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12 September 2023

NL221828-00

Department of Planning and Environment
4 Parramatta Square, 12 Darcy Street
Parramatta NSW 2150

Re: 207 – 209 Wallarah Road, Kanwal (Oasis Caravan Park) – Water Cycle and Stormwater Management & Preliminary Servicing Summary to Support a Rezoning Application

Northrop consulting engineers have been engaged to prepare a Water Cycle and Stormwater Management & Preliminary Servicing Summary for the proposed rezoning at 207 – 209 Wallarah Road, Kanwal (Lot 1223 DP 1004170, Lot 14 DP 23235, Lot 15 DP 23235 and Lot 1 DP518378). An existing caravan park exists on approximately 60% of the property, and the remaining area to the north and east is currently undeveloped greenfield. The proposed development, herein known as 'the site', proposes to rezone the site to accommodate a future mixed use development. For the purpose of the design assumptions, we have assumed the site will consist of six apartment complexes and a commercial block as detailed in the architectural plans and shown in Appendix A. This design has been produced in accordance with DPE technical guidelines, Central Coast Council (CCC) DCP (2022), CCC engineering requirements for development, and relevant Australian Standards.

Water Cycle and Stormwater Management Philosophy

The site generally falls towards the site's northeast boundary at approximately a 5% grade. The site is bordered by Wallarah Road and commercial lots to the south, bushland to the north, and residential and commercial developments to the west. Currently there are no stormwater drainage control facilities on the site. As such, stormwater runoff from all storm events currently discharges freely to an existing creek line along the north-eastern boundary within the bushland.

Site Area

- Total site area = 52,100m^2.
- Developed pervious area = 14,500m^2.
- Developed total impervious area = 37,600m^2.
- Post developed percent impervious = 72%.

		Date
Prepared by	EH	12/09/2023
Checked by	CP	12/09/2023
Admin	HB	12/09/2023

The philosophy of stormwater management on-site is summarised as follows:

- Stormwater runoff from the roofs of each building will be directed to rainwater reuse tanks for onsite reuse. Excess flow from the tanks, as well as all runoff from the podiums, will be directed to a filter chamber and detention tank at the base of each building. The detention tank outlets will be connected to the road network. Stormwater management infrastructure within each lot is proposed to be privately owned and maintained and designed, approved and constructed integrally with each building.
- Stormwater runoff from the site surface is to be generally graded to the kerbside of the roads, where stormwater pits capture runoff and convey flows to a combined downstream biofiltration and on-site detention basin via a below ground pipe network. The road drainage network and end of line combined detention and biofiltration basin are to become public assets, maintained by Central Coast Council.
- Minor stormwater events, conveyed within the pit and pipe network, are to be directed to a gross pollutant trap (GPT) for initial treatment before flowing into the biofiltration basin.
- The biofiltration basin is proposed at the site low point (northeast boundary) to enable the proposed impervious area to be managed. Polished captured stormwater runoff discharges to the existing creek line.
- On-site detention (OSD) storage is combined with the biofiltration basin to limit post development flows discharging the site to the pre-development runoff flowrates.
- A small portion of the development (part of the public space to the north) bypasses the water quality and quantity infrastructure.

Stormwater Quantity

In accordance with CCC civil design guidelines, on-site detention will be required to limit post development flows from the proposed development site to less than or equal to pre-development flows for storm events up to and including the 1% AEP storm event. Runoff from the proposed development was modelled using the runoff routing software DRAINS, incorporating onsite detention facilities. A small portion of the development was modelled as bypassing the water quantity infrastructure. The post developed site was compared to the pre-developed site in a green field state.

A hydrological model utilising the initial and continuing loss methodologies of ARR2019 was created in DRAINS which was used to generate runoff hydrographs for the pre-developed and post-developed site. ARR2019 rainfall data from the Bureau of Meteorology (BOM) was used to generate design storms. Runoff parameters were selected to replicate the site conditions that will be present in the post-developed case and that which currently occur in the pre-developed case.

Storm Losses

Storm losses used for this investigation have been obtained from the ARR Data Hub. Storm losses provided by the ARR Data Hub are intended for rural catchments. As the proposed development is located in an urbanised area, additional reductions to the pervious initial losses have been applied as shown in **Table 1**.

The pervious losses have been reduced by a factor of 0.7, as recommended in the latest ARR 2019 guidelines. Similarly, modelled continuing losses have been reduced by a factor of 0.4 in accordance with advice provided in the latest Department of Primary Industry and Environment (DPIE) guidelines.

Table 1: Adopted DRAINS Rainfall Loss Rates

Land-Use	Initial Loss (mm)	Continuing Loss (mm/hr)
Rural Pervious (ARR Data Hub)	49.0	3.0
Urban Pervious (Modelled)	34.3	1.2
Urban Impervious (Modelled)	1.5	0

Burst Rainfall Data

Rainfall Intensity-Frequency–Duration (IFD) depths for the ARR 2019 have been obtained from the Bureau of Meteorology (BOM) for a location over the catchment centroid. The "East-Coast South" temporal patterns have been adopted for the ARR 2019 hydrology. These temporal patterns were applied to 1% AEP.

Pre-Burst Rainfall Data

The latest NSW Specific Transformational pre-burst depths have been added from the ARR Data Hub to the design rainfall events and distributed evenly over the timesteps prior to the burst of the design storm events. The model was run for a range of storm events over a duration between 5 minutes and 6 hours.

DRAINS Results

A detention tank has been sized for each proposed building. Required volumes are provided in **Table 2**.

Table 2 – DRAINS Model Results

Location	Volume (m^3)
Building A	140
Building B	200
Building C	140
Building D	20
Building E	15
Building F	40
Commercial	110
End of Line Basin	500

Each tank will outlet to the road stormwater network, which flows into a proposed combined bioretention and detention basin. The end of line detention basin requires a minimum storage of 500m^3. A comparison between the pre-development and post-development peak flows from the site for the critical storm duration for each return interval up to and including the 1% AEP is presented in **Table 3**.

Table 3 – DRAINS Model Results

AEP	Pre-Flowrate (m^3/s)	Post-Flowrate (m^3/s)
1%	3.10	2.61
2%	2.61	2.14
5%	2.07	1.50
10%	1.67	0.926
20%	1.25	0.536

Due to spatial constraints, the basin is designed with maximum 1:4 internal batters, 1:3 external batters and maximum 0.7m detention depth. The external 1:3 batter will be vegetated with native grass (i.e. not turfed). A suitable fence and vehicular barrier system. A vehicular access point is proposed along the eastern end of the basin for maintenance. Minor storm events are proposed to be controlled via a grated inlet pit raised 0.1m above the basin surface (to allow for 100mm extended biofiltration detention depth in line with Table 11.8 in CCC Civil Works Specification) with two 375mm outlet pipe to limit outflows. Major overtopping storm events are to overflow via a 20m weir and directed to the existing creek line.

The results show that the proposed system will effectively attenuate runoff up to the 1% AEP event and is therefore considered to effectively mitigate the effects of the development on stormwater quantity in accordance with the DCP.

Stormwater Quality

To minimise adverse impacts upon the ecology of the downstream watercourses, stormwater treatment devices have been incorporated into the design of the development. The adopted stormwater quality targets were as specified in Central Coast Council's Engineering Guidelines and are summarised in **Table 4**.

Table 4 – Required Water Quality Reductions

Pollution Criteria	% Target Reduction
Total Suspended Solids (TSS)	80
Total Phosphorous (TP)	45
Total Nitrogen (TN)	45
Gross Pollutants (GP)	90

The performance of the proposed stormwater management strategy was assessed against these targets using the conceptual design software MUSIC (Version 6). The MUSIC mode was developed using parameters recommended in the document "NSW Music Modelling Guidelines" (WBM, 2015), Central Coast Council Design Guidelines and the Central Coast Council MUSIC Link. depicts the MUSIC model developed.

Stormwater Treatment Train

The proposed stormwater treatment train for the lifestyle development is described below.

- Rainwater Tanks - Stormwater from the roof of each building will be collected in a rainwater tank for reuse in irrigation. 400kL has been sized for the total roof area of all proposed buildings and should be divided according to reuse requirements.
- Proprietary filtration device – a proprietary filtration device, SPEL filter or approved equivalent, has been proposed to provide treatment to runoff from the roof and podium of each building. Three filter cartridges per building have been deemed necessary to adequately remove fine sediment and suspended nutrients prior to discharging to the detention tanks.
- Gross Pollutant Trap (GPT) – a HG18 HumeGard or approved equivalent proprietary GPT has been proposed prior to the biofiltration basin inlet in order to remove gross pollutants and attached nutrients from the piped runoff.
- Biofiltration – a biofiltration basin was modelled with a minimum filter media area of 320m^2, a 100mm extended detention depth and 500mm filter depth. Stormwater runoff is to be directed to the basin via a pit and pipe network where, through infiltration, it will be treated before discharging to the wetland area at the southern end of the site.

A schematic of the MUSIC model for the site can be seen in Figure 1.

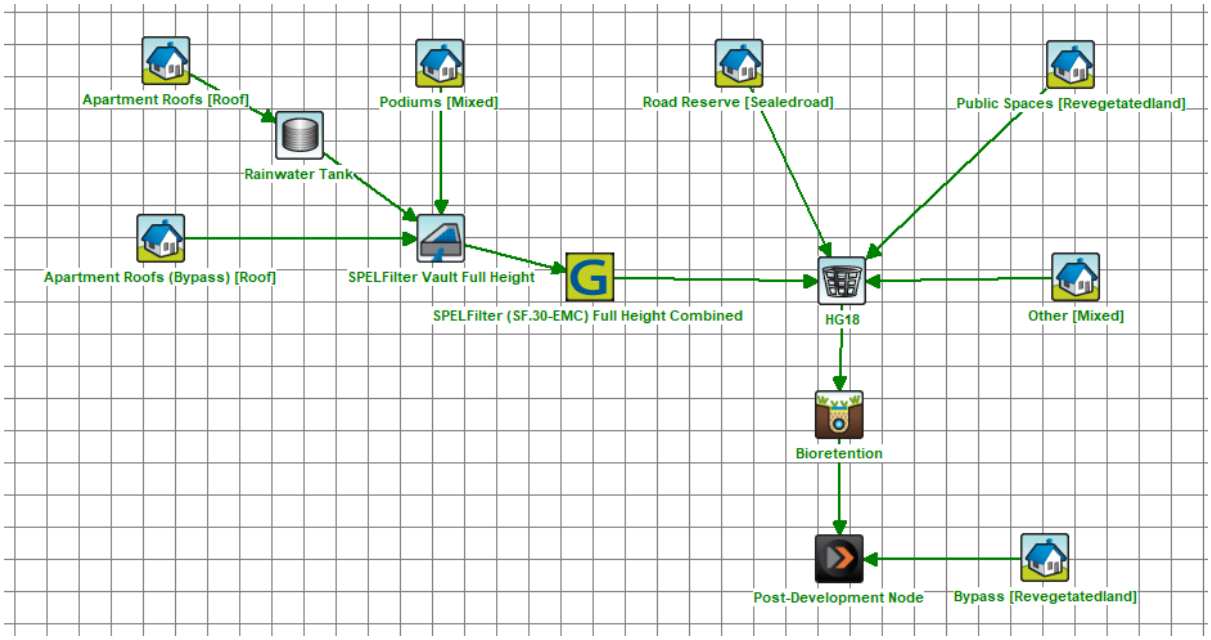


Figure 1 - MUSIC Model Schematics

Results of the MUSIC model is presented in Table 5.

