

CIVIL ENGINEERING REPORT DEVELOPMENT APPLICATION SSD_8586218

PROPOSED FACILITY LOT 4, BRINGELLY ROAD HORNINGSEA PARK

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1 INTRODUCTION

1.1 Introduction

ESR proposes to develop a warehouse facility for a speculative tenant over Lot 4 Bringelly Road, Horningsea Park, NSW.

The proposed development over the site is for a single-level warehouse building, office space, truck loading and circulation areas and passenger vehicle parking.

1.2 Scope

Costin Roe Consulting Pty Ltd has been commissioned by ESR 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 & Sediment Controls.

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

This report also specifically addresses Condition B15 of SSD_6324 (dated 13 January 2016) which states "*Future development applications for construction of buildings shall include a Stormwater Management Plan in accordance with the Civil and Engineering report prepared by Northrop, dated November 2014 and Councils Development Control Plan 2008 and Liverpool City Council Growth Centre Precincts Development Control Plan*". Further the report and design has been completed with consideration to the NSW Department of Planning & Environment SEARS SSD_8586218 dated 11 August 2020.

It should be noted that drawings developed for this report are conceptual only, and not a detailed design. Details provided are subject to adjustment as the design is developed to completion.

1.3 Authority Jurisdiction

The development, being part of the Bringelly Road Business Hub, as approved under SSD_6324, will be assessed by the NSW Department of Planning and Environment. The department issued SEARS specific to this development under SSD_8586218 (dated 11 August 2020) (Refer **Appendix C**) and this document considers the requirements of the SEARS and agency responses.

It is noted that as the site is located within the bounds of Liverpool City Council local government area that the requirements of the Liverpool City Council *Development Design Specification D1 through D9* will be considered in the design of facility.

2 DEVELOPMENT SITE

2.1 Location

The proposed development is located in the suburb of Horningsea Park within the proposed Bringelly Road Business Hub at Lot 4, Bringelly Road as shown in Figure 2.1.

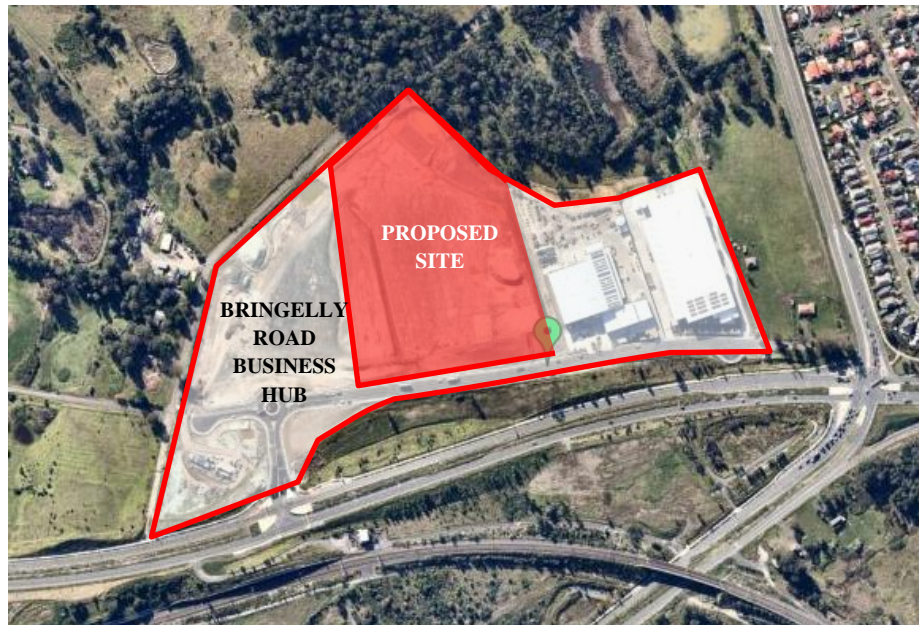


Figure 2.1. Locality Map (Source: Nearmap 2020)

2.2 Existing Site Description

The proposed industrial facility occupies a land area of 6.97 Ha located on Lot 4 of the Bringelly Road Business Hub Estate. The site is bounded by Stuart Road and an existing waterway to the north, Lot 3 of the proposed Bringelly Road Business Hub to the west, the existing CEA facility to the east, Skyline Crescent to the south.

The site drains to the waterway to the north of the site at grades of 1-2%.

Access to the site will be available from the recently completed Skyline Crescent.

2.3 Proposed Development

The proposed development is for the construction of a single level warehouse for a speculative tenant. The indicative layout for the development produced by ESR has been included in **Figure 2.2**.

The proposed warehouse comprises a large single level warehouse building situated centrally on the site. Ancillary office space has been provided on the south-eastern corner of the warehouse. Truck loading areas and circulation hardstand is located around the perimeter of the building as well as fire access. Parking is to the east of the building.

Civil works will include bulk earthworks, stormwater drainage and pavements.

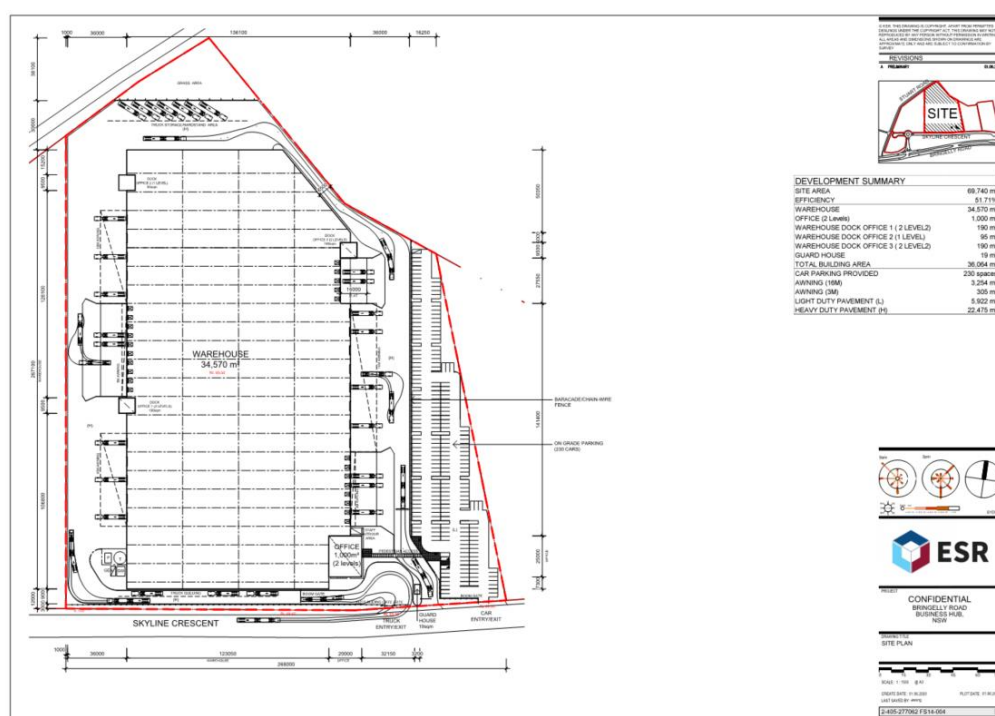


Figure 2.2. Proposed Development Layout

2.4 SEARS Items

The design considers the requirements of NSW Planning Industry & Environment SSD_8586218 SEARS dated 11 August 2020 (refer **Appendix C**). In particular this document covers requirements of *Soil & Water* as included in the *Key Issues* section of the SEARS document. We further provide the following response and direction to the relevant sections of the report for each of the *Soil and Water* items. Refer **Table 2.1** below.

<i>Item No.</i>	<i>Item & Response</i>
<i>SEARS Soil and Water</i>	
<i>Item 1</i>	<p><i>An assessment of potential surface and groundwater impacts associated with the development, including potential impacts on watercourses, riparian areas, groundwater, and groundwater-dependent communities nearby.</i></p> <p><u>Response</u></p> <p>Refer to Section 6 of this report in relation to proposed water quality measures, provided in accordance with approved SSD_6324 estate strategy.</p>
<i>Item 2</i>	<p><i>A detailed site water balance including a description of the water demands and breakdown of water supplies, and any water licensing requirements.</i></p> <p><u>Response</u></p> <p>The project does require any water licensing.</p> <p>Refer Section 4.5 to Section 4.8 for site water balance analysis.</p>
<i>Item 3</i>	<p><i>Description of the measures to minimise water use.</i></p> <p><u>Response</u></p> <p>Refer Section 6.3 for discussion on rainwater reuse, external and not-potable uses and harvesting.</p>
<i>Item 4</i>	<p><i>Details of stormwater/wastewater management system including the capacity of onsite detention system(s), onsite sewage management and measures to treat, reuse or dispose of water.</i></p> <p><u>Response</u></p> <p>Refer Sections 4, 5 and 6 of this report and associated drawings CO11994.10-DA41, DA42, DA45 and DA46 for detailed information of the proposed drainage layout and management systems.</p> <p>The stormwater management strategy (including stormwater detention, water quality and rainwater reuse requirements) has been completed in accordance with the overall estate strategy as defined and approved under SSD_6324 and condition B15 of SSD_6324.</p>
<i>Item 5</i>	<p><i>Detailed flooding assessment.</i></p> <p><u>Response</u></p> <p>The site achieves suitable flood immunity and the proposed development does not impact existing flooding to the north of the</p>

	site. Refer Section 4.4 of this report, and approved Northrop consulting Engineering Report under SSD_6324.
<i>Item 6</i>	<p><i>Description of the proposed erosion and sediment controls during construction.</i></p> <p><u>Response</u></p> <p>Refer Section 7 of this report and associated drawings CO11994.10-DA20 and DA25 for details of Erosion and Sediment Controls.</p>
<i>Item 7</i>	<p><i>Characterisation of water quality at the point of discharge to surface and/or groundwater against the relevant water quality criteria (including details of the contaminants of concern that may leach from the waste into the wastewater and proposed mitigation measures to manage any impacts to receiving waters and monitoring activities and methodologies).</i></p> <p><u>Response</u></p> <p>Refer to Section 6 of this report in relation to proposed water quality measures, provided in accordance with approved SSD_6324 estate strategy.</p>
<i>Item 8</i>	<p><i>Characterisation of the nature and extent of any contamination on the site and surrounding area.</i></p> <p><u>Response</u></p> <p>Refer to EIS.</p>

Table 2.1 SEARS Response Items

3 SITE WORKS

3.1 Bulk Earthworks

Bulk earthworks will be required over the site to facilitate the construction of the new warehouse building. The objective for the site will be to provide large flat building pad, facilitate site access and to drain the stormwater system via gravity

These works will involve cut to fill earthworks, and the construction of retaining walls. An import of fill is expected to achieve the final engineered level.

The final levels over the site will be subject to detailed earthworks modelling and volume assessments allowing for access, drainage, cut to fill and retaining wall considerations. The levels shown on the engineering drawings appended to this report could be considered to be within +/-500mm of the final adopted level.

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 7** of this report.

Refer to drawing **CO11994.10-DA30, 35 & 36** for bulk earthworks plan and sections.

3.2 Embankment Stability

To assist in maintaining embankment stability, slopes of permanent batters 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 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 AS3798-2007.

3.4 Retaining Walls

The civil engineering objective is to minimise retaining walls within the constraints of the architectural layout and allowable grading (as per AS2890.1 and AS2890.2) through paved areas and batters in landscaped areas.

Given the existing natural falls and proposed industrial layout, retaining walls will be required. Where possible, landscaped batters are proposed to limit and reduce retaining wall construction. Retaining will be provided as part of the works as shown indicatively on drawing **CO11994.10-DA51 & DA52**.

4 STORMWATER MANAGEMENT

4.1 Hydrology

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, Liverpool City Council Development Control Plan 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).

4.1.2 Minor/ Major System Design

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 (to the provided OSD tank) have also been provided which will limit major property damage and any risk to the public in the event of a piped system failure.

4.1.3 Rainfall Data

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

4.1.4 Runoff Models

The calculation of the runoff from storms of the design ARI will be calculated with the catchment modelling software DRAINS using council nominated IFD data.

The design parameters for the DRAINS model are to be based on typical parameters for the area and are as follows:

Model	Model for Design and analysis run	Rational method	
	Rational Method Procedure	ARR87	
	Soil Type-Normal	3.0	
	Paved (Impervious) Area Depression Storage	1	mm
	Supplementary Area Depression Storage	1	mm
	Grassed (Pervious) Area Depression Storage	5	mm
AMC	Antecedent Moisture Condition (ARI=1-5 years)	2.5	
AMC	Antecedent Moisture Condition (ARI=10-20 years)	3.0	
AMC	Antecedent Moisture Condition (ARI=50-100 years)	3.5	
	Sag Pit Blocking Factor (Minor Systems)	0	
	On Grade Pit Blocking Factor (Minor Systems)	0	
	Sag Pit Blocking Factor (Major Systems)	0.5	
	On Grade Pit Blocking Factor (Major Systems)	0.2	
	Inlet Pit Capacity		

Table 4.1: DRAINS Parameters

4.2 Hydraulics

4.2.1 General Requirements

Hydraulic calculations 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 Major System runoff. Where the pipes and junctions are sealed, this freeboard would not be required.

The calculated water surface for the peak runoff from the Major System runoff will not exceed a freeboard level of 300mm below the finished floor level of the building.

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

The piped system has been designed to convey all storms up to and including the 20-year ARI. Dedicated flow paths have been shown which will convey stormwater from the site to OSD system and in the event of full system blockage to the existing waterway to the north.

4.3 **Site Drainage**

4.3.1 Existing Site Drainage

The property is currently undeveloped with no formal in-ground drainage located on site.

The 6.97 Ha catchment is drained to a Bringelly Road Business Hub Estate sediment basin located on the north eastern side of the property. Discharge from the site is made to the existing natural waterway also toward the north of the site.

4.3.2 Proposed Site Drainage

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

The minor system is to consist of a piped drainage system which has been designed to accommodate the 1 in 20-year ARI storm event (Q20). This results in the piped system being able to convey all stormwater runoff up to and including the Q20 event. This meets the requirements of LCC and is the minimum recommended capacity for an industrial development.

The major system will be designed to cater for storms up to and including the 1 in 100-year ARI storm event (Q100). The major system will employ the use of defined overland flow paths, such as roads and open channels, to safely convey excess run-off from the site.

The design of the stormwater system for this site will be based on relevant national design guidelines, Australia Standard Codes of Practice, the standard of LCC 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 Institute of Engineers, Australia

publication “Australian Rainfall and Runoff” (1988 Edition), Volumes 1 and 2 (ARR).

Stormwater Management is required to be provided for water quantity and quality in accordance with the requirements of LCC DCP. Further discussion on the Stormwater Management Strategy is provided in **Section 5** and **6** of this report. Reference to drawings **CO11994.10-DA41 & DA42** shows the proposed drainage layout. The stormwater management strategy has been completed with consideration to the estate management strategy as defined by Northrop Consulting Engineers as part of SSD_6324.

4.3.3 Proposed Site Discharge

Discharge from the site is proposed at on the north of the property, via an existing stormwater pit, as per estate management strategy as defined by Northrop Consulting Engineers as part of SSD_6324.

4.4 **Flooding**

Liverpool City Council’s ePlanning portal demonstrates that the Bedwell Park Wetlands area has no risk of flooding as seen in **Figure 4.1** below.

Flood requirements for the estate have been assessed and approved as part of the SSD_6324 approval. As described in *Section 5.3* of the approved engineering report by Northrop Consulting (November 2014), with the proposed works are clear of any flood affected areas and with the provision of on-site detention measures, the proposed development will not affect flows or flooding within Bedwell Park Wetland. A short summary of the findings of the approved report and figures is included for reference.

Bewsher Consulting had carried out flooding assessment and prepared a flood management plan for Council in 2011. The Bedwell Park Wetland, downstream of the development site (refer to **Figure 4.2** for location) is discussed in this plan as follows:

- Pond A contains permanent water storage and flows through to Pond B downstream via two (2) 825mm diameter pipes and overflows at RL53.1m AHD
- Pond B discharges to an open channel downstream via a piped drainage system and has a spillway level at RL51.2m AHD
- Flood modelling results indicate that water levels in Ponds A and B increase to RL53.20m AHD and RL51.58m AHD respectively in the 1% AEP flood.

