3 November 2023

CIVIL ENGINEERING SERVICES

Forest Lodge, 8 Forest Road Warriewood

Water Management Report

Hydraulic Fire Civil Utilities Infrastructure

DOCUMENT CONTROL

01	14th April 2023	ISSUE FOR 70% DETAILED DESIGN	Previous
02	3rd November 2023	ISSUE FOR S4.56 SUBMISSION	Current
Rev #	**Date**	**Description of Change**	**Status**

APPROVALS

01	Isabella Oke *Senior Engineer – Civil & Water Engineering*	James Georgiades *Team Leader – Civil & Water Engineering*
02	Isabella Oke *Senior Engineer – Civil & Water Engineering*	James Georgiades *Team Leader – Civil & Water Engineering*
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CONTENTS

SCHEDULES

CIVIL ENGINEERING SERVICES

1. INTRODUCTION

Warren Smith Consulting Engineers (WSCE) has been engaged by Kuatro Build Pty Ltd to prepare an updated Water Management report for the proposed development for Forest Lodge Residential Development at 8 Forest Road, Warriewood.

This report provides updates for the purpose of a Section 4.56 submission with reference to a previous Water Management Report prepared by Martens Consulting Engineers dated February 2017.

The Section 4.56 modification of Approval N0440/15 in The Northern Beaches LGA proposes the following design alterations to the original Development Application submission:

- Removal of the internal 5.5m wide road between Buildings A & D and Buildings B & C.
- Provision of a community space between Buildings A & D and Buildings B & C including:
    - 4m wide shared path
    - BBQ areas
    - Seating areas
    - Outdoor gym area
    - Swimming pool
- Provision of a 4m wide ring road around the apartment building developments.

The above modifications impacts the following civil design elements:

- Site grading and retaining
- Bulk earthworks
- Internal stormwater drainage layout
- Upstream diversion trunk drainage pipe alignment and invert levels
- Overland flow paths
- Ring road alignment, longitudinal sections and cross sections.

1.1 BACKGROUND

The existing site is located at 8 Forest Road, Warriewood approximately 35km North-East of the Sydney CBD. The development site is bound by Narrabeen Creek to the north, residential development to the east, and dense bushland to the west and south. Refer to Figure 1.1 which shows the extent of the development site area in which the proposed works are to be undertaken.

Figure 1.1: Aerial View of Property Boundary (Source: SIXMaps)

The proposed development is for townhouses and multi-storey residential buildings with connecting roads.

2. ABBREVIATIONS AND DEFINITIONS

AEP	Annual Exceedance Probability
AHD	Australian Height Datum
ARI	Average Recurrence Interval
DN	Diameter (mm)
EY	Exceedances per Year
IFD	Intensity-Frequency-Duration
L/s	Litres per second
m/s	Metres per second
MUSIC	Model for Urban Stormwater Improvement Conceptualisation
OSD	On-Site Detention
PSD	Permissible Site Discharge
RCP	Reinforced Concrete Pipe
RWT	Rainwater Reuse Tank
SID	Safety In Design
SSR	Site Storage Requirement
WSC	Water Services Coordinator
WSUD	Water Sensitive Urban Design

The Use of Must, Shall & Should:

In accordance with the International Organisation for Standardisation (ISO) Directives, the word “shall” is used to state that a requirement is strictly to be followed in order to conform to a Performance Requirement. Consequently, there can be no deviation from that requirement, other than a specific tolerance.

It is noted that in legislation and specifications it is common to use the word “must” to express a requirement. The word “shall” in this document should be considered as equivalent to “must” in the legislation.

The word “should” introduces a suggestion or recommendation that is not a requirement. It is not necessary that such recommendations or suggestions be followed in order to comply with the Performance Requirement.

3. CIVIL SERVICES GENERAL

3.1 PURPOSE OF THIS DOCUMENT

The purpose of this document is to provide an updated report for a Section 4.56 Modification on Approval N0440/15 with reference to the Water Management Report prepared by Martens Consulting Engineers dated February 2017.

3.1.1 DESIGN CRITERIA

Table 3.1: Design Criteria

Item	Design Criteria
Stormwater Drainage Works	AS/NZS 3500.3 – 2015 – Stormwater Drainage AS 2865 – 2009 Safe Working in a Confined Space Warriewood Valley Water Management Specification 2001 Pittwater 21 Development Control Plan Section C6.1
On-Site Detention (OSD)	AS/NZS 3500.3 – 2015 – Stormwater Drainage AS 2865 – 2009 Safe Working in a Confined Space Pittwater 21 DCP Section 5.7 Warriewood Valley Water Management Specification 2001 Warringah Council On-site Stormwater Detention Technical Specifications
Water Quality Requirements and Proposed Treatment System	Draft NSW MUSIC Modelling Guidelines 2010 Pittwater 21 DCP Section B5.9 Stormwater Management – Water Quality - Other than low-Density Residential Warriewood Valley Water Management Specification 2001
Sediment and Erosion Control	Landcom 'Blue Book' – Managing Urban Stormwater Soils and Construction Guideline Edition 4

With reference to the above-mentioned documents, the Council requirements for this report are as presented below:

Water Quantity
With reference to the Warriewood Valley Water Management Specification:

- Minimum site storage requirements (SSR) to be satisfied as per Table A1.
- Permissible site discharges (PSD) to be satisfied as per Table A2.
- The post-development hydrograph is no more than 10% greater than the pre-development hydrograph.

This is further addresses in Section 5 of the report.

Water Quality
With reference to the Warriewood Valley Water Management Specification:

- Water quality assessment and monitoring
- Water quality management based on local conditions and local water acceptance criteria
- Details and management of Stormwater Quality Improvement devices

This is further addresses in Section 6 of the report.

4. OVERLAND FLOW AND FLOODING

A number of flooding assessments have been undertaken for the proposed development. This report references the information detailed within the Flood Study by Martens Consulting Engineers dated February 2017, and the Flood Assessment by GRC Hydro dated 14th April 2022.

4.1 EXISTING CONDITIONS

The site falls within a High Flood Risk zone as identified by Northern Beaches Council.
Narrabeen Creek is situated immediately to the north of the site, however mainstream flooding from the creek does not inundate the proposed development up to and including the PMF.

The property is currently affected by overland flooding from an upstream catchment of approximately 81.6ha.

4.2 PROPOSED DEVELOPMENT

The proposed development incorporates flood mitigation and risk minimising measures as part of the design.

The proposed stormwater drainage system associated with the flood mitigation consists of the following:

- Site is subject to upstream overland flow from the southern direction. A retaining wall has been proposed to act as a flood barrier which extends for almost the entire width of the site along the southern boundary. The top of retaining wall level has been nominated to be RL 30.8, which achieves 500mm freeboard to the 1% AEP flood level.
- Proposed swale, pit, and pipe (1500mm Diameter) network to capture upstream overland flow for all events up to 1% AEP and discharge via headwall outlet to Narrabeen creek.

5. WATER QUANTITY MANAGEMENT

The proposed drainage consists of minor and major systems. The minor system consists of below ground drainage consisting of pits and pipes and have been designed for the 5% AEP storm event. The Major system consists of above ground drainage, consisting of overland flow paths which have been designed to cater for the 1% AEP storm event.

The proposed stormwater drainage system consists of the following:

- A central 10kL rainwater tank located in the basement that services a portion of the multi-storey buildings. The reuse from this tank is proposed to be used for irrigation and toilet flushing.
- The western portion of the site is captured via an internal drainage system consisting of a series of swales, pits and pipes and ultimately discharges via a headwall outlet connection (HW/4) to Narrabeen creek. Prior to discharge to the creek, Bioretention Basin 1 has been proposed upstream to the headwall outlet to control post-development flows back to pre-development levels for all storm events up to and including the 1% AEP event.
- Similarly, the eastern portion of the site is captured via drainage network of swales, pits and pipes and discharged via headwall outlet (HW/5) connection to Narrabeen creek. Bioretention Basin 2 has been proposed upstream to headwall outlet to control post-development flows back to pre-development levels for all storm events up to and including the 1% AEP event.

Refer to the stormwater drawings within Schedule 1 for an illustration of the proposed stormwater & OSD system.

5.1 ON-SITE DETENTION SYSTEM

5.1.1 DRAINS INPUT PARAMETERS

The drainage system shall be modelled utilising DRAINS to ensure the system is designed to meet the Council's stormwater requirements. DRAINS is a stormwater drainage design and analysis program which performs hydraulic grade line analysis and generates the flows which would occur for a particular AEP storm event.

The catchment characteristic factor values which have been used in the DRAINS model are summarised below:

- Paved (impervious) Area Depression Storage 1mm
- Supplementary Area Depression Storage 1mm
- Grassed (Pervious) Area Depression Storage 5mm
- Soil Type - Normal 2.5
- Antecedent Moisture Condition (AMC) 3.0
- Minimum Pit Freeboard 150mm
- Blockage Factor for On-Grade Pits 50%
- Blockage Factor for Sag Pits 50%

Refer to Table 5.1 for the OSD1 and OSD2 details.

Table 5.1: On-Site Detention Basin Details

Item	Detail
On-Site Detention Basin (OSD1) Summary	
Total Catchment Area Draining	0.88 Ha
Average Base IL	22.19m AHD
Outlet Diameter	225 mm
Outlet IL	21.49m AHD
Provided Volume	942 m^3
On-Site Detention Basin (OSD2) Summary	
Total Catchment Area Draining	1.11 Ha
Average Base IL	20.20m AHD
Outlet Diameter	300 mm
Outlet IL	19.87m AHD
Provided Volume	400 m^3

The minimum OSD storage requirement for the total site as specified in the Warriewood WMS 2001 is 368m^3/Ha which equates to 743m^3 for the proposed development area of 2.0Ha. The 942m^3 and 400m^3 bioretention basins provide a total of 1,342m^3, which satisfies this requirement.

Refer to the stormwater drawings within Schedule 1 for an illustration of the proposed stormwater catchment.

5.1.2 SITE DISCHARGE RESULTS

The site discharge results for the pre and post development 1% AEP storm events of varying duration are presented in the below Table 5.2.

Table 5.2: Site Discharge Results

Storm Duration	30 min	1 hr	2 hr	3 hr	6 hr
Council PSD Requirement (L/s/ha)	229	331	390	279	235
Site PSD (L/s)	461	666	785	562	473
Pre-Development Site Discharge (L/s)	830	629	546	382	324
Post Development Site Discharge (L/s)	418	312	269	254	248

The site discharge results as demonstrated above satisfy the permissible site discharge requirements as specified in the Warriewood Valley WMS 2001 Table A2.

The hydrographs were also analysed to determine that the post-development hydrograph is no more than 10% greater than the pre-development hydrograph. These hydrographs are provided in Schedule 2 and demonstrate that the post-development hydrograph does not exceed the pre-development hydrograph, and thus this condition is satisfied.

5.2 STORMWATER QUANTITY MAINTENANCE

The pit and pipe network shall be inspected at intervals after a major storm event and not exceeding twelve (12) months. Inspections should be undertaken by suitably qualified persons with an understanding and experience in the operation of similar systems.

Inspections should as a minimum:

1. Check that all grates, covers and lintels are in sound condition and are undamaged. Any signs of deterioration should be noted.
2. Check all pits for accumulation of sediment, debris or litter.
3. If pits are found to be affected by sediment, debris or litter, an assessment should be made as to whether the upstream and downstream pipes require cleaning.
4. Inspect outlet and ensure it is in a sound, undamaged condition.

Maintenance of the pit and pipe system should be undertaken as required following the above inspections. Typical maintenance procedures that would need to be undertaken include:

1. Remove sediment, debris and litter from pits including lintels.
2. Remove sediment or other foreign material from pipes.

Rainwater tanks shall be inspected annually for any damages to gutters, first flush system or any other components that may need replacement.

The bioretention basin shall be also inspected at intervals after a major storm event and as indicated in Section 6.5 of this report.

6. WATER QUALITY MANAGEMENT

To adhere to the Northern Beaches Council's requirements for the adequate treatment of the stormwater runoff, a treatment plan has been formulated for the development area to remove the suspended solids and nutrients before being discharged from the site.

6.1 POTENTIAL POLLUTANTS GENERATED

The pollutants that could potentially be generated as a result of the development are as follows:-

- Gross Pollutants, e.g. Litter;
- Sediments;
- Nutrients (Phosphorus and Nitrogen), and;
- Hydrocarbons.

The development has been modelled to demonstrate the performance of the stormwater treatment system utilising a program called MUSIC (Model for Urban Stormwater Improvements Conceptualisation). MUSIC models the proposed stormwater treatment devices and estimates their respective performance against the performance targets of the project. The pollutants modelled in MUSIC are Gross Pollutants (GP), Total Suspended Solids (TSS), Total Phosphorus (TP), and Total Nitrogen (TN).

6.2 RAINFALL

The rainfall data used in the MUSIC model was based on the Bureau of Meteorology data and is presented in Table 6.1. A five (5) year continuous rainfall period with the maximum available data has been adopted in accordance with the Northern Beaches Council's WSUD & MUSIC Modelling Guidelines.

Table 6.1: Rainfall Data for MUSIC Modelling

Rainfall Station	Rainfall Period	Rainfall Period Dates	Time Step
066062 Sydney Observatory	5 years	1 Jan 1981 – 31 Dec 1985	6 minutes

The average potential evapotranspiration (PET) data used in the MUSIC model was based on the average monthly PET data for the Sydney region and is presented in Table 6.2.

Table 6.2: Monthly Evapotranspiration Data for MUSIC Modelling

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
PET (mm)	180	135	128	85	58	43	43	58	88	127	152	163

6.3 RAINFALL RUNOFF PROPERTIES

Table and Table present the rainfall-runoff properties which have been utilised in the MUSIC model.

Table 6.3: Soil Properties for MUSIC Source Nodes

Parameter	Units	Rainfall Period Dates	
Impervious Area Parameters			
Rainfall Threshold	mm	0.3 (Roofs) 1.5 (Roads/Pathways)	
Pervious Area Parameters			
		Sand	**Sandy Clay Loam**
Soil Capacity	mm	350	108
Initial Storage	%	30	30
Field Capacity	mm	144	73
Infiltration Capacity Coefficient – a		360	250
Infiltration Capacity Coefficient – b		0.5	1.3
Groundwater Properties			
		Sand	**Sandy Clay Loam**
Initial Depth	mm	10	10
Daily Recharge Rate	%	100	60
Daily Baseflow Rate	%	50	45
Deep Seepage	%	0	0

Table 6.4: Stormwater Water Quality Parameters for MUSIC Source Nodes*

Land Use Category		Log_{10}TSS (mg/L)		Log_{10}TP (mg/L)		Log_{10}TN (mg/L)	
		Storm Flow	**Base Flow**	**Storm Flow**	**Base Flow**	**Storm Flow**	**Base Flow**
Roofs	Mean	1.30	*	-0.89	*	0.30	*
	Std Dev	0.32	*	0.25	*	0.19	*
Mixed (Paved & Landscape)	Mean	2.20	*	-0.45	*	0.42	*
	Std Dev	0.32	*	0.25	*	0.19	*

*Base flows are only generated from pervious areas; therefore, these parameters are not relevant to impervious areas

6.4 STORMWATER TREATMENT WSUD DEVICES

Stormwater quality treatment is primarily achieved via two bioretention basins. The basins are proposed in the north-east and north-west of the site, with bioretention filter areas of 155m^2 and 175m^2 respectively. The bioretention system will degrade pollutants and nutrients through the planting and filter media layers. Treated water then exits through the underdrain to the discharge control pit.

Rainwater tanks also provide a level of stormwater quality treatment by implementing a first flush system which flushes the first polluted water that collects on the roof.

Refer to the stormwater drawings in Schedule 1 for stormwater quality treatment device locations and details.

6.5 STORMWATER QUALITY MAINTENANCE

The bioretention basin shall be inspected at intervals after a major storm event and as per the intervals shown in Table 6.5:

Table 6.5: Stormwater Quality Maintenance

Item	Description	Frequency
Filter Media	Check for and remove any build-up or litter from the basin surface.	3 months
	Check for and remove any sediment from inlet pipes, outlet pipes and pits, and filter media.	3 months
	Check for any erosion or scour. Replace or provide additional energy dissipation measures.	3 months
	Replace filter media as required if at capacity or surface is clogged.	10 years or as required
Planting	Assess and treat plant disease or pests and replace if required.	3 months
	Check plant density is consistent with original requirements. Replant as required at appropriate spacings (6-10 plants per m^2).	3 months
	Check for weeds and remove.	3 months
Drainage	Check the underdrain is not blocked. Remove any blockages.	6 months
	Check grates, weirs, inlets and outlets are clear of litter and debris. Repair any damages if identified.	Monthly
General	Check for any operational issues and repair/manage as required.	6 months

6.6 STORMWATER QUALITY MONITORING

Stormwater quality monitoring is proposed to be carried out in the following three locations in the vicinity of the proposed site:

1. Upstream of the site on the south to determine the existing conditions;
2. Downstream of the Basin 1 outlet; and
3. Downstream of the Basin 2 outlet in order to assess the results and impact of the stormwater quality treatment.

Two water and sediment samples are proposed to be taken at each of the above locations – one in dry conditions and one in wet conditions. These samples are to be taken once prior to construction and again at completion of construction for assessment.

The monitoring requirements indicating the variables to be tested are provided in Table C1 from the Warriewood WMS 2001. The acceptance criteria for these variables are shown in Table C2 from the Warriewood WMS 2001. Refer to Schedule 3 for these tables.

6.7 MOSQUITO RISK ASSESSMENT

A mosquito risk assessment has been undertaken to identify possible locations where ponding water can occur and therefore pose a risk of mosquito breeding. The assessment also identified proposed strategies to minimize this risk.

6.7.1 POTENTIAL LOCATION

The below locations have been identified as possible locations where water may lie stagnant and therefore provide a potential breeding environment for mosquitoes:

- General surface areas
- In-ground stormwater pits
- Bioretention/OSD Basins
- Narrabeen Creek

6.7.2 MANAGEMENT STRATEGIES AND RISK ASSESSMENT

The below management strategies or design conditions are listed below for the potential breeding locations:

- General surface areas – Site grading has been designed such that no areas will allow for ponding without in-ground drainage. Overland flow paths have been designed to be directed towards the bioretention basins and ultimately Narrabeen Creek.
- In-ground stormwater pits – The in-ground stormwater system freely drains by gravity and benching has been provided in all pits such that no water will pond within the pits or pipes. Regular maintenance should be carried out in accordance with the stormwater maintenance plan.
- Bioretention/OSD Basins – The basins drain via gravity through the discharge control pit towards Narrabeen Creek. The basins are generally dry in between storm events. Regular maintenance should be carried out in accordance with the stormwater maintenance plan.
- Narrabeen Creek – The creek is well graded with minimal localised flat or low areas at risk of ponding water. The creek runs from a west to east direction.

Per the above management strategies, the mosquito risk for the proposed development is considered to be relatively low.

7. SEDIMENT AND EROSION CONTROL

The Contractor for the works is required to provide Sedimentation and Erosion Control in accordance with the guidelines set out in Landcom's Managing Urban Stormwater Soils & Construction Guidelines and the general requirements outlined below.

7.1 SITE PROTECTION MEASURES

The Contractor for the works is required to provide Sedimentation and Erosion Control in accordance with the requirements outlined below to inhibit the movement of sediment off the site during demolition and construction phases.

7.1.1 SITE ACCESS

Construction vehicles leaving the site shall be required to pass over a Temporary Construction Vehicle Entry / Exit consisting of a 1.5m long by 3m wide 'cattle rack'.

7.1.2 SEDIMENT CONTROL

All exposed earth areas where it may be possible for runoff to transport silt downslope shall be protected with a sediment and erosion control silt fence generally installed along the boundaries of the site.

The fence will be constructed in accordance with details provided by the Department of Conservation and Land Management incorporating geotextile fabric which will not allow suspended particles greater than 50mg/L non-filterable solids to pass through, and as such comply with the appropriate provisions of the Clean Waters Act 1970.

The construction of the silt fence will include the following: -

- Geotextile fabric buried to a maximum of 150mm below the surface. Refer to Figure 7.1 for details;
- Overlapping any joins in the fabric;
- Turning up on the ends for a length of 1 meter in order to prevent volumes of suspended solids escaping in a storm event;

Refer to Figure 7.1 for details.

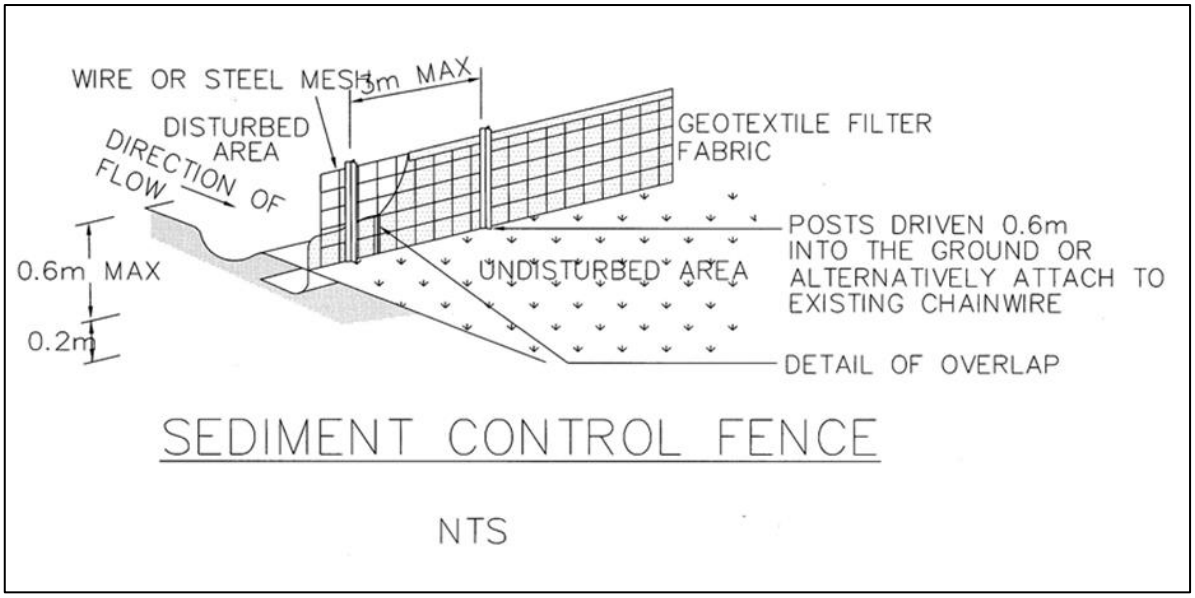

Figure 7.1: Sediment Control Fence Detail

Check Dams have also been proposed to reduce erosive energy levels of concentrated water within drainage channels. They can be built with various materials, including rocks, logs, sandbags, and straw bags under the following requirements:

- Trench the check dam 200mm into the ground across its whole width. Where rock is used, fill the trench to at least 100mm above the ground surface to reduce the risk of undercutting.
- Their maximum height should not exceed 600mm above the gully floor. The centre should act as a spillway, being at least 150mm lower than the outer edges.

Refer to Figure 7.2 below for details.

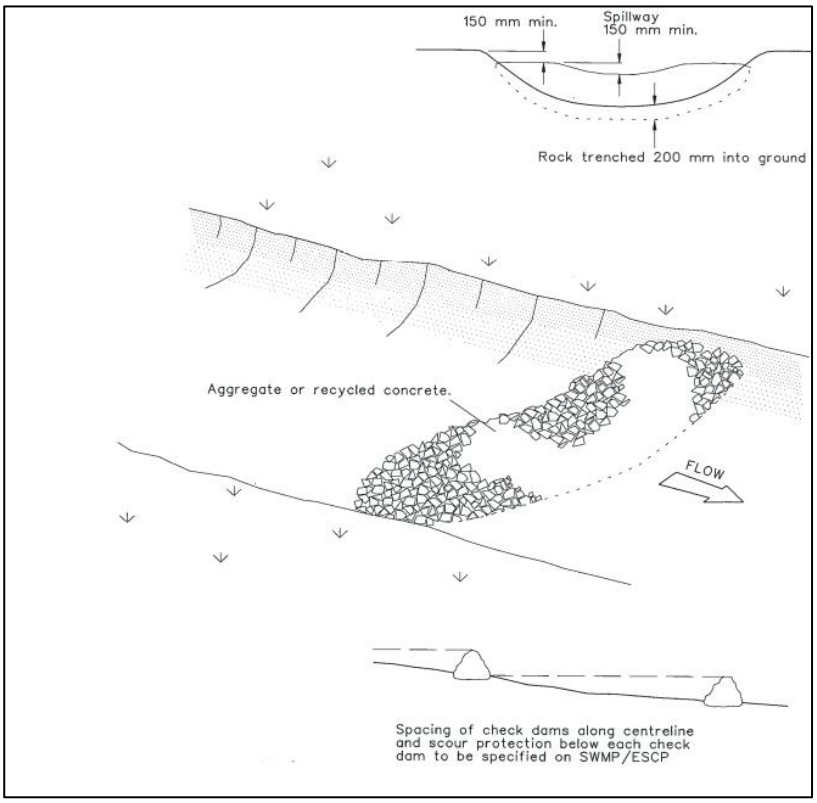

Figure 7.2: Rock Check Dam (NTS)

7.1.3 TEMPORARY STORMWATER SYSTEM (WHERE REQUIRED)

Site runoff within the zones of the excavation will be drained towards a central holding well within the excavation and sediment basins as shown on the Soil and Water Management Plan. The runoff will be allowed to settle out suspended particles and debris, and acceptable water of 50mg per litre of Non-Filterable Residues (NFR) is required to be achieved before discharge.

Upstream catchment runoff is proposed to be diverted through the site as “clean / unaffected water”, directly to Narrabeen Creek via a diversion channel.

7.1.4 DUST CONTROL

The following dust control procedures will be adhered to:

- Loose loads entering or leaving the site will be securely covered by a tarpaulin or like material in accordance with TfNSW and local Council Guidelines;
- Soil transport vehicles will use the single main access to the site;
- There will be no burning of any materials on site;
- Water sprays will be used across the site to suppress dust. The water will be applied either by water sprinklers or water carts across ground surfaces whenever the surface has dried out and has the potential to generate visible levels of dust either by the operation of equipment over the surface or by the wind. The watercraft will be equipped with a pump and sprays;
- Spraying water at the rate of not less than three (3) L/s and not less than 700kPa pressure. The area covered will be small enough that surfaces are maintained in a damp condition and large enough that runoff is not generated. The water spray equipment will be kept on-site during the construction of the works;
- During excavation all trucks/machinery leaving the site will have their wheels washed and/or agitated prior to traveling on Council Roads, and;
- Fences will have shade cloth or similar fabric fixed to the inside of the fence.

7.1.5 SEDIMENT PUMP OUT PITS

Sediment pump out pits shall be installed within the extent of proposed basement. A perforated riser outlet pipe shall be installed to pump any rainwater collected in these pits and shall discharge into a grated inlet pit along the southern boundary of the site. Refer to Figure 7.3 for details of a perforated riser outlet pipe.
The pump out pit within the basement are to discharge to Sediment Basins 1 & 2.

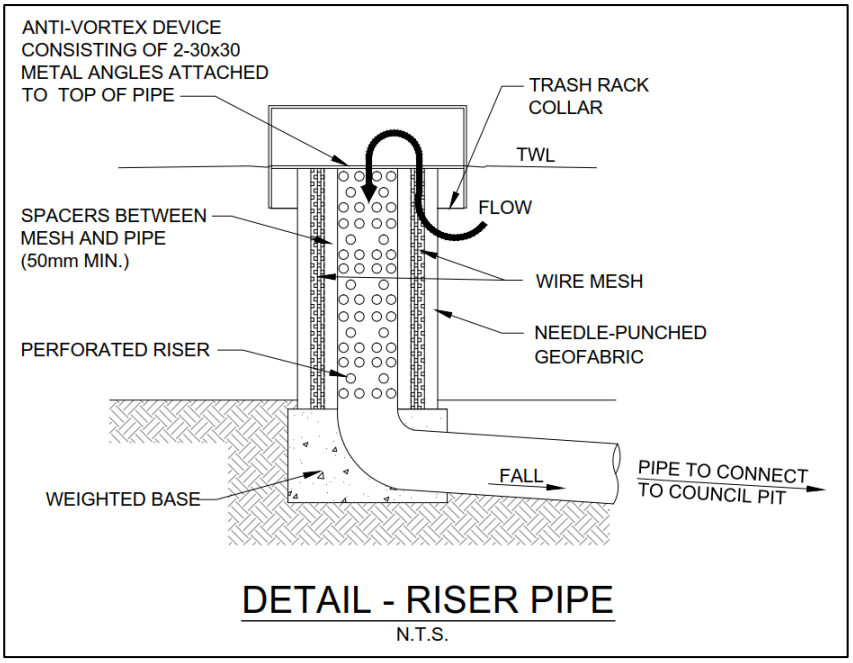

Figure 7.3: Pump Out Pit Outlet Pipe Detail

7.1.6 MAINTENANCE

Generally, the following maintenance measures shall be adhered to during construction:

- It will be the responsibility of the site foreman for the building contractor to ensure sediment and erosion control devices on site are maintained. The devices shall be checked daily, and the appropriate maintenance to be undertaken as necessary;
- Prior to the closing of the site each day, the road shall be swept, and materials deposited back onto the site;
- Gutters and roadways will be kept clean regularly to maintain them free of sediment;
- Appropriate covering techniques, such as the use of plastic sheeting will be used to cover excavation faces, stockpiles, and any unsealed surfaces;
- If dust is being generated from a given surface, and water sprays fail; a new work method statement must be provided by the contractor to ensure levels are reduced to a manageable level;
- If fugitive emissions have the potential to cause the ambient quality to foul the ambient air quality, measures must be taken in order to safely enclose emissions or implement a local extraction ventilation system;
- The area of soils exposed at any one time will be minimised wherever possible by excavating in a localised progressive manner over the site;
- Materials processing equipment suitable to comply with regulatory requirements. The protection will include the covering of feed openings with rubber curtains or socks, and;
- Suitable and approved bins shall be utilised for the containment of hard waste, including concrete slurries, building waste, and litter. In the case of accidental spills, particularly within the public reserve, the material shall be swept and contained, and not washed into a gutter or waterway.

