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CIVIL

Stormwater Management Report

for Project:

Maitland Heritage

for Eagles Automotive PTY LTD C/O Central Architects

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Report Document Control

Project: 19 Bungaree Street, Maitland

Project Ref: SY223448

Document Ref: E01

File Name: SY223448_E01 [D].pdf

Client: Eagles Autromotive Pty Ltd C/O Central Architects

Title: Stormwater Management Report

Revision History:

Revision	Report Status	Issue Date	Prepared	Reviewed	Admin
A	Issued for Review	28/02/2024	RW		
B	Re-Issued for Review		RW	KB	
C	Updated for Development Application	30/10/2024	KB		
D	Updated for Development Application	05/06/2025	BB	KB	

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Reviewed:

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1. Introduction

Northrop Consulting Engineers have been engaged by Eagles Autromotive Pty Ltd C/O Central Architects to provide concept design plans suitable for Development Application (DA) submission for the proposed additions and alterations of Maitland Heritage located at 19 Bungaree Street, Maitland NSW 2259.

The purpose of this engineering report is to address civil engineering and stormwater items associated with the proposed development of the site, in particular:

- Stormwater management, including:
    - Stormwater Quantity Management Strategy; and
    - Stormwater Quality Management Strategy.

The proposed management plan has been developed in accordance with Maitland City Council's (MCC's) 2011 Development Control Plan (DCP), MCC's Manual of Engineering Standards – 6. Stormwater Drainage, correspondence with Councils development engineering team, and relevant Australian Standards.

Contained herein is a description of the subject site and development, proposed stormwater management methodology and a summary of the water quality and quantity treatment. This document should be read in conjunction with the engineering drawings SY223448/DA Series. This report intends to discuss items relating to the site at a level appropriate for a DA submission. It does not attempt to provide detailed design solutions to all issues; rather it will investigate the feasibility of solutions based on information that we have gathered to date from various sources and provide outcomes which will be developed further at Construction Certificate and Construction phases of the project.

2. Site and Project Description

2.1 Locality Description

The proposed development is located at 19 Bungaree Street, Maitland. The subject site is bound by New England Highway the east, Bungaree Street to the west, a lagoon to the south and an intersection consisting of 5 roads to the north. The scope of this project includes Lot 19, 20, 21, 22/DP746311, as noted in the referenced civil drawing package prepared by Northrop Consulting Engineers.

The locality of the subject site can be seen in Figure 1.

Figure 1 – Subject Site Locality (maps.six.nsw.gov.au)

Elevations across the site range from RL 2.84 to the south and RL 15.48 to the north.

2.2 Proposed Development

The development proposal involves:

- Existing workshop, Suzuki showroom, Mitsubishi showroom and parking spaces to be retained.
- Additions to the existing workshop including an increase in floor space and awnings.
- New Kia showroom, Mazda showroom proposed in existing Mitsubishi showroom, retaining walls and parking spaces.

The scope of works is shown in the referenced civil drawing package prepared by Northrop Consulting Engineers.

The proposed workshop extensions will retain the same finished floor RL8.29 as the existing workshop. The proposed reception extension will retain the same finished floor RL6.78, as the existing reception. The proposed Kia showroom will have finished floor RL8.29. Additionally, the majority of existing retaining walls are to be demolished and new retaining walls constructed.

2.3 Site Flood Classification and Behaviour

MCC's DCP flood mapping, indicates the site is impacted by flooding during the 1% AEP design storm event. The extent of this flooding on the site is shown in Figure 2. The development site is outlined in green.

