CIVIL ENGINEERING
STORMWATER AND FLOOD REPORT
PROPOSED AGED CARE DEVELOPMENT
94-100 EXPLORERS WAY, ST CLAIR, NSW

Development Application Submission
April 2021
Revision 02

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1. INTRODUCTION

1.1 General

This report has been prepared to support the Development Application for the proposed Aged Care Development at 94-100 Explorers Way, St Clair, NSW. This report has been prepared in accordance with Penrith Council's DCP and flood requirements. HEC-RAS modelling has been undertaken to determine the pre-developed and post developed 100yr ARI flood levels in order to demonstrate that the proposed development is in accordance with Council's requirements, and to set the minimum habitable flood level based on this analysis. Additionally, the report has been prepared to demonstrate that Council's on-site detention and water quality requirements have been met.

The following Engineering matters have been addressed in this report:

- Water Sensitive Urban Design (WSUD)
- Stormwater Detention
- Overland Flow

1.2 Background

The site is located at 94-100 Explorers Way, St Clair, NSW and has a total site area of 10,570m^2. The site is bordered by residential properties on the western and eastern sides. There is vehicular access to the site from Explorers Way. Piped and overland stormwater from the western boundary discharges through the site. Refer to Figure 1.3 below for an overview of the site and the existing stormwater connections.

The existing site consists of a single residential building, with the majority of the site undeveloped and grassed. There is an existing grassed swale running west to east through the site, which conveys stormwater flows from the upstream catchment. The site generally grades to the North-East Corner at approximately 2-5% gradient.

Figure 1.3 The site

1.3 The Proposed Development

The proposed development consists of a residential aged care facility, with a loading dock, porte-cochere and external car parking. The proposed site also includes a vegetated swale at the rear of the site which is proposed to direct flows from the upstream catchment. Refer to Appendix A for a set of the civil engineering Development Application drawings.

1.4 Council Policies

The civil engineering component of the aforementioned project has been designed in accordance with the following council codes and policies:

- Penrith City Council – Stormwater Drainage and Guidelines for Building Developments
- Penrith City Council – WSUD Technical Guidelines
- Penrith City Council DCP – C3 Water Management

2. EXISTING FLOOD MODELLING

The subject site is not affected by mainstream flooding. The site falls within the South Creek Catchment. Worley Parsons have undertaken a Flood Study of South Creek, and the findings show that the subject site is outside of any mainstream flood extent. Refer to figure 2.0 below.

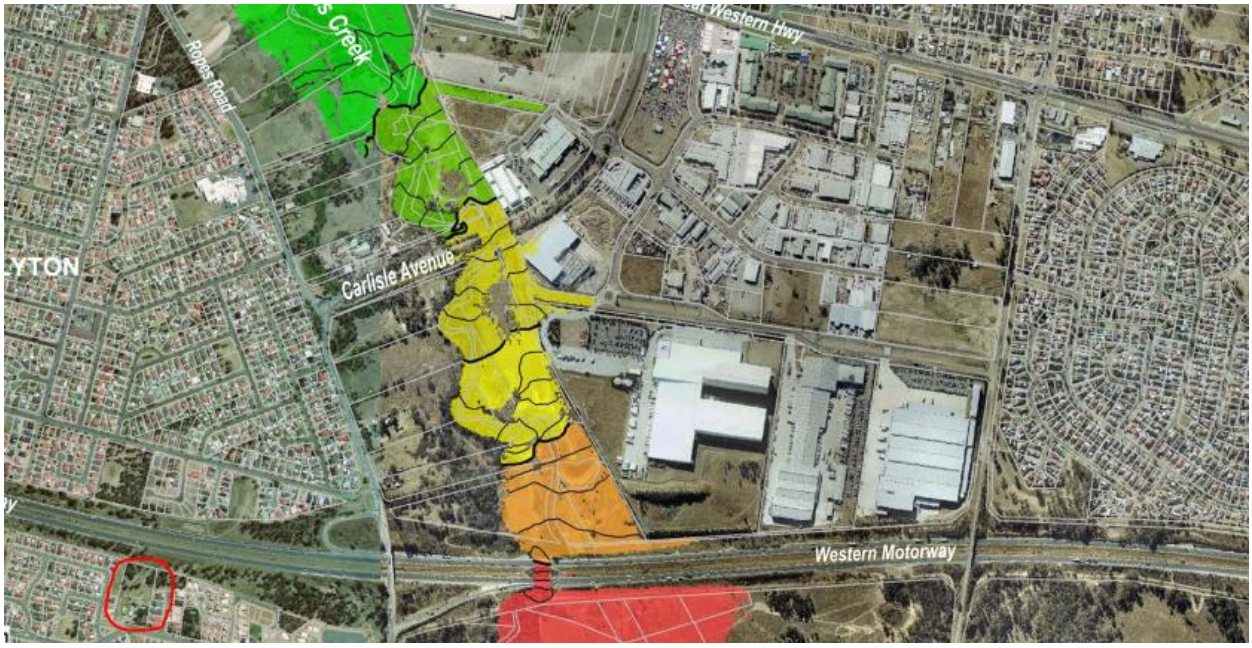


Figure 2.0a South Creek 100yr ARI flood Extent Map

However, the site is affected by Overland Flow. There is a grassed channel and a 600mm diameter stormwater pipe which directs flows through the site from the western boundary. Refer to Figure 2.0b below showing that the subject site is affected by overland flow, as shown within Penrith's Overland Flow Overview Study.

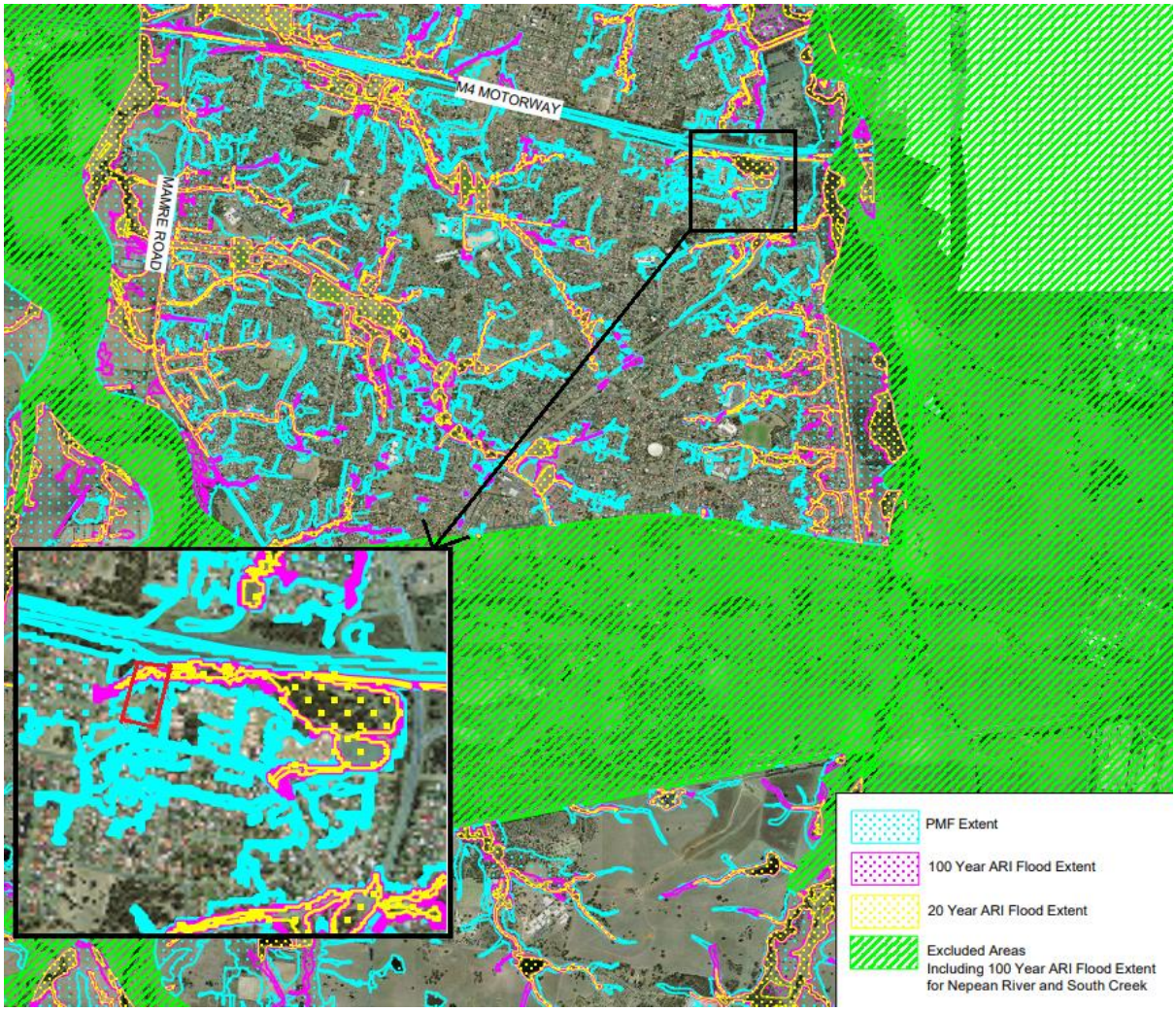


Figure 2.0b Penrith Overland Flow Study Map

Given that no detailed flood information was available for the site, Henry & Hymas have developed an existing and proposed HEC-RAS model that is based off catchment mapping (refer to section 3.1 of this report), DRAINS modelling (refer to section 3.2 of this report), and site levels as per the survey plan.

3. UPSTREAM CATCHMENT

3.1 Catchment Plan

As discussed previously, there is an upstream catchment which discharges overland through the site, in addition to a 600mm diameter stormwater pipe which discharges piped flows through the site. The total catchment area for the site is 174.6 hectares. Refer to Figure 3.1 for a plan showing the upstream catchment.

Figure 3.1 Upstream Catchment Plan

3.2 Calculated 100yr flows

Refer to the DRAINS model titled *HECRAS setup 19755 Rev01* which has been included as a part of this DA submission. The catchment areas and pipe sizes have been incorporated into this DRAINS model along with the following parameters:

11.118-hectare catchment

- 64% paved, 36% pervious
- 400m flow path length at 3%
- Retardance coefficient n* of 0.013

Refer to figure 3.2 below summarising the DRAINS results and Appendix D showing the catchment plan and details.

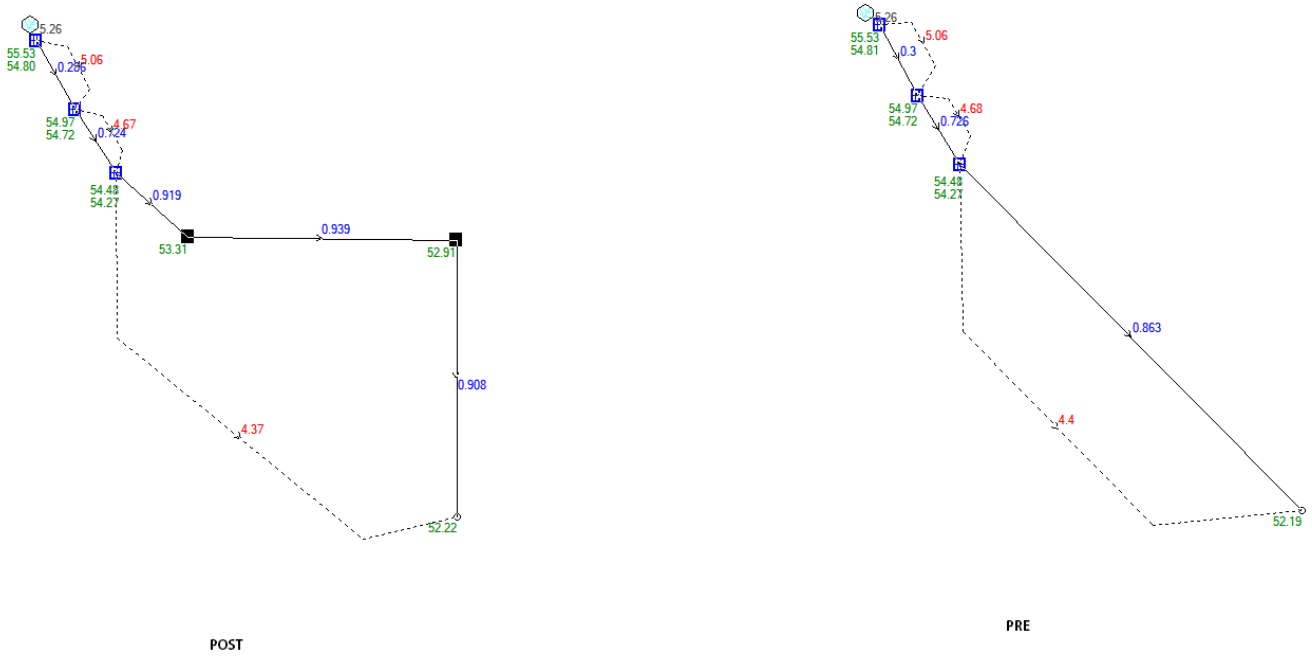


Figure 3.2 DRAINS results

Based on the results of the DRAINS model, the following 100yr flow rates have been employed for the HECRAS model:

- 4.37m^3/s directed through the culvert/swale in the post-developed model
- 4.40m^3/s directed through the swale in the pre-developed model

Please note that there is a different in the pre and post-developed flows through the site. This is because the piped flows are proposed to be redirected around the building footprint via a 750mm reinforced concrete pipe to replace the 600mm pipe. The additional capacity of the proposed pipe has led to a reduction in the post-developed overland flows through the site. Refer to the DRAINS model and civil drawings within Appendix A showing the details of the proposed stormwater pipe system.

4. PROPOSED CULVERT AND SWALE

In order to facilitate the proposed aged care development, the existing grassed swale within the site is proposed to be removed and replaced with a culvert and vegetated swale, which diverts the flows around the proposed building footprint.

