Our Ref: 43793-001-1
Your Ref: MCU24/0094

10 December 2024

Chief Executive Officer
Townsville City Council
PO Box 1268
Townsville QLD 4810

Attention: Development Assessment – Mrs Kaitlyn O'Malley

Dear Kaitlyn,

RESPONSE TO INFORMATION REQUEST
DEVELOPMENT APPLICATION FOR MATERIAL CHANGE OF USE (MCU24/0094) FOR RELOCATABLE HOME PARK
AT 99 HOGARTH DRIVE, BOHLE PLAINS

Brazier Motti act on behalf of the applicant, Ruby Developments Pty Ltd, with respect to the abovementioned development proposal, and refer to the Information Request (IR) issued by Townsville City Council ('the Council') on the 27th September 2024. The information and supporting documentation herein represent the applicant's full response to the IR.

Supporting information

This information request response has addressed the four (4) request items and is supported by the following additional information:

- **Appendix A:** Updated Flood Impact Assessment dated 6 December 2024;
- **Appendix B:** Traffic Impact Assessment dated 8 March 2024;
- **Appendix C:** Water and Sewer Network Analysis Reports;
- **Appendix D:** Updated Masterplan

Request item 1

The applicant is requested to provide a Flood Impact Assessment demonstrating that the proposed development will not create offsite flood impacts (>10mm) to adjoining land and infrastructure for the standard suite of design storm AEPs.

Response to RFI Item 1

Please refer to the updated Flood Impact Assessment in ***Appendix A***.

Request item 2

The applicant is requested to provide a Traffic Impact Assessment report for the proposed development in accordance with SC6.4.5.2 Traffic Impact Assessment (TIA) of the Townsville City Plan. The TIA is to identify impacts to the external road network as a result of the development and any external road upgrades required to accommodate the development.

Response to RFI Item 2

Please refer to the Traffic Impact Assessment dated 8 March 2024 in ***Appendix B***.

Request item 3

a) The applicant is requested to provide water and sewer network analyses for the proposed development. The analyses are to identify demands associated with the development, demonstrate that adequate service can be provided and identify any external infrastructure upgrades required to accommodate the development.

b) The applicant is requested to amend the engineering plans to show a single metered water connection (multiple water connections are not permitted).

Response to RFI Item 3

Please refer to the Water and Sewer Network Analysis Assessments in ***Appendix C***.

Request item 4

The applicant is requested to amend the site plan to illustrate pedestrian connectivity throughout the development.

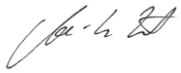
Response to RFI Item 4

The nature of the proposed development is different from a standard residential subdivision. A low-speed environment is proposed where residents are able to utilise the internal street network for walking and cycling. It is submitted, given the nature of the development, and in particular the demographic cohort that it will service, the proposed footpath strategy is appropriate.

Proceeding

We trust the above response provides Council sufficient information to satisfactorily proceed with the assessment of the application. In the meantime, we will now proceed with statutory advertising to allow community feedback. We welcome the opportunity to work through any queries Council may have in order to expedite the assessment.

Yours faithfully



_____

ANNE ZAREH
Senior Planner
Brazier Motti Pty Ltd

APPENDIX A

Updated Flood Impact Assessment dated 6 December 2024

ENGENY

GEMLIFE

Harris Crossing – Land Lease Community

Flood Impact Assessment

BBNE01218_0001-REP-001-0

6 DECEMBER 2024

DISCLAIMER

This Report has been prepared on behalf of and for the exclusive use of Gemlife and is subject to and issued in accordance with Gemlife instruction to Engeny Australia Pty Ltd (Engeny). The content of this Report was based on previous information and studies supplied by Gemlife.

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Rev	Date	Description	Author	Reviewer	Project Mgr.	Approver
0	6/12/2024	Client Issue	Nathan Fulcher	Daniel Niven	Nathan Fulcher	Daniel Niven
Signatures:						

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1. INTRODUCTION

Engeny Australia Pty Ltd (Engeny) was engaged by Gemlife Pty Ltd to undertake a flood impact assessment for the Gemlife Retirement Living Development (Land Lease Community) hereafter referred to as the Site. This Site has previously received development approval for freehold residential lots as part of the larger Harris Crossing development area. The current approved flood impact assessment to support the Harris Crossing development is contained in Engeny's *Harris Crossing Development Flood Impact Assessment Report (Engeny, 2018)* which was approval with respect to the Site's location as part of RAL20/0034 in 2021. This modelling has since received further updates as contained in Engeny's *Harris Crossing Development Stage Design Update (M7191_005-REP-002-2, 2023)* which has been submitted and accepted as part of staged operation works over the development (such as for OPW24/0014, 2024). However, minor updates to the Site to accommodate a Land Lease Community have necessitated the creation of this updated flood report. The primary differences between this report and the previously approved report (Engeny, 2023) are listed below:

- The hydraulic modelling for the Site has been updated to reflect:
  - higher density residential landuse associated with a Land Lease Community,
  - adjusted layout to accommodate the community, and
  - Latest earthworks model for the Site that reflect the Land Lease Community.
- The hydraulic modelling comparison for impact assessment has been performed between the previously approved modelling and the updated modelling.

This report outlines the scope, methodology, and hydraulic investigations conducted in assessing the regional stormwater interactions of the proposed development updates.

1.1 Site Description & Proposed Development

The Site is located just east of The Ring Road, situated immediately downstream of The Ring Road itself. The Harris Crossing development area is bordered to the east by the Bohle River and is traversed by two minor tributaries of the Bohle River (Three Mile Creek and unnamed tributary). The location of the proposed land lease community development is shown in Figure 1.1. with key proposed development drawings included in Appendix A.

Review of the aerial photography of the Site shows that the existing land is mainly covered with low to medium size vegetation. There exists dense vegetation along the banks of the surrounding waterways, including The Bohle River, Three Mile Creek, and the unnamed tributary. Most of the Site will be developed as a Land Lease Community (LLC), representative of medium-high density residential lots, while the appropriate flood conveyance and storage will be maintained along the River and Creek corridors, as per the original design. Details of the proposed urban development is shown in the Pre-Civil design drawings shown in Figure 1.2.

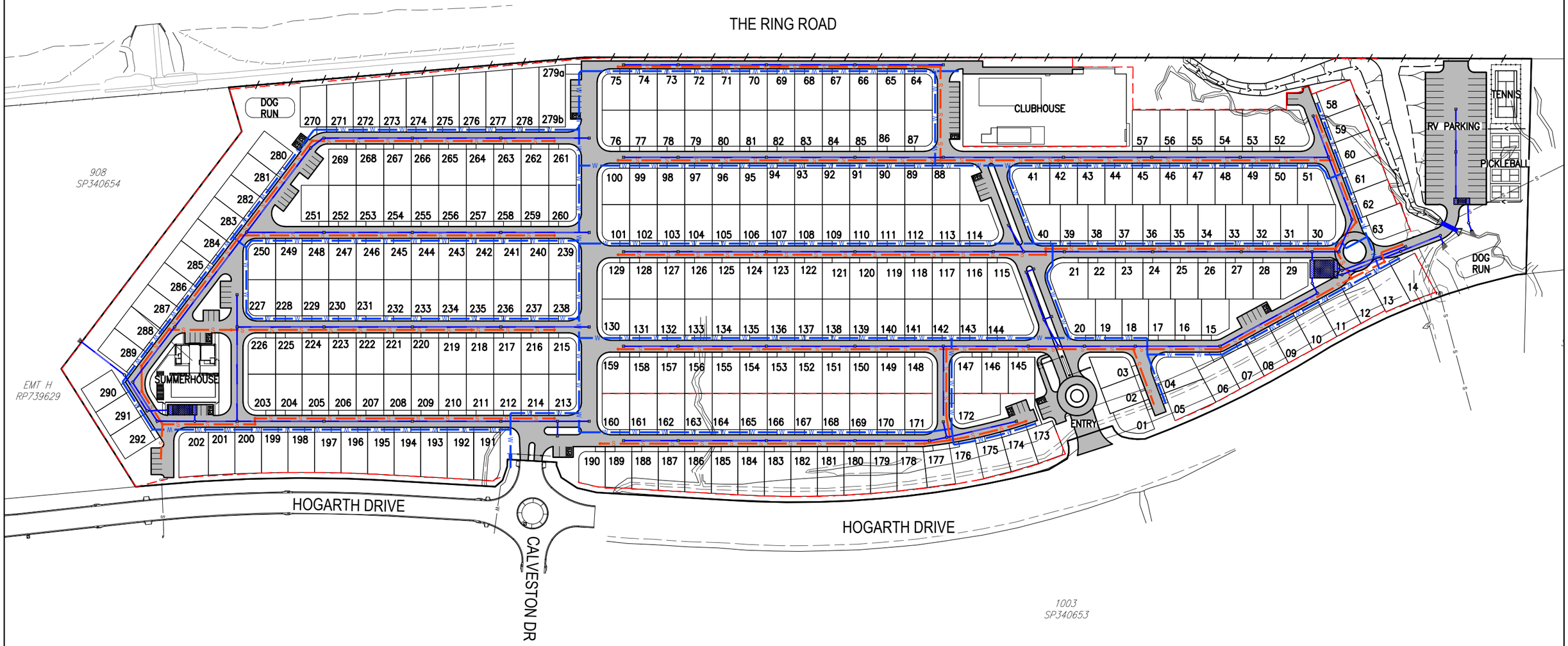
1.2 Scope of Works

The scope of this flood impact assessment is as follows:

- Utilise previously approved 1D/2D TUFLOW model of the Harris Crossing site, which has been modelled for the 1%, 2%, 5%, 10%, 20%, and 39% AEP design flood events and provide the pre-developed scenario.
- Update the approved pre-developed hydraulic model to reflect the revised development design across the Site.
- Undertake a review of the hydraulic modelling outputs in comparison with the previously approved results and reporting.
- Prepare a technical report detailing the methodology and results of the flood impact assessment for the Site.

The previously approved model development of the TUFLOW model has been included to capture all the relevant flood assumptions in a consolidated report.

Figure 1.1: Locality Plan



SITE PLAN

SCALE 1:1000 (A1 SIZE) 0 10 20 30 40 50

No.	DATE	REVISIONS	DES	DRN	CHK	APD

DESIGNED S.C.M
DRAWN J.J.D
CHECKED J.M.H
APPROVED J.M.H
DATE JULY 2024
DOCUMENT CONTROL

For and on behalf of WESTERA PARTNERS PTY. LTD.
APPROVED

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BRAZIER MOTTI
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DATUM A.H.D.
PSM 95569
R.L. 17.143

PROJECT	PROPOSED RETIREMENT LIVING DEVELOPMENT
LOCATION	LOT 1002 ON SP340654 99 HOGARTH DRIVE, BOHLE PLAINS
TITLE	SITE PLAN
CLIENT	RUBY DEVELOPMENTS PTY LTD

DRAWING STATUS	PRELIMINARY N.F.C.
DRAWING NUMBER	S24-020-PC02
SHEET NUMBER	02 OF 06
REVISION	

2. PRE-DEVELOPED SCENARIO

2.1 Overview

The creation and assessment of the pre-developed TUFLOW sub-model has been undertaken as part of the originally approved 2018 and 2023 FIAs. The modelling updates, performed as part of this FIA assessment of the LLC Site, are contained in Section 3 of this report.

The approved flood sub-model utilised a coupled one-dimensional (1D) and two-dimensional (2D) TUFLOW hydraulic model of the Bohle River catchment. This approach was adopted to allow better definition of proposed development earthworks designs and more accurate definition of the smaller tributaries which traverse the Harris Crossing Development. As part of the earlier assessments the 1% AEP sub-model has been validated to the Townsville City Council (TCC) MIKE-Flood model developed as part of the Bohle River Flood Study (AECOM, 2012). The validated sub-model was updated to include the latest topographic data to use as the pre-developed scenario, and then was further updated to include the proposed Harris Crossing development.

The pre-development scenario adopted to consider the LLC Site adopts the approved Harris Crossing development scenario. A concise summary of the model set up is detailed below, with the details in Engeny's *Harris Crossing Development Stage Design Update, M7191_005-REP-002-2 (Engeny 2023)*.

2.2 Approved Hydraulic Model Development

2.2.1 Topography and Model Extent

The following sources of topographic data have been used to create the pre-developed sub-model, including:

- A 10m DEM based 2009 LiDAR aerial survey extracted from the TCC MIKE-FLOOD model. This topography was used in the TUFLOW sub-model validation.
- A 1m DEM based on 2009 LiDAR aerial survey sourced from DNRM. After calibration, this data was used to define TUFLOW model bathymetry at a finer grid spacing to provide a more accurate representation of existing terrain.
- Multiple 1m DEM based on 3D earthworks models of the proposed bulk earthworks was supplied by Premise, which was used to define post-development Harris Crossing and Site levels.
- LiDAR data and 3D design surfaces for Stages 1 to 5 as supplied by Premise were used to update the model during its development to the latest approved topography.

The hydraulic sub-model extends from The Ring Rd bridge on Bohle River to approximately 1 km downstream of the site with a total reach length of 4.2 km. The hydraulic model extent (refer Figure 2.1) was found to be sufficient to assess the flood impact of the proposed earthworks.

Following an analysis of typical section of the waterway area within the hydraulic model extent, a 4 m grid cell size was considered appropriate for providing sufficient definition of the waterway in the model. The adopted grid cell in TUFLOW allows for a more accurate representation of the smaller waterways and earthworks design compared to the MIKE-Flood model (10 m grid size). The waterway within the catchment has been represented intrinsically within the 2D domain. Based on the fine grid resolution adopted it was approved that this approach is adequate to reasonably represent channel conveyance.

2.2.2 Boundary Conditions

2.2.2.1 1% AEP Hydrologic Inputs

Flow hydrographs for the Bohle River, the two tributaries at the western side of the Site and several smaller local inflow locations were extracted from the MIKE-Flood model and have been adopted at the upstream boundaries of the TUFLOW model. Adopted inflow locations are shown in Figure 2.1.

The MIKE-Flood model adopts direct-rainfall over the 2D model domain. The TUFLOW model was simulated with direct rainfall inputs consistent with the MIKE-Flood model. The critical duration for the Site location adopted in the Upper and Middle Bohle Flood Study (AECOM,

2014) was 12 hours for all flood events. Therefore, 12-hour duration has been adopted in this assessment for all flood events. The rainfall intensity (100y12hr=29.8 mm/hr) and temporal patterns (Zone 3) are based on the BOM 1987 and ARR 1987 guidelines in accordance with the methodology adopted in Upper & Middle Bohle Flood Study (AECOM, 2014).

