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202701-CR01-B 28-32 Somerset Street, Kingswood – Stormwater Management Report

Rev	Description	Prepared by	Reviewed by	Issue Date	Client App	Approval Date
A	Issued for Information	AC	PC	10/11/20		
B	Issued for Development Application	AC	PC	13/11/20		

1. Introduction

Northrop Consulting Engineers (Northrop) has been engaged by Boston Global to prepare documentation in support of a Development Application (DA) Submission to Penrith City Council (PCC) for the proposed residential development at 28-32 Somerset Street, Kingswood.

The proposed development will involve the demolition of an existing residential dwellings within the subject site and the construction of a 4-star hotel.

Northrop has been engaged to prepare a Stormwater Management Report (and accompanying plans) for the proposed development.

The report outlines the stormwater management strategy developed for managing stormwater runoff from the proposed development, so to document that the proposed concepts meet Council's specifications and requirements within the 2014 DCP as well as Stormwater Drainage for Building Developments. This report should be read in conjunction with Northrop's prepared civil DA drawing set 202701 DA1.01-DA6.01.

2.2. Proposed Development

The proposed development will involve the demolition of 1 existing residential dwelling within the subject site and the construction of a 4 star hotel.



Figure 2 – Proposed development 3d view

Refer to the architectural drawings prepared by Rothelowman Architecture for more details.

2.3. Existing Stormwater Infrastructure

Council has confirmed that there is no existing stormwater infrastructure (i.e. below ground pit and pipe system) present within the roadways fronting the site and that the nearest council stormwater asset is approximately 200m east along Hargrave Street. Please refer to Northrop's civil DA drawings for further details.

For further information on services such as electrical, sewer, water and gas refer to other disciplines.

2.4 Existing Services & Utilities

Based on a Dial Before You Dig assessment, the following services & utilities are available for the proposed development;

- Jemena Gas
- NBN Underground Fibre Optic Cable
- Sydney Water (sewer and water)
- Telstra

2.5 Ground Water

Based on the geotechnical report prepared by Douglas Partners, groundwater will not be an issue as the lowest basement level is above the groundwater table. Tanking of the basement is not expected.

3. Overland Flow Study

The site falls within the South Creek Catchment at the upper end of the Werrington Creek sub-catchment. Referring to the South Creek Flood Study, we have concluded the site is not affected by flooding due to upwelling of natural water courses or stormwater channels.

The topography of lands surrounding is relatively flat avoiding landforms that would concentrate surface stormwater runoff. Thus, in this basis we believe it is unlikely the site is affected by overland flow.

4. Stormwater Management

The stormwater Management measures have been designed to comply with the following guidelines:

- Australian Rainfall and Runoff;
- Penrith City Council's Development Control Plan (DCP), 2014; and
- Penrith City Council's Stormwater Drainage for Building Developments

4.1. Proposed Stormwater Drainage Network

Stormwater generated across the site will be captured and conveyed across the site via an in-ground stormwater pit and pipe network. The pit & pipe arrangement will collect/convey site runoff via outlets to the kerb. Only one (1) connection point per 15m street frontage will be provided as per Council's requirements. A rainwater tank is proposed to collect roof drainage and be utilised for re-use opportunities around the site.

The ILSAX method has been used to model the hydrologic and hydraulic characteristics of stormwater runoff and flow across the site using DRAINS. The system will be designed for a 10% AEP storm event while the overland flow paths will be designed for the 1% AEP storm event. Any areas that cannot be provided with an overland flow path will have a system designed for the 1% AEP storm event. The proposed system will include rainwater reuse and water quality treatment measures in accordance with Council's guidelines. The rainfall data adopted for the stormwater design were based on 2016 data from Australian Runoff and Rainfall data hub.

The proposed discharge connection is 2 x 125 x 75 Rectangular Hollow Sections (RHS) at the kerb and gutter at the lowest point of the site. This connection point will only drain the stormwater from the roof as the podium and basement ramp stormwater will drain to the basement pump-out system and discharge to the public drainage at a later stage (generally after the peak flow). The RHS will also assist to reduce the flow velocity at this connection to the Council kerb and gutter. The rainwater tanks and water quality chamber will also assist to offset the peak flow discharged from the site.

As the site discharge exceeds the maximum of 25l/s for the 10% AEP event, DRAINS modelling was undertaken to analyse the impacts of the site discharge to the gutter flows in Hargrave Street.

The catchment area draining to the existing kerb inlet pit in Hargrave St, downstream of the site, was determined utilising contours obtained from “Elevation and Depth – Foundation Spatial Data” (ELVIS). Figure 3 shows the existing catchment and location of the pit in relation to the subject site.



Figure 3: Catchment of the existing kerb inlet at Hargrave St.

The catchments and gutter flow was modelled in DRAINS and the 1% AEP and 10% AEP results are provided Figure 4 and Figure 5.

Generally, it can be observed that the increase in stormwater discharge caused by the site is negligible in both the minor and major storms. The maximum flow depth increases by only 4mm in the 10% AEP storm and 5mm in the 1% AEP storm, and in both cases the $V \times d$ is still less than 0.4, and therefore the overland flow route is still safe.

4.2. Rainwater Harvesting and On-site Re-use

Rainwater harvesting will minimise the generation of stormwater from the development and as such, a 15kL rainwater tank is proposed. This will be utilised to capture all roof drainage. In this regard, the concept stormwater design is considering reuse for irrigation of the landscaped areas.

4.3 OSD Requirements

On-site detention is not required for the proposed site based on Penrith City Council's Stormwater Drainage for Building Developments document. In this case, stormwater is to discharge to the kerb and gutter system in Hargrave Street as described in section 4.1.

For more details refer to the civil DA drawings.

5. Stormwater Quality

The stormwater quality management measures have been designed to comply with the following guidelines:

- Penrith City Council's Water Sensitive Urban Design Policy;
- Penrith City Council's Water Sensitive Urban Design Technical Guidelines

5.1 Music Modelling

The MUSIC software package was used to assess the extent of pollutant discharged from the site. The effectiveness of the proposed "treatment train" has been assessed based on modelling of the post development conditions with treatment measures

To appropriately manage the volume of pollutants discharged from the site, a treatment train will need to be developed to capture and remove as much of the pollutants from the site before they are discharged to the street;

- Building Runoff – via first flush devices to rainwater reuse tank;
- Rainwater Reuse Tank;
- Stormfilter 3 x cartridge system (Ocean Protect); and
- 2 x Ocean Guard (Ocean Protect) filter basket;

The results from the MUSIC model of the site under proposed conditions with the described treatment devices are presented in *Table 2* below.

Table 2 - MUSIC modelling results of the Subject Site under Post Developed Conditions

Pollutants	% Reduction Under Proposed Conditions	% Reduction Targets required by Council
Gross Pollutants (GP)	100%	90%
Total Suspended Solids (TSS)	87.5%	85%
Total Phosphorous (TP)	68%	60%
Total Nitrogen (TN)	51.5%	45%

Refer to Figure 4 for the MUSIC modelling results for the proposed development.

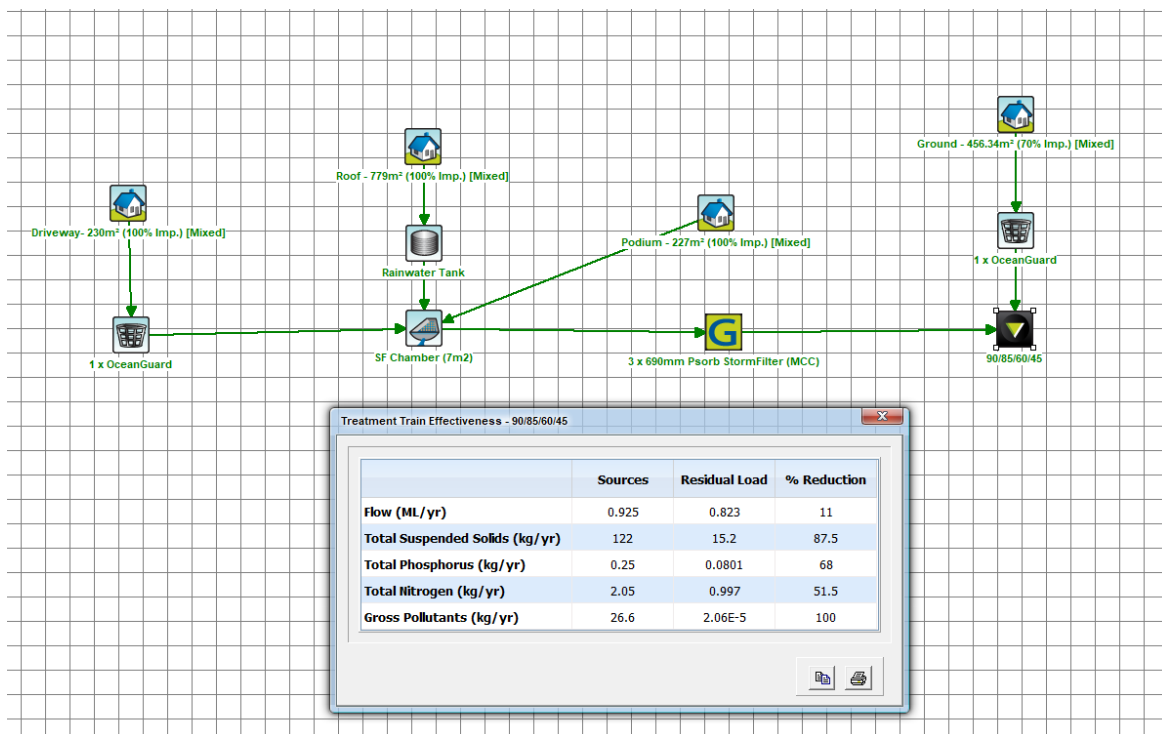


Figure 4 - MUSIC screenshot of Modelling Results of the Site Area under Proposed Development Conditions

