St George Illawarra Dragons Community & High Performance Centre (CHPC) DA Flood Study

SGID Flood Study Report

Populous

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1 Introduction

This report outlines the flood assessment undertaken in relation to the proposed Community & High Performance Centre for St George Illawarra Dragons (this development will be referred to as CHPC herein).

The proposed development is in the northern portion of the site known as the Innovation Campus (iC), located approximately 2 km north of Wollongong CBD. The proposed site is surrounded by existing residential properties to the north and west, Squires Way to the east and existing facilities to the south. Refer to Figure 1-1 for the site locality.

The flood study assessed the impacts of the proposed development using the Wollongong Council flood model of Fairy and Cabbage Tree Creek Flood Study (Advisian, June 2020). No adverse flood impacts are predicted on surrounding properties as a result of the proposed development. Internal to the site, flood management strategies have been proposed to provide flood protection to the critical elements of the development and existing infrastructure, as such complies with the flood planning requirements. Further details on the assessment, the flood management and it's outcomes is presented in the below sections.

1.1 Background

The iC Masterplan originally proposed a long day care centre, childcare centre, and accommodation type development for this site. The current development proposal (CHPC) is not considered to be of the same function as the original Masterplan with respect to the development type. The proposed CHPC development and configuration is presented in Figure 1-1.

Figure 1-1 - Development Site Locality

1.2 Study Objectives

The main objectives for this current assessment are as follows:

- Review of previous reports relevant to the study area for appreciation of flooding behaviour and floodplain management requirements for the area.
- Review the guidelines relevant to the study area and the proposed type of development. Then identify the required design criteria for minimum development levels and flood immunity.
- Determine the flood planning levels for the proposed development.
- Adopt the TUFLOW model provided by Wollongong City Council, set up a development case scenario and assess the flood risk and impacts.

1.3 Catchment Description

The proposal site falls within the Cabbage Tree Creek and Towradgi Arm Catchments. It is located north of the confluence of Fairy and Cabbage Tree Creeks. The Fairy and Cabbage Tree Creeks catchment has an area of approximately 20km² at the point of confluence in the vicinity of the proposed development site. The catchment is generally highly urbanised with steep high rainfall headwaters in the escarpment to the west. The development site is in the lower reaches of the catchment as shown in Figure 1-2.

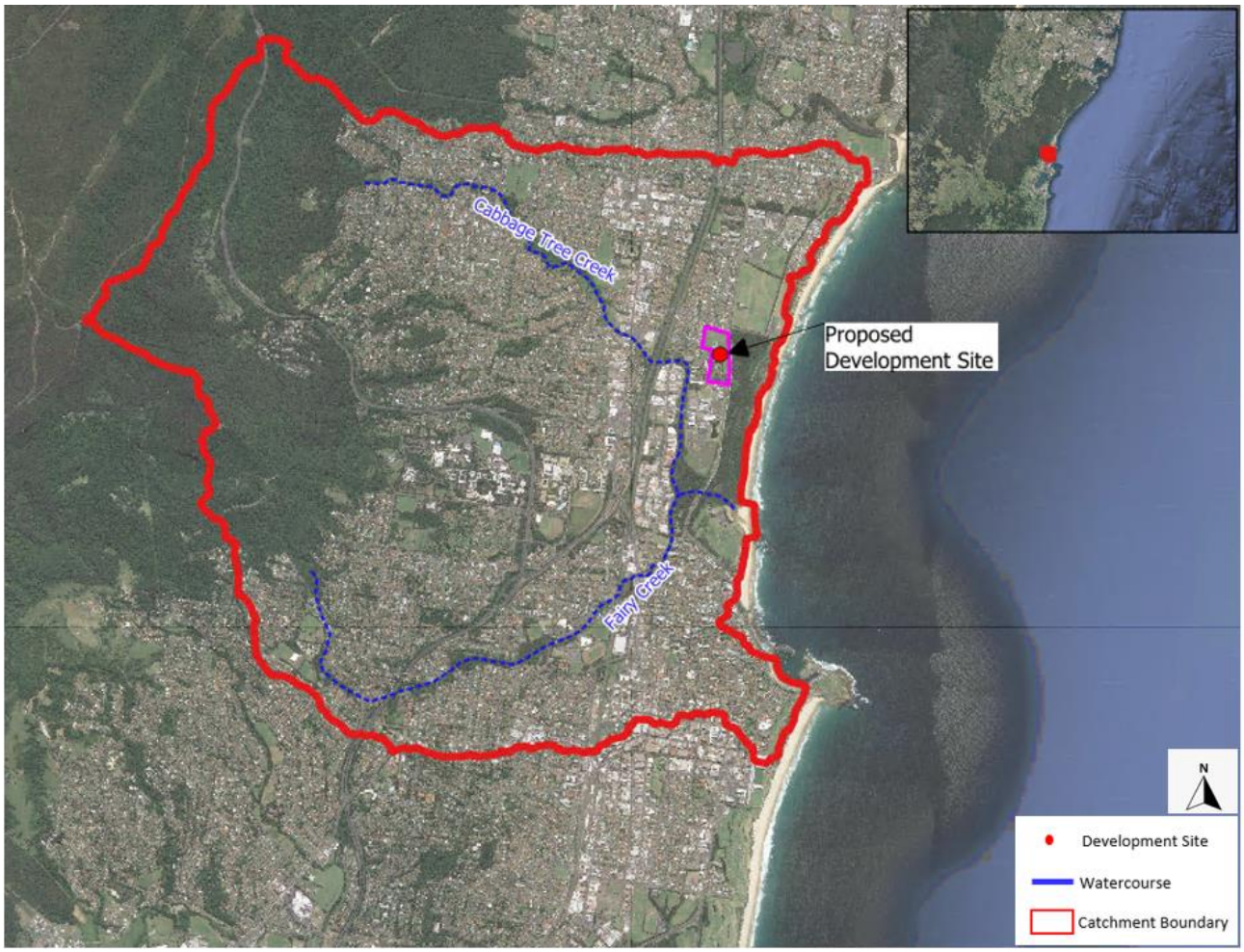

Figure 1-2 - Catchment Diagram

The proposed site generally falls from west to east with the site levels varying between 2m AHD and 5m AHD. Refer to Figure 1-3 for a topographical representation of the site.

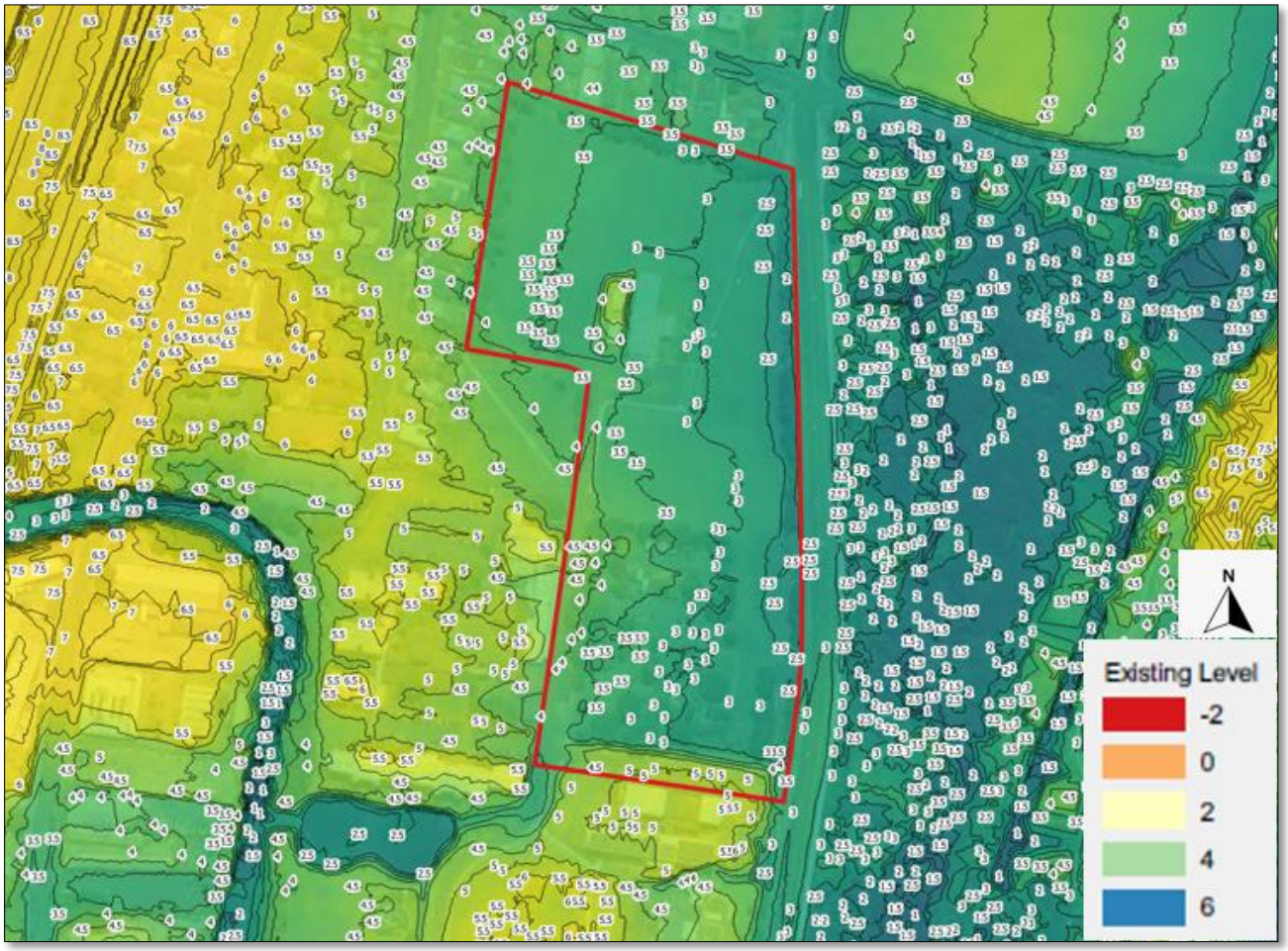

Figure 1-3 - Topographical representation of the site with contours in meters AHD