The Probable Maximum Flood (PMF) is conservatively estimated to be at RL53.50m AHD, 300mm above the top water level at RL53.20m. Taking into account the effects of climate change and applying a conservative increase of 500mm in flood levels and adopting 500mm of freeboard to the PMF, building pads and buildings would need to be set at a minimum level at RL54.50m.

The proposed building level is 69.50m. This has a clearance of more than 10m to the predicted PMF flood levels, hence flood immunity is provided to the building.

Local overland flows from pavement runoff etc have been accounted for within the building design as described in other sections of the report.

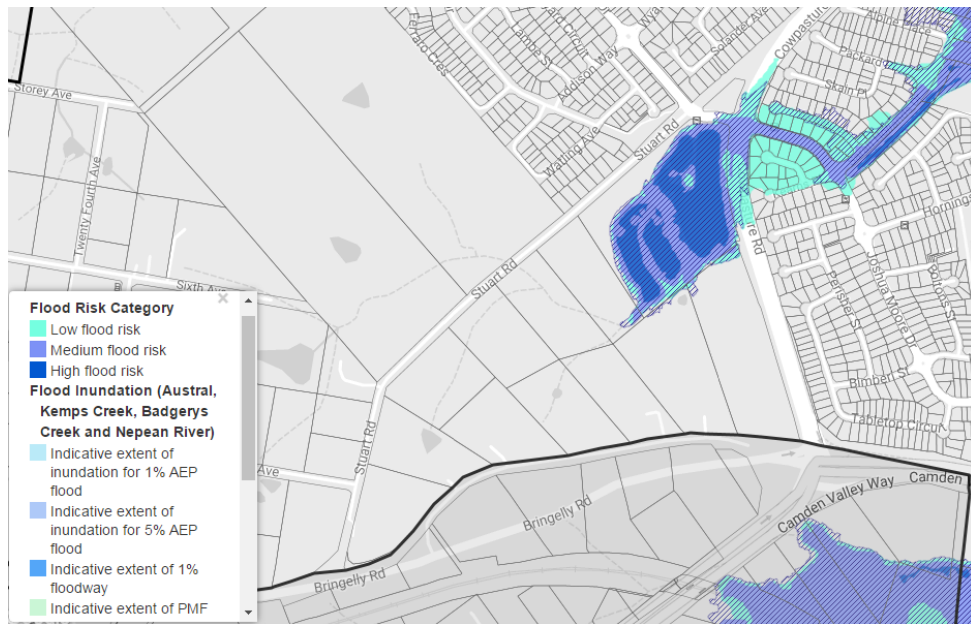


Figure 4.1 Flood risk (Source: Liverpool City Council, ePlanning Portal)



Figure 4.2 Bedwell Park Wetland (Source: Nearmap 2017)

4.5 Site Water Balance Objectives

A daily site water balance analysis was undertaken to determine the feasibility of the proposed rain and stormwater harvesting scheme and in particular the effects of various storage sizes for stormwater harvesting along with changes to demand.

The water balance utilised flows generated using a simple runoff calculation using historical rainfall data, analysed for various rainfall patterns including dry, mean and wet rainfall years. The purpose for modelling dry, mean and wet years was to assess the performance of various tank sizes given the changes to rainfall patterns.

4.6 Water Use Management Features

4.6.1 Existing

Existing water use features comprise Sydney Water Mains supply.

There will be no existing rainwater harvesting systems, or water extractions as the proposed site is currently vacant.

There are no current irrigated landscaped areas.

4.6.2 Proposed

Proposed management measures for water use are as follows:

- Existing Sydney Water mains supply is proposed to be maintained throughout the duration of the proposed site operation;
- Stormwater harvesting throughout rainwater reuse to reduce demand on non-potable water uses;
- Sprinkler water storage via Sydney Water mains.

A concept diagram for the proposed re-use scheme on site is shown in **Figure 4.3** below.

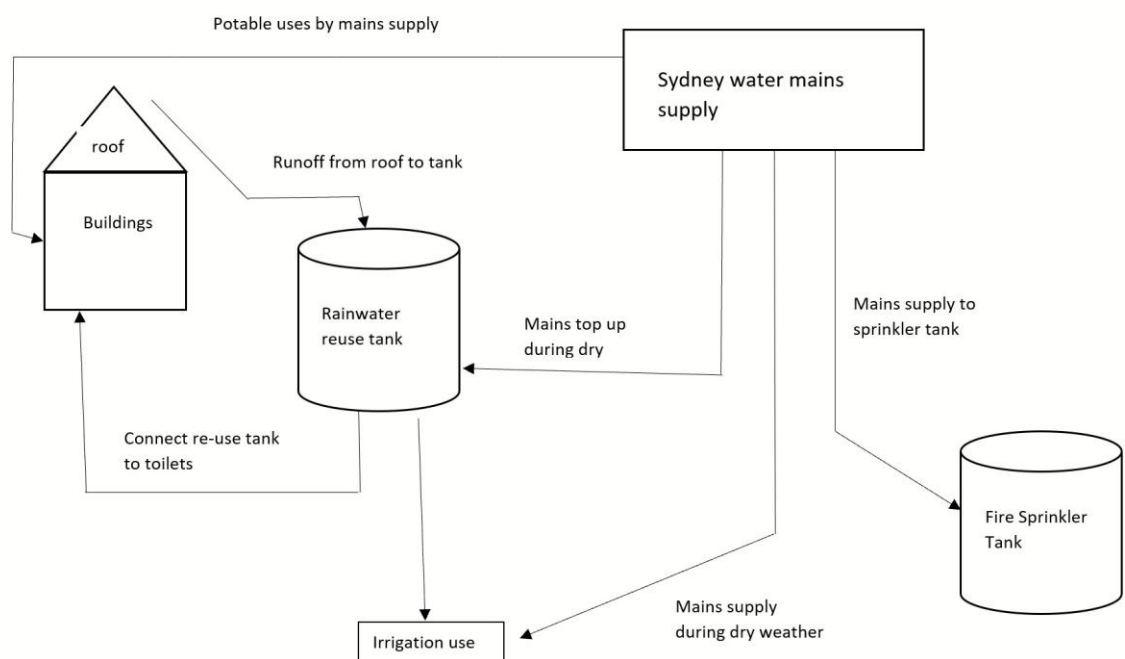


Figure 4.3. Water Cycle Management Schematic

A short description of the expected stormwater harvesting for the development is described below.

Stormwater Harvesting

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

Rainwater harvesting is proposed for this development, and rainwater tank sizing will be designed during detail design stage by the hydraulic consultant via a water balance assessment. Rainwater tanks are to be sized with reference to the NSW Department of Environment and Conservation document *Managing Urban Stormwater: Harvesting and Reuse*, using a simple water balance analysis to balance the supply and demand, based on the base water demands and the requirements of Council.

The water balance assessment will be based on local rainfall data and specific utilisation rates for the facility for re-use of non-potable applications. The expected reuse applications include internal uses such as toilet flushing, and external applications including irrigation.

In general terms the rainwater harvesting system will be comprised the following elements:

- In-line tank for the collection and storage of rainwater.
- Overflow to the in-ground stormwater drainage system sized to cater for the catchment being drained to the tank. This will operate at times when the rainwater storage tank is full so that 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 to toilets and external irrigation areas, and any other uses as defined in the Construction Certificate stage of the design.
- Mains top up to Sydney Water system for prolonged periods of dry weather.
- First flush diverter and filters to ensure adequate quality of reuse water.
- Tank material will be steel or polymer and appropriately located to minimise visual impact.

4.7 Water Balance Assessment

4.7.1 Internal Base Water Demand

The proposed development is expected to generate 240 operational jobs. The site is expected to operate with a two-shift roster, thus it is expected that there will be 120 employees on site per operational day.

Potable water demand is based on each employee using 25 litres per day for showering and inside tap use.

These rates give the following internal non-potable demand:

Potable Water	120 People	3.0 kL/day
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Indoor non-potable water demand has been based on each employee using 15 litres of potable water per day for toilet flushing which is typical of an office environment which uses energy efficient flushing devices.

These rates give the following internal non-potable demand:

Toilet Flushing	120 People	1.8 kL/day
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4.7.2 Fire Services Base Demand

The proposed sprinkler tank for fire services requires a storage of 600 kL. These are expected to be serviced twice yearly, hence total yearly demand of 1200 kL has been allowed.

Fire Services	3.29 kL/day
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4.7.3 Irrigation Base Water Demand

External water consumption within each landscaping system varies depending upon the nature of the irrigation system, species of planting, and the prevailing climate. For this development, the base case outdoor potable water demand has been modelled using a simple rainwater balance. The proposed irrigation system will be a drip-fed system with application rates averaging 10 L/m² (i.e. 10 mm/m²). For the purposes of our analysis the average of this application rate has been used, in conjunction with the application regime shown in **Table 4.2**, to determine the monthly and total yearly demand.

Table 4.2. External Irrigation Application Schedule

Month	No. of Applications
January	12
February	12
March	10
April	9
May	8
June	4
July	4
August	4
September	8
October	9
November	10
December	12

The above regime for the landscaped area for the site gives the following yearly outdoor water demands:

Proposed Development	Area=2200m ²	2244 kL/year 6.15 kL/day
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4.7.4 Rainwater Tank Sizing

The use of rainwater reduces the mains water demand and the amount of stormwater runoff. By collecting the rainwater run-off from roof areas, rainwater tanks provide a valuable water source suitable for flushing toilets and landscape irrigation.

Rainwater tanks were designed using the MUSIC water quality modelling software, based on calculated base water demands and proposed roof catchment areas. Allowances in the calculation were made for efficiency of collection, absorption/ evaporation losses. Refer **Appendix D** for the MUSIC model.

Table 4.3. Rainwater Reuse Requirements

Roof Catchment to Rainwater Tank (m ²)	Tank Size (kL)	Predicted Non-Potable Demand Reduction (%)
7210	40	50

The water balance assessment predicts 50% reduction in non-potable will be met for the developments with the provision of rainwater tanks as specified in **Table 4.3** above.

We note that the final configuration and sizing of the rainwater tanks is subject to detail design considerations and optimum site utilisation.

4.7.5 Overall Water Cycle Management

The following **Table 4.4** shows overall water cycle and each water source.

Table 4.4. Overall Water Cycle

Area	Daily Demand (kL/ Day)	
	Via Harvesting/ Reuse	Via Mains
Internal	0.90	3.90
External	3.08	3.08
Fire	-	3.29
Total	3.98	10.27

4.8 Operational Impact Assessment

Rainwater harvesting is proposed to reduce demand on non-potable applications.

An existing and reliable water supply is available during operations.

Impact on environment from water use is considered to be acceptable.

5 STORMWATER QUANTITY MANAGEMENT

Liverpool City Council requires water quantity management, or stormwater detention, to be provided to limit the runoff discharged from private property into the underground piped drainage system to pre-developed flow and to assist in mitigating the increased stormwater runoff generated by development.

Attenuation of stormwater runoff from the catchment on the development is proposed to be managed via an on-site detention tank provided in the north of the site. As set out in the estate management strategy as defined by Northrop Consulting Engineers as part of SSD_6324, the objective for stormwater discharge is to attenuate stormwater flow from the development to pre-developed flows, consistent with Liverpool City Council policy and engineering practice.

Sizing of the basin system has been completed using DRAINS modelling software in accordance with the Liverpool City Council Policy for the 1 in 5 year ARI to 1 in 100 year ARI storms for various durations.

Table 5.1 provides details for the pre and post development flows and storage for the total detention system. The critical storm duration for the 1 in 5 year, 1 in 20 year and for the 1 in 100 year ARI storms are 2 hours. Flows and storage information are provided for these storms.

ARI	Pre-developed Flow (m ³ /s)	Post-developed Flow (m ³ /s)	
		Un-attenuated	Attenuated
5	1.31	2.02	1.05
20	1.78	2.37	1.27
100	2.24	2.88	1.64

Table 5.1. Site and Detention Hydrology

The indicative location of the detention tank can be found on Drawing **Co11994.10-DA41**.

Indicative hydrological and storage arrangements are shown below, **Table 5.2**.

ARI	Post Developed Flow (m³/s)					Storage (m³)
	Un-attenuated	Attenuated				
		Low Flow	High Flow	Bypass	Total	
5	2.02	1.00	0	0.15	1.05	790
20	2.37	1.20	0	0.22	1.27	1160
100	2.88	1.64	0.21	0.26	1.74	1560

Table 5.2. OSD Tank Storage and Flow Arrangement

The modelling has shown that, with the provision of a total storage volume of 1560m³ contained in the modelled system, stormwater flows from the development will be attenuated to pre-development flows. Detention storage will be fully active and will be provided as an OSD tank in the north of the property. The proposed detention system meets the policy requirements of Liverpool City Council.

6 STORMWATER QUALITY CONTROLS

6.1 Regional Parameters

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

Liverpool City Council have nominated, in *Section 6.4* of their *DCP 2008 & MUSIC Link*, the requirements for stormwater quality to be performed on a catchment wide basis. These are presented in terms of annual percentage pollutant reductions on a developed catchment and are as follows:

Gross Pollutants	90%
Total Suspended Solids	85%
Total Phosphorus	65%
Total Nitrogen	45%
Total Hydrocarbons	90%

6.2 Proposed Stormwater Treatment System

Stormwater Treatment Measures (STM's) are to be implemented in accordance with the Liverpool Council Policy and the strategy and measures outlined in the Bringelly Road Business Hub Engineering Report by Northrop Engineers (Ref:140089) approved under SSD_6324. The STM's are to be sized according to the new development area only.

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 development are as follows:

- Primary treatment to parking, hardstand & roof areas is to be performed via an appropriately sized Gross Pollutant Trap (GPT) located on site. The proposed system is the Rocla CDS GPT or similar;
- Tertiary treatment is to be made off-lot, via the Bedwell Park Wetland located to the north-east of the estate. The Bedwell Park Wetland will provide treatment of nutrients and sediments as set out in the Northrop Report quoted above. Stormwater discharge to the Bedwell Park Wetland is via an overland flow path to the north of the site.

6.3 Stormwater Harvesting

Refer to **Section 4.6** for the description of the stormwater harvesting system proposed on site.

A nominal tank size is subject to detailed analysis during detail design stage by the Hydraulic Engineering Consultant. The tank will be located on site to best suit the development layout and servicing needs.

6.4 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 6.3** 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 6.3. 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.
OSD SYSTEM			
Check all items nominated for SWALES/ LANDSCAPED AREAS above	Refer to SWALES/ LANDSCAPED AREAS section above	Refer to SWALES/ LANDSCAPED AREAS section above	Refer to SWALES/ LANDSCAPED AREAS section above
Inspect and remove any blockage from orifice	Six Monthly	Maintenance Contractor/ Owner	Remove grate and screen to inspect orifice.
Inspect trash screen and clean	Six Monthly	Maintenance Contractor/ Owner	Remove grate and screen if required to clean it.

MAINTENANCE ACTION	FREQUENCY	RESPONSIBILITY	PROCEDURE
Inspect flap valve and remove any blockage.	Six Monthly	Maintenance Contractor/ Owner	Remove grate. Ensure flap valve moves freely and remove any blockages or debris.
Inspect pit sump for damage or blockage.	Six Monthly	Maintenance Contractor/ Owner	Remove grate & screen. Remove sediment/ sludge build up and check orifice and flap valve is clear.
Inspect storage areas and remove debris/ mulch/ litter etc likely to block screens/ grates.	Six Monthly	Maintenance Contractor/ Owner	Remove debris and floatable materials.
Check attachment of orifice plate and screen to wall of pit	Annually	Maintenance Contractor	Remove grate and screen. Ensure plate or screen mounted securely, tighten fixings if required. Seal gaps if required.
Check orifice diameter is correct and retains sharp edge.	Five yearly	Maintenance Contractor	Compare diameter to design (see Work-as-Executed) and ensure edge is not pitted or damaged.
Check screen for corrosion	Annually	Maintenance Contractor	Remove grate and screen and examine for rust or corrosion, especially at corners or welds.
Inspect overflow weir and remove any blockage	Six monthly	Maintenance Contractor/ Owner	Ensure weir is free of blockage.
Inspect walls for cracks or spalling	Annually	Maintenance Contractor	Remove grate to inspect internal walls, repair as necessary.
Check step irons	Annually	Maintenance Contractor	Ensure fixings are secure and irons are free from corrosion.