The results in *Table 2* show that the implementation of the proposed treatment devices within the treatment train can effectively capture and remove a sufficient amount of pollutants from the site. The results demonstrate that the proposed treatment train can effectively reduce the total volume of pollutant discharged from the site under proposed conditions to ensure they meet Council's requirements of:

- Gross Pollutants (GP) Reduction: 90%
- Total Suspended Solids (TSS) Reduction: 85%
- Total Phosphorus (TP) Reduction: 60%

- Total Nitrogen (TN) Reduction: 45%

5.1.1. PROPOSED STORMWATER TREATMENT TRAIN

In order to achieve the reduction targets presented in Section 5.1, the following treatment devices are required as part of the treatment train:

- Ocean Protect OceanGuard 200 inserts

A total of 2 x Ocean Protect OceanGuard 200 inserts will be used as pre-treatment for stormwater runoff to capture litter and coarse sediment from part of the site. The following capture rates have been adopted for the MUSIC model, based on information provided by Stormwater360:

○ TSS	85%
○ TN	45%
○ TP	60%
○ GP	90%

- 15kL Rainwater Tank

A 15kL rainwater tank will be implemented to capture stormwater runoff generated off the roof of the building (approx. 779m²). The collected rainwater will be used for irrigation of the landscaped areas across the site (approximately 280m²).

The reuse rate adopted for the rainwater 0.4kL/m²/year as per Penrith's WSUD Technical Guidelines (2015).

According to the MUSIC model, the percentage of non-potable demand met is 91.96%.

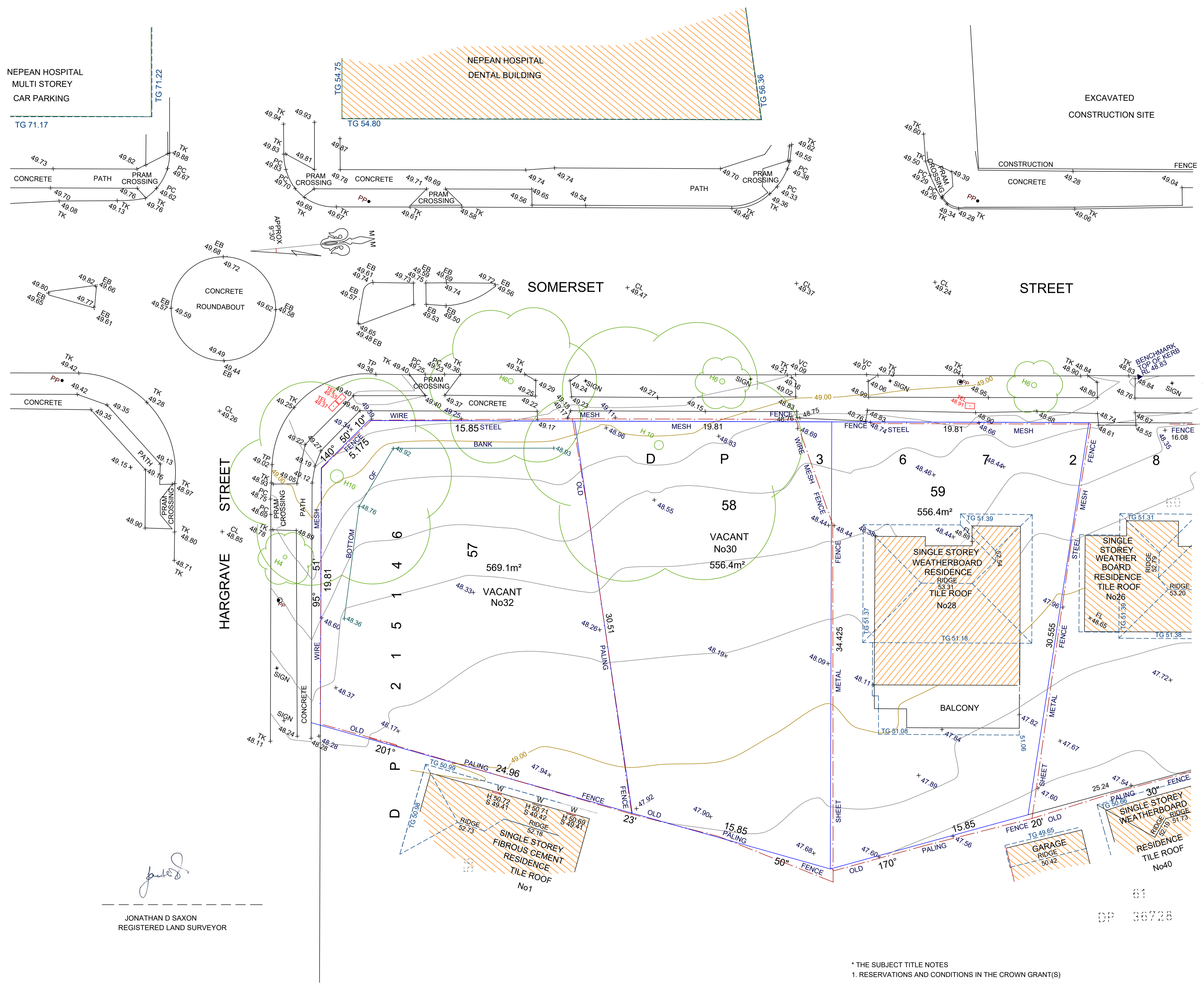
A draft operation and maintenance Schedule for the above treatment devices is presented in Appendix C.

6. Conclusion

Northrop Consulting Engineers has prepared this report and the corresponding drawings to provide information to Penrith City Council on the stormwater management requirements for the development to assist Council in assessing the Development Application.

The findings of this report and associated concept designs indicates effective stormwater management measures can be integrated into the proposed development, in accordance with the Penrith City Council's engineering standards, and that no major factors relating to stormwater management would preclude the proposed development of the site.

Attachment A – Site Survey



JONATHAN D SAXON
REGISTERED LAND SURVEYOR

A1

NOTES :
 * BOUNDARIES HAVE NOT BEEN DEFINED BY SURVEY AND ARE DIAGRAMMATIC ONLY.
 * LAND DIMENSIONS AND AREAS HAVE BEEN COMPILED FROM PLANS OBTAINED FROM NEW LRS.
 * BEARINGS RELATE TO NORTH ORIGINATING FROM DP 213146
 * LEVEL DATUM IS AHD ORIGINATING FROM SSM 45119 RL 48.44 LOCATED AT THE GREAT WESTERN HIGHWAY
 * VISIBLE, ACCESSIBLE SERVICES ONLY HAVE BEEN LOCATED. THIS PLAN DOES NOT PURPORT TO SHOW UNDERGROUND SERVICES.
 * THE EXISTENCE OF UNDERGROUND SERVICES HAS NOT BEEN ESTABLISHED.
 * EXISTENCE OF SERVICES MUST BE VERIFIED BY CONTACTING DIAL BEFORE YOU DIG (DBYD) 1100.COM.AU
 * CRITICAL SERVICES MUST BE EXPOSED AND LOCATED
 * NEIGHBOURING HOUSES - WINDOWS AND ROOF POSITIONS ARE APPROXIMATE ONLY.
 * FLOOR LEVELS GENERALLY SURVEYED AT DOOR THRESHOLDS. INTERNAL ROOMS NOT SURVEYED.
 * CONTOURS SHOWN ARE INDICATIVE OF LAND FORM. SPOT LEVELS SHOULD TAKE PRECEDENCE.
 * REFER TO FACE OF PLAN FOR SUBJECT TITLE NOTATIONS.
 * THIS TITLEBLOCK IS AN INTEGRAL PART OF THIS DRAWING AND SHOULD NOT BE REMOVED.