1.4 Relevant Studies

The following studies were identified relevant to this current assessment and reviewed:

- Flood Management Strategy, Wollongong Innovation campus (Cardno, February 2017)

  This study was undertaken for University of Wollongong (UOW) in support of the ultimate Masterplan for the IC. The primary objective for this strategy was to ensure consistency with Fairy & Cabbage Tree Creeks Floodplain Risk Management Study & Plan (completed by WCC in 2010) as well as State Government and WCC flood policies.

  This study is relevant to this current assessment as it covers the site proposed for CHPC.

- Fairly and Cabbage Tree Creeks Flood Study (Advisian, June 2020)

  This study was undertaken following the previous studies undertaken for the Fairy and Cabbage Tree Creeks and incorporates the latest changes to the catchment as a result of the developments undertaken since the previous studies. The development within the IC was also incorporated into the updated model.

  This study is relevant to the current assessment as it is recent, covers the study area and incorporates a detailed climate change assessment.

1.5 Relevant Development Controls

The following documents were identified as relevant at this stage of the study:

- Wollongong DCP (2009), Chapter D14-Wollongong Innovation Campus

  This chapter of the DCP sets out the precinct controls for development within the Wollongong Innovation Campus precinct. Chapter D14 was prepared based on the ultimate Masterplan prepared in July 2017.

Chapter D14 covers the study area and facilitates and regulates the establishment of a research and development campus that includes a hotel, student and campus related residential accommodation and necessary support services and facilities. However, it is noted that the development types proposed for CHPC are significantly different from the approved Masterplan. Given this, the elements of the specific DCP would not be relevant and as such, the relevant DCP for the catchment (ie. Fairy Creek and Cabbage Tree Creek system) has been adopted, referring to Chapter E13 for controls specifically relevant to CHPC development type.

- Wollongong DCP (2009) Chapter E13-Floodplain Management

  Chapter E13 of DCP provides WCC's requirements for development upon flood prone land and land below the flood planning level within the City of Wollongong Local Government Area (LGA).

  Chapter E13 is relevant to this current study as the proposed site is located within the Fairy Creek and Cabbage Tree Creek system, which is one of the floodplains specifically outlined in Chapter E13. Chapter E13 is the main document which will be used to determine the development levels and assess the flood risk.

2 Available Data

The available data for this assessment includes the following:

- Wollongong Council TUFLOW model
- Site survey
- Proposed CHPC urban design layout
- Proposed CHPC civil design
- NSW Health Ambulance depot proposed design

3 Assumptions and Limitations

The assumptions and limitations associated with the assessment are outlined below.

- This assessment is limited to the study area of the CHPC.
- The assessment is a concept level assessment only suitable to support the Development Application with the intention to confirm the flood impacts and development levels at the detailed design stage.
- This current assessment excludes drainage design or preparation of on-site water management plan for the proposed development (water quality and quantity assessment).
- Wollongong City Council's (WCC) flood planning TUFLOW model of the Fairy and Cabbage Tree Creek catchment has been adopted for this assessment and is assumed to account for the major hydraulic controls relevant to the study area and is an acceptable assessment methodology by WCC.
- WCC requires two scenarios for each flood event: 'no blockage' and 'with blockage factors'. The Fairly & Cabbage Tree Creeks Study TUFLOW model sets levels for blockage factors for a range of flood events based on the Class/ size of the culvert or bridge. Further detailed assessment of blockage has not been undertaken.
- No independent assessment of the climate change effects has been undertaken as part of this study. The Fairly & Cabbage Tree Creeks Study provided to Aurecon has undertaken a comprehensive assessment of climate change and therefore findings from that study have been adopted for this current assessment.

4 Flood Planning Controls

4.1 Flood risk precinct determination

The proposed CHPC is located within the Fairy & Cabbage Tree Creeks floodplain. Based on the hydraulic characteristics of the flooding, the proposed site is predominantly located within the “Medium” flood risk precinct based on the criterion in chapter E13 of the DCP (2009).

Extract from the DCP(2009) for the definition of flood risk precincts:

a) **High Flood Risk Precinct** - The High FRP is where high flood damages, potential risk to life and/or evacuation problems would be anticipated or where development would significantly or adversely alter flood behaviour. This area includes floodways. In this precinct, there would be a significant likelihood of flood damages and/or danger to life. The High FRP includes:

i) Areas greater than H3 hazard conditions during a 1% AEP flood from Figure 3;

ii) Land within 10m from the top of a watercourse bank; and

iii) Floodways.

b) **Medium Flood Risk Precinct** - In this precinct there would be a significant likelihood of flood damage and/or danger to life, but these damages or danger to life can be minimised by the application of appropriate development controls. The Medium FRP includes:

i) Includes land below the 1% AEP level plus 0.5 m that is not within the High FRP area inundated in a 1% AEP plus freeboard and not classified as High FRP.

c) **Low Flood Risk Precinct** - This precinct is where the likelihood of damages is low for most land uses. The Low FRP includes:

i) All areas within the floodplain (i.e. within the extent of the PMF) but not identified within either the High FRP or the Medium FRP; and

ii) All areas within the 2100 Coastal Zone Inundation Extent not classified Medium Flood Risk or High Flood Risk Precinct.

4.1.1 Flood Risk Precinct Evaluation

The proposed site is lower than the 1% AEP plus 0.5m therefore cannot be classified as a ‘low risk precinct’. To be classified as a ‘high risk precinct’ the development cannot be within a floodway or within a H4 hazard classification in accordance with the DCP (2009).

Hazard classifications referred to in the DCP (2009) are defined as follows and supported by the flow hazard categorisation chart by Smith et al / ARR2019, shown in Figure 4-1.

- H1 – generally safe for people, vehicles, and buildings
- H2 – unsafe for small vehicles
- H3 – unsafe for vehicles, children, and the elderly
- H4 – unsafe for people and vehicles
- H5 – unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust building types vulnerable to failure
- H6 – unsafe for vehicles and people. All building types considered vulnerable to failure.

