

Stormwater Management Report

Flower Power Terrey Hills

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1. Introduction

Northrop Consulting Engineers Pty Ltd have been engaged by Statewide Project Management Pty Ltd on behalf of Flower Power to prepare Civil Engineering Drawings for redevelopment works at 277 Mona Vale Road, Terrey Hills. This report will be lodged with Northern Beaches Council to support the Development Application.

1.1 Site Description and Proposed Works

The subject site is located within Terrey Hills, at 277 Mona Vale Road, and falls within the Northern Beaches Council Local Government Area (LGA). The proposed work will take place throughout the existing Flower Power complex in Terrey Hills. Refer to **Error! Reference source not found.** for site survey.

The site covers an area of approximately 28,289m² and falls from the northwestern side towards the southeastern side at a 4% slope. The construction zone is approximately 8,793 m². The site is bounded by the following roads:

- Mona Vale Road to the East.
- Cooyong Road to the North.
- Myoora Road to the West.



Figure 1: Site Aerial Image (Source: Nearmaps)

1.2 Project Description

The proposed development for Flower Power Terrey Hills consists of the retention of the existing flower power garden centre, nursery area, shade area, café, landscape shop, and some of the existing carpark area. The proposed works are a fruit shop, pet shop and additional carparking spaces. The architectural site plan is shown in Figure 2.

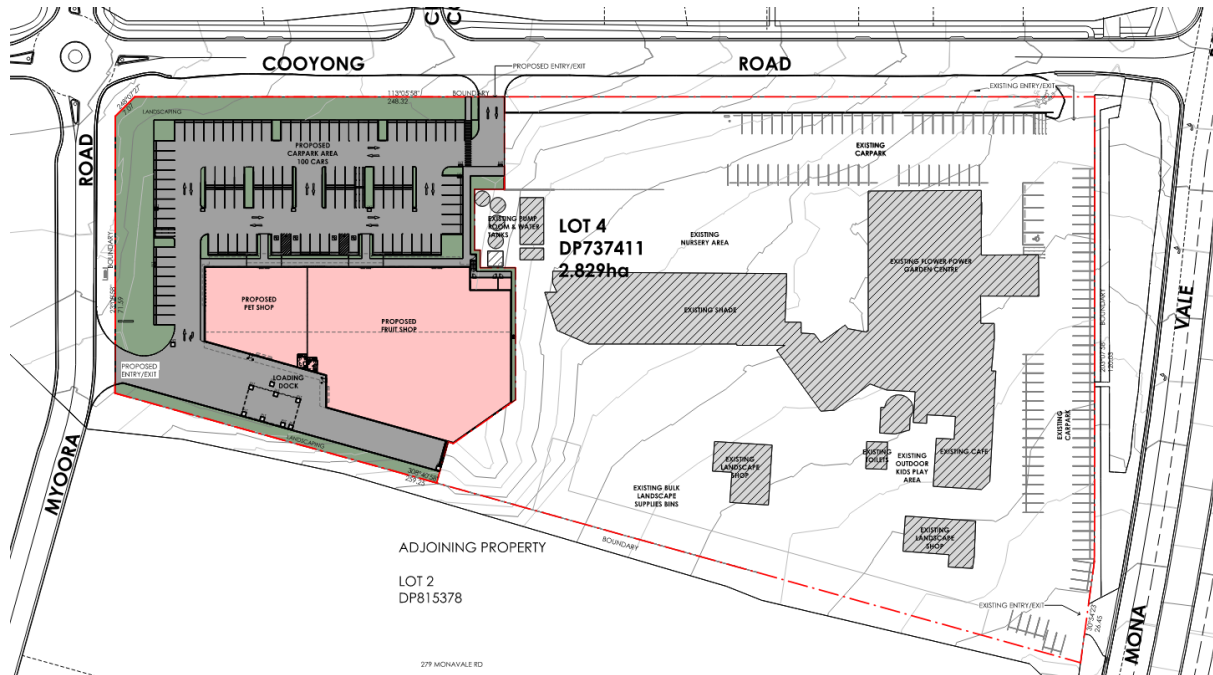


Figure 2: Architectural Site Plan (Leffler Simes Architects, DA14 REV A, issued 11/06/25)

2. Civil Engineering Design

2.1 Design Criteria & Methodology

The Civil Engineering design has considered a number of relevant documents and reports applicable to the proposed development. The objectives of this report are to ensure the proposed stormwater management of the site meets the requirements of the following documents:

- Northern Beaches Council Water Management for Development Policy (2021)
- Northern Beaches Council WSUD & MUSIC Modelling Guidelines (2016)
- Managing Urban Stormwater Soil & Construction (2004) by Landcom (The Blue Book)
- AS/NZS 3500.3:2018 (Plumbing and Drainage)

2.2 Sediment and Erosion Control

The objectives of the sediment and erosion control for the development site will be to ensure:

- Adequate sediment and erosion control measures are applied prior to the commencement of construction and are maintained throughout construction; and
- Construction site runoff is appropriately treated in accordance with the requirements of Northern Beaches Council, prior to discharge.

Prior to any earthworks commencing on site, the sediment and erosion control will need to be provided during the construction phase of the development in accordance with the requirements of Northern Beaches Council and The Blue Book.

SEDIMENT BASIN

Due to the size of the proposed development, a temporary sediment basin will be required to capture site runoff during construction. The construction of the basin may be undertaken in stages to enable maximum runoff capture assisted by diversion swales and direct runoff to the basin. The design parameters of this temporary sediment basin are summarised in Table 1.

Calculations to determine the required basin size are to be based on available geotechnical information regarding soil types and using The Blue Book.

To ensure the sediment basin is working effectively it will need to be maintained throughout the construction works. Maintenance includes ensuring adequate settlement times or flocculation and pumping of clean water to reach the minimum storage volume at the lower level of the settling zone. The settling zone will be identified by pegs to clearly show the level at which design storage capacity is available.

The pumped water from the sediment basin can be reused for dust control during construction.

Overflow weirs are to be provided to control overflows for rainfall events more than the design criteria.

Table 1: Sediment Basin Sizing Values

Parameter	Adopted value
Total disturbed area (ha)	0.88
Soil Texture Group	D or F
Design rainfall depth (days)	5
Design rainfall depth (percentile)	80
x-day, y-percentile rainfall event	35.2
Cv	0.42
Settling zone volume (m ³)	130.1
Sediment storage volume (m ³)	65.0
Total basin volume required (m ³)	195.149

SEDIMENT AND EROSION CONTROL MEASURES

Prior to any earthworks commencing on site, sediment and erosion control measure shall be implemented generally in accordance with the engineering drawings, Council requirements, and The Blue Book. The measures are intended to be a minimum treatment only as the contractor will be required to modify and stage the sediment and erosion control measures to suit the construction program, sequencing, and techniques. These measures may include:

- A temporary site security/safety fence is to be constructed around the site, the site office area, and the proposed sediment basin.
- Sediment fencing provided downstream of disturbed areas, including any topsoil stockpiles.
- Dust control measures including covering stockpiles, installing fence hessian, and watering exposed areas.
- Placement of hay bales or mesh and gravel inlet filters around and along proposed catch drains and around stormwater inlets pits
- The construction of a temporary sediment basin as noted above.
- Stabilised site access at the construction vehicle entry/exits.
- Any stockpiled material, including topsoil, shall be located as far away as possible from any associated natural watercourses or temporary overland flow paths. All stockpiles and embankment formations shall be stabilised by hydroseeding or hydro mulching on formation.

2.3 Stormwater Infrastructure and Modelling

The objectives of this investigation include:

- Management of 'minor' and 'major' flows using piped systems and overland flow paths such that the piped system flow is less than the 20% AEP pre-development runoff scenario.
- OSD design as per the Northern Beaches Water Management for Development Policy.

The proposed stormwater system was modelled using DRAINS. The following parameters were adopted:

- Major Storm = 1% AEP
- Minor Storms = 5% AEP & 20% AEP
- Soil Type - 2.5
- Paved (Impervious) Area Depression Storage - 1mm
- Supplementary Area Depression Storage - 1mm
- Grassed (Pervious) Area Depression Storage - 5mm
- Sag pit Blocking Factor - 0.5
- On Grade Pit Blocking Factor - 0.2

The DRAINS Model Layout is shown below. The DRAINS model can be provided for assessment upon request.

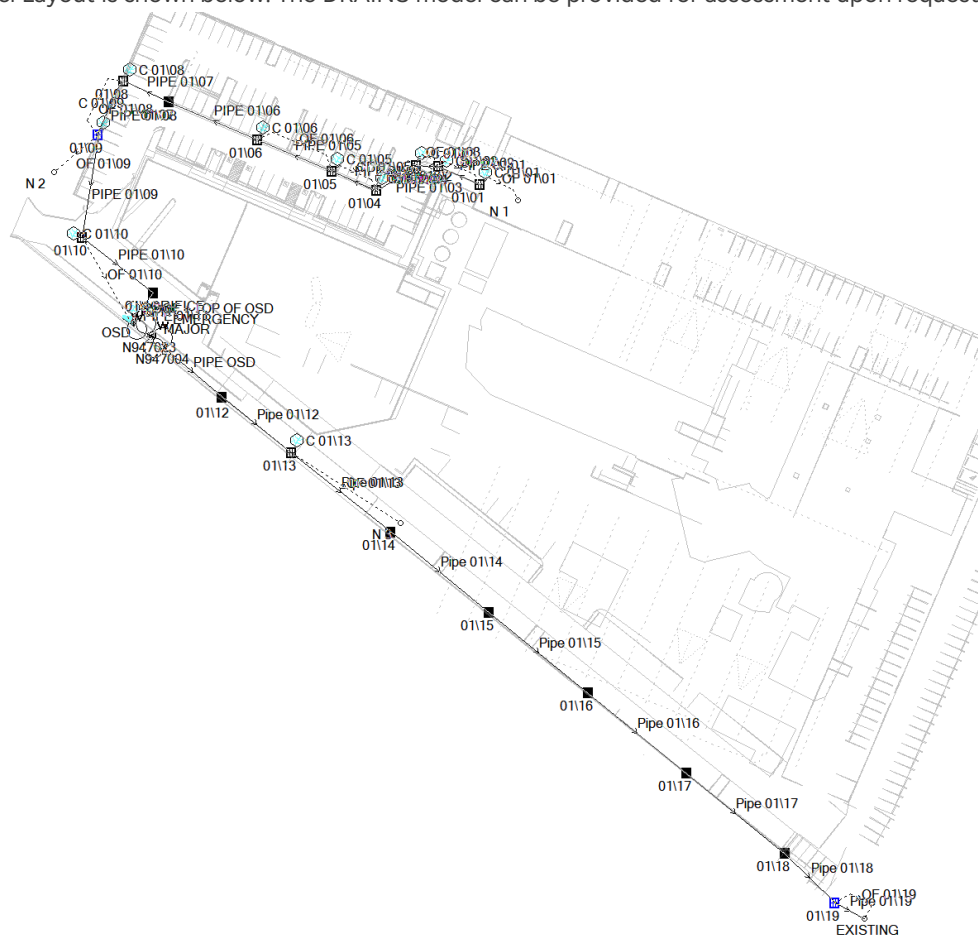


Figure 3: DRAINS Model Layout

2.4 On-Site Stormwater Detention

OSD REQUIREMENTS

On-site Stormwater Detention (OSD) has been provided for the site. According to the Northern Beaches Water Management for Development Policy, the proposed on-site detention tank should be designed in accordance with the following control standards:

- For all developments, the runoff from the site after development is not to exceed the runoff from the total site prior to the development for all storm durations for the 20% AEP, 5% AEP and a 1% AEP storm event.
- For all developments except single residential dwelling developments the PSD is to be calculated on the maximum allowable impervious fraction of 0%. That is, discharge off the site is to be restricted to the “state of nature” condition.

The PSD and post development discharges were calculated using DRAINS and can be seen in the below table.

Table 2: Site Discharge

Storm Event	Permissible Site Discharge (PSD)	Post-Development Discharge
20% AEP	0.159 m ³ /s	0.143 m ³ /s
5% AEP	0.281 m ³ /s	0.270 m ³ /s
1% AEP	0.447 m ³ /s	0.443 m ³ /s

OSD DESIGN

The tank has been designed to store and attenuate the peak discharge from the site in smaller events (20% and 5% AEP) and in larger events (1% AEP). Two weirs have been introduced, one to control the major event and one for an emergency. The 1% AEP weir orifice is 250mm and the emergency weir orifice is 370mm. The outflow pipe will enter the legal point of discharge located at the southeastern driveway. The assumed tailwater levels at the point of connection are:

- RL 194.140m for 1% AEP (top of kerb)
- RL 194.013m for 5% and 20% AEP (top of grate)

The key OSD design parameters are presented in Table 3.

Table 3: Summary of OSD Design Parameters

Item	Design Parameters
Effective OSD Volume	107 m ³
1% AEP Top Water Level	202.14m
Footprint Required	60m ²

2.5 Stormwater Overland Flow

According to Section 9.3.2.6 from Northern Beaches Council Water Management for Development Policy, "The total piped flow from the site to a Council drainage pipeline must not exceed the maximum 20% AEP pre-development runoff. The total piped and overland flows from the site must not exceed the 1% AEP pre-development discharge".

The pipe connection council's stormwater system has been designed to limit the piped discharge to be less than the 20% AEP pre-development runoff. The 20% AEP pre-development runoff was calculated to be **0.083m³/s**.

Total post-development pipe flows were modelled and compared with the maximum pipe flow allowed due to the 20% AEP pre-development runoff, the piped flow for the 1% AEP is **0.094 m³/s**.

The surface flow paths have been designed for the 1% AEP storm event so that the velocity and depth ratio ($v \times d$) is less than 0.4m²/s.

SAG PIT AND WEIR WALL

The pit at the south-eastern corner of the site will be a raised sag pit and will be accompanied by a 5.2m long upstanding weir wall along the eastern boundary of site. Once the ponding level of the sag pit exceeds the weir wall height the stormwater will sheet flow to Mona Vale Road's kerb and gutter system. The flow over this weir wall is 0.139m³/s with the $v \times d$ ratio of 0.03m²/s in the 1% AEP storm event.

2.6 Stormwater Quality

STORMWATER QUALITY REQUIREMENTS

According to the Northern Beaches Council WSUD & MUSIC Modelling Guidelines, the Stormwater Quality treatment target reduction removal rates are:

- 90% reduction in the post development mean annual load of Total gross pollutant load (>5mm).
- 85% reduction in the post development mean annual load of Total Suspended Solids (TSS).
- 65% reduction in the post development mean annual load of Total Phosphorus (TP).
- 45% reduction in the post development mean annual load of Total Nitrogen (TN).

PROPOSED STORMWATER QUALITY TREATMENT SYSTEM

The stormwater pollutant load reduction and water conservation objectives will be met by the use of a rainwater tank and stormwater treatment devices such as filters and pit baskets.

MODELLING OF STORMWATER QUALITY

Stormwater treatment was modelled using Modelling Urban Stormwater Improvement Conceptualisation (MUSIC) software v 6.3.0 for both water quality and quantity. The first MUSIC model uses the Sydney Observatory 6-minute rainfall data from the period of 1981-1985 to analyse the water quality treatment performance of the site. Whilst the second MUSIC model uses Sydney Observatory daily rainfall data from the period of 1925-1974 to accurately analyse the water quantity for the rainwater tank as per Northern Beaches Council WSUD & MUSIC Modelling Guidelines (2016).

The stormwater quality treatment parameters are included below:

- 12 x Ocean Guard Pit Inserts
- 1 x Rainwater Tank (15kL)
- 1 x StormFilter Chamber (4.0m²)
- 10 x P_{Sorb} StormFilters (690mm)

MUSIC Model Layout and pollutant removal performance is shown below.

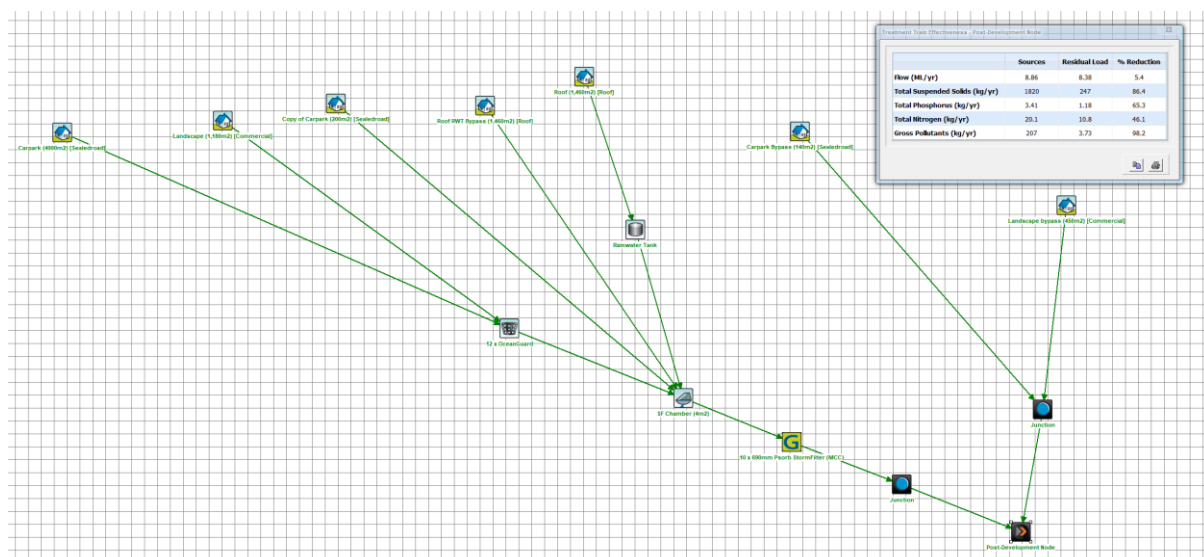


Figure 4: MUSIC Water Quality Model

Table 5: MUSIC Model Results

Item	Target Reduction Removal Rate (%)	% Reduction
Total Suspended Solids	85	86.4
Total Phosphorus	65	65.3
Total Nitrogen	45	46.1
Gross Pollutants	90	98.2

As shown in the table above, the stormwater treatment targets appropriate for the site will be met by the treatment measures provided. The pollutant removal performance as calculated by MUSIC modelling meets the Northern Beaches Council targets.