LEGEND
 ELP - ELECTRIC LIGHT POLE
 HYD - HYDRANT
 PC - PRAM CROSSING
 TK - TOP KERB
 TG - TOP GUTTER
 PP - POWER POLE
 SMH - SEWER MANHOLE
 SP - SIGN POST
 SV - STOP VALVE
 TEL - TELSTRA PIT
 VC - VEHICLE CROSSING
 EB - EDGE OF BITUMEN
 HG - HEIGHT OF TREE

SHEET 1 OF 1

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REV	AMENDMENTS	DATE
A	LOTS ADJUSTED, SCALE CHANGED	28.10.2020

CLIENT: BOSTON GLOBAL
 PLAN OF: No28, No30 & No32
 SOMERSET STREET,
 KINGSWOOD
 BEING: LOT 57 IN DP215146
 LOTS 58-60 IN DP36728
 SHOWING: GENERAL DETAIL AND
 SITE LEVELS
 PURPOSE: ARCHITECTURAL DESIGN
 COUNCIL SUBMISSION

SCALE 1:150

JOB REF.: D04666
 DRAWING No. D04666-DETAIL
 SURVEYOR: CHRIS T
 CHECKED: JONATHAN S
 REGISTERED LAND SURVEYOR
 DATE: 21.10.2020
 DATUM: A.H.D.
 ORIGIN: SSM 45119 RL 48.44
 REFERENCE SYSTEM: LOCAL

BELLA VISTA
 PO Box 7419
 BAULKHAM HILLS NSW 2153
 SUITE 405, LEVEL 4
 14 LEXINGTON DRIVE
 BELLA VISTA NSW 2153
 PHONE : 9056 1900
 email: office@projectsurveyors.com.au
 www.projectsurveyors.com.au
 ABN 20 068 433 974



* THE SUBJECT TITLE NOTES
 1. RESERVATIONS AND CONDITIONS IN THE CROWN GRANT(S)

61
 DP 36728

28 - 32 SOMERSET STREET, KINGSWOOD

CONCEPT STORMWATER MANAGEMENT PLAN CIVIL ENGINEERING PACKAGE - DEVELOPMENT APPLICATION



LOCALITY PLAN


SOURCE : NEARMAP.COM.AU (©2015)

DRAWING SCHEDULE	
DRG No.	DRAWING TITLE
DA_C01.01	COVER SHEET
DA_C02.01	CONCEPT SEDIMENT EROSION CONTROL PLAN
DA_C02.11	SEDIMENT EROSION CONTROL DETAILS
DA_C04.01	SITWORKS & STORMWATER MANAGEMENT PLAN
DA_C05.01	DRIVEWAY LONGITUDINAL SECTIONS
DA_C06.01	DETAILS

DRAWN: M.HAI
DESIGNED: P.CORNISH
JOB MANAGER: P.CORNISH
VERIFIER:

REVISION	DESCRIPTION	ISSUED	VER'D	APP'D	DATE
01	ISSUED FOR INFORMATION	MM		PC	09.11.20
02	ISSUED FOR DEVELOPMENT APPLICATION	CP		PC	13.11.20

CLIENT

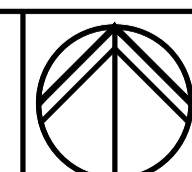


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ARCHITECT



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PROJECT

**28 - 32 SOMERSET STREET,
KINGSWOOD**

DRAWING TITLE

**CIVIL ENGINEERING PACKAGE
DEVELOPMENT APPLICATION**

COVER SHEET

JOB NUMBER

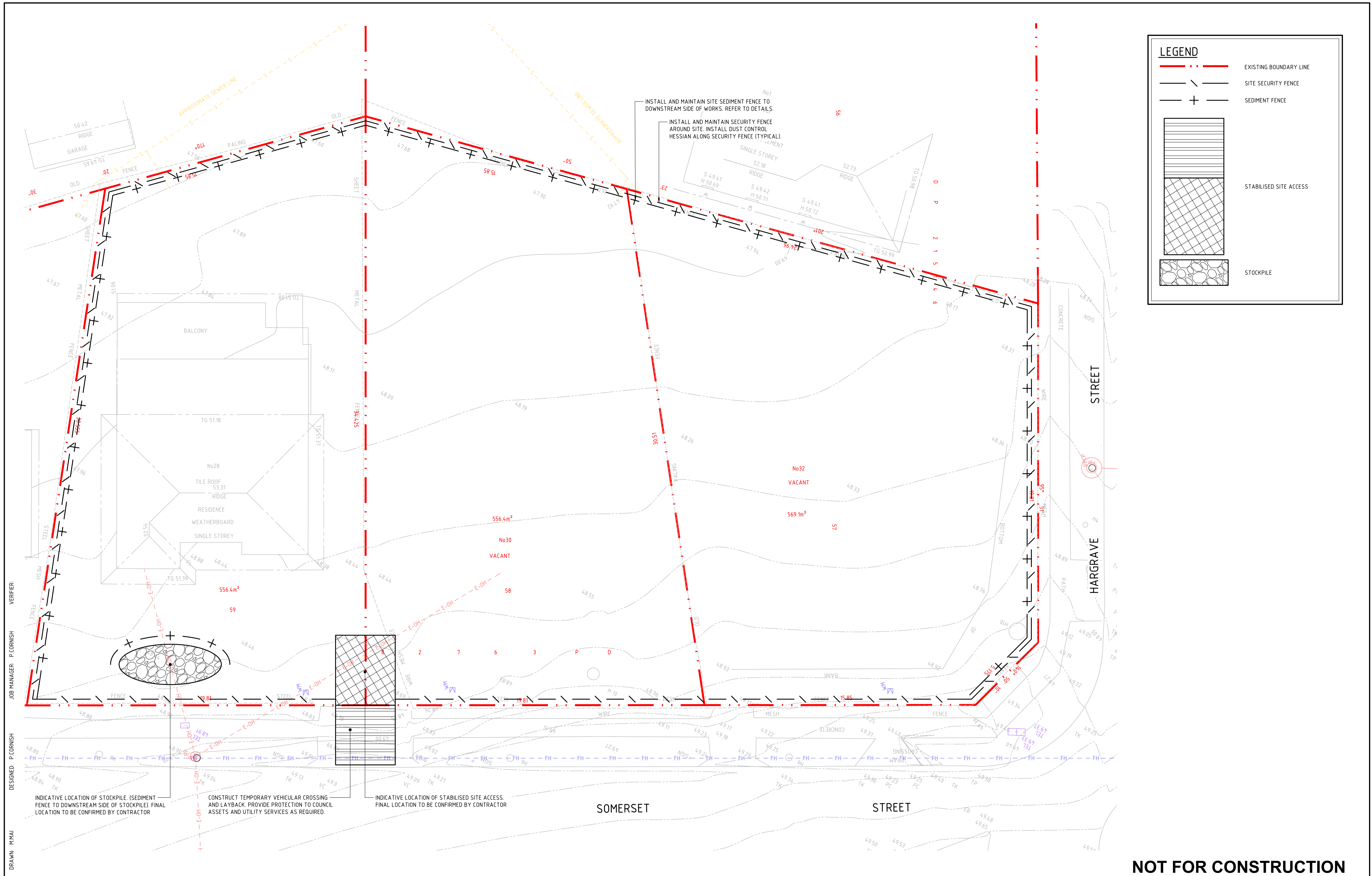
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LEGEND

- EXISTING BOUNDARY LINE
- SITE SECURITY FENCE
- SEDIMENT FENCE
- STABILISED SITE ACCESS
- STOCKPILE

DRAWN: M.MAI
 DESIGNED: P.CORNISH
 JOB MANAGER: P.CORNISH
 VERIFIER: P.CORNISH

INDICATIVE LOCATION OF STOCKPILE. (SEDIMENT FENCE TO DOWNSTREAM SIDE OF STOCKPILE). FINAL LOCATION TO BE CONFIRMED BY CONTRACTOR

CONSTRUCT TEMPORARY VEHICULAR CROSSING AND LAYBACK. PROVIDE PROTECTION TO COUNCIL ASSETS AND UTILITY SERVICES AS REQUIRED.

