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ENGENY
WATER MANAGEMENT

Millar Merrigan

Yarragon-Leongatha Rd Development

Stormwater Assessment

March 2020

V1261_001

www.engeny.com.au
P: 03 9888 6978 | F: 03 9830 2601
T5, Lvl 34, 360 Elizabeth St Melbourne VIC 3000 | PO Box 12192, A'Beckett St VIC 8006

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JOB NO. AND PROJECT NAME: V1261_001 Yarragon Development Planning					
DOC PATH FILE: \\EGIMELAPP02\Melbourne_Management$\Projects\V1261 Millar Merrigan\V1261_001 Yarragon Development Planning\07 Deliv\Docs\Report\Revs\V1261_001-REP-002-0-Yarragonfunctionaldesign.Docx					
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Signatures					

CONTENTS

Appendices

1. INTRODUCTION

Engeny Water Management (Engeny) was engaged by Millar Merrigan to prepare functional designs for two wetlands and retarding basins. The wetland and retarding basins are proposed to be located within development areas at the south-eastern and eastern boundaries of the existing township of Yarragon, within Baw Baw Shire Council (BBSC). This report documents the wetland and retarding basin functional designs.

Figure 1.1 provides the location of the proposed development areas.

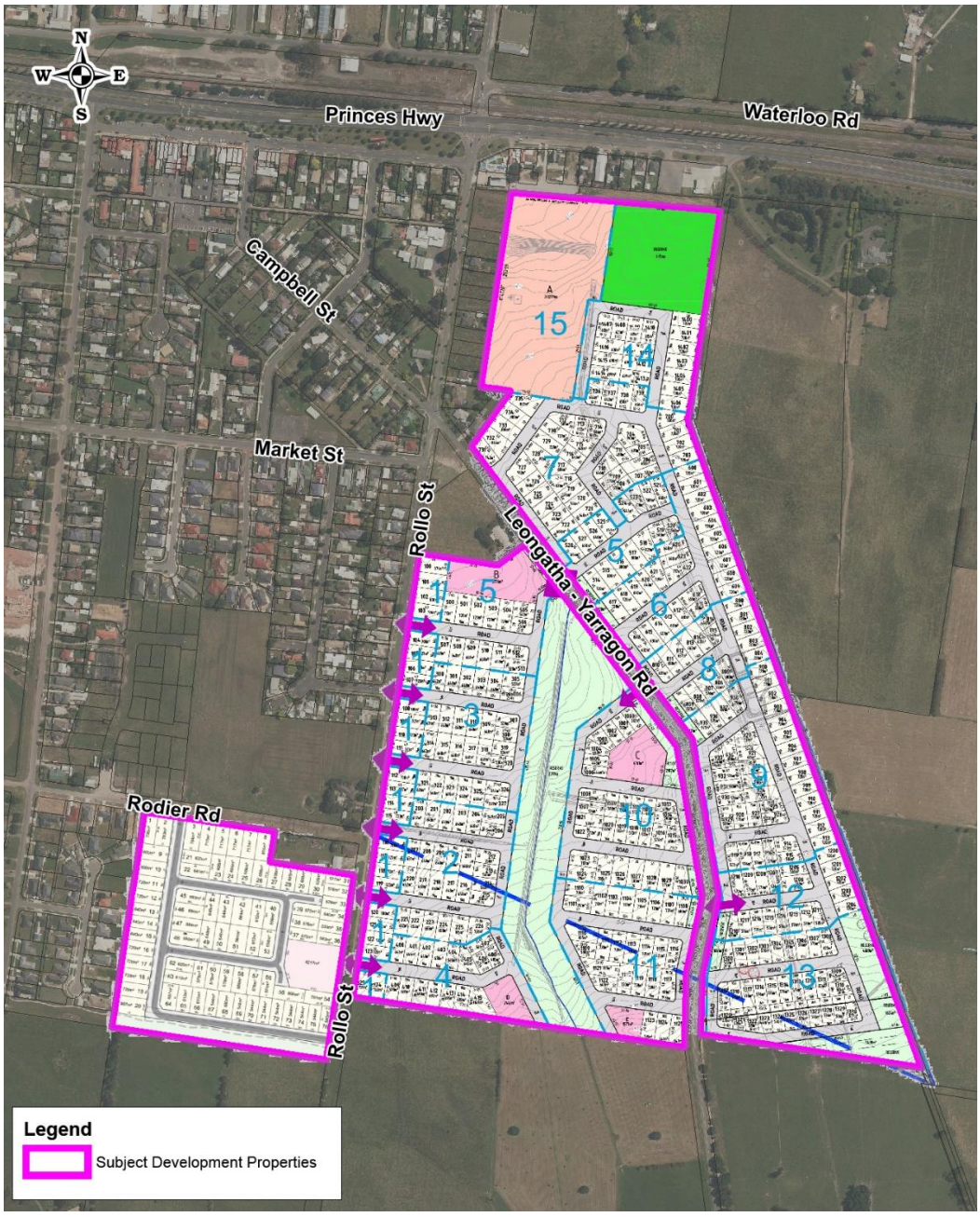


Figure 1.1 Proposed development layout

2. STORMWATER MANAGEMENT STRATEGY OVERVIEW AND OBJECTIVES

Engeny previously prepared a stormwater management strategy for the subject development areas on the eastern side of Rollo St in the report *Yarragon-Leongatha Rd Development Stormwater Assessment (December 2018).* The strategy outlined the intention to construct two wetlands and retarding basins within the development. The intention to locate retarding basins within these properties was initially identified by previous drainage planning undertaken by Engeny on behalf of BBSC, as documented in the Engeny reports *Yarragon Flood Modelling & Drainage Strategy (2013)* and *Yarragon & Trafalgar Public Acquisition Overlay (November 2018)*. The objective of these retarding basins based on the 2013 drainage strategy was to mitigate existing flooding issues within the Yarragon township (and not necessarily service future development).

More recently, Millar Merrigan prepared a stormwater management plan for the development area on the western side of Rollo Street, in the report titled *71 Rollo Street, Yarragon Stormwater Management Plan (October 2019)*. This strategy outlined the intention to convey all runoff from the development at 71 Rollo Street the southern wetland proposed within the development areas on the eastern side of Rollo Street.

The concept designs of the wetlands and retarding basins completed by Engeny in *Yarragon-Leongatha Rd Development Stormwater Assessment (December 2018)* did not account for the additional runoff from 71 Rollo Street that will contribute to the southern wetland and retarding basin.

In terms of peak flow management, the functional design of the retarding basins aims to:

- Cater for the runoff generated from all subject development areas, including 71 Rollo Street.
- Have no adverse impacts on surrounding or downstream properties in the 1 % AEP flood event, accounting for the increased runoff from the development, and
- Achieve a similar level of reduction in the existing flooding issues in the Yarragon township compared to the updated works based on the 2013 Yarragon Flood Modelling & Drainage Strategy.

In terms of water quality, the wetlands aim to achieve the State Environmental Protection Policy (SEPP) (Waters of Victoria) Guidelines and Planning Scheme Clause 56.07-4 requirements. This includes meeting pollutant removal targets specified in the Best Practice Environmental Management Guidelines (BPEMG), which are:

- 80 % removal of total suspended solids
- 45 % removal of total phosphorous
- 45 % removal of total nitrogen.

Figure 2.1 provides an overview of the proposed stormwater management strategy for the subject developments.

