



Flood Report

Park Ridge Unit Trust


391-397 Park Ridge Road

Park Ridge

Job Reference Number – 10436

Date: 4 October 2023

Document Status

Rev No	Author	Reviewer	Approved for Issue			
			Name	Signature	Date	RPEQ #
0	C.Omlid	E.Clements	E.Clements		23.02.23	8614
0	C.Omlid	E.Clements	E.Clements		04.10.23	8614

Distribution

Rev No	Date	Issue	Issued To	Format
0	23/02/23	For Approval	MB Planning Balanz	PDF / E
0	04/10/23	For Approval	MB Planning Balanz	PDF / E

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1 Introduction

1.1. Purpose and Scope

Inertia Engineering has been commissioned by Park Ridge Unit Trust to prepare a Flood Report for 391-397 Park Ridge Road, Park Ridge (the subject site).

The principal objectives of this study are to demonstrate that the existing dam on-site can be repurposed to provide detention storage and ensure non-worsening of flooding external to the site.

1.2. Report Limitations

This report has been prepared by Inertia Engineering Pty Ltd for Park Ridge Unit Trust and may only be used and relied on by Park Ridge Unit Trust for the purpose agreed between Inertia Engineering and Park Ridge Unit Trust as detailed within this report.

Inertia Engineering otherwise disclaims responsibility to any person other than Park Ridge Unit Trust arising in connection with this report. Inertia Engineering also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by Inertia Engineering in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. Inertia Engineering has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by Inertia Engineering described in this report. Inertia Engineering disclaims liability arising from any of the assumptions being incorrect.

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2 Site Characteristics

The land contained within the site is described as follows:

Title Details:	Lot 20 on RP94215
Street Address:	391-397 Park Ridge Road, Park Ridge
Area:	Total: 45,000m ²

2.1. Location

The subject site is located in Park Ridge, approximately 30km south of the Brisbane CBD. It occupies a total of 45,000m² and is has frontage to Park Ridge Road to the north.

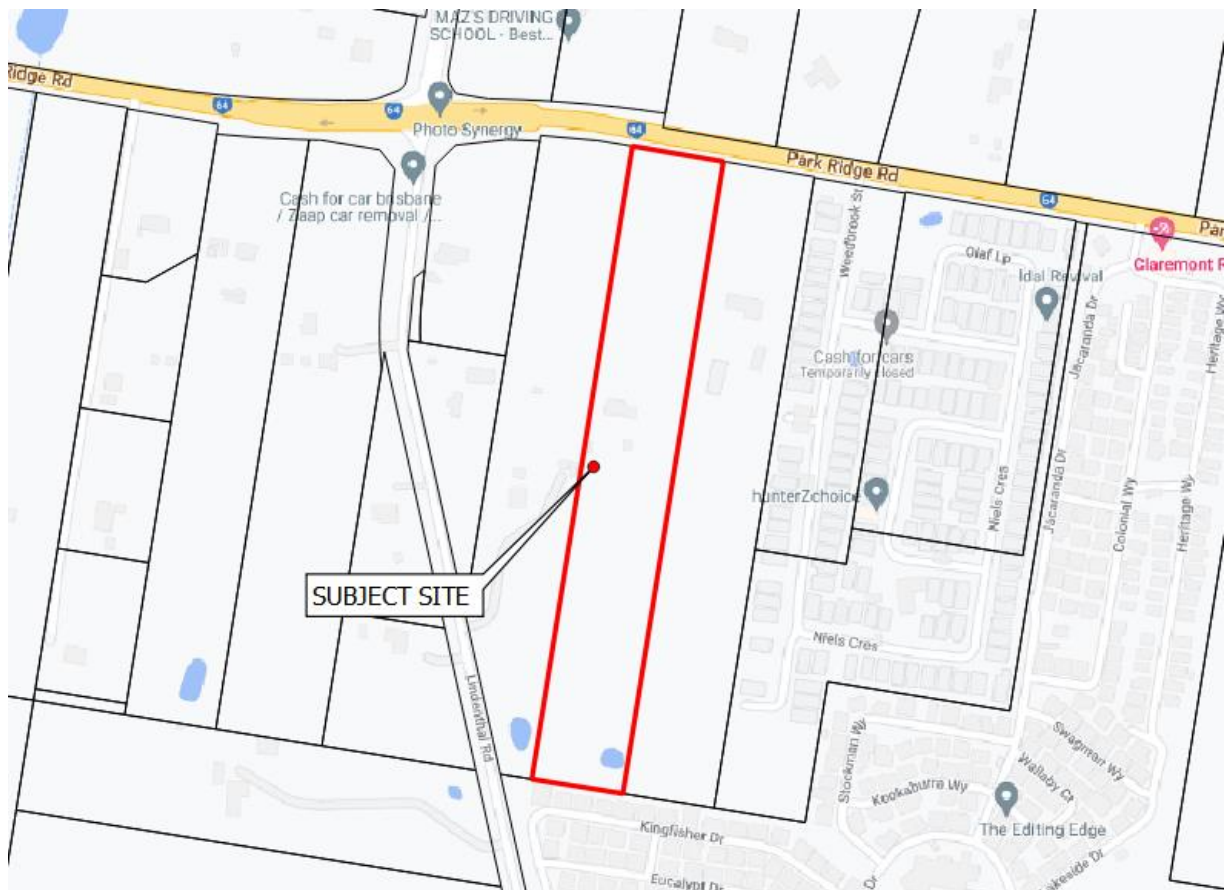


Figure 2-1 - Location Plan

2.2. Topography and Drainage

The site is split roughly in half by a ridge running east-west and drains to the north and south. This report is concerned with the southern catchment which drains to an existing overland flowpath immediately south of the subject site which drains to the east. There is an existing dam in the south-eastern corner of the site. For stormwater management details of the northern catchment, refer to the SBSMP prepared by Northrop.

