



Our Ref: AL: LCO: 239591(17)

17th December 2021

Maitland City Council
PO Box 220
Maitland NSW 2320

ATTENTION: ERAN AVERY

**RE LOCHINVAR RESIDENTIAL URA – DA 12/3005 | DA 17/1781 | DA 18/456
PROPOSED STORMWATER MANAGEMENT STRATEGY**

Dear Eran,

I am writing with regards to stormwater management for the proposed residential subdivisions of Lot 12 DP 119544, Lot 11 DP 1218389 and Lot 2-3 DP 1256011. This letter serves as an addendum to the approved Stormwater Management Plans for each relevant development application:

- DA 12/3005 – “*Flooding and Stormwater Strategy for Proposed Residential Development*” by PCB, October 2016 – Lot 12 DP 119544 – herein referred to as Murphy;
- DA 17/1781 – “*Stormwater Management Plan – Residential Subdivision – Lochinvar*” by ADW Johnson, August 2017 – Lot 11 DP 1218389 – herein referred to as McCloys; and
- DA 18/456 – “*Stormwater Drainage Strategy – Lochinvar Ridge Pty Ltd*” by Fisher Consulting Engineers, February 2018 – Lot 2-3 DP 1256011 – herein referred to as Hunter Land.

1.0 INTRODUCTION

Each of the aforementioned stormwater management plans addresses stormwater quality, quantity, and erosion and sediment outcomes for their relevant subdivision works.

This addendum proposes a regional stormwater management strategy to address the stormwater detention requirements for both McCloys and Hunter Land, whilst also addressing the water quality requirements for McCloys. This addendum will also show that the stormwater management results of the original Murphy SMP are preserved.

The strategy proposes to utilise the drainage reserve proposed within Murphy's land to address the aforementioned targets. The proposed strategy describes a collaborative approach to stormwater management and results in a fewer number of assets being handed over to Council for maintenance.

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2.0 STORMWATER DETENTION

An assessment of the proposed (combined) detention facility (this addendum) and the proposed Murphy detention facility was undertaken using the hydrological model XPRAFTS to assess their suitability in meeting stormwater detention requirements. The Rainfall Intensity Frequency Duration (IFD) data adopted was sourced from the Bureau of Meteorology website (IFD ARR87 application). An IL/CL model was adopted within XPRAFTS with parameters shown in **Table 1**. It is noted that the XPRAFTS model utilised in “Lochinvar Urban Release Area Flood Study” by ADW Johnson was adopted for this assessment.

Table 1 – XPRAFTS Loss Parameters

PARAMETER	PERVIOUS AREA	IMPERVIOUS AREA
Initial Loss (IL)	10 mm	1 mm
Continuing Loss (CL)	2.5 mm/hr	0 mm/hr
Manning's n	0.02	0.045

Predeveloped and developed catchment plans are provided in **Appendix A**. A concept plan for the combined basin has been prepared and is shown in **Appendix B**. This addendum considers Murphy, McCloys and Hunter Land developments as developed. All other upstream developments are considered undeveloped.

The proposed detention facility is located immediately upstream of the proposed Murphy basin. It is proposed that the basins act in series to attenuate peak flows. Properties of the proposed combined detention facility are shown in **Table 2**. It is noted that although the available detention volume in the Murphy basin has been reduced as a result of this proposal, its outlet controls are unchanged.

Table 2 – Combined Detention Facility Properties

Property	Value
Detention Volume at Berm	15760m ³
Invert Level	35.0 m AHD
Berm Level	37.8 m AHD
Outlet Controls	(1x) 0.3m (H) x 1.2m (W) RCBC – IL 35.0m AHD
	(3x) 0.6m (H) x 1.2m (W) RCBC – IL 35.95m AHD
	(1x) 0.6m (H) x 0.9m (W) RCBC – IL 35.95m AHD
	6m wide emergency spillway – IL 37.5m AHD

Peak stormwater flows were compared at the point of discharge from the development stage (refer catchment plans in **Appendix A**). **Table 3** shows the peak flowrates under developed and predeveloped conditions.