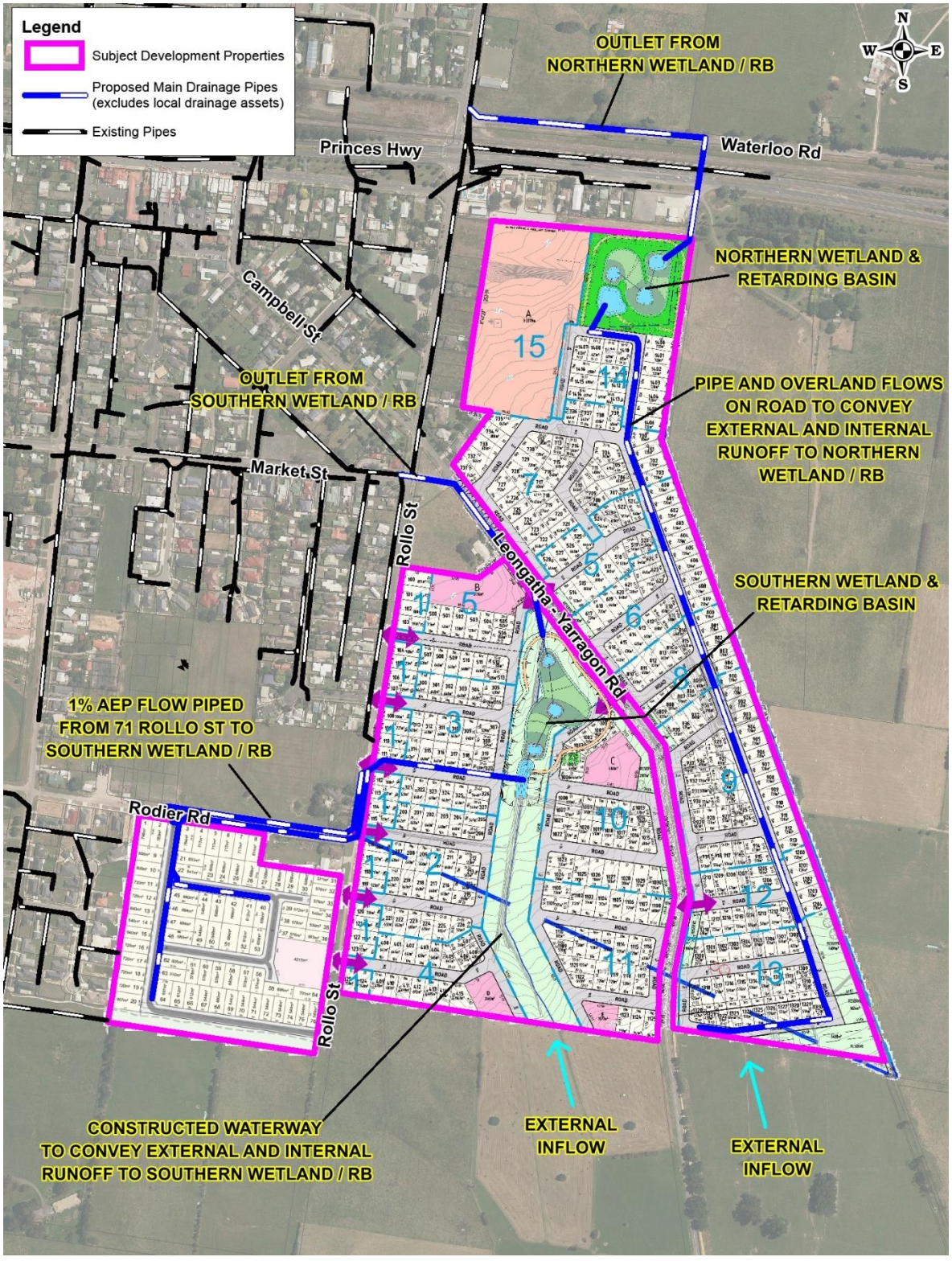


Figure 2.1 Proposed stormwater management strategy overview

3. FUNCTIONAL DESIGN

3.1 Design Plans

Appendix A provides the functional design plans for the southern wetland and retarding basin.

Appendix B provides the functional design plans for the northern wetland and retarding basin.

The following sections provide an overview of key aspects of the functional designs.

3.2 Water Quality

3.2.1 Overview

To achieve the development's water quality objectives, it is proposed to locate a wetland in each of the two retarding basins to be constructed within the development.

The wetland designs have been completed with reference to the 'deemed to comply criteria' of Melbourne Water's Wetland Design Manual.

3.2.2 Sediment Basin Sizing

Each wetland will include a sediment basin / inlet pond to remove coarse particles from runoff prior to treatment in the macrophyte zone of the wetland. The sediment basins have been sized using the Fair & Geyer equation.

Table 3.1 summarises key details relating to the design of the sediment basins.

Table 3.1 Sediment basin sizing

Parameter	Northern Sediment Basin	Southern Sediment Basin
Contributing catchment area	22.8 ha development area + 56.2 ha external rural catchment	22.2 ha development area + 21.3 ha external rural catchment
Design flow (~ 4 exceedance per year flow) [2]	0.32 m^3/s	0.25 m^3/s
Hydraulic efficiency	0.30	0.30
Basin surface area at normal water level	1100	700
Normal water level	84.85 m AHD	88.0 m AHD
Extended detention depth	0.35 m	0.35 m
Permanent pool depth	1.5 m	1.5 m

Parameter	Northern Sediment Basin	Southern Sediment Basin
Permanent pool volume	880 m^3	460 m^3
Batter slopes below NWL	1 in 8 safety batter, then 1 in 3	1 in 8 safety batter, then 1 in 3
Cleanout frequency	5 years	5 years

3.2.3 Wetland Treatment Zone

The wetland treatment area has been designed in accordance with the deemed to comply criteria of Melbourne Water's Wetland Design Manual, including areas of deeper open water and shallow marsh, deep marsh and submerged marsh zones.

Typically, wetlands are designed with an outlet structure that achieves a 72 hour detention time in the wetland. Both wetlands have significant external rural catchments that will contribute flow to the treatment system. Due to this, if a 72 hour detention time was adopted then the water level in the wetland would remain high for too long, potentially adversely impacting on vegetation health. Therefore, the outlet controls allow for slightly higher flows to be discharged from the wetlands to reduce the detention time and improve vegetation health.

Table 3.2 summarises key details of the wetland design.

Table 3.2 Wetland key details

Parameter	Northern Wetland	Southern Wetland
Total catchment area	79.0 ha	43.5 ha
Wetland normal water level	84.85 m AHD	88.0 m AHD
Extended detention depth	0.35 m	0.35 m
Wetland treatment area (excludes inlet ponds) at normal water level	5320 m^2	6250 m^2
Permanent pool volume	2130 m^3	2500 m^3
Nominal outlet orifice diameter	90 mm	95 mm
Detention time	46 hours	49 hours

3.2.4 Water Quality Modelling

A MUSIC model has been developed to determine the wetland treatment sizes required to achieve best practice water quality targets. The MUSIC model has been developed in accordance with the latest Melbourne Water MUSIC modelling guidelines.

Table 3.3 provides a summary of the MUSIC model's results. The MUSIC modelling predicts that the development achieves best practice water quality objectives.

Table 3.3 MUSIC water quality modelling results

Pollutant	Subject Site Source Pollutants (kg/yr)	% Pollutant Load Removed	Removal Achieved (%)	Reduction Target (%)
Total Suspended Solids	52227	43190	83 %	80 %
Total Phosphorus	111	91	82 %	45 %
Total Nitrogen	803	511	64 %	45 %
Gross Pollutants	10708	13220	123 %	70 %

3.2.5 Wetland Inundation Frequency Analysis

An inundation frequency analysis of each wetland has been undertaken to ensure that the inundation of potential vegetation selected for the wetland does not exceed half the vegetation height for more than 20 per cent of the time. This will help to prevent vegetation failure caused by drowning.

Figure 3.1 and Figure 3.2 provide the inundation frequencies for the wetlands (based on the online MUSIC auditor tool).

For the northern wetland, the analysis indicates that the water level in the wetland exceeds a depth of 0.35 metres for 20 per cent of the time. It is expected that the wetland will be constructed with a shallow marsh area of 0.15 metres depth and a deep marsh zone area with a depth of 0.35 metres. Therefore, the selection of plant species for the wetland should limit species in the shallow marsh zones to those with an average height of 1.0 metres or more, and in the deep marsh zone to those with an average height of approximately 1.4 metres or more.

For the southern wetland, the analysis indicates that the water level in the wetland exceeds a depth of 0.233 metres for 20 per cent of the time. The same shallow marsh and deep marsh depths will be adopted for the southern wetland and the selection of plant species for the wetland should limit species in the shallow marsh zones to those with an average height of 0.77 metres or more, and in the deep marsh zone to those with an average height of approximately 1.17 metres or more.

This allows for a large variety of macrophyte species to be suitable for planting in the wetlands.

