

STORMWATER MANAGEMENT PLAN

PROPOSED WAREHOUSE FOR ROCHE GREYSTANES SOUTHERN EMPLOYMENT LANDS

RECONCILIATION ROAD, GREYSTANES

Prepared For:

**Hansen Yunken Pty Ltd
Level 6, 15 Bourke Road
MASCOT NSW 2020**

Prepared by:

**Costin Roe Consulting
Level 1, 8 Windmill Street
WALSH BAY NSW 2000**

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	Name	Signature
Prepared by	Mark Wilson	
Checked by	Grant Roe	
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TABLE OF CONTENTS

1	INTRODUCTION	4
1.1	Background	4
1.2	Scope	4
1.3	Authority Jurisdiction	4
2	DEVELOPMENT SITE	5
2.1	Existing Site	5
2.2	Proposed Development	5
3	HYDROLOGY	6
3.1	General Design Principles	6
3.2	Major/ Minor System Design	6
3.3	Runoff Models	6
3.4	Estate Drainage and Discharge from Development Sites	6
3.5	On-site Detention	7
4	HYDRAULICS	8
4.1	General Requirements	8
4.2	Freeboard	8
4.3	Public Safety	9
4.4	Roadway Drainage	9
4.5	Overland Flow	9
5	WATER QUALITY CONTROLS	10
5.1	Regional Parameters	10
5.2	Estate Stormwater Treatment Measures	10
5.3	Site Specific Stormwater Treatment Measures	11
5.4	Site Surface Permeability Coverage	11
5.5	Maintenance and Monitoring	11

5.6	Stormwater Harvesting	13
6	CONCLUSION	14
	APPENDICES	15

1 INTRODUCTION

1.1 Background

Hansen Yunken Pty Ltd, on behalf of DEXUS, propose to construct a new warehouse, consisting of a single level warehouse and ancillary offices for Roche, in Super-lot C of the DEXUS Southern Employment Land (SEL) Industrial Estate, Greystanes.

The proposed development comprises a single level steel framed warehouse building and ancillary offices with provision for truck parking and unloading via on grade and recessed docks.

1.2 Scope

Costin Roe Consulting Pty Ltd has been commissioned by Hansen Yunken to prepare this report in support of a proposed Application for Development to be lodged over the site.

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

- Stormwater Quantity Management; and
- Stormwater Quality Management.

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

A set of concept drawings have been prepared to show the proposed surface levels over the site, retaining walls, stormwater drainage and erosion control. It should be noted that drawings developed for this report are subject to adjustment as the design is developed to completion.

The proposed development also requires adjustments to the approved "masterplan layout" for Super-lot C of the Southern Employment Lands however details of these changes are subject to a separate application with report and drawings and will not be discussed in any detail in this report.

1.3 Authority Jurisdiction

The site falls within the boundaries of Holroyd City Council however this development will be assessed and approved at state level by the NSW Department of Planning under the provisions of the original Part 3A approval for the industrial estate.

2 DEVELOPMENT SITE

2.1 Existing Site

The Roche (Building 11) site was originally known as the Prospect Quarry and operated by Boral Pty Ltd. During 2007-2008 this land underwent major civil works, which included earthworks and roads and stormwater infrastructure, for the purpose of redevelopment for employment-generating uses. This development was approved as a Part 3A approval at state level by the NSW Department of Planning as the 'Greystanes Southern Employment Lands'.

The current development is located on the middle portion of the land nominated as Super-lot C of the Greystanes Southern Employment Land approval. The site is bounded by Reconciliation Road to the west, Proposed Building 10 to the north, perimeter drainage path to the east and future development lots to the south.

The Roche (Building 11) development has a site area of 1.77Ha. The total area of Super-lot C is 12.15Ha.

Falls over the site are gradual from west to east at grades in the order of 1%.

2.2 Proposed Development

The proposed development comprises of a large single level steel framed building and ancillary offices for Roche also known as Building 11. Master planning for future buildings 10 and 12 has been nominated on architectural drawings however final details for these will be subject to future development applications over these parcels of land. We understand application for proposed Building 10 has already been lodged with the NSW Department of Planning and Infrastructure.

The Roche Facility has provision for truck parking and unloading via on grade and recessed docks on the eastern side of the building. Car parking is provided on the western side of the facility and complete access around the warehouse, via a fire access trail along the north and south of Roche Building has been catered for fire trucks.

Access to the site can be made at the south-east corner of the property via a proposed private access road. The access road is proposed to branch off Reconciliation Drive to the south of the site and also provide access to future Buildings 12 and 13.

3 HYDROLOGY

3.1 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, Holroyd City Council Engineering Guide for Development, 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).

3.2 Major/ Minor System Design

The piped stormwater drainage system has been designed to accommodate the 20-year ARI storm event (Q20). Overland flow paths which will convey all stormwater runoff up to and including the Q100 event have been provided which will limit major property damage and any risk to the public.

3.3 Runoff Models

In accordance with the recommendations and standards of Holroyd City Council, the calculation of the runoff from storms of the design ARI has been calculated with the catchment modelling software DRAINS.

3.4 Estate Drainage and Discharge from Development Sites

Extensive infrastructure was constructed as part of the SEL Estate works. This included a comprehensive stormwater management system which includes an in-ground piped network, open drainage channels, estate water quality basin and stormwater detention basin.

The in-ground piped drainage system traverses roadway alignments to open drainage channels located at the perimeter of the site. These drainage channels convey stormwater flows in a southerly direction around the perimeter of the estate to the estate wide water quality bio-retention basins and Widemere Detention basin.

Stormwater from the proposed Roche development site will discharge to the open drainage channels located on the eastern side of Precinct C. An indicative stormwater layout and discharge point has been indicated on drawings Co10529.14-DA41 & DA42.

3.5 On-site Detention

Holroyd City Council, in common with many other local authorities in the Sydney region, limit the runoff discharged from private property into the underground piped drainage system.

The Widemere Detention Basin forms part of the development of the estate drainage resulting in the runoff from all lots within the estate being attenuated to less than the pre-development flows. In addition the Widemere Detention basin ensures that downstream flooding in Prospect Creek is limited to less than 10mm which results in the developed flows being attenuated to a level much lower than the pre-developed flow.

Accordingly, the provision of the estate level detention basin results in no on-site detention being required for individual sites within the Estate. As such no on-site detention is proposed for this building development.

4 HYDRAULICS

4.1 General Requirements

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

The design parameters for the DRAINS model are to be based on the parameters defined as follows.