INDICATIVE LOCATION OF STABILISED SITE ACCESS. FINAL LOCATION TO BE CONFIRMED BY CONTRACTOR

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0 1 2 3 4 5m

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DRAWING TITLE

CIVIL ENGINEERING PACKAGE DEVELOPMENT APPLICATION

CONCEPT SEDIMENT EROSION CONTROL PLAN

JOB NUMBER

202701

DRAWING NUMBER

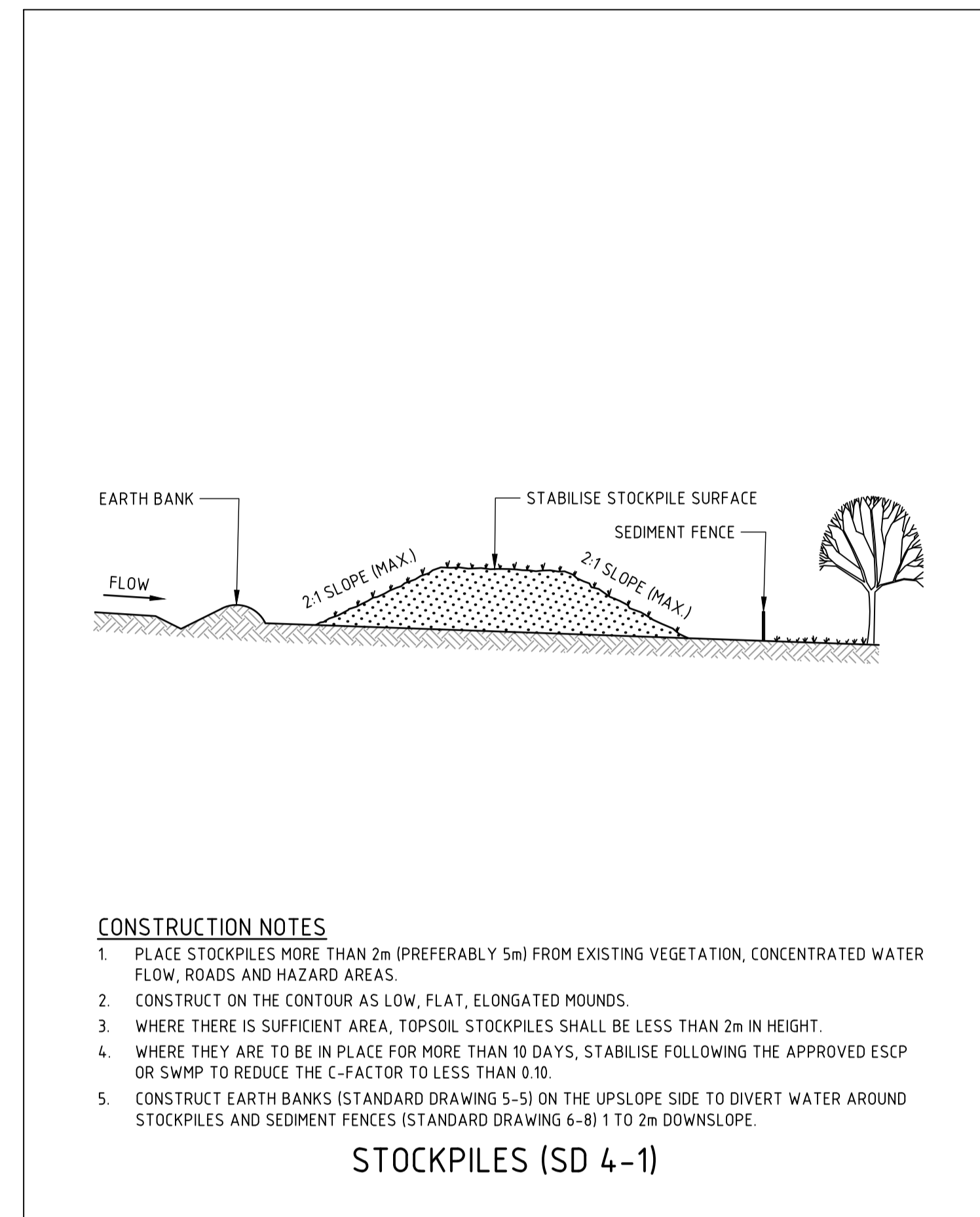
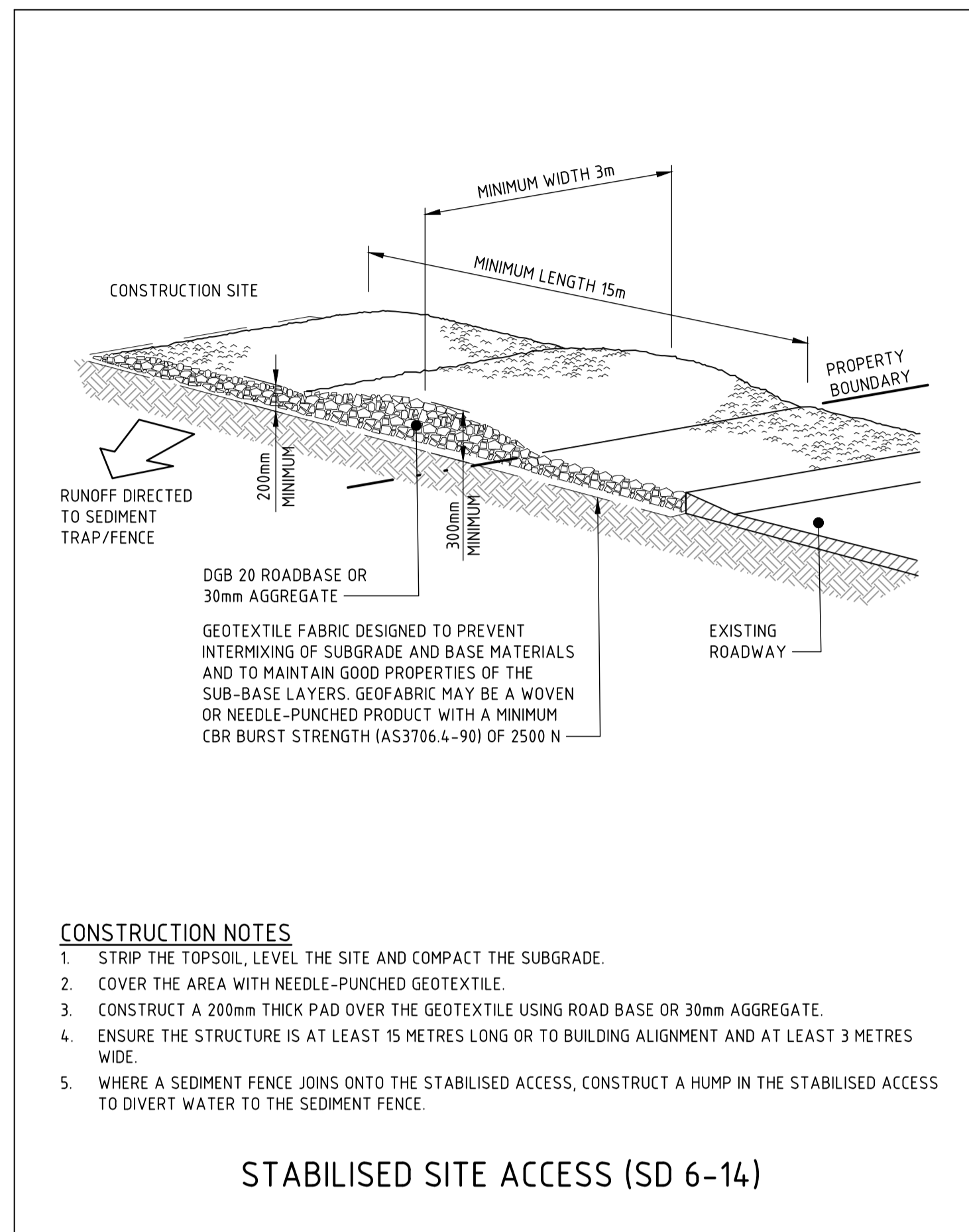
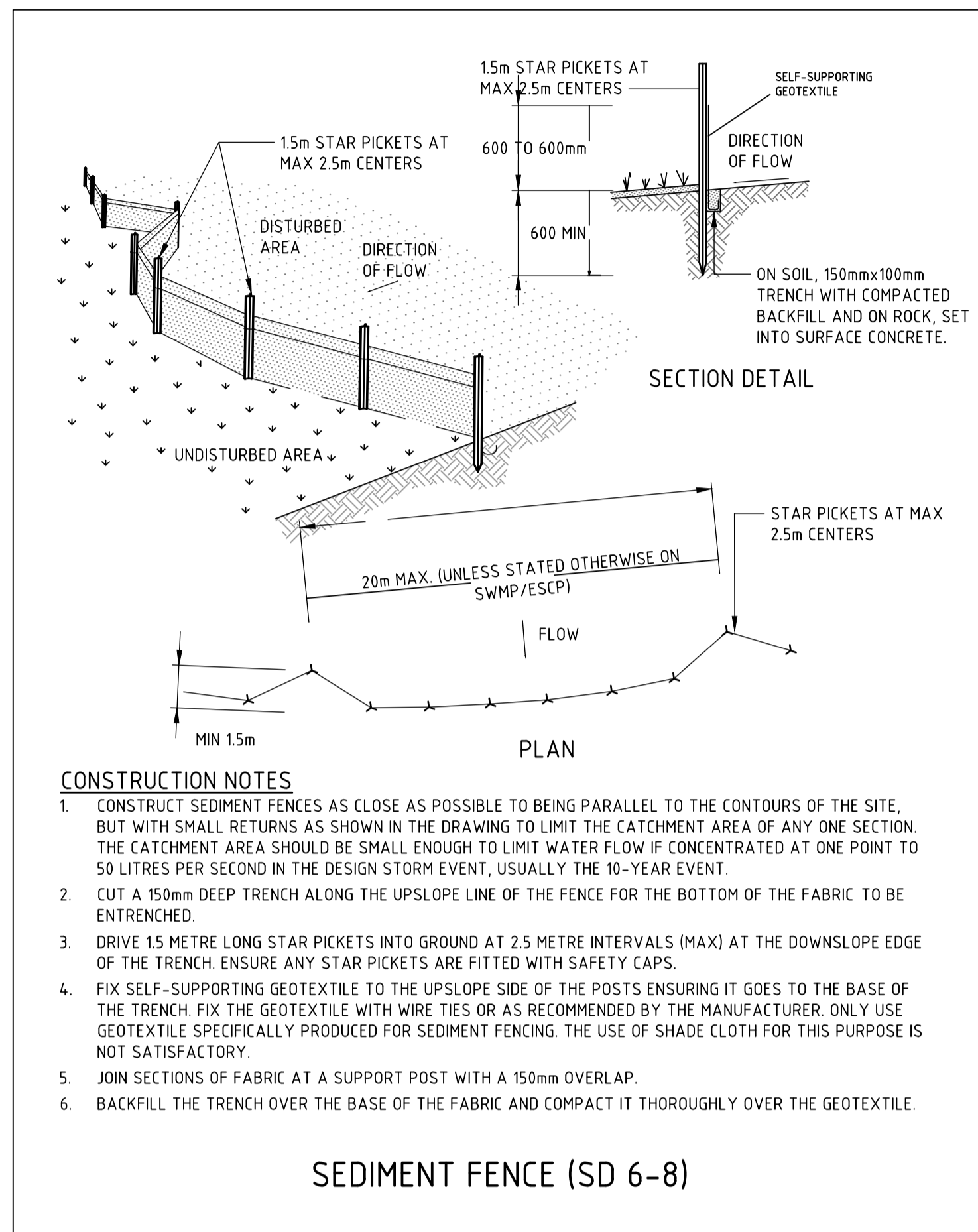
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PROJECT
28 - 32 SOMERSET STREET, KINGSWOOD

