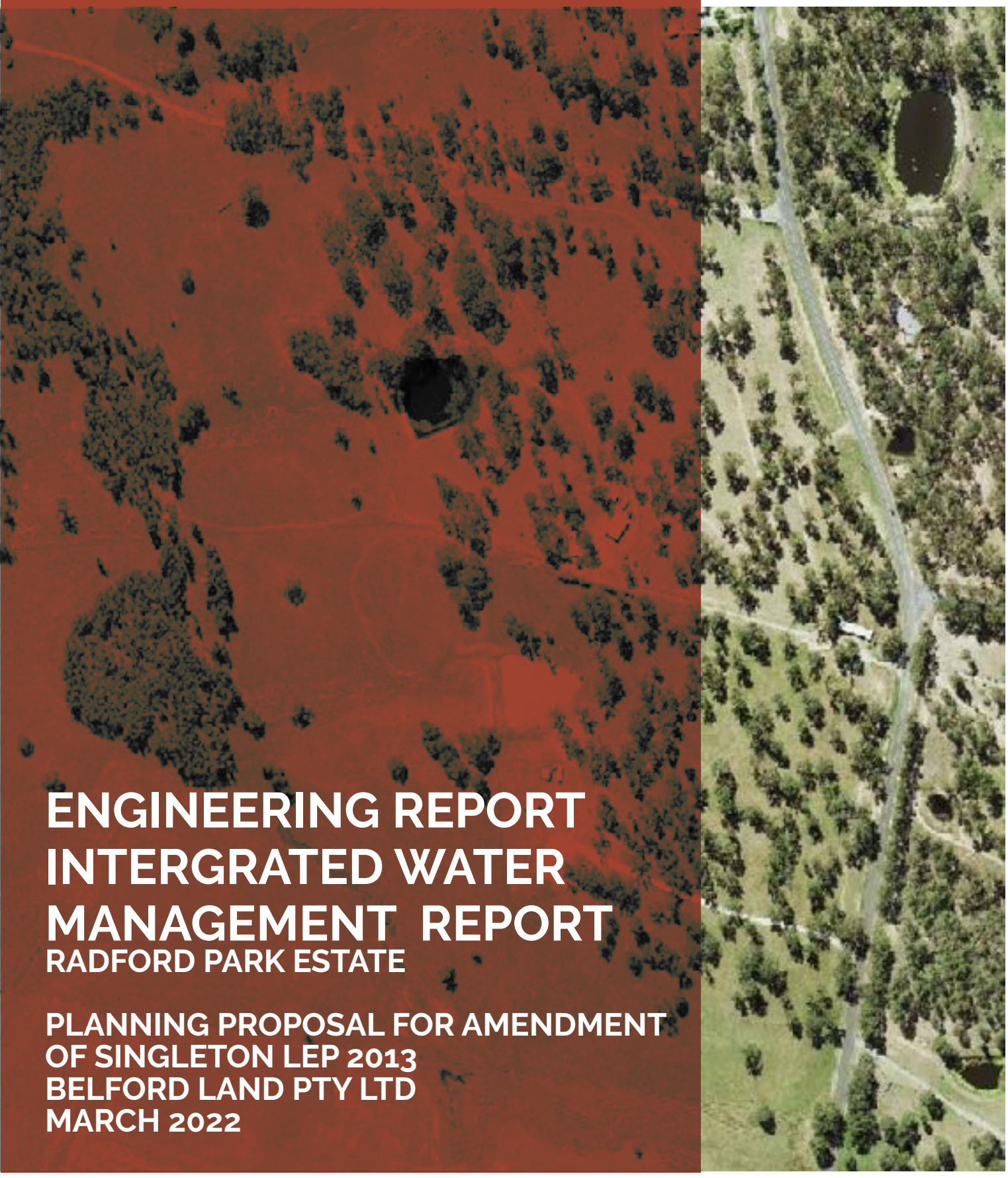

ENGINEERING REPORT INTERGRATED WATER MANAGEMENT REPORT
RADFORD PARK ESTATE

PLANNING PROPOSAL FOR AMENDMENT OF SINGLETON LEP 2013
BELFORD LAND PTY LTD
MARCH 2022

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Document Control Sheet

Issue No.	Amendment	Date	Prepared By	Checked By
A	Initial Issue	23/02/2022	AL	LG
B	Revised Issue	28/03/2022	AL	LG

Table of Contents

LIST OF FIGURES

1.0 Introduction

ADW Johnson (ADWJ) has been engaged by Belford Land Pty Ltd to prepare an Integrated Water Cycle Management Plan (IWCM). The IWCM is to support the Planning Proposal that would amend the Singleton LEP 2013 to facilitate the expansion of the Radford Park Estate. Land subject to the Planning Proposal consists of:

- Lot 1 DP 1124566;
- Lot 111 DP 850244;
- Lot 122 DP 1165184; and
- Lot 300 DP 1248134.

Figure 1 shows the site location. The overall concept masterplan is provided in ***Appendix A***.