MAINTENANCE ACTION	FREQUENCY	RESPONSIBILITY	PROCEDURE
INLET & JUNCTION PITS			
Inside of pits	Six Monthly	Maintenance Contractor	Remove grate and inspect internal walls and base, repair where required. Remove any collected sediment, debris, litter.
Outside of pits	Four Monthly/ After Major Storm	Maintenance Contractor	Clean grate of collected sediment, debris, litter and vegetation.
PROPRIETARY TREATMENT DEVICES (ROCLA CDS or Equiv.)			
Refer to Manufacturers Operation and Maintenance Manual	Annually	Maintenance Contractor	Refer to Manufacturers Operation and 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.

7 EROSION & SEDIMENT CONTROL PLAN

An erosion and sediment control plan (ESCP) is shown on drawings **CO11994.10-DA20 & DA25**. 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.

7.1 General Conditions

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

7.2 Land Disturbance

Where practicable, the soil erosion hazard on the site will be kept as low as possible and as recommended in **Table 7.1**

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

7.3 Erosion Control Conditions

- 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.
- 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.
- Where practicable, schedule the construction program so that the time from starting land disturbance to stabilisation has a duration of less than six months.
- 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.
- 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.
- Where practical, foot and vehicular traffic will be kept away from all recently established areas
- Earth batters shall be constructed in accordance with the Geotechnical Engineers Report or with as low 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

- All earthworks, including waterways/drains/spillways and their outlets, will be constructed to be stable in at least the design storm event.
- 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.

7.4 Pollution Control Conditions

- 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.
- Sediment fences will:
 - 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.

- 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
- 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.
- 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.
- 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.
- Temporary soil and water management structures will be removed only after the lands they are protecting are stabilised.

7.5 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.

7.6 Site Inspection and Maintenance

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

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.

Waste bins will be emptied as necessary. Disposal of waste will be in a manner approved by the Site Superintendent.

Proper drainage will be maintained. To this end drains (including inlet and outlet works) will be checked to ensure that they are operating as intended, especially that,

No low points exist that can overtop in a large storm event

Areas of erosion are repaired (e.g. lined with a suitable material) and/or velocity of flow is reduced appropriately through construction of small check dams or installing additional diversion upslope.

Blockages are cleared (these might occur because of sediment pollution, sand/soil/spoil being deposited in or too close to them, breached by vehicle wheels, etc.).

Sand/soil/spoil materials placed closer than 2 meters from hazard areas will be removed. Such hazard areas include areas of high velocity water flows (e.g. waterways and gutters), paved areas and driveways.

Recently stabilised lands will be checked to ensure that erosion hazard has been effectively reduced. Any repairs will be initiated as appropriate.

Excessive vegetation growth will be controlled through mowing or slashing.

All sediment detention systems will be kept in good, working condition. In particular, attention will be given to:

- Recent works to ensure they have not resulted in diversion of sediment laden water away from them
- Degradable products to ensure they are replaced as required, and
- Sediment removal, to ensure the design capacity or less remains in the settling zone.

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.

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.

Erosion and sediment control measures will be maintained in a functioning condition until all earthwork activities are completed and the site stabilised

Litter, debris and sediment will be removed from the gross pollutant traps and trash racks as required.

8 CONCLUSION

This *Civil Engineering Report* has been prepared to support the SSD_8586218 development application for a proposed warehouse facility at Lot 4 in Bringelly Road Business Hub on Bringelly Road, Horningsea Park.

A civil engineering strategy for the site has been developed which provides a best fit solution within the constraints of the existing landform, structures and pavements, the proposed architectural layout and the Stormwater Management Strategy as defined by Northrop Consulting Engineers as part of SSD_6324 and SEAR's requirements of SSD_8586218. The stormwater quality and quantity management strategy has been developed to reduce pollutant loads in stormwater leaving this site in accordance with engineering principles and council policy.

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.

Appendix A

DRAWINGS BY COSTIN ROE CONSULTING

*PROPOSED WAREHOUSE FACILITY
LOT 4, BRINGELLY ROAD, HORNINGSEA PARK, NSW 21
CIVIL DRAWINGS FOR DEVELOPMENT APPLICATION*

DRAWING LIST

DRAWING NO.	DRAWING TITLE
C011994.10-DA10	DRAWING LIST & GENERAL NOTES
C011994.10-DA20	EROSION AND SEDIMENT CONTROL PLAN
C011994.10-DA25	EROSION AND SEDIMENT CONTROL DETAILS
C011994.10-DA30	BULK EARTHWORKS PLAN
C011994.10-DA35	BULK EARTHWORKS SECTIONS - SHEET 1
C011994.10-DA36	BULK EARTHWORKS SECTIONS - SHEET 2
C011994.10-DA41	STORMWATER DRAINAGE PLAN - SHEET 1
C011994.10-DA42	STORMWATER DRAINAGE PLAN - SHEET 2
C011994.10-DA45	STORMWATER DRAINAGE DETAILS - SHEET 1
C011994.10-DA46	STORMWATER DRAINAGE DETAILS - SHEET 2
C011994.10-DA51	FINISHED LEVELS PLAN - SHEET 1
C011994.10-DA52	FINISHED LEVELS PLAN - SHEET 2
C011994.10-DA55	TYPICAL SECTIONS

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.
- G7 DRAWING TO BE READ IN CONJUNCTION WITH ENGINEERING REPORT C01994.01-05.rpt

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 ERRECTED CONVEX TO THE TOE OF SLOPE 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. CLEARING 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.
18. SPATIAL SURVEYORS REF 1938804, DATED 27/11/2019.
19. STRIP ANY TOP SOIL OR DELETERIOUS MATERIAL AND DISPOSE OF FROM SITE OR STORE AS DIRECTED.
20. 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.
21. PREPARE STEEP BATTERS TO RECEIVE FILL BY CONSTRUCTING BENCHING TO FACILITATE FILL PLACEMENT AND COMPACTION.
22. AREAS TO RECEIVE FILL (THAT ARE NOT ON BENCHMARKED BATTERS) AND AREAS IN CUT SHALL BE PROOF ROLLED TO IDENTIFY ANY SOFT HEAVING MATERIAL. SOFT MATERIAL SHALL BE BOXED OUT AND REMOVED PRIOR TO FILL PLACEMENT. PROOF ROLLING TO BE INSPECTED BY A GEOTECHNICAL ENGINEER OR THE EARTHWORKS DESIGNER.
23. SITE WIND FILL SHALL BE COMPACTED IN MAXIMUM 300mm LAYERS AND TO DRY OR HILF DENSITY RATIOS (STANDARD COMPACTION) OF BETWEEN 98% AND 103%. THE PLACEMENT MOISTURE VARIATION OR HILF MOISTURE VARIATION SHALL BE CONTROLLED TO BE BETWEEN 2% DRY AND 2% WET.
24. IMPORTED FILL SHALL BE COMPACTED IN MAXIMUM 300mm LAYERS AND TO DRY OR HILF DENSITY RATIOS (STANDARD COMPACTION) OF BETWEEN 98% AND 103%. THE PLACEMENT MOISTURE VARIATION OR HILF MOISTURE VARIATION SHALL BE CONTROLLED TO BE BETWEEN 2% DRY AND 2% WET.
25. ALL ENGINEERED FILL PARTICLES SHALL BE ABLE TO BE INCORPORATED WITHIN A SINGLE LAYER. FURTHER, LESS THAN 30% OF PARTICLES SHALL BE RETAINED ON THE 37.5 MIEV. ENGINEERED FILL SHALL BE ABLE TO BE TESTED IN ACCORDANCE WITH THE STANDARD COMPACTION METHOD (AS1289 5.4.1) OR HILF TEST METHOD (AS1289 5.7.1). THESE METHODS REQUIRE LESS THAN 20% RETAINED ON THE 37.5 MIEV. SIEVE. WHERE BETWEEN 20% AND 30% OF PARTICLES ARE RETAINED ON THE 37.5 MIEV SEE THE ABOVE TEST METHODS SHALL STILL BE ADOPTED AND TEST REPORTS ANNOTATED APPROPRIATELY. THESE REQUIREMENTS SHOULD BE MET BY THE MATERIAL AFTER PLACEMENT AND COMPACTION.
26. ALL THE EARTHWORKS UNDERTAKEN AND THE SUBGRADE CONDITION IN THE CUT AREAS (IN THE STATED PERIOD) ARE DOCUMENTED IN THE REPORTS AND HAVE BEEN UNDERTAKEN IN ACCORDANCE WITH THE SPECIFICATION.
27. PRIOR TO ANY EARTHWORKS, EROSION CONTROL AS OUTLINED IN THE EROSION AND SEDIMENTATION CONTROL PLAN SHALL BE COMPLETED.
28. EXISTING ROCK, IF ANY, SHALL BE REMOVED BY HEAVY ROCK BREAKING OR RIPPING.
29. MATCH EXISTING LEVELS AT BATTER INTERFACE.
30. 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.
31. DURING EARTHWORKS THE CONTRACTOR IS TO ENSURE ALL AREAS ARE FREE DRAINING & WILL NOT RETAIN WATER DURING RAINFALL. PROVIDE TEMPORARY MEASURES AS REQUIRED TO ENSURE FREE FLOWING RUNOFF THROUGH MANAGED DRAINAGE PATHS, DIVERSION DRAINS OR OTHER SUITABLE DISPOSAL METHOD AS AGREED DURING THE WORKS. REFER ANY CONCERNS TO THE ENGINEER. REFER TO EROSION AND SEDIMENT CONTROL DRAWINGS AND NOTES.

SITE PREPARATION NOTES:

1. ALL EARTHWORKS SHALL BE COMPLETED GENERALLY IN ACCORDANCE WITH THE GUIDELINES SPECIFIED BY THE GEOTECHNICAL ENGINEER UNDER LEVEL 1 SUPERVISION
2. EXISTING LEVELS ARE BASED ON INFORMATION PROVIDED BY AXIOM SPATIAL SURVEYORS REF 1938804.4 DATED 27/11/2019.
3. STRIP ANY TOP SOIL OR DELETERIOUS MATERIAL AND DISPOSE OF FROM SITE OR TO REUSE
4. COMPLETE CUT TO FILL EARTHWORKS TO ACHIEVE THE REQUIRED LEVELS AS INDICATED ON THE DRAWINGS WITHIN A TOLERANCE OF +0mm/-10mm THROUGH BUILDING PADDS/PAVEMENTS AND +0mm/-20mm ELSEWHERE.
5. PREPARE STEEP BATTERS TO RECEIVE FILL BY CONSTRUCTING BENCHING TO FACILITATE FILL PLACEMENT AND COMPACTION.
6. AREAS TO RECEIVE FILL (THAT ARE NOT ON BENCHED BATTERS) AND AREAS IN CUT SHALL BE PROOF ROLLED TO IDENTIFY ANY SOFT HEAVING MATERIAL. SOFT MATERIAL SHALL BE BOXED OUT AND REMOVED PRIOR TO FILL PLACEMENT AND COMPACTION. THIS SHALL BE SUPERVISED BY A GEOTECHNICAL ENGINEER OR THE EARTHWORKS DESIGNER.
7. SITE WON FILL SHALL BE COMPACTED IN MAXIMUM 300mm LAYERS AND TO DRY OR HALF DENSITY RATIOS (STANDARD COMPACTION) OF BETWEEN 98% AND 103%. THE PLACEMENT MOISTURE VARIATION OR HALF MOISTURE VARIATION SHALL BE CONTROLLED TO BE BETWEEN 2% DRY AND 2% WET.
8. IMPORTED FILL SHALL BE COMPACTED IN MAXIMUM 300mm LAYERS AND TO DRY OR HALF DENSITY RATIOS (STANDARD COMPACTION) OF BETWEEN 98% AND 103%. THE PLACEMENT MOISTURE VARIATION OR HALF MOISTURE VARIATION SHALL BE CONTROLLED TO BE BETWEEN 2% DRY AND 2% WET.
9. ALL ENGINEERED FILL PARTICLES SHALL BE ABLE TO BE INCORPORATED WITHIN A SINGLE LAYER. FURTHER, LESS THAN 30% OF PARTICLES SHALL BE RETAINED ON THE 37.5 MM SIEVE. ENGINEERED FILL SHALL BE ABLE TO BE TESTED IN ACCORDANCE WITH THE STANDARD COMPACTION METHOD (AS1289 5.4.1) OR HALF TEST METHOD (AS1289 5.7.1). THESE METHODS REQUIRE LESS THAN 20% RETAINED ON THE 37.5 MM SIEVE. WHERE BETWEEN 20% AND 30% OF PARTICLES ARE RETAINED ON THE 37.5 MM SIEVE THE ABOVE TEST METHODS SHALL STILL BE ADOPTED AND TEST REPORTS ANNOTATED APPROPRIATELY. THESE REQUIREMENTS SHOULD BE MET BY THE MATERIAL AFTER PLACEMENT AND COMPACTION.
10. ALL THE EARTHWORKS UNDERTAKEN AND THE SUBGRADE CONDITION IN THE CUT AREAS (IN THE STATED PERIOD) ARE DOCUMENTED IN THE REPORTS AND HAVE BEEN UNDERTAKEN IN ACCORDANCE WITH THE SPECIFICATION.
11. PRIOR TO ANY EARTHWORKS, EROSION CONTROL AS OUTLINED IN THE EROSION AND SEDIMENTATION CONTROL PLAN SHALL BE COMPLETED.
12. EXISTING ROCK, IF ANY, SHALL BE REMOVED BY HEAVY ROCK BREAKING OR RIPPING.
13. MATCH EXISTING LEVELS AT BATTER INTERFACE.
14. CONTRACTOR TO MATCH EXISTING LEVELS AT THE INTERFACE OF EARTHWORKS AND EXISTING SURFACE AT BATTERY 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.
15. DURING EARTHWORKS THE CONTRACTOR IS TO ENSURE ALL AREAS ARE FREE DRAINING & WILL NOT RETAIN WATER DURING RAINFALL. PROVIDE TEMPORARY MEASURES AS REQUIRED TO ENSURE FREE FLOWING RUNOFF TO THE MANAGED DRAINAGE PIPES. DIVERSION DRAINS OR OTHER SUITABLE DISPOSAL METHOD AS AGREED DURING THE WORKS. REFER ANY CONCERNS TO THE ENGINEER. REFER TO EROSION AND SEDIMENT CONTROL DRAWINGS AND NOTES.