DRAWING TITLE
CIVIL ENGINEERING PACKAGE DEVELOPMENT APPLICATION

SEDIMENT EROSION CONTROL DETAILS

JOB NUMBER
202701

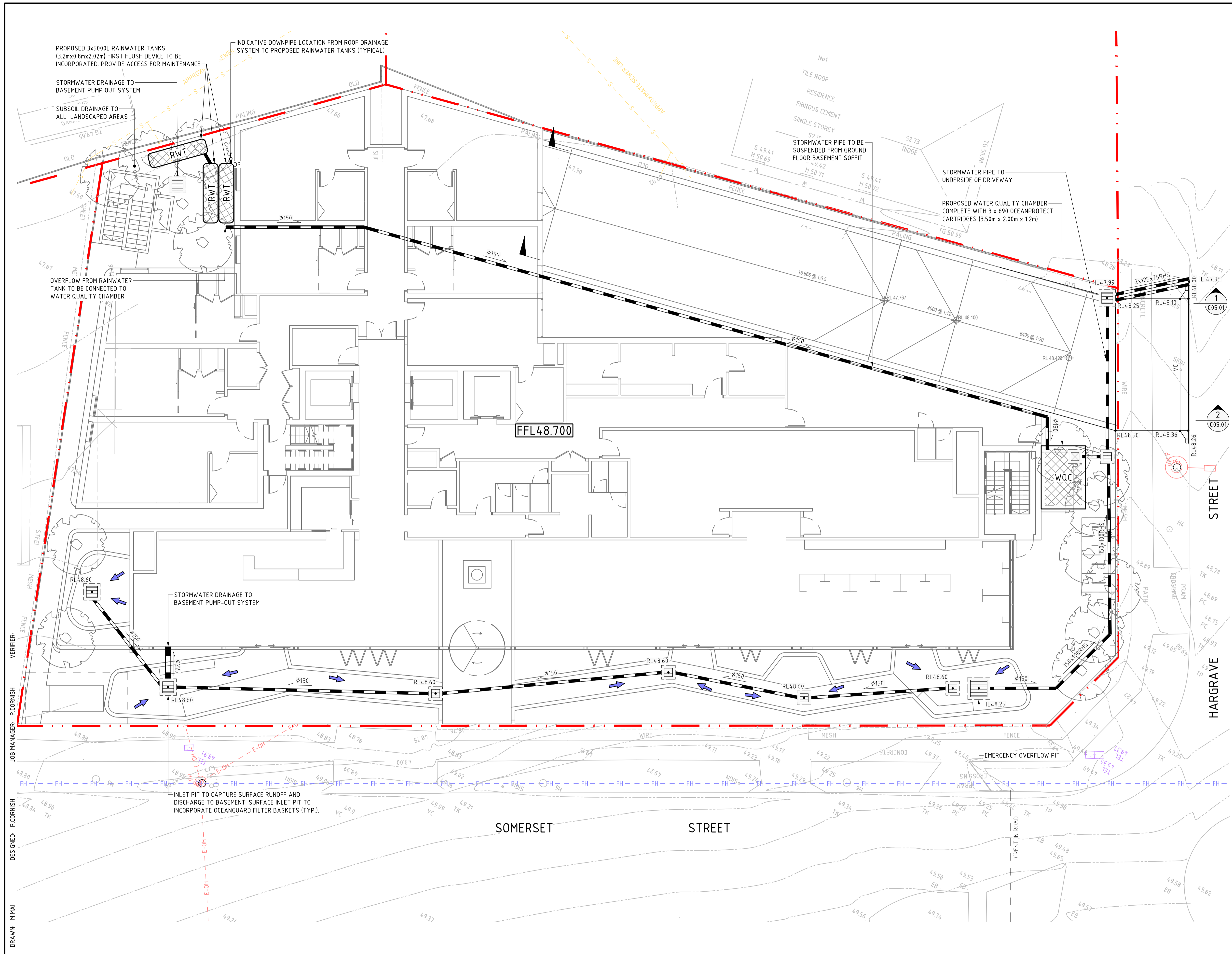
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LEGEND	
	PROPOSED BOUNDARY LINE
	STORMWATER PIPE
	GRATED INLET PIT
	VEHICULAR CROSSING
	PROPOSED SPOT HEIGHT
	RECTANGULAR HOLLOW SECTION
	PROPOSED FINISHED FLOOR LEVEL
	DOWNPIPE
	LANDSCAPING
	RAINWATER TANK

DRAINAGE CALCULATIONS	
SITE - 28-32 SOMERSET STREET KINGSWOOD	
A = CATCHMENT AREA (m ²) = 1694m ²	
OSD NOT REQUIRED - SITE LOCATED IN EXEMPTED AREA	
RAINWATER TANK SIZE = 15KL	
NON-POTABLE DEMAND MET = 91.96%	
RAINWATER TO BE USED FOR IRRIGATION PURPOSES	
SITE DISCHARGE	
PRE-DEVELOPMENT	
10% AEP = 45L/s	
1% AEP = 73L/s	
POST-DEVELOPMENT	
ROOF DRAINAGE AND BYPASS (TO KERB OUTLET)	
10% AEP = 47L/s	
1% AEP = 74 L/s	
BASEMENT PUMP OUT SYSTEM	
10% AEP = 25L/s	
1% AEP = 40 L/s	

- GENERAL NOTES**
- REFER SPECIFICATION NOTES FOR STORMWATER GENERAL REQUIREMENTS.
 - ALL WORKS TO BE CARRIED OUT WITH COUNCIL/RELEVANT AUTHORITY SPECIFICATIONS AND DETAILS.
 - STORMWATER PIPES HAVE BEEN DESIGNED TO CATER FOR THE 1 IN 100 YEAR ARI STORM EVENT.
 - REFER TO STORMWATER MANAGEMENT REPORT PREPARED BY NORTHPROP FOR FURTHER MANAGEMENT DETAILS.
 - SUBSOIL DRAINAGE TO ALL LANDSCAPED AND RETAINING WALLS.
 - ALL STORMWATER SURFACE INLET PITS TO BE FITTED WITH 'OCEANGUARD' INSERT AND 200 MICRON FILTERS.
 - PROVIDE DRAINAGE CONNECTION TO KERB IN ACCORDANCE WITH COUNCIL STANDARD DETAILS AND SPECIFICATIONS.
 - ALL STORMWATER DESIGN INDICATED IS CONCEPT FOR DEVELOPMENT APPLICATION PURPOSES ONLY AND IS SUBJECT TO DETAILED DESIGN.