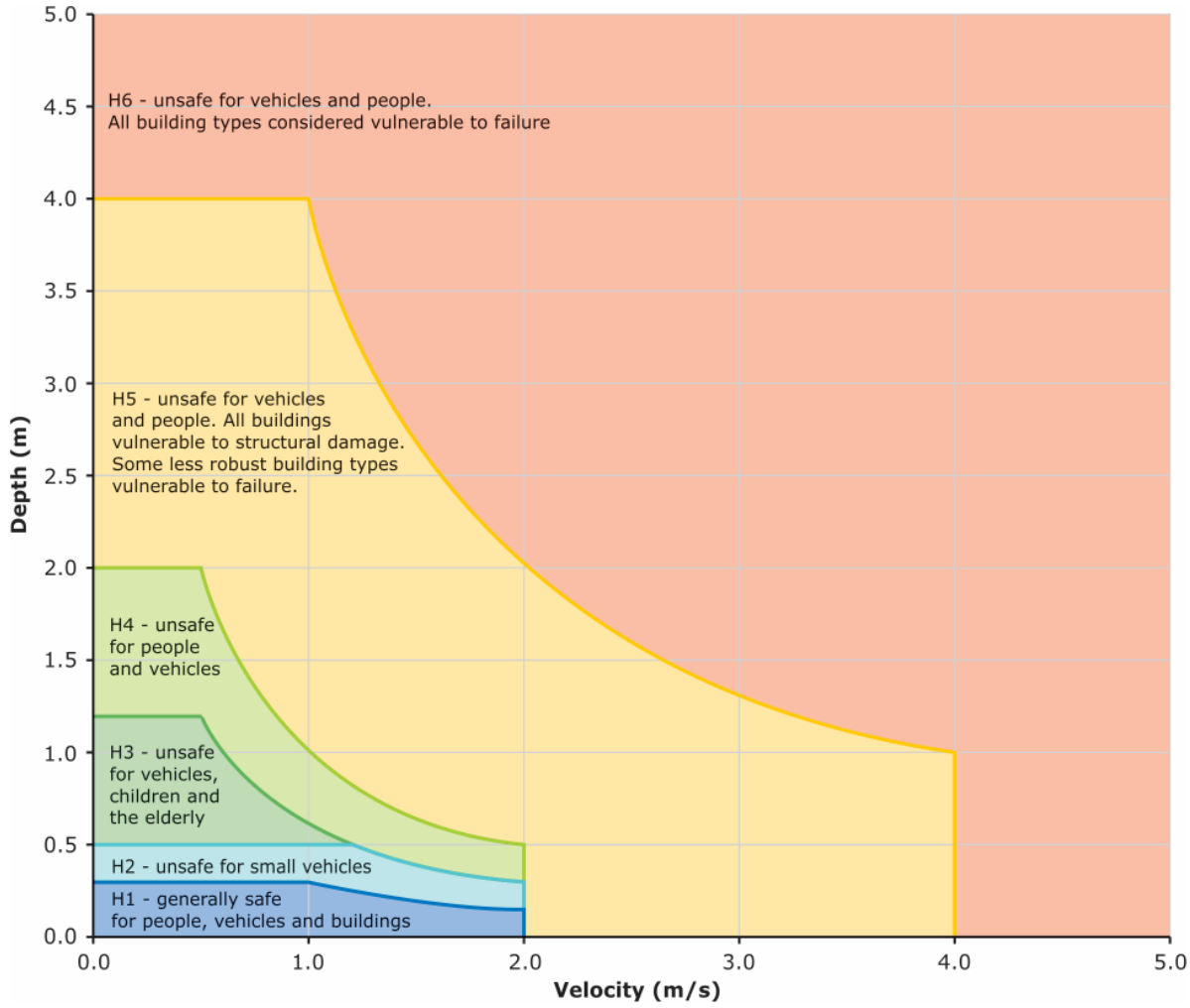

Figure 4-1 - Combined Flood Hazard Curves (ARR2019, Smith et al 2014)

To support the determination of the area being a 'Medium flood risk precinct', the proposed development cannot be in a floodway. The definition of hydraulic categories is assessed in the Fairly and Cabbage Tree Creeks Flood Study (Advisian, June 2020). It presents the areas defined as floodway in a 1% AEP event.

The hydraulic categorisation was derived for this study using the same criteria as per Advisian (2020). This is presented in Figure 4-2, and overlayed by the proposed developmentFigure 4-2. It is somewhat consistent with Advisian (2020), with the exception of some minor floodway areas under the proposed elevated carpark. It is understood that these minor inconsistencies are likely a result of additional filtering or processing of the data.

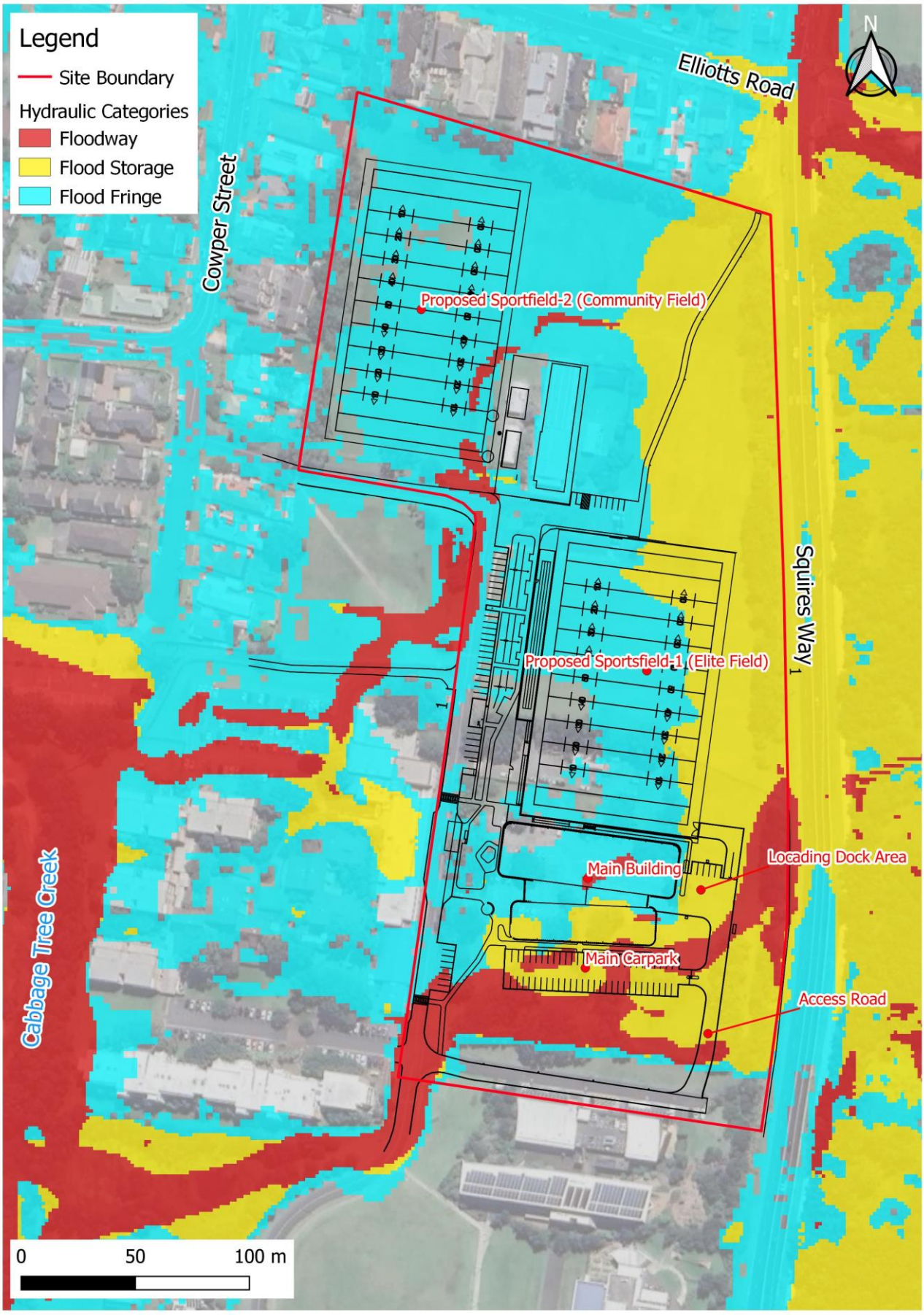

Figure 4-2 - Flood Function - 1%AEP Existing scenario

Furthermore, a hazard classification of H4 during a 1% AEP also triggers a ‘High Risk Flood Precinct’. Based on this criterion, the proposed main building and carparks are all located in areas less than H4 hazard

rating, therefore concluding that the proposed site would be generally defined as a ‘Medium Flood Risk Precinct’.

