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202701-CR01-C 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		
C	Issued for Development Application	SH	PC	22/07/21		

Table of Contents

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, and relevant referenced report from Penrith City Council – College, Orth and Werrington Creeks Catchment Overland Flow Flood Study-Final Report-Volume 2 of 2: Figures.

This report should be read in conjunction with Northrop's prepared civil DA drawing set 202701 DA1.01-DA6.02.

1.1. Existing Site Description

The address of the subject site is 28-32 Somerset Street, Kingswood. The site is located within B4 mixed use land zoning area. Refer to **Figure 1** for the site location.

Figure 1 - Locality Plan

The site is generally trapezoidal in shape and covers an area of approximately 1694 m^2. The site is enclosed by Somerset Street on the western boundary and Hargrave Street on the southern boundary.

The existing (pre-development) site condition consists of a single storey dwelling located on 28 Somerset Street whilst 30 and 32 Somerset Street are vacant.

Based on survey information, the general site levels fall from a maximum RL of approximately 49.10 m AHD along the western boundary to a minimum RL of approximately 47.58 m AHD on the eastern boundary constituting an average grade of 4.4%. Refer to Attachment A for the existing site survey plan.

1.2. 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.

1.3. 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 80m 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. Pump out system has been provided for basement level to collect any seepage water along with uncovered driveway runoff to basement and it has been designed in accordance with Council's Stormwater Drainage Specification for Building Developments.

2. 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.

3. 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

3.1. 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 a 225 diameter outlet pipe to a proposed kerb inlet pit in front of the site and then across Hargrave Street to a proposed kerb inlet pit on the southern side of the road where the stormwater will then be conveyed by a proposed 375 diameter pipe to an existing stormwater pit located in front of No. 10 Hargrave Street, Kingwood. There is a small amount of bypass from the development, with approximately 50m^2 which is drained via overland flow to Somerset Street. A basement pump-out system is operating for the site drainage system to collect driveway runoff less than 100m^2.

Runoff from roof areas (i.e areas not accessible to the building occupants) will be directed to rainwater tanks where they will be utilised for re-use opportunities around the site. Three 5000 Litre rainwater tanks are proposed.

The majority of the site, including the rainwater tank overflow, along with the uncovered driveway runoff and landscape areas, will be directed to the proposed water quality chamber to be treated, prior to discharging to existing drainage system. The proposed water quality chamber will be located in landscape area in between bicycle parking and entrance of the building on Hargrave Street.

4. Minor/Major Drainage System.

The major/minor approach to stormwater drainage is the recognised drainage concept for urban catchments within the Penrith City Council Local Government Area. The ILSAX method has been used to model the hydrologic and hydraulic characteristics of stormwater runoff and flow across

the site using DRAINS. The rainfall data adopted for the stormwater design were based on 2016 data from Australian Runoff and Rainfall data hub.

The minor drainage system proposed is comprised of below ground pit and pipe network and is designed to control nuisance flooding and enable effective stormwater management for the site. Council's DCP requires that the minor drainage system be designed to convey the 20-year ARI storm event for surface/piped drainage and 100-year ARI storm to be conveyed via overland flowpaths. Designs for roof drainage will be undertaken as either conventional or siphonic drainage by a qualified and certified Hydraulic Engineer during the detailed design stage of works.

The major system also exists to cater for minor drainage system failures. In accordance with council requirements, the major drainage system is to be designed in a manner that ensures that personal safety is not compromised. An emergency overflow pit has been showed and designed for the 1% AEP storm event in case pits and pipes at the frontage of the development along Somerset Street are blocked. Any areas that cannot be provided with an overland flow path will have a system designed for the 1% AEP storm event. No water will pond around the sag pit 01/02 during a major storm event.

For the purposes of modelling, the rainwater tanks are taken to be full during simulation and added to Cat1-Roof to simulate the roof run-off. All paved and landscaped areas are also collected with either pits or grated drains. Iterations were performed in the DRAINS model to determine the size of the proposed piped network in order to satisfy the major/minor system requirements. (Refer to DRAINS model).

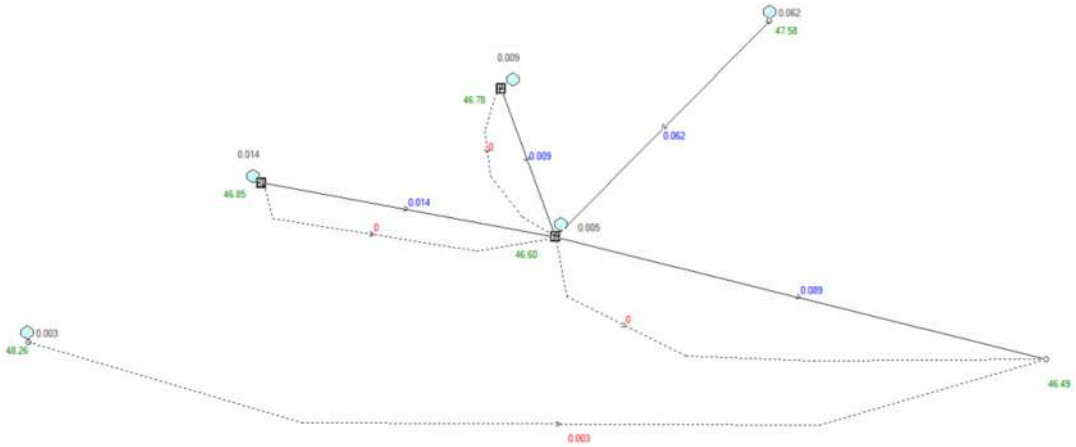


Figure 3 - Overall Site Pit & Pipe Network for 1%AEP

5. Downstream Network Modelling

As the site naturally falls to the rear boundary (i.e. away from Somerset Street towards Orth Street) and the proposed site drainage for development drains the site away from its natural sub-catchment towards Hargrave Street, Council have requested an HGL (hydraulic grade line) analysis to demonstrate that the capacity of the existing drainage system in Hargrave Street will not be adversely affected by the development for the 5% AEP storm event.

Figure 4 shows the existing Council stormwater drainage infrastructure. The existing flows from upstream Hargrave Street contribute to the sag point before draining to the corner of Orth Street and Bringelly Road.

Figure 4 - Existing Drainage System in Hargrave Street

5.1. Catchment Analysis

As discussed with Council Senior Engineer, Joshua Hull, on 20th July 21 with regards to modelling the existing downstream network, it was agreed that it was acceptable to only model the existing stormwater network upstream from the corner of Hargrave Street (adjacent to the drainage reserve) and not to where it connects to Orth Street. This approach has been taken as the downstream network is flooded in the 5%AEP.

Figure 5 is from Penrith City Council – College, Orth and Werrington Creeks Catchment Overland Flow Flood Study-Final Report. It shows that flood water depth for the 5% AEP flood between Somerset Street and Bringelly Road

As can be seen the corner of Hargrave Street is flood affected with a water depth of approximately 0.2m. Based on ground survey information it is estimated that the 5% AEP flood level is approximately 43.77m AHD. This level has been adopted as the downstream tailwater condition in the DRAINS model.

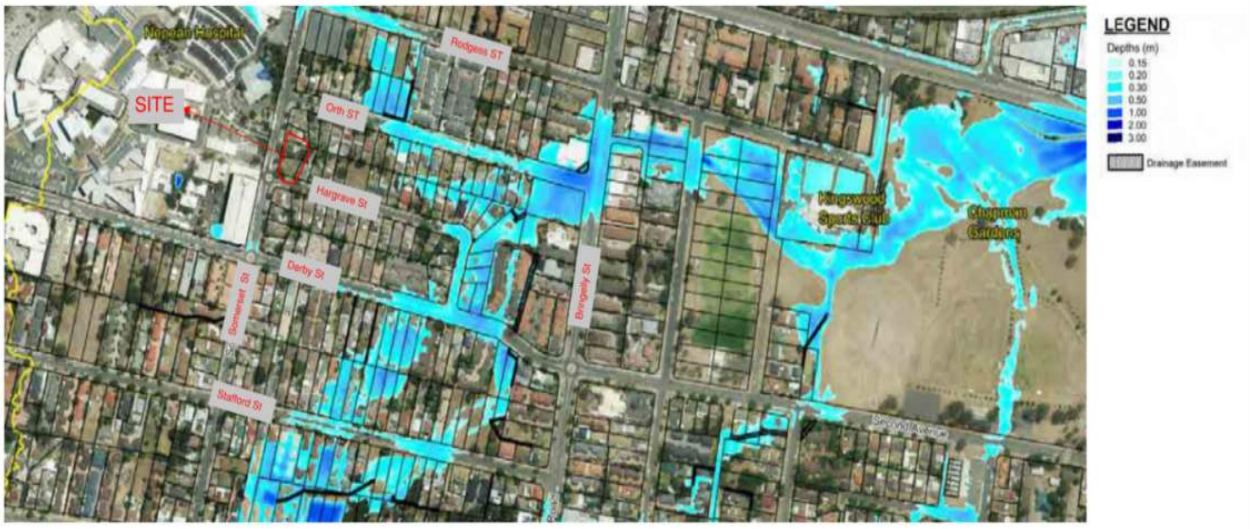


Figure 5 - Peak Design Floodwater Depths for the 5% AEP Flood

Source : College, Orth and Werrington Creeks Catchment Overland Flow Flood Study-Final Report- Volume 2 of 2

Two drains models were set up to analyse the HGL from the receiving drainage system in Hargrave Street to the point where it connects prior to downstream drainage reserve for pre and post development conditions for 5% AEP. The models were based on five sub catchments draining to Hargrave Street. The catchments that drain to Hargrave Street are represented in the Figure 6 below. Refer to Table 1 for catchment areas summary for existing drainage system.

