Proposed Subdivision

STORMWATER DRAINAGE STRATEGY

Lot 44 DP1117263

McFarlanes Road, Chisholm

28 September 2021

High Definition Design Pty ltd
ABN 60 612 635 435
21 Council Street
Wallsend NSW 2287 Australia
T: 0412 009 891

Prepared BY:

HIGH DEFINITION DESIGN PTY LTD

Prepared for:

DREW LUMSDEN

Client Manager: Kevin Urane
Report Number: HD311
Version / Date: 28/09/2021

Document Control

REVISION	DATE	REVISION DETAILS	AUTHOR	REVIEWER
A	28.09.21	Original Issue	Aline Sena	Kevin Urane

Contents

List of Acronyms

AHD	Australian Height Datum
ARI	Average Recurrence Interval
ARQ	Australian Runoff Quality, Engineers Australia, 2006
AR&R	Australian Rainfall and Runoff, Institution of Engineers, Australia, 1987
BASIX	Building Sustainability Index
BOM	Bureau of Meteorology
CC	Construction Certificate
DA	Development Application
DLWC	Department of Land and Water Conservation
FFL	Finished Floor Level
FPL	Flood Planning Level
IAD	Interallotment drainage
IFD	Intensity Frequency Duration
LGA	Local Government Area
MCC	Local Government Area
MUSIC	Model for Urban Stormwater Improvement Conceptualisation
RL	Reduced Level
TN	Total Nitrogen
TP	Total Phosphorus
TSS	Total Suspended Solids

1. INTRODUCTION

1.1 Background

High Definition Design Pty Ltd was commissioned by Drew Lumsden to formulate a Stormwater Drainage Strategy in accordance with the stormwater quantity and quality requirements of the Maitland City Council's Development Control Plan and the Engineering Guidelines to support a proposed Development Application for residential subdivision at McFarlanes Road, Chisholm known as lot 44 DP 1117263 located within the Maitland City Council area, the site location is shown in Figure 03 Appendix A.

The report describes the principles and operation of the proposed stormwater system as well as the primary components of the drainage system. As the assessment and evaluation are required under the conditions of consent, the final stormwater system layout may need to be revised in the future during the application for a Construction Certificate.

The following information and documents were used in this investigation:

- Maitland City Council Development Control Plan (DCP) 2011.
- Maitland City Council, Manual of Engineering Standards, adopted April 2014.
- "Australian Runoff Quality – A Guide to Water Sensitive Urban Drainage", Engineers Australia (2006).
- "Australian Rainfall and Runoff – A Guide to Flood Estimation", Institute of Engineers Australia (1987).
- Flood study, "Hunter River Floodplain Risk Management" of Maitland City Council Release Area as per council website 16/7/2019.

The increase in impervious areas and alteration of the natural topography due to land development has the potential to increase and concentrate peak storm flows. This has the potential to impact on flow regimes and cause erosion of the downstream drainage network and associated waterways.

To avoid any adverse impact on the downstream drainage systems, the site's stormwater management system must be designed to ensure the safe conveyance of flows throughout the site and within the capacity of the downstream trunk drainage systems in a healthy environmental state for Ecological Sustainable Development.

1.2 Site Description

The site is generally bounded by residential lots to the West, rural land to the East and North, and McFarlanes Road to the South.

The site has average natural surface slopes from the west to the East approximately 4.67%. The total area of the site proposed is 13.78ha, the area to be developed is 2.28ha and the 11.50ha left is located on flooding zone. The proposed development varies in level from approximately RL 12.00m at Southwestern boundary adjacent to the McFarlanes Road to below RL 4.0m AHD adjacent to the North-eastern boundary.

1.3 Proposed Development

The proposal for the site is for the creation of a residential subdivision with 28 residential lots. The lot layout of the development has been prepared and is shown in Figure 04 Appendix A.

1.4 Drainage Catchment

The site generally drains from the West towards East of the proposed site.

1.5 Objective and Target of Work

This strategy has been undertaken to provide the following information is the support of the Development Application:

- Documentation of the requirements of Maitland City Council for this development site.
- Define the impacts of this proposed residential development on existing waterways and downstream properties.
- Provide stormwater controls that ensure the proposed development does not adversely impact on the quantity of stormwater flows within, adjacent and downstream of the site.
- Provide concept dimension of the proposed stormwater management services in accordance with the adopted approach by the council.

1.6 Strategy Purposes / Criteria

1.6.1 Stormwater Runoff Quantity Criteria

Stormwater flow management and design criteria of quantity include:

- The adoption of a major/minor flow approach to the design of the local stormwater management system.
- Delivery of major flows through the site to the stormwater system in a safe manner and to avoid impacting the site and downstream properties.
- Limiting the discharges rates of the proposed to development pre-development discharge rates.

- Limiting the discharges rates of the proposed to development pre-development discharge rates.

1.6.2 Stormwater Runoff quality Criteria

Stormwater runoff from the development area should be treated prior to discharge to the public Stormwater system, consistent with normal practice criteria for new developments, and with consideration to opportunities for integration with developed site features and topography.

The design methodology for Stormwater Runoff Quality typically contains stormwater quality treatment devices based on identified opportunities for stormwater quality management referencing the development site and catchment.

Stormwater quality management for the proposed site could include a treatment train of structures consisting of:

- Water harvester for reducing runoff volumes;
- Gross pollutant trap (GPT);
- Stormwater Bioretention basin;
- Proprietary water quality improvement devices for runoff water treatment.

1.6.3 Flooding Criteria

For the purpose of assessing this development, the report utilises Maitland City Council Development Control Plan 2011, Part C Design guidelines, “C.10 Subdivision, Section 4. Design Element- EC.3 Hazards, Flooding”, States:

a) All lots Within new residential subdivisions shall have safe access available in a 1 in 100 year flood event.
b) All new residential lots are to be wholly above the Council’s adopted flood standard (the 1% AEP or 1 in 100 flood event). In exceptional circumstances, and where lot sizes have been increased to provide sufficient flood free area for erection of a dwelling and associated structures, parts of the lot may be permitted below the adopted flood standard.
c) If a basin is located in a flood plain the design should achieve its elevation (RL) to limit inundation by flood waters. The lowest desirable level of the spillway should aim to be higher than the 20 year ARI event in the flood plain.

Hence, all the proposed lots should be designed at or above the 1 in 100 year flood event level, and all residences should have 500mm freeboard above the flood planning level. The Possible Maximum Flood level (PMF) on this site is shown on Figure 14.

2. STORMWATER DRAINGE MANAGEMENT STRATEGY

The stormwater drainage management strategy involves:

- Roof areas of residences will drain to rainwater tanks/harvesters within each lot for re-use. Water Tanks will overflow through a piped connection to IAD or street drainage system.
- Output of the captured stormwater from drainage pipe system to gross pollutant traps (GPT's) for primary treatment prior to the discharge into the proposed bioretention basin for further treatment.
- Capture of stormwater from lot and road reserve areas by a convectional pit and pipe drainage network located in the street or in IAD easements where required.
- Discharge from the catchment's outlets will be conveyed overland towards the existing waterways or piped where required, generally similar to the discharge from the undeveloped catchments.
- Creation of stormwater bioretention basin, in accordance with Maitland City Council's standards

Detail drainage design of the pipped system will be provided during the Construction Certificate application, to Council's standard requirements.

3. METHODOLOGY

3.1 Stormwater Runoff Quantity

The hydrological modelling software has been used for flowrates estimation of the existing and post-development flows to demonstrate the magnitude of the local catchment discharge.

3.1.1 Stormwater Flow Model

The post-development release is compared to the pre-developed discharge, and if higher, detention is usually warranted in accordance with Council's standard requirements.

3.1.1.1 Catchment Plan and Model Data

Surface runoff flowrates from the proposed site were modelled in two differing scenarios (the pre-developed state and post-developed catchment) using the DRAINS – Urban Drainage Model.

The Horton/ILSAX model was used within the DRAINS software package for both scenarios.

The catchment of the proposed lots will be discharged at the basin it will be released to the atmosphere with flowrates less or equal to the pre-development, as shown in Figure 05 Appendix B. DRAINS model data is included in Appendix F.

The methodology for stormwater quantity comprised quantitative analysis of available data to estimate existing and future flow behaviour from the development site. The analysis involved examination of surface hydrology to identify runoff characteristics from the proposed site and determination if stormwater mitigation devices are required to negate the impact of site development on existing flowrates from the site.

This involved the following steps:

- Estimate the existing peak stormwater flowrates at the downstream drainage outlets of the site using the DRAINS drainage software package.
- Revise the existing scenario in the DRAINS drainage model to include the additional impervious areas that will arise due to development of the site. This resulted in the developed DRAINS drainage model.
- The critical storm was then selected for each ARI, based on the peak discharge from the site. The hydrographs of these 'critical' storms were plotted to enable comparison of the existing state storm event to the developed state storm event.

3.1.1.2 Rainfall Data

Rainfall for the 1 year, 2 year, 5 year ,10 year, 20 year, 50 year, and 100 year ARI design events, and storm durations from 5 minutes to 4.5 hours for each, were modelled in order to identify the critical storm duration (producing the highest peak flowrate) for each ARI

from the site. The required rainfall Intensity Frequency Duration (IFD) rainfall data was obtained from the tables supplied in Australian Rainfall and Runoff, and the BOM website, and is reproduced below, as shown in appendix G.

3.1.1.3 DRAINS Model Parameters

Table 1 summarises the catchment storage and loss parameter values adopted in the DRAINS models for both the pre-developed and post-developed models.

Table 1: Storage and loss parameter values adopted in the DRAINS hydrological models

Parameter	Value
Paved depression storage (mm)	1
Grassed depression storage (mm)	5
Soil type	3

3.1.1.4 Model Catchment Data

Full DRAINS model Catchment data is provided in Appendix F. Surface roughness values, n*, used in the DRAINS models are summarised in Table 2.

Table 2**:** Roughness parameter values, n*, adopted in the DRAINS models

Model - surface type	Surface roughness 'n*' value
Pre-developed	0.15
Pervious areas	0.21
Impervious areas	0.01

Catchment impervious area percentage values used in the DRAINS models are summarised in Table 3.

Table 3: Impervious area percentage values adopted in the DRAINS models

Model - type	Impervious Area Percentage
Existing site area (Pre-development)	0%
Post-development – roads reserve	70%
Post-development – residential lots	60%

3.2 Stormwater Runoff Quality

The methodology for Stormwater Runoff Quality typically involves selection of stormwater quality treatment devices based on identified opportunities for stormwater quality management referencing the development site and catchment conditions, and normal best practice.

The performance of the stormwater management plan was undertaken using the MUSIC stormwater water quality model. MUSIC is a continuous simulation water quality model. The pollutants considered in the water quality modelling were total suspended solids (TSS), total phosphorus (TP) and total nitrogen (TN) which are typical components of urbanised stormwater runoff.

MUSIC input parameters include:

- Rainfall and potential evapotranspiration data
- Catchment area and percentage impervious
- Hydrologic parameters
- Statistical pollutant generation parameters

MUSIC outputs include:

- Average annual pollutant export loads
- Treatment train effectiveness expressed in terms of pollutant reduction.

Input parameters used for modelling were derived from BOM Climate Data, parameter values in the *MUSIC User Manual* and the publication *Using MUSIC in Sydney's Drinking Water Catchment, A Sydney Catchment Authority Standard* (Published by Sydney Catchment Authority, Penrith, December 2012).

The treatment criteria of stormwater quality of Maitland City Council are summaries in Table 4:

Table 4: Stormwater Treatment Objectives

Pollutant	Stormwater Treatment Objective
Total Suspended Solids (TSS)	80% retention of average annual load
Total Phosphorus (TP)	45% retention of average annual load
Total Nitrogen (TN)	45% retention of average annual load

3.2.1 MUSIC Parameters

3.2.1.1 Land Use Type

The post-developed land use was modelled using both the residential land use/zoning and surface type. The pollutant generation characteristics of the land use/zoning and surface type are shown in Table 6 below.

3.2.1.2 Rainfall and Evapotranspiration

The rainfall data used for the modelling was from Williamtown weather station (061078). The rainfall data used in the analysis was from the year 2000. The average annual rainfall during this period was 961mm.

Monthly average areal potential evapotranspiration (PET) values from MUSIC's default values for Newcastle were used in the modelling. Evapotranspiration values are given in Table 5. The estimated total annual areal PET is 1407 mm.

Table 5:Monthly Average Areal PET Values

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
PET (mm/mont)	188	148	148	96	66	53	56	72	100	138	162	180

3.2.1.3 Time Step

The model was run with a time step of 5 minutes.

3.2.1.4 Hydrology

MUSIC hydrology parameters used are summarised below in Table 6.

Table 6: MUSIC Rainfall-Runoff Parameters

Parameter	Residential	Road
Impervious Area Properties		
Land Use Area (ha)	1.734	0.577
Impervious Area (%)	60	70
Rainfall Threshold (mm/day)	1.0	1.0
Pervious Area Properties		
Soil Storage Capacity (mm)	120	120
Initial Storage (% of Capacity)	25	25
Field Capacity (mm)	80	80
Infiltration Capacity	200	200
Exponent - a		
Infiltration Capacity	1.0	1.0
Exponent - b		
Groundwater Properties		
Initial Depth (mm)	10	10
Daily Recharge Rate (%)	25	25
Daily Baseflow Rate (%)	5	5
Daily Deep Seepage Rate (%)	0	0

3.2.1.5 Event Mean Concentrations

The MUSIC model requires pollutant generation parameters for baseflow and stormflow conditions. Baseflow is derived from the groundwater store, which is recharged from the previous soil store. Stormflow is generally generated from the impervious area, and under some conditions the pervious area as well.

The pollutant parameters for the adopted land use types were determined from the *Using* MUSIC in Sydney's Drinking Water Catchment, A Sydney Catchment Authority Standard (Published by Sydney Catchment Authority, Penrith, December 2012), and are provided in Table 7.

Table 7: Adopted Land Use Baseflow and Stormflow Concentration Parameters

Land Use and Flow Type	Total Suspended Solids (TSS) (log_{10} mg/L)		Total Phosphorus (TP) (log_{10} mg/L)		Total Nitrogen (TP) (log_{10} mg/L)	
	Mean	Std.Dev	Mean	Std.Dev	Mean	Std.Dev
Baseflow Residential Roof	1.10	0.17	-0.82	0.19	0.32	0.12
Stormflow Residential Roof	1.20	0.17	-0.85	0.19	0.11	0.12
Stormflow Road	1.20	0.17	-0.85	0.19	0.11	0.12
Stormflow Basin	1.10	0.17	-0.82	0.19	0.32	0.12

4. MODEL RESULTS

4.1 Stormwater Runoff Quantity

4.1.1 DRAINS Model Results

The pre and post-developed site conditions were modelled to establish the peak rate of discharge for each critical storm event from the 1 year to 100 year ARI events. The stormwater water plan is shown in Appendix B. The pre-developed flow rates were calculated using the Probabilistic Rational Method, the results are shown in Table 8 as allowable pre-developed peak discharge. The time of concentration for the pre developed catchments was estimated using the Kinematic Wave Equation. Estimated peak rates of discharge for each pre-developed using the rational method and post-developed undetained storm event are shown below in Table 8 and 9.

Table 8: Estimated Pre and Post-Developed Peak Discharge

ARI (years)	Allowable Pre-Developed Peak Discharge (m^3/s)	Undetained Post-Developed Peak Discharge (m^3/s)
1	0.071	0.408
2	0.113	0.482
5	0.289	0.706
10	0.438	0.870
20	0.590	1.040
50	0.822	1.290
100	1.000	1.490

The incorporation of an outlet control structure configuration will reduce post-developed flowrates to less than, or equal to the pre-developed flowrates for all storm events up to and including the 100 year ARI event. The Post Developed flows with the outlet control structure in place are shown in Table 9.

Table 9: Estimated Pre and Post-Developed Peak Discharge

ARI (years)	Allowable Pre-Developed Peak Discharge with Bypass (m^3/s)	Post-Developed Peak Discharge (m^3/s)	Basin Top Water Level (RL)
1	0.071	0.050	4.04
2	0.113	0.055	4.16

5	0.289	0.227	4.39
10	0.438	0.404	4.44
20	0.590	0.564	4.47
50	0.822	0.761	4.51
100	1.000	0.968	4.55

The DRAINS model for each year has been attached to the report for assessment.

The bioretention basin calculations do not account for reduced runoff due to the presence of rainwater harvesting tanks. A noticeable reduction in peak runoff during larger storms (such as the 100 year ARI) would likely occur due to such tanks.

In accordance with Council's stormwater detention basin requirements, a spillway must be incorporated within the basin embankment. The spillway must be able to convey the 100-year ARI flood event.

Using the Manning Equation for Uniform Open Channel Flow a spillway width of 6m, with 1:5 side slopes the height of the basin spillway is 0.5m. The depth of water in the basin was modelled in Drains for the 100 year ARI storm event was found to be 4.55m with a max volume of 645.20m^3, therefore the bioretention volume 658.59m^3 will be adopted and the proposed spillway can adequately handle the discharge generated by the 100 year ARI storm event.

The summary DRAINS Output is provided for the 1, 2, 5, 10, 20-year ARI and the 100-year ARI in Appendix F.

4.2 Stormwater Runoff Quality

4.2.1 MUSIC Results – Post Development land Use (No Treatment)

The modelled average annual pollutant loads leaving the site in its post-development land use, without any treatment measures, is shown in Table 10. Pollutant load estimates are provided for total suspended solids (TSS), total phosphorus (TP) and total nitrogen (TN). Figure 10 Appendix D shows the node layout used in the MUSIC modelling.

Table 10: MUSIC Model Results for the Site's Post Development Land Use (No Treatment)

Average Annual Pollutant Load (kg/yr)			
	Pre-developed	Post Develop (No treated)	Post Develop (treated)
Total Suspended Solids (TSS)	743	3410	265
Total Phosphorous (TP)	2.14	5.66	1.67
Total Nitrogen (TN)	16.10	34.6	17.60

Standard engineering practice is to ensure that runoff from the proposed new impervious area of the development is treated to meet the established criteria previously documented in Table 4, and this is the basis for evaluation of the treatment train effectiveness as documented below.

4.2.2 MUSIC Results – Post Development land Use (With Treatment)

The MUSIC model results for the post-development land use, with treatment measures, is documented below, enabling the evaluation of the treatment train effectiveness.

4.2.2.1 Treatment Device

Treatment devices modelled in MUSIC for the treatment of runoff from the developments impervious surface areas include:

- Rainwater Tanks
- Gross Pollutant Trap (GPT)
- Sediment Basin

4.2.2.1.1 Rainwater Tanks

The rainwater tank node was included immediately following the roof area node, using the default rainwater tank treatment node within MUSIC. Rainwater tanks for all proposed lots within the catchment was modelled as one MUSIC treatment node.

Rainwater tank treatment node data included:

- Stored water would be utilised by internal reused on each lot;
- Rainwater tank volume is 3000L per lot; (Water NSW Table 5.3)
- Daily usage demand (consisting of internal and external) of 0.62kL/day per lot. (Water NSW Table 5.4)

4.2.2.1.2 Gross Pollutant Traps

The GPT node was included downstream of the development area and prior to the proposed sedimentation basin. A GPT node was created by using the Sydney Catchment Authority Standard parameter in MUSIC Modelling.

4.2.2.1.3 Detention Basin with Bioretention filtration

The proposed bioretention filtration and detention basin node was included in the MUSIC model immediately downstream of the proposed GPT node. The MUSIC model parameters used for the detention basin with bioretention filtration are shown below in Figure 01 and 02.