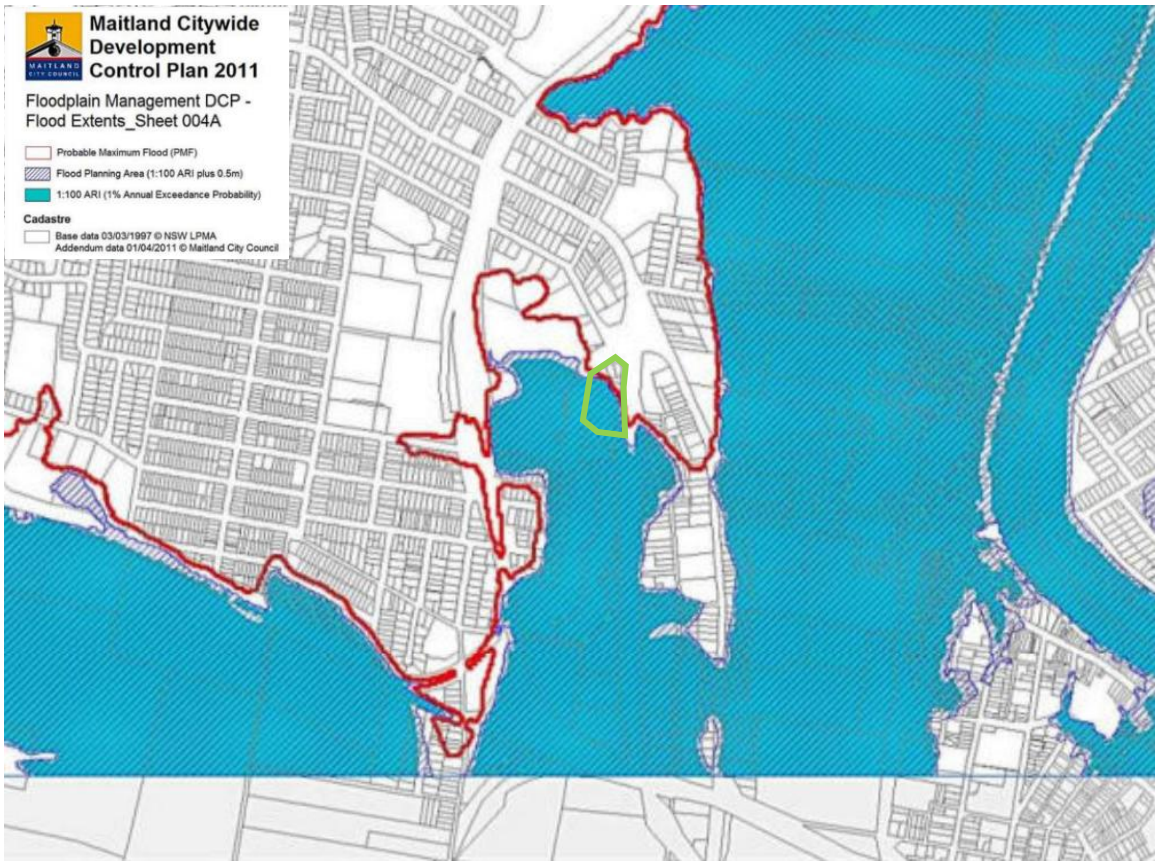


Figure 2 – Flood Extents (Maitland Citywide Development Control Plan 2011, Floodplain Management DCP-Flood Extents_Sheet 004A)

The majority of the works area is within the 1% flood extents, whilst a small portion of the works to the north are within the flood planning area.

The flood levels provided by Council are as follows;

Design Flood Levels	
Frequency	Flood Level
PMF (Probable Maximum Flood)	12.14
1% AEP	9.74

The Flood Planning Level is defined as 1% AEP + 500mm freeboard.

A Flood Impact Assessment has been prepared separately to address impacts of flooding on the development.

3. Stormwater Management

The following stormwater management strategy has been completed in accordance with MCC's Development Control Plan 2011, MCC's Manual of Engineering Standards – 6. Stormwater Drainage, correspondence with Councils development engineering team, and relevant Australian Standards

This document combined with the civil drawings intends to satisfy these documentation requirements.

3.1 Site Analysis

The proposed development area consists of approximately:

- Site area = 14,206 m^2
- Total disturbed area = 4,920 m^2
- Proposed additional roof area = 1,213 m^2
- Proposed additional impermeable pavement = 558 m^2
- Total managed impermeable area = 100%