Table 1: DRAINS Parameters

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)	0.5	
	On Grade Pit Blocking Factor (Minor Systems)	0.2	
	Sag Pit Blocking Factor (Major Systems)	0.5	
	On Grade Pit Blocking Factor (Major Systems)	0.2	
	Inlet Pit Capacity		

4.2 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.

4.3 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.

4.4 Roadway Drainage

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

A layout of piped stormwater drainage for the site has been prepared and is included in the Appendix A to this report (Drawings Co10529.14-DA41 & DA42).

4.5 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 the estate road system, perimeter drainage channels and ultimately to the Widemere Detention Basin.

5 WATER QUALITY CONTROLS

5.1 Regional Parameters

There is a need to target pollutants that are present in the stormwater so as to minimise the adverse impact these pollutants could have on receiving waters. The need to target pollutants in the design and meet the requirements as laid down in the Upper Parramatta River Stormwater Management Plan (UPRSMP).

The expected pollutant load from this site is typical of pollutants associated with industrial areas and freeways. These include heavy metals and oils. Hence, guidelines for expected catchment loads contained in the UPRSMP are not directly applicable to this site. However, the UPRSMP has made recommendations with regard to water treatment objectives for different development styles.

Table 18a ranks the importance of pollutant types for industrial developments as follows:

- a Fine particulates
- b Hydrocarbons: motor spirit, oil & grease
- c Litter
- d Coarse sediment
- e Cooking oil & grease
- f Nutrients

Objectives a, b, c, d and f are to be treated to the standards in Table 18b. However, for this development, objective e is not applicable.

5.2 Estate Stormwater Treatment Measures

As discussed in this report, the SEL Estate comprises an estate wide stormwater management system which has been designed and approved as part of the original Part 3A approval for the estate. This has been documented in the original Stormwater Management Strategy by Parson Brinkerhoff (Sept. 2006) and in subsequent amendments by GHD Consulting Engineers.

The estate wide water quality improvement measures, which are based on a treatment train approach, include:

- Individual lot Gross Pollutant Traps (GPT's);
- Perimeter drainage channels and buffer zones; and
- Bioretention basin.

The stormwater strategy noted above and as described on the approved master plans was developed based on a target fraction impervious (covered) land of 86% which has been achieved over the whole of Super-lot C.

5.3 Site Specific Stormwater Treatment Measures

As noted above, individual development sites require that site stormwater is pre-treated via GPT on site prior to discharge into the estate drainage system. An end of line pollution control device will be fitted at each discharge point (treating a minimum of hardstand surfaces) to retain coarse sediments and floating hydrocarbons.

The proposed pollutant control device is the Ecosol RSF In-Line/ End of Line solid pollutant filter/oil & grease arrestor. All retained materials are prevented from remobilisation by more severe storms, as required by NSW EPA. Reference to the drawing nominates locations and size of each nominated unit.

5.4 Site Surface Permeability Coverage

As noted in Section 5.2 above, the stormwater strategy for the Greystanes Industrial Estate as described on the approved master plans was developed based on a target fraction impervious (covered) land of 86%. The proposed development achieves this target through landscaped areas and infiltration (bioretention) areas. These are generally located along the Reconciliation Drive property boundary. For further demonstration of these areas please refer to the architect and landscape architects documentation. Bioretention/ filtration swales have been included within parking areas to simulate permeable paving/ surface and achieve the minimum target of 14% pervious area. Refer to drawings Co10529.14-DA41 & DA42 for bioretention locations.

5.5 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, a preliminary maintenance schedule has been prepared (below) to assist in the effective operation and maintenance of the various water quality components.

In addition to the below maintenance schedule, the stormwater treatment measures are to be inspected as at 3 month intervals for the first year of operation and at 4 month intervals for the second year of operation, details of the type and amount of pollutants are to be logged, with the details kept on site. Upon completion of the first two years of operation the below maintenance schedule will be able to be finalised based on the recommendations of the manufacturer and the logged data, with cleaning and removal of trapped pollutants from the devices occurring at a maximum time of 6 month intervals.

MAINTENANCE ACTION	FREQUENCY	RESPONSIBILITY	PROCEDURE
SWALES			
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.
"ECOSOL RSF UNIT"			
Refer to manufacturer's O&M manual	Refer to manufacturer's O&M manual	Refer to manufacturer's O&M manual	Refer to manufacturer's O&M manual
INLET & JUNCTION PITS			
Inside Pit	Six Monthly	Maintenance Contractor	Remove grate and inspect internal walls and base,

MAINTENANCE ACTION	FREQUENCY	RESPONSIBILITY	PROCEDURE
			repair where required. Remove any collected sediment, debris, litter.
Outside of Pit	Four Monthly/ After Major Storm	Maintenance Contractor	Clean grate of collected sediment, debris, litter and vegetation.
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.

5.6 Stormwater Harvesting

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

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

Rainwater harvesting is proposed for this development with re-use for non-potable applications. The aim is to reduce the water demand of the development for internal uses (toilet flushing) and external applications (irrigation).

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

Indoor and outdoor water demand and rainwater tank sizing will be based on individual site requirements and form part of detail design component of the development lots.

6 CONCLUSION

This Stormwater Management Report has been prepared to support the application for a proposed industrial development for Roche (Building 10) located in Super-lot C of the Greystanes Southern Employment Land Industrial Estate.

A civil engineering strategy for the site has been developed which provides a best fit solution within the constraints of the existing landform and proposed architectural layout. Within this strategy a stormwater quality management strategy has been also been developed to reduce pollutant loads in stormwater leaving this site in accordance with the approved estate development, council policy and incorporating principles of WSUD.

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

ROCHE WAREHOUSE & OFFICE FACILITY

PRECINCT C, RECONCILIATION DRIVE

GREYSTANES, NSW

CIVIL DRAWINGS FOR DEVELOPMENT APPLICATION

DRAWING LIST

DRAWING NO.	DRAWING TITLE
C010529.14-DA 10	DRAWING LIST & GENERAL NOTES
C010529.14-DA 20	EROSION AND SEDIMENT CONTROL PLAN
C010529.14-DA 25	EROSION AND SEDIMENT CONTROL DETAILS
C010529.14-DA 41	CONCEPT STORMWATER PLAN - SHEET 1
C010529.14-DA 42	CONCEPT STORMWATER PLAN - SHEET 2
C010529.14-DA 45	CONCEPT STORMWATER DETAILS
C010529.14-DA 51	FINISHED LEVELS PLAN - SHEET 1
C010529.14-DA 52	FINISHED LEVELS PLAN - SHEET 2

GENERAL NOTES

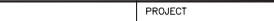
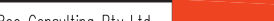
- G1 THESE DRAWINGS SHALL BE READ IN CONJUNCTION WITH ALL ARCHITECTURAL AND OTHER CONSULTANTS' DRAWINGS AND SPECIFICATIONS AND WITH SUCH OTHER WRITTEN INSTRUCTIONS AS MAY BE ISSUED DURING THE COURSE OF THE CONTRACT. ANY DISCREPANCY SHALL BE REFERRED TO THE ENGINEER BEFORE PROCEEDING WITH THE WORK.
- 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.
- G4 UNLESS NOTED OTHERWISE ALL LEVELS ARE IN METRES AND ALL DIMENSIONS ARE IN MILLIMETERS.
- G5 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.

