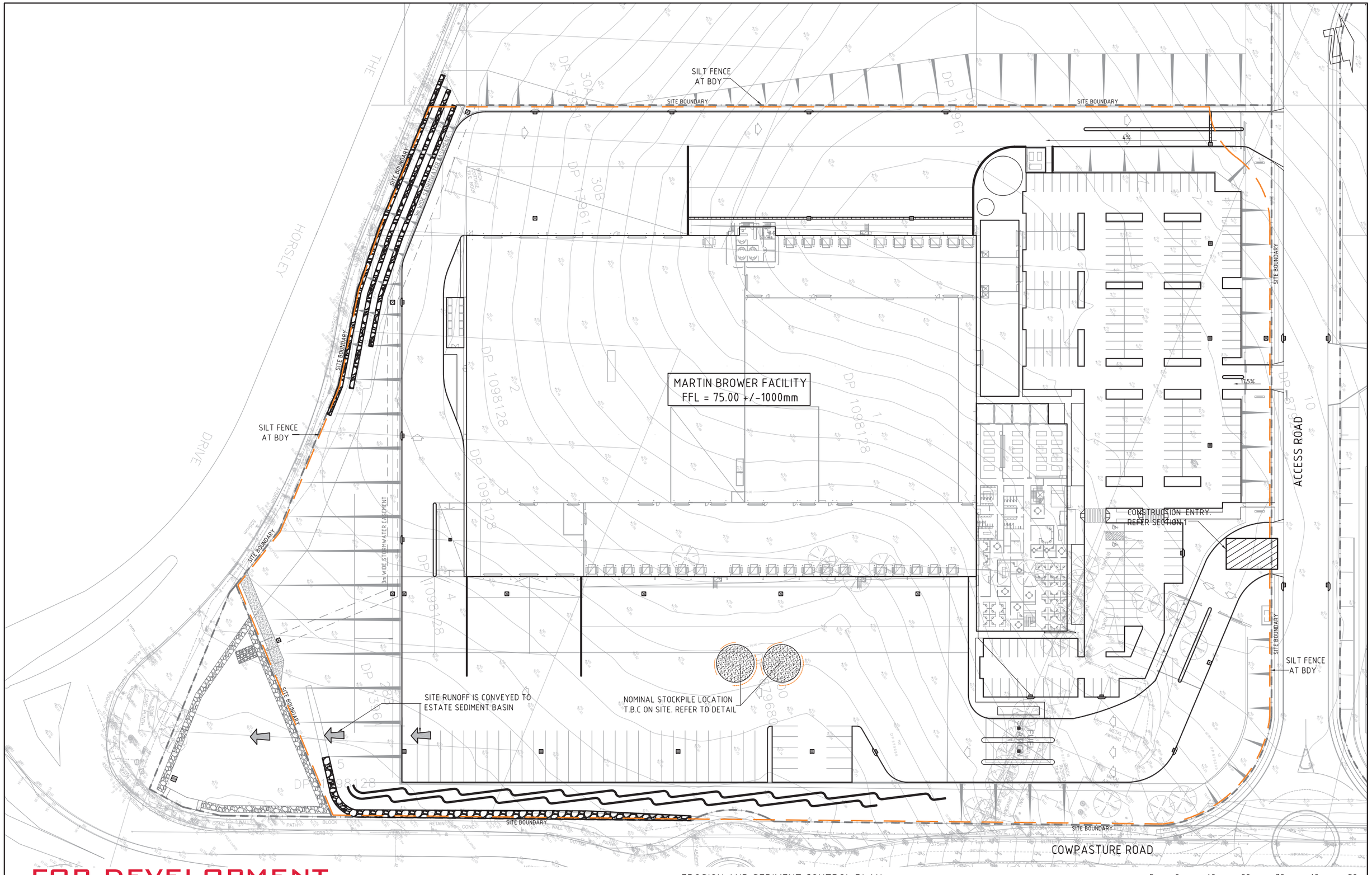
DRAWING TITLE: DRAWING LIST AND GENERAL NOTES
DRAWING No C011492.09-DA10
ISSUE C



FOR DEVELOPMENT APPLICATION

EROSION AND SEDIMENT CONTROL PLAN
SCALE 1:500

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

AMENDMENTS	DATE	ISSUE
FOR DEVELOPMENT APPLICATION	03.07.15	C
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australand
COMMERCIAL & INDUSTRIAL DIVISION
1 HOMEBUSH BAY DRIVE PHONE 02 8767 2300
HOMEBUSH NSW 2140 FAX 02 8767 2900
PO BOX 3307
RHODES NSW 2138
1800 829 877