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DRAWING TITLE

CIVIL ENGINEERING PACKAGE DEVELOPMENT APPLICATION

SITWORKS & STORMWATER MANAGEMENT PLAN

JOB NUMBER

202701

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REVISION

02

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DESIGNED: P.CORNISH
 JOB MANAGER: P.CORNISH
 VERIFIER:

DRAWN: M.HAI



DRIVEWAY LONGITUDINAL SECTION 1
 DESIGN VEHICLE 6.4m SRV



DRIVEWAY LONGITUDINAL SECTION 2
 DESIGN VEHICLE 6.4m SRV

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PROJECT
28 - 32 SOMERSET STREET, KINGSWOOD

DRAWING TITLE
CIVIL ENGINEERING PACKAGE DEVELOPMENT APPLICATION
 DRIVEWAY LONGITUDINAL SECTIONS

JOB NUMBER
202701

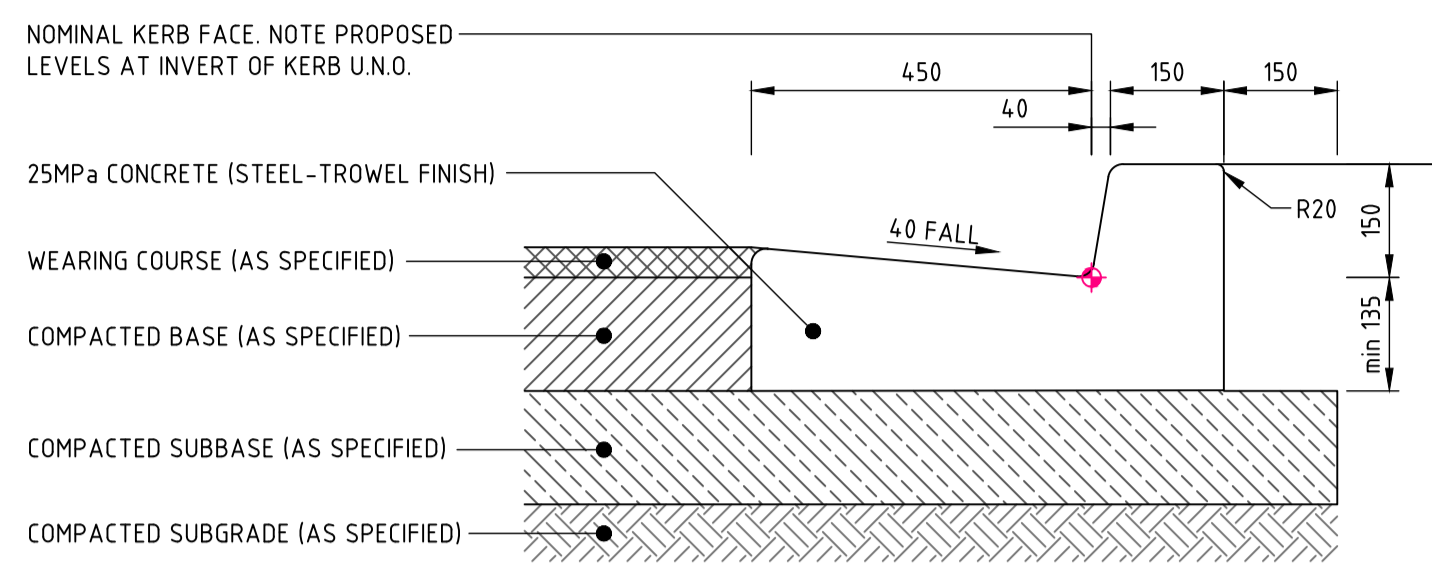
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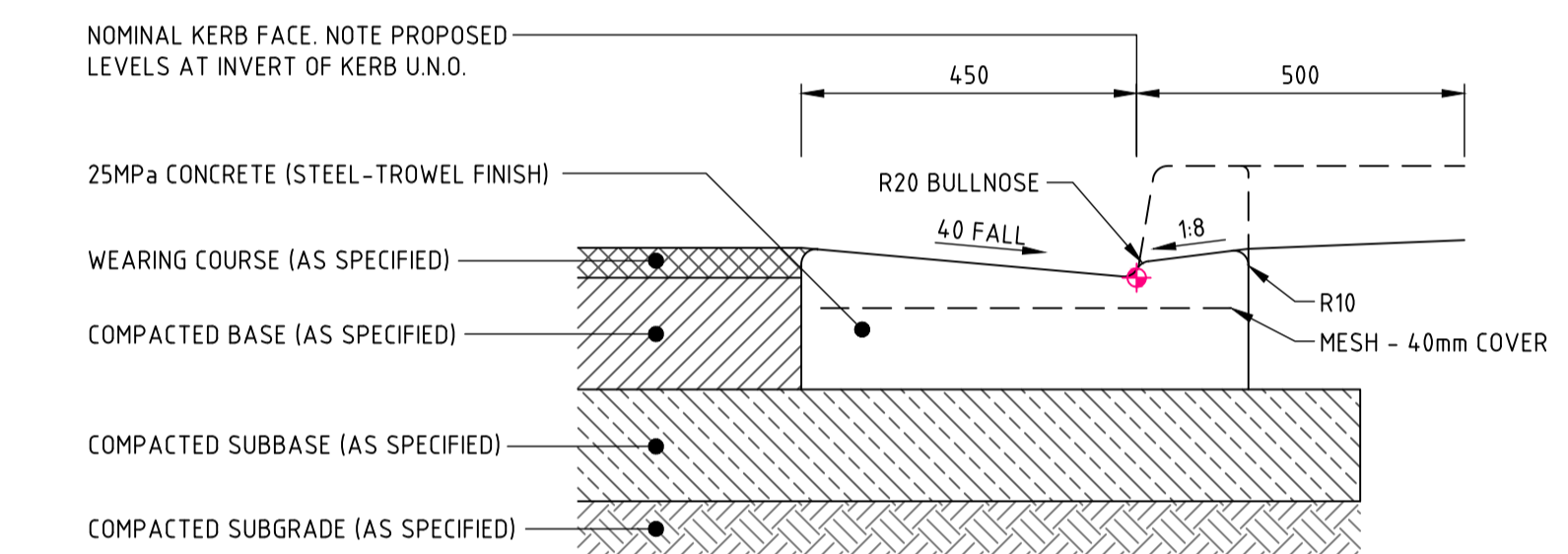
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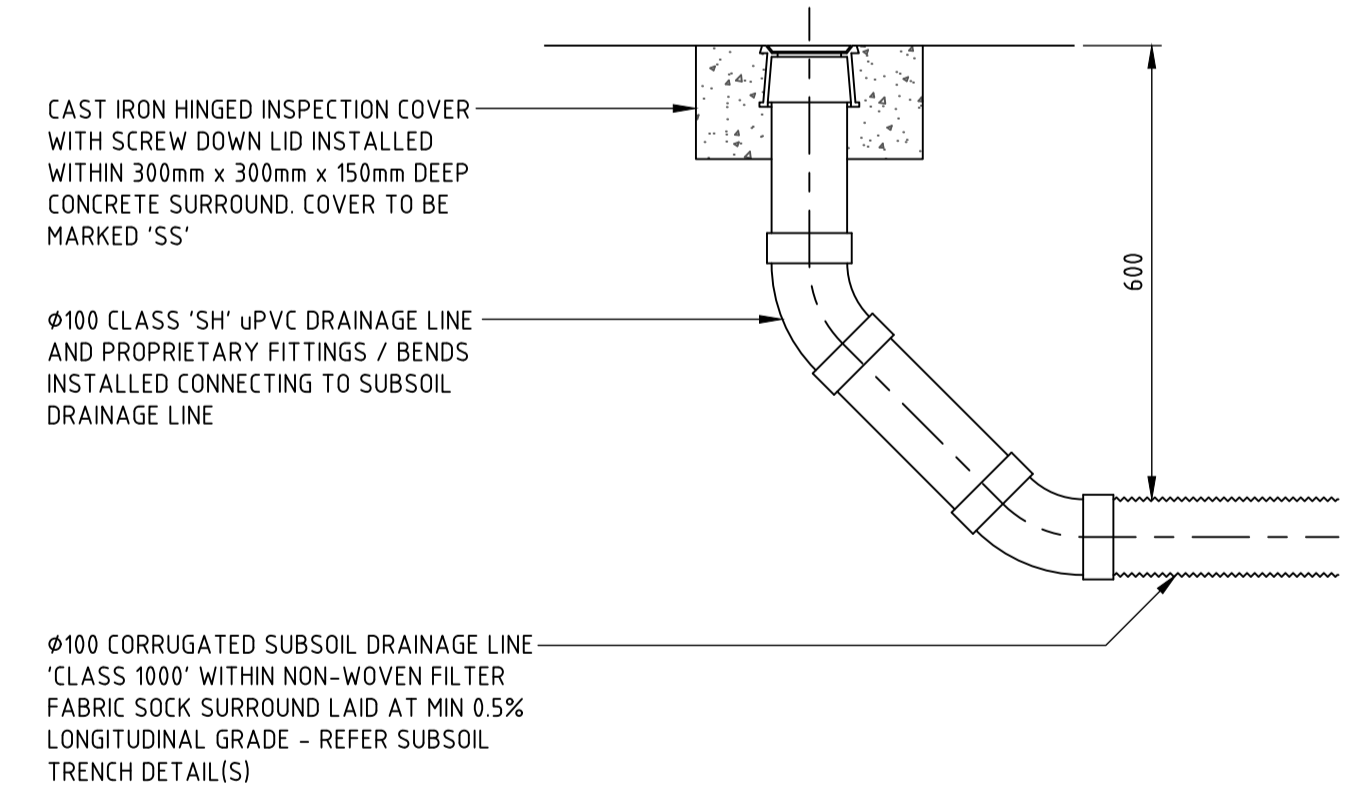
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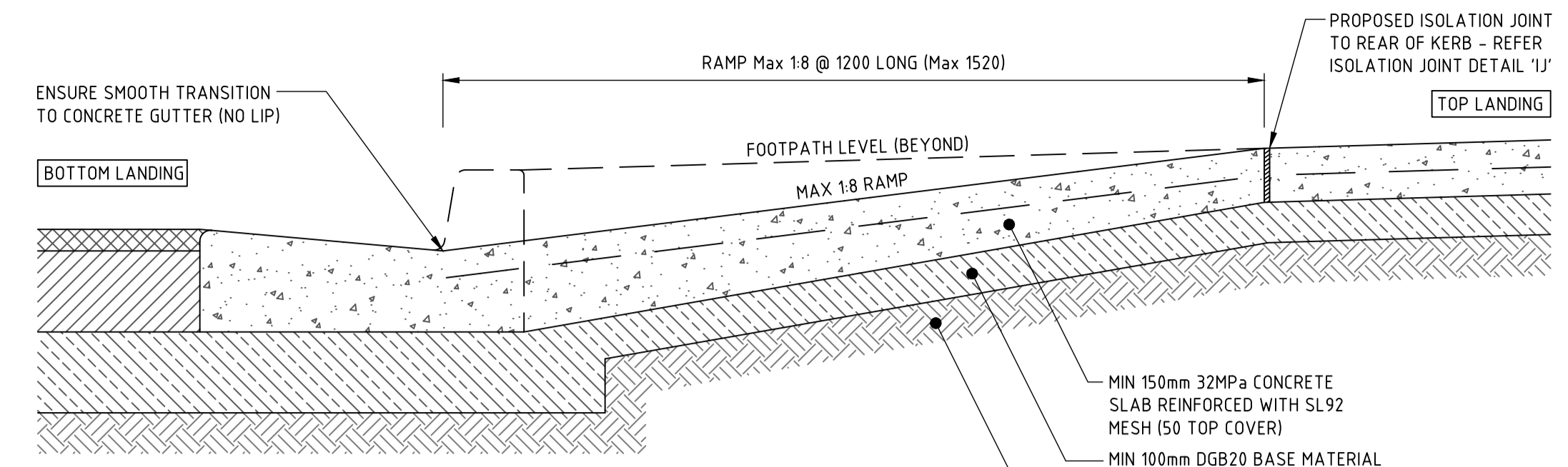
KERB & GUTTER 'KG'
 EXPANSION JOINTS @ MAX 12m CTRS / TOOL JOINTS @ MAX 3m CTRS
 ALL RADII TO BE 20mm U.N.O.