Table 5 - MUSIC Model Results

	Source Loads (KG/YR)	Residual Loads (KG/YR)	% Achieved Reduction	% Target Reduction
TSS	7160	1170	83.6	80
TP	14	5	64.8	45
TN	107	47.4	55.8	45
GP	1190	31.3	97.4	90

Table 5 illustrates the proposed stormwater quality management strategy will achieve the required load reduction targets. A copy of the MUSIC Link report has been appended to the rear of this report.

Erosion Protection and Energy Dissipation

Rip-rap erosion protection has been utilised to prevent scour at the proposed headwall outlet. The energy dissipation device has been designed in accordance with the requirements outlaid in Catchments and Creeks 2014 guidelines 'Rock Sizing for Single Pipe Outlets'. The rip-rap has been sized using the outflow velocity for the 1% AEP (obtained from the DRAINS Model) and pipe diameter. A minimum length of 3m, mean rock size of 200mm and minimum rock pad thickness of 400mm was specified.

Flooding

Site levels have been raised to allow for drainage infrastructure and to ensure the proposed apartment floor levels meet the minimum habitable floor level of 33.48m AHD, in accordance with the Flood Information Certificate (see appended). A small portion of the site located in proposed APZ area is affected by 1% AEP flood extents. The batters of the combined bioretention and detention basin extend into the 1% AEP flood extent, please refer to further clarification prepared by BMT.

Preliminary Sewer and Water Servicing Advice

A request for servicing advice was made to the Central Coast Council on 31st July 2023, to determine the feasibility of connection to existing water and sewer infrastructure. At time of writing no response was received however a summary of known services and the design intent is provided below.

1. Water Servicing

It is proposed to upgrade the existing 100mm water main along Wallarah Road (see enclosed DBYD information) to a 200mm pipe. The site will be connected to the network via this upgraded water main.

2. Wastewater Servicing

There are three 150mm Council gravity sewer mains connected into the site as shown in the enclosed DBYD information. The existing Council gravity sewer mains on the northern side and western side of the village drains into SPS CH12 catchment and the eastern side drains into SPS CH09 catchment.

We are proposing to connect part of the development to each gravity sewer main, subject to Council advice. Based on an initial site investigation, the northern sewer main (BJ03) is above ground and may conflict with the proposed basin area. If this is the case, the sewer line will be concrete encased within the basin wall, and the basin designed to ensure the pipe is clear of the bioretention filter media. If council should require the basin to be clear of the existing pipe, there is availability for the basin to be resituated.

We trust this meets your expectations. Should you have any queries, please feel free to contact the undersigned.

Yours Sincerely,

Erin Holswich
Cadet Civil Engineer

Chris Piper

Principal | Civil Engineer

BEng (Civil) (Hons) MIEAust CPEng NER (Civil)

Appendix A – Supplementary Information

- MUSIC Link Report.
- Flood Information Certificate.
- Concept Stormwater Design
- Dial Before You Dig information

APPROXIMATE LOCATION OF COMBINED BIOFILTRATION AND DETENTION BASIN. PROVIDE BIOFILTRATION BASIN WITH MINIMUM FILTER MEDIA SURFACE AREA OF 320m^2.

MINIMUM BASIN VOLUME 500m^3

TOP SURFACE AREA 1,000m^3

EXTERNAL BASIN BATTERS AT MAXIMUM 1V:3H

INTERNAL BASIN BATTERS AT MAXIMUM 1V:4H

DETENTION TANK MINIMUM VOLUME 140m^3
3m^2 TANK WITH 3 SPELFILTER CARTRIDGES.

DETENTION TANK MINIMUM VOLUME 150m^3
3m^2 TANK WITH 3 SPELFILTER CARTRIDGES.

DETENTION TANK MINIMUM VOLUME 200m^3
3m^2 TANK WITH 3 SPELFILTER CARTRIDGES.

DETENTION TANK MINIMUM VOLUME 150m^3
3m^2 TANK WITH 3 SPELFILTER CARTRIDGES.

PROVIDE GROSS POLLUNTANT TRAP, HUMEGARD HG18 (OR APPROVED EQUIVALENT) AT STORMWATER OUTLET

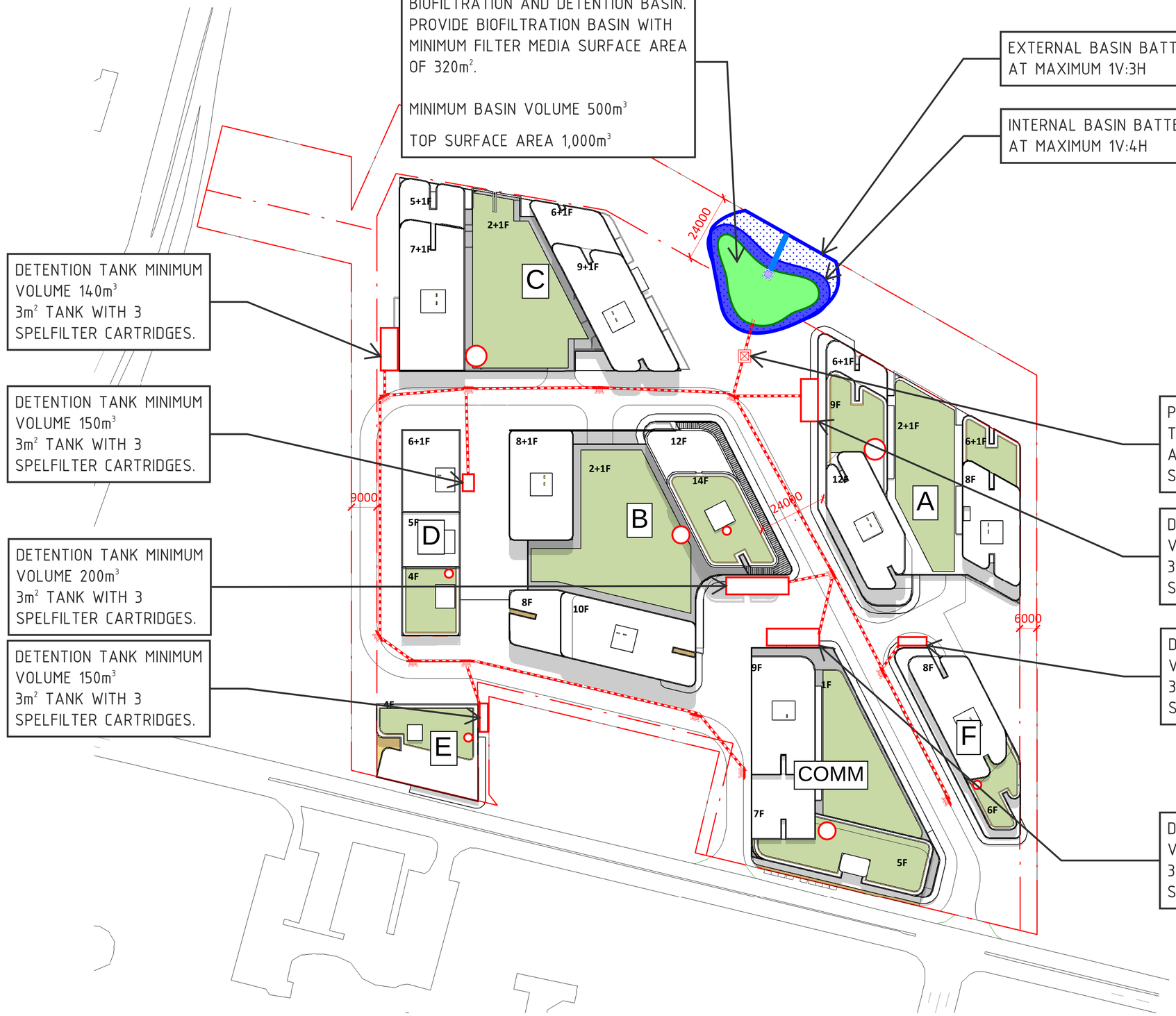
DETENTION TANK MINIMUM VOLUME 140m^3
3m^2 TANK WITH 3 SPELFILTER CARTRIDGES.

DETENTION TANK MINIMUM VOLUME 40m^3
3m^2 TANK WITH 3 SPELFILTER CARTRIDGES.

DETENTION TANK MINIMUM VOLUME 200m^3
3m^2 TANK WITH 3 SPELFILTER CARTRIDGES.

LEGEND

- DETENTION TANK
- RAINWATER TANK
- STORMWATER PIPE
- STORMWATER PIT



DRAWN: E.HOLSWICH DESIGNED: E.HOLSWICH JOB MANAGER: C.PIPER VERIFIER: -

REVISION	DESCRIPTION	ISSUED	VER'D	APP'D	DATE
2	CONCEPT STORMWATER DESIGN	EH		CP	12.09.23

CLIENT: Vivacity

DRAWING NOT TO BE USED FOR CONSTRUCTION UNLESS VERIFICATION SIGNATURE HAS BEEN ADDED

ARCHITECT: PTW ARCHITECTS PTW

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PROJECT: **OASIS REZONING APPLICATION 207-209 WALLARAH ROAD, KANWAL NSW 2259**

DRAWING TITLE: **CONCEPT STORMWATER DESIGN**

JOB NUMBER: **NL221828**

DRAWING NUMBER: **SK01**

REVISION: **2**

DRAWING SHEET SIZE = A1

MUSIC-*link* Report

Project Details		Company Details	
Project:	NL221828 Oasis Redevelopment	**Company:**	Northrop Consulting Engineers
Report Export Date:	11/09/2023	**Contact:**	Erin Holswich
Catchment Name:	NL221828_MUSIC_REDEV_EH_v2	**Address:**	207-209 Wallarah Road and 755-757 Pacific Highway, Kanwal
Catchment Area:	5.21ha	**Phone:**	49431777
Impervious Area*:	72.01%	**Email:**	eholswich@northrop.com.au
Rainfall Station:	66062 SYDNEY		
Modelling Time-step:	6 Minutes		
Modelling Period:	1/01/1974 - 31/12/1993 11:54:00 PM		
Mean Annual Rainfall:	1297mm		
Evapotranspiration:	1261mm		
MUSIC Version:	6.3.0		
MUSIC-link data Version:	6.34		
Study Area:	Lowland		
Scenario:	Central Coast Development		

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

Treatment Train Effectiveness

Node: Post-Development Node	Reduction
Flow	8.94%
TSS	83.2%
TP	64.5%
TN	55.5%
GP	97.4%

Treatment Nodes

Node Type	Number
Bio Retention Node	1
Rain Water Tank Node	1
Detention Basin Node	1
GPT Node	1
Generic Node	1

Source Nodes

Node Type	Number
Urban Source Node	7

Comments

Please note the following deviations from the MUSIC-Link parameters:

Impervious Area Rainfall Threshold - In accordance with the CCC Civil Works Design Guideline 2020, the rainfall threshold specific to roofs and roads was changed to 0.3 and 1.5, respectively, as specified in the MUSIC Modelling Guidelines.

Bioretention Total Nitrogen Content - The TN content was changed to 400mg/kg in accordance with the CCC Civil Works Design Guideline 2020.

SPELfilter Evaporative Loss as % of PET - 0% evaporative loss was modelled in accordance with Atlan (formerly SPEL) guidelines.

