Report

Oran Park Precinct Tranche 41 Stormwater Management Report

PREPARED FOR GREENFIELDS

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DOCUMENT CONTROL

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A	18/02/20	DRAFT	MC	TE	
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1 Site Description and Development

The Tranche 41 site is ~40 hectares in size, located within the future Pondicherry Precinct. It is located north of Dick Johnson Drive and Oran Park Town Centre, and east of The Northern Road, as shown in Figure 1.1.

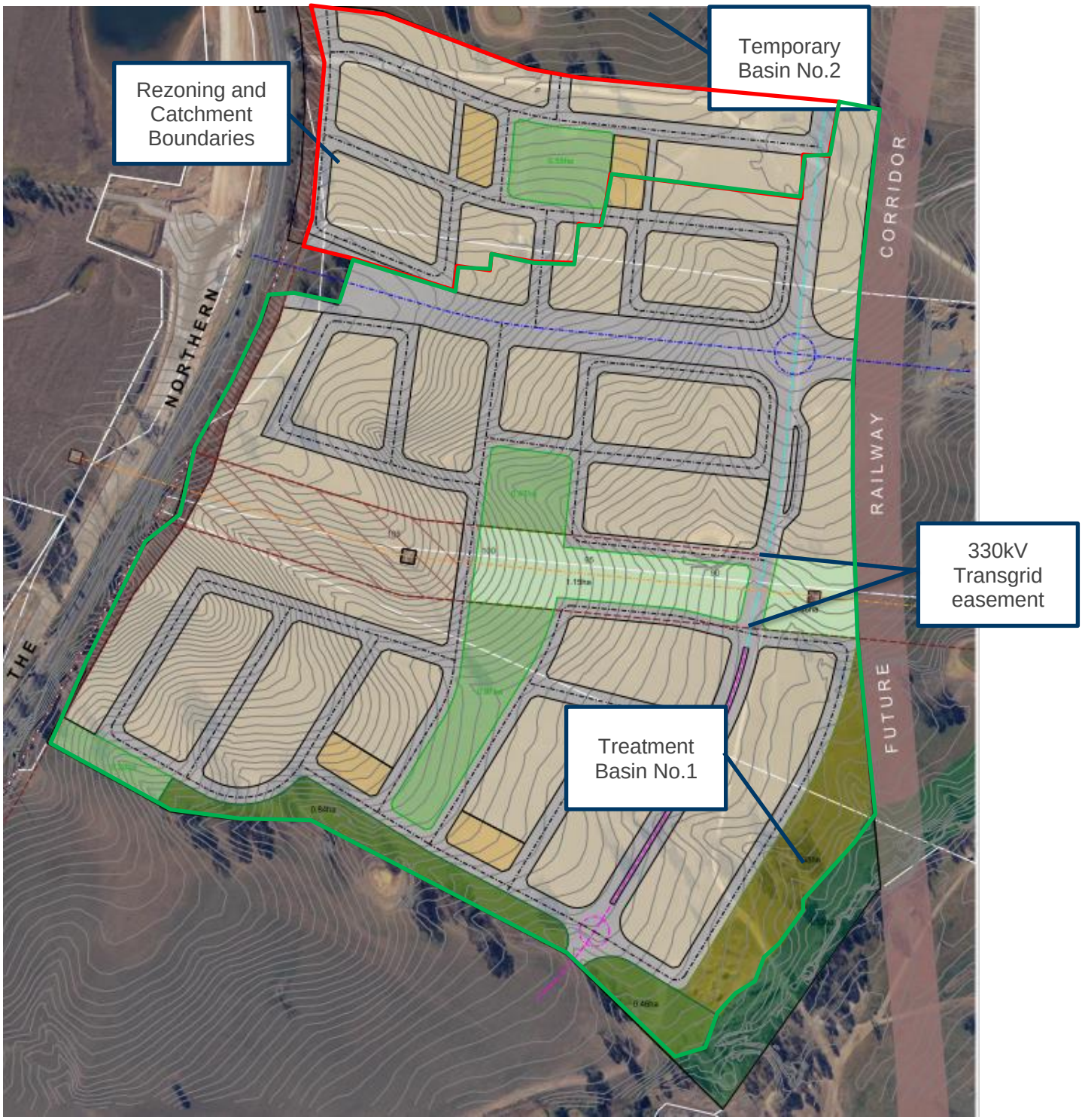

Figure 1.1 Tranche 41 region

The existing area for Tranche 41 is zoned as RU1 – Primary Production. This will need to be rezoned to suit the future development for residential buildings, parkland, and water treatment basins.