ELECTRONIC INFORMATION NOTES:

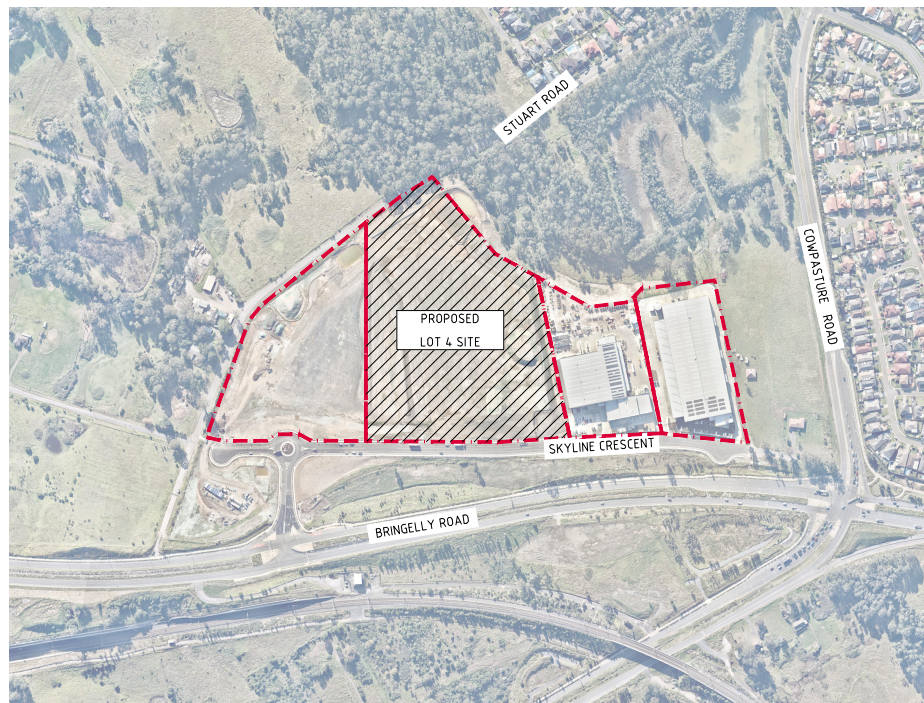
1. THE ISSUED DRAWINGS IN HARD COPY OR PDF FORMAT TAKE PRECEDENCE OVER ANY ELECTRONICALLY ISSUED INFORMATION, LAYOUTS OR DESIGN MODELS.
2. THE CONTRACTOR'S DIRECT AMENDMENT OR MANIPULATION OF THE DATA OR INFORMATION THAT MIGHT BE CONTAINED WITHIN AN ENGINEER-SUPPLIED DIGITAL TERRAIN MODEL AND ITS SUBSEQUENT 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 PLUMBING AND DRAINAGE, PART 3: STORMWATER DRAINAGE.
2. THE MINOR (PIPE) 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. FINISHED PAVEMENT LEVELS SHALL BE AS INDICATED ON FINISHED LEVELS PLANS D&S1 & D&S2.
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 Ø300 TO BE P15 GRADE S80 UNDO PIPE CLASS NOMINATIONS ARE FOR IN-SERVICE LOADING CONDITIONS ONLY. CONTRACTOR IS TO MAKE ANY NECESSARY ADJUSTMENTS REQUIRED FOR CONSTRUCTION CONDITIONS.
9. ALL CONCRETE PITS GREATER THAN 1000mm DEEP SHALL BE REINFORCED USING M12-200 EACH WAY CENTERED IN WALL AND BASE. LAP MINIMUM 300mm where REQUIRED. ALL CONCRETE FOR PITS SHALL BE Fc 25 MPa. PRECAST PITS MAY BE USED WITH THE APPROVAL OF THE ENGINEER.
11. IN ADDITION TO ITEM 6 ABOVE, ALL CONCRETE PITS GREATER THAN 3000mm DEEP SHALL HAVE WALLS AND BASE THICKNESS INCREASED TO 200mm.
12. 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 UNDER AND UNDER BACK OF PIPES AND PIPE FAUCETS, WITH NARROW EDGED RAMMERS OR OTHER SUITABLE TAMPING DETAILS.
22. WHERE PIPE LINES ENTER PITS, PROVIDE 2m LENGTH OF STORMWRAP SLOTTED Ø100 UPVC TO EACH SIDE OF PIPE.
33. ALL SUBSOIL DRAINAGE LINES SHALL BE Ø100 SLOTTED UPVC WITH APPROVED FILTER FABRIC AND 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.
44. ALL PIPE GRADES 1 IN 100 MINIMUM UNDO.
55. PROVIDE STEP IRONS IN PITS DEEPER THAN 1000mm.
66. MIN. 600 COVER TO PIPE OBVERT BENEATH ROADS & CLASS 4 COVER BENEATH LANDSCAPED AREAS TO BE USED.
77. PIT COVERS IN TRAFFICABLE PAVEMENT SHALL BE CLASS D 'HEAVY DUTY'; THOSE IN CONTAINER PAVEMENT SHALL BE CLASS G 'HEAVY DUTY'; AND THOSE LOCATED IN NON-TRAFFICABLE AREAS SHALL BE CLASS B 'MEDIUM DUTY' U.N.O.
88. PROVIDE CLEANING EYES (RODDING POINTS) TO PIPES AT ALL CORNERS AND T-JUNCTIONS WHERE NO PITS ARE PRESENT.
99. 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 EACH LEVEL.
100. 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.

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 EXCEED 1:20 (5%)
9. PERMANENT BATTER SLOPES ARE TO HAVE A MAXIMUM GRADE OF 1V:3H.
10. ALL BATTER SLOPE WITH GRADES AT OR EXCEEDING 1V:6H ARE TO BE TURFED IMMEDIATELY OR APPROPRIATE EROSION CONTROL IS TO BE PROVIDED TO THE SATISFACTION OF THE ENGINEER.
11. ALL FOOTPATHS ARE TO FALL AWAY FROM THE BUILDING AT 25% NOMINAL GRADE.
12. ALL PAVEMENTS ARE TO BE SET AT 50mm BELOW THE FINISHED FLOOR LEVEL OF THE WAREHOUSE AND OFFICE AREAS.



FOR APPROVAL

[illegible]

LEGEND:

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

- DENOTES SILT FENCE WITH CATCH DRAIN
- DENOTES SILT FENCE ONLY
- DENOTES DIVERSION DRAIN
- DENOTES DIRECTION OF FLOW

SEDIMENTATION BASIN NOTE:

FOR SEDIMENT & EROSION CONTROL DETAILS REFER TO DRAWING
C011994.10-DA25.
SEDIMENTATION BASIN SIZING BASED ON RECOMMENDATIONS OF 'SOILS AND
CONSTRUCTION, MANAGING URBAN STORMWATER-THE BLUE BOOK'.
CAPACITY BASED UPON 5 DAY RAINFALL DEPTH AT 85th PERCENTILE
INTENSITY (24.4mm).

APPROXIMATE AREA OF DISTURBED SITE = 7.0 Ha

SEDIMENT BASIN 1:
CATCHMENT AREA = 7.0 Ha
REQUIRED BASIN VOLUME = 1640m³
BASE DIMENSIONS (L X W) = 40.0m x 20.0m
TOP DIMENSIONS (L X W) = 50.0m x 30.0m
MAX SIDE SLOPE = 1V:3H
DEPTH = 1.5m
PROVIDED BASIN VOLUME = 1700m³

SEDIMENTATION BASINS TO COLLECT RUN-OFF IN EXTREME RAINFALL EVENTS.
COLLECTED RUN-OFF TO BE ASSESSED BY A QUALIFIED LABORATORY FOR
DOUSING RATES OF ALUM OR GYPSUM TO ENSURE COAGULATION OF SEDIMENTS
PRIOR TO WATER BEING DISCHARGED TO COUNCIL STORMWATER SYSTEM.

EACH BASIN IS TO HAVE A MARKER PLACED AS PER THE DETAIL TO INDICATE
WHEN SEDIMENT IS TO BE REMOVED. REMOVED SEDIMENT IS TO BE CLASSED
AND DEWATERED PRIOR TO REMOVAL FROM SITE.

ALLOWANCE TO BE MADE DURING BENCHING OF SITE TO ENSURE RUN-OFF IS
DIRECTED TO SEDIMENTATION BASINS.

NOTES:

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



EROSION & SEDIMENT CONTROL PLAN
SCALE 1:500

FOR APPROVAL

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

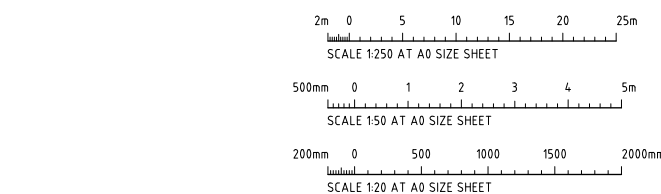
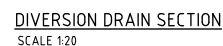
ISSUED FOR APPROVAL			14.08.20	C	ARCHITECT			CLIENT			PROJECT			Costin Roe Consulting Pty Ltd.			DRAWING TITLE		
REVISED AS CLOUDED			06.08.20	B							LOT 4 WAREHOUSE FACILITY			Consulting Engineers			EROSION AND SEDIMENT		
ISSUED FOR INFORMATION			24.07.20	A							BRINGELLY ROAD, BUSINESS HUB			Level 1, 8 Windmill Street			CONTROL PLAN		
AMENDMENTS			DATE	ISSUE	AMENDMENTS			AMENDMENTS			DESIGNED (DRAWN)			Level 1, 8 Windmill Street			DRAWING No.		
			DATE	ISSUE							1.0			Wahah Bay, Sydney NSW 2000			C011994.10-DA20		
			DATE	ISSUE							JULY 20			Tel: (02) 8551-7889 Fax: (02) 9541-3721			C		
			DATE	ISSUE							CHECKED			email: mail@costinroe.com.au ©					
			DATE	ISSUE							SIZE								
			DATE	ISSUE							A0								
			DATE	ISSUE							SCALE								
			DATE	ISSUE							AS SHOWN								
			DATE	ISSUE							CNO REF:								
			DATE	ISSUE							C011994.10-DA20								



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



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.



NOTES:
ALL EROSION & SEDIMENT CONTROL MEASURES TO BE INSPECTED & MAINTAINED DAILY BY SITE MANAGER.

MINIMISE DISTURBED AREAS.

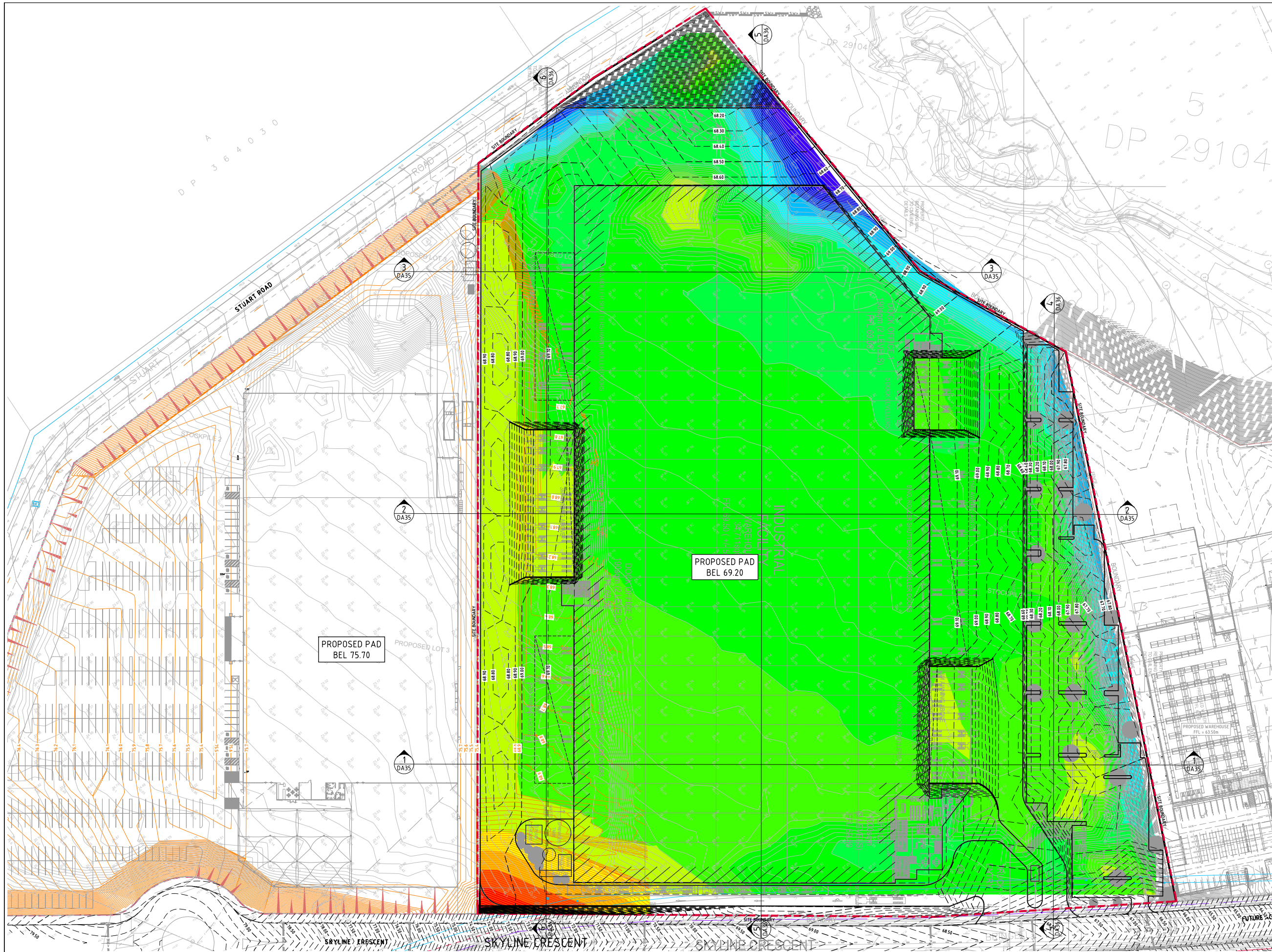
ROADS & FOOTPATHS TO BE SWEEPED DAILY.

12m TURF TO BE PLACED BEHIND KERBS.

DUST MINIMISATION CONTROL BY WATERING TO BE IMPLEMENTED BY SITE MANAGER REQUIRED OR AS DIRECTED BY THE EPA.

FOR APPROVAL

[illegible]



DEPTH RANGE			
No.	FROM DEPTH	TO DEPTH	COLOUR
1	-6.000	-5.000	Red
2	-5.000	-4.000	Orange
3	-4.000	-3.000	Yellow
4	-3.000	-2.000	Light Green
5	-2.000	-1.000	Green
6	-1.000	0.000	Light Blue
7	0.000	1.000	Blue
8	1.000	2.000	Dark Blue
9	2.000	3.000	Very Dark Blue
10	3.000	4.000	Black
11	4.000	5.000	White
12	5.000	6.000	Light Grey
13	6.000	7.000	Medium Grey
14	7.000	8.000	Dark Grey
15	8.000	9.000	Black
16	9.000	10.000	Black

LEGEND
LEVELS DATUM IS AHD.

— 73.00 — - EXISTING CONTOUR
— 73.00 — - PROPOSED ADJOINING EARTHWORKS LEVEL
— 73.00 — - B.E.L. CONTOUR (MAJOR 0.50m)
— 73.10 — - B.E.L. CONTOUR (MINOR 0.10m)

NOMINATED B.E.L. DETAIL
N.T.S.

PAVEMENT FFL
DEPTH OF PAVEMENT. REFER TO STRUCTURAL PLANS FOR DETAILS.
NOMINATED B.E. LEVEL

PAVEMENT
BASE / SUBBASE COURSES
SUBGRADE

EARTHWORKS VOLUMES ESTIMATE

EARTHWORKS VOLUMES:

CUT MATERIAL = - 5,000m³
FILL MATERIAL = + 96,000m³

DETAILED EXCAVATION = - 7,000m³ (1000m³/ha)
OSD TANK = - 2,000m³
RETAINING WALLS = - 15,000m³ (TBC BY D-C CONTRACTOR)

BALANCE = + 67,000m³ (IMPORT)

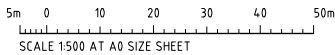
EARTHWORKS VOLUMES ARE APPROXIMATE ONLY AND ARE CALCULATED ASSUMING NO TOPSOIL STRIP AND A NOMINAL 300mm PAVEMENT THICKNESS. NO ALLOWANCE HAS BEEN MADE FOR EROSION AND SEDIMENT CONTROL, BULKING, COMPACTION OF FILLED SOILS.

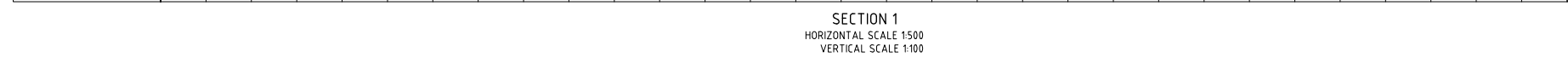
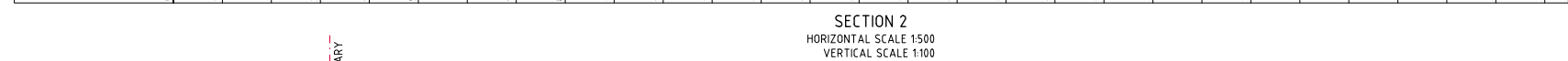
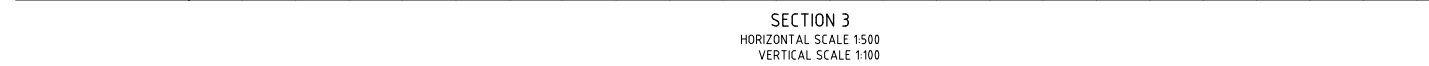
REFER TO DRAWING DA20 FOR EROSION & SEDIMENT CONTROL PLAN.