2.7 Water Conservation

WATER CONSERVATION REQUIREMENTS

A rainwater tank has been proposed to supply the demand of toilet flushing and landscape irrigation (external to the nursery). It has been assumed that at least 50% of the new retail buildings will be connected to the rainwater tank (1,455m²).

With reference to the Architectural drawings, there are 8 toilets in the building and 1626m² of landscaping. Assuming the rates of 0.1 kL/day/toilet and 0.4 kL/year/m² the daily and annual demand adopted in MUSIC are 0.8 kL/day and 650 kL/year, respectively.

RAINWATER TANK SPECIFICATION

A 15kL rainwater tank achieves a reuse demand met value of 47.69% for toilet flushing and irrigation purposes for the landscaped areas. See Figure 6 for the node water balance of the proposed rainwater tank.

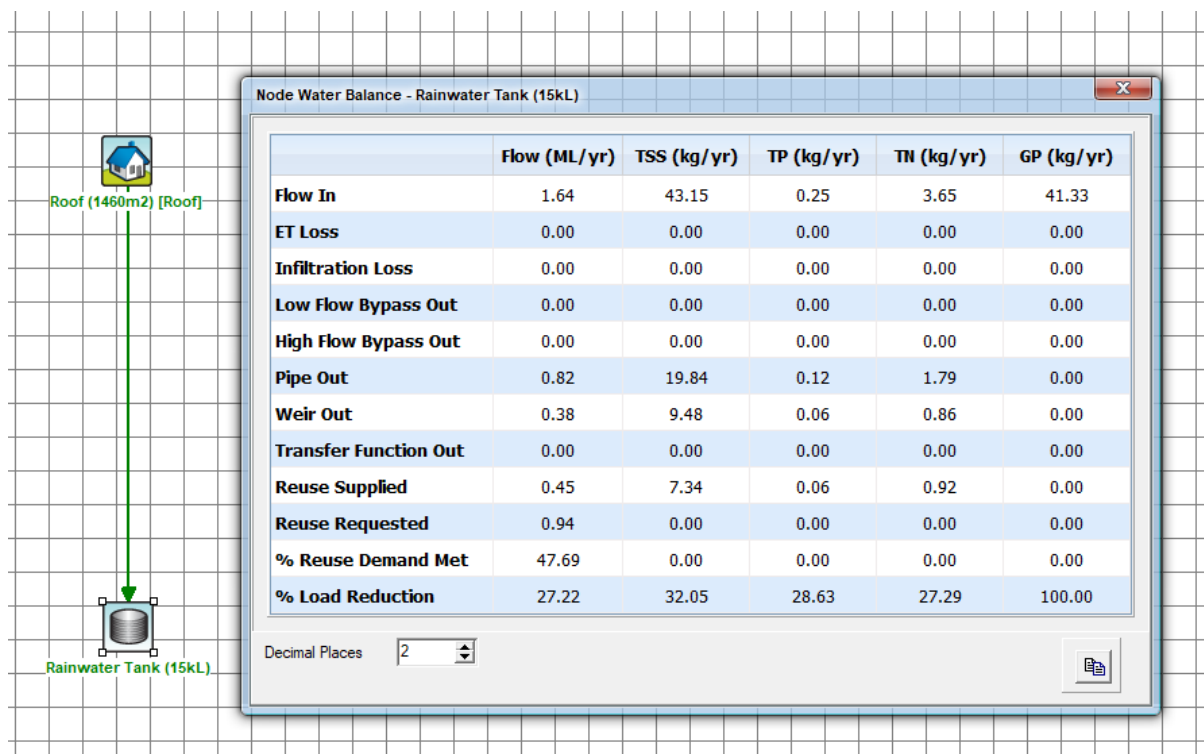


Figure 6: MUSIC Water Quantity Model

4. Conclusion

In summary, the civil engineering requirements for the proposed development are as follows:

- Sediment & Erosion Control – A sediment basin is required to effectively capture sediment laden site runoff during siteworks. Sediment and erosion control measures should be installed and maintained for the duration of the construction works.
- Stormwater Infrastructure – The stormwater design has considered the below ground drainage network and overflow paths consistent with the requirements of Northern Beaches Council inclusive of on-site stormwater detention.
- Water Quality and Conservation – Water quality requirements will be achieved through the provision of pit baskets and filter cartridges, in accordance with the requirements of Northern Beaches Council. A rainwater tank has been designed to reduce non-potable water demand and two irrigation tanks have also been specified for irrigation purposes.

Appendix A – Survey

Appendix B – Civil Engineering Drawings

FLOWER POWER

CIVIL ENGINEERING PACKAGE / DEVELOPMENT APPLICATION

277 MONA VALE ROAD
TERREY HILLS
NSW 2084



LOCALITY PLAN

SOURCE : NEARMAPS.COM.AU (@2023)

DRAWING LIST

DAC01.01	COVER SHEET, DRAWING SCHEDULE AND LOCALITY PLAN
DAC01.11	SPECIFICATION NOTES
DAC01.21	GENERAL ARRANGEMENT PLAN
DAC02.01	SEDIMENT AND SOIL EROSION CONTROL PLAN
DAC02.11	SEDIMENT AND SOIL EROSION CONTROL DETAILS
DAC03.01	BULK EARTHWORKS CUT AND FILL PLAN
DAC04.01	SITEWORKS AND STORMWATER MANAGEMENT PLAN - SHEET 01
DAC04.02	SITEWORKS AND STORMWATER MANAGEMENT PLAN - SHEET 02
DAC06.01	STORMWATER MANAGEMENT DETAILS - SHEET 01
DAC06.02	STORMWATER MANAGEMENT DETAILS - SHEET 02
DAC06.03	STORMWATER MANAGEMENT DETAILS - SHEET 03

NOT FOR CONSTRUCTION

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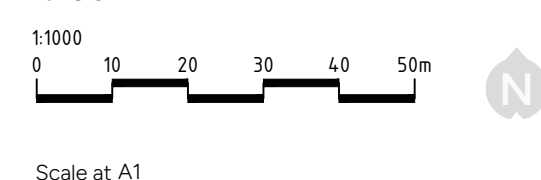
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T.BUGAEV



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REV.	DESCRIPTION	ISSUED	DATE
2	ISSUED FOR DEVELOPMENT APPLICATION	MM	23.06.25
1	ISSUED FOR INFORMATION	AS	29.05.25

PROJECT
FLOWER POWER

ADDRESS
277 MONA VALE ROAD,
TERREY HILLS
NSW 2084

DRAWING
**COVER SHEET, DRAWING SCHEDULE
AND LOCALITY PLAN**

JOB No.
SY211979
DRAWING No.
DAC01.01

REV.
2

Drawing Location: C:\S\Pre-July 24 Projects\Sydney\2021 jobs\211979 05 - Flower Power - Terrey Hills New DA\Civil Drawings\A Working\02-DA-02\SY211979-DAC011
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GENERAL NOTES

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

ALL DIMENSIONS ARE IN MILLIMETRES & ALL LEVELS ARE IN METRES, UNO (UNLESS NOTED OTHERWISE).

NO DIMENSION SHALL BE OBTAINED BY SCALING THE DRAWINGS.

ALL LEVELS AND SETTING OUT DIMENSIONS SHOWN ON THE DRAWINGS SHALL BE CHECKED ON SITE PRIOR TO THE COMMENCEMENT OF THE WORK.

DETAIL SURVEY DATA WAS SUPPLIED BY: BOXALL SURVEYORS
REF. NUMBER: 10115-002
REVISION DATE: 06.09.2024
REVISION NUMBER: J
GEOCENTRIC DATUM OF AUSTRALIA: GDA94
SURVEYOR: BC
APPROVED: SL

EXISTING SERVICES WHERE SHOWN HAVE BEEN PLOTTED FROM SUPPLIED DATA AND SUCH THEIR ACCURACY CAN NOT BE GUARANTEED. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO ESTABLISH THE LEVEL OF ALL EXISTING SERVICES PRIOR TO THE COMMENCEMENT OF WORK.

ON COMPLETION OF STORMWATER INSTALLATION, ALL DISTURBED AREAS MUST BE RESTORED TO ORIGINAL CONDITION, INCLUDING KERBS, FOOTPATHS, CONCRETE AREAS, GRAVEL AND GRASSED AREAS AND ROAD PAVEMENTS, UNLESS DIRECTED OTHERWISE.

ALL STORMWATER MANAGEMENT MEASURES SHOWN ON THIS DRAWING HAVE BEEN PREPARED FOR DEVELOPMENT APPLICATION PURPOSES TO DEMONSTRATE FEASIBILITY. ALL MEASURES WILL BE SUBJECT TO DETAIL DESIGN AT THE CONSTRUCTION CERTIFICATE STAGE AND MAY BE SUBJECT TO VARIATION PROVIDED THAT THE DESIGN INTENT IS MAINTAINED.

STORMWATER DRAINAGE

- ALL DRAINAGE LINES SHALL BE UPVC (CLASS SN4) SEWER GRADE DRAINAGE PIPE, U.N.O.
- ALL DRAINAGE LINES SHALL BE LAID AT 1% MIN. FALL, UNO.
- ALL LEVELS ARE AUSTRALIAN HEIGHT DATUM (AHD).
- ALL DOWNPIPES GUTTERS TO BE DESIGNED IN ACCORDANCE WITH AS/NZS 3500.3.2 - 2003 'STORMWATER' DRAINAGE.
- THE STORMWATER DRAINAGE DESIGN HAS BEEN CARRIED OUT IN ACCORDANCE WITH AS/NZS 3500.3.2-2003 'STORMWATER' DRAINAGE.
- ANY VARIATIONS TO THE NOMINATED LEVELS SHALL BE REFERRED TO ENGINEER IMMEDIATELY.
- SUBSOIL DRAINAGE SHALL BE PROVIDED TO ALL RETAINING WALLS & EMBANKMENTS, WITH THE LINES FEEDING INTO THE STORMWATER DRAINAGE SYSTEM.
- ALL GRATES TO BE GALVANISED STEEL WITH HINGES AND CHILD PROOF LOCK.
- THE STORMWATER DRAINAGE IS DESIGNED IN ACCORDANCE WITH NORTHERN BEACHES COUNCIL WATER MANAGEMENT FOR DEVELOPMENT POLICY 2021.

RAINWATER RE-USE

- PROVIDE RAINWATER RE-USE SYSTEM TO SUPPLY WATER FOR TOILET FLUSHING.
- GUTTER GUARD TO BE INSTALLED ON ALL EAVES GUTTERS.
- A PERMANENT SIGN IS TO BE LOCATED IN THE VICINITY OF THE TANK STATING THE WATER IS "NON POTABLE WATER" WITH APPROPRIATE HAZARD IDENTIFICATION.
- PIPEWORK USED FOR RAINWATER SERVICES SHALL BE COLOURED LILAC IN ACCORDANCE WITH AS1345.
- ALL VALVES AND APERTURES SHALL BE CLEARLY AND PERMANENTLY LABELLED WITH SAFETY SIGNS TO COMPLY WITH AS1319.
- RAINWATER TANK RETICULATION SYSTEM AND MAINS WATER BYPASS ARRANGEMENT TO BE INSTALLED IN ACCORDANCE WITH AS/NZS 3500.1.2-2003 AND THE NSW CODE OF PRACTICE : PLUMBING AND DRAINING.
- A FIRST FLUSH FILTRATION DEVICE IS TO BE PROVIDED AT RAINWATER TANK.

DESIGN SUMMARY

SITE DISCHARGE CALCULATIONS:

	20% AEP	5% AEP	1% AEP
PRE-DEVELOPMENT	0.159 m³/s	0.281 m³/s	0.447 m³/s
POST-DEVELOPMENT	0.143 m³/s	0.270 m³/s	0.443 m³/s

ON-SITE DETENTION:

DESIGN BASIS:

- PRE TO POST DEVELOPMENT CONDITIONS

ON-SITE DETENTION SUMMARY:

- BELOW GROUND BLOCK WORK TANK

RAINWATER RE-USE:

IN ACCORDANCE WITH BASIX/COUNCIL REQUIREMENTS.
RAINWATER RE-USE STORAGE PROVIDED IS TO BE DESIGNED.

RAINWATER RE-USE TO BE USED FOR THE FOLLOWING;

- TOILET FLUSHING;
- IRRIGATION;

STORMWATER MANAGEMENT REQUIREMENTS HAVE BEEN CALCULATED IN ACCORDANCE WITH NORTHERN BEACHES COUNCIL WATER MANAGEMENT PLAN FOR DEVELOPMENT POLICY 2021: PART 9.0 ONSITE STORMWATER MANAGEMENT.

TREATMENT NOTES:

- RAINWATER RE-USE TANK
- 'OCEANGUARD' PIT INSERTS (OR SIMILAR)
- FILTER CARTRIDGES

MUSIC MODEL PARAMETERS IN ACCORDANCE WITH NORTHERN BEACHES COUNCIL'S WSUD AND MUSIC MODELLING GUIDELINES 2016.

TREATMENT STANDARDS:

POLLUTANT	REDUCTION STANDARDS	REDUCTION ACHIEVED
GROSS POLLUTANTS	90%	98.2%
TOTAL SUSPENDED SOLIDS	85%	86.4%
TOTAL PHOSPHORUS	65%	65.3%
TOTAL NITROGEN	45%	46.1%

CONCEPT SOIL & WATER MANAGEMENT

- ALL WORK IS TO BE CARRIED OUT IN ACCORDANCE WITH RELEVANT ORDINANCES AND REGULATIONS; NOTE IN PARTICULAR THE REQUIREMENTS OF LANDCOMS MANAGING URBAN STORMWATER, SOILS AND CONSTRUCTION' (THE 'BLUE BOOK'). THIS SOIL AND WATER MANAGEMENT PLAN DETAILS THE ACTIONS TO BE TAKEN FOR THE MANAGEMENT AND DEWATERING OF STORMWATER DURING CONSTRUCTION OF THE PROPOSED BUILDING.
- INSTALL SEDIMENT PROTECTION FILTERS ON ALL NEW AND EXISTING STORMWATER INLET PITS IN ACCORDANCE WITH EITHER THE MESH AND GRAVEL INLET FILTER DETAIL SD6-11 OR THE GEOTEXTILE INLET FILTER DETAIL SD6-12 OF THE 'BLUE BOOK'.
- ESTABLISH ALL REQUIRED SEDIMENT FENCES IN ACCORDANCE WITH DETAIL SD6-8 OF THE 'BLUE BOOK'.
- INSTALL SEDIMENT FENCING AROUND INDIVIDUAL BUILDING ZONES/AREAS AS REQUIRED AND AS DIRECTED BY THE SUPERINTENDENT.
- ALL TRENCHES INCLUDING ALL SERVICE TRENCHES AND SWALE EXCAVATION SHALL BE SIDE-CAST TO THE HIGH SIDE AND CLOSED AT THE END OF EACH DAYS WORK.
- THE CONTRACTOR SHALL ENSURE THAT ALL VEGETATION (TREE, SHRUB & GROUND COVER) WHICH IS TO BE RETAINED SHALL BE PROTECTED DURING THE DURATION OF CONSTRUCTION. REFER ARCHITECTS PLANS FOR TREES TO BE KEPT.
- ALL VEGETATION TO BE REMOVED SHALL BE MULCHED ONSITE AND SPREAD/STOCKPILED AS DIRECTED BY THE SUPERINTENDENT.
- STRIP TOPSOIL IN AREAS DESIGNATED FOR STRIPPING AND STOCKPILE FOR RE-USE AS REQUIRED. ANY SURPLUS MATERIAL SHALL BE REMOVED FROM SITE AND DISPOSED OF IN ACCORDANCE WITH EPA GUIDELINES.
- CONSTRUCT AND MAINTAIN ALL MATERIAL STOCKPILES IN ACCORDANCE WITH DETAIL SD4-1 OF THE 'BLUE BOOK' (INCLUDING CUT-OFF SWALES TO THE HIGH SIDE AND SEDIMENT FENCES TO THE LOW SIDE).
- ENSURE STOCKPILES DO NOT EXCEED 2.0m HIGH. PROVIDE WIND AND RAIN EROSION PROTECTION AS REQUIRED IN ACCORDANCE WITH THE 'BLUE BOOK'.
- PROVIDE WATER TRUCKS OR SPRINKLER DEVICES DURING CONSTRUCTION AS REQUIRED TO SUPPRESS DUST.
- ONCE CUT/FILL OPERATIONS HAVE BEEN FINALIZED ALL DISTURBED AREAS THAT ARE NOT BEING WORKED ON SHALL BE RE-VEGETATED AS SOON AS IS PRACTICAL.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR KEEPING A DETAILED WRITTEN RECORD OF ALL EROSION & SEDIMENT CONTROLS ON-SITE DURING THE CONSTRUCTION PERIOD. THIS RECORD SHALL BE UPDATED ON A DAILY BASIS & SHALL CONTAIN DETAILS ON THE CONDITION OF CONTROLS AND ANY/ ALL MAINTENANCE, CLEANING & BREACHES. THIS RECORD SHALL BE KEPT ON-SITE AT ALL TIMES AND SHALL BE MADE AVAILABLE FOR INSPECTION BY THE PRINCIPAL CERTIFYING AUTHORITY AND THE SUPERINTENDENT DURING NORMAL WORKING HOURS.
- GROUNDWATER SEEPAGE RATES AND QUALITY TO BE MONITORED AND TREATED IF REQUIRED DURING CONSTRUCTION IN ACCORDANCE WITH REQUIREMENTS OF SUPERVISING GEOTECHNICAL ENGINEER.

NOT FOR CONSTRUCTION



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ISSUED

DATE

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ADDRESS

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NSW 2084

DRAWING

SPECIFICATION NOTES

JOB No.

SY211979

DRAWING No.

DAC01.11

REV.