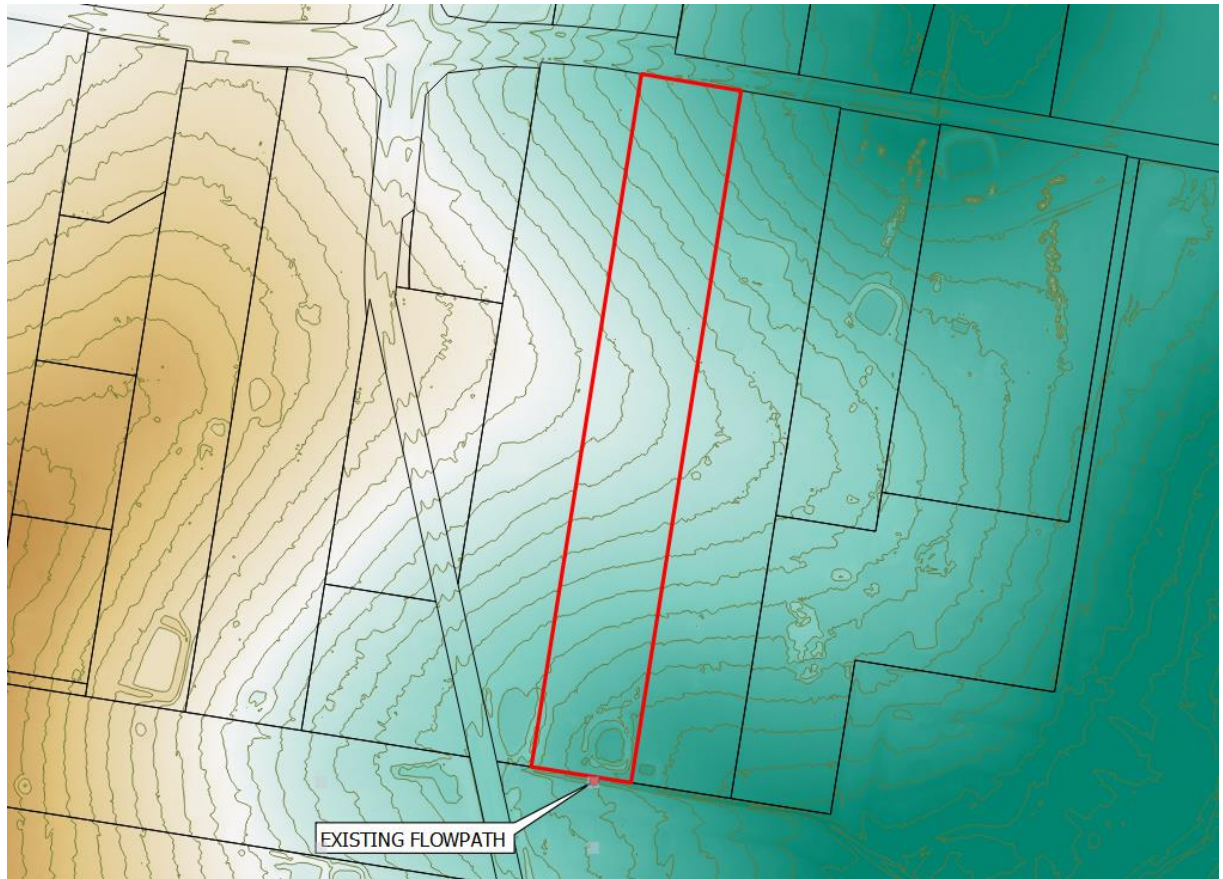


Figure 2-1 – Existing Topography

2.3. Existing Use

The existing site is partially cleared of vegetation, with significant vegetation toward the southern boundary.

2.4. Development Layout

The development consists of the creation of 54 residential allotments. The southern portion of the site which is heavily vegetated is to be dedicated as park and stormwater drainage.

Refer to Appendix A for the proposed development plans.

3 Hydraulic Analysis

3.1. Objectives

The objectives for the local flood assessment are to demonstrate that the proposed development will not adversely impact flood levels external to the subject site.

3.2. Hydrology

The TUFLOW software package has been used to simulate local design storm events and to estimate design flood depths within the study area. The model has utilised a rain-on-grid methodology which applies design rainfall directly to the surface of the flood model. This type of model is suited to this analysis as the contributing catchment is irregular with poorly defined flow paths.

Refer to Appendix B for a map of the local contributing catchment.