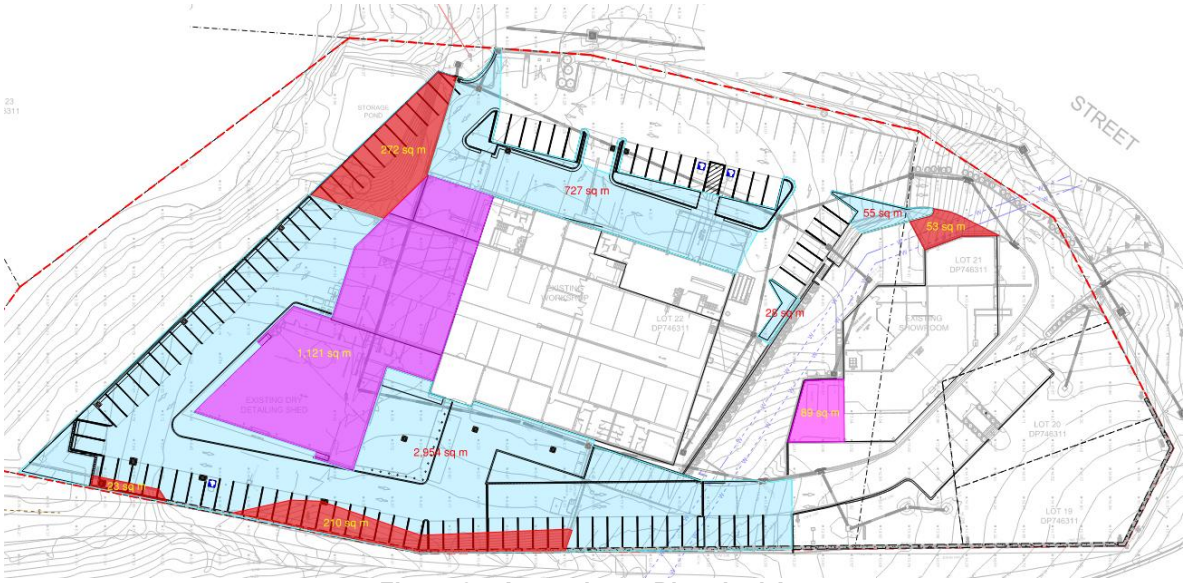


Figure 3 – Approximate Disturbed Area.

The figure above demonstrates the approximate disturbed area on site highlighted blue, additional roof area is highlighted purple, and additional impermeable pavement is highlighted red.

The existing site can be divided into two sub-catchments:

- Catchment 1 (approximately 8,782m^2) is directed via overland flow and pit and pipe network to a sealed junction pit next to the southern entry on Bungaree Street -which directs water to Telarah Lagoon along the sites southern border.
- Catchment 2 (approximately 2,593 m^2) is directed via overland flow and pit and pipe network to a storage pond to the south of the site which overflows to Telarah Lagoon along the sites southern border.

Figure 4 – Approximate Current Sub-Catchments: Catchment 1 (Yellow), Catchment 2 (Blue).

The proposed additional buildings dictate that part of the existing stormwater network and overland flow paths in catchment 1 will need to be regraded and constructed. All of catchment 2 requires new stormwater methodology.

Figure 5 below demonstrates the proposed new sub-catchments:

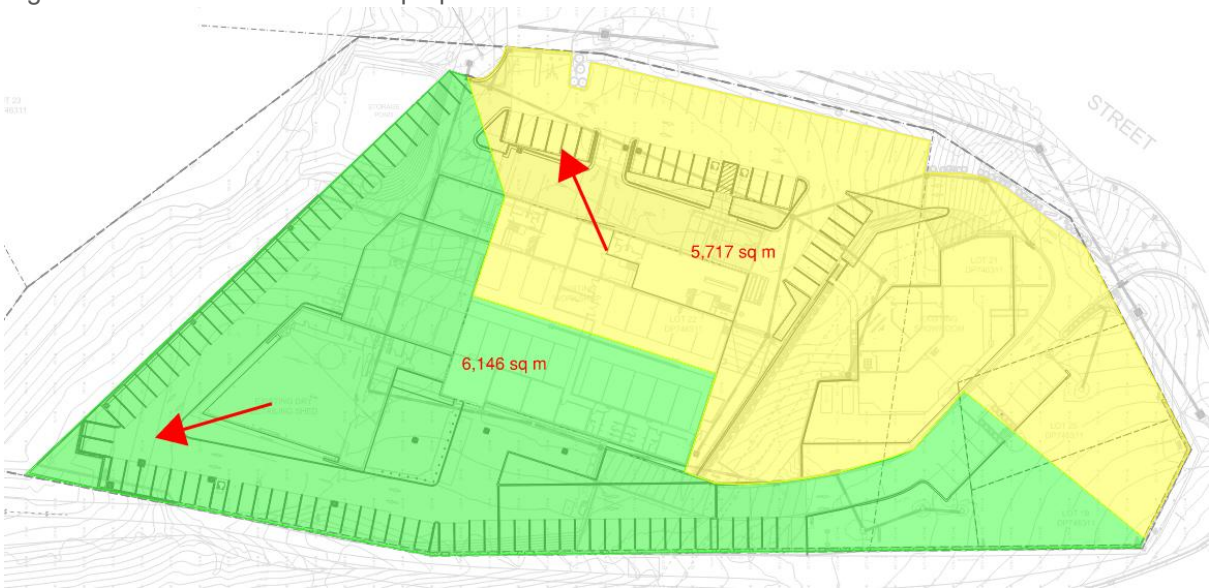


Figure 5 – Approximate Proposed Sub-Catchments: Catchment A (Yellow), Catchment B (Green).

Catchment A (approximately 5,717 m^2) will utilize the existing stormwater overland flow paths and pit and pipe work from Catchment 1, with only minor works proposed where required. Catchment B (approximately 6,146 m^2) will have mostly new pit and pipe networks and overland flow paths and direct stormwater to the sites southeast.

Both Catchment A and B will ultimately discharge stormwater to Telarah Lagoon, in line with the current behaviour of Catchment 1 and 2.

3.2 Stormwater Quantity Management Strategy

The Stormwater Quantity Management Strategy can will be divided by the two sub-catchments mentioned in the section 3.1.

3.2.1 Catchment A

Catchment A is essentially 65% of Catchment 1. The existing overland flow paths and in-ground stormwater network will have capacity to convey the stormwater run-off for the 5% AEP storm event for the reduced area. No major change to the current stormwater strategy is proposed for this area.

3.2.1 Catchment B

Catchment B will drain via overland flow path and pit and pipe network to the site's south-east. The overland flow path has been sized to convey the 1% AEP storm event, and the proposed in-ground stormwater network has been sized to convey up to the 5% AEP storm event. The stormwater runoff model used to assess the overland flow paths, pits and pipes sizing was developed using DRAINS software package. An Initial Loss/Continuing Loss (IL/CL) hydrological model, site-specific ARR2019 rainfall intensities, temporal patterns, and pre-burst rainfall data were used to build the model. Runoff parameters were selected to replicate the site conditions that will be present in the post-developed case in line with ARR2019 guidelines and MCC's Manual of Engineering Standards – 6. Stormwater Drainage. A 0.5 blockage factor was applied to all stormwater pits (proposed and existing).

A summary of parameters used for the model are shown below:

- Impervious area initial loss = 0.00 mm
- Impervious area continuing loss = 0.00 mm/hr
- Pervious area initial loss = 14.00 mm
- Pervious area continuing loss = 1.12 mm/hr

Time of concentration was determined using ARR2019 and QUDM best principles.

Storm durations ranging from 5 minutes to 270 minutes were investigated to ensure that the stormwater infrastructure was adequately sized for the design AEP storm events.

Stormwater will be directed to the site's south-east, where it will be discharged via headwall to Telarah Lagoon.

The DRAINS model can be made available to Council upon request.

3.3 On Site Detention

On Site Detention (OSD) for the proposed development has been considered in accordance with Council requirements and correspondence (email dated 2/07/2024). The requirement we are required to satisfy is to demonstrate that proposed development flows are less than pre-development flows.

OSD appears to have been provided in different forms for the three previous developments on this site, as summarised below;

- Original Development (refer survey dated 02/06/2088) shows a storage pond in the south-west corner of the site. This storage pond will be retained and not affected by the proposed development. It is unknown if this storage pond is acting as OSD or as flood storage.

- DA100223 (Proposed steel famed building to the south-east of the site). A 14,500L OSD tank was provided as part of this development. This OSD tank is no longer in use.

- DA131721 (Pavement extension to the south of the site). 13.6m3 storage was provided as part of this DA in the form of combined above-ground storage and in-ground pits and pipes storage. This are proposed to be demolished as part of the proposed development.

As noted above, the OSD provided as part of the previous developments will no longer be in use and as such the proposed development will require OSD to be provided for the entire development to limit post-development flow to at or below pre-development flows of an undeveloped (greenfield) site.