2

Scale at

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LEGEND

SITE BOUNDARY LINE

ADJACENT BOUNDARY LINE

BUILDING FOOTPRINT

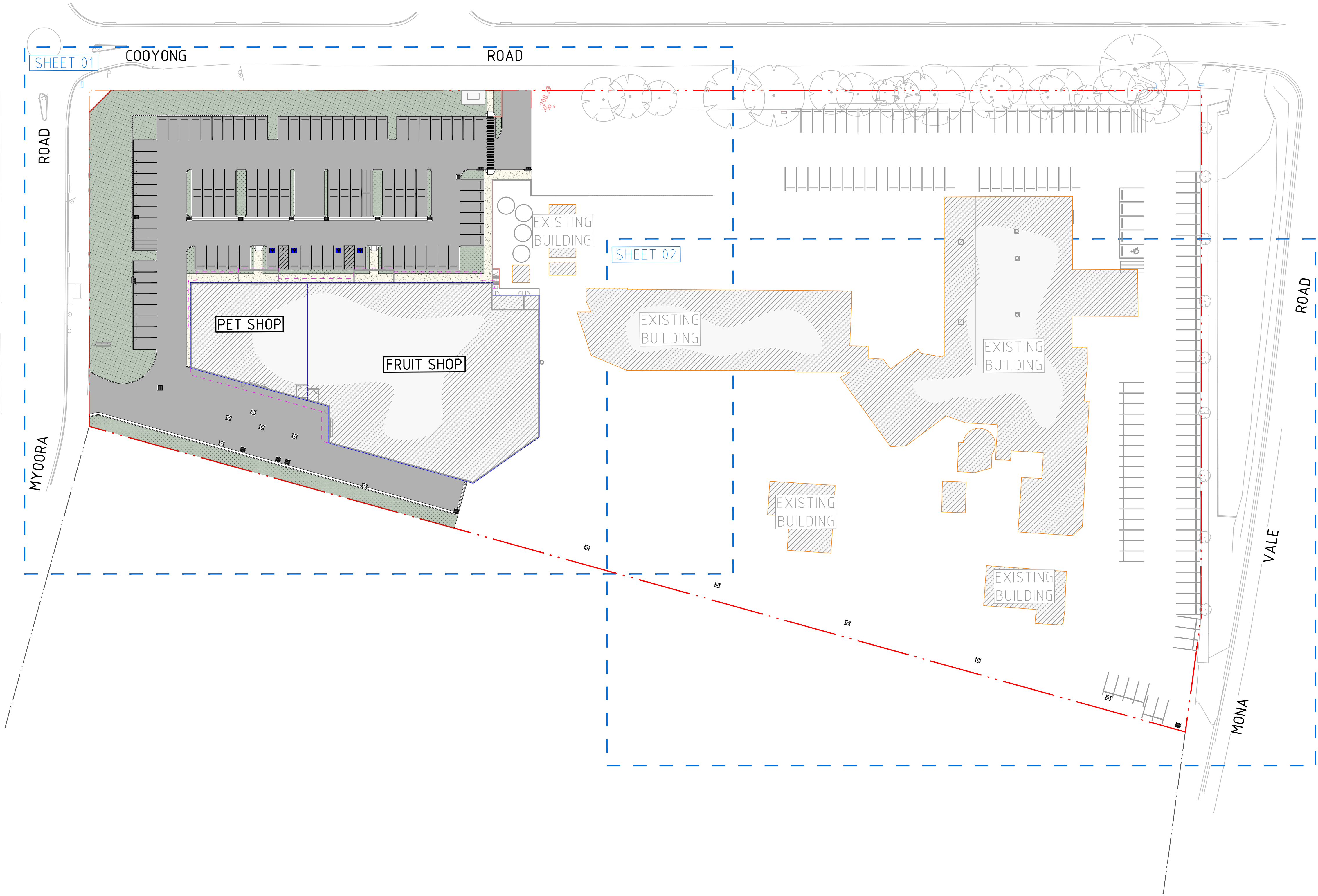
EXISTING BUILDING FOOTPRINT

ROOF EXTENTS

CARPARK PAVEMENT

FOOTPATH PAVEMENT

LANDSCAPING



NOT FOR CONSTRUCTION



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PARTNERS



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LEFFLER SIMES ARCHITECTS

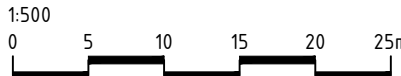
801/140 Arthur Street
North Sydney
NSW, 2060

DRAWN

W.DODIC

DESIGNED

T.BUGAEV



Scale at A1

JOB MANAGER

A.CARVALHAES

VERIFIER

REV. DESCRIPTION

2 ISSUED FOR DEVELOPMENT APPLICATION
1 ISSUED FOR INFORMATION

ISSUED

MM

AS

DATE

23.06.25

29.05.25

PROJECT

FLOWER POWER

ADDRESS

277 MONA VALE ROAD,
TERREY HILLS
NSW 2084

DRAWING

GENERAL ARRANGEMENT PLAN

JOB No.

SY211979

DRAWING No.

DAC01.21

REV.

2

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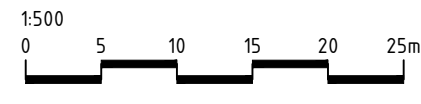
flowerpower

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LEFFLER SIMES ARCHITECTS

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NSW, 2060

DRAWN
W.DODIC
DESIGNED
T.BUGAEV



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JOB MANAGER
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VERIFIER

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PROJECT
FLOWER POWER

ADDRESS
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NSW 2084

DRAWING

**SEDIMENT AND SOIL EROSION
CONTROL PLAN**

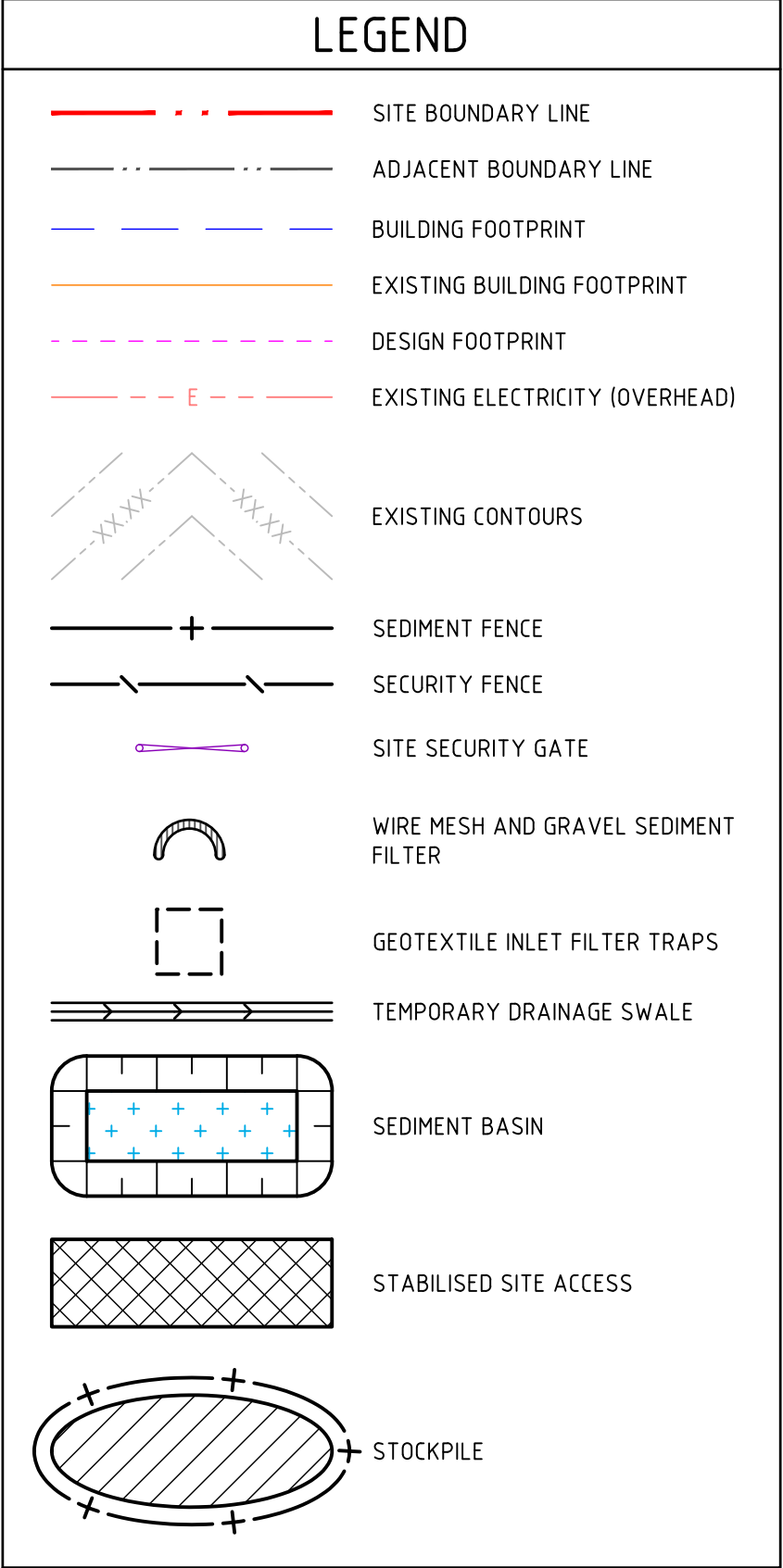
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DAC02.01

REV.

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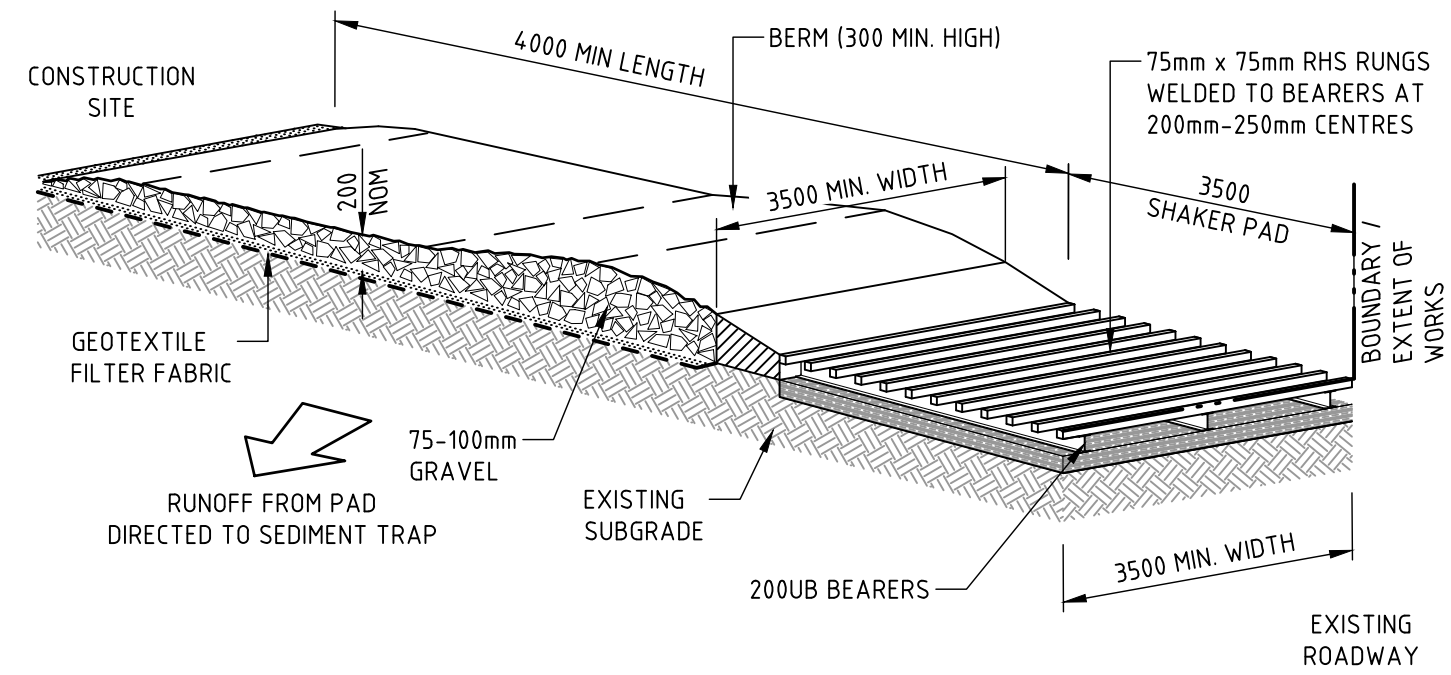


GENERAL NOTES

- ALL WORKS TO BE CARRIED OUT IN ACCORDANCE WITH COUNCIL / RELEVANT AUTHORITY SPECIFICATIONS AND DETAILS.
- ALL SEDIMENT AND SOIL EROSION CONTROL MEASURES TO BE INSTALLED IN ACCORDANCE WITH THE 'BLUE BOOK'. CONTRACTOR TO ENSURE THESE MEASURES ARE IN PLACE AND MAINTAINED AT ALL TIMES DURING CONSTRUCTION WORKS.
- CONTRACTOR TO PROVIDE 'WIRE MESH AND GRAVEL SEDIMENT FILTER' TO ALL PAVED / ROAD AREAS (BOTH PROPOSED AND EXISTING) IN ACCORDANCE WITH THE 'BLUE BOOK'.
- CONTRACTOR TO PROVIDE 'GEOTEXTILE INLET FILTER TRAPS' TO ALL STORMWATER DRAINAGE INLETS (BOTH PROPOSED AND EXISTING) IN ACCORDANCE WITH THE 'BLUE BOOK'.

SEDIMENT BASIN CALCULATIONS	
PARAMETER	ADOPTED VALUE
TOTAL DISTURBED AREA (ha)	0.880
SOIL TEXTURE GROUP	D OR F
DESIGN RAINFALL DEPTH (DAYS)	5
DESIGN RAINFALL DEPTH (PERCENTILE)	80%
x-DAY, y-PERCENTILE RAINFALL EVENT	35.2
Cv	0.42
SETTLING ZONE VOLUME (m³)	130.100
SEDIMENT STORAGE VOLUME (m³)	65.000
TOTAL BASIN VOLUME REQUIRED (m³)	195.100

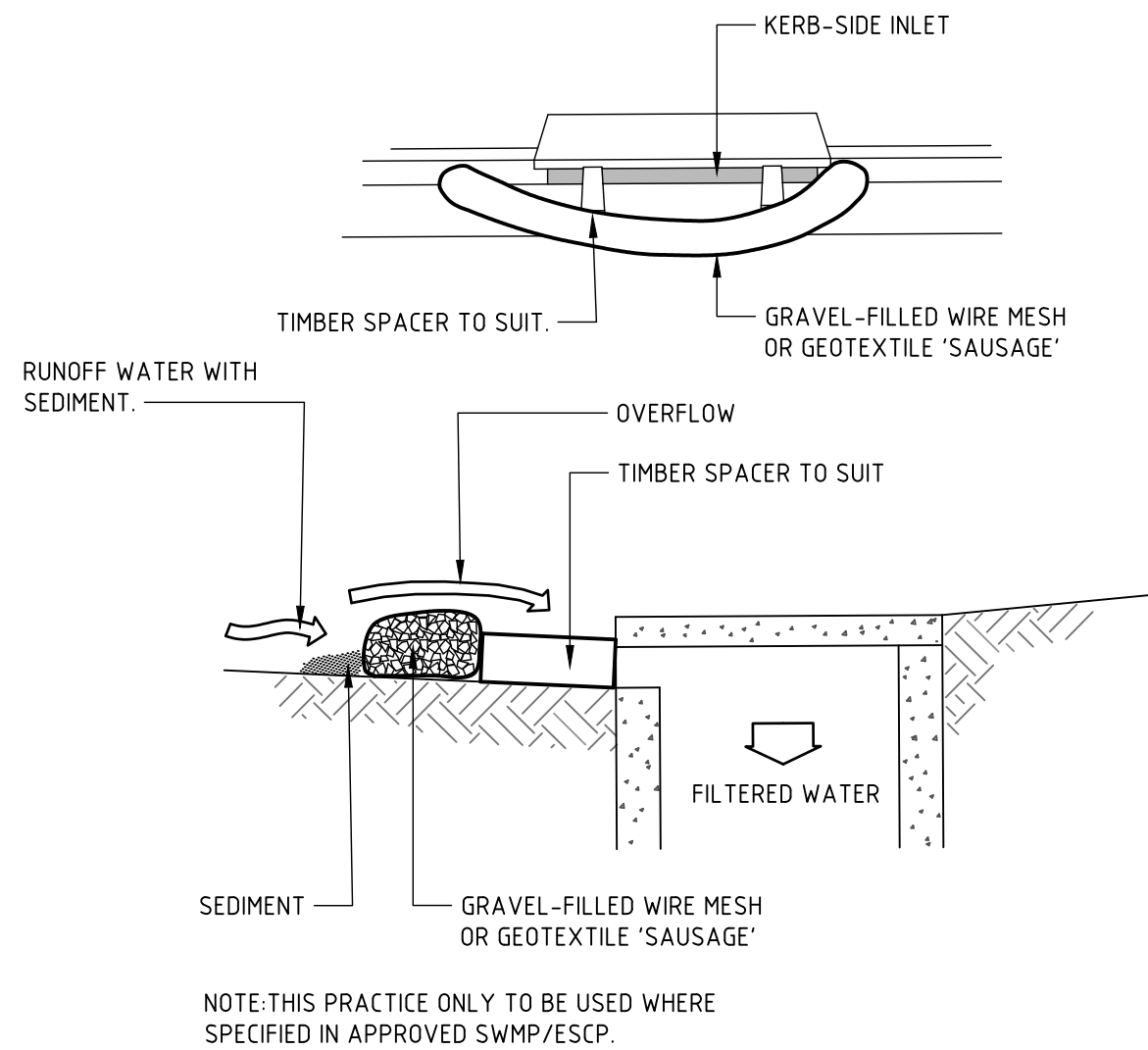
NOT FOR CONSTRUCTION



CONSTRUCTION NOTES

1. THE TEMPORARY ACCESS SHALL BE MAINTAINED IN A CONDITION THAT PREVENTS TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHTS OF WAY.
 - THIS MAY REQUIRE PERIODIC TOP DRESSING WITH ADDITIONAL GRAVEL AS CONDITIONS DEMAND AND REPAIR AND/OR CLOSURE OF ANY MEASURES USED TO TRAP SEDIMENT.
2. ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACKED ONTO PUBLIC RIGHTS OF WAY MUST BE REMOVED IMMEDIATELY.
3. INSTALL BARRIER ON EITHER SIDE OF SHAKER PAD. TO ENSURE VEHICLES ARE GUIDED ON TO THE PAD.
4. INVERT OF SHAKER PAD TO BE DRAINED VIA AGRICULTURAL PIPE WRAPPED IN GEOTEXTILE FABRIC.