It is considered that by complying with the above, appropriate levels of protection are afforded to the site and the adjacent public roads, footpaths, and environment.

SCHEDULE 1 CIVIL DRAWINGS

FOREST LODGE
WARRIEWOOD
CIVIL & STORMWATER
ISSUE FOR S4.56

LOCALITY AERIAL
NOT TO SCALE

SOURCE : SIXMAPS

Sheet List Table		
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CLIENT KUATRO

PROJECT MANAGER KUATRO

ARCHITECT ADS ARCHITECTS

GLOBAL COMPLIANCE CERTIFICATION GCC ISO 9001 Certified

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TITLE **COVER SHEET**

SCALE	DRAWN	DESIGNED	CHECKED	APPROVED
AS SHOWN	I.K.	I.O.S	J.G.	J.G.

JOB No.	DRAWING No.	ISSUE
7368002	C1.01	1

DATE	STATUS
SEPTEMBER 2023	ISSUE FOR S4.56

Pilot Date

GENERAL

G1. DESIGN HEREIN HAS BEEN PREPARED BY WARREN SMITH CONSULTING CIVIL ENGINEERS PTY LTD, LEVEL 20, 66 GOULBURN ST, SYDNEY NSW 2000 TEL:- (02) 9299 1312, FAX:- (02) 9290 1295.

G2. THE DRAWINGS HEREIN SHALL BE READ AS REQUIRED IN CONJUNCTION WITH ARCHITECT DRAWINGS BY:
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SYDNEY OLYMPIC PARK NSW 2127
TEL: (02) 9648 6663

G3. ALL DIMENSIONS IN MILLIMETRES UNO. REDUCED LEVELS AND CHAINAGES ARE IN METRES. DO NOT SCALE DRAWINGS. USE FIGURED DIMENSIONS.

G4. THE PROPOSED WORKS DETAILED HEREIN SHALL BE CONSTRUCTED TO THE REQUIREMENTS OF COUNCIL GENERALLY AS DETAILED HEREUNDER.

G5. ALL EXISTING SERVICES SHALL BE VERIFIED FOR DEPTH AND HORIZONTAL POSITION BY PHYSICAL MEANS PRIOR TO EXCAVATION. ANY DISCREPANCIES SHALL BE BROUGHT FORTHWITH TO THE PROJECT MANAGER'S ATTENTION.

G6. REFERENCE SHALL BE MADE TO THE CONSTRUCTION MANAGEMENT PLAN FOR ALL SITE WORKS DETAILED HEREIN.

STORMWATER & SUB-SOIL DRAINAGE

MATERIALS:

STW1. PIPES AND FITTINGS FOR STORMWATER DRAINAGE SHALL BE AS FOLLOWS UNO ON THE DRAWINGS:
A. SEWER GRADE uPVC (SN8) WITH SOLVENT WELDED JOINTS FOR BELOW GROUND DRAINAGE UP TO 225mm.
B. REINFORCED CONCRETE WITH RUBBER RINGS, CLASS 3, FOR PIPE DIA'S GREATER THAN 225mm OR WHERE REQUIRED BY AS3500 FOR EXCESSIVE DEPTH.
C. INSTALL IN ACCORDANCE WITH AUSTRALIAN STANDARD AS3500 EXCEPT WHERE VARIED BY THE CONTRACT DOCUMENTS.

STW2. PIPES & FITTINGS FOR SUBSOIL DRAINAGE SHALL BE SLOTTED POLYVINYL CHLORIDE (PVC) WITH SOLVENT WELDED JOINTS, MIN. 150mm DIAMETER.

STW3. IN GROUND DRAINAGE PIPEWORK SERVING DP's SHALL BE MINIMUM 150mm DIA. UNO.

STW4. GRATED DRAINS SHALL BE 150mm NOM.
A. 150mm NOM. WIDTH IN NON TRAFFICABLE AREAS.
B. 225mm NOM. WIDTH IN TRAFFICABLE AREAS.

STW5. STORMWATER PITS ARE AS SHOWN & SPECIFIED ON THE PLANS . PRECAST TYPE ACCEPTABLE WITH STEP IRONS FOR DEPTH GREATER THAN 1200. BENCH ALL PITS MIN. 50mm & FORM SMOOTH TRANSITION FROM INLET TO OUTLET.

STW6. SELECT FILL SHALL BE MATERIAL OBTAINED FROM EXCAVATION OF THE PIPE TRENCH OR IMPORTED WITH A PARTICLE SIZE FOR ROCK NOT GREATER THAN 75mm OR FOR OTHER THAN ROCK NOT GREATER THAN 150mm.

STW7. IMPORTED FILL SHALL BE EITHER, AND GENERALLY CONSIST OF SINGLE SIZED AGGREGATE WITH PARTICLE SIZE NOT GREATER THAN 5mm WRAPPED ALL ROUND WITH GEOTEXTILE FILTER FABRIC OR APPROVED HIGH COMPACTION SAND OR APPROVED CRUSHED ROAD GRAVEL CONFORMING TO RTA FORM 3051 OR SIMILAR.

STW8. STORMWATER PITS AND GRATES TO CONFORM WITH STANDARD COUNCIL REQUIREMENTS. WHERE ON PUBLIC LAND. GRATES TO BE SUPPLIED IN CLASS SHOWN ON THE DRAWINGS.

INSTALLATION REQUIREMENTS:

STW9. PIPES SHALL BE TRUE TO GRADES SHOWN AND ALIGNED SO THAT THE CENTRES OF THE INLET PIPES INTERSECT WITH THE CENTRE OF THE OUTLET PIPE AT THE DOWNSTREAM FACE OF THE PIT.

STW10. MINIMUM GRADES FOR GRAVITY STORMWATER DRAINAGE SHALL CONFORM TO AS3500 PART3 AS FOLLOWS, UNO:
1% FOR 100 AND 150 mm DIA.
0,5% FOR 225 mm DIA
0.5% FOR 300 mm DIA
0.4% FOR 375 mm DIA

STW11. MINIMUM DEPTH OF COVER SHALL BE :-
- 300mm IN PRIVATE PROPERTY (NON VEHICULAR TRAFFIC).
- 450mm IN PUBLIC AREAS.
- 600mm IN VEHICULAR TRAFFICABLE AREAS (FOOTWAY/ROADWAY)

STW12. BED ALL PIPES FIRMLY AND EVENLY ONTO IMPORTED BEDDING FILL MATERIAL.

STW13. LAY AND JOINT ALL PIPES IN ACCORDANCE WITH THE MANUFACTURERS RECOMMENDATIONS AND AS 3725-1989 BURIED FLEXIBLE PIPELINES AS 2566-1998 LOADS ON BURIED FLEXIBLE PIPELINES AS 1597.2-1996 PRECAST REINFORCED CONCRETE BOX CULVERTS. AS 3500-1990 NATIONAL PLUMBING & DRAINAGE CODE. PART 2, SANITARY PLUMBING AND SANITARY DRAINAGE. SYDNEY WATER REQUIREMENTS.

STW14. ALLOW TO TEST ALL PIPES AND PITS TO MANUFACTURERS REQUIREMENTS.

CONCRETE WORKS

C1. ALL WORKMANSHIP AND MATERIALS SHALL BE IN ACCORDANCE WITH AS3600, THE STANDARDS ASSOCIATION AUSTRALIA, STANDARDS CITED IN AS3600, THE DRAWINGS AND THE SPECIFICATION.

C2. ALL CONCRETE SHALL BE 80mm NOMINAL SLUMP, 20mm MAXIMUM AGGREGATE WITH NO ADMIXTURES OR FLY ASH, UNLESS OTHERWISE APPROVED. ALL CONCRETE WORK IN CONTACT WITH SEWER TO HAVE TYPE SL PORTLAND CEMENT, OTHERWISE TYPE A CEMENT FOR BRIDGE WORKS, A MAXIMUM 56 DAYS SHRINKAGE OF 600 MICROSTRAIN, A MINIMUM CEMENT CONTENT 350kg/m3 AND MAXIMUM WATER:CEMENT RATIO OF 0.40.

C3. STRENGTH GRADE OF CONCRETE SHALL BE : 25 MPa (KERBS, EDGE STRIPS & CONCRETE ENCASEMENT) AND 32 MPa ELSEWHERE.

C4. CONSTRUCTION JOINTS SHALL BE PROPERLY FORMED AND USED ONLY WHERE SHOWN OR APPROVED. GENERALLY FOR HAND PLACED KERB & GUTTER 6mm THICK APPROVED BITUMINOUS MASTIC JOINTING MATERIAL SHALL BE PROVIDED AT INTERVALS NOT EXCEEDING 6m, FOR MACHINE PLACED KERB & GUTTER 6mm THICK APPROVED BITUMINOUS MASTIC JOINTING MATERIAL SHALL BE PROVIDED AT INTERVALS NOT EXCEEDING 12m & GUILLOTINED DUMMY GROOVED JOINTS, 25mm IN DEPTH, SHALL BE FORMED EVERY 3m OF GUTTER. JOINTS ARE ALSO REQUIRED AT EACH END OF GUTTER CROSSING AND GULLY PITS. JOINTS SHALL BE SET VERTICAL AND SQUARE TO THE KERB.

C5. REINFORCEMENT IS REPRESENTED DIAGRAMMATICALLY AND IS NOT NECESSARILY SHOWN IN TRUE PROJECTION.

C6. ELDING OR SPLICES IN REINFORCEMENT SHALL BE USED ONLY IN POSITIONS APPROVED BY THE ENGINEER.

C7. CONCRETE CURING SHALL BE IN ACCORDANCE WITH AS3600. CURING SHALL BE COMMENCED WITHIN TWO HOURS OF FINISHING OPERATIONS AND SHALL BE CONTINUED FOR A MINIMUM OF SEVEN DAYS BY AN APPROVED PROPRIETARY COMPOUND OR BY KEEPING CONTINUOUSLY WET.

C8. FORMWORK SHALL BE DESIGNED AND CONSTRUCTED IN ACCORDANCE WITH AS3610. FORMWORK SHALL NOT BE STRIPPED NOR PROPS REMOVED WITHOUT APPROVAL.

C9. FABRIC LAP DETAILS SHALL BE IN ACCORDANCE WITH FIG.13.2.4 OF AS3600.

C10. HOOKS, LAPS AND BENDS SHALL BE IN ACCORDANCE WITH AS3600 UNO.

C11. ALL CHEMICAL ANCHORS SHALL BE EITHER 'CHEMSET' BY "RAMSET" WITH THE GLASS CAPSULE SYSTEM INSTALLED IN STRICT ACCORDANCE WITH MANUFACTURERS INSTRUCTIONS OR HILTI HVU ADHESIVE ANCHOR WITH FOIL CAPSULE SYSTEM INSTALLED IN STRICT ACCORDANCE WITH MANUFACTURERS INSTRUCTION.

C12. ALL CHEMICAL ANCHORS SHALL BE HOT DIPPED GALVANIZED AND BE MIN M16 DIA. U.N.O.

GENERAL EARTHWORKS, SITEWORKS & FILLING: FILLING:

SGE1. THESE CLAUSES SHALL BE READ IN CONJUNCTION WITH CARDNO REPORT OF GEOTECHNICAL ASSESSMENT, DATED 22 DECEMBER 2021.

SGE2. THE RECOMMENDATIONS CONTAINED IN THE GEOTECH REPORT SHALL OVERRIDE THE CLAUSES PRESENTED HEREIN.

SGE3. STRIP ALL TOPSOIL AND UNDERLYING FILL AND STOCKPILE TOPSOIL FOR LATER REUSE FOR LANDSCAPING PURPOSES.

SGE4. NEW FILL REQUIRED TO REINSTATE CUT LEVELS TO PROPOSED BENCHING LEVELS SHALL BE SOURCED FROM OTHER PARTS OF THE EXCAVATION AS SELECT FILL OR IMPORTED FILL AS SPECIFIED BELOW IN SGE 5 AND SGE 6.

SGE5. SELECT FILL SHALL CONSIST OF LOCALLY DERIVED OR CUT NATURAL CLAYS.

SGE6. IMPORTED FILL SHALL CONSIST OF RIPPED SANDSTONE OR SHALE OR SIMILAR MATERIAL WITH MAXIMUM PARTICLE SIZE NOT GREATER THAN 120mm AND A MOISTURE CONTENT WITHIN 2-3% OF STANDARD OPTIMUM.

SGE7. ALL FILL (COHESIVE SOIL) SHALL BE PLACED IN LAYERS OF 200mm MAXIMUM THICKNESS, COMPACTED BY MACHINE ROLLING TO ACHIEVE A DRY DENSITY RATIO OF NOT LESS THAN 98% STANDARD MAXIMUM AT A CORRESPONDING MOISTURE CONTENT WITHIN 2-3% OF STANDARD OPTIMUM.

SGE8. IN AREAS WHERE HIGH IMPACT ROLLING IS USED TEST EACH FINAL LAYER OF NOT GREATER THAN 300mm TO 400mm TO ACHIEVE A DRY DENSITY SGE8. RATIO OF NOT LESS THAN 98% STANDARD MAXIMUM AT A CORRESPONDING MOISTURE CONTENT WITHIN 2-3% OF STANDARD OPTIMUM.

EXCAVATION BATTERS:

SGE9. ALL TEMPORARY BATTERS CUT IN CLAY SUBSTRATE SHALL BE 1 HORIZ : 1 VERT. ALL LONG TERM EXPOSED BATTERS CUT IN CLAY SUBSTRATE SHALL BE 2 HORIZ : 1 VERT. ALL DETENTION BASIN BATTERS IN CLAY SUBSTRATE SHALL BE 3 HORIZ : 1 VERT. ALL DETENTION BASIN BATTERS IN ROCK SUBSTRATE SHALL BE NEAR VERTICAL.

SGE10. GEOTECHNICAL TESTING IS TO BE UNDERTAKEN TO AT LEAST LEVEL 1 CONTROL OF FILL COMPACTION STANDARD, AS DEFINED IN AS. 3738 AS FOLLOWS

- FOR GENERAL FILL OR CUT AREAS OVER THE AREA PROVIDE ONE (1) TEST PER 200mm LAYER, OVER AN AREA NOT GREATER THAN 500 m^2
- FOR GENERAL FILL AREAS IN CONCENTRATED AREAS ADJACENT TO AND BEHIND THE STRUCTURE AND ADJACENT TO AND BEHIND RETAINING WALLS PROVIDE ONE (1) TEST PER 200mm LAYER, OVER AN AREA NOT GREATER THAN 50m^2

SGE11. SUBMIT ALL GEOTECHNICAL TEST RESULTS TO WARREN SMITH CONSULTING ENGINEERS FOR REVIEW PRIOR TO CONTINUATION WITH SUBSEQUENT SECTION OF WORK.

EARTH WORKS FOR SERVICES

E1. EXCAVATE TRENCHES AND STOCKPILE ALL MATERIAL FOR INSPECTION WITH REGARD TO RE-USE FOR TRENCH BACKFILL. REMAINING MATERIAL TO BE REMOVED FROM SITE.

E2. BEDDING MATERIAL SHALL CONSIST OF IMPORTED FILL ONLY. THICKNESS OF BEDDING LAYER SHALL BE 75mm IN O.T.R. AND 200mm IN ROCK.

E3. EMBED ALL PIPES WITH IMPORTED FILL. PROVIDE 200mm SIDE SUPPORT AND 150mm OVERLAY ABOVE PIPE CROWN.

E4. TRENCH FILL ABOVE THE EMBEDMENT ZONE TO THE UNDERSIDE OF THE ROAD PAVEMENT OR FOOTWAY FILL MATERIAL SHALL BE AS FOLLOWS :

UNDER ROADWAY

TRENCH FILL MATERIAL SHALL CONSIST OF IMPORTED FILL AS SPECIFIED HEREIN OF EITHER HIGH GRADE COMPACTION SAND OR APPROVED CRUSHED ROAD GRAVEL CONFORMING TO RTA FORM 3051 OR SIMILAR.

OTHER THAN ROADWAY

TRENCH FILL MATERIAL EXCAVATED SHALL CONSIST OF SELECT FILL AS SPECIFIED HEREIN AND SHALL NOT CONTAIN MORE THAN 20% OF STONES OF SIZE BETWEEN 75mm & 150mm AND NONE LARGER THAN 150mm. PRIOR TO THE USE OF THE EXCAVATED MATERIAL IT SHALL BE INSPECTED AND APPROVED BY THE CONSULTANT.

E5. COMPACT BEDDING, EMBEDMENT AND TRENCH FILL MATERIALS AS FOLLOWS:

EMBEDMENT:-
FOR GRANULAR FILL MATERIAL (NON-COHESIVE SOILS) EG, COARSE AGGREGATE FILL. HIGH GRADE COMPACTION SAND, THE DENSITY INDEX (ID) SHALL BE NOT LESS THAN 70%.

TRENCH FILL:-
FOR GRANULAR MATERIAL (NON-COHESIVE SOILS), THE DENSITY INDEX (ID) SHALL BE NOT LESS THAN 70%.

FOR NON-GRANULAR FILL MATERIAL (COHESIVE SOILS), THE DRY DENSITY RATIO (RD) SHALL BE NOT LESS THAN 95%.

E6. MEASURE OF COMPACTION:-
THE DEGREE OF COMPACTION SHALL BE MEASURED BY ONE OF THE FOLLOWING PARAMETERS :-

GRANULAR FILL (NON-COHESIVE SOILS). THE DENSITY INDEX (ID) DETERMINED IN ACCORDANCE WITH AS 1289,E6.1 BASED ON THE MAXIMUM AND MINIMUM DRY DENSITIES IN ACCORDANCE WITH AS 1289,E5.1 AND THE FIELD DRY DENSITY IN ACCORDANCE WITH AS 1289,5.3.2, AS 1289,E3,5 OR AS 1289,E8.1.

NON-GRANULAR FILL (COHESIVE SOILS). THE DRY DENSITY RATION (RD) DETERMINED IN ACCORDANCE WITH AS 1289,5.4.1 BASED ON THE FIELD DRY DENSITY IN ACCORDANCE WITH AS 1289,5.3.2 AND THE MAXIMUM DRY DENSITY IN ACCORDANCE WITH AS 1289,5.1.1

E7. GEOTECHNICAL TESTING IS TO BE UNDERTAKEN TO AT LEAST LEVEL 1 CONTROL OF FILL COMPACTION STANDARD, AS DEFINED IN AS. 3738 AS FOLLOWS:

- TEST EACH 300mm LAYER ABOVE PIPE CROWN.
- TEST BASE & SUB-BASE LAYERS WHERE APPLICABLE.
- TESTS SHALL BE REQUIRED AT EACH 50m CENTRES WHERE THE LENGTH OF TRENCH IS WITHIN THE 50m REQUIREMENT.

E8. SUBMIT ALL GEOTECHNICAL TEST RESULTS TO WARREN CONSULTING ENGINEERS FOR REVIEW PRIOR TO CONTINUATION WITH SUBSEQUENT SECTION OF WORK.

RESTORATION:

RES1. RESTORE ALL TRAFFIC AREAS TO PRE EXISTING CONDITION.

RES2. FOR ALL SURFACES OTHER THAN IN TRAFFIC AREAS RESTORE DISTURBED SURFACES TO PRE-EXISTING CONDITIONS AND COMPACT AS SPECIFIED.

RES3. RESTORE ALL AUTHORITY OWNED AREAS TO COUNCIL STANDARDS

ROAD WORKS, DRIVEWAYS & CARPARKS

R1. ALLOW FOR LEVEL 2 TESTING AND SUB-GRADE CONDITIONS & PAVEMENT THICKNESS TO BE VERIFIED BY GEOTECHNICAL CONSULTANT AFTER INSPECTION OF PRELIMINARY BOXING.

R2. ALLOW FOR ANY SUB-GRADE REPLACEMENT WORK TO BE DETERMINED AS REQUIRED BY GEOTECHNICAL CONSULTANT AT THE TIME OF PAVEMENT CONSTRUCTION.

R3. MINIMUM DRY DENSITY RATIOS (AS 1289 3,4,1-1993) TO BE:

BASE COURSE:	98% MODIFIED
SUB-BASE:	95% MODIFIED
SUB-GRADE:	100% STANDARD
SUB-GRADE REPLACEMENT:	100% STANDARD

R4. PAVEMENT MATERIALS TO COMPLY WITH RMS SPECIFICATION No. 3051 OR SIMILAR AS APPROVED BY GEOTECHNICAL CONSULTANT.

R5. PROVIDE (1) TEST FOR EACH LAYER NOT EXCEEDING 250mm THICK BEING BASECOURSE, SUB-BASE & SUB-GRADE OVER AN AREA NOT GREATER THAN 500m^2

R6. SUBMIT ALL GEOTECHNICAL TEST RESULTS TO WARREN CONSULTING ENGINEERS FOR REVIEW PRIOR TO CONTINUATION WITH SUBSEQUENT SECTION OF WORK.

APPROVALS

A1. THE AS CONSTRUCTED WORKS SHALL BE INSPECTED BY DESIGN CONSULTANT. MINIMUM 48 HOURS NOTICE SHALL APPLY TO ALL INSPECTIONS.

A2. THE DESIGN PLANS HEREIN ARE SUBJECT TO LOCAL COUNCIL APPROVAL PRIOR TO CONSTRUCTION. OBTAIN EXPRESS (WRITTEN) ADVICE TO PROCEED FROM PROJECT MANAGER PRIOR TO COMMENCEMENT.

A3. SUBMIT WORK-AS-EXECUTED DRAWINGS IN CIVILCAD OR DXF DIGITAL FORMAT AND HARD COPY FORMAT. VERIFY ALL CONSTRUCTION WORKS SHOWN HEREON.

A4. CERTIFY THAT THE AS CONSTRUCTED SYSTEM HAS BEEN BUILT IN ACCORDANCE WITH THE APPROVED PLANS ISSUED FOR CONSTRUCTION.

SERVICES UNDER ROAD SURFACES

S1. ALL OTHER SERVICES INCLUDING BUT NOT LIMITED TO WATER, HYDRANT, GAS, SEWER, ELECTRICAL AND COMMUNICATIONS CONDUITS OR CABLES SHALL BE LAID WITH MINIMUM 600mm U.N.O. COVER BELOW PROPOSED ROAD SURFACE OR APPROVED OTHER MEANS TO PROTECT DURING CONSTRUCTION.

ROAD SIGNS & LINE MARKING

RS1. ALL SIGNS AND LINEMARKING SHALL BE TO ROADS & TRAFFIC AUTHORITY STANDARDS AND SPECIFICATIONS AND AS.1742, MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES

RS2. ALL LINEMARKING SHALL BE AUGMENTED BY RETROREFLECTIVE RAISED PAVEMENT MARKERS (RRPMs) AND ALL SHALL BE TO AS 1742.2 - 1994 AND AS 1742.2 /AMDT 1/1997-10-05

RS3. ALL ROAD SIGNS AND POSTS SHALL BE TO AS 1742.2 - 1994 AND AS 1742.2 /AMDT 1/1997-10-05

PROTECTION OF FLORA - REFER SPECIFICATION

1. ANY TRENCHES WITHIN 3m OF TREES SHALL BE HAND DUG TO AVOID DAMAGE TO TREE ROOTS.

2. IF IT IS CONSIDERED NECESSARY TO PERFORM ANY WORK ON TREES, INCLUDING TRIMMING, LOPPING, ROOT CUTTING, REPAIR AND REMOVAL, APPLICATION IN WRITING SHALL BE MADE BY THE CONTRACTOR TO THE SUPERINTENDENT. ANY WORK PERMITTED TO BE DONE ON TREES TO BE RETAINED SHALL BE PERFORMED IN ACCORDANCE WITH THE ARBORISTS REPORT.

3. MATURE TREES AND SHRUBS ARE TO BE REMOVED IN ACCORDANCE WITH THE ARBORISTS REPORT.

AUTHORITY STANDARDS

LGA 1. THE DRAWINGS HEREIN SHALL BE READ IN CONJUNCTION WITH NORTHERN BEACHES COUNCIL COUNCIL STANDARDS & SPECIFICATIONS WHICH SHALL OVERRIDE SPECIAL DETAILS SHOWN ON THE DRAWINGS.

TRAFFIC NOTE:

1. A TRAFFIC CONTROL PLAN IS TO BE PREPARED BY AN ACCREDITED RMS 1. TRAFFIC CONTROLLER AND SUBMITTED TO COUNCIL. THIS TRAFFIC PLAN IS TO BE CERTIFIED BY AND IMPLEMENTED TO THE SATISFACTION OF AN ACCREDITED RMS TRAFFIC CONTROLLER

PRIOR TO COMMENCEMENT OF WORK

2. ALL TRAFFIC CONTROL WORKS SHALL ONLY BE CARRIED OUT BY 2. ACCREDITED RMS TRAFFIC CONTROLLERS.

CLOSED CIRCUIT COLOUR TV (CCTV)

CCTV 1. UNDERTAKE A CCTV INSPECTION OF ALL THE COMPLETED DRAINAGE IN ACCORDANCE WITH THE GUIDELINES OF THE AUSTRALIAN CONDUIT CONDITION EVALUATION MANUAL (ACCEM)

CCTV 2. APPLY THE FOLLOWING REQUIREMENTS TO THE CCTV INSPECTION:-
A. USE DATA CAPTURE SOFTWARE APPROVED BY SYDNEY WATER

B. USE CERTIFIED CCTV OPERATORS C. THE CCTV FOOTAGE SHALL BE OF QUALITY TO ALLOW ACCURATE ASSESSMENT OF THE INTERNAL CONDITION OF THE PIPE. FURNISH TO THE DESIGN CONSULTANT:-

CCTV 3. A. VIDEOS IN MPG FORMAT
B. CCTV REPORT AND SURVEY DATA IN PDF FORMAT

PROTECTION OF TREES

T1. WHERE STORMWATER DRAINAGE IS LAID WITHIN THE VICINITY OF TREES / CANOPIES OF TREES. WORK IS TO BE COMPLETED TO THE PROJECT ARBORIST'S REQUIREMENTS AND SPECIFICATIONS.

DRAWING COLOUR CODED - PRINT ALL COPIES IN COLOUR

REVISION	AMENDMENT	DATE	REVISION	AMENDMENT	DATE
1	ISSUE FOR S4.56	03/11/23			

CLIENT: KLIATRO

PROJECT: FOREST LODGE WARRIEWOOD

PREPARED BY
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Driven by excellence, built on experience.

TITLE: SPECIFICATION NOTES

SCALE	DRAWN	DESIGNED	CHECKED	APPROVED
AS SHOWN	I.K.	I.O.	J.G.	J.G.

JOB No.	DRAWING No.	ISSUE
7368002	C1.02	1

DATE	STATUS
SEPTEMBER 2023	ISSUE FOR S4.56

Xrefs: X:7368002-TB_A1H
Plot Date: 03.11.2023@09:02:11 Login Name: mo Cad File: T:\7368002\Drawings\AutoCAD\Civil\Design\Civil 2023\S4.56\C1.02 Specification Notes.dwg

0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

LEGEND

- SITE BOUNDARY
- EXISTING OVERHEAD ELECTRICTY
- EXISTING WATER MAIN
- EXISTING STORMWATER MAIN
- EXISTING TELECOMMS LINE

DO NOT SCALE FROM DRAWINGS, CHECK & VERIFY ALL DIMENSIONS & LEVELS BEFORE COMMENCEMENT OF ANY WORK.

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NORTH

DRAWING COLOUR CODED - PRINT ALL COPIES IN COLOUR

12.5 0 5 10 15 20 25m
PLAN SCALE 1:750 A1 SHEET

0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

REVISION	AMENDMENT	DATE	REVISION	AMENDMENT	DATE
1	ISSUE FOR S4.56	03/11/23			

CLIENT
KUATRO

PROJECT
FOREST LODGE
WARRIEWOOD

PREPARED BY
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WSce
Driven by excellence, built on experience.

TITLE
EXSITING SURVEY

SCALE	DRAWN	DESIGNED	CHECKED	APPROVED
AS SHOWN	I.K.	I.O.	J.G.	J.G.

JOB No.	DRAWING No.	ISSUE
7368002	C1.03	1

DATE	STATUS
SEPTEMBER 2023	ISSUE FOR S4.56

Xref: 7368003-WSCG-DS-MOJ1 - Existing Surface; X-7368002-SU - Existing Survey; X-7368003-TB_A1H
Plot Date: 03.11.2023@15:56:12 Login Name: iskeart Cad File: T:\7368002\Drawings\AutoCAD\Cad\Design\Civil 2DS\4-5\6\Existing Survey.dwg

LEGEND

- SITE BOUNDARY
- VEHICLE ENTRY SHAKER GRID
- SPILLWAY
- PUMPOUT
- SITE GATE
- SEDIMENT FENCE
- SEDIMENT TRAP FOR KERB INLET - SAND BAGS
- SEDIMENT BASIN
- DB+C → DIVERSION BANK AND CHANNEL

NOTES:

1. GEOTEXTILE INLET FILTER BAGS TO BE FITTED IN ALL EXISTING AND PROPOSED STORMWATER GRATED PITS WITHIN THE DEVELOPMENT AREA WHICH ARE IN USE.
2. STOCKPILE LOCATION SHALL BE DETERMINED ON SITE DURING CONSTRUCTION STAGE. STOCKPILE ARE TO REMAIN CLEAR OF SITE ACCESS, DRAINS AND PAVED AREAS. HEIGHT OF STOCKPILE SHALL NOT EXCEED 2m.
3. INSTALLATION OF ALL EROSION AND SEDIMENT CONTROL MEASURES IS TO BE IN ACCORDANCE WITH THE LATEST EDITION OF THE 'BLUE BOOK - MANAGING URBAN STORMWATER'. ALL CONTROLS ARE TO BE INSTALLED PRIOR TO CONSTRUCTION COMMENCING.
4. THE CONTRACTOR IS RESPONSIBLE FOR THE CORRECT INSTALLATION AND ONGOING MAINTENANCE OF THE CONTROLS. REFER TO DRG C2.02 FOR MAINTENANCE REQUIREMENTS.
5. SUITABLE AND APPROVED BINS SHALL BE UTILISED FOR THE CONTAINMENT OF ALL HARD WASTE, INCLUDING CONCRETE SLURRIES, BUILDING WASTE AND LITTER. IN THE CASE OF ACCIDENTAL SPILLS OF SOIL OR OTHER MATERIAL, PARTICULARLY IN THE PUBLIC RESERVE, THE MATERIAL SHALL BE SWEPT AND CONTAINED AND NOT WASHED INTO A GUTTER.