2.2.2.2 2%, 5%, 10%, 20%, 39%, 63% Hydrologic Inputs

It was not possible to extract the other AEP flood event data at the same locations as the 1% AEP flood event, due to the flood data provided to Engeny. Thus, the flow hydrographs for the catchments west of The Ring Rd were extracted from the 1d structures flow outputs. The inlet locations were moved upstream of the 1d structures and the 1d structures removed from the model, to remove the mitigation caused by the 1D elements already captured in the flow hydrographs. This allowed for the removal of any boundary effects before the flows interacted with the proposed development. Adopted inflow locations are shown in Figure 2.2.

The rainfall intensities, calculated as per the 1% AEP event, are shown below in Table 2.1.

TABLE 2.1: DIRECT RAINFALL VALUES

Event	Rainfall Intensity
2% AEP	26.4 mm/hr
5% AEP	22.1 mm/hr
10% AEP	18.8 mm/hr
20% AEP	16.3 mm/hr
39% AEP	12.2 mm/hr

This approach is suitable to provide a representation of the expected water levels and potential flood level increases due to the proposed works. All other design requirements are controlled by the validated 1% AEP flood event.

2.2.2.3 Downstream Model Boundaries

The Bohle River AEP peak flood levels for all events as output by the MIKE-Flood model was adopted as the downstream boundaries of the TUFLOW sub-model. The downstream model boundaries were over 1 km downstream of the Site to ensure downstream boundary does not affect flood impact assessment of the Site.

2.2.3 Hydraulic Roughness

The hydraulic roughness (Manning's 'n') applied in the TUFLOW sub-model was based on the values adopted in MIKE-Flood model. In order to validate the TUFLOW model, Manning's 'n' values were increased by 10% to provide reasonable agreement between 1% AEP peak flood levels for the two models. Table 2.2 summarises the hydraulic roughness adopted in the hydraulic model.

TABLE 2.2: SUMMARY OF ADOPTED HYDRAULIC MODEL ROUGHNESS AND LOSSES

Land Use Type	Manning's n1	Impervious Fraction (%)	Initial Loss (mm)	Continuing Loss (mm/hr)
Road	0.028	40-50	15.4	1.5
Waterway	0.044	0-10	25	2.5
Residential	0.066	40-50	15.4	1.5
Medium-Dense Veg.	0.077	0-10	25	2.5
Floodplain	0.110	0-10	25	2.5

2.2.4 Impervious Fraction

The impervious fraction applied in the TUFLOW model was based on the values shown in Figure 2.3 of Upper & Middle Bohle Flood Study (AECOM, 2014). Table 2.2 summarises the impervious fraction adopted in the hydraulic model.

2.2.5 Initial and Continuing Losses

The initial and continuing losses applied in the TUFLOW model was based on the values adopted in MIKE-Flood model. Adopted initial and continuing losses for the pervious areas are 25 mm and 2.5 mm/hr respectively. A 1 mm initial loss and 0 mm/hr continuing loss were adopted for the impervious areas. The final losses adopted in TUFLOW were function of land use type and impervious fraction for each land use type. Table 2.2 summarises the adopted impervious fraction and losses in the hydraulic model.

2.2.6 Hydraulic Structures

Cross drainage hydraulic structures located on The Ring Road and Hervey Range Road were defined in the TUFLOW model. Dimensions and details of the structures were obtained from the MIKE-Flood model. Form Loss Coefficient (FLC) for Hervey Range Road bridge was adjusted to provide reasonable agreement between 1% AEP peak flood levels for the two models. The location of these structures is shown in Figure 2.1.

2.2.7 Eddy Viscosity

TUFLOW adopts the Smagorinsky formulation for viscosity (turbulence) effects. The default coefficient of 0.5 has been adopted in accordance with the recommendation in the TUFLOW user manual.

2.2.8 Summary

Key parameters adopted in the MIKE-Flood and TUFLOW models were provided and compared in Table 2.3. The validation process described in Engeny's original *Harris Crossing Development Flood Impact Assessment Report (Engeny 2018)* concluded that the model produces results that align reasonably with the TCC MIKE-Flood model. As such, it was approved that the TULFOW sub-model provides a reasonable basis for the FIA of the GemLife LLC.

TABLE 2.3: SUMMARY OF ADOPTED KEY PARAMETERS IN MIKE-FLOOD AND TUFLOW

Item	MIKE-Flood	TUFLOW	Comment
Grid Size	10 m	4 m	The adopted grid cell in TUFLOW allows more accurate representation of the smaller waterways and earthworks design.
Hydrologic Flow	XPRAFTS Inflow and Rain on Grid	Hydrographs extracted from MIKE-Flood at sub-model boundaries. Rain on Grid	Flow hydrographs for Bohle River and two tributaries within the Site extent were extracted from the MIKE-Flood model and have been adopted at the upstream boundaries of the TUFLOW model. Rain on grid was included in the TUFLOW model.
Hydraulic Roughness	Manning's n values documented in Table 3.4 of Upper & Middle Bohle Flood Study (AECOM, 2014)	Adopted roughness based on MIKE-Flood	Manning's 'n' values in TUFLOW were increased by 10% to provide better agreement between 1% AEP peak flood levels for the two models. The Manning's n of 0.06 was adopted to the developed site in consistent with the recommended values for Urban Areas in Upper & Middle Bohle Flood Study (AECOM, 2014)
Initial and Continuing Losses	Losses values documented in Section 2.1 of Upper & Middle Bohle Flood Study (AECOM, 2014)	Adopted losses based on MIKE-Flood	Pervious area: IL=25mm and CL=2.5 mm/hr Impervious area: IL=1mm and CL=0 mm/hr

Item	MIKE-Flood	TUFLOW	Comment
Fraction Impervious	Fraction impervious values shown in Figure 2.2 of Upper & Middle Bohle Flood Study (AECOM, 2014)	Adopted losses based on Upper & Middle Bohle Flood Study (AECOM, 2014)	The IL/CL losses adopted in the TUFLOW model considers percentage impervious for each land use type.
Eddy Viscosity	Velocity based viscosity, constant value of 6	Default parameters adopted.	TUFLOW default eddy viscosity parameters were adopted.
Hydraulic Structure	Bridge and culverts	Layered flow constrictions and culverts.	Bridge and culvert details in TUFLOW were obtained from MIKE-Flood model. Form Loss Coefficient (FLC) for Hervey Range Road bridge was adjusted to provide reasonable agreement between 1% AEP peak flood levels for the two models.
Downstream Boundary	Tide level	Constant flood level	1%, 2%, 5%, 10%, 20%, and 39% AEP flood levels at the location of TUFLOW's downstream boundary was obtained from MIKE-Flood model results.

RR_49A
RR_48A
RR_47D
W7
W6
W5
W4
W3
W2
W1
The Ring Rd
RP6
RP5
PO10
RP8
Bohle River
RP11
RP3
PO07
RP10
RP7
RP3
RP9
RP2
RP1
PO03
Bridge_Overtop

LEGEND

Map Features
- Hydraulic Model Extents
- Harris Crossing Site Boundary
- Pre-Developed Extent
- DCDB
- Inflows
- Bridge
- Cross Drainage
- HQ Model Outlets
- HT Model Outlets
- Reporting Points
- Reporting Lines

Surface Elevation (mAHD)
19
8

R	DETAILS	DATE
1	Final Issue	19-11-2024

DRAWN	NF	CHECKED	DN
APPROVED	DN	DATE	19-11-2024

NOTES: XXXXXXXXX

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SCALE @ A3 - 1:11,721
GDA94 / MGA zone 55

DISCLAIMER
Engeny has endeavoured to ensure accuracy and completeness of the data. Engeny assumes no legal liability or responsibility for any decisions or actions resulting from the information contained within this map.

DATA SOURCE
QLD Government Open Data Source

ENGENY

GemLife

Figure 2.1

Gemlife
Pre-Development (1% AEP Event)
TUFLOW Model Layout

Drg Ref.
BBNE01218-0001-SKE-0001

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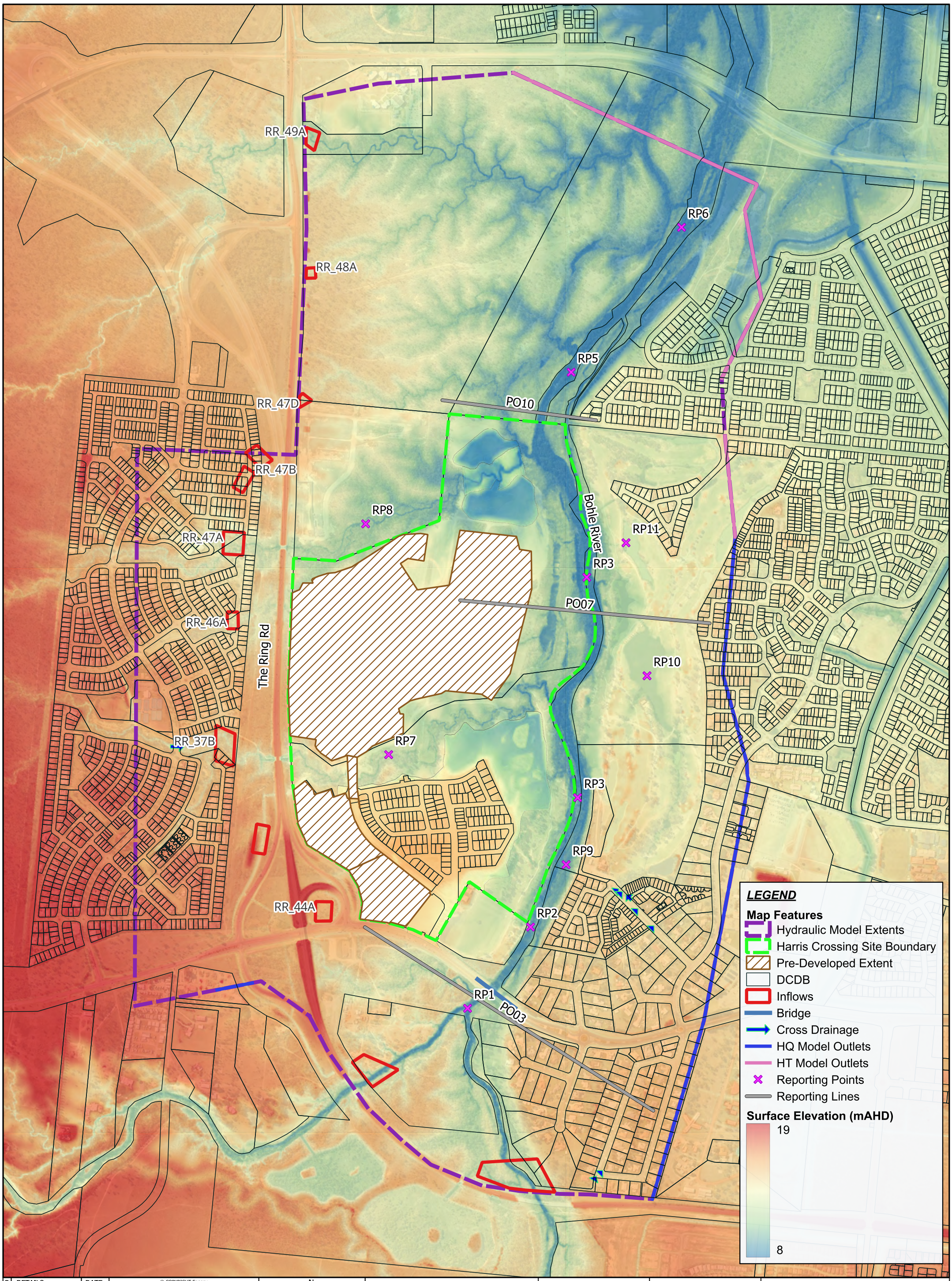

R	DETAILS	DATE
1	Final Issue	19-11-2024

DRAWN	NF	CHECKED	DN
APPROVED	DN	DATE	19-11-2024

NOTES: XXXXXXXXX

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0 0.1 0.2 km

SCALE @ A3 - 1:11,721
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DATA SOURCE
QLD Government Open Data Source

ENGENY

GemLife

Figure 2.2

Gemlife
Pre-Development (Additional Events)
TUFLOW Model Layout

Drg Ref.
BBNE01218-0001-SKE-0002

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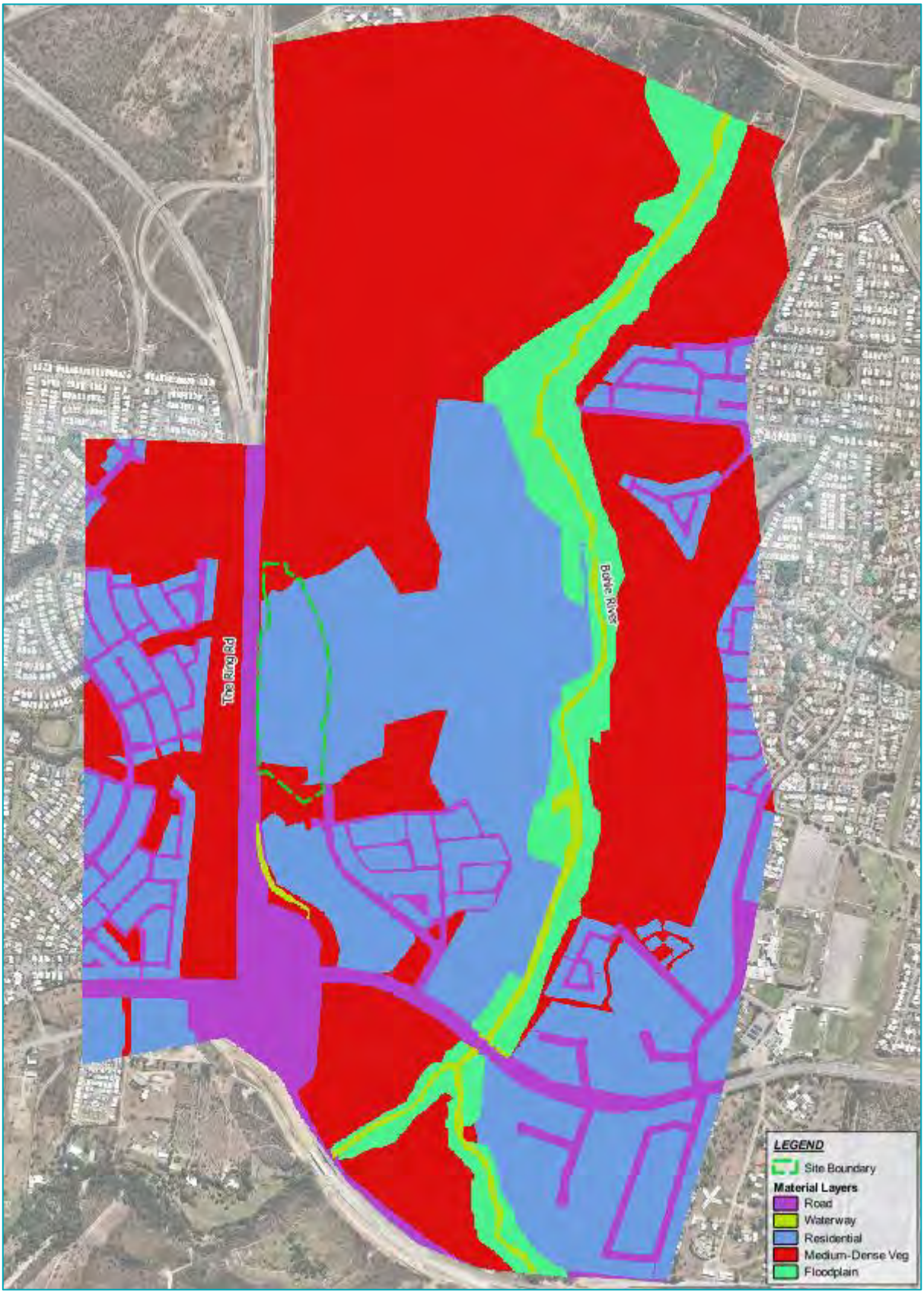

Figure 2.3: Pre-Developed TUFLOW Model Material Layout

3. POST-DEVELOPED SCENARIO

3.1 Overview

The post-development scenario was updated to account for the latest Gemlife LLC design, including development area and adjacent channel diversions. The implementation of these updates in the hydraulic model are described below.