This report is intended for rezoning of the site only – the strategy and objectives described in Sections 2 - 4 below are intended only for the rezoning of the land.

2 Stormwater Management Objectives

As part of the precinct planning for Oran Park, a stormwater strategy was prepared. This report presents a stormwater and trunk drainage strategy based on WSUD principles set out in the *Integrated Water Cycle Management Study* (Ecological Engineering, 2007) and *Stormwater Quantity Management & Flooding Report* (Brown Consulting, 2007) which underwent a major revision in 2013. The strategies were developed as part of the master-planning process to support future development applications in Oran Park. The master planning of Tranche 41 has adopted the key objectives of the Oran Park Precinct and include:

- Link water infrastructure effectively to minimise impact of the development upon the water cycle.
- Attenuate peak storm flows of 2, 5, 10, 20, 100-year events to existing flows.
- Provide water quality management.
- Meet relevant stormwater policies and guidelines outlined in this report.

This Tranche does not fall within the masterplan associated with the reports stated above. However, the stormwater management strategy of this Tranche is consistent with the objectives of the study listed above. This Tranche falls within the future Pondicherry Precinct, the site will drain north towards Lowes Creek and west towards South Creek.

The proposed stormwater management strategy includes a permanent basin for the catchment draining to South Creek. For the Lowes Creek catchment, a basin proposed as part of the Pondicherry Precinct will ultimately detain and treat the entire catchment. Until such time as the Pondicherry basin is in place, a temporary basin has been included as part of the Tranche 41 works to control and treat the stormwater flows. The sizing of the Tranche 41 basins has been included in section 3.

2.1 Camden Council Requirements

The site is located within the Camden Council local government area (LGA).

- Draft Upper South Creek Regional Flood Model and User Guide (WMA 2020)

The document is a draft user guide for use with the Upper South Creek Regional Model prepared by WMA. The document outlines the recommendations on methods when completing a flood impact assessment.

- *Engineering Design Specification* (Camden Council, 2020)

This specification contains technical design data for the calculation of flows, flood elevations and velocities along with technical standards for the design of drainage infrastructure. The hydrologic parameters include rainfall intensity charts and runoff parameters for flow estimation. The document also outlines hydraulic parameters and design requirements for pits, culverts and pipes.

- *Camden Local Environmental Plan 2010* (Camden Council, 2014)

Local Environmental Plans (LEPs) guide planning decisions for local government areas (NSW Department of Planning & Environment, 2014). LEPs were standardised in 2006 to create a common format and content across councils and other consent authorities.

The *Camden Local Environmental Plan 2010* was gazetted in 2010. The LEP applies to all land within the Camden LGA, with the exception of land at Oran Park, Turner Road (Gregory Hills) and Catherine Field, which falls under *State Environmental Planning Policy (Sydney Region Growth Centres) 2006*.

- *Camden Development Control Plan 2011* (Camden Council, 2011)

A Development Control Plan (DCP) is a non-legal document that supports the LEP with more detailed planning and design guidelines.

The Camden DCP applies to all land within the Camden LGA. The DCP also applies to Growth Centre precincts gazetted under *State Environmental Planning Policy (Sydney Region Growth Centres) 2006* that are subject to the Growth Centre specific DCPs, which contain additional provisions.

- *Flood Risk Management Policy* (Camden Council, 2006)

The *Flood Risk Management Policy* establishes flood risk management planning and development for all flood prone land within the Camden LGA. Flood prone land is susceptible to flooding by the Probably Maximum Flood (PMF) event. The policy has regard to the requirements of the *New South Wales Government Floodplain Development Manual – April 2005*.

