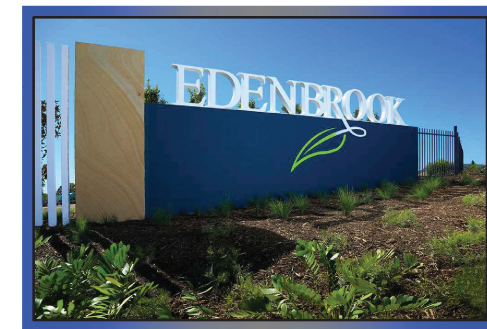
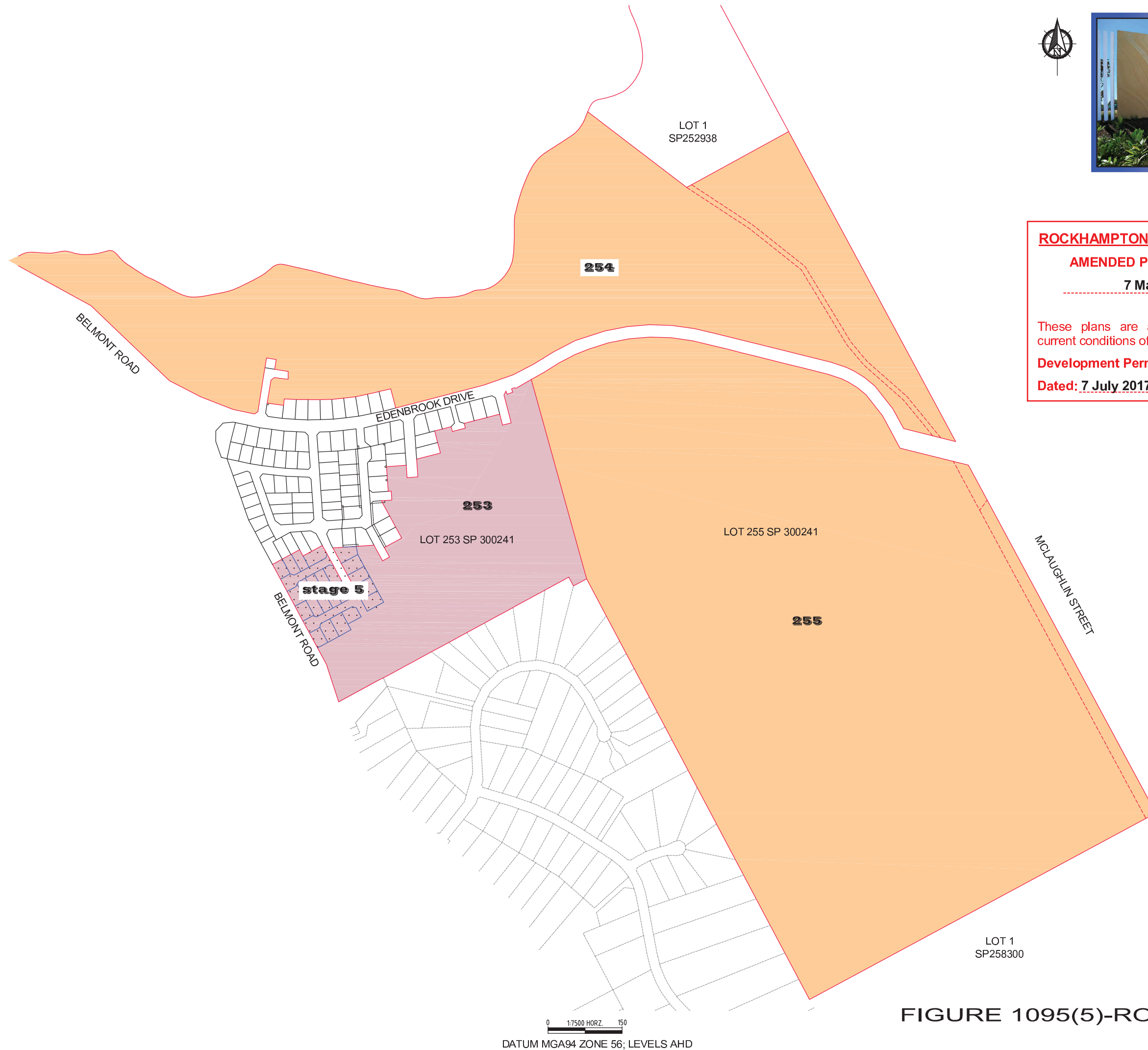


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AMENDED PLANS APPROVED

7 March 2018

DATE

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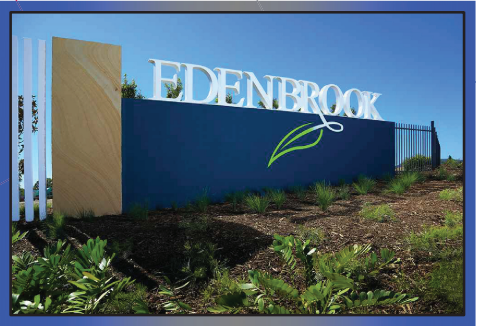
Development Permit No.: D/27-2017

Dated: 7 July 2017

LEGEND EASEMENTS:

SEWER EASEMENT

SEWER & STORM WATER (ROOF WATER)



ROCKHAMPTON REGIONAL COUNCIL

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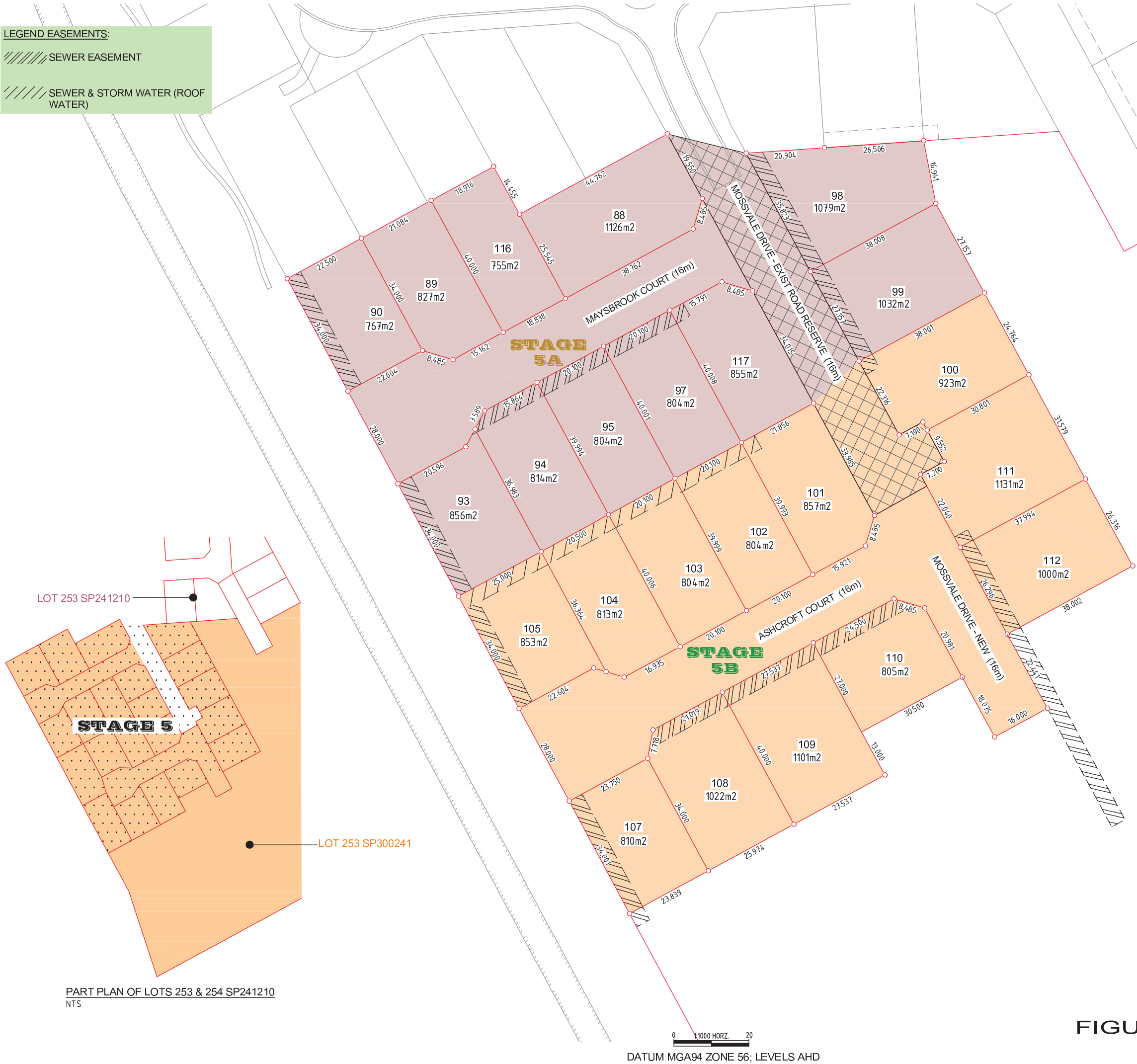
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Dated: 7 July 2017