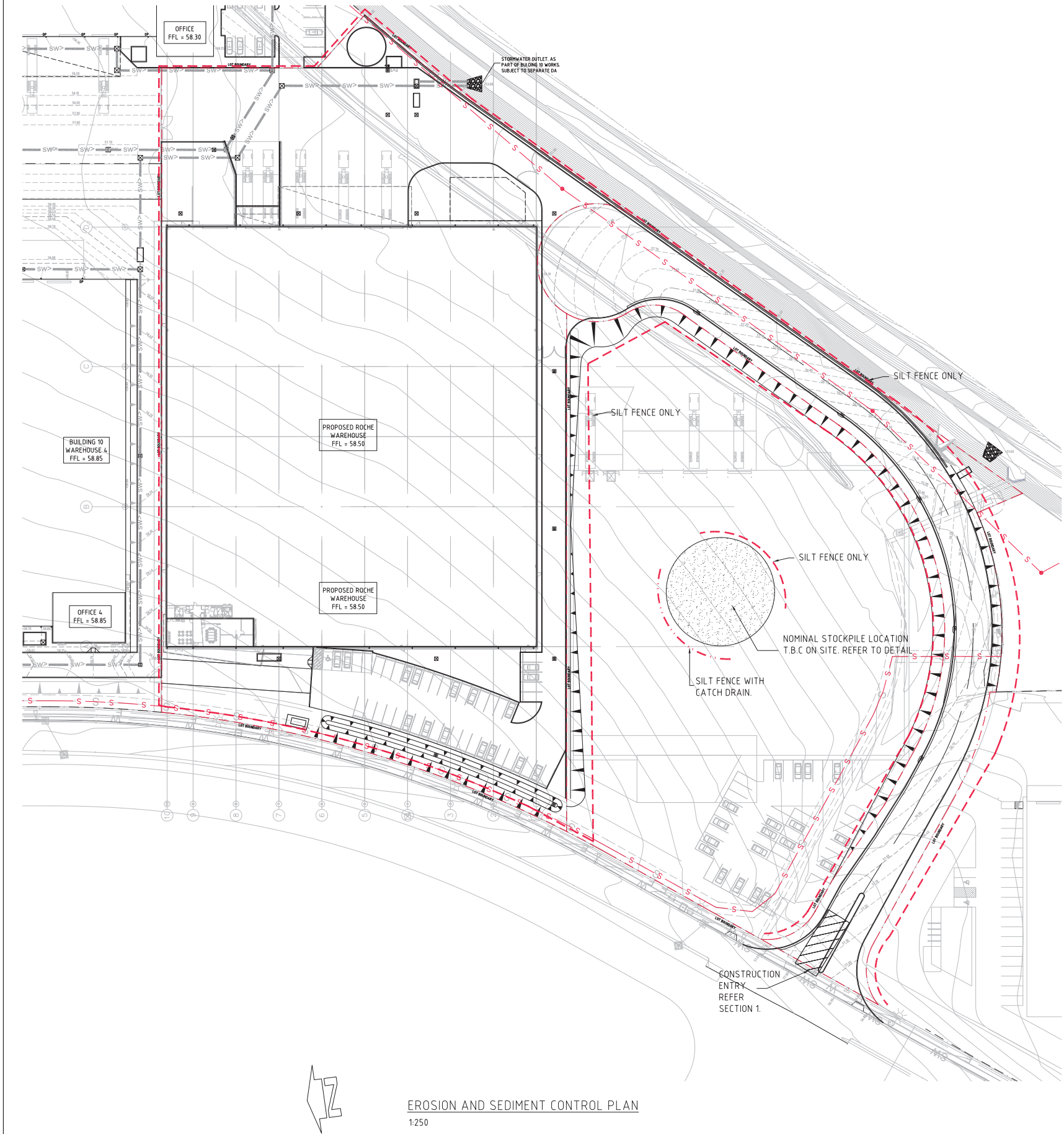


SITE LOCATION PLAN

N.T.S

FOR DEVELOPMENT APPLICATION

																				
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EROSION AND SEDIMENT CONTROL PLAN
1:250

EROSION CONTROL NOTES

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

1. SILT FENCES AND SILT FENCE RETURNS SHALL BE ERECTED CONVEX TO THE CONTOUR TO POND WATER.
2. HAY BALE BARRIERS AND GEOFABRIC FENCES ARE TO BE CONSTRUCTED TO TOE OF BATTER, PRIOR TO COMMENCEMENT OF EARTHWORKS, IMMEDIATELY AFTER CLEARING OF VEGETATION AND BEFORE REMOVAL OF TOP SOIL.
3. ALL TEMPORARY EARTH BERMS, DIVERSION AND SILT DAM EMBANKMENTS ARE TO BE MACHINE COMPACTED, SEEDED AND MULCHED FOR TEMPORARY VEGETATION COVER AS SOON AS THEY HAVE BEEN FORMED.
4. CLEAR WATER IS TO BE DIVERTED AWAY FROM DISTURBED GROUND AND INTO THE DRAINAGE SYSTEM.
5. THE CONTRACTOR IS RESPONSIBLE FOR MAINTAINING AND PROVIDING ON GOING ADJUSTMENT TO EROSION CONTROL MEASURES AS REQUIRED DURING CONSTRUCTION.
6. ALL SEDIMENT TRAPPING STRUCTURES AND DEVICES ARE TO BE INSPECTED AFTER STORMS FOR STRUCTURAL DAMAGE OR CLOGGING, TRAPPED MATERIAL IS TO BE REMOVED TO A SAFE, APPROVED LOCATION.
7. ALL FINAL EROSION PREVENTION MEASURES INCLUDING THE ESTABLISHMENT OF GRASSING ARE TO BE MAINTAINED UNTIL THE END OF THE DEFECTS LIABILITY PERIOD.
8. ALL EARTHWORKS AREAS SHALL BE ROLLED ON A REGULAR BASIS TO SEAL THE EARTHWORKS.
9. ALL FILL AREAS ARE TO BE LEFT WITH A BUND AT THE TOP OF THE SLOPE AT THE END OF EACH DAYS EARTHWORKS. THE HEIGHT OF THE BUND SHALL BE A MINIMUM OF 200MM.
10. ALL CUT AND FILL SLOPES ARE TO BE SEEDED AND MULCHED 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 CONTRACT ADMINISTRATOR 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 CONTRACT ADMINISTRATOR. 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 CONTRACT ADMINISTRATOR 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. THE CONTRACTOR SHALL INCORPORATE THE MEASURES ON THIS PLAN WITHIN THE CONTRACTORS CONSTRUCTION MANAGEMENT PLAN.