2.2 Oran Park Indicative Layout Plan (ILP) (2013)

In 2007, a master planning process coordinated by the Growth Centres Commission was used to develop an Indicative Layout Plan (ILP) for the Oran Park Precinct, Brown Consulting and Ecological Engineering jointly undertook the water cycle management assessment as part of the ILP development. Ecological (now AECOM) undertook the WSUD aspects and Brown Consulting developed the flooding and trunk drainage component of the water cycle management. The stormwater management strategies proposed in the masterplan included:

- Public detention and bio-retention systems proposed at various locations to manage the quantity and quality of stormwater flows.
- On-site detention devices proposed at non-residential lands such as light industrial, employment, educational and commercial areas that are required by the Oran Park DCP to be treated prior to discharge into public systems.

The masterplan has been revised multiple times and the most recent revision was produced in 2013. This report is based on the Oran Park Water Cycle Masterplan and the revised stormwater Master Plan (Brown Consulting, 2013) developed for the Indicative Layout Plan (Brown Consulting, 2013).

2.3 Integrated Water Cycle Management Study – WSUD Component (Ecological Engineering, 2007)

The *Integrated Water Cycle Management strategy* (Ecological Engineering, 2007) for the Oran Park Precinct outlines the overall strategy for water management with the design component describing features for WSUD. The key principles of WSUD for Oran Park are aimed at achieving integrated water cycle management of the three urban water streams potable water, wastewater and stormwater by:

- Reducing potable mains water consumption through demand management and substitution with treated reclaimed water and stormwater.
- Treating urban stormwater to meet water quality objectives for reuse or discharge to waterways.
- Using stormwater in the urban landscape to maximise visual and recreational amenity of developments, and where appropriate influence the microclimate of the area.

2.4 Water Management Act 2000

The key NSW legislation governing the management of the state's water resources are the *Water Management Act 2000* and the *Water Act 1912*. The *Water Management Act 2000* is progressively replacing the *Water Act 1912*, which represented outdated principles in water management.

The objective of the *Water Management Act 2000* is to provide sustainable and integrated management of water resources for the benefit of both present and future generations (NSW Office of Water, 2014). The NSW Office of Water administers the *Water Management Act 2000* and regulates controlled activities carried out around and on waterfront land.

Amendments have been made to the legislation since it was passed by NSW parliament in December 2000. In 2012, the *Guidelines for Riparian Corridors on Waterfront Land* (NSW Office of Water, 2012) allowed construction of online detention basins in riparian corridors. The revision also streamlined the categorisation of streams and permitted activities around the riparian corridors.

2.5 Growth Centres Development Code (Growth Centres Commision, 2006)

The *Growth Centres Development Code* was released by the Department of Environment and Conservation in 2006. The department no longer exists and the Growth Centres Commission formally took over planning for the Growth Centres.

The *Growth Centres Development Code* provides the basis for the planning and design of precincts and neighbourhoods in the Growth Centres. It is intended to be a reference work, to stimulate ideas and provide a guide to best practice. Sections of the *Growth Centres Development Code* that provide guidance relevant to the design are:

- B-2 Water Sensitive Urban Design and Stormwater Management

This section introduces WSUD, which encompasses all aspects of urban water cycle management, including water supply, wastewater and stormwater management. It emphasises the importance of linking water infrastructure, landscape design and the urban built form, in a manner that is more attuned to natural hydrological and ecological processes than conventional design.

- B-3 Riparian Corridors

The development guide provides guidance for the management of riparian corridors. These guidelines are considered to be superseded by the *Guidelines for Riparian Corridors on Waterfront Land* (NSW Office of Water, 2012).

2.6 Oran Park Development Control Plan 2007 (Department of Planning and Environment, 2007)

The *Oran Park Precinct Development Control Plan 2007* (Department of Planning and Environment, 2007) applies specifically to the Oran Park development. The most recent revision was released in 2014. The purpose of this DCP is to communicate the planning, design and environmental objectives and controls against which Camden Council will assess future DAs. Sections of the DCP specifically relevant to the design are:

- Environmental management
- Riparian corridors
- Flooding and water cycle management
- Salinity and soil management.

2.7 USC Regional Model Draft User Guide (WMA Water, 2020)

This document contains a first draft of the Upper South Creek Regional Model User Guide, to accompany the handover of Camden Council's Upper South Creek flood model to consultants that propose to develop within the catchment. It outlines the approach to the modelling makes recommendations on methods to apply when completing flood impact assessments for proposed development. It is intended that this draft will be reviewed and possibly updated based on feedback from Council and other consultants. This document has been used to inform some of the parameters used in the XP-Rafts model involved in the analysis of this development.