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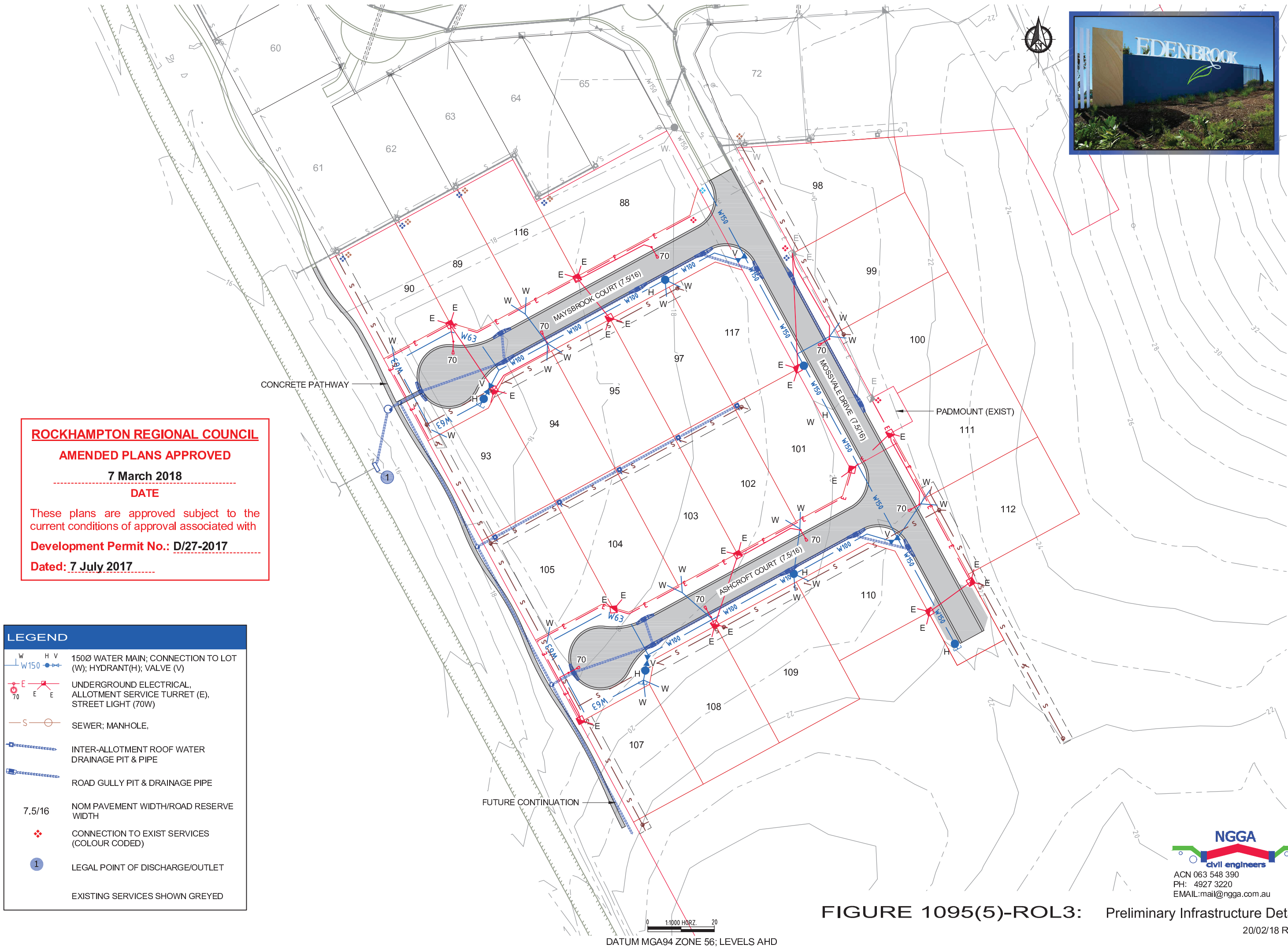
civil engineers

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FIGURE 1095(5)-ROL2: Proposal Plan

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1. REFERENCES STORM WATER MANAGEMENT & HEALTHY WATERWAY REQUIREMENTS

The site based storm water management plan has been based on the following publications and guidelines:

- Healthy Waters Music Modeling Guidelines (HWMMG).
- State Planning Policy April 2016 (SPP)
- Queensland Urban Drainage Manual (QUDM)
- Water Sensitive Urban Design (WSUD)
- Storm water quality improvement devices are referred to as SQUID's.

2. OPPORTUNITIES, CONSTRAINTS & PRECEDENTS

The type of development complies with the Council standards for Residential subdivisional works. This development is the continuation of a staged development.

The principal pollutants likely to be generated from the site development will be hydrocarbons, metals, sediment and nutrients such as nitrogen and phosphorus fixed to the sediments.

- This development is part of a staged development. Existing downstream stages have either been constructed, are being constructed or approved for construction. Part of this stage connects to the existing downstream drainage system with previously constructed and approved storm water improvement devices (SQUID's) and has been included in the treatment capacities of the existing SQUID's;
- The existing downstream developments include underground storm water drainage collection systems that have been sized for a 1 in 10 year design storm and incorporate in-line SQUIDs sized for the ultimate catchment area(s);
- Road and allotment layout and sizing, soil types and functionality requirements precludes the practical and feasible use of above ground in-line and end of line SQUIDs (vegetated swales; bioretention beds; wetlands) installed in the road verge area;
- Current best practice policies in Queensland generally acknowledge that other than for small selected infill developments or specific isolated areas such as the central area of large roundabouts, the use of above ground SQUIDs (vegetated swales; bioretention beds) located within the road reserves, generally in the road verge area, are not a long term successful option and are high long term maintenance;
- Council can adopt and set storm water quality targets different to the those recommended in the State Planning Policy if considered more appropriate to the the site and available opportunities and constraints; and
- The storm water management strategy proposed for these current stages is the continuation of the same adopted and approved by Council for the existing constructed stages. Outlet/area 2 has already been included in the treatment provided for the constructed downstream stages.

3. RECEIVING WATERS

The nominated receiving waterway is Ramsay Creek. Although some infiltration of storm water is likely to occur at the site, use of groundwater does not occur downstream of the site. Consequently, only surface water Environmental Values (EVs) and water quality objectives (WQOs) have been identified.

4. PROPOSED STORM WATER TREATMENT

After consideration of the available opportunities & constraints, the treatment train will be the same as has been adopted and approved by Council for the downstream stages:

- In line SQUIDs within the pipe drainage system for gross pollutant, sediment and nutrient removal.

In accordance with SPP Appendix 3's AO1.1b, this is considered current best practice reflecting land use constraints in this case.