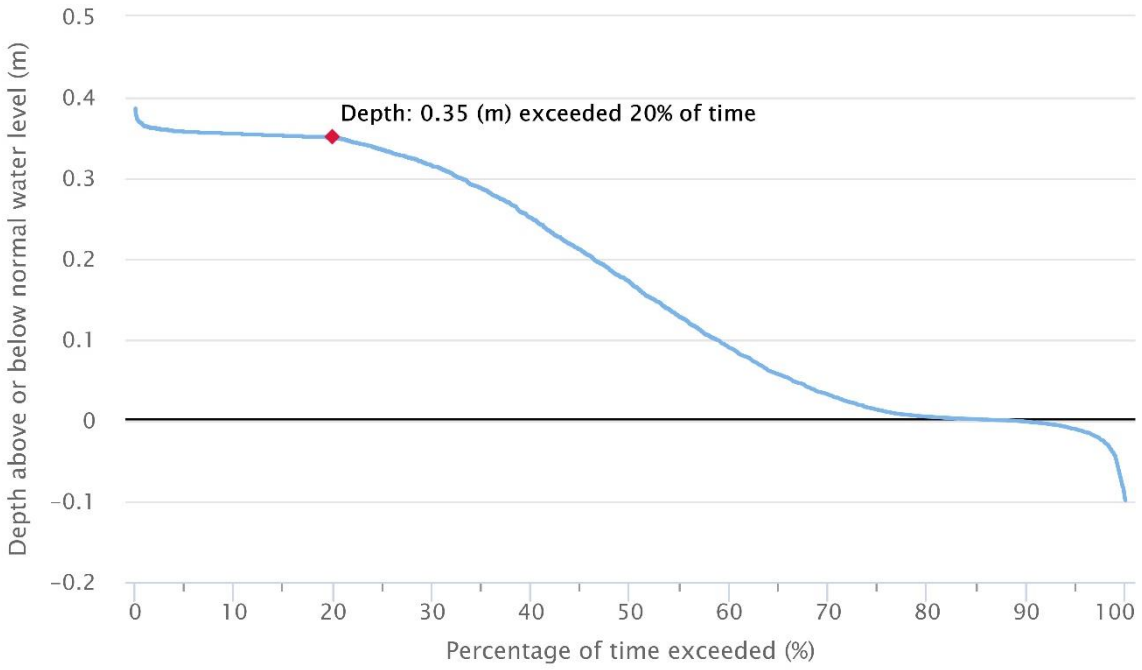


Figure 3.1 **Northern wetland inundation frequency analysis**

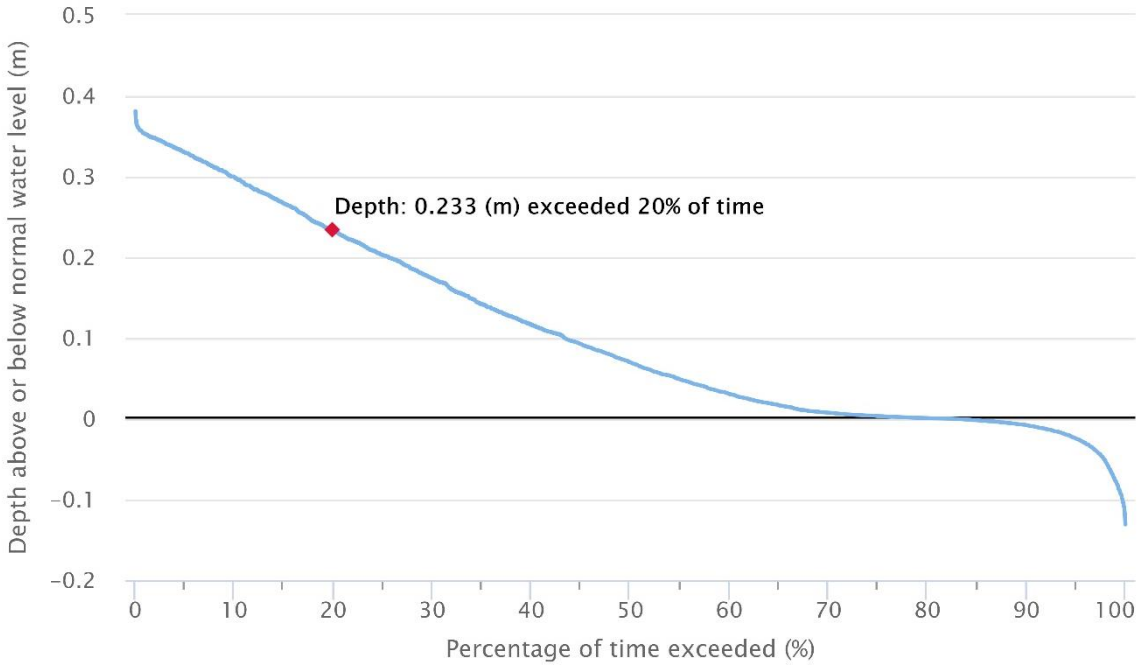


Figure 3.2 **Southern wetland inundation frequency analysis**

3.2.6 Treatment System Velocities

Based on the requirements of Melbourne Water's deemed to comply section of the Wetland Design Manual, the following velocity checks have been performed for wetland WL4:

- Inlet pond velocities less than 0.5 m/s for the 1 % AEP events.
- Wetland velocities less than 0.5 m/s for the 1 % AEP events and less than 0.05 m/s for the 4 exceedances per year (EY) event.

The TUFLOW model of the Yarragon township has been used to analyse the potential velocities in the treatment systems. The development of the TUFLOW model is discussed in more detailed in Section 3.3 of this report.

Figure 3.3 shows the predicted 4 exceedance per year event velocities in each treatment system. Only the velocities in the wetland are relevant for this event (velocities in the sediment basin can be ignored). For this event, the model predicts:

- For the northern wetland, velocities are just above of the objective of 0.05 m/s in the first part of the wetland treatment zone and then go below 0.05 m/s. At the very start of the wetland, the model predicts some localised high velocities, which will be in a deep-water zone of the wetland and therefore the impact of vegetation scour is minimal.
- For the southern wetland, the velocities are just above of the objective of 0.05 m/s in the first part of the wetland treatment zone and then go below 0.05 m/s

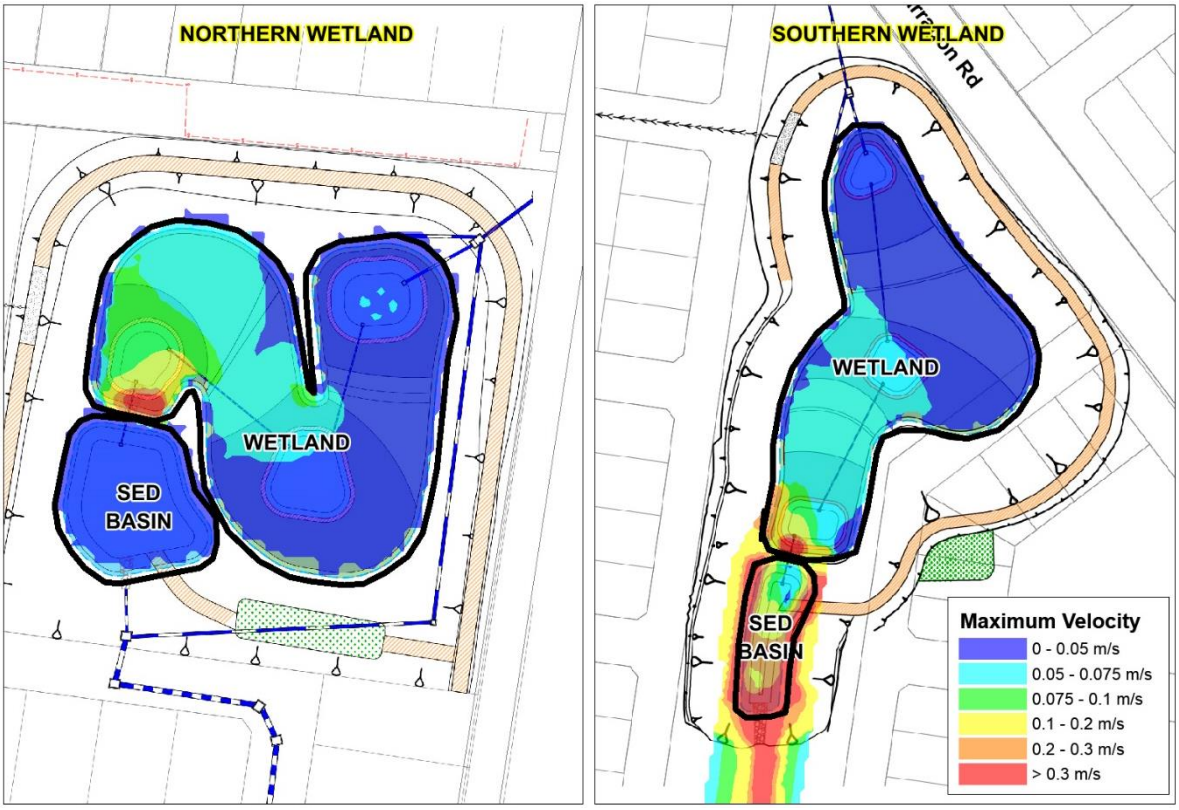


Figure 3.3 4 exceedance per year event treatment system velocities

Figure 3.4 shows the predicted 1 % AEP event velocities in each treatment system. For this event, the model predicts:

- For the northern wetland, velocities within the sediment basin and wetland macrophyte zone are typically less than 0.5 m/s.
- For the southern wetland, the velocities in the wetland treatment system are typically less than 0.5 m/s. The velocities in and around the sediment basin are slightly high. This is likely to be due to the vertical transition from the constructed waterway to the sediment basin. This could be resolved in future design work of the constructed waterway, which could include a drop structure and energy dissipation upstream of the sediment basin to reduce the incoming flow velocities.

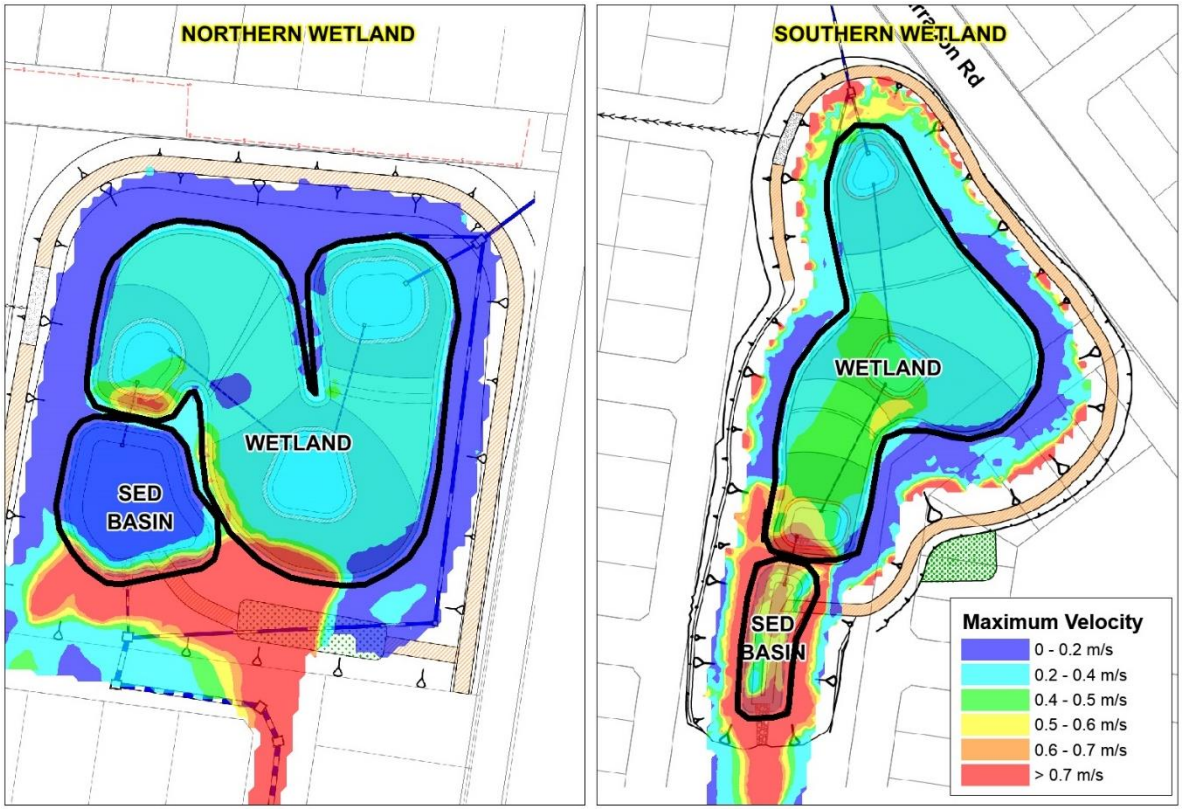


Figure 3.4 1 % AEP event treatment system velocities

Overall, the analysis shows that the predicted velocities are within reasonable tolerance of the deemed to comply objectives.