PROJECT
MARTIN BROWER FACILITY - HDBP
CNR THE HORSELY DV. & COWPASTURE RD
WETHERILL PARK, NSW

DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
M.C	M.C	24.06.15	M.W	A1	AS SHOWN	C011492.09-DA20

CONSULT AUSTRALIA

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Consulting Engineers ACN 003 896 446
Level 1, 8 Windmill Street
Walsh Bay, Sydney NSW 2000
Tel: (02) 9251-7699 Fax: (02) 9241-3731
email: mail@costinroe.com.au ©

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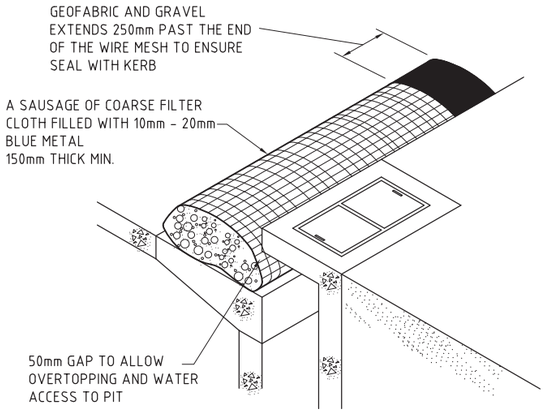
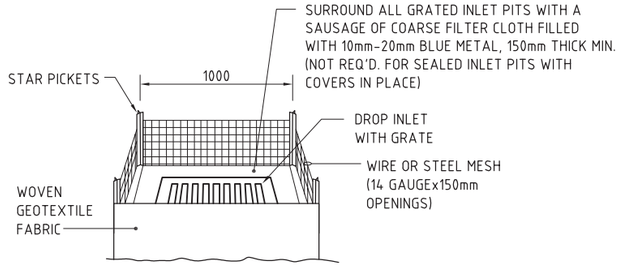
DRAWING TITLE
EROSION AND SEDIMENT CONTROL PLAN

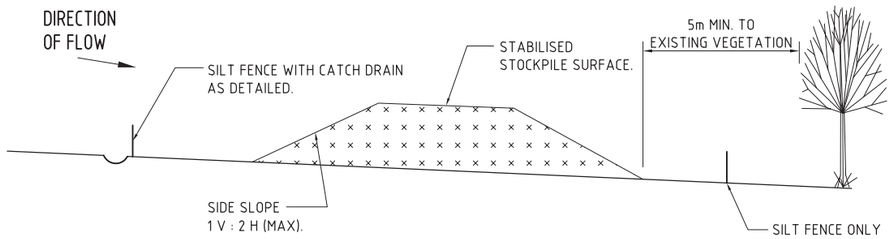
DRAWING No C011492.09-DA20 ISSUE C



KERB INLET PIT CONTROL
N.T.S



GRATED INLET PIT FILTER DETAIL
N.T.S

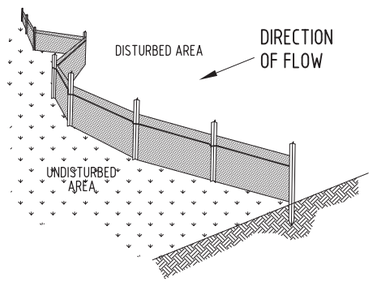


TYPICAL STOCKPILE DETAIL
N.T.S.

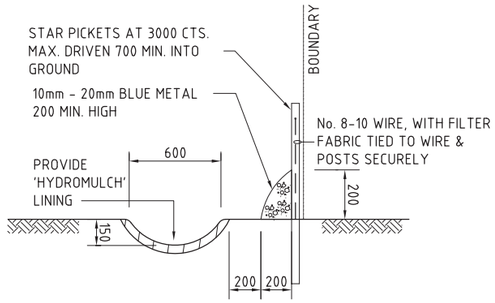
NOTE : ADOPT ABOVE DETAILS AROUND ALL PITS WITHIN AREA ENCOMPASSED BY SILT FENCE & TO PITS ON THE ROAD ADJACENT TO SITE BOUNDARY.