Figure 01: Detention Basin Parameters

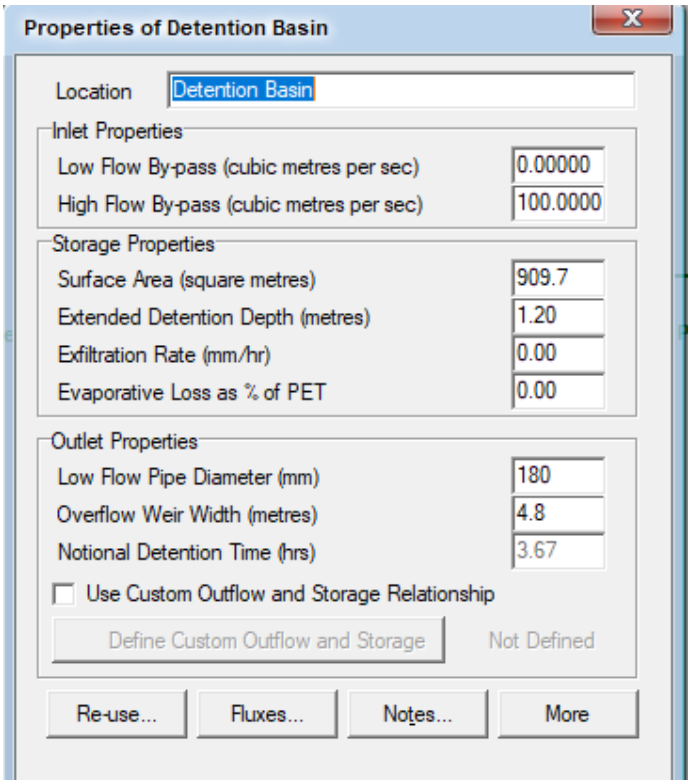
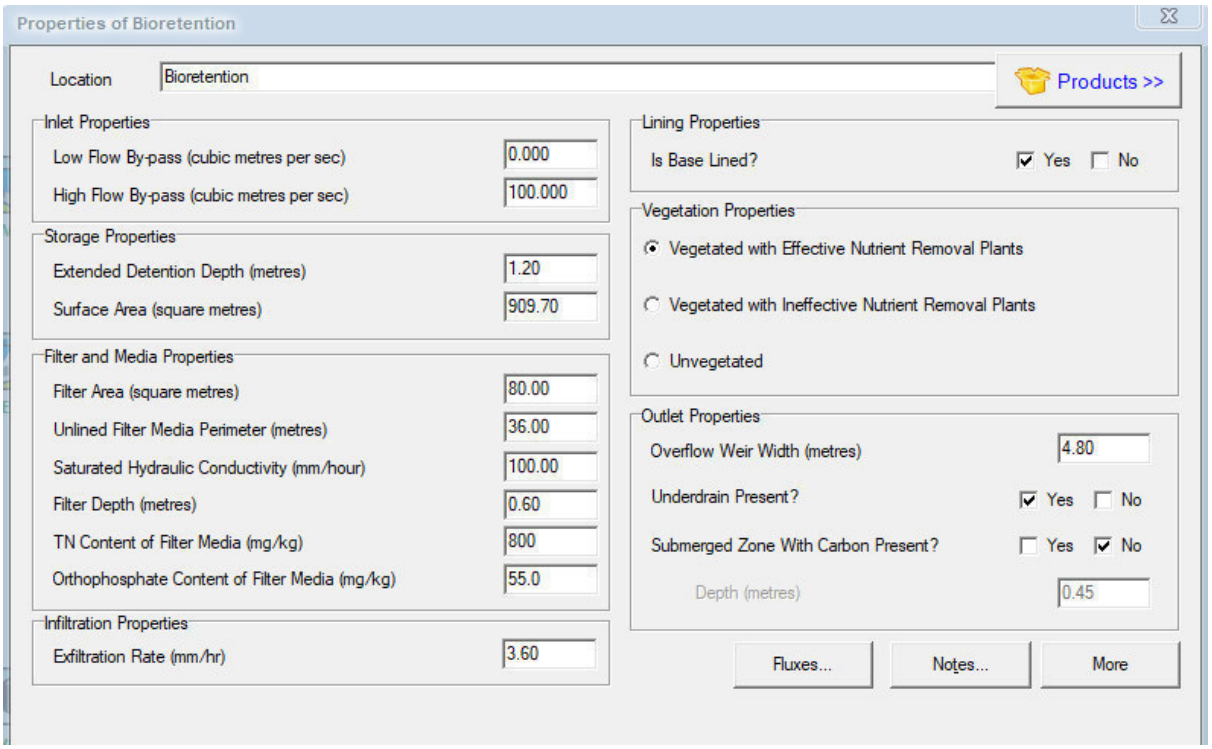


Figure 02: Bioretention Filtration Treatment Parameters



4.2.2.2 Modelling Results

The modelled average annual pollutant loads leaving the site in its post-development land use, utilising treatment measures, is shown in Table 12. Pollutant load estimates are provided for total suspended solids (TSS), total phosphorus (TP), and total nitrogen (TN). Figure 11 Appendix D shows the node layout used in the MUSIC modelling.

Table 11: MUSIC Model Results for the Site's Post Development Land Use (with Treatment)

Land Use	Average Annual Pollutant Load (kg/yr)		
	Total Suspended Solids (TSS)	**Total Phosphorus (TP)**	**Total Nitrogen (TN)**
Post Development	265	1.67	17.86

The results above show that the pollutant export for the post-development land use with treatment measures is significantly lower than the post-development land use with no treatment measures.

The treatment train effectiveness, expressed as a percentage reduction in post-development land use pollutant loads generated by the modelled sources, is summarised in Table 13.

Table 12: MUSIC Model Treatment Train Effectiveness Results

Pollutant	Export Value		Treatment Train Effectiveness
	Post Development	**Post Development with treatment measures**	
TSS (kg/yr)	3470	265	92.10%
TP (kg/yr)	5.68	1.67	70.60%
TN (kg/yr)	34.5	17.60	49.10%

The treatment train effectiveness results above indicate that the pollutant reduction performance following the requirements of the Australian Runoff Quality pollutant removal criteria and Maitland City Council's Manual of Engineering Standards, Section 8.2.

4.3 Flooding

Following the stormwater modelling process, and the inclusion of any required stormwater detention measures and/or stormwater flow conveyance structures, proposed lots are reviewed against localised 100 year ARI stormwater flood levels to confirm that the lots are at or above the 1 in 100 year flood event level, enabling all dwellings to be above the flood planning level, which is the 1 in 100 year flood level plus 500mm freeboard for residential development.

Maitland City Council's LEP 2011, Flood Planning Map, and ePlanning Spatial viewer of Planning Portal of NSW shows that the subject site is in a mapped flood zone as shown in Appendix E Figure 12 and 13. Therefore, the site is subject to flooding limitations:

- The Finished Floor level (FFL) of all buildings shall be 500mm above the 1 in 100 year ARI storm event. The 1 in 100 year ARI RL AHD is 5.89m, which means the minimum FFL shall be 6.39m.
- The basin spillway level shall be higher than the level of 1 in 20 year ARI storm event, the RL ADH od 1 in 20 year ARI storm is 4.54m. The basin spill way RL AD is 4.60m, being above this level.

5. SOIL AND WATER MAGEMENT DURING CONSTRUCTION

Soil and water management devices to minimise land disturbance during the subdivision construction phase are to be provided in accordance with the publication *Managing Urban Stormwater: Soils and Construction* (Landcom, 2004).

A detailed erosion and sedimentation control plan are to be undertaken during the detailed design stage of the proposed development. The erosion and sedimentation control plan should generally contain the following range of management practices for effective soil and water management during a land disturbance phase:

- Minimise the area of soil disturbed and exposed to erosion by phasing works so that land disturbance is confined to minimum areas.
- Erect barrier fencing to minimise disturbance by preventing vehicular and pedestrian access to restricted areas.
- Limit access for plant etc. to current construction area to limit the amount of disturbed area.
- Conserve topsoil for site rehabilitation/revegetation when site works are complete.
- Installation of sediment filters, such as silt fences, straw bales, or turf strips downstream of disturbed areas.
- Control water flows from the top of, and through the development area. In particular, it diverts upslope runoff around works and limits slope length to 80 metres on disturbed lands if rainfall is expected.
- Where appropriate, reduce the effects of wind erosion by controlling on-site traffic movement and watering bare soil areas.
  Provision of shaker humps/pads near construction entry and exit locations to remove excess soil materials from vehicle tyres and underbodies.
- Rehabilitate disturbed lands quickly.
- Ensure that all erosion and sediment control measures are kept in a properly functioning condition until all site disturbance works are completed and the site is rehabilitated.

6. SUMMARY AND CONCLUSIONS

Although a BASIX's requirements review is not a specific requirement of this stormwater management strategy, it is anticipated that BASIX's requirements would require all individual dwellings to provide rainwater tanks for re-use in conjunction with other BASIX's requirements. Where installed, rainwater tanks would provide at-source stormwater management benefits.

Stormwater Flow Management (stormwater runoff quantity and quality)

The strategy for management of stormwater runoff from the development is depicted in Figure 02 to 05 Appendix B and comprises:

- The capture of stormwater from lot and road reserve areas by a conventional pit and pipe drainage network located in the street.
- Conveyance of captured stormwater within the drainage pipe network to gross pollutant traps (GPT's) for primary treatment prior to discharge into the proposed bioretention basin.
- The bioretention basin will provide attenuation of developed stormwater flowrates to existing flowrate conditions for the development site.
- The catchment of the proposed lots will be discharged at the basin it will be released to the atmosphere with flowrates less or equal to the pre-development.

MUSIC modelling has demonstrated that the proposed treatment devices will treat developed stormwater runoff to meet requirements outlined in Manual of Engineering Standard 2014 Section 8.2 Stormwater Quality, and on this basis, it is considered that no further water quality controls will be required within the proposed subdivision development.

Details of the proposed local drainage system will be determined at the time of Construction Certificate application, to Council's standard requirements.

As illustrated by Figure 06 Appendix B, there is sufficient area within the site to provide stormwater drainage management measures to negate the impact of the proposed development.

The catchment area outside of the development portion of the site is not considered as part of this current application as the natural flow from this portion of the subject land will not be going to the proposed basin.

Flooding

From a review of Maitland City Council's Floodplain Risk Management Study and Plan 2015, Flood Planning Map, it is considered that the subject site is in a mapped flood zone. Therefore, the site is subject to flooding limitations:

- The site's levels, including the lots regrading, shall be above the 1 in 100 year flood level, enabling future habitable dwellings to be located 500mm above it. 1% AEP RL AHD is 5.89m which means the Finished Floor Level is 6.39m minimum.
- The spill way shall be located above the 1 in 20 years Storm (5% AEP). The 5% AEP RL AHD is 4.54m, the spill way level is 4.60m, suing above the 5% AEP RL level.

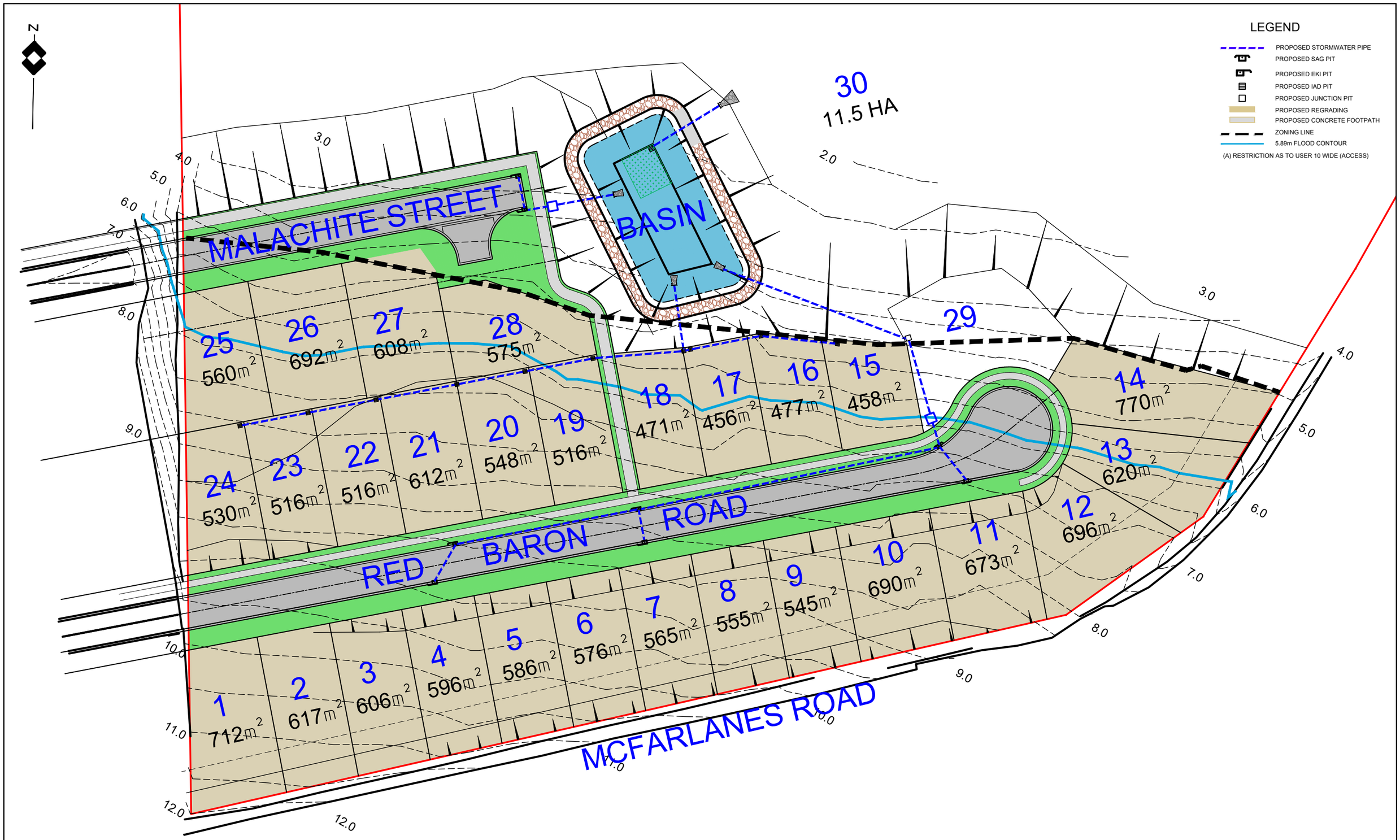
7. STATEMENT OF COMPLIANCE

We confirm that he hydraulic design and calculations detailed in this Stormwater Strategy Report satisfy the requirements of Council's Stormwater specifications and Australian Standards listed below:

- Maitland City Council's Manual of Engineering Standards, 2014.
- Australian Rainfall and Runoff, Institution of Engineers, Australia, 1987.
- "Australian Runoff Quality – A guide to flood Estimation", Institute of Engineers Australia, 2006.
- Using MUSIC in Sydney's Drinking Water Catchment, A Sydney Catchment Authority Standard, Sydney Catchment Authority, Penrith, December 2012.

Appendix A: Site location and Leasehold Plan

Figure 03 – Sie location



TITLE: PROPOSED SUBDIVISION LOT 44 DP1117263
MCFARLANES ROAD CHISHOLM

FIGURE 04 SITE PLAN

CLIENT: DREW LUMSDEN

High Definition Design Pty Ltd

KEVIN URANE 0412009891

NOTE:

ALL EXISTING UNDERGROUND SERVICES MUST BE LOCATED AND EXPOSED PRIOR TO EARTHWORKS COMMENCING AND IT IS RESPONSIBILITY OF THOSE PERSONS USING THIS PLAN TO CONFIRM BOTH POSITION AND LEVEL OF THESE UTILITIES IN CONJUNCTION WITH THE APPROPRIATE AUTHORITY.