Table 3 – Predeveloped and Developed Peak Flow

ARI	1-year	5-year	10-year	20-year	100-year
Predeveloped Peak Flow (m ³ /s)	1.760	5.201	6.581	8.488	12.550
Developed Peak Flow (m ³ /s)	1.824	5.143	5.913	6.745	8.382
Murphy Basin Water Level (m AHD)	34.704	35.258	35.462	35.710	36.290
Combined Basin Water Level (m AHD)	36.184	36.559	36.708	36.937	37.492

Note: Emergency spillway level for Murphy Basin @ 36.30m AHD
Berm level for Murphy Basin @ 36.60m AHD

Table 3 shows that the 1-year ARI event experiences a 3% increase in peak flow in the developed state. However, for all other events, the proposed detention facility successfully attenuates peak flows to predeveloped levels.

2.1 Lochinvar Urban Release Area Flood Study Requirement

Section 6.4 of the Lochinvar Urban Release Area Flood Study by ADW Johnson states that for the 90min, 120min and 360min storm durations in the 10% and 1% AEP events, post development peak flows must match existing peak flows for each duration. **Table 4** shows the peak flowrates in each of these durations under developed and predeveloped conditions.

Table 4 – Critical Storm Duration Peak Flows

PEAK DISCHARGE	10-Year ARI			100-Year ARI		
	90min	120min	360min	90min	120min	360min
Pre-Developed (m ³ /s)	6.195	6.581	6.388	12.095	12.550	10.799
Developed (m ³ /s)	5.693	5.913	5.884	8.101	8.382	8.153

Table 4 shows that the proposed detention facility successfully attenuates peak flows to predeveloped levels for the 90min, 120min and 360min storm durations in the 10-year and 100-year storm events.

3.0 WATER QUALITY

A review of the water quality treatment train for the McCloy site has been undertaken. The breakdown of land use areas within the McCloy site are shown in **Table 5**. A catchment plan is shown in **Appendix A** and the MUSIC network is shown in **Appendix C**.

Table 5 – McCloy Land Use Areas

Land Use	Area (ha)
Roof Area	4.025
Lot Area	2.420
Road Area	3.307

A treatment train consisting of rainwater tanks, a GPT and a bioretention basin are proposed. Each of the treatment devices are described below.

3.1 Rainwater Tanks

Rainwater tanks are proposed on each lot to harvest rainwater for re-use. For the purpose of water quality modelling, the parameters described in **Table 6** have been adopted, but are subject to BASIX requirements.

Table 6 – Rainwater Tank Parameters

Parameter	Input
Volume Below Overflow Pipe (L)	4000
Depth Above Overflow Pipe (m)	0.2
Surface Area (m ²)	4
Overflow Pipe Diameter (mm)	50
Daily Reused (kL/day/dwelling)	0.3

3.2 Gross Pollutant Traps

A Humegard GPT is proposed to be installed prior to stormwater runoff being discharged to the bioretention basin. Published removal efficiencies for the Humegard GPT are specified in **Table 7**.

Table 7 – Humegard GPT Removal Efficiencies

Pollutant	Removal Efficiency
Total Suspended Solids	49%
Total Phosphorus	40%
Total Nitrogen	26%
Gross Pollutants	90%

3.3 Bioretention Basin

Stormwater runoff from higher frequency storm events is proposed to be treated by a bioretention basin. Once the extended detention depth within the bioretention basin is reached, stormwater will flow over a berm into the proposed detention facility. Design parameters for the bioretention basin are shown in **Table 8**.

Table 8 – Bioretention Basin Design Parameters

Parameter	Value
Extended Detention Depth (m)	0.30
Filter depth (m)	0.4
Saturated Hydraulic Conductivity (mm/hr)	90
Filter Area (m ²)	220
Unlined Filter Media Perimeter (m)	160
Base Lined	No
Vegetated with Nutrient Removal Plants	Yes
Underdrain Present	Yes
Submerged Zone	No

3.4 Water Quality Results

The treatment train for the McCloys site was modelled in MUSIC and results are shown in **Table 9**.