THE EXISTING SURFACE IS BASED ON INFORMATION PROVIDED BY AXIOM SPATIAL SURVEYORS. THIS SURFACE USED IS THE MOST CURRENT AVAILABLE INFORMATION HOWEVER IT MAY NOT ACCURATELY REFLECT ACTUAL GROUND LEVELS OR STOCKPILES ETC ON SITE. IT IS THE CONTRACTORS RESPONSIBILITY TO CONFIRM VOLUMES AND ALLOWANCES FOR EARTHWORKS.

BULK EARTHWORKS PLAN
SCALE 1:500

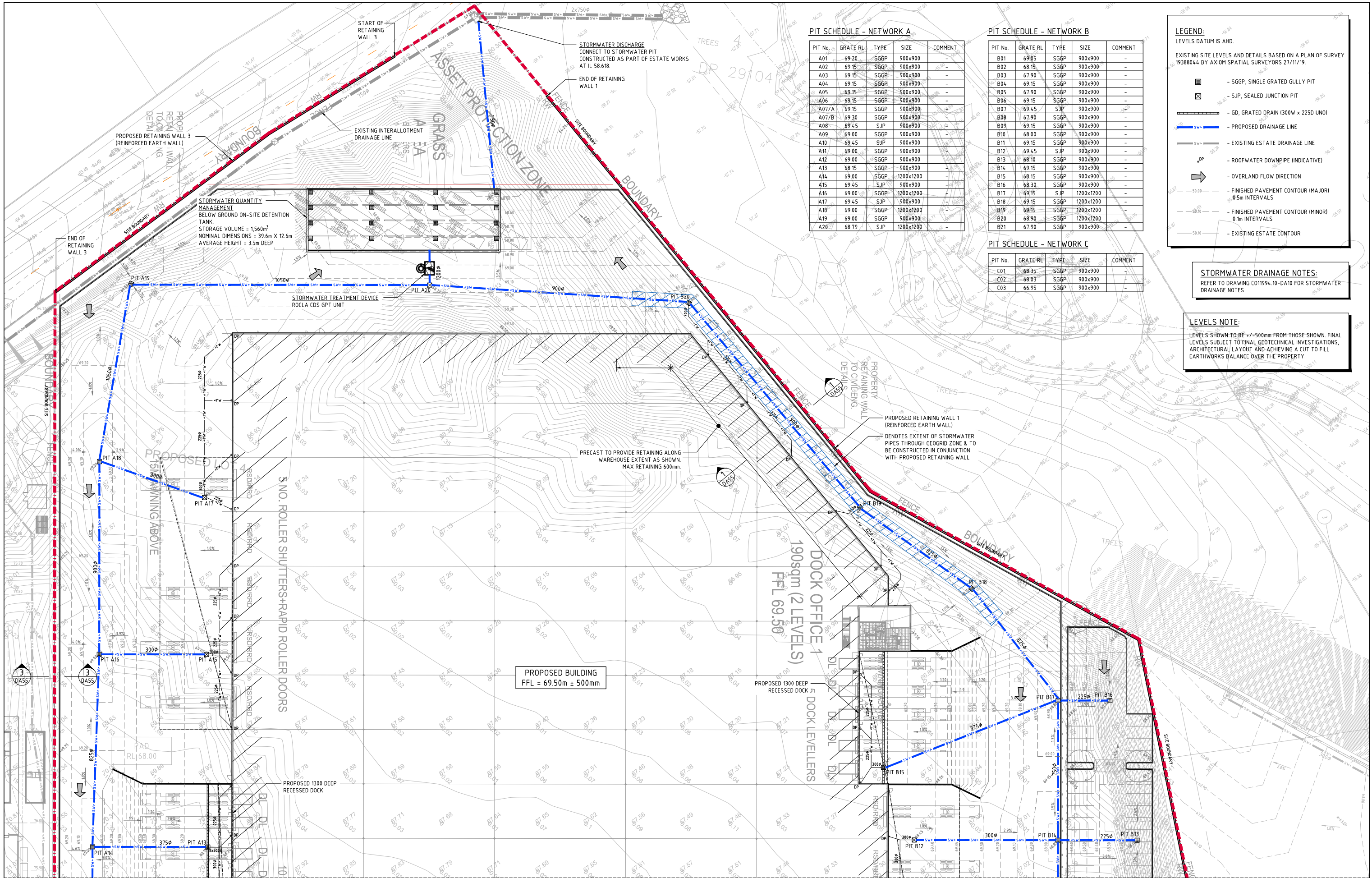
FOR APPROVAL





FOR APPROVAL





PIT SCHEDULE - NETWORK A

PIT No.	GRATE RL	TYPE	SIZE	COMMENT
A01	69.20	SGGP	900x900	-
A02	69.15	SGGP	900x900	-
A03	69.15	SGGP	900x900	-
A04	69.15	SGGP	900x900	-
A05	69.15	SGGP	900x900	-
A06	69.15	SGGP	900x900	-
A07/A	69.15	SGGP	900x900	-
A07/B	69.30	SGGP	900x900	-
A08	69.45	SJP	900x900	-
A09	69.00	SGGP	900x900	-
A10	69.45	SJP	900x900	-
A11	69.00	SGGP	900x900	-
A12	69.00	SGGP	900x900	-
A13	68.15	SGGP	900x900	-
A14	69.00	SGGP	1200x1200	-
A15	69.45	SJP	900x900	-
A16	69.00	SGGP	1200x1200	-
A17	69.45	SJP	900x900	-
A18	69.00	SGGP	1200x1200	-
A19	69.00	SGGP	900x900	-
A20	68.79	SJP	1200x1200	-

PIT SCHEDULE - NETWORK B

PIT No.	GRATE RL	TYPE	SIZE	COMMENT
B01	69.05	SGGP	900x900	-
B02	68.15	SGGP	900x900	-
B03	67.90	SGGP	900x900	-
B04	69.15	SGGP	900x900	-
B05	67.90	SGGP	900x900	-
B06	69.15	SGGP	900x900	-
B07	69.45	SJP	900x900	-
B08	67.90	SGGP	900x900	-
B09	69.15	SGGP	900x900	-
B10	68.00	SGGP	900x900	-
B11	69.15	SGGP	900x900	-
B12	69.45	SJP	900x900	-
B13	68.10	SGGP	900x900	-
B14	69.15	SGGP	900x900	-
B15	68.15	SGGP	900x900	-
B16	68.30	SGGP	900x900	-
B17	69.15	SJP	1200x1200	-
B18	69.15	SGGP	1200x1200	-
B19	69.15	SGGP	1200x1200	-
B20	68.90	SGGP	1200x1200	-
B21	67.90	SGGP	900x900	-

PIT SCHEDULE - NETWORK C

PIT No.	GRATE RL	TYPE	SIZE	COMMENT
C01	68.35	SGGP	900x900	-
C02	68.03	SGGP	900x900	-
C03	66.95	SGGP	900x900	-

LEGEND:

LEVELS DATUM IS AHD.

EXISTING SITE LEVELS AND DETAILS BASED ON A PLAN OF SURVEY 1938044 BY AXIOM SPATIAL SURVEYORS 27/11/19.

- SGGP, SINGLE GRATED GULLY PIT
- SJP, SEALED JUNCTION PIT
- GD, GRATED DRAIN (300W x 225D UNO)
- PROPOSED DRAINAGE LINE
- EXISTING ESTATE DRAINAGE LINE
- ROOFWATER DOWNPIPE (INDICATIVE)
- OVERLAND FLOW DIRECTION
- FINISHED PAVEMENT CONTOUR (MAJOR) 0.5m INTERVALS
- FINISHED PAVEMENT CONTOUR (MINOR) 0.1m INTERVALS
- EXISTING ESTATE CONTOUR

STORMWATER DRAINAGE NOTES:

REFER TO DRAWING C011994.10-DA10 FOR STORMWATER DRAINAGE NOTES

LEVELS NOTE:

LEVELS SHOWN TO BE +/-500mm FROM THOSE SHOWN. FINAL LEVELS SUBJECT TO FINAL GEOTECHNICAL INVESTIGATIONS, ARCHITECTURAL LAYOUT AND ACHIEVING A CUT TO FILL EARTHWORKS BALANCE OVER THE PROPERTY.

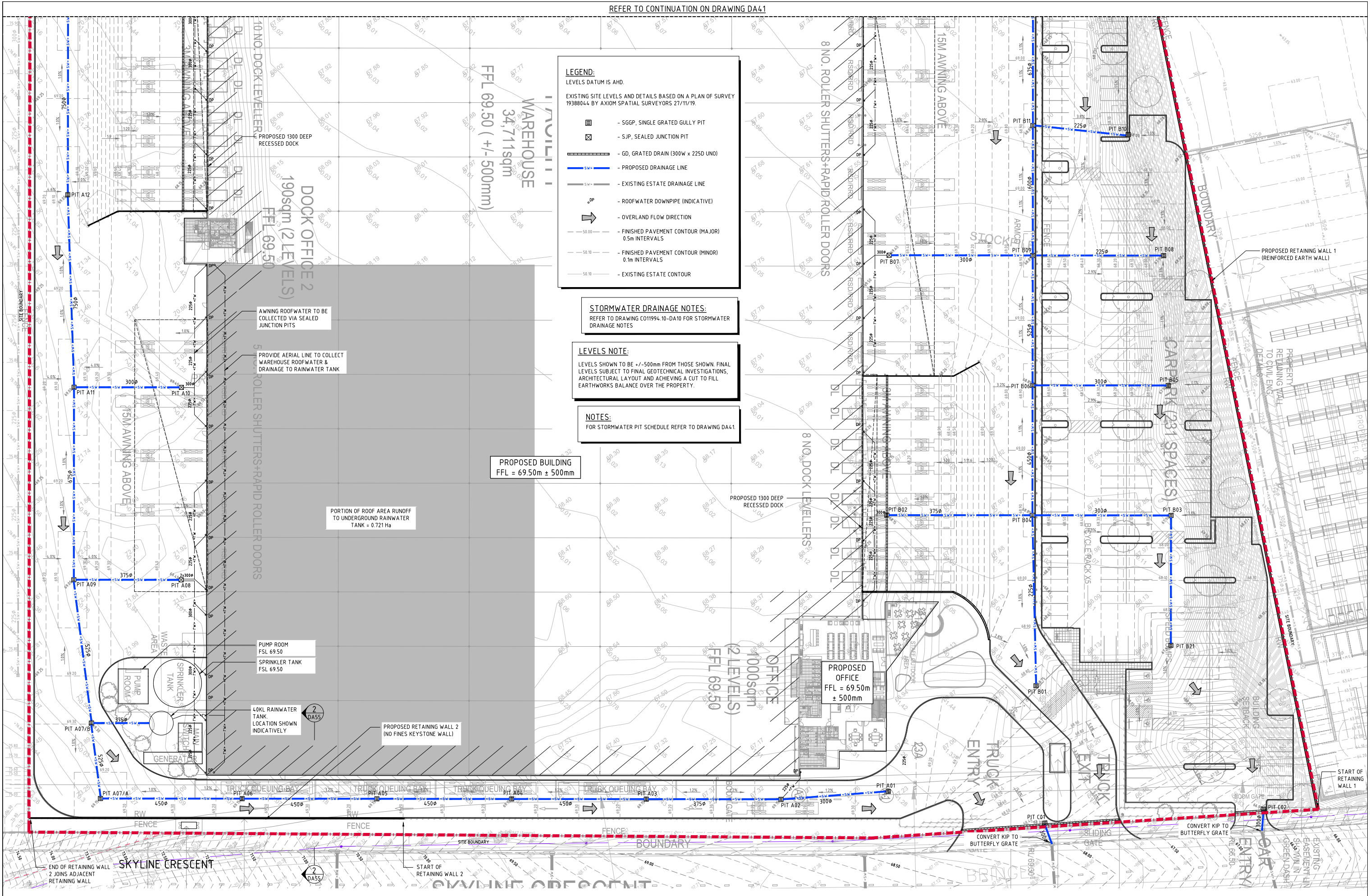
REFER TO CONTINUATION ON DRAWING DA42

STORMWATER DRAINAGE PLAN - SHEET 1
SCALE 1:250

FOR APPROVAL

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

ISSUED FOR APPROVAL REVISED AS CLOURED ISSUED FOR INFORMATION			14.08.20 06.08.20 24.07.20			C B A			AMENDMENTS			DATE			ISSUE			AMENDMENTS			DATE			ISSUE		
PROJECT			ARCHITECT			CLIENT			PROJECT			DRAWING TITLE			DRAWING NO.			REVISION			DATE			ISSUE		
LOT 4 WAREHOUSE FACILITY BRINGELLY ROAD, BUSINESS HUB HORNINGSSEA PARK, NSW			ESR			Costin Roe Consulting Pty Ltd. Consulting Engineers Level 1, 8 Windmill Street Wahah Bay, Sydney NSW 2000 Tel: (02) 8551-7000 Fax: (02) 8541-7021 email: mail@costinroe.com.au			C011994.10-DA41			STORMWATER DRAINAGE PLAN SHEET 1			C011994.10-DA41			PRECISION COMMUNICATION ACCOUNTABILITY			C			C		



LEGEND:
LEVELS DATUM IS AHD.

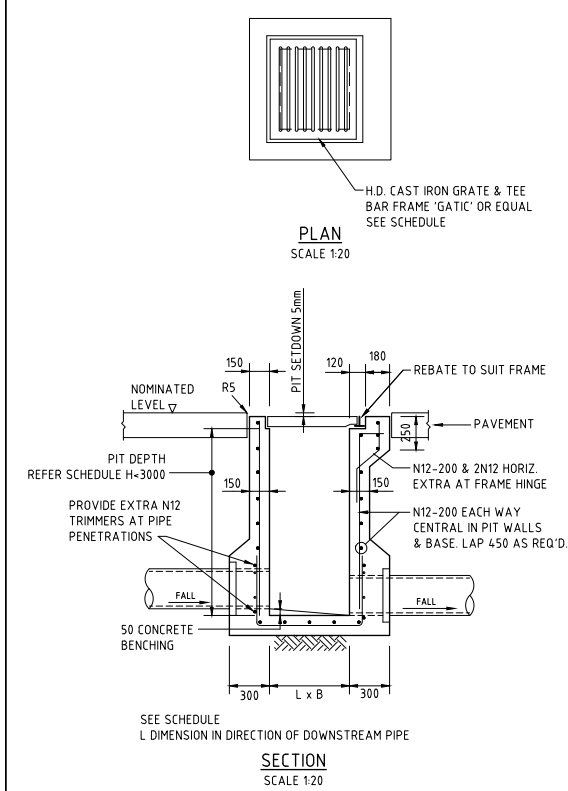
EXISTING SITE LEVELS AND DETAILS BASED ON A PLAN OF SURVEY 1938804.4 BY AXIOM SPATIAL SURVEYORS 27/11/19.