SEDIMENT BASIN NOTE:

SEDIMENT BASINS HAVE BEEN SIZED BY USING PROCEDURES DETAILED IN THE 'BLUE BOOK - MANAGING URBAN STORMWATER' FOR TYPE D BASINS. A SUMMARY OF THE CALCULATED AND PROVIDED VOLUMES IS PROVIDED BELOW.

SEDIMENT BASIN 1:

REQUIRED VOLUME	= 339 m^3
BASE AREA	= 167 m^2
TOP AREA	= 726 m^2
DEPTH	= 2.11 m
MAX SIDE SLOPE	= 1V:2.5H
VOLUME PROVIDED	= 942 m^3

PROVIDE 2m SPILLWAY TO CREEK.

SEDIMENT BASIN 2:

REQUIRED VOLUME	= 376 m^3
BASE AREA	= 157 m^2
TOP AREA	= 511 m^2
DEPTH	= 1.2 m
MAX SIDE SLOPE	= 1V:2.5H
VOLUME PROVIDED	= 400 m^3

PROVIDE 2m SPILLWAY TO CREEK.

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NORTH

DRAWING COLOUR CODED - PRINT ALL COPIES IN COLOUR

10,0 0 5,0 10,0 15,0 20,0m
PLAN SCALE 1:500 AT SHEET

0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

A1

REVISION	AMENDMENT	DATE	REVISION	AMENDMENT	DATE
1	ISSUE FOR S4.56	03/11/23			

CLIENT: KUATRO

PROJECT: FOREST LODGE WARRIEWOOD

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TITLE: SEDIMENT & EROSION CONTROL PLAN

SCALE	DRAWN	DESIGNED	CHECKED	APPROVED
AS SHOWN	I.K.	I.O.	J.G.	J.G.

JOB No.	DRAWING No.	ISSUE
7368002	C2.01	1

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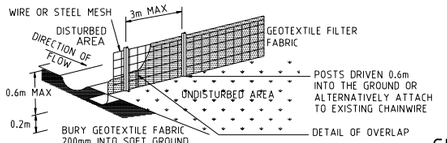
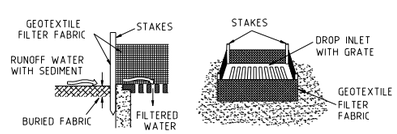
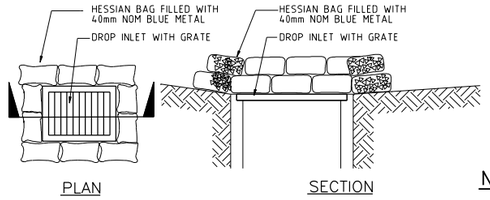
Xrefs: X-7368002-AR_Basement; X-7368002-SU_Existing Survey; 7368002-WSCE-DS-MO01_Existing Surface; X-7368002-TB_A1H
Plot Date: 03.11.2023@11:32:18 Login Name: mayor Cad File: T:\7368002\Drawings\AutoCAD\CivilDesign\Civil\2DS\4.56\C2.01 Sediment & Erosion Control Plan.dwg



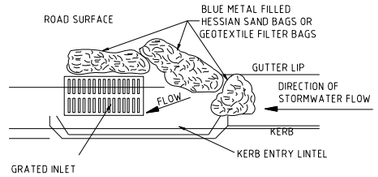
SEDIMENT CONTROL FENCE
NTS



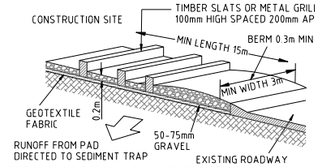
GEOTEXTILE FILTER FABRIC DROP INLET SEDIMENT TRAP
NTS



HESSIAN BAG DROP INLET SEDIMENT TRAP
NTS



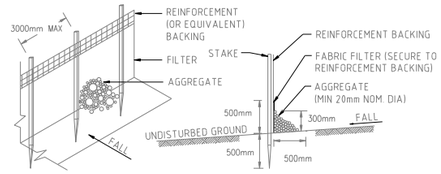
NEW/EXISTING GRATED KERB ENTRY PIT SEDIMENT CONTROL BARRIER
NTS



STABILIZED CONSTRUCTION SITE VEHICLE ENTRY/EXIT
NTS

SITE ENTRY/EXIT NOTES:-

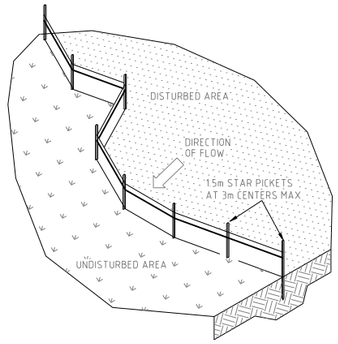
1. ALL VEHICLE ENTRANCES & EXITS TO THE CONSTRUCTION SITE MUST BE STABILIZED TO PREVENT THEM BECOMING A SOURCE OF SEDIMENT, BY PROVIDING A VEHICLE SHAKE AREA. THIS MAY CONSIST OF A TIMBER, CONCRETE OR STEEL SHAKER GRID OR RUBBLE AREA.
2. THE VEHICLE EXIT AREA IS TO BE MAINTAINED IN A CLEAN & SERVICEABLE CONDITION DURING THE TOTAL TIME OF USAGE.
3. ANY UNSEALED ROAD BETWEEN THE DEVICE AND COUNCILS ROADWAY IS TO BE TOPPED WITH 100mm THICK, 40mm NOMINAL SIZE AGGREGATE.
4. PUBLIC ROADS MUST BE KEPT FREE OF DIRT AND MUD. SEDIMENT TRACKED ONTO THE PUBLIC ROADWAY BY VEHICLES LEAVING THE CONSTRUCTION SITE IS TO BE SWEPT UP IMMEDIATELY.
5. FENCES SHOULD BE ERECTED TO ENSURE VEHICLES CAN NOT BYPASS THE STABILIZED ACCESS POINTS, UNLESS COMING FROM A STABILIZED AREA.

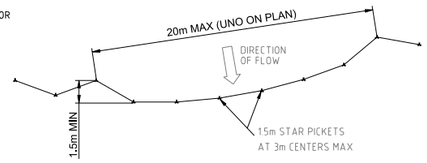


SEDIMENT FENCE DETAIL FOR ROCKY GROUND
NTS

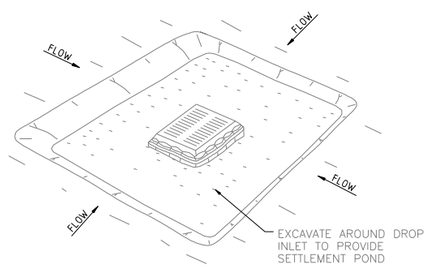
SEDIMENT FENCE NOTES:-

1. CONSTRUCT SEDIMENT FENCE AS CLOSE AS POSSIBLE TO PARALLEL TO THE CONTOURS OF THE SITE OR AT THE TOE OF A SLOPE.
2. DRIVE 1.5 METRE LONG STAR PICKETS INTO GROUND SUFFICIENT TO PROVIDE RIGID SUPPORT, 3 METERS APART. WHERE THERE IS INSUFFICIENT SOIL DEPTH OVER ROCK, HOLES ARE TO BE DRILLED INTO ROCK TO ACCEPT THE STAR PICKETS.
3. ON SOFT GROUND MATERIALS, DIG A 150mm DEEP TRENCH ALONG THE UPSLOPE LINE OF THE FENCE FOR THE BOTTOM OF THE FABRIC TO BE ENTRENCHED.
4. BACKFILL TRENCH OVER BASE OF FABRIC & COMPACT.
5. FIX SELF-SUPPORTING GEOTEXTILE TO UPSLOPE SIDE OF POSTS WITH WIRE TIES OR AS RECOMMENDED BY THE GEOTEXTILE MANUFACTURER. USE A REINFORCEMENT BACKING WITH NON SELF-SUPPORTING GEOTEXTILE FABRIC.
6. JOIN SECTIONS OF FABRIC AT A SUPPORT POST WITH A 150mm OVERLAP.
7. ON HARD OR ROCKY GROUND, SMOOTH A 500mm WIDE STRIP UPSLOPE OF THE FENCE LINE. TURN THE BOTTOM 500mm OF THE FABRIC UPSLOPE AND ANCHOR IN PLACE WITH SUITABLE AGGREGATE.
8. WHERE A SEDIMENT FENCE IS CONSTRUCTED DOWN SLOPE FROM A DISTURBED BATTER THE FENCE SHOULD BE LOCATED 1.5 TO 2.0 METERS DOWN SLOPE FROM THE TOE OF THE BATTER.





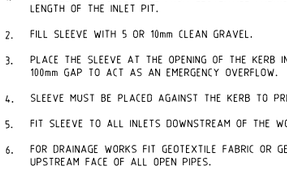
SEDIMENT FENCE LAYOUT PLAN
NTS



EXCAVATED SEDIMENT TRAP
NTS

EXCAVATED SEDIMENT TRAP NOTES:-

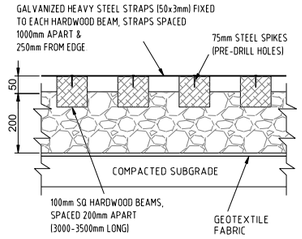
1. REMOVE THE SEDIMENT WHEN IT HAS ACCUMULATED TO HALF THE DESIGN DEPTH OF THE TRAP AND RESTORE THE TRAP TO ITS ORIGINAL DIMENSIONS.
2. PROVIDE 50 cu.m/Ha OF SEDIMENT STORAGE VOLUME.
3. REFER TO THE MAINTENANCE REQUIREMENTS.



GEOTEXTILE FILTER BAGS
NTS

SEDIMENT BARRIER FOR PITS & PIPES, NOTES:-

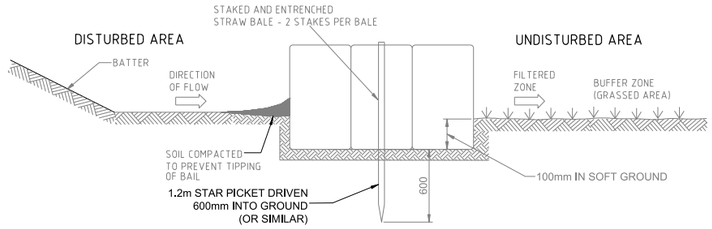
1. SLEEVES ARE TO BE MADE FROM GEOTEXTILE FABRIC LONGER THEN THE LENGTH OF THE INLET PIT.
2. FILL SLEEVE WITH 5 OR 10mm CLEAN GRAVEL.
3. PLACE THE SLEEVE AT THE OPENING OF THE KERB INLET LEAVING A 100mm GAP TO ACT AS AN EMERGENCY OVERFLOW.
4. SLEEVE MUST BE PLACED AGAINST THE KERB TO PREVENT BYPASS.
5. FIT SLEEVE TO ALL INLETS DOWNSTREAM OF THE WORKS.
6. FOR DRAINAGE WORKS FIT GEOTEXTILE FABRIC OR GEO BAGS TO UPSTREAM FACE OF ALL OPEN PIPES.
7. MAINTAIN AN OPENING AT THE TOP OF THE PIPE OF 1/3 OF THE PIPE DIAMETER.
8. THE FILTERS ARE TO BE CLEANED AND MAINTAINED DAILY.
9. ALL CARE SHOULD BE TAKEN TO MINIMIZE SEDIMENT REACHING THE STORMWATER SYSTEM BY MINIMIZING EXCAVATION WORKS AND PREVENTING EXCESS WATER FLOW THROUGH WORKS.



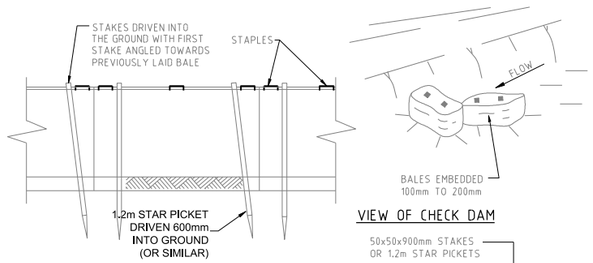
VEHICLE SHAKER GRID
NTS

SITE ENTRY/EXIT CONSTRUCTION NOTES:-

1. STRIP TOP SOIL & LEVEL SITE. PROVIDE CATCH DRAIN AT SIDES TO DIRECT RUNOFF WATER TO SEDIMENT TRAPS.
2. COMPACT SUBGRADE AND REMOVE ANY HIGH POINTS.
3. COVER AREA WITH GEOTEXTILE FABRIC. THIS MAY BE WOVEN OR NEEDLE PUNCHED PRODUCT WITH A MINIMUM CBR BURST STRENGTH (AS3706.4-90) OF 2500 N.
4. CONSTRUCT 200mm THICK RUBBLE PAD OVER GEOTEXTILE USING ROAD BASE OR 30-40mm AGGREGATE. MINIMUM LENGTH 15 METRES OR TO BUILDING ALIGNMENT. MINIMUM WIDTH 3 METRES. CONSTRUCT 300mm HIGH HUMP IMMEDIATELY WITHIN BOUNDARY TO DIVERT WATER TO A SEDIMENT TRAP.
5. WHERE GRIDS ARE USED FIRST CONSTRUCT A 150 THICK PAD OVER GEOTEXTILE FABRIC. LEVEL THIS IN BOTH DIRECTIONS. LOWER GRID ON TO THE PREPARED BASE AND ENSURE THAT NO PART IS SITTING ON ANY HIGH POINTS. BACKFILL THE SPACES BETWEEN THE GRIDS TO WITHIN 50mm OF THE TOP.
6. PROVIDE RAMPS AT ENDS AND SIDE OF GRIDS. IF DEPRESSIONS OCCUR IN THE RAMPS DURING USE. ADD ADDITIONAL MATERIAL.

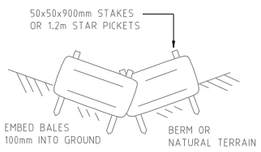


TYPICAL STRAW BALE SECTION
NTS



TYPICAL STRAW BALE DETAIL
NTS

VIEW OF CHECK DAM

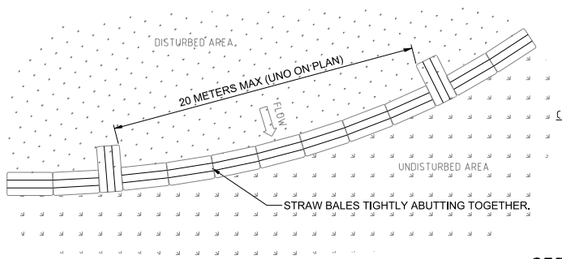


CHECK DAM SECTION

STRAW BALE NOTES:-

1. CONSTRUCT STRAW BALE FILTER AS CLOSE AS POSSIBLE TO PARALLEL TO THE CONTOURS OF THE SITE OR AT THE TOE OF A SLOPE.

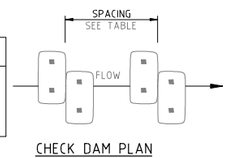
   PLACE BALES LENGTHWISE IN A ROW WITH ENDS TIGHTLY ABUTTING.
2. USE STRAW TO FILL ANY GAPS BETWEEN BALES. STRAWS TO BE PLACED PARALLEL TO GROUND.
3. MAXIMUM HEIGHT OF FILTER IS ONE BALE.
4. ON SOFT MATERIALS, EMBED EACH BALE IN THE GROUND 75mm TO 100mm AND ANCHOR WITH TWO 1.2 METRE STAR PICKETS. ANGLE THE FIRST STAKE IN EACH BALE TOWARDS THE PREVIOUSLY LAID BAIL. DRIVE STAKES 600mm INTO THE GROUND AND FLUSH WITH THE TOP OF THE BALES.
5. WHERE A STRAW BALE FILTER IS CONSTRUCTED DOWN SLOPE FROM A DISTURBED BATTER THE BALES SHOULD BE LOCATED 1.5 TO 2.0 METERS DOWN SLOPE FROM THE TOE OF THE BATTER.
6. WHERE REQUIRED WRAP GEOTEXTILE FILTER FABRIC AROUND BALES AND STAPLE IN POSITION.



TYPICAL STRAW BALE LAYOUT PLAN
NTS

CHECK DAM SPACING TABLE

LONGITUDINAL GRADE (%)	SPACING (METERS)
0 - 5	40
5 -10	30
10 - 15	20
GREATER THAN 15	10



STRAW BALE CHECK DAM DETAILS
NTS

DIVERSION DRAIN (LOW FLOW)
NTS

DIVERSION DRAIN NOTES:-

1. CONSTRUCT WITH GRADIENT OF 1 PER CENT TO 5 PER CENT.
2. AVOID REMOVING TREES AND SHRUBS IF POSSIBLE.
3. DRAINS TO BE OF CIRCULAR, PARABOLIC OR TRAPEZOIDAL CROSS SECTION NOT V-SHAPED.
4. EARTH BANKS TO BE ADEQUATELY COMPACTED IN ORDER TO PREVENT FAILURE.
5. PERMANENT OR TEMPORARY STABILIZATION OF THE EARTH BANK TO BE COMPLETED WITHIN 10 DAYS OF CONSTRUCTION.
6. ALL OUTLETS FROM DISTURBED LANDS ARE TO FEED INTO A SEDIMENT BASIN OR SIMILAR.
7. DISCHARGE RUN OFF COLLECTED FROM UNDISTURBED LANDS ONTO EITHER A STABILIZED OR AN UNDISTURBED DISPOSAL SITE WITHIN THE SAME SUBCATCHMENT AREA FROM WHICH THE WATER ORIGINATED.
8. COMPACT BANK WITH A SUITABLE IMPLEMENT IN SITUATIONS WHERE THEY ARE REQUIRED TO FUNCTION FOR MORE THAN FIVE DAYS.
9. EARTH BANKS TO BE FREE OF PROJECTIONS OR OTHER IRREGULARITIES THAT WILL IMPEDE NORMAL FLOW.

MAINTENANCE REQUIREMENTS:-

1. ACCUMULATED SILT & SEDIMENT MUST BE REMOVED AT REGULAR INTERVALS AND AFTER EACH MAJOR STORM.
2. SILT & SEDIMENT MUST BE REMOVED FROM OFF THE SITE OR TO A COUNCIL APPROVED LOCATION WITHIN THE SITE, WHERE IT WILL NOT ERODE.
3. THE SEDIMENT FENCES, BALES & TRAPS SHALL BE REGULARLY INSPECTED, ESPECIALLY AFTER RAIN AND KEPT IN GOOD REPAIR AND FUNCTIONING CONDITION AT ALL TIMES.
4. CONSTRUCTION OPERATIONS SHALL BE CARRIED OUT IN SUCH A MANNER THAT SEDIMENT, EROSION & WATER POLLUTION SHALL BE MINIMIZED.
5. THE SEDIMENT TRAPS SHALL BE REMOVED AND THE AREA STABILIZED WHEN THE CONSTRUCTION AREA HAS BEEN PROPERLY STABILIZED.

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REVISION	AMENDMENT	DATE	REVISION	AMENDMENT	DATE
1	ISSUE FOR S4.56	03/11/23			

CLIENT: KUATRO

PROJECT: FOREST LODGE WARRIEWOOD

PREPARED BY
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TITLE: **SEDIMENT & EROSION CONTROL DETAILS**

SCALE	DRAWN	DESIGNED	CHECKED	APPROVED
AS SHOWN	I.K.	I.O.	J.G.	J.G.

JOB No.	DRAWING No.	ISSUE
7368002	C2.02	1

DATE: SEPTEMBER 2023 | STATUS: ISSUE FOR S4.56

0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

A1

Levels Table			
No.	From Depth	To Depth	Colour
1	-4.500	-3.000	
2	-3.000	-2.000	
3	-2.000	-1.000	
4	-1.000	0.000	
5	0.000	1.000	
6	1.000	2.000	
7	2.000	3.000	
8	3.000	4.000	

LEGEND

— · — · — · —	SITE BOUNDARY
---------- 152.0 ----------	NATURAL SURFACE CONTOUR
-------- -2.0 --------	DEPTH CONTOUR

NOTE:

1. VOLUMES ARE PRELIMINARY ONLY AND IS SUBJECT TO CHANGE. CONTRACTOR TO CONFIRM BULK EARTHWORKS VOLUMES AND LEVELS BASED ON THEIR OWN ASSUMPTIONS AND CALCULATIONS. THE FOLLOWING DEPTH PROFILES WERE ADOPTED FOR THE BULK EARTHWORKS. NOTE: ASSUMED LEVELS, SUBJECT TO CHANGE DURING DETAILED DESIGN STAGE.

   - ASPHALT PAVEMENT (TRAFFICABLE) (TBC BY GEOTECHNICAL ENGINEER) = 280 mm
   - CONCRETE PAVEMENT (TRAFFICABLE) = 330mm
   - CONCRETE PAVEMENT (NON-TRAFFICABLE) = 275mm
   - CONCRETE FOOTPATH IN ROAD RESERVE = 175mm
   - CONCRETE STRUCTURAL SLABS = 200 mm
   - LANDSCAPING TOP SOIL = 100 mm

2. VOLUMES FROM PIPE TRENCH HAVE NOT BEEN INCLUDED IN THESE CALCULATIONS.
3. A TOPSOIL REMOVAL OF 300mm HAS BEEN INCLUDED FOR THE OVERALL SITE.
4. BULKING FACTORS HAVE NOT BEEN INCLUDED.
5. ALLOW A +/-15% TOLERANCE FOR THESE VOLUMES.
6. EXTENT OF VERTICAL CUTS IN ROCK TO BE CONFIRMED ON SITE BY CONTRACTOR AND GEOTECHNICAL ENGINEER.
7. EXTENT OF CUTTING/FILLING IN THE VICINITY OF EXISTING TREES SHALL BE CONFIRMED BY THE PROJECT ARBORIST.
8. TREE PROTECTION ZONES TO BE CONFIRMED BY THE PROJECT ARBORIST.
9. ALLOW A +/-15% TOLERANCE FOR THESE VOLUMES.
   CUT 6,000 m³
   FILL 4,800 m³
   NET 1,200 m³ EXPORT

NORTH

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10.0 0 5.0 10.0 15.0 20.0m
PLAN SCALE 1:500 A1 SHEET

0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150
A1

REVISION	AMENDMENT	DATE	REVISION	AMENDMENT	DATE
1	ISSUE FOR S4.56	03/11/23			

CLIENT
KUATRO

PROJECT
FOREST LODGE
WARRIEWOOD

PREPARED BY
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TITLE
BULK EARTHWORKS LEVELS PLAN

SCALE	DRAWN	DESIGNED	CHECKED	APPROVED
AS SHOWN	I.K.	I.O.	J.G.	J.G.

JOB No.	DRAWING No.	ISSUE
7368002	C3.01	1

DATE	STATUS
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Xrefs: 'X:\7368002\LJ\N_X-7368002-SU_Existing Survey_X-7368002.dwg' 'X:\7368002\LJ\N_X-7368002-AR_Site Plan RNG ROAD.dwg'
Plot Date: 03.11.2023@09:49:26 Login Name: rito
Cad File: Y:\7368002\Drawings\AutoCAD\Civil\Design\Civil 2023\5-5\Bulk Earthworks Levels Plan.dwg

PROVIDE SMOOTH INTERFACE WITH EXISTING ROAD STUB LEVELS. REFER TO DETAIL ON C4.51. WAE LEVELS AND EXTENT OF CONSTRUCTED ROAD STUB TO BE CONFIRMED BY DETAILED SURVEY.

MATCH EXISTING LEVELS AT TOP OF WALL. TYPICAL

PROVIDE MIN 600W x 100H SPACE BELOW FENCE TO ALLOW FOR OVERLAND FLOW. TYPICAL FOR ALL FENCES

MATCH EXISTING LEVELS ALONG BOUNDARY. TYPICAL

START OF WALL IN CUT

PROPOSED RETAINING WALL. MAX RETAINED HEIGHT = XXm

RETAINED HEIGHT = 2.2m

RETAINED HEIGHT = 1,2m

RETAINED HEIGHT = 1.2m

RETAINED HEIGHT = 1.0m

RETAINED HEIGHT = 0.4m

RETAINED HEIGHT = 1.0m

RETAINED HEIGHT = 1.4m

RETAINED HEIGHT = 1.0m

RETAINED HEIGHT = 0.8m

RETAINED HEIGHT = 3.36m

PROVIDE MIN 2 x 200W x 100H SLOTS IN WALL FOR EMERGENCY OVERFLOW. TYPICAL FOR COURTYARD AREAS.

PROVIDE MIN 2 x 200W x 100H SLOTS IN WALL FOR EMERGENCY OVERFLOW. TYPICAL FOR COURTYARD AREAS.

PROVIDE MIN 2 x 200W x 100H SLOTS IN WALL FOR EMERGENCY OVERFLOW. TYPICAL FOR COURTYARD AREAS.

PROVIDE MIN 2 x 200W x 100H SLOTS IN WALL FOR EMERGENCY OVERFLOW. TYPICAL FOR COURTYARD AREAS.

LOCAL REGRADING AT TOP OF WALL TO DIRECT UPSTRTEAM OVERLAND FLOW TOWARDS DIVERSION HEADWALL AND PIPE. TOP OF WALL TO BE 500mm ABOVE GROUND LEVEL FOR FLOOD PROTECTION

RETAINED HEIGHT = 1,5m

BUILDING A FFL 23.20

BUILDING B FFL 24.70

DEEP LANDSCAPE

DEEP LANDSCAPE

ENTRY

COVERED FITNESS AREA

SEATING AREA

SEATING AREA

SEATING AREA

BBQ

POOL

POOL DECK

BIORETENTION BASIN 2

BOOSTER

SUBSTATION

POWER POLE

INTERNAL ACCESS ROAD

LEGEND

- EXISTING BOUNDARY
- MAJOR SURFACE CONTOUR
- MINOR SURFACE CONTOUR
- EXISTING SURFACE CONTOUR
- TOP OF BATTER
- BOTTOM OF BATTER
- V.C. VEHICULAR CROSSING (V.C.)
- K&G KERB & GUTTER (K&G)
- K.O. KERB ONLY (K.O.)
- KERB INLET PIT (ON GRADE)
- GRATED INLET PIT
- RL91.86 FINISHED SURFACE LEVEL
- GRL91.86 FINISHED STORMWATER PIT LID/GRATE LEVEL
- TOW84.20 / BOW84.00 TOP OF WALL LEVEL / BOTTOM OF WALL LEVEL
- 2.5% GRADE ARROW
- RETAINING WALL
- BASEMENT LINE
- UPSTREAM DIVERSION SWALE
- SWALE FLOW ARROW

NOTES:
1. GEOTECHNICAL ENGINEER TO CONFIRM EXTENT OF VERTICAL CUT IN ROCK WHERE PERIMETER RETAINING WALLS ARE NOMINATED.
2. REFER STRUCTURAL ENGINEER DRAWINGS FOR RETAINING WALL AND BUILDING SLAB DETAILS.