3 Stormwater Quantity Management Strategy

In accordance with Camden Council requirements, the stormwater strategy for Tranche 41 aims to match post-development peak runoff to the permissible site discharge (PSD) in storm events of up to 100 year to meet the requirements as outlined in Section 2. The stormwater strategy has provided an estimated basin volume required to attenuate the flows from the developed site. See Figure 3.1 and Figure 3.2 for site analysis.

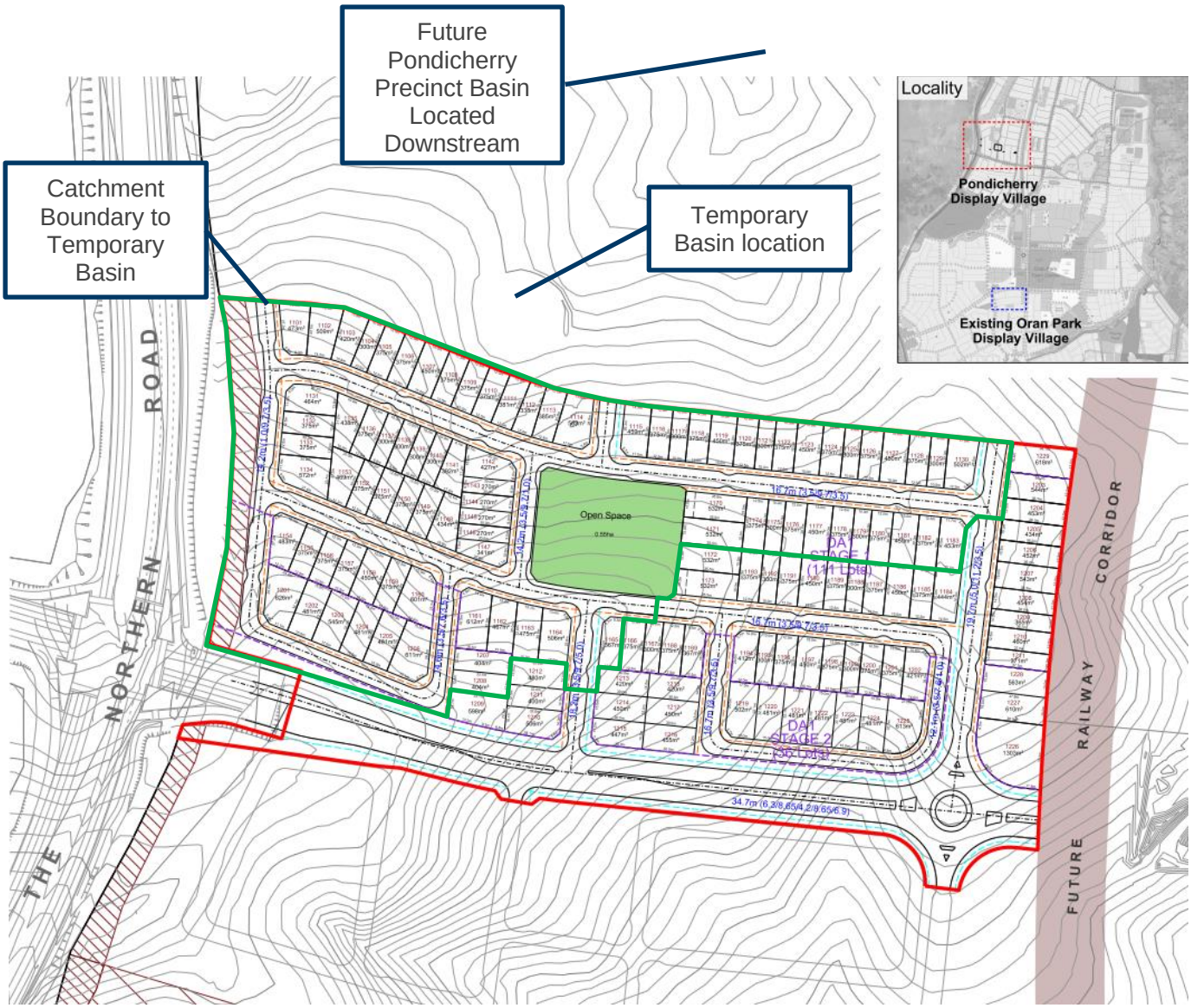

Figure 3.1 Tranche 41 Stage 1 and 2

Figure 3.2 Tranche 41 Stage DA2 and DA3

Two detention basins have been considered for Tranche 41 as a whole, due to a ridgeline that roughly follows the catchment boundary shown above, and a Transgrid asset which prevents works within 30m of the asset. These basins are to be located in the regions above as shown.The northern basin will serve approximately 6 Ha, and the southern basin will serve approximately 34 Ha.

The northern basin would be temporary, as that land will be developed in the future, and a permanent basin will be constructed downstream of the temporary basin location within the Pondicherry Precinct. The permanent basin will serve that portion of Tranche 41 and approximately 18.5 Ha of the neighbouring Pondicherry development in the future.

Based on the catchments and grades provided, the basin storage for Basins 1 and 2 are given in Table 3.1.

Table 3.1 Detention Basin Configurations

Attributes	Basin 1	Basin 2 (Temp. Basin)
Live storage (m^3)	9,100	1,330

The total detention storage for the basins amounts to 10,430 m^2.

Based on the existing topography of the site and the surrounding land, it is expected that Basin 1 will drain towards South Creek, and Basin 2 towards Lowes Creek.

4 Stormwater Quality Management Strategy

The stormwater quality management strategy aims to meet targets outlined in the *Engineering Design Specification* (Camden Council, 2020). Table 4.1 summarises the required pollution retention targets by Council.

Table 4.1 Water Quality Objectives

Pollutant	Reduction target
Total suspended solids	85 %
Total phosphorus	65 %
Total nitrogen	45 %
Gross pollutants	90 %