5. PROPOSED STORM WATER TREATMENT EVALUATION & SIZING

The evaluation & sizing of the components proposed and/or adopted for the treatment train has been carried out using the MUSIC Version 6 computer package and 6 minute rainfall for the period from 1 January 1970 to 31 December 2000. The pollutant types and concentrations evaluated for removal are -

- gross pollutants (GP);
- sediments and dissolved solids, Total Suspended Solids (TSS);
- total dissolved nitrogen (TN); and
- total dissolved phosphorus (TP).

All catchments have been modeled as 'Urban Residential' split catchments. The split catchment surface types & associated runoff generation parameters; pollutant concentrations and generation parameters applicable to these type of catchments and surface compositions recommended in Healthy Waters Music Modeling Guidelines have been adopted. Details of these areas are shown in Table 1.

Inline proprietary product SQUID HUMECEPTORS or equivalent have been nominated. The size of the unit(s) has been determined using the manufacturers software package based on a minimum 80% TSS removal rate and associated nitrogen and phosphorus removed being that component 'fixed' to the suspended solids.

6. PERFORMANCE EVALUATION

Details of the catchments applicable to this stage are summarised in Table 1. Details of the SPP suggested target water quality objectives (WQO) for storm water discharging from the site to the receiving waters based on nutrient load reduction are summarised in Table 2. Details of performance of the treatment train measured at the nominated receiving water for the whole of the upstream catchments are summarised in Tables 3 to 5. Tables 3 and 4 provide a comparison between the pre and post development scenario. Table 5 provides details of the post development pollutant load reductions for the proposed treatment train and evaluation in relation to target objectives in Table 2

7. CERTIFICATION

An assessment has been carried out of the impact from this proposed development stage on storm water quality (comparison between pre and post development loads) and the effectiveness of the proposed site water quality management in meeting the suggested SPP water quality standards for storm water management and healthy waterways. Details of the nominated standards, comparison between pre and post development pollutant loads & evaluation of the effectiveness of the proposals in meeting the standards have been provided. This is a stage update to the previously approved management for the whole development. Within the limits imposed by the available opportunities and constraints and existing precedents, the proposed storm water management should provide -

- Treatment comparable to the Council approved proposals for existing constructed stages;
- An acceptable water quality management strategy that is the best achievable, cost effective and within community and sensible expectations.

ROCKHAMPTON REGIONAL COUNCIL

AMENDED PLANS APPROVED

7 March 2018

DATE

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TABLE 1: DESIGN AREAS (ha) (COLOUR CODED TO MATCH PLAN VIEW)				
Outlet	Total	Roof	Roads	Ground level
1	2.830	0.540	0.448	1.842
2	0.981	0.150	0.111	0.720
Total	3.811 (100%)	0.690 (18%)	0.559 (15%)	2.562 (67%)

Outlet (Area) 2 included in capacity & treatment provided for the downstream stage & excluded from this assessment.

TABLE 2: TARGET WATER QUALITY OBJECTIVES (WQO)	
	Load Reduction (ref QWQG)
Indicator	% Reduction
Total Suspended Solids (TSS)	85
Total Nitrogen (TN)	45
Total Phosphorus (TP)	60
Litter, Gross Pollutants (GP)	90

TABLE 3: PERFORMANCE EVALUATION - POLLUTANT MEAN CONCs (mg/L)						
	TSS		TN		TP	
PRE & POST COMPARISON	PRE	POST	PRE	POST	PRE	POST
At Nominated Receiving Waters combined wet & dry flows	8.19	3.21	0.293	0.589	0.031	0.080

TABLE 4: PERFORMANCE EVALUATION - POLLUTANT MEAN ANNUAL LOAD (kg/yr)						
	TSS		TN		TP	
PRE & POST COMPARISON	PRE	POST	PRE	POST	PRE	POST
At Nominated Receiving Waters combined wet & dry flows	1470	337	15.50	15.50	2.90	2.03

TABLE 5: PERFORMANCE EVALUATION - POLLUTANT REDUCTION (%)				
	TSS	TN	TP	GP
At Nominated Receiving Waters combined wet & dry flows	85	37	39	>90
	Complies with Table 2 frequency requirements.			

LEGEND

DRAINAGE PIPES AND GULLY PITS

LEGAL POINT OF DISCHARGE; DRAINAGE SYSTEM OUTLET

CONNECTED CATCHMENT

PORTION OF CATCHMENT THESE STAGES

NOMINATED RECEIVING WATER NODE



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FIGURE 1095(5)-ROL4: Storm Water Management - Water Quality