REFER C4.02 FOR CONTINUATION

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NORTH

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5,0 0 2,5 5,0 7,5 10,0m
PLAN SCALE 1:250 A1 SHEET

REVISION	AMENDMENT	DATE	REVISION	AMENDMENT	DATE
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CLIENT: KLIATRO

PROJECT: FOREST LODGE WARRIEWOOD

PREPARED BY
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TITLE: GENERAL ARRANGEMENT PLAN-SHEET 1

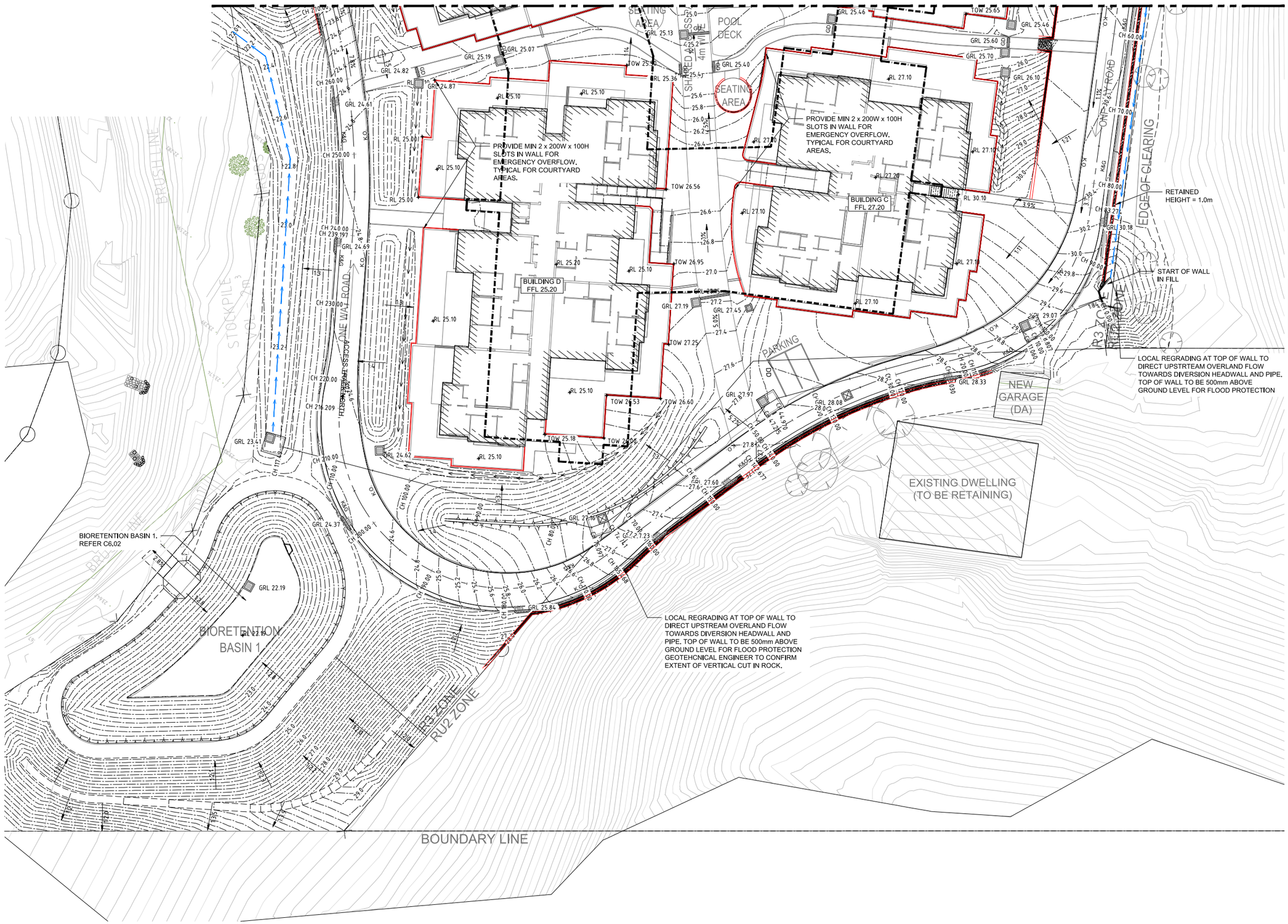
SCALE	DRAWN	DESIGNED	CHECKED	APPROVED
AS SHOWN	I.K.	I.O.	J.G.	J.G.

JOB No.	DRAWING No.	ISSUE
7368002	C4.01	1

DATE	STATUS
SEPTEMBER 2023	ISSUE FOR S4.56

Xrefs: X-7368003-TB_A1H_X-7368003-SU_Existing Survey: 7368003_WSCE-CSA-DR-01 - Existing Surface; X-7368003-AR - Site Plan RING ROAD, 7368003_WSCE-CSA-DR-02 - Design Surface RING ROAD, X-7368003-SHU.dwgxref
Plot Date: 03.11.2023@16:39:29 Login Name: stewart Ctrl File: T:\7368002\Drawings\AutoCAD\Civil\Design\Civil 2024\Sheets\General Arrangement Plan-Sheet 1.dwg

REFER C4.01 FOR CONTINUATION



LEGEND

- EXISTING BOUNDARY
- MAJOR SURFACE CONTOUR
- MINOR SURFACE CONTOUR
- EXISTING SURFACE CONTOUR
- TOP OF BATTER
- BOTTOM OF BATTER
- V.C. — VEHICULAR CROSSING (V.C.)
- K&G — KERB & GUTTER (K&G)
- K.O. — KERB ONLY (K.O.)
- KERB INLET PIT (ON GRADE)
- GRATED INLET PIT
- RL91.86 — FINISHED SURFACE LEVEL
- GRL91.86 — FINISHED STORMWATER PIT LID/GRATE LEVEL
- TOW84.20 / BOW84.00 — TOP OF WALL LEVEL / BOTTOM OF WALL LEVEL
- 2.5% — GRADE ARROW
- RETAINING WALL
- BASEMENT LINE
- UPSTREAM DIVERSION SWALE
- SWALE FLOW ARROW

NOTES:
1. GEOTECHNICAL ENGINEER TO CONFIRM EXTENT OF VERTICAL CUT IN ROCK WHERE PERIMETER RETAINING WALLS ARE NOMINATED.

2. REFER STRUCTURAL ENGINEER DRAWINGS FOR RETAINING WALL AND BUILDING SLAB DETAILS.

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25 0 10 20 30 40 50m
PLAN SCALE 1:1250 A1 SHEET

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CLIENT: KUATRO

PROJECT: FOREST LODGE WARRIEWOOD

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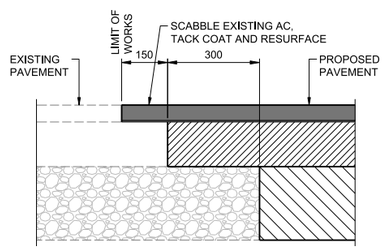
TITLE: GENERAL ARRANGEMENT PLAN-SHEET 2

SCALE	DRAWN	DESIGNED	CHECKED	APPROVED
AS SHOWN	I.K.	I.O.	J.G.	J.G.

JOB No.	DRAWING No.	ISSUE
7368002	C4.02	1

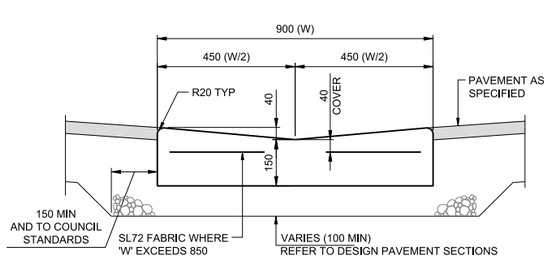
DATE: SEPTEMBER 2023 STATUS: ISSUE FOR S4.56

Xrefs: X:\7368002\78_ANN_X:\7368002\SU_Existing Survey 7368002.JWSCE.CSA.DY1_Existing Surface; X:\7368002\AR_Site Plan RING ROAD 7368002.JWSCE.GS.MO.02 - Design Surface RING ROAD; X:\7368002\SW Layout
Plot Date: 03.11.2023@16:40:18 Login Name: iskwart Cad File: T:\7368002\Drawings\AutoCAD\Civil\Design\Civil 3D\94.56\General Arrangement Plan-Sheet 1.dwg



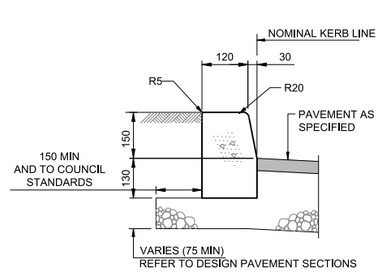
AC CONNECTION TO EXISTING PAVEMENT

SCALE 1:10



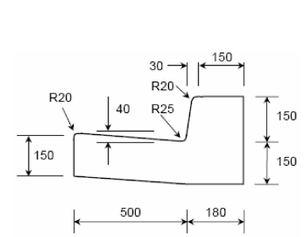
DISH DRAIN (DD)

SCALE 1:10

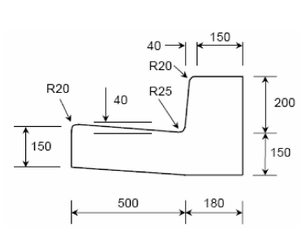


KERB ONLY (KO)

SCALE 1:10



150mm KERB & GUTTER



200mm KERB & GUTTER

NORTHERN BEACHES COUNCIL KERB AND GUTTER (K&G) STANDARD DETAILS (A47284)

SCALE NTS

DRAWING COLOUR CODED - PRINT ALL COPIES IN COLOUR

100 0 50 100 150 200mm
PLAN SCALE 1:5 A1 SHEET

100 0 100 200 300 400 500mm
PLAN SCALE 1:10 A1 SHEET

REVISION	AMENDMENT	DATE	REVISION	AMENDMENT	DATE
1	ISSUE FOR S4.56	03/11/23			

CLIENT: KUATRO

PROJECT: FOREST LODGE WARRIEWOOD

PREPARED BY

WSce Pty Ltd
ACN 668 655 141
ABN 75 668 655 141
info@wsce.com.au
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GCC ISO 9001 Certified

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TITLE: SITEWORKS DETAILS

SCALE	DRAWN	DESIGNED	CHECKED	APPROVED
AS SHOWN	I.K.	I.O.	J.G.	J.G.

JOB No.	DRAWING No.	ISSUE
7368002	C4.51	1

DATE	STATUS
SEPTEMBER 2023	ISSUE FOR S4.56

0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 A1


RING ROAD
ACCESS ROAD
JUBILEE AVENUE
BERT CLOSE
BOUNDARY LINE
R3 ZONE
RUZ ZONE
BIORETENTION BASIN 1
BIORETENTION BASIN 2
SHARED ACCESS PATH
4m WIDE
POOL
POOL DECK
BBQ
COVERED FITNESS AREA
DEEP LANDSCAPE
EXISTING AREA
PARKING
EXISTING DWELLING (TO BE RETAINING)
NEW GARAGE (DA)
SUBSTATION
BOOSTER
CH 0.00
CH 10.00
CH 20.00
CH 30.843
CH 40.000
CH 43.753
CH 50.00
CH 60.00
CH 70.00
CH 80.00
CH 86.873
CH 90.00
CH 95.820
CH 100.00
CH 110.00
CH 120.00
CH 130.00
CH 140.00
CH 144.818
CH 150.00
CH 154.008
CH 160.00
CH 164.943
CH 169.943
CH 180.430
CH 180.950
CH 195.44
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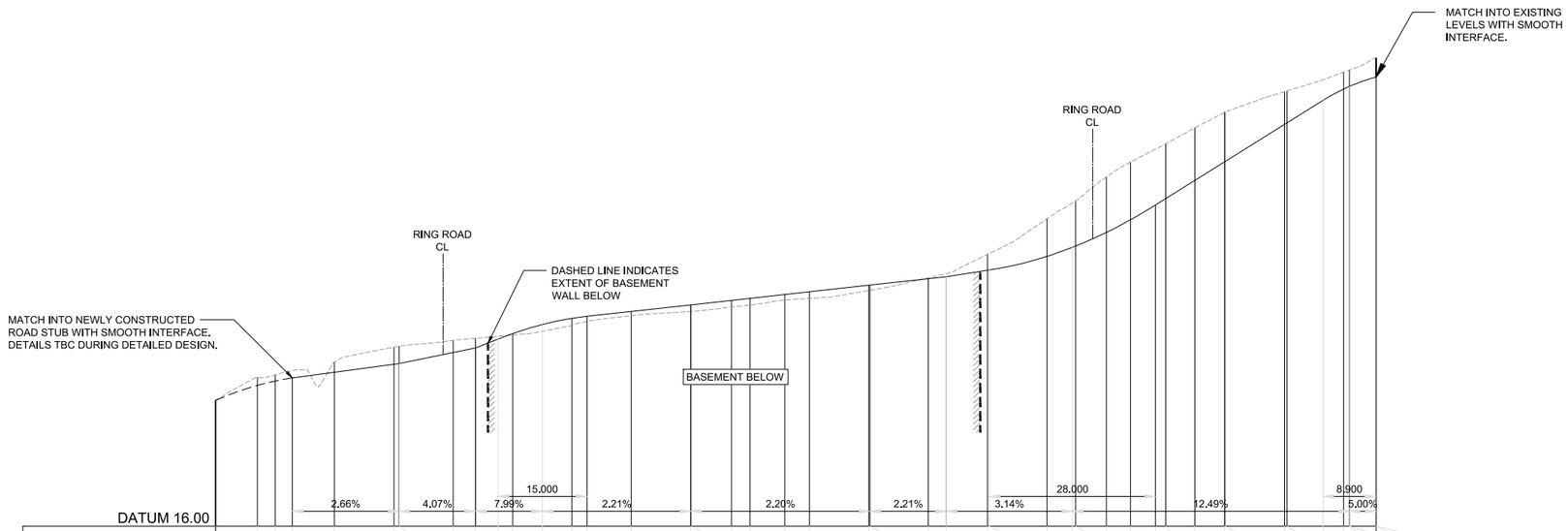

DESIGN LEVEL				20.997	21.186	21.452	21.475	21.847	22.000	22.301	22.487	22.792	22.998	23.066	23.231
EXISTING LEVEL	20.241	21.000	21.095	21.245	21.528	22.028	22.059	22.255	22.328	22.394	22.438	22.563	22.771	22.895	23.089
CHAINAGE	0.000	6.998	10.000	12.900	20.000	30.000	30.843	40.000	43.753	47.524	50.000	55.024	60.000	62.524	70.000

DESIGN LEVEL	23.452	23.453	23.603	23.672	23.800	23.892	24.111	24.116	24.332	24.400	24.618	24.627	25.089	25.394	25.435
EXISTING LEVEL	23.227	23.228	23.378	23.450	23.616	23.671	23.935	23.942	24.363	24.508	25.156	25.185	26.350	26.886	26.951
CHAINAGE	80.000	80.024	86.873	90.000	95.820	100.000	110.000	110.191	120.000	123.057	130.000	130.300	140.000	144.300	144.818

DESIGN LEVEL	25.894	26.317	26.816	27.028	27.646	28.271	28.278	29.527	29.581	30.339	30.725	30.812	30.812	31.118	31.120
EXISTING LEVEL	27.760	28.266	28.700	28.881	29.416	29.941	29.947	30.634	30.661	31.035	31.291	31.360	31.360	31.780	31.785
CHAINAGE	150.000	154.068	158.300	160.000	164.943	169.943	170.000	180.000	180.430	186.500	190.000	190.950	190.950	195.400	195.444

Access Road LONGITUDINAL SECTION
HORIZONTAL SCALE 1:250
VERTICAL SCALE 1:50

Xrefs: X-7368002-TB_A1H; 7368002-WSCE-CS-MO-02 - Design Surface RING ROAD
Plot Date: 03.11.2023@15:25:58 Login Name: istewart Cad File: T:\7368002\Drawings\AutoCAD\Civil\Design\Civil 2D\S4.56\C5.11 Road Long Sections.dwg

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10.0 0 5.0 10.0 15.0 20.0m
PLAN SCALE 1:500 A1 SHEET

REVISION	AMENDMENT	DATE	REVISION	AMENDMENT	DATE
1	ISSUE FOR S4.56	03/11/23			

CLIENT
KUATRO

PROJECT
FOREST LODGE
WARRIEWOOD

PREPARED BY
WSce Pty Ltd
ACN 668 655 141
ABN 75 668 655 141
info@wsce.com.au
wsce.com.au
ISO 9001 Certified
Driven by excellence,
built on experience.

TITLE
ROAD LONG SECTIONS - ACCESS ROAD

SCALE	DRAWN	DESIGNED	CHECKED	APPROVED
AS SHOWN	I.K.	I.O.	J.G.	J.G.

JOB No.	DRAWING No.	ISSUE
7368002	C5.11	1

DATE	STATUS
SEPTEMBER 2023	ISSUE FOR S4.56

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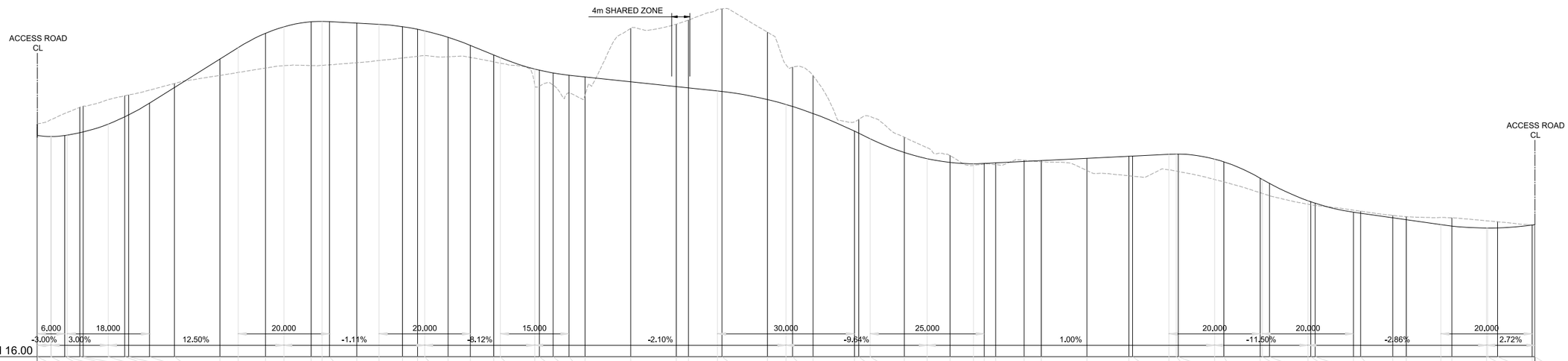

DESIGN LEVEL	25.680	25.680	25.635	25.680	25.696	25.799	25.832	26.180	26.494	26.578	27.091	27.773	29.023
EXISTING LEVEL	26.186	26.186	26.373	26.640	26.685	26.911	26.958	27.249	27.416	27.453	27.665	27.954	28.307
CHAINAGE	0.000	0.000	3.000	6.000	6.544	9.307	10.000	15.544	19.149	20.000	24.544	30.000	40.000

DESIGN LEVEL	29.523	30.151	30.433	30.652	30.671	30.662	30.595	30.541	30.438	30.324	30.255	29.972	29.618
EXISTING LEVEL	28.438	28.629	28.732	28.739	28.746	28.770	28.864	28.957	29.068	29.142	29.176	29.122	29.094
CHAINAGE	44.000	50.000	54.000	60.000	62.366	64.000	70.000	74.878	80.000	83.274	84.878	90.000	94.878

DESIGN LEVEL	29.202	29.082	28.586	28.535	28.411	28.315	28.241	28.031	27.821	27.764	27.631	27.609	27.249
EXISTING LEVEL	28.901	28.836	27.926	27.839	27.880	27.548	27.444	30.364	30.545	30.727	31.192	31.216	30.196
CHAINAGE	100.000	101.472	108.972	110.000	113.030	116.472	120.000	130.000	140.000	142.677	149.041	150.000	160.000

DESIGN LEVEL	27.033	26.946	26.638	25.869	25.776	25.535	24.932	24.662	24.499	24.443	24.455	24.480	24.542
EXISTING LEVEL	28.777	28.673	28.294	26.275	26.381	26.503	25.603	25.143	24.805	24.377	24.422	24.403	24.592
CHAINAGE	164.041	165.468	170.000	179.041	180.000	182.500	190.000	195.000	200.000	205.151	207.500	210.000	216.209

DESIGN LEVEL	24.580	24.680	24.772	24.780	24.860	24.868	24.867	24.647	24.529	23.810	23.758	23.583	22.824
EXISTING LEVEL	24.526	24.145	23.917	23.900	24.177	24.123	24.107	23.756	23.651	23.171	23.142	23.042	22.670
CHAINAGE	220.000	230.000	239.197	240.000	247.988	249.588	250.000	257.988	260.000	267.988	268.437	270.000	278.437

DESIGN LEVEL	22.781	22.717	22.322	22.278	22.077	21.992	21.776	21.715	21.629	21.629	21.636	21.762	21.778
EXISTING LEVEL	22.648	22.619	22.412	22.366	22.181	22.124	22.090	22.076	21.947	21.942	21.903	21.759	21.750
CHAINAGE	279.049	280.000	288.437	290.000	297.024	300.000	307.573	310.000	317.573	317.824	320.000	327.573	328.175

RING ROAD LONGITUDINAL SECTION
HORIZONTAL SCALE 1:250
VERTICAL SCALE 1:50

Xrefs: X-7368002-TB_A1H; 7368002-WSCE-CS-MO-02 - Design Surface RING ROAD
Plot Date: 03.11.2023@15:26:39 Login Name: istewart Cad File: T:\7368002\Drawings\AutoCAD\Civil\Design\Civil 2D\S4.56\C5.11 Road Long Sections.dwg

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10.0 0 5.0 10.0 15.0 20.0m
PLAN SCALE 1:500 A1 SHEET

REVISION	AMENDMENT	DATE	REVISION	AMENDMENT	DATE
1	ISSUE FOR S4.56	03/11/23			

CLIENT
KUATRO

PROJECT
FOREST LODGE
WARRIEWOOD

PREPARED BY
WSce Pty Ltd
ACN 668 655 141
ABN 75 668 655 141
info@wsce.com.au
wsce.com.au
Driven by excellence, built on experience.

TITLE
ROAD LONG SECTIONS - RING ROAD

SCALE	DRAWN	DESIGNED	CHECKED	APPROVED
AS SHOWN	I.K.	I.O.	J.G.	J.G.

JOB No.	DRAWING No.	ISSUE
7368002	C5.12	1

DATE	STATUS
SEPTEMBER 2023	ISSUE FOR S4.56

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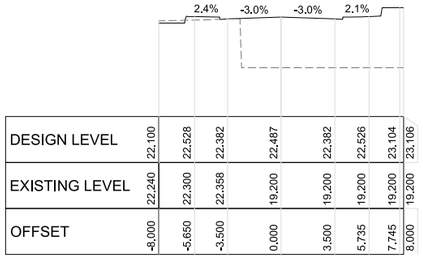
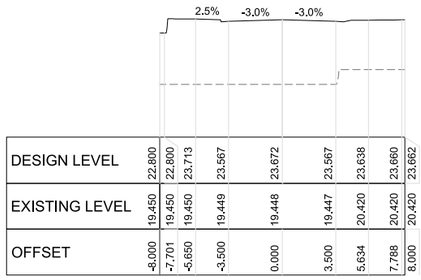


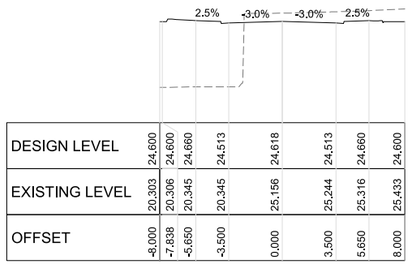
DESIGN LEVEL	22.100	22.528	22.382	22.487	22.382	22.526	23.104	23.106
EXISTING LEVEL	22.240	22.300	22.358	19.200	19.200	19.200	19.200	19.200
OFFSET	-8.000	-5.650	-3.500	0.000	3.500	5.735	7.745	8.000

CHAINAGE 50.00
HORIZONTAL SCALE 1:200
VERTICAL SCALE 1:200



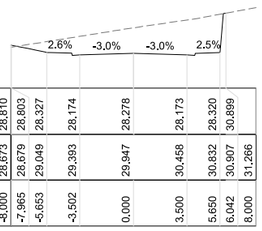
DESIGN LEVEL	22.800	22.800	23.713	23.567	23.672	23.567	23.638	23.660	23.662
EXISTING LEVEL	19.450	19.450	19.450	19.449	19.448	19.447	20.420	20.420	20.420
OFFSET	-8.000	-7.701	-5.650	-3.500	0.000	3.500	5.634	7.788	8.000

CHAINAGE 90.00
HORIZONTAL SCALE 1:200
VERTICAL SCALE 1:200



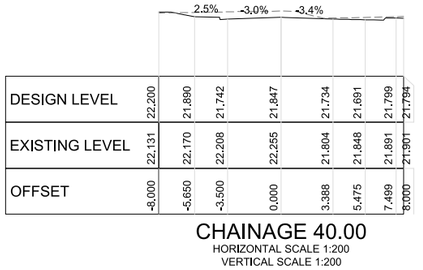
DESIGN LEVEL	24.600	24.600	24.660	24.513	24.618	24.513	24.660	24.600
EXISTING LEVEL	20.303	20.306	20.345	20.345	25.156	25.244	25.316	25.433
OFFSET	-8.000	-7.838	-5.650	-3.500	0.000	3.500	5.650	8.000

CHAINAGE 130.00
HORIZONTAL SCALE 1:200
VERTICAL SCALE 1:200



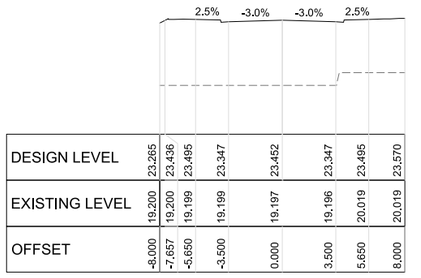
DESIGN LEVEL	28.810	28.803	28.327	28.174	28.278	28.173	28.320	30.899
EXISTING LEVEL	28.673	28.679	29.049	29.393	29.947	30.458	30.832	30.907	31.266
OFFSET	-8.000	-7.965	-5.653	-3.502	0.000	3.500	5.650	6.042	8.000

CHAINAGE 170.00
HORIZONTAL SCALE 1:200
VERTICAL SCALE 1:200



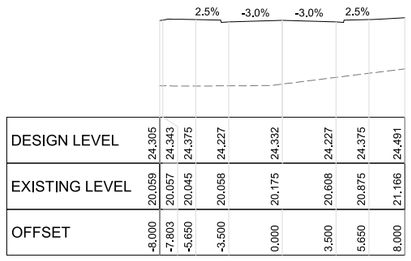
DESIGN LEVEL	22.200	21.890	21.742	21.847	21.734	21.691	21.799	21.794
EXISTING LEVEL	22.131	22.170	22.208	22.255	21.804	21.848	21.891	21.901
OFFSET	-8.000	-5.650	-3.500	0.000	3.388	5.475	7.499	8.000

CHAINAGE 40.00
HORIZONTAL SCALE 1:200
VERTICAL SCALE 1:200



DESIGN LEVEL	23.265	23.436	23.495	23.347	23.452	23.347	23.495	23.570
EXISTING LEVEL	19.200	19.200	19.199	19.199	19.197	19.196	20.019	20.019
OFFSET	-8.000	-7.657	-5.650	-3.500	0.000	3.500	5.650	8.000

CHAINAGE 80.00
HORIZONTAL SCALE 1:200
VERTICAL SCALE 1:200

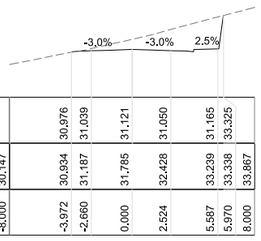


DESIGN LEVEL	24.305	24.343	24.375	24.227	24.332	24.227	24.375	24.491
EXISTING LEVEL	20.059	20.057	20.045	20.058	20.175	20.608	20.875	21.166
OFFSET	-8.000	-7.803	-5.650	-3.500	0.000	3.500	5.650	8.000

CHAINAGE 120.00
HORIZONTAL SCALE 1:200
VERTICAL SCALE 1:200

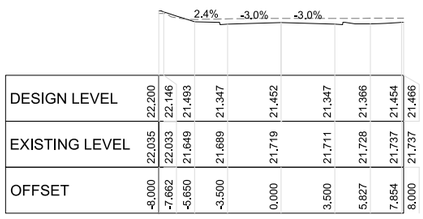
DESIGN LEVEL	27.654	27.071	26.923	27.028	26.923	27.071	30.074
EXISTING LEVEL	27.362	28.092	28.390	28.881	29.469	30.004	30.111	30.598
OFFSET	-8.000	-5.650	-3.500	0.000	3.500	5.650	6.071	8.000

CHAINAGE 160.00
HORIZONTAL SCALE 1:200
VERTICAL SCALE 1:200



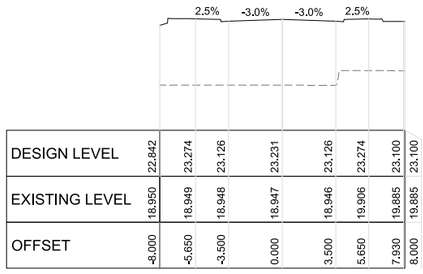
DESIGN LEVEL		30.976	31.039	31.121	31.050	31.165	33.325
EXISTING LEVEL	30.147	30.934	31.187	31.785	32.428	33.239	33.338	33.867
OFFSET	-8.000	-3.972	-2.660	0.000	2.524	5.587	5.970	8.000

CHAINAGE 195.44
HORIZONTAL SCALE 1:200
VERTICAL SCALE 1:200



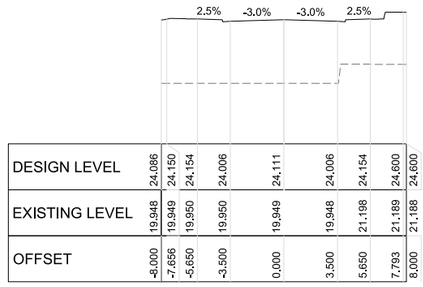
DESIGN LEVEL	22.200	22.146	21.493	21.347	21.452	21.347	21.366	21.454	21.466
EXISTING LEVEL	22.035	22.033	21.649	21.689	21.719	21.711	21.728	21.737	21.737
OFFSET	-8.000	-7.662	-5.650	-3.500	0.000	3.500	5.827	7.854	8.000

CHAINAGE 30.00
HORIZONTAL SCALE 1:200
VERTICAL SCALE 1:200



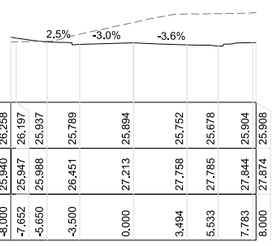
DESIGN LEVEL	22.842	23.274	23.126	23.231	23.126	23.274	23.100	23.100
EXISTING LEVEL	18.950	18.949	18.948	18.947	18.946	19.906	19.885	19.885
OFFSET	-8.000	-5.650	-3.500	0.000	3.500	5.650	7.930	8.000

CHAINAGE 70.00
HORIZONTAL SCALE 1:200
VERTICAL SCALE 1:200



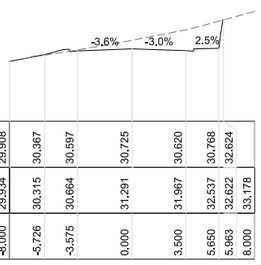
DESIGN LEVEL	24.086	24.150	24.154	24.006	24.111	24.006	24.154	24.600
EXISTING LEVEL	19.948	19.949	19.950	19.950	19.949	19.948	21.198	21.189	21.188
OFFSET	-8.000	-7.656	-5.650	-3.500	0.000	3.500	5.650	7.793	8.000