3.3 Peak Flow Control

3.3.1 Retarding Basin Design Overview

Table 3.4 provides a summary of the key design parameters of each retarding basin.

Table 3.4 Retarding basin design summary

Attribute	Northern Retarding Basin	Southern Retarding Basin
Flood storage invert (EDD of the wetland)	85.1 m AHD	88.35 m AHD
Typical batters	1 in 5	1 in 5
Outlet controls	750 mm outlet pipe	600 mm outlet pipe
Spillway crest level	87.05 m AHD	90.9 m AHD
Top of embankment	87.65 m AHD	91.5 m AHD
Embankment crest width	4 m	4 m
1 % AEP TWL	87.05 m AHD	90.9 m AHD
1 % AEP peak volume	21,760 m^3	33,135 m^3
10 % AEP TWL	85.67 m AHD	89.22

At this stage, the retarding basin spillway widths have been indicatively sized (20 metres wide). The southern retarding basin's spillway will convey extreme event flows west, through the development and on to Rollo Street. The northern retarding basin's spillway will also convey extreme events flow west, towards Rollo Street.

The spillway designs are subject to ANCOLD assessments.

3.3.2 Flood Modelling

The 2013 Yarragon Flood Modelling & Drainage Strategy was based on hydrologic modelling using RORB to convert design rainfall to runoff hydrographs and TUFLOW to undertake two-dimensional hydraulic modelling.

The TUFLOW model has been used to analyse the performance of the proposed retarding basins. Engeny understands that a key objective for the retarding basins is to achieve a similar level of flood mitigation compared to the outcomes of the 2013 Yarragon Flood Modelling & Drainage Strategy.

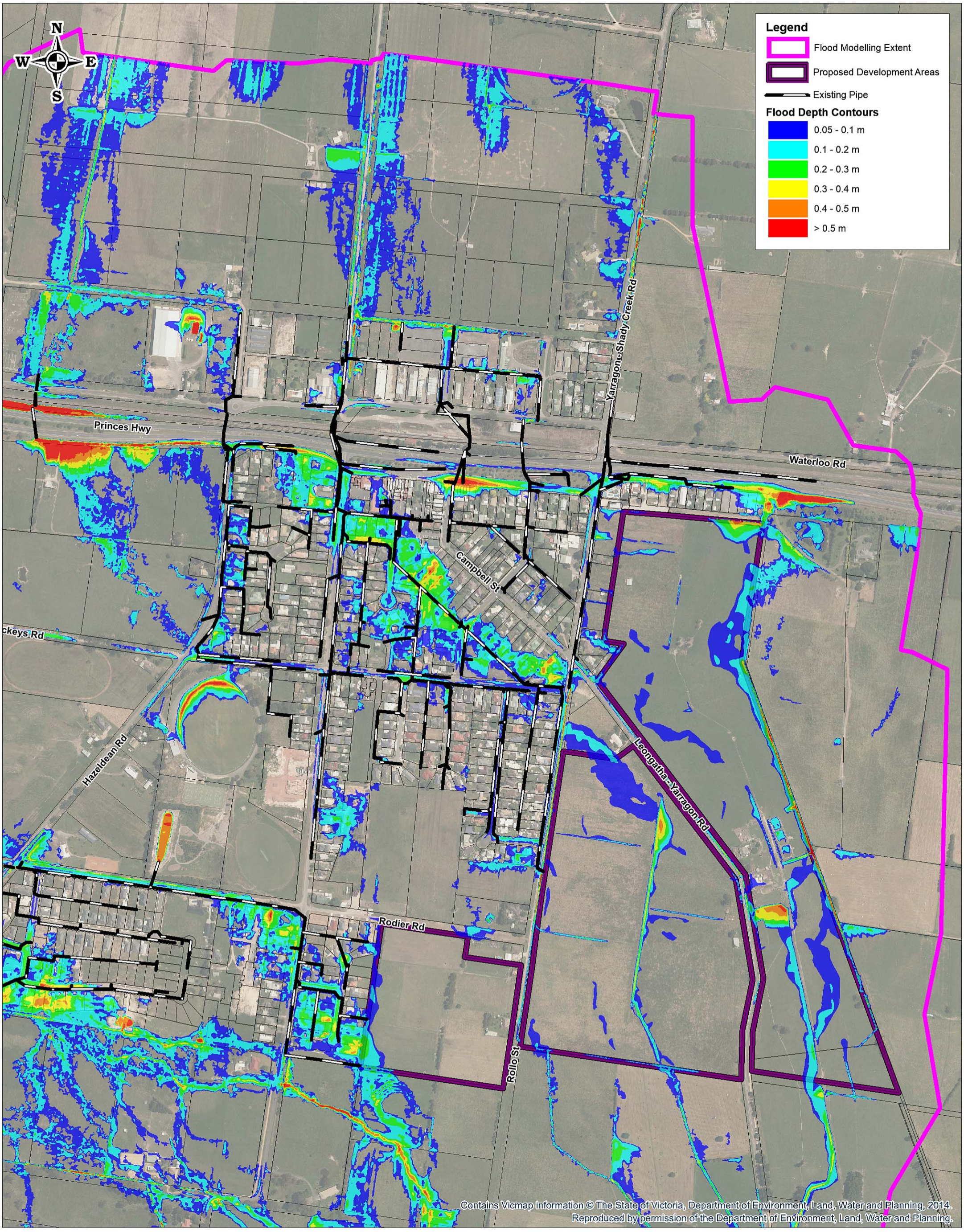
The TUFLOW model was updated to include the functional designs of the retarding basins. The subsequent pages of this report include the following flood maps:

- Figure 3.5: Existing Conditions 1 % AEP flood map
- Figure 3.6: Developed conditions, with retarding basins, 1 % AEP flood map
- Figure 3.7: 1 % AEP afflux map (difference between developed conditions and existing conditions)

The flood modelling predicts that the flood reduction achieved by the proposed retarding basins is similar to that achieved by the 2013 Yarragon Flood Modelling & Drainage Strategy BBSC design project. The most flood prone parts of the Yarragon township are located south of the Princes Highway. In this area, the flood modelling predicts that the proposed retarding basins achieve an improved level of flood reduction. This is due to the fact that the northern retarding basin is now proposed to discharge back into the existing drainage system on the northern side of Princes Highway.

This means that on the northern side of the Princes Highway the predicted performance of the proposed retarding basins is marginally worse compared to the 2013 Yarragon Flood Modelling & Drainage Strategy. However, there are no adverse impacts for properties north of Princes Highway due to the development and the proposed retarding basins.

Overall, Engeny believes that the outcomes achieved by the proposed retarding basins provides an overall better outcome compared to the 2013 Yarragon Flood Modelling & Drainage Strategy as the flood reduction occur in the areas most impacted by flooding and the marginal increase does not impact any properties.



Level 34, Tenancy 5, 360 Elizabeth St, Melbourne VIC 3000
PO Box 12192, A'Beckett St VIC 8006
www.engeny.com.au
P: 03 9888 6978
F: 03 9830 2601
E: melb@engeny.com.au

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0 130 260

Scale in metres (1:6,500 @ A3)

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia 1994.
Vertical Datum: Australia Height Datum
Grid: Map Grid of Australia, Zone 55