The treatment system for water quality for Tranche 41 includes (at a minimum) bio-retention basins. These structures will be situated within each detention basin as given under Figure 1.1. As under Section 3, a temporary basin will be required for treatment purposes within the boundaries of Tranche 41, for the north sub-catchment, while the surrounding area is developed. Basin 2 will have a GPT installed, as that will be a permanent feature and as such it will be necessary to prevent rubbish from clogging the filter media over the course of its design life. The calculated treatment areas for each basin are given in Table 4.2.

Table 4.2 Retention Basin Configurations

Attributes	Basin 1	Basin 2 (Temp Basin)
Treatment Area (m^2)	2,200	650

The total retention area for the basins amounts to 2,850m^2. This value has decreased from the previous assessment as that was an estimate based on the previous catchment area. The preliminary layout provided by the client has enabled a detailed breakdown of pollutant sources from Tranche 41 which enables specific measurements of pollutant runoff.

A GPT has not been included for Basin No.2 as that is a temporary structure.

5 Flood Management

Tranche 41 is located adjacent to Anthony Creek, a tributary of South Creek. Anthony Creek conveys flows upstream of The Northern Road through Oran Park and discharges into the large dam upstream of South Creek.

The 1%AEP (100 yr ARI) flows from the developed catchment are conveyed within the creek corridor (Figure 5.1), the existing terrain levels for Tranche 41 development remain above the major creek flood levels. The proposed habitable finished floor levels will have a freeboard of 600 mm or greater above the 1% AEP flood level.

The local flows from the Tranche 41 catchment will be managed by the minor and major drainage network (pit and pipe and road reserve overland flow).

The updated Upper Creek South Creek Flood Model (WMA 2020) was provided from Council, the Tuflow model results are shown below in Figure 5.1 and 5.2. The figure shows the flood extents are conveyed within the existing Creek and Tranche 41 remains outside the 100 year ARI flood. All flood hazards and velocities are confined to the Creek and drainage areas.

The development remains above the PMF flood levels, the proposal provides a rising grade for flood evacuation.