Given the extent of the proposed car park, a headwall and culvert are proposed adjacent to the western boundary to ensure that upstream flows can be directed underneath the car park pavement. By directed flows within an underground culvert, the flood risk for the proposed development can be minimised. The headwall has been designed so that the width of the headwall is equivalent to the width of the pre-developed flow path at the boundary.

The flows are then discharged to a swale which directs flows around the building footprint. The swale has been carefully designed to ensure that it provides the capacity to direct flows up to the 100yr storm event whilst minimising impacts on adjacent trees.

Refer to the civil drawings included within Appendix A for further details of the proposed culvert and swale.

5. PROPOSED HECRAS MODEL

5.1 Pre-developed Model

A pre-developed HEC-RAS model has been generated from a survey of the floodplain. The centreline of the overland flow path has been aligned based on the direction of overland flow through the site. Sections have been taken at 5m chainages and at change of flow direction junctions.

A manning's n value of 0.03 has been adopted for the HEC-RAS sections within the site given that the majority of the site is undeveloped grassland.

The boundary conditions have been input as a normal depth of S=0.015 for both upstream and downstream conditions.

Flow rates have been input as calculated in Section 3.2 of this report:

- 4.40m^3/s at chainage 86.46

Refer to Appendix A for the flood extent of the pre-developed model, and Table 5.4 for the 100yr flood level at each chainage.

5.2 Post-developed Model

A post-developed HEC-RAS model has been generated in order to ascertain the post-developed flood levels and to ensure that the development can accommodate the flows through the site without increasing the flood level within neighbouring properties.

A manning's n value of 0.03 has been adopted for the HEC-RAS sections within the site that form part of the swale. A manning's n value of 0.013 has been adopted for sections through the proposed concrete culvert.

The boundary conditions have been input as a normal depth of S=0.015 for both upstream and downstream conditions.

Flow rates have been input as calculated in Section 3.2 of this report:

- 4.37m^3/s at chainage 100

Refer to the HEC-RAS model and drawings within Appendix A for further details.

5.3 HECRAS Model Parameters

Manning's n value = 0.013 (impervious surfaces)
Manning's n value = 0.03 (pervious/grassed surfaces)
Boundary Conditions > Normal depth of S=0.01
Flow Rates

- 4.37m³/s at chainage 86.46 (post-developed)
- 4.40m³/s at chainage 86.46 (pre-developed)

5.4 Results

Refer to drawings C120 and C121 within Appendix A showing the Flood extent in the pre-developed and post-developed conditions.

Refer to the tables below for a full summary of the 100-year pre and post flood levels at each chainage.

Chainage (m)	Pre-developed 100yr WSL
86.46	54.66
85	54.64
80	54.54
75	54.45
70	54.30
65	54.17
60	53.98
55	53.97
50	53.75
45	53.67
40	53.51
35	53.36
30	53.32
25	53.23
20	53.15
15	53.13
10	53.09
05	53.07
00	53.00

Table 5.4a HEC-RAS 100yr pre-developed flood levels

Chainage (m)	Post-developed 100yr WSL
100	54.51
95.1	54.47
95	54.44
93.56	54.44
90	54.26
85	54.06
80	54.13
75	54.03

70	**54.18**
65	**54.20**
60	**54.02**
55	**53.81**
50	**53.94**
45	**53.79**
40	**53.73**
35	**53.67**
30	**53.60**
25	**53.44**
20	**53.27**
15	**53.21**
10	**53.05**
05	**53.07**
00	**53.00**

Table 5.4b HEC-RAS 100yr post-developed flood levels

6. IMPACT ON NEIGHBOURING PROPERTIES

The proposed swale and culvert has been designed in such a way as to ensure no adverse flood impacts on neighbouring properties. As shown in the flood extent plans within Appendix A, the swale and culverts have sufficient capacity and additionally, the flooding is contained within the site boundaries (with the exception of the upstream and downstream discharge points).

At the upstream discharge point (western boundary), the headwall has been sized to be equal in width to the pre-developed flow path. These flows then drop down into the culvert and discharge downstream. There is no increase in 100yr flood levels at this upstream point.

The proposed swale ties in with existing levels within the north-eastern part of the site. This point is taken as chainage 00m in both the pre and post-developed models. The HEC-RAS modelling records no increase in flood level at this point.

7. MINIMUM FINISHED FLOOR LEVEL

Refer to Drawing C121 in Appendix A for the post developed flood extent and table 5.4b for the post developed flood levels at each chainage. The 100yr post-developed flood level for chainage 90 is 54.26. Council require a minimum 500mm freeboard from the 100yr flood level to the finished floor level (FFL), dictating a minimum FFL of 54.76 for the development. The proposed FFL for the development is 55.80, therefore it can be surmised that the proposed FFL is in accordance with Council's requirements.

8. STORMWATER MANAGEMENT

Background

Stormwater controls will be implemented that ensure that the proposed development does not adversely impact on stormwater flows and water quality of the stormwater system downstream of the site.

The principles and operation of the proposed stormwater system for the development including water quality measures and the components of the internal drainage system are detailed on the Development Application Drawings included in Appendix A.

Key Issues

The key issues and the proposed mitigation measures to be implemented as part of the proposed development are:

- **Stormwater Quantity** - The increased impervious surfaces (such as roads, roofs, driveways, etc) associated with the development will result in an increase in peak stormwater flows from the site during storm events. On-site Stormwater Detention (OSD) will be proposed for the development to ensure that runoff from the development is appropriately managed in accordance with Council's requirements. The site stormwater system has been designed to safely convey the flows through the site and within the capacity of the downstream system. The design and operation of the proposed stormwater system is described in Section 8.1 below.

- **Water Quality** - Urban developments have the potential to increase gross pollutants, sediments, hydrocarbons and nutrient concentrations in stormwater runoff. To limit impact on the downstream water quality, water quality measures at source and end of line treatments will be provided. Section 8.2 further describes the specific implementation of these measures for the proposed development.

8.1 Stormwater Quantity

As per Penrith City Council's DCP and engineering guidelines, on-site detention will be required for the site to ensure post-developed flows are reduced to pre-developed flows for the 10yr and 100yr ARI storm events.

A combined on-site detention (OSD), rainwater and stormfilter tank has been proposed within the rear part of the site. The tank provides a detention storage volume of approximately 75m^3. Refer to the table below for a summary of the pre and post developed flows for the relevant storm events. Refer to Appendix A for sections and details of the on-site detention tank, and the DRAINS model included in the DA submission for a full analysis of the hydraulics of the site.

Storm event	Pre-developed Flows (m3/s)	Post – Developed Flows (m3/s)
10year ARI storm	0.265	0.263
100year ARI storm	0.436	0.394

Table 2.2 Pre and Post developed Flows

The proposed development meets Penrith City Council's stormwater detention requirements as shown by the table above.

8.2 Water Quality

Council's requirements also dictate that the stormwater be treated before discharging from the site. The requirements dictate that the post developed pollutants be reduced by the following factors when compared to the pre-developed pollutant generation:

- Total Nitrogen to be reduced by 45%
- Total Phosphorus to be reduced by 60%
- Total Suspended Solids to be reduced by 85%

A MUSIC model has been undertaken in order to design the stormwater quality system. Stormwater from the site is proposed to be treated by a combination of a bio-retention basin and enviropod pit baskets. Refer to drawing 19755_DA_C100 and 19755_DA_C201 for further details on the stormwater treatment system. The results from the MUSIC model has been summarised in the table below.

Pollutant	Pre-Developed Pollutant Loads (kg/yr)	Post Developed Pollutant Loads (kg/yr)	Target Reduction	Pollutant Reduction
Nitrogen	9.05	4.27	45%	52.9%
Phosphorus	1.30	0.318	60%	75.5%
Suspended Solids	615	47	85%	92.4%

Table 8.2 Catchment 1 Pollutant Loads

The proposed development meets Penrith City Council's water quality requirements as shown by the table above, and figure 8.2 below.

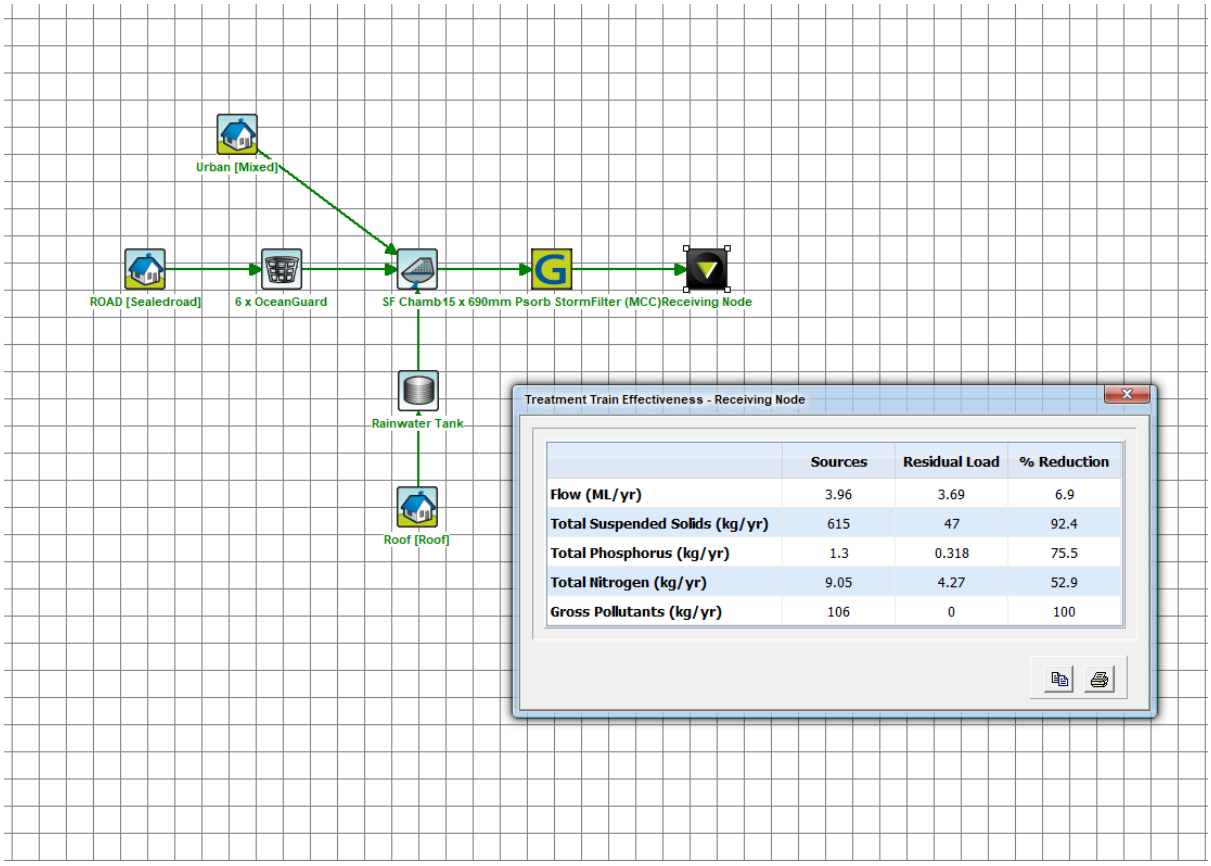
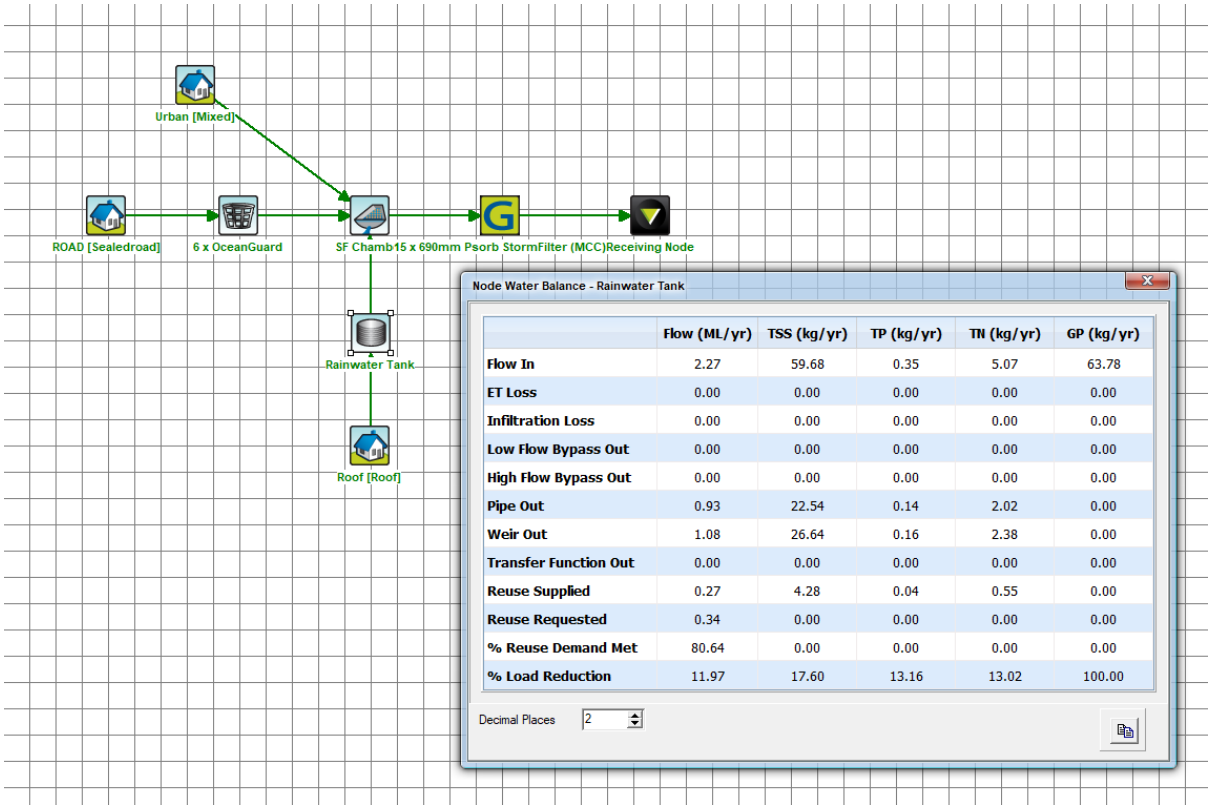


Figure 8.2 MUSIC modelling water quality screenshot

9. WATER CONSERVATION

A 15kL rainwater tank is proposed to be provided in order to meet Penrith City Council's water conservation requirements. This rainwater storage is to be provided within the combined OSD/ Water quality/ rainwater tank. Refer to drawing C201 within Appendix A for further details.

