



van der meer

FLOOD MANAGEMENT REPORT

PROPOSED RURAL RESIDENTIAL SUBDIVISION

63 Redbank Creek Road,

Adare – Stage 1

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1 Contents

| | | |
|-----|-------------------------------------|----|
| 2 | Executive Summary | 3 |
| 3 | Introduction | 4 |
| 3.1 | Planning and Policy Background..... | 4 |
| 4 | Description of Development | 5 |
| 4.1 | Existing Site | 5 |
| 4.2 | Proposed Works | 5 |
| 5 | Flood Analysis | 7 |
| 6 | Pre-Development Results | 9 |
| 7 | Post-Development Results..... | 11 |
| 8 | Assessment of Impacts..... | 14 |
| 9 | Conclusion | 15 |
| 10 | References | 16 |

2 Executive Summary

This report has sought to assess the flood risk for the proposed rural residential subdivision at 63 Redbank Creek Road, Adare. The southern portion of the site is affected by regional flooding of Lockyer Creek, and there are two local watercourses which pass through the site.

The LVRC provided Lockyer Creek model has been used as a basis for analysis, with a local TUFLOW model developed to incorporate the upstream catchments in greater detail, with a regional tailwater applied. Flood levels at the south of the site are influenced by the regional tailwater level due to backwater flooding from Lockyer Creek.

This report has demonstrated that flood free building envelopes can be provided to all lots within stage 1 of the proposed development, and that the proposed works will not cause an impact to peak flood levels external to the site.

3 Introduction

Van der Meer Consulting has been commissioned to prepare a Flood Management Report for the proposed rural residential subdivision at 63 Redbank Creek Road, Adare. This report will be lodged to Lockyer Valley Regional Council for the Development Assessment for this development.

The scope of this report includes an assessment of the flood risk for the proposed development from both local and regional sources.

3.1 Planning and Policy Background

The Council policies and plans are relevant to the development, and are addressed in this report:

- Lockyer Valley Regional Council (LVRC) Temporary Local Planning Instrument 2022 Flood Regulation.

4 Description of Development

4.1 Existing Site

The subject site area is approximately 120 ha and has frontage to Redbank Creek Road to the south and Adare Road to the West. Currently, the site is undeveloped and lightly forested with several dams and watercourses. The site lies within the “investigation area” of the LVRC Flood Regulation TLIP overlay maps G1 and G2. The location of the subject site is shown in Figure 4.1 below.