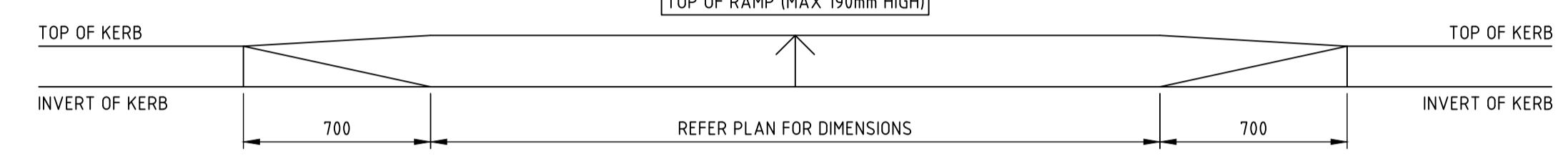
VEHICLE LAYBACK 'VC'
 EXPANSION JOINTS @ MAX 12m CTRS / TOOL JOINTS @ MAX 3m CTRS
 ALL RADII TO BE 20mm U.N.O.



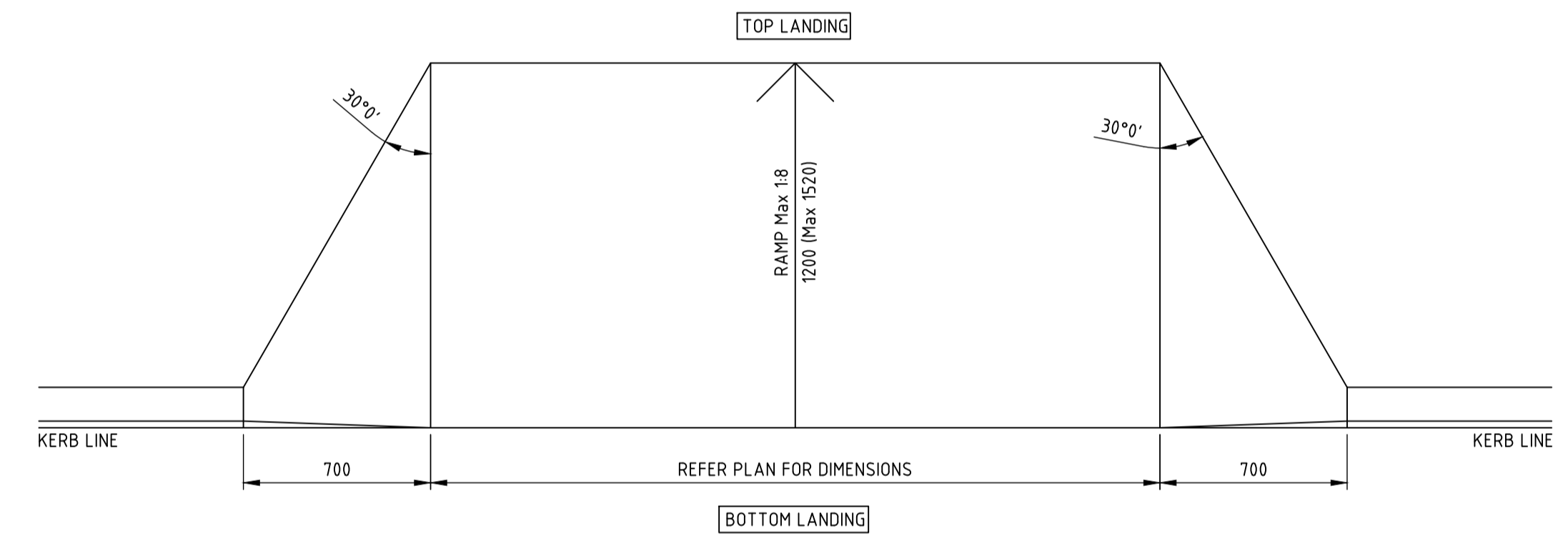
SUBSOIL DRAINAGE CLEAROUT 'CO'
 CLEAROUT TO BE INSTALLED AT UPSTREAM POINTS ALONG SUBSOIL DRAINAGE LINES @ MAX 30m CENTRES AND DISCHARGING TO DRAINAGE STRUCTURES @ MAX 60m CENTRES.