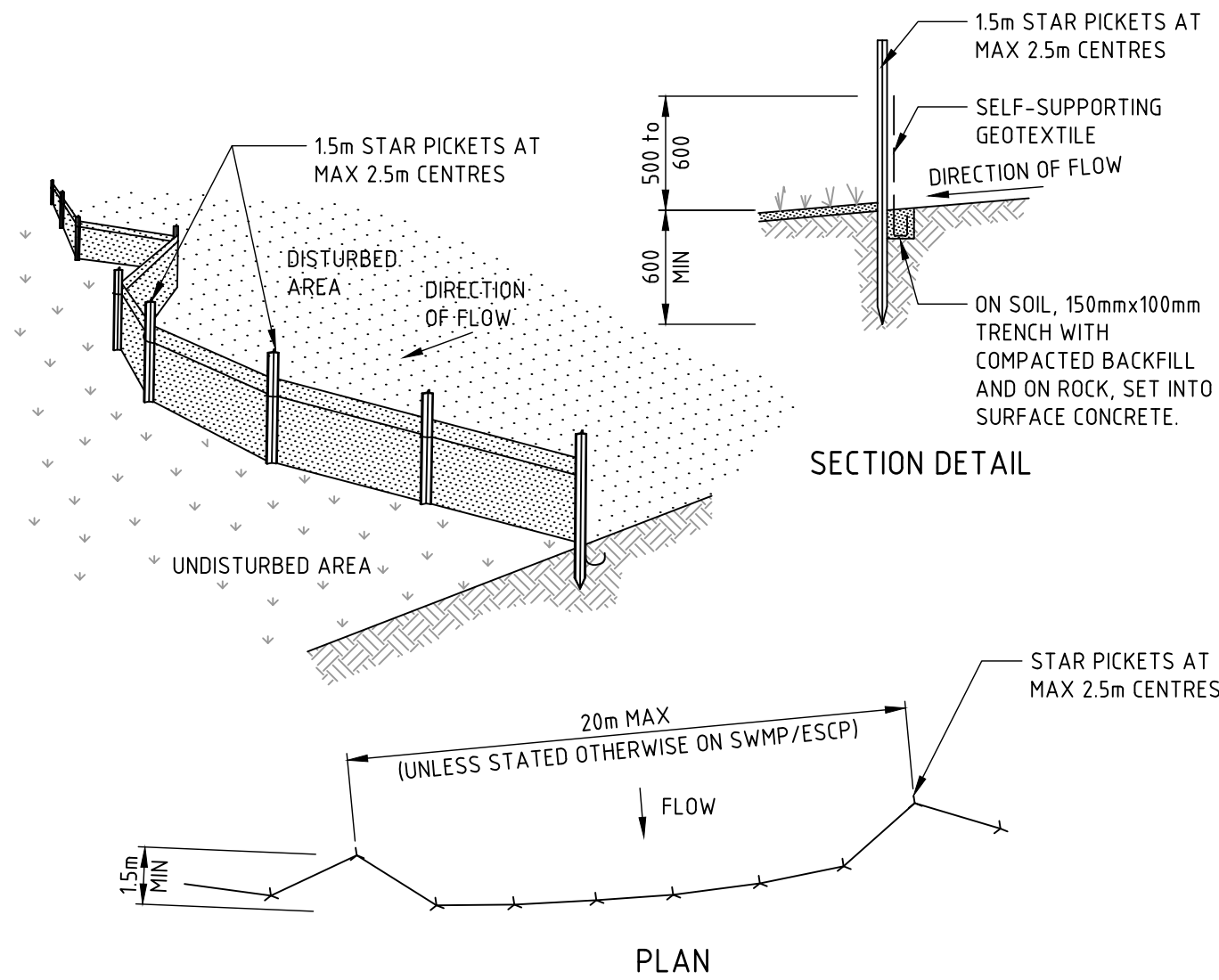
STABILISED SITE ACCESS



CONSTRUCTION NOTES

1. INSTALL FILTERS TO KERB INLETS ONLY AT SAG POINTS.
2. FABRICATE A SLEEVE MADE FROM GEOTEXTILE OR WIRE MESH LONGER THAN THE LENGTH OF THE INLET PIT AND FILL IT WITH 25mm TO 50mm GRAVEL.
3. FORM AN ELLIPTICAL CROSS-SECTION ABOUT 150mm HIGH x 400mm WIDE.
4. PLACE THE FILTER AT THE OPENING LEAVING AT LEAST A 100mm SPACE BETWEEN IT AND THE KERB INLET. MAINTAIN THE OPENING WITH SPACER BRICKS.
5. FORM A SEAL WITH THE KERB TO PREVENT SEDIMENT BYPASSING THE FILTER.
6. SANDBAGS FILLED WITH GRAVEL CAN SUBSTITUTE FOR THE MESH OR GEOTEXTILE PROVIDING THEY ARE PLACED SO THAT THEY FIRMLY ABUT EACH OTHER AND SEDIMENT-LADEN WATERS CANNOT PASS BETWEEN.

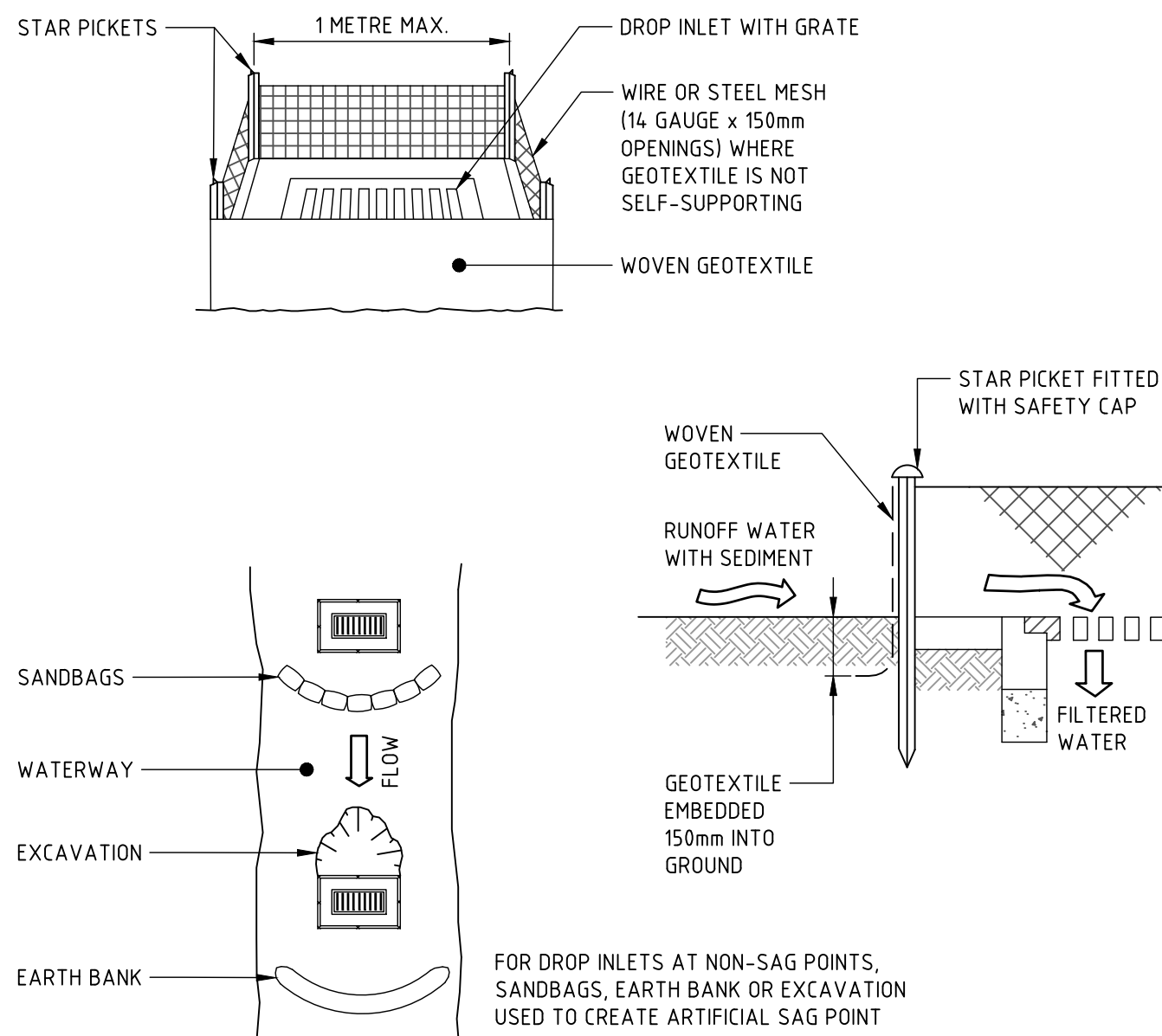
WIRE MESH AND GRAVEL SEDIMENT FILTER



CONSTRUCTION NOTES

1. CONSTRUCT SEDIMENT FENCES AS CLOSE AS POSSIBLE TO BEING PARALLEL TO THE CONTOURS OF THE SITE, BUT WITH SMALL RETURNS AS SHOWN IN THE DRAWING TO LIMIT THE CATCHMENT AREA OF ANY ONE SECTION. THE CATCHMENT AREA SHOULD BE SMALL ENOUGH TO LIMIT WATER FLOW IF CONCENTRATED AT ONE POINT TO 50 LITRES PER SECOND IN THE DESIGN STORM EVENT, USUALLY THE 10-YEAR EVENT.
2. CUT A 150mm DEEP TRENCH ALONG THE UPSLOPE LINE OF THE FENCE FOR THE BOTTOM OF THE FABRIC TO BE ENTRENCHED.
3. DRIVE 15 METRE LONG STAR PICKETS INTO GROUND AT 2.5 METRE INTERVALS (MAX) AT THE DOWNSLOPE EDGE OF THE TRENCH. ENSURE ANY STAR PICKETS ARE FITTED WITH SAFETY CAPS.
4. FIX SELF-SUPPORTING GEOTEXTILE TO THE UPSLOPE SIDE OF THE POSTS ENSURING IT GOES TO THE BASE OF THE TRENCH. FIX THE GEOTEXTILE WITH WIRE TIES OR AS RECOMMENDED BY THE MANUFACTURER. ONLY USE GEOTEXTILE SPECIFICALLY PRODUCED FOR SEDIMENT FENCING. THE USE OF SHADE CLOTH FOR THIS PURPOSE IS NOT SATISFACTORY.
5. JOIN SECTIONS OF FABRIC AT A SUPPORT POST WITH A 150mm OVERLAP.
6. BACKFILL THE TRENCH OVER THE BASE OF THE FABRIC AND COMPACT IT THOROUGHLY OVER THE GEOTEXTILE.

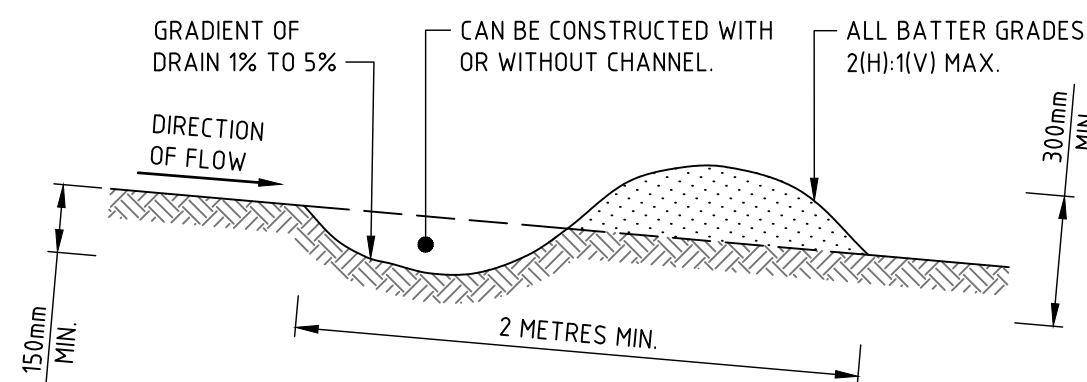
SEDIMENT FENCE



CONSTRUCTION NOTES

1. FABRICATE A SEDIMENT BARRIER MADE FROM GEOTEXTILE OR STRAW BALES.
2. FOLLOW STANDARD DRAWING 6-7 AND STANDARD DRAWING 6-8 FOR INSTALLATION PROCEDURES FOR THE STRAW BALES OR GEOFABRIC. REDUCE THE PICKET SPACING TO 1 METRE CENTRES.
3. IN WATERWAYS, ARTIFICIAL SAG POINTS CAN BE CREATED WITH SANDBAGS OR EARTH BANKS AS SHOWN IN THE DRAWING.
4. DO NOT COVER THE INLET WITH GEOTEXTILE UNLESS THE DESIGN IS ADEQUATE TO ALLOW FOR ALL WATERS TO BYPASS IT.

GEOTEXTILE INLET FILTER TRAPS

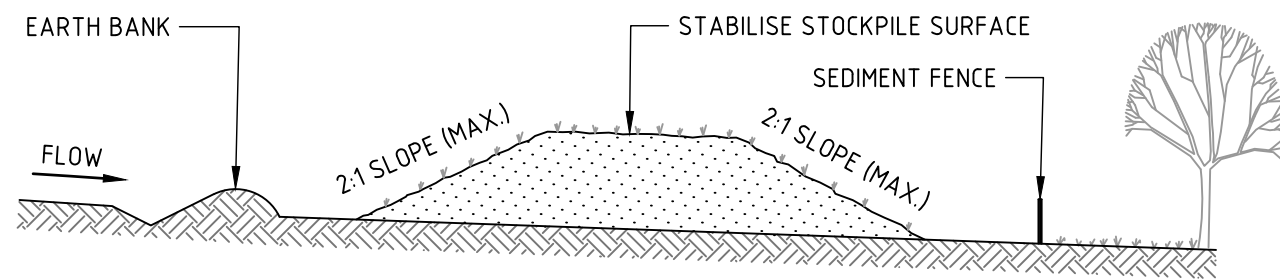


CONSTRUCTION NOTES

1. BUILD WITH GRADIENTS BETWEEN 1 AND 5 PERCENT.
2. AVOID REMOVING TREES AND SHRUBS IF POSSIBLE - WORK AROUND THEM.
3. ENSURE THE STRUCTURES ARE FREE OF PROJECTIONS OR OTHER IRREGULARITIES THAT COULD IMPEDE WATER FLOW.
4. BUILD THE DRAINS WITH CIRCULAR, PARABOLIC OR TRAPEZOIDAL CROSS SECTIONS, NOT V SHAPED.
5. ENSURE THE BANKS ARE PROPERLY COMPACTED TO PREVENT FAILURE.
6. COMPLETE PERMANENT OR TEMPORARY STABILISATION WITHIN 10 DAYS OF CONSTRUCTION.

NOTE: ONLY TO BE USED AS TEMPORARY BANK
WHERE MAXIMUM UPSLOPE LENGTH IS 80 METRES.

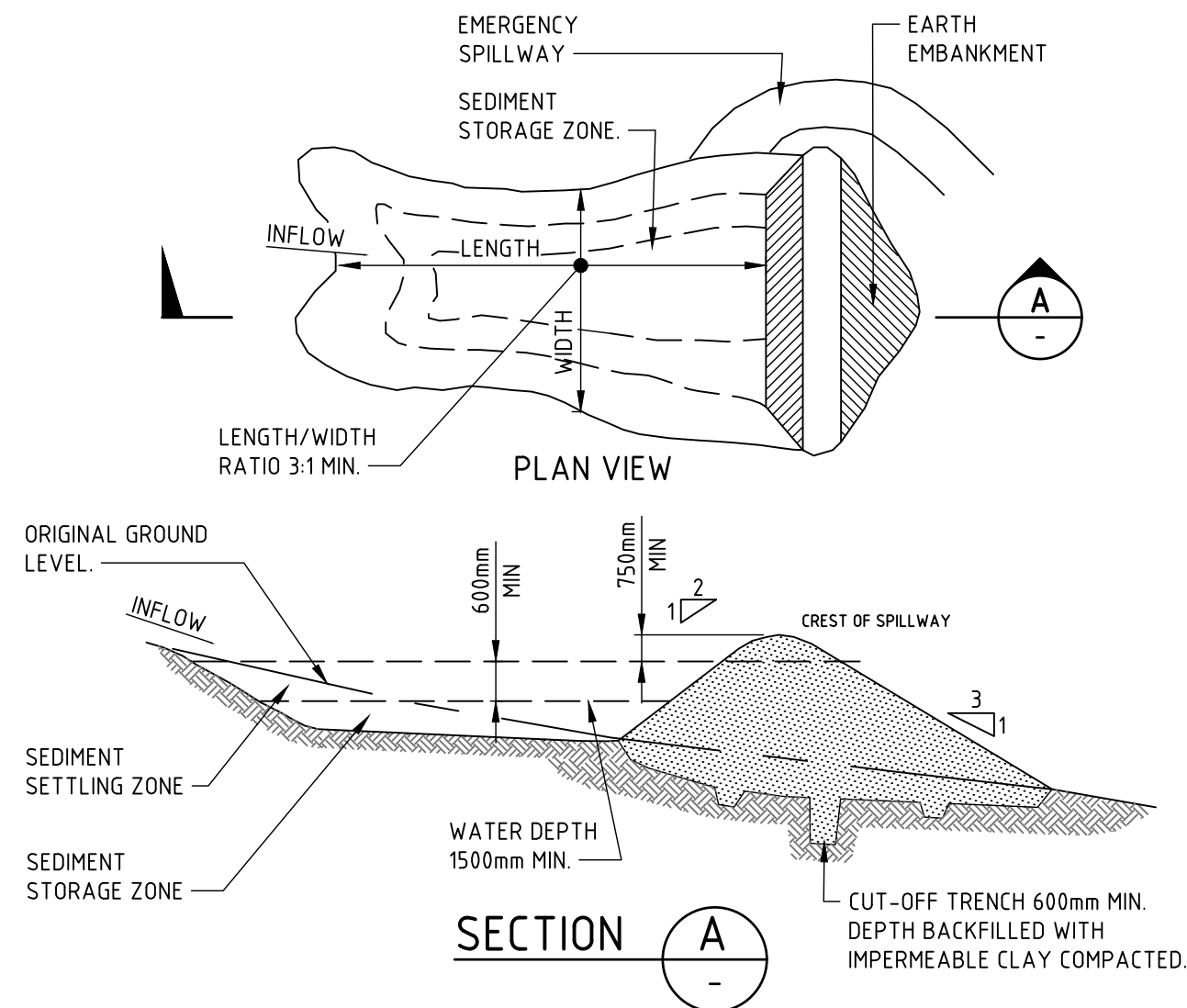
TEMPORARY DRAINAGE SWALE



CONSTRUCTION NOTES

1. PLACE STOCKPILES MORE THAN 2m (PREFERABLY 5m) FROM EXISTING VEGETATION, CONCENTRATED WATER FLOW, ROADS AND HAZARDOUS AREAS.
2. CONSTRUCT ON THE CONTOUR AS LOW, FLAT, ELONGATED MOUNDS.
3. WHERE THERE IS SUFFICIENT AREA, TOPSOIL STOCKPILES SHALL BE LESS THAN 2m IN HEIGHT.
4. WHERE THEY ARE TO BE IN PLACE FOR MORE THAN 10 DAYS, STABILISE FOLLOWING THE APPROVED ESCP OR SWMP TO REDUCE THE C-FACTOR TO LESS THAN 0.10.
5. CONSTRUCT EARTH BANKS (STANDARD DRAWINGS 5-5) ON THE UPSLOPE SIDE TO DIVERT WATER AROUND STOCKPILES AND SEDIMENT FENCES (STANDARD DRAWING 6-8) 1 TO 2m DOWNSLOPE.