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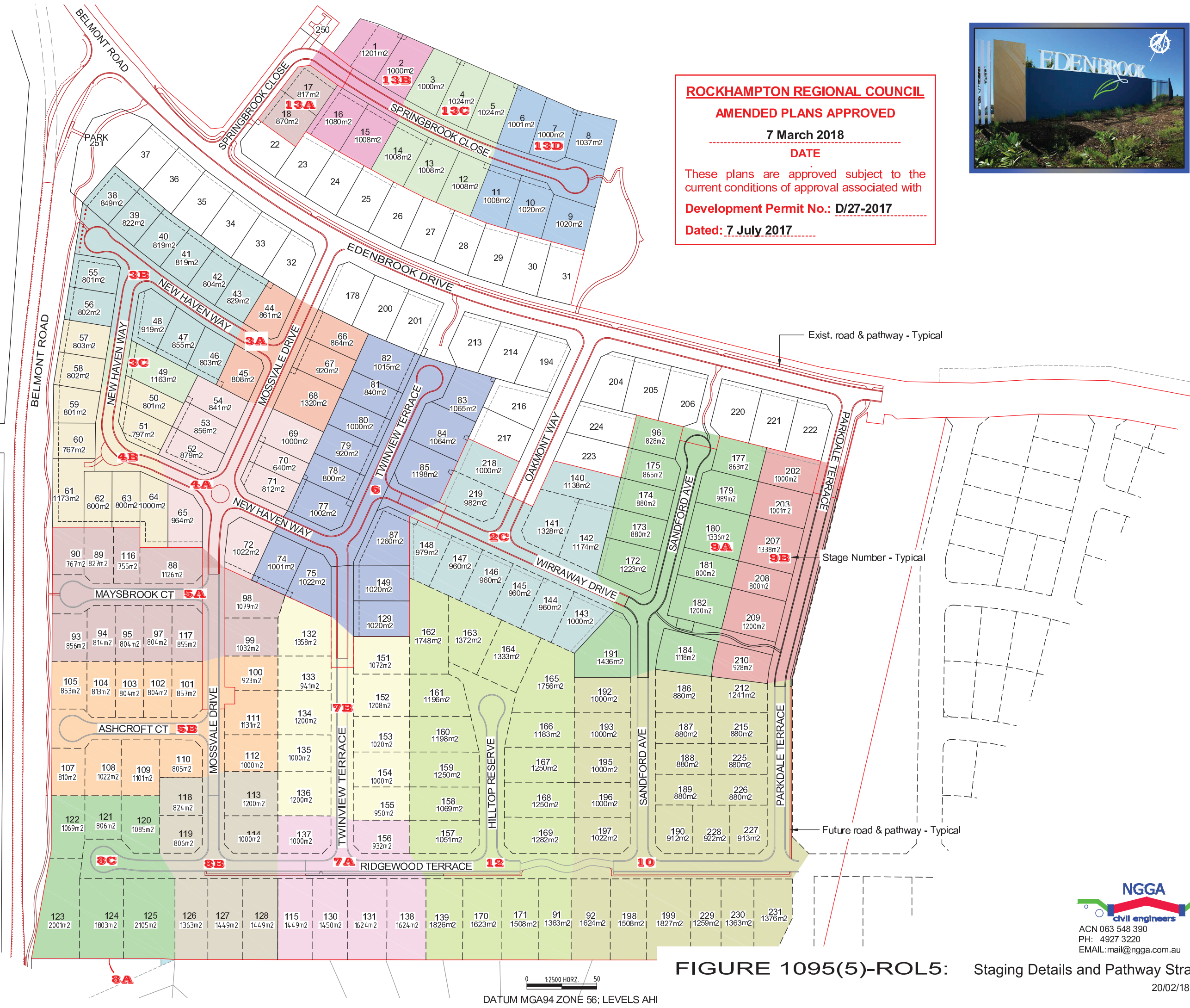
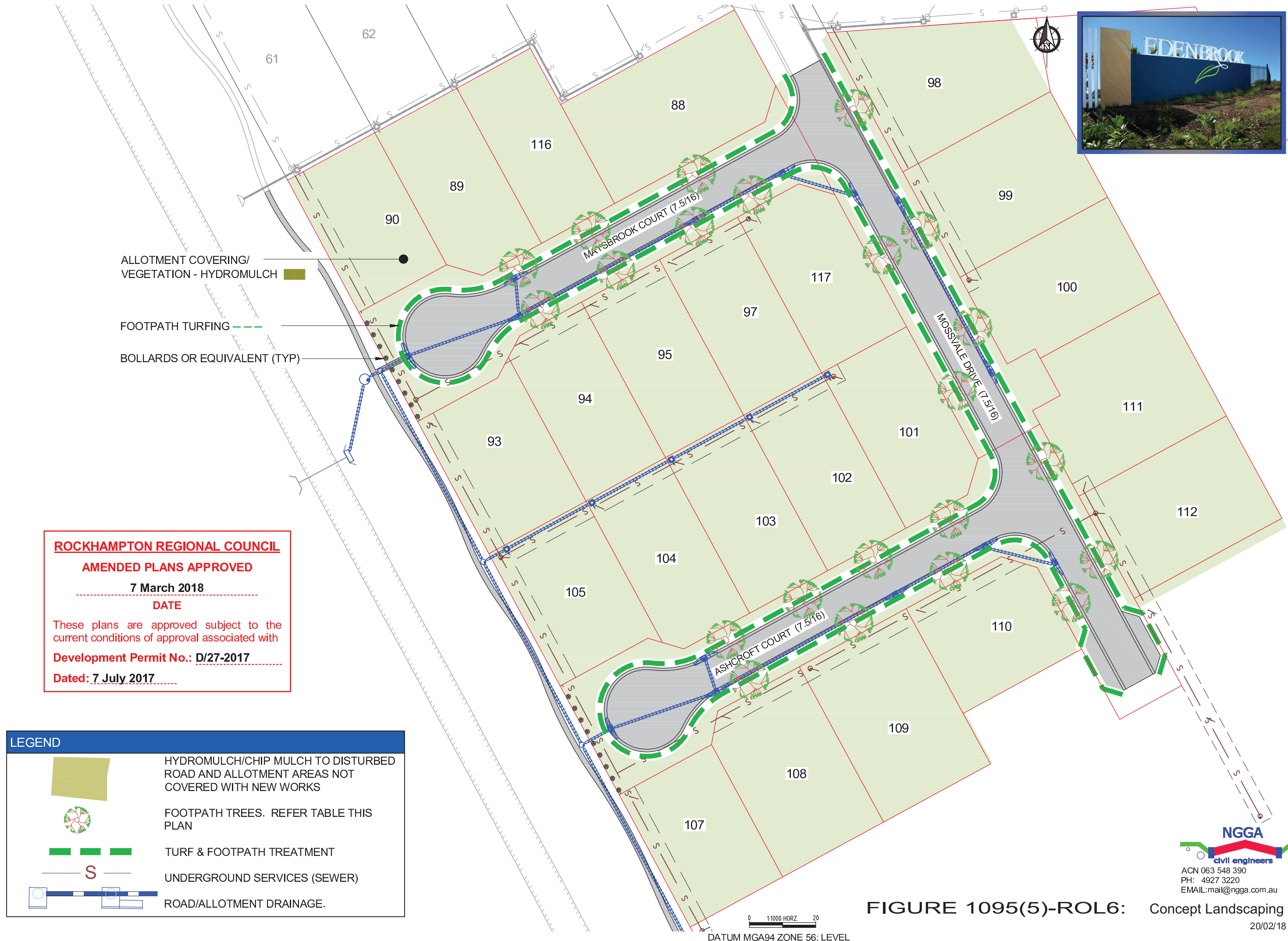


FIGURE 1095(5)-ROL5: Staging Details and Pathway Strategy
20/02/18 Rev 4

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ROCKHAMPTON REGIONAL COUNCIL
AMENDED PLANS APPROVED
7 March 2018
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Development Permit No.: D/27-2017
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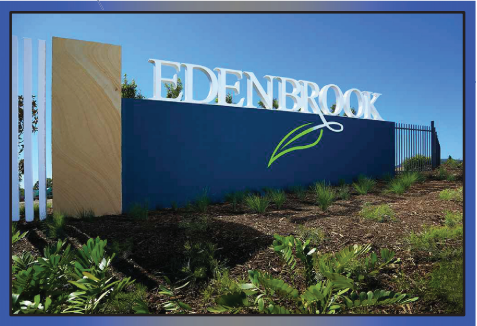
LEGEND

	HYDROMULCH/CHIP MULCH TO DISTURBED ROAD AND ALLOTMENT AREAS NOT COVERED WITH NEW WORKS
	FOOTPATH TREES. REFER TABLE THIS PLAN
	TURF & FOOTPATH TREATMENT
	UNDERGROUND SERVICES (SEWER)
	ROAD/ALLOTMENT DRAINAGE.

FIGURE 1095(5)-ROL6: Concept Landscaping Plan
20/02/18 Rev 4

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LEGEND EASEMENTS:

SEWER EASEMENT

SEWER & STORM WATER (ROOF WATER)

BUILDING LOCATION ENVELOPE SETBACKS

- FRONT BOUNDARY - 6.0m UNO
- REDUCED FRONT BOUNDARY SETBACK - 4.0m UNO
- SIDE BOUNDARY - 1.5m (REFER NOTE 1. (II))
- REAR BOUNDARY - 2.0m UNO

ANNOTATED AREAS SHOWN WITHIN EACH LOT DENOTES THE RESPECTIVE BUILDING LOCATION ENVELOPE AREA FOR EACH LOT .

ALL SERVICES ARE CLEAR OF THE BUILDING LOCATION ENVELOPES

NOTES

- ALL SETBACKS TO BUILDINGS OR STRUCTURES ARE TO BE IN ACCORDANCE WITH THE QDC MP 1.2, EXCEPT FOR THE FOLLOWING:-
 - (I) ROAD, SIDE, REAR AND / OR ACCESS EASEMENT BOUNDARY SETBACK FOR STRUCTURES ARE AS DEPICTED ON THE PLAN
 - (II) SIDE BOUNDARY SETBACKS TO THE OUTERMOST PROJECTION ARE:
 - WHERE THE HEIGHT OF THAT PART IS 4.5M OR LESS - 1.5M
 - WHERE THE HEIGHT OF THAT PART IS GREATER THAN 4.5M BUT NOT MORE THAN 8.5M - 2.0M
- SITES WITH A GRADIENT GREATER THAN 15% WILL HAVE SPECIAL DESIGN NEEDS
- SWIMMING POOLS ARE PERMITTED TO BE LOCATED WITHIN THE ROAD AND SIDE / REAR BOUNDARY SETBACK IN ACCORDANCE WITH QDC MP 1.2 REQUIREMENT

DEVELOPMENT CONDITIONS

- MAXIMUM BUILDING HEIGHT FOR ANY DWELLING IS 7m ABOVE GROUND LEVEL TO THE EAVES AND 9m TO THE HIGHEST POINT ON THE ROOF.
- NO PART OF THE DWELLING INCLUDING EAVES, MAY BE CONSTRUCTED OUTSIDE THE BUILDING LOCATION ENVELOPE.