3.2 Model Development

3.2.1 Topography Updates

The TUFLOW sub-model elevation surface has been updated to reflect the proposed Gemlife development. The key updates are shown in Figure 3.1 and include:

- **Design surface:** A design surface, provided on 23 July 2024 and produced by Western Partners, was included in the model. These updates are reflected in the design drawings included in Appendix A.
- **Recent survey:** A recent survey provided on 23 July 2024 by the client was trimmed and facilitated tie-in with the existing lidar surface at the northern extent of the proposed development.
- **Water release:** To prevent water entrapment within the development itself due to the rain on grid nature of the model, multiple channels were cut into the development surface to represent the ultimate major overland and minor stormwater network flow paths. This prevents under reporting of stormwater runoff within the surrounding waterways.

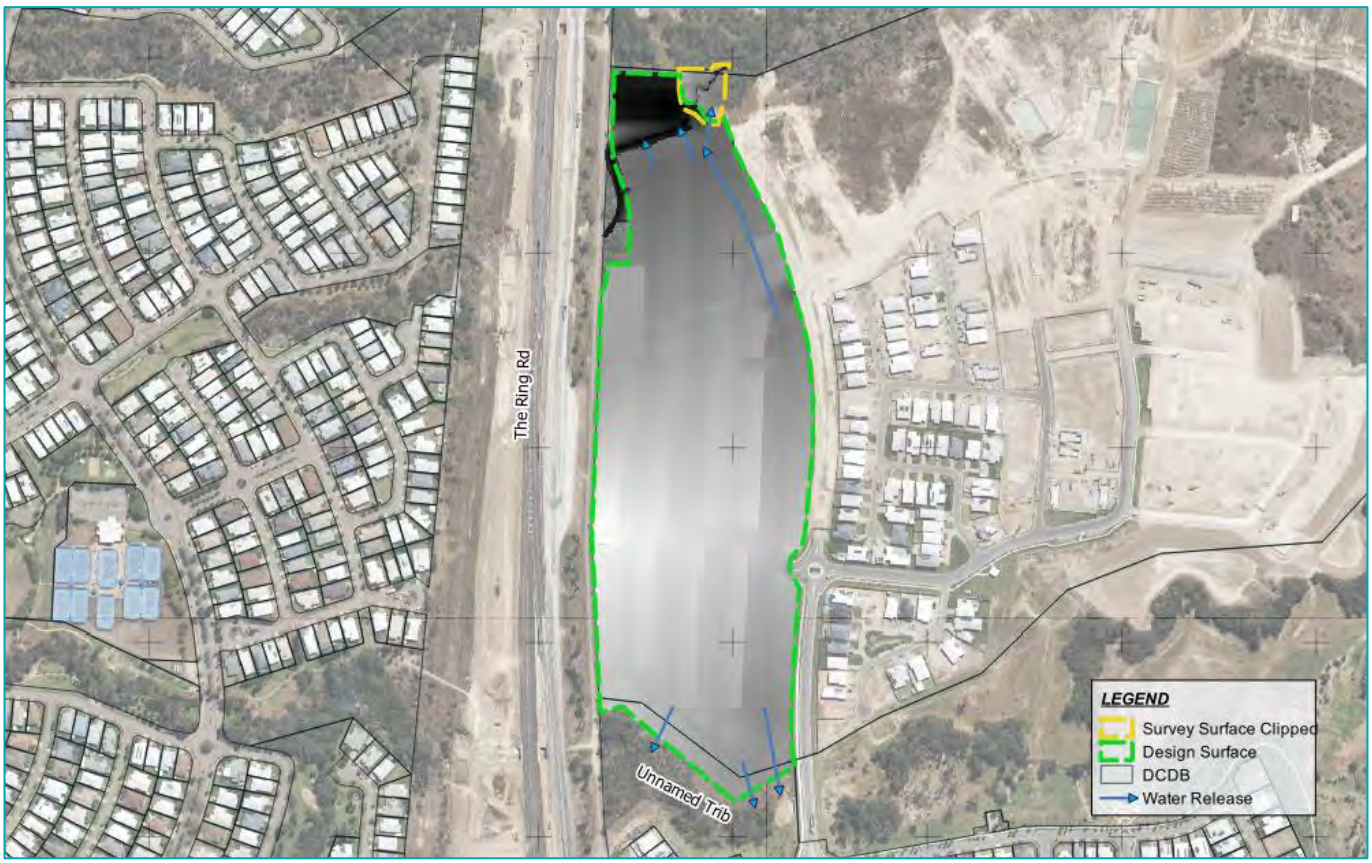

Figure 3.1: Updated Model Surface

3.2.2 Boundary Conditions

The upstream and downstream model boundary conditions have not been changed from the approved sub-model discussed in Section 2.2.2, because the proposed GemLife LLC development does not change these model inputs.

3.2.3 Hydraulic Roughness, Impervious Fraction & Losses

The TUFLOW model material values have been updated to reflect the proposed Gemlife LLC development. For the location of the updates refer to Figure 3.2. The materials layer, which controls the Manning's roughness values and rainfall loss values, was updated to reflect the updated development extent, including the proposed car park and channel areas. The rainfall loss values were calculated based on the fraction impervious values for each landuse type. The land use parameters are outlined in Table 3.1.

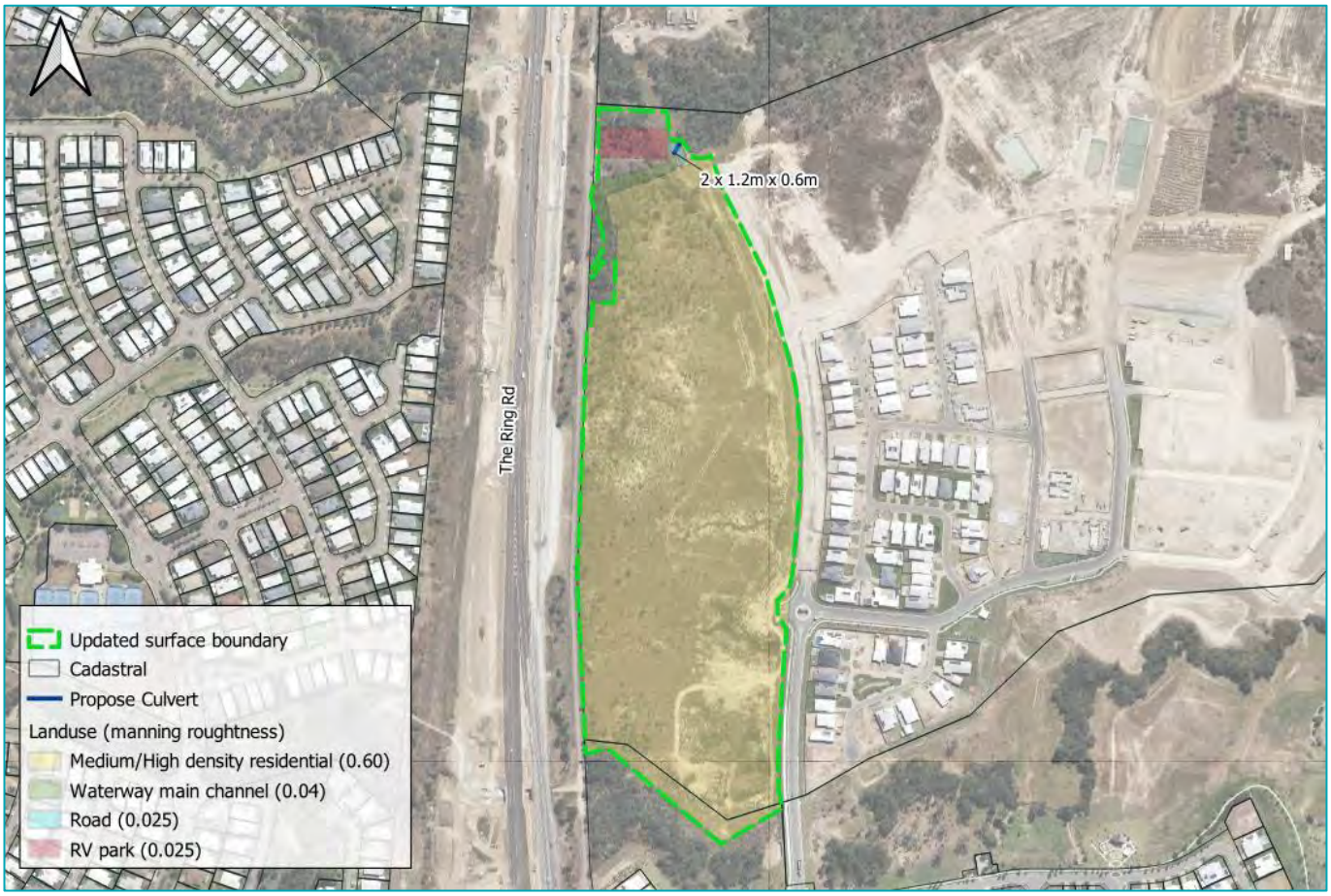

Figure 3.2: Hydraulic Roughness and Structure Updates

TABLE 3.1: ADOPTED HYDRAULIC MODEL ROUGHNESS, FRACTION IMPERVIOUS, AND PREVIOUS LOSSES

Land Use Type	Manning's n	Impervious Fraction (%)	Initial Loss (mm)	Continuing Loss (mm/hr)
RV Park	0.025	80	5	0.5
Road	0.025	40	15.4	1.5
Waterway	0.040	0	25	2.5
Residential	0.600	85	3.75	0.375

3.2.4 Hydraulic Structures

The hydraulic structures included in the pre-developed flood model remain unchanged.

As part of the GemLife LLC works a culvert is proposed beneath the RV park access road at the northern extents of the site to allow for the channel flows to be discharge downstream into The Bohle River (refer Figure 3.1). For culvert dimensions please refer to Table 3.2. The culvert was sized to both allow for adequate conveyance of the upstream stormwater flows and to comply with the accepted development requirements (ADR) as outlined by the Department of Agriculture and Fisheries (DAF) The requirements needing to be met include:

- Have a minimum (combined) culvert aperture width of 1.2m and be placed within the low flow channel; or
- Have a combined culvert aperture width that spans 100% of the main channel width.
- All new or replacement culvert cells must be installed at or below bed level.
- The obvert (internal roof) of the culvert cell(s) must be a minimum of 300 mm above the commence to flow water level (or bed level, for ephemeral waterways).
- The culvert must be installed at no steeper gradient than the waterway bed gradient.
- New culvert cells must be aligned parallel (within 10°) to the direction of water flow to minimise turbulence.

TABLE 3.2: PROPOSED CULVERT DIMENSION

Number	Type	Width	Height	Upstream Invert Level	Downstream Invert Level	Slope
2	RCBC	1200mm	600mm	11.18 mAHD	11.09 mAHD	0.8%

4. FLOOD IMPACT RESULTS

The hydraulic flood model was simulated for the 1%, 2%, 5%, 10%, 20% and 39% AEP flood events, with the peak flood level, depth, velocity and afflux mapping included in Appendix B (Pre-Developed Scenario) and Appendix C (Post-Developed Scenario). The following sections outline the key observations made regarding the modelling results and development requirements.

4.1 Site Immunity

It is important to understand that Engeny's flood assessment is focused on the flood conditions within the creeks and gullies. Whilst the site includes the final topography design DEM in the hydraulic sub-model, with the necessary roughness, losses etc included, this is only included to allow the model to assess the impact of the Site on the flooding within the creeks and gullies. The modelling detailed in this report does **not** include a detailed assessment of the stormwater network and overland flow paths. This assessment will be completed by Westera Partners.

Figure 4.1 presents the predicted 1% AEP flood levels for the post-developed scenario, with Table 4.1 presenting the predicted 1% AEP flood levels at the reporting locations shown in the figure.

All internal lots within the GemLife LLC will be designed by Westra Partners as part of the future operational works submissions to ensure building floor levels achieve flood immunity above the 1% AEP flood event water level within the creeks and gullies (detailed in Table 4.1), with 300 mm freeboard.

The road connecting to the RV parking overtops during the 39% AEP event. Depths and velocities at this road during the 39% AEP event are 300 mm and 0.3 m/s respectively. This road should **not** be considered trafficable during rain events. This crossing does not provide access into or out of the site and therefore will not need to be utilized in an emergency situation. The standard practices surrounding "when it's flooded, forget it" should apply.