STOCKPILE NOTES

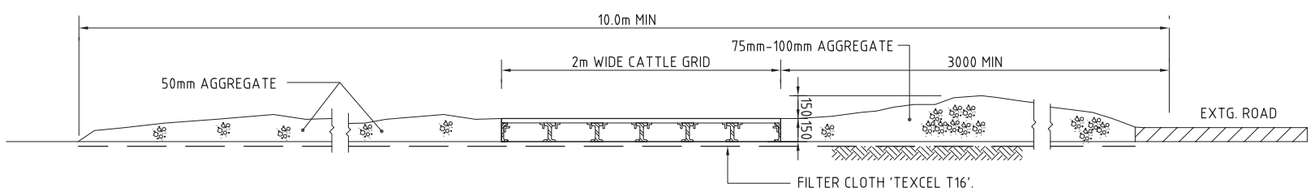
1. PLACE ALL STOCKPILES IN LOCATIONS MORE THAN 5m FROM EXISTING VEGETATION, ROADS & HAZARD AREAS.
2. CONSTRUCT ON THE CONTOUR AS LOW, FLAT ELONGATED MOUNDS. SIDE SLOPE TO BE 1 V: 2 H MAX.
3. WHERE THERE IS SUFFICIENT AREA, TOPSOIL STOCKPILES SHALL BE LESS THAN 2m IN HEIGHT.
4. WHERE STOCKPILES ARE TO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



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



TYPICAL OPEN DRAIN & SILT FENCE
SCALE 1:20



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

200mm 0 500 1000 1500 2000mm
SCALE 1:20 AT A1 SHEET SIZE

FOR DEVELOPMENT APPLICATION

AMENDMENTS	DATE	ISSUE
FOR DEVELOPMENT APPLICATION	03.07.15	C
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AMENDMENTS	DATE	ISSUE

CLIENT
australand
COMMERCIAL & INDUSTRIAL DIVISION
1300 829 877

PROJECT
MARTIN BROWER FACILITY - HDBP
CNR THE HORSELY DV. & COWPASTURE RD
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DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
M.C	M.C	24.06.15	M.W	A1	AS SHOWN	C011492.09-DA25

Costin Roe Consulting Pty Ltd.
Consulting Engineers ACN 003 696 448
Level 1, 8 Windmill Street
Walsh Bay, Sydney NSW 2000
Tel: (02) 9251-7699 Fax: (02) 9241-3731
email: mail@costinroe.com.au ©

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DRAWING TITLE
EROSION AND SEDIEMNT CONTROL DETAILS

DRAWING No C011492.09-DA25
ISSUE C

STORMWATER DRAINAGE NOTES:

REFER TO DRAWING DA10 FOR STORMWATER DRAINAGE NOTES

LEGEND:

LEVELS DATUM IS AHD.

EXISTING SITE LEVELS AND DETAILS BASED ON SURVEY INFORMATION PROVIDED BY LAND PARTNERS SURVEYORS DATED 12.04.12.

- SGGP, SINGLE GRATED GULLY PIT
- SJP, SEALED JUNCTION PIT
- KIP, KERB INLET PIT
- DRAINAGE LINE
- SUBSOIL LINE
- ROOFWATER LINE
- DOWNPIPE (INDICATIVE ONLY)
- OVERLAND FLOW PATH
- ESTATE TRUNK DRAINAGE LINE
- FINISHED PAVEMENT SPOT HEIGHT
- FINISHED PAVEMENT CONTOUR (MAJOR) 0.5m INTERVALS
- FINISHED PAVEMENT CONTOUR (MINOR) 0.1m INTERVALS
- EXISTING SURFACE CONTOUR
- EXISTING SURFACE SPOT HEIGHT

PIT SCHEDULE

PIT No.	GRATE RL	DEPTH	TYPE	SIZE	COMMENT
PIT A1	74.50	900	K.I.P	900x600	◉
PIT A2	74.50	2150	K.I.P	900x900	◉
PIT A3	74.50	2400	K.I.P	900x900	◉
PIT A4	74.50	2650	K.I.P	900x900	◉
PIT A5	73.75	1000	S.G.G.P	900x900	◉
PIT A6	73.75	1200	S.G.G.P	900x900	◉
PIT A7	74.95	1500	S.J.P	900x900	◉
PIT B1	73.75	1200	S.J.P	900x900	◉
PIT B2	73.75	1450	S.J.P	900x900	◉
PIT B3	73.75	1900	S.J.P	900x900	◉
PIT B4	74.95	3350	S.J.P	900x900	◉
PIT B5	74.55	3150	S.J.P	900x900	◉
PIT B6	74.60	900	K.I.P	900x600	◉
PIT B7	74.60	1150	K.I.P	900x900	◉
PIT C1	73.10	1500	S.G.G.P	900x900	◉
PIT C2	73.80	2400	S.G.G.P	900x900	◉
PIT C3	73.80	2600	S.G.G.P	900x900	◉
PIT C4	72.20	1500	S.J.P	900x900	◉
PIT C5	NOT USED				
PIT C6	73.80	1150	K.I.P	900x900	◉
PIT C7	74.05	1600	S.J.P	900x900	◉
PIT C8	73.80	1700	S.G.G.P	900x900	◉
PIT C9	74.10	900	S.G.G.P	900x900	◉
PIT C10	74.10	1150	S.G.G.P	900x900	◉
PIT C11	74.10	900	K.I.P	900x900	◉
PIT D1	73.10	900	K.I.P	900x900	◉
PIT D2	72.50	1000	S.G.G.P	900x900	◉
PIT D3	72.50	1450	S.G.G.P	900x900	◉
PIT D4	72.50	1900	S.G.G.P	900x900	◉
PIT D5	72.50	2350	S.G.G.P	900x900	◉