Yarragon-Leongatha Rd & 71 Rollo St Developments, Yarragon

Figure 3.5 Existing Conditions, 1% AEP Flood Depth

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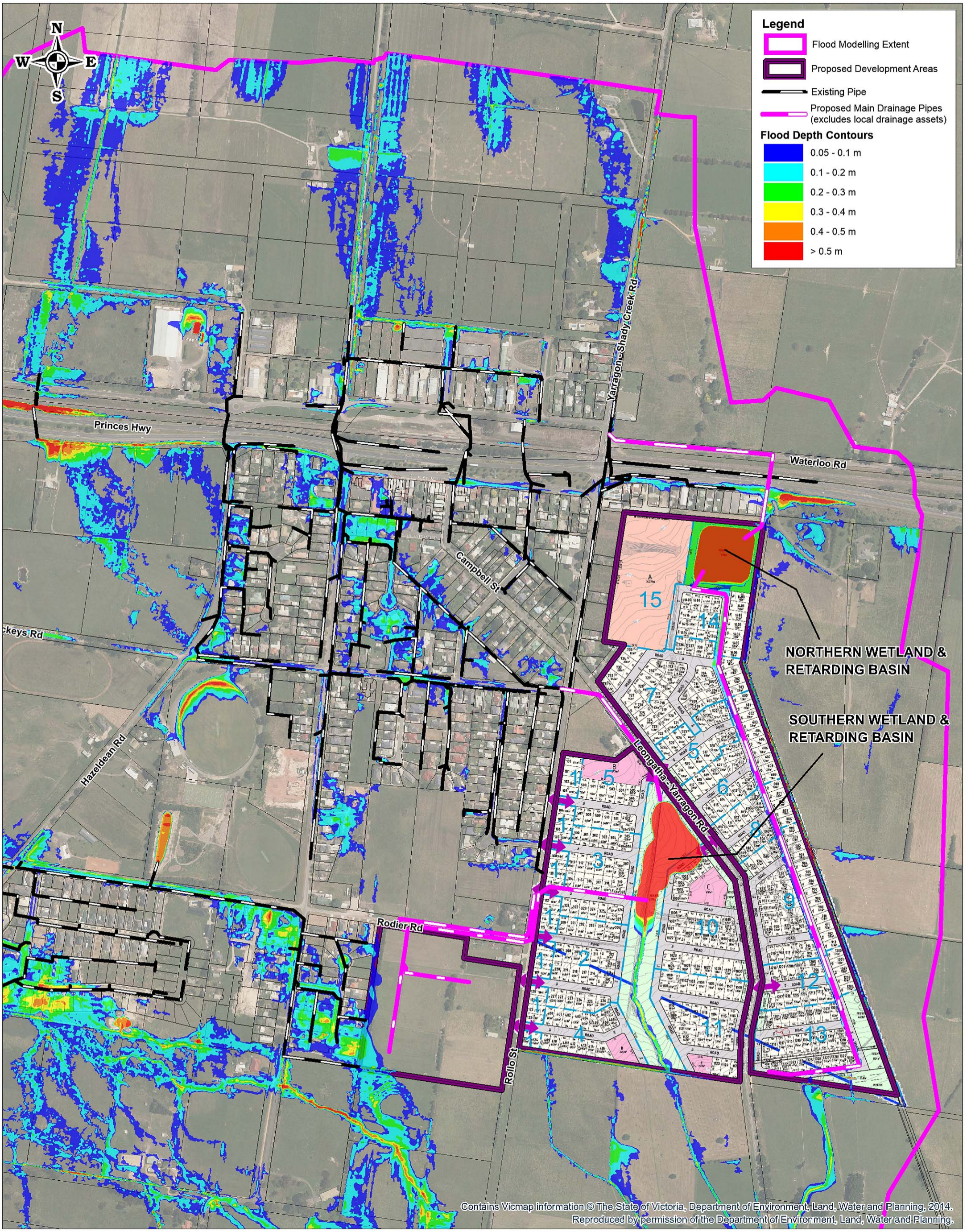
Date: 30 March 2020



Level 34, Tenancy 5, 360 Elizabeth St, Melbourne VIC 3000
PO Box 12192, A'Beckett St VIC 8006
www.engeny.com.au
P: 03 9888 6978
F: 03 9830 2601
E: melb@engeny.com.au

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Scale in metres (1:6,500 @ A3)

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia 1994.
Vertical Datum: Australia Height Datum
Grid: Map Grid of Australia, Zone 55

Yarragon-Leongatha Rd & 71 Rollo St Developments, Yarragon

Figure 3.6 - Developed Conditions 1% AEP Flood Depth

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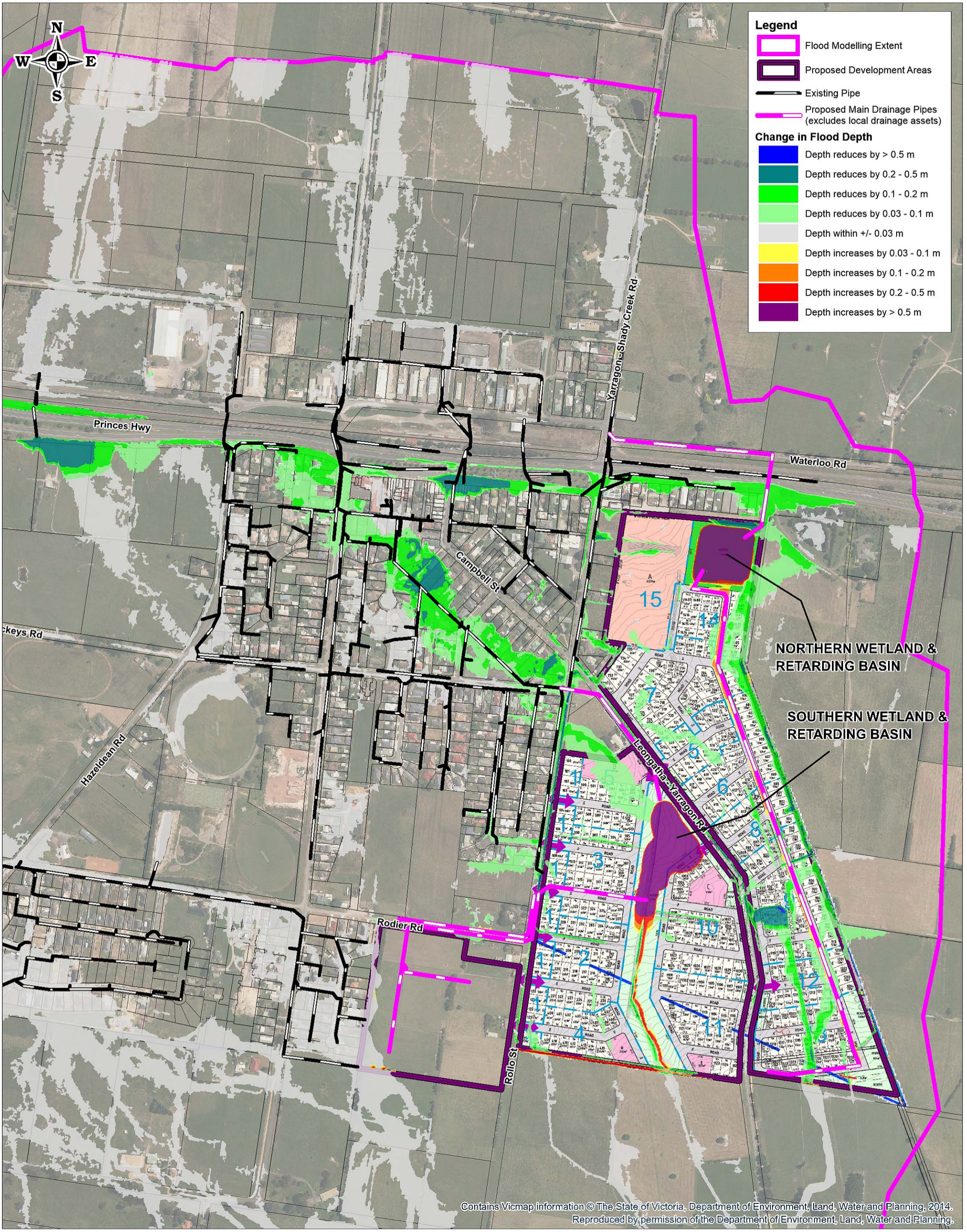

Level 34, Tenancy 5, 360 Elizabeth St, Melbourne VIC 3000
PO Box 12192, A'Beckett St VIC 8006
www.engeny.com.au
P: 03 9888 6978
F: 03 9830 2601
E: melb@engeny.com.au
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Scale in metres (1:6,500 @ A3)

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia 1994.
Vertical Datum: Australia Height Datum
Grid: Map Grid of Australia, Zone 55

Yarragon-Leongatha Rd & 71 Rollo St Developments, Yarragon

Figure 3.7
1% AEP Afflux (change in flood depth due to development)

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Drawn: PC
Checked: GO
Date: 30 March 2020

4. SUMMARY

This report has outlined the functional designs of the proposed wetlands and retarding basins to be located within the developments at Yarragon-Leongatha Road and 71 Rollo Street, Yarragon.

The analysis undertaken as part of this assessment predicts that:

- There are no adverse flooding impacts on surrounding properties in the 1 % AEP event
- Existing flooding issues in the Yarragon township are mitigated to a similar level to that achieved by the 2013 Yarragon Flood Modelling & Drainage Strategy
- Best practice water quality targets are achieved.

5. QUALIFICATIONS

a. In preparing this document, including all relevant calculation and modelling, Engeny Water Management (Engeny) has exercised the degree of skill, care and diligence normally exercised by members of the engineering profession and has acted in accordance with accepted practices of engineering principles.

b. Engeny has used reasonable endeavours to inform itself of the parameters and requirements of the project and has taken reasonable steps to ensure that the works and document is as accurate and comprehensive as possible given the information upon which it has been based including information that may have been provided or obtained by any third party or external sources which has not been independently verified.

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   (ii) Engeny considers it prudent to revise any aspect of the works in light of any information which becomes known to it after the date of submission.

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g. This report does not provide legal advice.