Council's requirement is to provide 80% of non-potable demand through rainwater reuse. Given the number of toilets proposed within the aged care facility, it is not considered feasible to meet this 80% reuse rate. Rainwater storage is therefore only proposed to be reused for irrigation purposes. A total irrigation area of 850m2 has been estimated, with an irrigation rate of 0.4kL/year/m^2. Refer to the MUSIC modelling results shown in figure 9.0, showing that Council's 80% non-potable demand has been achieved.



	Flow (ML/yr)	TSS (kg/yr)	TP (kg/yr)	TN (kg/yr)	GP (kg/yr)
Flow In	2.27	59.68	0.35	5.07	63.78
ET Loss	0.00	0.00	0.00	0.00	0.00
Infiltration Loss	0.00	0.00	0.00	0.00	0.00
Low Flow Bypass Out	0.00	0.00	0.00	0.00	0.00
High Flow Bypass Out	0.00	0.00	0.00	0.00	0.00
Pipe Out	0.93	22.54	0.14	2.02	0.00
Weir Out	1.08	26.64	0.16	2.38	0.00
Transfer Function Out	0.00	0.00	0.00	0.00	0.00
Reuse Supplied	0.27	4.28	0.04	0.55	0.00
Reuse Requested	0.34	0.00	0.00	0.00	0.00
% Reuse Demand Met	80.64	0.00	0.00	0.00	0.00
% Load Reduction	11.97	17.60	13.16	13.02	100.00

Figure 9.0 MUSIC modelling rainwater screenshot

10. CONCLUSION

Catchment mapping, DRAINS modelling and HEC-RAS flood modelling has been undertaken in order to estimate the extent and surface level of the overland flows through the site in the 100yr ARI storm event. The flood modelling shows that the development has no adverse flood impact on neighbouring properties, and shows that the required freeboard has been provided to the proposed building FFL.

Additionally, appropriate stormwater management practices are proposed to be implemented to minimise the impact of the development on the existing stormwater system in terms of water quality whilst ensuring safe and efficient conveyance of runoff and the provision of adequate freeboard to habitable dwellings.

The design is in accordance with Penrith City Council's detention, water quality and flooding requirements as well as engineering best practice principles, hence it can be ensured that there will be minimal impact on the existing environment as a result of the proposed development.

It should be noted that the results shown in this report are limited to use for Development Application purposes only. During the detailed design stages, a further refinement of the modelling based on the detail design of the development will be necessary.

11. APPENDICES

APPENDIX A: DEVELOPMENT APPLICATION DRAWINGS

ST. CLAIR RACF
100 EXPLORERS WAY ST CLAIR NSW
CIVIL ENGINEERING WORKS

GENERAL NOTES:

1. ALL WORK TO BE CARRIED OUT IN ACCORDANCE WITH PENRITH CITY COUNCIL'S SPECIFICATION. CONTRACTOR TO OBTAIN AND RETAIN A COPY ON SITE DURING THE COURSE OF THE WORKS.
2. ALL NEW WORKS ARE TO MAKE A SMOOTH JUNCTION WITH EXISTING CONDITIONS AND MARRY IN A 'WORKMANLIKE' MANNER.
3. THE CONTRACTOR IS TO VERIFY THE LOCATION OF ALL SERVICES WITH EACH RELEVANT AUTHORITY. ANY DAMAGE TO SERVICES SHALL BE RECTIFIED BY THE CONTRACTOR OR THE RELEVANT AUTHORITY AT THE CONTRACTOR'S EXPENSE. SERVICES SHOWN ON THESE PLANS ARE ONLY THOSE EVIDENT AT THE TIME OF SURVEY OR AS DETERMINED FROM SERVICE DIAGRAMS. H & H CONSULTING ENGINEERS PTY. LTD CANNOT GUARANTEE THE INFORMATION SHOWN NOR ACCEPT ANY RESPONSIBILITY FOR INACCURACIES OR INCOMPLETE DATA.
4. SERVICES & ACCESSES TO THE EXISTING PROPERTIES ARE TO BE MAINTAINED IN WORKING ORDER AT ALL TIMES DURING CONSTRUCTION.
5. ADJUST EXISTING SERVICE COVERS TO SUIT NEW FINISHED LEVELS TO RELEVANT AUTHORITY REQUIREMENTS WHERE NECESSARY.
6. REINSTATE AND STABILISE ALL DISTURBED LANDSCAPED AREAS.
7. MINIMUM GRADE OF SUBSOIL SHALL BE 0.5% (1:200) FALL TO OUTLETS.
8. ALL TEMPORARY SEDIMENT AND EROSION CONTROL DEVICES ARE TO BE CONSTRUCTED, PLACED AND MAINTAINED IN ACCORDANCE WITH THE TECHNICAL SPECIFICATIONS, EROSION AND SEDIMENTATION CONTROL PLAN AND PENRITH CITY COUNCIL'S REQUIREMENTS WHERE APPLICABLE.
9. CONTRACTOR TO CHECK AND CONFIRM SITE DRAINAGE CONNECTIONS ACROSS THE VERGE PRIOR TO COMMENCEMENT OF SITE DRAINAGE WORKS.
10. PROPERTIES AFFECTED BY THE WORKS ARE TO BE NOTIFIED IN ADVANCE WHERE DISRUPTION TO EXISTING ACCESS IS LIKELY.

EXISTING SERVICES & FEATURES

- THE CONTRACTOR SHALL ALLOW FOR THE CAPPING OFF, EXCAVATION AND REMOVAL (IF REQUIRED) OF ALL EXISTING SERVICES IN AREAS AFFECTED BY WORKS WITHIN THE CONTRACT AREA OR AS SHOWN ON THE DRAWINGS UNLESS DIRECTED OTHERWISE BY THE SUPERINTENDENT.
- THE CONTRACTOR SHALL ENSURE THAT AT ALL TIMES SERVICES TO ALL BUILDINGS NOT AFFECTED BY THE WORKS ARE NOT DISRUPTED.
- PRIOR TO COMMENCEMENT OF ANY WORKS THE CONTRACTOR SHALL GAIN APPROVAL OF HIS PROGRAM FOR THE RELOCATION/ CONSTRUCTION OF TEMPORARY SERVICES.
- CONTRACTOR SHALL CONSTRUCT TEMPORARY SERVICES TO MAINTAIN SUPPLY TO EXISTING BUILDING REMAINING IN OPERATION DURING WORKS TO THE SATISFACTION AND APPROVAL OF THE SUPERINTENDENT. ONCE DIVERSION IS COMPLETE AND COMMISSIONED, THE CONTRACTOR SHALL REMOVE ALL SUCH TEMPORARY SERVICES AND MAKE GOOD TO THE SATISFACTION OF THE SUPERINTENDENT.
- INTERRUPTION TO SUPPLY OF EXISTING SERVICES SHALL BE DONE SO AS NOT TO CAUSE ANY INCONVENIENCE TO THE PRINCIPAL. CONTRACTOR TO GAIN APPROVAL FROM THE SUPERINTENDENT FOR TIME OF INTERRUPTION.
- EXISTING SERVICES, BUILDINGS, EXTERNAL STRUCTURES AND TREES SHOWN ON THESE DRAWINGS ARE EXISTING FEATURES PRIOR TO ANY DEMOLITION WORKS.
- EXISTING SERVICES UNLESS SHOWN ON SURVEY PLAN HAVE BEEN PLOTTED FROM SERVICES SEARCH PLANS AND AS SUCH THEIR ACCURACY CANNOT BE GUARANTEED. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO COMPLETE A 'DIAL BEFORE YOU DIG' SEARCH AND TO ESTABLISH THE LOCATION AND LEVEL OF ALL EXISTING SERVICES PRIOR TO THE COMMENCEMENT OF ANY WORK. ANY DISCREPANCIES SHALL BE REPORTED TO THE SUPERINTENDENT. CLEARANCES SHALL BE OBTAINED FROM THE RELEVANT SERVICE AUTHORITY.
- ALL BRANCH GAS AND WATER SERVICES UNDER DRIVEWAYS AND BRICK PAVING SHALL BE LOCATED IN Ø80 uPVC SEWER GRADE CONDUITS EXTENDING A MINIMUM OF 500mm BEYOND EDGE OF PAVING.

LOCALITY SKETCH

SCALE: N.T.S.

SITEWORKS NOTES

- DATUM : A.H.D.
- ORIGIN OF LEVELS : REFER TO BENCH OR STATE SURVEY MARKS WHERE SHOWN ON PLAN.
- CONTRACTOR MUST VERIFY ALL DIMENSIONS AND EXISTING LEVELS ON SITE PRIOR TO THE COMMENCEMENT OF WORK.
- ALL WORKS TO BE UNDERTAKEN IN ACCORDANCE WITH THE DETAILS SHOWN ON THE DRAWINGS & THE DIRECTIONS OF THE SUPERINTENDENT.
- EXISTING SERVICES UNLESS SHOWN ON THE SURVEY PLAN HAVE BEEN PLOTTED FROM SERVICES SEARCH PLANS AND AS SUCH THEIR ACCURACY CANNOT BE GUARANTEED. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO ESTABLISH THE LOCATION AND LEVEL OF ALL EXISTING SERVICES PRIOR TO THE COMMENCEMENT OF ANY WORK. ANY DISCREPANCIES SHALL BE REPORTED TO THE SUPERINTENDENT. CLEARANCES SHALL BE OBTAINED FROM THE RELEVANT SERVICE AUTHORITY.
- WHERE NEW WORKS ABUT EXISTING THE CONTRACTOR SHALL ENSURE THAT A SMOOTH EVEN PROFILE, FREE FROM ABRUPT CHANGES IS ACHIEVED.
- THE CONTRACTOR SHALL ARRANGE ALL SURVEY SETOUT TO BE CARRIED OUT BY A REGISTERED SURVEYOR.
- CARE IS TO BE TAKEN WHEN EXCAVATING NEAR EXISTING SERVICES. NO MECHANICAL EXCAVATION IS TO BE UNDERTAKEN OVER TELSTRA OR ELECTRICAL SERVICES. HAND EXCAVATE IN THESE AREAS.
- CONTRACTOR TO OBTAIN AUTHORITY APPROVALS WHERE APPLICABLE.
- MAKE SMOOTH TRANSITION TO EXISTING SURFACES AND MAKE GOOD.
- THESE PLANS SHALL BE READ IN CONJUNCTION WITH APPROVED LANDSCAPE, ARCHITECTURAL, STRUCTURAL, HYDRAULIC AND MECHANICAL DRAWINGS AND SPECIFICATIONS
  OR WRITTEN INSTRUCTIONS THAT MAY BE ISSUED RELATING TO DEVELOPMENT AT THE SITE.
- TRENCHES THROUGH EXISTING ROAD AND CONCRETE PAVEMENTS SHALL BE SAWCUT TO FULL DEPTH OF CONCRETE AND A MINIMUM OF 50mm IN BITUMINOUS PAVING.
- ALL BRANCH GAS AND WATER SERVICES UNDER DRIVEWAYS AND BRICK PAVING SHALL BE LOCATED IN Ø80 uPVC SEWER GRADE CONDUITS EXTENDING A MINIMUM OF 500mm BEYOND EDGE OF PAVING.
- GRADES TO PAVEMENTS TO BE AS IMPLIED BY RL'S ON PLAN . GRADE EVENLY BETWEEN NOMINATED RL'S. AREAS EXHIBITING PONDING GREATER THAN 5mm DEPTH WILL NOT BE ACCEPTED UNLESS IN A DESIGNATED SAG POINT.
- ALL COVERS AND GRATES ETC TO EXISTING SERVICE UTILITIES ARE TO BE ADJUSTED TO SUIT NEW FINISHED SURFACE LEVELS WHERE APPLICABLE.

DRAWING SCHEDULE

19755_DA_C000	COVER SHEET, DRAWING SCHEDULE, NOTES & LOCALITY SKETCH
19755_DA_C100	GENERAL ARRANGEMENT PLAN
19755_DA_C110	SITE SECTIONS
19755_DA_C120	PRE-DEVELOPED FLOOD EXTENT PLAN
19755_DA_C121	POST-DEVELOPED FLOOD EXTENT PLAN
19755_DA_C200	STORMWATER MISCELLANEOUS DETAILS & PIT LID SCHEDULE
19755_DA_C201	ON-SITE DETENTION TANK, SECTIONS AND DETAILS
19755_DA_C250	STORMWATER CATCHMENT PLAN
19755_DA_SE01	SEDIMENT & EROSION CONTROL PLAN
19755_DA_SE02	SEDIMENT & EROSION CONTROL TYPICAL SECTIONS & DETAILS
19755_DA_BE01	BULK EARTHWORKS PLAN

SURVEY NOTES

THE EXISTING SITE CONDITIONS SHOWN ON THE FOLLOWING DRAWINGS HAVE BEEN INVESTIGATED BY THE SURVEYOR SPECIFIED IN THE TITLE BLOCK.
THE INFORMATION IS SHOWN TO PROVIDE A BASIS FOR DESIGN. HENRY AND HYMAS PTY. LTD. DOES NOT GUARANTEE THE ACCURACY OR COMPLETENESS OF THE SURVEY BASE OR ITS SUITABILITY AS A BASIS FOR CONSTRUCTION DRAWINGS.
SHOULD DISCREPANCIES BE ENCOUNTERED DURING CONSTRUCTION BETWEEN THE SURVEY DATA AND ACTUAL FIELD DATA, CONTACT HENRY AND HYMAS PTY. LTD. THE FOLLOWING NOTES HAVE BEEN TAKEN DIRECTLY FROM ORIGINAL SURVEY DOCUMENTS.