ROCKHAMPTON REGIONAL COUNCIL

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7 March 2018

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Dated: 7 July 2017

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FIGURE 1095(5)-ROL7: Building Setback Details

RRC Ref: D/27-2017_2 LOTS INTO 21 LOTS

Our Ref: 1095_Response to ROL INFORMAL Information Request

26 June 2017

Development Assessment Section
Rockhampton Regional Council
PO Box 1860, Rockhampton QLD 4700

Attention:- Thomas Gardiner

Dear Thomas

ROCKHAMPTON REGIONAL COUNCIL

APPROVED PLANS

These plans are approved subject to the current conditions of approval associated with

Development Permit No.: D/27-2017

Dated: 7 July 2017

INFORMAL INFORMATION REQUEST

D/27-2017, ROL APPLICATION, 2 LOTS INTO 21 LOTS

Lots 253 and 254 SP241210 – EDENBROOK STAGE 5(A & B)

We acknowledge on behalf of the Applicant receipt of Council's email of 19 June 2017 wherein an additional informal information requested was outlined. The Applicant has approved the following response.

The proposal for this development is to discharge stormwater to the existing culver across the Belmont Road which is a lawful point of discharge.

We issued the further information request regarding Quality but not Quantity. We are more concern on Quantity and would it be possible to get a detail stormwater report and address the following issues:

- 1.0 Please demonstrate that the proposed development will not cause or have the potential to cause an "actionable nuisance" or "worsening" to surrounding lands or infrastructure or to a Lawful Point of Discharge.*
- 2.0 Please ensure the flowing are addressed, where applicable:*
 - 2.1 The adverse impacts from concentrated flow on the Belmont Road and downstream property;*
 - 2.2 The existing stormwater drainage infrastructure is not interfered with or damage by the proposed development such as through concentrated flows, surcharging, scour or deposition;*
 - 2.3 This portion of Belmont Road is not affected by Q100 Riverine or Ramsay Creek flooding. Provides detailed engineering calculations demonstrating the adequacy and suitability of existing culvert. If overtopping is proposed please provide the DV product.*
 - 2.4 Identification of drainage catchment and sub-catchment areas for the pre-development and post- development scenarios. Please include all the upstream catchment of ultimate development that will discharge to this lawful point.*
- 3.0 Include details of the mitigation measures proposed to address any potential stormwater impacts of the proposed development. The design storm peak discharges should be shown for the mitigated case to demonstrate there is no worsening impact to surrounding land or infrastructure or to a Lawful Point of Discharge.*

Response:-

Attached are the following drawings arising from the flood modelling:

FIGURE 1095(5)-IR1	CATCHMENT PLAN (PRE AND POST)
FIGURE 1095(5)-IR2	PRE DEVELOPMENT DOWNSTREAM FLOOD DEPTHS
FIGURE 1095(5)-IR3	PRE DEVELOPMENT DOWNSTREAM "DV" HAZARD
FIGURE 1095(5)-IR4	POST DEVELOPMENT DOWNSTREAM FLOOD DEPTHS
FIGURE 1095(5)-IR5	POST DEVELOPMENT DOWNSTREAM "DV" HAZARD

- A. The submission accompanying the application provided to Council the likely drainage layout for Stage 5, showed the intention to discharge stormwater to the existing culvert in Belmont Road, demonstrated that Belmont Road is a lawful point of discharge and in particular that the post development catchment would reduce in area.
- The relevant receiving catchment (pre and post) is relatively small; the culvert is a 2/1200 x 450 RCBC; the capacity of the culvert was judged as sufficient or at least not significantly adversely impacted given the change in catchment area. Even if it was to be shown as insufficient at Operational Works, Council's standard ROL approval conditions would address the matter in detail.
- B. FIGURE 1095(5)-IR1, the CATCHMENT PLAN (PRE AND POST) summarises and demonstrates that the catchment from Pre-development to Post-development decreases by 0.6 hectares (or 10.5%). This is solely due to the road layout where a parallel road above Stage 5 intercepts the top of the catchment in the ultimate development condition.
- C. FIGURE 1095(5)-IR2 provides the modelling output for the PRE DEVELOPMENT DOWNSTREAM FLOOD DEPTHS and the flow hydrographs for 3 different Q100 storms showing the maximum peak discharge is 2.28 cumecs. This output also shows that there is no overtopping of the road; that the existing culvert has Q100 capacity and that the flow depths are basically less than 150mm downstream of the culvert outlet.
- FIGURE 1095(5)-IR4 provides the modelling output for the POST DEVELOPMENT DOWNSTREAM FLOOD DEPTHS and the flow hydrographs for the same three Q100 storms showing a maximum peak discharge of 2.02 cumecs. Not unexpectedly the peak discharge has slightly reduced with the slight changes in area and permeability of the catchment. In summary the peak discharge is slightly reduced from the pre-development situation; there is no overtopping of the road; the culvert still has Q100 capacity; there is no depth of flow hazard downstream of the outlet.
- D. FIGURE 1095(5)-IR3 provides the PRE DEVELOPMENT DOWNSTREAM FLOOD DEPTHS and the flow hydrographs for the 3 different Q100 storms, showing the peak discharge is 2.28 cumecs. There is no overtopping of the road; the existing culvert has Q100 capacity and the "DV" downstream of the culvert outlet is about 10 to 15% of the QUDM critical 0.04 value. In other words there is no hazard downstream
- E. FIGURE 1095(5)-IR5 provides the POST DEVELOPMENT DOWNSTREAM FLOOD DEPTHS and the flow hydrographs for the same three Q100 storms showing the reduced peak discharge of 2.02 cumecs. The modelling shows no overtopping of the road; the culvert still has Q100 capacity and there is no "DV" hazard downstream of the outlet arising from the proposed development.

Summary:

1. The catchment is slightly reduced, the peak discharge is marginally lower, the Belmont Road culvert still has Q100 capacity, there is no road flow over/on Belmont Road and the proposed development cannot cause or have the potential to cause an "actionable nuisance" or "worsening" to surrounding lands.

2. The following has been addressed as specified:

- 2.1 The existing culvert has Q100 capacity in the post development scenario; there are no impacts from a concentrated flow onto, from and over Belmont Road as result of the Stage 5 development;
- 2.2 The existing culvert has Q100 capacity and the existing stormwater infrastructure is not harmed in any way as result of the Stage 5 development.
- 2.3 The overall drainage catchment for the pre and post development situations has been identified and provided. This includes the ultimate catchment situation. The "sub-catchments" have not been provided as they are irrelevant to the Belmont Road and downstream impacts from drainage runoff; this was an unreasonable request from Council.
- 2.4 No mitigation measures are proposed or necessary.

The informal information request was not warranted. The submission that accompanied the ROL application pointed out the reduction in catchment and any reasonable judgement would be a compensatory reduction in peak discharge albeit minor.

Regardless of this submission demonstrating no issues in regard to the discharge to the legal point of discharge, Council will impose its standard suite of drainage conditions on the ROL approval and make the developer jump through the same hoops again at Operational Works.