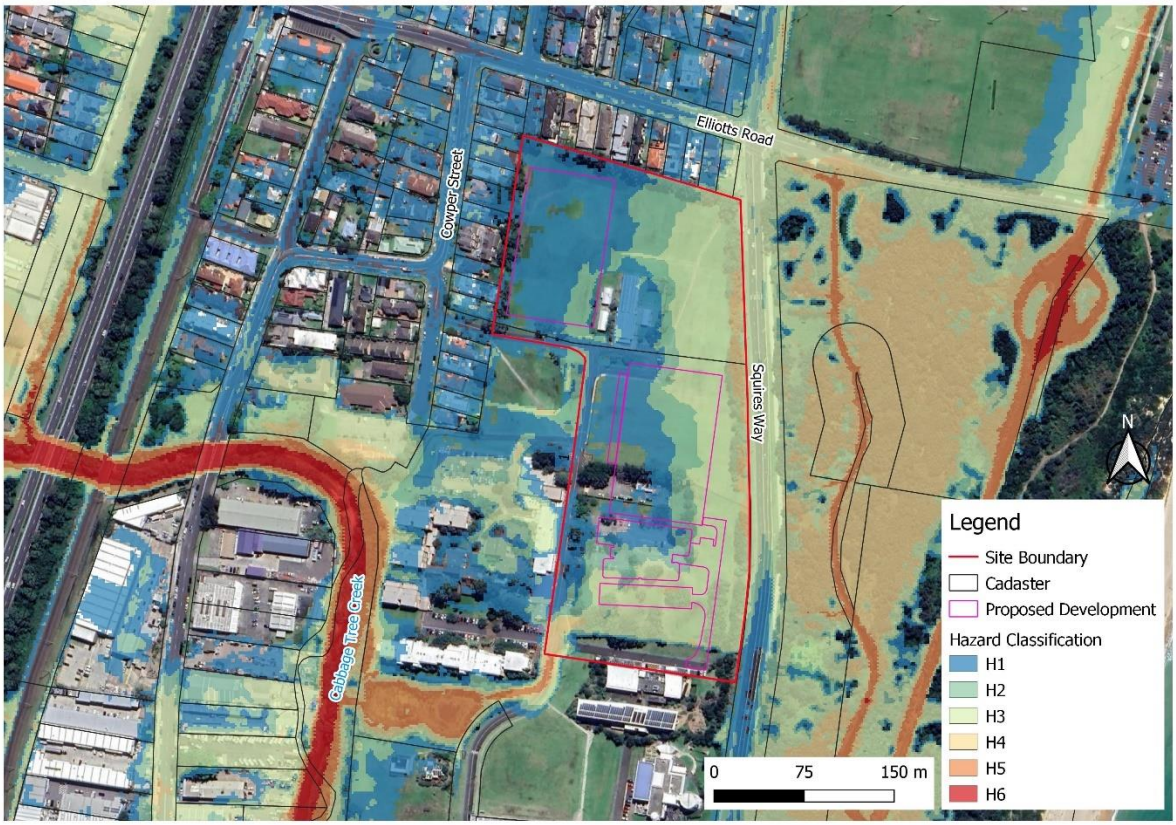

Figure 4-3 - 1% AEP Hazard Classification for Existing Conditions, Zero Blockage

The proposed CHPC is classified as Recreational & Non-Urban with the exception of the building component which can be classified as Commercial & Industrial (with reference to Schedule 5 of Chapter E13). Derivation of the relevant prescriptive controls is presented in Appendix A. Based on this guidance, the above assumptions of the building classifications and referring to Chapter E13, Schedule 5: Perspective Controls-Fairly Cabbage Tree Creek Floodplain, the following controls are deemed applicable to the proposed CHPC:

- Minimum floor level of 5% AEP design flood level plus 500mm of freeboard for the CHPC excluding the building
- Minimum floor level with Climate Change of 1% AEP design flood level plus 500mm of freeboard for the proposed building
- The proposed development shall not increase flood affectation elsewhere.

When assessing the flood affectation, the following must be considered:

  - Loss of net floodplain storage
  - Changes in flood levels and velocities

DCP Chapter E13 indicates that the flood studies must be undertaken for 20% AEP, 1% AEP and PMF flood events for assessment of the flood impacts. DCP Chapter 13 also indicates that flood impacts in PMF will be assessed on merit and will consider the following:

- Impacts to evacuation routes and onsite refuge service levels;
- additional flood affected allotments;
- flood warning time; and
- changes to above yard and above floor flooding

The DCP suggests that the modelling will need to be run for the 0.2% and 0.5% AEPs in addition to the PMF to demonstrate no adverse impacts in rare events due to filling above the 1% AEP. It is noted that the Council TUFLOW model provided does not have the 0.2% and 0.5% AEP events readily available. The flood events modelled in the current study have been limited to events up to the 1% AEP and the PMF i.e. does not include the 0.2% AEP or 0.5% AEP events.

4.2 Filling in the floodplain

Chapter D13 of the DCP (2009) stipulates that filling of the floodplain is not permitted unless a Flood Risk Management Plan (FRMP) for the catchment has been adopted allowing filling or a specialist study is undertaken. The current FRMP (Fairy and Cabbage Tree Creeks Floodplain Risk Management Plan, 2010) is currently under review however does not discuss filling of the iC site. In addition, the Cardno (2017) floodplain management strategy for the innovation campus doesn't discuss the loss of floodplain storage to facilitate the original master plan either.

The approach adopted for the CHPC proposal is to minimise loss of floodplain storage

The DCP (2009) requirements relating to filling in the floodplain (Chapter E13, Section 7) is summarised in Table 4-1 below. This is accompanied by how the requirements are addressed by the flood impact assessment for the DA submission.

Table 4-1 - DCP clause on filling in the floodplain

DCP Clause	How addressed
(1) Filling in the flood prone areas is not permitted unless:	N/A – Heading
(a) A FRMP (Flood Risk Management Plan) has been adopted which allows filling to occur.	N/A – The current 2010 FRMP is under review. No mention of filling or development across the university is mentioned. Reference to the university master plan is made as a review of other studies.
(b) A report from a suitably qualified engineer is submitted to Council that satisfies the requirements of items 2 & 3 below and certifies that the development, in combination with similar filling of developable sites in the area, will not increase flood affectation elsewhere.	This report
(2) Filling of individual sites in isolation without consideration of the cumulative effects is not permitted. A case-by-case decision making approach cannot take into account the cumulative impact on flooding behaviour and associated risks caused by individual developments. Any proposal to fill a site must be accompanied by an analysis of the effect on flood levels of similar filling of developable sites in the area.	The proposal does not result in filling that reduces the pre-development floodplain storage volume in the PMF, 1% AEP, 5% AEP, 20% AEP events (refer to Section 9.4).
(3) The analysis would form part of a flood study prepared in accordance with Chapters E13 and E14 of this DCP.	The flood study supporting the proposal (this study) is based on Council's approved flood model issued to the project team on 19/10/2021 and as such is prepared in accordance with Chapters E13 and E14 of the DCP.
(4) Generally, there is to be no net increase in fill in the floodplain. Compensatory excavation may be used to offset fill, however the compensatory excavation must be taken from an adjacent area of similar flood function that is lower in the floodplain (i.e.. at a lower AEP inundation extent) than the proposed fill areas. Cut and fill drawings and volume calculations must be supplied to Council.	No net increase in fill is proposed under this proposal (refer to Section 9.4). The fill volumes were compared against the existing flood extent area. No loss of floodplain storage is predicted in the modelled flood events (PMF, 1% AEP, 5% AEP and 20% AEP events). As such, this only accounts for

DCP Clause	How addressed
(5) Filling above the 1% event may be permitted if it can be demonstrated there are no adverse impacts in rare events (e.g. 0.2%, 0.5%, PMF).	The proposal does not propose filling that results in a reduction of existing floodplain storage.

5 Proposed Development

The proposed development includes a community sports-field (field 2) in the north, elite sports-field (field 1) in the south, a main building adjacent to the elite sports-field, a main carpark south of the main building and supplementary carparks to support the development. This layout is shown in Figure 5-1 below.

Figure 5-1 - Proposed Building and Sports-field Layout

The development levels for the different components of the CHPC are adopted as per DCP Chapter E13 as described here:

- It is anticipated that a building floor level of 1% AEP plus 500mm freeboard would be compliant with DCP Chapter E13.
- The main car park is elevated above the 1% AEP flood level. The other new carparks are subject to some level of flooding, while aiming that all flooded carparking spaces are still within hydraulic hazard category H1, in reference to Combined Flood Hazard Curves (Smith et al., 2014).
- The finished surface of the community and elite sports-fields are graded in an easterly direction, facilitating local drainage. The elite sports-field (field 1) achieves flood immunity to the 20% AEP event. In order to minimise loss of floodplain storage and flood risk to surrounding properties, the community field (field 2) is at a lower level than existing levels and therefore has a similar level of immunity.

- Impact to flood storage is not worsened from pre-project conditions. The proposed strategy is to place the main building and carpark on piers so that flood flow can pass underneath the structural slabs. Serveral culverts are proposed under the main access road to provide continuity of flow along the floodway and maintain the loading dock on grade to minimise loss of floodplain storage.

6 Permissible Flood Impacts

The DCP requires that flooding impacts do not increase elsewhere with respect to flood levels and velocities.

In accordance with Table 2 from Chapter 13 of the DCP, the impact limitations are shown in Table 6-1below for flood events up to the 1% AEP flood. The allowable impacts for the current study are based on the Multi-Lot Subdivision primarily due to the proposed development being outside the category of Individual Property or Government Infrastructure Project.

New development must not cause additional lots to be impacted by the 1% AEP or PMF, nor increase the frequency of overland flooding in a 20%, 1% AEPs or PMF flood event.

Table 6-1 - Allowable Impact, Increase in Flood Levels up to 1%AEP

Development/ Project Type	Allowable Impact (mm)					
	Critical uses and facilities	Sensitive Uses and Facilities	Residential	Commercial or Industrial	Tourist Related Development	Recreation or Non-urban Uses
Individual Property	10	10	20	20	20	20
Multi-Lot Subdivision	10	10	20	50	50	50
Government Infrastructure Projects	20	20	100	150	150	150
Proposed**	**10**	**10**	**20**	**50**	**50**	**50**

** Based on Multi-Lot Subdivision

Residential properties are located to the north and north-west of the development site requiring a maximum impact of 20mm. Commercial or Industrial properties are located to the south-west of the proposed development site requiring a maximum impact of 50mm. Other areas are categorised as Recreational or Non-Urban land uses requiring a maximum allowable impact of 50mm. No allowable/ tolerance for changes in velocities, hazard or velocity-depth product were noted in the DCP therefore changes in these outputs have not been assessed against a criteria in the current study.