ORIGIN OF LEVELS	SSM 91483 RL56.747
DATUM	A.H.D.

FOR DA ONLY

SURVEY INFORMATION
SURVEYED BY GEOMETRA CONSULTING
DATUM: A.H.D
ORIGIN OF LEVELS: SSM 91483 RL56.747

REVISION	AMENDMENT	DRAWN	DESIGNED	DATE
02	ISSUED FOR DA ONLY	NH	NH	01.04.2021
01	ISSUED FOR DA ONLY	IK	NH	24.03.2021

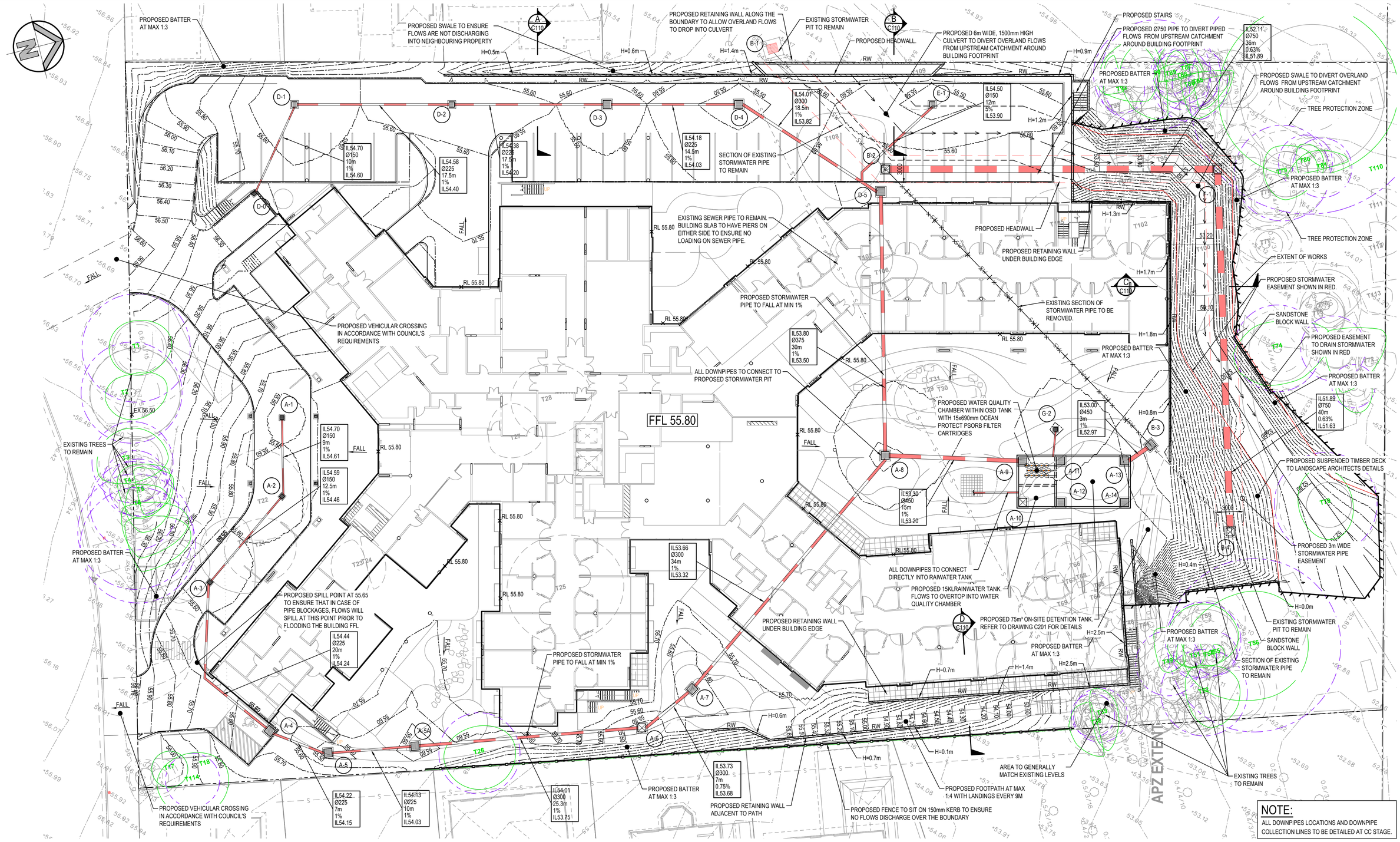
Client: OPAL AGED CARE
Architect: CUSTANCE ASSOCIATES AUSTRALIA

Suite 2.01
828 Pacific Highway
Gordon NSW 2072
Telephone +61 2 9417 8400
Facsimile +61 2 9417 8337
Email email@hhconsult.com.au
Web www.henryandhymas.com.au
henry&hymas

Project: ST. CLAIR RACF
100 EXPLORERS WAY ST CLAIR NSW
Title: COVER SHEET, DRAWING SCHEDULE, NOTES & LOCALITY SKETCH

Drawn	Designed	Date
I.Khachab	N.Heazlewood	OCT 2020
Checked	Approved	Scale @A1
N.Heazlewood	A.Francis	N.T.S.

Drawing number: 19755_DA_C000
Revision: 02



LEGEND

- EXISTING BOUNDARY
- PROPOSED JUNCTION PITS
- PROPOSED SURFACE INLET PITS
- PROPOSED PIT TAG (LINE LETTER / PIT NUMBER)
- STORMWATER UPSTREAM INVERT RL.
- STORMWATER PIPE DIAMETER & CLASS
- STORMWATER PIPE LENGTH
- STORMWATER PIPE GRADE
- STORMWATER DOWNSTREAM INVERT RL.
- EXISTING STORMWATER PIPE
- EXISTING STORMWATER PIPE TO BE REMOVED
- PROPOSED STORMWATER PIPE
- PROPOSED STORMWATER SWALE
- PROPOSED BATTER LINE
- EXISTING CONTOURS
- PROPOSED CONTOURS
- PROPOSED SPOT LEVEL
- EXISTING SEWER LINE
- PROPOSED RETAINING WALL
- PROPOSED EASEMENT TO DRAIN STORMWATER
- PROPOSED STORMWATER PIPE EASEMENT

GENERAL ARRANGEMENT PLAN

SCALE: 1:200

0 4 8 12 16 20m

4 3 2 1

SCALE 1:200

FOR DA ONLY

SURVEY INFORMATION
SURVEYED BY GEOMETRA CONSULTING
DATUM: A.H.D
ORIGIN OF LEVELS: SSM 91483 RL56.747

REVISION	AMENDMENT	DRAWN	DESIGNED	DATE
05	ISSUED FOR DA ONLY	IK	NH	20.05.2021
04	ISSUED FOR DA ONLY	NH	NH	06.04.2021
03	ISSUED FOR DA ONLY	NH	NH	01.04.2021
02	ISSUED FOR DA ONLY	IK	NH	22.03.2021
01	SKETCH	NH	NH	17.03.2021

Client: OPAL AGED CARE

Architect: CUSTANCE ASSOCIATES AUSTRALIA

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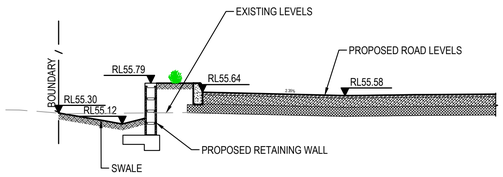
Project: ST. CLAIR RACF
100 EXPLORERS WAY ST CLAIR NSW

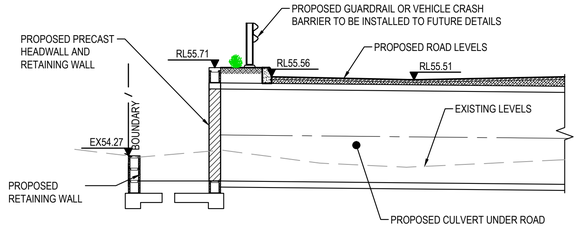
Title: GENERAL ARRANGEMENT PLAN

Drawn	Designed	Date
I.Khachab	N.Heazlewood	OCT 2020
Checked	Approved	Scale @A1
N.Heazlewood	A.Francis	1:200

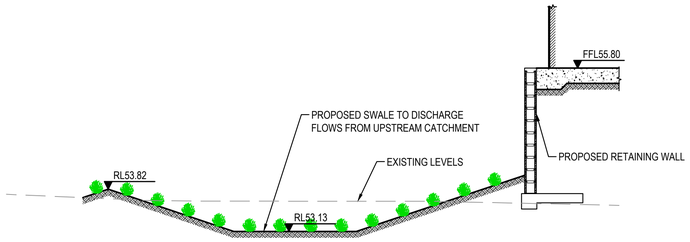
Drawing number: 19755_DA_C100 — Revision: 05



SECTION A C100
SCALE: 1:50



SECTION B C100
SCALE: 1:50



SECTION C C100
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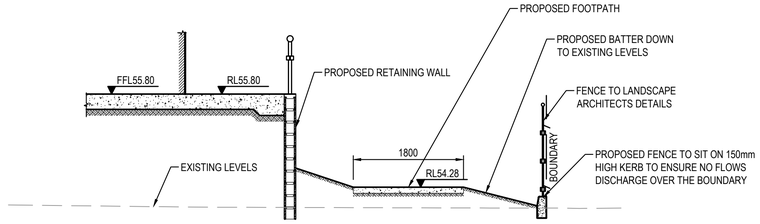

SECTION D C100
SCALE: 1:50

0 1000 2000 3000 4000 5000mm
1000 600 200
SCALE 1:50

FOR DA ONLY

SURVEY INFORMATION
SURVEYED BY
GEOMETRA CONSULTING
DATUM: A.H.D
ORIGIN OF LEVELS: SSM 91483 RL56.747

REVISION	AMENDMENT	DRAWN	DESIGNED	DATE	REVISION	AMENDMENT	DRAWN	DESIGNED	DATE
02	ISSUED FOR DA ONLY	IK	NH	20.05.2021					
01	SKETCH	NH	NH	01.04.2021					

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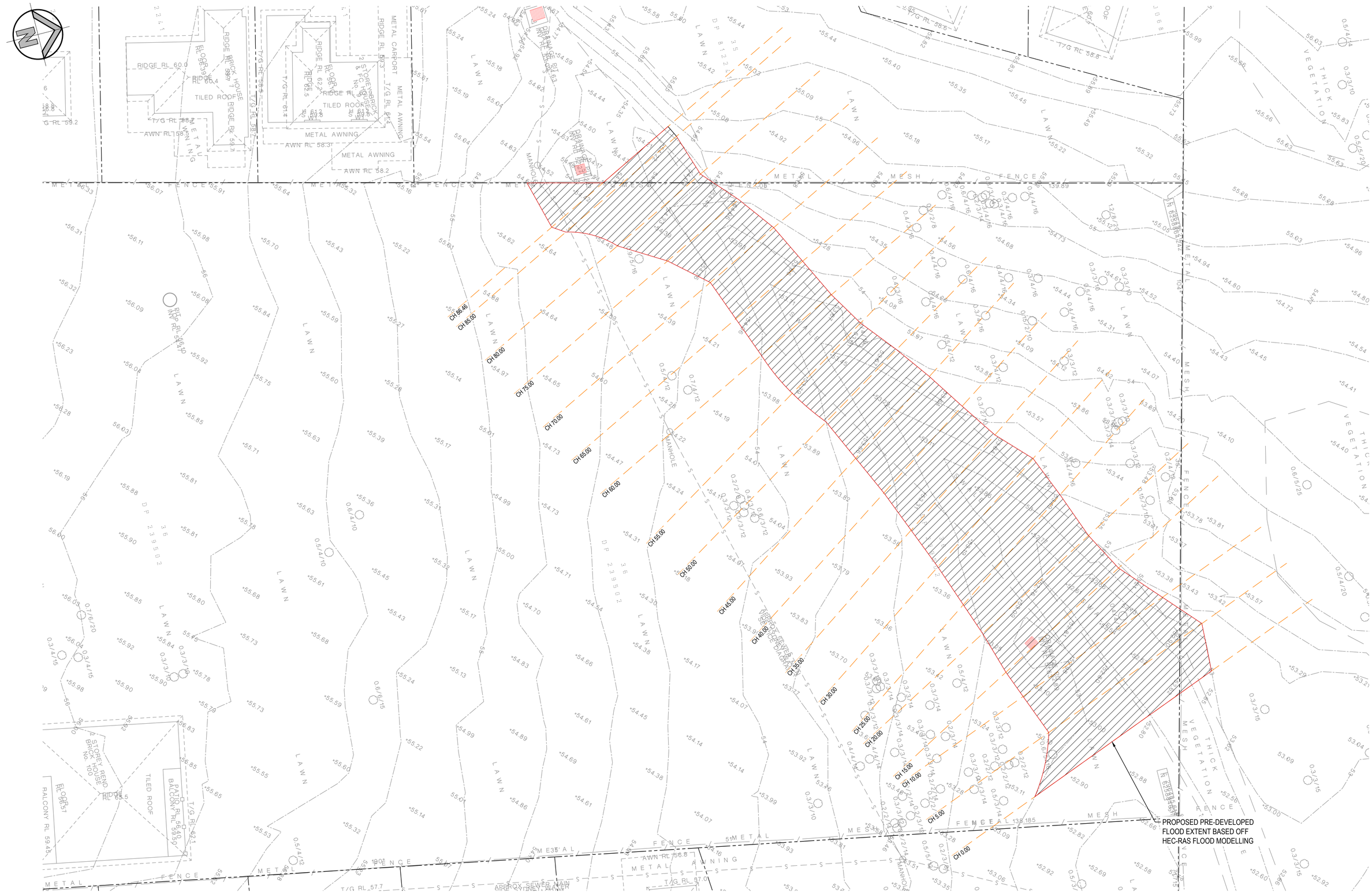
Project
ST. CLAIR RACF
100 EXPLORERS WAY ST CLAIR NSW