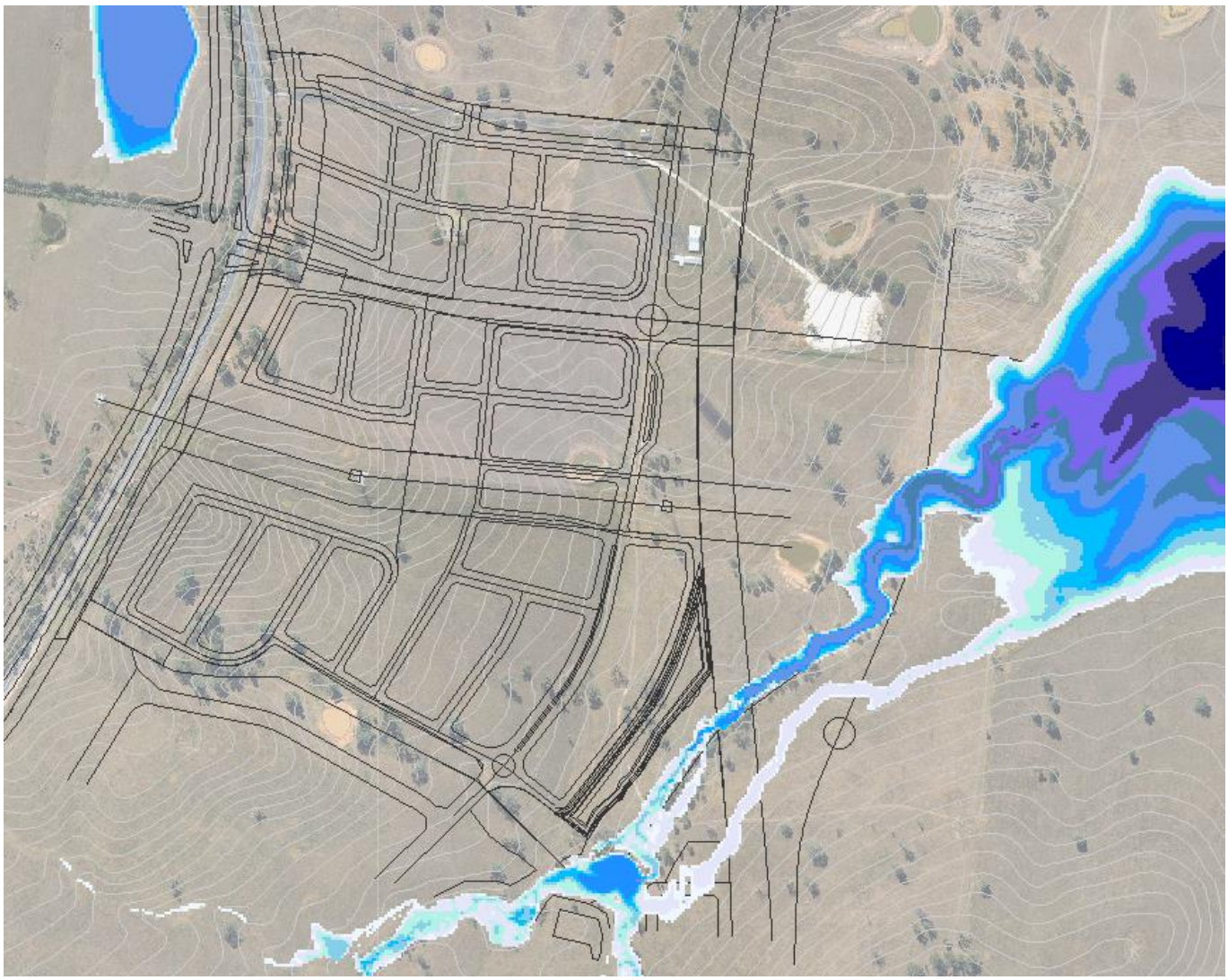

Figure 5.1 1% AEP flood depths – Council model

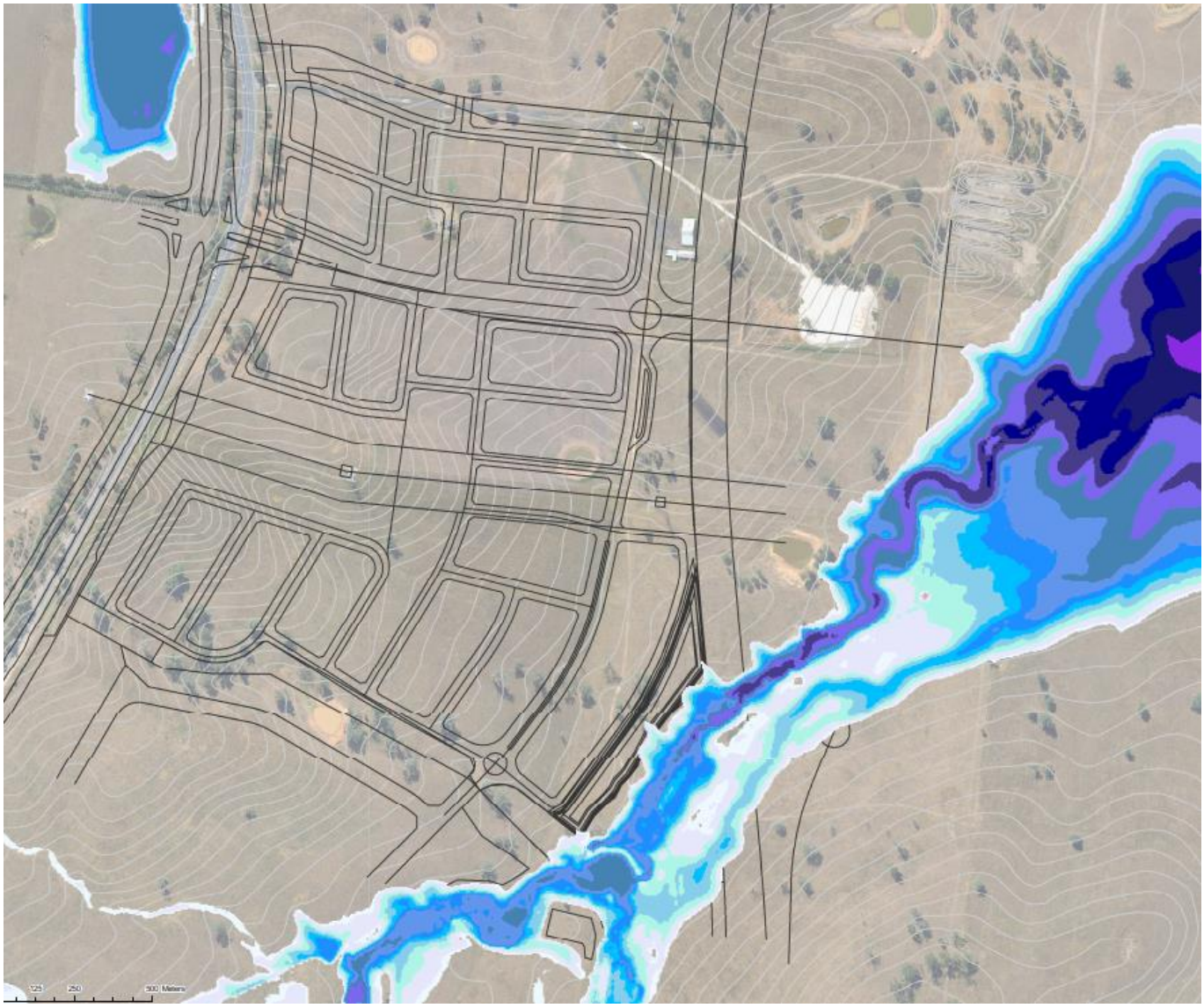

Figure 5.2 PMF flood depths – Council model

6 Conclusion

The stormwater management strategies have been developed to protect Lowes Creek and South Creek from both water quantity and quality impacts from the development of Tranche 41. The design includes two detention storage and bio retention basins to attenuate and treat the 40 Ha catchment area. Storm events between 2 year ARI and up to 100 year will be attenuated to the existing flow condition by the two basins. The sizing has been based on similar work in the area. As part of the design process the catchments and basin sizing will be confirmed through detailed modelling. This report presents the concept stormwater strategy for Tranche 41.

The proposed levels will ensure no impact on the proposed development from minor or major flooding. The flows are conveyed within Anthony Creek.

7 References

Brown Consulting. (2007). *Oran Park Precinct Masterplan Stormwater Quantity Management & Flooding.* Sydney, Australia: Brown Consulting.