Table 9 – Treatment Train Effectiveness

Pollutant	Developed	Treated	
	Load	Load	Reduction (%)
TSS (kg/yr)	7870	1530	80.6
TP (kg/yr)	16.6	7.28	56.2
TN (kg/yr)	125	65.6	47.6
GP (kg/yr)	1930	0	100

Table 9 shows that the treatment train successfully treats stormwater quality, surpassing Council's reduction targets for the McCloys site.

Water quality for the Murphy development has been addressed in the PCB report and is not affected by this addendum.

Water quality for the Hunter Land development has not been addressed within this addendum.

4.0 CONCLUSION

This addendum has addressed:

- Stormwater detention and water quality requirements for the McCloys development;
- Stormwater detention requirements for the Hunter Land development; and
- Upholds the stormwater detention and water quality requirements for the Murphy development.

Should you have any questions or require any further advice please do not hesitate to contact the undersigned on 4978 5100 or email angusl@adwjohanson.com.au.

Regards,

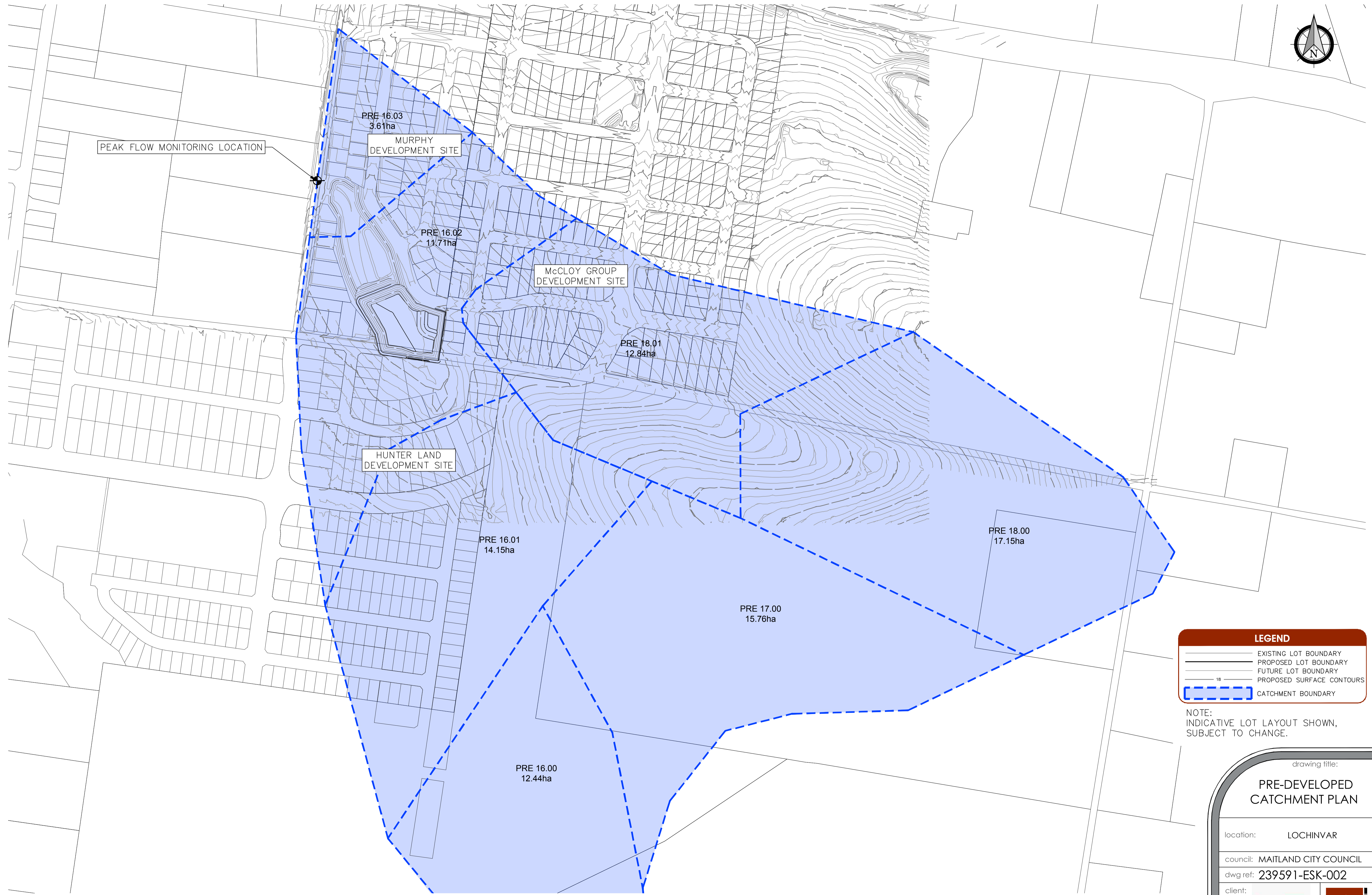
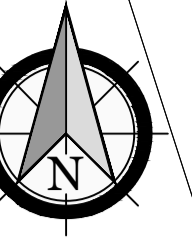
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ANGUS LIM
CIVIL ENGINEER
ADW JOHNSON PTY LTD
Hunter Office