Table 1 - Catchment Areas for existing drainage system

Contributing catchment	C1	C2	C3	C4	C5
Area (Ha)	0.4539	0.2833	0.8824	0.3214	0.1202

Figure 6 - Catchment Plan

Figures 7 and 8 below show the resulting pipe and gutter flows from the catchments for the pre and post developed conditions in Hargraves Street.

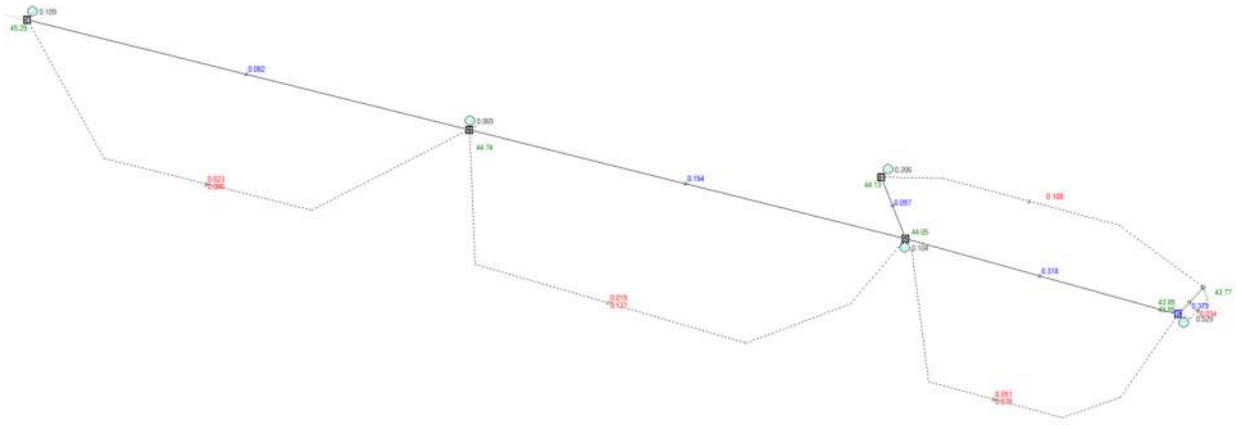


Figure 7 - DRAINS Model Schematic – Pre Developed 5% AEP

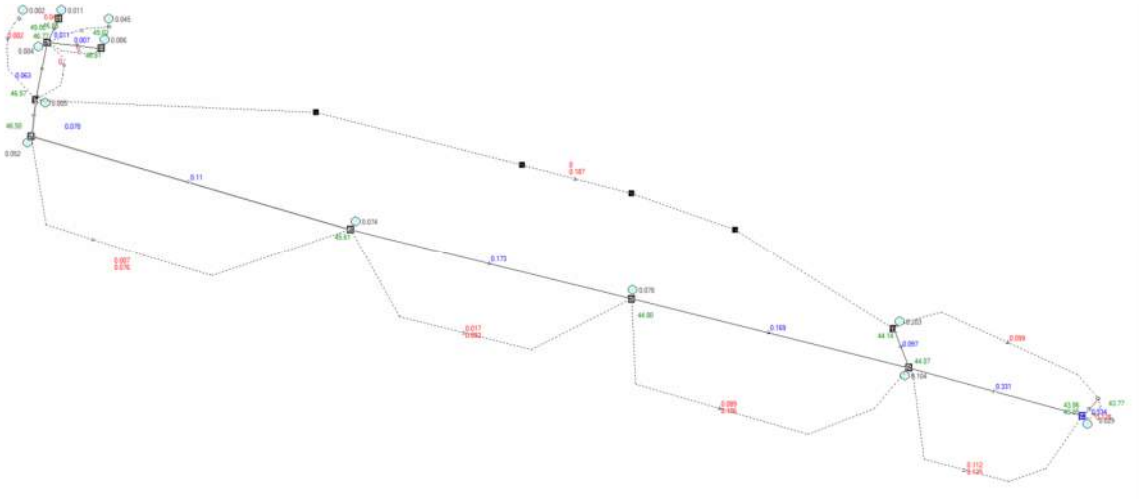


Figure 8 - DRAINS Model Schematic – Post Developed 5% AEP

A review of the results from the 5% AEP analysis of the pre and post developed models shows that the increase in stormwater bypass flows caused by the site discharge is negligible with a maximum increase in gutter flow depths of 21mm observed between Pit 4 and Pit 5, from a pre developed depth of 101mm to a post developed depth of 122mm. The DxV increases from 0.07 to 0.10 sq.m/sec and the maximum flow width increases from 2.5m to 3.2m. Therefore the overland flow route is considered safe as DxV is less than maximum safe depth x velocity in the gutter of 0.6 sq.m/sec.