The TUFLOW model was used to estimate the 0.5EY, 0.2EY, 9.5%, 5% and 1% AEP storm events.

3.2.1. Adopted Design Rainfalls

Design rainfall patterns and intensities for the area were determined using standard procedures given in Australian Rainfall and Runoff 2019 (*AR&R 2019*). An ensemble of 10 temporal patterns for each storm duration have been analysed, with the selected design storm being the first above the mean flow for each duration. The selected design storm for the catchment for the 1% AEP is the 25 minute, temporal pattern 4 storm. This critical storm produces the greatest overland flow within the channel downstream of the site.

3.2.2. Land Use

Impervious percentages for the catchments have been applied based on aerial photography. The majority of the catchment to the west is pervious aside from rural residential dwellings.

3.2.3. Rainfall Losses

Initial loss (IL) and continuing losses (CL) have been applied to the model for the impervious and pervious portions of the catchment. The values utilised are from the AR&R data hub with median pre-burst values subtracted. The data hub starting loss values are:

- Impervious IL = 0mm CL = 0mm/hr; and
- Pervious IL = 20mm CL = 1.5mm/hr

3.3. Hydraulic Analysis

3.3.1. Model Setup

The 2D model was established to estimate the flood depths across the site and neighbouring lots and the following is of note;

- The extent of the model encompasses the catchment which contributes runoff to the channel to the south of the site, and extends 200m downstream;
- The model adopted a grid cell size of 1m to capture the detail of the existing flowpaths;
- A dynamic timestep approach was utilised as part of the Heavily Parallelised Computing (HPC) version of the 2D software; and
- The model was run for a number of durations to find the critical storm event. The 25 minute storm was found to produce peak flood levels in the area of interest.

3.3.2. Topography

The 2D model topography has been created from LIDAR data supplied from the Department of Natural Resources and Mines (DNRM). The LIDAR data provided was from the 2014 South East Queensland LIDAR capture project. Dams within the catchment have been assumed to be full to the spillway.

3.3.3. Mannings 'n' Roughness

The following Manning's n values have been adopted:

- Residential Areas = 0.15
- Dense Vegetation = 0.15
- Medium Vegetation = 0.1
- Light Vegetation = 0.05
- Open Space and Parks = 0.04
- Roads = 0.015
- Grassed Channels = 0.035
- Open Waterways = 0.025

3.3.4. Stormwater Network

The as-constructed stormwater network within the catchment were modelled as 1D elements within TUFLOW to ensure that the capacity of the pipes was accurately represented.

All invert levels, pipe sizes, pipe grades and material types were sourced from LCC records and site survey.

3.3.5. Hydrologic Inputs

Inflow has been applied directly to the model grid as described in Section 3.2 above.

3.3.6. Tailwater Conditions

The downstream boundary has been set upstream of a culvert crossing downstream 200m downstream of the subject site. The tailwater level at this location has been set at 300mm above the crown of the road embankment.

Refer to Figure 3-1 showing the model configuration.



Figure 3-1 –TUFLOW Model Extent

3.4. Hydraulic Analysis Results – Pre-Development

Runoff from the contributing catchment flows as overland sheet flow and collects in the open channel to the south of the subject site. The following information is of note from the model results:

- Site and upstream catchment flows are partially collected within the existing dam on the site and the property upstream of the site; and
- Flow from the site discharges across the eastern and southern boundaries as indicated in Figure 3-2. These two flowpaths merge into the channel to the east of the site.

Figures 3-2 and 3-3 show the pre-development scenario peak flood depths.