TABLE 4.1: 1% AEP WATER SURFACE LEVEL EXTRACTS

Point ID	1% AEP WSL (mAHD)	Point ID	1% AEP WSL (mAHD)
1	13.59	16	15.24
2	13.59	17	15.65
3	13.59	18	14.76
4	13.59	19	14.76
5	13.59	20	14.77
6	13.59	21	14.76
7	13.59	22	14.75
8	13.59	23	14.87
9	13.59	24	14.74
10	13.59	25	14.78
11	13.59	26	14.73
12	13.58	27	14.8
13	13.59	28	14.72
14	13.59	29	14.71
15	14.43	30	14.71
		31	14.71

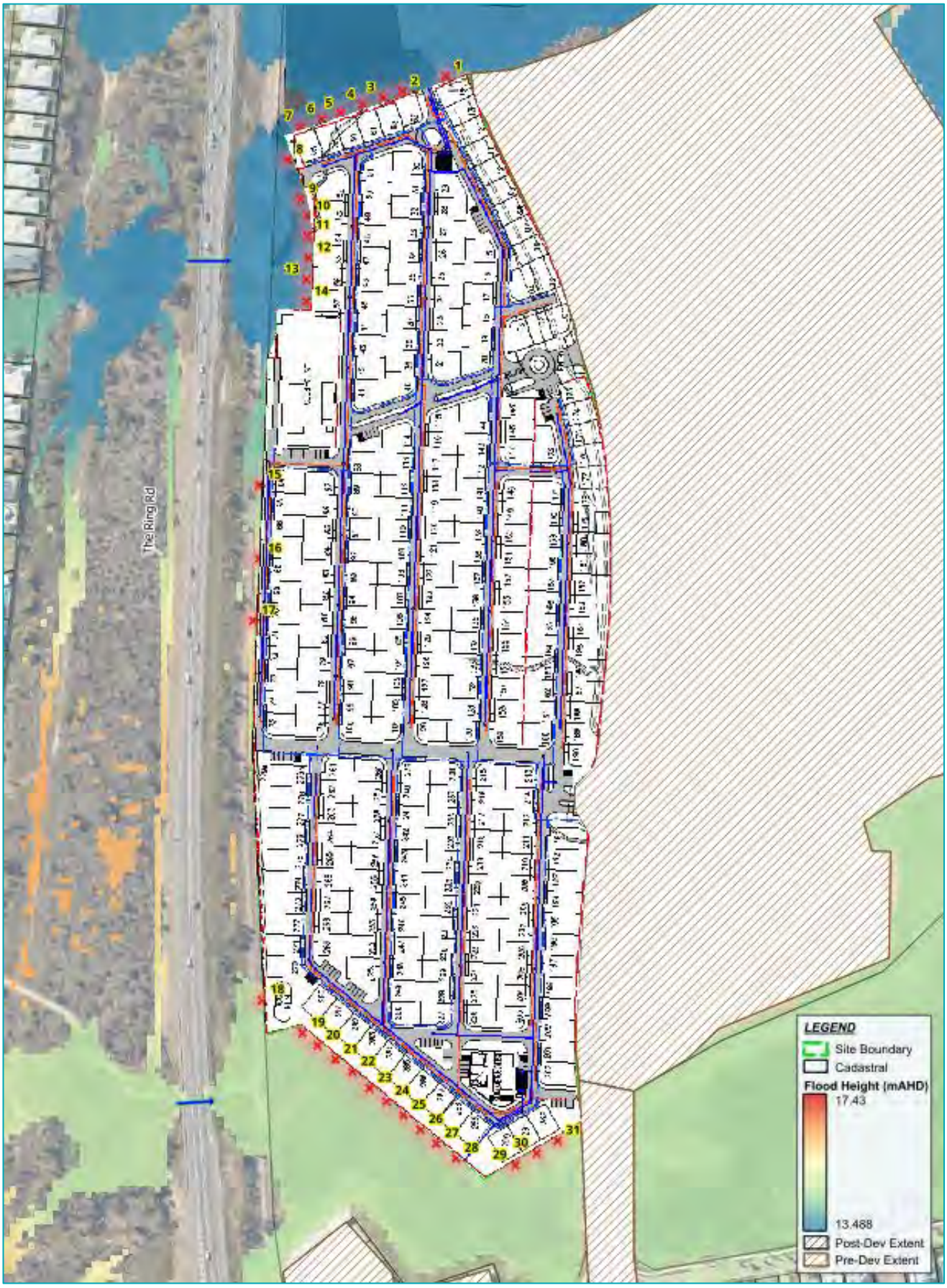

Figure 4.1: 1% AEP Water Surface Level Extract Points

4.2 General External Flood Level Impacts

The flood level impacts between the pre-developed scenario and the post-developed scenario are relatively minor and classified as follows:

- There are no flood level impacts throughout the larger catchment extent.
- There are no flood level impacts at the immediate northern extent of the Site. This is shown in Figure 4.2 below.
- There are minor flood level impacts to the immediate west of the northern end of the Site. This is shown in Figure 4.2 below.
- There are minor flood level impacts at the immediate southern extent of the updated development extent. This is shown in Figure 4.3 below.

The flood level impacts to the west of the site occur because the updated development pulls back from the road crossing, allowing the conveyance of flows to be less constricted. This slightly increases flood levels at the immediate downstream location but provides greater conveyance, does not impact on road immunity, and aligns more closely with flow conditions prior to the pre-developed scenario.

The southern flood level impacts have occurred due to a slight adjustment in the development extent and the increased density. These flood level impacts are contained wholly within the waterway extents and the road reserve of The Ring Road. The flood level impacts directly adjacent to The Ring Road reach a maximum change in flood level of 25mm. The magnitude of these impacts has been reviewed as part of The Ring Road immunity assessment conducted below in Section 4.5 of this report. Because of the continued immunity of The Ring Road and the low value of water level increases in the vicinity of The Ring Road these impacts are not considered to represent a material worsening. Increases in water level on the bike path have been addressed in Section 4.6 of this report.

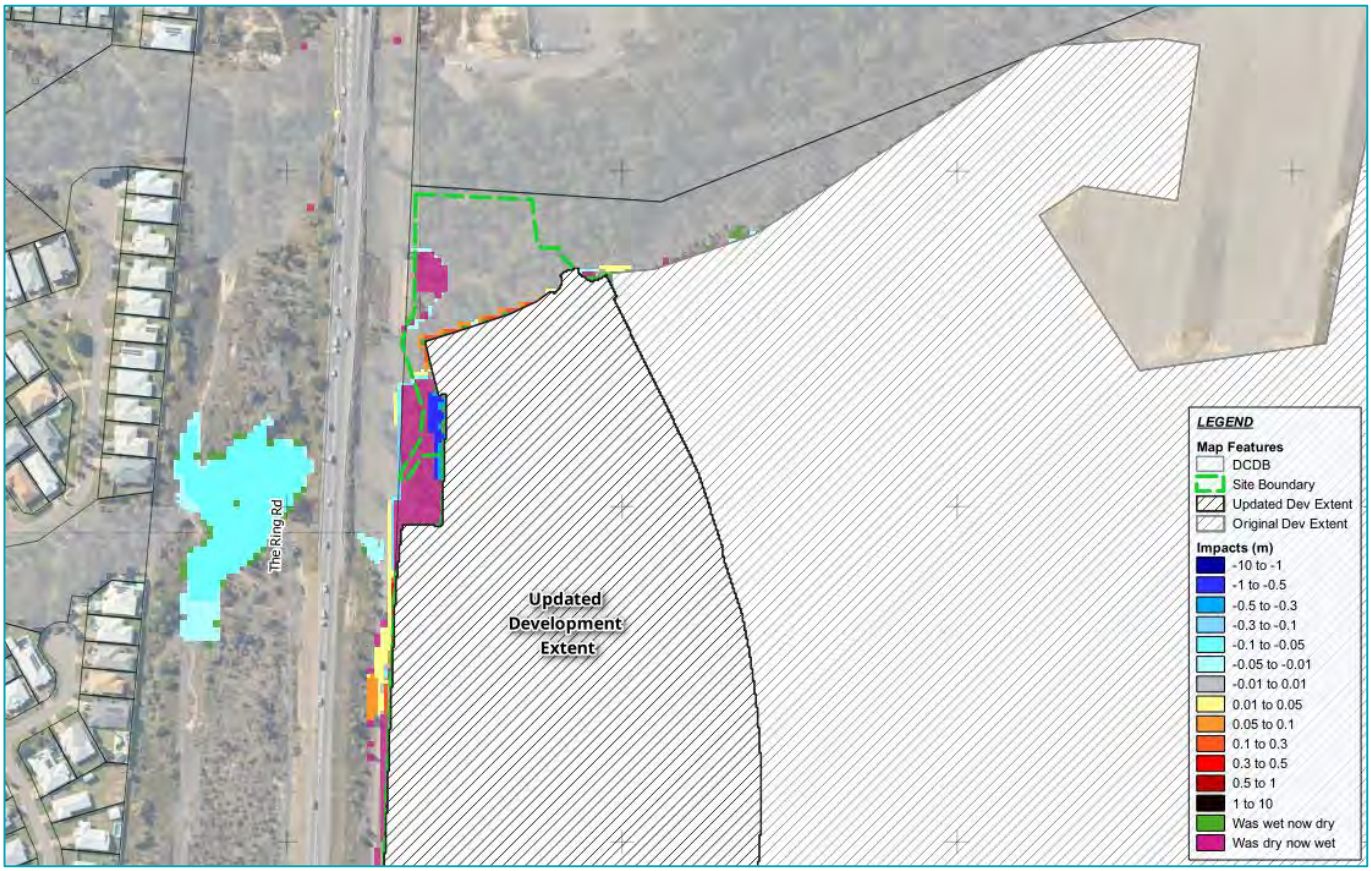

Figure 4.2: 1% AEP Updated Development Northern Impact Map

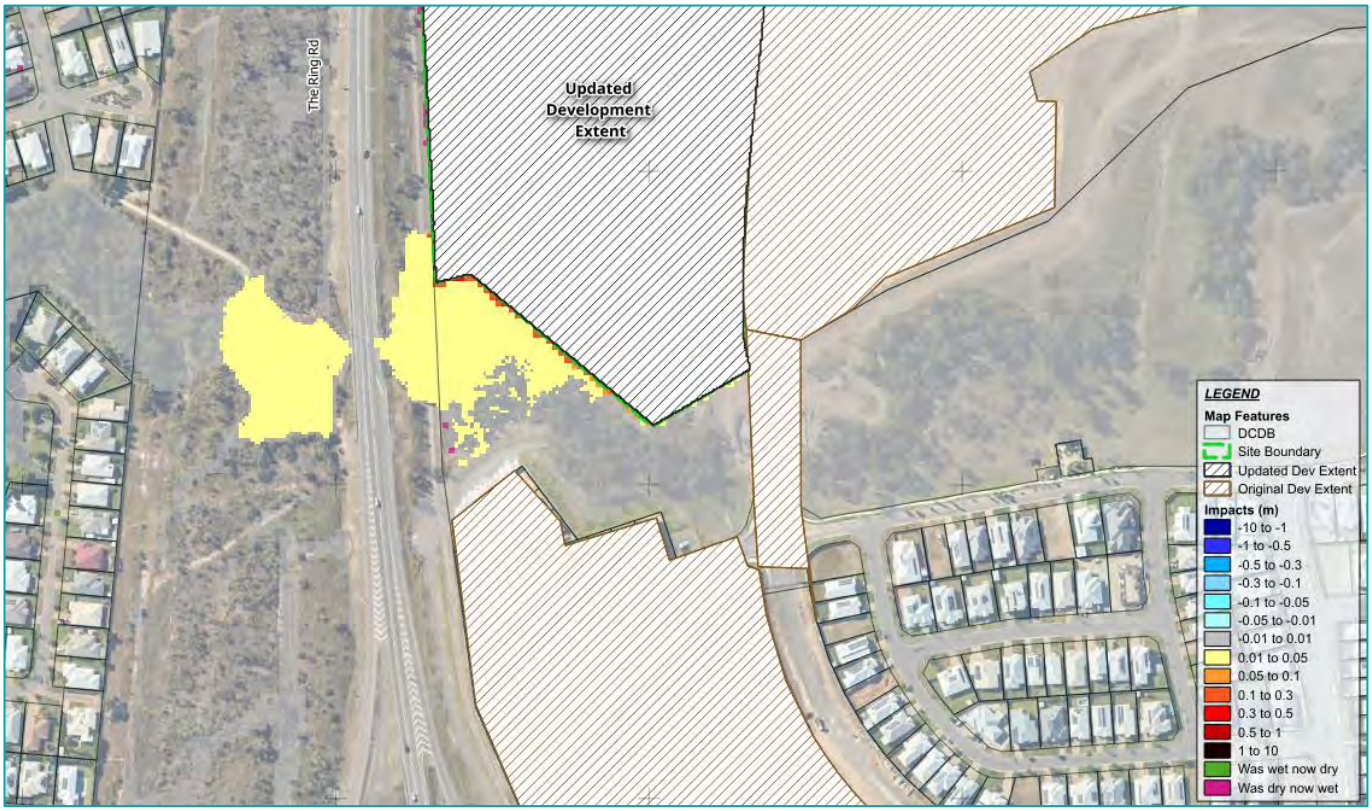

Figure 4.3: 1% AEP Updated Development Southern Impact Map

4.3 Velocity and Erosion Risks

Minimal changes to peak velocities have been observed between the pre-developed and post-developed scenarios.

The largest increases in velocity around The Ring Road occur in small, isolated pockets that reach a maximum value of 0.78 m/s. This is because the new channel downstream of The Ring Road more efficiently conveys flows that are passed beneath the road. Despite these increases in velocity, the maximum velocities at this location are still relatively low, with 1% AEP velocities peaking at just over 1.3 m/s as shown below in Figure 4.4. This indicates that there is no risk of erosion caused by the proposed site works.

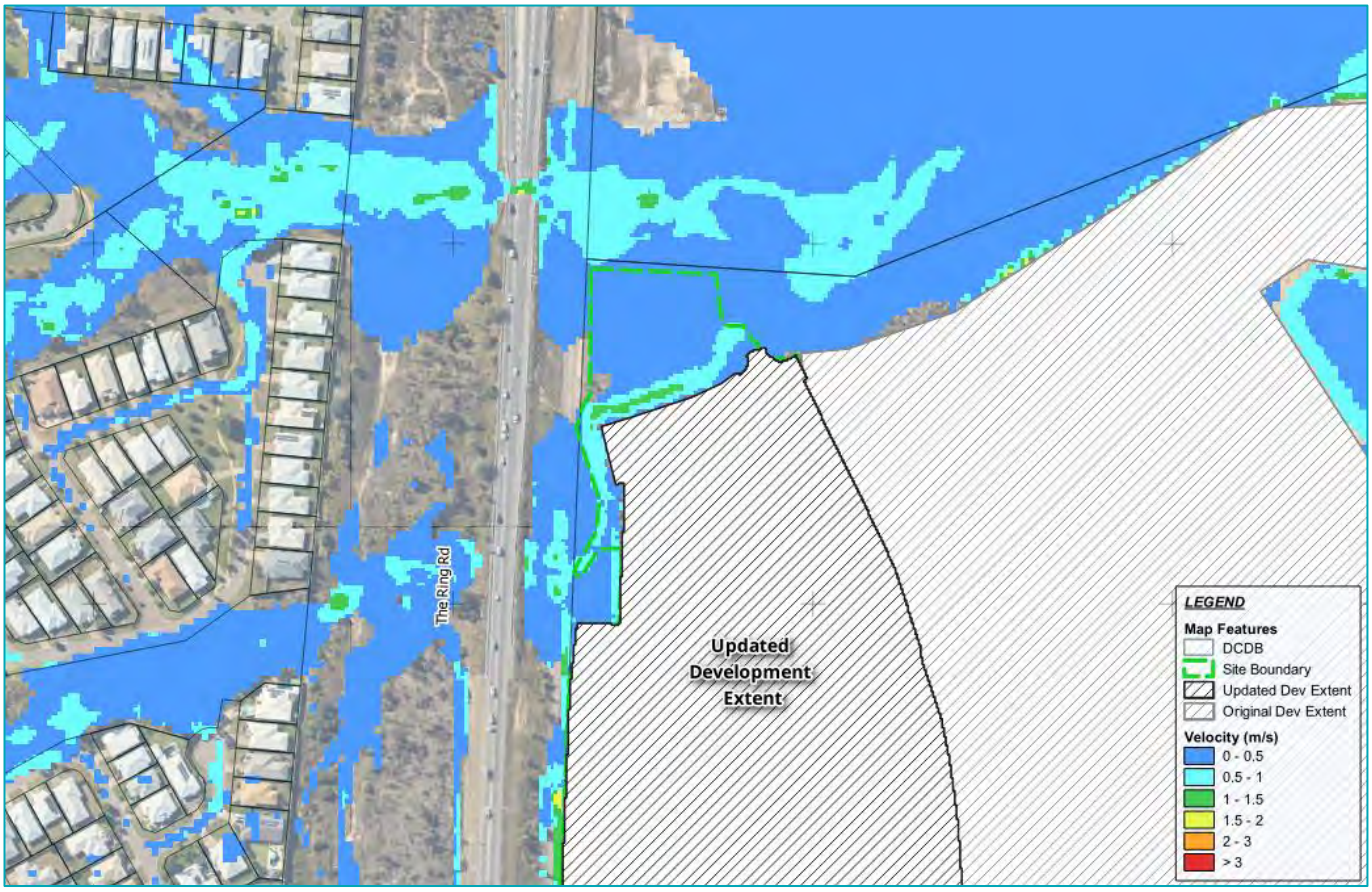

Figure 4.4: 1% AEP Peak Velocities

4.4 The Ring Road / Bruce Highway Immunity

The Ring Road and the Bruce Highway is in the process of receiving upgrades and being expanded with additional lanes. Based on the designs of these roads, the new lanes are to be built lower than the existing lanes and as such will be more susceptible to changing flood conditions. The immunity of this revised road at two critical crossing leading into the development has been assessed, as shown on Figure 4.5. Both the 1% AEP water level and the finished surface level of the new road lanes have been included in Table 4.2 below.