CHAINAGE 110.00
HORIZONTAL SCALE 1:200
VERTICAL SCALE 1:200



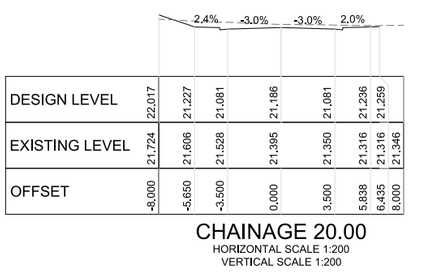
DESIGN LEVEL	26.258	26.197	25.937	25.789	25.894	25.752	25.678	25.904	25.908
EXISTING LEVEL	25.940	25.947	25.988	26.451	27.213	27.758	27.785	27.844	27.874
OFFSET	-8.000	-7.652	-5.650	-3.500	0.000	3.494	5.533	7.783	8.000

CHAINAGE 150.00
HORIZONTAL SCALE 1:200
VERTICAL SCALE 1:200



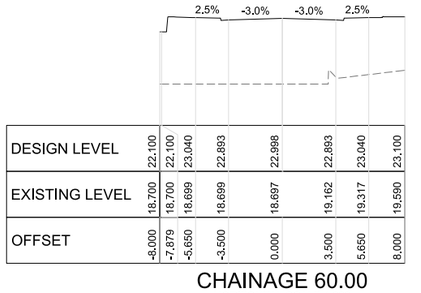
DESIGN LEVEL	29.908	30.367	30.597	30.725	30.620	30.768	32.624
EXISTING LEVEL	29.934	30.315	30.664	31.291	31.967	32.537	32.622	33.178
OFFSET	-8.000	-5.726	-3.575	0.000	3.500	5.650	5.963	8.000

CHAINAGE 190.00
HORIZONTAL SCALE 1:200
VERTICAL SCALE 1:200



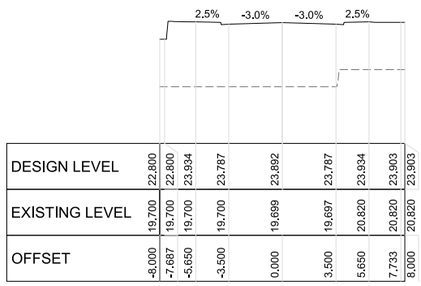
DESIGN LEVEL	22.017	21.227	21.081	21.186	21.081	21.236	21.259
EXISTING LEVEL	21.724	21.606	21.528	21.395	21.350	21.316	21.316	21.346
OFFSET	-8.000	-5.650	-3.500	0.000	3.500	5.838	6.435	8.000

CHAINAGE 20.00
HORIZONTAL SCALE 1:200
VERTICAL SCALE 1:200



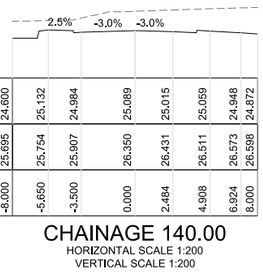
DESIGN LEVEL	22.100	22.100	23.040	22.893	22.998	22.893	23.040	23.100
EXISTING LEVEL	18.700	18.700	18.699	18.699	18.697	19.162	19.317	19.590
OFFSET	-8.000	-7.879	-5.650	-3.500	0.000	3.500	5.650	8.000

CHAINAGE 60.00
HORIZONTAL SCALE 1:200
VERTICAL SCALE 1:200



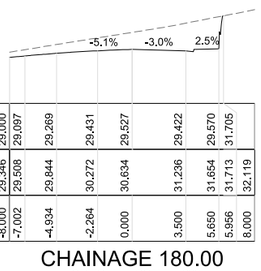
DESIGN LEVEL	22.800	22.800	23.934	23.787	23.892	23.787	23.934	23.903	23.903
EXISTING LEVEL	19.700	19.700	19.700	19.700	19.699	19.697	20.820	20.820	20.820
OFFSET	-8.000	-7.687	-5.650	-3.500	0.000	3.500	5.650	7.733	8.000

CHAINAGE 100.00
HORIZONTAL SCALE 1:200
VERTICAL SCALE 1:200



DESIGN LEVEL	24.600	25.132	24.984	25.089	25.015	25.059	24.948	24.872
EXISTING LEVEL	25.695	25.754	25.907	26.350	26.431	26.511	26.573	26.598
OFFSET	-8.000	-5.650	-3.500	0.000	2.484	4.908	6.924	8.000

CHAINAGE 140.00
HORIZONTAL SCALE 1:200
VERTICAL SCALE 1:200



DESIGN LEVEL	29.000	29.097	29.269	29.431	29.527	29.422	29.570	31.705
EXISTING LEVEL	29.346	29.508	29.844	30.272	30.634	31.236	31.654	31.713	32.119
OFFSET	-8.000	-7.002	-4.934	-2.264	0.000	3.500	5.650	5.956	8.000

CHAINAGE 180.00
HORIZONTAL SCALE 1:200
VERTICAL SCALE 1:200

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2.5 0 2.5 5.0 7.5 10.0m
PLAN SCALE 1:200 A1 SHEET

0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

REVISION	AMENDMENT	DATE	REVISION	AMENDMENT	DATE
1	ISSUE FOR S4.56	03/11/23			

CLIENT
KUATRO

PROJECT
FOREST LODGE
WARRIEWOOD

PREPARED BY
WSce Pty Ltd
ACN 668 655 141
ABN 75 668 655 141
info@wsce.com.au
wsce.com.au
IQNet GCC ISO 9001 Certified
WSce Driven by excellence, built on experience.

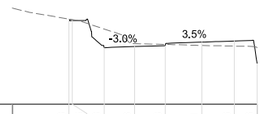
TITLE
ROAD CROSS SECTIONS - ACCESS ROAD

SCALE	DRAWN	DESIGNED	CHECKED	APPROVED
AS SHOWN	I.K.	I.O.	J.G.	J.G.

JOB No.	DRAWING No.	ISSUE
7368002	C5.21	1

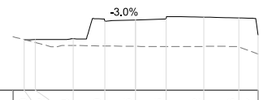
DATE	STATUS
SEPTEMBER 2023	ISSUE FOR S4.56

Xrefs: X:\7368002\TB_A1H
Plot Date: 03.11.2023@15:28:88 Login Name: istewart Civil File: T:\7368002\Drawings\AutoCAD\Civil\Design\Civil 3D\S4.56\C5.21 Road Cross Sections.dwg



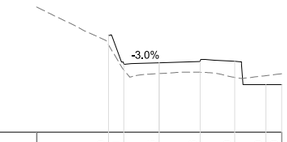
DESIGN LEVEL		29.558	29.475	27.688	27.773	27.833	28.061	28.136	26.646
EXISTING LEVEL	30.279	29.564	29.526	28.919	27.954	27.912	27.844	27.803	27.711
OFFSET	-8.000	-4.289	-4.069	-2.000	0.000	2.000	4.380	6.511	8.000

CHAINAGE 30.00
HORIZONTAL SCALE 1:200
VERTICAL SCALE 1:200



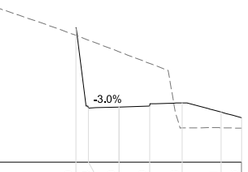
DESIGN LEVEL		29.300	29.302	29.354	30.510	30.595	30.655	30.782	30.726	29.607
EXISTING LEVEL	29.499	29.300	29.111	28.918	28.890	28.864	28.860	28.861	28.825	28.368
OFFSET	-8.000	-7.265	-6.540	-4.063	-2.000	0.000	2.000	4.459	6.756	8.000

CHAINAGE 70.00
HORIZONTAL SCALE 1:200
VERTICAL SCALE 1:200



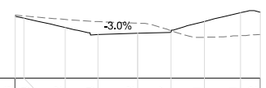
DESIGN LEVEL		30.320	28.441	28.535	28.616	28.640	27.100	27.100
EXISTING LEVEL	32.178	29.730	28.078	27.839	27.921	27.582	27.703	27.823
OFFSET	-8.000	-3.321	-2.319	0.000	2.678	4.923	6.963	8.000

CHAINAGE 110.00
HORIZONTAL SCALE 1:200
VERTICAL SCALE 1:200



DESIGN LEVEL		32.779	27.524	27.609	27.669	27.878	27.271	26.906
EXISTING LEVEL	34.093	32.286	31.978	31.216	30.456	26.246	26.249	26.225
OFFSET	-8.000	-2.816	-2.000	0.000	2.000	4.129	6.671	8.000

CHAINAGE 150.00
HORIZONTAL SCALE 1:200
VERTICAL SCALE 1:200

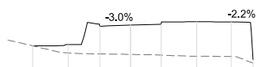


DESIGN LEVEL	26.043	25.924	25.312	24.854	24.932	24.997	25.711	26.291	26.312
EXISTING LEVEL	26.126	26.075	25.846	25.701	25.604	25.107	24.675	24.774	24.857
OFFSET	-8.000	-7.420	-4.738	-2.596	0.000	2.169	4.347	6.711	8.000

CHAINAGE 190.00
HORIZONTAL SCALE 1:200
VERTICAL SCALE 1:200

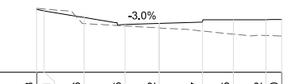
DESIGN LEVEL		29.401	29.506	26.493	26.578	26.652	26.827	26.907	26.292
EXISTING LEVEL	30.090	29.401	29.185	28.477	27.453	27.328	27.210	27.141	27.122
OFFSET	-8.000	-5.268	-4.007	-2.001	0.000	2.458	4.472	7.181	8.000

CHAINAGE 20.00
HORIZONTAL SCALE 1:200
VERTICAL SCALE 1:200



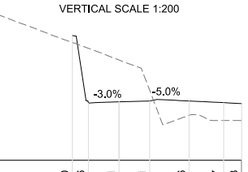
DESIGN LEVEL		29.300	29.385	30.567	30.652	30.712	30.868	30.853	28.381
EXISTING LEVEL	29.674	29.300	28.838	28.773	28.739	28.689	28.625	28.605	28.179
OFFSET	-8.000	-6.398	-4.066	-2.000	0.000	2.000	4.324	6.574	8.000

CHAINAGE 60.00
HORIZONTAL SCALE 1:200
VERTICAL SCALE 1:200



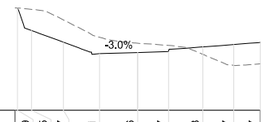
DESIGN LEVEL	30.108	30.011	29.586	29.135	29.202	29.287	29.435	29.442	29.450
EXISTING LEVEL	30.172	30.132	29.186	29.030	28.901	28.895	28.496	28.411	28.371
OFFSET	-8.000	-7.510	-4.907	-2.230	0.000	2.827	4.836	6.959	8.000

CHAINAGE 100.00
HORIZONTAL SCALE 1:200
VERTICAL SCALE 1:200



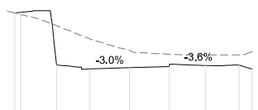
DESIGN LEVEL		32.150	27.736	27.821	27.881	27.876	27.767	27.713
EXISTING LEVEL	33.542	31.699	31.313	30.543	28.588	26.944	26.599	26.599
OFFSET	-8.000	-3.049	-2.000	0.000	2.000	4.577	6.827	8.000

CHAINAGE 140.00
HORIZONTAL SCALE 1:200
VERTICAL SCALE 1:200



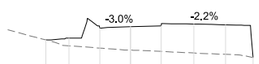
DESIGN LEVEL	28.679	27.215	26.447	25.701	25.776	25.837	26.138	26.297	26.437
EXISTING LEVEL	28.689	28.679	28.589	27.900	26.769	26.381	26.241	25.655	24.939	25.037
OFFSET	-8.000	-7.858	-6.944	-4.851	-2.495	0.000	2.018	4.247	6.269	8.000

CHAINAGE 180.00
HORIZONTAL SCALE 1:200
VERTICAL SCALE 1:200



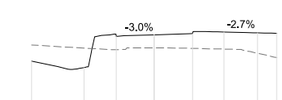
DESIGN LEVEL		29.397	29.450	26.007	25.753	25.832	25.909	25.979	26.001	25.741
EXISTING LEVEL	29.518	29.397	29.301	28.565	27.721	26.963	26.707	26.666	26.668	26.880
OFFSET	-8.000	-7.505	-7.113	-4.776	-2.623	0.000	2.577	4.945	7.153	8.000

CHAINAGE 10.00
HORIZONTAL SCALE 1:200
VERTICAL SCALE 1:200



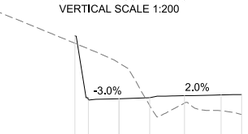
DESIGN LEVEL		29.295	29.415	30.066	30.151	30.211	30.330	30.281	28.159
EXISTING LEVEL	29.955	29.295	28.917	28.765	28.629	28.545	28.444	28.354	28.150
OFFSET	-8.000	-5.530	-4.016	-2.000	0.000	2.000	4.133	6.207	8.000

CHAINAGE 50.00
HORIZONTAL SCALE 1:200
VERTICAL SCALE 1:200



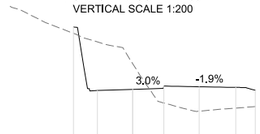
DESIGN LEVEL		27.845	29.873	29.972	30.047	30.155	30.103	30.077
EXISTING LEVEL	29.263	29.110	29.007	29.122	29.091	29.045	28.777	28.506
OFFSET	-8.000	-4.584	-2.476	0.000	2.506	4.558	6.741	8.000

CHAINAGE 90.00
HORIZONTAL SCALE 1:200
VERTICAL SCALE 1:200



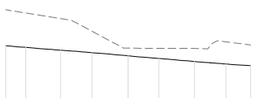
DESIGN LEVEL		32.121	27.946	28.031	28.091	28.226	28.273	28.300
EXISTING LEVEL	33.740	31.638	31.281	30.359	27.595	27.744	27.239	27.000
OFFSET	-8.000	-2.870	-2.000	0.000	2.000	4.283	6.657	8.000

CHAINAGE 130.00
HORIZONTAL SCALE 1:200
VERTICAL SCALE 1:200



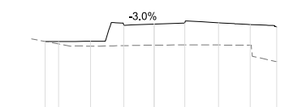
DESIGN LEVEL		30.689	26.569	26.638	26.848	26.803	26.764	26.579
EXISTING LEVEL	32.066	30.286	29.730	28.309	25.751	25.208	25.414	25.514
OFFSET	-8.000	-3.871	-2.313	0.000	2.023	4.334	6.732	8.000

CHAINAGE 170.00
HORIZONTAL SCALE 1:200
VERTICAL SCALE 1:200



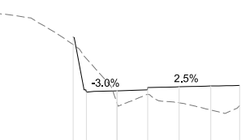
DESIGN LEVEL		29.378	29.445	28.938	29.023	29.083	29.316	29.401	27.211
EXISTING LEVEL	30.355	29.432	29.321	28.571	28.307	28.258	28.194	28.110	27.449
OFFSET	-8.000	-4.322	-4.030	-2.000	0.000	2.000	4.467	6.878	8.000

CHAINAGE 40.00
HORIZONTAL SCALE 1:200
VERTICAL SCALE 1:200



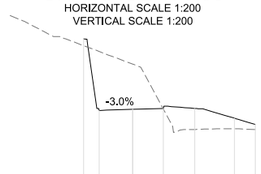
DESIGN LEVEL		29.302	29.326	30.353	30.438	30.498	30.522	30.411	30.249
EXISTING LEVEL	29.465	29.303	29.139	29.001	29.032	29.068	29.076	29.075	29.059	28.000
OFFSET	-8.000	-7.121	-6.237	-4.168	-2.000	0.000	2.000	4.196	6.270	8.000

CHAINAGE 80.00
HORIZONTAL SCALE 1:200
VERTICAL SCALE 1:200



DESIGN LEVEL		31.744	28.156	28.241	28.451	28.498	28.550	28.592
EXISTING LEVEL	33.319	31.257	30.346	27.438	28.000	27.460	26.988	27.276
OFFSET	-8.000	-2.865	-2.001	0.000	2.016	4.059	6.127	8.000

CHAINAGE 120.00
HORIZONTAL SCALE 1:200
VERTICAL SCALE 1:200



DESIGN LEVEL		31.845	27.159	27.249	27.309	27.307	26.669	26.262
EXISTING LEVEL	33.372	31.414	31.027	30.196	27.245	25.938	25.983	25.925
OFFSET	-8.000	-3.216	-2.191	0.000	2.000	4.046	6.637	8.000

CHAINAGE 160.00
HORIZONTAL SCALE 1:200
VERTICAL SCALE 1:200

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2.5 0 2.5 5.0 7.5 10.0m
PLAN SCALE 1:200 A1 SHEET

0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

REVISION	AMENDMENT	DATE	REVISION	AMENDMENT	DATE
1	ISSUE FOR S4.56	03/11/23			

CLIENT
KUATRO

PROJECT
FOREST LODGE
WARRIEWOOD

PREPARED BY
WSce Pty Ltd
ACN 668 655 141
ABN 75 668 655 141
info@wsce.com.au
wsce.com.au
GCC NO 9001 Certified
WSce
Driven by excellence, built on experience.

TITLE
ROAD CROSS SECTIONS - RING ROAD SHEET 1

SCALE	DRAWN	DESIGNED	CHECKED	APPROVED
AS SHOWN	I.K.	I.O.	J.G.	J.G.

JOB No.	DRAWING No.	ISSUE
7368002	C5.22	1

DATE	STATUS
SEPTEMBER 2023	ISSUE FOR S4.56

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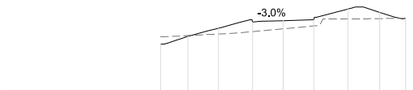
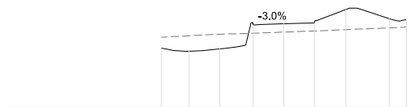
Login Name: stewart
Xrefs: X_7368000_TB_A1H
Plot Date: 03.11.2023@10:48:09



DESIGN LEVEL	23.137	23.648	24.190	24.595	24.680	24.740	25.434	25.211	24.846
EXISTING LEVEL	23.610	23.698	23.802	23.954	24.145	24.336	24.793	24.814	24.833
OFFSET	-8.000	-6.220	-4.214	-2.000	0.000	2.004	4.221	6.315	8.000

CHAINAGE 230.00
HORIZONTAL SCALE 1:200
VERTICAL SCALE 1:200

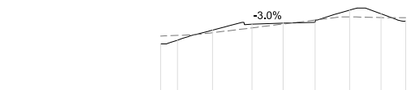


DESIGN LEVEL	21.980	21.777	21.932	23.498	23.583	23.643	24.514	23.916	23.860
EXISTING LEVEL	22.710	22.801	22.904	22.966	23.042	23.117	23.202	23.318	23.399
OFFSET	-8.000	-6.201	-4.188	-2.000	0.000	2.000	4.046	6.886	8.000

CHAINAGE 270.00
HORIZONTAL SCALE 1:200
VERTICAL SCALE 1:200

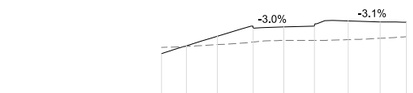
DESIGN LEVEL	20.200	20.200	20.662	21.618	21.715	21.775	22.492	23.023	23.077
EXISTING LEVEL	21.886	21.934	21.999	22.030	22.075	22.077	22.086	22.146	22.280
OFFSET	-8.000	-7.053	-4.878	-2.383	0.000	2.000	4.227	6.278	8.000

CHAINAGE 310.00
HORIZONTAL SCALE 1:200
VERTICAL SCALE 1:200



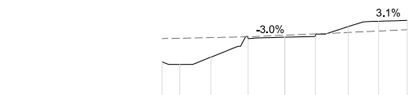
DESIGN LEVEL	23.238	23.476	24.126	24.519	24.580	24.642	25.431	25.201	24.720
EXISTING LEVEL	23.738	23.783	23.963	24.277	24.526	24.783	24.988	24.953	24.942
OFFSET	-8.000	-6.899	-4.611	-2.031	0.000	2.087	4.345	6.389	8.000

CHAINAGE 220.00
HORIZONTAL SCALE 1:200
VERTICAL SCALE 1:200



DESIGN LEVEL	22.782	23.301	23.921	24.444	24.529	24.589	24.931	24.859	24.844
EXISTING LEVEL	23.192	23.261	23.378	23.544	23.651	23.650	23.702	23.795	23.892
OFFSET	-8.000	-6.370	-4.349	-2.000	0.000	2.000	4.200	6.275	8.000

CHAINAGE 260.00
HORIZONTAL SCALE 1:200
VERTICAL SCALE 1:200

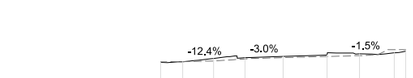


DESIGN LEVEL	20.375	20.200	20.689	21.895	21.992	22.052	22.680	23.031	23.090
EXISTING LEVEL	21.898	21.923	21.968	22.022	22.124	22.209	22.301	22.394	22.477
OFFSET	-8.000	-6.853	-4.818	-2.390	0.000	2.000	4.149	6.149	8.000

CHAINAGE 300.00
HORIZONTAL SCALE 1:200
VERTICAL SCALE 1:200

DESIGN LEVEL	21.418	21.482	21.574	21.672	21.778	21.855	21.917	21.967	22.057
EXISTING LEVEL	21.737	21.753	21.768	21.738	21.750	22.265	22.317	22.367	22.401
OFFSET	-8.000	-6.556	-4.435	-2.410	0.000	2.102	4.229	6.317	8.000

CHAINAGE 328.18
HORIZONTAL SCALE 1:200
VERTICAL SCALE 1:200



DESIGN LEVEL	24.089	24.131	24.350	24.405	24.480	24.565	24.653	24.715	24.828
EXISTING LEVEL	24.129	24.151	24.182	24.318	24.403	24.479	24.535	24.926	24.916
OFFSET	-8.000	-6.554	-4.549	-2.494	0.000	2.858	4.975	7.260	8.000

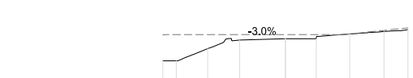
CHAINAGE 210.00
HORIZONTAL SCALE 1:200
VERTICAL SCALE 1:200

DESIGN LEVEL	22.742	23.121	23.969	24.782	24.867	24.927	25.627	25.258	24.924
EXISTING LEVEL	23.425	23.504	23.580	23.682	24.107	24.165	24.238	24.260	24.205
OFFSET	-8.000	-6.392	-4.383	-2.000	0.000	2.000	4.026	6.542	8.000

CHAINAGE 250.00
HORIZONTAL SCALE 1:200
VERTICAL SCALE 1:200

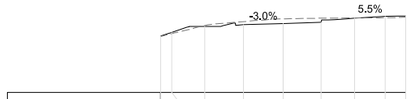
DESIGN LEVEL	20.582	20.200	20.678	22.181	22.278	22.338	22.989	23.041	23.076
EXISTING LEVEL	22.013	22.192	22.244	22.307	22.366	22.417	22.498	22.547	22.588
OFFSET	-8.000	-6.864	-4.845	-2.388	0.000	2.000	4.240	6.259	8.000

CHAINAGE 290.00
HORIZONTAL SCALE 1:200
VERTICAL SCALE 1:200



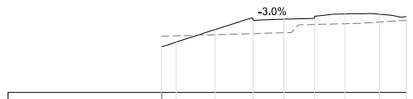
DESIGN LEVEL	20.200	20.200	20.985	21.546	21.636	21.641	21.945	22.105	22.224
EXISTING LEVEL	21.885	21.900	21.903	21.903	21.903	21.900	21.948	22.180	22.342
OFFSET	-8.000	-7.129	-5.071	-2.993	0.000	2.012	4.206	6.442	8.000

CHAINAGE 320.00
HORIZONTAL SCALE 1:200
VERTICAL SCALE 1:200



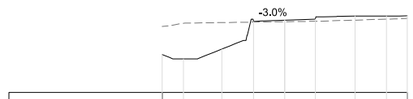
DESIGN LEVEL	23.685	23.925	24.300	24.422	24.499	24.574	24.851	24.967	24.985
EXISTING LEVEL	23.652	23.839	24.370	24.615	24.805	24.849	24.864	24.878	24.912
OFFSET	-8.000	-7.269	-5.117	-2.596	0.000	2.479	4.655	6.660	8.000

CHAINAGE 200.00
HORIZONTAL SCALE 1:200
VERTICAL SCALE 1:200



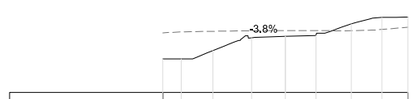
DESIGN LEVEL	23.001	23.289	24.110	24.695	24.780	24.840	25.115	25.107	24.971
EXISTING LEVEL	23.665	23.694	23.767	23.842	23.901	24.436	24.484	24.596	24.701
OFFSET	-8.000	-7.028	-4.480	-2.000	0.000	2.000	4.002	6.232	8.000

CHAINAGE 240.00
HORIZONTAL SCALE 1:200
VERTICAL SCALE 1:200



DESIGN LEVEL	20.477	20.200	20.834	22.631	22.717	22.777	22.977	22.988	22.994
EXISTING LEVEL	22.316	22.519	22.560	22.592	22.619	22.646	22.721	22.784	22.826
OFFSET	-8.000	-6.607	-4.096	-2.032	0.000	2.000	4.601	6.643	8.000

CHAINAGE 280.00
HORIZONTAL SCALE 1:200
VERTICAL SCALE 1:200



DESIGN LEVEL	20.200	20.200	20.735	21.571	21.667	21.715	22.482	22.902	22.921
EXISTING LEVEL	21.892	21.951	21.992	22.021	22.037	22.032	22.029	22.115	22.259
OFFSET	-8.000	-6.809	-4.724	-2.211	0.000	2.000	4.297	6.307	8.000

CHAINAGE 312.60
HORIZONTAL SCALE 1:200
VERTICAL SCALE 1:200

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DRAWING COLOUR CODED - PRINT ALL COPIES IN COLOUR

2.5 0 2.5 5.0 7.5 10.0m
PLAN SCALE 1:200 A1 SHEET

0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150
A1

REVISION	AMENDMENT	DATE	REVISION	AMENDMENT	DATE
1	ISSUE FOR S4.56	03/11/23			

CLIENT
KUATRO

PROJECT
FOREST LODGE
WARRIEWOOD

PREPARED BY
WSce Pty Ltd
ACN 668 655 141
ABN 75 668 655 141
info@wsce.com.au
wsce.com.au
Driven by excellence, built on experience.

TITLE
ROAD CROSS SECTIONS - RING ROAD SHEET 2

SCALE	DRAWN	DESIGNED	CHECKED	APPROVED
AS SHOWN	I.K.	I.O.S.	J.G.	J.G.

JOB No.	DRAWING No.	ISSUE
7368002	C5.23	1

DATE	STATUS
SEPTEMBER 2023	ISSUE FOR S4.56

Xrefs: X:\7368002\TB_A1H
Plot Date: 03.11.2023@10:48:43 Login Name: istewart Cad File: T:\7368002\Drawings\AutoCAD\C4dDesign\Civil 3D\S4.56\C5.21 Road Cross Sections.dwg

PROVIDE SLOT UNDER FENCE 600mm W x 100mm HIGH FOR OVERLAND FLOW. TYPICAL.

PROVIDE SLOT UNDER FENCE 600mm W x 100mm HIGH FOR OVERLAND FLOW. TYPICAL.

PROVIDE SLOT UNDER FENCE 600mm W x 100mm HIGH FOR OVERLAND FLOW. TYPICAL.

BOUNDARY LINE

SUBSTATION

SCOUR PROTECTION TO BE PROVIDED AT HEADWALL DISCHARGE LOCATION.

3m WIDE OVERFLOW WEIR TO NARRABEEN CREEK

BIORETENTION BASIN 2

BOOSTER

ONE WAY ROAD

TREE 2

BIORETENTION BASIN 2

FILTER AREA	= 157m²
FILTER MEDIA DEPTH	= 500mm
RETENTION BASE RL	= RL 20.20
RETENTION DEPTH	= 300mm
OSD VOLUME PROVIDED	= 400 m³

REFER TO C6.12 AND C6.14 FOR BASIN PLAN AND SECTIONS.

PROVIDE 400W x 100H SLOTS AT 10m INTERVALS IN WALL OVERFLOW INTO BASIN.

CONNECTION COURTYARD DRAINAGE BY HYDRAULIC ENGINEER

PROVIDE MIN 2 x 200W x 100H SLOTS IN WALL FOR EMERGENCY OVERFLOW. TYPICAL FOR COURTYARD AREAS.

INDICATIVE BASEMENT RISING MAIN CONNECTION. TBC BY HYDRAULIC ENGINEER

PROVIDE MIN 2 x 200W x 100H SLOTS IN WALL FOR EMERGENCY OVERFLOW. TYPICAL FOR COURTYARD AREAS.

CONNECTION OF RAINWATER TANK OVERFLOW PIPE. HYDRAULIC ENGINEER TO CONFIRM LOCATION AND DETAILS

LOCATION OF 10kL RAINWATER TANK IN BASEMENT

PROVIDE MIN 2 x 200W x 100H SLOTS IN WALL FOR EMERGENCY OVERFLOW. TYPICAL FOR COURTYARD AREAS.

COURTYARD DRAINAGE CONNECTION BY HYDRAULIC ENGINEER

PROVIDE MIN 2 x 200W x 100H SLOTS IN WALL FOR EMERGENCY OVERFLOW. TYPICAL FOR COURTYARD AREAS.

7.5m LONG ACO KERB DRAIN

DEEP LANDSCAPE

DEEP 18m LONG ACO KERB DRAIN

ENTRY

COVERED FITNESS AREA

SEATING AREA

SEATING AREA

BBQ

POOL

POOL DECK

SEATING AREA

COURTYARD DRAINAGE CONNECTION BY HYDRAULIC ENGINEER.