APPENDIX A

Southern Wetland / Retarding Basin Functional Design Plans

MILLAR MERRIGAN
YARRAGON DEVELOPMENT PLANNING
SOUTHERN RETARDING BASIN

LOCALITY PLAN
SCALE 1:2000

AERIAL SOURCED FROM NEARMAP

DRAWING INDEX	
DRAWING No.	DRAWING TITLE
V1261-001-DWG-1001	LOCALITY PLAN & DRAWING INDEX
V1261-001-DWG-1101	RETARDING BASIN/WETLAND AND PIPE OUTFALL LAYOUT PLAN
V1261-001-DWG-1200	TYPICAL SECTIONS

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SCALE 1:2000 (A1)
SCALE BEFORE REDUCTION

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Millar | Merrigan
Land Development Consultants

ENGENY WATER MANAGEMENT
Ph. 03 9888 6978
Level 34
360 Elizabeth St
Melbourne VIC
www.engeny.com.au

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MILLAR MERRIGAN
YARRAGON DEVELOPMENT PLANNING
SOUTHERN RETARDING BASIN
LOCALITY PLAN & DRAWING INDEX

ORIGINAL SIZE	DWG NO.	REV.
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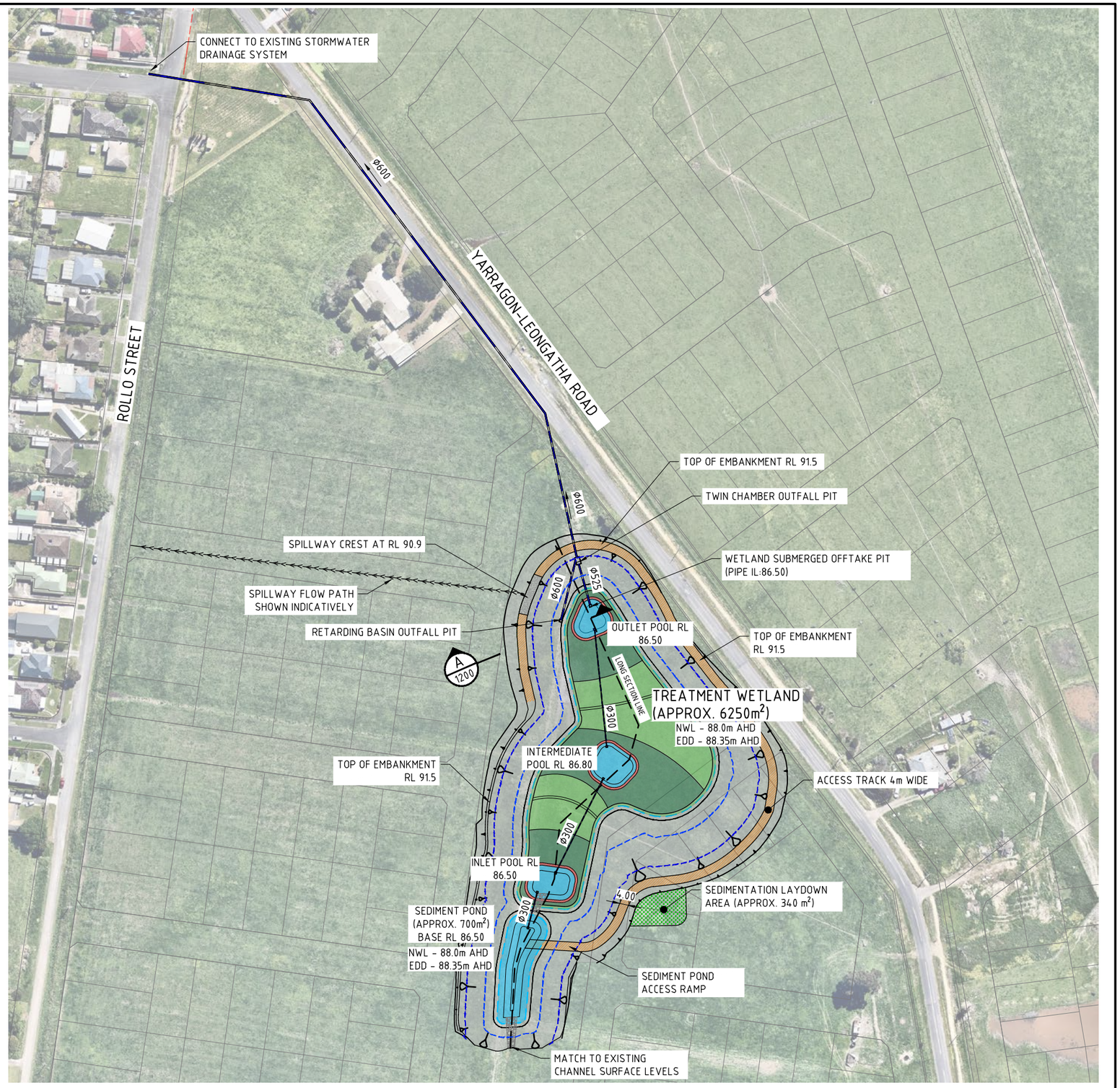

LEGEND

- OPEN WATER ZONE
- SHALLOW MARSH ZONE 0.10 - 0.15m BELOW NWL
- DEEP MARSH ZONE 0.15 - 0.35m BELOW NWL
- SUBMERGED MARSH ZONE 0.35 - 0.70m BELOW NWL

- PROPOSED DRAINAGE
- 1% AEP FLOOD LEVEL = 90.9
- 10% AEP FLOOD LEVEL = 89.22

LEGEND - EXISTING SERVICES

- EXISTING SEWER
- EXISTING GAS
- EXISTING TELECOMMUNICATIONS
- EXISTING WATER
- EXISTING UNDERGROUND ELECTRICITY
- EXISTING STORMWATER DRAINAGE

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SCALE 1:1000 (A1)
SCALE BEFORE REDUCTION

RETARDING BASIN/WETLAND AND PIPE OUTFALL LAYOUT PLAN

SCALE 1:1000

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CPENG		CPENG No.	

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YARRAGON DEVELOPMENT PLANNING
SOUTHERN RETARDING BASIN
RETARDING BASIN/WETLAND AND PIPE OUTFALL LAYOUT PLAN

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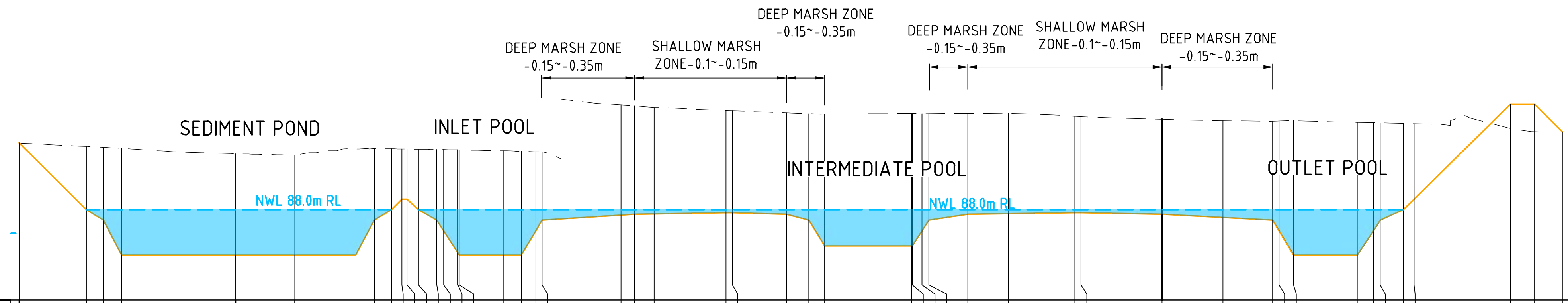

Datum 85

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35.998	86.500	89.856	3.356
45.800	86.500	89.808	3.308
59.008	87.650	90.030	2.380
61.851	88.000	90.024	2.024
63.557	88.350	90.018	1.668
64.439	88.350	90.015	1.665
66.337	88.000	90.008	2.008
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100.000	87.821	91.475	3.654
102.238	87.850	91.444	3.594
105.485	87.861	91.385	3.524
117.431	87.900	91.288	3.388
118.503	87.900	91.280	3.380
127.450	87.850	91.212	3.362
131.197	87.650	91.184	3.534
133.819	86.800	91.171	4.371
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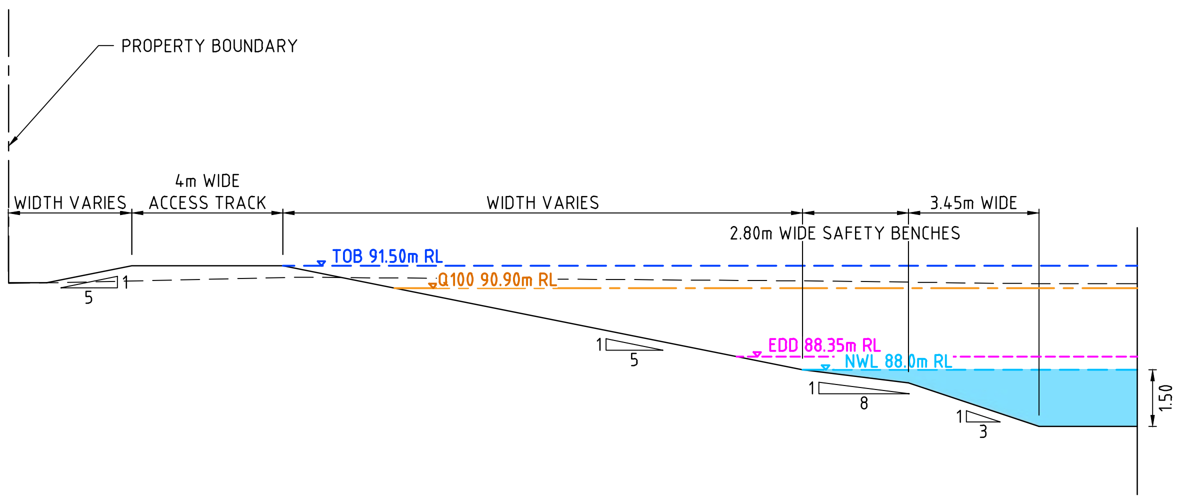
157.596	87.850	91.194	3.344
164.343	87.869	91.200	3.331
175.403	87.900	91.099	3.199
176.420	87.900	91.086	3.186
189.849	87.850	90.998	3.148
200.000	87.740	90.954	3.214
208.256	87.650	90.937	3.287
209.308	87.300	90.944	3.644
211.709	86.500	90.956	4.456
222.304	86.500	90.899	4.399
225.003	87.300	90.887	3.587
226.108	87.650	90.882	3.232
229.964	88.000	90.865	2.865
231.718	88.350	90.857	2.507
247.745	91.500	90.697	-0.803
251.762	91.500	90.588	-0.912
256.378	90.580	90.580	0.000



TREATMENT WETLAND TYPICAL SECTION

SECTION A 1101
SCALE 1:100

NOTE:
REFER TO DWG 0002 FOR GENERAL NOTES AND LEGEND.