7 Flood Modelling

7.1 Base Flood Model

The TUFLOW model developed as part of the Fairy and Cabbage Tree Creek Flood Study (Advisian, June 2020) was extracted from the NSW Flood Data Portal and was used as a basis for this current assessment.

Upon the initial attempts to rerun the TUFLOW models, errors due to missing model set-up files were identified. WCC provided the missing files following a request, which resulted in the successful running of the models.

The results from the model reruns were compared with the reference results downloaded from the NSW Flood Portal and showed reasonable consistency.

The zero blockage scenario has been adopted as base scenario given it is more conservative with respect to flood level. All results presented in this assessment relate to this scenario unless otherwise mentioned. However, all blockage scenarios have been assessed and presented.

7.1.1 Flood events

All flood events and scenarios supplied were simulated for the assessment. This included multiple events, durations, tailwater conditions and blockage scenarios. A summary of these events and scenarios are presented in Table 7-1.

Table 7-1 - Summary of modelled events and scenarios

Design event	Duration	Tailwater Level (mAHD)	Blockage	Comment
20%	120min 360min	HHWS (SS) = 1.10	No blockage Design Blockage Risk Blockage	
5%	120min 360min	HHWS (SS) =1.10	No blockage Design Blockage Risk Blockage	For flood storage volume calculations only
1% AEP	120min 360min	5% AEP Ocean tide =2.35 1% AEP Ocean tide =2.55 ISLW = -0.90	No blockage Design Blockage Risk Blockage	
1% AEP Climate change	120min 360min	Year 2100, 1% AEP Ocean tide =3.45	No blockage Design Blockage Risk Blockage	Includes 20% increase in rainfall intensity and 0.9m sea level rise
PMF	60min 120min	1% AEP Ocean tide=2.55	No blockage Design Blockage Risk Blockage	

SS = Summer Solstice
ISLW = Indian Spring Low Water
HHWS = High High Water Springs

7.2 NSW Health Ambulance Depot

The development of an Ambulance Depot is proposed by NSW Health. The proposed development will coincide with the CHPC development and will be located to the west of Field 1, bound by Innovation Way to the north and eastern side (refer to Figure 5-1).

NSW Health have provided the proposed design (received April 4th 2023) as TUFLOW layers. These layers have been added to the model for both existing and proposed scenarios.

7.3 Survey and Design TIN

A survey TIN was added to the base case model based on detailed ground survey. The design TIN was also added with changes updated during the course of the study. The survey TIN was dated 03/06/2022 while the most up to date design TIN was dated 13/02/2024. The proposed design TIN is shown Figure 7-1.

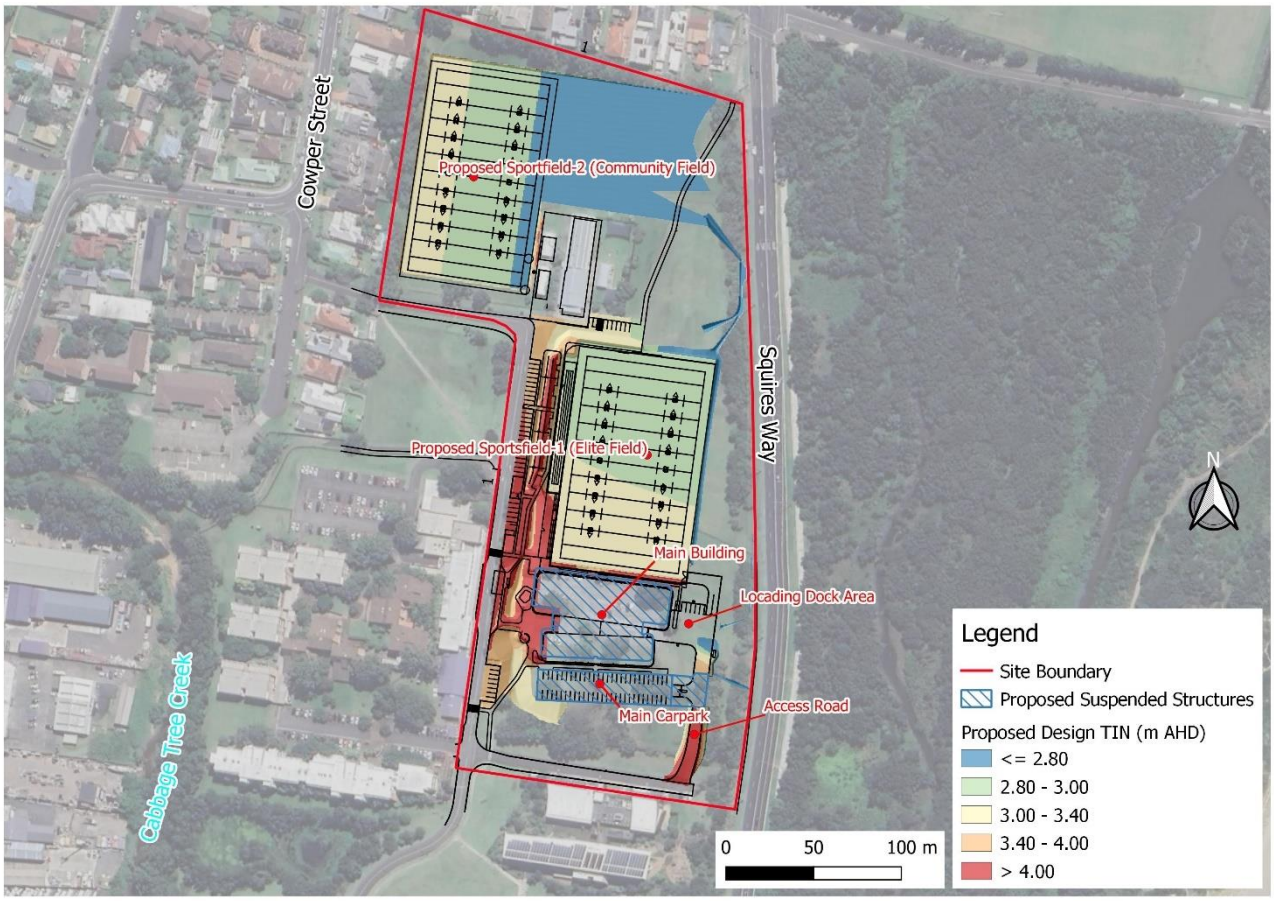

Figure 7-1 - Proposed design TIN surface

7.4 Blockage Scenarios

According to the Wollongong Shire Council DCP, blockage is only required for the major drainage system and applies to "*all watercourses including creeks, floodways and other trunk drainage systems within the City of Wollongong with the exception of the minor system as defined in Chapter E14 of this DCP*". The proposed development includes one major culvert under the main access road. Blockage factors were applied to the proposed culvert as per Table 7-2 for all events (20% AEP, 1% AEP, PMF).

The DCP states a requirement to address scenarios with and without blockage. Since the proposed design can potentially impact on flooding to surrounding land, the model was run with various blockage cases to assess potential flood impacts. The clockage scenarios simulated include the "*Zero Blockage*" case, and two levels of additional blockage named "*Design blockage*" and "*Risk blockage*" based on the model supplied.

The design blockage value was based on guidance from ARR 2019, Chapter 6. The risk blockage value was based on guidance from the the DCP (2009) for Class 2 stuctures (ie. proposed culvert is 12 units of 0.9m x 2.4m RCBC).

Table 7-2 - Adopted Condute Blockage

Modelling Scenrio (Existing & Developed)	Blockage for Proposed Culvert
No Blockage	0%
Design Blockage	25%

Modelling Scenrio (Existing & Developed)	Blockage for Proposed Culvert
Risk Blockage	75%

No proposed minor drainage has been represented in the model. The minor drainage is considered local drainage and does not influence the regional flooding. The representation of the existing minor drainage across the catchment is maintained as per the original flood study and includes pit blockages of 20% and 50% for on grade and sag pits in accordance with the DCP (2009) Minor systems requirements.

7.5 Buildings

The modelling of the buildings outside of the project is as per the adopted modelling approach from the Fairy & Cabbage Tree Creek Flood Study (2020). For the proposed development, the main building and carpark is elevated on piers. These structures are represented using the layered flow constriction feature in TUFLOW, which represents the structural slab as being elevated and 100% blocked. The piers and structural walls supporting the slabs were represented as individual layered flow constrictions that were blocked to 20% (0.6m diameter piers within 3m model grid cell).

7.6 Fences

The representation of fences throughout the catchment are as per the Fairy & Cabbage Tree Creek Flood Study (2020). Within the proposal, no fences have been represented apart from proposed fencing around the void under the carpark and main building. The intent of the fencing is to prevent people from accessing the void, which may encourage loitering and vandalism.