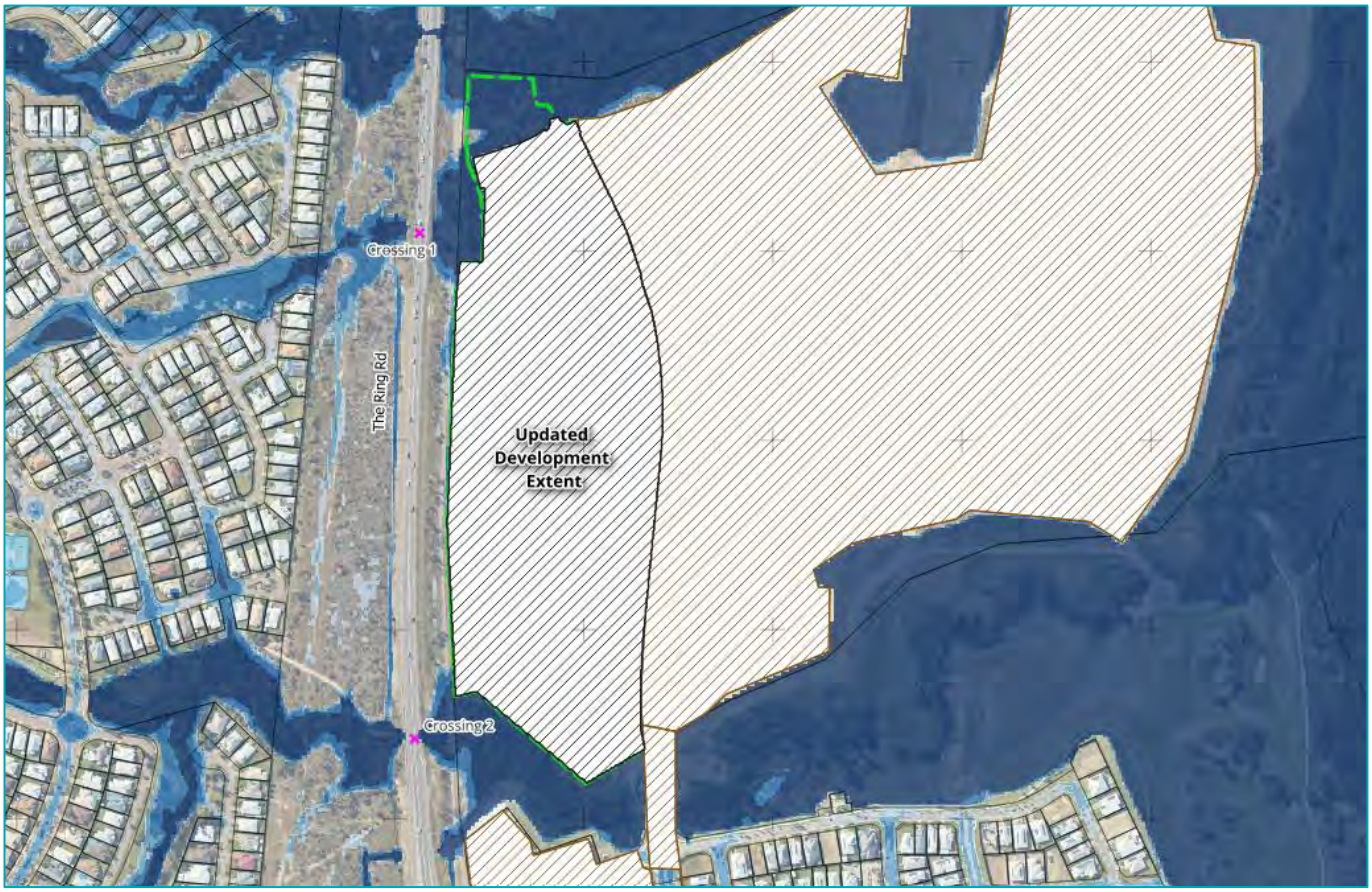

Figure 4.5: Road Immunity Check Locations

TABLE 4.2: 1% AEP ROAD IMMUNITY CHECK

Upstream Crossing	1% AEP Post-Development Water Level	Road Finished Surface Level
Crossing 1	13.70 mAHD	15.2 mAHD
Crossing 2	14.85 mAHD	16.4 mAHD

Based on the above modelling, the new road upgrades will still have over 1.5 m of freeboard above the predicted 1% AEP water level, ensuring that adequate immunity is maintained.

4.5 Bike Path Flood Level Impacts

While the 1% AEP Flood results have dictated specific requirements to the proposed design, specifically lot immunity and the Ring Road immunity, DTMR have previously indicated the importance of the bike path and the need to assess the impact the design will have on its useability. The bike path experiences flooding in the pre-developed model for all modelled events. It is considered that the principle of "if it's flooded, forget it" applies to this piece of infrastructure, in which case the bike path is not able to be utilised. A comparison between the pre- and post-developed scenario was still conducted to outline the minimal impact created by the proposed development update.

The afflux levels across the bike path and surrounding areas have been measured using the points shown in Figure 4.6. Table 4.3 shows the extracted data for the 39% AEP flood event. The 39% AEP flood event has been chosen for this assessment as it is the smallest modelled event and represents the most likely scenario in which the bike paths might still be in use during a storm event.

Two locations were identified where flood levels increase as a result of the proposed development update. At these locations the increases are relatively minor (increases of 10 and 20 mm) and are not expected to significantly alter the useability of these routes during a storm event.

Additionally, it should be acknowledged that anyone using the bike path during a 39% AEP event or greater (either during the pre-developed or post-developed scenario) should not be able to get to these locations in the first place or would have nowhere to go if they began their journey at these locations due to significant overtopping of the bike path at northern and southern locations (as shown in the flood maps contained in Appendix B and C). This results in this portion of the bike path not being utilised as a bike path during these AEP storm events.

Overall, considering the pre-developed inundation present on the bike path in events down to the 39% AEP flood event, the proposed development update is not considered to produce a material worsening in the use of the adjacent bike paths.

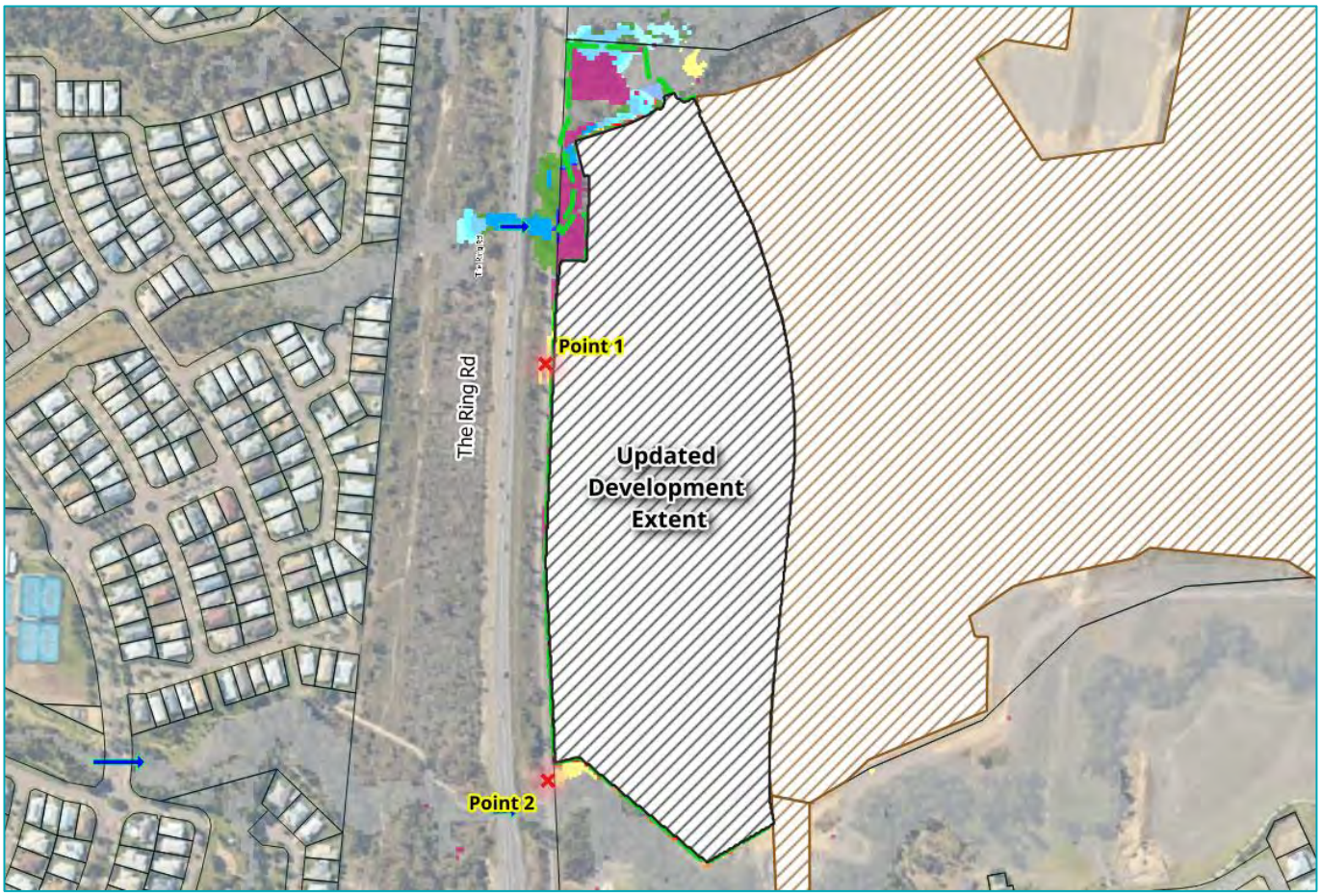

Figure 4.6: Afflux Extraction Point Locations

TABLE 4.3: 39% AEP DATA EXTRACTION POINTS

Point ID	Pre-Dev WSL (mAHD)	Post-Dev WSL (mAHD)	Afflux (m)
1	14.09	14.11	0.02
2	13.85	13.86	0.01

5. CONCLUSION

Engeny has undertaken a flood impact assessment for the proposed GemLife Land Lease Community development. For this assessment the previously approved modelling was adopted as the Pre-Developed Scenario in assessing the impacts of the post-developed scenario.

Based on the results of the post-developed scenario modelling, the following observations have been made:

- Internal lots are to be designed according to the 1% AEP event water level to ensure 300mm freeboard is achieved to floor levels.
- The proposed updated development has no material impact on peak water levels.
- Some minor increases in velocities occur immediately north of the updated development extent. However, the absolute peak velocities at this location are still very low, maxing out at just over 1.3 m/s. Therefore, these changes are not considered to materially impact upon the surrounding infrastructure, including The Ring Road.
- The remaining aspects of the hydraulic modelling outputs are generally in accordance with the previously approved reporting (M7191_001-REP-001-2, 2018) and the submitted and accepted reporting updated (M7191_005-REP-002-2, 2023).

An assessment of the Townsville City Council flood hazard overlay code and the State Planning Policy has been included in Appendix D, which indicate the local Council and State performance outcomes have been achieved.

6. QUALIFICATIONS

(a) In preparing this document, including all relevant calculation and modelling, Engeny Australia Pty Ltd (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.

(c) Engeny reserves the right to review and amend any aspect of the works performed including any opinions and recommendations from the works included or referred to in the works if:

  (i) Additional sources of information not presently available (for whatever reason) are provided or become known to Engeny; or

  (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.

(d) Engeny does not give any warranty nor accept any liability in relation to the completeness or accuracy of the works, which may be inherently reliant upon the completeness and accuracy of the input data and the agreed scope of works. All limitations of liability shall apply for the benefit of the employees, agents and representatives of Engeny to the same extent that they apply for the benefit of Engeny.

(e) This document is for the use of the party to whom it is addressed and for no other persons. No responsibility is accepted to any third party for the whole or part of the contents of this Report.

(f) If any claim or demand is made by any person against Engeny on the basis of detriment sustained or alleged to have been sustained as a result of reliance upon the Report or information therein, Engeny will rely upon this provision as a defence to any such claim or demand.

(g) This Report does not provide legal advice.

7. REFERENCES

1. AECOM (May 2014), Upper & Middle Bohle Flood Study Base-line Flooding Assessment.
2. IPWEA (2017), Queensland Urban Drainage Manual. Institute of Public Works Engineering Australasia, Queensland.
3. Engeny (2023), Harris Crossing Development Flood Impact Assessment (M7191_001-REP-001-2).
4. Engeny (2023), Harris Crossing Development Stage Update (M7191_005-REP-002-2).