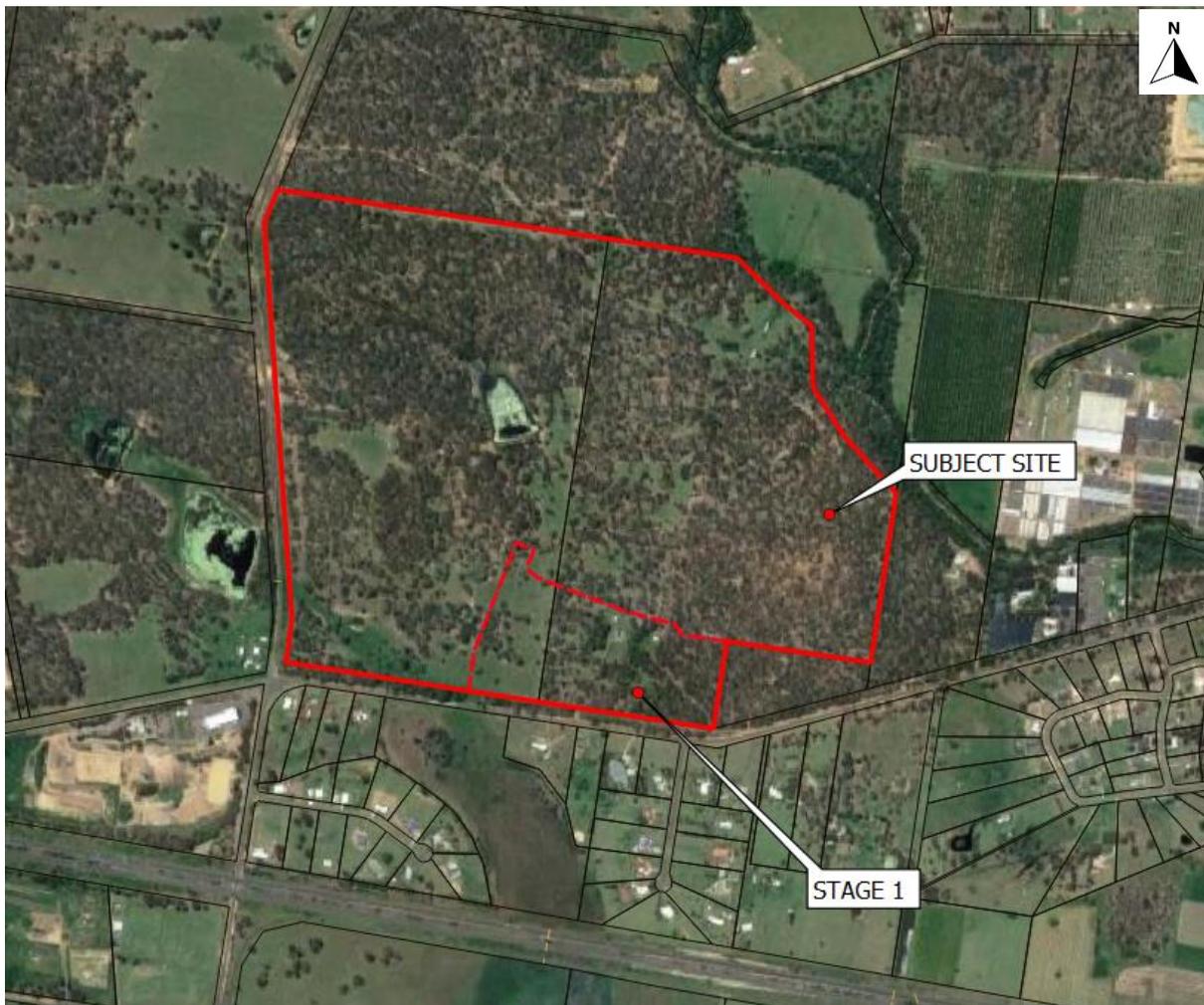


Figure 4.1 – Site Location (Google, 2022)

4.2 Proposed Works

The proposed development consists of a residential subdivision as depicted in Figure 4.1. This report is concerned solely with the works proposed within Stage 1 and will be updated over time to reflect future stages.



Figure 4.2 – Proposed Layout

5 Flood Analysis

To quantify the level and extent of overland flow flooding at the site, both local and regional flooding scenarios have been considered. For the regional flooding scenario, the Lockyer Creek flood model has been acquired from LVRC. The local flooding scenario utilises a modified version of this model to refine the upstream catchments inflows from the north and west of the site.

The regional model is the 2021 Lockyer Creek model originally developed by WMA. It is a large scale direct-rainfall model covering an area from Gatton at the upstream end to Clarendon at the downstream end. It includes upstream inflows from Lockyer Creek and local “rf polygons” to apply local catchment inflows based on catchment areas. The extent of the regional model is shown in Figure 5.1.



Figure 5.1 – Regional Model Extent

For the local flooding scenario, a TUFLOW 2D model has been produced for the site and upstream catchment based upon a modified version of the regional model. This model is a rain-on-grid model based on AR&R 2019 methodology. The following is a summary of the inputs and assumptions used for the 2D model.

- Topography based on LVRC regional model input DEM's, superseded by site survey over stage 1;
- Rainfall intensity data from BOM, substituted for LVRC rainfall envelope mapping where it exceeded the BOM values;
- Temporal pattern ensembles from AR&R data hub. The critical storm for the subject site in the 1% AEP is the 90 minute TP06 pattern;

- Initial and continuing loss data from AR&R data hub (29 mm initial and 1.1 mm continuing with pre-burst median depth subtracted from initial);
- Existing stormwater infrastructure from the regional model, updated with site survey where applicable;
- Manning's roughness applied as per the regional model, updated where necessary;
- Land use from aerial photography and land planning maps;
- Dams within the catchment have been assumed to be full to the spillway; and
- Downstream tailwater applied based on regional flood levels from the regional model.

The local TUFLOW model layout is depicted in Figure 5.2 below.