- SGGP, SINGLE GRATED GULLY PIT
- SJP, SEALED JUNCTION PIT
- GD, GRATED DRAIN (300W x 225D UNO)
- PROPOSED DRAINAGE LINE
- EXISTING ESTATE DRAINAGE LINE
- ROOFWATER DOWNPIPE (INDICATIVE)
- OVERLAND FLOW DIRECTION
- FINISHED PAVEMENT CONTOUR (MAJOR) 0.5m INTERVALS
- FINISHED PAVEMENT CONTOUR (MINOR) 0.1m INTERVALS
- EXISTING ESTATE CONTOUR

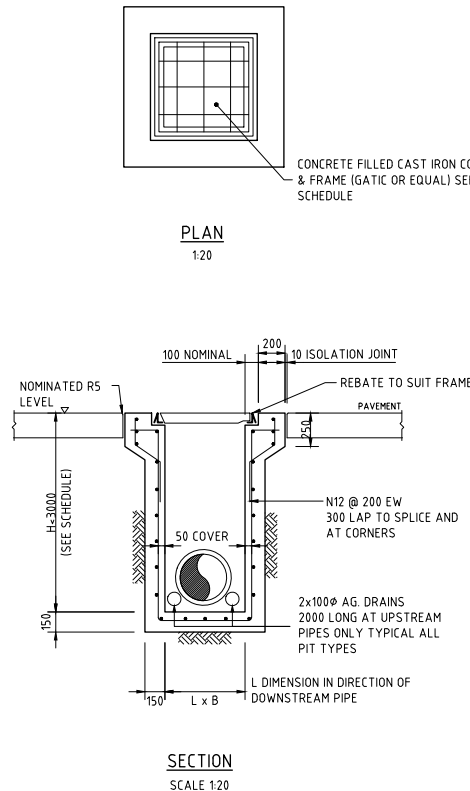
STORMWATER DRAINAGE NOTES:
REFER TO DRAWING C011994.10-DA10 FOR STORMWATER DRAINAGE NOTES

LEVELS NOTE:
LEVELS SHOWN TO BE +/-500mm FROM THOSE SHOWN. FINAL LEVELS SUBJECT TO FINAL GEOTECHNICAL INVESTIGATIONS, ARCHITECTURAL LAYOUT AND ACHIEVING A CUT TO FILL EARTHWORKS BALANCE OVER THE PROPERTY.

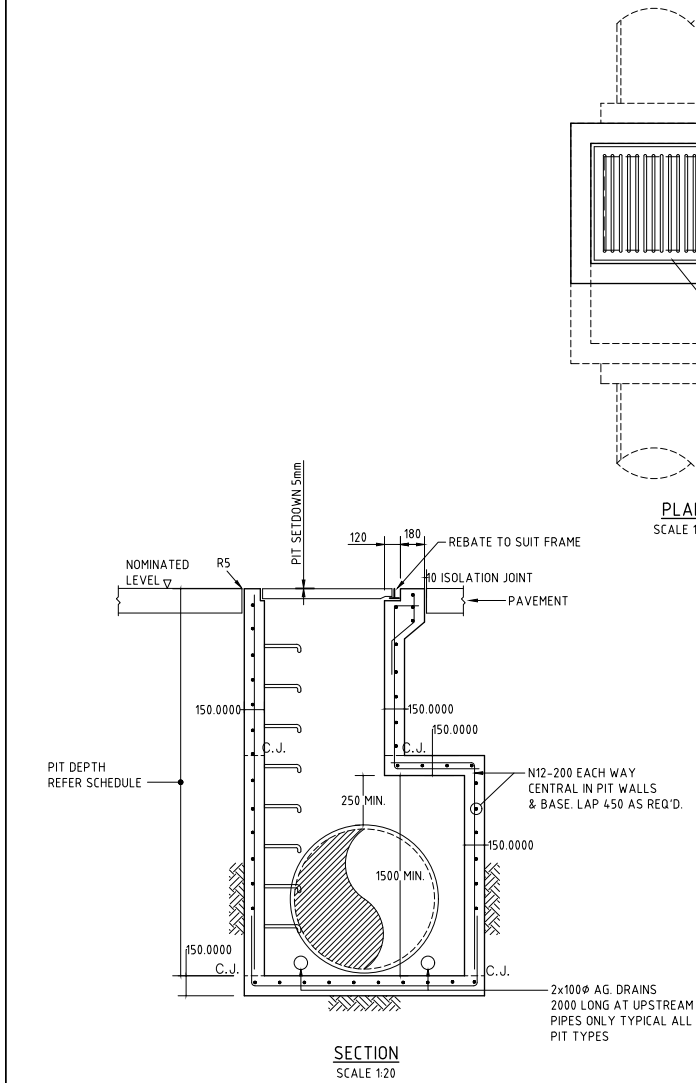
NOTES:
FOR STORMWATER PIT SCHEDULE REFER TO DRAWING DA41.



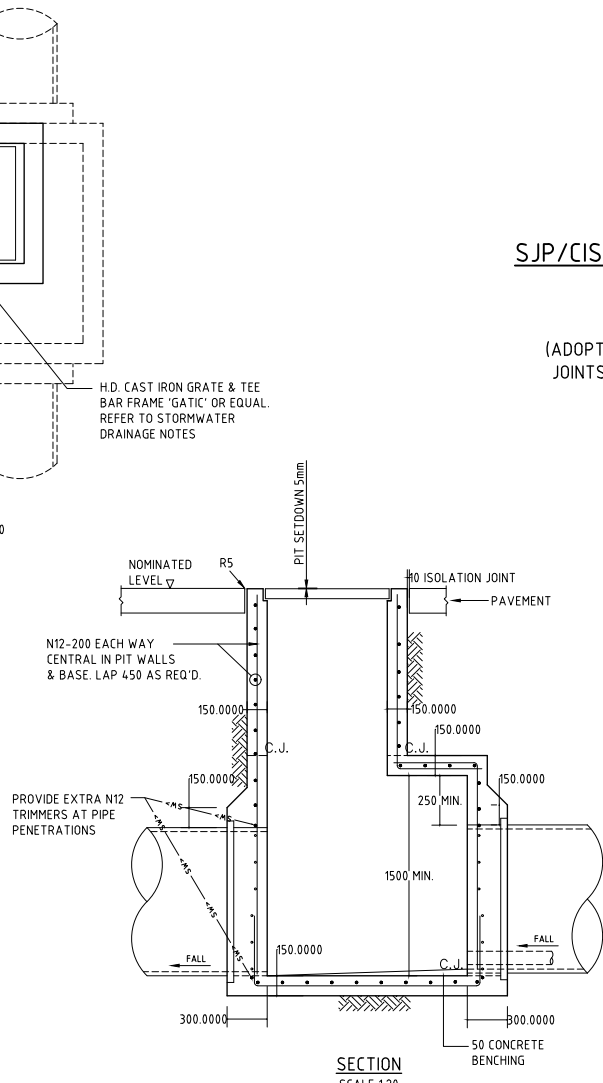
SINGLE GRATED GULLY PIT - SGGP



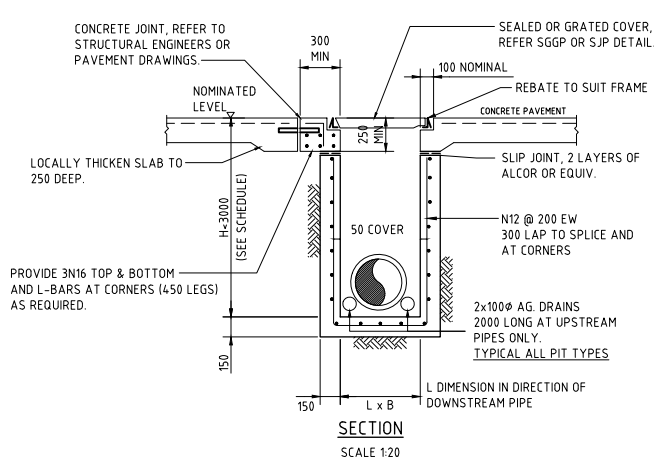
SEALED JUNCTION PIT - SJP



TAPERED SINGLE GRATED GULLY PIT - SGGP

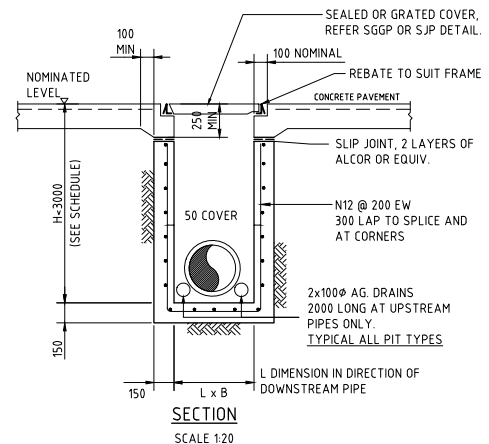


TAPERED SINGLE GRATED GULLY PIT - SGGP



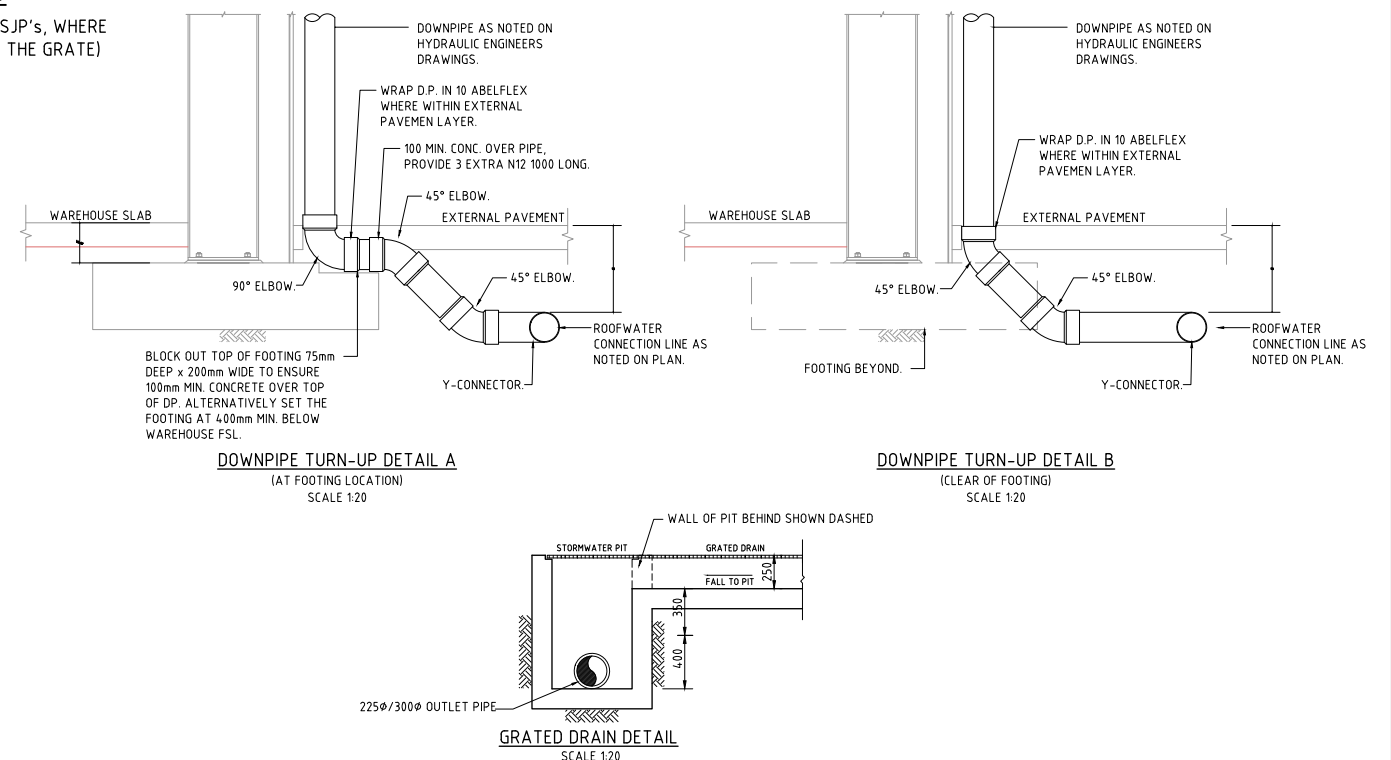
SJP/CIS & SGGP/CIS (CAST IN SLAB) PIT DETAIL GRATE/COVER SUPPORT CAST-INTO PAVEMENT SLAB

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

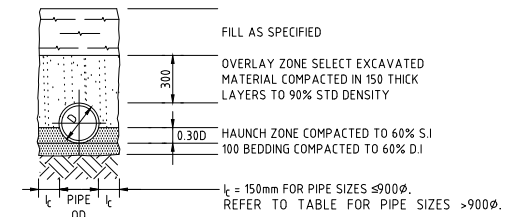


SJP/CIS & SGGP/CIS (CAST IN SLAB) PIT DETAIL GRATE/COVER SUPPORT CAST-INTO PAVEMENT SLAB

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



SUPPORT TO AG. DRAIN



TYPE H1 SUPPORT TO
CONCRETE PIPES AT
LANDSCAPED AREAS

BEDDING & HAUNCH MATERIAL GRADING	
SIEVE SIZE	WEIGHT PASSING(%)
19	100
2.36	100 TO 50
0.60	90 TO 20
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

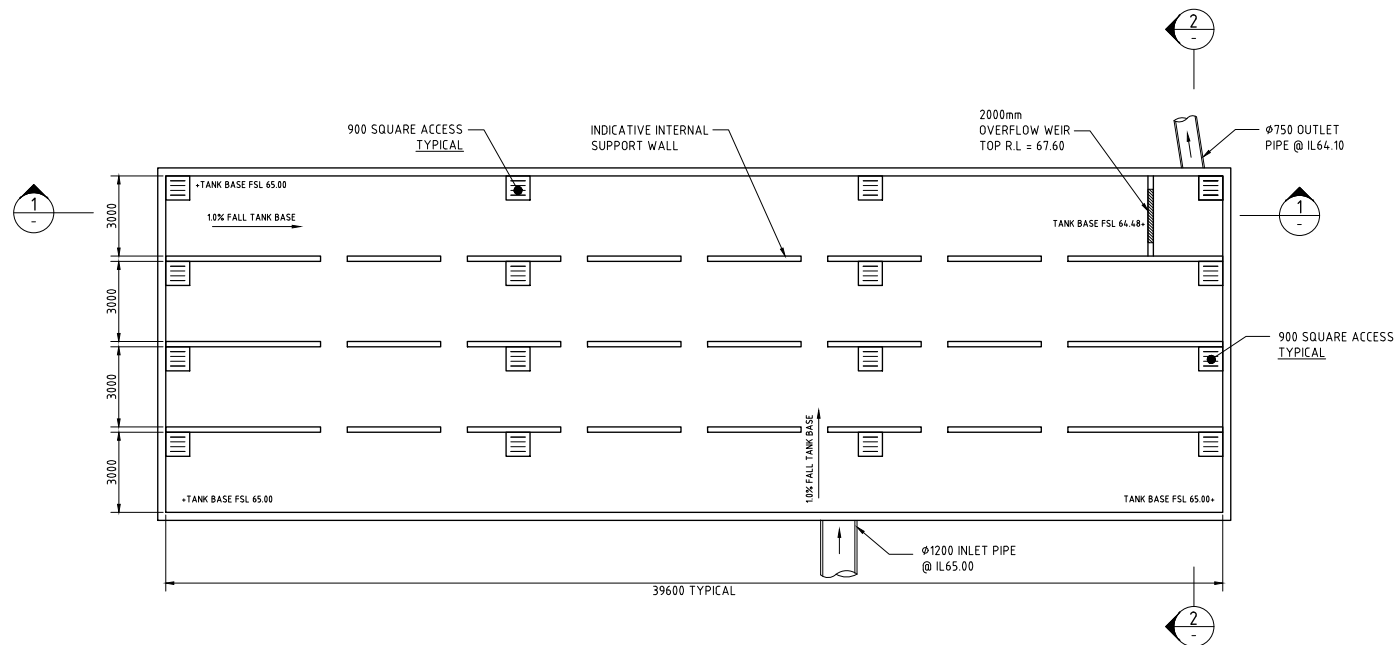
SELECT FILL MATERIAL IN ACCORDANCE WITH TABLE 1 AS 3725

SIDE ZONE WIDTH	
PIPE SIZE	l _t (mm)
≤900mm	150
1050mm	175
1200mm	200
1350mm	225
1500mm	250
1650mm	275
1800mm	300

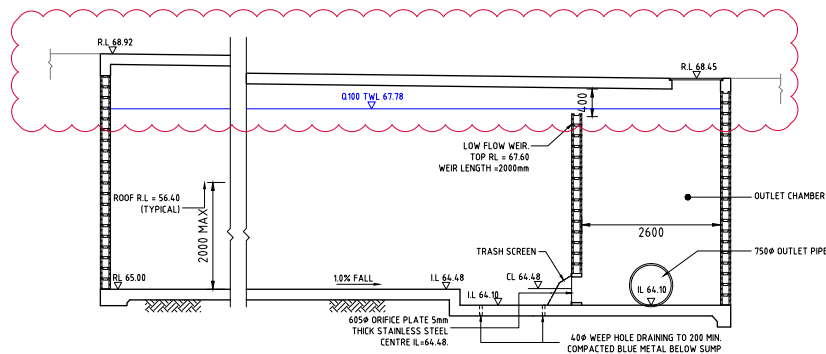
REFER TO ENGINEER FOR TRENCH WIDTHS FOR PIPE SIZES GREATER THAN 1800mm