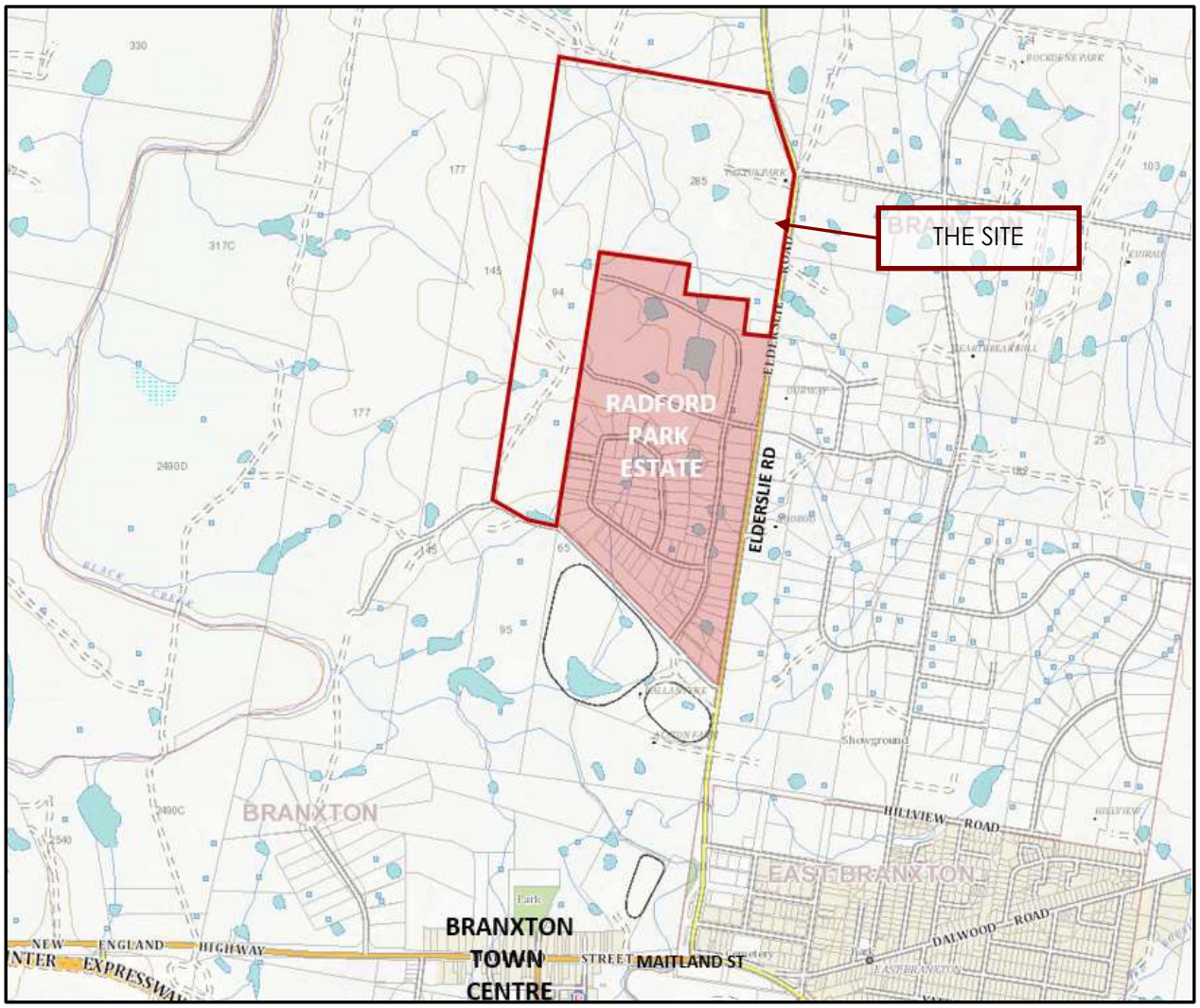

Figure 1: Site Location.

1.1 EXISTING DRAINAGE

The majority of the site is drained via a first-order watercourse and second-order watercourse to the north-west corner of the site, before adjoining Black Creek. The south-western portion of the site is currently drained via two first-order watercourses towards Black Creek. There is one upstream catchment that currently drains through the site, located to the east of Elderslie Road. The watercourse network and stream-orders are shown in ***Figure***

2. It is noted that two first-order watercourses were previously distinguished as a result of development to the south of the site.