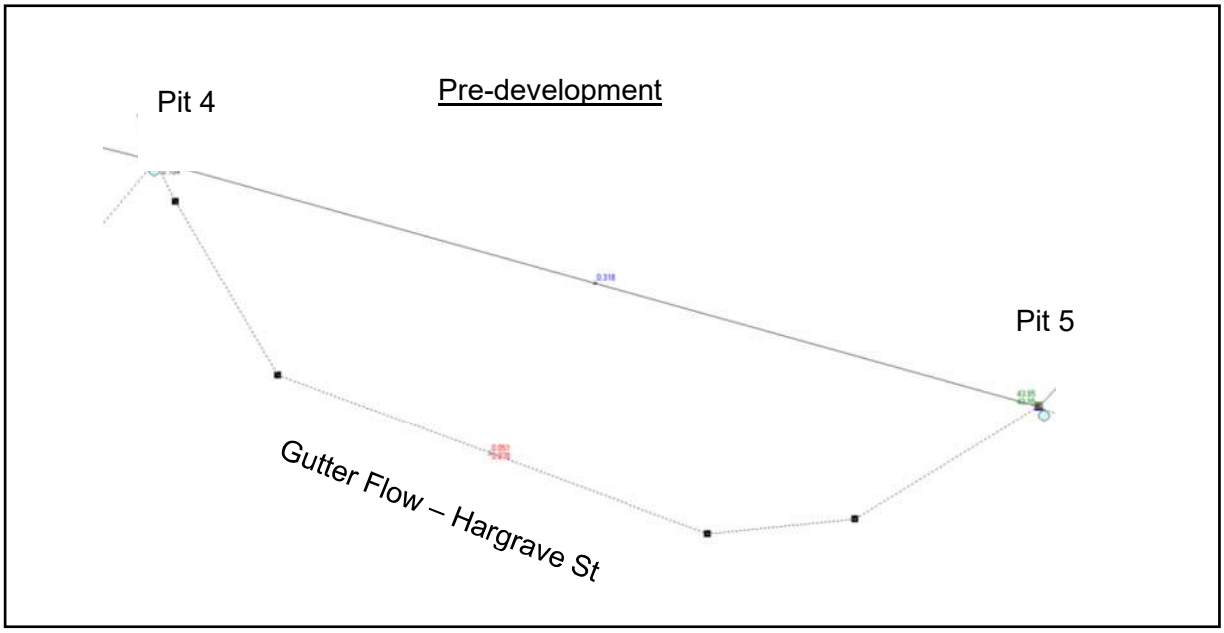


Figure 9 - DRAINS results between pit 4 and 5 for Pre Developed 5% AEP

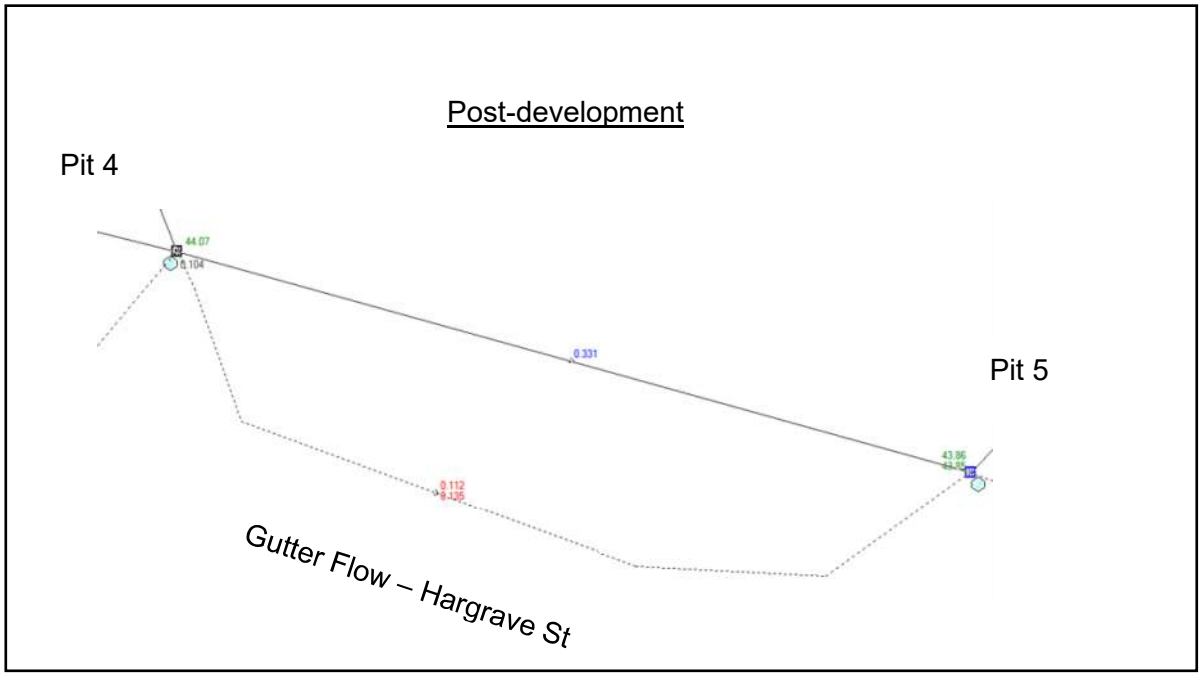


Figure 10 - DRAINS results between pit 4 and 5 for Post Developed 5% AEP

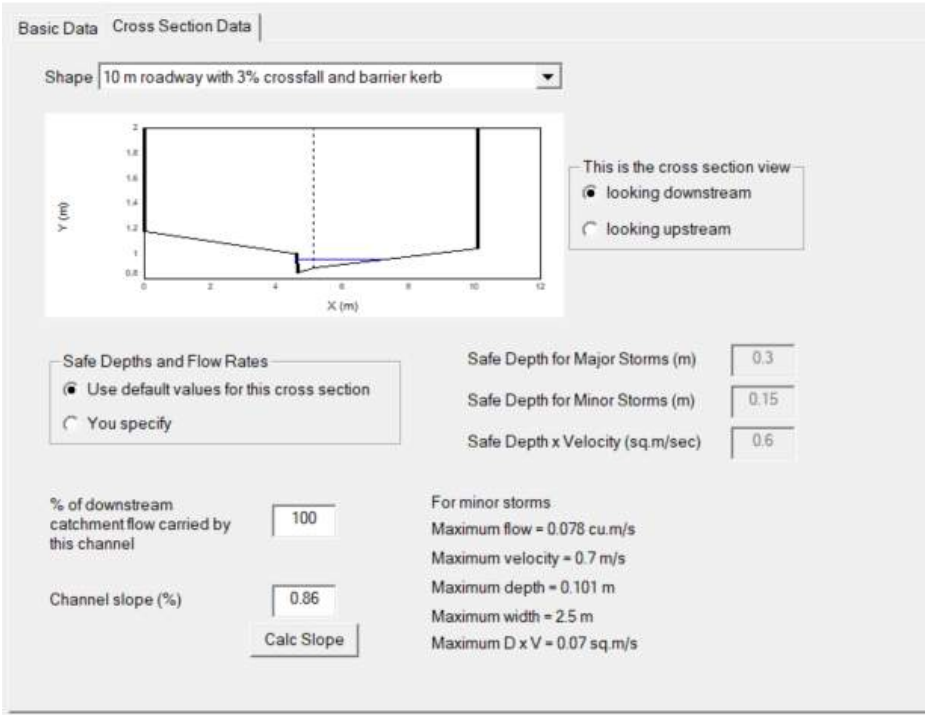


Figure 11 - DRAINS cross section results between Pit 4 and 5 for Pre Developed 5% AEP

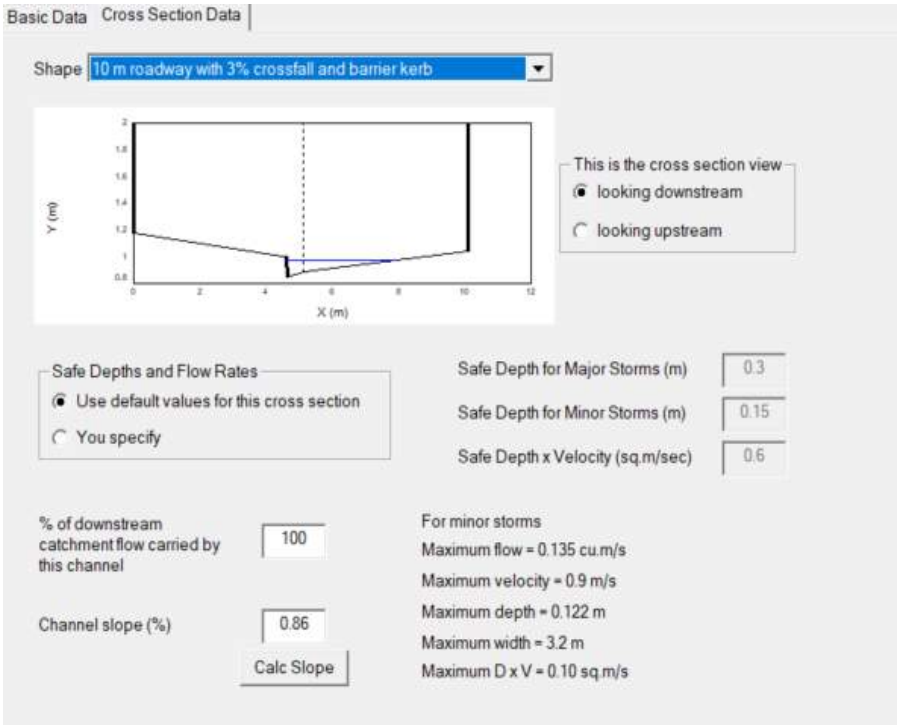


Figure 12 - DRAINS cross section results between Pit 4 and 5 for Post Developed 5% AEP

6. 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 proposed kerb inlet pits in Hargrave Street as described in section 4.1.

For more details refer to the civil DA drawings.

7. 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 4 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)	96.8%	90%
Total Suspended Solids (TSS)	86%	85%
Total Phosphorous (TP)	78.3%	60%
Total Nitrogen (TN)	58.9%	45%

Refer to Figure 13 for the MUSIC modelling results for the proposed development.

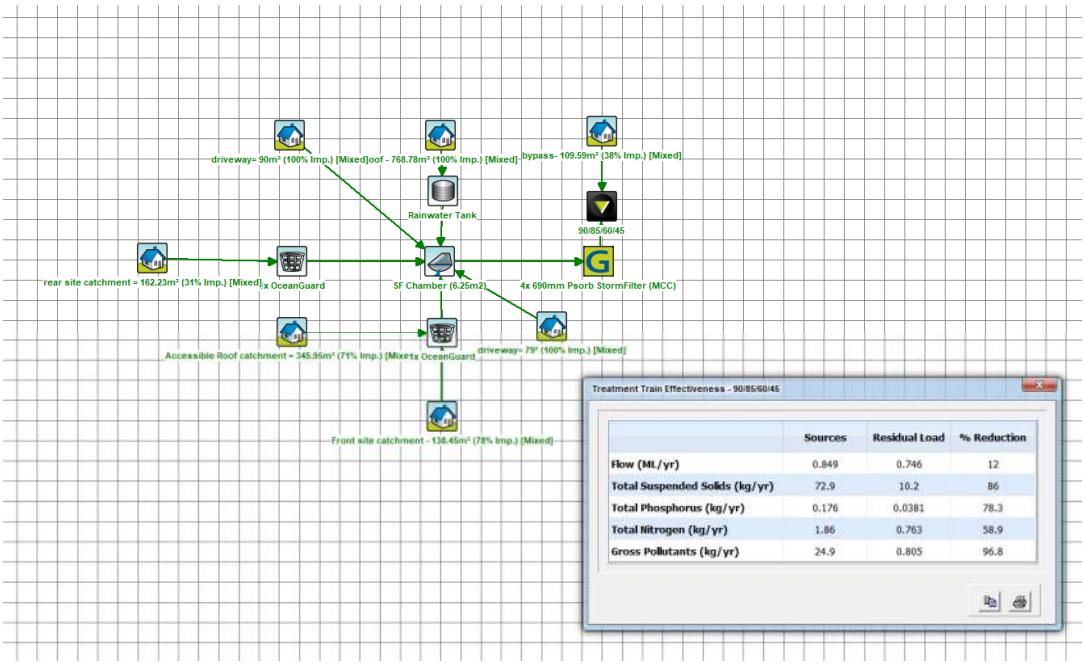


Figure 13 - MUSIC screenshot of Modelling Results of the Site Area under Proposed Development Conditions

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%

7.1.1. 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. 768.78m^2). The collected rainwater will be used for irrigation of the landscaped areas across the site.