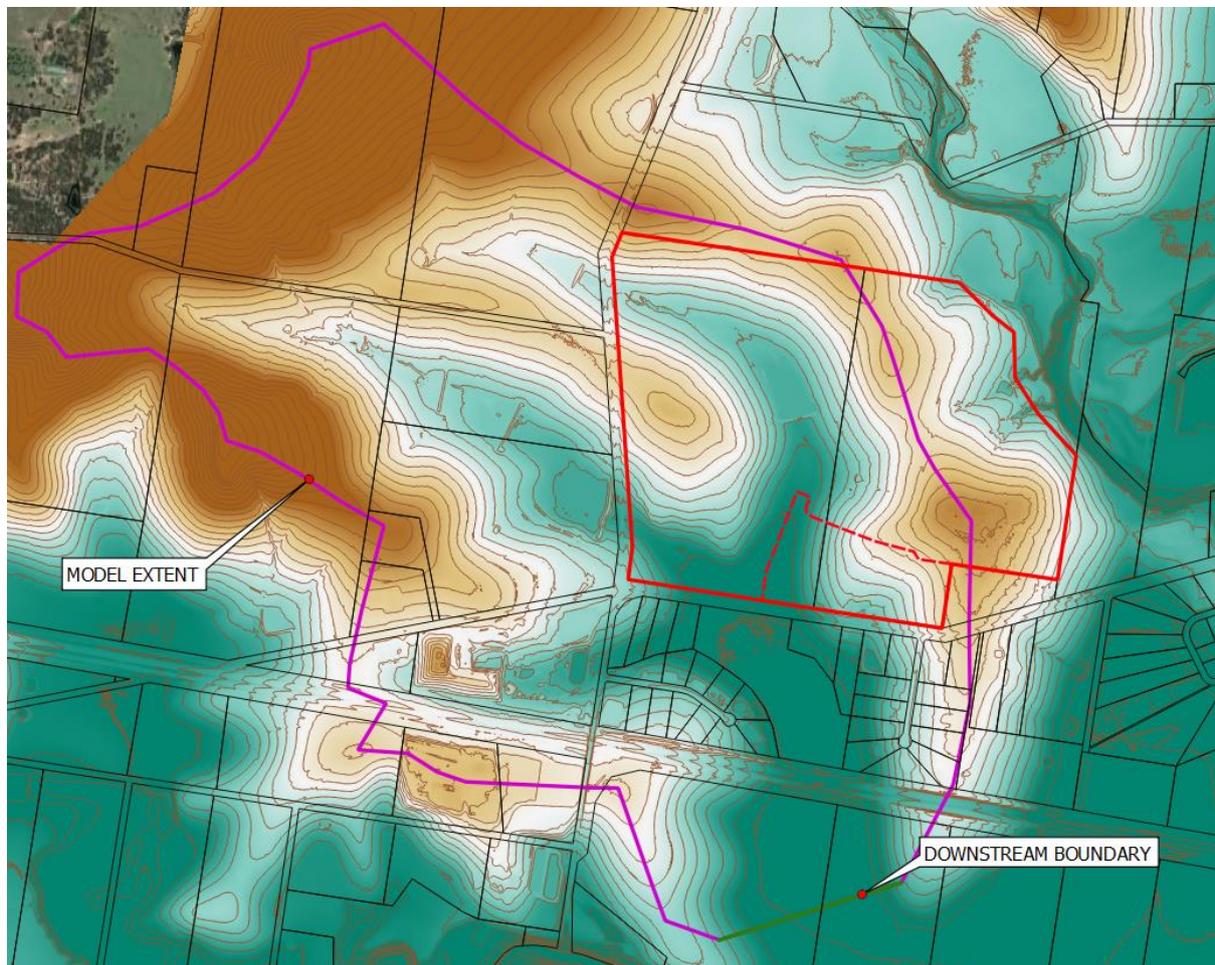


Figure 5.2 – Local TUFLOW Model Layout

6 Pre-Development Results

Regional flooding extends into the south of the subject site as backwater flooding away from the main flowpath. Peak depth within the site is up to 1.2m in the 1% AEP and the peak level at the Redbank Creek Road frontage is RL 99.21 m AHD.

The 1% AEP regional depth plot is presented in Figure 6.1 below.