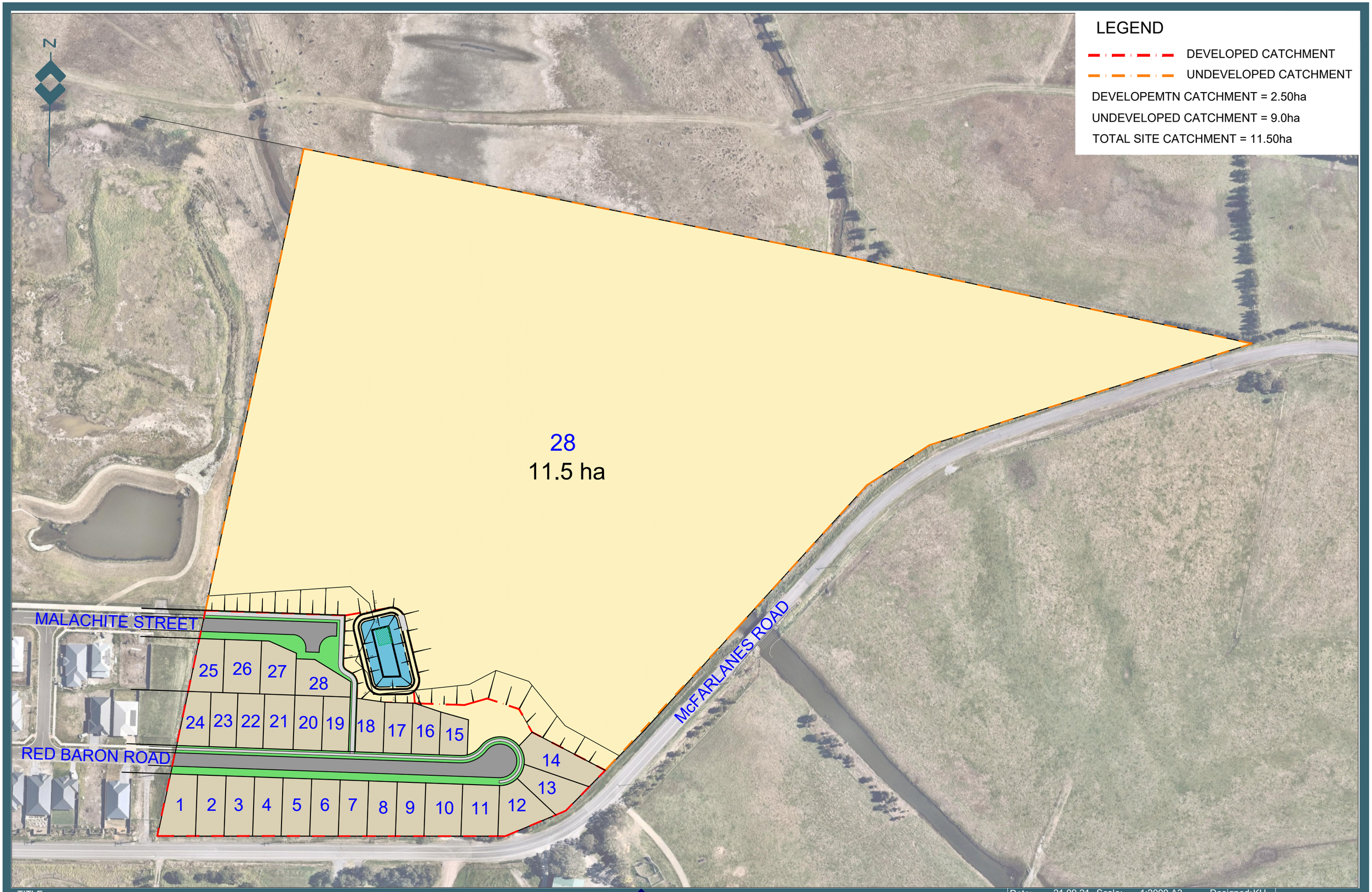
0 8 16 24 32 40m
1:400 @ A1

Date: 23.09.21 Scale: 1:400 Designed: AS
Cad Ref: HD311 DA Civil

No	Amendment	Drawn	Date
1	DA ISSUE	AS	23.09.21

Project No HD-311
Drawing No CC02
Revision 1

Appendix B: Stormwater Plan



TITLE: PROPOSED SUBDIVISION
LOT 44 DP1117263
MCFARLANES ROAD CHISHOLM

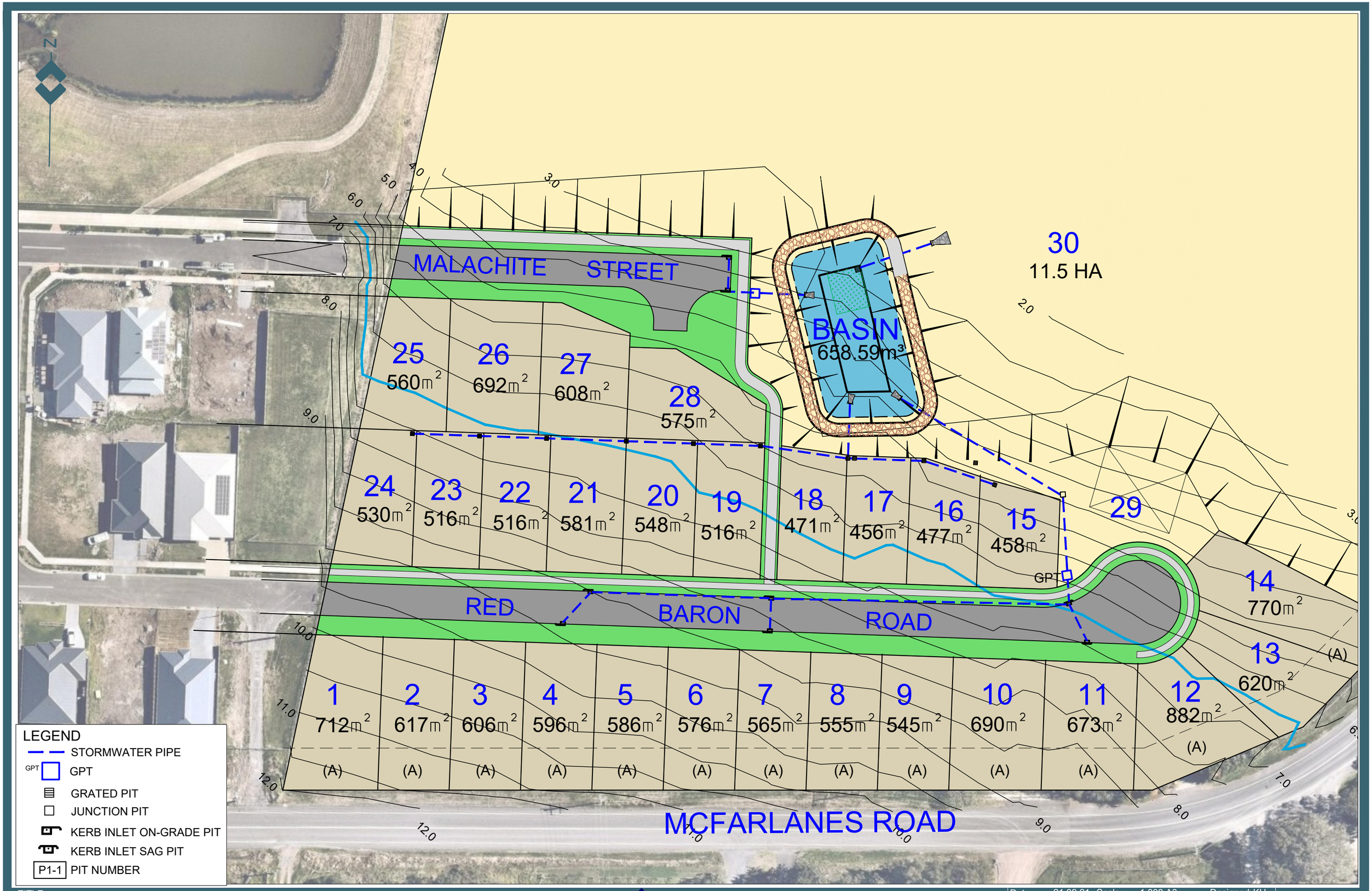
FIGURE 05 CATCHMENT PLAN

High Definition Design Pty Ltd
KEVIN URANE 0412009891

Date: 21.09.21 Scale: 1:2000 A3 Designed: KU
Cad Ref: HD311 Drainage r1

No	Amendment	Drawn	Date
1	FIGURE 05	KU	21.09.21

Project No HD311
Drawing No HD01
Revision 1



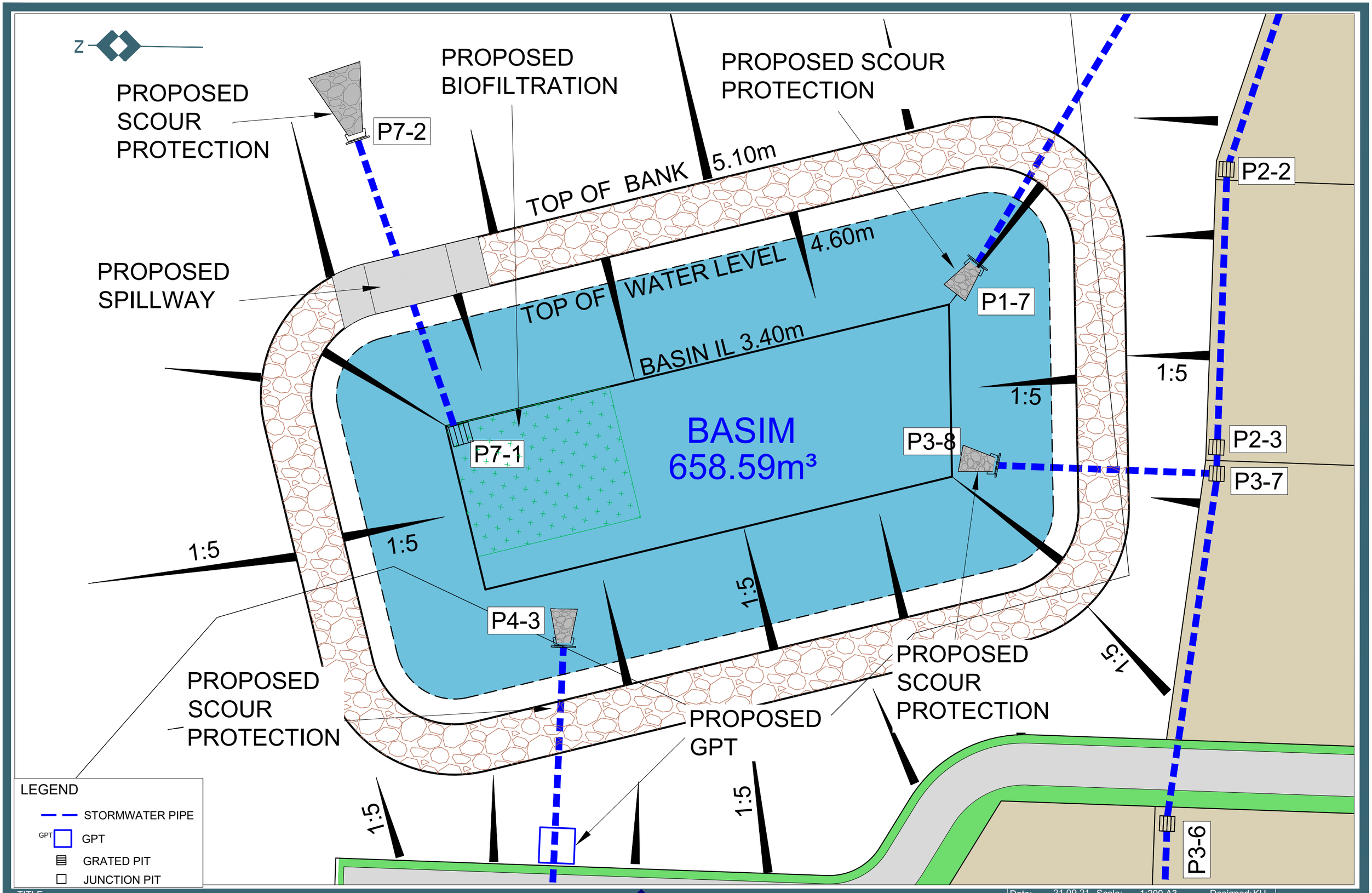
TITLE: PROPOSED SUBDIVISION
LOT 44 DP1117263
MCFARLANES ROAD CHISHOLM

FIGURE 06 STORMWATER MANAGEMENT PLAN

High Definition Design Pty Ltd
KEVIN URANE 0412009891

Date: 21.09.21 Scale: 1:800 A3		Designed: KU	
Cad Ref: HD311 Drainage r1			
1	FIGURE 06	KU	21.09.21
No	Amendment	Drawn	Date

Project No HD311
Drawing No HD01
Revision 1



TITLE: PROPOSED SUBDIVISION
LOT 44 DP1117263
MCFARLANES ROAD CHISHOLM

FIGURE 07 BASIN PLAN

High Definition Design Pty Ltd
KEVIN URANE 0412009891

Date: 21.09.21 Scale: 1:200 A3		Designed: KU	
Cad Ref: HD311 Drainage r1			
1	FIGURE 07	KU	21.09.21
No	Amendment	Drawn	Date