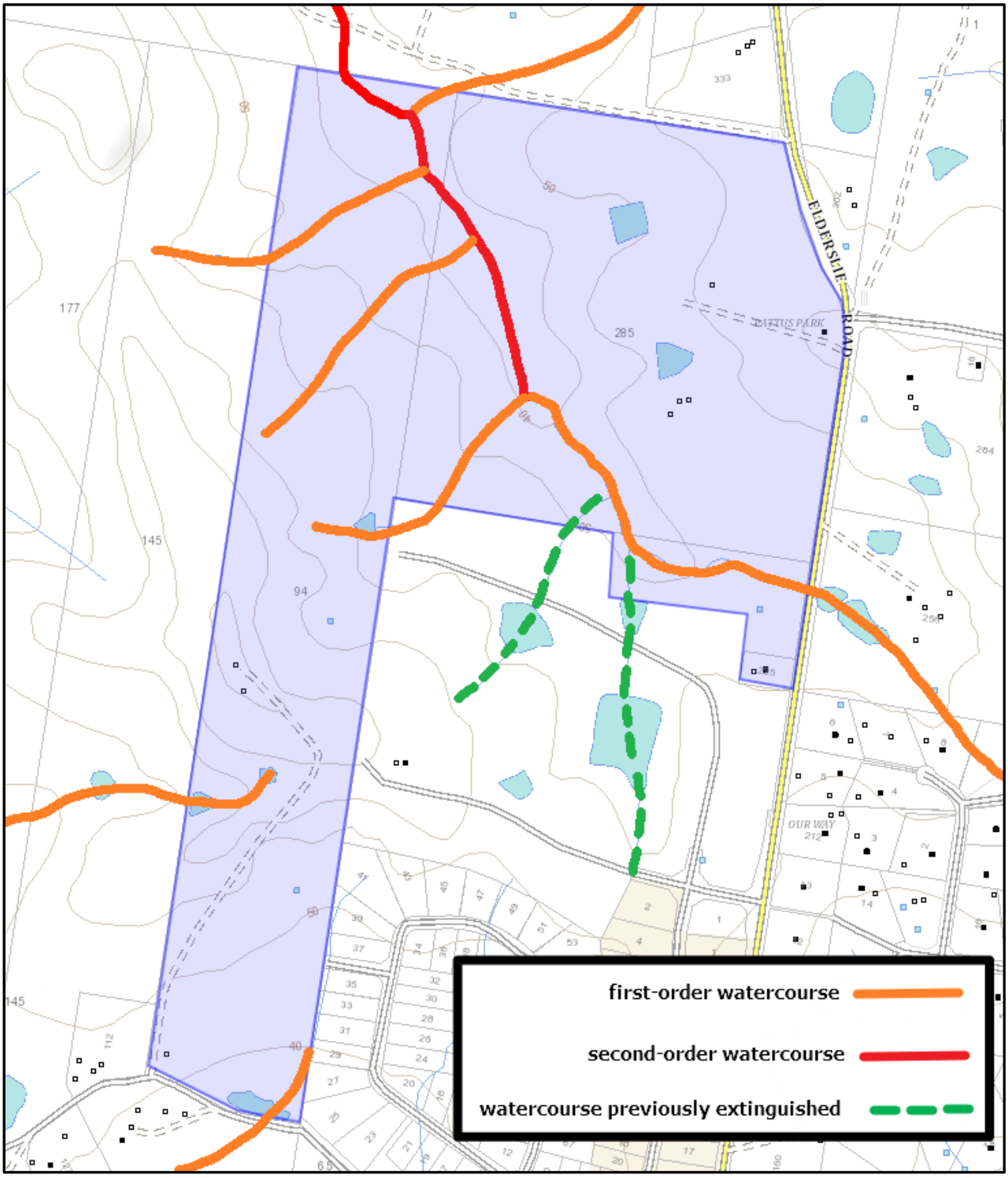

Figure 2: Existing Watercourse map.

2.0 Flood Planning

We provide the following information on flooding to address Ministerial Direction 4.1 for flooding, which applies to all planning authorities that are responsible for flood prone land.

2.1 IDENTIFYING FLOOD PRONE LAND

2.1.1 Existing Flood Assessments

The subject site is not identified as Flood Planning Area in Singleton Council's LEP Flood Planning Map (refer ***Appendix B***).

The Hunter River – Branxton to Green Rocks Flood Study 2010 (Hunter River Flood Study) is the most recent and is the current adopted flood study relevant to the subject site.

A review of the Hunter Flood Study indicates that the site is unaffected by the 1% Annual Exceedance Probability (AEP) regional flooding. A plan showing the regional flood extents extracted from the Flood Study is provided in ***Appendix C***.

2.1.2 Local Flooding

A local flooding assessment has been carried out utilising the U.S. Army Corps of Engineers' River Analysis System (HEC-RAS) software. This software is capable of simulating one-dimensional flows through a full network of open channels, dendritic systems and single river reaches. The HEC-RAS model layout is shown in ***Appendix D***.

Streamflow for input into the HEC-RAS model was determined using a recognised hydraulic runoff routing method (XPRAFTS). A high-level stormwater detention assessment was undertaken, analysing peak flows from the development and upstream catchments, to determine post-development peak flowrates through the second-order watercourse. The calculated streamflow was then input into HEC-RAS to determine the flood extents in the developed scenario in the 1% AEP storm event.

It should be noted that a tailwater condition of RL 36.0m at the site's north western boundary was implemented. The tailwater condition was interpreted from the Hunter River – Branxton to Green Rocks Flood Study.

The 1% AEP local flooding extents are provided in ***Appendix E***. It is shown that no development areas are impacted by local flooding and the flood extents are contained within the watercourse. It is recommended that a non-residential land use should be applied to those areas subject to local flooding.

2.2 LOCAL AREA FLOOD RISK AND CHARACTERISTICS.

Figure 26(f) of the Hunter River Flood Study indicates that the flood peak in Branxton (south of the subject site) in the 1% AEP event occurs approximately 40 hours after the start of the storm event. It is noted that 40 hours presents sufficient warning time for residents to safely evacuate from the subject site.

It is acknowledged that the Hunter River Flood Study indicates the western portion of the Branxton township is subject to flooding in the 1% AEP event (refer ***Appendix C***) such that the southern end of Elderslie Road becomes inundated. In the unlikely scenario that residents are unable to evacuate via Elderslie Road, there is an alternative evacuation route

available. Flood-free egress from the site is possible via Rusty Lane and McMullins Road, from where it is possible to safely move to the New England Highway.

Flooding does not affect the developability of the site. Flooding behaviour has been assessed, concluding that there are safe, flood-free evacuation routes from the subject site.