The reuse rate adopted for the rainwater 0.4kL/m^2/year as per Penrith's WSUD Technical Guidelines (2015).

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

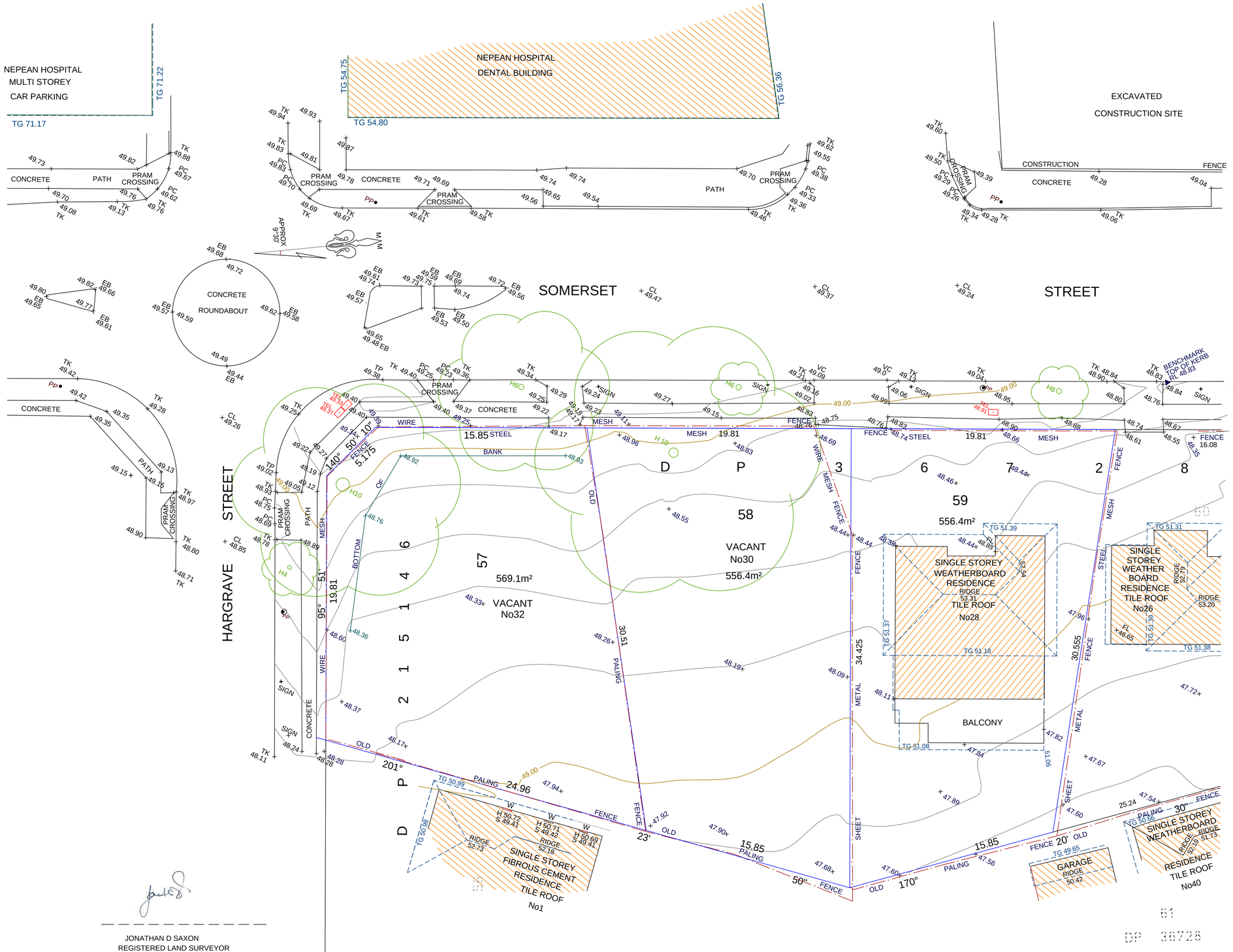
A draft operation and maintenance Schedule for the above treatment devices is presented in Appendix C.

8. 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

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

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
H6 - HEIGHT OF TREE

SHEET 1 0F 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
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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

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Attachment B – Civil Design DA Package

28 - 32 SOMERSET STREET, KINGSWOOD

CONCEPT STORMWATER MANAGEMENT PLAN
CIVIL ENGINEERING PACKAGE - DEVELOPMENT APPLICATION

LOCALITY PLAN

SOURCE : NEARMAP.COM.AU (©2015)

CIVIL DRAWING SCHEDULE

DWG 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	SITEWORKS & STORMWATER MANAGEMENT PLAN - GROUND FLOOR
DA_C04.02	SITEWORKS & STORMWATER MANAGEMENT PLAN - BASEMENT 3
DA_C04.21	STORMWATER LONGITUDINAL SECTIONS
DA_C05.01	DRIVEWAY LONGITUDINAL SECTIONS
DA_C06.01	DETAILS SHEET 01
DA_C06.02	DETAILS SHEET 02

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

NOT FOR CONSTRUCTION

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
03	RE-ISSUED FOR DEVELOPMENT APPLICATION	JO		PC	15.07.21

CLIENT: Boston_Global

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ARCHITECT: rothelowman

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Email sydney@northrop.com.au ABN 81 094 433 100

PROJECT: 28 - 32 SOMERSET STREET, KINGSWOOD

DRAWING TITLE: CIVIL ENGINEERING PACKAGE DEVELOPMENT APPLICATION

COVER SHEET

JOB NUMBER: 202701

DRAWING NUMBER: DA_C01.01 REVISION: 03

DRAWING SHEET SIZE = A1

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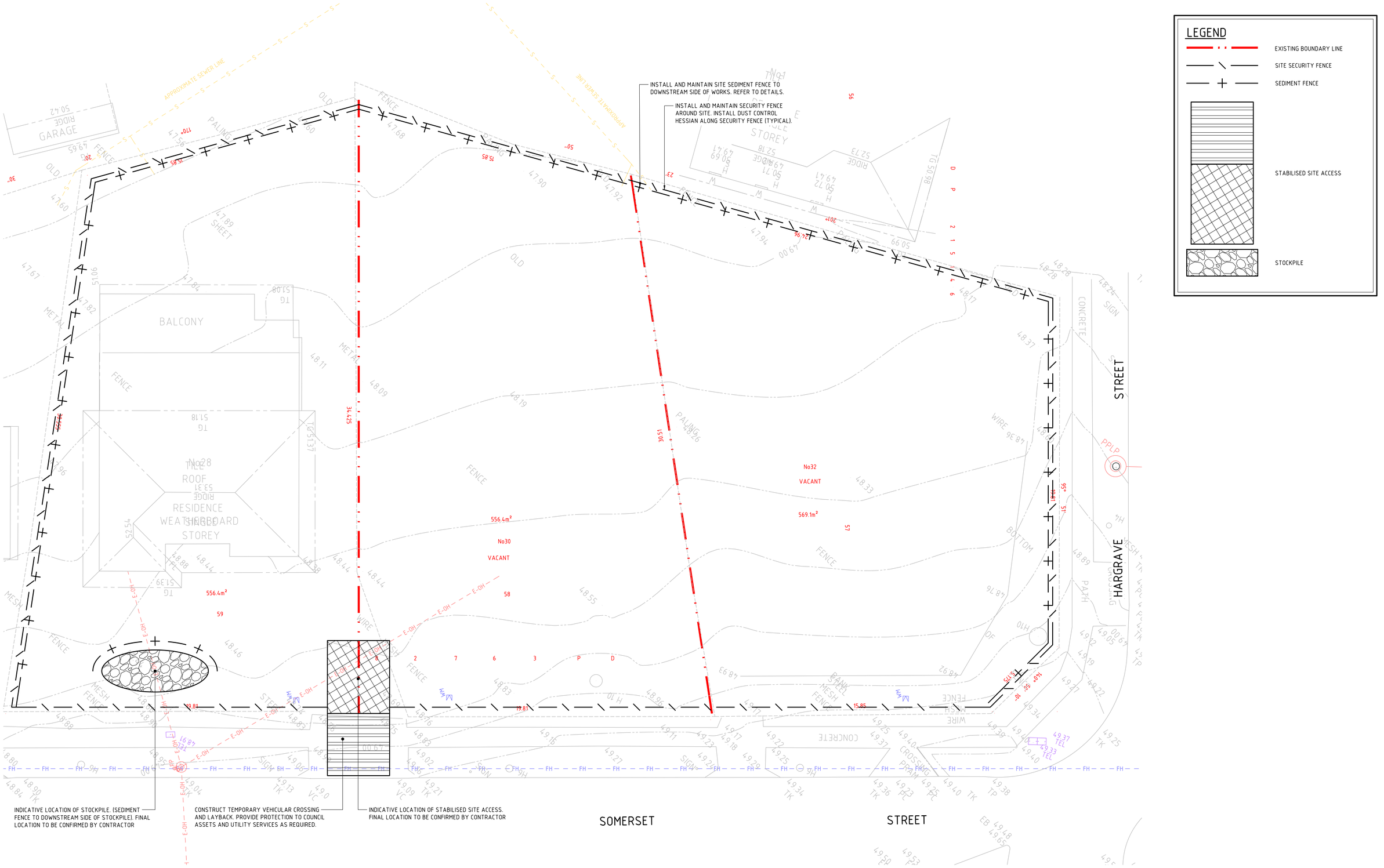