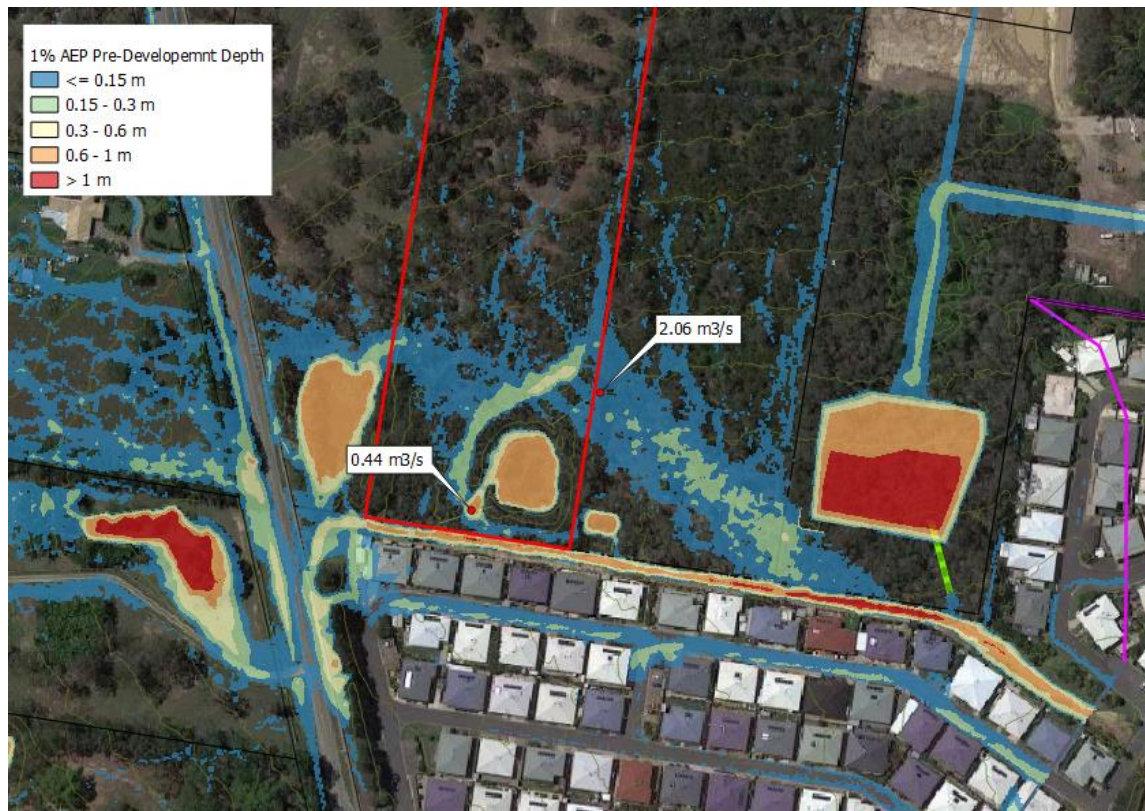


Figure 3-2 – 1% AEP Peak Pre-Development Flood Depths

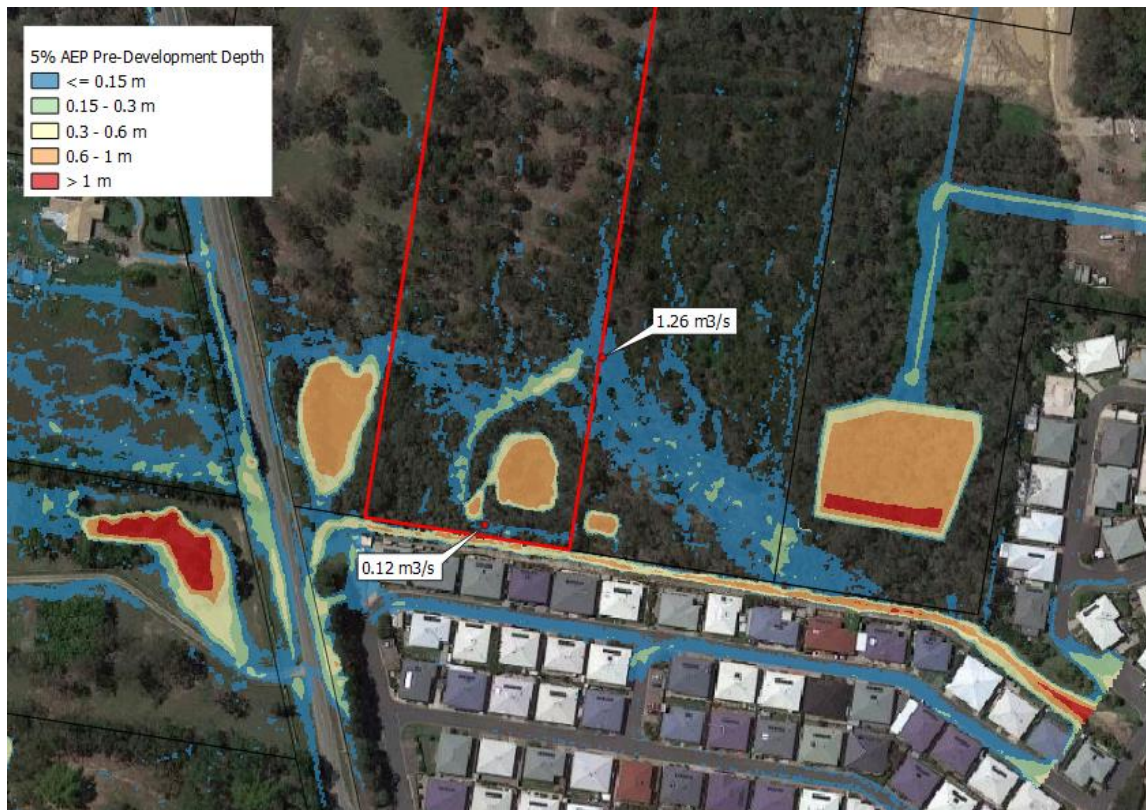


Figure 3-3 – 5% AEP Peak Pre-Development Flood Depths

3.5. Hydraulic Analysis Results – Post-Development

The post-development scenario builds upon the TUFLOW model by incorporating the following elements:

- Fully developed site catchment;
- Fully developed catchment of the property to the west;
- Utilise existing dam on site and existing dam to the west on neighbouring site to provide detention of stormwater flows;
- Piped drainage from the site to convey flow to the dam;
- Maintain two discharge points from the site as per the pre-development scenario;
- Incorporate the following outlets within the detention dams:
 - Site dam
 - 500mm x 400mm orifice @RL 32.7 m AHD (dam base)
 - 900x900 Pit @ RL 33.35 m AHD
 - 525 mm RCP outlet pipe to channel

- 2m wide weir discharging to the south
- Neighbouring dam
 - 225mm orifice @RL 34.0 m AHD (dam Base)
 - 900x900 Pit @ RL 36.8 m HAD
 - 525 mm RCP outlet pipe to channel

The post-development scenario results indicate that the depths within the modified dam to the west will exceed QUDM recommendations and will therefore be required to be fully fenced to prevent access by the public.