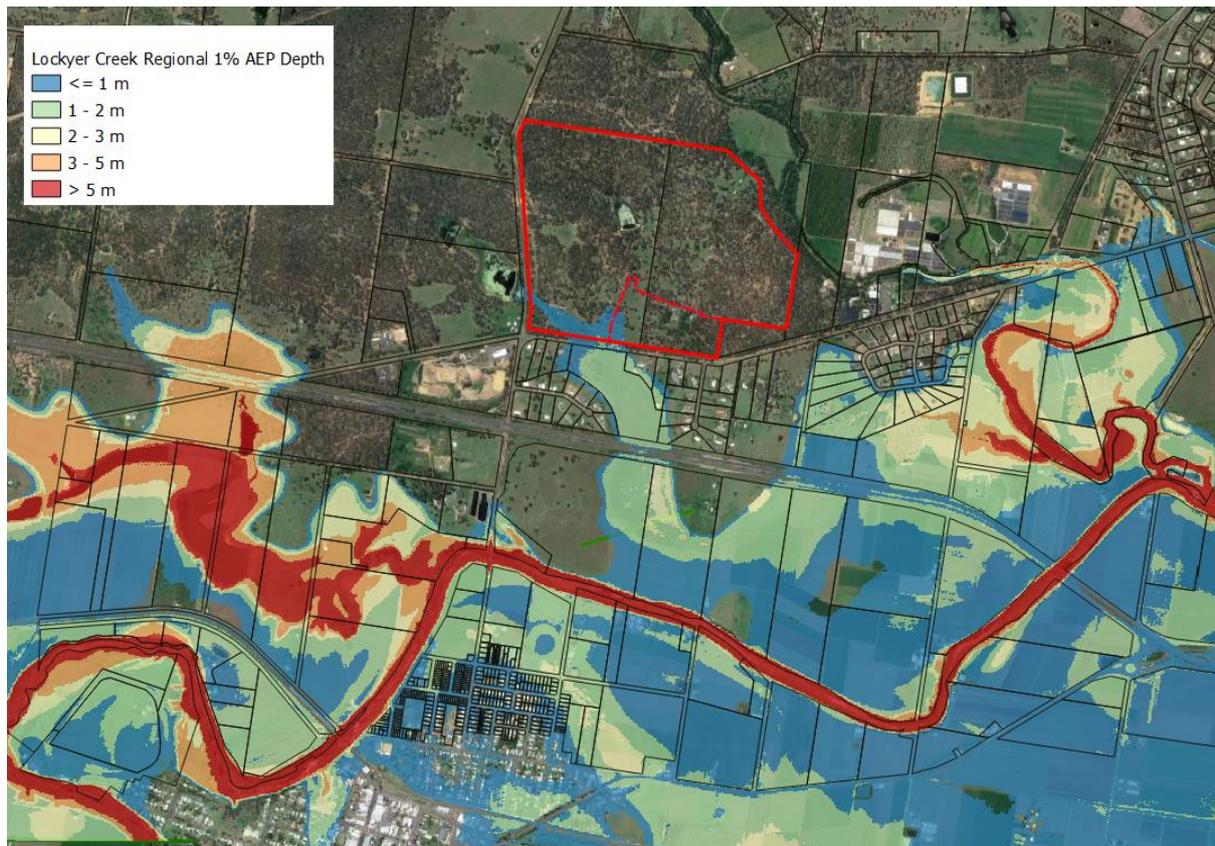


Figure 6.1 – 1% AEP Regional Flood Depth

In the local flooding scenario, overland flow enters the site at two main locations along the western boundary. These two flowpaths converge at the southern boundary and overtop Redbank Creek Road. Peak depths in the 1% AEP within these flowpaths is generally up to 500mm, increasing to 1.75m on the upstream side of Redbank Creek Road. Peak velocity through the site is generally low as the nature of the flow is wide sheet flow. There are localised increases in velocity at dam spillways and through steeper sections of the watercourses.

The existing peak depth and velocity for the 1% AEP are shown on Figures 6.2 and 6.3.