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REVISION	DESCRIPTION	ISSUED	VER'D	APP'D	DATE
01	ISSUED FOR INFORMATION	MM		PC	09.11.20
02	ISSUED FOR DEVELOPMENT APPLICATION	CP		PC	13.11.20
03	RE-ISSUED FOR DEVELOPMENT APPLICATION	JO		PC	15.07.21

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SCALE 1:100 @ A1
0 1 2 3 4 5m

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PROJECT
28 - 32 SOMERSET STREET, KINGSWOOD

DRAWING TITLE
CIVIL ENGINEERING PACKAGE DEVELOPMENT APPLICATION

CONCEPT SEDIMENT EROSION CONTROL PLAN

JOB NUMBER 202701
DRAWING NUMBER DA_C02.01
REVISION 03
DRAWING SHEET SIZE = A1

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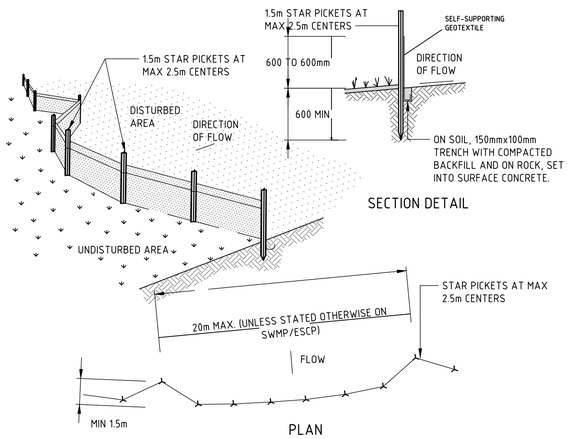
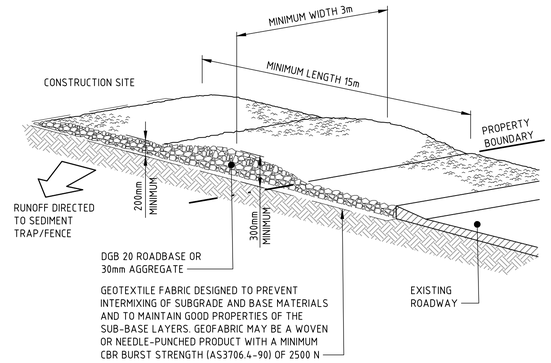


CONSTRUCTION NOTES

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 1.5 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.

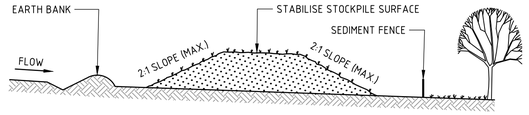
SEDIMENT FENCE (SD 6-8)



CONSTRUCTION NOTES

1. STRIP THE TOPSOIL, LEVEL THE SITE AND COMPACT THE SUBGRADE.
2. COVER THE AREA WITH NEEDLE-PUNCHED GEOTEXTILE.
3. CONSTRUCT A 200mm THICK PAD OVER THE GEOTEXTILE USING ROAD BASE OR 30mm AGGREGATE.
4. ENSURE THE STRUCTURE IS AT LEAST 15 METRES LONG OR TO BUILDING ALIGNMENT AND AT LEAST 3 METRES WIDE.
5. WHERE A SEDIMENT FENCE JOINS ONTO THE STABILISED ACCESS, CONSTRUCT A HUMP IN THE STABILISED ACCESS TO DIVERT WATER TO THE SEDIMENT FENCE.

STABILISED SITE ACCESS (SD 6-14)



CONSTRUCTION NOTES

1. PLACE STOCKPILES MORE THAN 2m (PREFERABLY 5m) FROM EXISTING VEGETATION, CONCENTRATED WATER FLOW, ROADS AND HAZARD 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 DRAWING 5-5) ON THE UPSLOPE SIDE TO DIVERT WATER AROUND STOCKPILES AND SEDIMENT FENCES (STANDARD DRAWING 6-8) 1 TO 2m DOWNSLOPE.

STOCKPILES (SD 4-1)

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

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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
03	RE-ISSUED FOR DEVELOPMENT APPLICATION	JO		PC	15.07.21

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ARCHITECT: rothelowman

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SCALE 1:10 @ A1 (0.0 0.1 0.2 0.3 0.4 0.5m)

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Email sydney@northrop.com.au ABN 81 094 433 100

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

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

SEDIMENT EROSION CONTROL DETAILS

JOB NUMBER: **202701**

DRAWING NUMBER: **DA_C02.11** REVISION: **03**

DRAWING SHEET SIZE = A1

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Date: 16.04.2020 2:24 PM
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PROPOSED 3x5000L RAINWATER TANKS (3.2mx0.8mx2.02m) FIRST FLUSH DEVICE TO BE INCORPORATED. PROVIDE ACCESS FOR MAINTENANCE

INDICATIVE DOWNPIPE LOCATION FROM ROOF DRAINAGE SYSTEM TO PROPOSED RAINWATER TANKS (TYPICAL)

Ø150 UPVC
uIL 47.41
dIL 47.17

SUBSOIL DRAINAGE TO ALL LANDSCAPED AREAS

Ø150 UPVC
uIL 47.50
dIL 47.44

OVERFLOW FROM RAINWATER TANK TO BE CONNECTED TO WATER QUALITY CHAMBER

ALL GRATED INLET PITS TO BE FITTED WITH OCEANGUARD INSERTS (TYP.)

STORMWATER PIPE TO BE SUSPENDED FROM GROUND FLOOR BASEMENT SOFFIT

Ø150 UPVC
uIL 46.67
dIL 46.42

STORMWATER PIPE TO UNDERSIDE OF DRIVEWAY

PROPOSED WATER QUALITY CHAMBER COMPLETE WITH 3 x 690 OCEANPROTECT CARTRIDGES (3.50m x 2.00m x 1.2m)

PROPOSED KERB INLET PIT
SL 48.00
PIT IL 46.31

Ø225 UPVC
uIL 46.39
dIL 46.35

EXISTING KERB INLET PIT
SL 45.83
PIT IL 45.045
IN FRONT OF 12 HARGRAVE ST
(SHOWN INDICATIVELY ON PLAN)

Ø375 RCP
uIL 46.20
dIL 45.05
APPROX. LENGTH 75m

PROPOSED KERB INLET PIT
SL 48.05
PIT IL 46.20

Ø375 RCP
uIL 46.31
dIL 46.23

Ø225 uPVC
uIL 46.60
dIL 46.52

Ø225 uPVC
uIL 46.65
dIL 46.63

150x100 RHS
uIL 48.00
dIL 47.00

Ø150 uPVC
uIL 47.35
dIL 47.20

Ø150 uPVC
uIL 48.00
dIL 47.70

Ø150 uPVC
uIL 47.67
dIL 47.57

Ø150 uPVC
uIL 47.54
dIL 47.45

Ø225 uPVC
uIL 47.00
dIL 46.83

PRESSURE PIPE FROM PUMP-OUT TANK

ALL GRATED INLET PITS TO BE FITTED WITH OCEANGUARD INSERTS (TYP.)

EMERGENCY OVERFLOW PIT

FFL48.70

SOMERSET STREET

HARGRAVE STREET

LEGEND

- PROPOSED BOUNDARY LINE
- BASEMENT OUTLINE
- FFLXX.XX — PROPOSED FINISHED FLOOR LEVEL
- STORMWATER PIPE (UNDERGROUND)
- STORMWATER PIPE (SUSPENDED)
- GRATED INLET PIT
- L / S — STORMWATER PIT TAG LINE ID / STRUCTURE NO
- DP — DOWNPIPE
- VC — VEHICULAR CROSSING
- RL.XX.XX — PROPOSED SPOT HEIGHT
- 200x75 RHS — RECTANGULAR HOLLOW SECTION

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 ls
BASEMENT PUMP OUT SYSTEM
10% AEP = 25L/s
1% AEP = 40 l/s