PIPE LAYING DETAILS
SCALE 1:20

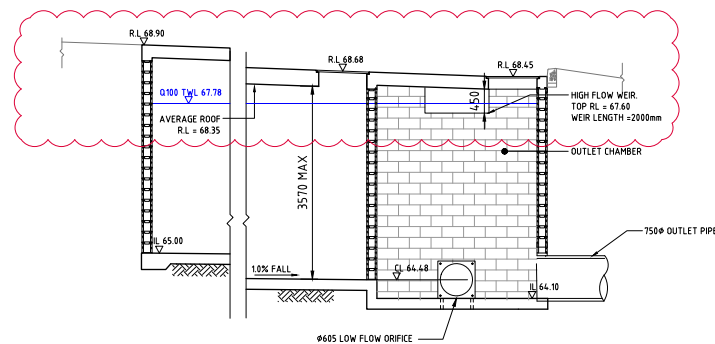
FOR APPROVAL



BELOW GROUND OSD TANK PLAN
SCALE 1:100



SECTION 1:50 1: TYPICAL THRU' TANK



SECTION 1:50 2

OSD TANK DETAILS

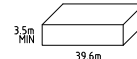
SITE AREA
TOTAL SITE AREA 69 740m²

TOTAL SITE AREA DRAINING TO STORAGE
(90% IMPERVIOUS) 64 870m²

STORAGE

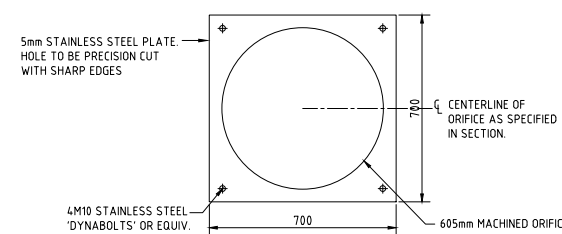
ORIFICE Ø 605mm
STORAGE VOLUME 1,560m³

INTERNAL TANK DIMENSIONS
(INC. HIGH FLOW CHAMBERS)



OSD HYDRAULIC DETAILS

STORM A.R.I. EVENT	STORM DURATION	PRE-DEVELOPMENT FLOW (m ³ /s)	POST-DEVELOPMENT FLOW (UN-ATTENUATED) (m ³ /s)	POST-DEVELOPMENT FLOW (ATTENUATED) (m ³ /s)	OSD TANK WATER DEPTH (mm)	OSD TANK STORAGE VOLUME (m ³)
5 YEAR	1 HOUR	1.31	2.02	1.05	1660	790
20 YEAR	2 HOURS	1.78	2.37	1.25	2420	1160
100 YEAR	2 HOURS	2.24	2.88	1.64	3270	1560



ORIFICE PLATE DETAIL

1:10

NOTE:
STRUCTURAL DESIGN OF TANK BY STRUCTURAL ENGINEER IN DETAIL DESIGN STAGE.

1m 0 1 2 3 4 5 6 7 8 9 10m

SCALE 1:100 AT A0 SIZE SHEET

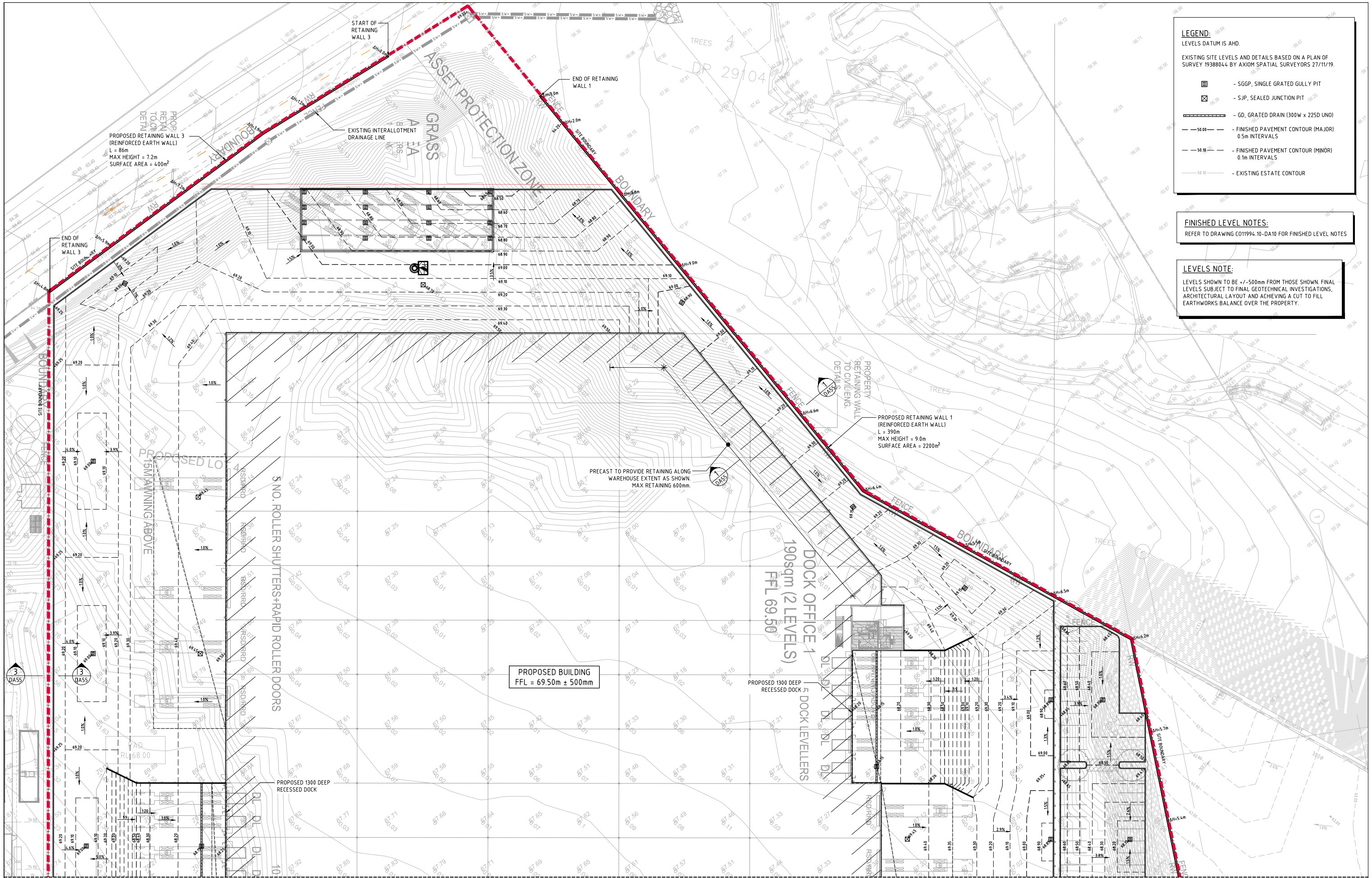
500mm 0 1 2 3 4 5m

SCALE 1:50 AT A0 SIZE SHEET

100mm 0 200 400 600 800 1000mm

SCALE 1:10 AT A0 SIZE SHEET

FOR APPROVAL



LEGEND:
LEVELS DATUM IS AHD.

EXISTING SITE LEVELS AND DETAILS BASED ON A PLAN OF SURVEY 19388044 BY AXIOM SPATIAL SURVEYORS 27/11/19.

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

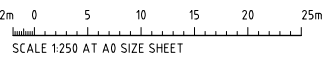
FINISHED LEVEL NOTES:
REFER TO DRAWING C011994.10-DA10 FOR FINISHED LEVEL NOTES

LEVELS NOTE:
LEVELS SHOWN TO BE +/-500mm FROM THOSE SHOWN. FINAL LEVELS SUBJECT TO FINAL GEOTECHNICAL INVESTIGATIONS, ARCHITECTURAL LAYOUT AND ACHIEVING A CUT TO FILL EARTHWORKS BALANCE OVER THE PROPERTY.

REFER TO CONTINUATION ON DRAWING DA52



FINISHED LEVELS PLAN - SHEET 1
SCALE 1:250



FOR APPROVAL

<div>ISSUED FOR APPROVAL REVISED AS CLOURED ISSUED FOR INFORMATION</div> <div>14.08.20 06.08.20 24.07.20</div> <div>C B A</div>	<div>AMENDMENTS</div> <div>DATE</div> <div>ISSUE</div> <div>AMENDMENTS</div> <div>DATE</div> <div>ISSUE</div>	<div>ARCHITECT</div> <div>CLIENT</div> <div>PROJECT</div> <div>LOT 4 WAREHOUSE FACILITY BRINGELLY ROAD, BUSINESS HUB HORNINGSEA PARK, NSW</div> <div>DESIGNED (DRAWN) LO</div> <div>CHECKED M.W.</div> <div>DATE JULY 20</div> <div>SCALE AS SHOWN</div> <div>CHD REF: C011994.10-DA51</div>	<div>Costin Roe Consulting Pty Ltd. Consulting Engineers Level 1, 8 Windmill Street Wahah Bay, Sydney NSW 2000 Tel: (02) 8551-7000 Fax: (02) 8541-3721 email: mail@costinroe.com.au</div> <div>PRECISION COMMUNICATION ACCOUNTABILITY</div>	<div>DRAWING TITLE FINISHED LEVELS PLAN SHEET 1</div> <div>DRAWING NO. C011994.10-DA51</div> <div>TRUCK</div>
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REFER TO CONTINUATION ON DRAWING DA51

LEGEND:
LEVELS DATUM IS AHD.

EXISTING SITE LEVELS AND DETAILS BASED ON A PLAN OF SURVEY 19388044 BY AXIOM SPATIAL SURVEYORS 27/11/19.

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

FINISHED LEVEL NOTES:
REFER TO DRAWING C011994.10-DA10 FOR FINISHED LEVEL NOTES

LEVELS NOTE:
LEVELS SHOWN TO BE ± 500mm FROM THOSE SHOWN. FINAL LEVELS SUBJECT TO FINAL GEOTECHNICAL INVESTIGATIONS, ARCHITECTURAL LAYOUT AND ACHIEVING A CUT TO FILL EARTHWORKS BALANCE OVER THE PROPERTY.

DOCK OFFICE 2
190sqm (2 LEVELS)
FFL 69.50

DOCK OFFICE 1
1000sqm (2 LEVELS)
FFL 69.50

PROPOSED BUILDING
FFL = 69.50m ± 500mm

PROPOSED OFFICE
FFL = 69.50m ± 500mm

PROPOSED 1300 DEEP RECESSED DOCK

8 NO. ROLLER SHUTTERS + RAPID ROLLER DOORS

5 NO. ROLLER SHUTTERS + RAPID ROLLER DOORS

TRUCK QUEUING BAY

PUMP ROOM
FSL 69.50
SPRINKLER TANK
FSL 69.50

RAINWATER TANK
LOCATION SHOWN INDICATIVELY

MAIN SWITCH
GENERATOR

PROPOSED RETAINING WALL 2
(NO FINES KEYSTONE WALL)
L = 78m
MAX HEIGHT = 3.3m
SURFACE AREA = 130m²

PROPOSED RETAINING WALL 1
(REINFORCED EARTH WALL)
L = 390m
MAX HEIGHT = 9.0m
SURFACE AREA = 2200m²

SKYLINE CRESCENT

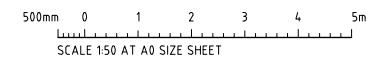
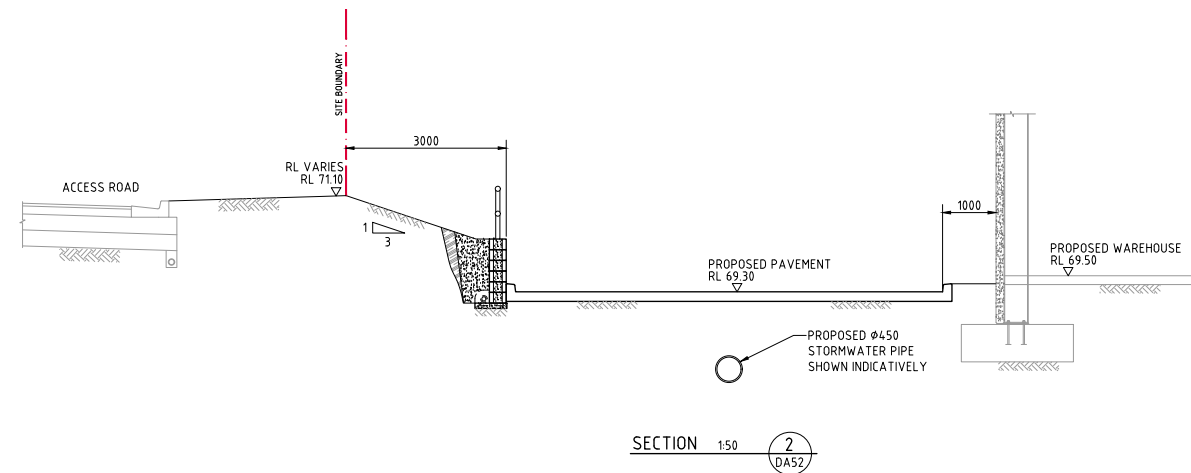
FINISHED LEVELS PLAN - SHEET 2
SCALE 1:250

FOR APPROVAL

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

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

										ARCHITECT										CLIENT										PROJECT										 																													
ISSUED FOR APPROVAL 14.08.20 C REVISED AS CLOUSED 04.08.20 B ISSUED FOR INFORMATION 24.07.20 A AMENDMENTS DATE ISSUE AMENDMENTS DATE ISSUE AMENDMENTS DATE ISSUE																														LOT 4 WAREHOUSE FACILITY BRINGELLY ROAD, BUSINESS HUB HORNINGSSEA PARK, NSW DESIGNED LO DRAWN LO DATE JULY 20 CHECKED N.W. SIZE 1:50 SCALE AS SHOWN CDD REF: C01994.10-DA52										Costin Roe Consulting Pty Ltd. Consulting Engineers ***** Level 1, 8 Windmill Street Walsh Bay, Sydney NSW 2000 Tel: (02) 6261-7699 Fax: (02) 6261-3728 email: mail@costinroe.com.au ©										DRAWING TITLE FINISHED LEVELS PLAN SHEET 2										DRAWING NO. C01994.10-DA52									



Costin Roe Consulting

DRAWING TITLE
TYPICAL SECTIONS

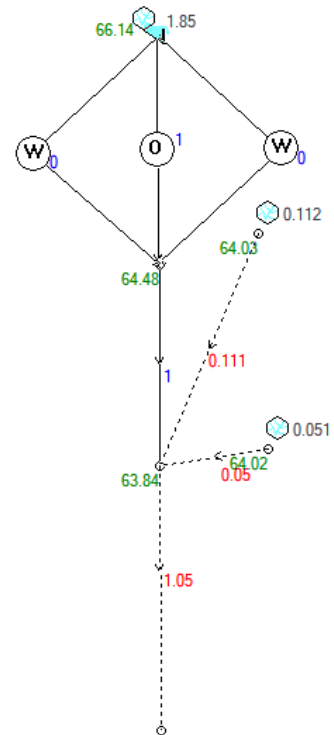
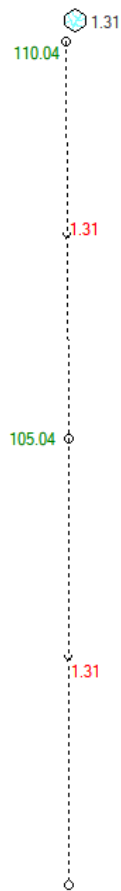
DRAWING No. C011994.10-DA55