Passing Parameters

Node Type	Node Name	Parameter	Min	Max	Actual
Bio	Bioretention	Exfiltration Rate (mm/hr)	0	0	0
Bio	Bioretention	Extended detention depth (m)	0.1	0.3	0.1
Bio	Bioretention	Filter depth (m)	0.5	1	0.5
Bio	Bioretention	Orthophosphate Content in Filter (mg/kg)	40	50	40
Bio	Bioretention	PET Scaling Factor	2.1	2.1	2.1
Bio	Bioretention	Saturated Hydraulic Conductivity (mm/hr)	100	180	100
GPT	HG18	Hi-flow bypass rate (cum/sec)	None	99	0.528
Post	Post-Development Node	% Load Reduction	None	None	8.94
Post	Post-Development Node	GP % Load Reduction	90	None	97.4
Post	Post-Development Node	TN % Load Reduction	45	None	55.5
Post	Post-Development Node	TP % Load Reduction	45	None	64.5
Post	Post-Development Node	TSS % Load Reduction	80	None	83.2
Urban	Apartment Roofs	Baseflow Total Nitrogen Mean (log mg/L)	0.32	0.32	0.32
Urban	Apartment Roofs	Baseflow Total Phosphorus Mean (log mg/L)	-0.82	-0.82	-0.82
Urban	Apartment Roofs	Baseflow Total Suspended Solids Mean (log mg/L)	1.1	1.1	1.1
Urban	Apartment Roofs	Stormflow Total Nitrogen Mean (log mg/L)	0.3	0.3	0.3
Urban	Apartment Roofs	Stormflow Total Phosphorus Mean (log mg/L)	-0.89	-0.89	-0.89
Urban	Apartment Roofs	Stormflow Total Suspended Solids Mean (log mg/L)	1.3	1.3	1.3
Urban	Apartment Roofs (Bypass)	Baseflow Total Nitrogen Mean (log mg/L)	0.32	0.32	0.32
Urban	Apartment Roofs (Bypass)	Baseflow Total Phosphorus Mean (log mg/L)	-0.82	-0.82	-0.82
Urban	Apartment Roofs (Bypass)	Baseflow Total Suspended Solids Mean (log mg/L)	1.1	1.1	1.1
Urban	Apartment Roofs (Bypass)	Stormflow Total Nitrogen Mean (log mg/L)	0.3	0.3	0.3
Urban	Apartment Roofs (Bypass)	Stormflow Total Phosphorus Mean (log mg/L)	-0.89	-0.89	-0.89
Urban	Apartment Roofs (Bypass)	Stormflow Total Suspended Solids Mean (log mg/L)	1.3	1.3	1.3
Urban	Bypass	Baseflow Total Nitrogen Mean (log mg/L)	-0.05	-0.05	-0.05
Urban	Bypass	Baseflow Total Phosphorus Mean (log mg/L)	-1.22	-1.22	-1.22
Urban	Bypass	Baseflow Total Suspended Solids Mean (log mg/L)	1.15	1.15	1.15
Urban	Bypass	Stormflow Total Nitrogen Mean (log mg/L)	0.3	0.3	0.3
Urban	Bypass	Stormflow Total Phosphorus Mean (log mg/L)	-0.66	-0.66	-0.66
Urban	Bypass	Stormflow Total Suspended Solids Mean (log mg/L)	1.95	1.95	1.95
Urban	Other	Baseflow Total Nitrogen Mean (log mg/L)	0.11	0.11	0.11
Urban	Other	Baseflow Total Phosphorus Mean (log mg/L)	-0.85	-0.85	-0.85
Urban	Other	Baseflow Total Suspended Solids Mean (log mg/L)	1.2	1.2	1.2
Urban	Other	Stormflow Total Nitrogen Mean (log mg/L)	0.3	0.3	0.3
Urban	Other	Stormflow Total Phosphorus Mean (log mg/L)	-0.6	-0.6	-0.6
Urban	Other	Stormflow Total Suspended Solids Mean (log mg/L)	2.15	2.15	2.15
Urban	Podiums	Baseflow Total Nitrogen Mean (log mg/L)	0.11	0.11	0.11
Urban	Podiums	Baseflow Total Phosphorus Mean (log mg/L)	-0.85	-0.85	-0.85
Urban	Podiums	Baseflow Total Suspended Solids Mean (log mg/L)	1.2	1.2	1.2
Urban	Podiums	Stormflow Total Nitrogen Mean (log mg/L)	0.3	0.3	0.3

Only certain parameters are reported when they pass validation

Node Type	Node Name	Parameter	Min	Max	Actual
Urban	Podiums	Stormflow Total Phosphorus Mean (log mg/L)	-0.6	-0.6	-0.6
Urban	Podiums	Stormflow Total Suspended Solids Mean (log mg/L)	2.15	2.15	2.15
Urban	Public Spaces	Baseflow Total Nitrogen Mean (log mg/L)	-0.05	-0.05	-0.05
Urban	Public Spaces	Baseflow Total Phosphorus Mean (log mg/L)	-1.22	-1.22	-1.22
Urban	Public Spaces	Baseflow Total Suspended Solids Mean (log mg/L)	1.15	1.15	1.15
Urban	Public Spaces	Stormflow Total Nitrogen Mean (log mg/L)	0.3	0.3	0.3
Urban	Public Spaces	Stormflow Total Phosphorus Mean (log mg/L)	-0.66	-0.66	-0.66
Urban	Public Spaces	Stormflow Total Suspended Solids Mean (log mg/L)	1.95	1.95	1.95
Urban	Road Reserve	Baseflow Total Nitrogen Mean (log mg/L)	0.11	0.11	0.11
Urban	Road Reserve	Baseflow Total Phosphorus Mean (log mg/L)	-0.85	-0.85	-0.85
Urban	Road Reserve	Baseflow Total Suspended Solids Mean (log mg/L)	1.2	1.2	1.2
Urban	Road Reserve	Stormflow Total Nitrogen Mean (log mg/L)	0.34	0.34	0.34
Urban	Road Reserve	Stormflow Total Phosphorus Mean (log mg/L)	-0.3	-0.3	-0.3
Urban	Road Reserve	Stormflow Total Suspended Solids Mean (log mg/L)	2.43	2.43	2.43

Only certain parameters are reported when they pass validation

Failing Parameters

Node Type	Node Name	Parameter	Min	Max	Actual
Bio	Bioretention	Total Nitrogen Content in Filter (mg/kg)	750	950	400
Detention	SPELFilter Vault Full Height	Evaporative Loss as % of PET	100	100	0
Urban	Apartment Roofs	Impervious Area Rainfall Threshold (mm/day)	1	1	0.3
Urban	Apartment Roofs (Bypass)	Impervious Area Rainfall Threshold (mm/day)	1	1	0.3
Urban	Road Reserve	Impervious Area Rainfall Threshold (mm/day)	1	1	1.5

Only certain parameters are reported when they pass validation

Flood Information Certificate

Property Address:	207-209 Wallarah Rd, KANWAL
Lot /DP:	1223/DP1004170
Date Prepared:	9 September 2022
Source of information:	Porters Creek Floodplain Risk Management Study and Plan, 2012

This Flood Certificate provides advice furnished in good faith by the council relating to the likelihood of the land identified above being flooded and to the nature or extent of any such flooding ("flood risk") .

Flood level and flood planning advice is provided in the tables below and as maps in the Appendix. This advice regarding flood risk has been derived from the flood study listed above. Should you have any enquiries concerning this certificate, please do not hesitate to contact Andrew Dewar on 1300 463 954 during the hours of 8.00am to 4.15pm Monday to Friday

Flood Level Information Table

Flood Event	Minimum Level (m AHD)	Maximum Level (m AHD)
PMF	31.87	33.18
1% AEP	31.64	32.98
5% AEP	31.59	32.95

Planning Information Table

Flood Control Lot	☒
Minimum Habitable Floor Level	33.48m AHD
Complying Development: Flood Exclusionary Categories	
(a) Flood Storage Area	☐
(b) Floodway Area	☒
(c) Flow Path	☐
(d) High Hazard Area (H3, H4, H5, H6 Hazard Categorisation)	☐
(e) High Risk Area	☐

Central Coast Council
P 1300 463 954 I **E** ask@centralcoast.nsw.gov.au

Flood Information Certificate

Minimum Habitable Floor Level in the Planning Information Table above is also known as the Flood Planning Level. It is derived from the maximum 1% AEP Flood Level plus 0.5m freeboard and an allowance for sea level rise if applicable. For large lots the maximum 1% AEP flood level may vary across the lot; as such the Minimum Habitable Floor Level would vary at different locations on the lot, which may result in a lower Minimum Habitable Floor Level than the one quoted in the Planning Information Table. Note that Minimum Habitable Floor Levels are based on a flood size that has a 1% chance each year of either being reached or exceeded. Larger floods still have a small chance of occurring. For this reason, Council recommends that property owners consider the merits of choosing a floor level above the minimum floor level if practical to do so.

Flood Mapping related to this address is included in the Appendix. On the Environmental Layers you can choose to view 1% AEP (1 in 100y) flood extents, as well as Flood Precincts, which are referred to in the Development Control Plan.
https://maps.centralcoast.nsw.gov.au/public/

Development Controls set appropriate floor levels, construction materials, pedestrian and vehicular access, car parking and impacts on surrounding property for a proposed development; either complying development (fast tracked - see below) or a DA. Council's development controls vary depending on the location:

- Former Gosford: LEP 2014 Clauses 5.21 & 7.3, DCP 2013 Chapter 6.7
- Former Wyong: LEP 2013 Clauses 5.21 & 7.3, DCP 2013 Chapter 3.3

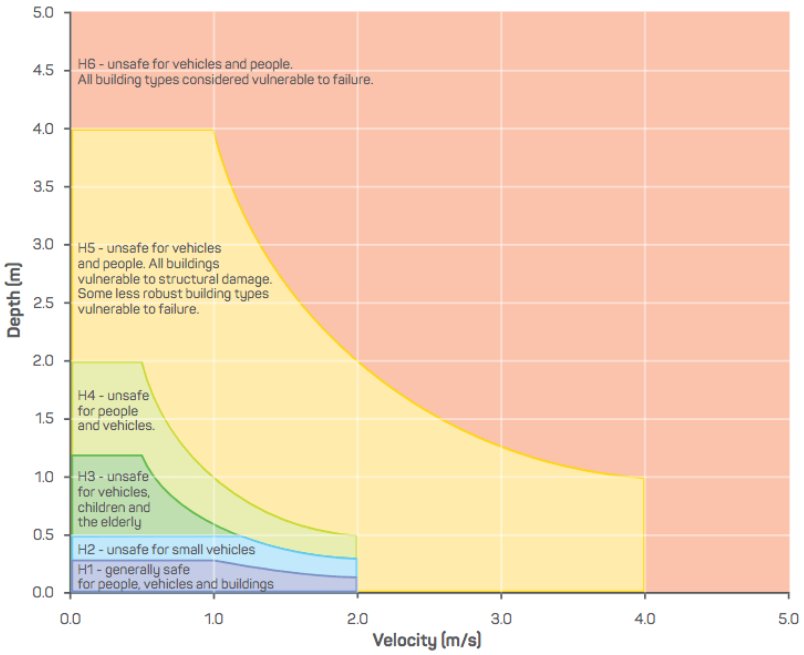
https://www.centralcoast.nsw.gov.au/plan-and-build/planning-controls-and-guidelines

Complying Development is a fast-track approval process for straightforward residential, commercial and industrial development (e.g. Granny Flats). From 1 July 2021, all Complying Development Certificate (CDC) applications must be lodged through the online NSW Planning Portal. If the application meets specific criteria it can be determined by a registered certifier. Under Clause 3A.38 of the Codes SEPP 2008 Development must not be carried out on any part of a *flood control lot* that is considered to be in one of the following exclusionary categories: (a) flood storage area, (b) floodway area, (c) flow path, (d) high hazard area, (e) high risk area. Complying Development may be allowable at this address if none of the five flood exclusionary categories in the Planning Information Table above are marked "Yes".
https://www.planning.nsw.gov.au/Assess-and-Regulate/Development-Assessment/Planning-Approval-Pathways/Complying-development

Flood Hazard: Flooding has the potential to cause loss: loss of life, injury or economic loss. The degree of hazard varies with the severity of flooding and is affected by flood behaviour (extent, depth, velocity, isolation, rate of rise of floodwaters, duration), topography and emergency management.