GENERAL NOTES

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

NOT FOR CONSTRUCTION

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

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ARCHITECT: rothelowman
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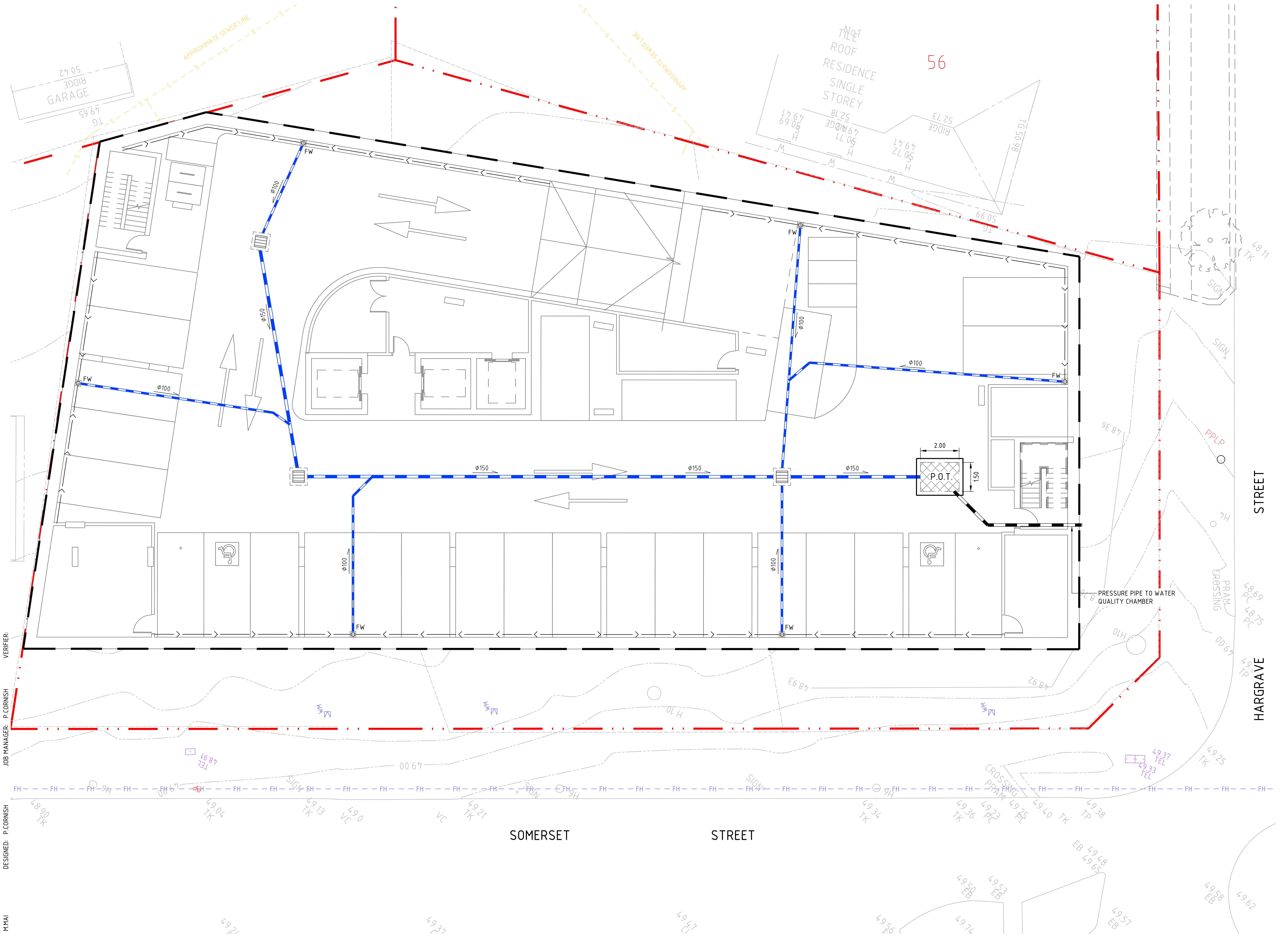
PROJECT: 28 - 32 SOMERSET STREET, KINGSWOOD

DRAWING TITLE: CIVIL ENGINEERING PACKAGE DEVELOPMENT APPLICATION
SITEWORKS & STORMWATER MANAGEMENT PLAN - GROUND FLOOR

JOB NUMBER: 202701
DRAWING NUMBER: DA_C04.01
REVISION: 03
DRAWING SHEET SIZE = A1

Plotted By : JOHN O
Date : 16.04.2020 2:24 PM
Found : T:\2020 Jobs\202701- 28-32 Somerset Street Kingswood\D-Drawings\C-Civil\202701-CAD\01-DA\202701_DA_C04.01.dwg



LEGEND

(red dash-dot line)	PROPOSED BOUNDARY LINE
(black dashed line)	BASEMENT OUTLINE
Ø100 (blue dashed line)	STORMWATER PIPE
(arrowed line)	SPOON DRAIN
(symbol)	FLOOR WASTE
(symbol)	600x600 GRATED INLET PIT
P.O.T	PUMP OUT TANK

PUMP OUT TANK

TOTAL SITE = 1694m²

DRIVEWAY CATCHMENT = 90m²
100YR; 2 HOURS = 44.1mm/hr
TOTAL WATER = 44.1x2 = 88.2x0.009 = 0.8m³

SEEPAGE = 2.5ml/YR/Ha
= AREA x 6.85m³
= 0.1694x6.85
= 1.16m³

TOTAL PUMP OUT TANK REQUIRED
0.8m³ + 1.16 = 1.96m³

PUMP OUT TANK PROVIDED = 3m³ (MINIMUM VOLUME REQUIRED)

PUMP HEAD = 10m
RAINFALL INTENSITY FOR CALCULATIONS = 100
YEAR STORM DURATIONS 5 mins = 219.79mm/hr
PUMP RATE REQUIRED = 219.79 x 90 / 3600 = 5.5L/s

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

NOT FOR CONSTRUCTION

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ARCHITECT: rothelowman

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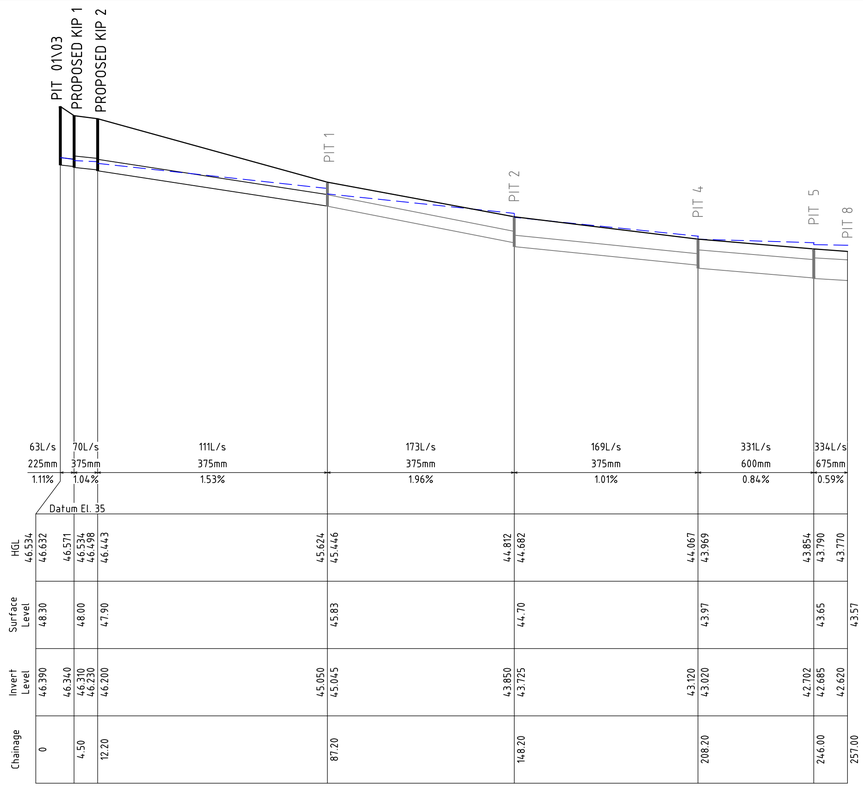
PROJECT: 28 - 32 SOMERSET STREET, KINGSWOOD

DRAWING TITLE: CIVIL ENGINEERING PACKAGE DEVELOPMENT APPLICATION

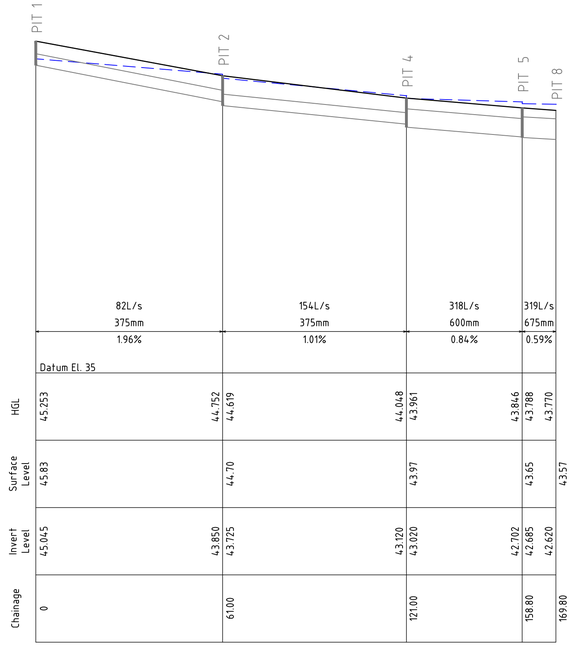
SITEWORKS & STORMWATER MANAGEMENT PLAN - BASEMENT 3

JOB NUMBER: 202701
DRAWING NUMBER: DA_C04.02
REVISION: 01
DRAWING SHEET SIZE = A1

Document Set ID: 9681866
Version: 1, Version Date: 02/08/2021



STORMWATER LONGITUDINAL SECTION 5% AEP PIT 01\03 TO PIT 8 (POST DEVELOPED)