◉ DENOTES PIT TO BE FITTED WITH ENVIROPOD SERIES 200 PIT INSERT WITH OILSORB ABSORBENT POUCH.

CONNECT TO EASEMENT LINE AS PART OF ESTATE WORKS

ACCESS ROAD AS PART OF ESTATE WORKS

RETAINING WALL AS PART OF ESTATE WORKS

20KL RAINWATER TANK. DP'S FROM WAREHOUSE ROOF TO CONNECT TO RW TANK. PROVIDE 225Ø OVERFLOW TO PIT A5

MARTIN BROWER FACILITY
FFL = 75.00 +/-1000mm

PROVIDE SUMP IN TRUCK WASH AND CONNECT TO WASTE SYSTEM

CONNECT TO EASEMENT LINE AS PART OF ESTATE WORKS

OSD/BIO RETENTION BASIN AS PART OF ESTATE WORKS

RETAINING WALL AS PART OF ESTATE WORKS

CONNECT TO STUB PROVIDED AS PART OF ESTATE WORKS

PROVIDE SUMP IN FUEL STATION AND CONNECT TO WASTE SYSTEM

STORMWATER CATCHMENT BOUNDARY

SITE BOUNDARY

3m WIDE STORMWATER EASEMENT

ACCESS ROAD

COWPASTURE ROAD

FOR DEVELOPMENT APPLICATION

CONCEPT STORMWATER DRAINAGE PLAN

SCALE 1:500

SCALE 1:500 AT A0 SHEET SIZE

AMENDMENTS	DATE	ISSUE
FOR DEVELOPMENT APPLICATION	03.07.15	C
FOR DEVELOPMENT APPLICATION	30.06.15	B
PRELIMINARY ISSUE	26.06.15	A

CLIENT: australand — COMMERCIAL & INDUSTRIAL DIVISION — 1 MEADOW WAY DRIVE, NORTH RYDE, NSW 2113 — PO BOX 3307, NORTH RYDE NSW 2113 — PHONE 02 9767 2000 — FAX 02 9767 2060 — 1800 829 877

PROJECT: MARTIN BROWER FACILITY - HDBP
CNR THE HORSELY DV. & COWPASTURE RD
WETHERILL PARK, NSW

DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
M.C	M.C	24.06.15	M.W	A1	AS SHOWN	C011492.09-DA40

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Consulting Engineers ACN 003 696 448
Level 1, 8 Windmill Street
Walsh Bay, Sydney NSW 2000
Tel: (02) 9251-7699 Fax: (02) 9241-3731
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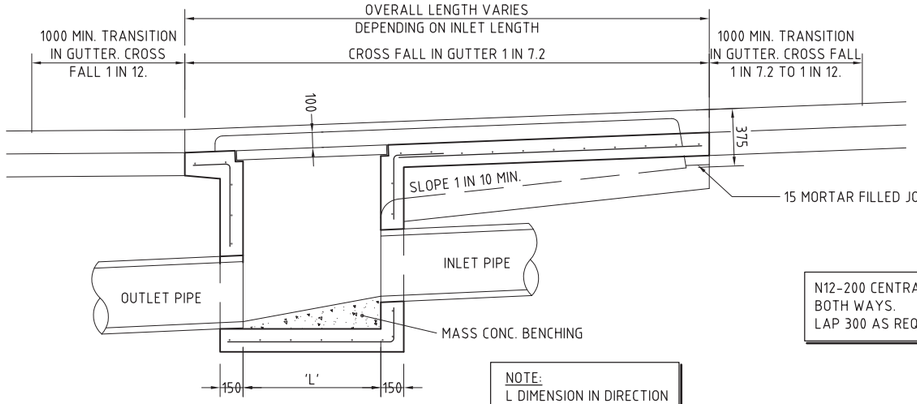
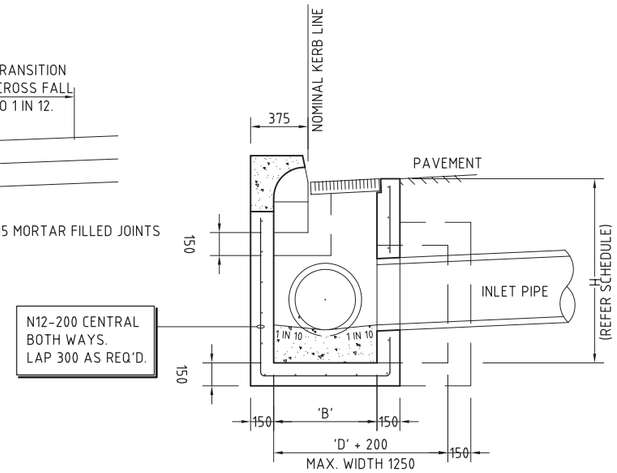
DRAWING TITLE: CONCEPT STORMWATER DRAINAGE PLAN