Project No HD311
Drawing No HD01
Revision 1

Appendix C: Drains Model

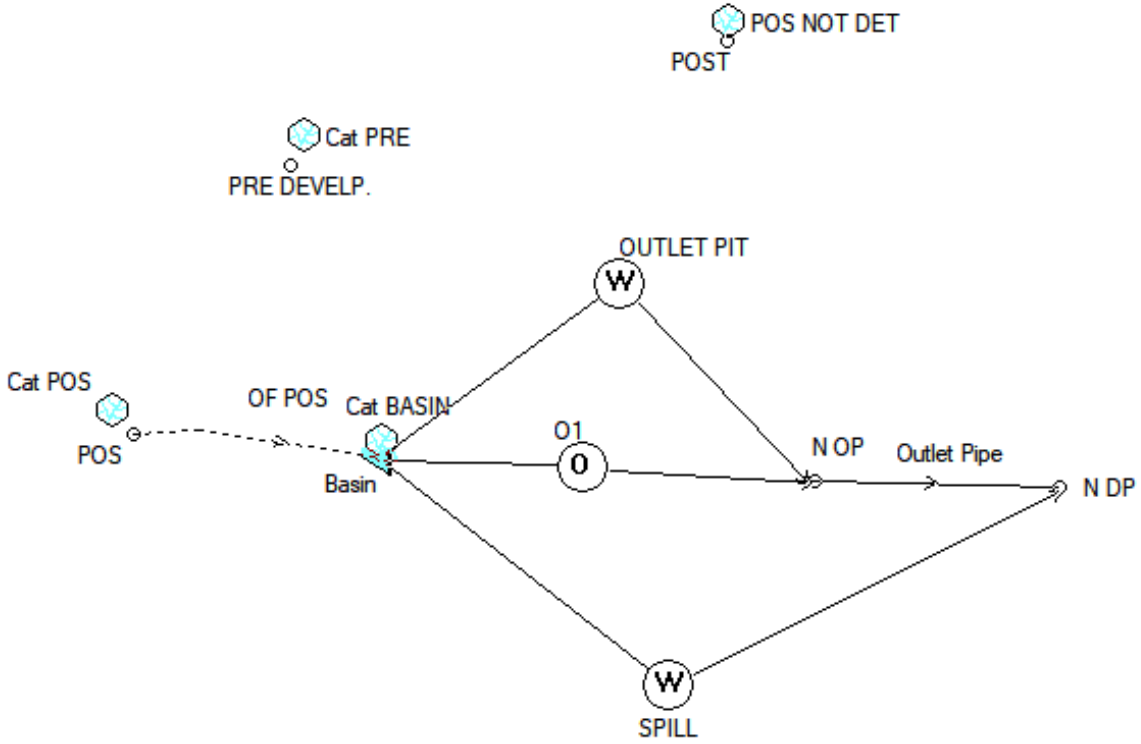


Figure 08 – Drain model

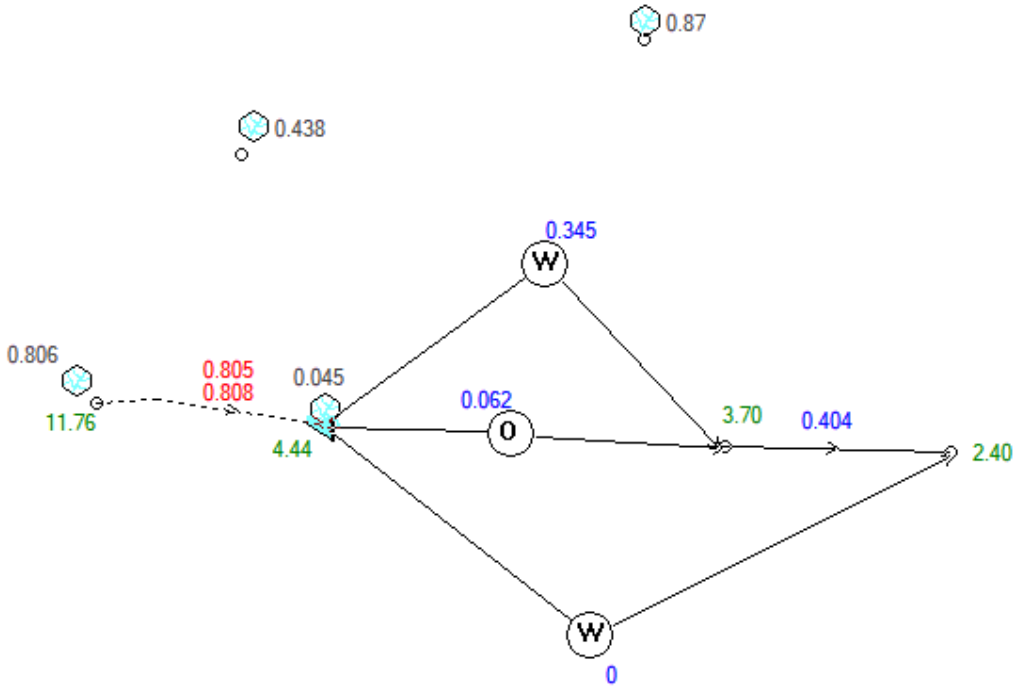


Figure 09 - Minor Storm

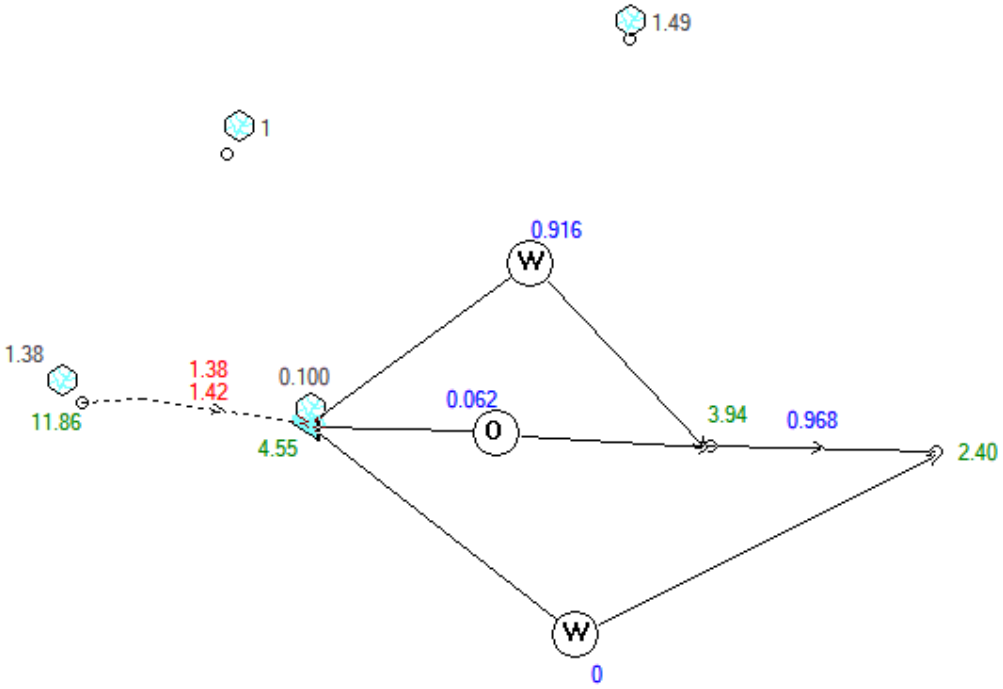


Figure 10 - Major Storm

Appendix D: MUSIC Modelling

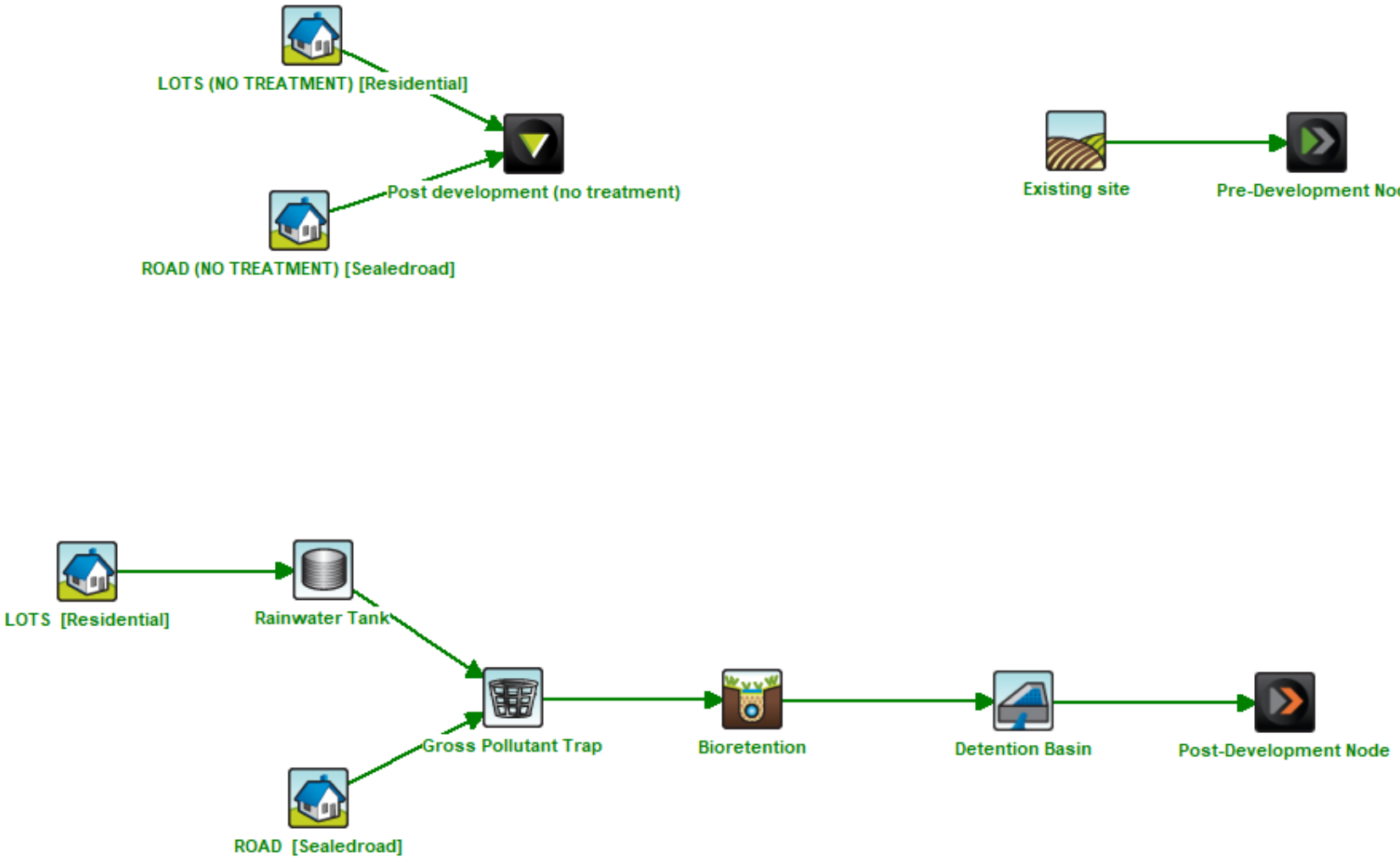


Figure 11: MUSIC model Layout treatment

Appendix E: Floodplain Risk Management Study

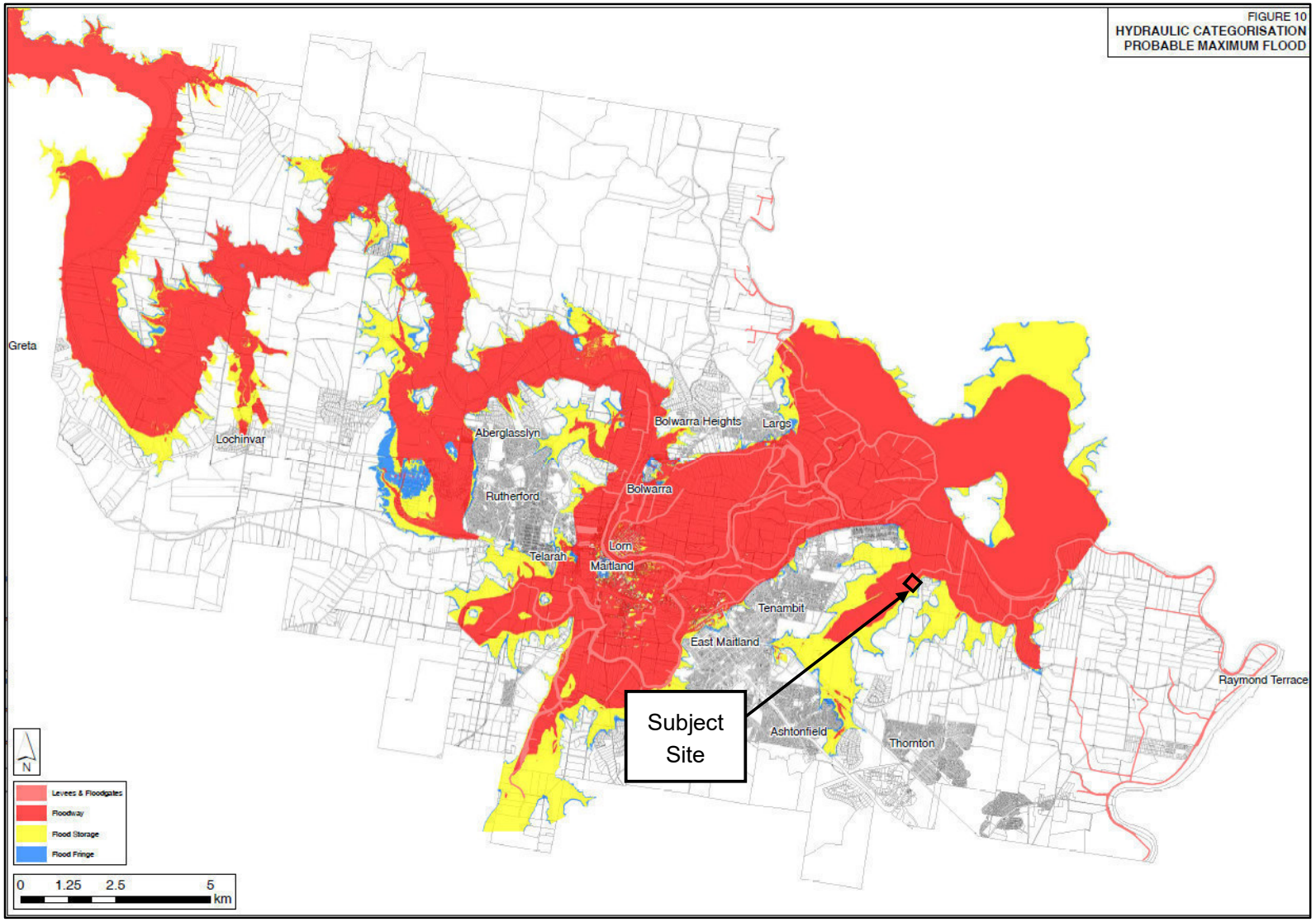


Figure 12: Probable maximum Flood map

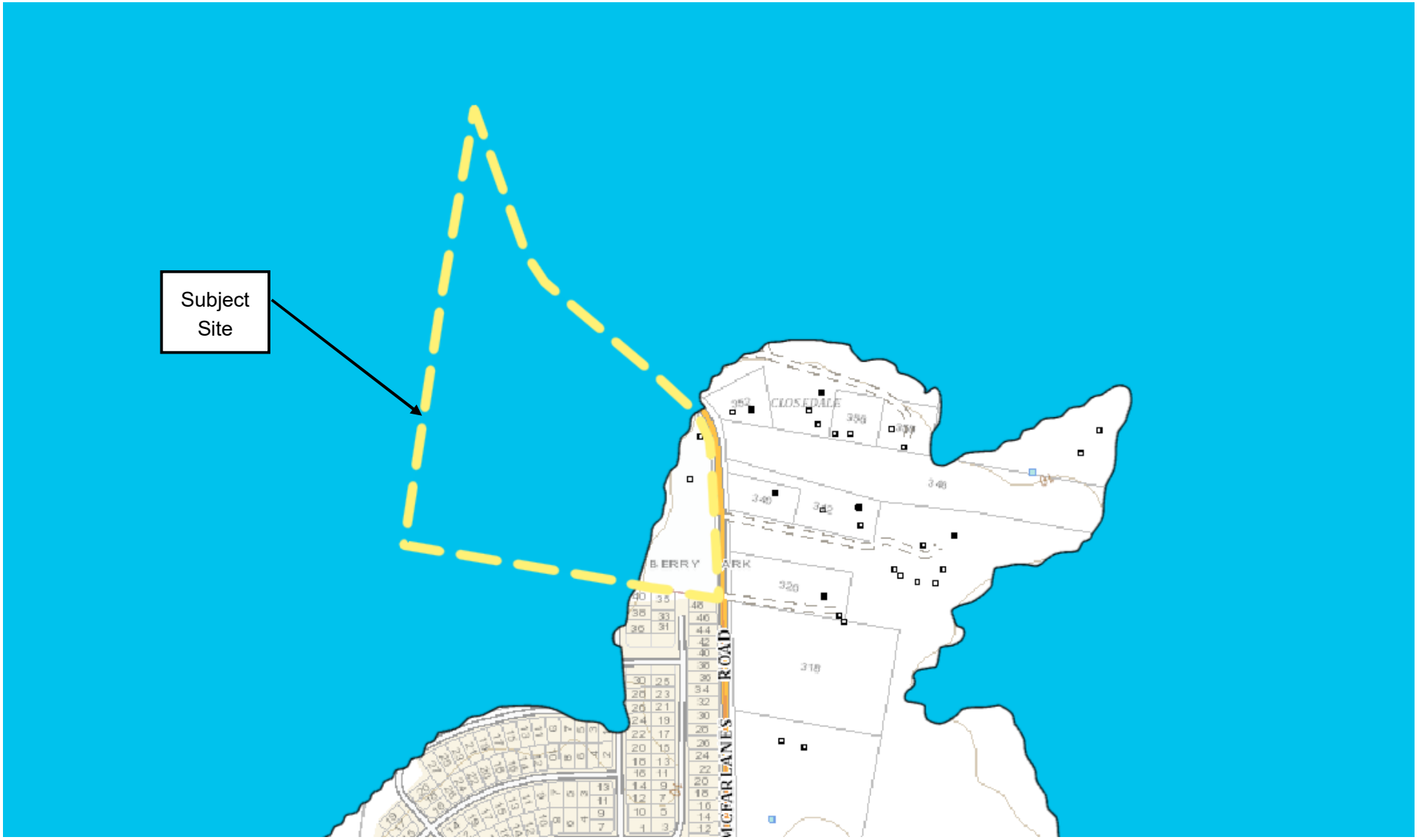


Figure 13: Flood zone map

Appendix F: DRAINS Data Spreadsheets

Table 13 – Drains Modelling Data

PIT / NODE DETAILS																			
Name	Type	Family	Size	Ponding	Pressure	Surface	Max Pond	Base	Blocking	x	y	Bolt-down	id	Part Full	Inflow	Pit is	Internal	Inflow is	Minor Safe	Major Safe
				Volume	Change	Elev (m)	Depth	Inflow	Factor			lid		Shock	Hydrogra		Width	Misalign	Pond	Pond
				(cu.m)	Coeff. Ku			(cu.m/s)									(mm)		(m)	(m)
PRE	Node							0		841.36	-184.72		2		No					
POS	Node					11.5		0		730.48	-374.8		156185		No					
POST	Node					6		0		1149.52	-96.88		313577		No					
N OP	Node					5.1		0		1211.44	-407.92		10		No					
N DP	Node					4		0		1384.24	-412.24		1108		No					

DETENTION BASIN DETAILS															
Name	Elev	Surf. Area	Not Used	Outlet Type	K	Dia(mm)	Centre RL	Pit Family	Pit Type	x	y	HED	Crest RL	Crest Length(m)	id
Basin	3.4	297.07		None						904.72	-394.96	No			8
	4.6	909.7													
	5.1	1099.61													

SUB-CATCHMENT DETAILS																						
Name	Pit or	Total	Paved	Grass	Supp	Paved	Grass	Supp	Paved	Grass	Supp	Paved	Grass	Supp	Paved	Grass	Supp	Lag Time	Gutter	Gutter	Gutter	Rainfall
	Node	Area	Area	Area	Area	Time	Time	Time	Length	Length	Length	Slope(%)	Slope	Slope	Rough	Rough	Rough	or Factor	Length	Slope	FlowFact	Multiplie
		(ha)	%	%	%	(min)	(min)	(min)	(m)	(m)	(m)	%	%	%					(m)	%		
Cat PRE	PRE	2.5	0	100	0	0	0	0	0	175	0	0	4.67	0	0	0.15	0	0				1
Cat	Basin	0.184	0	100	0	0	0	0	0	42	0	0	3	0	0	0.21	0	0				1
Cat POS	POS	2.316	70	30	0	0	0	0	175	175	0	4.67	4.67	0	0.01	0.21	0	0				1
POS NOT	POST	2.5	70	30	0	0	0	0	175	175	0	4.67	4.67	0	0.011	0.21	0	0				1

PIPE DETAILS																		
Name	From	To	Length	U/S IL	D/S IL	Slope	Type	Dia	I.D.	Rough	Pipe Is	No. Pipes	Chg From	At Chg	Chg	Rl	Chg	RL	etc
			(m)	(m)	(m)	(%)		(mm)	(mm)						(m)	(m)	(m)	(m)	(m)
Outlet	N OP	N DP	33	3.4	2.4	3.03	er roads, 1	600	600	0.013	New	1	N DP	0					

DETAILS of SERVICES CROSSING PIPES										
Pipe	Chg	Bottom	Height of Service	Chg	Bottom	Height of Service	Chg	Bottom	Height of Service	etc
	(m)	Elev (m)	(m)	(m)	Elev (m)	(m)	(m)	Elev (m)	(m)	etc

CHANNEL DETAILS												
Name	From	To	Type	Length	U/S IL	D/S IL	Slope	Base Width	L.B. Slope	R.B. Slope	Manning	Depth	Roofed
				(m)	(m)	(m)	(%)	(m)	(1:?)	(1:?)	n	(m)	

OVERFLOW ROUTE DETAILS																	
Name	From	To	Travel	Spill	Crest	Weir	Cross	Safe Depth	SafeDepth	Safe	Bed	D/S Area		id	U/S IL	D/S IL	Length (m)
			Time	Level	Length	Coeff. C	Section	Major	Minor	DxV	Slope	Contribut					
			(min)	(m)	(m)			(m)	(m)	(sq.m/sec)	(%)	%					
OF POS	POS	Basin	1.6				4 m wide	0.3	0.15	0.4	4.74	100		159098	11.5	6.2	175

PIPE COVER DETAILS				
Name	Type	Dia (mm)	Safe Cover (m)	Cover (m)
Outlet	Concrete,	600	0.4	0.95

Table 14 - Minor Storm Results (10 years)

PIT / NODE DETAILS							
Name	Max HGL	Max Pond	Max Surface	Max Pond	Min	Overflow	Constraint
		HGL	Flow Arriving	Volume	Freeboard	(cu.m/s)	
			(cu.m/s)	(cu.m)	(m)		
POS	11.76		0.964				
N OP	3.7		0				
N DP	2.4		0				

SUB-CATCHMENT DETAILS							
Name	Max	Paved	Grassed	Paved	Grassed	Supp.	Due to Storm
	Flow Q	Max Q	Max Q	Tc	Tc	Tc	
	(cu.m/s)	(cu.m/s)	(cu.m/s)	(min)	(min)	(min)	
Cat PRE	0.438	0	0.438	0	20.91	0	10% AEP, 25 min burst, Storm 8
Cat BASIN	0.045	0	0.045	0	11.14	0	10% AEP, 15 min burst, Storm 6
Cat POS	0.806	0.757	0.05	3.14	19.48	0	10% AEP, 5 min burst, Storm 1
POS NOT DET	0.87	0.817	0.054	3.32	19.48	0	10% AEP, 5 min burst, Storm 1

PIPE DETAILS					
Name	Max Q	Max V	Max U/S	Max D/S	Due to Storm
	(cu.m/s)	(m/s)	HGL (m)	HGL (m)	
Outlet Pipe	0.404	3.51	3.702	2.656	10% AEP, 1 hour burst, Storm 3

CHANNEL DETAILS				
Name	Max Q	Max V		Due to Storm
	(cu.m/s)	(m/s)		

OVERFLOW ROUTE DETAILS								
Name	Max Q U/S	Max Q D/S	Safe Q	Max D	Max DxV	Max Width	Max V	Due to Storm
SPILL								
O1	0.062	0.062						10% AEP, 1 hour burst, Storm 6
OUTLET PIT	0.345	0.345						10% AEP, 1 hour burst, Storm 3
OF POS	0.805	0.808	0.405	0.261	0.43	2	1.67	10% AEP, 5 min burst, Storm 1

DETENTION BASIN DETAILS					
Name	Max WL	MaxVol	Max Q	Max Q	Max Q
			Total	Low Level	High Level
Basin	4.44	552.8	0.407	0	0.407

Table 15 - Major Storm Result (100 Years)

PIT / NODE DETAILS							
Name	Max HGL	Max Pond	Max Surface	Max Pond	Min	Overflow	Constraint
		HGL	Flow	Volume	Freeboar	(cu.m/s)	
			(cu.m/s)	(cu.m)	(m)		
POS	11.86		1.74				
N OP	3.94		0				
N DP	2.4		0				

SUB-CATCHMENT DETAILS							
Name	Max	Paved	Grassed	Paved	Grassed	Supp.	Due to Storm
	Flow Q	Max Q	Max Q	Tc	Tc	Tc	
	(cu.m/s)	(cu.m/s)	(cu.m/s)	(min)	(min)	(min)	
Cat PRE	1.003	0	1.003	0	15.24	0	1% AEP, 15 min burst, Storm 9
Cat BASIN	0.1	0	0.1	0	8.42	0	1% AEP, 10 min burst, Storm 7
Cat POS	1.381	1.254	0.127	2.56	15.92	0	1% AEP, 5 min burst, Storm 1
POS NOT DET	1.491	1.353	0.137	2.71	15.92	0	1% AEP, 5 min burst, Storm 1

PIPE DETAILS					
Name	Max Q	Max V	Max U/S	Max D/S	Due to Storm
	(cu.m/s)	(m/s)	HGL (m)	HGL (m)	
Outlet Pipe	0.968	4.23	3.937	2.852	1% AEP, 20 min burst, Storm 8

CHANNEL DETAILS					
Name	Max Q	Max V			Due to Storm
	(cu.m/s)	(m/s)			

OVERFLOW ROUTE DETAILS								
Name	Max Q U/S	Max Q D/S	Safe Q	Max D	Max DxV	Max Width	Max V	Due to Storm
SPILL								
O1	0.062	0.062						1% AEP, 10 min burst, Storm 4
OUTLET PIT	0.916	0.916						1% AEP, 20 min burst, Storm 8
OF POS	1.378	1.422	0.744	0.368	0.74	2	2.02	1% AEP, 5 min burst, Storm 1

DETENTION BASIN DETAILS					
Name	Max WL	MaxVol	Max Q	Max Q	Max Q
			Total	Low Level	High Level
Basin	4.55	645.2	0.979	0	0.979

Appendix G: Design Rainfall Data 2016

Table 19 – Design Rainfall Data

All Design Rainfall Depth (mm)
Issued: 6-Sep-21
Location Label:
Requeste Latitude -32.7391 Longitude 151.6422
Nearest gı Latitude 32.7375 (S Longitude 151.6375 (E)

			Annual Exceedance Probability (AEP)																
Duration	Duration in min	12EY	6EY	4EY	3EY	2EY	63.20%	50%	0.5EY	20%	0.2EY	10%	5%	2%	1%	1 in 200	1 in 500	1 in 1000	1 in 2000
1 min	1	0.802	0.928	1.15	1.32	1.57	2.04	2.33	2.59	3.32	3.39	4.05	4.81	5.88	6.77	7.7	9.16	10.4	11.7
2 min	2	1.4	1.62	1.99	2.27	2.67	3.39	3.9	4.33	5.58	5.7	6.8	8.04	9.73	11.1	12.6	15	16.9	19
3 min	3	1.92	2.23	2.76	3.14	3.71	4.72	5.42	6.02	7.75	7.9	9.43	11.2	13.6	15.5	17.6	20.9	23.6	26.6
4 min	4	2.38	2.77	3.44	3.93	4.64	5.93	6.8	7.55	9.71	9.91	11.8	14	17.1	19.5	22.2	26.4	29.8	33.6
5 min	5	2.79	3.25	4.04	4.63	5.49	7.02	8.05	8.94	11.5	11.7	14	16.6	20.2	23.2	26.4	31.4	35.5	40
10 min	10	4.34	5.06	6.34	7.29	8.68	11.2	12.8	14.2	18.2	18.6	22.2	26.4	32.4	37.3	42.4	50.4	57.2	64.6
15 min	15	5.44	6.32	7.92	9.11	10.8	14	16.1	17.8	22.8	23.3	27.8	33.1	40.6	46.8	53.2	63.3	71.9	81.2
20 min	20	6.28	7.29	9.12	10.5	12.5	16.2	18.5	20.5	26.3	26.8	32.1	38.1	46.7	53.8	61.2	72.9	82.7	93.4
25 min	25	6.98	8.08	10.1	11.6	13.8	17.9	20.4	22.7	29.1	29.6	35.4	42.1	51.6	59.4	67.6	80.4	91.2	103
30 min	30	7.57	8.76	10.9	12.5	14.9	19.2	22	24.5	31.4	32	38.3	45.4	55.6	64	72.9	86.7	98.3	111
45 min	45	8.96	10.3	12.8	14.6	17.4	22.4	25.7	28.6	36.7	37.4	44.8	53.1	64.9	74.6	84.9	101	114	129
1 hour	60	10	11.5	14.2	16.2	19.2	24.8	28.5	31.6	40.7	41.5	49.6	58.9	71.9	82.4	93.8	112	126	142
1.5 hour	90	11.6	13.3	16.4	18.7	22.1	28.3	32.6	36.2	46.7	47.7	57	67.6	82.5	94.6	108	128	145	163
2 hour	120	12.8	14.7	18.1	20.6	24.3	31.1	35.8	39.8	51.5	52.5	62.8	74.5	91	104	119	141	160	180
3 hour	180	14.7	16.9	20.8	23.6	27.8	35.6	41	45.5	59.1	60.3	72.2	85.8	105	120	137	163	184	208
4.5 hour	270	16.9	19.4	23.9	27.2	32	40.9	47.2	52.4	68.2	69.6	83.5	99.4	122	140	159	189	215	242
6 hour	360	18.6	21.3	26.4	30.1	35.5	45.4	52.4	58.2	75.9	77.4	93.1	111	136	157	179	212	241	272
9 hour	540	21.2	24.5	30.5	34.8	41.2	52.9	61.1	67.8	88.6	90.4	109	130	161	187	211	252	286	323
12 hour	720	23.3	27	33.7	38.7	45.9	59.2	68.3	75.8	99.2	101	122	147	182	211	239	285	323	365
18 hour	1080	26.6	31	38.9	44.8	53.5	69.4	80	88.8	116	119	144	174	216	251	285	339	385	435
24 hour	1440	29.1	34	43	49.6	59.5	77.6	89.4	99.3	130	133	162	196	243	283	322	382	434	489
30 hour	1800	31	36.5	46.3	53.5	64.4	84.5	97.2	108	142	145	176	214	265	309	358	430	492	560
36 hour	2160	32.7	38.5	49	56.8	68.5	90.2	104	115	152	155	189	229	284	330	385	464	532	606
48 hour	2880	35.1	41.6	53.3	62	75	99.5	114	127	167	171	208	253	313	363	423	507	577	655
72 hour	4320	38.3	45.7	59	68.9	83.9	112	129	143	188	192	235	286	351	404	462	544	611	684
96 hour	5760	40	48	62.4	73.3	89.6	120	138	153	202	206	251	305	371	425	480	558	621	689
120 hour	7200	41	49.3	64.7	76.2	93.3	125	144	160	210	214	261	316	383	436	489	565	627	691
144 hour	8640	41.4	49.9	66.1	78.1	96	129	148	165	216	220	267	322	388	440	493	569	633	697
168 hour	10080	41.5	50.1	67	79.5	97.8	131	151	168	219	224	270	325	390	441	495	574	641	706

PROPOSED SUBDIVISION

MCFARLANES ROAD, CHISHOLM

DREW LUMSDEN

MAITLAND CITY COUNCIL

NOTES:

1. ALL DIMENSIONS OF EASEMENTS AND LOTS ARE SUBJECT TO REGISTRATION OF DEPOSITED PLAN.
2. ALL WORK TO BE CARRIED OUT IN ACCORDANCE WITH COUNCIL'S STANDARD SPECIFICATIONS FOR ROADWORKS, WATER SUPPLY, SEWER, STORMWATER AND OTHER ASSOCIATED WORKS.
3. EROSION CONTROL DEVICES AND SILTATION TRAPS TO BE INSTALLED BEFORE SITE IS DISTURBED IN ACCORDANCE WITH THE ATTACHED SILTATION PLAN.
4. DENUDED AREAS TO BE REGRASSED ON COMPLETION OF WORKS.
5. ALL EXISTING UNDERGROUND SERVICES MUST BE LOCATED AND EXPOSED PRIOR TO EARTHWORKS COMMENCING AND IT IS THE RESPONSIBILITY OF THOSE PERSONS USING THIS PLAN TO CONFIRM BOTH POSITION & LEVEL OF THESE UTILITIES IN CONJUNCTION WITH THE APPROPRIATE AUTHORITY.
6. PAVEMENT THICKNESS TO BE IN ACCORDANCE WITH THE RECOMMENDATIONS OF THE GEOTECHNICAL ENGINEER..
7. WORKING HOURS ON SITE SHALL BE IN ACCORDANCE WITH EPA & COUNCIL REQUIREMENTS.
8. VEHICULAR ACCESS AND ALL SERVICES ARE TO BE MAINTAINED AT ALL TIMES TO ADJOINING PROPERTIES AFFECTED BY CONSTRUCTION WORKS.
9. MAINTENANCE ON THE SEEDED AND TURFED AREAS SHALL BE OVER A 3 MONTH PERIOD. TURF THE FULL WIDTH OF ALL EARTH DISH DRAINS. WHERE NOT NOTED LAY 600mm WIDE TURF STRIPS TO EACH SIDE OF CONCRETE ACCESSWAYS, PATHWAYS, AT THE REAR OF ALL KERB AND GUTTERING AND AT THE TOP OF CUT BATTERS. MULCH (IF AVAILABLE FROM SITE CLEARING) AND SEED ALL OTHER DISTURBED AREAS, INCLUDING TRENCHES.
10. TRAFFIC CONTROL MEASURES TO BE IN ACCORDANCE WITH AS 1742.3-1996.
11. ALL LEVELS MUST BE OBTAINED FROM ESTABLISHED BENCH MARKS AS DIRECTED BY THE SUPERVISOR.
12. THE CONTRACTOR IS TO ENSURE THAT ALL THE NECESSARY SERVICE PIPE CONDUITS AND FITTINGS ARE IN PLACE PRIOR TO THE FINAL WEARING COURSE BEING LAID.
13. PROVIDE STREET NAME SIGNS AT ALL INTERSECTIONS, DOUBLE BLADED WHERE NECESSARY.
14. ALL SITE FILLING TO BE CONTROLLED FILL TO AS3798 WITH TESTING TO BE CARRIED OUT BY A NATA REGISTERED LABORATORY.
15. PAVEMENT PROOF ROLLING AND LEVEL CHECKS TO BE IN ACCORDANCE WITH STANDARD COUNCIL REQUIREMENTS.

High Definition Design Pty Ltd
KEVIN URANE 0412009891

DRAWING SCHEDULE JOB NUMBER HD311

DATE - 23/09/2021		DA ISSUE
DWG No.	SHEET TITLE	REV
CC00	COVER SHEET	1
CC01	OVERALL PLAN	1
CC02	DEVELOPMENT PLAN	1
CC03	RED BARON ROAD LONGITUDINAL SECTION	1
CC04	RED BARON ROAD CROSS SECTION 1 OF 2	1
CC05	RED BARON ROAD CROSS SECTION 2 OF 2	1
CC06	MALACHITE STREET LONGITUDINAL SECTION	1
CC07	MALACHITE STREET CROSS SECTION 1 OF 2	1
CC08	MALACHITE STREET CROSS SECTION 2 OF 2	1
CC09	TYPICAL SECTION	1
CC10	EROSION AND SEDIMENT CONTROL PLAN	1
CC11	EROSION AND SEDIMENT CONTROL DETAILS	1
CC12	EROSION AND SEDIMENT CONTROL NOTES 1 OF 2	1
CC13	EROSION AND SEDIMENT CONTROL NOTES 2 OF 2	1

DA ISSUE

N

LEGEND

BUILDING ENVELOPE

ZONING LINE

5.89m FLOOD CONTOUR

(A) RESTRICTION AS TO USER 10 WIDE (ACCESS)

EXISTING BOUNDARY

EXISTING BOUNDARY

EXISTING BOUNDARY

28

11.5 ha

PROPOSED BASIN

MALACHITE STREET

RED BARON ROAD

MCFARLANES ROAD

TITLE: PROPOSED SUBDIVISION LOT 44 DP1117263
MCFARLANES ROAD CHISHOLM

OVERALL PLAN

CLIENT: DREW LUMSDEN

High Definition Design Pty Ltd

KEVIN URANE 0412009891

NOTE:

ALL EXISTING UNDERGROUND SERVICES MUST BE LOCATED AND EXPOSED PRIOR TO EARTHWORKS COMMENCING AND IT IS RESPONSIBILITY OF THOSE PERSONS USING THIS PLAN TO CONFIRM BOTH POSITION AND LEVEL OF THESE UTILITIES IN CONJUNCTION WITH THE APPROPRIATE AUTHORITY.

0 20 40 60 80 100m

1:1000 @ A1

Date: 23.09.21 Scale: 1:1000 Designed: AS

Cad Ref: HD311 DA Civil

No	Amendment	Drawn	Date
1	DA ISSUE	AS	23.09.21

Project No HD-311

Drawing No CC01

Revision 1

N

LEGEND

- PROPOSED STORMWATER PIPE
- PROPOSED SAG PIT
- PROPOSED EKI PIT
- PROPOSED IAD PIT
- PROPOSED JUNCTION PIT
- PROPOSED REGRADING
- PROPOSED CONCRETE FOOTPATH
- ZONING LINE
- 5.89m FLOOD CONTOUR
- EXISTING CONTOURS LINE
- REGRADING LEVEL

(A) RESTRICTION AS TO USER 10 WIDE (ACCESS)

EXISTING BOUNDARY

PROPOSED 2.5m WIDE CONCRETE FOOTPATH

PROPOSED ROLL KERB

MALACHITE STREET

PROPOSED GPT

PROPOSED SCOUR PROTECTION

PROPOSED SPILLWAY

PROPOSED BIOFILTRATION

BASIN
658.59m³

TOP OF BANK

TOP OF WATER LEVEL

BASIN 1.40m

5.40m

7.00m

PROPOSED 2.5m WIDE CONCRETE WALKWAY

PROPOSED 1.5m WIDE CONCRETE FOOTPATH

RED BARON ROAD

MCFARLANES ROAD

P1-1 P1-2 P1-3 P1-4 P1-5 P1-6 P1-7
P2-1 P2-2 P2-3
P3-1 P3-2 P3-3 P3-4 P3-5 P3-6 P3-7 P3-8
P4-1 P4-2 P4-3 P4-4
P5-1
P6-1
P7-1 P7-2

TITLE: PROPOSED SUBDIVISION LOT 44 DP1117263
MCFARLANES ROAD CHISHOLM

DEVELOPMENT PLAN

CLIENT: DREW LUMSDEN

High Definition Design Pty Ltd

KEVIN URANE 0412009891

NOTE:

ALL EXISTING UNDERGROUND SERVICES MUST BE LOCATED AND EXPOSED PRIOR TO EARTHWORKS COMMENCING AND IT IS RESPONSIBILITY OF THOSE PERSONS USING THIS PLAN TO CONFIRM BOTH POSITION AND LEVEL OF THESE UTILITIES IN CONJUNCTION WITH THE APPROPRIATE AUTHORITY.

0 8 16 24 32 40m

1:400 @ A1

Date: 23.09.21 Scale: 1:400 Designed: AS

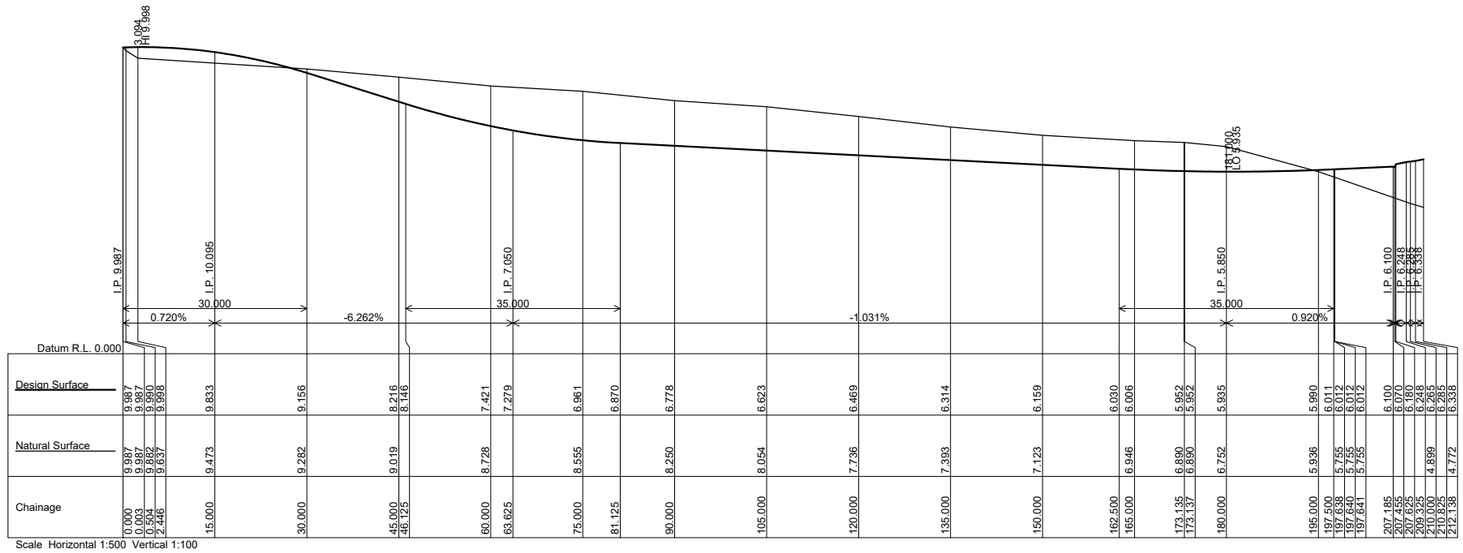
Cad Ref: HD311 DA Civil

No	Amendment	Drawn	Date
1	DA ISSUE	AS	23.09.21

Project No HD-311

Drawing No CC02

Revision 1



Scale Horizontal 1:500 Vertical 1:100

RED BARON ROAD LONGITUDINAL SECTION

TITLE: PROPOSED SUBDIVISION LOT 44 DP1117263
MCFARLANES ROAD CHISHOLM

RED BARON ROAD LONGITUDINAL SECTION

CLIENT: DREW LUMSDEN

KEVIN URANE 0412009891

NOTE:

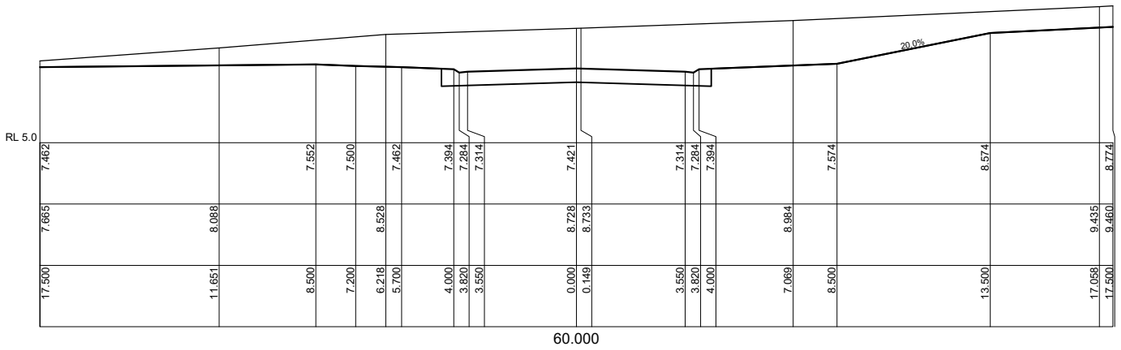
ALL EXISTING UNDERGROUND SERVICES MUST BE LOCATED AND EXPOSED PRIOR TO EARTHWORKS COMMENCING AND IT IS RESPONSIBILITY OF THOSE PERSONS USING THIS PLAN TO CONFIRM BOTH POSITION AND LEVEL OF THESE UTILITIES IN CONJUNCTION WITH THE APPROPRIATE AUTHORITY.

0 8 16 24 32 40m
1:400 @ A1

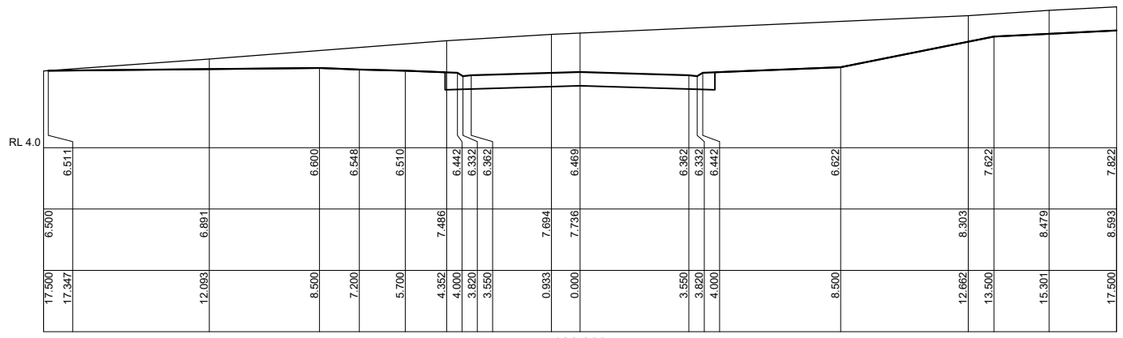
Date: 23.09.21 Scale: 1:400 Designed: AS
Cad Ref: HD311 DA Civil

No	Amendment	Drawn	Date
1	DA ISSUE	AS	23.09.21

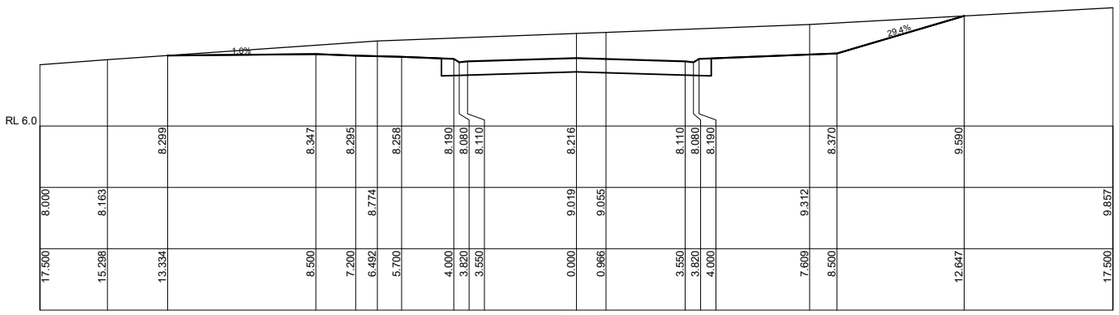
Project No HD-311
Drawing No CC03
Revision 1



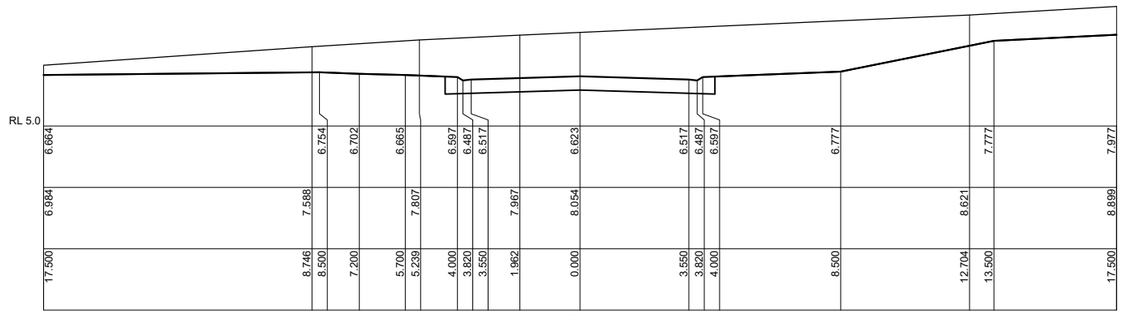
60.000



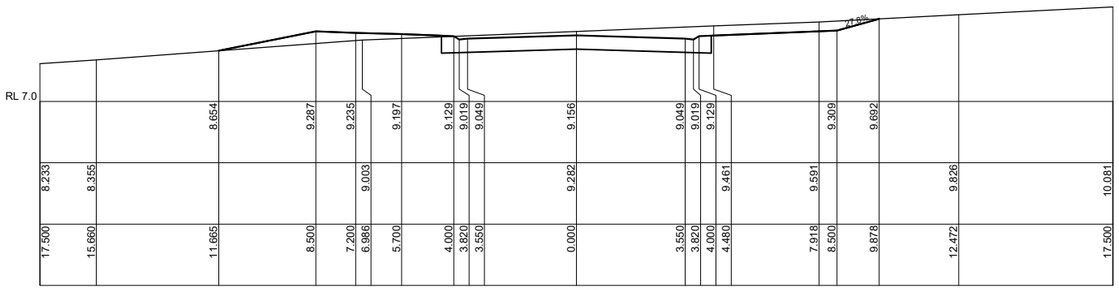
120.000



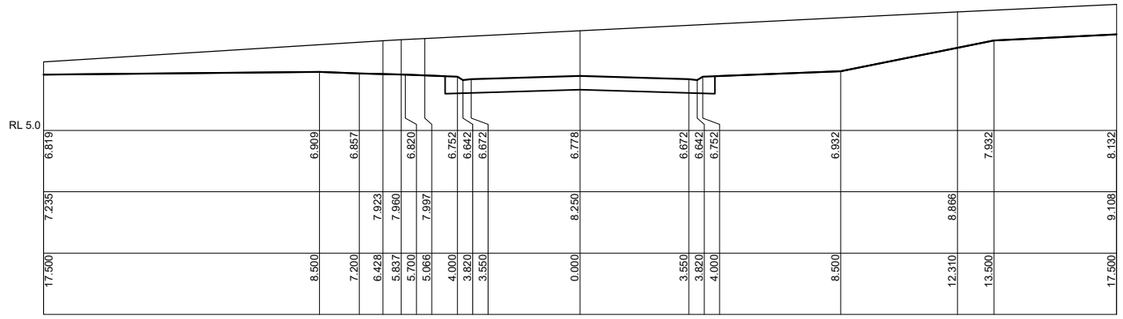
45.000



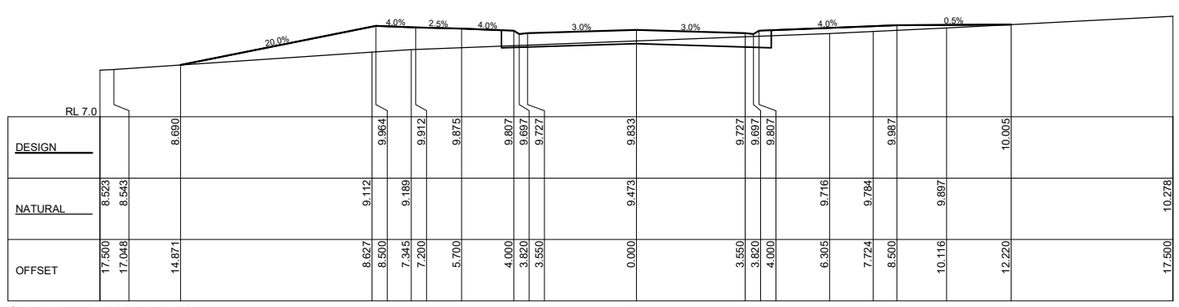
105.000



30.000

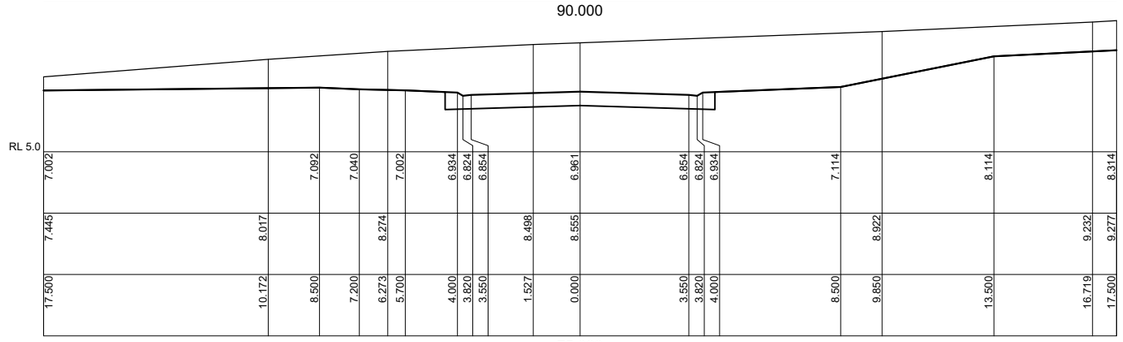


90.000



Scale Horizontal 1:100 Vertical 1:100

15.000



75.000

TITLE: PROPOSED SUBDIVISION LOT 44 DP1117263
MCFARLANES ROAD CHISHOLM

RED BARON ROAD CROSS SECTION 1 OF 2

CLIENT: DREW LUMSDEN

High Definition Design Pty Ltd

KEVIN URANE 0412009891

NOTE:

ALL EXISTING UNDERGROUND SERVICES MUST BE LOCATED AND EXPOSED PRIOR TO EARTHWORKS COMMENCING AND IT IS RESPONSIBILITY OF THOSE PERSONS USING THIS PLAN TO CONFIRM BOTH POSITION AND LEVEL OF THESE UTILITIES IN CONJUNCTION WITH THE APPROPRIATE AUTHORITY.