SWALE TYPE 2
DEPTH = 0.125m
TOP WIDTH = 1.0m

PROVIDE MIN 2 x 200W x 100H SLOTS IN WALL FOR EMERGENCY OVERFLOW. TYPICAL FOR COURTYARD AREAS.

SWALE TYPE 1
DEPTH = 0.2m
TOP WIDTH = 1.2m

TOP OF WALL LEVEL TO BE 500mm ABOVE PROBABLE MAXIMUM FLOOD WATER LEVEL

SWALE TYPE 1
DEPTH = 0.2m
TOP WIDTH = 1.2m

TOP OF WALL TO BE RL30.80 FOR FLOOD PROTECTION.

BOW 28.30 TOW 30.20

TOW 25.65

LEGEND

- EXISTING BOUNDARY
- Ø450 ESW — EXISTING STORMWATER PIPE
- ESW — EXISTING STORMWATER PIPE TO BE REMOVED
- INDICATIVE OVERLAND FLOW ROUTE
- Ø450 — PIPE DIAMETER AND DIRECTION OF FLOW
- SW — STORMWATER PIPE (SIZE <Ø1050)
- STORMWATER PIPE (SIZE ≥ Ø1050)
- KERB DRAIN
- KERB INLET PIT (SAG) (900 x 450 GRATE WITH 1.8m WIDE LINTEL)
- GRATED INLET PIT
- PIT STRUCTURE NUMBER / STORMWATER LINE NUMBER
- SWALE FLOW ARROW
- UPDREAM DIVERSION SWALE FLOW ARROW
- DRAINAGE BY OTHERS REFER HYDRAULIC ENGINEER DRAWINGS

NOTES:

1. STORMWATER DRAINAGE ASSOCIATED WITH ALL SUSPENDED AREAS AND COURTYARDS ARE TO BE UNDERTAKEN BY THE HYDRAULIC ENGINEER.
2. COORDINATION WITH THE HYDRAULIC ENGINEER IS REQUIRED.

REFER C6.02 FOR CONTINUATION

NORTH

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PLAN SCALE 1:250 A1 SHEET

REVISION	AMENDMENT	DATE	REVISION	AMENDMENT	DATE
1	ISSUE FOR S4.56	03/11/23			

CLIENT: KUATRO

PROJECT: FOREST LODGE WARRIEWOOD

PREPARED BY

WSce Pty Ltd
ACN 668 655 141
ABN 75 668 655 141
info@wsce.com.au
wsce.com.au

Driven by excellence, built on experience.

TITLE: **STORMWATER LAYOUT PLAN-SHEET 1**

SCALE	DRAWN	DESIGNED	CHECKED	APPROVED
AS SHOWN	I.K.	I.O.	J.G.	J.G.

JOB No.	DRAWING No.	ISSUE
7368002	C6.01	1

DATE: SEPTEMBER 2023 STATUS: ISSUE FOR S4.56

Xrefs: X:\7368000.SU_Existing Survey\X-7368002.SU_Existing Surface X:\7368002.TB.AIH_X:\7368000.AR_Site Plan RNW.ROAD, 7368002.HSCE.CS.AIG.02 -Design Surface RNW.ROAD, X:\7368000.SW-Layout
Plot Date: 03.11.2023@16:20:55 Login Name: stewart Cad File T:\7368002\Drawings\AutoCAD\Civil\Dwg\Civil 2023\4.SW\Stormwater Layout Plan-Sheet 1.dwg

REFER C6.01 FOR CONTINUATION

SWALE DIVERTED TOWARD NARRABEEN CREEK

CONNECTION COURTYARD DRAINAGE BY HYDRAULIC ENGINEER

PROVIDE MIN 2 x 200W x 100H SLOTS IN WALL FOR EMERGENCY OVERFLOW. TYPICAL FOR COURTYARD AREAS.

PROVIDE MIN 2 x 200W x 100H SLOTS IN WALL FOR EMERGENCY OVERFLOW. TYPICAL FOR COURTYARD AREAS.

SWALE TYPE 2
DEPTH = 0.125m
TOP WIDTH = 1.0m

SWALE TYPE 2
DEPTH = 0,125m
TOP WIDTH = 1.0m

TOP OF WALL TO BE RL30.80 FOR FLOOD PROTECTION.

KOPPERS LOGS (ø150MM, 500MM SPACING)

COURTYARD DRAINAGE CONNECTION BY HYDRAULIC ENGINEER

500mm DEEP, 5000mm WIDE SWALE TO ACT AS LEVEL SPREADER AND DISTRIBUTE FLOW TO NARRABEEN CREEK.

PROVIDE MIN 2 x 200W x 100H SLOTS IN WALL FOR EMERGENCY OVERFLOW. TYPICAL FOR COURTYARD AREAS.

225Ø STORMWATER PIPE CROSSES DIVERSION PIPE AT APPROX 300 CLEARANCE

SURCHARGE PIT TO DIRECT FLOW TO ADJACENT SWALE

SCOUR PROTECTION TO BE PROVIDED AT HEADWALL DISCHARGE LOCATION.

300Ø STORMWATER PIPE CROSSES DIVERSION PIPE AT APPROX 300 CLEARANCE

225Ø STORMWATER PIPE CROSSES DIVERSION PIPE AT APPROX 750 CLEARANCE

COURTYARD DRAINAGE CONNECTION BY HYDRAULIC ENGINEER

PROPOSE 1500 DIVERSION PIPE TO REDIRECT 100 YR LOCAL UPSTREAM FLOOD WATER ARROUND THE SITE

SCOUR PROTECTION TO BE PROVIDED AT HEADWALL DISCHARGE LOCATION.

150Ø STORMWATER PIPE CROSSES DIVERSION PIPE AT APPROX 550 CLEARANCE

3m WIDE OVERFLOW WEIR TO NARRABEEN CREEK

BIORETENTION BASIN 1

FILTER AREA	= 176m²
FILTER MEDIA DEPTH	= 600mm
RETENTION BASE RL	= RL 22.19
RETENTION DEPTH	= 300mm
OSD VOLUME PROVIDED	= 942 m³

REFER TO C6.11 AND C6.13 FOR BASIN PLAN AND SECTIONS.

PROVIDE FENCE AROUND TOP OF BASIN.

BIORETENTION BASIN 1

NEW GARAGE (DA)

EXISTING DWELLING (TO BE RETAINING)

SEATING AREA

POOL DECK

SHADE 4m WIDE

PARKING

ONE SKY ROAD

STOCKPILE AREA

BRUSH FENCE

R3 ZONE

RU2 ZONE

BOUNDARY LINE

LEGEND

- EXISTING BOUNDARY
- Ø450 BSW — EXISTING STORMWATER PIPE
- X BSW X — EXISTING STORMWATER PIPE TO BE REMOVED
- INDICATIVE OVERLAND FLOW ROUTE
- Ø450 — PIPE DIAMETER AND DIRECTION OF FLOW
- SW — STORMWATER PIPE (SIZE <Ø1050)
- STORMWATER PIPE (SIZE ≥ Ø1050)
- KERB DRAIN
- KERB INLET PIT (SAG) (900 x 450 GRATE WITH 1.8m WIDE LINTEL)
- GRATED INLET PIT
- PIT STRUCTURE NUMBER
- STORMWATER LINE NUMBER
- SWALE FLOW ARROW
- UPDREAM DIVERSION SWALE FLOW ARROW
- DRAINAGE BY OTHERS REFER HYDRAULIC ENGINEER DRAWINGS

NOTES:

1. STORMWATER DRAINAGE ASSOCIATED WITH ALL SUSPENDED AREAS AND COURTYARDS ARE TO BE UNDERTAKEN BY THE HYDRAULIC ENGINEER.
2. COORDINATION WITH THE HYDRAULIC ENGINEER IS REQUIRED.

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NORTH

DRAWING COLOUR CODED - PRINT ALL COPIES IN COLOUR

5,0 0 2,5 5,0 7,5 10,0m
PLAN SCALE 1:250 A1 SHEET

0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

REVISION	AMENDMENT	DATE	REVISION	AMENDMENT	DATE
1	ISSUE FOR S4.56	03/11/23			

CLIENT: KUATRO

PROJECT: FOREST LODGE WARRIEWOOD

PREPARED BY
WSce Pty Ltd
ACN 668 655 141
ABN 75 668 655 141
info@wsce.com.au
wsce.com.au
GCC ISO 9001 Certified
WSce Driven by excellence, built on experience.

TITLE: **STORMWATER LAYOUT PLAN-SHEET 2**

SCALE	DRAWN	DESIGNED	CHECKED	APPROVED
AS SHOWN	I.K.	I.O.	J.G.	J.G.

JOB No.	DRAWING No.	ISSUE
7368002	C6.02	1

DATE: SEPTEMBER 2023 STATUS: ISSUE FOR S4.56

Xrefs: X:7368000.SSL - Existing Survey; X:7368002.SSL-CS-MO-01 - Existing Surface; X:7368002.TB_ATH; X:7368000.AR - Site Plan RING ROAD; 7368002.WSCE-CS-MO-01 - Design Surface RING ROAD; X:7368002.STM-Layout
Plot Date: 03.11.2023@16:20:50 Login Name: stewart Cad File: Y:\7368002\Drawings\AutoCAD\Civil\Design\Civil 2025\4.6\Stormwater Layout Plan-Sheet 2.dwg

NAME	SURFACE ELEV. (m)	PIT DEPTH (m)	PIT SIZE AND TYPE	FROM	TO	LENGTH (m)	U/S IL (m)	D/S IL (m)	SLOPE (%)	PIPE TYPE	DIA (mm)	No. PIPES
Pit 1/1	24.41	0.67	900SQ PIT WITH CLASS B GRATE	Pit 1/1	Pit 2/1	13.2	23.74	23.61	0.98	uPVC	225	1
Pit 2/1	24.5	1.73	900SQ PIT WITH CLASS B GRATE	Pit 2/1	Pit 3/1	17.8	22.77	22.59	1.01	uPVC	225	1
Pit 3/1	23.48	1.49	900SQ PIT WITH CLASS B GRATE	Pit 3/1	Pit 4/1	12.4	21.99	21.87	0.97	uPVC	225	1
Pit 4/1	22.69	0.87	600SQ PIT WITH CLASS B GRATE	Pit 4/1	Pit 5/1	12	21.82	21.7	1.00	uPVC	300	1
Pit 5/1	22.64	1.43	900SQ PIT WITH CLASS B GRATE	Pit 5/1	Pit 6/1	18.2	21.21	21.03	0.99	uPVC	300	1
Pit 6/1	21.97	0.99	600SQ PIT WITH CLASS B GRATE	Pit 6/1	Pit 7/1	13.7	20.98	20.84	1.02	uPVC	300	1
Pit 7/1	21.9	1.11	600SQ PIT WITH CLASS B GRATE	Pit 7/1	Pit 8/1	11.9	20.79	20.67	1.01	uPVC	300	1
Pit 8/1	22.09	1.47	900SQ PIT WITH CLASS B COVER	Pit 8/1	Pit 9/1	17.5	20.62	20.45	0.97	uPVC	300	1
Pit 9/1	21.31	1.01	900SQ PIT WITH 600 x 900 CLASS D SINGLE GRATE WITH 1.8m LINTEL OPENING	Pit 9/1	Pit 10/1	7.1	20.3	20.26	0.56	RCP	375	2
Pit 10/1	21.33	1.09	900SQ PIT WITH 600 x 900 CLASS D SINGLE GRATE WITH 1.8m LINTEL OPENING	Pit 10/1	Basin A	7.2	20.24	20.2	0.56	RCP	375	2
Basin A	21.4		OSD BASIN 1	Basin A	HW4	28.2	19.25	18	4.43	uPVC	300	1
Pit 13/1	21.49	1.00	900SQ PIT WITH 600 x 900 CLASS D SINGLE GRATE WITH 1.8m LINTEL OPENING	Pit 13/1	Basin A	2.9	20.49	20.2	10	uPVC	225	1
Pit 1/2	25.80	1.27	900SQ PIT WITH 600 x 900 CLASS D SINGLE GRATE WITH 1.8m LINTEL OPENING	Pit 1/2	Pit 2/2	9.6	24.53	24.01	5.42	uPVC	225	1
Pit 2/2	24.85	0.75	900SQ PIT WITH CLASS B GRATE	Pit 2/2	Pit 3/2	4.2	24.1	24.05	1.19	uPVC	225	1
Pit 3/2	24.86	0.96	900SQ PIT WITH 600 x 900 CLASS D SINGLE GRATE WITH 1.8m LINTEL OPENING	Pit 3/2	Pit 4/2	7	23.9	23.83	1.00	uPVC	225	1
Pit 4/2	24.85	1.12	900SQ PIT WITH 600 x 900 CLASS D SINGLE GRATE WITH 1.8m LINTEL OPENING	Pit 4/2	Pit 5/2	44.7	23.73	22.76	2.17	uPVC	225	1
Pit 5/2	23.61	1.01	900SQ PIT WITH 600 x 900 CLASS D SINGLE GRATE WITH 1.8m LINTEL OPENING	Pit 5/2	Pit 6/2	15.4	22.6	22.19	2.66	uPVC	300	1
Pit 6/2	23.24	1.07	900SQ PIT WITH 600 x 900 CLASS D SINGLE GRATE WITH 1.8m LINTEL OPENING	Pit 6/2	Pit 7/2	32	22.17	20.94	3.84	uPVC	300	2
Pit 7/2	21.85	0.97	900SQ PIT WITH 600 x 900 CLASS D SINGLE GRATE WITH 1.8m LINTEL OPENING	Pit 7/2	Pit 9/1	7.7	20.88	20.4	6.23	uPVC	300	2
Pit 1/3	23.6	0.90	18m LENGTH ACO TRENCH DRAIN WITH CLASS D GRATE	Pit 1/3	Pit 5/2	7.4	22.7	22.62	1.08	uPVC	150	2
Pit 2/4	23.66	0.90	3.8m LENGTH ACO TRENCH DRAIN WITH CLASS D GRATE	Pit 2/4	Pit 4/4	10.7	22.76	22.34	3.93	uPVC	150	2
Pit 4/4	23.25	0.91	7.2m LENGTH ACO TRENCH DRAIN WITH CLASS D GRATE	Pit 4/4	Pit 6/2	7.4	22.34	22.26	1.08	uPVC	150	2
Pit 1/5	21.85	0.91	900SQ PIT WITH CLASS D GRATE	Pit 1/5	Pit 7/2	7	20.94	20.9	0.57	uPVC	300	2
Pit 1/6	26.1	1.10	900SQ PIT WITH CLASS B GRATE	Pit 1/6	Pit 2/6	1.8	25	24.85	8.33	uPVC	225	1
Pit 2/6	25.7	1.00	900SQ PIT WITH CLASS B GRATE	Pit 2/6	Pit 3/6	22.5	24.7	24.5	0.89	uPVC	225	1
Pit 3/6	25.46	1.01	900SQ PIT WITH 600 x 900 CLASS B SINGLE GRATE WITH 1.2m LENGTH ACO TRENCH DRAIN	Pit 3/6	Pit 4/6	18.8	24.45	24.27	0.96	uPVC	225	1
Pit 4/6	25.13	1.48	900SQ PIT WITH CLASS B GRATE WITH 2.8m LENGTH ACO TRENCH DRAIN	Pit 4/6	Pit 5/6	23.8	23.65	23.53	0.5	uPVC	300	1
Pit 5/6	25.19	1.69	900SQ PIT WITH 600 x 900 CLASS B SINGLE GRATE WITH 1.2m LENGTH ACO TRENCH DRAIN	Pit 5/6	Pit 6/6	10.2	23.5	23.44	0.59	uPVC	300	1
Pit 6/6	24.87	1.46	900SQ PIT WITH 600 x 900 CLASS B SINGLE GRATE WITH 1.2m LENGTH ACO TRENCH DRAIN	Pit 6/6	Pit 7/6	10.5	23.41	23.35	0.57	uPVC	300	1
Pit 7/6	24.61	1.29	900SQ PIT WITH 600 x 900 CLASS D SINGLE GRATE WITH 1.8m LINTEL OPENING	Pit 7/6	Pit 8/6	17.8	23.32	23.23	0.51	uPVC	300	1
Pit 8/6	24.69	1.49	900SQ PIT WITH 600 x 900 CLASS D SINGLE GRATE WITH 1.8m LINTEL OPENING	Pit 8/6	Pit 7/7	36.3	23.2	23.01	0.52	uPVC	300	1
Pit 1/7	30.18	0.85	900SQ PIT WITH 600 x 900 CLASS D SINGLE GRATE WITH 1.8m LINTEL OPENING	Pit 1/7	Pit 2/7	28.1	29.33	27.47	6.37	uPVC	225	1
Pit 2/7	28.33	0.91	900SQ PIT WITH 600 x 900 CLASS D SINGLE GRATE WITH 1.8m LINTEL OPENING	Pit 2/7	Pit 3/7	12.7	27.42	27.23	1.5	uPVC	225	1
Pit 3/7	28.08	0.90	900SQ PIT WITH CLASS D COVER	Pit 3/7	Pit 4/7	18.7	27.18	26.75	2.3	uPVC	225	1
Pit 4/7	27.6	1.55	900SQ PIT WITH 600 x 900 CLASS D SINGLE GRATE WITH 1.8m LINTEL OPENING	Pit 4/7	Pit 5/7	10.9	26.05	25.94	1.01	uPVC	225	1
Pit 5/7	27.23	1.32	900SQ PIT WITH 600 x 900 CLASS D SINGLE GRATE WITH 1.8m LINTEL OPENING	Pit 5/7	Pit 6/7	19.9	25.91	24.99	4.62	uPVC	225	1
Pit 6/7	25.84	0.94	900SQ PIT WITH 600 x 900 CLASS D SINGLE GRATE WITH 1.8m LINTEL OPENING	Pit 6/7	Pit 7/7	24.6	24.9	23.4	6.1	uPVC	300	1
Pit 7/7	24.37	1.39	900SQ PIT WITH 600 x 900 CLASS D SINGLE GRATE WITH 1.8m LINTEL OPENING	Pit 7/7	Basin B	8.1	22.98	22.43	6.79	RCP	375	1
Basin B	24.3	2.81	OSD BASIN B	Basin B	HW5	21.1	21.49	21.00	1.84	uPVC	150	1
Pit 1/8	28.62	1.55	900SQ PIT WITH 600 x 900 CLASS D SINGLE GRATE WITH 1.8m LINTEL OPENING	Pit1/8	Pit2/8	24.3	27.07	24.64	10	uPVC	225	1
Pit 2/8	25.49	0.88	900SQ PIT WITH 600 x 900 CLASS D SINGLE GRATE WITH 1.8m LINTEL OPENING	Pit2/8	Pit 1/2	4.8	24.61	24.56	1.04	uPVC	225	1
Pit 3/8	26.14	0.89	900SQ PIT WITH 600 x 900 CLASS D SINGLE GRATE WITH 1.8m LINTEL OPENING	Pit 3/8	Pit2/8	7.2	25.25	24.64	8.47	uPVC	225	1
Pit 1/9	22.99	0.96	900SQ PIT WITH CLASS B GRATE	Pit 1/9	Pit 2/9	8.7	22.03	21.7	3.79	uPVC	300	1
Pit 2/9	22.63	2.13	900SQ PIT WITH 600 x 900 CLASS D SINGLE GRATE WITH 1.8m LINTEL OPENING	Pit 2/9	Basin A	3	20.5	20.2	10	uPVC	300	1
Pit 1/11	25.46	0.71	900SQ PIT WITH CLASS B GRATE	Pit 1/11	Pit 2/6	2.9	24.75	24.72	1.03	uPVC	225	1
Pit 1/12	23.05	0.95	900SQ PIT WITH CLASS B GRATE	Pit 1/12	Pit 1/9	3.7	22.1	22.06	1.08	uPVC	225	1
Pit 1/14	27.45	1.15	600SQ PIT WITH CLASS B GRATE	Pit 1/14	Pit 2/14	6.4	26.3	26.25	0.78	uPVC	225	1
Pit 2/14	27.19	0.97	900SQ PIT WITH CLASS B GRATE & 3.8m LENGTH ACO TRENCH DRAIN	Pit 2/14	Pit 4/7	23.5	26.22	26.1	0.51	uPVC	225	1
Pit 1/15	24.62	0.95	900SQ PIT WITH CLASS B COVER	Pit 1/15	Pit 7/7	9.8	23.67	23.01	6.73	uPVC	300	1
HW1/SD	31.36	1.91	HEADWALL	HW1/SD	Pit 1/SD	9	29.45	27.28	24.11	RCP	1500	1
Pit 1/SD	29.07	2.72	2250 SQ PIT WITH 900SQ CLASS D GRATE	Pit 1/SD	Pit 2/SD	42	26.35	23.35	7.14	RCP	1500	1
Pit 2/SD	27.16	3.86	2250 SQ PIT WITH 900SQ CLASS B GRATE	Pit 2/SD	Pit 3/SD	23.4	23.3	22.95	1.5	RCP	1500	1
Pit 3/SD	25.57	2.67	2250 SQ PIT WITH 900SQ CLASS B COVER	Pit 3/SD	Pit 4/SD	36.9	22.9	20.77	5.77	RCP	1500	1
Pit 4/SD	23.41	2.66	2250 SQ PIT WITH 900SQ CLASS B GRATE	Pit 4/SD	HW/2	17.4	20.75	20.6	0.86	RCP	600	1

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REVISION	AMENDMENT	DATE	REVISION	AMENDMENT	DATE
1	ISSUE FOR S4.56	03/11/23			

CLIENT: KUATRO

PROJECT: FOREST LODGE WARRIEWOOD

PREPARED BY

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TITLE: STORMWATER PIT SCHEDULE

SCALE	DRAWN	DESIGNED	CHECKED	APPROVED
AS SHOWN	I.K.	I.O.	J.G.	J.G.

JOB No.	DRAWING No.	ISSUE
7368002	C6.04	1

DATE	STATUS
SEPTEMBER 2023	ISSUE FOR S4.56

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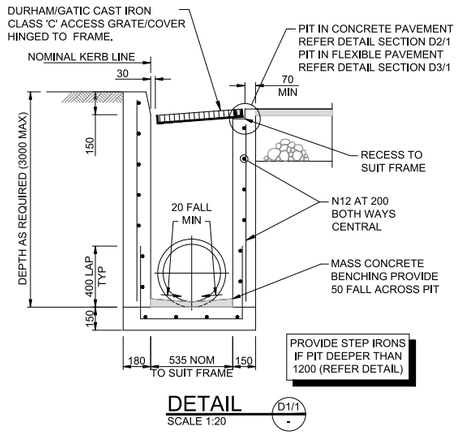
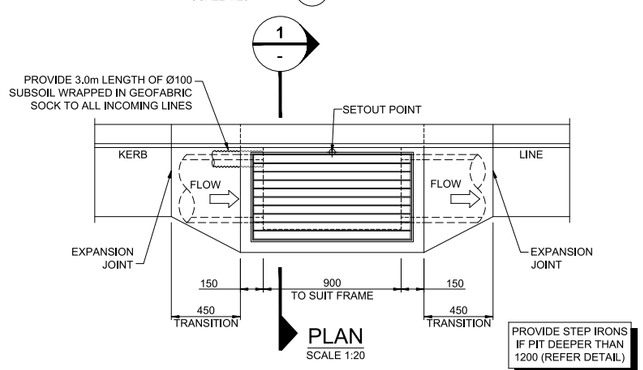
A1



DETAIL D1/1 - SCALE 1:20



PLAN SCALE 1:20

GRATED GULLY PIT

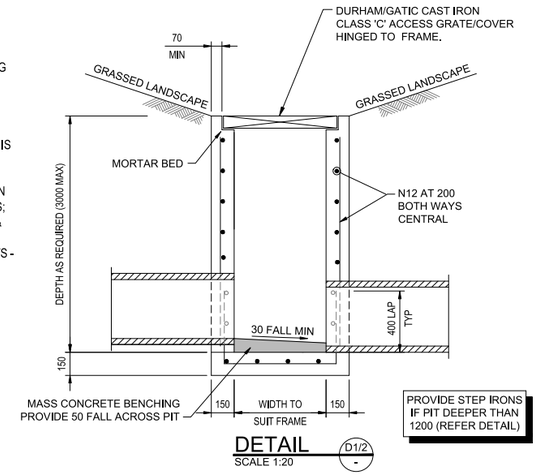
(PIPE SIZES ≤ Ø375)

NOTES:

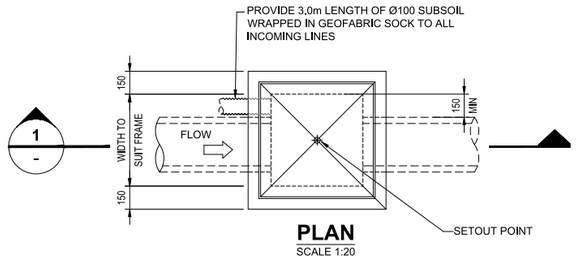
1. TRENCH WIDTH MAY NEED TO BE INCREASED SUBJECT TO ACHIEVING ADEQUATE COMPACTION.
2. MINIMUM PIPE COVER NOT UNDER ROADS = 450mm UNO.
3. THE CONTRACTOR SHALL ENSURE THAT THE SHORING OF TRENCHES IS INSTALLED AS REQUIRED BY STATUTORY REQUIREMENTS.
4. ENSURE BACKFILLING COMPACTION MEETS THE RELEVANT STANDARDS;

A) TRENCHES UNDER PAVED AREAS & BUILDINGS - 100% SMDD.

B) TRENCHES NOT UNDER PAVEMENTS - 95% SMDD.

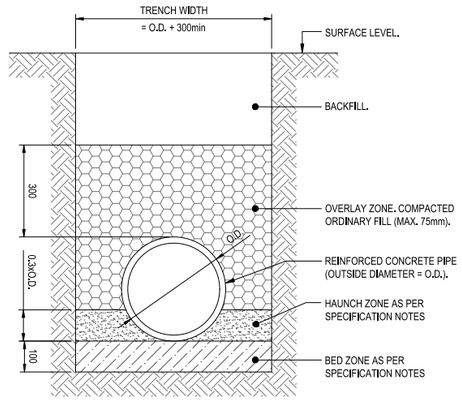


DETAIL D1/2 - SCALE 1:20



PLAN SCALE 1:20

600 - 900SQ SURFACE INLET PITS



GENERAL AREAS

TYPICAL PIPE TRENCH

NOT TO SCALE

NOTES:

1. TRENCH WIDTH MAY NEED TO BE INCREASED SUBJECT TO ACHIEVING ADEQUATE COMPACTION.
2. MINIMUM PIPE COVER NOT UNDER ROADS = 450mm UNO. MINIMUM PIPE COVER UNDER ROADS = 600mm UNO.
3. THE CONTRACTOR SHALL ENSURE THAT THE SHORING OF TRENCHES IS INSTALLED AS REQUIRED BY STATUTORY REQUIREMENTS.
4. ENSURE BACKFILLING COMPACTION MEETS THE FOLLOWING STANDARDS;

A) TRENCHES UNDER PAVED AREAS & BUILDINGS - 100% SMDD.

B) TRENCHES NOT UNDER PAVEMENTS - 90% SMDD.

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100 0 100 200 300 400 500mm
PLAN SCALE 1:10 A1 SHEET

200 0 200 400 600 800 1000mm
PLAN SCALE 1:20 A1 SHEET

0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

A1

REVISION	AMENDMENT	DATE
1	ISSUE FOR S4.56	03/11/23

CLIENT: KUATRO

PROJECT: FOREST LODGE WARRIEWOOD

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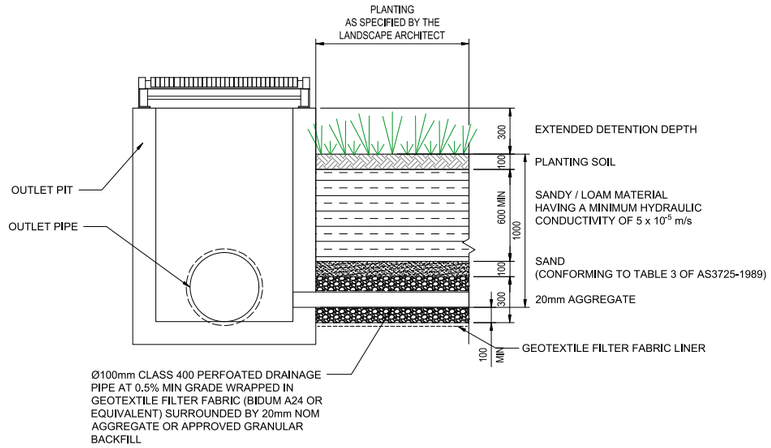
GCC ISO 9001 Certified
WSce Driven by excellence, built on experience.

TITLE: STORMWATER DRAINAGE DETAILS - SHEET 1

SCALE	DRAWN	DESIGNED	CHECKED	APPROVED
AS SHOWN	I.K.	I.O.	J.G.	J.G.