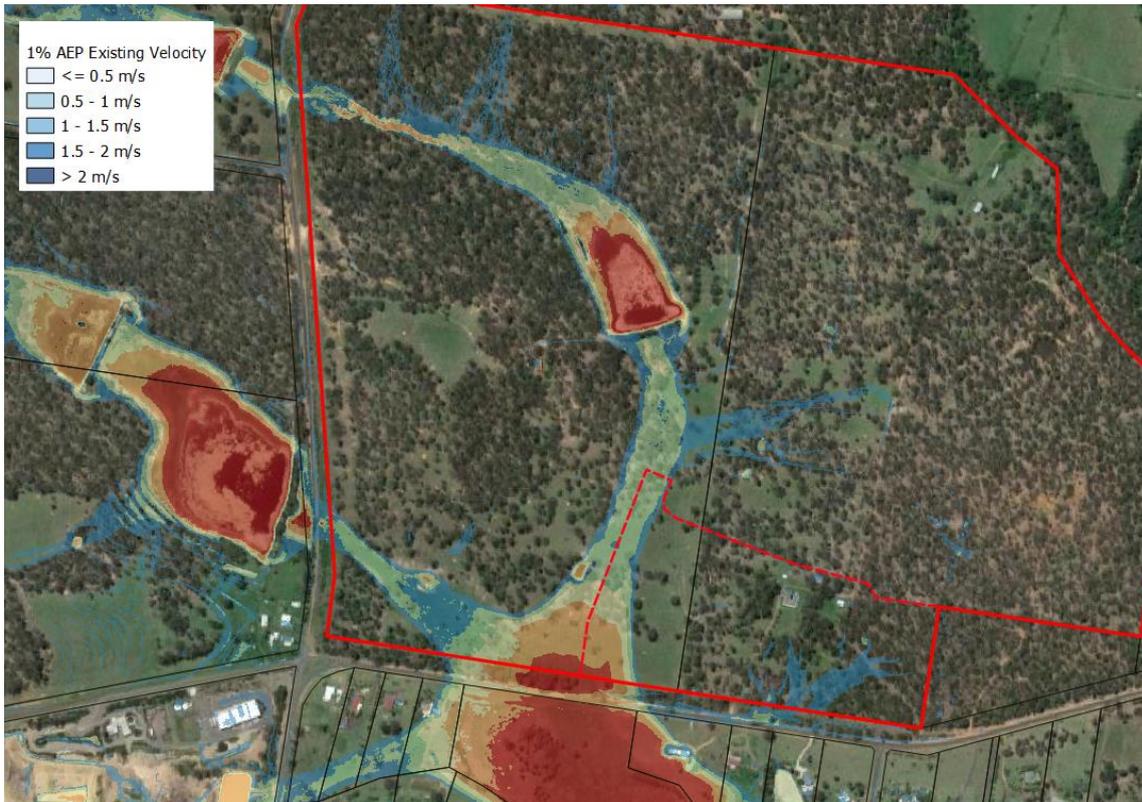


Figure 6.2 – 1% AEP Pre-Development Flood Depth

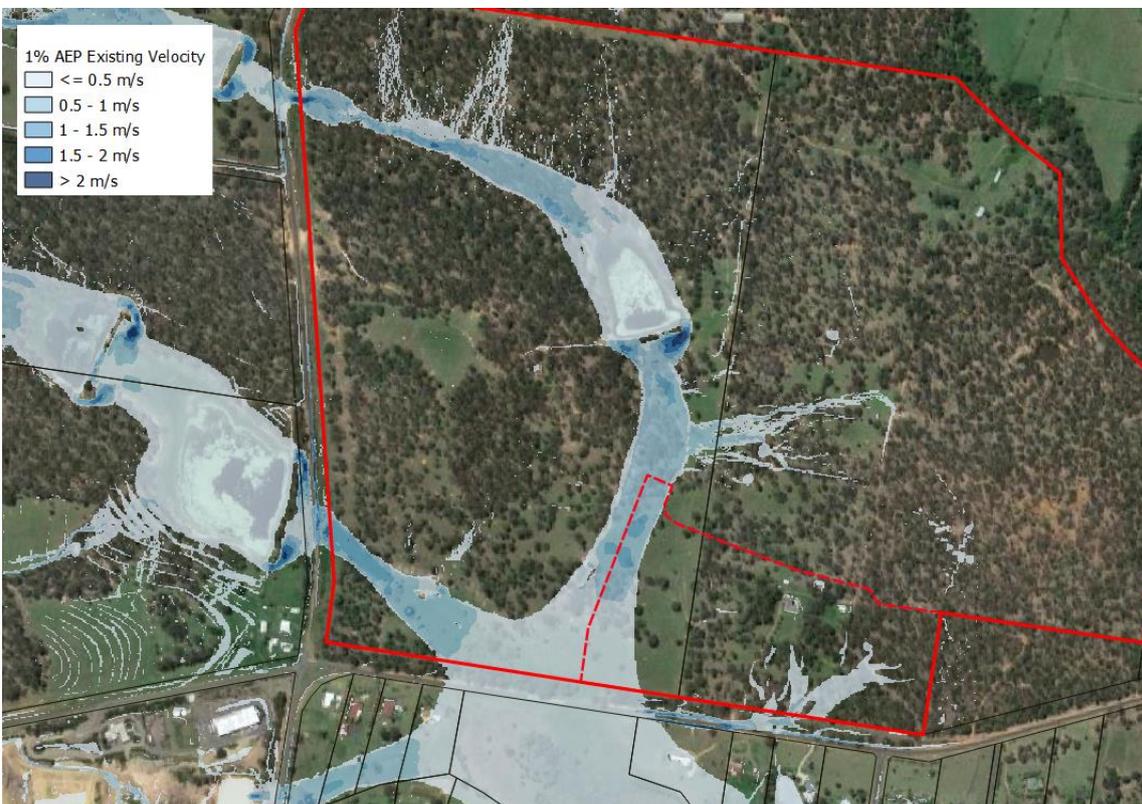


Figure 6.3 – 1% AEP Pre-Development Flood Velocity

7 Post-Development Results

The post-development scenario has been represented by adding the proposed stage 1 earthworks to the model DTM. These earthworks include the road network, localised filling to provide flood immunity, and a series of channels to convey overland flow through the lots. The post-development model modifications are shown on Figure 7.1.



Figure 7.1 – Post-Development Model Modifications

The post-development flooding behaviour is largely similar to the pre-development scenario. Shallow flooding within the lots is captured within swales where appropriate and directed to existing table drains. is shown across the north-western corner of the site, generally less than 300mm depth. A drainage easement is proposed to contain the Q100 ARI flood event extents. The post-development peak depth and velocity plots are shown in Figures 7.2 and 7.3.