0 8 16 24 32 40m

1:400 @ A1

Date: 23.09.21 Scale: 1:400 Designed: AS

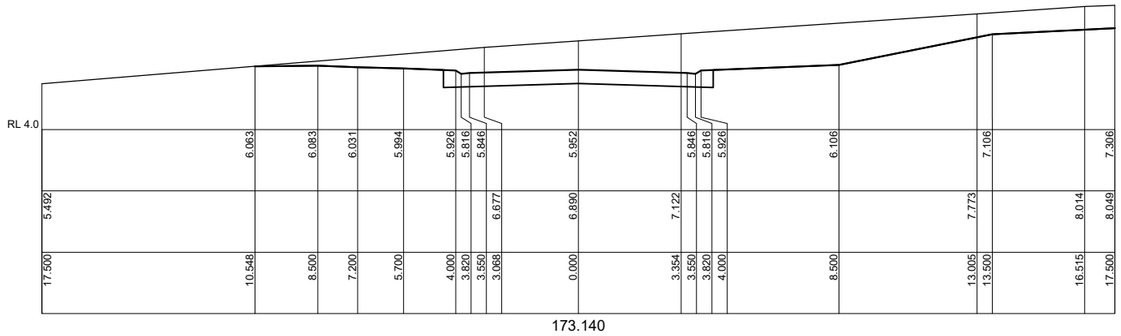
Cad Ref: HD311 DA Civil

No	Amendment	Drawn	Date
1	DA ISSUE	AS	23.09.21

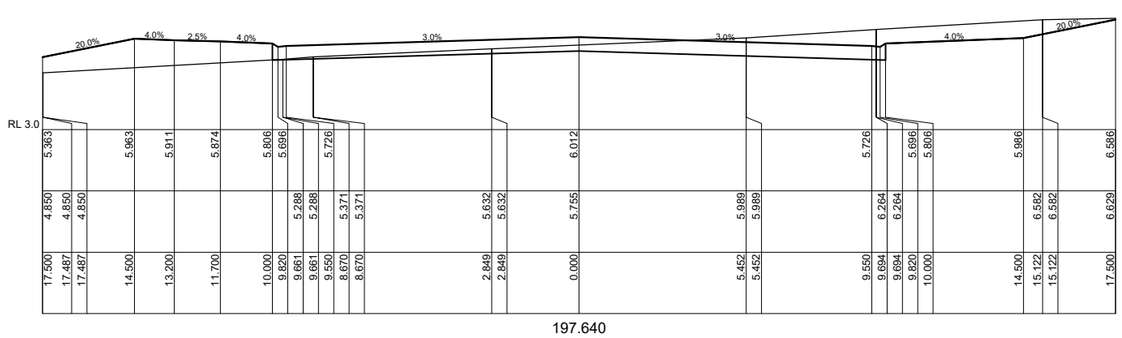
Project No HD-311

Drawing No CC04

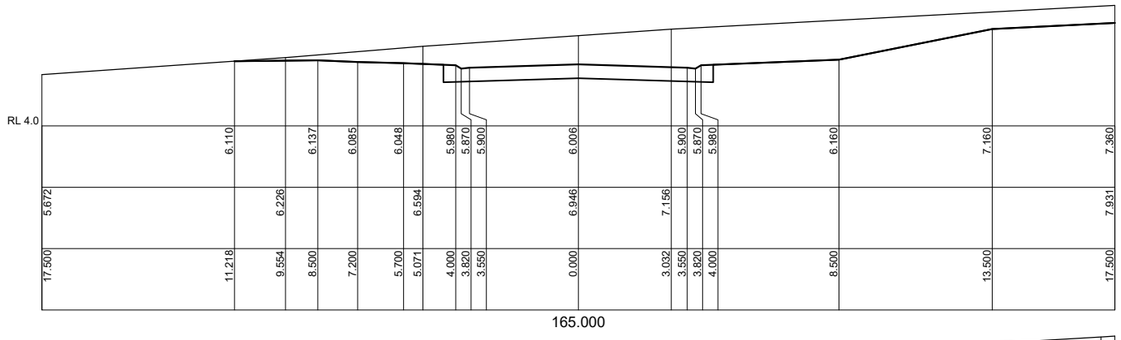
Revision 1



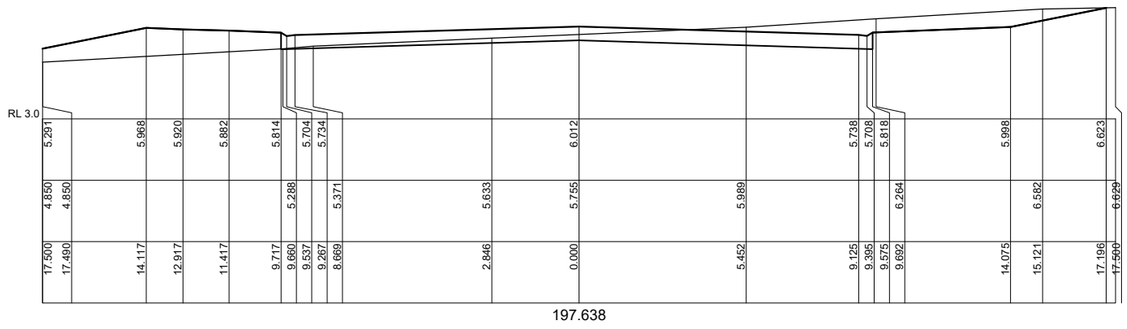
173.140



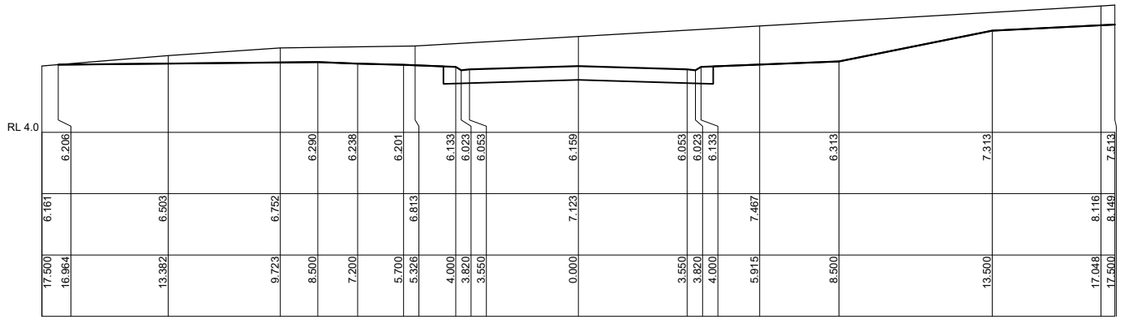
197.640



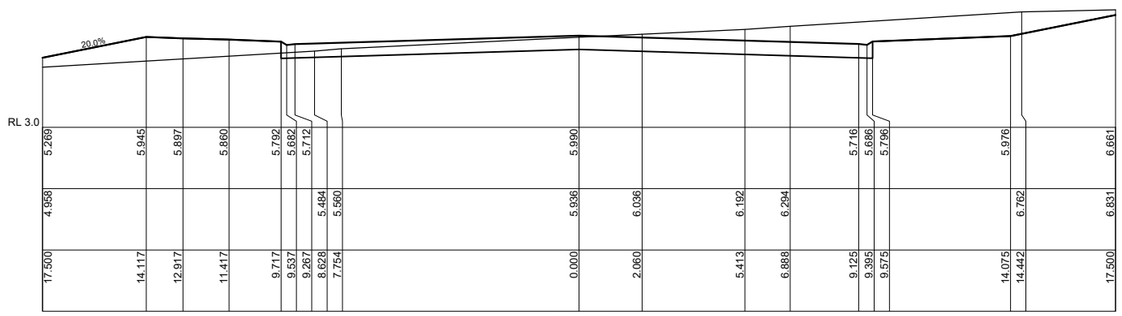
165.000



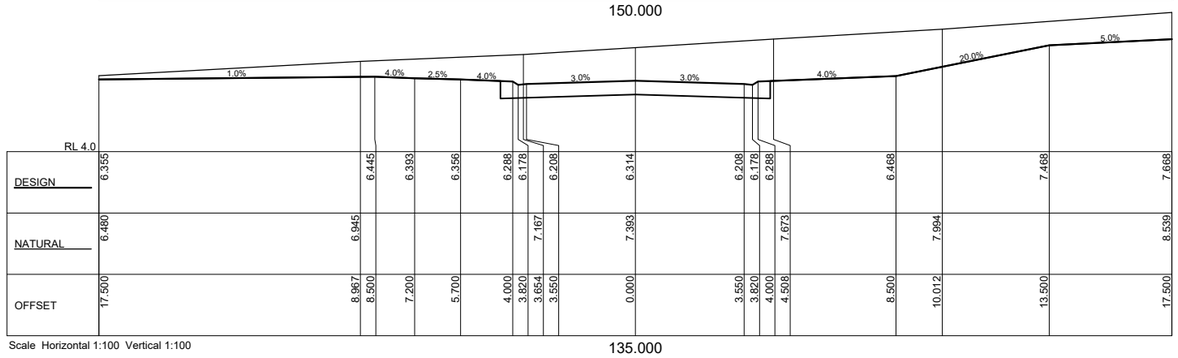
197.638



150.000

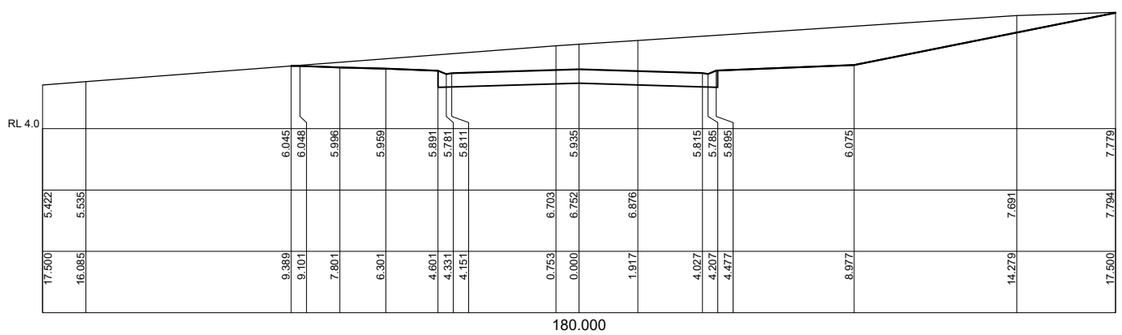


195.000



Scale Horizontal 1:100 Vertical 1:100

135.000



180.000

TITLE: PROPOSED SUBDIVISION LOT 44 DP1117263
MCFARLANES ROAD CHISHOLM

RED BARON ROAD CROSS SECTION 2 OF 2

CLIENT: DREW LUMSDEN

High Definition Design Pty Ltd

KEVIN URANE 0412009891

NOTE:

ALL EXISTING UNDERGROUND SERVICES MUST BE LOCATED AND EXPOSED PRIOR TO EARTHWORKS COMMENCING AND IT IS RESPONSIBILITY OF THOSE PERSONS USING THIS PLAN TO CONFIRM BOTH POSITION AND LEVEL OF THESE UTILITIES IN CONJUNCTION WITH THE APPROPRIATE AUTHORITY.

0 8 16 24 32 40m

1:400 @ A1

Date: 23.09.21 Scale: 1:400 Designed: AS

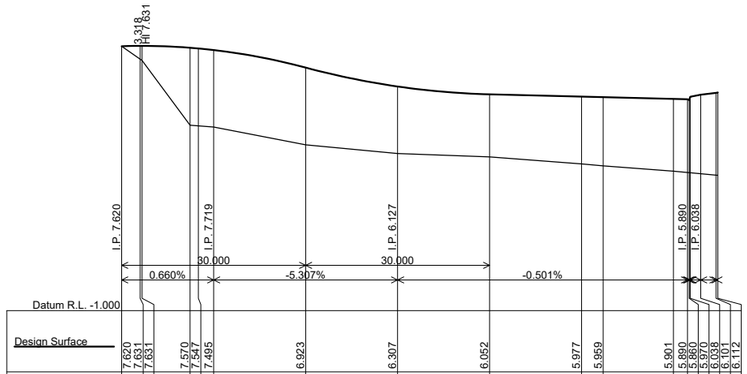
Cad Ref: HD311 DA Civil

No	Amendment	Drawn	Date
1	DA ISSUE	AS	23.09.21

Project No HD-311

Drawing No CC05

Revision 1



Scale Horizontal 1:500 Vertical 1:100

MALACHITE STREET LONGITUDINAL SECTION

TITLE: PROPOSED SUBDIVISION LOT 44 DP1117263
MCFARLANES ROAD CHISHOLM

MALACHITE STREET LONGITUDINAL SECTION

CLIENT: DREW LUMSDEN

High Definition Design Pty Ltd
KEVIN URANE 0412009891

NOTE:

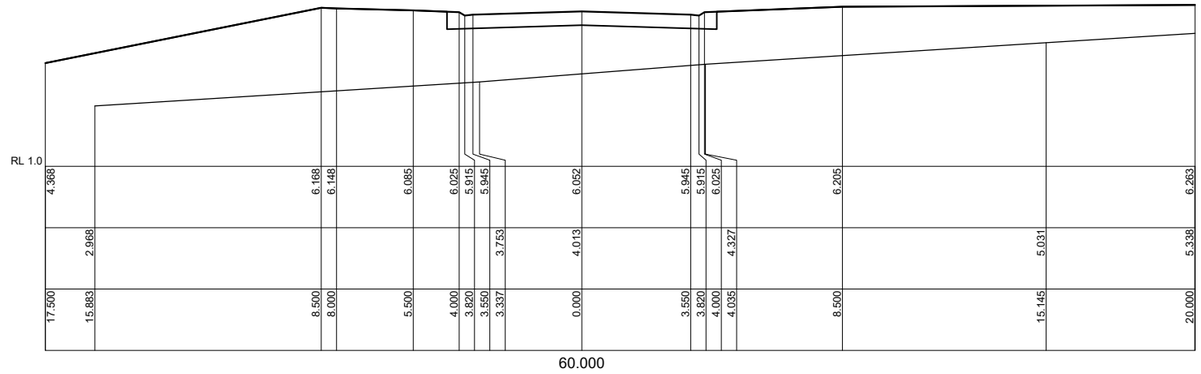
ALL EXISTING UNDERGROUND SERVICES MUST BE LOCATED AND EXPOSED PRIOR TO EARTHWORKS COMMENCING AND IT IS RESPONSIBILITY OF THOSE PERSONS USING THIS PLAN TO CONFIRM BOTH POSITION AND LEVEL OF THESE UTILITIES IN CONJUNCTION WITH THE APPROPRIATE AUTHORITY.

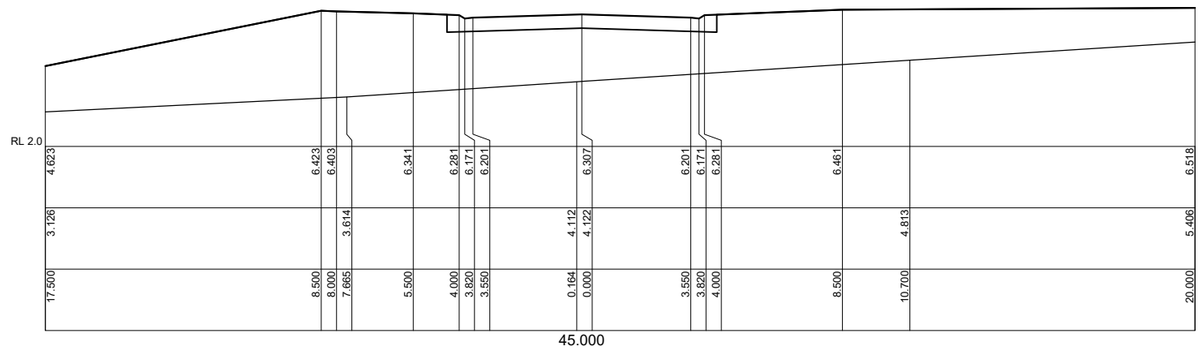
0 8 16 24 32 40m
1:400 @ A1

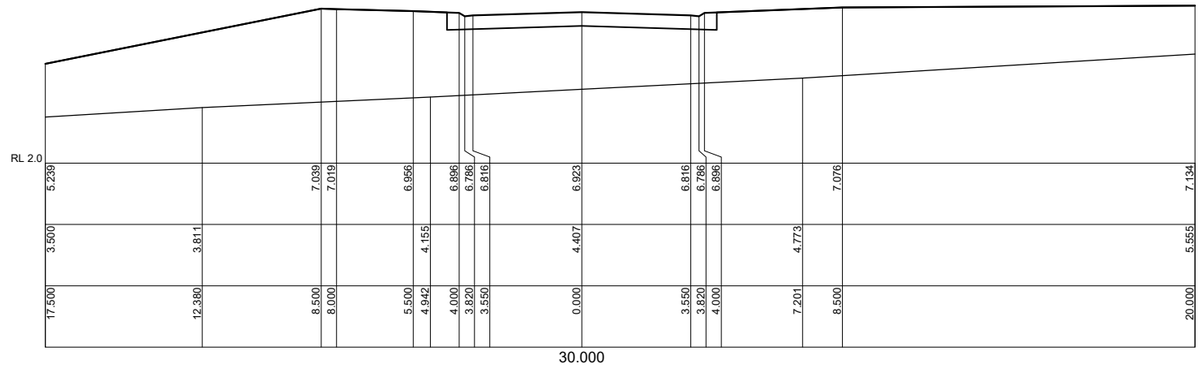
Date: 23.09.21 Scale: 1:400 Designed: AS
Cad Ref: HD311 DA Civil

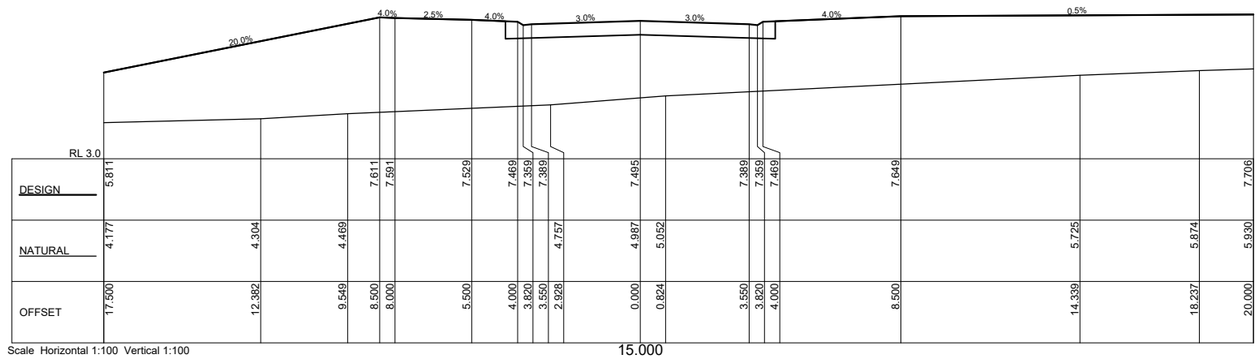
No	Amendment	Drawn	Date
1	DA ISSUE	AS	23.09.21

Project No HD-311
Drawing No CC06
Revision 1









TITLE: PROPOSED SUBDIVISION LOT 44 DP1117263
MCFARLANES ROAD CHISHOLM

MALACHITE STREET CROSS SECTION 1 OF 2

CLIENT: DREW LUMSDEN

High Definition Design Pty Ltd
KEVIN URANE 0412009891

NOTE:

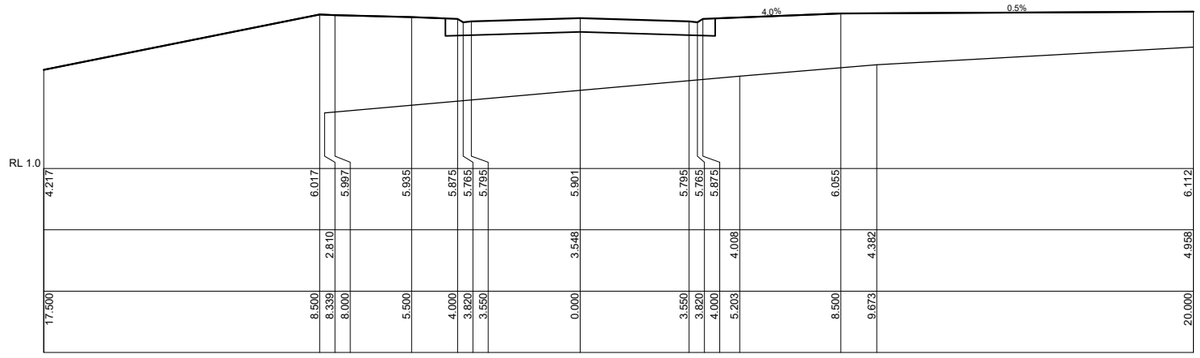
ALL EXISTING UNDERGROUND SERVICES MUST BE LOCATED AND EXPOSED PRIOR TO EARTHWORKS COMMENCING AND IT IS RESPONSIBILITY OF THOSE PERSONS USING THIS PLAN TO CONFIRM BOTH POSITION AND LEVEL OF THESE UTILITIES IN CONJUNCTION WITH THE APPROPRIATE AUTHORITY.