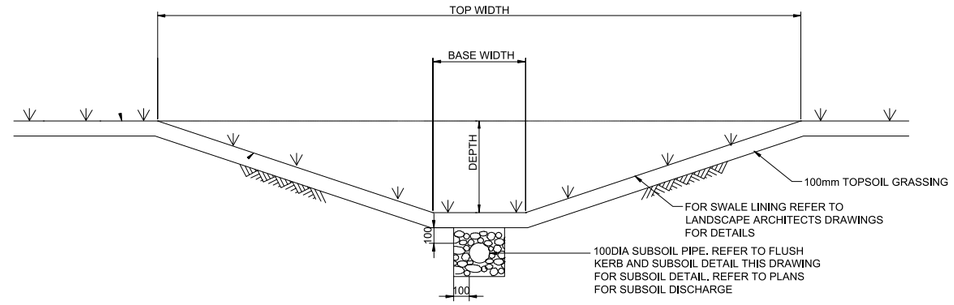
JOB No.	DRAWING No.	ISSUE
7368002	C6.06	1

DATE	STATUS
SEPTEMBER 2023	ISSUE FOR S4.56



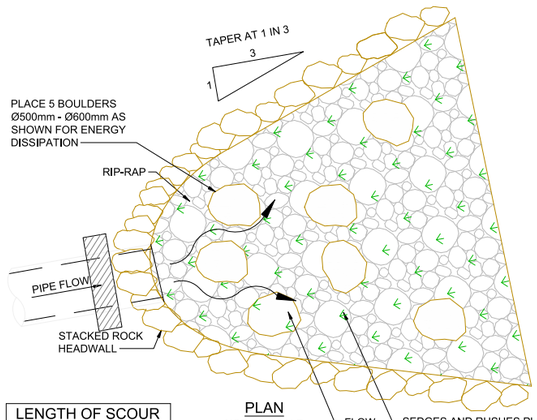
BIORETENTION DETAIL

SCALE 1:20

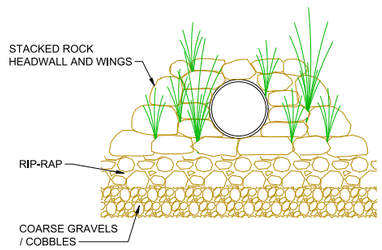


TYPICAL SECTION THROUGH SWALE

1. REFER TO PLAN FOR SWALE DIMENSIONS
2. SWALE INVERT LEVELS AS SPECIFIED ON PLAN. MIN LONGITUDINAL GRADE 0.5% (UNO)

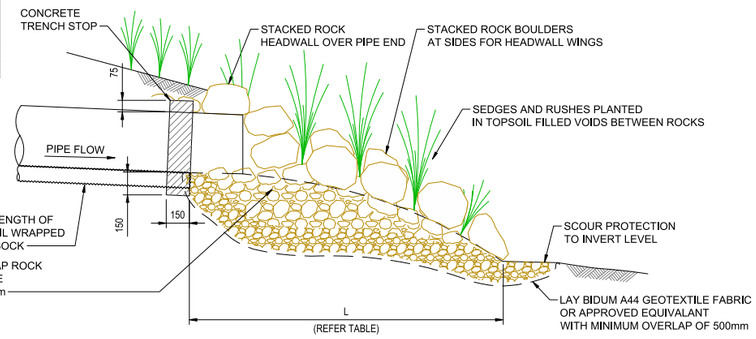


PLAN
NOT TO SCALE



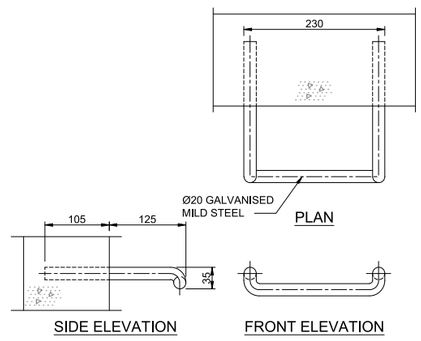
CROSS SECTION
NOT TO SCALE

LENGTH OF SCOUR PROTECTION	
OUTLET PIPE SIZE	L (mm)
375 - 750	4000
900 - 1350	6000
1500 - 1800	8000



ROCK HEADWALL - TYPICAL ARRANGEMENT

NOT TO SCALE

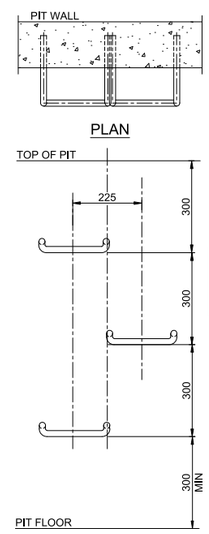


PLAN

SIDE ELEVATION FRONT ELEVATION

STEP IRON DETAIL

SCALE 1:5



PLAN

ELEVATION

NOTE:
1. STEP IRONS SHALL BE PROVIDED TO ALL PITS AND TANKS WITH A DEPTH OF 1.2m OR GREATER

STEP IRON PLACEMENT TO PIT WALL

SCALE NTS

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100 0 50 100 150 200mm
PLAN SCALE 1:5 A1 SHEET
100 0 100 200 300 400 500mm
PLAN SCALE 1:10 A1 SHEET
200 0 200 400 600 800 1000mm
PLAN SCALE 1:20 A1 SHEET

0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

A1

REVISION	AMENDMENT	DATE	REVISION	AMENDMENT	DATE
1	ISSUE FOR S4.56	03/11/23			

CLIENT: KUATRO

PROJECT: FOREST LODGE WARRIEWOOD

PREPARED BY
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TITLE: STORMWATER DRAINAGE DETAILS - SHEET 2

SCALE	DRAWN	DESIGNED	CHECKED	APPROVED
AS SHOWN	I.K.	I.O.	J.G.	J.G.

JOB No.	DRAWING No.	ISSUE
7368002	C6.07	1

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SEPTEMBER 2023	ISSUE FOR S4.56

Xref: X:\7368000\7B_ATH
Plot Date: 01.11.2023@12:50:24 Login Name: mtaylor Cad File: T:\7368000\Drawings\AutoCAD\Civil\Design\Civil 3D\S4-5\Stormwater Drainage Details - Sheet 2.dwg

TAIL OUT DIVERSION SWALE
TO FREELY DISCHARGE
TOWARDS CREEK

MAX BATTER 1V:2.5H

BIORETENTION BASIN 1

FILTER AREA	= 175m²
FILTER MEDIA DEPTH	= 600mm
RETENTION BASE RL	= RL 22.19
RETENTION DEPTH	= 300mm
OSD VOLUME	= 942 m³

BIORETENTION BASIN 1

Ø150 OUTLET PIPE

2000mm WIDE FLAT
BERM AT TOP OF BASIN

UPSTREAM DIVERSION SWALE
BASE WIDTH = 1,0m
MIN DEPTH = 0,4m

OUTLET PIT SUMP RL21.49

Ø375 INLET PIPE
AND HEADWALL

BRUSH LINE

Ø600

Ø375

Ø300

Ø150

GRL 22.19

GRL 24.37

GRL 23.41

CH 176.00

CH 210.00

CH 216.209

CH 220.00

CH 232.49

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NORTH

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PLAN SCALE 1:100 A1 SHEET

REVISION	AMENDMENT	DATE
1	ISSUE FOR S4.56	03/11/23

CLIENT: KUATRO

PROJECT: FOREST LODGE WARRIEWOOD

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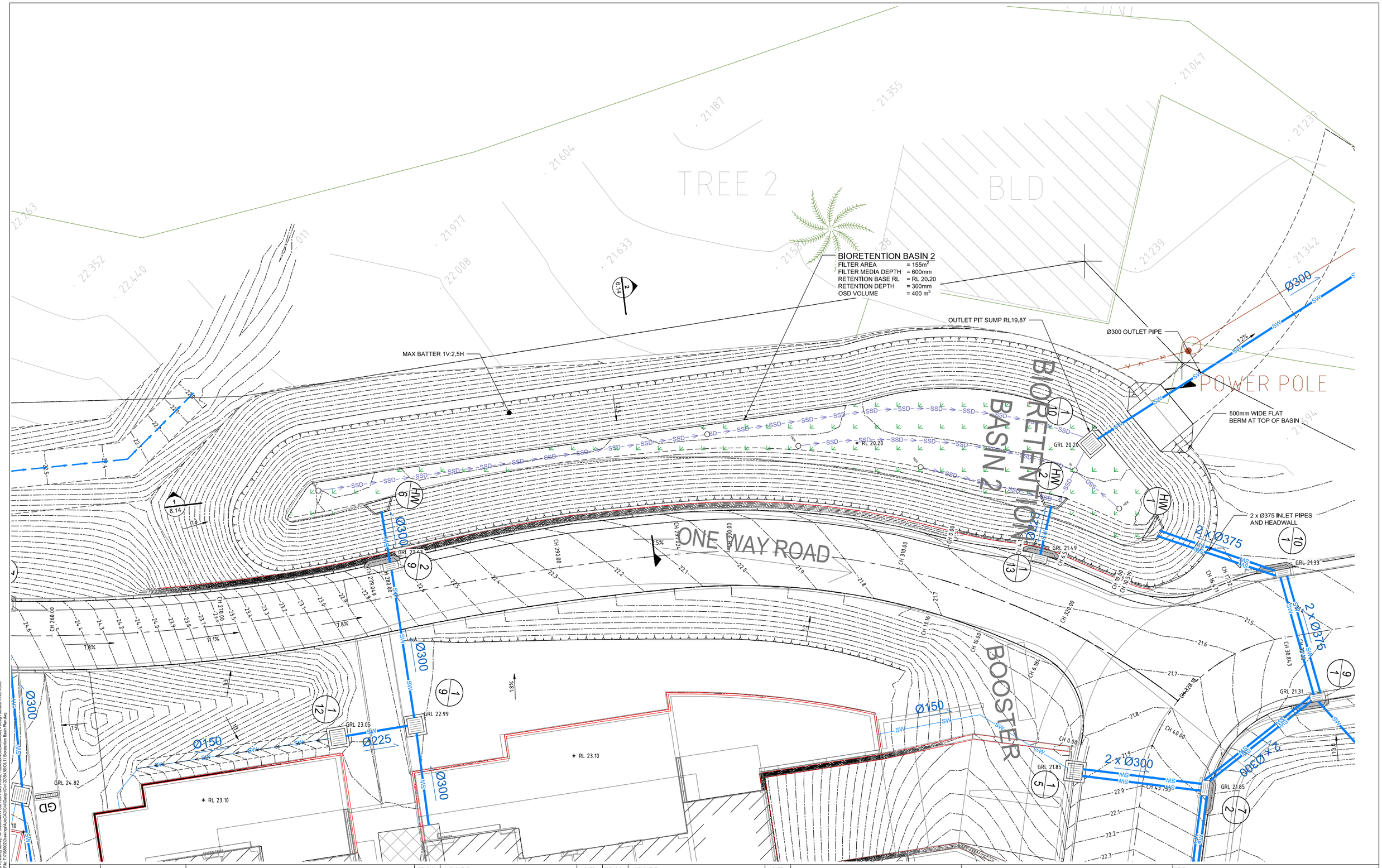
TITLE: BIORETENTION BASIN PLAN - SHEET 1

SCALE	DRAWN	DESIGNED	CHECKED	APPROVED
AS SHOWN	I.K.	I.O.	J.G.	J.G.

JOB No.	DRAWING No.	ISSUE
7368002	C6.11	1

DATE: SEPTEMBER 2023
STATUS: ISSUE FOR S4.56



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PLAN SCALE 1:100 A1 SHEET

REVISION	AMENDMENT	DATE	REVISION	AMENDMENT	DATE
1	ISSUE FOR S4.56	03/11/23			

CLIENT: KLIATRO

PROJECT: FOREST LODGE WARRIEWOOD

PREPARED BY

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TITLE: **BIORETENTION BASIN PLAN - SHEET 2**

SCALE	DRAWN	DESIGNED	CHECKED	APPROVED
AS SHOWN	I.K.	I.O.	J.G.	J.G.

JOB No.	DRAWING No.	ISSUE
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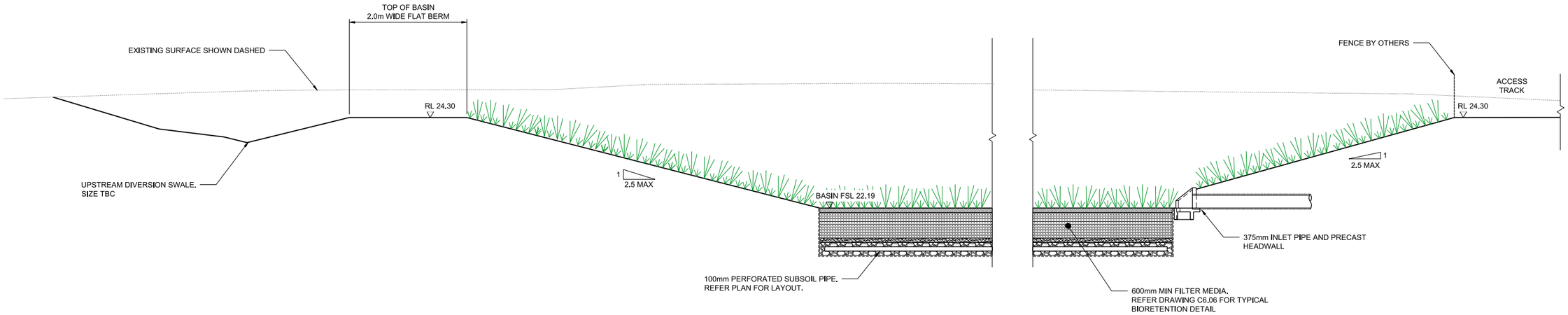
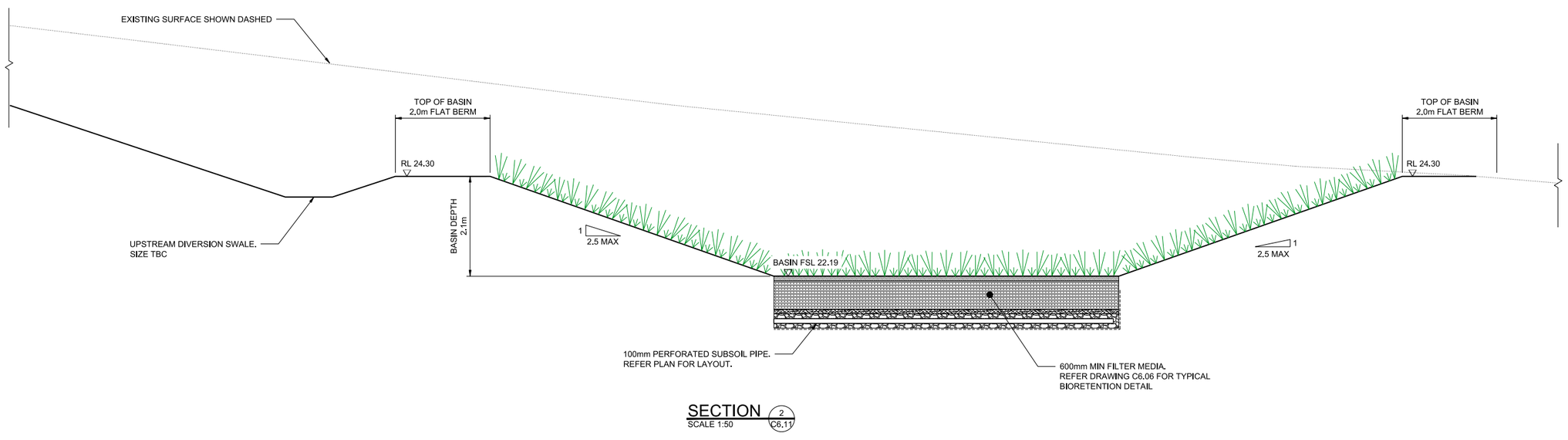
Xrefs: X-7368003_TB_ATH, X-7368003_SHM_Layout, X-7368003_SU_Existing Survey, X-7368003_AR_-_Site Plan RING ROAD, 7368003-WSCE-SJC-MO-02_Design Surface RING ROAD
Plot Date: 03.11.2023@13:30:19 Login Name: mtaylor Civil File: 1173680002\Drawings\AutoCAD\Civil\Design\Civil 3D\C6.11 Bioretention Basin Plan.dwg



SECTION 1 C6.11
SCALE 1:50



SECTION 2 C6.11
SCALE 1:50

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1000 0 500 1000 1500 2000mm
PLAN SCALE 1:50 A1 SHEET

0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150
A1

REVISION	AMENDMENT	DATE	REVISION	AMENDMENT	DATE
1	ISSUE FOR S4.56	03/11/23			

CLIENT
KUATRO

PROJECT
FOREST LODGE
WARRIEWOOD

PREPARED BY
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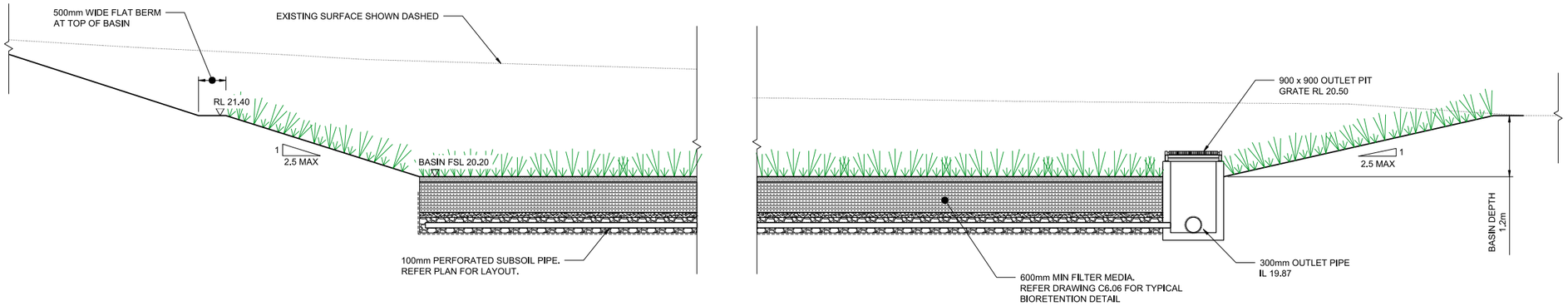
TITLE
BIORETENTION BASIN SECTIONS - SHEET 1

SCALE	DRAWN	DESIGNED	CHECKED	APPROVED
AS SHOWN	I.K.	I.O.	J.G.	J.G.

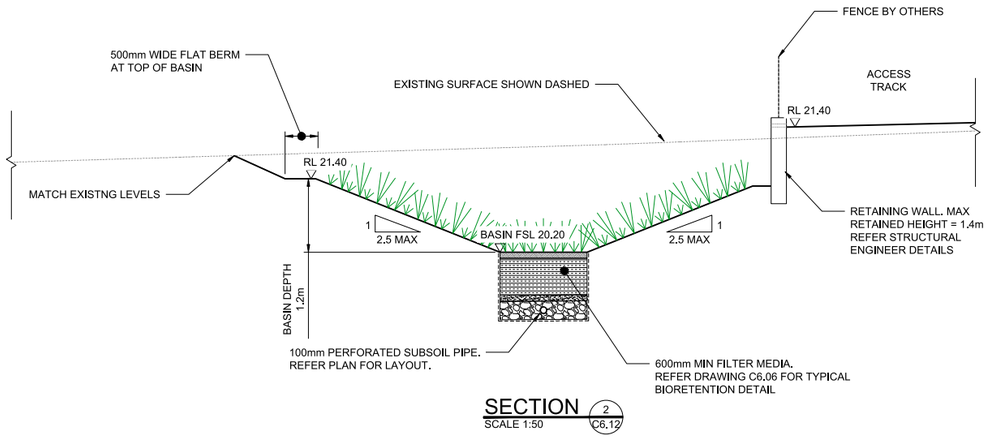
JOB No.	DRAWING No.	ISSUE
7368002	C6.13	1

DATE	STATUS
SEPTEMBER 2023	ISSUE FOR S4.56

Xrefs: X:\7368002\8_A1\1 X:\7368002\SHU\Layout_X-7368002.SHU - Existing Survey 7368002.WSCE_CS_MO.02 - Design Surface.DA (APPROVED) X:\7368002\AR - Site Plan RING ROAD
Plot Date: 03.11.2023@09:23:56 Login Name: mtaylor Civil File: 1:\7368002\Drawings\AutoCAD\Civil\Design\Civil 2023\4-SHCS.11 Bioretention Basin Plan.dwg



SECTION 1 — C6.12
SCALE 1:50



SECTION 2 — C6.12
SCALE 1:50

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1000 0 500 1000 1500 2000mm
PLAN SCALE 1:50 A1 SHEET

0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150
A1

REVISION	AMENDMENT	DATE	REVISION	AMENDMENT	DATE
1	ISSUE FOR S4.56	03/11/23			

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TITLE
BIORETENTION BASIN SECTIONS - SHEET 2

SCALE	DRAWN	DESIGNED	CHECKED	APPROVED
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JOB No.	DRAWING No.	ISSUE
7368002	C6.14	1

DATE	STATUS
SEPTEMBER 2023	ISSUE FOR S4.56

Xrefs: X:\7368002\8_A1\1 X:\7368002\SHU\Layout_X-7368002.SHU - Existing Survey; 7368002-WSCE-DS-MO-02 - Design Surface.DA APPROVED; X:\7368002\8_A1\1 X:\7368002\8_A1\1 X-7368002-AR - Site Plan RING ROAD
Plot Date: 03.11.2023@09:23:25 Login Name: mtaylor Civil File: I:\7368002\Drawings\AutoCAD\Civil\Design\Civil 2023\4-5\C6.11 Bioretention Basin Plan.dwg

CAT 7/1
160m² 35% IMP.

CAT 6/1
220m² 25% IMP.

CAT 5/1
140m2 25% IMP.

CAT 4/1
170m² 20% IMP.

CAT 3/1
200m² 25% IMP.

CAT 2/1
150m² 35% IMP.

CAT 1/1
550m² 30% IMP.

CAT BYPASS
470m² 40% IMP.

CAT 7/1R
210m² 100% IMP.

CAT 6/1R
260m² 100% IMP.

CAT 5/1R
180m² 100% IMP.

CAT 4/1R
180m² 100% IMP.

CAT 3/1R
260m² 100% IMP.

CAT 2/1R
190m² 100% IMP.

CAT 4/2
430m² 60% IMP.

CAT 3/8
230m² 100% IMP.

CAT HYD - 130m² - 50% IMP.

CAT HYD - 70m² - 50% IMP.

CAT HYD - 120m² - 50% IMP.

CAT 9/1
100m² 50% IMP.

CAT 7/2
220m² 90% IMP.

CAT 6/2
120m² 90% IMP.

CAT 5/2
340m² 90% IMP.

CAT 10/1
70m² 100% IMP.

CAT 1/5
320m² 90% IMP.

CAT 4/4
250m² 70% IMP.

CAT 1/3
330m² 90% IMP.

CAT 3/2
120m² 80% IMP.

CAT 2/8
190m² 95% IMP.

CAT HYD BASEMENT (TOTAL)
90m2 100% IMP.

CAT 1/13
480m² 50% IMP.

CAT BASIN A
640m² 0% IMP.

CAT 7/2H
270m² 100% IMP.

CAT TO BASIN A
1.162Ha
80% IMP.

CAT 1/3H
510m² 100% IMP.

CAT 2/2
390m² 10% IMP.

CAT 1/5H
100m² 100% IMP.

CAT RWT
1020m² 100% IMP.

CAT 2/2H
610m² 100% IMP.

CAT 2/4
1000m² 70% IMP.

CAT 1/8
150m² 95% IMP.

CAT 2/9
180 m2 60% IMP.

CAT 1/12
100 m2 40% IMP.

CAT 6/6H(1)
270m² 100% IMP.

CAT 5/6
130 m2 30% IMP.

CAT 2/6
250m² 75% IMP.

CAT 4/6H
490m² 100% IMP.

CAT 3/6
10m² 40% IMP.

CAT 1/11
210m² 5% IMP.

CATCHMENT LEGEND

- ROOF CATCHMENT
- ROAD CATCHMENT
- LANDSCAPED CATCHMENT
- MIXED CATCHMENT
- CATCHMENT TO HYDRAULIC

REFER C6.22 FOR CONTINUATION

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PLAN SCALE 1:250 A1 SHEET

0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

A1

REVISION	AMENDMENT	DATE	REVISION	AMENDMENT	DATE
1	ISSUE FOR S4.56	03/11/23			

CLIENT: KUATRO

PROJECT: FOREST LODGE WARRIEWOOD

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TITLE: **STORMWATER CATCHMENT PLAN - SHEET 1**

SCALE	DRAWN	DESIGNED	CHECKED	APPROVED
AS SHOWN	I.K.	I.O.	J.G.	J.G.

JOB No.	DRAWING No.	ISSUE
7368002	C6.21	1

DATE	STATUS
SEPTEMBER 2023	ISSUE FOR S4.56

Xrefs: X:\7368002\SU_Existing Survey\ X:\7368002\SW\Catchment X:\7368002\SW\Layout: X:\7368002\TB_AH\ X:\7368002\AR_Site Plan RING ROAD_7368002\WSCE-CS-MOd2- Design Surface RING ROAD
Plot Date: 03.11.2023@15:27:49 Login Name: mwyk Cad File: Y:\7368002\Drawings\AutoCAD\Civil\Design\Civil 2025\4-SW\Stormwater Catchment Plan - Sheet 2.dwg

REFER C6.01 FOR CONTINUATION

CATCHMENT LEGEND

- ROOF CATCHMENT
- ROAD CATCHMENT
- LANDSCAPED CATCHMENT
- MIXED CATCHMENT
- CATCHMENT TO HYDRAULIC

CAT 5/6
130 m2
30% IMP.

CAT 2/6
250m²
75% IMP.

CAT 3/6
10m²
40% IMP.

CAT 4/6
460m²
60% IMP.

CAT 7/6
60 m2
60% IMP.

CAT 6/6
130 m2
30% IMP.

CAT 6/6H(2)
970m²
100% IMP.

CAT HYD
530m²
100% IMP.

CAT 1/7
120m2
90% IMP.

CAT 1/6
340m²
10% IMP.

CAT 8/6
130 m2
70% IMP.

CAT 1/14H
520m²
100% IMP.

CAT TO BASIN B
0.862Ha
80% IMP.

CAT 1/15H
530m²
100% IMP.

CAT 9/7 - 180m² - 90% IMP.

CAT 1/14
100m²
10% IMP.

CAT 2/7
240m²
70% IMP.

CAT 2/15
80m²
100% IMP.

CAT 4/7
430m²
50% IMP.

CAT 1/15
630m²
0% IMP.

CAT 5/7
80m²
70% IMP.

CAT 7/7
580m²
60% IMP.

CAT 6/7
180m²
60% IMP.

CAT BASIN B
1540m²
0% IMP.