STOCKPILE



CONSTRUCTION NOTES

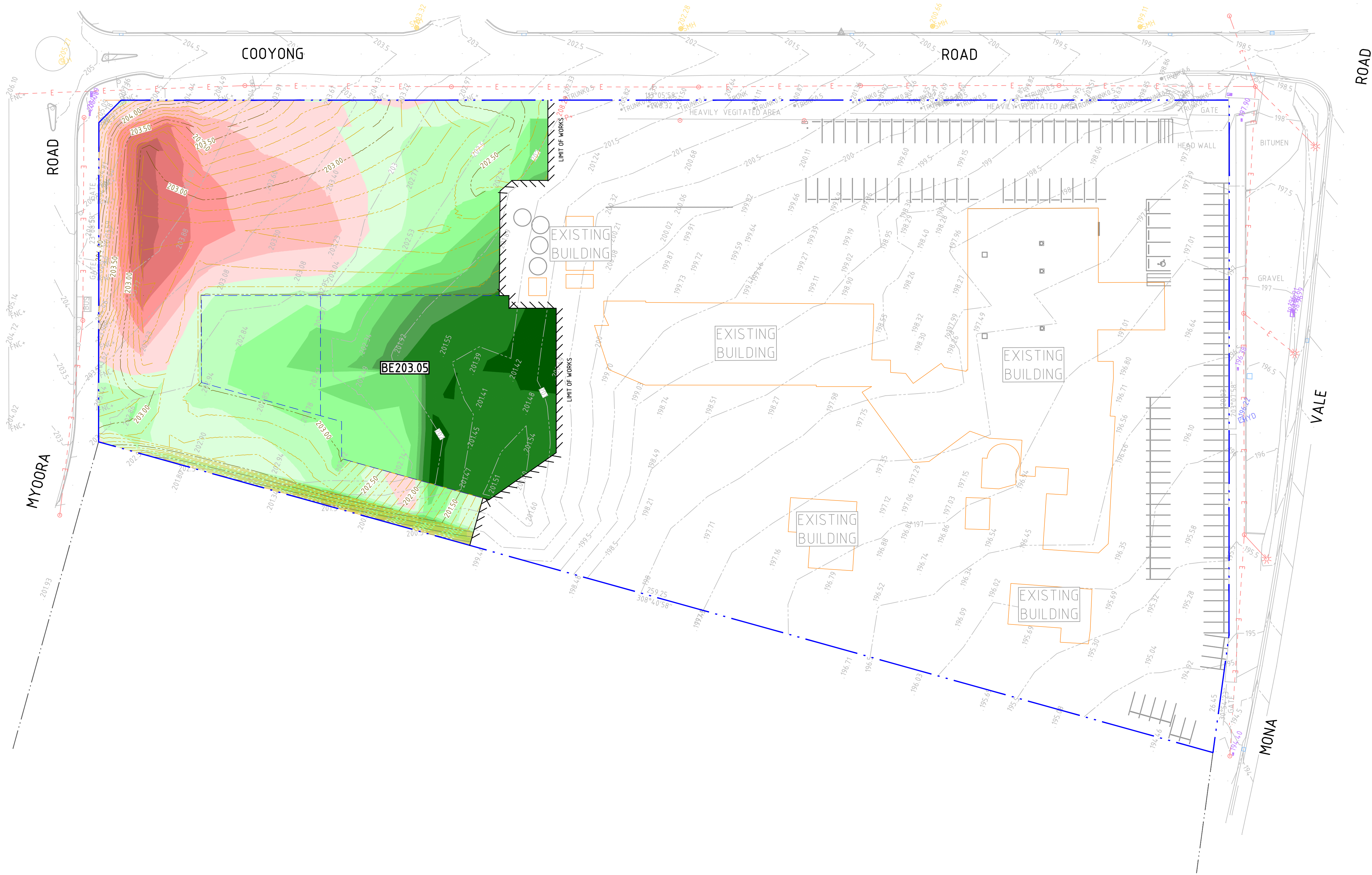
1. REMOVE ALL VEGETATION AND TOPSOIL FROM UNDER THE DAM WALL AND FROM WITHIN THE STORAGE AREA.
2. CONSTRUCT A CUT-OFF TRENCH 500mm DEEP AND 1200mm WIDE ALONG THE CENTRELINE OF THE EMBANKMENT EXTENDING TO A POINT ON THE GULLY WALL LEVEL WITH THE RISER CREST.
3. MAINTAIN THE TRENCH FREE OF WATER AND RECOMPACT THE MATERIALS WITH EQUIPMENT AS SPECIFIED IN THE SWMP TO 95 PER CENT STANDARD PROCTOR DENSITY.
4. SELECT FILL FOLLOWING THE SWMP THAT IS FREE OF ROOTS, WOOD, ROCK, LARGE STONE OR FOREIGN MATERIAL.
5. PREPARE THE SITE UNDER THE EMBANKMENT BY RIPPING TO AT LEAST 100mm TO HELP BOND COMPACTED FILL TO THE EXISTING SUBSTRATE.
6. SPREAD THE FILL IN 100mm TO 150mm LAYERS AND COMPACT IT AT OPTIMUM MOISTURE CONTENT FOLLOWING THE SWMP.
7. CONSTRUCT THE EMERGENCY SPILLWAY.
8. REHABILITATE THE STRUCTURE FOLLOWING THE SWMP.

(APPLIES TO 'TYPE D' AND 'TYPE F' SOILS ONLY)

SEDIMENT BASIN

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LEGEND

SITE BOUNDARY LINE

ADJACENT BOUNDARY LINE

BUILDING FOOTPRINT

EXISTING BUILDING FOOTPRINT

BE000.00

BULK EARTHWORKS PAD LEVEL

XXXX

XXXX

EXISTING CONTOURS

XXXX

XXXX

BULK EARTHWORKS CONTOURS

DEPTH OF CUT

-1.25m TO -1.0m

-1.0m TO -0.75m

-0.75m TO -0.5m

-0.5m TO -0.25m

-0.25m TO -0.0m

DEPTH OF FILL

0.0m TO 0.25m

0.25m TO 0.5m

0.5m TO 0.75m

0.75m TO 1.0m

1.0m TO 1.25m

1.25m TO 1.5m

1.5m TO 2.0m

2.0m TO 4.0m

LIMIT OF WORKS

LIMIT OF WORKS

GENERAL NOTES:

1. ALL WORKS TO BE CARRIED OUT IN ACCORDANCE WITH COUNCIL / RELEVANT AUTHORITY SPECIFICATIONS AND DETAILS.

2. CAD FILES / DTM FILES TO BE SUPPLIED IN AUTOCAD FORMAT FOR SETOUT PURPOSES (UPON REQUEST).

3. STRIP EXISTING TOPSOIL IN CONSULTATION WITH THE GEOTECHNICAL ENGINEER / REPORT. FOR THE PURPOSES OF EARTHWORKS CALCULATIONS A TOPSOIL STRIPPING DEPTH OF 150mm HAS BEEN ASSUMED.

4. NO ALLOWANCE HAS BEEN MADE FOR BULKING FACTORS. NOTE ALL VOLUMES DEPICTED ARE SOLID VOLUMES ONLY AND MAY NOT REFLECT DETAILED EARTHWORKS.

5. NO ALLOWANCE HAS BEEN MADE FOR DETAILED EARTHWORKS, ie SERVICE TRENCHING, DETAILED EXCAVATION, FOOTINGS, RETAINING WALLS AND THE LIKE. CONTRACTOR IS TO ALLOW FOR REMOVAL OF ALL EXCESS MATERIAL GENERATED BY THE WORKS.

6. THE CONTRACTOR SHALL USE FINAL SURFACE LEVELS AND TYPICAL PAVEMENT DETAILS FOR ACTUAL EARTHWORKS LEVELS.

7. BULK EARTHWORKS ARE BASED ON THE FOLLOWING DEPTHS FROM FINISHED SURFACE LEVELS:

7.1. ASPHALT PAVEMENT 230mm

7.2. CONCRETE PAVEMENT 230mm

7.3. BUILDING SLAB 200mm

7.4. FOOTPATH PAVEMENT 230mm

7.5. LANDSCAPE AREA 300mm

8. APPROXIMATE BULK EARTHWORK VALUES AS FOLLOWS:

9.1 CUT 1,064 cu.m

9.2 FILL 4,607 cu.m

9.3 BALANCE 3,543 cu.m (EXPORT)

9.4 SITE STRIPPING LAYER 2,506 cu.m

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NSW, 2060

DRAWN

W.DODIC

DESIGNED

T.BUGAEV

0 5 10 15 20 25m

Scale at A1

JOB MANAGER

A.CARVALHAES

VERIFIER

REV. DESCRIPTION

2 ISSUED FOR DEVELOPMENT APPLICATION
1 ISSUED FOR INFORMATION

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PROJECT

FLOWER POWER

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NSW 2084

DRAWING

**BULK EARTHWORKS
CUT AND FILL PLAN**

JOB No.

SY211979

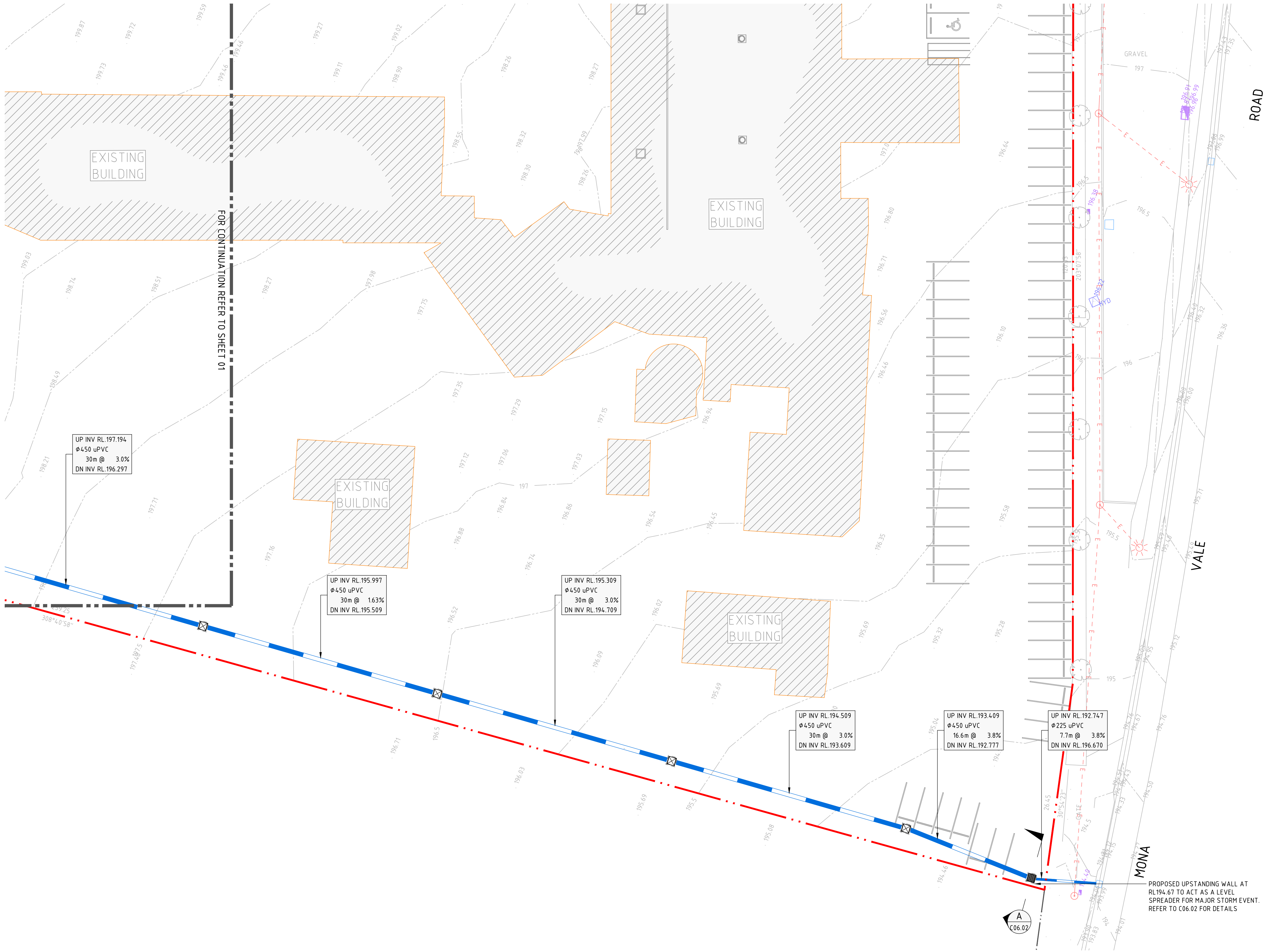
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LEGEND

PROPOSED BOUNDARY LINE

EXISTING BOUNDARY LINE

BUILDING FOOTPRINT

EXISTING BUILDING FOOTPRINT

ROOF EXTENTS

EXISTING ELECTRICAL (OVERHEAD)

EXISTING CONTOURS

DESIGN CONTOURS

K0

KERB ONLY

KG

KERB AND GUTTER

DD

DISH DRAIN

KR

KERB RAMP

B

BOLLARD

RW

RETAINING WALL

WS

WHEEL STOP

RLXX.XX

PROPOSED SPOT HEIGHT

FSLXX.XX

PROPOSED FINISHED FLOOR LEVEL

STORMWATER PIPE

GRADED INLET PIT

KERB INLET PIT

SEALED JUNCTION PIT

OSD

ON-SITE DETENTION TANK

CARPARK PAVEMENT

FOOTPATH PAVEMENT

LANDSCAPING

GENERAL NOTES

1. REFER SPECIFICATIONS NOTES FOR STORMWATER REQUIREMENTS

2. ALL WORKS TO BE CARRIED OUT IN ACCORDANCE WITH COUNCIL / RELEVANT AUTHORITY SPECIFICATIONS AND DETAILS.

3. CAD FILES TO BE SUPPLIED IN AUTOCAD FORMAT FOR SETOUT PURPOSES (UPON REQUEST).

4. SUBSOIL DRAINAGE TO RETAINING WALLS, KERBS AND SWALE DRAINS NOT SHOWN FOR CLARITY - REFER RELEVANT DETAILS.

5. REFER HYDRAULIC ENGINEERS / ARCHITECTS DRAWINGS FOR DOWNPIPE LOCATIONS AND SIZING.

6. PROVIDE DRAINAGE CONNECTIONS TO KERB IN ACCORDANCE WITH COUNCIL STANDARD DETAILS AND SPECIFICATION.

7. CONTRACTOR TO ALLOW TO ADJUST AND LIAISE WITH RELEVANT SERVICE AUTHORITIES IN RELATION TO EXISTING SERVICE ADJUSTMENT AND MODIFICATIONS.

8. WHEEL STOPS TO BE INSTALLED TO ALL CAR SPACES AS SHOWN AND INSTALLED IN ACCORDANCE WITH AUSTRALIAN STANDARDS AND MANUFACTURERS SPECIFICATIONS. IF WHEEL STOPS ARE NOT SHOWN, ALLOW FOR WHEEL STOPS WHERE CAR SPACES ARE FRONTING A WALL

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PROJECT

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NSW 2084

DRAWING

**SITeworks AND STORMWATER
MANAGEMENT PLAN - SHEET 02**

JOB No.