This fencing was considered important to represent in the modelling due to it's proximity to the floodway, south of the car park, and flood function of the area. The fencing will be of large aperture given it cannot be climbed over. The large aperture will limit the impact of blockage however, in accordance with the DCP (2009), (Chapter E13, Table 1 Blockage factors), barriers and fencing should adopt a blockage of 75%. This blockage factor was applied to the fencing represented in the flood modelling.

8 Flood Management Strategy

The analysis of the proposed development identified the need for flood management and modifications to finished levels. The below outlines details on the proposed bunds and minimum levels.

8.1 Proposed Bunds and Diversion Drains

Two locations required physical barriers to protect and redirect overland flow. A low level wall is proposed in front of the existing Nissen Huts (Childcare centre) to the north of the elite sports-field (refer to Figure 8-1). This flood wall limits increases in flood levels across the existing buildings. The flood wall has a height of approximately 300mm and works in conjunction with a drain that conveys flows towards the east along the northern side of the elite sports-field.

A second flood protection barrier in the form of an earth bund is proposed along the western side of the elite sports-field (field 1) to protect the proposed sprint track from overland flow. Although the elite field can be subject to flooding, the sprint track is required to remain flood free due to its risk of damage from surface water. The earth bund is at an elevation of approximately 4.4m AHD and 100 m in length. The horizontal alignment of the bund is shown in Figure 8-1.

The proposed main building does constrict a portion of the overland flow travelling from Innovation Way to Squires Way. This results in increases in flood levels to the west and in front of the building. To manage this risk, a diversion drain has been incorporated in the design to convey flows more efficiently from the western

face of the main building around to the south of the main carpark, into the existing floodway. The approximate alignment of the drain is shown in Figure 8-1.

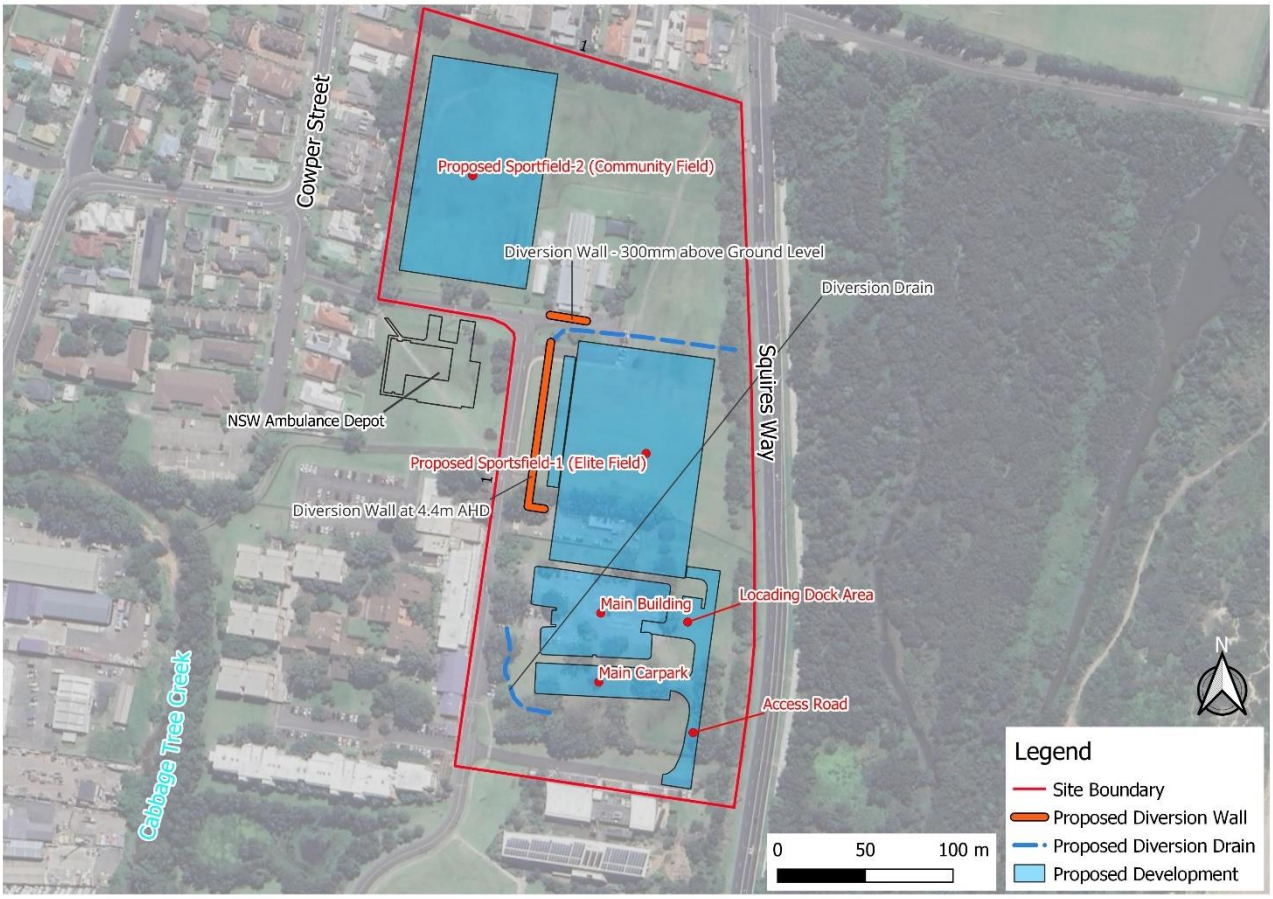

Figure 8-1 - Proposed mitigation strategy

8.2 Access Road Culverts

The proposed access road will incorporate 12 units of 0.9m high x 2.4m wide reinforced concrete box culverts (RCBC). The access road will cross the existing overland flowpath south of the carpark and therefore a large number of culvers have been proposed to mitigate any impact on flood levels and from blockage. The culverts are indicatively shown in Figure 8-2 with more detail presented in the civil design package supplied as part of this DA.

Figure 8-2 - Proposed culverts under access road

8.3 Development Levels

Table 8-1 shows a summary of required and proposed development levels for the proposed development site.

Table 8-1 - Required and proposed development levels

Proposed Development Component	Proposed Main Building Platform	Proposed Main Carparking	Sports Filed 2 Community Field	Sports Field 1 Elite Field	Minor carparks along Innovation Way
Minimum Development Level Required by DCP	1% AEP flood level plus 500mm of freeboard	Allowed to flood in 1% AEP design event if the flood hazard is within H1 classification	None specified	None specified	Allowed to flood in 1% AEP design event if the flood hazard is within H1 classification
Masterplan development levels	Finished floor levels to 1% AEP plus 500mm plus Sea level rise of 900mm^				
Proposed Development Level	1% AEP flood level plus climate change* effects plus 500mm of freeboard	Minimum Development Level Required by DCP	Provides compensatory floodplain storage	20% AEP flood level as agreed with stakeholders	Minimum Development Level Required by DCP
20% AEP Flood level (m AHD)	2.9	2.9-3.5	2.8-3.0	Not flooded	Vary from 3.7 (Only southern Innovation Way carpark partially inundated)
5% AEP Flood Level (m AHD)	3.1	3.1-3.6	3.0	3.0	Vary from 3.7-3.8 (Only southern Innovation Way carpark partially inundated)
1% AEP Flood Level (m AHD)	3.3-3.5	3.4 - 3.7	3.4	3.4	Vary from 3.9 - 4.2
1% AEP Flood Level plus Climate Change Effects (m AHD)	4.17	3.9 -4.0	3.9	3.9	Vary from 3.9 - 4.3
Freeboard (m)	0.5	n/a	n/a	n/a	n/a
Minimum Development Level (m AHD)	4.67	n/a	n/a	n/a	n/a
Adopted Design Level (m AHD)	4.67	4.0	Vary from 2.8-3.0	Vary from 2.8-3.1	Varying from 3.6 - 4.2

*Climate change effects defined as 20% rainfall increase plus 900mm sea level rise simulated in the hydraulic model.

^The sea level rise of 900mm was simplistically added to the design level at the site based on the Masterplan documentation. This approach is very conservative and not adopted for this assessment.

9 Flood Assessment Results

Flood mapping results are presented in Appendix B. Flood levels, depths, velocity, hazard, velocity-depth product and hydraulic categories have been mapped. These are presented for the existing and developed scenarios. Also presented are flood level impact maps for the modelled events.

The zero blockage scenario was identified as the critical scenario for the site. As such, the discussion and presentation of results mapping in Appendix B focuses on the zero blockage outputs.

Peak flood results for each duration and tailwater condition for each event was combined to create a peak flood envelope. This was consistent with the enveloping process adopted in the Advisian (2020) flood study.

Results for the PMF 120m duration, risk blockage scenario and the 1% AEP climate change design blockage, were not able to be incorporated. The models were unstable in the final simulation and did not provide suitable results for presentation. Due to this instability, only the available durations have been adopted for the risk and design blockage mapping for the respective events. These events are not considered critical and would not influence the outcome of this assessment.