JE
B

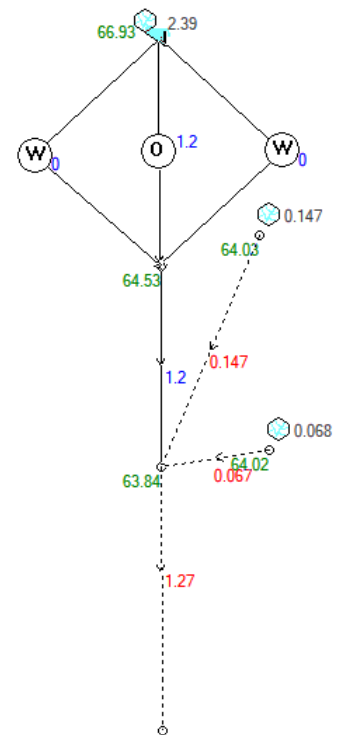
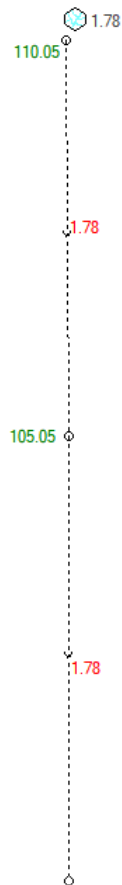
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Appendix B

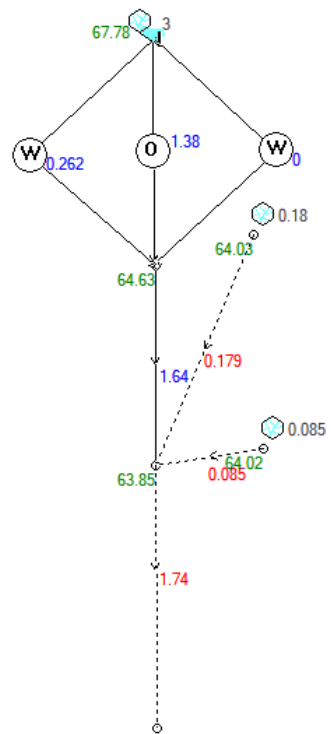
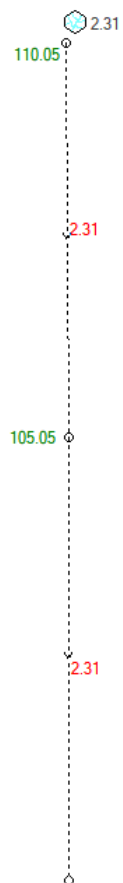
DRAINS MODEL



Q5 MODEL



Q20 MODEL



Q100 MODEL

Appendix C

SEARS SSD_8586218 (Dated 11 August 2020)

Planning Secretary's Environmental Assessment Requirements

Section 4.12(8) of the *Environmental Planning and Assessment Act 1979*
Schedule 2 of the *Environmental Planning and Assessment Regulation 2000*

Application Number	SSD-8586218
Project Name	Temperature Controlled Warehouse Facility, Lot 4 Bringelly Road Business Hub
Development	Construction and operation of a light industrial building, encompassing a temperature controlled warehouse facility, ancillary office administration, car parking and landscaping within the Bringelly Road Business Hub.
Location	Lot 4 within Bringelly Road Business Hub at Bringelly Road, Homingsea Park (Lot 11 DP 29104), Liverpool local government area
Applicant	ESR Developments (Australia) Pty Ltd
Date of Issue	11/08/2020
General Requirements	<p>The Environmental Impact Statement (EIS) must be prepared in accordance with, and meet the minimum requirements of clauses 6 and 7 of Schedule 2 of the <i>Environmental Planning and Assessment Regulation 2000</i> (the Regulation). In addition, the EIS must include:</p> <ul style="list-style-type: none"> - a detailed description of the development, including: <ul style="list-style-type: none"> · a description of the proposed operation · the need and justification for the proposed development · likely staging of the development · likely interactions between the development and any existing, approved and proposed developments in the vicinity of the site · plans of any proposed works with details of the proposed setbacks, site coverage, car parking, landscaped areas · details of infrastructure upgrades or items required to facilitate the development, and a description of any arrangements to ensure the upgrades will be implemented in a timely manner and maintained. - a detailed description of how the development is consistent with the Bringelly Road Business Hub concept proposal (SSD 6324), particularly the approved land uses - consideration of all relevant environmental planning instruments, including identification and justification of any inconsistencies with these instruments - a list of any approvals that must be obtained under the <i>Roads Act 1993</i>, or any other Act or law before the development may lawfully be carried out - consideration of key issues identified by Government agencies and Liverpool City Council (see Attachment 2) - a risk assessment of any potential environmental impacts of the development, identifying the issues for further assessment <p>Where relevant, the assessment of key issues below, and any other significant issues identified in the risk assessment, must include:</p>

	<ul style="list-style-type: none"> - adequate baseline data - consideration of the potential cumulative impacts due to other developments in the vicinity (completed, underway or proposed); - measures to avoid, minimise and if necessary, offset predicted impacts, including detailed contingency plans for managing any significant risks to the environment; and - a health impact assessment of local and regional impacts associated with the development, including those health risks associated with relevant key issues. <p>The EIS must also be accompanied by a report from a qualified quantity surveyor providing:</p> <ul style="list-style-type: none"> - a detailed calculation of the Capital Investment Value (CIV) (as defined in clause 3 of the Regulation) of the proposal, including details of all assumptions and components from which the CIV calculation is derived. The report shall be prepared on company letterhead and indicate applicable GST component of the CIV; - an estimate of jobs that will be created during the construction and operational phases of the proposed development; - and certification that the information provided is accurate at the date of preparation.
Key issues	<p>The EIS must include an assessment of potential impacts of the proposal (including cumulative impacts) and develop appropriate measures to avoid, mitigate, manage and/or offset these impacts. The EIS must address the following specific matters:</p> <p>1. Statutory and Strategic Context</p> <ul style="list-style-type: none"> o demonstrate the proposal is consistent with all relevant planning strategies, environmental planning instruments, adopted precinct plans, draft district plan(s) and adopted management plans and justification for any inconsistencies. The following documents must be addressed: <ul style="list-style-type: none"> o State Environmental Planning Policy No. 33 – Hazardous and Offensive Development o State Environmental Planning Policy No. 64 – Advertising and Signage o State Environmental Planning Policy (Infrastructure) 2007 o State Environmental Planning Policy (State and Regional Development) 2011 o State Environmental Planning Policy (Western Sydney Parklands) 2009 o Parklands Plan of Management 2030. o address the matters to be included in future development applications, as described in Part B of the development consent SSD 6324. <p>2. Community and Stakeholder Engagement – including:</p> <ul style="list-style-type: none"> o a detailed community and stakeholder engagement strategy identifying who and how stakeholders will be engaged in the process o a report detailing the issues raised and how they have been addressed including any changes to the proposal o details of proposed engagement activities throughout the construction and operation of the development.

3. Traffic and Access – including:

- o a Traffic Impact Assessment detailing all daily and peak traffic and transport movements likely to be generated (vehicle, public transport, pedestrian and cycle trips) during construction and operation of the development, including a description of vehicle access routes and the impacts on nearby intersections
- o details of access to the site from the road network including intersection location, design and sight distance
- o an assessment of predicted impacts (including cumulative impacts from nearby surrounding development) on road safety and the capacity of the road network to accommodate the development including existing and future performance of nearby key intersections, including Bringelly Road/ Skyline Crescent and Bringelly Road/ Camden Valley Way/ Cowpasture Road
- o details of any road upgrades or new roads, roundabouts or intersections required for the development, including demonstration of consultation with the relevant roads authority on the proposed design
- o details of vehicle circulation of the largest light and heavy vehicles anticipated to access the site, including swept path analysis, loading dock servicing and provisions
- o detailed plans of the proposed site access and parking provision on site in accordance with the relevant Australian Standards
- o identification of any dangerous goods likely to be transported on arterial and local roads to/ from the site and, if necessary, the preparation of an incident management strategy
- o impacts on the safety and capacity of the surrounding road network (including intersections along Bringelly Road and Cowpasture Road) and access points, using SIDRA modelling or similar to assess impacts from current traffic counts and cumulative traffic from existing and proposed development
- o details of bicycle parking and end of trip facilities
- o details of impact mitigation, management and monitoring measures.

4. Urban Design

Measures to minimise the visual impacts of the development, including:

- o a detailed assessment of the proposed development including height, colour, scale, building materials and finishes, signage and lighting, particularly from nearby residential receivers
- o detailed plans showing suitable landscaping
- o justification for any inconsistencies with the Updated Site Design Guidelines prepared by JBA Urban Planning Consultants, dated June 2015 as amended and approved under Condition A9 of the development consent for SSD 6324
- o include details of any advertising signage or structures proposed as part of the development.

5. Soil and Water – including:

- o an assessment of potential surface and groundwater impacts associated with the development, including potential impacts on watercourses, riparian areas, groundwater, and groundwater-dependent communities nearby
- o a detailed site water balance including a description of the water demands and breakdown of water supplies, and any water licensing requirements

- o description of the measures to minimise water use
- o details of stormwater/wastewater management system including the capacity of onsite detention system(s), onsite sewage management and measures to treat, reuse or dispose of water
- o detailed flooding assessment
- o description of the proposed erosion and sediment controls during construction
- o characterisation of water quality at the point of discharge to surface and/or groundwater against the relevant water quality criteria (including details of the contaminants of concern that may leach from the waste into the wastewater and proposed mitigation measures to manage any impacts to receiving waters and monitoring activities and methodologies) and
- o characterisation of the nature and extent of any contamination on the site and surrounding area

6. Noise and Vibration – including:

- o a description of all potential noise and vibration sources during the construction and operational phases of the development, including on and off-site traffic noise
- o a cumulative noise impact assessment of all potential noise sources in accordance with relevant Environment Protection Authority guidelines
- o details of noise mitigation, management and monitoring measures.

7. Hazards and Risks – including:

- o if the storage of dangerous goods is proposed on site, the EIS must include a preliminary risk screening completed in accordance with State Environmental Planning Policy No. 33 – Hazardous and Offensive Development and Applying SEPP 33 (DoP, 2011), with a clear indication of class, quantity and location of all dangerous goods and hazardous materials associated with the development. Should preliminary screening indicate that the project is “potentially hazardous” a preliminary hazard analysis (PHA) must be prepared in accordance with Hazardous Industry Planning Advisory Paper No. 6 – Guidelines for Hazard Analysis (DoP, 2011) and Multi-Level Risk Assessment (DoP, 2011).
- o report on consultation with pipeline operator Jemena to ensure that any nearby high pressure gas pipelines remain compliant with the relevant Australian Standards throughout the life of the development and include a Safety Management Study, if necessary.

8. Bushfire

Prepare a bushfire assessment report which provides an assessment of bushfire hazard, including:

- o details of the storage of flammable materials
- o an assessment against the requirements of *Planning for Bushfire Protection 2019*, particularly access and provision of water supply for firefighting purposes
- o a description of measures to ensure the proposal will not increase the bushfire risk to adjoining lands.

9. Waste Management – including:

- o details of the quantities and classification of all waste streams to be generated on site in accordance with the EPA’s Waste Classification

Guidelines (2014)

- o details of waste storage, handling, transport, and disposal
- o the measures that would be implemented to ensure the development is consistent with the aims, objectives and guidelines in the *NSW Waste Avoidance and Resource Recovery Strategy 2014-21*.

10. Air Quality – including:

- o a description of all potential sources of odour and emissions during the construction and operational phases of the development
- o an assessment of the air quality impacts at receivers during construction and operation of the development, in accordance with the relevant Environment Protection Authority guidelines
- o details of any mitigation, management and monitoring measures required to prevent and/ or minimise emissions.

11. Social and Economic – including:

- o an analysis of the economic and social impacts of the development, including any benefits to the community.

12. Ecologically Sustainable Development and Energy Efficiency – including:

- o an assessment of how the development will incorporate ecologically sustainable development principles in all phases of the development
- o consideration of the use of green walls, green roof and/or cool roof into the design
- o climate change projections developed for the Sydney Metropolitan area and how they are used to inform the building design and asset life of the development
- o an assessment of the energy uses on-site, including measures proposed to ensure the development is energy efficient.

13. Biodiversity – including:

- o an assessment and documentation of biodiversity impacts related to the development in accordance with the Biodiversity Assessment Method and documented in a Biodiversity Development Assessment Report (BDAR) where required under the Act, except where a waiver for preparation of a BDAR has been granted.

14. Cultural Heritage and Aboriginal Cultural Heritage – including:

- o consideration of heritage items within the vicinity of the site and any potential heritage impacts associated with the development.

15. Infrastructure Requirements – including:

- o a detailed written and graphical description of infrastructure required on the site, including a description of any arrangements to avoid locating infrastructure within public domain areas
- o identification of any infrastructure upgrades required off-site to facilitate the development, including a description of any arrangements to ensure that the upgrades will be implemented in a timely manner and appropriately maintained
- o an assessment of the impacts of the development on existing utility infrastructure and service provider assets surrounding the site, and a description of how any potential impacts would be avoided and minimised.

Plans and Documents	The EIS must include all relevant plans, architectural drawings, diagrams and relevant documentation required under Schedule 1 of the Regulation. Provide these as part of the EIS rather than as separate documents.
Consultation	<p>During the preparation of the EIS, you must consult with the relevant local, State or Commonwealth Government authorities, service providers, community groups and affected landowners.</p> <p>In particular you must consult with:</p> <ul style="list-style-type: none"> - Liverpool City Council - Western Sydney Parklands Trust - Transport for New South Wales - Sydney Water - Water NSW - Rural Fire Service - Environment, Energy and Science of DPIE - Jemena - surrounding landowners and the local community - any other public transport or community service providers. <p>The EIS must describe the consultation process and the issues raised, and identify where the design of the development has been amended in response to these issues. Where amendments have not been made to address an issue, a short explanation should be provided.</p>
Further consultation after 2 years	If you do not lodge a Development Application and EIS for the development within 2 years of the issue date of these SEARs, you must consult further with the Secretary in relation to the preparation of the EIS.
References	The assessment of the key issues listed above must take into account relevant guidelines, policies, and plans as identified. While not exhaustive, the following attachment contains a list of some of the guidelines, policies, and plans that may be relevant to the environmental assessment of this proposal.

ATTACHMENT 1

Technical and Policy Guidelines

The following guidelines may assist in the preparation of the environmental impact statement. This list is not exhaustive and not all of these guidelines may be relevant to your proposal.

Many of these documents can be found on the following websites:

<http://www.planning.nsw.gov.au>

<http://www.shop.nsw.gov.au/index.jsp>

<http://www.australia.gov.au/publications>

<http://www.epa.nsw.gov.au/>

<http://www.environment.nsw.gov.au/>

<http://www.dpi.nsw.gov.au/>

Policies, Guidelines & Plans

Plans and Documents

The EIS must include all relevant plans, architectural drawings, diagrams and relevant documentation required under Schedule 1 of the *Environmental Planning and Assessment Regulation 2000*. Provide these as part of the EIS rather than as separate documents.

In addition, the EIS must include the following:

1. An existing site survey plan drawn at an appropriate scale illustrating:
 - the location of the land, boundary measurements, area (sq.m) and north point
 - the existing levels of the land in relation to buildings and roads
 - location and height of existing structures on the site
 - location and height of adjacent buildings and private open space
 - all levels to be to Australian Height Datum (AHD).
2. A locality/context plan drawn at an appropriate scale indicating:
 - significant local features
 - the location and uses of existing buildings, shopping and employment areas
 - traffic and road patterns, pedestrian routes and public transport nodes.
3. Drawings at an appropriate scale illustrating:
 - draft plan of subdivision prepared by a registered surveyor
 - detailed earthworks plan
 - stormwater concept plan
 - landscape plan
 - Construction Management Plan, inclusive of a Construction Traffic Management Plan and construction methodology and staging.

Documents to be Submitted

Documents to submit include:

- 1 electronic copy of all the documents and plans for review prior to exhibition
- Additional copies as determined by the Department once the development

application is lodged

ATTACHMENT 2

Government Authority Responses to Request for Key Issues
For Information Only

Appendix D

MUSIC MODEL