STORMWATER LONGITUDINAL SECTION 5% AEP PIT 1 TO PIT 8 (PRE DEVELOPED)

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

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01	ISSUED FOR DEVELOPMENT APPLICATION	JO		PC	15.07.21
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PROJECT: **28 - 32 SOMERSET STREET, KINGSWOOD**

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

STORMWATER LONGITUDINAL SECTIONS

JOB NUMBER: **202701**

DRAWING NUMBER: **DA_C04.21** REVISION: **01**

DRAWING SHEET SIZE = A1

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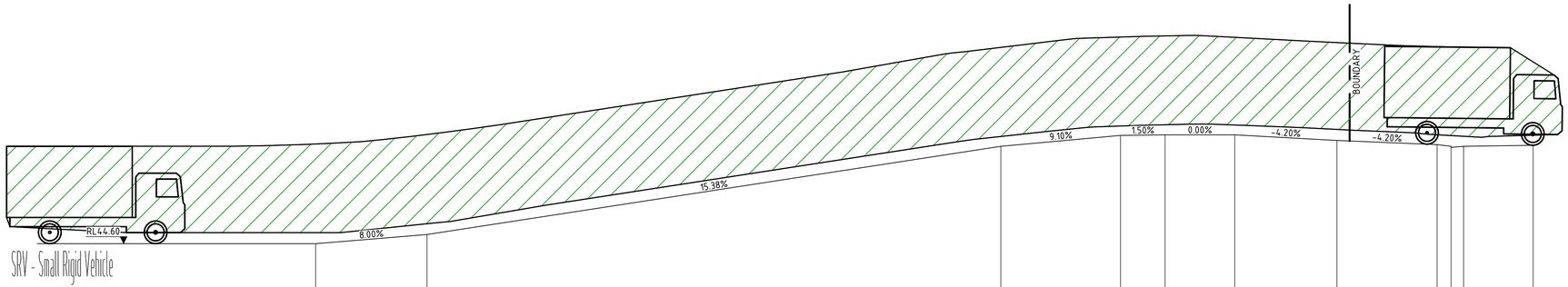
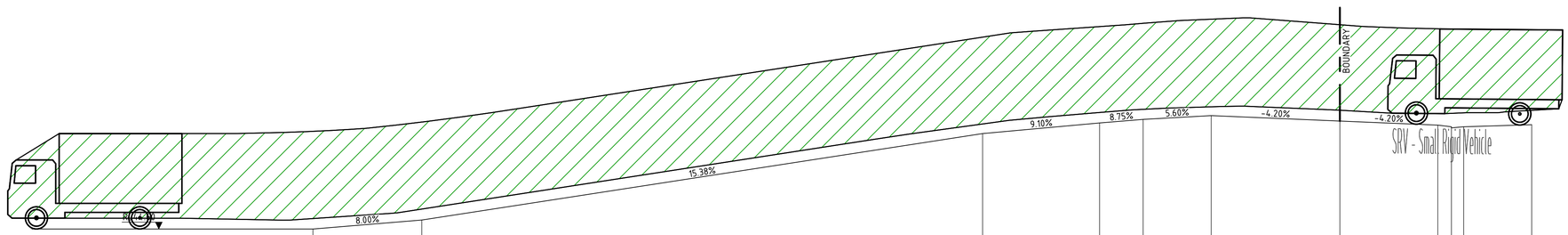


DATUM RL 40.0													
DESIGN LEVEL	44.60	44.92	48.09	48.48	48.50	48.50	48.30	48.15	48.05	48.09			
CHAINAGE	0.000	4.000	24.610	28.910	30.510	33.010	36.680	40.280	40.780	41.230			

DRIVEWAY LONGITUDINAL SECTION (1 / C3.01)
DESIGN VEHICLE 6.4m SRV - EXIT



DATUM RL 40.0													
DESIGN LEVEL	44.60	44.92	48.09	48.48	48.62	48.76	48.56	48.41	48.31	48.35			
CHAINAGE	0.000	4.000	24.610	28.910	30.510	33.010	37.740	41.340	41.840	42.290			

DRIVEWAY LONGITUDINAL SECTION (2 / C3.01)
DESIGN VEHICLE 6.4m SRV - ENTRY

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

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DRAWING TITLE: CIVIL ENGINEERING PACKAGE DEVELOPMENT APPLICATION

DRIVEWAY LONGITUDINAL SECTIONS

JOB NUMBER: 202701
DRAWING NUMBER: DA_C05.01
REVISION: 03
DRAWING SHEET SIZE = A1

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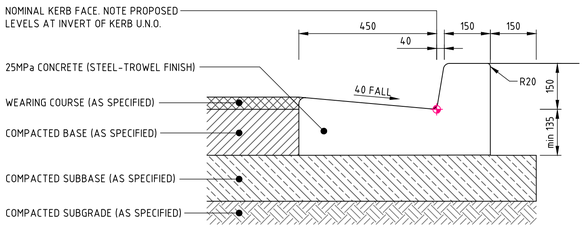
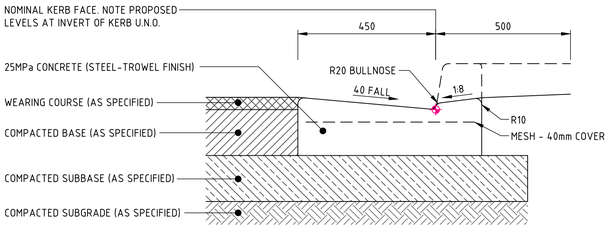


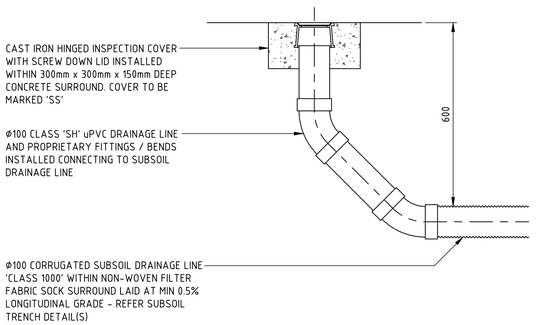
KERB & GUTTER 'KG'

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



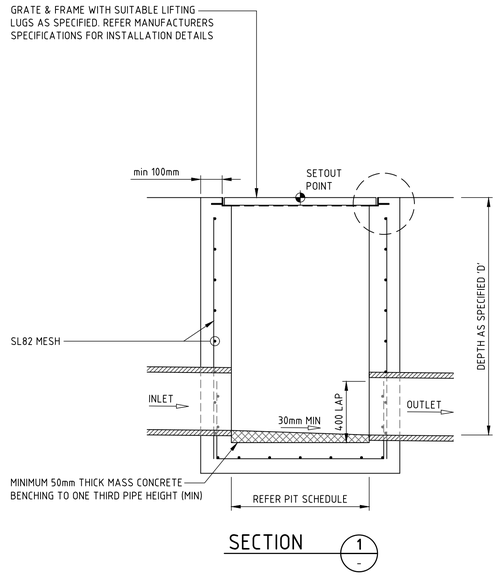
VEHICLE LAYBACK 'VC'

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

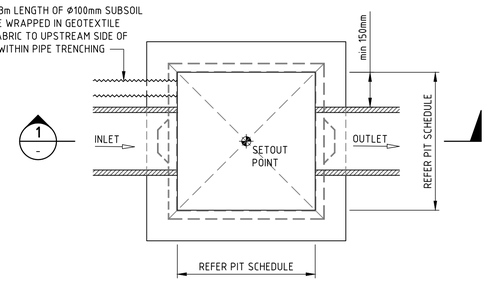


SUBSOIL DRAINAGE CLEAROUT 'CO'