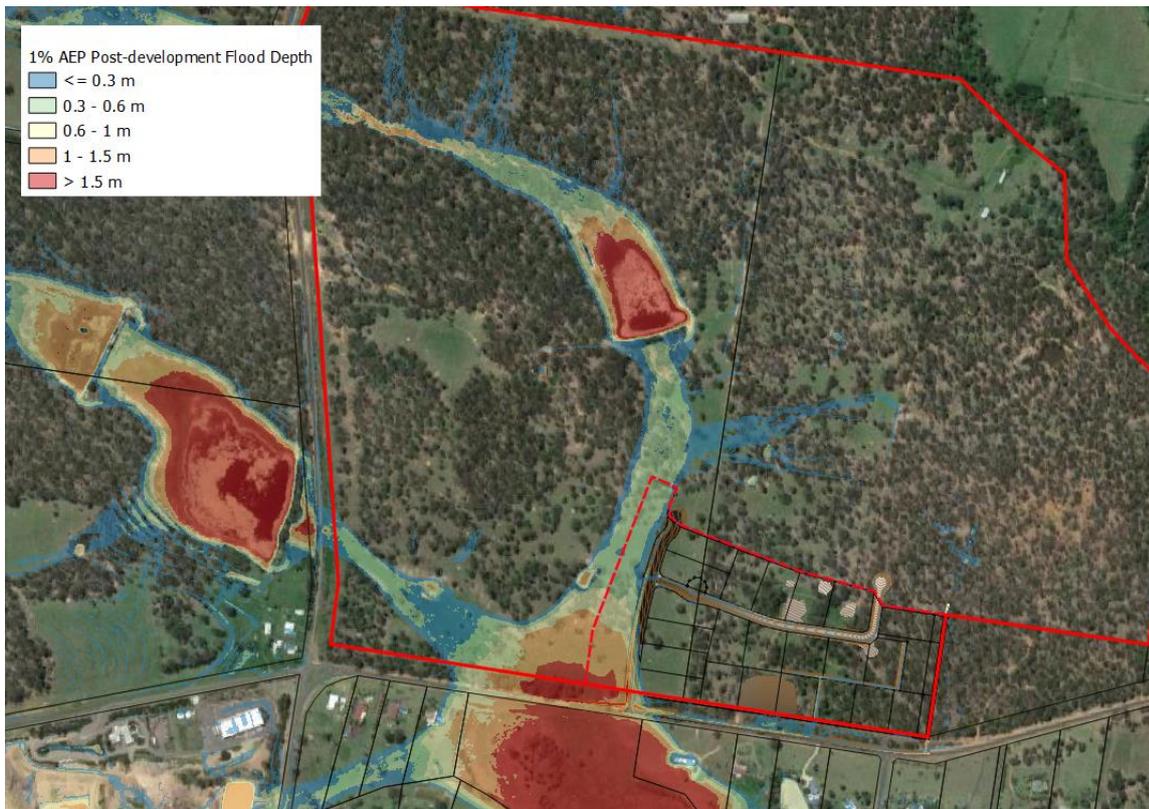


Figure 7.2 – 1% AEP Post-Development Flood Depth

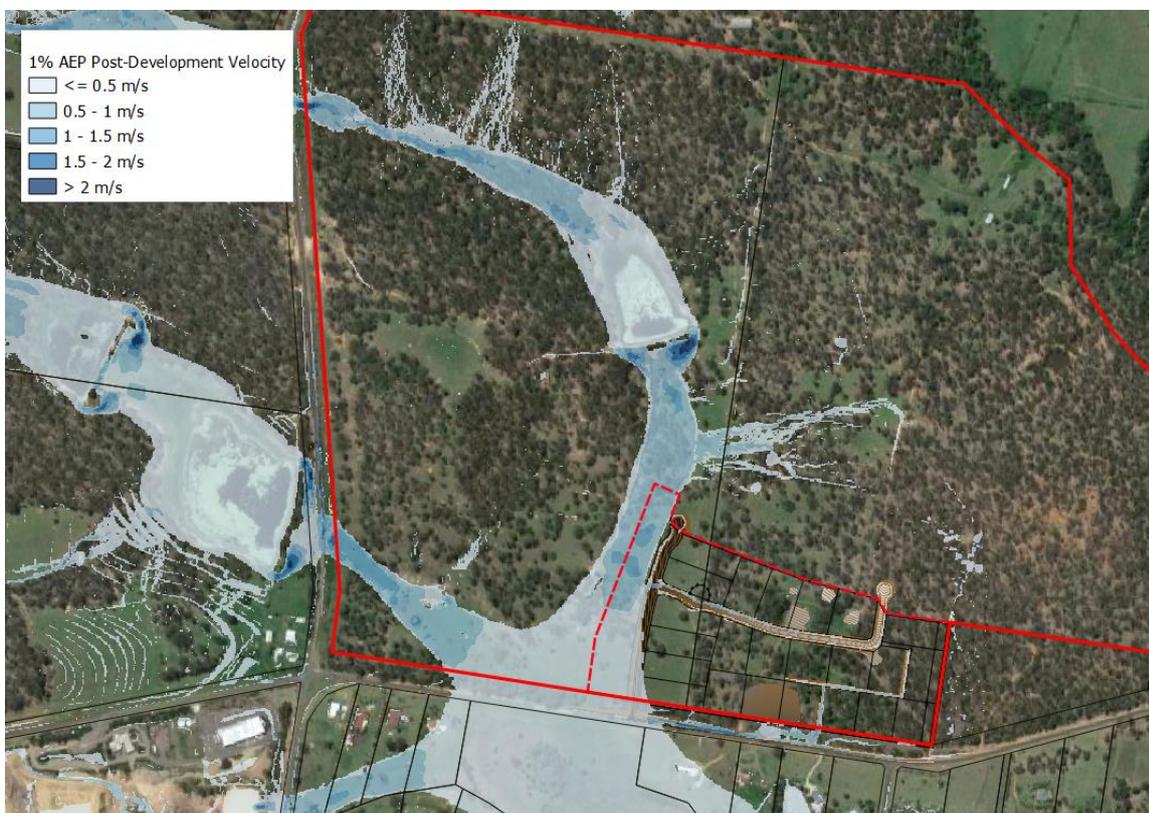


Figure 7.3 – 1% AEP Post-Development Velocity

The peak 1% AEP flood levels along the central drainage path are shown on Figure 7.4 below.



Figure 7.4 – 1% AEP Post-Development Flood Levels

8 Assessment of Impacts

The pre and post-development results have been compared to ensure no worsening of peak flood levels external to the site. Figure 8.1 demonstrates that 1% AEP peak flood levels have not been increased.