0 8 16 24 32 40m
1:400 @ A1

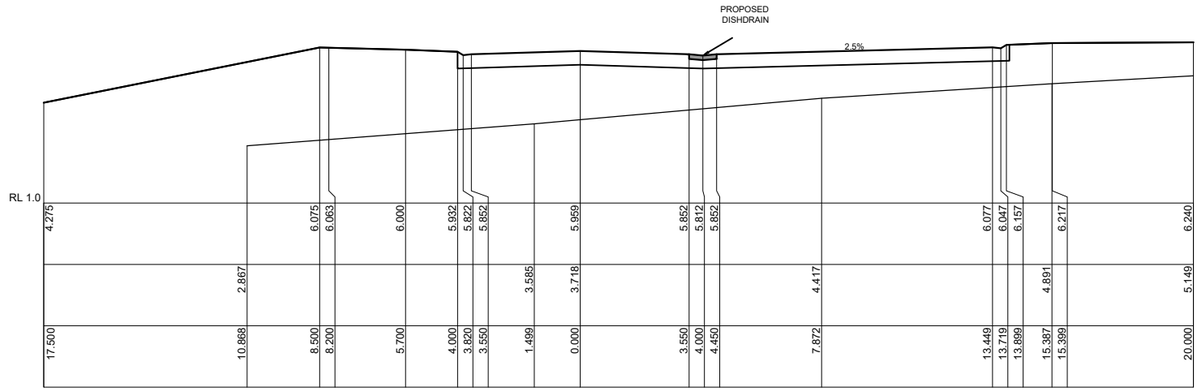
Date: 23.09.21 Scale: 1:400 Designed: AS
Cad Ref: HD311 DA Civil

No	Amendment	Drawn	Date
1	DA ISSUE	AS	23.09.21

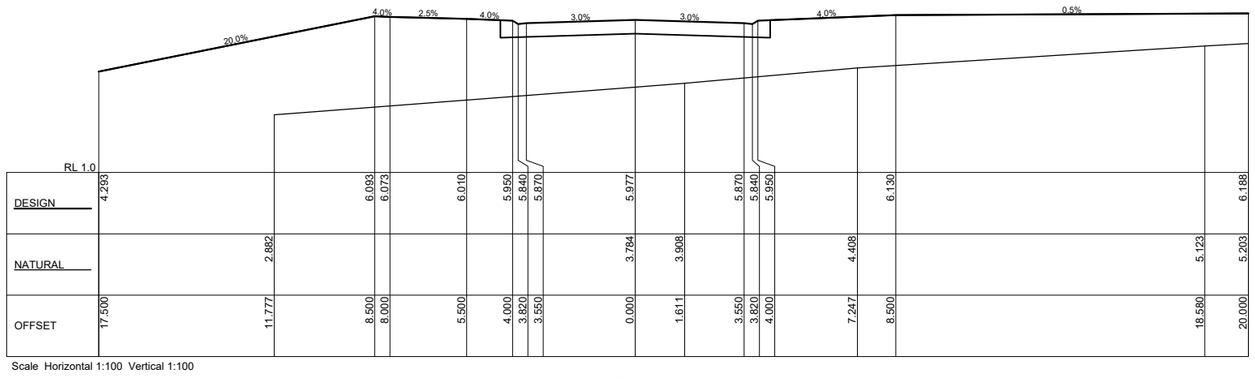
Project No HD-311
Drawing No CC07
Revision 1



90.000



78.529



Scale Horizontal 1:100 Vertical 1:100

75.000

TITLE: PROPOSED SUBDIVISION LOT 44 DP1117263
MCFARLANES ROAD CHISHOLM

MALACHITE STREET CROSS SECTION 2 OF 2

CLIENT: DREW LUMSDEN

High Definition Design Pty Ltd

KEVIN URANE 0412009891

NOTE:

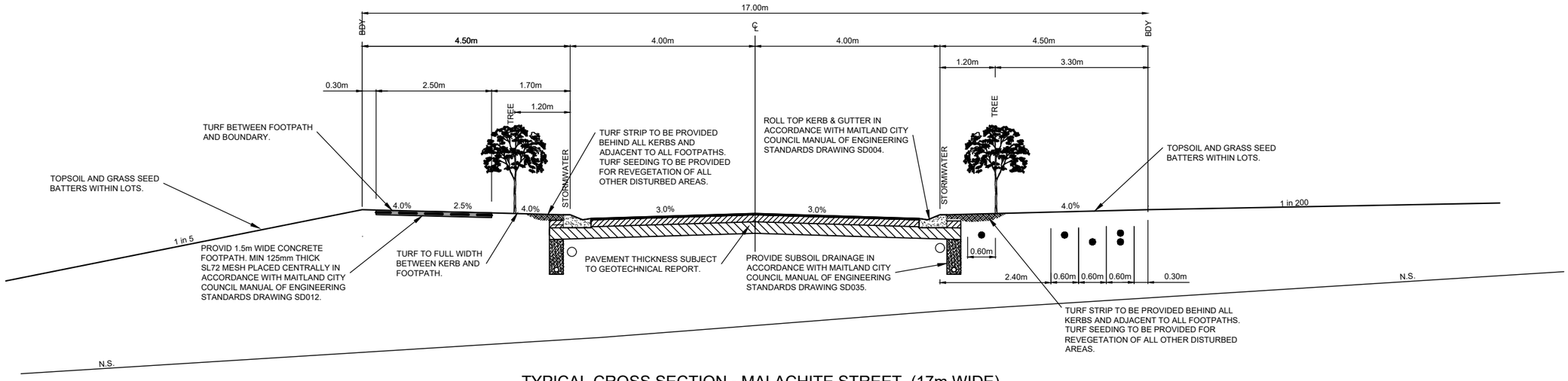
ALL EXISTING UNDERGROUND SERVICES MUST BE LOCATED AND EXPOSED PRIOR TO EARTHWORKS COMMENCING AND IT IS RESPONSIBILITY OF THOSE PERSONS USING THIS PLAN TO CONFIRM BOTH POSITION AND LEVEL OF THESE UTILITIES IN CONJUNCTION WITH THE APPROPRIATE AUTHORITY.

0 8 16 24 32 40m
1:400 @ A1

Date: 23.09.21 Scale: 1:400 Designed: AS
Cad Ref: HD311 DA Civil

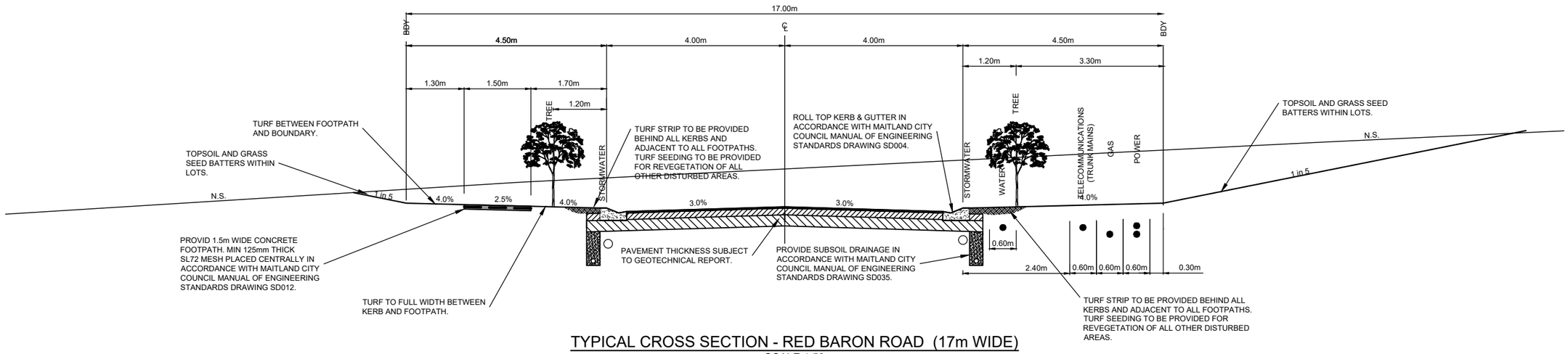
No	Amendment	Drawn	Date
1	DA ISSUE	AS	23.09.21

Project No HD-311
Drawing No CC08
Revision 1



TYPICAL CROSS SECTION - MALACHITE STREET (17m WIDE)

SCALE 1:50



TYPICAL CROSS SECTION - RED BARON ROAD (17m WIDE)

SCALE 1:50

TITLE: PROPOSED SUBDIVISION LOT 44 DP1117263
MCFARLANES ROAD CHISHOLM

TYPICAL CROSS SECTION

CLIENT: DREW LUMSDEN

High Definition Design Pty Ltd
KEVIN URANE 0412009891

NOTE:

ALL EXISTING UNDERGROUND SERVICES MUST BE LOCATED AND EXPOSED PRIOR TO EARTHWORKS COMMENCING AND IT IS RESPONSIBILITY OF THOSE PERSONS USING THIS PLAN TO CONFIRM BOTH POSITION AND LEVEL OF THESE UTILITIES IN CONJUNCTION WITH THE APPROPRIATE AUTHORITY.

0 8 16 24 32 40m
1:400 @ A1

Date: 23.09.21 Scale: 1:400 Designed: AS
Cad Ref: HD311 DA Civil

No	Amendment	Drawn	Date
1	DA ISSUE	AS	23.09.21

Project No HD-311
Drawing No CC09
Revision 1

N

LEGEND

- MATERIAL STOCK PILE
- SILT FENCE
- LIP DRAIN
- HAY BALES

CONSTRUCT STRAW BALE SEDIMENT TRAP

PROVIDE SILT FENCE TO LOW SIDE OF SITE

BASIN
658.59m³

PROVIDE SILT FENCE TO LOW SIDE OF SITE

MALACHITE STREET

PROVIDE LIP DRAIN TO HIGH SIDE OF THE SITE

CONSTRUCT STRAW BALE SEDIMENT TRAP

CONSTRUCT AND MAINTAIN STABILISED SITE ACCESS

RED BARON ROAD

PROVIDE SILT FENCE TO LOW SIDE OF STOCKPILE

PROVIDE LIP DRAIN TO HIGH SIDE OF STOCKPILE TO DIVERT OVERLAND FLOW

POSSIBLE MATERIAL STOCK PILE LOCATION

PROVIDE LIP DRAIN TO HIGH SIDE OF THE SITE

TITLE: PROPOSED SUBDIVISION LOT 44 DP1117263
MCFARLANES ROAD CHISHOLM

EROSION AND SEDIMENT CONTROL PLAN

CLIENT: DREW LUMSDEN

High Definition Design Pty Ltd

KEVIN URANE 0412009891

NOTE:

ALL EXISTING UNDERGROUND SERVICES MUST BE LOCATED AND EXPOSED PRIOR TO EARTHWORKS COMMENCING AND IT IS RESPONSIBILITY OF THOSE PERSONS USING THIS PLAN TO CONFIRM BOTH POSITION AND LEVEL OF THESE UTILITIES IN CONJUNCTION WITH THE APPROPRIATE AUTHORITY.

0 8 16 24 32 40m

1:400 @ A1

Date: 23.09.21 Scale: 1:400 Designed: AS

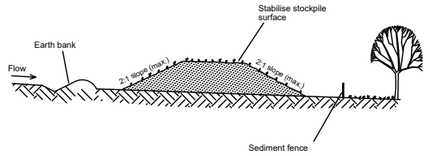
Cad Ref: HD311 DA Civil

No	Amendment	Drawn	Date
1	DA ISSUE	AS	23.09.21

Project No HD-311

Drawing No CC10

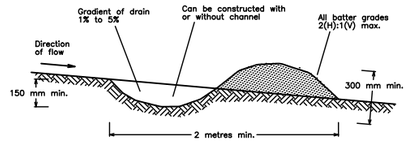
Revision 1



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 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 2 metres downslope.

STOCKPILES SD 4-1

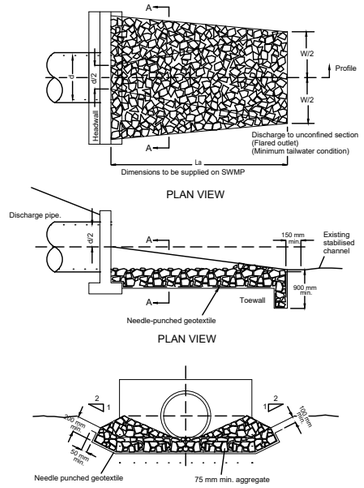


NOTE: Only to be used as temporary bank where maximum upslope length is 80 metres.

Construction Notes

1. Build with gradients between 1 percent and 5 percent.
2. Avoid removing trees and shrubs if possible - work around them.
3. Ensure the structures are free of projections or other irregularities that could impede water flow.
4. Build the drains with circular, parabolic or trapezoidal cross sections, not V shaped.
5. Ensure the banks are properly compacted to prevent failure.
6. Complete permanent or temporary stabilisation within 10 days of construction.

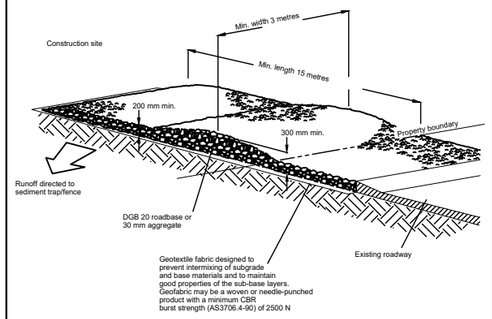
EARTH BANK (LOW FLOW) SD 5-5



Construction Notes

1. Compact the subgrade fill to the density of the surrounding undisturbed material.
2. Prepare a smooth, even foundation for the structure that will ensure that the needle-punched geotextile does not sustain serious damage when covered with rock.
3. Should any minor damage to the geotextile occur, repair it before spreading any aggregate. For repairs, patch one piece of fabric over the damage, making sure that all joints and patches overlap more than 300 mm.
4. Lay rock following the drawing, according to Table 5.2 of Landcom (2004) and with a minimum diameter of 75 mm.
5. Ensure that any concrete or riprap used for the energy dissipater or the outlet protection conforms to the grading limits specified on the SWMP.

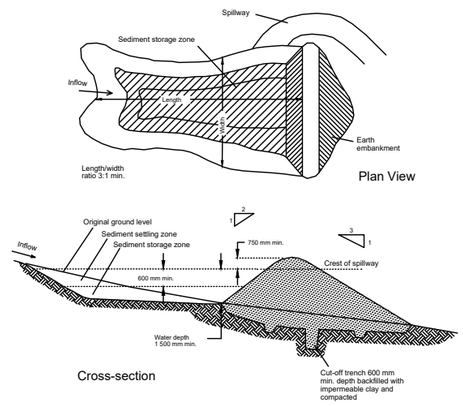
ENERGY DISSIPATER SD 5-8



Construction Notes

1. Strip the topsoil, level the site and compact the subgrade.
2. Cover the area with needle-punched geotextile.
3. Construct a 200 mm thick pad over the geotextile using road base or 30 mm 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

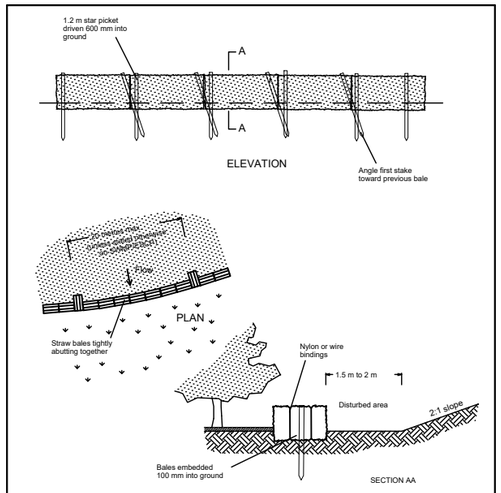
STABILISED SITE ACCESS SD 6-14



Construction Notes

1. Remove all vegetation and topsoil from under the dam wall and from within the storage area.
2. Construct a cut-off trench 500 mm deep and 1,200 mm wide along the centreline of the embankment extending to a point on the gully wall level with the riser crest.
3. Maintain the trench free of water and recompact the materials with equipment as specified in the SWMP to 95 per cent Standard Proctor Density.
4. Select fill following the SWMP that is free of roots, wood, rock, large stone or foreign material.
5. Prepare the site under the embankment by ripping to at least 100 mm to help bond compacted fill to the existing substrate.
6. Spread the fill in 100 mm to 150 mm layers and compact it at optimum moisture content following the SWMP.
7. Construct the emergency spillway.
8. Rehabilitate the structure following the SWMP.

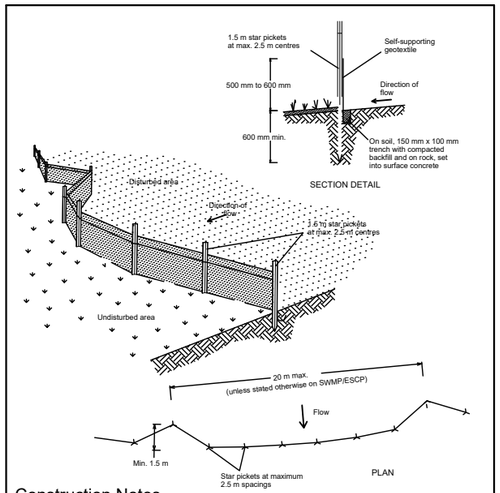
EARTH BASIN - WET SD 6-4
(APPLIES TO 'TYPE D' AND 'TYPE F' SOILS ONLY)



Construction Notes

1. Construct the straw bale filter as close as possible to being parallel to the contours of the site.
2. Place bales lengthwise in a row with ends tightly abutting. Use straw to fill any gaps between bales. Straws are to be placed parallel to ground.
3. Ensure that the maximum height of the filter is one bale.
4. Embed each bale in the ground 75 mm to 100 mm and anchor with two 1.2 metre star pickets or stakes. Angle the first star picket or stake in each bale towards the previously laid bale. Drive them 600 mm into the ground and, if possible, flush with the top of the bales. Where star pickets are used and they protrude above the bales, ensure they are fitted with safety caps.
5. Where a straw bale filter is constructed downslope from a disturbed batter, ensure the bales are placed 1 to 2 metres downslope from the toe.
6. Establish a maintenance program that ensures the integrity of the bales is retained - they could require replacement each two to four months.