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Appendix A

CATCHMENT PLANS



LEGEND

- EXISTING LOT BOUNDARY
- PROPOSED LOT BOUNDARY
- FUTURE LOT BOUNDARY
- PROPOSED SURFACE CONTOURS
- CATCHMENT BOUNDARY

NOTE:
INDICATIVE LOT LAYOUT SHOWN,
SUBJECT TO CHANGE.

drawing title:
**PRE-DEVELOPED
CATCHMENT PLAN**

location: LOCHINVAR

council: MAITLAND CITY COUNCIL

dwg ref: 239591-ESK-002

client:

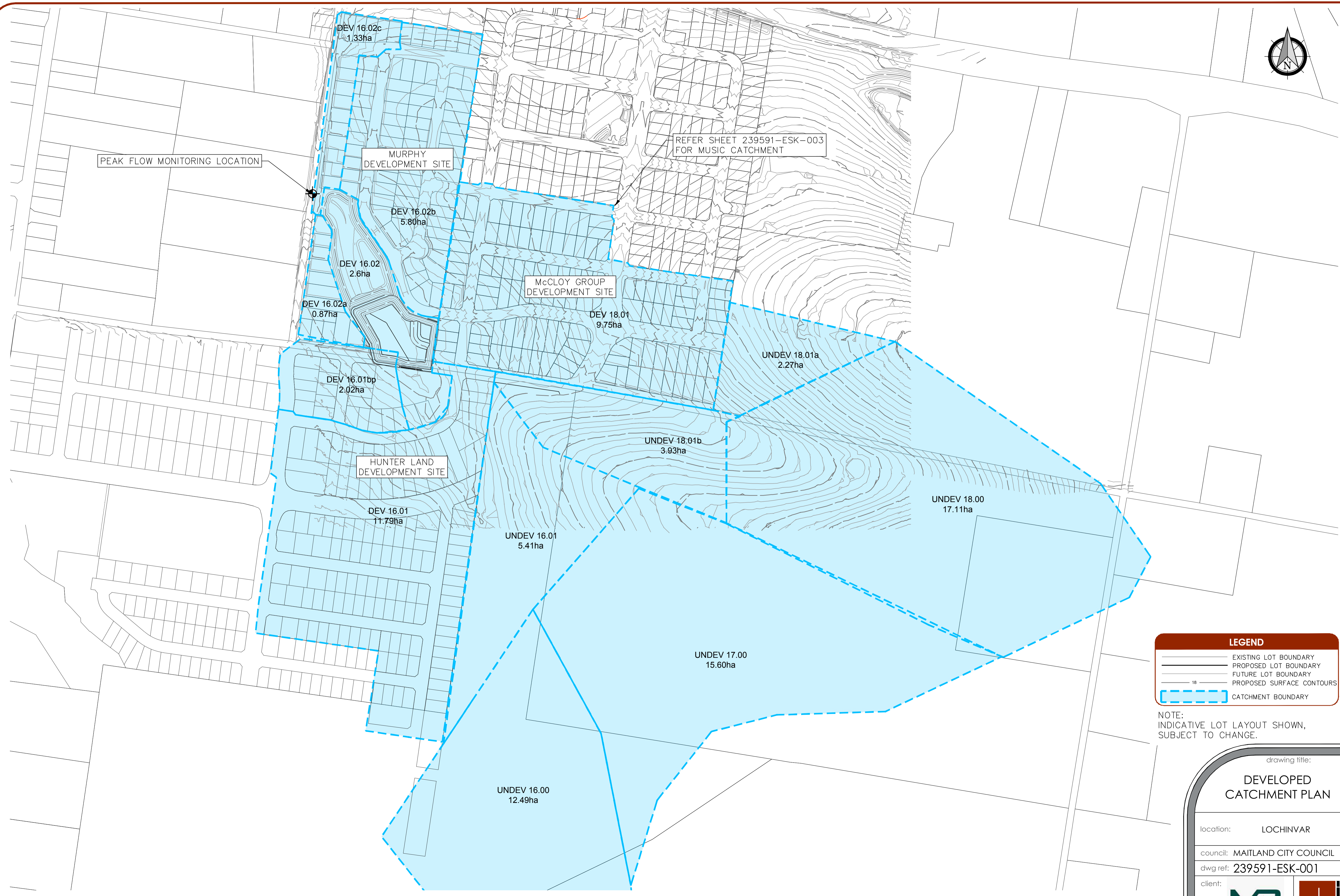
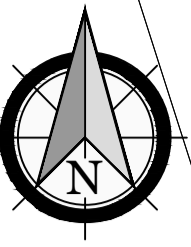



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PLAN
SCALE 1:2500

ver.	date	comment	drawn	pm	level information	scale (A1 original size)	notes
B	17.12.21	MINOR AMENMENTS	JB	AL	DATUM: AHD CONTOUR INTERVAL: 0.5	 SCALE: 1:2500 (FULL)	



LEGEND

- EXISTING LOT BOUNDARY
- PROPOSED LOT BOUNDARY
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- CATCHMENT BOUNDARY

NOTE:
INDICATIVE LOT LAYOUT SHOWN,
SUBJECT TO CHANGE.