3.0 Stormwater Management

We provide the following information on stormwater management to demonstrate that Council policy can be met for the development footprint. This section addresses the site's capacity to adequately manage stormwater through the development with considerations of flood risk within the site and to adjacent properties.

3.1 STORMWATER MANAGEMENT

3.1.1 Concept Stormwater Management Plan

The future development of the site will alter the existing landform and generate impervious areas which in turn will lead to an increase in stormwater runoff from the site. The increased post-development stormwater runoff can be detained on-site to match pre-development conditions adhering to Council's requirements. This approach is standard development practice.

It is typical for watercourses within or directly adjacent to development to be protected, restored and rehabilitated in order to maintain and/or improve the shape, stability and ecological functions of each watercourse under agreed principles for;

- riparian corridor widths;
- riparian corridor rehabilitation;
- riparian buffers and planting densities; and
- detention basin locations.

These works would be carried out in accordance with the Natural Resources Access Regulator (NRAR) guidelines as required. We note that riparian realignment and removal is also catered for within the guidelines and is typically subject to a Vegetation Management Plan to provide compensatory riparian land and biodiversity offsets where necessary.

It is proposed that some sections of first-order watercourses are extinguished as a result of the proposed development. The resultant watercourse network is shown in ***Figure 3***.

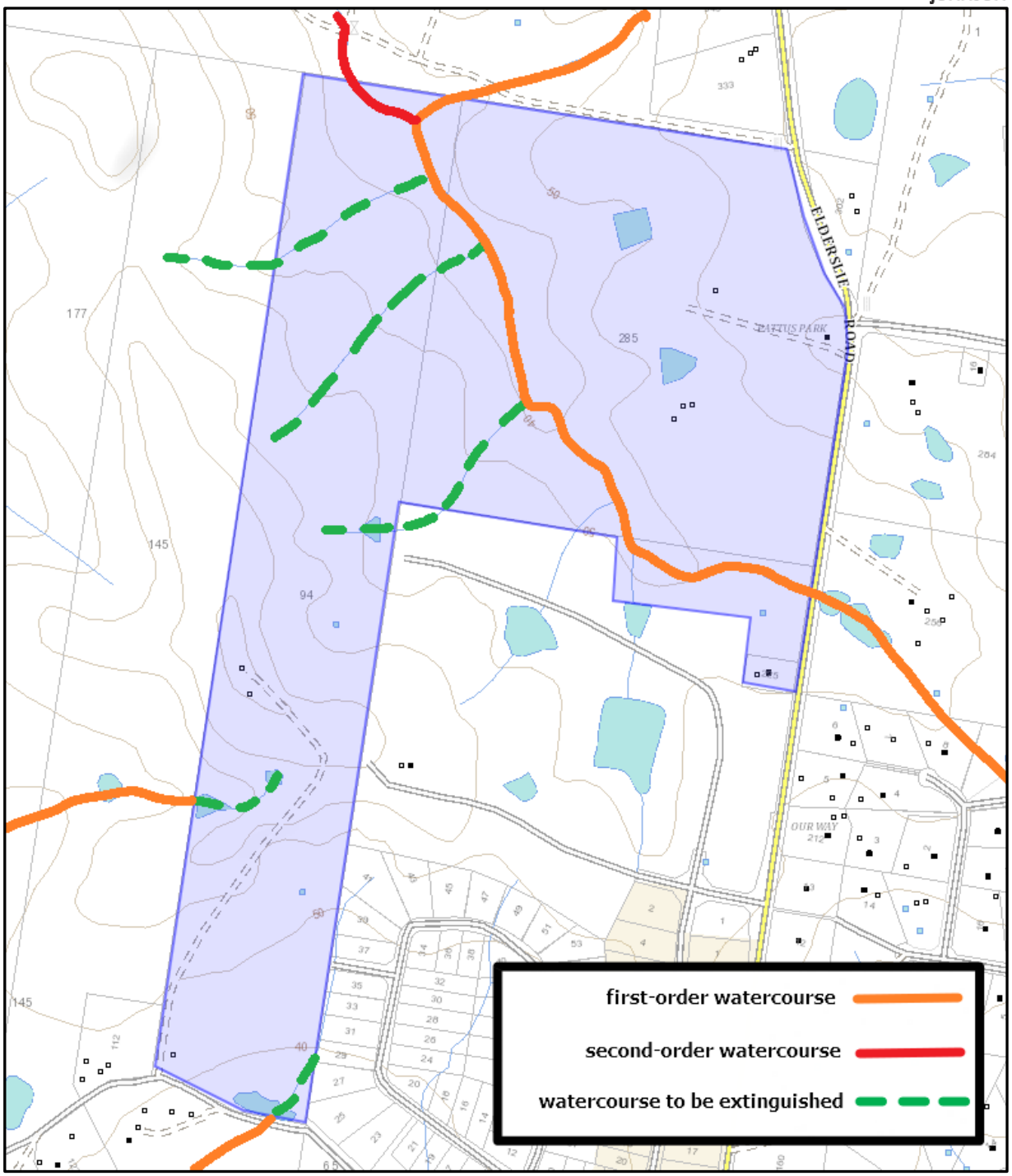

Figure 3: Resultant Watercourse Map after development.