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

--- SILT FENCE WITH CATCH DRAIN.
--- SILT FENCE ONLY

2m 0 5 10 15 20 25m
SCALE 1:250 AT B1 SIZE PLOT

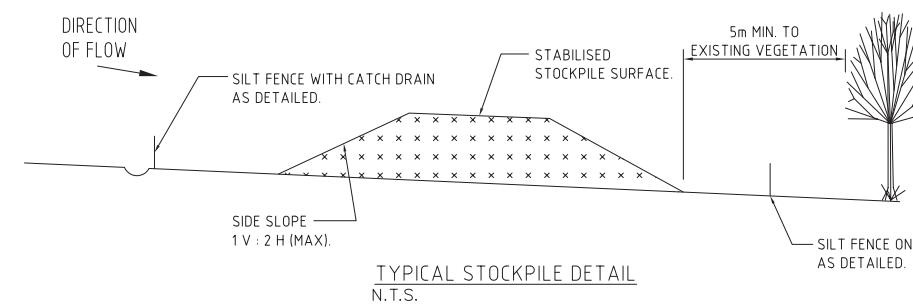
FOR DEVELOPMENT APPLICATION

			ARCHITECT			CLIENT			PROJECT			 Costin Roe Consulting Pty Ltd. Consulting Engineers Level 1, 8 Windmill Street Wahib Bay, Sydney NSW 2200 Tel: (02) 9551-7000 Fax: (02) 9241-3731 email: mail@costinroe.com.au ©						DRAWING TITLE		
						DEXUS PROPERTY GROUP PO BOX R1822 ROYAL EXCHANGE, NSW 1225			PRECINCT C - ROCHE PROJECT RECONCILIATION DR, GREYSTANES ESTATE GREYSTANES, NSW									EROSION AND SEDIMENT CONTROL PLAN		
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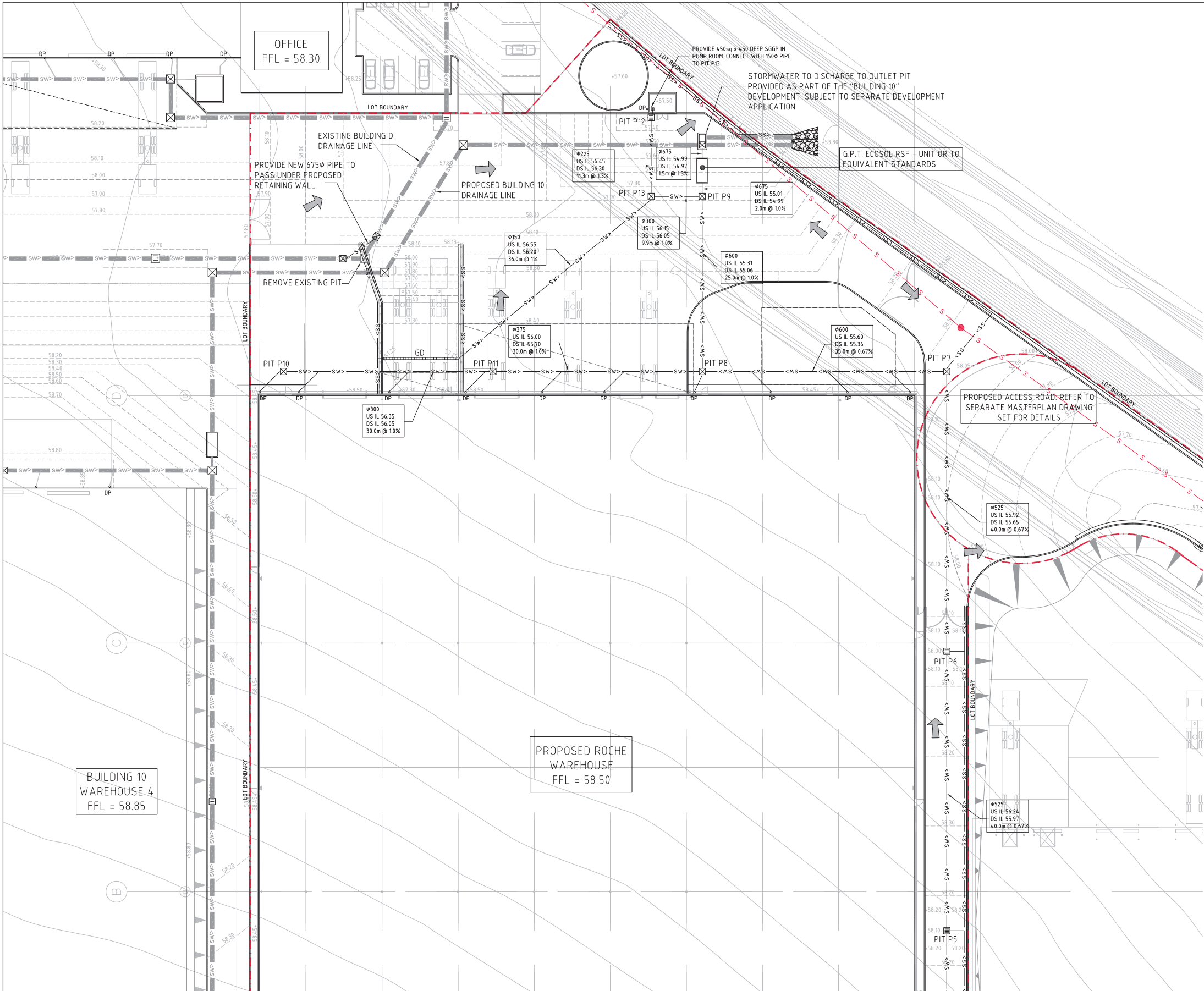
Diagram illustrating the cross-section of a stabilised construction entrance 'truck shaker'. The structure consists of a 2m wide cattle grid supported by 75mm-100mm aggregate, which is placed on a 50mm aggregate base. A filter cloth 'TEXCEL T16' is located beneath the cattle grid. The total width of the structure is 10.0m MIN, and the length of the cattle grid is 3000 MIN. The structure is adjacent to an 'EXTG ROAD'.