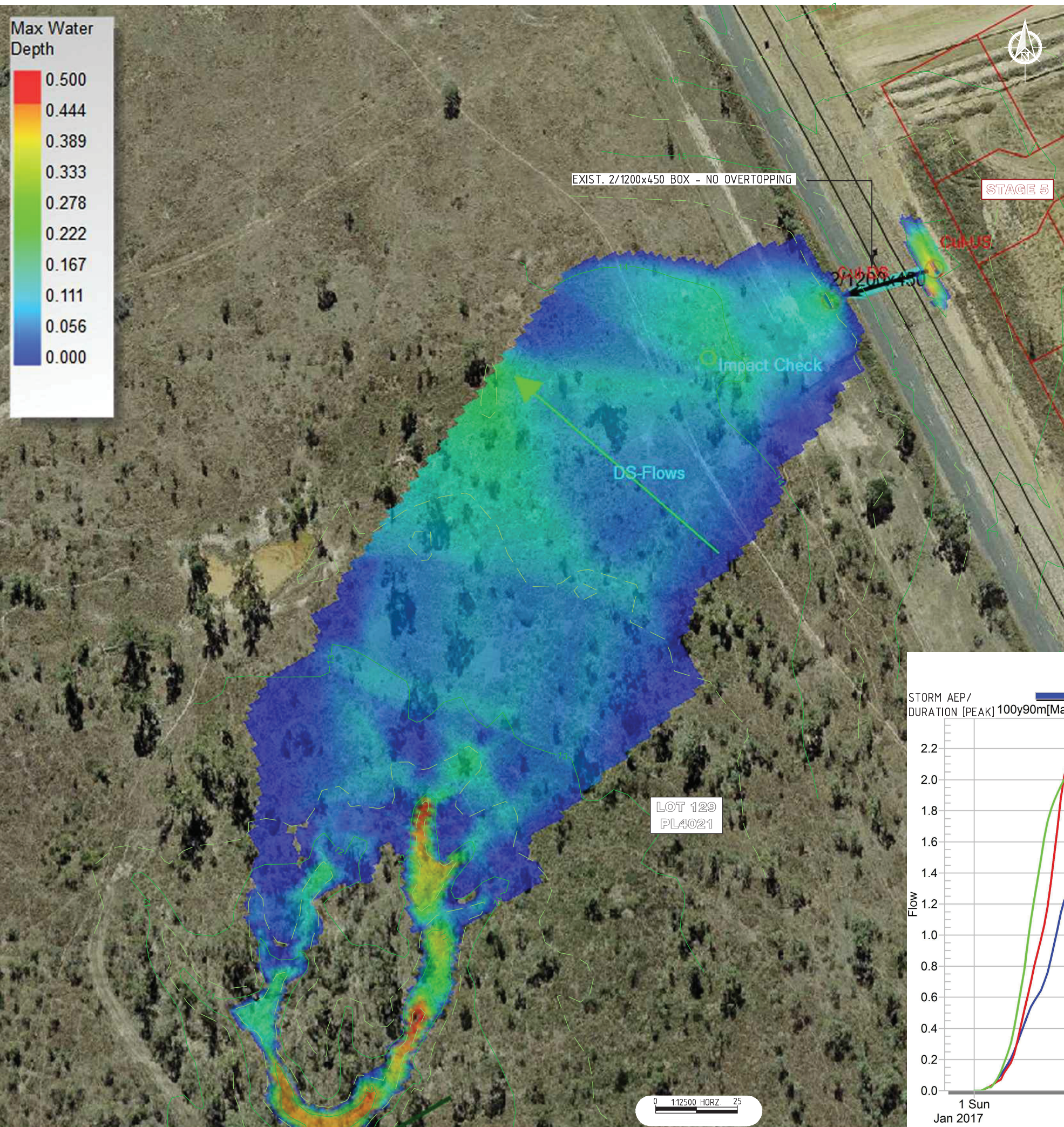
This is a complete response to the Council's informal information request.

We request Council proceed with assessment of the application.

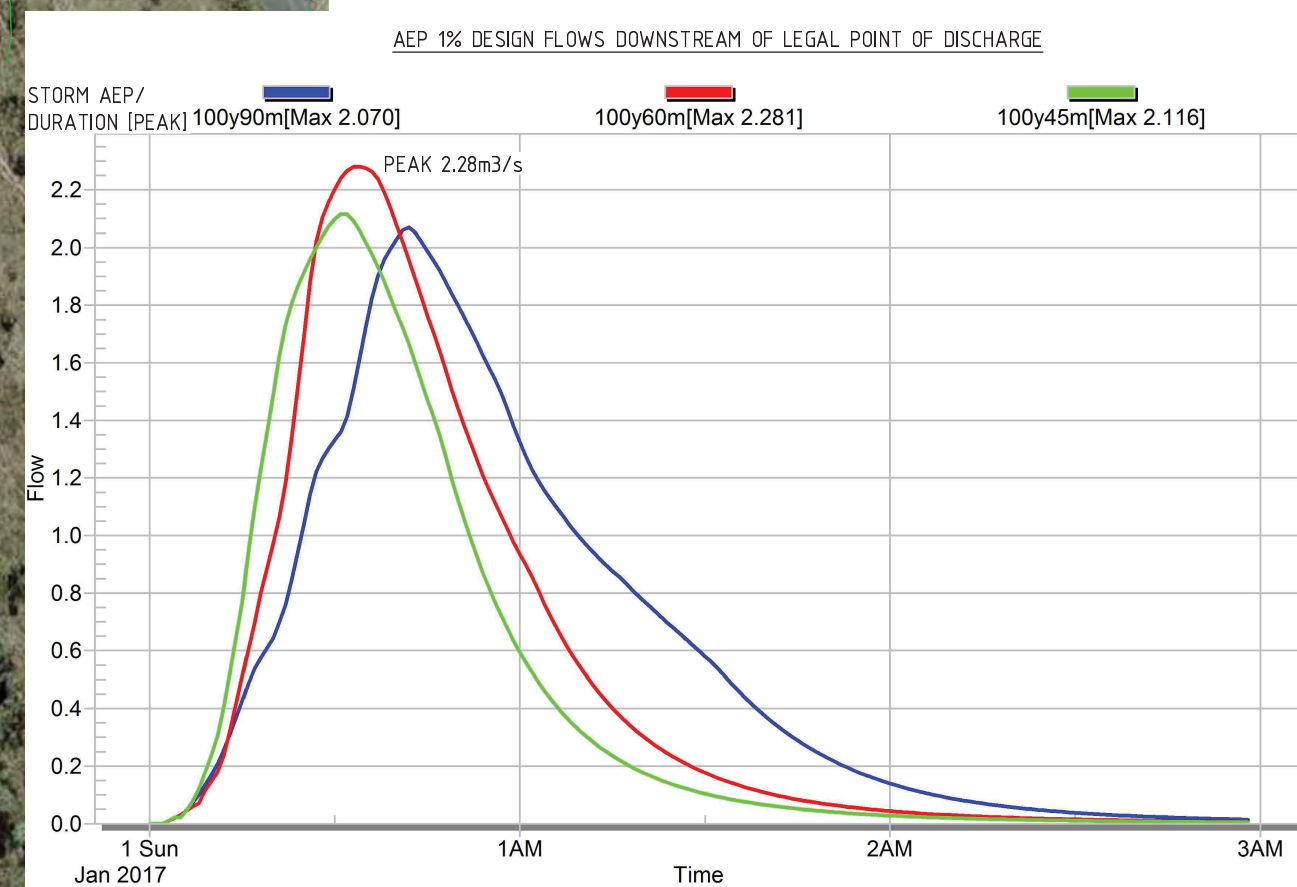
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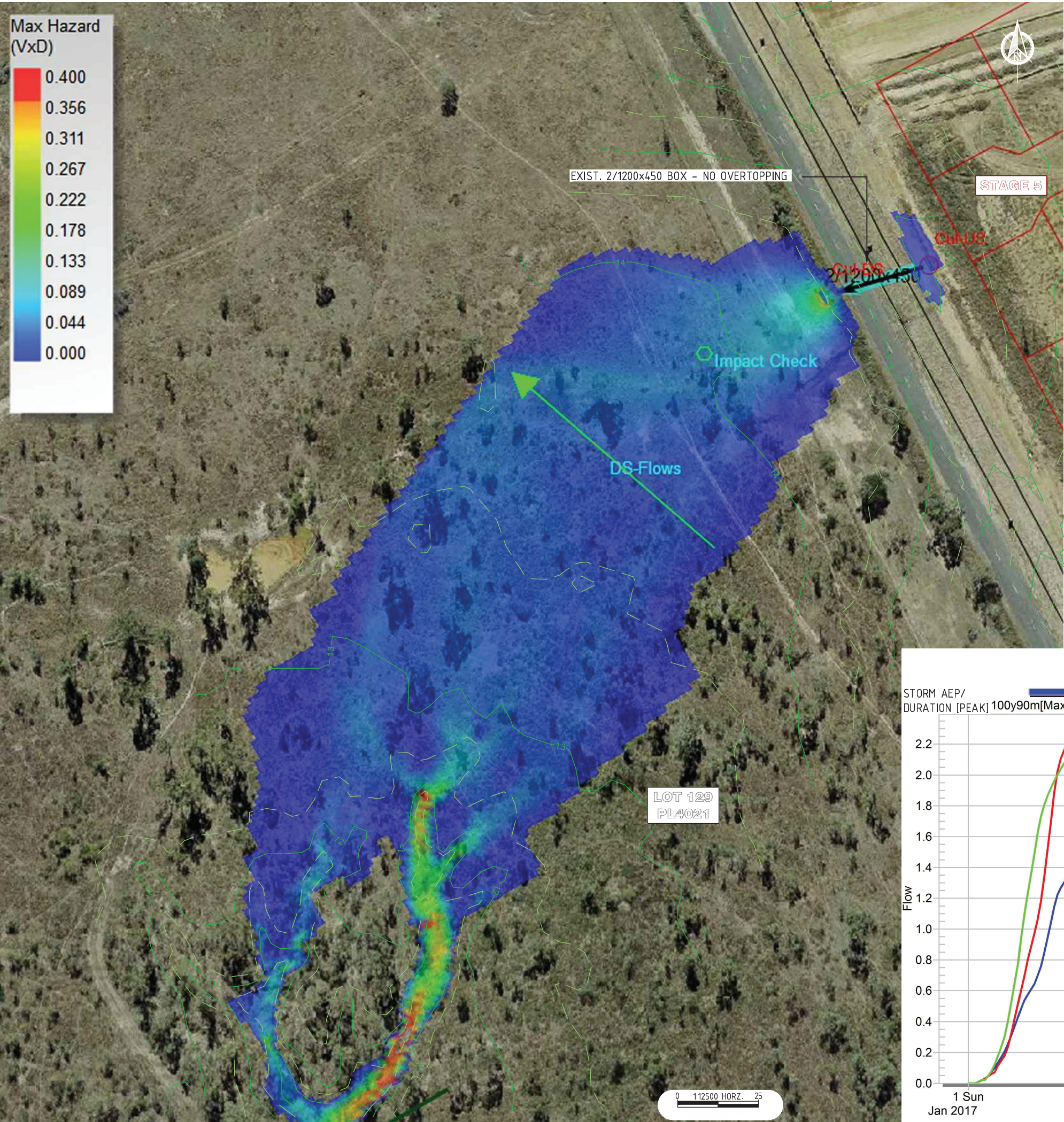
Signed by N. Gardner RPEQ No 2393 for and on behalf of