SY211979

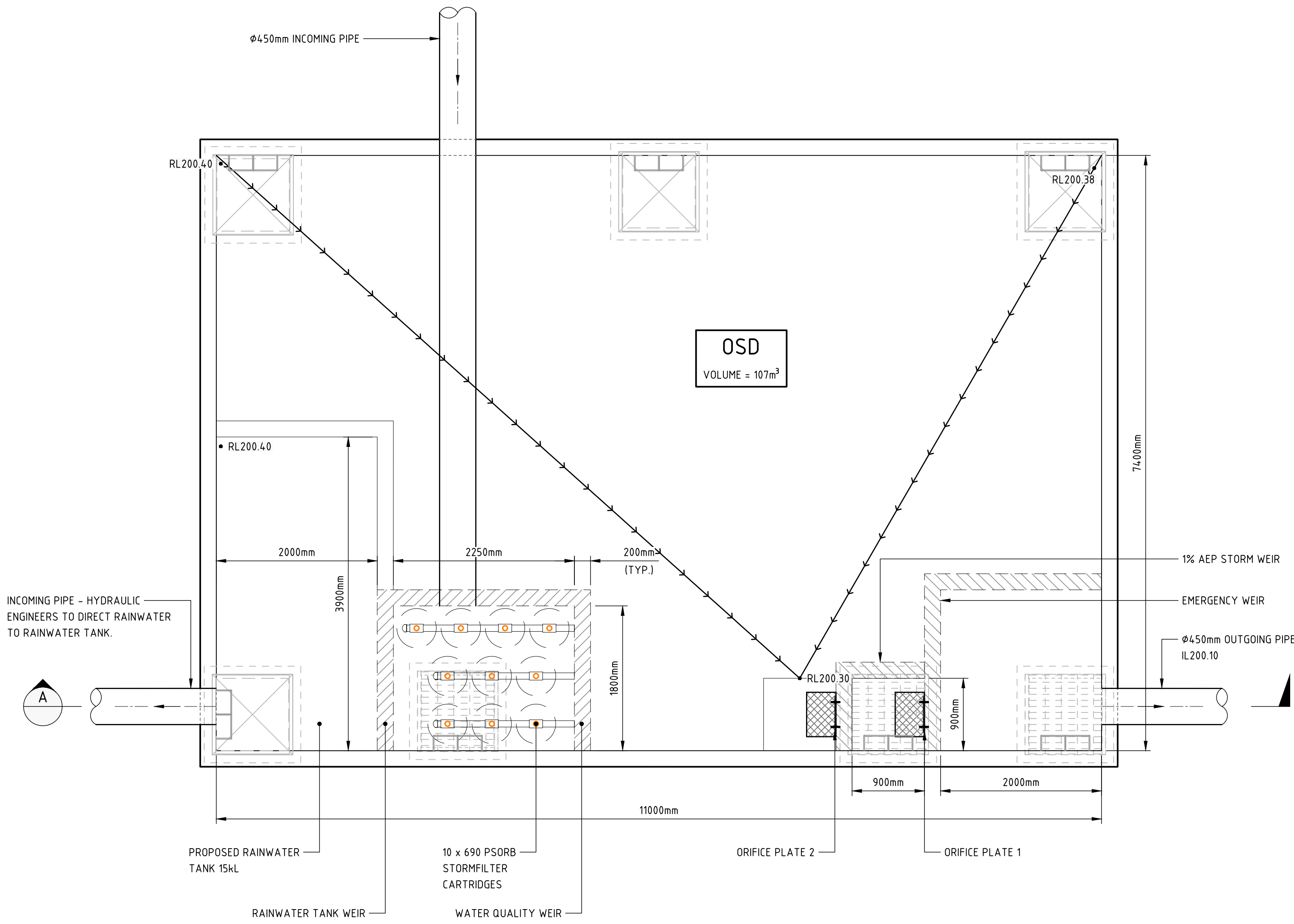
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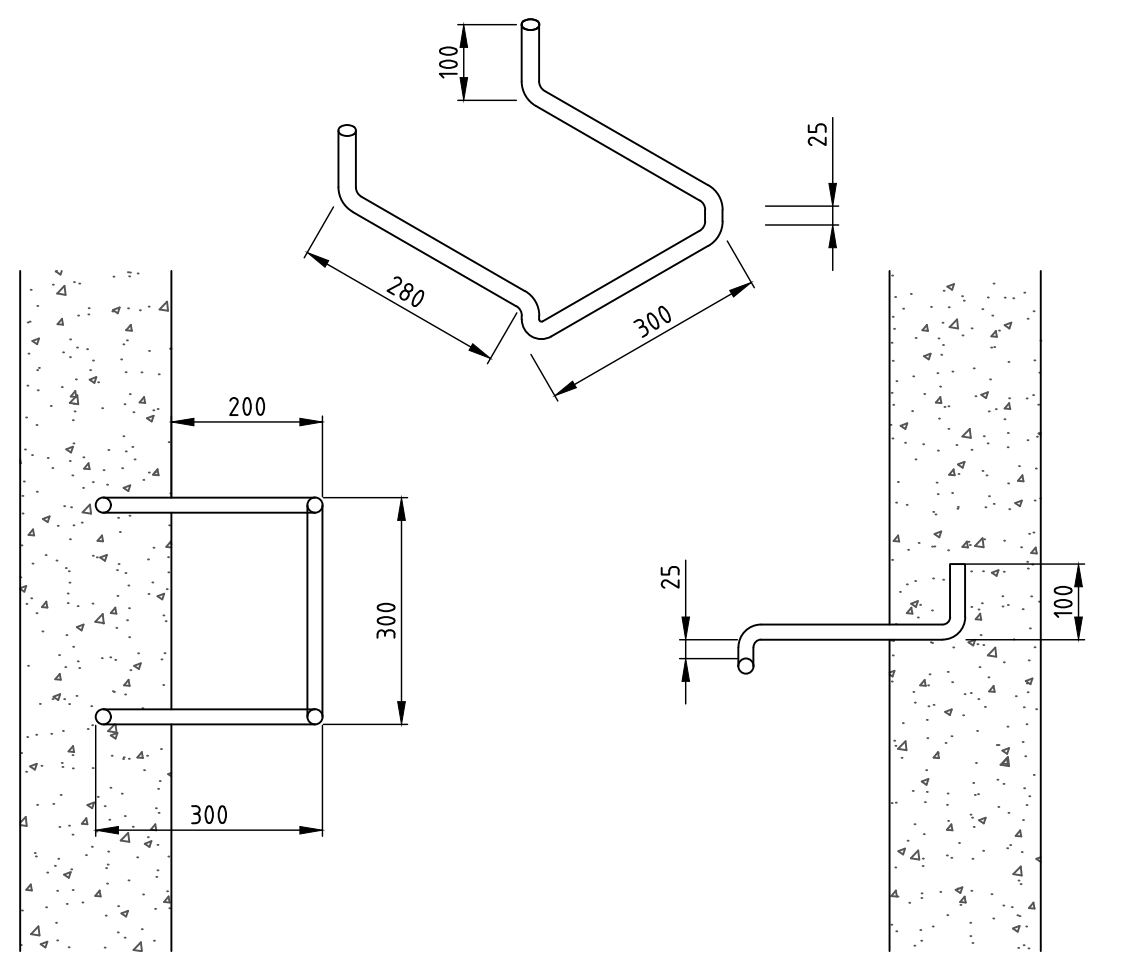
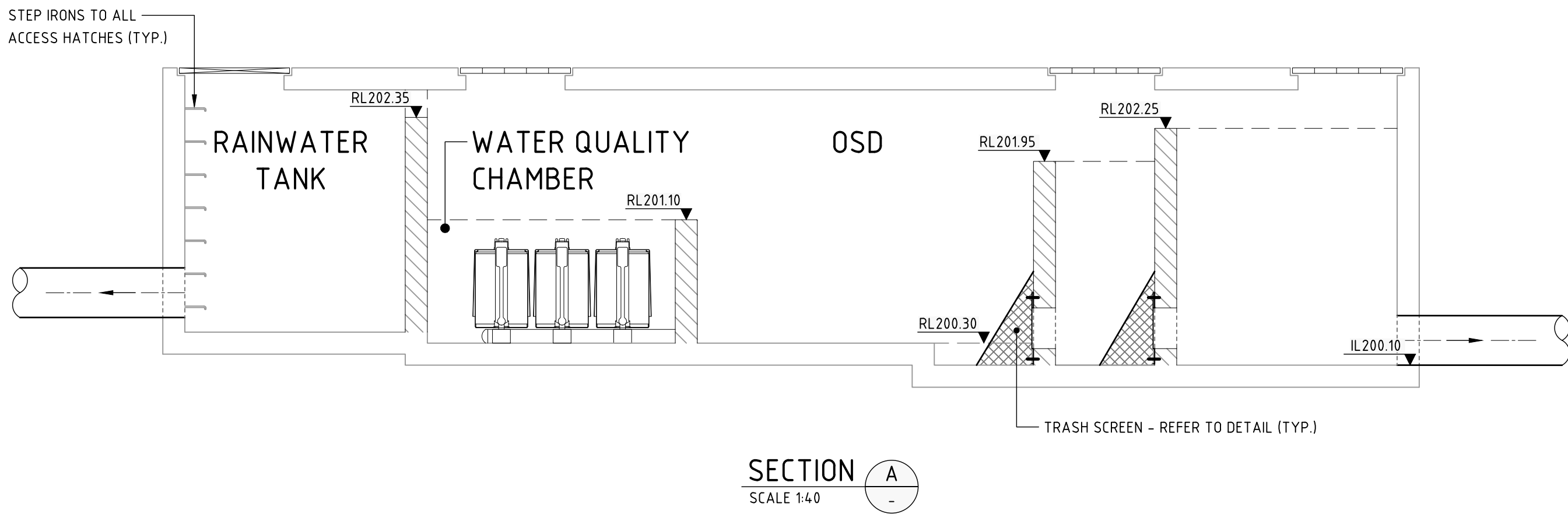
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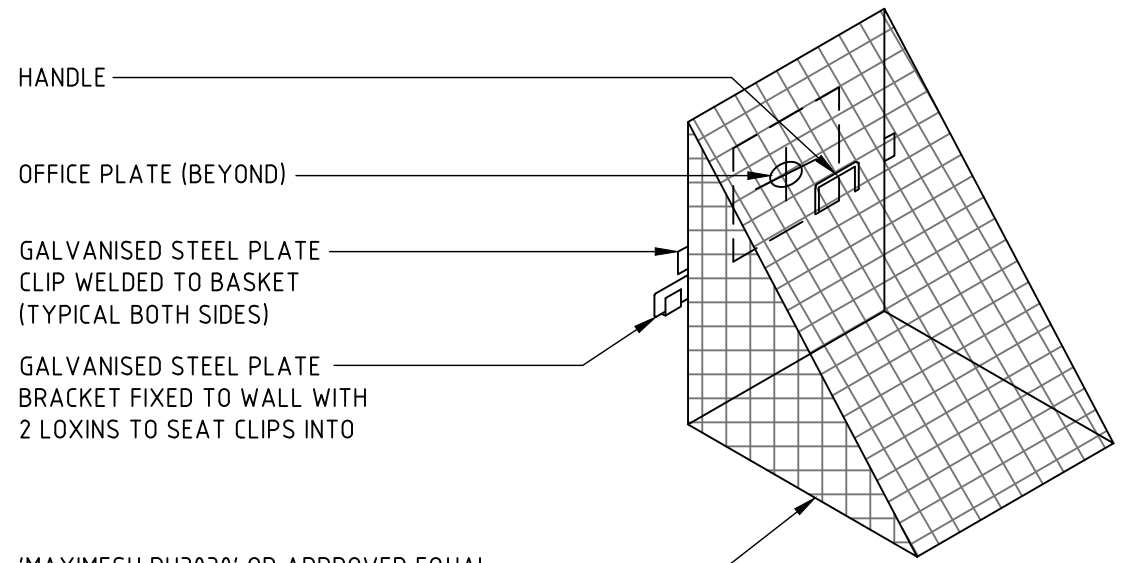
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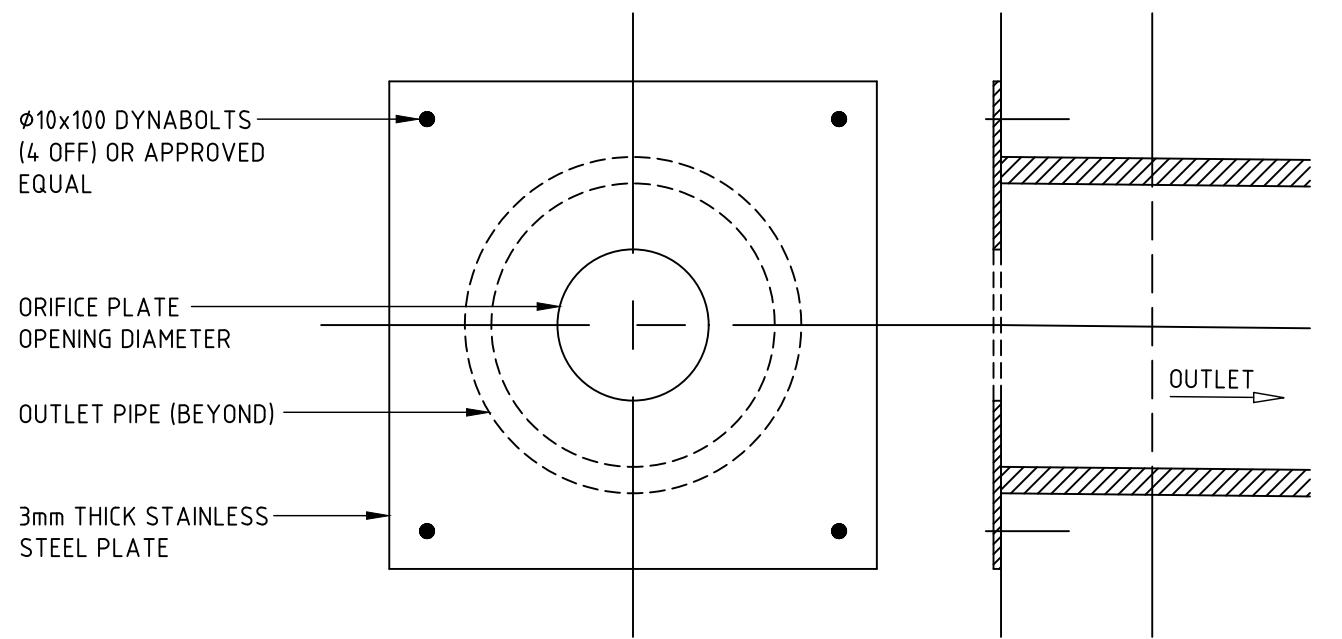
OSD BASE PLAN
SCALE 1:40



STEP IRON DETAIL
STEP IRON OF 20mm GALVANISED STEEL MADE TO SHAPE AND DIMENSIONS AS SHOWN, PLACED AT 300 CENTRES AND STAGGERED HORIZONTALLY FOR ALL PITS DEEPER THAN 1.0m. THE USE OF PROPRIETARY STEP IRONS ARE ACCEPTABLE PROVIDED THE PRODUCT IS IN ACCORDANCE WITH AUSTRALIAN STANDARDS
SCALE 1:10



TRASH SCREEN DETAIL
SCALE 1:10



ORIFICE PLATE DETAIL
• ORIFICE PLATE 1 - Ø370mm
• ORIFICE PLATE 2 - Ø250mm
SCALE 1:10

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JOB MANAGER
A.CARVALHAES
VERIFIER

SCALE VARIES

Scale at

REV.	DESCRIPTION	ISSUED	DATE
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PROJECT
FLOWER POWER

ADDRESS
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NSW 2084

DRAWING
**STORMWATER MANAGEMENT
DETAILS - SHEET 01**

JOB No.
SY211979
DRAWING No.
DAC06.01

REV.

2



REFER EXTENDED CHAMBER PIT DETAIL FOR
PIPEWORK IN EXCESS OF $\phi 450$ AND WHERE REQUIRED



1. TRENCH WIDTH MAY NEED TO BE INCREASED SUBJECT TO ACHIEVING COMPACTION. ENSURE MINIMUM 300mm CLEARANCE BETWEEN, WHEN USING MULTIPLE PIPES TO ACHIEVE ADEQUATE COMPACTION.
2. MINIMUM PIPE COVER NOT UNDER ROADS TO BE 300mm U.N.O.
3. THE CONTRACTOR SHALL ENSURE THAT SHORING OF TRENCHES IS INSTALLED AS REQUIRED BY STATUTORY REQUIREMENTS.
4. ENSURE BACKFILLING COMPACTION MEETS THE FOLLOWING STANDARDS;
 - 4.1. TRENCHES UNDER PAVED AREAS / BUILDING - 100% SMD
 - 4.2. TRENCHES NOT UNDER PAVEMENTS - 95% SMD