DRAWING No: C011492.09-DA40 — ISSUE: C

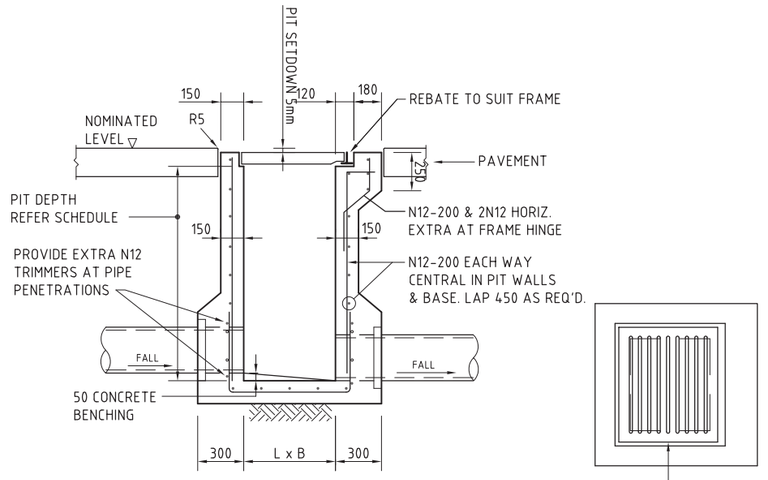


NOTE:
L DIMENSION IN DIRECTION OF DOWNSTREAM PIPE

LONG SECTION.
SCALE 1:20



CROSS SECTION.
SCALE 1:20



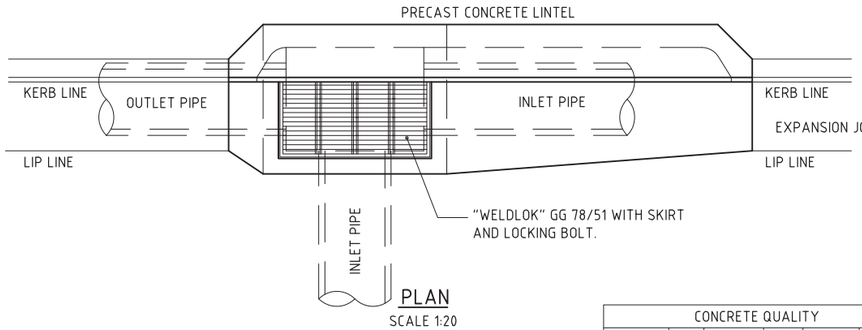
SEE SCHEDULE
L DIMENSION IN DIRECTION OF DOWNSTREAM PIPE

SECTION
SCALE 1:20

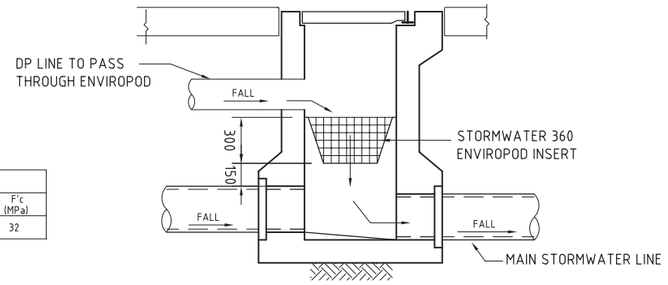
H.D. CAST IRON GRATE & TEE BAR FRAME 'GATIC' OR EQUAL SEE SCHEDULE