A concept stormwater strategy will be prepared on the following basis;

- Detention on-line to the first-order watercourse; and
- All development water entering the watercourse must first be treated for quality in adherence with Council's requirements.

Note: Watercourse definition by the Strahler method

It is acknowledged that the final outcome will be subject to approval under the Development Application (Council) and Controlled Activity (NRAR) processes including consideration of ecological and Aboriginal value and outcomes as they evolve through the planning process.

3.1.2 Stormwater Detention

Detailed stormwater detention modelling will be undertaken to ensure the proposed development does not increase peak stormwater flows from the site. Stormwater detention basins can be designed in such a way to ensure that Council's requirements for stormwater runoff are satisfied.

3.1.3 Stormwater Quality

Detailed stormwater quality control measures will be incorporated into the development's subdivision design to ensure that all water leaving the site meets the required pollutant reduction criteria. Gross pollutant traps, bioretention basins and sedimentation basins can be implemented to meet the target objectives for stormwater quality in accordance with Council requirements.

4.0 Conclusion

ADW Johnson has been engaged by Belford Land Pty Ltd to prepare an Integrated Water Management Report to support the Planning Proposal for an amendment to the Singleton Local Environment Plan 2013 to facilitate the rezoning and expansion of the Radford Park Estate.

It is recommended that a non-residential land use is applied to the areas subject to local flooding (refer ***Appendix E***) contained within the watercourses that run through the site. It is noted that areas within the land will be required as part of the stormwater management system that serves the residential land.

It is confirmed that, in term of Flooding, the Planning Proposal in consistent with Ministerial Direction 4.1 and no further action in regards to flooding or flood assessment is required.

4.1 FLOODING

The Hunter River – Branxton to Green Rocks Flood Study indicates that the site is unaffected by the 1% AEP regional flood.

Regional flooding does not affect the site and does not inhibit the developability or potential rezoning of the site.

A HEC-RAS assessment was undertaken to determine the extents of local flooding post-development. It was found that local flooding is contained within the watercourse in the site and does not affect any of the proposed development area. All flows leave the site at a legal point of discharge and are contained to a mapped watercourse.

Stormwater flows through and from the site are contained within the first and second-order watercourse. The proposed development areas are unaffected by local flooding. Local flooding does not inhibit the developability or potential rezoning of the site.

4.2 STORMWATER MANAGEMENT

Stormwater detention measures including detention basins will be implemented to detain stormwater flows from the site to pre-development levels, in accordance with Council's requirements.

Stormwater detention can be managed using industry standard drainage techniques in accordance with the adopted Council engineering requirements and best practices.

A range of Stormwater quality control measures including gross pollutant traps, bioretention basins and sedimentation basins can be implemented to meet the target objectives for stormwater quality in accordance with Council's requirements.

Stormwater quality can be managed using industry standard techniques in accordance with Council's engineering requirements. It does not inhibit the developability or potential rezoning of the site.

Appendix A

OVERALL CONCEPT SITE MASTERPLAN

240272-PSK-002-B

• urban design • visualisation • development feasibility • surveying • town planning • social impact • economic analysis • infrastructure • civil engineering • superintendency • project management

688//1145128
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112//850244
111//850244
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711//1056530
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12//1022400
10//1022400
9//1022400
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1//880269
103//1022399
102//1022399

CLARET DRIVE
AVENUE
PISTACIA GROVE
ROBINIA CIRCUIT
RADFORD PARKWAY
PIN OAK CIRCUIT
PYRUS AVENUE

N

LEGEND
- REZONING BOUNDARY
- EXISTING ROAD
- PROPOSED ROAD
- EXISTING BOUNDARY
- DEVELOPMENT AREA

ver.	date	comment	drawn	pm	level information	scale (2A0 original size)	notes
B	25/03/2022	UPDATE PRESENTATION OF PLAN	GS	LG	DATUM: AHD CONTOUR INTERVAL: 0.5m	0 25.0 50.0 62.5m SCALE: 1:1250 (FULL)	

working beyond expectations

drawing title:

Overall Concept Master Plan

location: ELDERSLIE ROAD, RADFORD PARK

council: SINGLETON

dwg ref: 240272-PSK-002-B

client: RADFORD PARK

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Plotted By: Glenn Stewart Plot Date: 25/03/22 4:50:21PM Cad File: N:\240272\DWG\PLANNING\PSK\240272-PSK-002-B.DWG

This plan includes coloured information. If you have a black and white copy you do not have all of the information. This note is coloured RED.