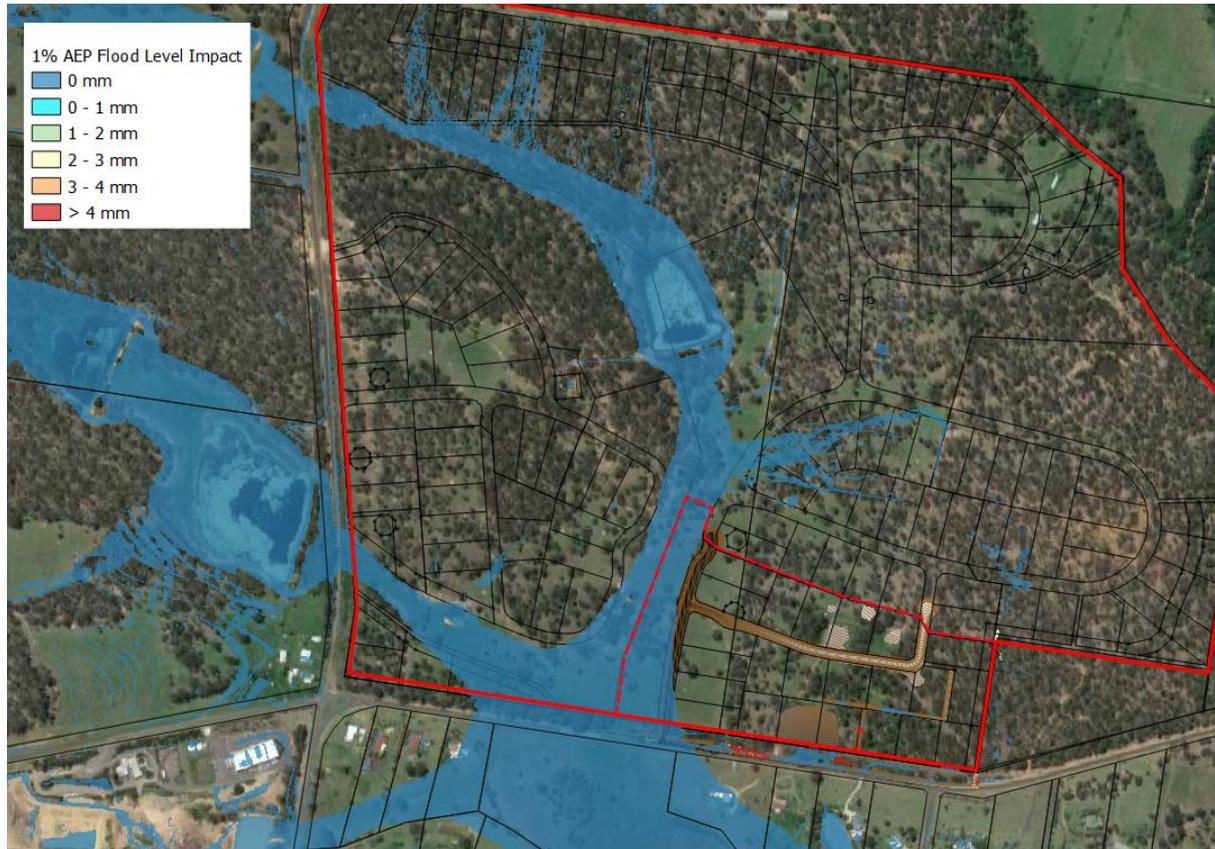


Figure 8.1 – 1% AEP Flood Level Impact

9 Conclusion

This report has sought to assess the flood risk for the proposed rural residential subdivision at 63 Redbank Creek Road, Adare. The southern portion of the site is affected by regional flooding of Lockyer Creek, and there are two local watercourses which pass through the site.

The LVRC provided Lockyer Creek model has been used as a basis for analysis, with a local TUFLOW model developed to incorporate the upstream catchments in greater detail, with a regional tailwater applied.

This report has demonstrated that flood free building envelopes can be provided to all lots within stage 1 of the proposed development, and that the proposed works will not cause an impact to peak flood levels external to the site.

10 References

Lockyer Valley Regional Council (July, 2022) - Temporary Local Planning Instrument Flood Regulation

QUDM 4th Edition (2016)