NEW GARAGE (DA)

EXISTING DWELLING (TO BE RETAINING)

EDGE OF CLEARING

BRUSH LINE

STOCKPILE

ACCESS ROAD

R3 ZONE

RU2 ZONE

BOUNDARY LINE

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PLAN SCALE 1:250 A1 SHEET

REVISION	AMENDMENT	DATE	REVISION	AMENDMENT	DATE
1	ISSUE FOR S4.56	03/11/23			

CLIENT: KUATRO

PROJECT: FOREST LODGE WARRIEWOOD

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TITLE: STORMWATER CATCHMENT PLAN - SHEET 2

SCALE	DRAWN	DESIGNED	CHECKED	APPROVED
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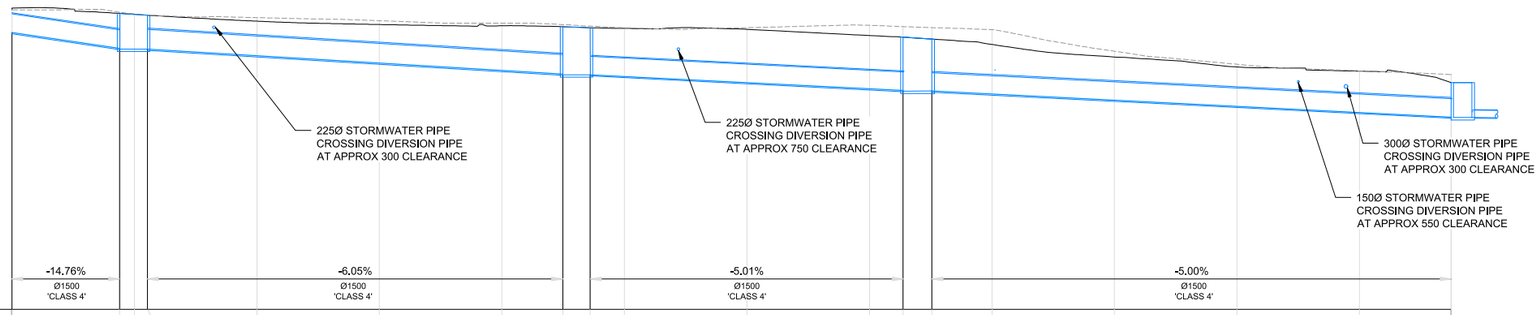
JOB No.	DRAWING No.	ISSUE
7368002	C6.22	1

DATE	STATUS
SEPTEMBER 2023	ISSUE FOR S4.56

Xrefs: X-7368003.SU - Existing Survey; X-7368003.SW-Catchment; X-7368003.SW-Layout; X-7368003.TB_AHI; X-7368004.AR - Site Plan RING ROAD, 7368002.WRCS-CES-MO-02 - Design Surface RING ROAD
Plot Date: 03/11/2023@16:28:40 Login Name: mayle Cad File: T:\7368002\Drawings\AutoCAD\Civil\Design\Civil 2D\S4.56\Stormwater Catchment Plan - Sheet 2.dwg



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INVERT LEVEL	27.600		26.300	26.274	26.250	25.710	25.105	24.500	24.200	24.150	24.010	23.509	23.007	22.870	22.820	22.575	22.075	21.575	21.074	20.700
DEPTH TO INVERT	1.891		2.859	2.808	2.760	2.815	3.148	3.650	3.865	3.840	3.928	4.353	4.349	4.360	4.247	4.052	3.535	3.202	3.370	2.815
CHAINAGE	0.000		8.807	10.000	11.060	20.000	30.000	40.000	44.970	47.215	50.000	60.000	70.000	72.741	75.097	80.000	90.000	100.000	110.000	117.486

UPSTREAM DIVERSION CULVERT DRAINAGE LONG SECTION

HORIZONTAL SCALE 1:250
VERTICAL SCALE 1:250

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5,0 0 2,5 5,0 7,5 10,0m
PLAN SCALE 1:250 A1 SHEET

0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

A1

REVISION	AMENDMENT	DATE	REVISION	AMENDMENT	DATE
1	ISSUE FOR S4.56	03/11/23			

CLIENT
KUATRO

PROJECT
FOREST LODGE
WARRIEWOOD

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TITLE
TRUNK DRAINAGE LONGITUDINAL SECTION

SCALE	DRAWN	DESIGNED	CHECKED	APPROVED
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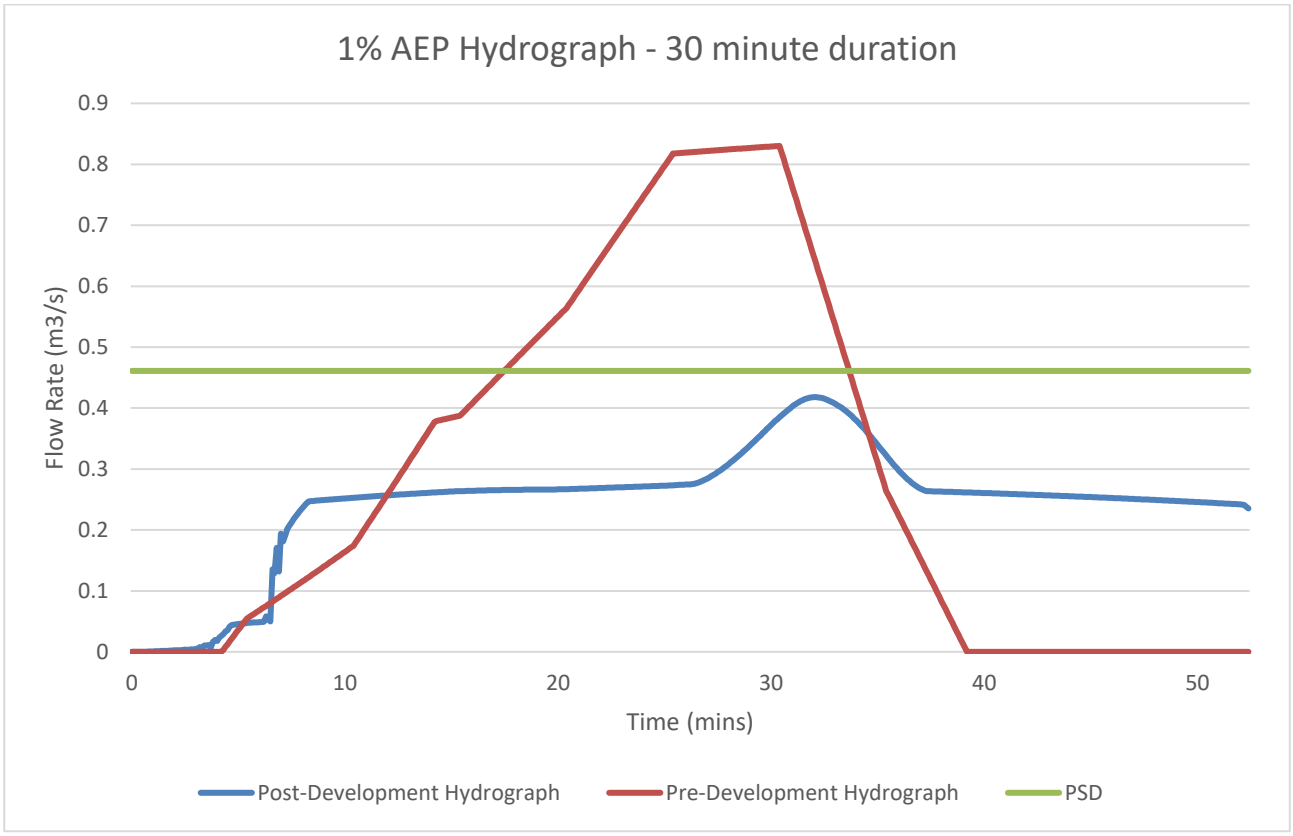
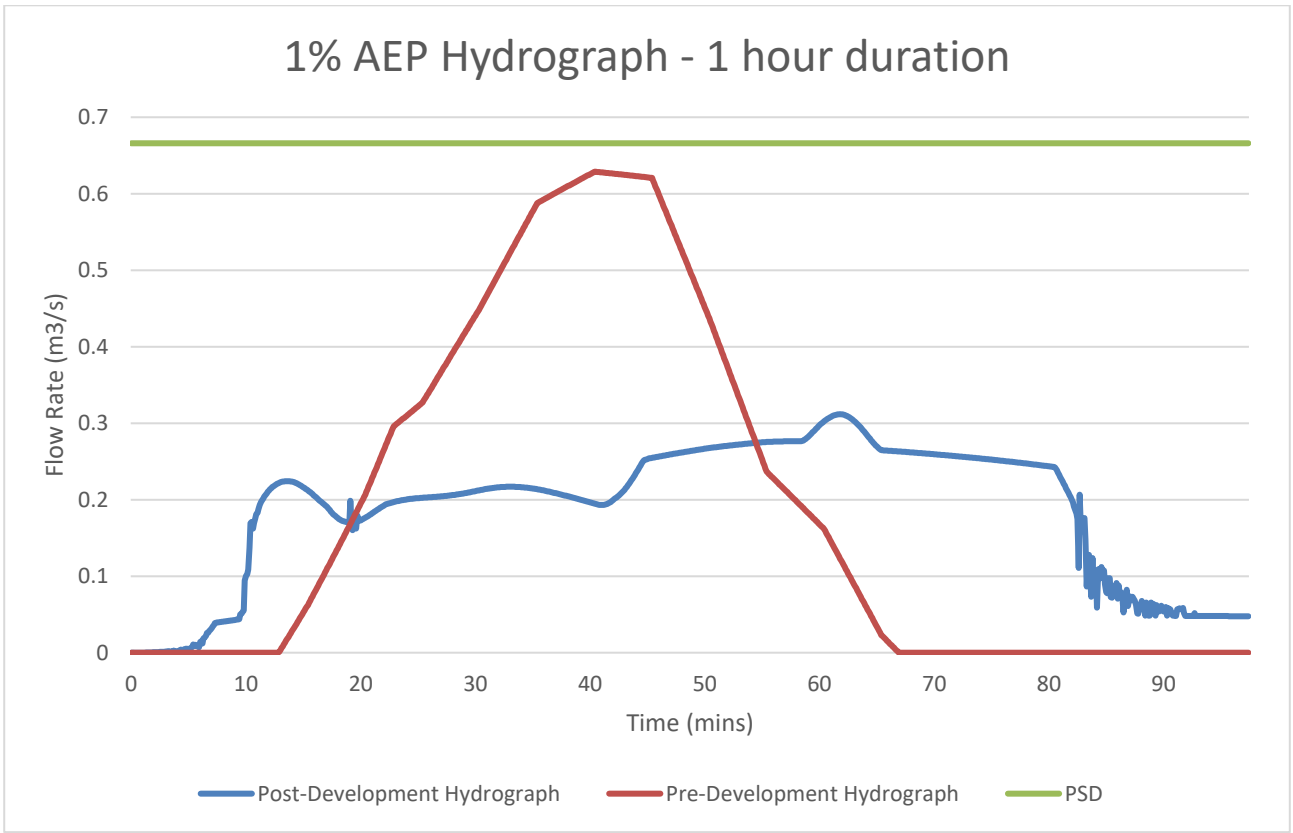
JOB No.	DRAWING No.	ISSUE
7368002	C6.41	1

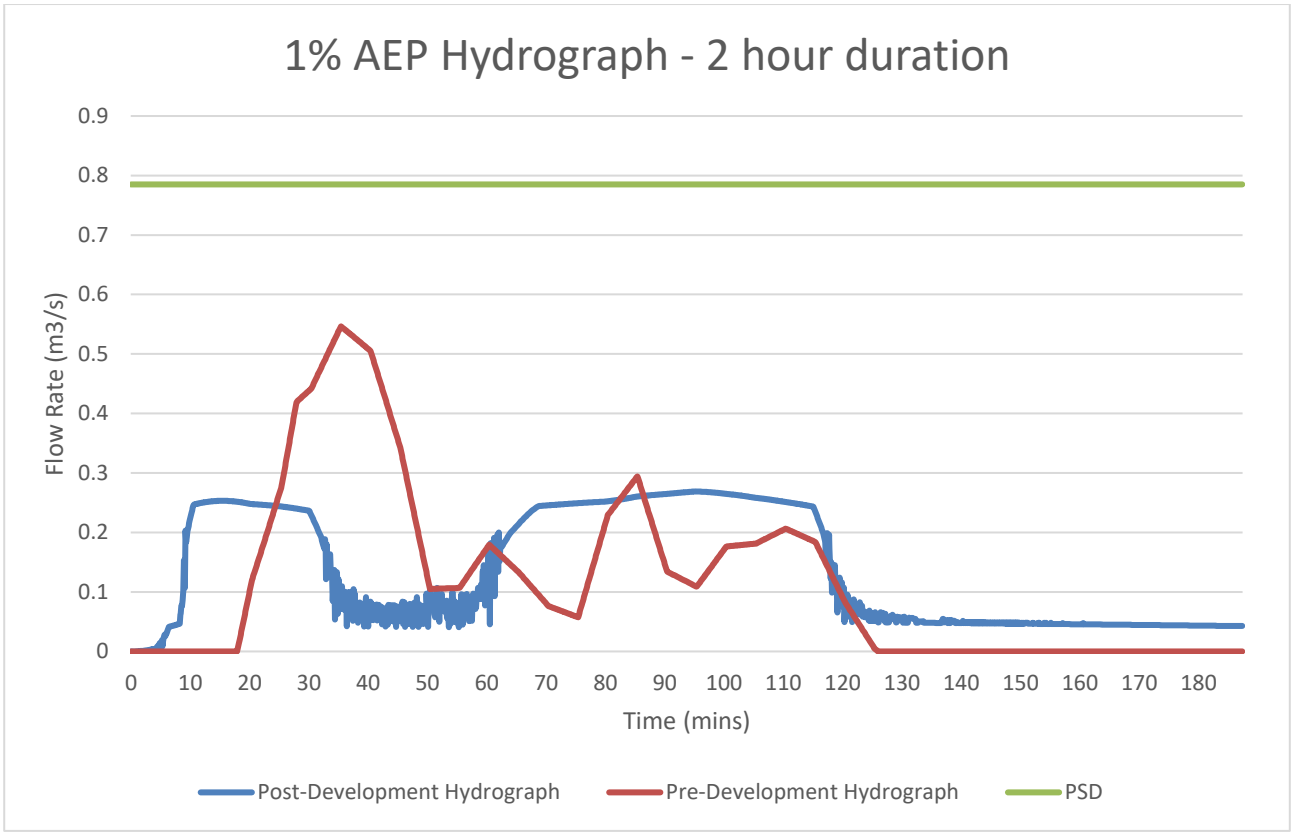
DATE	STATUS
SEPTEMBER 2023	ISSUE FOR S4.56

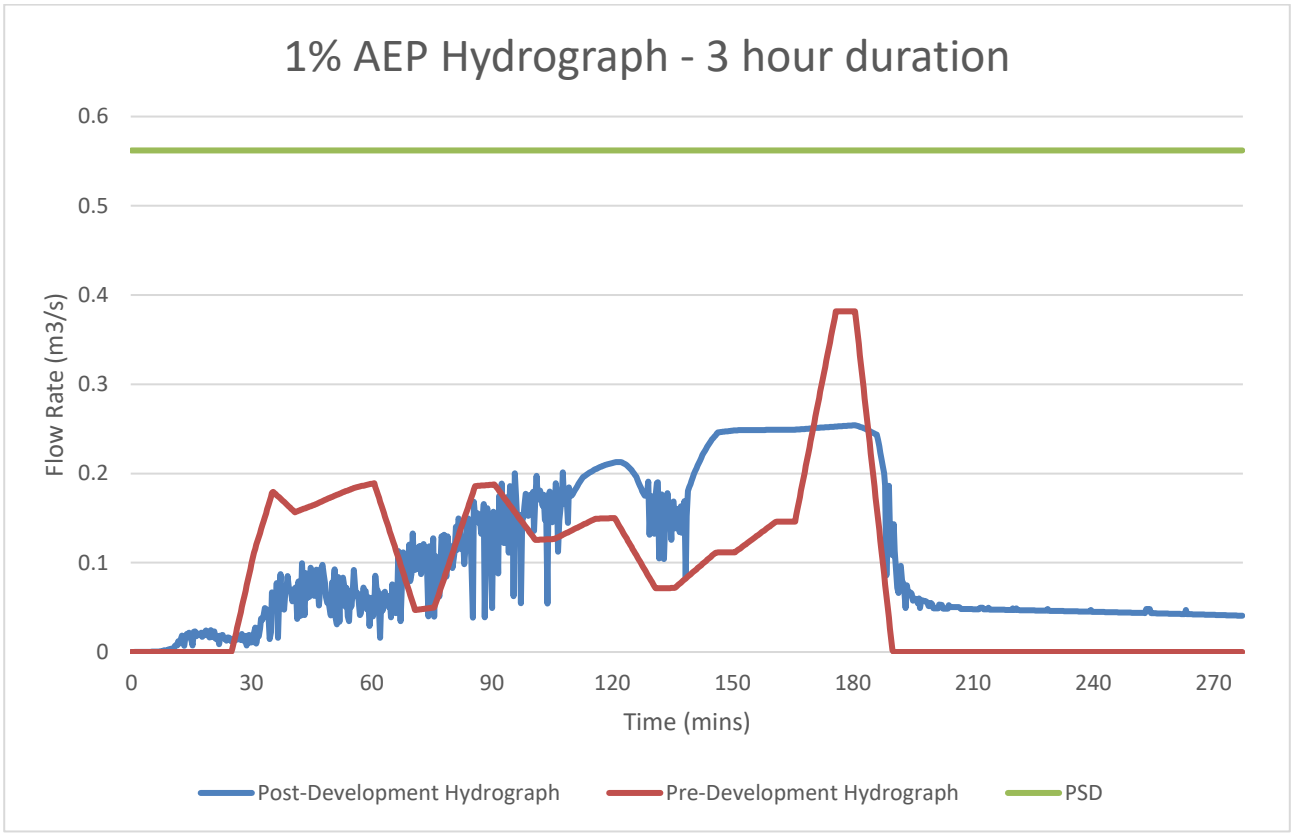
Xrefs: X:\7368000_TB_ATH_7368002-WSCE-CS-MOJO_-_Design_Surface RING ROAD
Plot Date: 03.11.2023@16:01:55 Login Name: stewart Cad File: T:\7368002\Drawings\AutoCAD\Civil\Design\Civil 2015\4-56\C6.11 Trunk Drainage Longitudinal Section.dwg

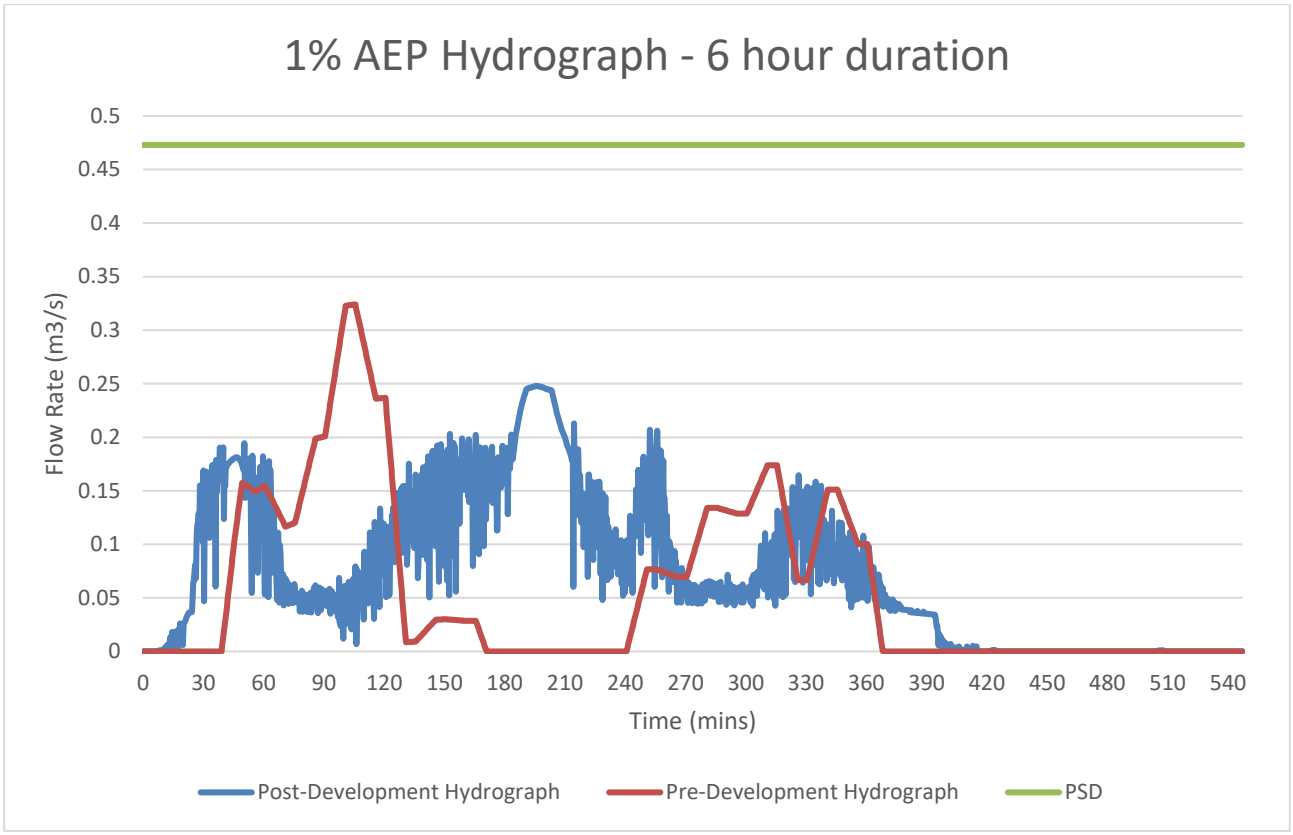
SCHEDULE 2 HYDROGRAPHS






1% AEP Hydrograph - 2 hour duration
Flow Rate (m3/s)
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180
Time (mins)
Post-Development Hydrograph
Pre-Development Hydrograph
PSD


1% AEP Hydrograph - 3 hour duration
Flow Rate (m3/s)
0.6
0.5
0.4
0.3
0.2
0.1
0
0 30 60 90 120 150 180 210 240 270
Time (mins)
Post-Development Hydrograph
Pre-Development Hydrograph
PSD


1% AEP Hydrograph - 6 hour duration
Flow Rate (m3/s)
0.5
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
0 30 60 90 120 150 180 210 240 270 300 330 360 390 420 450 480 510 540
Time (mins)
Post-Development Hydrograph
Pre-Development Hydrograph
PSD

SCHEDULE 3 MONITORING REQUIREMENTS AND ACCEPTANCE CRITERIA

Table C1 Summary of Monitoring Requirements

Media	State	Variable	Undeveloped*		Construction Phase**		Post-Construction Phase ***	
			Wet Weather	Dry Weather	Wet Weather	Dry Weather	Wet Weather	Dry Weather
Water	Physical	Visual	U/D/I	**U/D/I**	U/D/I/ESC	**U/D/I**	U/D/I/SQID	**U/D/I**
		Salinity	U/D	**U/D**	U/D	**U/D**	U/D	**U/D**
		pH (Field)	U/D	**U/D**	U/D	**U/D**	U/D	**U/D**
		Temperature (Field)	U/D	**U/D**	U/D	**U/D**	U/D	**U/D**
		Dissolved Oxygen (Field)	U/D	**U/D**	U/D	**U/D**	U/D	**U/D**
		Turbidity (Field)	U/D	**U/D**	U/D	**U/D**	U/D	**U/D**
		Suspended Solids	U/D/I	**U/D/I**	U/D/I/ESC	**U/D/I**	U/D/I/SQID	**U/D/I**
		Volume Gross Pollutants Removed	NA	NA	NA	**SQID**	NA	**SQID**
	Chemical	Total Nitrogen	U/D/I	**U/D/I**	U/D/I/ESC	**U/D/I**	U/D/I/SQID	**U/D/I**
		Ammonia-Nitrogen	U/D/I	**U/D/I**	U/D/I/ESC	**U/D/I**	U/D/I/SQID	**U/D/I**
		Total Kjeldahl Nitrogen	U/D/I	**U/D/I**	U/D/I/ESC	**U/D/I**	U/D/I/SQID	**U/D/I**
		Nitrates and Nitrites	U/D/I	**U/D/I**	U/D/I/ESC	**U/D/I**	U/D/I/SQID	**U/D/I**
		Total Phosphorous	U/D/I	**U/D/I**	U/D/I/ESC	**U/D/I**	U/D/I/SQID	**U/D/I**
		Ortho-Phosphate	U/D/I	**U/D/I**	U/D/I/ESC	**U/D/I**	U/D/I/SQID	**U/D/I**
		Non-Filterable Phosphorous	U/D/I	**U/D/I**	U/D/I/ESC	**U/D/I**	U/D/I/SQID	**U/D/I**
		Hardness ($CaCO_3$)	NA	**U/D**	NA	**U/D**	NA	**U/D**
		Chromium	NA	**U/D**	NA	**U/D**	NA	**U/D**
		Lead	NA	**U/D**	NA	**U/D**	NA	**U/D**
		Zinc	NA	**U/D**	NA	**U/D**	NA	**U/D**
		Arsenic	NA	**U/D**	NA	**U/D**	NA	**U/D**
		Mercury	NA	**U/D**	NA	**U/D**	NA	**U/D**
		Copper	NA	**U/D**	NA	**U/D**	NA	**U/D**
		Phenolic Compounds	NA	**U/D**	NA	**U/D**	NA	**U/D**
		OC/OP Pesticides	NA	**U/D**	NA	**U/D**	NA	**U/D**
		Oil & Grease (H.E.M)	NA	**U/D**	NA	**U/D**	NA	**U/D**
		PAH	NA	**U/D**	NA	**U/D**	NA	**U/D**
		Chlorophyll-a	NA	NA	NA	NA	NA	**U/D**
	Biological	Algal Identification and Count	NA	**U/D**	NA	**U/D**	NA	**U/D**
		Faecal Coliform Count	U/D/I	**U/D/I**	U/D/I	**U/D/I**	U/D/I/SQID	**U/D/I**
		Biotic Index (SIGNAL)	NA	**U/D**	NA	**U/D**	NA	**U/D**
Sediment	Chemical	Chromium	NA	**U/D**	NA	**U/D**	NA	**U/D**
		Lead	NA	**U/D**	NA	**U/D**	NA	**U/D**
		Zinc	NA	**U/D**	NA	**U/D**	NA	**U/D**
		Arsenic	NA	**U/D**	NA	**U/D**	NA	**U/D**
		Mercury	NA	**U/D**	NA	**U/D**	NA	**U/D**
		Copper	NA	**U/D**	NA	**U/D**	NA	**U/D**
		Phenolic Compounds	NA	**U/D**	NA	**U/D**	NA	**U/D**
		Organochlorine Pesticides	NA	**U/D**	NA	**U/D**	NA	**U/D**
		PAH	NA	**U/D**	NA	**U/D**	NA	**U/D**

***Up to Construction Certificate Issue**
****Immediately after site works commence and up to Subdivision Certificate Issue**
*****Immediately after Subdivision Certificate Issue and up to Handover**

Table C2 Summary of Acceptance Criteria - Site Discharge and Creeks

Media	State	Variable	Units	During Construction Site Discharges/Insector	Post Construction Site Discharges	Instream Short Term (Status Quo)	In-Stream Medium Term	In-Stream Long Term
Water	Physical	Visual	-	No litter	No litter	No litter	No litter	No litter
		Salinity (TDS)	mg/L	NA	NA	1000	1000	1000
		pH (Field)	-	NA	NA	6.6 - 8	6.6 - 8	6.6 - 8
		Temperature (Field)	°C	NA	NA	Status quo	Status quo	Status quo
		Dissolved Oxygen (Field)	%Sat	NA	NA	Status quo	90	90
		Turbidity (Field)	NTU	NA	NA	Status quo	50	20
		Suspended Solids	mg/L	100	50	Status quo	20	6
		Volume Gross Pollutants Removed	Tonne	NA	NA	NA	NA	NA
	Chemical	Total Nitrogen	mg/L	1.6	1.6	Status quo	1.6	1.0
		Ammonia-Nitrogen	mg/L	See Key	See Key	See Key	See Key	See Key
		Total Kjeldahl Nitrogen	mg/L	-	-	-	-	-
		Nitrates and Nitrites	mg/L	-	-	-	-	-
		Total Phosphorous	mg/L	0.1	0.05	Status quo	0.1	0.04
		Ortho-Phosphate	mg/L	-	-	-	-	-
		Non-Filterable Phosphorous	mg/L	-	-	-	-	-
		Hardness ($CaCO_3$)	mg/L	NA	NA	-	-	-
		Chromium	μg/L	NA	NA	Status quo	50% status quo	10
		Lead	μg/L	NA	NA	Status quo	50% status quo	1
		Zinc	μg/L	NA	NA	Status quo	50% status quo	50
		Arsenic	μg/L	NA	NA	Status quo	50% status quo	50
		Mercury	μg/L	NA	NA	Status quo	50% status quo	0.1
		Copper	μg/L	NA	NA	Status quo	50% status quo	2
		Phenolic Compounds	μg/L	NA	NA	Status quo	50% status quo	Note
		OC/OP Pesticides	ng/L	NA	NA	Status quo	50% status quo	Note
		Oil & Grease (H.E.M)	mg/L	NA	NA	50	20	5
		PAH	μg/L	NA	NA	Status quo	50% status quo	3
		Chlorophyll-a	mg/m^3	NA	NA	15	15	10
	Biological	Algal Identification and Count	-	NA	NA	Status quo	No algal bloom	No algal bloom
		Faecal Coliform Count	Cfu/ 100mL	150	150	1000	150	150
		Biotic Index (SIGNAL)	-	NA	NA	Status quo	> 5	> 6
Sediment	Chemical	Chromium	mg/kg	NA	NA	Status quo	50% status quo	80
		Lead	mg/kg	NA	NA	Status quo	50% status quo	50
		Zinc	mg/kg	NA	NA	Status quo	50% status quo	200
		Arsenic	mg/kg	NA	NA	Status quo	50% status quo	20
		Mercury	mg/kg	NA	NA	Status quo	50% status quo	0.15
		Copper	mg/kg	NA	NA	Status quo	50% status quo	65
		Phenolic Compounds	mg/kg	NA	NA	Status quo	50% status quo	Note
		Organochlorine Pesticides	mg/kg	NA	NA	Status quo	50% status quo	Note
		Total PAH	mg/kg	NA	NA	Status quo	50% status quo	4000

SCHEDULE 4 DOCUMENTATION CHECKLIST

DOCUMENTATION CHECKLIST - CONSTRUCTION CERTIFICATE

(Detach and include with submissions)

Section	Item	Requirement	Check (√)
4.1	Water Cycle Assessment - Water Balance Modelling Pre & Post Development		
4.1.1	Stream Gauging, infiltration testing and use of local rainfall data for modelling		
4.2.1	Water Quality Monitoring Plan	♦♦♦♦♦♦♦♦	
4.2.1	Water Quality Monitoring Sites Shown on Plan (at least three)	♦♦♦♦♦♦♦♦	
4.2.1, 2, C	Water Quality Monitoring Data	♦♦♦♦♦♦♦♦	
4.2.1, 2, C	Assessment and interpretation of water quality monitoring data	♦♦♦♦♦♦♦♦	
4.2.1, 2, C	Assessment and interpretation of water quality monitoring data from SQID's		
4.3	Water Quality Management Assessment - Load Modelling Pre and Post Development		
4.3.1, 3	Justification of assumptions for Event Mean Concentrations		
4.3.2	Identification of and details for Stormwater quality facilities	++++++++++	
4.3.2, 4.4.5	Mosquito Risk Assessment for both Watercourse and Water Quality/Quantity features	++++++++++	
4.3.6, 4.6.5	Inspection and Cleaning Reports for SQID's and OSD		
4.3.6	Management Plan for Stormwater Quality Improvement Devices	++++++++++	
4.3.5	Environmental Management Plan (Soil and Water Aspects)	++++++++++	
4.3.4	Erosion and Sediment Control Plan	++++++++++	
4.4.3, 4, 5	Existing and Proposed Creek Corridor in plan with cross/long sections with flood levels	+++Note 1+++	
4.4.4	Proposed Creek Corridor Planting Schedule	+++Note 1+++	
4.4.5	Creek Corridor Vegetation Monitoring and Management Plan	♦♦Note 1♦♦	
4.4.5	Vegetation and Creek Maintenance and Monitoring Reports		
4.5	Flood Analysis – existing design conditions	♦♦♦♦♦♦♦♦	
4.5.2	Compliance of structures and creek corridor with flood planning levels	++++++++++	
4.5.4	Details of Interim Flood Protection Works	++++++++++	
4.6.3	Design Storm Hydrological Modelling of Site - Pre and Post Development	♦♦♦♦♦♦♦♦	
4.6.3	On-Site Detention Facilities	++++++++++	
4.6.4	Stormwater Retention Facilities	++++++++++	
4.7	Stormwater Concept Drainage Plan		

KEY:

	Preliminary Calculations/Assessment Required		*Work as Executed Plans*
	Concept Design Required	♦♦♦♦♦♦	*Required/Reviewed/Updated*
+++++++	*Detailed Assessment/Calculations/Design*		*Not required*

Note 1 Even if the works are not to be constructed by the Applicant on the land to be transferred to Council under the Material Public Benefit Option in the Section 94 Plan, preliminary investigation for Rezoning and concept design at DA stage is required

Completed by Principal Certifier:

Name: ..... _____
Title: ..... _____
Organisation: ..... _____

Signature: ..... _____
Date: ..... _____