PLAN
SCALE 1:20

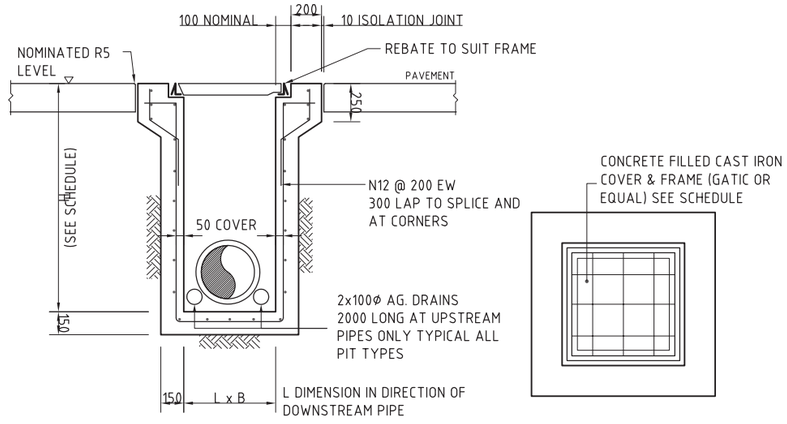
SINGLE GRATED GULLY PIT - SGGP



PLAN
SCALE 1:20



ROOFWATER/STORMWATER PIT WITH ENVIROPOD CONFIGURATION
SCALE 1:20



SECTION
SCALE 1:20

PLAN
1:20

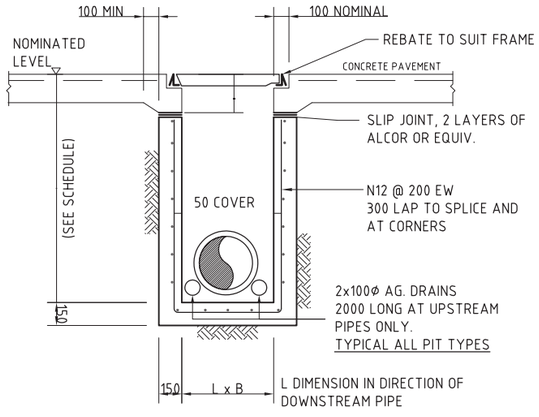
SEALED JUNCTION PIT - SJP

CONCRETE QUALITY					
ELEMENT	SLUMP	AGGREGATE (MAX. SIZE)	CEMENT TYPE	ADMIXTURE	F'c (MPa)
PIT	80	20	GP	NIL	32

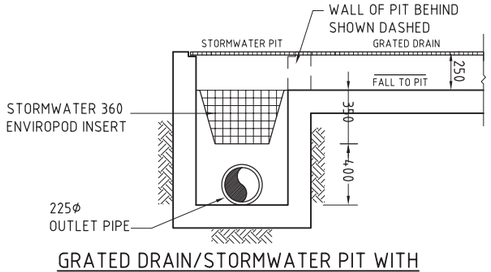
NOTES:

1. WHERE GULLY PIT IS LOCATED ON KERB RETURNS OR BULB OF CUL-DE-SACS PROVIDE CURVED PRECAST CONCRETE LINTELS.
2. SAG PITS SHALL HAVE LINTEL PLACED CENTRALLY ABOUT THE GRATE.
3. ALL REINFORCING TO HAVE 30 MIN. CLAER CONCRETE COVER.
4. FOR PITS DEEPER THAN 1200mm CLIMB RAILS SHALL BE PROVIDED.

KERB INLET PIT - KIP



SECTION
SCALE 1:20



GRATED DRAIN/STORMWATER PIT WITH ENVIROPOD CONFIGURATION
SCALE 1:20

ALTERNATIVE PIT DETAIL GRATE/COVER SUPPORT CAST-INTO PAVEMENT SLAB

(ADOPT AS REQUIRED FOR SGGP's & SJP's)

200mm 0 500 1000 1500 2000mm

SCALE 1:20 AT A1 SHEET SIZE

FOR DEVELOPMENT APPLICATION

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PROJECT: MARTIN BROWER FACILITY - HDBP
CNR THE HORSELY DV. & COWPASTURE RD
WETHERILL PARK, NSW