9.1 Flood Immunity

The flood depth mapping for a 20% AEP event is shown in Figure 9-1. The proposed design has been developed to provide the elite sports-field (field 1) with a flood immunity to a 20% AEP event. The community field has no specified immunity and is lower than existing levels. This is intended to provide additional floodplain storage to satisfy the no net increase in fill.

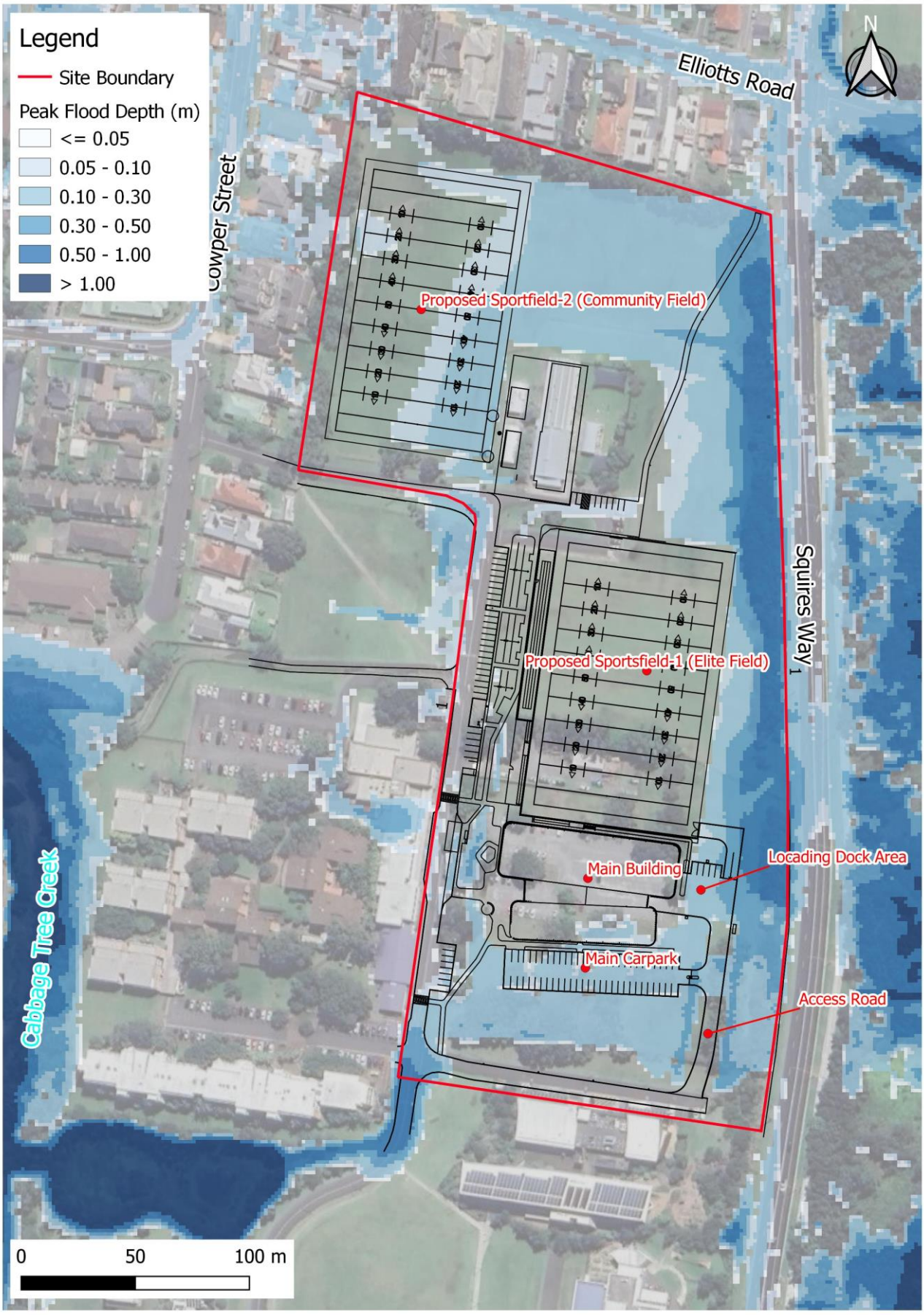

Figure 9-1 - Flood Immunity of sports-fields in 20%AEP in Developed Case

For the main building, the required flood immunity is to the 1% AEP plus climate change plus 500mm freeboard. The adopted peak flood level for this event is 4.17mAHD, which is the predicted flood level at the western side of the building at the entrance. Predicted flood levels are shown in Figure 9-2. Higher levels

than 4.17m AHD can be seen to the north-west of the building however these levels are considered local drainage flow that travels south rather than flooding the building. Flow depths are shallow in the order of 50-100mm. Flood levels along the floodway, south of the carpark, and levels across the eastern side of the building are considered flooding. These levels are in the order of 3.9-4.0m AHD.

To achieve the required flood immunity, the finished floor level of the main building is set to 4.67mAHD. Figure 9-2 demonstrates the main building achieving the required flood immunity and is also shown in Appendix B. Note that the building is suspended on piers and the flood extent presented in Figure 9-2 represents flooding under the building.

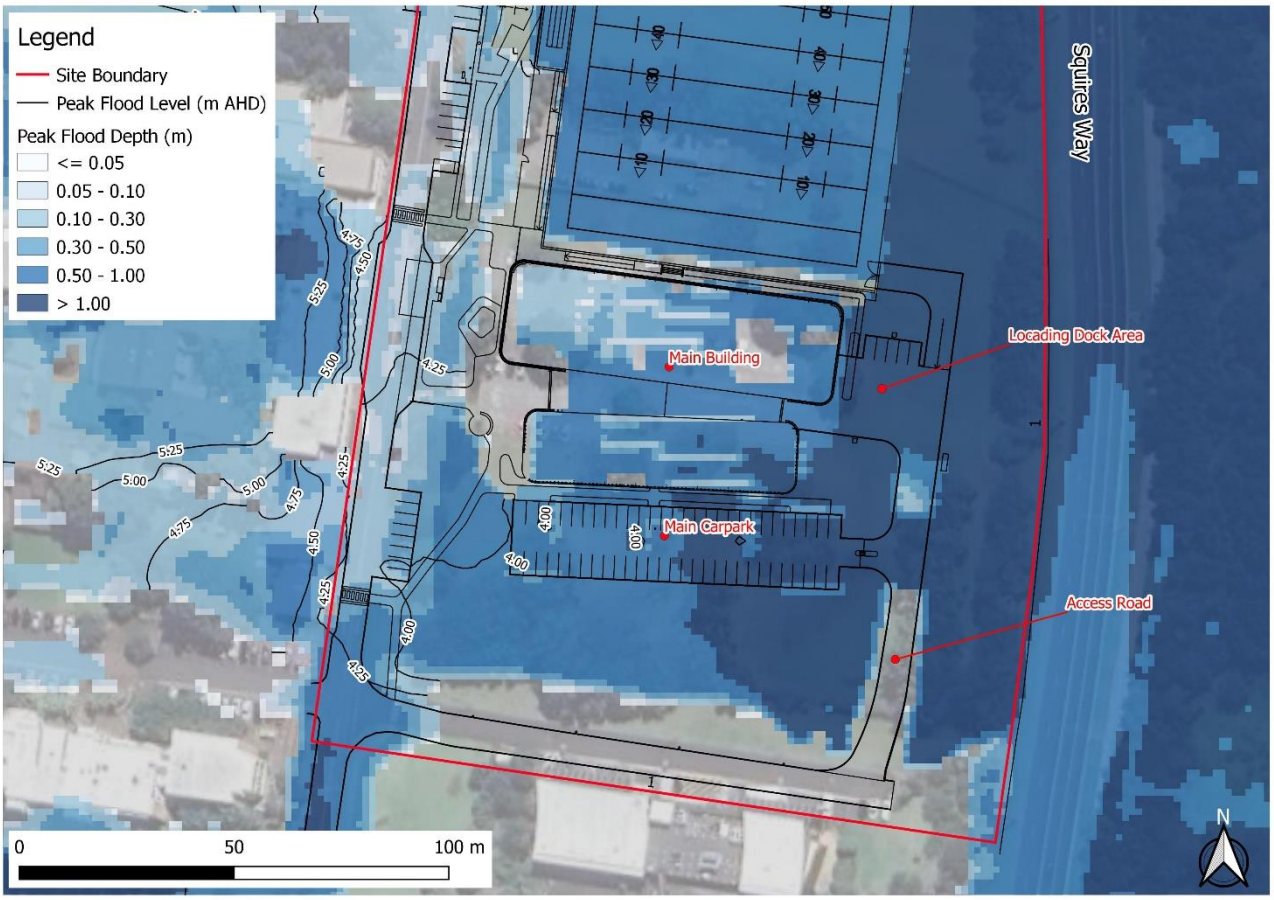

Figure 9-2 - Flood immunity of main building to the 1% AEP plus climate change plus 500mm freeboard

9.2 Flood Impact

9.2.1 Change in flood level - Afflux

Maps showing the flood impacts in the 20% AEP, 1% AEP and PMF are presented in this section for the developed, zero blockage scenario. Additional afflux maps are shown in Appendix B for the Risk and Design blockage scenarios. All blockage scenarios show similar impacts on flood levels due to the project, showing localised afflux that does not encroach onto adjacent properties.