APPENDIX A: PROPOSED DEVELOPMENT LAYOUT

PROPOSED RETIREMENT LIVING DEVELOPMENT

99 HOGARTH DRIVE, BOHLE PLAINS

RUBY DEVELOPMENTS PTY LTD

Project Number: S24-020

INDEX OF DRAWINGS

GENERAL DRAWINGS
S24-020-PG01 COVER SHEET

PRELIMINARY CIVIL DRAWINGS
S24-020-PC01 CIVIL NOTES & LEGEND
S24-020-PC02 SITE PLAN
S24-020-PC03 CATCHMENT PLAN
S24-020-PC04 PRELIMINARY SERVICES PLAN 1 of 2
S24-020-PC05 PRELIMINARY SERVICES PLAN 2 of 2
S24-020-PC06 STORMWATER DETAILS

PRELIMINARY EARTHWORKS DRAWINGS
S24-020-PE01 PRELIMINARY EARTHWORKS PLAN
S24-020-PE02 PRELIMINARY EARTHWORKS SECTIONS

LOCALITY PLAN
NOT TO SCALE

No.	DATE	REVISIONS	DES	DRN	CHK	APD
01	12.12.24	Issued for Approval				

DESIGNED S.C.M
DRAWN J.J.D
CHECKED J.M.H
APPROVED J.M.H
DATE JULY 2024
DOCUMENT CONTROL

For and on behalf of WESTERA PARTNERS PTY. LTD.
APPROVED

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BRAZIER MOTTI
PHONE 07 4772 1144

DATUM A.H.D.
PSM 95569
R.L. 17.143

PROJECT PROPOSED RETIREMENT LIVING DEVELOPMENT
LOCATION LOT 1002 ON SP340654
99 HOGARTH DRIVE, BOHLE PLAINS
TITLE COVER SHEET
CLIENT RUBY DEVELOPMENTS PTY LTD

DRAWING STATUS PRELIMINARY N.F.C.
DRAWING NUMBER S24-020-PG01
SHEET NUMBER 01 OF 01
REVISION

GENERAL NOTES

G1 WESTERA PARTNERS HAS LIMITED CONTROL OR INPUT TO LOCAL GOVERNMENT OR OTHER LEGISLATED APPROVALS UNLESS SPECIFICALLY ENGAGED BY IT'S CLIENT. ANY CHANGES TO APPROVAL REQUIREMENTS (INCLUDING ORDERS FOR SUSPENSION OF WORKS ETC) SHOULD BE COMMUNICATED TO WESTERA PARTNERS AND ALL OTHER RELEVANT DESIGNERS TO ALLOW ASSESSMENT OF POTENTIAL RISKS AND ENSURE DESIGN AND SAFETY COMPLIANCE.

G2 ALL CONSTRUCTION AND MATERIALS SHALL BE IN ACCORDANCE WITH THE LOCAL AUTHORITIES STANDARD DRAWINGS & SPECIFICATIONS AND COMPLETED TO THE SATISFACTION OF THE SUPERINTENDENT AND LOCAL AUTHORITY.

G3 UNLESS SPECIFIED OTHERWISE ALL MATERIALS AND WORK SHALL COMPLY WITH THE RELEVANT AUSTRALIAN STANDARDS.

G4 PRIOR TO THE COMMENCEMENT OF CONSTRUCTION THE CONTRACTOR MUST LOCATE ALL EXISTING SERVICES AND PROMPTLY PROVIDE THE LOCATION DATA TO THE DESIGN ENGINEER TO ASSESS IMPACTS ON THE DESIGN.

G5 ALL CONNECTIONS TO EXISTING SEWERS AND WATER MAINS ARE TO BE CONSTRUCTED BY THE LOCAL AUTHORITY OR AN APPROVED CONTRACTOR. THE CONTRACTOR IS TO ALLOW IN HIS CONTRACT SUM FOR THE COST OF ANY PROPOSED CONNECTIONS.

G6 ALL SEWERS ARE TO BE 150MM DIA. U.P.V.C. CLASS SN8 RUBBER RING JOINTED AND PROPERTY CONNECTIONS ARE TO BE 100MM DIA. U.P.V.C CLASS SN6 UNLESS NOTED OTHERWISE

G7 THE PAVEMENT DEPTHS SHOWN ARE PRELIMINARY ONLY AND ARE TO BE VERIFIED FOLLOWING SUB-SOIL TESTS OF THE SUB-GRADE MATERIAL.

G8 ALL ROOFWATER CONNECTIONS FROM KERB ADAPTERS ARE TO BE 100MM DIA CLASS SN10 AT A MIN GRADE OF 1.0% UNLESS SHOWN OTHERWISE. ROOFWATER CONNECTIONS FROM FIELD INLETS OR GULLY PITS ARE TO BE 150MM DIA CLASS SN8 AT A MIN GRADE OF 1.0% UNLESS NOTED OTHERWISE.

G9 ALL U.P.V.C. STORMWATER DRAINAGE PIPES ARE TO BE CLASS SN8 (U.N.O.)

ALL R.C. PIPES ARE TO BE CLASS 3 (U.N.O.)
< 900ø = USE SPIGOT AND SOCKET PIPES WITH RUBBER RING JOINTS
900ø < PIPES < 1050ø = USE FLUSH JOINTED PIPES WITH EXTERNAL ELASTOMERIC BAND
1050ø < PIPES = USE FLUSH JOINTED PIPES WITH EXTERNAL ELASTOMERIC BAND AND INTERNAL CEMENT MORTAR JOINT

ALL F.R.C. PIPES ARE TO BE FRCPIPE+ CLASS 4 (U.N.O.) AND SHALL BE DUAL RUBBER RING JOINT WITH COLLAR. PIPES SHALL BE FROM 225ø TO 600ø ONLY.

POLYPROPYLENE/POLYETHYLENE STORMWATER PIPE MINIMUM CLASS SN8 (U.N.O.) SUBJECT TO ACCEPTANCE BY CERTIFYING ENGINEER AND LOCAL AUTHORITY. CONSTRUCTION AND EMBEDMENT TO BE IN ACCORDANCE WITH MANUFACTURERS SPECIFICATIONS.

G10 WATER PIPES SHALL BE;
- P.V.C.-M WATER PIPES ARE TO BE SERIES 2 PN16 SN10 R.R.J.
- D.I.C.L. WATER PIPES ARE TO BE PN35 WITH ALL FITTINGS TO BE FUSION BONDED POLYMERIC COATED.
- PE WATER PIPES ARE TO BE PN16 SDR11 PE100. DN25 AND DN32 WATER SERVICES SHALL BE PE80B.

G11 ALL "AS CONSTRUCTED" INFORMATION IS TO BE RECORDED AS REQUIRED BY THE LOCAL AUTHORITY AND SUBMITTED TO THE SUPERINTENDENT IMMEDIATELY AFTER COMPLETION OF THE WORKS.

G12 ALL ALLOTMENTS ARE TO BE GRADED AT A MINIMUM GRADE OF 1 IN 200.

CONCRETE NOTES

C1 ALL WORKMANSHIP AND MATERIALS SHALL BE IN ACCORDANCE WITH AS3600 CONCRETE STRUCTURES CODE AND THE REFERENCED STANDARDS THEREIN.

C2 THE CONCRETE STRENGTH GRADE AND THE COVER TO REINFORCEMENT FOR THE VARIOUS CONCRETE ELEMENTS SHALL BE AS LISTED BELOW:
- CLIMATE ZONE: TROPICAL / TEMPERATE / ARID
- LOCATION: COASTAL / NEAR COASTAL / INLAND

ELEMENT	EXPOSURE CLASSIFICATION	STRENGTH GRADE	MINIMUM COVER
MANHOLES	B1	N32	40
	C2	S50	65
FIELD INLET PITS	B1	N32	40
	C2	S50	65
HEADWALLS	B1	N32	40
	C2	S50	65
INTERNAL ROADS	B1	N32	40
KERB/CHANNEL	B1	N32	–
FOOTPATHS	B1	N32	40
RETAINING WALL PANELS	B1	N32	30*
	C2	S50	60*
BORED PIERS	B1	N32	40
	C2	S50	65

*RIGID FORMWORK & INTENSE COMPACTION

C3 CONCRETE TO HAVE A MAXIMUM AGGREGATE SIZE OF 20mm WITH 80mm MAXIMUM SLUMP, A WATER/CEMENT RATIO OF NOT GREATER THAN 0.65 AND A MAXIMUM FINAL BASIC DRYING SHRINKAGE STRAIN OF 800 x 10^{-6} UNLESS APPROVED OTHERWISE.

C4 NO ADDITIVES SHALL BE ADDED OF APPLIED TO THE CONCRETE MIX WITHOUT THE APPROVAL OF THE ENGINEER.

C5 THE MAXIMUM PERMISSIBLE TRANSPORT TIME FOR CONCRETE BETWEEN BATCHING AND PLACEMENT ON SITE SHALL BE IN ACCORDANCE WITH THE FOLLOWING TABLE.

AMBIENT AIR TEMPERATURE	MAX. BATCHING TO PLACEMENT TIME
10° – 24°C	120 MINUTES
25° – 27°C	90 MINUTES
28° – 30°C	60 MINUTES
31° – 33°C	45 MINUTES
34° – 36°C	30 MINUTES
37°C+	NO PLACEMENT OF CONCRETE UNLESS CHILLED WATER OR ICE IN MIX

C6 ALL CONCRETE SHALL BE MECHANICALLY VIBRATED. VIBRATORS SHALL NOT BE USED TO SPREAD CONCRETE.

C7 ALL CONCRETE SHALL BE SAMPLED AND TESTED IN ACCORDANCE WITH AS1379 ADOPTING THE PROJECT ASSESSMENT METHOD FOR COMPRESSIVE STRENGTH AND SLUMP COMPLIANCE. THE RESULTS OF ALL TESTS SHALL BE PROMPTLY SUBMITTED TO THE ENGINEER FOR REVIEW.

C8 WHEN THE AIR TEMPERATURE EXCEEDS 30°C, ALIPHATIC ALCOHOL SHALL BE APPLIED TO THE CONCRETE SURFACE OF SLABS IMMEDIATELY AFTER THE INITIAL SCREED AND AGAIN AFTER BULL FLOATING.

C9 CURING OF ALL CONCRETE SURFACES SHALL COMMENCE IMMEDIATELY AFTER COMPLETING CONCRETE FINISHING AND SHALL CONTINUE FOR 7 DAYS. CONTRACTOR TO CONFIRM METHOD OF CURING WITH ENGINEER PRIOR TO USE.

C10 SIZES OF CONCRETE ELEMENTS DO NOT INCLUDE THICKNESS OF APPLIED FINISHES.

C11 BEAM DEPTHS ARE WRITTEN FIRST AND INCLUDE SLAB THICKNESS, IF ANY.

C12 NO HOLES, CHASES OR EMBEDDED ITEMS OTHER THAN THOSE SHOWN ON THE STRUCTURAL DRAWINGS SHALL BE MADE IN CONCRETE MEMBERS WITHOUT PRIOR APPROVAL OF THE ENGINEER. CONDUITS, PIPES ETC. SHALL NOT BE PLACED IN THE COVER THICKNESS OF THE CONCRETE.

C13 WHERE SERVICE PIPES PENETRATE CONCRETE ELEMENTS, PROVISION SHOULD BE MADE TO ALLOW FOR MOVEMENT OF THE ELEMENT.

C14 FORMWORK SHALL BE DESIGNED, CONSTRUCTED AND STRIPPED IN ACCORDANCE WITH AS3610 FORMWORK CODE, UNLESS NOTED OTHERWISE ON THE DRAWINGS.

C15 REINFORCEMENT IS REPRESENTED DIAGRAMMATICALLY AND NOT NECESSARILY SHOWN IN TRUE PROJECTION OR SCALE.

C16 ALL REINFORCEMENT SHALL BE SECURELY SUPPORTED IN ITS CORRECT POSITION ON PLASTIC BAR CHAIRS, GENERALLY AT NOT GREATER THAN 800mm CENTRES IN BOTH DIRECTIONS.

C17 WELDING AND HEATING OF REINFORCEMENT SHALL NOT BE PERMITTED WITHOUT APPROVAL OF THE ENGINEER.

C18 ALL STEEL REINFORCEMENT IN CONCRETE ELEMENTS SHALL BE INSPECTED BY THE ENGINEER AND PASSED PRIOR TO POURING OF ANY CONCRETE.

C19 LAP REINFORCEMENT ONLY AT LOCATIONS SHOWN ON THE DRAWINGS OR AS APPROVED BY THE ENGINEER.

C20 SLAB FABRIC SHALL BE LAPPED ONE FULL PANEL OF FABRIC PLUS 50mm SO THAT THE TWO OUTERMOST TRANSVERSE WIRES OF ONE SHEET OVERLAP THE TWO OUTERMOST TRANSVERSE WIRES OF THE SHEET BEING LAPPED BY 50mm.

C21 BAR REINFORCEMENT SHALL BE LAPPED IN ACCORDANCE WITH THE FOLLOWING TABLE.

TYPICAL BAR REINFORCEMENT LAP LENGTHS		
BAR	LAP LENGTH UNO	HORIZONTAL BARS WITH GREATER THAN 300mm OF CONCRETE CAST BELOW THEM
N12	550	750
N16	800	1100
N20	1100	1400
N24	1250	1600
N28	1400	1800
N32	1600	2100
N36	2000	2500

WHERE LAPS ARE SHOWN ON THE DRAWINGS THE ABOVE LAP LENGTHS SHALL BE ADOPTED UNLESS NOTED OTHERWISE. WHERE BARS OF DIFFERENT DIAMETER ARE SHOWN LAPPED, ADOPT THE LAP LENGTH APPROPRIATE TO THE SMALLER DIAMETER BAR.

C22 A VAPOUR BARRIER OF 0.2mm (200um) MINIMUM THICK POLYTHENE SHEETING SHALL BE PLACED BENEATH SLABS ON GROUND UNLESS NOTED OTHERWISE.