REV	BY	DATE	REVISION DESCRIPTION	PM APPD
A	MW	24.02.20	FOR REVIEW	

DOC. NUMBER	DOCUMENT TITLE
REFERENCE DOCUMENTS	

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WATER MANAGEMENT

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DRAWN	MW	CHECKED	
PM APPD.		PD APPD.	
CPENG		CPENG No.	

MILLAR MERRIGAN

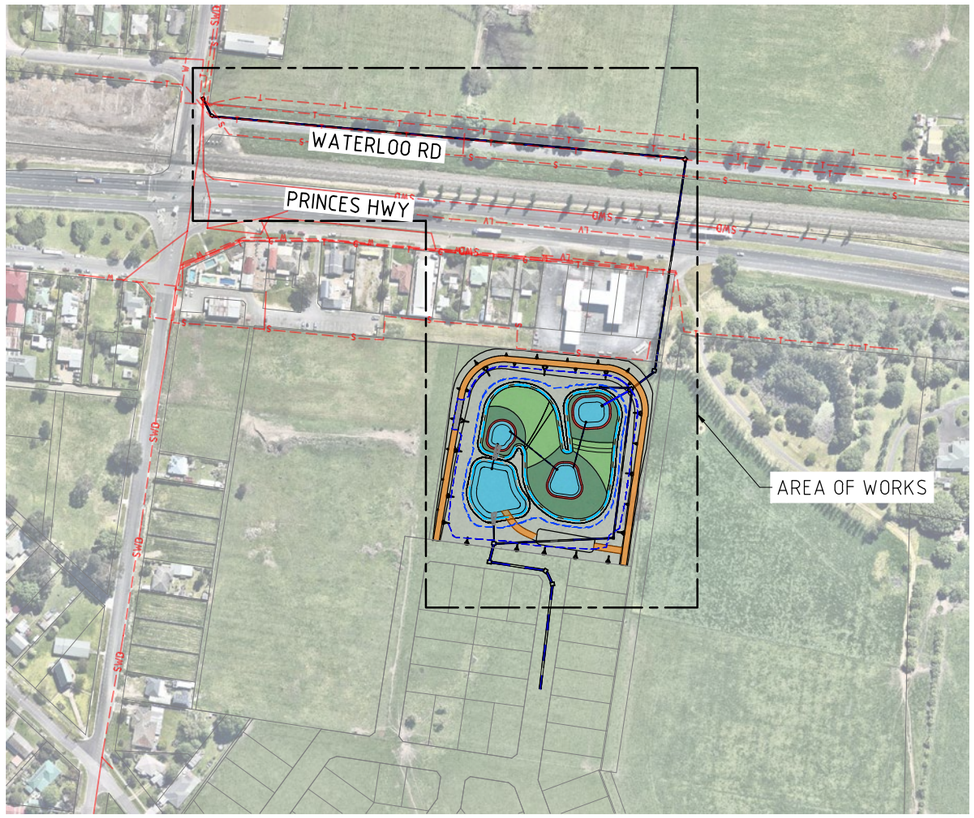
YARRAGON DEVELOPMENT PLANNING
SOUTHERN RETARDING BASIN
TYPICAL SECTIONS

ORIGINAL SIZE A1 | DWG NO. V1261-001-DWG-1200 | REV. A

APPENDIX B

Northern Wetland / Retarding Basin Functional Design Plans

MILLAR MERRIGAN
YARRAGON DEVELOPMENT PLANNING
NORTHERN RETARDING BASIN



LOCALITY PLAN
SCALE 1:2000

AERIAL SOURCED FROM NEARMAP

DRAWING INDEX	
DRAWING No.	DRAWING TITLE
V1261-001-DWG-0001	LOCALITY PLAN & DRAWING INDEX
V1261-001-DWG-0101	RETARDING BASIN/WETLAND LAYOUT PLAN
V1261-001-DWG-0102	OUTFALL PIPE LAYOUT PLAN
V1261-001-DWG-0200	TYPICAL SECTIONS

0 20 40 60 80 100m
SCALE 1:2000 (A1)
SCALE BEFORE REDUCTION

LAST MODIFIED: 25/2/2020 4:31 PM
CAD REF: \\EGMELAPP12\MELBOURNE_MANAGEMENT\PROJECTS\V1261 MILLAR MERRIGAN\V1261_001 YARRAGON DEVELOPMENT PLANNING\05 DESIGN\AUTOCAD\DRAWINGS\NORTH RB\V1261-001-DWG-0001.DWG

REV	BY	DATE	REVISION DESCRIPTION	PM APPD.
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REFERENCE DOCUMENTS	DOCUMENT TITLE
DOC. NUMBER	

Millar | Merrigan
Land Development Consultants

ENGENY WATER MANAGEMENT
Ph. 03 9888 6978
Level 34
360 Elizabeth St
Melbourne VIC
www.engeny.com.au

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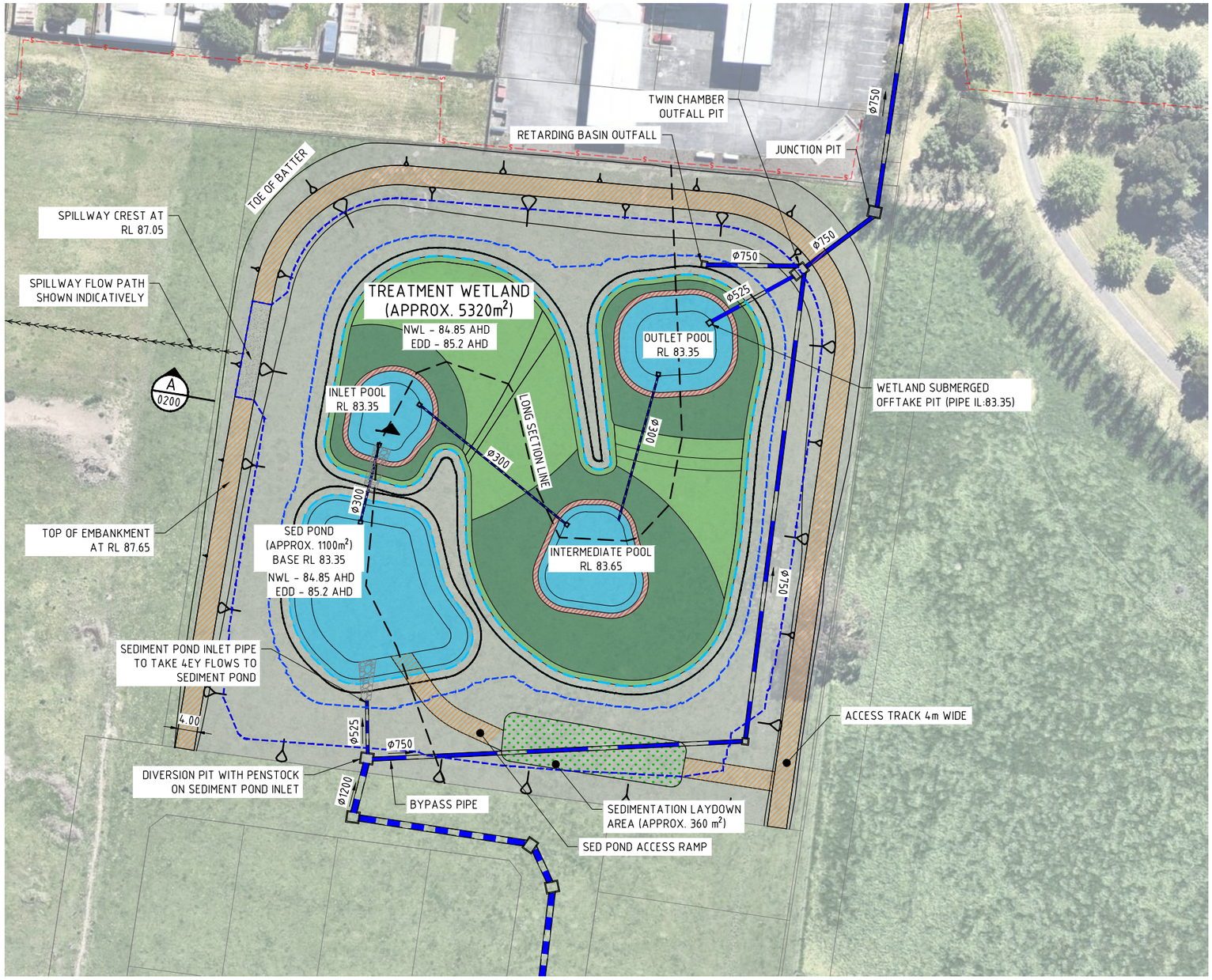
MILLAR MERRIGAN
YARRAGON DEVELOPMENT PLANNING
NORTHERN RETARDING BASIN
LOCALITY PLAN & DRAWING INDEX