Title
SITE SECTIONS

Drawn	Designed	Date
I.Khachab	N.Heazlewood	OCT 2020
Checked	Approved	Scale @A1
N.Heazlewood	A.Francis	1:50

Drawing number: 19755_DA_C110
Revision: 02



0 4 8 12 16 20m
4 3 2 1
SCALE 1:200

PRE-DEVELOPED FLOOD EXTENT PLAN

SCALE: 1:200

FOR DA ONLY

SURVEY INFORMATION
SURVEYED BY
GEOMETRA CONSULTING
DATUM: A.H.D
ORIGIN OF LEVELS: SSM 91483 RL56.747

REVISION	AMENDMENT	DRAWN	DESIGNED	DATE
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Project
ST. CLAIR RACF
100 EXPLORERS WAY ST CLAIR NSW

Title
PRE-DEVELOPED FLOOD EXTENT PLAN

Drawn	Designed	Date
I.Khachab	N.Heazlewood	OCT 2020
Checked	Approved	Scale @A1
N.Heazlewood	A.Francis	1:200

Drawing number: 19755_DA_C120
Revision: 01

0 4 8 12 16 20m
4 3 2 1
SCALE 1:200

POST-DEVELOPED FLOOD EXTENT PLAN

SCALE: 1:200

FOR DA ONLY

SURVEY INFORMATION
SURVEYED BY
GEOMETRA CONSULTING
DATUM: A.H.D
ORIGIN OF LEVELS: SSM 91483 RL56.747

REVISION	AMENDMENT	DRAWN	DESIGNED	DATE
01	ISSUED FOR DA ONLY	NH	NH	01.04.2021

Client: OPAL AGED CARE

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Project: ST. CLAIR RACF
100 EXPLORERS WAY ST CLAIR NSW

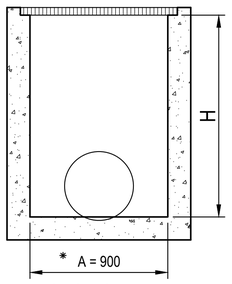
Title: POST-DEVELOPED FLOOD EXTENT PLAN

Drawn	Designed	Date
I.Khachab	N.Heazlewood	OCT 2020
Checked	**Approved**	**Scale @A1**
N.Heazlewood	A.Francis	1:200

Drawing number: 19755_DA_C121 — Revision: 01

TYPICAL PIT CHAMBER SIZES
IT IS THE CONTRACTORS RESPONSIBILITY TO SELECT PIT CHAMBER SIZE WITH REGARDS TO PIPE SIZE, DEPTH TO INVERT AND SKEW ANGLE. REFER SKETCHES BELOW.

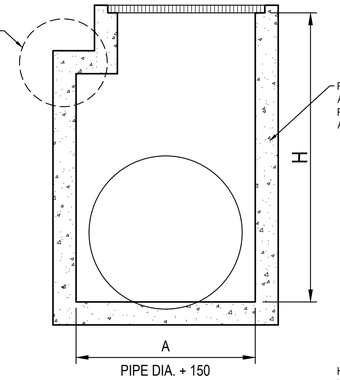
1. SELECT PIT CHAMBER USING THE STEPS BELOW:
2. SELECT PIT CHAMBER SIZE DEPENDING ON THE PIPE DIAMETERS.
3. CHECK PIT CHAMBER SIZE TO SATISFY DEPTH TO INVERT REQUIREMENTS.
   CHECK PIT CHAMBER DIMENSIONS TO SATISFY THE SKEW ANGLE IN THE TABLE.



SECTION
NTS

*A = 600 FOR PIPES UP TO 375 DIA.

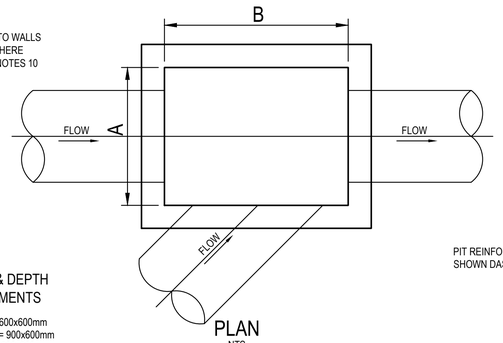
(1) PIT CHAMBER DIMENSIONS FOR PIPES UP TO 600 DIA.



SECTION
NTS

(1) PIT CHAMBER FOR PIPES GREATER THAN 600 DIA.

FOR B = 600mm - MAX. SIDE ENTRY PIPE AT 45° SKEW = 225mm
FOR B = 900mm - MAX. SIDE ENTRY PIPE AT 45° SKEW = 375mm
FOR B = 1200mm - MAX. SIDE ENTRY PIPE AT 45° SKEW = 600mm
FOR B = 1500mm - MAX. SIDE ENTRY PIPE AT 45° SKEW = 825mm
FOR B = 1900mm - MAX. SIDE ENTRY PIPE AT 45° SKEW = 1050mm

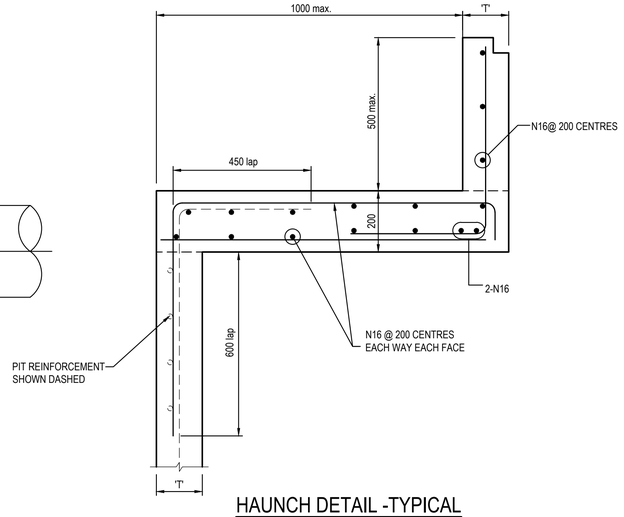


(2) PIT SIZE & DEPTH REQUIREMENTS

H = 0-900mm - AxB = 600x600mm
H = 900-1200mm - AxB = 900x600mm
H = >1200mm - AxB = 900x900mm

PLAN
NTS

(3) PIT CHAMBER FOR SIDE ENTRY ON SKEW



HAUNCH DETAIL -TYPICAL
SCALE 1:10

PIT LID SCHEDULE

PIT/STRUCTURE NUMBER	DESCRIPTION
A-1, D-0, C-1, E-1, G-2	PROPOSED INLET PIT WITH 450x450 HINGED HEAVY DUTY GRATED LID CLASS "D" IN ACCORDANCE WITH PENRITH CITY COUNCIL'S REQUIREMENT.
A-2, A-3, D-1, D-2, D-3	PROPOSED INLET PIT WITH 600x600 HINGED HEAVY DUTY GRATED LID CLASS "D" IN ACCORDANCE WITH PENRITH CITY COUNCIL'S REQUIREMENT.
D-4, D-5, A-4, A-5, A-6, A-7, A-8, A-9, A-11, A-12, A-13, A-14, B-3	PROPOSED INLET PIT WITH 900x900 HINGED HEAVY DUTY GRATED LID CLASS "D" IN ACCORDANCE WITH PENRITH CITY COUNCIL'S REQUIREMENT.
A-10, B-2, F-1	PROPOSED JUNCTION PIT WITH 900x900 HEAVY DUTY SEALED LID CLASS "D" IN ACCORDANCE WITH PENRITH CITY COUNCIL'S REQUIREMENT.
B-1, B-4	EXISTING PIT TO REMAIN

NOTE:

ALL INLET PITS TO BE FITTED WITH OCEAN PROTECT PIT BASKETS FOR WATER QUALITY PURPOSES.

DRAINAGE NOTES:

1. ALL STORMWATER WORK TO COMPLY WITH AS 3500 PART 3.

2. CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING THE MINIMUM COVER OF 600mm ON ALL PIPES.

3. PROTECTION OF PIPES DUE TO LOADS EXCEEDING W7 WHEEL LOAD SHALL BE THE CONTRACTOR'S RESPONSIBILITY.

4. BEDDING TYPE SHALL BE TYPE H2 FOR RCP. WHERE NECESSARY THE OVERLAY ZONE SHALL BE REDUCED TO ACCOMMODATE PAVEMENT REQUIREMENTS. REFER TO THIS DRAWING FOR DETAILS.

5. MINIMUM COVER OVER EXISTING PIPES FOR PROTECTION DURING CONSTRUCTION SHALL BE 800mm.

6. NO CONSTRUCTION LOADS SHALL BE APPLIED TO PLASTIC PIPES.

7. FINISHED SURFACE LEVELS SHOWN ON LAYOUT PLAN DRGS TAKE PRECEDENCE OVER DESIGN DRAINAGE SURFACE LEVELS.

8. ALL PIPES UP TO AND INCLUDING 300 DIA. SHALL BE SOLVENT OR RUBBER RING JOINTED PVC CLASS SH PIPE TO AS1260. ALL OTHER PIPES TO BE RCP USING CLASS 2 RUBBER RING JOINTED PIPE. HARDIES FRC PIPE MAY BE USED IN LIEU OF RCP IF DESIRED IN GROUND. ALL AERIAL PIPES TO BE PVC CLASS SH.

9. ALL PITS IN NON TRAFFICABLE AREAS TO BE PREFABRICATED POLYESTER CONCRETE "POLYCRETE" WITH "LIGHT DUTY" CLASS B GALV. MILD STEEL GRATING AND FRAME.
ALL PITS IN TRAFFICABLE AREAS (CLASS "D" LOADING MAX) TO HAVE 150mm THICK CONCRETE WALLS AND BASE CAST IN-SITU f'c=32 MPa, REINFORCED WITH N12-200 BOTH LOADING WAYS CENTRALLY PLACE .U.N.O. ON SEPARATE DESIGN DRAWINGS IN THIS SET. GALV.MILD STEEL GRATING AND FRAME TO SUIT DESIGN LOADING. PRECAST PITS, RECTANGULAR OR CIRCULAR IN SHAPE, MAY BE USED IN LIEU AND SHALL COMPLY WITH RELEVANT AUSTRALIAN STANDARDS.

10. ALL PITS, GRATINGS AND FRAMES SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURERS SPECIFICATION AND TO BE IN ACCORDANCE WITH AS3500.3 AND AS3996.

11. PIT CHAMBER DIMENSIONS ARE TO BE SELECTED TO SATISFY THE FOLLOWING:
- PIPE SIZE
- DEPTH TO INVERT
- SKEW ANGLE
  REFER TYPICAL PIT CHAMBER DETAILS BELOW
IF PIT LID SIZE IS SMALLER THAN THE PIT CHAMBER SIZE THEN THE PIT LID IS TO BE CONSTRUCTED ON THE CORNER OF THE PIT CHAMBER WITH THE STEP IRONS DIRECTLY BELOW. ALTERNATIVELY THE PIT LID TO BE USED, IS TO BE THE SAME SIZE AS THE PIT CHAMBER.

12. FOR PIPE SIZES GREATER THAN Ø300mm, PIT FLOOR IS TO BE BENCHED TO FACILITATE FLOW.

13. GALVANISED STEP IRONS SHALL BE PROVIDED AT 300 CTS FOR PITS HAVING A DEPTH EXCEEDING 1200mm. SUBSOIL DRAINAGE PIPE SHALL BE PROVIDED IN PIPE TRENCHES ADJACENT TO INLET PIPES. (MINIMUM LENGTH 3m).

14. ALL SUBSOIL PIPES SHALL BE 100mm SLOTTED PVC IN A FILTER SOCK, UNO, WITH 3m INSTALLED UPSTREAM OF ALL PITS.

15. ALL PIPEWORK SHALL HAVE MINIMUM DIAMETER 100.

16. MINIMUM GRADE FOR ROOFWATER DRAINAGE LINES SHALL BE 1%.

17. ALL PIPE JUNCTIONS AND TAPER UP TO AND INCLUDING 300 DIA. SHALL BE VIA PURPOSE MADE FITTINGS.

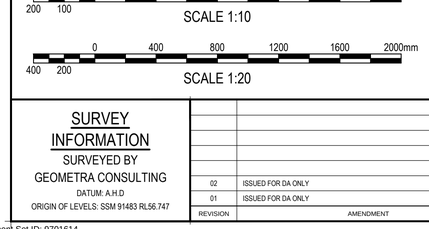
18. ALL ROOF DRAINAGE TO BE INSTALLED IN ACCORDANCE WITH AS3500, PART 3. TESTING TO BE UNDERTAKEN AND REPORTS PROVIDED TO THE SUPERINTENDENT.

19. LOCATION OF THE DIRECT DOWN PIPE CONNECTIONS MAY VARY ON SITE TO SUIT SITE CONDITIONS, WHERE CONNECTION SHOWN ON LONG SECTIONS CHAINAGES ARE INDICATIVE ONLY.

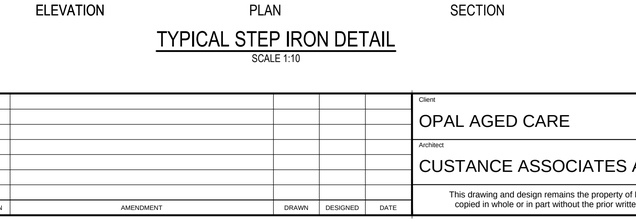
20. PITS IN EXCESS OF 1.5 m DEEP TO HAVE WALL AND FLOOR THICKNESS INCREASED TO 200mm. REINFORCED WITH N12@200 CTS CENTRALLY PLACED BOTH WAYS THROUGHOUT U.N.O.ON SEPARATE DESIGN DRAWINGS IN THIS SET. IF DEPTH EXCEEDS 5m CONTACT ENGINEER.