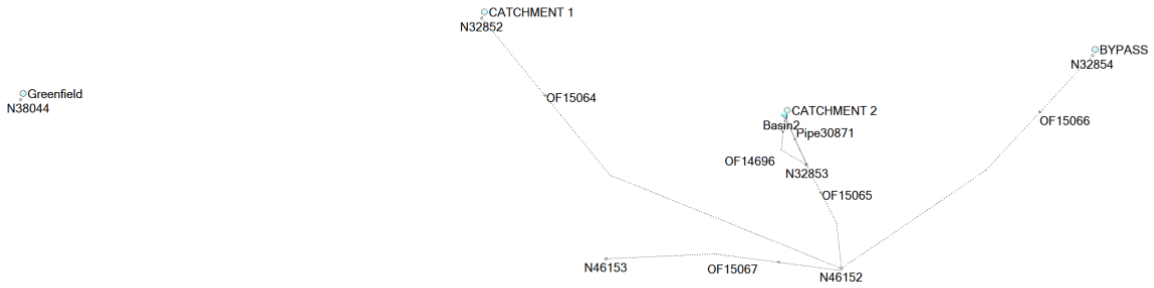
The post-development site has been divided into two Catchments as seen in Figure 6 below, with the catchment areas noted in the table beneath.

Figure 6 – Post-development catchment areas

Post Development Catchment	Area 1 (m^2)	Area 2 (m^2)	Bypass (m^2)	Combined Area (m^2)
Landscape	396	270	2,603	3,269
Roof	3,065	589		3,654
Impervious Pavement	4,216	3,422		7,638
Total	7,677	4,281	2,603	14,561

A DRAINS model has been set up to analyse the pre vs post development runoff from the site. A diagram of the DRAINS model is shown below, with results from the analysis in the table beneath.

The OSD tank has been included in this model with an area of 30m^2, depth of 2.20m and 300mm outlet pipe with no orifice.



Storm Event	Pre-Development Peak Flow (m^3/s)	Post-Development Peak Flow (m^3/s)
1% AEP	0.938	0.844
2% AEP	0.754	0.690
5% AEP	0.642	0.559
10% AEP	0.540	0.472
20% AEP	0.413	0.381

As seen above, the peak post-development flows for storm events up to the 1% AEP have been detained to less than that for the pre-development site. Confirming the OSD provided will achieve the design intent to limit post-development flows to that of the pre-development state

4.3 Stormwater Quality Management Strategy

To minimise adverse impacts upon downstream watercourses, stormwater treatment devices and strategies have been incorporated into the design of the development. Engineering best practice was adopted to minimize the risk to the downstream waterways. Several factors were identified to select the most appropriate Stormwater Quality Improvement Devices (SQIDs). The proposed development footprint and usage was considered especially significant to the design. In addition to the practical constraints, maintenance, operability, and aesthetics were considered.

Site stormwater quality management was modelled in MUSIC to ensure the proposed treatment train for the development meets Council's stormwater pollution targets. Modelling was completed in accordance with "NSW MUSIC Modelling Guidelines" (BMT WBM, 2015). To demonstrate that Council's quality targets have been met, a MUSIC-Link report has been generated and can be viewed in the appendix of this report. Note, as recommended by MCC's Developer Engineer Sam Dowd on the 28/02/2024 via phone call, a MUSIC-Link using Lake Macquarie City Councils parameters is deemed acceptable until MCC's MUSIC-Link has been developed.

The catchment area included in the model consisted of disturbed and upstream areas only – i.e. current infrastructure, roads and roofs falling under Catchment 1 were not modelled. This is because the existing impervious area and treatment strategy in this catchment is not changing, and the current water quality treatment measures will now be oversized given the treatment area is proposed to be approximately 56% of the current catchment area.

Areas for each pollutant source node were delineated based on the development plan view, with roof, pavement and landscaping surface types considered when determining approximate catchment permeability.

4.3.1 Treatment Train

The treatment train for the site generally consists of:

- Proprietary gross pollutant trap pit inserts in all new stormwater pits and,
- Proprietary 10 x 690 PSORB Stormfilter (Ocean Protect).