LEGEND

GENERAL

ASPHALTIC CONCRETE PAVEMENT
REINFORCED CONCRETE PAVEMENT
REINFORCED CONCRETE PATHWAY/CROSSOVER
TURF
STONE PITCHING
CEMENT GROUTED STONE PITCHING
TELECOMMUNICATION
GAS MAIN
ELECTRICITY OVERHEAD
ELECTRICITY UNDERGROUND
LIGHT POLE
POWER POLE
PIT (TELSTRA/ELEC)
EDGE OF BITUMEN
FENCE
×2.53 EXISTING SURFACE LEVEL
× 2.53 FINISHED SURFACE LEVEL
RETAINING WALL
SWALE

STORMWATER DRAINAGE

NEW / EXISTING
STORMWATER PIPE
SAG GULLY PIT
ON GRADE GULLY PIT
MANHOLE
600 x 600 FIELD INLET
900 x 600 FIELD INLET
1050 DIA FIELD INLET
HEADWALL
SWD KERB ADAPTER WITH ROOFWATER PIPE
2A STORMWATER STRUCTURE LABEL

WATER

EXISTING / DISUSED / NEW

WATER MAIN
FIRE HYDRANT
DUAL OUTLET FIRE HYDRANT
SWABBING FIRE HYDRANT
ISOLATION VALVE
SCOUR VALVE
AIR VALVE
DEAD END
TEST/CHLORINATION POINT
REDUCER
PIPE MATERIAL CHANGE
WATER SERVICE PRE-TAPPED TEE
WATER SERVICE PIPE & CONDUIT
FLOW METER
FLUSHING POINT

SEWERAGE

EXISTING / DISUSED / NEW

GRAVITY SEWER MAIN
SEWER RISING MAIN
SEWER VACUUM MAIN
MAINTENANCE HOLE & END OF LINE
END OF LINE
MAINTENANCE SHAFT
HORIZONTAL/VERTICAL BEND
COMPOUND BEND
STUB / TEMPORARY END
RODDING END
PROPERTY CONNECTION
OVERFLOW MAINTENANCE HOLE
ISOLATION VALVE
SCOUR VALVE AND CHAMBER
GAS RELEASE VALVE
FLUSHING POINT
DISCHARGE MAINTENANCE HOLE
NON-RETURN/REFLUX VALVE
VENT POLE / ODOUR CONTROL UNIT

No.	DATE	REVISIONS	DES	DRN	CHK	APD

DESIGNED S.C.M
DRAWN J.J.D
CHECKED J.M.H
APPROVED J.M.H
DATE JULY 2024
DOCUMENT CONTROL
For and on behalf of WESTERA PARTNERS PTY. LTD.
APPROVED

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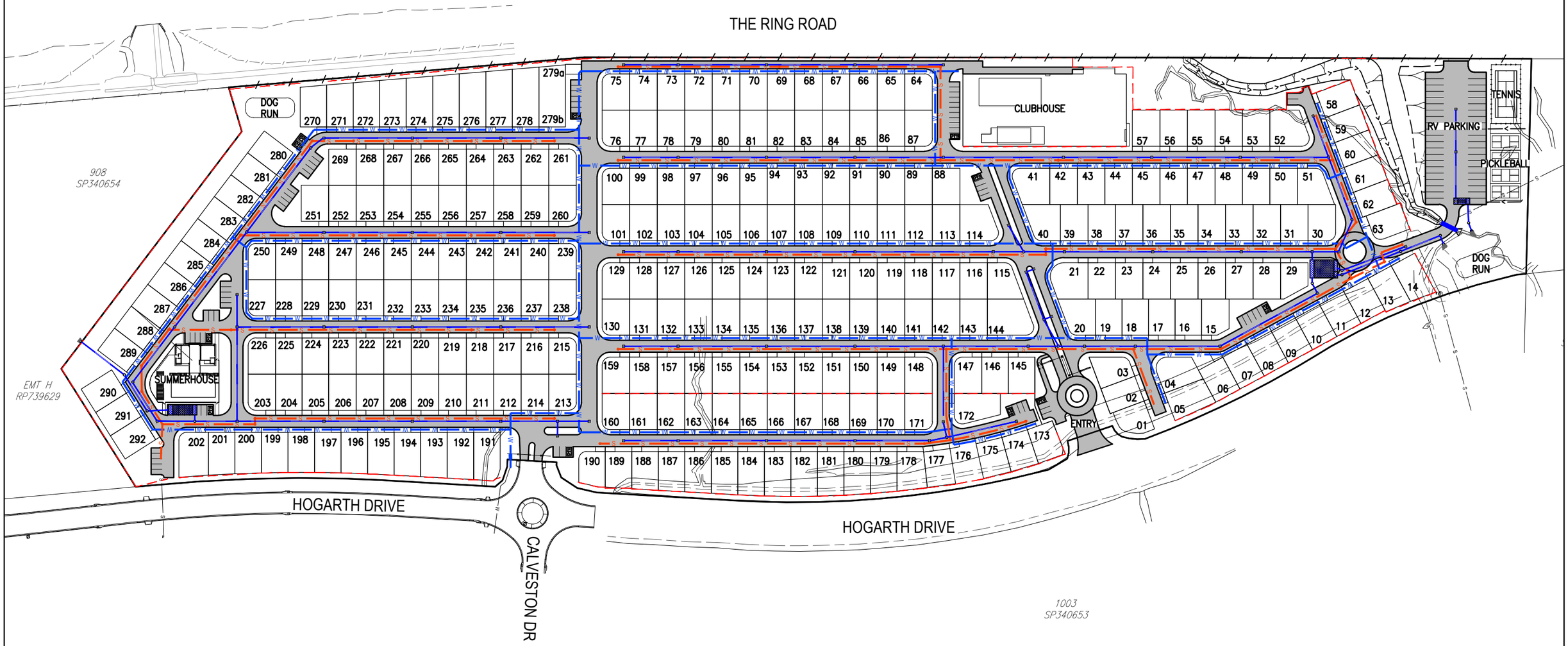
CENTRAL VICTORIA T 03 5441 0922 E centralvic@westerapartners.com.au

SURVEYOR
BRAZIER MOTTI
PHONE 07 4772 1144
DATUM A.H.D.
PSM 95569
R.L. 17.143

PROJECT PROPOSED RETIREMENT LIVING DEVELOPMENT
LOCATION LOT 1002 ON SP340654
99 HOGARTH DRIVE, BOHLE PLAINS
TITLE CIVIL NOTES AND LEGEND
CLIENT RUBY DEVELOPMENTS PTY LTD

DRAWING STATUS PRELIMINARY N.F.C.
DRAWING NUMBER S24-020-PC01
SHEET NUMBER 01 OF 06
REVISION



SITE PLAN

SCALE 1:1000 (A1 SIZE) 0 10 20 30 40 50

No.	DATE	REVISIONS	DES	DRN	CHK	APD

DESIGNED S.C.M
DRAWN J.J.D
CHECKED J.M.H
APPROVED J.M.H
DATE JULY 2024
DOCUMENT CONTROL

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SURVEYOR
BRAZIER MOTTI
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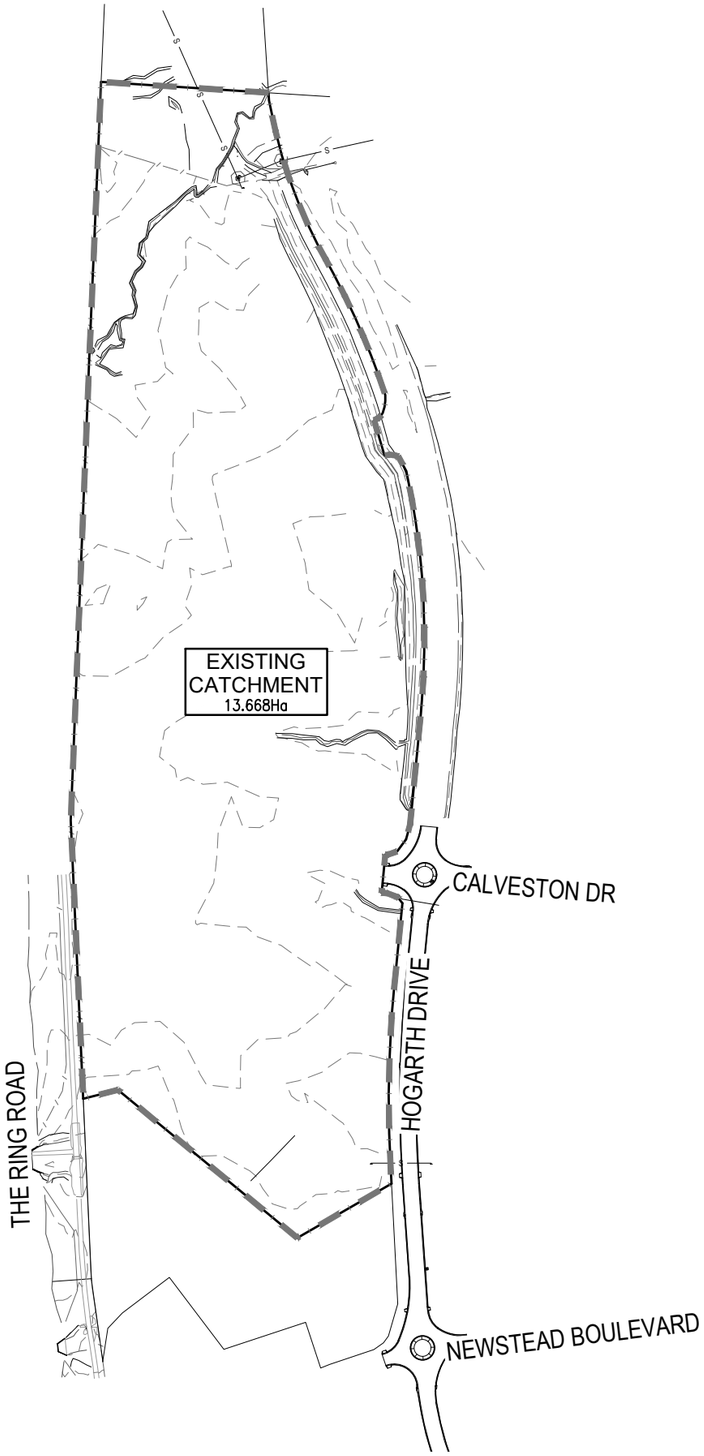
DATUM A.H.D.
PSM 95569
R.L. 17.143

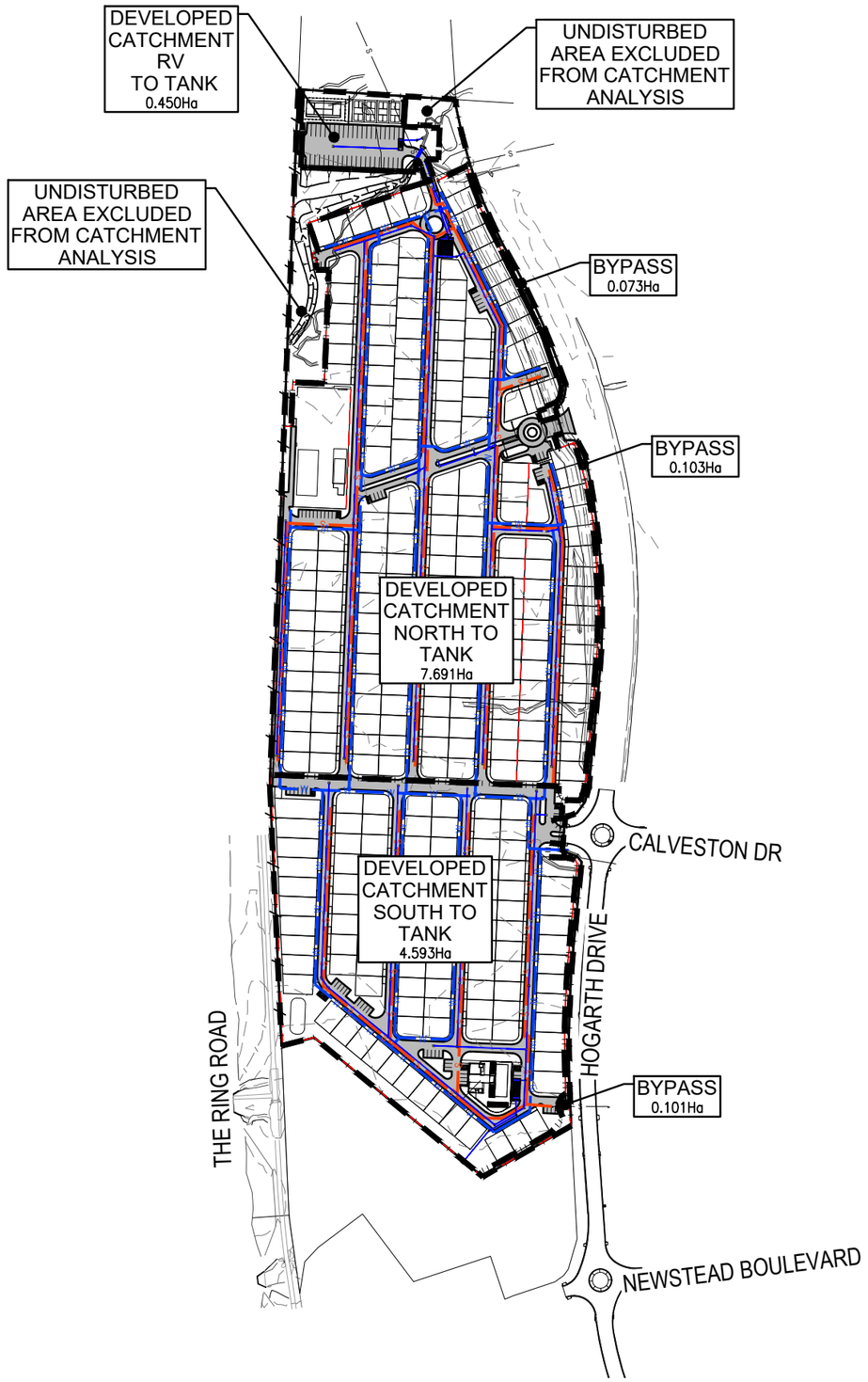
PROJECT	PROPOSED RETIREMENT LIVING DEVELOPMENT
LOCATION	LOT 1002 ON SP340654 99 HOGARTH DRIVE, BOHLE PLAINS
TITLE	SITE PLAN
CLIENT	RUBY DEVELOPMENTS PTY LTD

DRAWING STATUS	PRELIMINARY N.F.C.
DRAWING NUMBER	S24-020-PC02
SHEET NUMBER	02 OF 06
REVISION	



EXISTING CATCHMENT PLAN

SCALE 1:2000 (A1 SIZE) 0 20 40 60 80 100



DEVELOPED CATCHMENT PLAN

SCALE 1:2000 (A1 SIZE) 0 20 40 60 80 100

No.	DATE	REVISIONS	DES	DRN	CHK	APD

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DATUM A.H.D.
PSM 95569
R.L. 17.143

PROJECT PROPOSED RETIREMENT LIVING DEVELOPMENT
LOCATION LOT 1002 ON SP340654
99 HOGARTH DRIVE, BOHLE PLAINS
TITLE CATCHMENT PLAN
CLIENT RUBY DEVELOPMENTS PTY LTD

DRAWING STATUS PRELIMINARY N.F.C.
DRAWING NUMBER S24-020-PC03
SHEET NUMBER 03 OF 06
REVISION

THE RING ROAD

DOG RUN

SUMMERHOUSE

908
SP340654

EMT H
RP739629

TREATMENT TANK SOUTH
TOTAL AREA = 78.84 m2
INTERNAL WEIRS = 0.900 m
FILTER CARTRIDGES = 50

PROVIDE COMBINED FIRE/DOMESTIC WATER METER.

EXISTING DN150 SERVICE FROM WATER MAIN.