SCALE 1:10

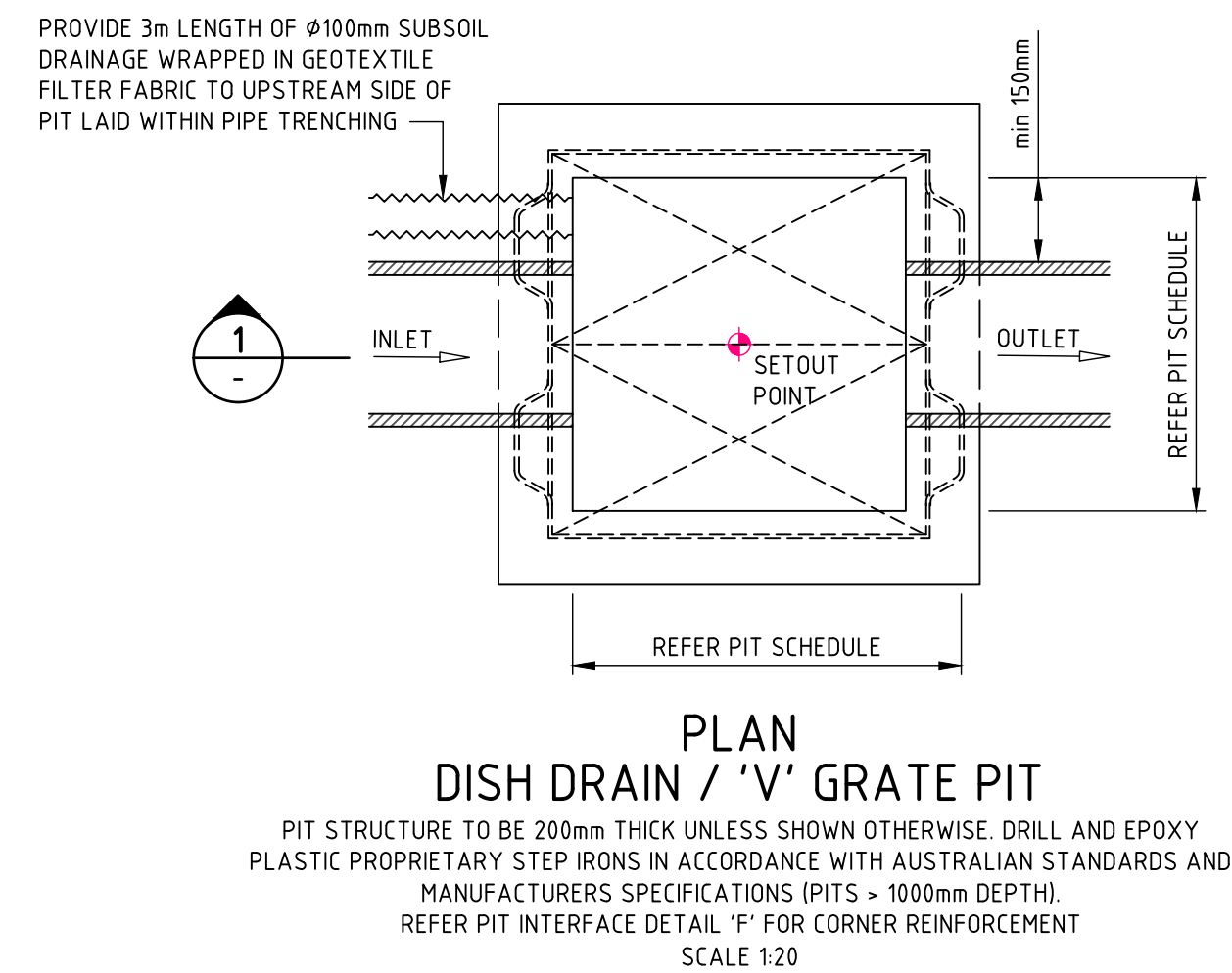
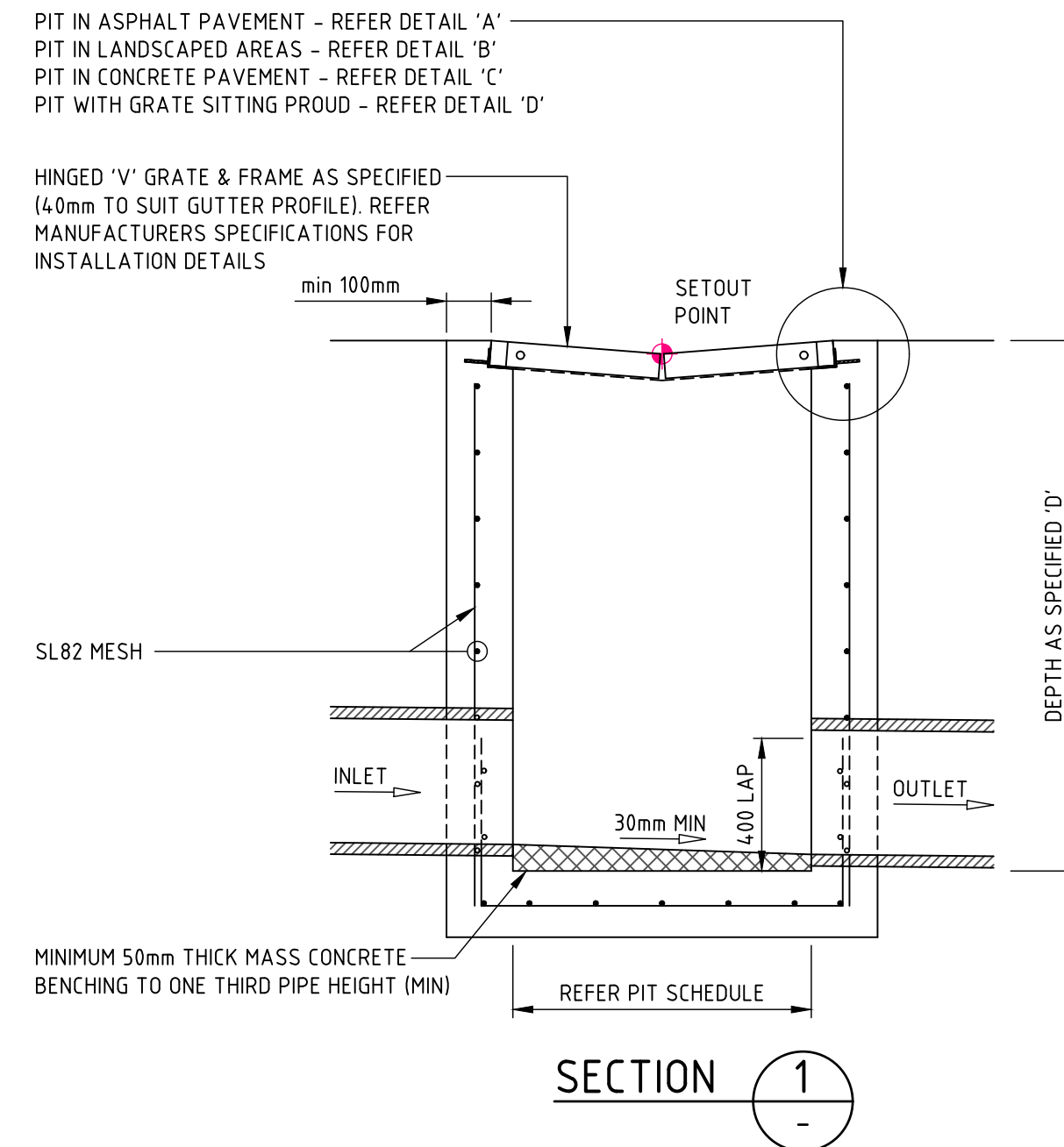
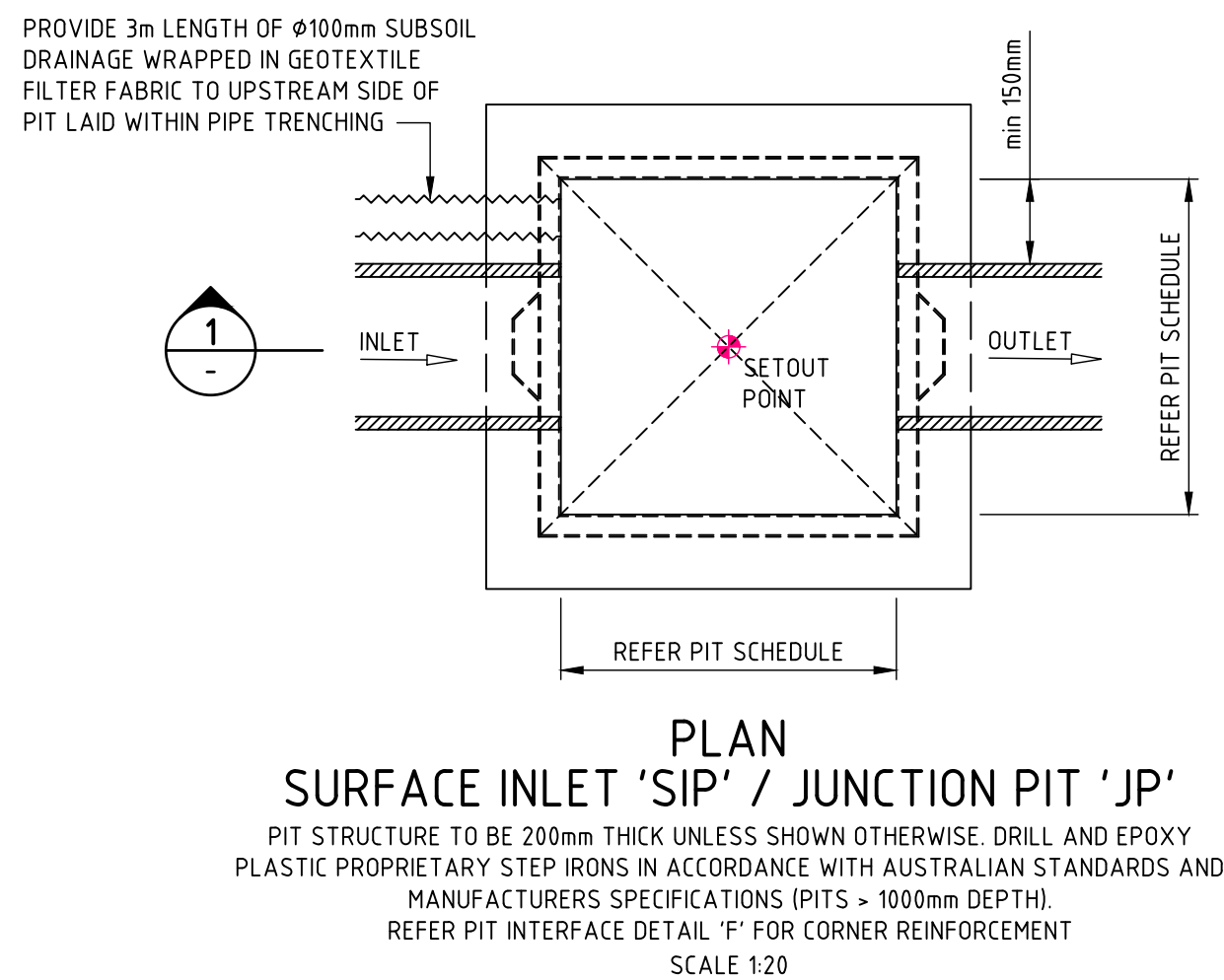
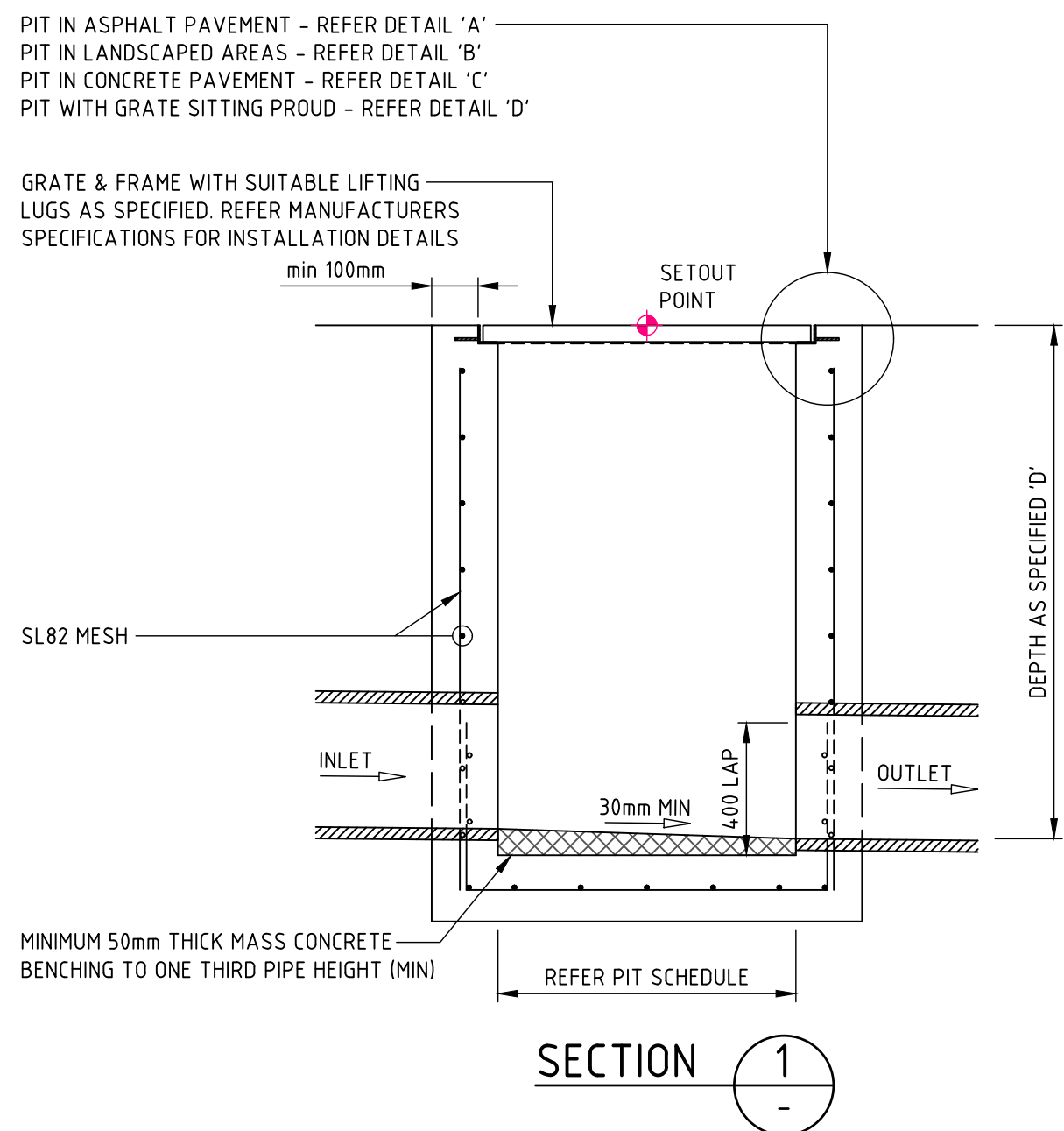
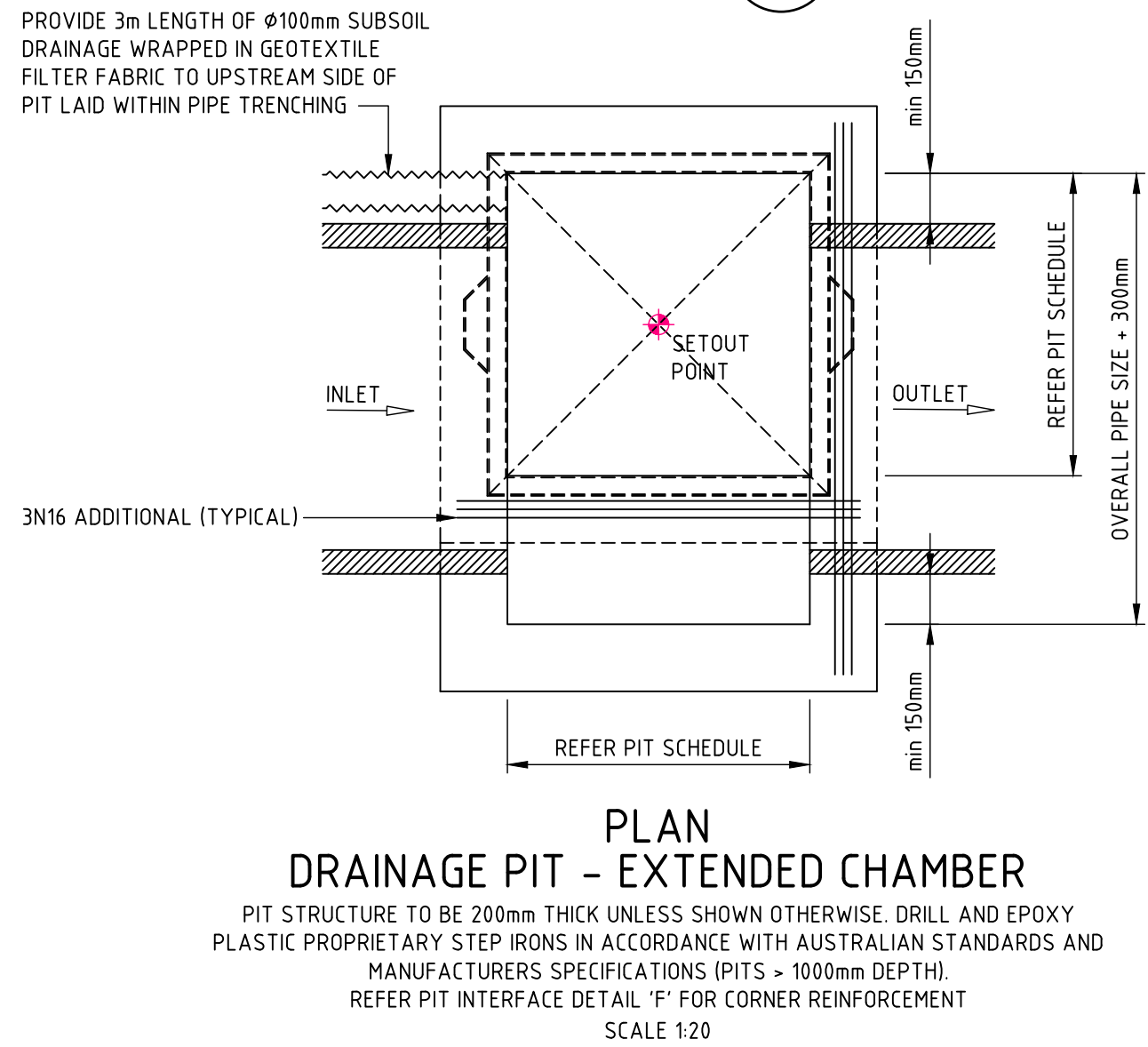
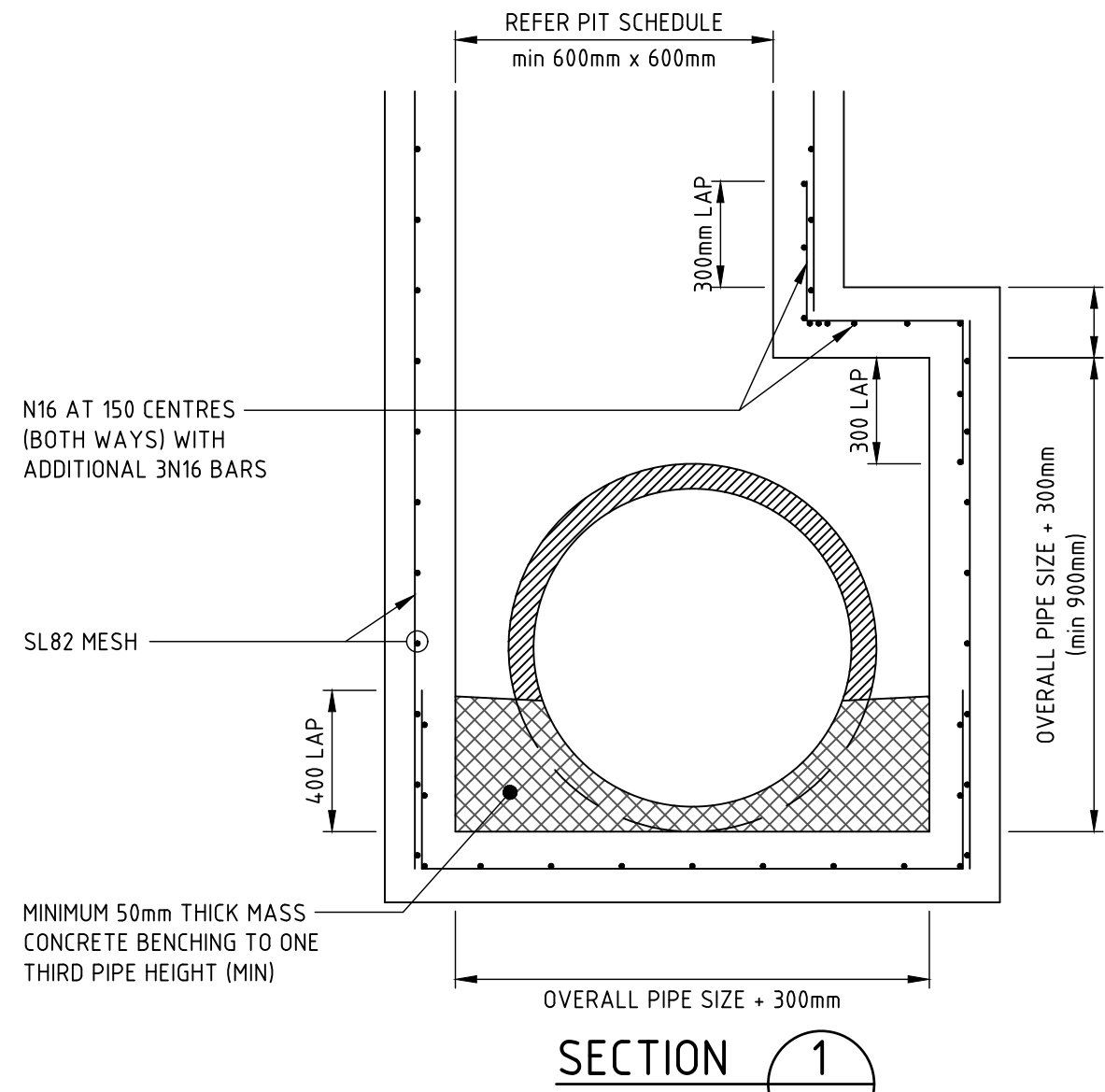
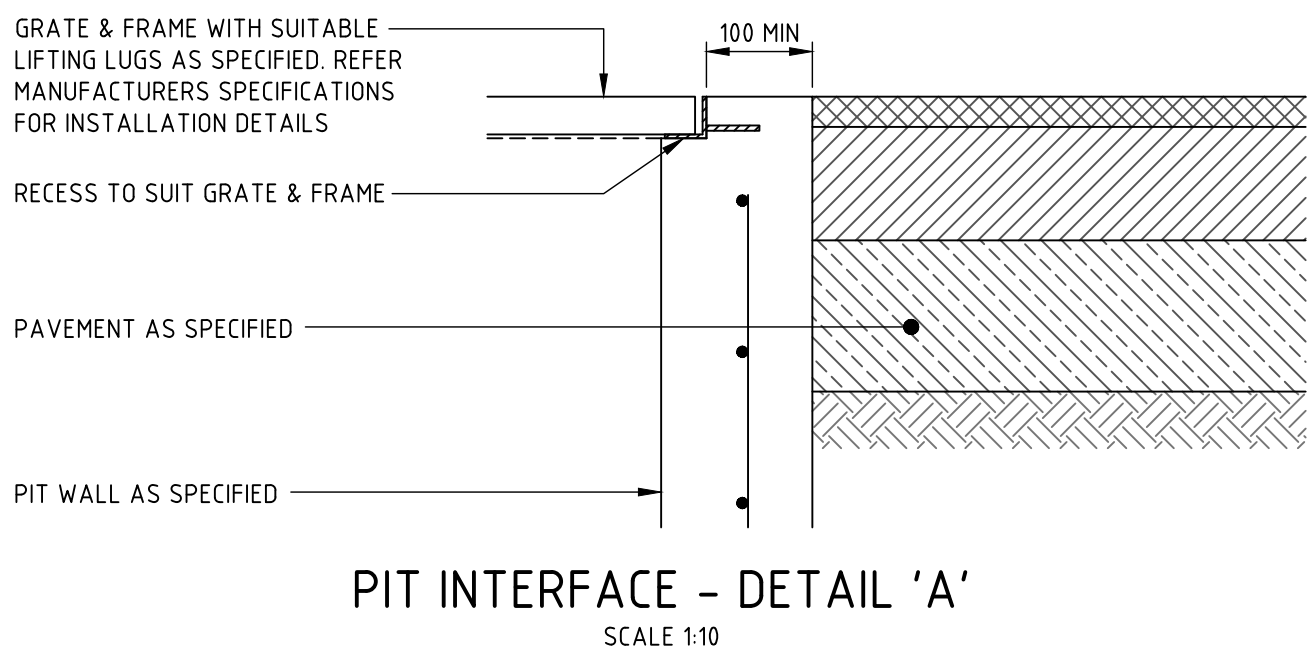
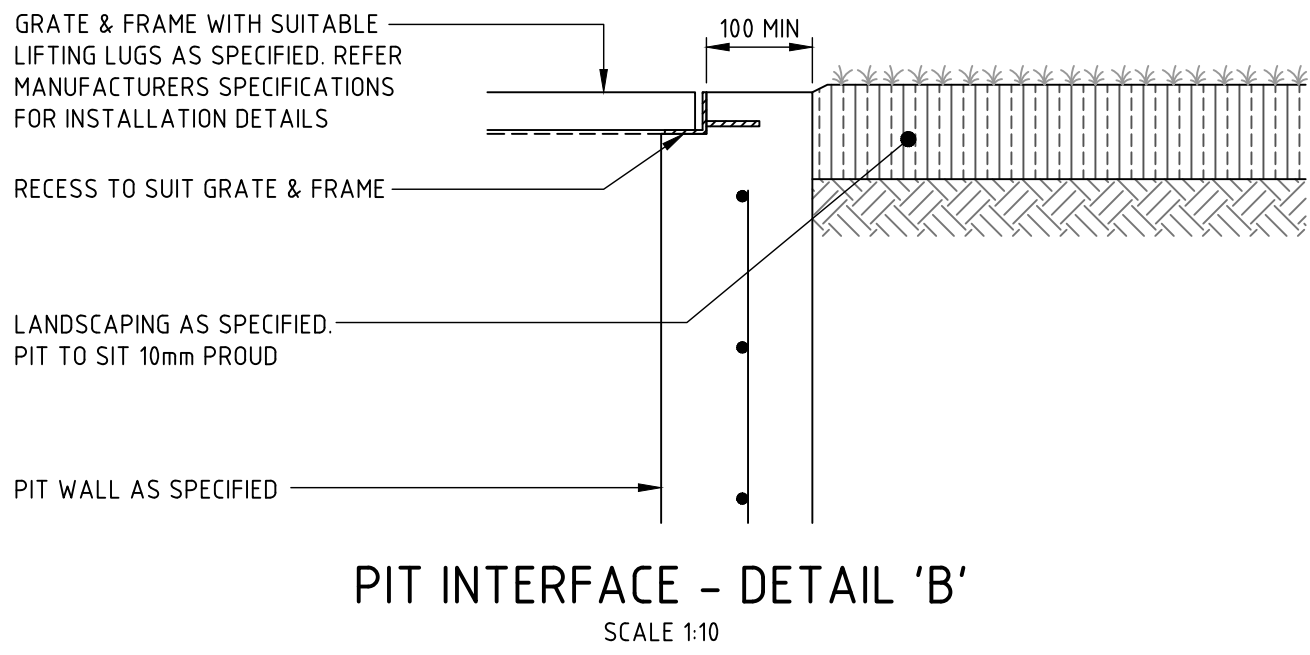
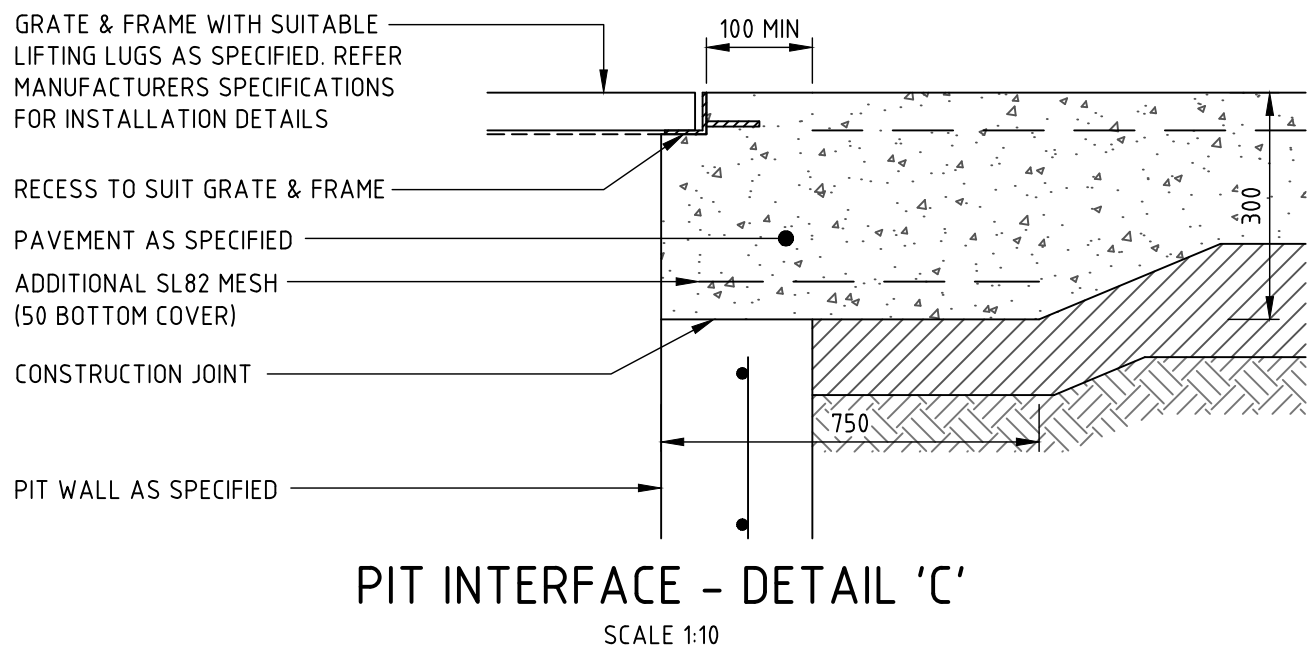
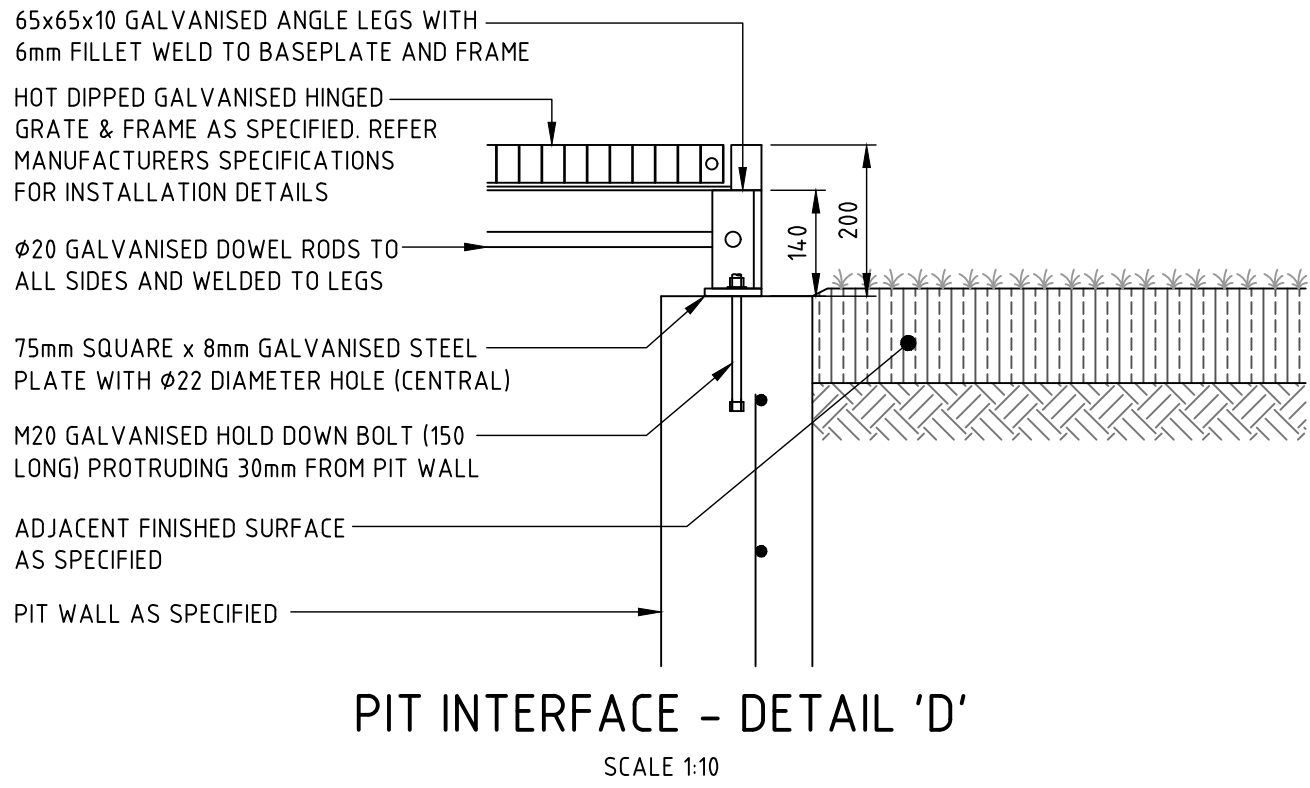
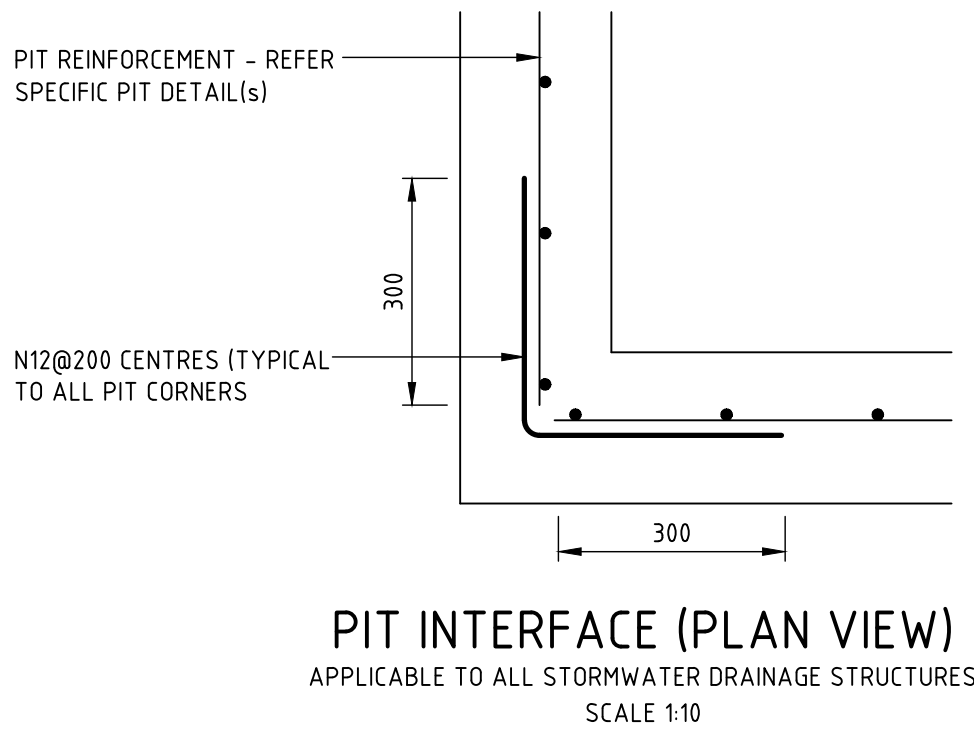