Council classifies flood hazard using thresholds related to the stability of people as they walk or drive through flood waters, or shelter in a building during a flood. This method classifies hazard on a spectrum of H1 to H6 as described by the hazard vulnerability curves below. For further information refer to: Flood Hazard: Guideline 7.3, Australian Institute for Disaster Resilience 2017 https://knowledge.aidr.org.au/media/3518/adr-guideline-7-3.pdf

Flood Information Certificate



Source – Australian Institute for Disaster Resilience 2017. Hydraulic Hazard: refer also to Australian Rainfall and Runoff Section 7.2.7 General Flood Hazard Curves (Figure 6.7.9) http://book.arr.org.au.s3-website-ap-southeast-2.amazonaws.com/

Disclaimers

a. This certificate is based on Council's relevant flood study, which covers a large area and utilises *airborne laser scanning* ground level data. Flood depths as shown on the maps at specific locations may not accurately account for localised changes in ground topography; the accuracy of flood depth information at a specific location may be improved by taking the flood level and subtracting the accurate ground level at a particular location, which could be established by a Registered Surveyor.

b. Without limiting s.733 of the *Local Government Act* 1993, Council expressly disclaims all and any liability and responsibility in respect of loss, damage or injury to person or property arising from anything done or omitted to be done by any person in reliance, whether wholly or in part, upon any part of this information. Any person having regard to the information contained in this document is encouraged to seek, at their discretion, all other sources of information on the subject matter as they consider appropriate, which may include local knowledge and/or professional advice.

c. Council does not, and cannot, warrant that it will, in its capacity as a consent authority under the *Environmental Planning and Assessment Act 1979*, grant consent to a DA that seeks to erect or use dwellings or other structures on the above property that conform with the levels set out in the above information. Council assesses DAs based on merit, which must consider various development controls as set out in the LEP and DCP. For any development proposal on a *Flood Control Lot* Council recommends the applicant to engage the services of a professional engineer who specialises in Flood Risk Management.

Flood Information Certificate

Glossary

AEP	*Annual Exceedance Probability*: The probability of a flood event of a given size occurring in any one year, usually expressed as a percentage. For example, the 1% AEP flood has a 1% probability of occurring in any given year. This flood is sometimes referred to as 1 in 100, 100yr ARI or Q100
AHD	*Australian Height Datum* is the reference level for defining ground levels in Australia. The level of 0.0m AHD is approximately mean sea level.
Airborne Laser Scanning	A ground level measurement system in which a laser is emitted from an instrument in an aircraft and directed to the ground in a scanning pattern
DA	Development Application
DCP	Development Control Plan
Flood Control Lot	A land parcel that is subject to flood related development controls
Flood Hazard	Flooding which has the potential to cause loss: loss of life, injury or economic loss. The degree of hazard varies with the severity of flooding and is affected by flood behaviour (extent, depth, velocity, isolation, rate of rise of floodwaters, duration), topography and emergency management.
Flood Storage Area	Areas that are important for the temporary storage of floodwaters during the passage of flood.
Floodway Area	Those areas where a significant volume of water flows during floods.
Flow Path	Those areas where a flow path is identified in the relevant flood study, generally associated with velocities greater than 1 metre per second in the 1% AEP flood.
Freeboard	A factor of safety used in relation to the setting of floor levels. The typical freeboard set by the NSW Government is 0.5m, unless Council can demonstrate a different freeboard can apply as defined in an adopted Floodplain Risk Management Plan.
Ground Levels	Highest and lowest ground levels on the property, predominately based on ground level information databases created by *Airborne Laser Scanning*. A Registered Surveyor can confirm exact ground levels.
High Hazard Area	Those areas where flooding has the potential to be unsafe or cause damage. Council considers those areas that are Hazard Category H3 or above in a 1% AEP flood to be high hazard. Refer to Section on Flood Hazard below.
High Risk Area	Those areas of high flood risk as identified in a flood study or Floodplain Risk Management Plan.
LEP	Local Environment Plan
PMF	The *Probable Maximum Flood* is an extreme flood deemed to be the largest flood that could conceivably occur at a specific location. It is generally not physically or economically possible to provide complete protection against this flood event but should be considered for emergency response. The PMF defines the extent of flood prone land (i.e. the floodplain).

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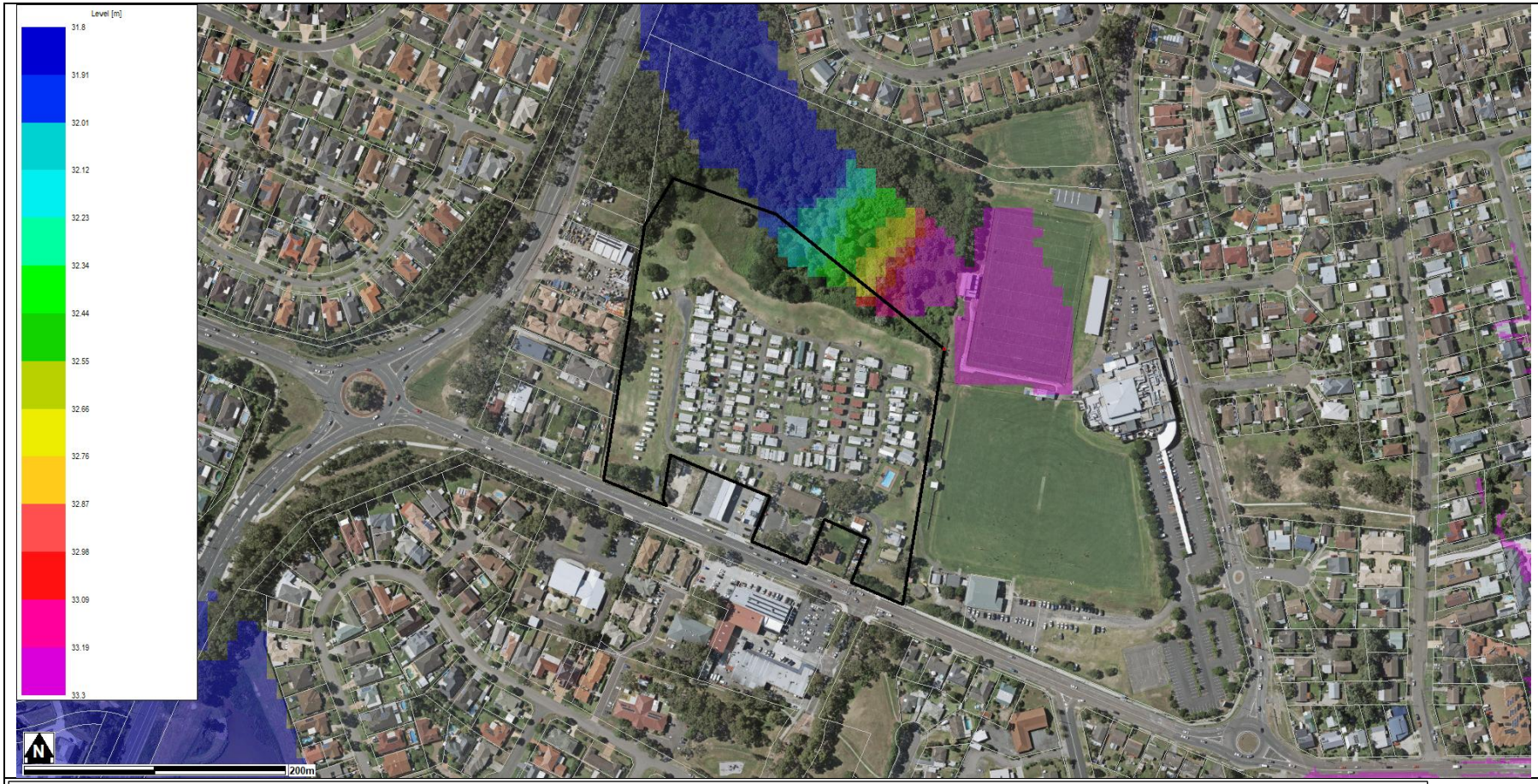
Flood Information Certificate

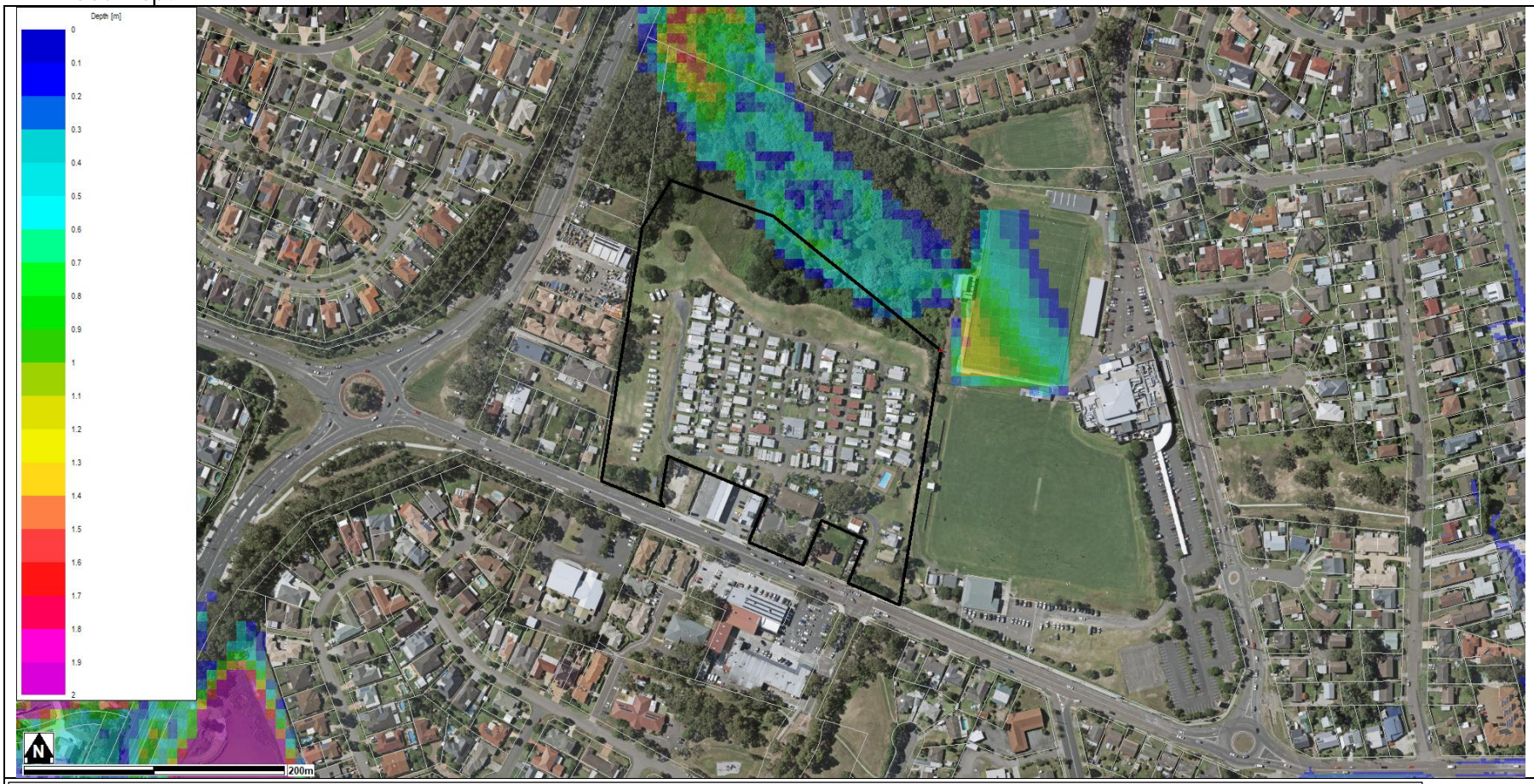
PMF Flood Extents



Phone: 1300 463 954 I **Email:** ask@centralcoast.nsw.gov.au I ABN 73 149 644 003
Wyong Office: 2 Hely St / PO Box 20 Wyong NSW 2259 **Gosford Office:** 49 Mann St / PO Box 21 Gosford NSW 2250