Appendix B

SINGLETON LEP FLOOD PLANNING MAP

Singleton Local Environmental Plan 2013

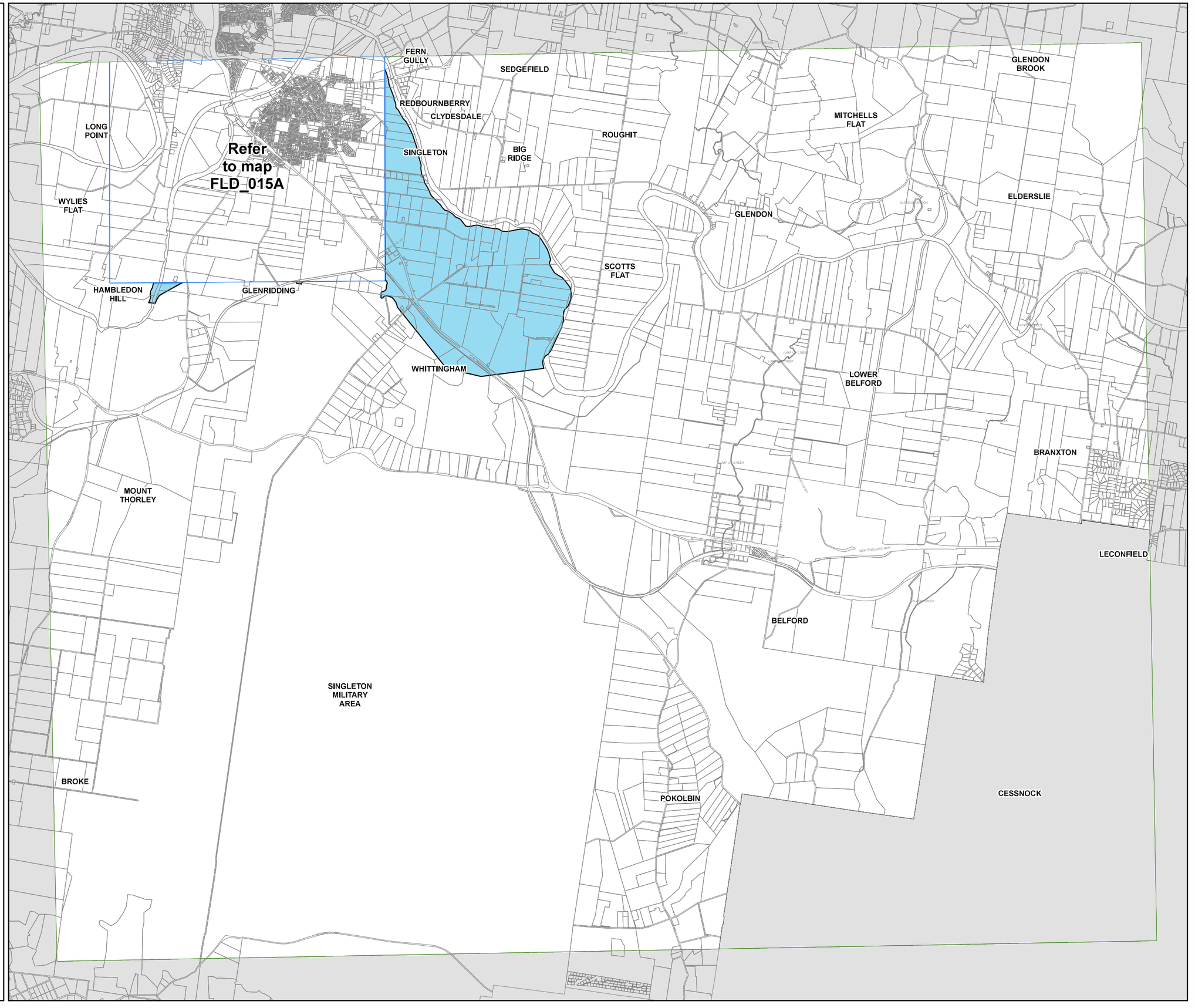
Flood Planning Map - Sheet FLD_015

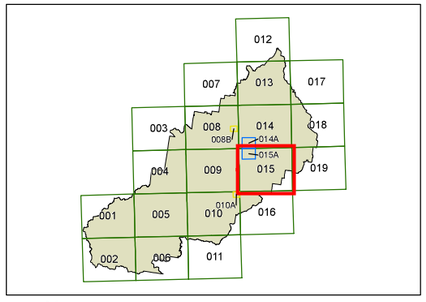
Flood Planning Land

Flood Planning Area

Cadastre

Cadastre 08/03/2013
© Land and Property Information (LPI)