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Consulting Engineers ACN 003 896 448
Level 1, 8 Windmill Street
Walsh Bay, Sydney NSW 2000
Tel: (02) 9251-7699 Fax: (02) 9241-3731
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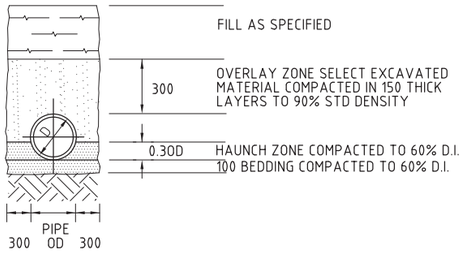
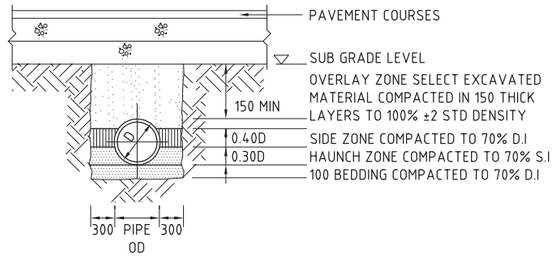
DRAWING TITLE: CONCEPT STORMWATER DRAINAGE DETAILS - SHEET 1

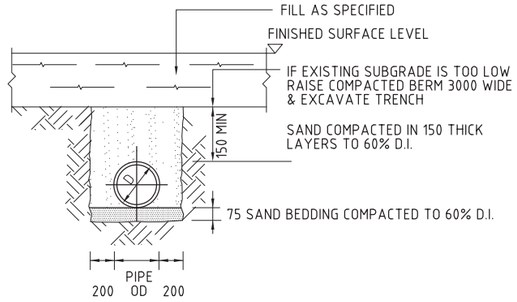
DRAWING No: C011492.09-DA45 ISSUE: C



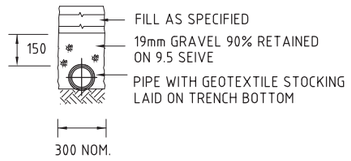
TYPE H1 SUPPORT TO
CONCRETE PIPES AT LANDSCAPED AREAS



TYPE H3 SUPPORT TO
CONCRETE PIPES
UNDER PAVEMENT



SUPPORT TO uPVC PIPES



SUPPORT TO AG. DRAIN

BEDDING & HAUNCH MATERIAL GRADING	
SIEVE SIZE	WEIGHT PASSING(%)
19	100
2.36	100 TO 50
0.60	90 TO 50
0.30	60 TO 10
0.15	25 TO 0
0.075	10 TO 0

SIDE ZONE MATERIAL GRADING	
SIEVE SIZE	WEIGHT PASSING(%)
75	100
9.5	100 TO 50
2.36	100 TO 30
0.60	50 TO 15
0.075	25 TO 0

PIPE LAYING DETAILS

1:20

200mm 0 500 1000 1500 2000mm

SCALE 1:20 AT A1 SHEET SIZE

FOR DEVELOPMENT APPLICATION

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AMENDMENTS	DATE	ISSUE

CLIENT

australand

COMMERCIAL & INDUSTRIAL DIVISION
1 HOMEBUSH BAY DRIVE PHONE 02 8767 2000
BUILDING C, LEVEL 3 FAX 02 8767 2900
RHODES NSW 2138
PO BOX 3307
RHODES NSW 2138
1800 829 877

PROJECT
MARTIN BROWER FACILITY - HDBP
CNR THE HORSELY DV. & COWPASTURE RD
WETHERILL PARK, NSW

CONSULT AUSTRALIA

DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
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Consulting Engineers ACN 003 696 448
Level 1, 8 Windmill Street
Walsh Bay, Sydney NSW 2000
Tel: (02) 9251-7699 Fax: (02) 9241-3731
email: mail@costinroe.au ©