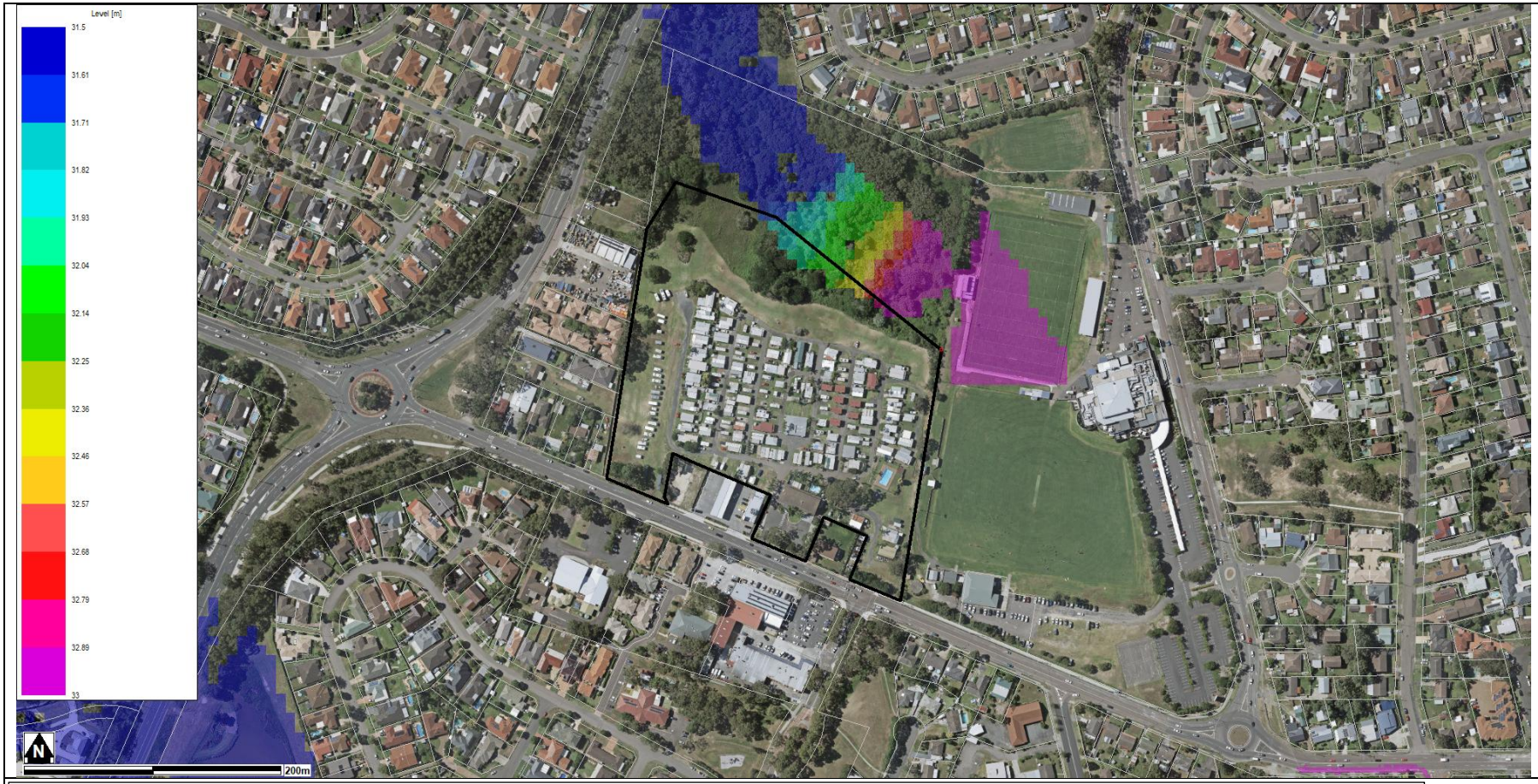
Flood Information Certificate

PMF Flood Depth



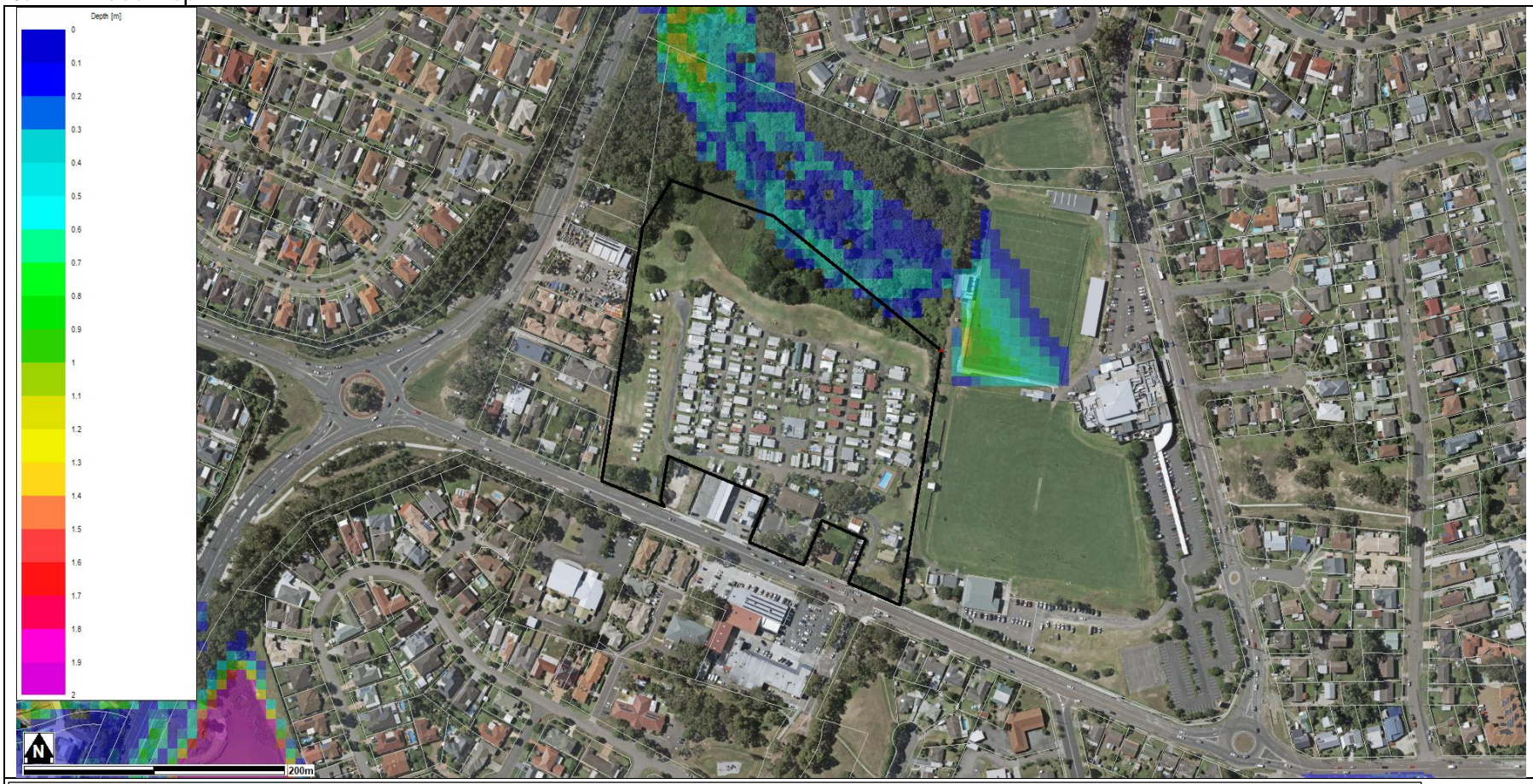
Flood Information Certificate

1% AEP Flood Extents



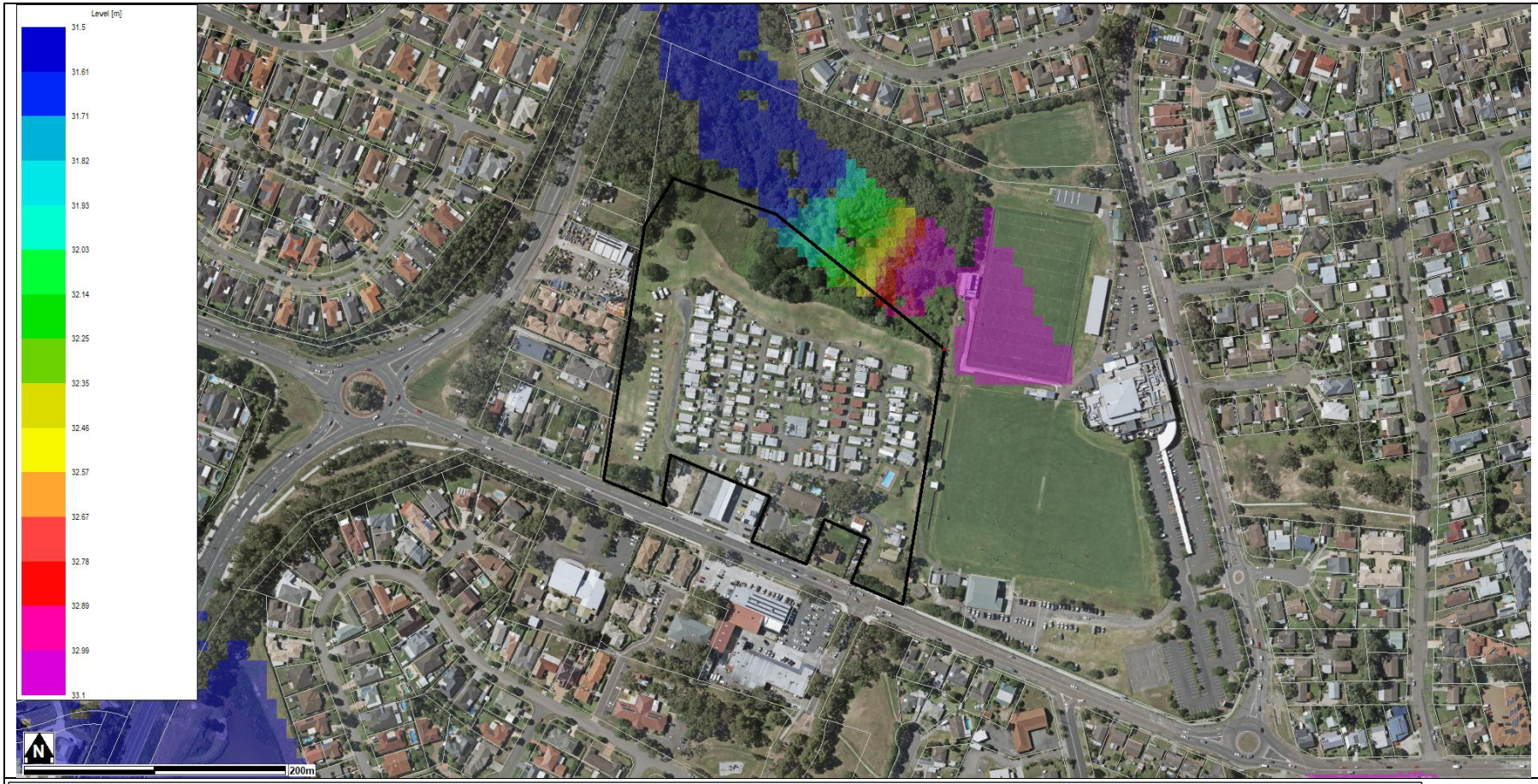
Flood Information Certificate

1% AEP Flood Depth



Flood Information Certificate

5% AEP Flood Extents



DISCLAIMER

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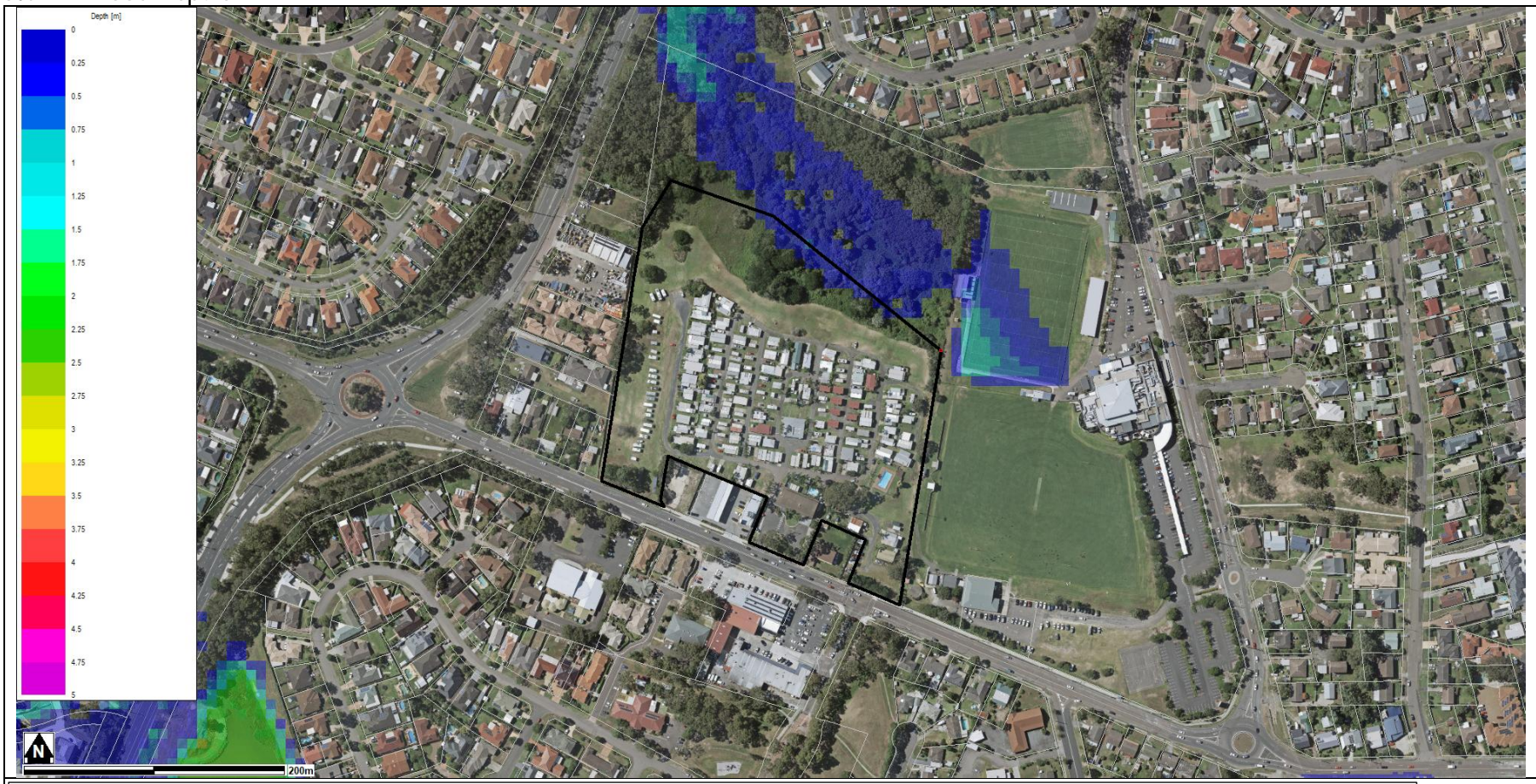
Flood Information Certificate

5% AEP Flood Depths



Flood Information Certificate

1% AEP Hazard Categorisation

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Flood Information Certificate

Hydraulic Categorisation

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Sequence No: 215153978
Job No: 32585962
Location: 207 Wallarah Road, Kanwal, NSW 2259