SECTION 1:20 : STABILISED CONSTRUCTION ENTRANCE 'TRUCK SHAKER'



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

									CLIENT DEXUS PROPERTY GROUP PO BOX R1822 ROYAL EXCHANGE, NSW 1225			PROJECT PRECINCT C - ROCHE PROJECT RECONCILIATION DR, GREYSTANES ESTATE GREYSTANES, NSW						Costin Roe Consulting Pty Ltd. Consulting Engineers ACT 002 000 040 Level 1, 8 Windmill Street Walsh Bay, Sydney NSW 2000 Tel: (02) 9251-7600 Fax: (02) 9241-3731 email: mail@costinroe.com.au ©						DRAWING TITLE EROSION AND SEDIMENT CONTROL DETAILS		
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PIT SCHEDULE - SITE SYSTEM

PIT No.	GRATE RL	DEPTH	TYPE	SIZE	COMMENT
PIT P1	58.40	1650	S.J.P.	900x900	
PIT P2	57.95	1000	S.G.G.P.	900x900	
PIT P3	57.80	1000	S.G.G.P.	900x900	
PIT P4	58.20	1700	S.G.G.P.	900x900	
PIT P5	58.10	1860	S.G.G.P.	900x900	
PIT P6	58.00	2080	S.G.G.P.	900x900	
PIT P7	58.08	2480	S.J.P.	900x900	
PIT P8	58.40	3090	S.J.P.	900x900	
PIT P9	57.87	2860	S.J.P.	900x900	
PIT P10	58.40	2050	S.J.P.	900x900	
PIT P11	58.47	2470	S.J.P.	900x900	
PIT P12	57.35	900	S.G.G.P.	900x900	
PIT P13	57.87	1620	S.J.P.	900x900	

LEGEND:

LEVELS DATUM IS AHD.

EXISTING SITE LEVELS AND DETAILS BASED ON A PLAN OF SURVEY OF LOT 13 IN DP270644 BY LAND PARTNERS SURVEYORS 28/9/11.

- SGGP, SINGLE GRATED GULLY PIT
- SJP, SEALED JUNCTION PIT
- KIP, KERB INLET PIT
- GD - GRATED DRAIN (200 WIDE)
- SW> - NEW DRAINAGE LINE
- PROPOSED BUILDING 10 DRAINAGE LINE
- EXISTING BUILDING 9 DRAINAGE LINE
- SS> - SUBSOIL LINE
- RW> - ROOFWATER LINE
- DOWNPIPE
REFER TO HYDRAULIC ENGINEERS DRAWINGS
- OVERLAND FLOW PATH
- EXISTING SEWER LINE

RAINWATER TANKS NOTE:

RAINWATER TANKS SHOWN ARE INDICATIVE ONLY AND ARE SUBJECT TO CHANGE DURING DETAILED DESIGN

2m 0 5 10 15 20 25m
SCALE 1:250 AT B1 SIZE PLOT

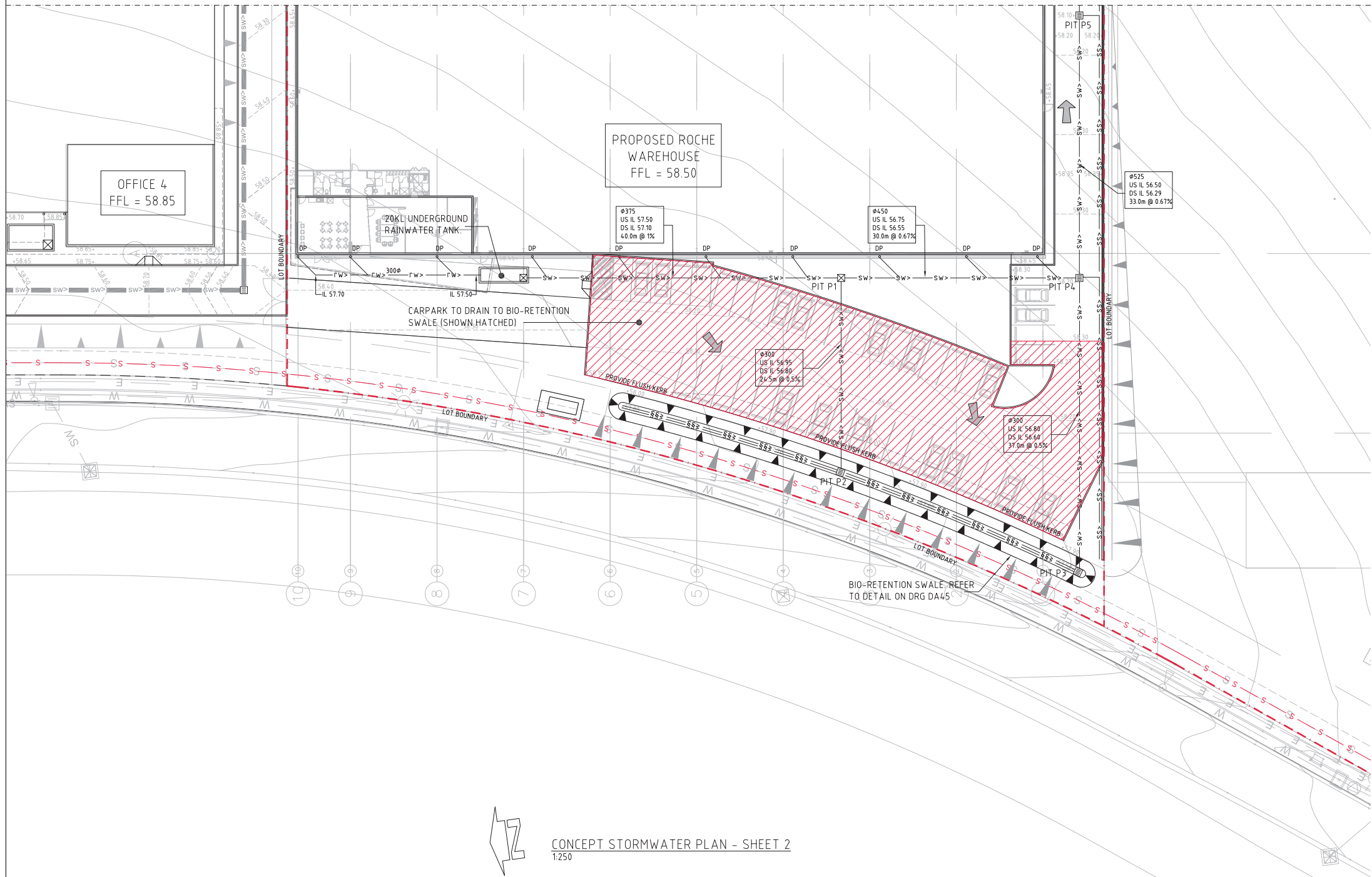
STORMWATER DRAINAGE NOTES:
REFER TO DRAWING DA42 FOR STORMWATER DRAINAGE NOTES

CONCEPT STORMWATER PLAN - SHEET 1
1:250

FOR DEVELOPMENT APPLICATION

FOR DEVELOPMENT APPLICATION FOR INFORMATION ONLY FOR INFORMATION ONLY AMENDMENTS				13.12.12 03.11.12 26.11.12 DATE	C B A ISSUE	ARCHITECT nt		CLIENT DEXUS PROPERTY GROUP PO BOX R1822 ROYAL EXCHANGE, NSW 1225		PROJECT PRECINCT C - ROCHE PROJECT RECONCILIATION DR, GREYSTANES ESTATE GREYSATNES, NSW		DESIGNED M.W.		DRAWN M.C.		DATE 20.01.12		CHECKED B1		SCALE AS SHOWN		CAD REF: Co10529.14-DA41		Costin Roe Consulting Pty Ltd. Consulting Engineers Level 1, 8 Windmill Street Wahia Bay, Sydney NSW 2200 Tel: (02) 9551-7000 Fax: (02) 9241-3731 email: mail@costinroe.com.au ©		Costin Roe Consulting		Value in Engineering and Management		DRAWING TITLE CONCEPT STORMWATER PLAN SHEET 1		DRAWING No Co10529.14-DA41		ISSUE C	
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BREAKLINE - FOR CONTINUATION REFER TO DRAWING Co10529.14-DA41



CONCEPT STORMWATER PLAN - SHEET 2
1:250

STORMWATER DRAINAGE NOTES:

1. ALL FINISHED PAVEMENT LEVELS SHALL BE AS INDICATED ON FINISHED LEVELS PLAN.
2. PIT SIZES SHALL BE AS INDICATED IN THE SCHEDULE WHILE PIPE SIZES AND DETAILS ARE PROVIDED ON PLAN.
3. EXISTING STORMWATER PIT LOCATIONS AND INVERT LEVELS TO BE CONFIRMED BY SURVEY PRIOR TO COMMENCING WORKS ON SITE.
4. ALL STORMWATER PIPES $\phi 375$ OR GREATER SHALL BE CLASS 2 REINFORCED CONCRETE WITH RUBBER RING JOINTS UNLESS NOTED OTHERWISE.
5. ALL PIPES UP TO AND INCLUDING 300ϕ TO BE uPVC GRADE SN8.
6. ALL CONCRETE PITS GREATER THAN 1000mm DEEP SHALL BE REINFORCED USING N12-200 EACH WAY CENTRED IN WALL AND BASE. LAP MINIMUM 300mm WHERE REQUIRED. ALL CONCRETE FOR PITS SHALL BE F'c 25 MPA. PRECAST PITS MAY BE USED WITH THE APPROVAL OF THE ENGINEER.
7. IN ADDITION TO ITEM 6 ABOVE, ALL CONCRETE PITS GREATER THAN 3000mm DEEP SHALL HAVE WALLS AND BASE THICKNESS INCREASED TO 200mm.
8. PIPES SHALL BE LAID AS PER PIPE LAYING DETAILS. PARTICULAR CARE SHALL BE TAKEN TO ENSURE THAT THE PIPE IS FULLY AND EVENLY SUPPORTED. RAM AND PACK FILLING AROUND AND UNDER BACK OF PIPES AND PIPE FAUCETS, WITH NARROW EDGED RAMPERS OR OTHER SUITABLE TAMPING DETAILS.
9. WHERE PIPE LINES ENTER PITS, PROVIDE 2m LENGTH OF STOCKING WRAPPED SLOTTED $\phi 100$ uPVC TO EACH SIDE OF PIPE.
10. ALL SUBSOIL DRAINAGE LINES SHALL BE $\phi 100$ SLOTTED uPVC WITH APPROVED FILTER WRAP LAID IN 300mm WIDE GRANULAR FILTER UNLESS NOTED OTHERWISE. LAY SUBSOIL LINES TO MATCH FALLS OF LAND AND/OR 1 IN 200 MINIMUM. PROVIDE CAPPED CLEANING EYE (RODDING POINT) AT UPSTREAM END OF LINE AND AT 30m MAX. CTS. PROVIDE SUBSOIL LINES TO ALL PAVEMENT/ LANDSCAPED INTERFACES, TO REAR OF RETAINING WALLS (AS NOMINATED BY STRUCTURAL ENGINEER) AND AS SHOWN ON PLAN.
11. ALL PIPE GRADES 1 IN 100 MINIMUM UNO.
12. PROVIDE STEP IRONS IN PITS DEEPER THAN 1000mm.
13. MIN. 600 COVER TO PIPE OBVERT BENEATH ROADS & MIN. 400 COVER BENEATH LANDSCAPED AND PEDESTRIAN AREAS.
14. PIT COVERS IN TRAFFICABLE PAVEMENT SHALL BE CLASS D 'HEAVY DUTY'; THOSE LOCATED IN NON-TRAFFICABLE AREAS SHALL BE CLASS B 'MEDIUM DUTY' UNO.
15. PROVIDE CLEANING EYES (RODDING POINTS) TO PIPES AT ALL CORNERS AND T-JUNCTIONS WHERE NO PITS ARE PRESENT.
16. DOWN PIPES TO BE AS PER HYDRAULIC ENGINEERS DETAILS WITH CONNECTOR TO MATCH DP SIZE UNO. ON PLAN. PROVIDE CLEANING EYE AT GROUND LEVEL.
17. 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.

LEGEND:

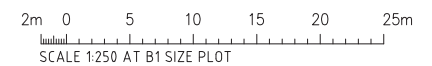
LEVELS DATUM IS AHD.

EXISTING SITE LEVELS AND DETAILS BASED ON A PLAN OF SURVEY OF LOT 13 IN DP270644 BY LAND PARTNERS SURVEYORS 28/9/11.