21. SUBSOIL DRAINAGE LINES FOR LANDSCAPE AREA NOT SHOWN ON THESE DRAWINGS. REFER TO LANDSCAPING PLANS FOR DETAILS.

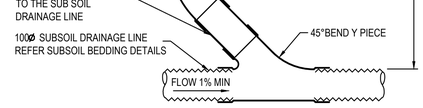
22. ALL STORMWATER PITS TO HAVE Ø100 uPVC SLOTTED SUBSOIL PIPES CONNECTED TO THEM. THESE SUBSOILS TO EXTEND 3m UPSTREAM OF THE PIT AT A MINIMUM GRADE.



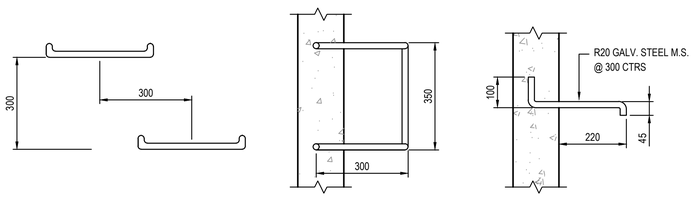
PIPE TRENCH INSTALLATION BENEATH PAVEMENT
(H1 & H2 SUPPORT)
SCALE 1:20



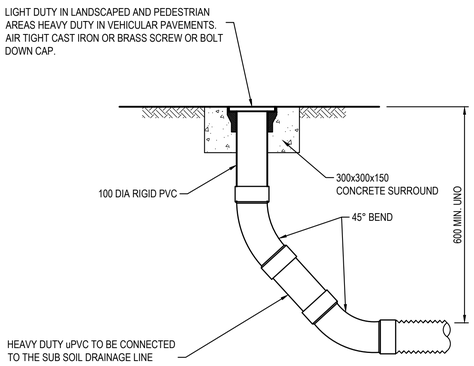
PIPE TRENCH INSTALLATION IN LANDSCAPE AREAS
(H1 & H2 SUPPORT)
SCALE 1:20



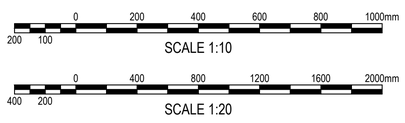
INTERMEDIATE RISER (IR)
SCALE 1:10
NOTE: SLOTTED RIGID PVC PIPE AND FITTINGS MAY BE USED



TYPICAL STEP IRON DETAIL
SCALE 1:10



FLUSHING POINT (FP)
SCALE 1:10
NOTE: SLOTTED RIGID PVC PIPE AND FITTINGS MAY BE USED



FOR DA ONLY

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GEOMETRA CONSULTING
DATUM: A.H.D
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02	ISSUED FOR DA ONLY	IK	NH	20.05.2021
01	ISSUED FOR DA ONLY	IK	NH	22.03.2021

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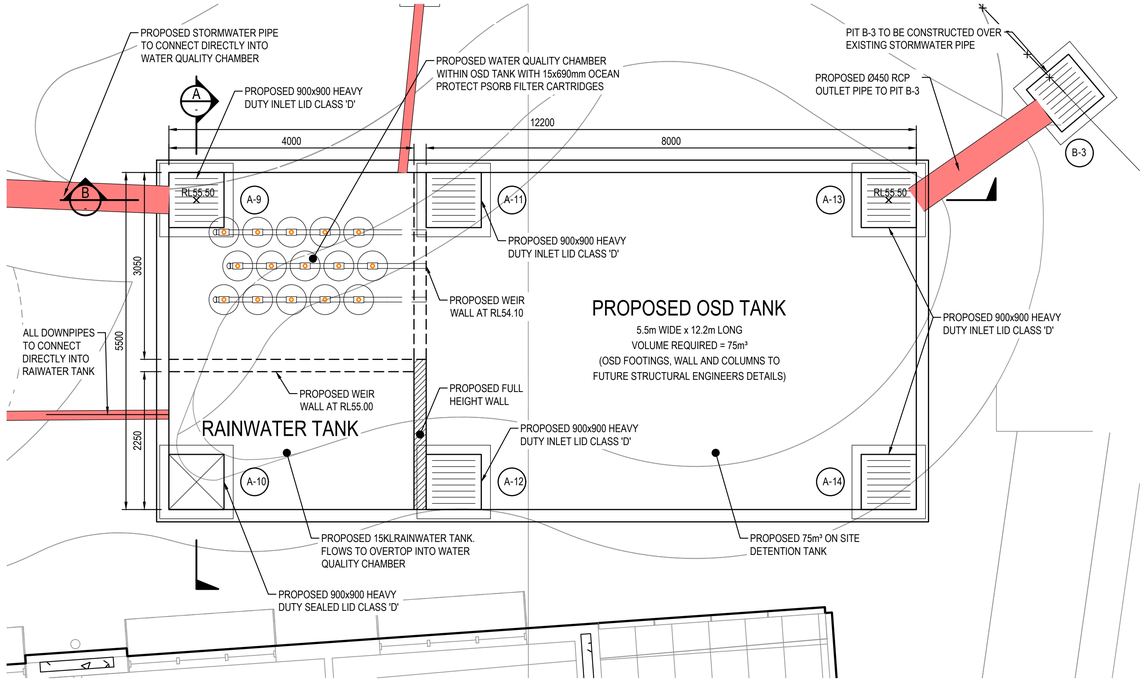
Project: ST. CLAIR RACF
100 EXPLORERS WAY ST CLAIR NSW

Title: STORMWATER MISCELLANEOUS DETAILS & PIT LID SCHEDULE

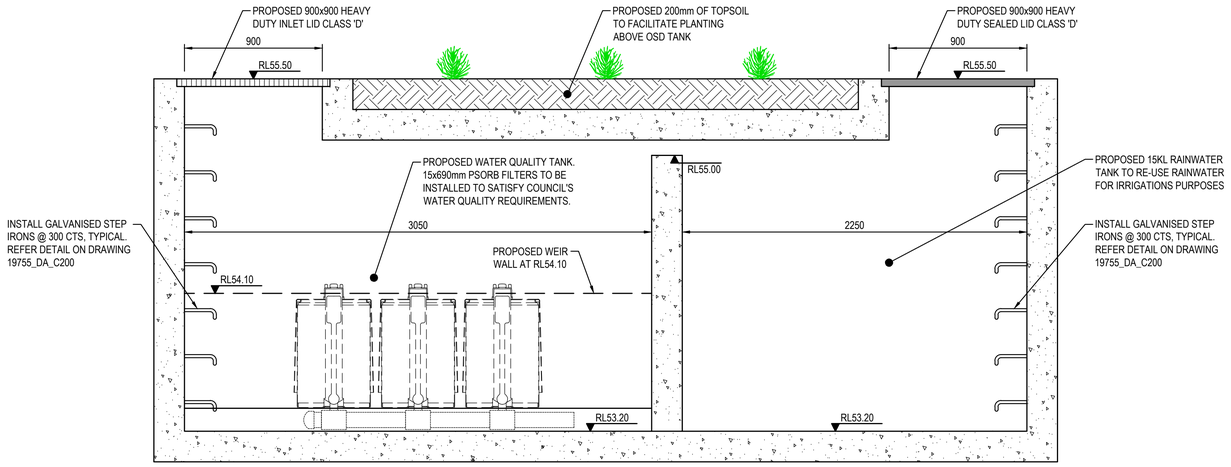
Drawn	Designed	Date
I.Khachab	N.Heazlewood	OCT 2020
Checked	Approved	Scale @A1
N.Heazlewood	A.Francis	AS NOTED

Drawing number: 19755_DA_C200
Revision: 02



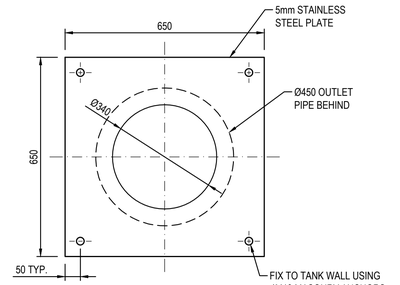
OSD TANK PLAN

SCALE: 1:50



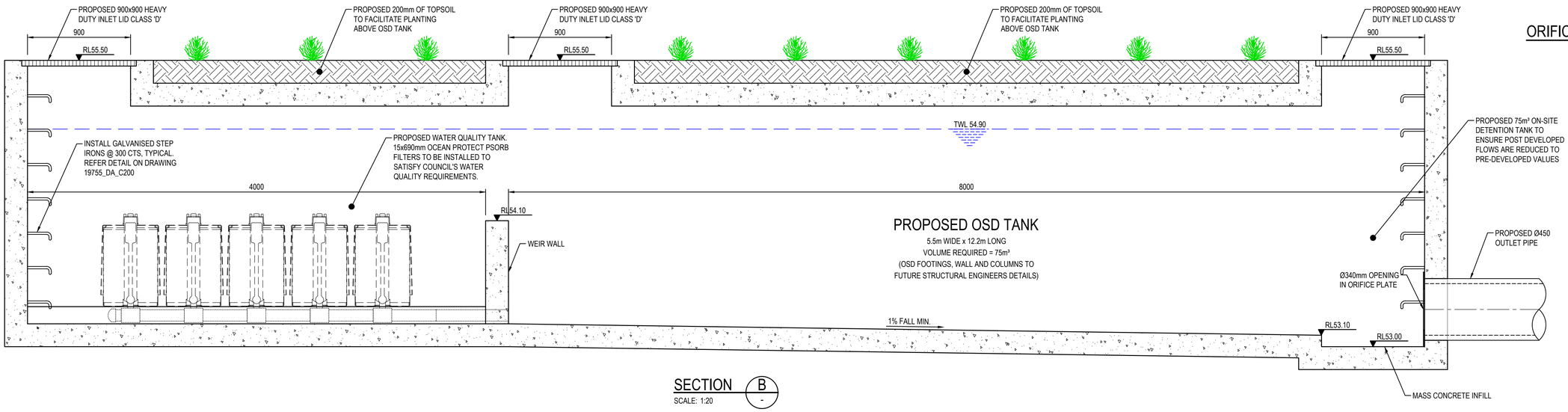
SECTION A

SCALE: 1:20



ORIFICE PLATE DETAIL

SCALE 1:10



SECTION B

SCALE: 1:20

0 200 400 600 800 1000mm
200 100
SCALE 1:10

0 400 800 1200 1600 2000mm
400 200
SCALE 1:20

FOR DA ONLY

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DATUM: A.H.D
ORIGIN OF LEVELS: SSM 91483 RL56.747

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Client: OPAL AGED CARE
Architect: CUSTANCE ASSOCIATES AUSTRALIA

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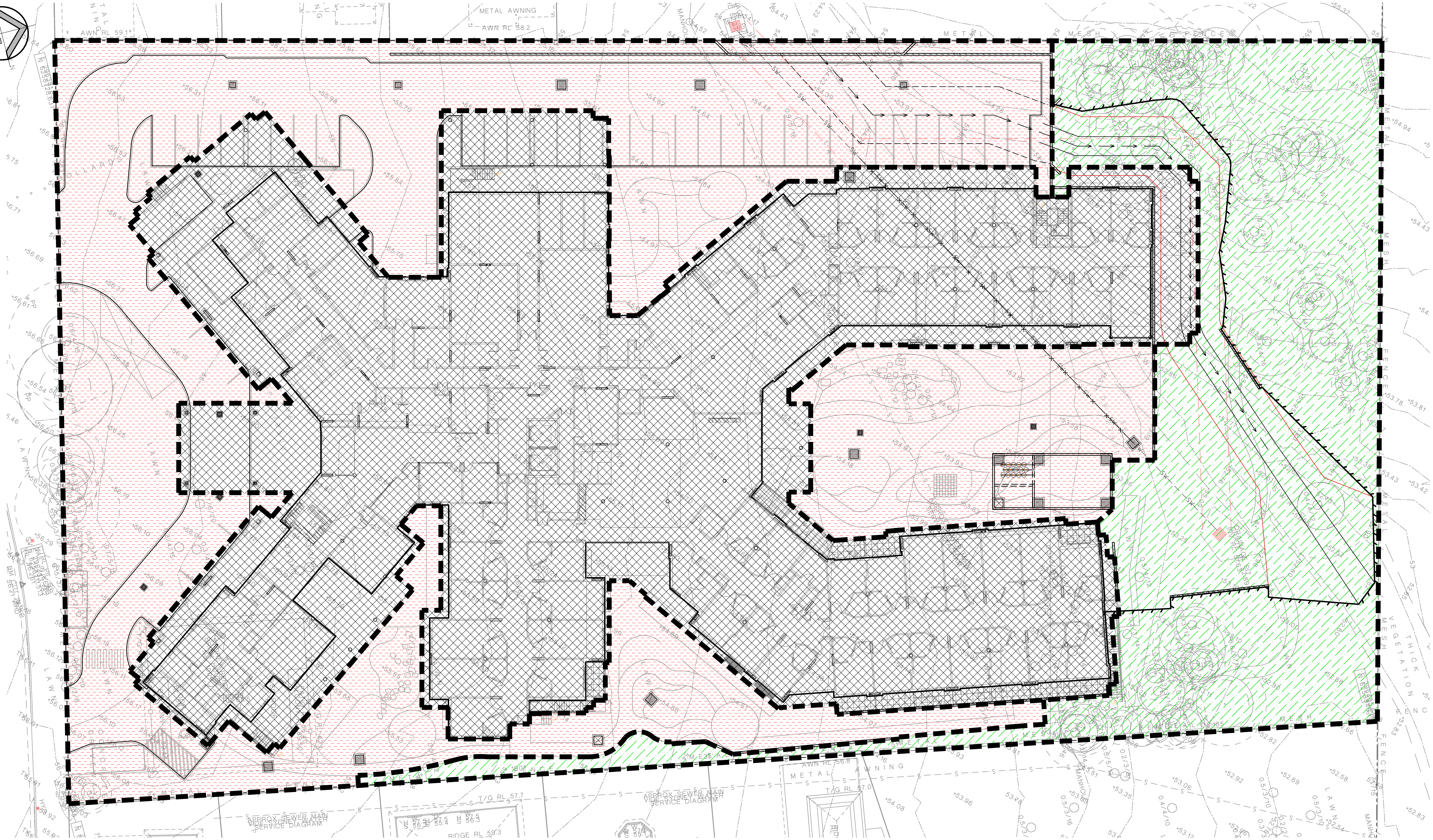
Project: ST. CLAIR RACF
100 EXPLORERS WAY ST CLAIR NSW