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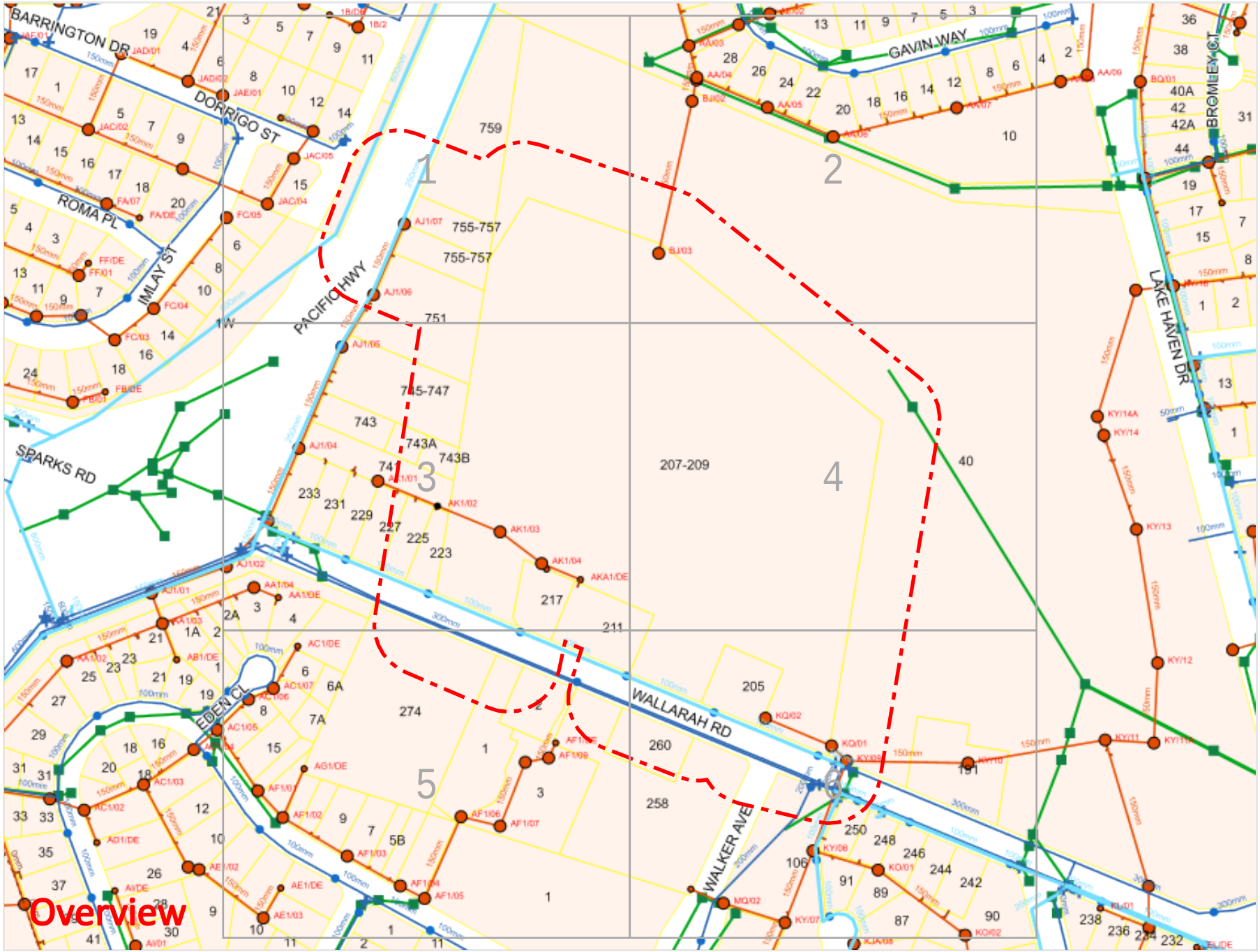

Legend

- Watermain
- Watermain (Asbestos)
- Watermain - Expired
- Watermain - Expired (Asbestos)
- Water Valve
- Watermain - Recycled
- Water Hydrant
- Sewer Service Connection
- Sewer Pressure Main
- Sewer Pressure Main- Expired
- Sewer Network Structures
- Sewer Maintenance Hole
- Sewer Dead End
- Sewer Lamphole
- Sewer Gravity Main
- Sewer Gravity Main (Asbestos)
- Sewer Gravity Main - Expired
- Drainage Pit
- Drainage Pipe
- Drainage Pipe - Expired
- Drainage Culverts
- Drainage Culverts - Expired

N

Scale: 1:3075
Expires: 21 Sep 2022

Central Coast Council

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Location: 207 Wallarah Road, Kanwal, NSW 2259

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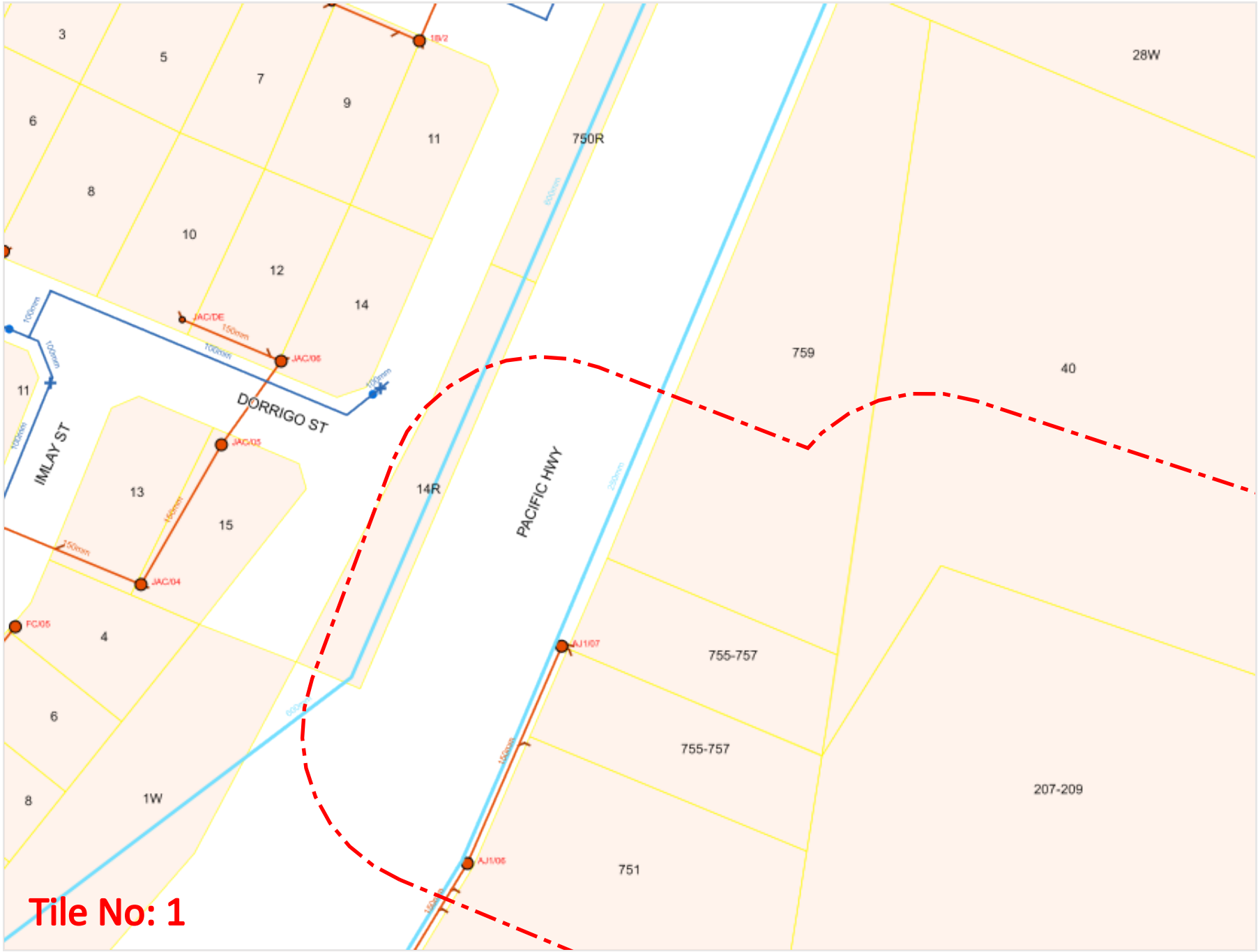