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Scale: 1:80,000 @ A3

Projection: GDA 1994
Zone 56

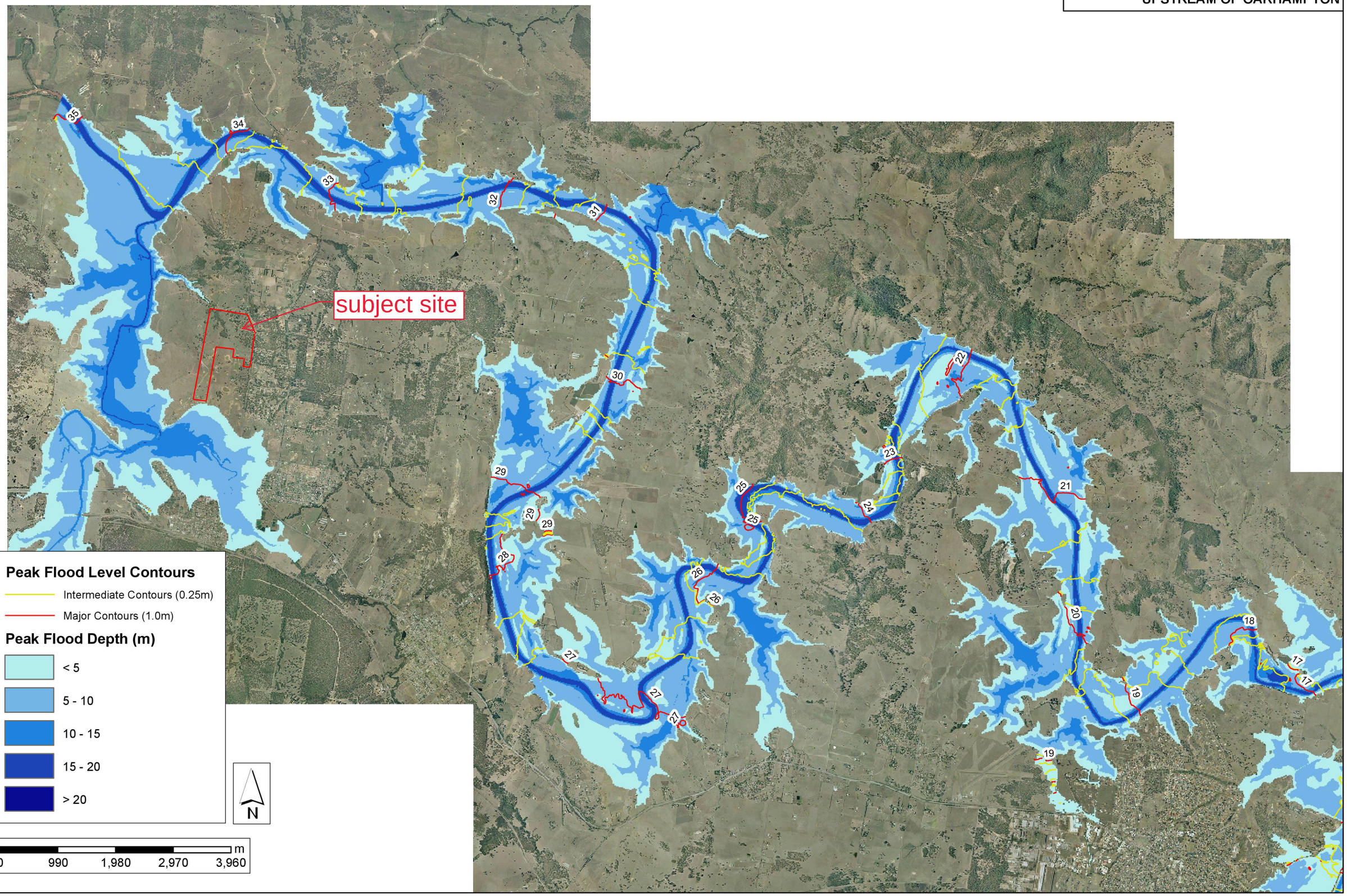
Map Identification Number:
7000_COM_FLD_015_080_20130430