N G Gardner & Associates Pty Ltd

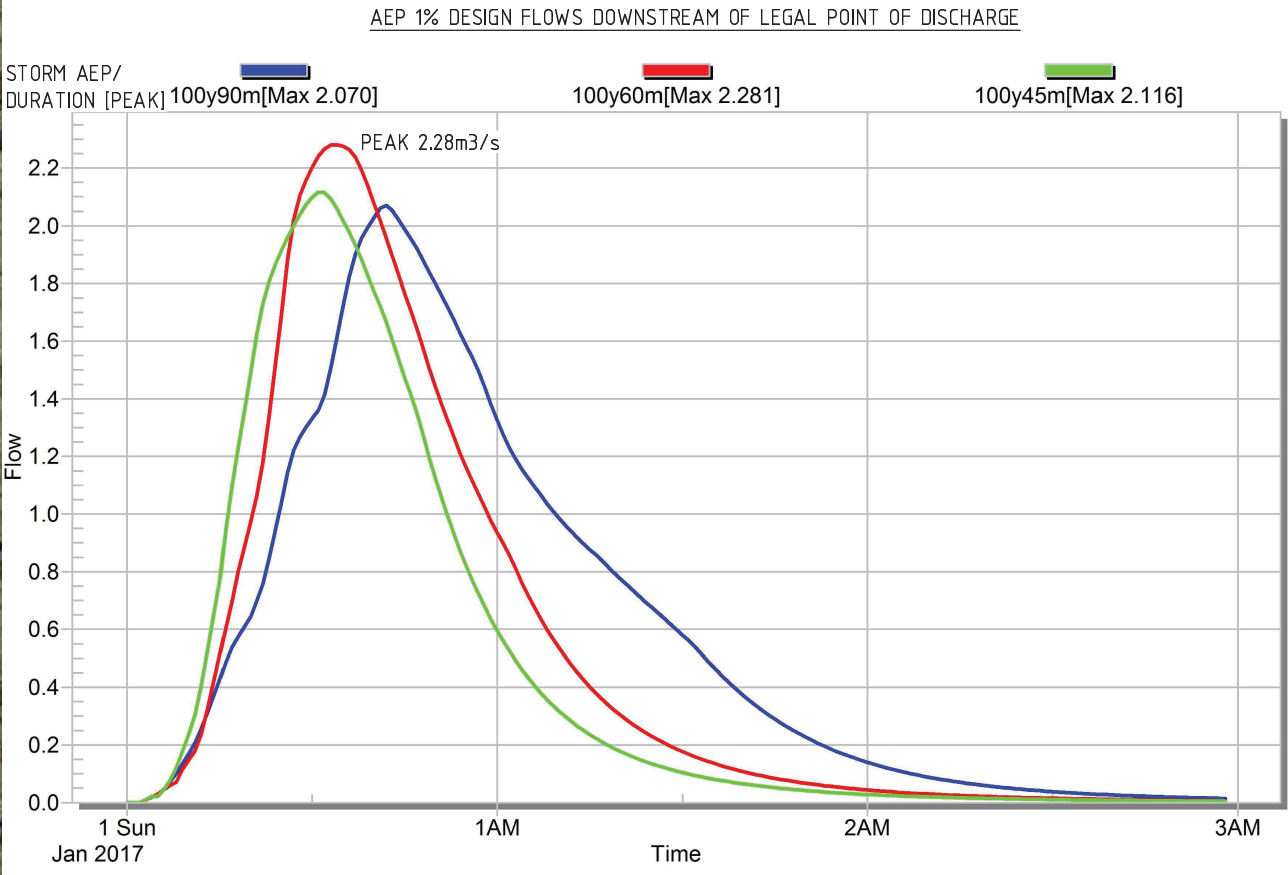


EDENBROOK STAGE 5
STORM WATER PRE AND POST DEVELOPMENT FLOWS
PRE DEVELOPMENT DOWN STREAM FLOOD DEPTHS
FIGURE 1095(5)-IR2
23/06/17 Rev 1

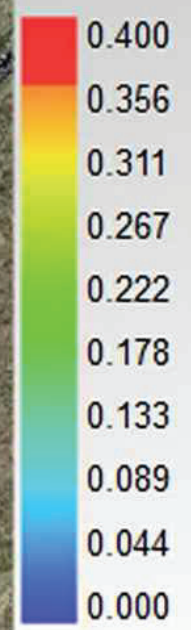




EDENBROOK STAGE 5
STORM WATER PRE AND POST DEVELOPMENT FLOWS
PRE DEVELOPMENT DOWN STREAM FLOOD DxV HAZARD
FIGURE 1095(5)-IR3
23/06/17 Rev 1