Title: OSD TANK PLAN, SECTIONS AND DETAILS

Drawn	Designed	Date
I.Khachab	N.Heazlewood	OCT 2020
Checked	Approved	Scale @A1
N.Heazlewood	A.Francis	AS NOTED

Drawing number: 19755_DA_C201
Revision: 02



STORMWATER CATCHMENT PLAN

SCALE: 1:200

TOTAL SITE AREA = 10570m²

Legend	Description
Cross-hatched area	ROOF AREA TO OSD/WQ TANK AREA = 4767m²
Red dashed hatch area	HARDSTAND/LANDSCAPE AREA TO OSD/WQ TANK AREA = 3733m²
Green hatch area	LANDSCAPE BYPASS AREA = 2070m²

0 4 8 12 16 20m
4 3 2 1
SCALE 1:200

FOR DA ONLY

SURVEY INFORMATION
SURVEYED BY
GEOMETRA CONSULTING
DATUM: A.H.D
ORIGIN OF LEVELS: SSM 91483 RL56.747

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Project
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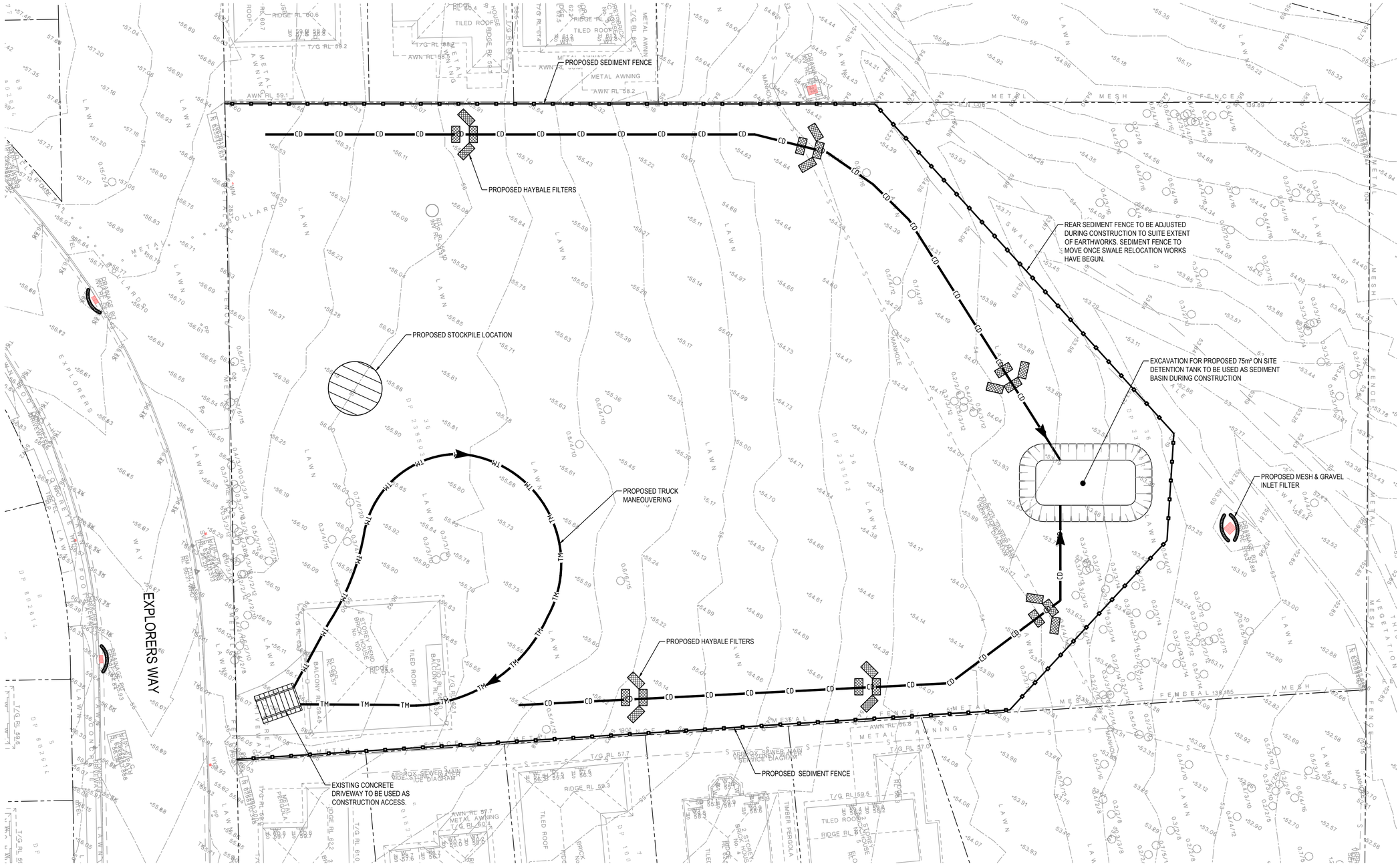
100 EXPLORERS WAY ST CLAIR NSW

Title
STORMWATER CATCHMENT PLAN

Drawn	Designed	Date
I.Khachab	N.Heazlewood	OCT 2020
Checked	**Approved**	**Scale @A1**
N.Heazlewood	A.Francis	1:200

Drawing number: 19755_DA_C250
Revision: 02

Document Set ID: 9701614
Version: 1, Version Date: 18/08/2021



LEGEND

- PROPOSED SEDIMENTATION FENCE
- CD CD — CATCH DIVERSION DRAIN
- TM TM — TRAFFIC MANOEUVRING
- PROPOSED VEHICLE SHAKER GRID
- PROPOSED STOCKPILE LOCATION
- PROPOSED HAYBALE FILTER
- PROPOSED MESH & GRAVEL INLET FILTER

SEDIMENT & EROSION CONTROL NOTES

- ALL SEDIMENT CONTROL DEVICES ARE TO BE CONSTRUCTED, PLACED AND MAINTAINED IN ACCORDANCE WITH PENRITH CITY COUNCIL'S SPECIFICATIONS AND LANDCOM'S "SOIL AND CONSTRUCTION" MANUAL.
- ALL PERIMETER & SILTATION CONTROL MEASURES ARE TO BE PLACED PRIOR TO, OR AS THE FIRST STEP IN EARTH WORKS AND/OR CLEARING.
- THE SEDIMENT & EROSION CONTROL PLAN MAY REQUIRE FUTURE ADJUSTMENT TO REFLECT CONSTRUCTION STAGING. IT IS ALSO THE CONTRACTORS RESPONSIBILITY TO PREPARE THEIR OWN SEDIMENT AND EROSION CONTROL PLAN WHICH SUITS THE DESIGNED CONSTRUCTION STAGING.
- FILTRATION BUFFER ZONES ARE TO BE FENCED OFF AND ACCESS PROHIBITED TO ALL PLANT AND MACHINERY.
- ALL TEMPORARY EARTH BERMS, DIVERSIONS & SILT DAM EMBANKMENTS ARE TO BE MACHINE COMPACTED, SEEDED & MULCHED FOR TEMPORARY VEGETATION COVER AS SOON AS THEY HAVE BEEN FORMED.
- ALL SEDIMENT TRAPPING STRUCTURES AND DEVICES ARE TO BE INSPECTED AFTER STORMS FOR STRUCTURAL DAMAGE OR CLOGGING. TRAPPED MATERIAL IS TO BE REMOVED TO A SAFE LOCATION.
- ALL TOPSOIL IS TO BE STOCKPILED ON SITE FOR REUSE (AWAY FROM TREES AND DRAINAGE LINES). MEASURES SHALL BE APPLIED TO PREVENT EROSION OF THE STOCKPILES.
- ALL EARTHWORK AREAS SHALL BE ROLLED EACH EVENING TO SEAL THE EARTHWORKS.
- ALL FILLS ARE TO BE LEFT WITH A LIP AT THE TOP OF THE SLOPE AT THE END. ALL CUT AND FILL SLOPES ARE TO BE SEEDED AND STRAW MULCHED WITHIN 14 DAYS OF COMPLETION OF FORMATION U.N.O. BY LANDSCAPE ARCHITECTS.
- UPON COMPLETION OF ALL EARTHWORKS OR AS DIRECTED BY COUNCIL SOIL CONSERVATION TREATMENTS SHALL BE APPLIED SO AS TO RENDER AREAS THAT HAVE BEEN DISTURBED, EROSION PROOF WITHIN 14 DAYS.
- EROSION AND SILT PROTECTION MEASURES ARE TO BE MAINTAINED AT ALL TIMES.

SEDIMENT & EROSION CONTROL PLAN

SCALE: 1:250

0 5 10 15 20 25m

SCALE 1:250

FOR DA ONLY

SURVEY INFORMATION
SURVEYED BY
GEOMETRA CONSULTING
DATUM: A.H.D
ORIGIN OF LEVELS: SSM 91483 RL56.747

REVISION	AMENDMENT	DRAWN	DESIGNED	DATE
01	ISSUED FOR DA ONLY	IK	NH	22.03.2021

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Project: ST. CLAIR RACF
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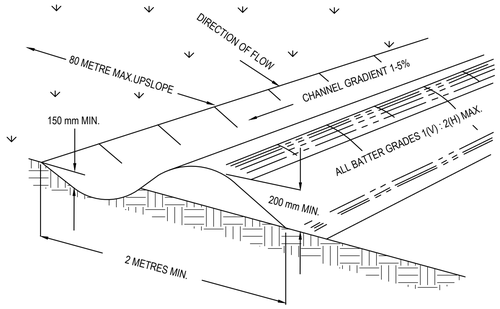
Title: SEDIMENT & EROSION CONTROL PLAN

Drawn	Designed	Date
I.Khachab	N.Heazlewood	MARCH 2021
Checked	Approved	Scale @A1
N.Heazlewood	A.Francis	1:250

Drawing number: 19755_DA_SE01

Revision: 01



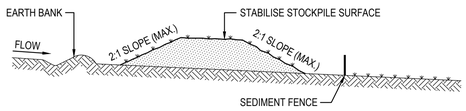
NOTE: ONLY TO BE USED AS TEMPORARY BANK WHERE MAC.UPSLOPE LENGTH IS 80 METERS.

CATCH DRAIN CONSTRUCTION NOTES:

1. CONSTRUCT ALONG GRADIENT AS SPECIFIED.
2. MAXIMUM SPACING BETWEEN BANKS SHALL BE 80 METRES.
3. DRAINS TO BE OF PARABOLIC OR TRAPEZOIDAL CROSS SECTION NOT V-SHAPED.
4. EARTH BANKS TO BE ADEQUATELY COMPACTED IN ORDER TO PREVENT FAILURE.
5. CONSTRUCTION IS OF A TEMPRORARY NATURE AND SHALL BE COMPACTED AT THE END A DAYS WORK OR IMMEDIATELY PRIOR RAIN.
6. ALL OUTLETS FROM DISTURBED LANDS ARE TO FEED INTO SEDIMENT BASIN OR SIMILAR.
7. DISCHARGE RUNOFF COLLECTED FROM UNDISTURBED LANDS ONTO EITHER A STABILISED OR AN UNDISTURBED DISPOSAL AISTE WITHIN THE SAME SUBCATCHMENT AREA FROM WHICH THE WATER ORIGINATED.
8. COMPACT WITH A SUITABLE IMPLEMENT IN SITUATIONS WHERE THEY ARE REQUIRED TO FUNCTION FOR MORE THAN FIVE DAYS.
9. EARTH BANKS TO BE FREE OF PROJECTIONS OR OTHER IRREGULARITIES THAT WILL IMPEDE NORMAL FLOW.

CATCH DRAINS SD 5-8

SCALE N.T.S.

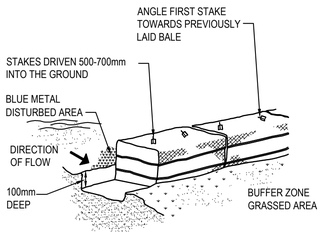


STOCKPILE CONSTRUCTION NOTES:

1. PLACE STOCKPILES MORE THAN 2 (PREFERABLY 5) METRES 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 2 METRES IN HEIGHT.
4. WHERE THEY ARE TO BE PLACED FOR MORE THAN 10 DAYS, STABILISE FOLLOWING THE APPROVED E.S.C.P. OR S.W.M.P. TO REDUCE THE C-FACTOR TO LESS THAN 0.10.
5. CONSTRUCT EARTH BANKS ON THE UPSLOPE SIDE TO DIVERT WATER AROUND STOCKPILES AND SEDIMENT FENCES 1 TO 2 METRES DOWNSLOPE.

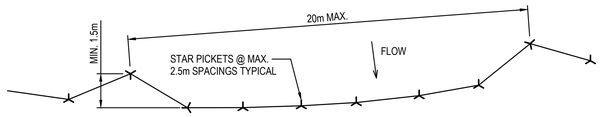
STOCKPILES

SCALE N.T.S.

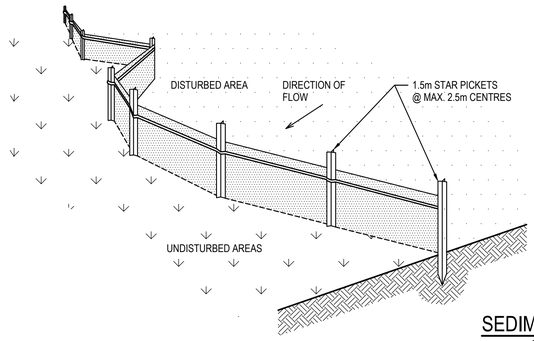


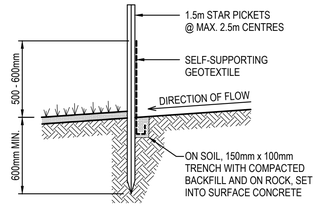
HAYBALE BARRIERS

N.T.S.