- SGGP, SINGLE GRATED GULLY PIT
- SJP, SEALED JUNCTION PIT
- KIP, KERB INLET PIT
- GD - GRATED DRAIN (200 WIDE)
- NEW DRAINAGE LINE
- PROPOSED BUILDING 10 DRAINAGE LINE
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- SUBSOIL LINE
- ROOFWATER LINE
- DOWNPIPE
REFER TO HYDRAULIC ENGINEERS DRAWINGS
- OVERLAND FLOW PATH
- EXISTING SEWER LINE

RAINWATER TANKS NOTE:

RAINWATER TANKS SHOWN ARE INDICATIVE ONLY AND ARE SUBJECT TO CHANGE DURING DETAILED DESIGN



FOR DEVELOPMENT APPLICATION

				ARCHITECT		CLIENT		PROJECT				 Costin Roe Consulting Pty Ltd. Consulting Engineers Level 1, 8 Windmill Street Wahib Bay, Sydney NSW 2000 Tel: (02) 9551-7000 Fax: (02) 9241-3731 email: mail@costinroe.com.au @				DRAWING TITLE	
						DEXUS PROPERTY GROUP		PRECINCT C - ROCHE PROJECT								CONCEPT STORMWATER PLAN	
						PO BOX R1822		RECONCILIATION DR, GREYSTANES ESTATE								SHEET 2	
						ROYAL EXCHANGE, NSW 1225		GREYSTANES, NSW									
FOR DEVELOPMENT APPLICATION				13.12.12	C					DESIGNED				CAD REF:		DRAWING No	
FOR INFORMATION ONLY				03.11.12	B					M.W.				Co10529.14-DA42		Co10529.14-DA42	
FOR INFORMATION ONLY				26.11.12	A					M.C.						ISSUE	
AMENDMENTS				DATE	ISSUE	AMENDMENTS		DATE		ISSUE		CHECKED				SIZE	
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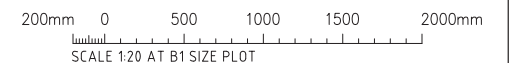


PIT NOTES:

1. WHERE GULLY PIT IS LOCATED ON KERB RETURNS OR BULB OF CUL-DE-SACS PROVIDE CURVED PRECAST CONCRETE LINTELS.
2. SAG PITS SHALL HAVE LINTEL PLACED CENTRALLY ABOUT THE GRATE.
3. ALL REINFORCING TO HAVE 30 MIN. CLEAR CONCRETE COVER.
4. FOR PITS DEEPER THAN 1000mm CLIMB RAILS SHALL BE PROVIDED.



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

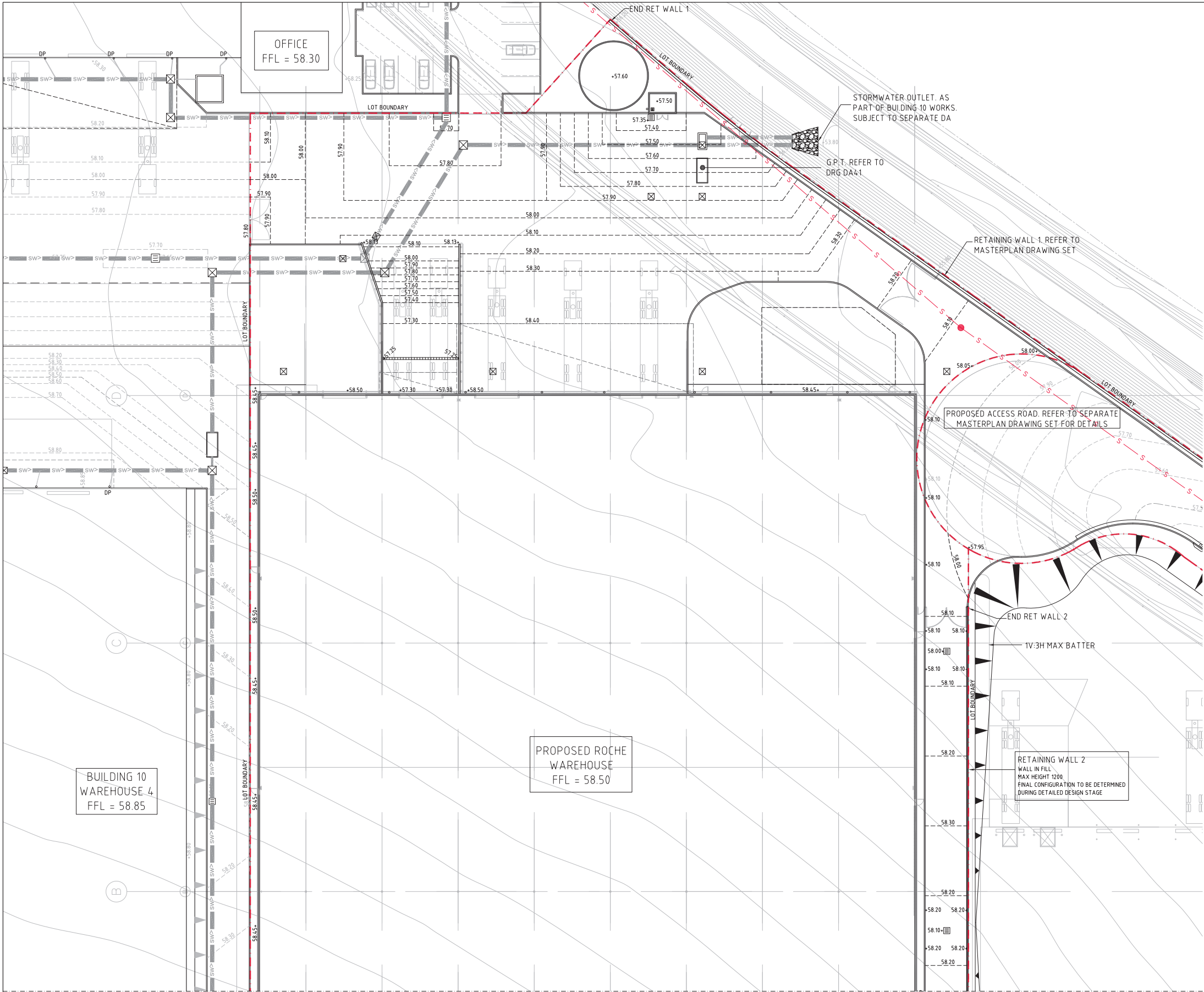


FOR DEVELOPMENT APPLICATION

Costin Roe Consulting

DRAWING TITLE
CONCEPT STORMWATER DETAILS

DRAWING No	C010529.14-DA45	ISSUE	B
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LEGEND
LEVELS DATUM IS AHD.

EXISTING SITE LEVELS AND DETAILS BASED ON A PLAN OF SURVEY OF LOT 13 IN DP270644 BY LAND PARTNERS SURVEYORS 28/9/11.