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



SECTION 1/-



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

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

NOT FOR CONSTRUCTION

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CLIENT: Boston_Global

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ARCHITECT: rothelowman

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

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

DETAILS SHEET 01

JOB NUMBER: **202701**

DRAWING NUMBER: **DA_C06.01**

REVISION: **03**

DRAWING SHEET SIZE = A1

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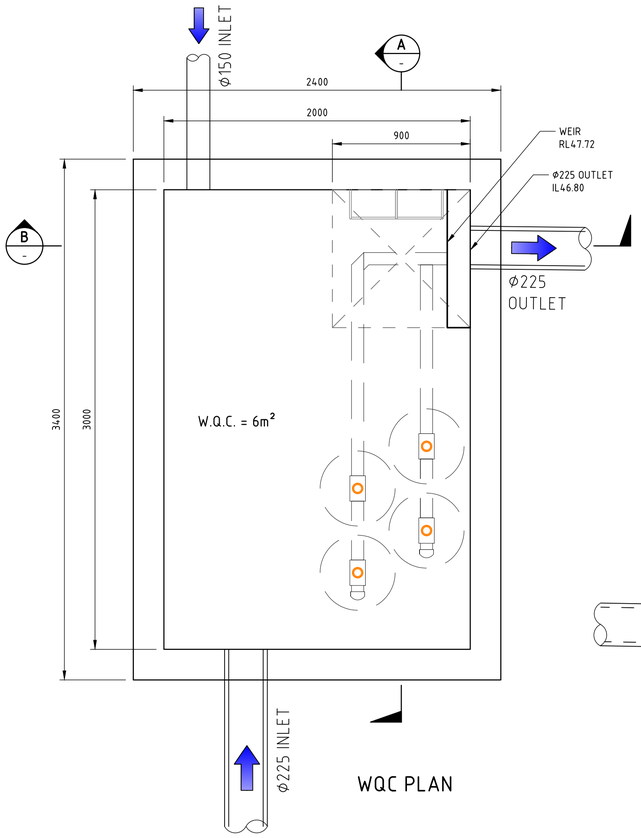
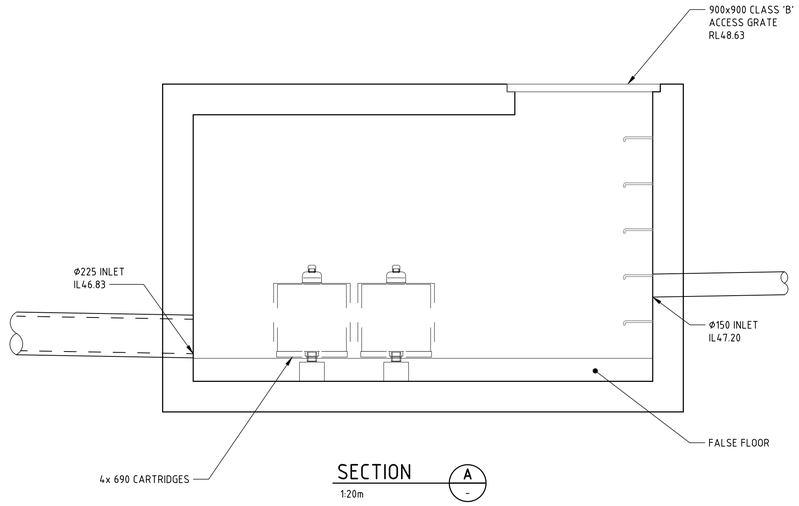
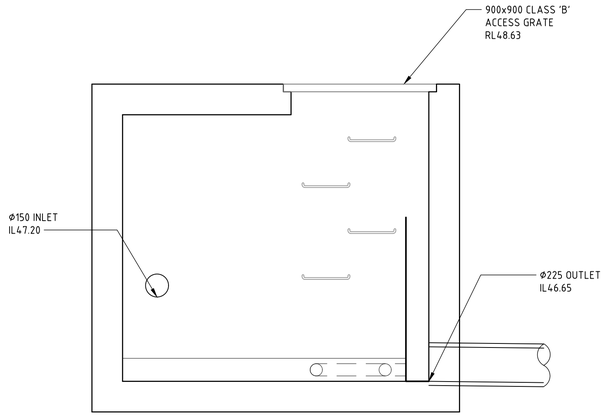


WQC PLAN



SECTION A
1:20m



SECTION B
1:20m

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

NOT FOR CONSTRUCTION

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

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

DETAILS SHEET 02

JOB NUMBER: **202701**

DRAWING NUMBER: **DA_C06.02** REVISION: **01**

DRAWING SHEET SIZE = A1

Found : T:\2020 Jobs\202701- 28-32 Somerset Street Kingswood\D-Drawings\C-Civil\202701-CAD\01-DA\202701_DA_C06.02.dwg
Plotted By : JOHN O
Date : 16.04.2020 2:24 PM

Attachment C – Draft Operation and Maintenance Schedule

28-32 Somerset Street Kingswood

Stormwater Maintenance Schedule

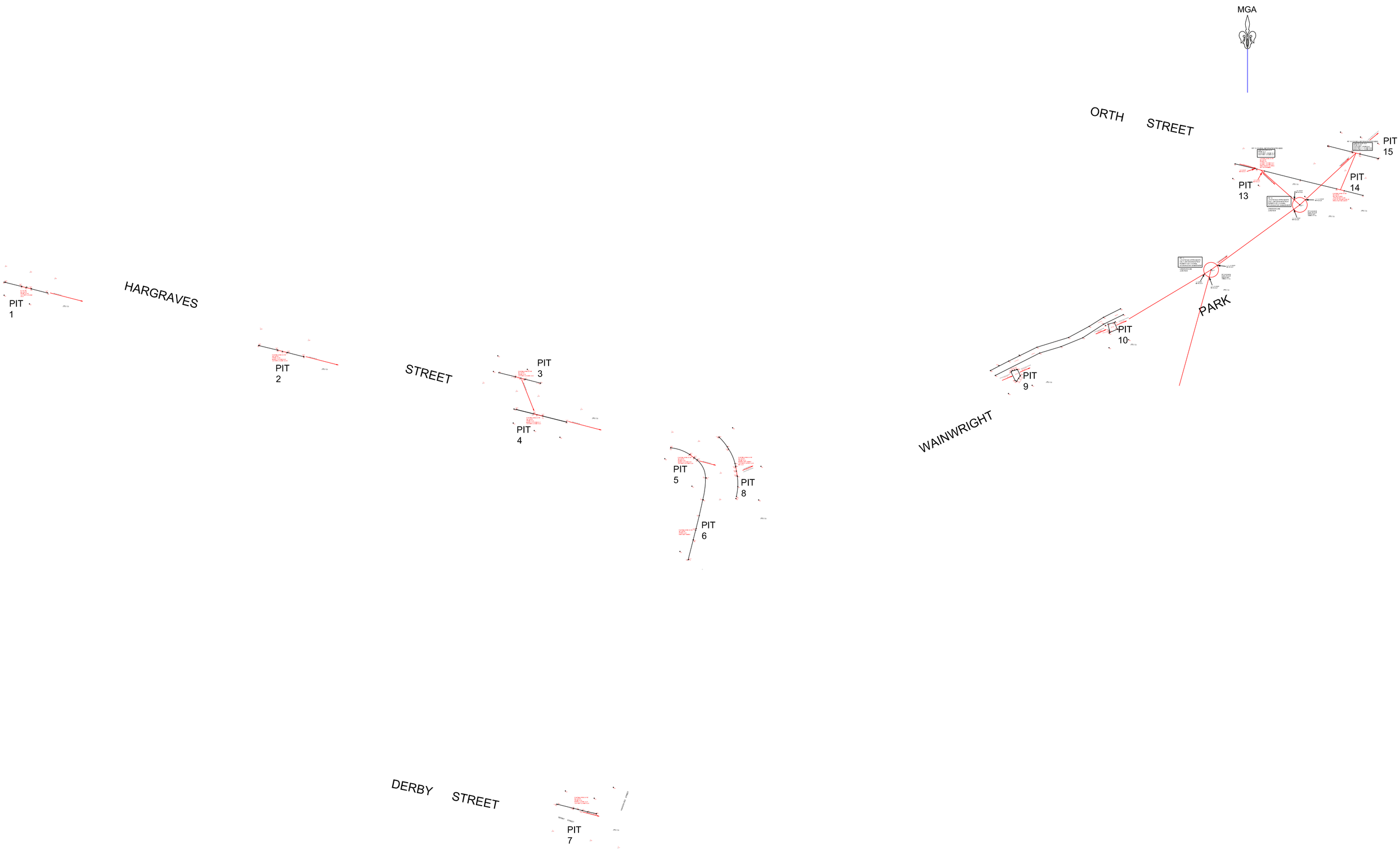
Prepared on 13.11.20

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: 1694m^2
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, carrry 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.	

Attachment D – Existing Drainage System Location Plan



A1

NOTES :

* BOUNDARIES HAVE NOT BEEN DEFINED BY SURVEY AND ARE DIAGRAMMATIC ONLY.
* LAND DIMENSIONS AND AREAS HAVE BEEN COMPILED FROM PLANS OBTAINED FROM LPMA.
* BEARINGS RELATE TO GDA 94 NORTH SCIMS
* LEVEL DATUM IS AHD ORIGINATING FROM SSM 64052 RL 49.949 LOCATED AT BRINGELLY ROAD.
* 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

INV - GUTTER INVERT
NS - NATURAL SURFACE
CL - CENTRE LINE
TK - TOP KERB
CONC - CONCRETE LID
LIN -TOP OF LINTEL

DIAL BEFORE YOU DIG www.1100.com.au

REV	AMENDMENTS	DATE

CLIENT:

PLAN OF: HARGRAVES & ORTH STREETS, KINGSWOOD
BEING: LOT IN DP
SHOWING: STORMWATER DETAIL AND SITE LEVELS
PURPOSE: ARCHITECTURAL DESIGN COUNCIL SUBMISSION

SHEET 1 0F 12

SCALE 1:400
0 10 20 30 40

JOB REF. : D04666 WAE
DRAWING No. D04666 SW WAE
SURVEYOR: CT
CHECKED: CHECKED: REGISTERED LAND SURVEYOR
DATE: 11/05/2021
DATUM: A.H.D.
ORIGIN: SSM 64052 RL 42.949
REFERENCE SYSTEM: GDA 1994

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