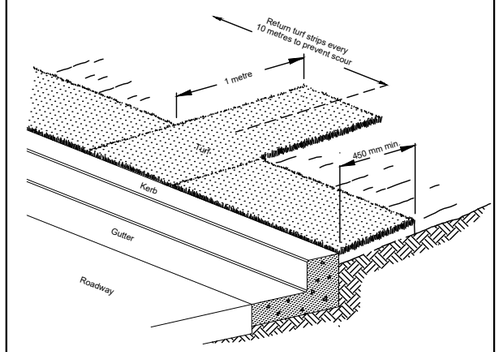
STRAW BALE FILTER SD 6-7



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 150-mm 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 150-mm 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. Install a 450 mm minimum wide roll of turf on the footpath next to the kerb and at the same level as the top of the kerb.
2. Lay 1.4 metre long turf strips normal to the kerb every 10 metres.
3. Rehabilitate disturbed soil behind the turf strip following the ESCP/SWMP.

KERBSIDE TURF STRIP SD 6-13

TITLE: PROPOSED SUBDIVISION LOT 44 DP1117263
MCFARLANES ROAD CHISHOLM

EROSION AND SEDIMENT CONTROL DETAIL

CLIENT: DREW LUMSDEN

High Definition Design Pty Ltd
KEVIN URANE 0412009891

NOTE:
ALL EXISTING UNDERGROUND SERVICES MUST BE LOCATED AND EXPOSED PRIOR TO EARTHWORKS COMMENCING AND IT IS RESPONSIBILITY OF THOSE PERSONS USING THIS PLAN TO CONFIRM BOTH POSITION AND LEVEL OF THESE UTILITIES IN CONJUNCTION WITH THE APPROPRIATE AUTHORITY.

0 8 16 24 32 40m
1:400 @ A1

Date: 23.09.21 Scale: 1:400 Designed: AS
Cad Ref: HD311 DA Civil

No	Amendment	Drawn	Date
1	DA ISSUE	AS	23.09.21

Project No HD-311
Drawing No CC11
Revision 1

Erosion and Sediment Control Notes

The following notes may not be relevant to each development.

General

1. ESCP refers to Erosion and Sediment Control Plan and SWMP refers to Soil and Water Management Plan.

2. ESC refers to erosion and sediment control.

3. Sediment, includes, but is not limited to, clay, silt, sand, gravel, soil, mud, cement, and ceramic waste.

4. Any reference to the Blue Book refers to Managing Urban Stormwater- Soils and Construction. Land com, 2004.

5. Any reference to the IECA White Books (2008) refers to IECA2008.Best Practice Erosion and Sediment Control. Books 1-6.InternationalErosion Control Association (Australasia). Picton NSW.

6. Any material deposited in any conservation area from works associated with the development shall be removed immediately by measures involving minimal ground and/or vegetation disturbance and no machinery, or following directions by Council and/or within a time frame advised by Council.

The ESCP

7. The ESCP and its associated ESC measures shall be constantly monitored, reviewed, and modified as required to correct deficiencies. Council has the right to direct changes if, in its opinion, the measures that are proposed or have been installed are inadequate to prevent pollution.

8.Prior to any activities on site, the responsible person(s) is to be nominated. The responsible person(s) shall be responsible for the ESC measures onsite. The name, address and 24 hour contact details of the person(s) shall be provided to Council in writing. Council shall be advised within 48 hours of any changes to the responsible person(s), or their contact details, in writing.

9. At least 14 days before the natural surface is disturbed in any new stage, the contractor shall submit to the Certifier, a plan showing ESC measures for that Stage. The degree of design detail shall be based on the disturbed area.

10. At any time, the ESC measures on site shall be appropriate for the area of disturbance and its characteristics including soils (in accordance with those required for the site as per DCP).

11. The implementation of the ESCP shall be supervised by personnel with appropriate qualifications and/or experience in ESC on construction sites.

12. The approved ESCP shall be available on-site for inspection by Council officers while work activities are occurring.

13. The approved ESCP shall be up to date and show a timeline of installation, maintenance and removal of ESC measures.

14. All ESC measure shall be appropriate for the Sediment Type(s) of the soils on site, in accordance with the Blue Book, IECA White Books or other current recognised industry standard for ESC for Australian conditions.

15. Adequate site data, including soil data from a NATA approved Laboratory, shall be obtained to allow the preparation of an appropriate ESCP, and allow the selection, design and specification of required ESC measures.

16. All works shall be carried out in accordance with the approved ESCP (as amended from time to time) unless circumstances arise where: a) compliance with the ESCP would increase the potential for environmental harm; or b) circumstances change during construction and those circumstances could not have been foreseen; or c) Council determines that unacceptable off-site sedimentation is occurring as a result of a land-disturbing activity. In either case, the person(s) responsible maybe required to take additional, or alternative protective action, and/or undertake reasonable restoration works within the timeframe specified by the Council.

17. Additional ESC measures hall be implemented, and a revised ESCP submitted for approval to the certifier(within five business days of any such amendments) in the event that:

a) there is a high probability that serious or material environmental harm may occur as a result of sediment leaving the site; or

b) the implemented works fail to achieve Council's water quality objectives specified in these conditions; or

c) site conditions significantly change; or

d) site inspections indicate that the implemented works are failing to achieve the “objective” of the ESCP.

18. A copy of any amended ESCP shall be forwarded to an appropriate Council Officer, within five business days of any such amendments.

Site establishment including clearing and mulching

19. No land clearing shall be undertaken unless preceded by the installation of adequate drainage and sediment control measures, unless such clearing is required for the purpose of installing such measures, in which case, only the minimum clearing required to install such measures shall occur.

20. Bulk tree clearing and grubbing of the sites hall be immediately followed by specified temporary erosion control measures (e.g. temporary grassing or mulching) prior to commencement of each stage of construction works.

21. Trees and vegetation cleared from the site shall be mulchedonsitewithin7 days of clearing.

22. Appropriate measures shall be undertaken to control any dust originating due to the mulching of vegetation onsite.

23. All office facilities and operational activities shall be located such that any effluent, including wash-down water, can be totally contained and treated within the site.

24. All reasonable and practicable measures shall be taken to ensure storm water runoff from access roads and stabilised entry/exit systems, drains to an appropriate sediment control device.

25. Site exit points shall be appropriately managed to minimise the risk of sediment being tracked onto sealed, public roadways.

26. Stormwater runoff from access roads and stabilised entry/exit points shall drain to an appropriate sediment control device.

27. The Applicant shall ensure an adequate supply of ESC, and appropriate pollution clean-up materials are available on-site at all times.

28. All temporary earth banks, flow diversion systems, and sediment basin embankments shall be machine-compacted, seeded and mulched within ten (10) days of formation for the purpose of establishing a vegetative cover, or lined appropriately.

29. Sediment deposited off site as a result of on-site activities shall be collected and the area cleaned/rehabilitated as soon as reasonable and practicable.

30. Concrete waste and chemical products, including petroleum and oil-based products, shall be prevented from entering any internal or external water body, or any external drainage system, excluding those on-site water bodies specifically designed to contain and/or treat such material. Appropriate measures shall be installed to trap these materials onsite.

31. Brick, tile or masonry cutting shall be carried out on a pervious surface (e.g. grass or open soil) and in such a manner that any resulting sediment-laden run off is prevented from discharging into a gutter, drain or water. Appropriate measures shall be installed to trap these materials onsite.

32. Newly sealed hard-stand areas (e.g .roads, driveways and car parks)shall be swept thoroughly as soon as practicable after sealing/surfacing to minimise the risk of components of the surfacing compound entering stormwater drains.

33. Stockpiles of erodible material shall be provided with an appropriate protective cover (synthetic or organic) if the materials are likely to be stockpiled for more than 10 days.

34. Stockpiles, temporary or permanent, shall not be located in areas identified as no-go zones (including, but not limited to, restricted access areas, buffer zones, or areas of non-disturbance) on the ESCP.

35. No more than 150mof a stormwater, sewer line or other service trench shall to be open at any one time.

36. Site spoil shall be lawfully disposed of in a manner that does not result in ongoing soil erosion or environmental harm.

37. Wherever reasonable and practicable, stormwater runoff entering the site from external areas, and non-sediment laden (clean) stormwater runoff entering a work area or area of soil disturbance, shall be diverted around or through that area in a manner that minimises soil erosion and the contamination of that water for all discharges up to the specified design storm discharge

Erosion and Sediment Control Notes continued Site Management including Dust

38. Priority shall be given to the prevention, or at least the minimisation, of soil erosion, rather than the trapping of displaced sediment. Such a clause shall not reduce the responsibility to apply and maintain, at all times, all necessary ESC measures.

39. Measures used to control wind erosion shall be appropriate for the location and prevents oil erosion and emissions from site at all times, including working hours, out of hours, weekends, public holidays, and during any other shutdown periods.

40. The application of liquid or chemical-based dust suppression measures shall ensure that sediment-laden run off resulting from such measures does not create a traffic or environmental hazard.

41. All cut and fill earth batters less than 3m in elevation shall be topsoiled, and grass seeded/hydromulchedwithin10 days of completion of grading in consultation with Council.

42. All disturbed areas shall be stabilised in accordance with timelines in the Blue Book.

43. All reasonable and practicable measures shall be taken to prevent, or at least minimise, the release of sediment from the site.

44. Suitable all-weather maintenance access shall be provided to all sediment control devices.

45. Sediment control devices, other than sediment basins, shall be de-silted and made fully operational as soon as reasonable and practicable after a sediment-producing event, whether natural or artificial, if the device's sediment retention capacity falls below 75% of its design retention capacity.

46. All erosion and sediment control measures, including drainage control measures shall be maintained in proper working order at all times during their operational lives.

47. Washing/flushing of sealed road ways shall only occur where sweeping has failed to remove sufficient sediment and there is a compelling need to remove the remaining sediment (e.g. for safety reasons). In such circumstances, all reasonable and practicable sediment control measures shall be used to prevent, or at least minimise, the release of sediment into receiving waters. Only those measures that will not cause safety and property flooding issues shall be employed. Sediment removed from road ways shall be disposed of in a lawful manner that does not cause ongoing soil erosion or environmental harm.

48. Sediment removed from sediment traps and places of sediment deposition shall be disposed of in a lawful manner that does not cause ongoing soil erosion or environmental harm.

Sediment Basins - installation, maintenance and removal including sediment traps

49. As-Constructed plans shall be prepared for all constructed Sediment Basins and associated emergency spillways. Such plans shall verify the basin's dimensions, levels and volumes comply with the approved design drawings. These plans may be requested by the Certifier or Council.

50. Sediment basins shall be constructed and fully operational prior to any other soil disturbance in their catchment.

51. Install an internal gated valve, or similar, in any outlet pipe once pipes installed, or install a sacrificial pipe from basin through wall to external outlet point. The valve shall be connected to a riser made from slotted pipe in the basin. The valve maybe opened once captured water meets water quality requirements. The final setup for temporary internal outlet structures to be confirmed prior to construction with Council. This setup will enable discharge of treated water from site without need for pumping.

52. A sediment storage level marker post shall be with a cross member set just below the top of the sediment storage zone (as specified on the approved ESCP). At least a 75mmwidepost shall be firmly set into the basin floor.

53. The Site Manager shall obtain the relevant approvals from the relevant organisations to discharge treated water from any existing basins. Organisations may include, but not be limited to, Hunter Water, and Council.

54. Where more than one stage is to be developed at one time, or before the preceding stage is complete, the sediment basin(s) for these stages shall have sufficient capacity to cater for all area directed to the basin(s).

55. Prior to any forecast weather event likely to result in runoff, any basins/traps shall be dewatered to provide sufficient capacity to capture sediment laden water from the site.

56.Sufficient quantities of chemicals/agents to treat captured water shall be placed such that water entering the basin mix with the chemical/agents and is carried into the basin to speed up clarification.

57. Any basin shall be dewatered within the X-day rainfall depth used to calculate the capacity of the basin, after a rainfall event.

58. Sufficient quantities of chemicals/agents to treat turbid water shall be securely stored on-site to provide for at least three complete treatments of all basins requiring chemically treatment onsite.

TITLE: PROPOSED SUBDIVISION LOT 44 DP1117263
MCFARLANES ROAD CHISHOLM

EROSION AND SEDIMENT CONTROL NOTES 1 OF 2

CLIENT: DREW LUMSDEN

High Definition Design Pty Ltd

KEVIN URANE 0412009891

NOTE:

ALL EXISTING UNDERGROUND SERVICES MUST BE LOCATED AND EXPOSED PRIOR TO EARTHWORKS COMMENCING AND IT IS RESPONSIBILITY OF THOSE PERSONS USING THIS PLAN TO CONFIRM BOTH POSITION AND LEVEL OF THESE UTILITIES IN CONJUNCTION WITH THE APPROPRIATE AUTHORITY.

0 8 16 24 32 40m

1:400 @ A1

Date: 23.09.21 Scale: 1:400 Designed: AS

Cad Ref: HD311 DA Civil

No	Amendment	Drawn	Date
1	DA ISSUE	AS	23.09.21

Project No HD-311

Drawing No CC12

Revision 1

59. Prior to the controlled discharge (e.g. de-watering activities) from site including excavations and/or sediment basins, the following water quality objectives shall be achieved:

a) Total Suspended Solids (TSS) to a maximum 50 milligrams/L;

b) water pH between 6.5 and 8.5, unless otherwise required by the Council;

c) Turbidity (measured in NTUs) to a maximum of 60 NTU); and

d) EC levels no greater than background levels.

60. The Development Approval may require testing of additional water quality elements prior to discharge. E.g. including but not limited to metals, organic substances, chemicals or bacteriological indicators.

61. A sample of the released treated water shall be kept onsite in a clear container with the sample date recorded on it.

62. Water quality samples shall be taken at a depth no less than 200mm below the water surface of the basin.

63. No Aluminum based products may be used treat captured water onsite without the prior written permission from an appropriate Council Officer. The applicant shall have a demonstrated ability to use such products correctly and without environmental harm prior to any approval.

64. The chemical/agent used in Type D and Type F basins to treat captured water captured in the basin shall be applied in concentrations sufficient to achieve Council's water quality objectives within the X-day rainfall depth used to calculate the capacity of the basin, after a rainfall event.

65. All Manufacturers' Instructions shall be followed for any chemicals/agents used onsite, except where approved by the Responsible Person or an appropriate Council Officer.

66. The Applicant shall ensure that on each occasion a Type F or Type D basin was not de-watered prior to being surcharged by a following rainfall event, a report is presented to an appropriateCounciloffICerwithin5 days identifying the circumstances and proposed amendments, if any, to the basin's operating procedures.

67. Settled sediment shall be removed as soon as reasonable and practicable from any sediment basin if:

a) it is anticipated that the next storm event is likely to cause sediment to settle above the basin's sediment storage zone; or

b) the elevation of settled sediment is above the top of the basin's sediment storage zone; or

c) the elevation of settled sediment is above the basins sediment marker line.

68. Scour protection measures placed on sediment basin emergency spill ways shall appropriately protect the spillway chute and its side batters from scour, and shall extend a minimum of 3m beyond the downstream toe of the basin's embankment.

69. Suitable all-weather maintenance access shall be provided to all sediment control devices.

70. Materials, whether liquid or solid, removed from any ESC measure or excavation during maintenance or decommissioning, shall be disposed of in a manner that does not cause ongoing soil erosion, water pollution or environmental harm.

71. All sediment basins shall remain fully operational at all times until the basin's design catchment achieves 70% ground cover or surface stabilisation acceptable to Council.

72. The ESC measures installed during the decommissioning and rehabilitation of a sediment basin shall comply with same standards specified for the normal construction works.

73. A sediment basin shall not be decommissioned until all up-slope site stabilisation measures have been implemented and are appropriately working to control soil erosion and sediment runoff.

Erosion and Sediment Control Notes continued

74. Immediately prior to the construction of the permanent stormwater treatment device, appropriate flow by pass condition shall be established to prevent sediment-laden water entering the device.

Revegetation/Stabilisation

75. Temporary Stabilisation maybe attained using vegetation, non rewettable soil polymers, or pneumatically applied erosion controls.

76. All cut and fill earth batters less than 3m in elevation shall be topsoiled, and grass seeded/hydromulchedwithin10 days of completion of grading in consultation with Council.

77. At the completion of formation in any section, all disturbed areas shall be stabilised in accordance with time lines in the Blue Book.

78. The Maitland Council City Seed mix shall be used unless stated on the ESCP/SWMP.

79. The pH level of topsoil shall be appropriate to enable establishment and growth of specified vegetation prior to initiating the establishment of vegetation.

80. Non rewettable binder shall be used in all hydro mulch/ hydro seed/polymer mixes on slopes or works adjacent to a water course.

81. Soil ameliorants shall be added to the soil in accordance with an approved Landscape Plan, Vegetation Management Plan, and/or soil analysis.

82. Surface soil density, compaction and surface roughness shall be adjusted prior to seeding/planting in accordance with an approved Landscape Plan, Vegetation Management Plan, and/or soil analysis.

83. Procedures for initiating a site shutdown, whether programmed or un-programmed, shall incorporate revegetation of all soil disturbances unless otherwise approved by Council. The stabilisation works shall not rely upon the longevity of non-vegetated erosion control blankets, or temporary soil binders.

Site Monitoring and Maintenance

84. The Applicant shall ensure that appropriate procedures and suitably qualified personnel are engaged to plan and conduct site inspections and water quality monitoring throughout the construction and maintenance phase.

85. All ESC measures shall be inspected and any maintenance undertaken immediately:

a) at least daily (when work is occurring on-site); and

b) at least weekly (when work is not occurring on-site); and

c) within 24hrs of expected rainfall; and

d) within 18hrs of a rainfall event that causes runoff on the site.

86. Written records shall be kept onsite of ESC monitoring and maintenance activities conducted during the construction and maintenance periods, and be available to Council officers on request.

87. All environmentally relevant incidents shall be recorded in a field log that shall remain accessible to all relevant regulatory authorities.

88. All water quality data, including dates of rainfall, dates of testing, testing results and dates of water release, shall of testing, testing results and dates of water release, shall be kept in an on-site register. The register is to be maintained p to date for the duration of the approved works and be available on-site for inspection by all relevant regulatory authorities on request.

64. At nominated instream water monitoring sites, a minimum of 3 water samples shall be taken and analysed, and the average result used to determine quality. Instream Works 90. All instream works (including in or adjacent to watercourses natural or manmade, flowing or not) shall be carried out in accordance with the IECA White Books.

Instream Works

65. All instream works (including in or adjacent to water courses natural or manmade, flowing or not) shall be carried out in accordance with the IECA White Books.

TITLE: PROPOSED SUBDIVISION LOT 44 DP1117263
MCFARLANES ROAD CHISHOLM

EROSION AND SEDIMENT CONTROL NOTES 2 OF 2

CLIENT: DREW LUMSDEN

High Definition Design Pty Ltd
KEVIN URANE 0412009891

NOTE:
ALL EXISTING UNDERGROUND SERVICES MUST BE LOCATED AND EXPOSED PRIOR TO EARTHWORKS COMMENCING AND IT IS RESPONSIBILITY OF THOSE PERSONS USING THIS PLAN TO CONFIRM BOTH POSITION AND LEVEL OF THESE UTILITIES IN CONJUNCTION WITH THE APPROPRIATE AUTHORITY.

0 8 16 24 32 40m
1:400 @ A1

Date: 23.09.21 Scale: 1:400 Designed: AS
Cad Ref: HD311 DA Civil

No	Amendment	Drawn	Date
1	DA ISSUE	AS	23.09.21

Project No HD-311
Drawing No CC13
Revision 1