ORIGINAL SIZE: A1
DWG NO.: V1261-001-DWG-0001
REV.: A

CONTINUED ON SHEET 0102



LEGEND

- OPEN WATER ZONE
- SHALLOW MARSH ZONE 0.10 - 0.15m BELOW NWL
- DEEP MARSH ZONE 0.15 - 0.35m BELOW NWL
- SUBMERGED MARSH ZONE 0.35 - 0.70m BELOW NWL
- PROPOSED DRAINAGE
- 1% AEP FLOOD LEVEL = 87.05
- 10% AEP FLOOD LEVEL = 85.67

LEGEND - EXISTING SERVICES

- EXISTING SEWER
- EXISTING GAS
- EXISTING TELECOMMUNICATIONS
- EXISTING WATER
- EXISTING UNDERGROUND ELECTRICITY
- EXISTING STORMWATER DRAINAGE

RETARDING BASIN/WETLAND LAYOUT PLAN

SCALE 1:500

0 5 10 15 20 25m
SCALE 1:500 (A1)
SCALE BEFORE REDUCTION

0 2.5 5.0 7.5 10.0 12.5m
SCALE 1:250 (A1)
SCALE BEFORE REDUCTION

REV	BY	DATE	REVISION DESCRIPTION	PM APPD.
A	MW	24.02.20	FOR REVIEW	

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CPENG		CPENG No.	

MILLAR MERRIGAN

YARRAGON DEVELOPMENT PLANNING
NORTHERN RETARDING BASIN
RETARDING BASIN/WETLAND LAYOUT PLAN

ORIGINAL SIZE: A1
DWG NO.: V1261-001-DWG-0101
REV.: A

LEGEND

- OPEN WATER ZONE
- SHALLOW MARSH ZONE 0.10 - 0.15m BELOW NWL
- DEEP MARSH ZONE 0.15 - 0.35m BELOW NWL
- SUBMERGED MARSH ZONE 0.35 - 0.70m BELOW NWL

PROPOSED DRAINAGE

LEGEND - EXISTING SERVICES

- EXISTING SEWER
- EXISTING GAS
- EXISTING TELECOMMUNICATIONS
- EXISTING WATER
- EXISTING UNDERGROUND ELECTRICITY
- EXISTING STORMWATER DRAINAGE

CONTINUED ON SHEET 0101

OUTFALL PIPE LAYOUT PLAN

SCALE 1:500

0 5 10 15 20 25m
SCALE 1:500 (A1)
SCALE BEFORE REDUCTION

0 2.5 5.0 7.5 10.0 12.5m
SCALE 1:250 (A1)
SCALE BEFORE REDUCTION

REV	BY	DATE	REVISION DESCRIPTION	PM APPD.
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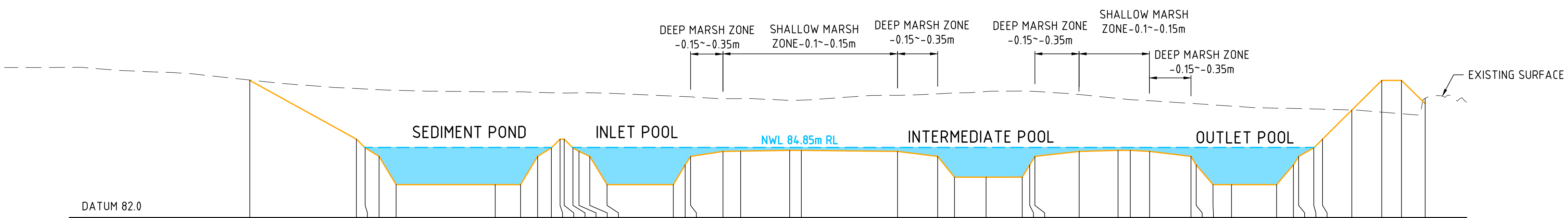
CPENG		CPENG No.	

MILLAR MERRIGAN

YARRAGON DEVELOPMENT PLANNING
NORTHERN RETARDING BASIN
OUTFALL PIPE LAYOUT PLAN

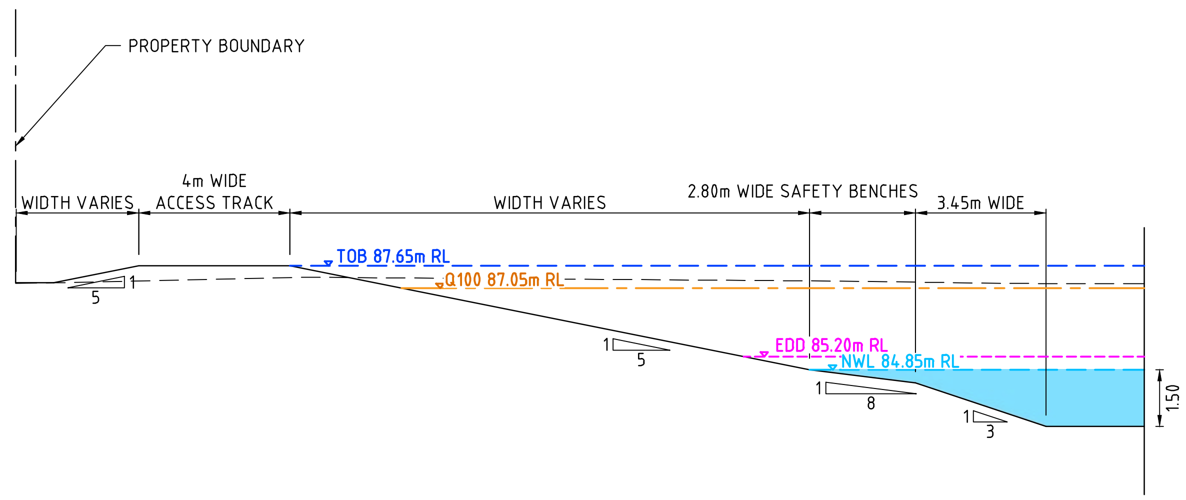
ORIGINAL SIZE	DWG NO.	REV.
A1	V1261-001-DWG-0102	A



CHAINAGES	DEPTHS	DESIGN LEVELS	EXISTING SURFACE
0.000	0.017	87.599	87.616
21.704	2.067	85.200	87.267
23.482	2.399	84.850	87.249
26.317	2.721	84.500	87.221
29.814	3.842	83.350	87.192
50.000	3.786	83.350	87.136
55.160	3.781	83.350	87.131
58.627	2.612	84.500	87.112
61.441	2.244	84.850	87.094
63.198	1.882	85.200	87.082
64.036	1.881	85.200	87.081
65.820	2.239	84.850	87.089
67.045	2.395	84.700	87.095
69.245	2.596	84.500	87.096
72.769	3.730	83.350	87.080
86.276	3.608	83.350	86.958
88.708	2.787	84.150	86.937
89.804	2.427	84.500	86.927
96.375	2.154	84.700	86.854
100.000	2.144	84.713	86.857
109.967	2.038	84.750	86.788
112.362	2.043	84.750	86.793
131.949	2.290	84.700	86.990
140.114	2.552	84.500	87.052
143.538	3.439	83.650	87.089
150.000	3.495	83.650	87.145
157.371	3.514	83.650	87.164
158.869	3.007	84.150	87.157
159.926	2.651	84.500	87.151
168.942	2.327	84.700	87.027
176.894	2.114	84.750	86.864
179.353	2.065	84.750	86.815
183.288	2.071	84.700	86.771
191.740	2.160	84.500	86.660
192.790	2.496	84.150	86.646
196.241	3.251	83.350	86.601
200.000	3.201	83.350	86.551
209.166	3.120	83.350	86.470
212.616	2.304	84.150	86.454
213.667	1.949	84.500	86.449
216.758	1.583	84.850	86.433
218.515	1.224	85.200	86.424
224.508	0.000	86.392	86.392
230.597	-1.297	87.600	86.303
234.629	-1.363	87.600	86.237
239.427	0.223	86.648	86.870

WETLAND SECTION

SCALE 1:500 HORIZ
SCALE 1:100 VERT



TREATMENT WETLAND TYPICAL SECTION

SECTION A 0010
SCALE 1:100

CAD REF:\\EGMELAPP02\MELBOURNE_MANAGEMENT$\PROJECTS\V1261 MILLAR MERRIGAN\V1261_001 YARRAGON DEVELOPMENT PLANNING\05 DESIGN\AUTOCAD\DRAWINGS\NORTH RB\V1261-001-DWG-0200.DWG

LAST MODIFIED:2/24/2020 5:30 PM

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REFERENCE DOCUMENTS	

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CPENG		CPENG No.	

MILLAR MERRIGAN

YARRAGON DEVELOPMENT PLANNING
NORTHERN RETARDING BASIN
TYPICAL SECTIONS

ORIGINAL SIZE	DWG NO.	REV.
A1	V1261-001-DWG-0200	A