Appendix C

HUNTER RIVER – BRANXTON TO GREEN ROCKS FLOOD STUDY
1% AEP FLOOD EXTENTS

FIGURE 33

1% AEP FLOOD CONTOURS AND DEPTHS UPSTREAM OF OAKHAMPTON



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Appendix D

HEC-RAS MODEL

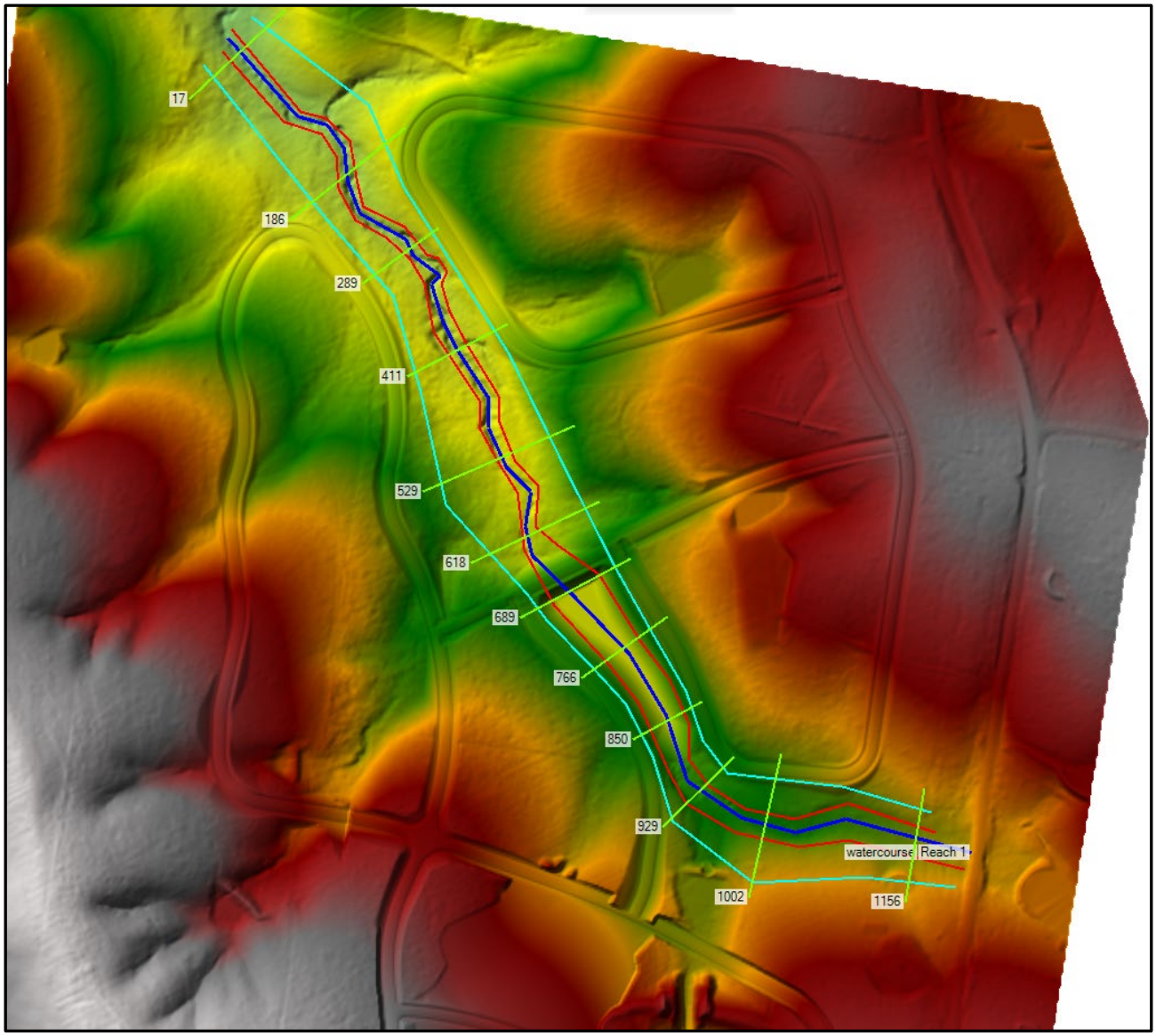

Figure D-1: HEC-RAS Model Layout.

Appendix E

1% AEP FLOOD EXTENTS – HEC-RAS

240272-ESK-001-B

NOTES:

1. LOCAL FLOOD EXTENTS DETERMINED FROM HEC–RAS MODELLING
2. REFER TO 'HUNTER RIVER – BRANXTON TO GREEN ROCKS FLOOD STUDY' FOR REGIONAL FLOODING EXTENTS

688//1145128
690//1145128
112//850244
111//850244
51//620139
52//620139
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711//1056530
2//1124566
12//864176
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CLARET DRIVE
AVENUE
PISTACIA GROVE
ROBINIA CIRCUIT
RADFORD PARKWAY
PIN OAK CIRCUIT
PYRUS AVENUE

LEGEND

- REZONING BOUNDARY
- EXISTING ROAD
- PROPOSED ROAD
- EXISTING BOUNDARY
- DEVELOPMENT AREA
- 1% AEP FLOOD EXTENTS

ver.	date	comment	drawn	pm	level information	scale (2A0 original size)	notes
B	25/03/2022	REVISED ISSUE	AL	LG	DATUM: AHD CONTOUR INTERVAL: -	0 25.0 50.0 62.5m SCALE: 1:1250 (FULL)	

working beyond expectations

drawing title:
1% AEP LOCAL FLOOD EXTENTS PLAN

location: ELDERSLIE ROAD, RADFORD PARK

council: SINGLETON

dwg ref: 240272-ESK-001-B

client: RADFORD PARK

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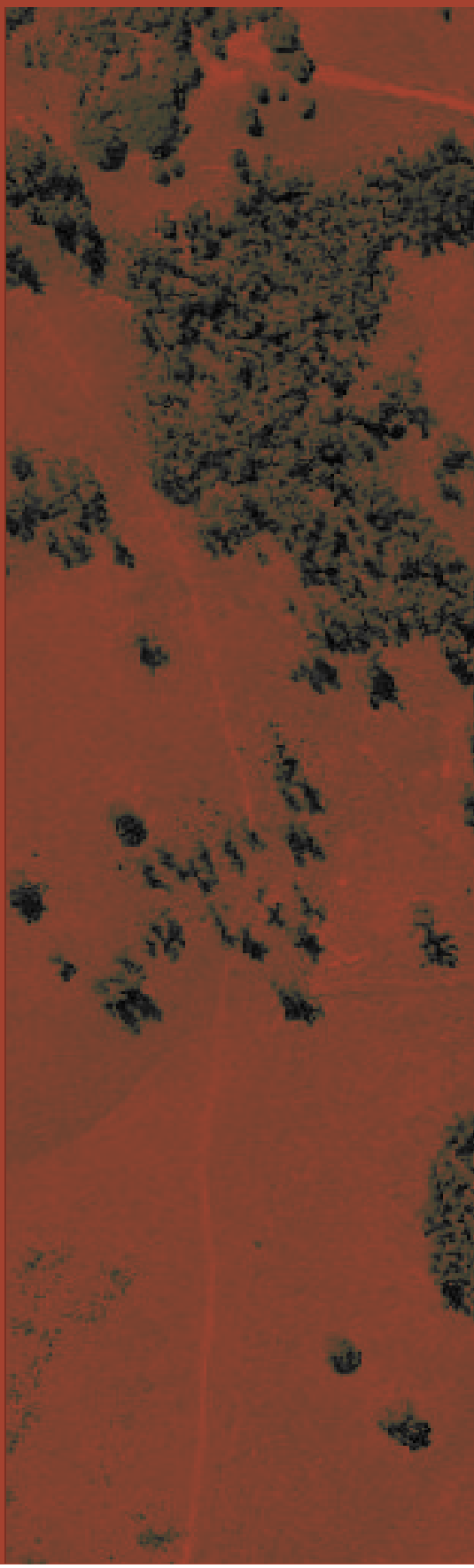
• urban design • visualisation • development feasibility • surveying • town planning • social impact • economic analysis • infrastructure • civil engineering • superintendency • project management



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