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N

Scale: 1:1000
Expires: 21 Sep 2022

Central Coast Council

Sequence No: 215153978
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Location: 207 Wallarah Road, Kanwal, NSW 2259

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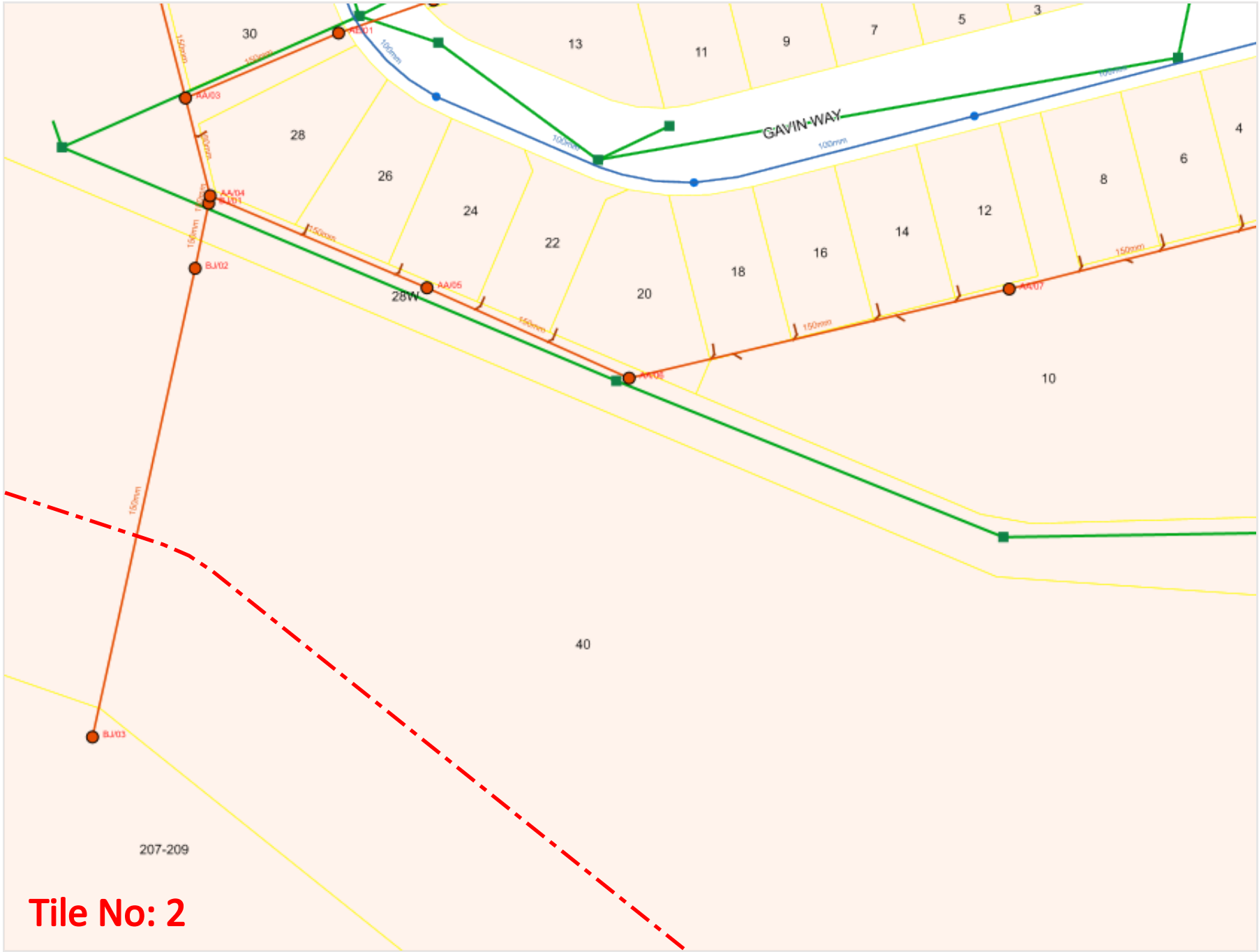

Tile No: 2

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- Drainage Culverts
- Drainage Culverts - Expired

N

Scale: 1:1000
Expires: 21 Sep 2022

DISCLAIMER: While reasonable measures have been taken to ensure the accuracy of the information contained in this plan response, neither Central Coast Council nor PelicanCorp shall have any liability whatsoever in relation to any loss, damage, cost or expense arising from the use of this plan response or the information contained in it or the completeness or accuracy of such information. Use of such information is subject to and constitutes acceptance of these terms.

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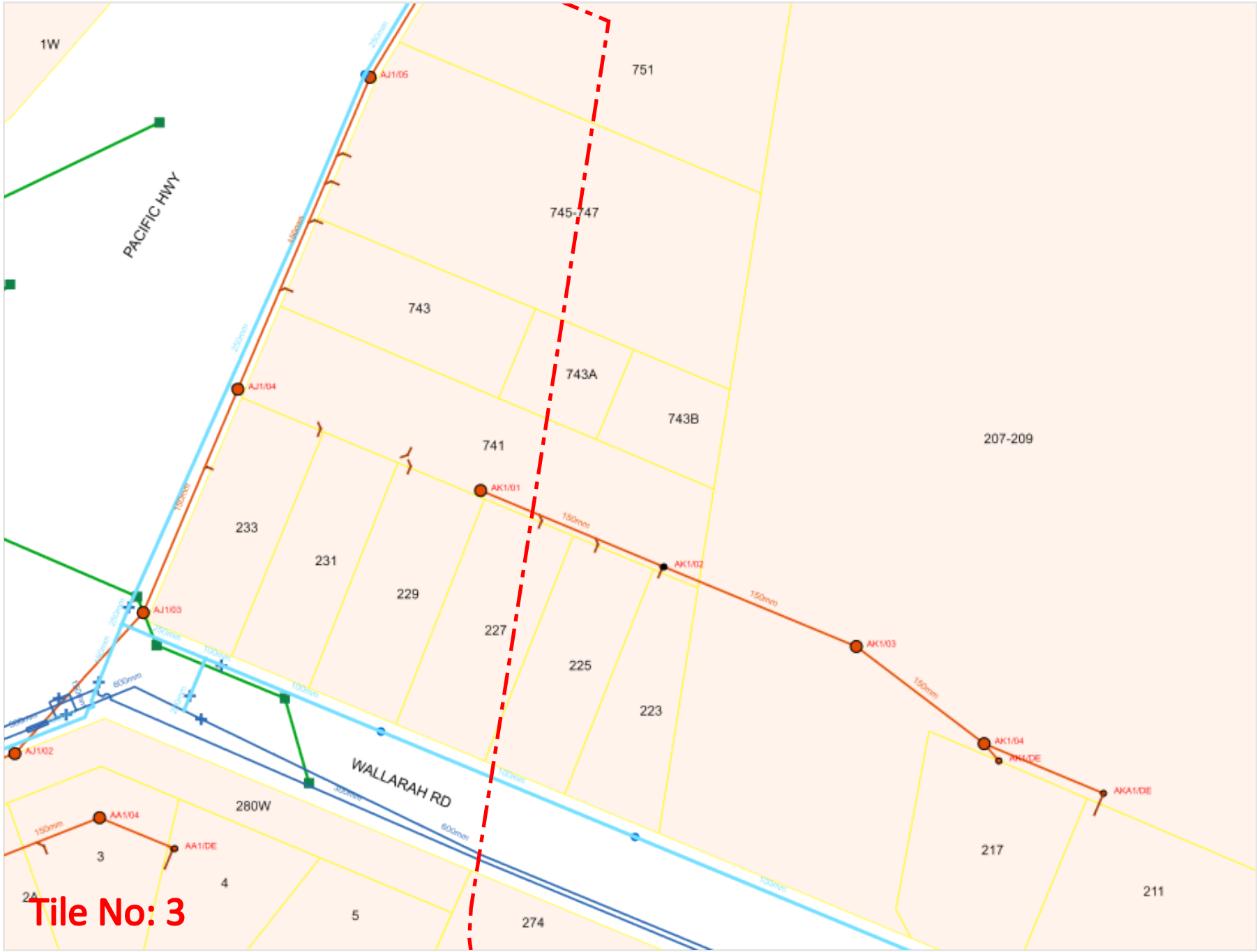

Tile No: 3

Legend

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Scale: 1:1000
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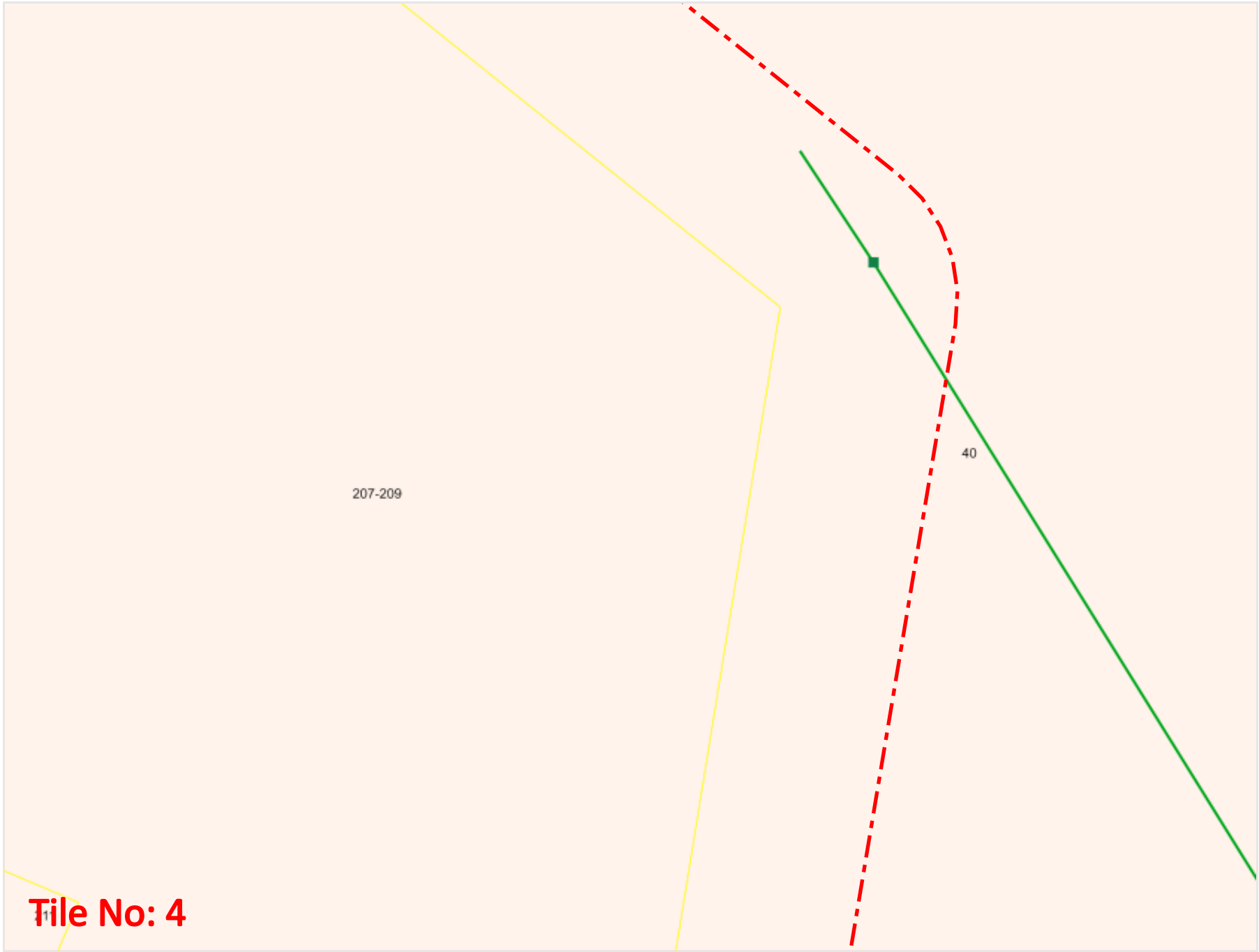