Max Water Depth



EXIST. 2/1200x450 BOX - NO OVERTOPPING

STAGE 5

CULVUS

2/1200x450

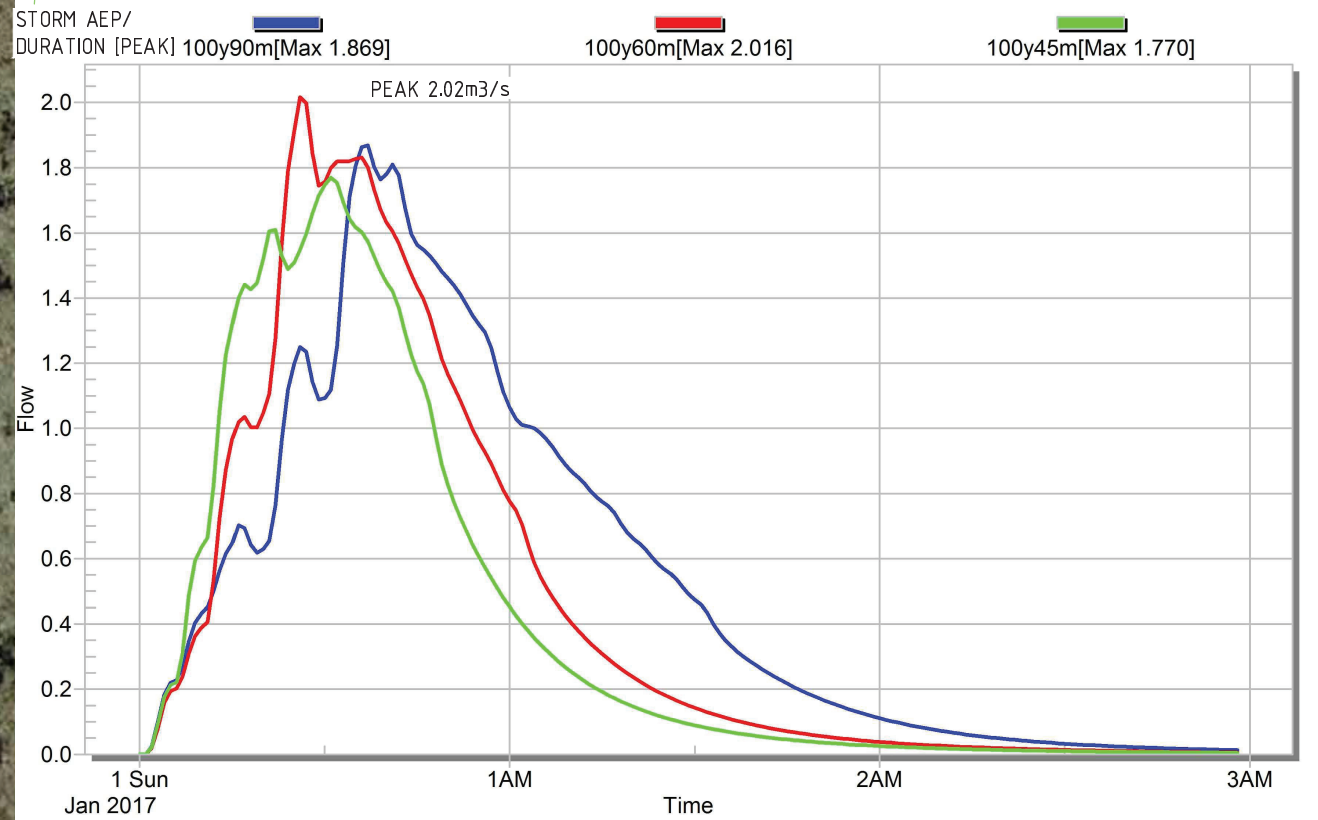
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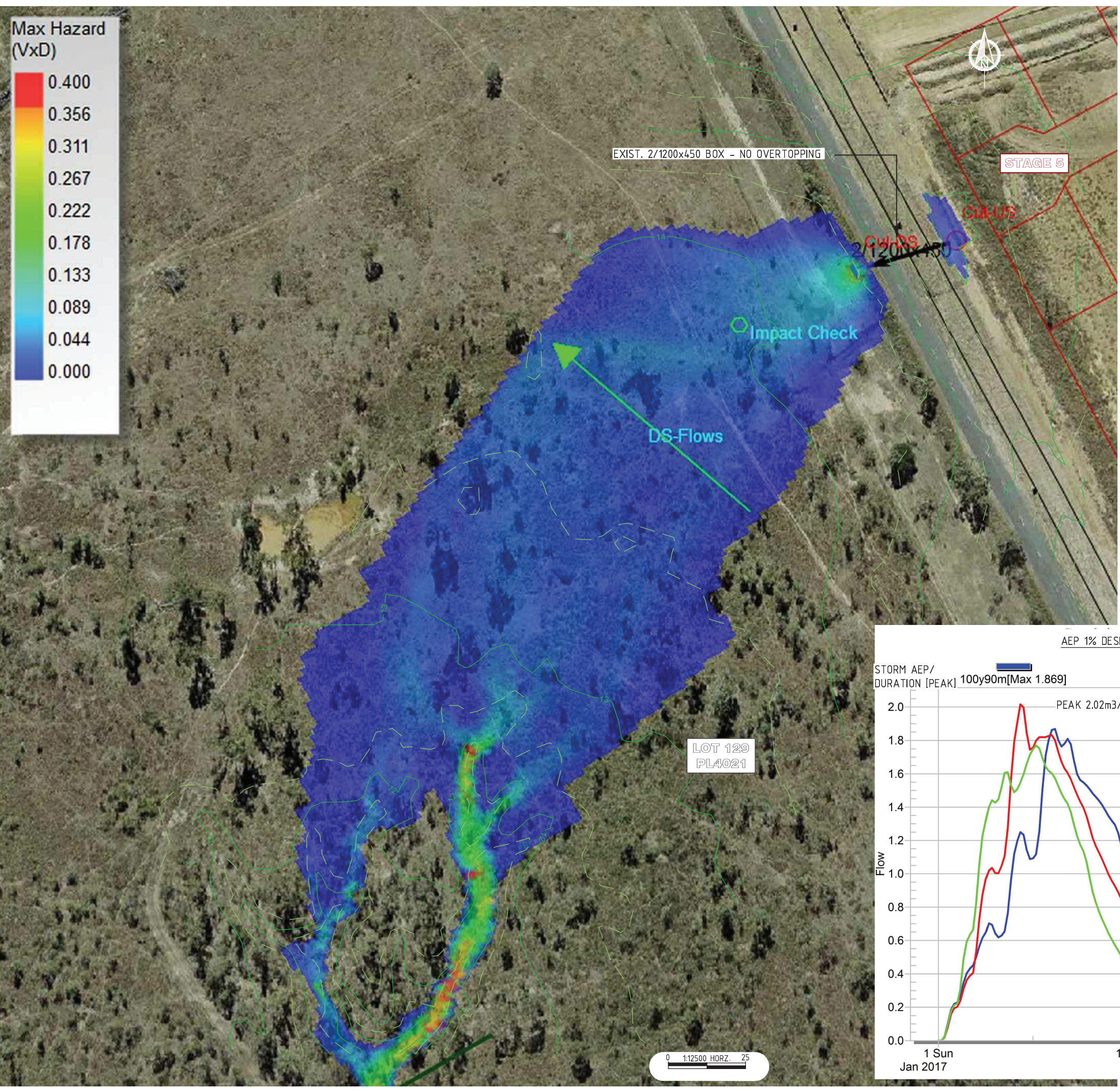
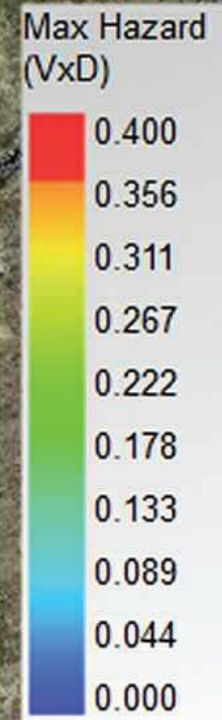
DS-Flows

LOT 129
PL4021

EDENBROOK STAGE 5
STORM WATER PRE AND POST DEVELOPMENT FLOWS
POST DEVELOPMENT DOWN STREAM FLOOD DEPTHS
FIGURE 1095(5)-IR4
23/06/17 Rev 1

AEP 1% DESIGN FLOWS DOWNSTREAM OF LEGAL POINT OF DISCHARGE





EDENBROOK STAGE 5
STORM WATER PRE AND POST DEVELOPMENT FLOWS
POST DEVELOPMENT DOWN STREAM FLOOD D_xV HAZARD
FIGURE 1095(5)-IR5
23/06/17 Rev 1