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DRAWING TITLE
CONCEPT STORMWATER
DRAINAGE DETAILS - SHEET 2

DRAWING No C011492.09-DA46

ISSUE C

FINISHED LEVELS NOTES

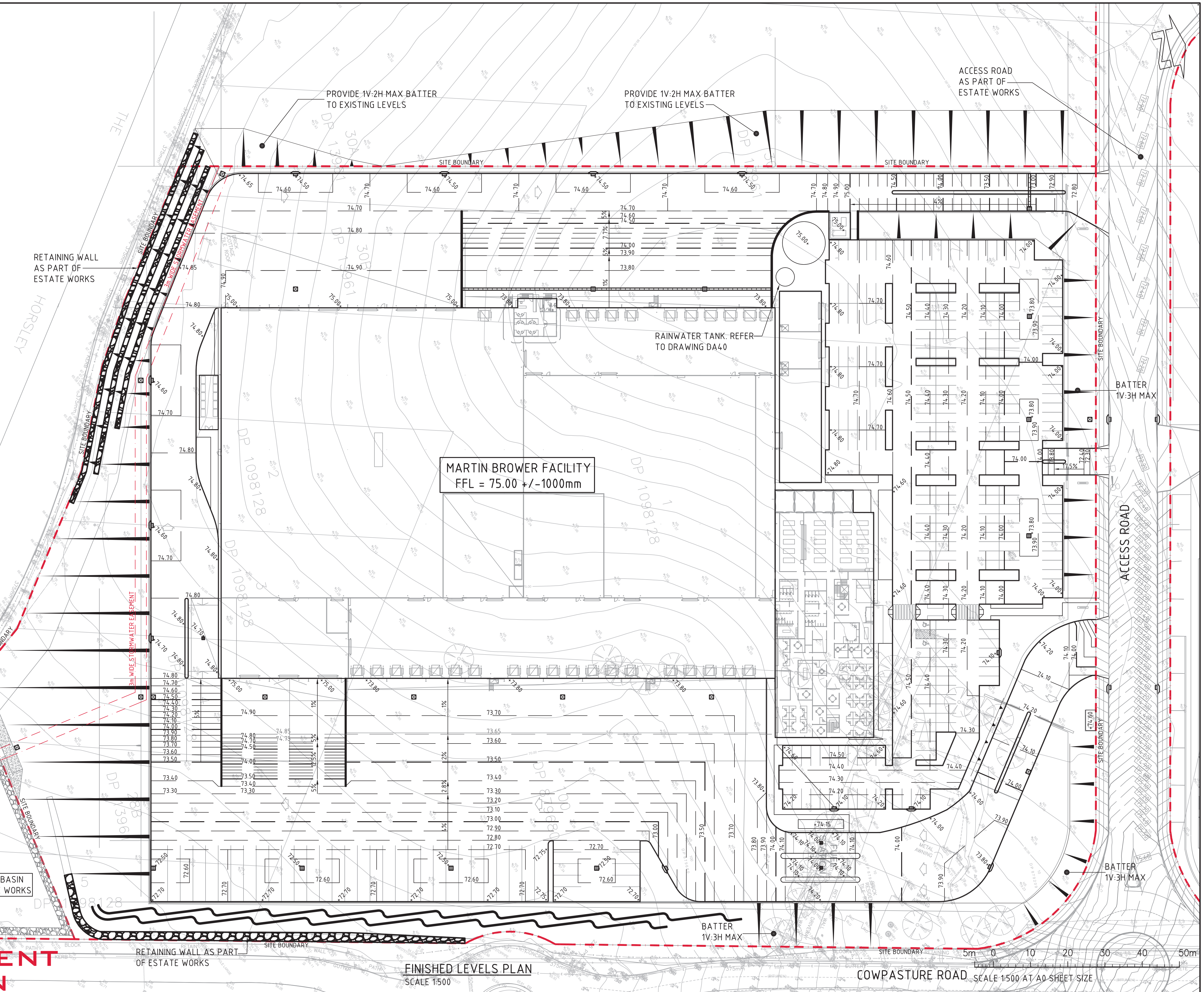
REFER TO DRAWING DA10 FOR FINISHED LEVELS NOTES

LEGEND:

LEVELS DATUM IS AHD.

EXISTING SITE LEVELS AND DETAILS BASED ON SURVEY INFORMATION PROVIDED BY LAND PARTNERS SURVEYORS DATED 12.04.12.

- SGGP, SINGLE GRATED GULLY PIT
- SJP, SEALED JUNCTION PIT
- KIP, KERB INLET PIT
- +65.30 – FINISHED PAVEMENT SPOT HEIGHT
- 50.00 – FINISHED PAVEMENT CONTOUR (MAJOR) 0.5m INTERVALS
- 50.10 – FINISHED PAVEMENT CONTOUR (MINOR) 0.1m INTERVALS
- 58.5 – EXISTING SURFACE CONTOUR
- EXISTING SURFACE SPOT HEIGHT



FOR DEVELOPMENT APPLICATION

FINISHED LEVELS PLAN

SCALE 1:500

AMENDMENTS	DATE	ISSUE
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CNR THE HORSELY DV. & COWPASTURE RD
WETHERILL PARK, NSW

DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
M.C	M.C	24.06.15	M.W	A1	AS SHOWN	CO11492.09-DA50

CONSULT AUSTRALIA

Costin Roe Consulting Pty Ltd.
Consulting Engineers ACN 003 696 446
Level 1, 8 Windmill Street
Walsh Bay, Sydney NSW 2000
Tel: (02) 9251-7699 Fax: (02) 9241-3731
email: mail@costinroe.com.au ©

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DRAWING TITLE: FINISHED LEVELS PLAN

DRAWING No: CO11492.09-DA50 | ISSUE: C