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8 Appendix A

MUSIClink

MUSIC-*link* Report

Project Details		Company Details	
Project:		**Company:**	
Report Export Date:	28/08/2020	**Contact:**	
Catchment Name:	Tranche_41_BEW_Rev01	**Address:**	
Catchment Area:	42.93ha	**Phone:**	
Impervious Area*:	66.48%	**Email:**	
Rainfall Station:	67035 LIVERPOOL(WHITLAM		
Modelling Time-step:	6 Minutes		
Modelling Period:	1/01/1985 - 31/12/1994 11:54:00 PM		
Mean Annual Rainfall:	783mm		
Evapotranspiration:	1261mm		
MUSIC Version:	6.3.0		
MUSIC-link data Version:	6.33		
Study Area:	Camden City Council		
Scenario:	Camden City Council		

* takes into account area from all source nodes that link to the chosen reporting node, excluding Import Data Nodes

Treatment Train Effectiveness		Treatment Nodes		Source Nodes	
Node: Receiving Node	**Reduction**	**Node Type**	**Number**	**Node Type**	**Number**
Flow	3.01%	Bio Retention Node	2	Urban Source Node	10
TSS	89%	GPT Node	1		
TP	67.9%				
TN	46.6%				
GP	100%				

Comments

NOTE: A successful self-validation check of your model does not constitute an approved model by Camden City Council
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Passing Parameters

Node Type	Node Name	Parameter	Min	Max	Actual
Bio	Bioretention 1	Hi-flow bypass rate (cum/sec)	None	None	100
Bio	Bioretention 1	PET Scaling Factor	2.1	2.1	2.1
Bio	Bioretention 2	Hi-flow bypass rate (cum/sec)	None	None	100
Bio	Bioretention 2	PET Scaling Factor	2.1	2.1	2.1
GPT	Rocla CleansAll 1350	Hi-flow bypass rate (cum/sec)	None	99	2.732
Receiving	Receiving Node	% Load Reduction	None	None	3.01
Receiving	Receiving Node	GP % Load Reduction	90	None	100
Receiving	Receiving Node	TN % Load Reduction	45	None	46.6
Receiving	Receiving Node	TP % Load Reduction	65	None	67.9
Receiving	Receiving Node	TSS % Load Reduction	85	None	89
Urban	Driveway	Area Impervious (ha)	None	None	0.312
Urban	Driveway	Area Impervious (ha)	None	None	1.783
Urban	Driveway	Area Pervious (ha)	None	None	0.036
Urban	Driveway	Area Pervious (ha)	None	None	0.191
Urban	Driveway	Total Area (ha)	None	None	0.349
Urban	Driveway	Total Area (ha)	None	None	1.975
Urban	Imp	Area Impervious (ha)	None	None	2.973
Urban	Imp	Area Pervious (ha)	None	None	0.977
Urban	Imp	Total Area (ha)	None	None	3.951
Urban	Impervious	Area Impervious (ha)	None	None	0.522
Urban	Impervious	Area Pervious (ha)	None	None	0.175
Urban	Impervious	Total Area (ha)	None	None	0.698
Urban	Pervious	Area Impervious (ha)	None	None	0
Urban	Pervious	Area Impervious (ha)	None	None	0
Urban	Pervious	Area Pervious (ha)	None	None	1.4
Urban	Pervious	Area Pervious (ha)	None	None	10.511
Urban	Pervious	Total Area (ha)	None	None	1.4
Urban	Pervious	Total Area (ha)	None	None	10.511
Urban	Road	Area Impervious (ha)	None	None	1.730
Urban	Road	Area Impervious (ha)	None	None	8.435
Urban	Road	Area Pervious (ha)	None	None	0.193
Urban	Road	Area Pervious (ha)	None	None	0.903
Urban	Road	Total Area (ha)	None	None	1.924
Urban	Road	Total Area (ha)	None	None	9.339
Urban	Roof	Area Impervious (ha)	None	None	1.918
Urban	Roof	Area Impervious (ha)	None	None	10.86
Urban	Roof	Area Pervious (ha)	None	None	0
Urban	Roof	Area Pervious (ha)	None	None	0
Urban	Roof	Total Area (ha)	None	None	1.918
Urban	Roof	Total Area (ha)	None	None	10.86

Only certain parameters are reported when they pass validation

NOTE: A successful self-validation check of your model does not constitute an approved model by Camden City Council
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