The post-development results are summarised by:

- The proposed detention basin (converted dam) has a peak depth of 1.03m in the 5% AEP and 1.39m in the 1% AEP;
- The existing flowpaths across the eastern and southern boundaries are maintained; and
- The low flow pipe from the basin discharges directly to the southern channel.

Figures 3-4 and 3-5 show the post-development scenario peak flood depths.

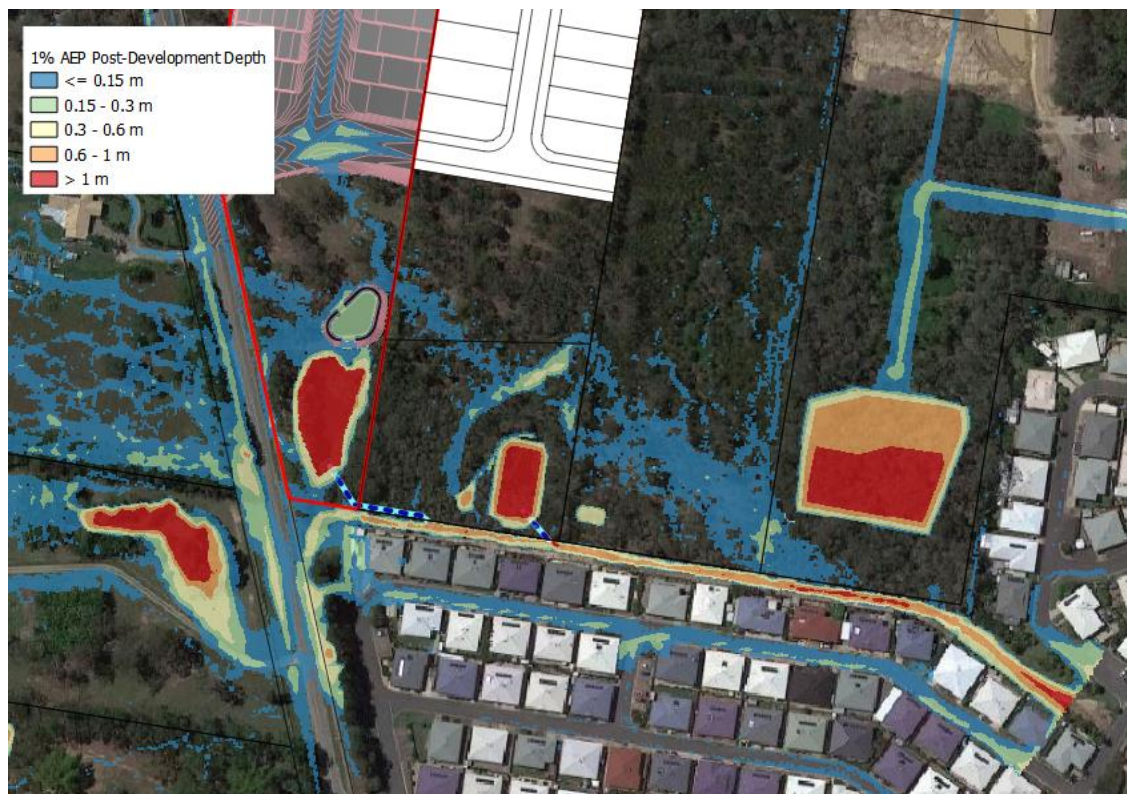


Figure 3-4 – 1% AEP Peak Post-Development Flood Depths

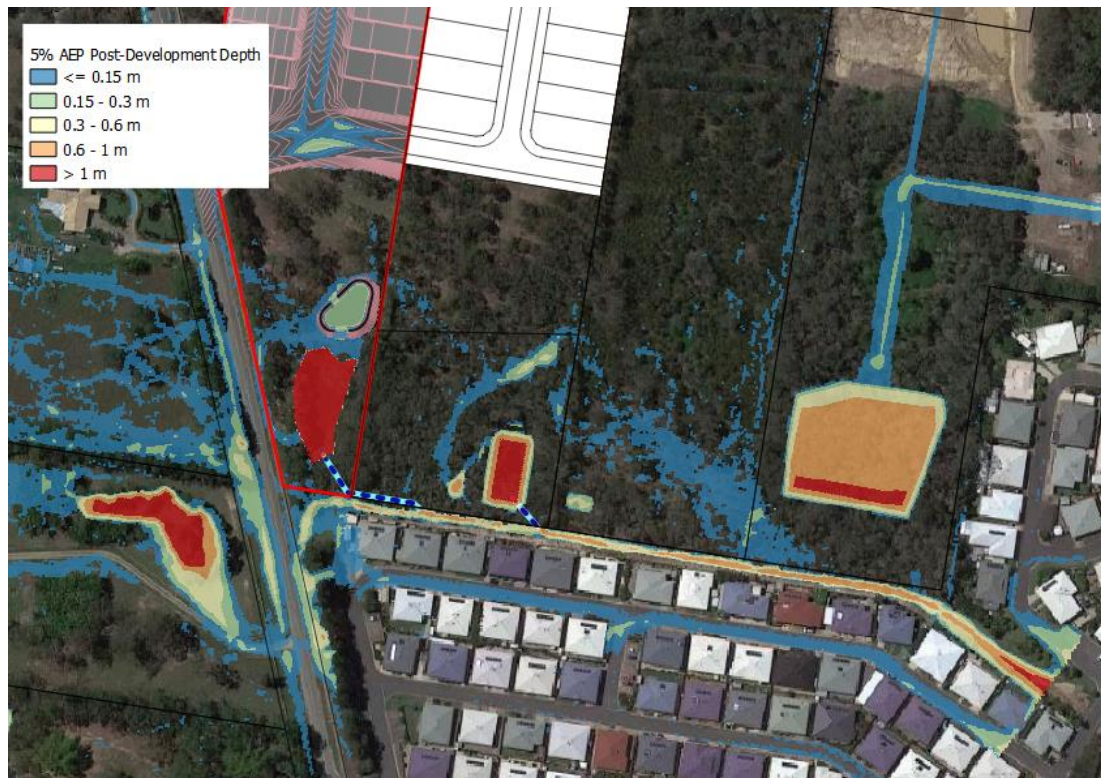


Figure 3-5 – 5% AEP Peak Post-Development Flood Depths

3.6. Flood Impact Assessment

To assess the flood impact that the proposed development will have on surrounding properties, the results of the pre and post-development TUFLOW models have been compared.