Tile No: 4

Legend

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N

Scale: 1:1000
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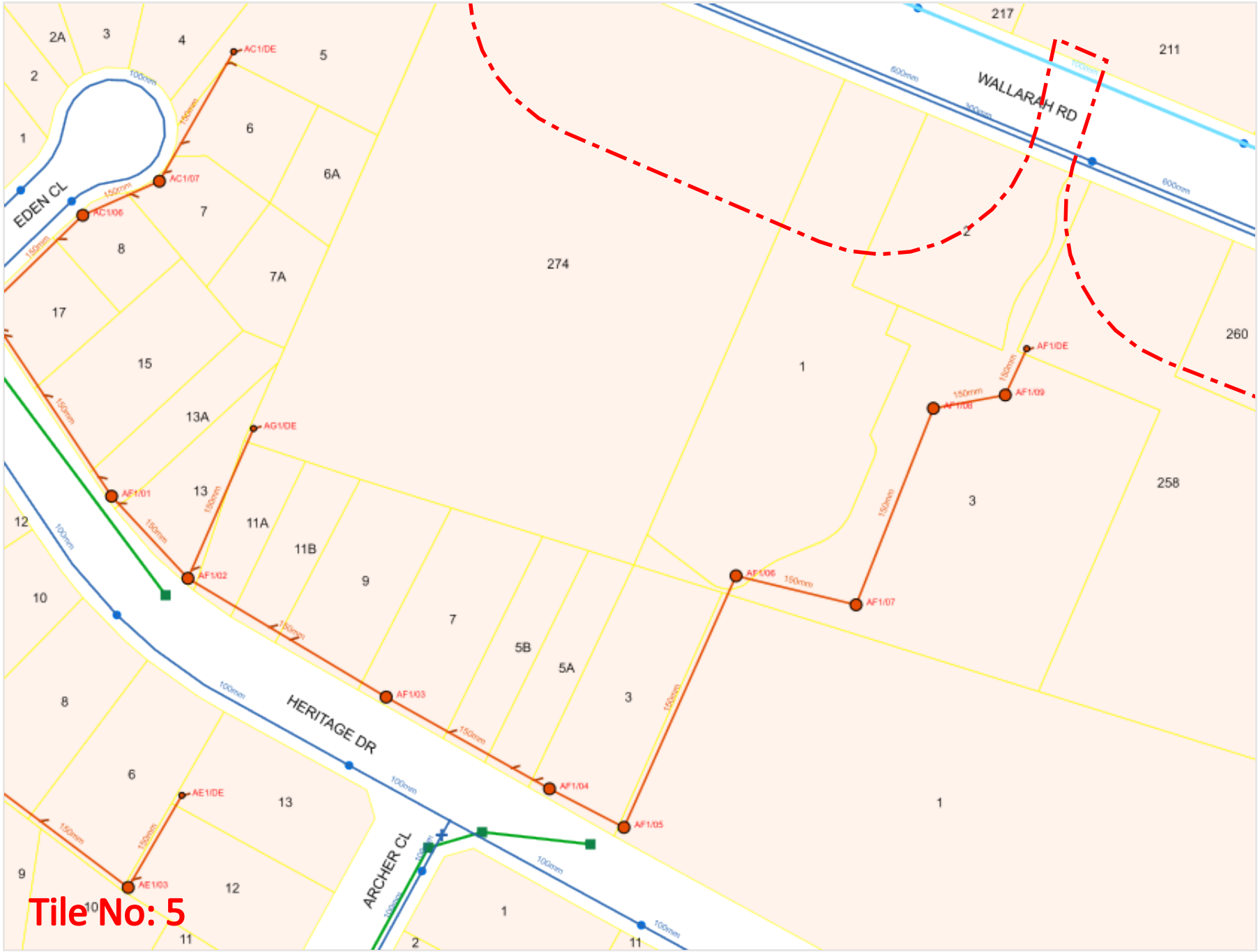

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N

Scale: 1:1000
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Central Coast Council

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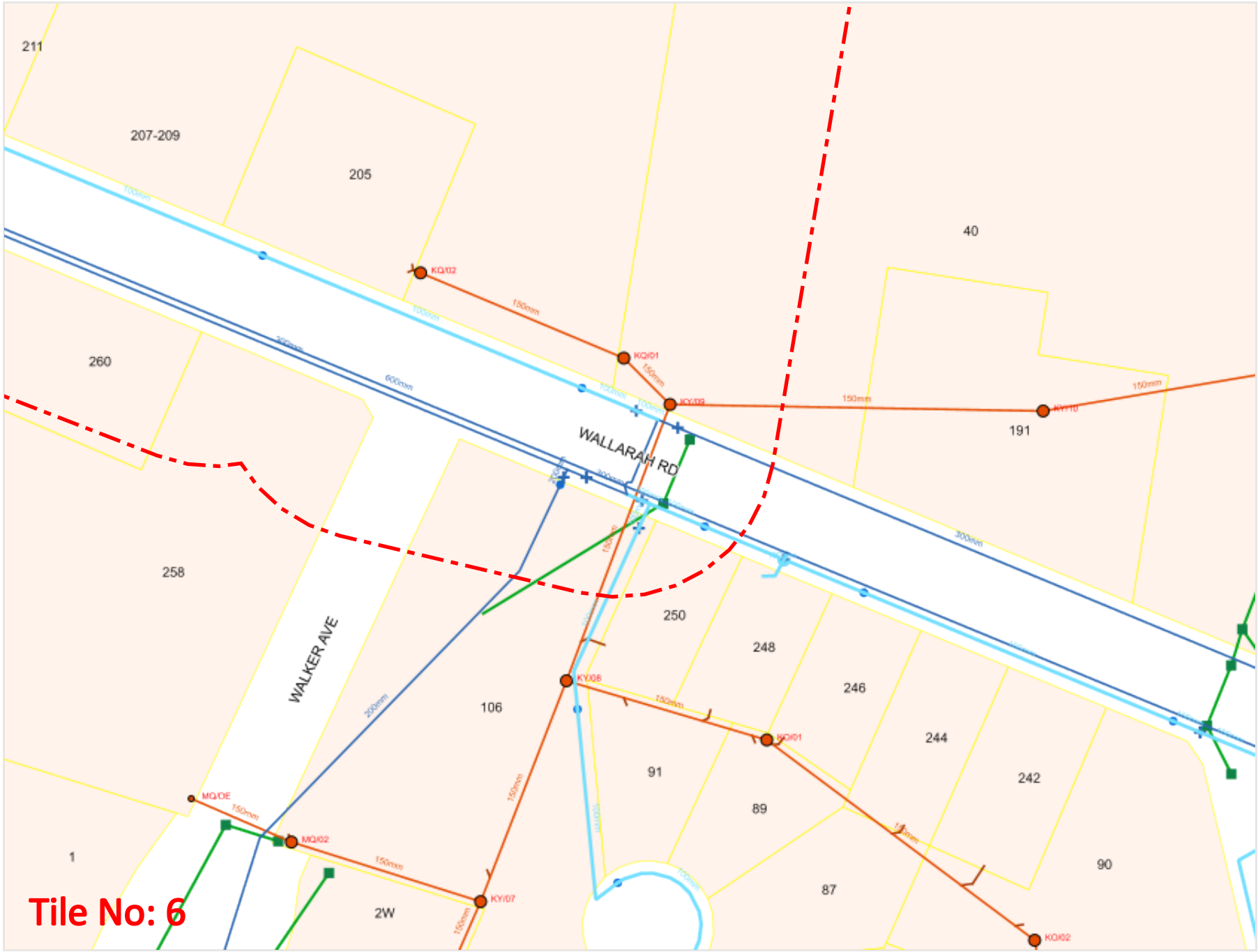

Tile No: 6

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- Drainage Culverts
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N

Scale: 1:1000
Expires: 21 Sep 2022

Power Solutions (NSW) Pty Ltd
C106/215 Pacific Highway
Charlestown NSW 2290
Australia
projects@powersol.com.au
1300 732 293
www.powersol.com.au
17/08/2023

Vivacity Property Group
PO Box H72
Australia Square NSW 1215

Attention: Tom Copping

Project Reference: 5954
Electrical Service Report Oasis Redevelopment, 207-209 Wallarah Road, Kanwal

Dear Tom,

Power Solutions has been engaged to provide an electrical service report for the proposed development at 207—209 Wallarah Road, Kanwal.

Electrical Demand

After review of the load requirements for the development (provided via email 09/08/23), an electrical demand of 3.9 MVA (5428 LV Amps) was estimated.

Existing Ausgrid Infrastructure

There are two HV feeders present along Wallarah Rd, adjacent to the proposed site. These feeders are PA13 and PA9, both originating at zone substation ZN14892. PA9 currently services 15 distribution substations, allowing capacity to potentially service the development. PA13 currently services approx. 24 distribution substations and would have low chances of servicing the development. The actual capacity on these feeders would need to be determined via an Ausgrid Preliminary Enquiry. If capacity was not available on either of these feeders, a new feeder from ZN14892 (approx. 1.5km) may be required.

Proposed Electrical Servicing

As discussed above, the site is estimated to require 3.9MVA. Using this demand, a total of 4 x 1000kVA substations will be required to service the development. These substations are to be looped into feeder PA9 overhead conductors via overhead to underground transitions (UGOH's) along Wallarah Rd. Two pole replacements will be required to facilitate this arrangement.

Proposed NBN Servicing

The area is currently serviced by Fibre to the Node (FTTN) technology. We expect NBN will insist on connecting the new development to the existing fibre optic network for Fibre to the Premises (FTTP) connection. This will require approximately 550m of pit and pipe installation along Walker Ave.

Next Steps

An Ausgrid Preliminary Enquiry will be required to determine the existing capacity in the network.
Once network upgrades are determined, a certified ASP3 design will be required before electrical servicing works can begin. Power Solutions would be happy to provide a fee proposal for Ausgrid Preliminary Enquiry submission and ASP3 design.

An NBN Development Application will need to be submitted to determine the scope of works required.

Kind Regards,

Ben Dennis
Electrical Engineer
Power Solutions (NSW) Pty Ltd
bdennis@powersol.com.au