PLAN





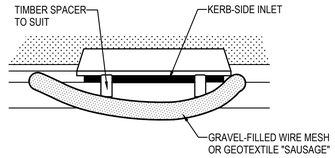
SECTION DETAIL

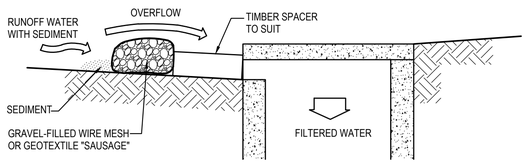
SEDIMENT FENCE

SCALE N.T.S.

SEDIMENT FENCE 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. 3. DRIVE 1.5m LONG STAR PICKETS INTO GROUND @ 2.5m INTERVALS (MAX.) AT THE DOWNSLOPE EDGE OF THE TRENCH. ENSURE ANY STAR PICKETS ARE FITTED WITH SAFETY CAPS.
4. 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. 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.



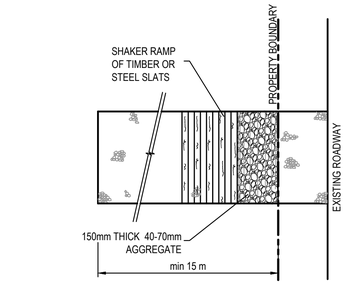


MESH & GRAVEL INLET FILTER CONSTRUCTION NOTES:

1. 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.
2. FORM AN ELLIPTICAL CROSS-SECTION ABOUT 150mm HIGH x 400mm WIDE.
3. PLACE THE FILTER AT THE OPENING LEAVING AT LEAST A 100mm SPACE BETWEEN IT AND THE KERB INLET. MAINTAIN THE OPENING WITH SPACER BLOCKS.
4. FORM A SEAL WITH THE KERB TO PREVENT SEDIMENT BYPASSING THE FILTER.
5. SANDBAGS FILLED WITH GRAVEL CAN SUBSTITUTE FOR THE MESH OR GEOTEXTILE PROVIDING THEY ARE PLACED SO THAT THEY CAN FIRMLY ABUT EACH OTHER AND SEDIMENT / LADEN WATERS CANNOT PASS BETWEEN.

MESH & GRAVEL INLET FILTER

SCALE N.T.S.

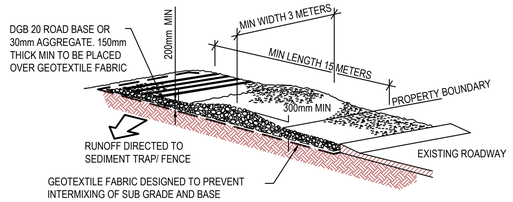


PLAN

STABILISED SITE ACCESS WITH SHAKER RAMP

N.T.S.

CONSTRUCTION SITE



STABILISED SITE ACCESS WITH SHAKER RAMP

N.T.S.

NOTES:

1. THIS DEVICE IS TO BE LOCATED AT ALL EXITS FROM CONSTRUCTION SITE.
2. THIS DEVICE IS TO BE REGULARLY CLEANED OF DEPOSITED MATERIAL SO AS TO MAINTAIN A 50mm DEEP SPACE BETWEEN PLANKS.
3. ANY UNSEALED ROAD BETWEEN THIS DEVICE AND NEAREST ROADWAY IS TO BE TOPPED WITH 100mm THICK 40-70mm SIZE AGGREGATE.
4. ALTERNATIVELY, THREE(3) PRECAST CONCRETE CATTLE GRIDS (AS MANUFACTURED BY "HUMES CONCRETE MAY BE USED. 1, 2 & 3 ABOVE ALSO APPLY.

FOR DA ONLY

SURVEY INFORMATION
SURVEYED BY GEOMETRA CONSULTING
DATUM: A.H.D
ORIGIN OF LEVELS: SSM 91483 RL56.747

REVISION	AMENDMENT	DRAWN	DESIGNED	DATE
01	ISSUED FOR DA ONLY	IK	NH	22.03.2021

Client: OPAL AGED CARE
Architect: CUSTANCE ASSOCIATES AUSTRALIA

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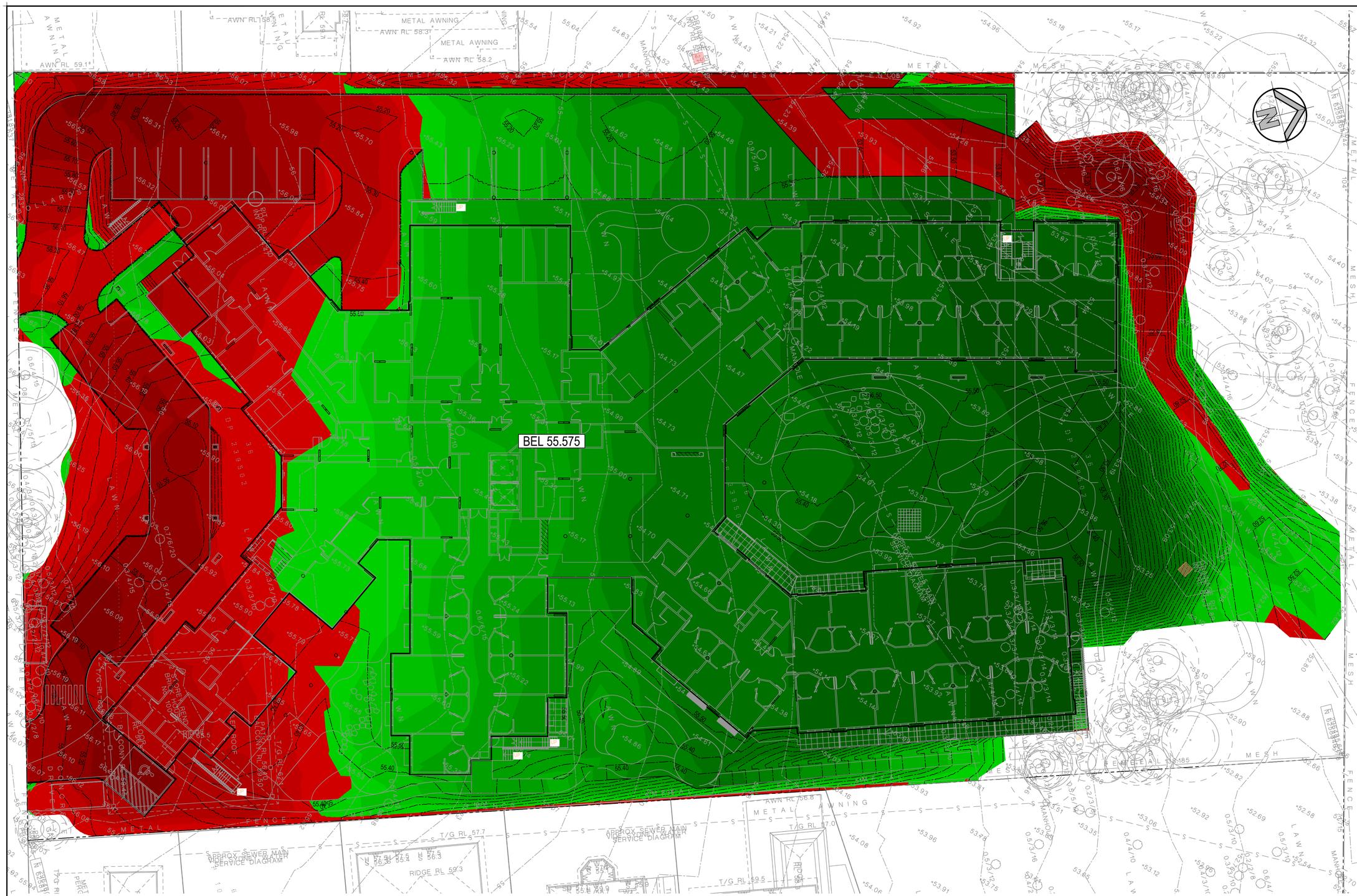
Project: ST. CLAIR RACF
100 EXPLORERS WAY ST CLAIR NSW

Title: SEDIMENT & EROSION CONTROL DETAILS AND SECTION

Drawn	Designed	Date
I.Khachab	N.Heazlewood	MARCH 2021
Checked	Approved	Scale @A1
N.Heazlewood	A.Francis	NTS

Drawing number: 19755_DA_SE02
Revision: 01



BULK EARTHWORKS PLAN

SCALE: 1:200

0 4 8 12 16 20m

4 3 2 1

SCALE 1:200

DEPTH OF CUT & FILL RANGE				
LOWER VALUE		UPPER VALUE		COLOUR
-4.0	to	-3.0	m	
-3.0	to	-2.0	m	
-2.0	to	-1.5	m	
-1.5	to	-1.0	m	
-1.0	to	-0.8	m	
-0.8	to	-0.6	m	
-0.6	to	-0.4	m	
-0.4	to	-0.2	m	
-0.2	to	-0.1	m	
-0.1	to	0.0	m	
0.0	to	0.1	m	
0.1	to	0.2	m	
0.2	to	0.4	m	
0.4	to	0.6	m	
0.6	to	0.8	m	
0.8	to	1.0	m	
1.0	to	1.5	m	
1.5	to	2.0	m	
2.0	to	3.0	m	
3.0	to	4.0	m	

BULK EARTHWORKS GENERAL NOTES

REFER TO GEOTECHNICAL INVESTIGATION REPORT PREPARED BY GROUND ENGINEERING DESIGN CONSULTING SERVICES DATED APRIL 2015 FOR INFORMATION RELATING TO EXISTING GROUND CONDITIONS, SITE TREATMENT AND SUPERVISION.

THE LOCATIONS OF UNDERGROUND SERVICES SHOWN ON THESE DRAWINGS HAVE BEEN PLOTTED FROM SURVEY AND AUTHORITY INFORMATION. THE SERVICE INFORMATION HAS BEEN PREPARED ONLY TO SHOW THE APPROXIMATE POSITIONS OF ANY KNOWN SERVICES AND MAY NOT BE AS CONSTRUCTED OR ACCURATE.

HENRY AND HYMAS PTY LTD CAN NOT GUARANTEE THAT THE SERVICES INFORMATION SHOWN ON THESE DRAWINGS, ACCURATELY INDICATES THE PRESENCE OR ABSENCE OF SERVICES OR THEIR LOCATION AND WILL ACCEPT NO LIABILITY FOR INACCURACIES IN THE SERVICES INFORMATION SHOWN ARISING FROM ANY CAUSE WHATSOEVER. CONTRACTORS ARE TO CONTACT THE RELEVANT SERVICE AUTHORITY PRIOR TO COMMENCEMENT OF EXCAVATION. FOR COMMENCEMENT OF WORKS ON SITE, SEARCH RESULTS ARE TO BE KEPT ON SITE AT ALL TIMES.

ALL SERVICES ARE TO BE LOCATED AND CUT OFF PRIOR TO THE COMMENCEMENT OF EXCAVATION AND FILLING OPERATIONS.

ALL TOP SOIL, ORGANIC MATTER AND FILL MATERIAL SHALL BE REMOVED FROM ALL AREAS UNDER BUILDING AND CARPARK LOCATIONS TO THE SATISFACTION OF THE GEOTECHNICAL ENGINEER. AREAS TO BE FULLY STRIPPED OF EXISTING FILL AND DARK BROWN BLACK UPPER ORGANIC ALLUVIUM.

UPON COMPLETION OF STRIPPING AND PRIOR TO PLACEMENT OF FILL THE ENTIRE SITE SHALL BE PROOF ROLLED WITH A MINIMUM OF 6 PASSES OF A VIBRATOR PADFOOT ROLLER OF NOT LESS THEN 9 TONNE MINIMUM DEAD WEIGHT OR AS SPECIFIED IN THE GEOTECHNICAL REPORT. ANY SOFT OR HEAVING AREAS SHALL BE REMOVED TO THE SATISFACTION OF THE GEOTECHNICAL ENGINEER TO A MINIMUM DEPTH OF 500mm AND THEN BACKFILLED WITH APPROVED MATERIAL IN 200mm THICK LOOSE LAYERS COMPACTED TO 98% OF STANDARD MAX. DRY DENSITY AND TO WITHIN +/- 2% OF STANDARD OPTIMUM MOISTURE CONTENT. APPROVED BACKFILL MATERIAL MAY BE CRUSHED ROCK OR SANDY LOAM WITH A PLASTICITY INDEX LESS THAN 15%.

IMPORTED FILLING:
THE CONTRACTOR WILL IMPORT SUITABLE FILL FROM AN EXTERNAL SOURCE. EXCAVATION MATERIALS MEETING THE REQUIRED SPECIFICATION MAY BE USED AS FILL. THIS MAY INCLUDE RECYCLED MATERIALS IF THEY ARE SUITABLY BLENDED/CONDITIONED TO MEET MATERIALS SPECIFICATIONS.

BULK EARTHWORKS QUANTITIES

TOTAL AREA (9,235m²)

CUT	978	m³
FILL	6,413	m³
EXCESS OF FILL OVER CUT	5,435	m³
EXCAVATION FOR RETAINING WALLS NOT INCLUDED IN CALCULATION		
EXCAVATION FOR SERVICE TRENCHES NOT INCLUDED IN CALCULATION		
VOLUME HAS BEEN CALCULATED AFTER STRIPPING THE SITE OF TOPSOIL - ASSUMED TOPSOIL DEPTH 200mm. STRIPPED MATERIAL NOT INCLUDED IN ABOVE QUANTITIES		

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Architect: CUSTANCE ASSOCIATES AUSTRALIA

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