Figures 3-6 to 3-10 below show the 1% AEP to 0.5EY flood level impact plots, which demonstrates that there are no actionable adverse impacts to peak flood levels external to the site. Minor impacts within the southern drain are localised to the new proposed headwall outlet locations.

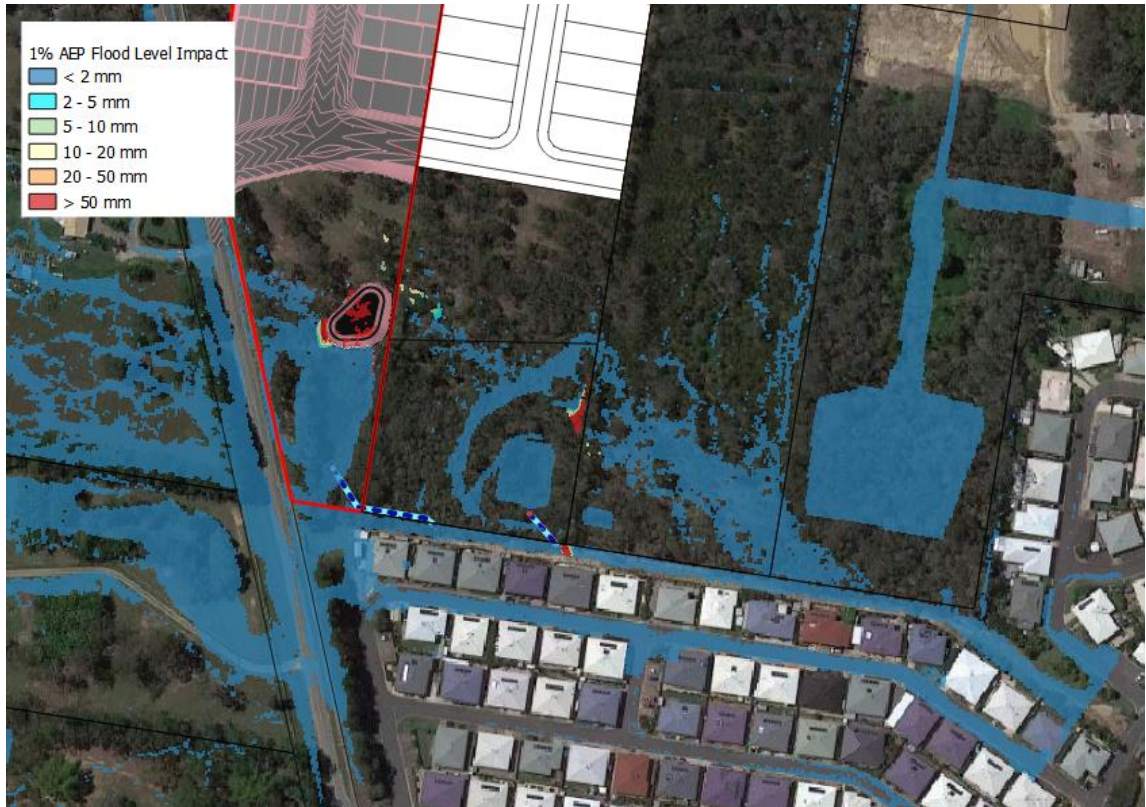


Figure 3-6 – 1% AEP Flood Level Impact



Figure 3-7 – 5% AEP Flood Level Impact



Figure 3-8 – 10% AEP Flood Level Impact



Figure 3-9 – 0.2EY Flood Level Impact



Figure 3-10 – 0.5EY Flood Level Impact

4 Conclusions

Inertia Engineering was commissioned by Park Ridge Unit Trust to prepare a Flood Report for the proposed development at 391-397 Park Ridge Road, Park Ridge to support a development application.