KERB INLET PIT 'KIP'

PIT STRUCTURE TO BE 200mm THICK UNLESS SHOWN OTHERWISE. DRILL AND EPOXY PLASTIC PROPRIETARY STEP IRONS IN ACCORDANCE WITH AUSTRALIAN STANDARDS AND MANUFACTURERS SPECIFICATIONS (PITS > 1000mm DEPTH).
REFER PIT INTERFACE DETAIL 'F' FOR CORNER REINFORCEMENT

SCALE 1:20

Drawing Location: C:\S Projects\Sydney\2021\pba\21979-03 - Flower Power - Terry Hills New DA\Civil Drawings\A Working\02-DA-02\SY21979-DAC06.01
Date plotted: 23/06/2025
Sheet size: A1
Drawing to be printed in colour
Drawing © Northrop Consulting Engineers Pty Ltd



NOT FOR CONSTRUCTION

NORTHROP

PARTNERS

flowerpower

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JOB MANAGER
A.CARVALHAES
VERIFIER

REV.	DESCRIPTION
2	ISSUED FOR DEVELOPMENT APPLICATION
1	ISSUED FOR INFORMATION

ISSUED	DATE
MM	23.06.25
AS	29.05.25

PROJECT
FLOWER POWER

ADDRESS
277 MONA VALE ROAD,
TERREY HILLS
NSW 2084

DRAWING
STORMWATER MANAGEMENT
DETAILS - SHEET 03

JOB No.
SY211979
DRAWING No.
DAC06.03

REV.

2

SCALE VARIES

Scale at