Stormwater from the various pollutant source nodes (excluding roofed areas) will be directed to in-ground stormwater pit. Stormwater from roof nodes will be directed via down pipes to the in-ground pit and pipe network (bypassing the pit filters). The in-ground stormwater pit and pipe network will direct stormwater to the Ocean Protect Stormfilters installed within the OSD tank.

The collected stormwater will discharge from the Stormfilters and OSD towards Telarah Lagoon.

It is the responsibility of the developer/owner to manage and maintain all stormwater quality treatment devices.

Figure 6 shows the proposed treatment train and effectiveness for the development as modelled in MUSIC. Refer to the engineering drawings SY223448/DA series for more information.

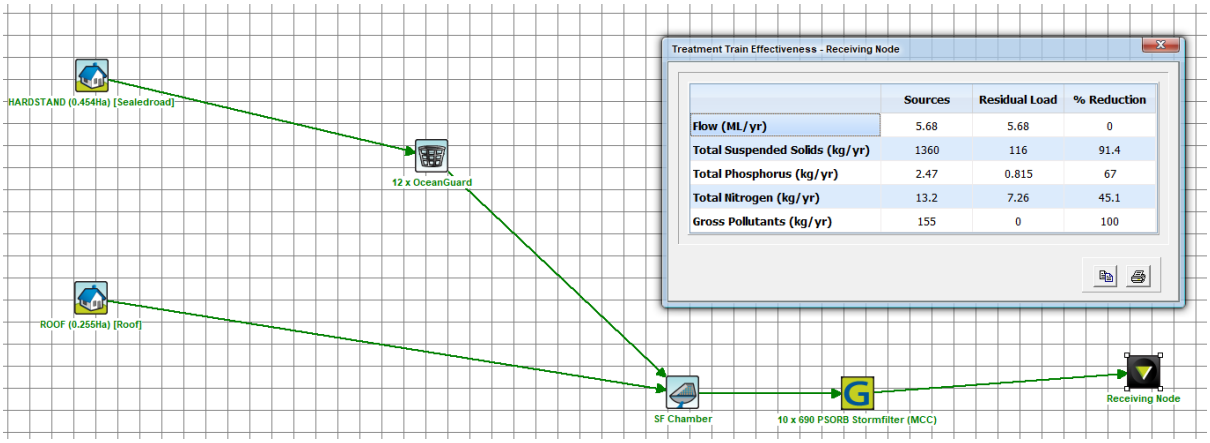


Figure 6 – MUSIC modelling methodology

4.3.2 MUSIC Modelling results

Table 1 summarises the results from the MUSIC model and compares the modelled pollutant reductions to the council reduction targets outlined in MCC's Manual of Engineering Standards – 6. Stormwater Drainage. A report generated from MUSIC-Link for LMCC (as mentioned earlier) has been included in Appendix B.

Table 1 - MUSIC Model Results

Pollutant	Sources (kg/yr)	Residual load (kg/yr)	Reduction (%)	Council Reduction Target (%)
Total Suspended Solids (TSS)	1360	116	91.4	80
Total Phosphorus (TP)	2.47	0.815	67	45
Total Nitrogen (TN)	13.2	7.26	45.1	45
Gross Pollutants (GP)	155	0	100	-

A copy of the MUSIC model can be made available to Council on request.

5. Conclusion

Given the results of the above investigations, it is reasoned that the development meets MCC's requirements. In particular:

- Stormwater infrastructure is appropriately sized for the 5% AEP storm event.
- The treatment of stormwater runoff is achieved through the proposed treatment train as modelled by MUSIC. This includes proprietary GPT pit inserts and Jellyfish unit.

Based on the above, our investigation and concept designs indicate the proposed development can be adequately managed and addresses all items surrounding the stormwater engineering works on site. Should you have any queries, please feel free to contact the signed on (02) 4365 1668.

Limitation statement

Northrop Consulting Engineers Pty Ltd (Northrop) has been retained to prepare this report based on specific instructions, scope of work and purpose pursuant to a contract with its client. It has been prepared in accordance with the usual care and thoroughness of the consulting profession for the use by Eagles Automotive PTY LTD C/O Central Architects. The report is based on generally accepted practices and standards applicable to the scope of work at the time it was prepared. No other warranty, express or implied, is made as to the professional advice included in this report.

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Appendix A – Civil Engineering Drawing Package

Appendix B – Music Link Report

Appendix C – Catchment Plans