Flood events have been analysed using a TUFLOW rain-on-grid model. This model incorporates the local catchment which contributes to the channel to the south of the subject site. The post-development scenario incorporates earthworks which convert the existing dam on the site and the neighbouring site into detention basins. TUFLOW modelling has demonstrated that the works will not increase peak flood levels external to the site.

5 References

LCC (2015) – Ipswich City Council Planning Scheme 2015

QUDM (2016) – Queensland Urban Drainage Manual Fourth Edition, 2016

TUFLOW (2020) – BMT Group LTD, Version 2020-03-AE

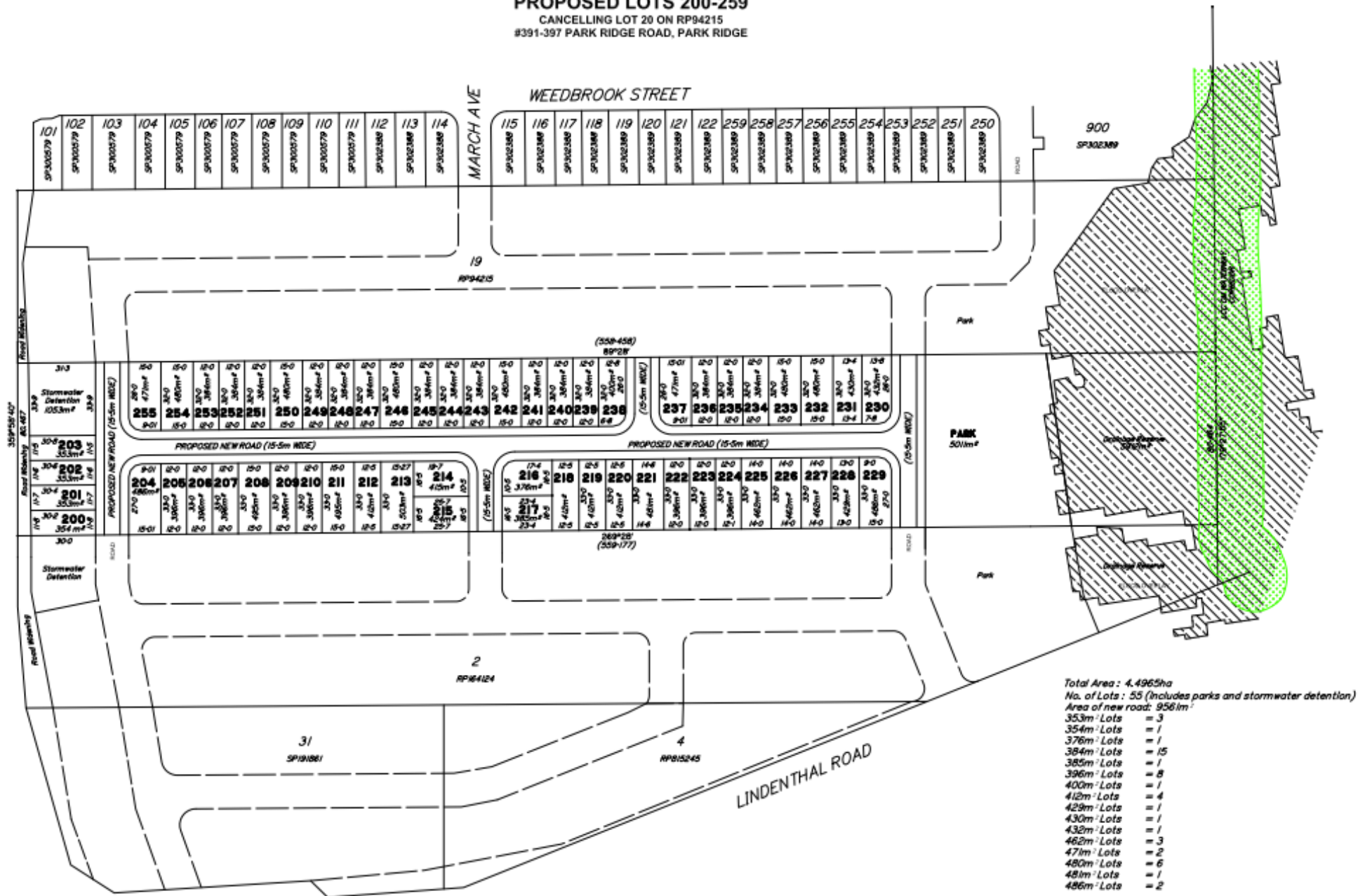


Appendix A – Proposed Development Plan

PROPOSAL PLAN
PROPOSED LOTS 200-259
 CANCELLING LOT 20 ON RP94215
 #391-397 PARK RIDGE ROAD, PARK RIDGE



PARK RIDGE ROAD



Total Area : 4.4965ha
 No. of Lots : 55 (includes parks and stormwater detention)
 Area of new road : 956lm