HOGARTH DRIVE

CALVESTON DR

REFER DWG. S24-020-PC05 FOR CONTINUATION

PRELIMINARY SERVICES PLAN

SCALE 1:500 (A1 SIZE)

0 5 10 15 20 25

No.	DATE	REVISIONS	DES	DRN	CHK	APD
1	12/12/2024	Issue for Council				

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DATUM A.H.D.
PSM 95569
R.L. 17.143

PROJECT PROPOSED RETIREMENT LIVING DEVELOPMENT
LOCATION LOT 1002 ON SP340654
99 HOGARTH DRIVE, BOHLE PLAINS
TITLE PRELIMINARY SERVICES PLAN 1 of 2
CLIENT RUBY DEVELOPMENTS PTY LTD

DRAWING STATUS PRELIMINARY N.F.C.
DRAWING NUMBER S24-020-PC04
SHEET NUMBER 04 OF 06
REVISION

CLUBHOUSE

DIVERT WATER WAY AROUND DEVELOPMENT FOOTPRINT.

TREATMENT TANK RV
TOTAL AREA = 27.88 m2
INTERNAL WEIRS = 0.900 m
FILTER CARTRIDGES = 8

TREATMENT TANK NORTH
TOTAL AREA = 133.49 m2
INTERNAL WEIRS = 0.900 m
FILTER CARTRIDGES = 90

TENNIS

PICKLEBALL

RV PARKING

EXISTING SEWER MAIN

PROVIDE STORMWATER OUTLET & SCOUR PROTECTION TO EXISTING OPEN DRAIN.

PROVIDE CULVERT UNDER RV STORAGE DRIVEWAY.

PROVIDE STORMWATER OUTLET & SCOUR PROTECTION TO EXISTING OPEN DRAIN.

ENTRY

HOGARTH DRIVE

1002 SP332255

7000 SP344622

1003 SP340653

REFER DWG. S24-020-PC04 FOR CONTINUATION

PRELIMINARY SERVICES PLAN

SCALE 1:500 (A1 SIZE)

0 5 10 15 20 25

No.	DATE	REVISIONS	DES	DRN	CHK	APD

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DRAWN J.J.D
CHECKED J.M.H
APPROVED J.M.H
DATE JULY 2024
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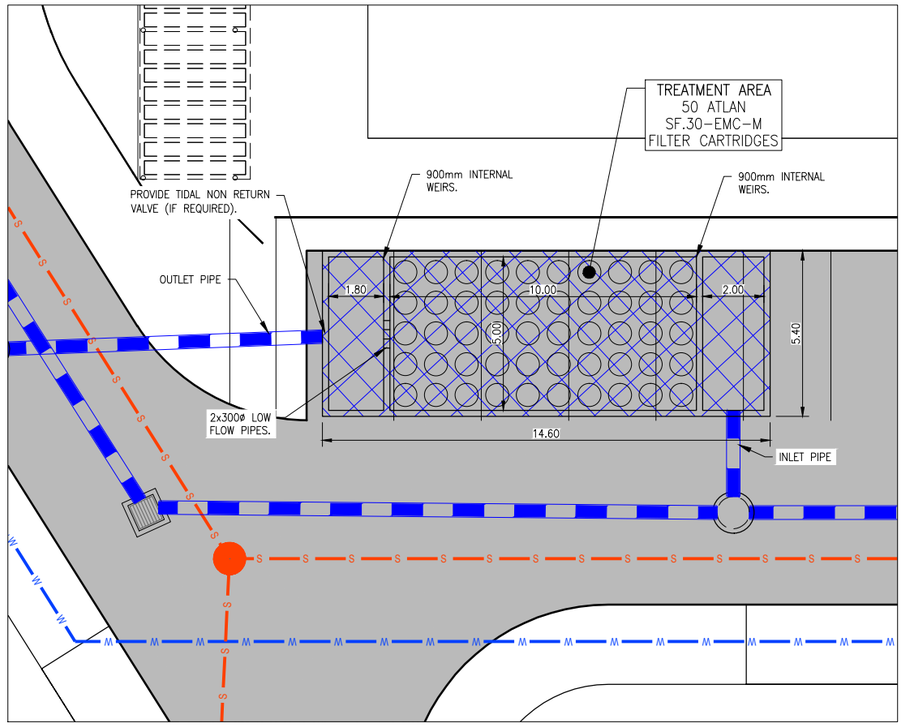
DATUM A.H.D.
PSM 95569
R.L. 17.143

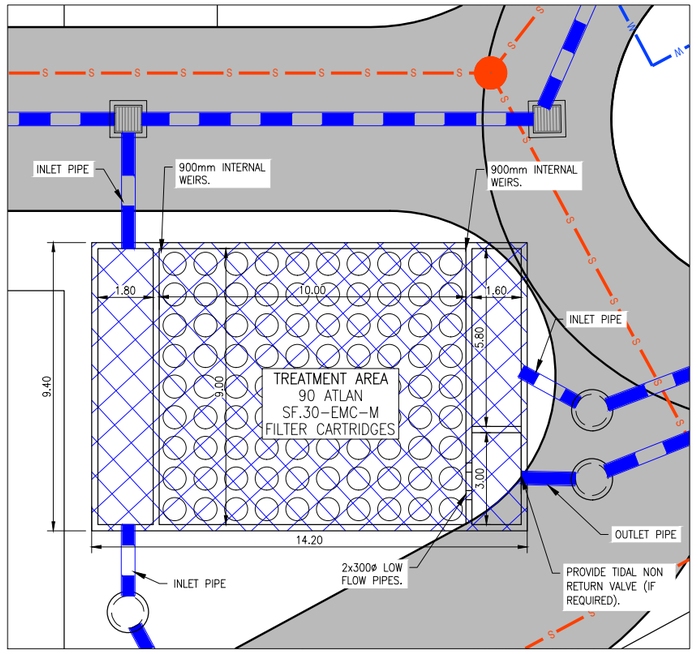
PROJECT	PROPOSED RETIREMENT LIVING DEVELOPMENT
LOCATION	LOT 1002 ON SP340654 99 HOGARTH DRIVE, BOHLE PLAINS
TITLE	PRELIMINARY SERVICES PLAN 2 of 2
CLIENT	RUBY DEVELOPMENTS PTY LTD

DRAWING STATUS	PRELIMINARY N.F.C.
DRAWING NUMBER	S24-020-PC05
SHEET NUMBER	05 OF 06
REVISION	



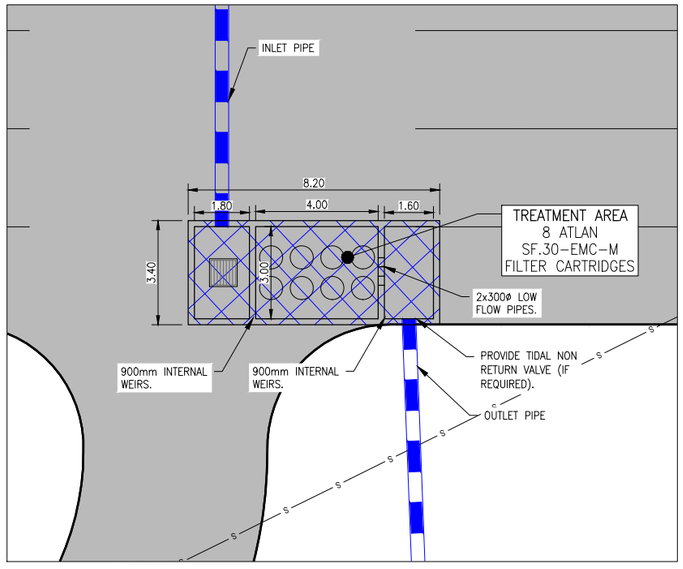
SOUTH TREATMENT TANK

SCALE 1:100 (A1 SIZE) 0 1 2 3 4 5



NORTH TREATMENT TANK

SCALE 1:100 (A1 SIZE) 0 1 2 3 4 5



RV PARKING TREATMENT TANK

SCALE 1:100 (A1 SIZE) 0 1 2 3 4 5

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DATUM A.H.D.
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R.L. 17.143

PROJECT PROPOSED RETIREMENT LIVING DEVELOPMENT
LOCATION LOT 1002 ON SP340654
99 HOGARTH DRIVE, BOHLE PLAINS
TITLE STORMWATER DETAILS
CLIENT RUBY DEVELOPMENTS PTY LTD

DRAWING STATUS PRELIMINARY N.F.C.
DRAWING NUMBER S24-020-PC06
SHEET NUMBER 06 OF 06
REVISION

PRELIMINARY EARTHWORKS PLAN

SCALE 1:1000 (A1 SIZE)

0 10 20 30 40 50

EARTHWORKS SUMMARY

CUT VOLUME	=	9,792 m^3
CUT AREA	=	38,792 m^2
FILL VOLUME	=	102,554 m^3
FILL AREA	=	205,634 m^2

EARTHWORKS LEGEND

DEPTH OF CUT TABLE	DEPTH OF FILL TABLE
0.0m - 0.25m	0.0m - 0.25m
0.25m - 0.5m	0.25m - 0.5m
0.5m - 0.75m	0.5m - 0.75m
0.75m - 1.0m	0.75m - 1.0m
1.0m - 1.25m	1.0m - 1.25m
1.25m - 1.5m	1.25m - 1.5m
1.5m - 1.75m	1.5m - 1.75m
1.75m - 2.0m	1.75m - 2.0m
2.0m - 2.25m	2.0m - 2.25m
2.25m - 2.5m	2.25m - 2.5m
> 2.5m	2.5m - 3.5m
	> 3.5m

GENERAL NOTES:

1. IN CASE OF DOUBT – ASK!
2. ALL LEVELS TO AHD, DIMENSIONS IN METERS U.N.O
3. ALL LIAISON WITH LOCAL, STATE & STATUTORY AUTHORITIES IS THE CONTRACTOR'S RESPONSIBILITY.
4. THE LOCATION OF EXISTING SERVICES IS FOR CONTRACTOR'S INFORMATION ONLY, THE LOCATION OF SERVICES WILL BE CONFIRMED BY THE CONTRACTOR PRIOR TO THE COMMENCEMENT OF WORKS.
5. ANY DAMAGE CAUSED TO THE EXISTING SERVICE WILL BE MADE GOOD AT THE CONTRACTORS EXPENSE.
6. EARTHWORKS PROCEDURES ARE TO BE CARRIED OUT IN ACCORDANCE WITH AS 3798 – 2007 "GUIDELINES ON EARTHWORKS FOR COMMERCIAL AND RESIDENTIAL DEVELOPMENTS".
7. EARTHWORKS OPERATIONS ARE TO BE CARRIED OUT IN GENERAL ACCORDANCE WITH THE GEOTECHNICAL REPORT.
8. WORKS NOT SPECIFICALLY REFERRED TO, ARE TO BE CONSTRUCTED IN ACCORDANCE WITH THE GENERAL DRAWINGS AND SPECIFICATIONS OF THE LOCAL AUTHORITY.
9. THE CONTRACTOR IS TO ALLOW FOR ALL FEES AND HAULAGE COSTS ASSOCIATED WITH DISPOSAL OF MATERIAL FROM THE SITE.
10. ALL COSTS ASSOCIATED WITH NOISE AND DUST SUPPRESSION FOR SITE WORKS ARE DEEMED THE CONTRACTOR'S RESPONSBILITY.
11. COMPACTION STANDARDS
    - 'MODIFIED' TO AS 1289 TEST 5.2.1
    - 'STANDARD TO AS 1289 TEST 5.1.1
12. PRIOR TO COMMENCEMENT OF WORKS THE CONTRACTOR WILL PROVIDE SCOUR AND EROSION PROTECTION INCLUDING PROVISION OF SILT TRAPS AND FENCES TO MINIMISE DEPOSITION OF MATERIAL DOWNSTREAM OF THE PROPERTY.
13. NO BLASTING WILL BE PERMITTED.
14. THE LOCATION OF THE SITE SHEDS, SITE OFFICE AND AMENITIES BUILDING WILL BE LOCATED TO SUIT TEMPORARY UTILITY SERVICES OR AS AGREED WITH THE MANAGER.
15. TESTING FREQUENCY AS 3798 – 2007 SECTION 8.0 OR AS APPROVED BY THE GEOTECHNICAL ENGINEER.
16. AT COMPLETION OF CONSTRUCTION THE CONTRACTOR SHALL ARRANGE FOR AN INDEPENDENT LICENSED SURVEYOR TO CARRY OUT A "WORKS AS CONSTRUCTED" SURVEY AND SUBMIT THE DETAIL PLAN TO THE MANAGER.
17. THE LOCATION OF TEMPORARY STOCKPILES DURING CONSTRUCTION IS TO BE AGREED WITH THE MANAGER.

No.	DATE	REVISIONS	DES	DRN	CHK	APD

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DRAWN J.J.D
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APPROVED J.M.H
DATE JULY 2024

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SURVEYOR
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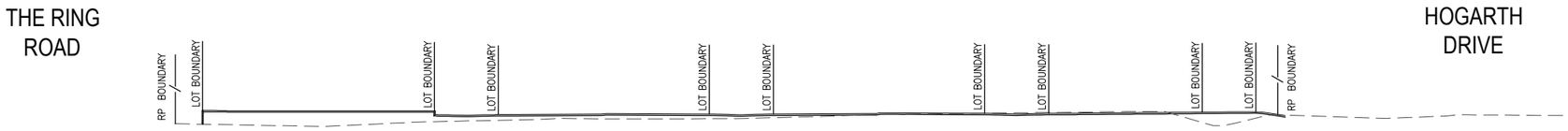
DATUM A.H.D.
PSM 95569
R.L. 17.143

PROJECT PROPOSED RETIREMENT LIVING DEVELOPMENT
LOCATION LOT 1002 ON SP340654
99 HOGARTH DRIVE, BOHLE PLAINS
TITLE PRELIMINARY EARTHWORKS PLAN
CLIENT RUBY DEVELOPMENTS PTY LTD

DRAWING STATUS PRELIMINARY N.F.C.
DRAWING NUMBER S24-020-PE01
SHEET NUMBER 01 OF 02
REVISION

SECTION A
SCALE A1 – 1 : 500
A3 – 1 : 1000
PE01



SECTION B
SCALE A1 – 1 : 500
A3 – 1 : 1000
PE01

SECTION C
SCALE A1 – 1 : 1000
A3 – 1 : 2000
PE01

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DATUM A.H.D.
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R.L. 17.143

PROJECT PROPOSED RETIREMENT LIVING DEVELOPMENT
LOCATION LOT 1002 ON SP340654
99 HOGARTH DRIVE, BOHLE PLAINS
TITLE PRELIMINARY EARTHWORKS SECTIONS
CLIENT RUBY DEVELOPMENTS PTY LTD

DRAWING STATUS PRELIMINARY N.F.C.
DRAWING NUMBER S24-020-PE02
SHEET NUMBER 02 OF 02
REVISION