drawing title:
**DEVELOPED
CATCHMENT PLAN**

location: LOCHINVAR

council: MAITLAND CITY COUNCIL

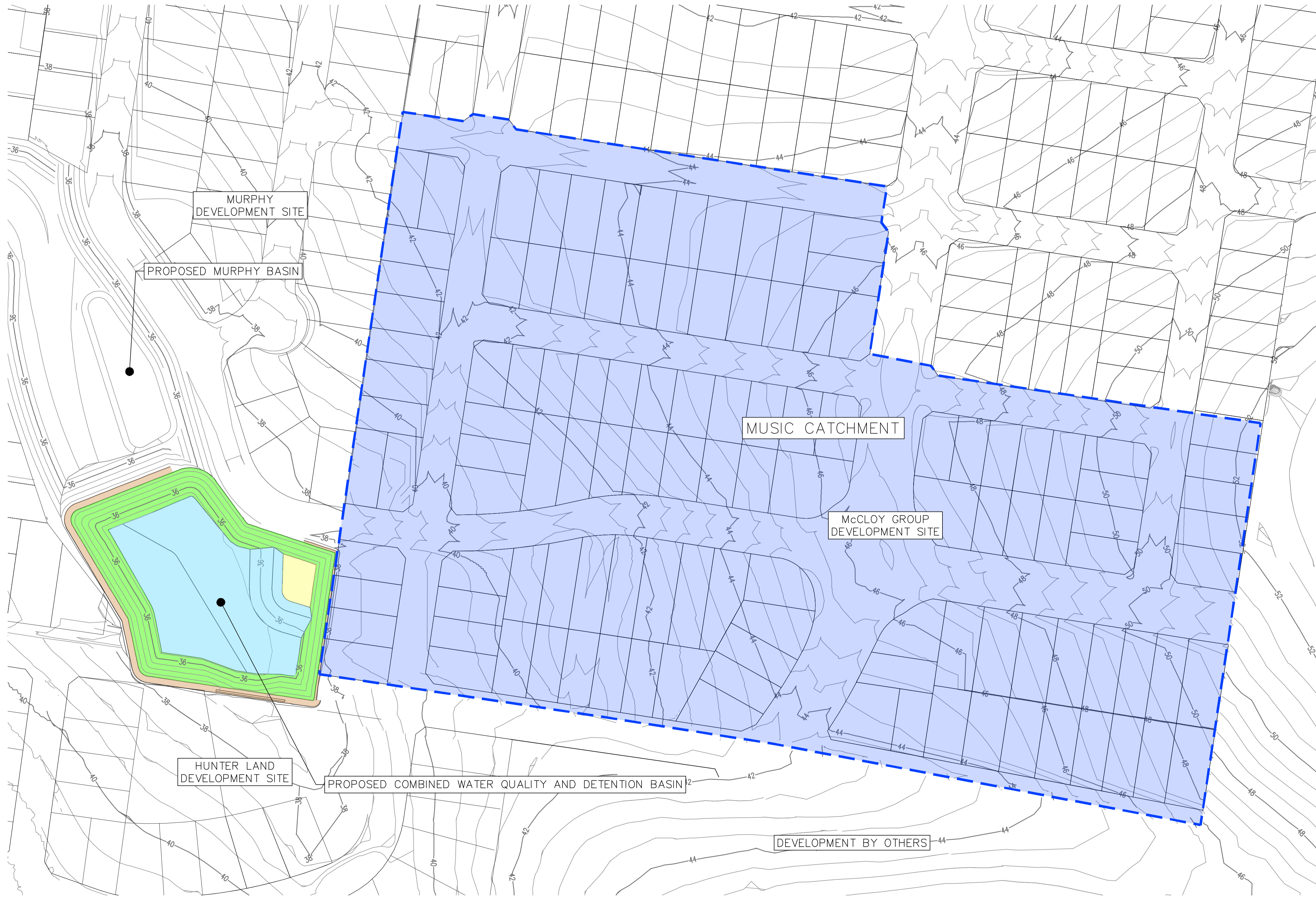
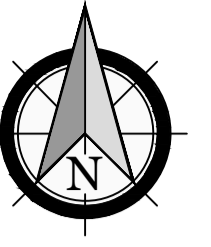
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ver.	date	comment	drawn	pm	level information	scale (A1 original size)	notes
B	17.12.21	MINOR AMENMENTS	IB	AL	DATUM: AHD CONTOUR INTERVAL: 0.5	 SCALE: 1:2500 (FULL)	



LEGEND

- EXISTING LOT BOUNDARY
- PROPOSED LOT BOUNDARY
- FUTURE LOT BOUNDARY
- PROPOSED SURFACE CONTOURS
- CATCHMENT BOUNDARY

drawing title:
MUSIC CATCHMENT PLAN

location: LOCHINVAR

council: MAITLAND CITY COUNCIL

dwg ref: 239591-ESK-003

client:

McCLOY GROUP

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Plotted By: John Baker Plot Date: 17/12/21 9:07:19AM Cad File: \\PFSERVER\0\ADM-DATA\239591\17\DWG\ENGINEERING\ESK\239591-ESK-003 [B].DWG
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Appendix B

BASIN CONCEPT PLAN



Appendix C

MUSIC NETWORK