353m : Lots	= 3
354m : Lots	= 1
376m : Lots	= 1
384m : Lots	= 15
385m : Lots	= 1
396m : Lots	= 8
400m : Lots	= 1
412m : Lots	= 4
429m : Lots	= 1
430m : Lots	= 1
432m : Lots	= 1
462m : Lots	= 3
471m : Lots	= 2
480m : Lots	= 6
481m : Lots	= 1
486m : Lots	= 2

This design is preliminary only and is subject to review to accommodate Local Authority, Engineering and Marketing requirements. Area and distances are approximate only and subject to survey

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SITE:
 #391-397 PARK RIDGE ROAD
 PARK RIDGE
 LOT 20 ON RP94215

LOCAL AUTH: LOGAN C.C.
 AREA: 4.4965ha
 USD REF: 108 P1

SUBDIVISION PROPOSAL PLAN

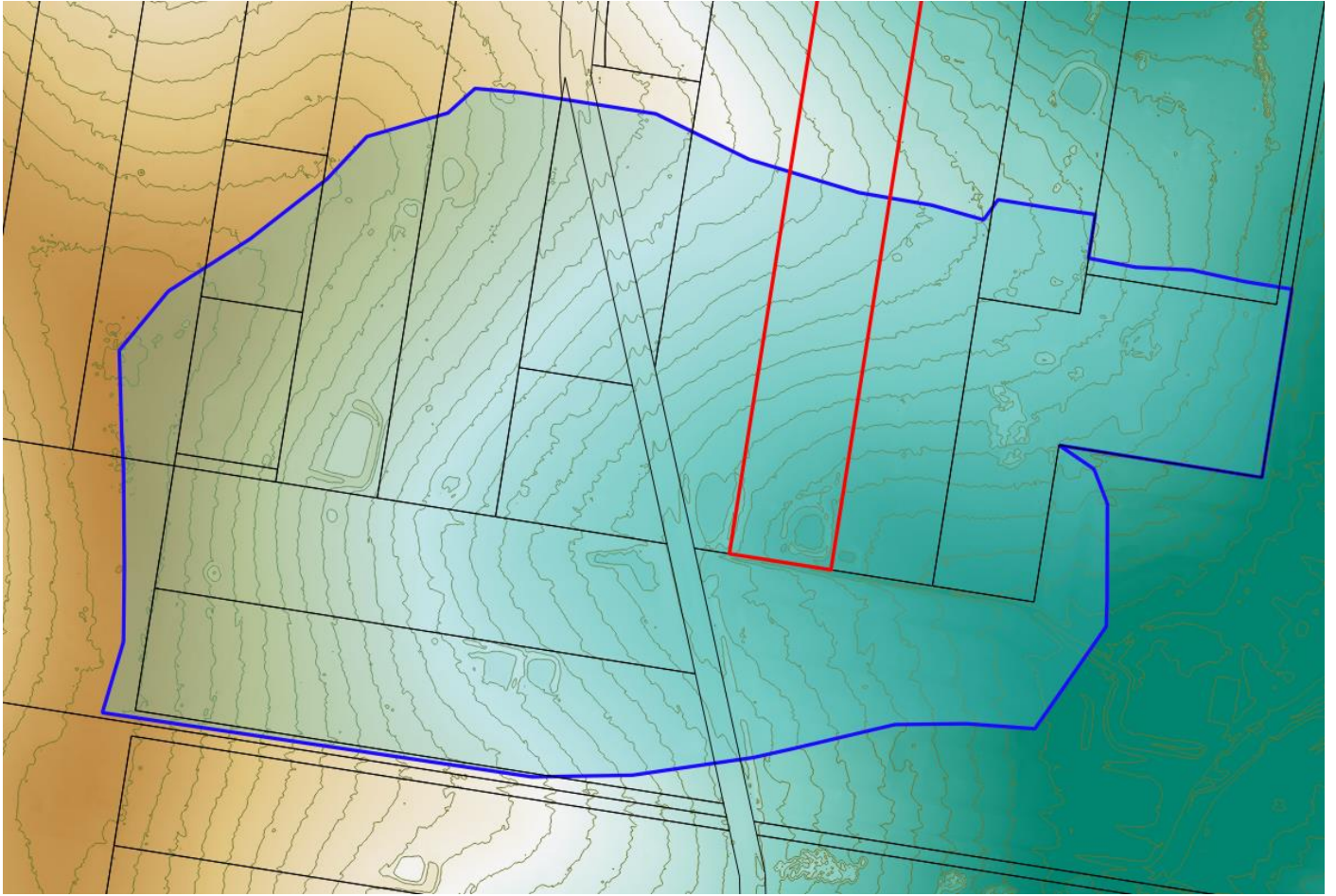
DATE: 31/01/2023 SURVEYOR: JP
 DRAWN BY: GGP
 ECAD: 21-2306rp-prod-njs CHECKED:

SCALE: 1:1250 - O=1m A2

JOB NO: 21-2306p2



Appendix B – Catchment Plan





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