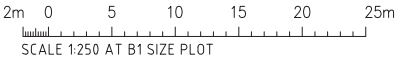
- GD - GRATED DRAIN
- SGGP - SINGLE GRATED GULLY PIT
- SJP - SEALED JUNCTION PIT
- KIP - KERB INLET PIT (1800 LINTEL)
- FINISHED PAVEMENT CONTOUR (MAJOR)
- FINISHED PAVEMENT CONTOUR (MINOR)
- FINISHED PAVEMENT SPOT HEIGHT
- EXISTING CONTOUR
- EXISTING SPOT HEIGHT
- EXISTING SEWER LINE



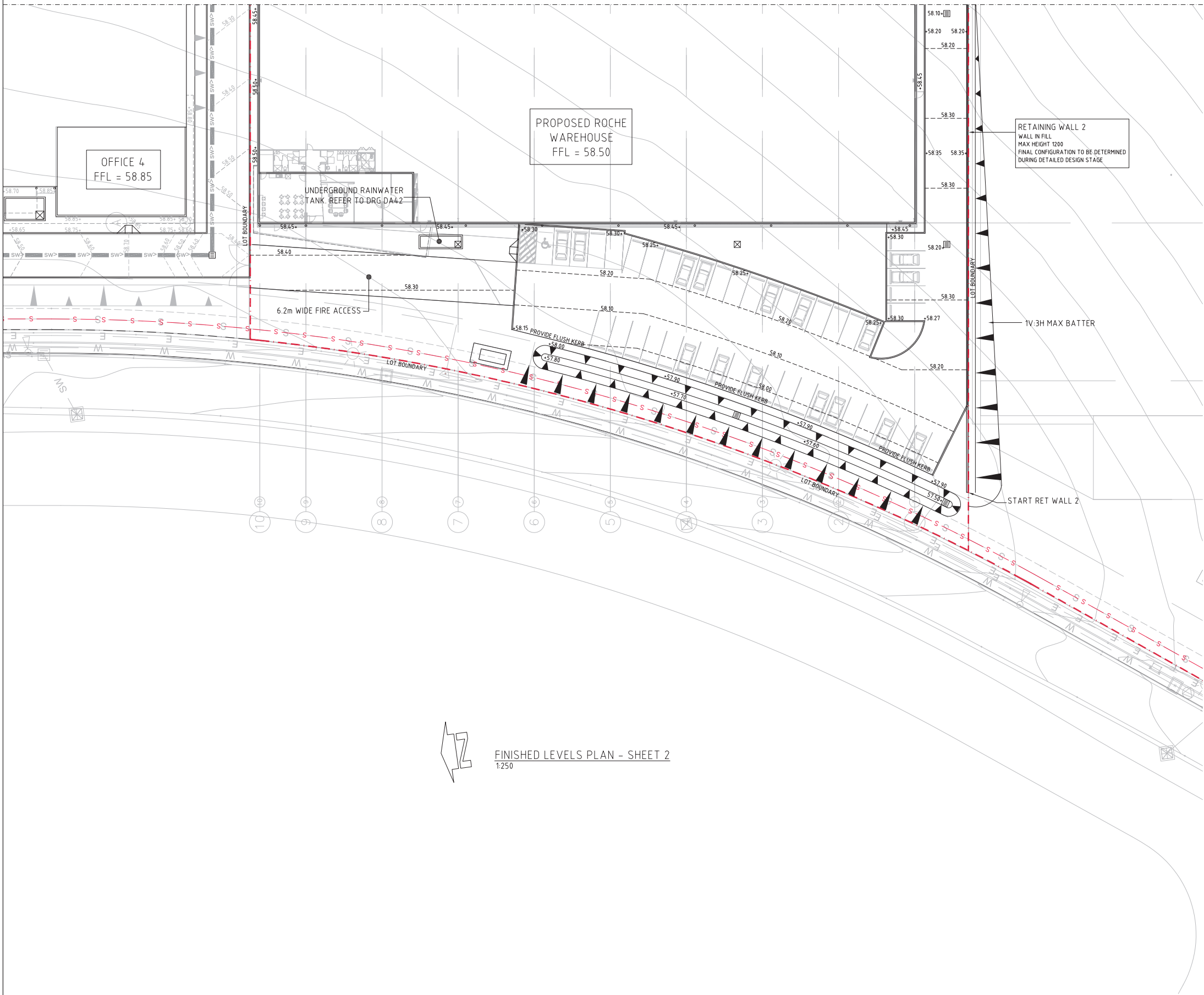
BREAKLINE - FOR CONTINUATION REFER TO DRAWING Co10529.14-DA52

FINISHED LEVELS PLAN - SHEET 1
1:250

FINISHED LEVELS NOTES:
REFER TO DRAWING DA52 FOR FINISHED LEVELS NOTES



BREAKLINE - FOR CONTINUATION REFER TO DRAWING Co10529.14-DA51



- 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 1:30 IN DISABLED PARKING, 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 2.5% NOMINAL GRADE.
 12. ALL PAVEMENTS ARE TO BE SET AT 50mm BELOW THE FINISHED FLOOR LEVEL OF THE WAREHOUSE AND OFFICE AREAS U.N.O. ON PLAN.

- LEGEND**
LEVELS DATUM IS A.H.D.
- EXISTING SITE LEVELS AND DETAILS BASED ON A PLAN OF SURVEY OF LOT 13 IN DP270644 BY LAND PARTNERS SURVEYORS 28/9/11.
- GD - GRATED DRAIN
 - SGGP - SINGLE GRATED GULLY PIT
 - SJP - SEALED JUNCTION PIT
 - KIP - KERB INLET PIT (1800 LINTEL)
 - 57.80 - FINISHED PAVEMENT CONTOUR (MAJOR)
 - 57.60 - FINISHED PAVEMENT CONTOUR (MINOR)
 - 65.30 - FINISHED PAVEMENT SPOT HEIGHT
 - 58.5 - EXISTING CONTOUR
 - 58.65 - EXISTING SPOT HEIGHT
 - - - - - EXISTING SEWER LINE

2m 0 5 10 15 20 25m
SCALE 1:250 AT B1 SIZE PLOT

FOR DEVELOPMENT APPLICATION

						ARCHITECT			CLIENT			PROJECT			 Costin Roe Consulting Pty Ltd. Consulting Engineers ACT 001 001 001 Level 1, 8 Windmill Street Walsh Bay, Sydney NSW 2200 Tel: (02) 8051-7699 Fax: (02) 8241-3731 email: mail@costinroe.com.au ©			 Costin Roe Consulting			DRAWING TITLE FINISHED LEVELS PLAN SHEET 2																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
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