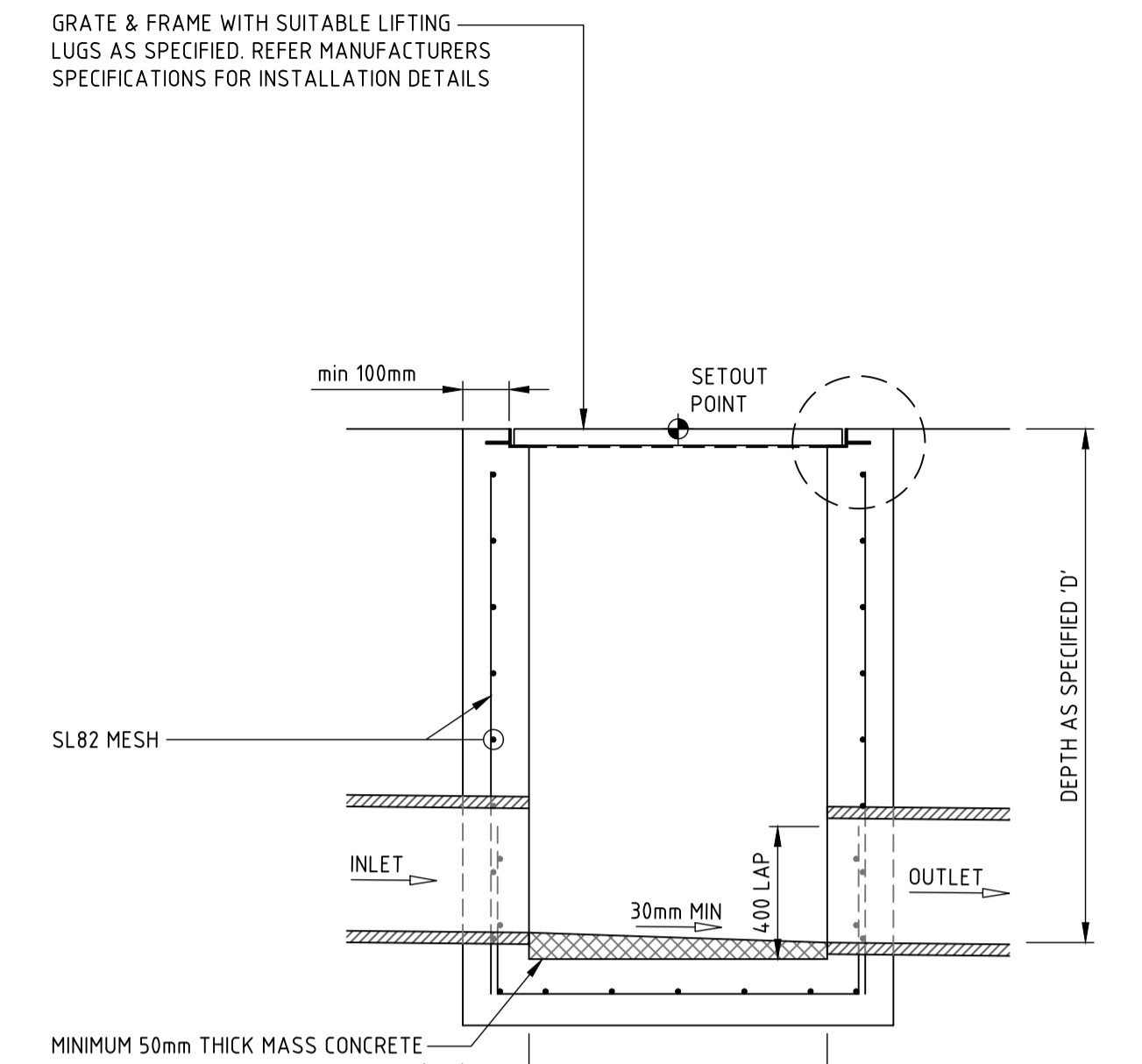
SECTION 1



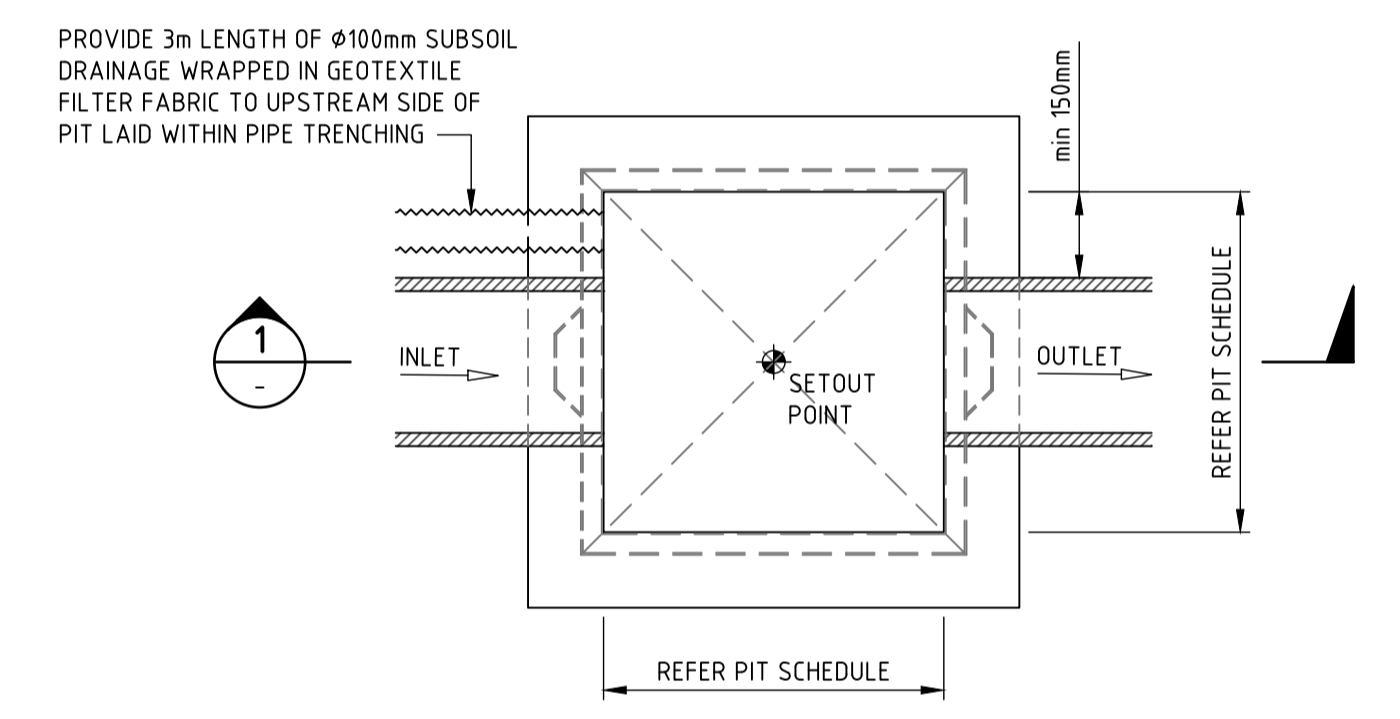
ELEVATION



PLAN VEHICLE CROSSING 'VC'



SECTION 1



PLAN SURFACE INLET 'SIP' / JUNCTION PIT 'JP'
 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.

DRAWN: M.HAI
 DESIGNED: P.CORNISH
 JOB MANAGER: P.CORNISH
 VERIFIER:

REVISION	DESCRIPTION	ISSUED	VER'D	APP'D	DATE
01	ISSUED FOR INFORMATION	MM		PC	09.11.20
02	ISSUED FOR DEVELOPMENT APPLICATION	CP		PC	13.11.20

CLIENT: **Boston Global**

ARCHITECT: **rothelowman**

DRAWING NOT TO BE USED FOR CONSTRUCTION UNLESS VERIFICATION SIGNATURE HAS BEEN ADDED

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PROJECT: **28 - 32 SOMERSET STREET, KINGSWOOD**

DRAWING TITLE: **CIVIL ENGINEERING PACKAGE DEVELOPMENT APPLICATION**

DETAILS

JOB NUMBER: **202701**

DRAWING NUMBER: **DA_C06.01**

REVISION: **02**

DRAWING SHEET SIZE = A1

NOT FOR CONSTRUCTION

Found: T:\2020 Jobs\202701 - 28-32 Somerset Street Kingswood\0-Drawings\Civil\202701-CAD\04-DAL\202701_DAL_C06.01.dwg
 Printed By: CARLTON PASKIE
 Date: 16.04.2020 2:24 PM



Attachment C – Draft Operation and Maintenance Schedule

28-32 Somerset Street Kingswood

Stormwater Maintenance Schedule

Prepared on 13.11.20

Inspected by:

Date of Inspection:

Next Inspection:

Site Description: The site is located on the eastern side of Somerset Street and on the corner of Hargrave Street.

Site Area: 1694m²

Site Access: Direct access to the site will be by Hargrave Street.

Items to be Inspected	Frequency	Performed by	Inspected		Maintenance Needed		Maintenance Procedure	Initial
			Yes	No	Yes	No		
General								
Stormwater surface inlet pits	Four Monthly/ After Major Storm	Owner / Maintenance Contractor					Remove grate and inspect internal walls and base, repair where required. Remove any collected sediment, debris, litter and vegetation. (e.g. Vacum/eductor truck) Inspect and ensure grate is clear of sediment, debris, litter and vegetation. Ensure flush placement of grate on refitment	
General inspection of complete stormwater drainage system (that's visible - including roof gutters)	Bi-annually	Owner / Maintenance Contractor					Inspect all drainage structures noting any dilapidation, carry out required repairs.	
Rainwater Tanks								
First Flush Device	6 Monthly	Owner / Maintenance Contractor					Inspect first flush device to ensure correct operation. Remove accumulated litter & debris. If device is not functioning properly repair or replace.	
Internal Inspection	6 Monthly	Owner / Maintenance Contractor					Check for evidence of access by animals, birds or insects including the presence of mosquito larvae. If present, identify access point and close. If evidence of algae growth, find and close points of light entry.	
Tank and Lids	6 Monthly	Owner / Maintenance Contractor					Check structural integrity of tank including roof and access covers. Any dilapidation including holes or gaps are to be noted and repaired.	
Depth of Sediment within Tank	Every 2 Years	Owner / Maintenance Contractor					De-sludge tank(s) by engaging professional cleaner	
Primary Treatment								
Stormwater 360 Enviropod Pit Inserts (or equivalent)	Refer Manufacturers Manual	Maintenance / Specialised Contractor					Refer to manufacturers operation and maintenance manual.	
Secondary Treatment								
Stormwater 360 Stormfilter Cartridges (or equivalent)	Refer Manufacturers Manual	Maintenance / Specialised Contractor					Refer to manufacturers operation and maintenance manual.	