The changes in flood level for the 20% AEP are shown in Figure 9-3 below. These results indicate that no increases in flood levels are predicted on surrounding properties. The 1% AEP design event peak flood afflux result (Figure 9-4) shows no increases across surrounding properties.

The changes in flood level for the PMF event are shown in Figure 9-5. The results indicate that increases in PMF flood levels are localised to the site, therefore no impact on critical infrastructure, evacuation routes or emergency management is expected.

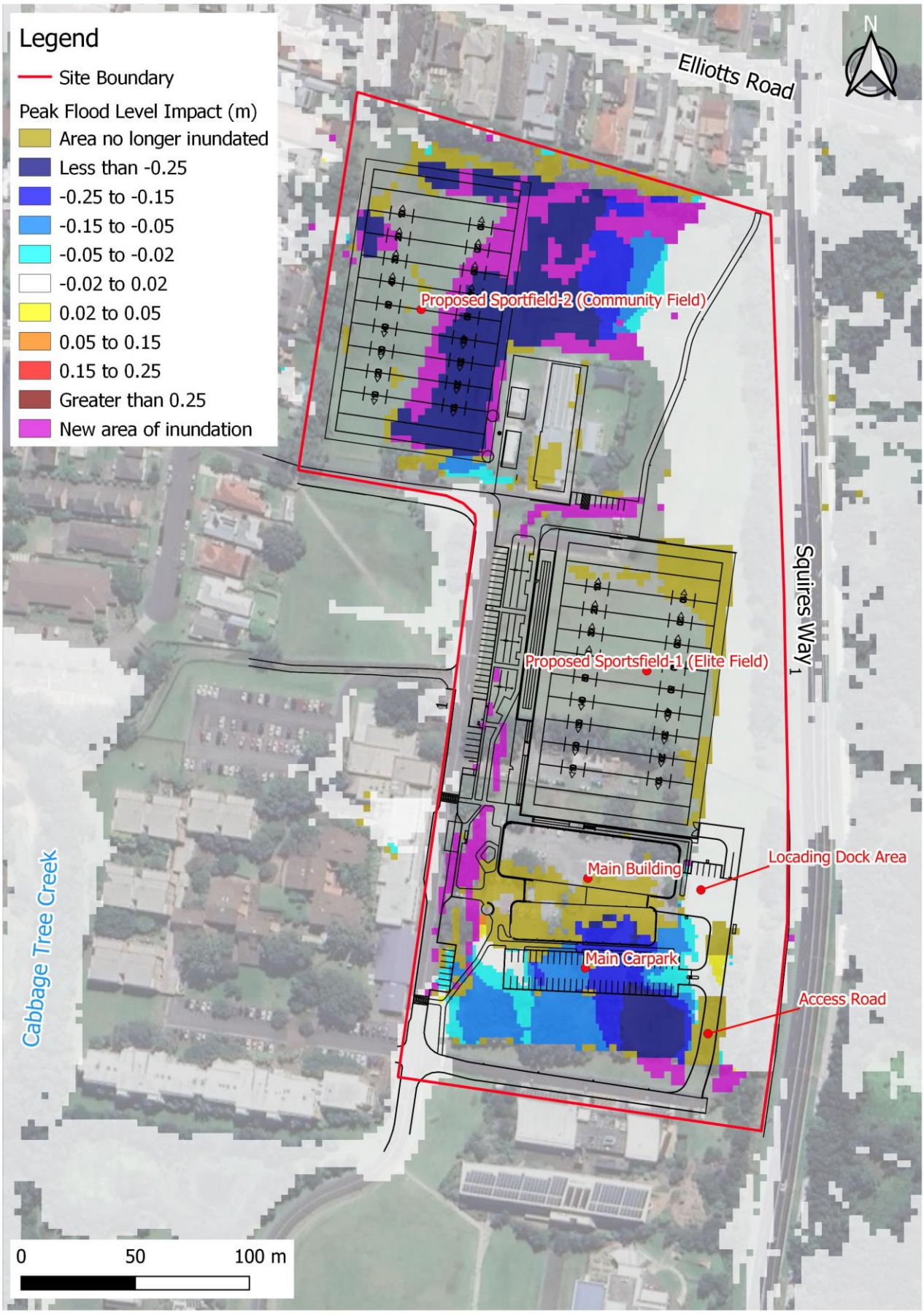

Figure 9-3 - Changes in Peak Flood Levels (Afflux) in a 20% AEP Design Event – Zero Blocakge

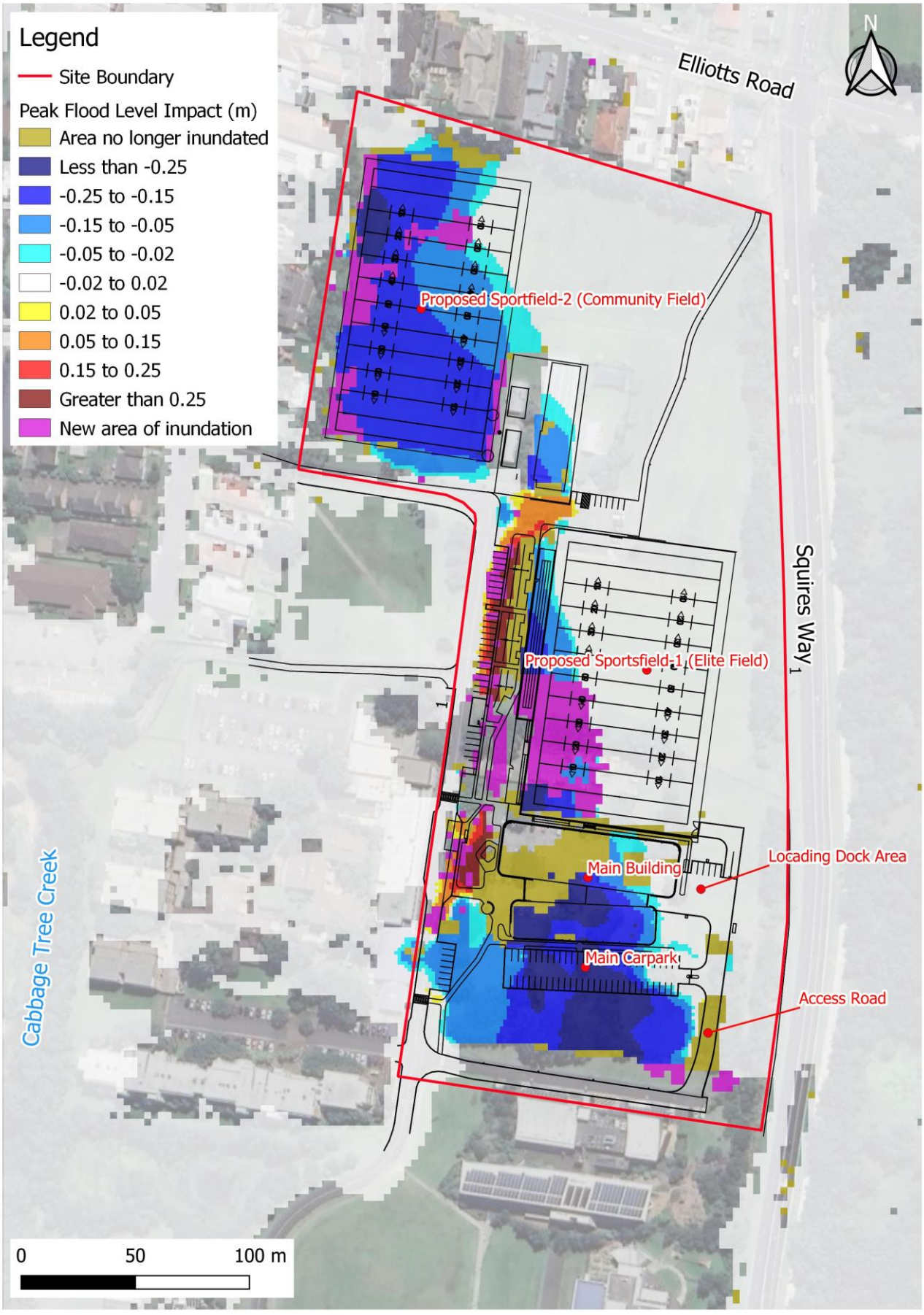

Figure 9-4 - Changes in Peak Flood Levels (Afflux) in a 1% AEP Design Event – Zero Blocakge

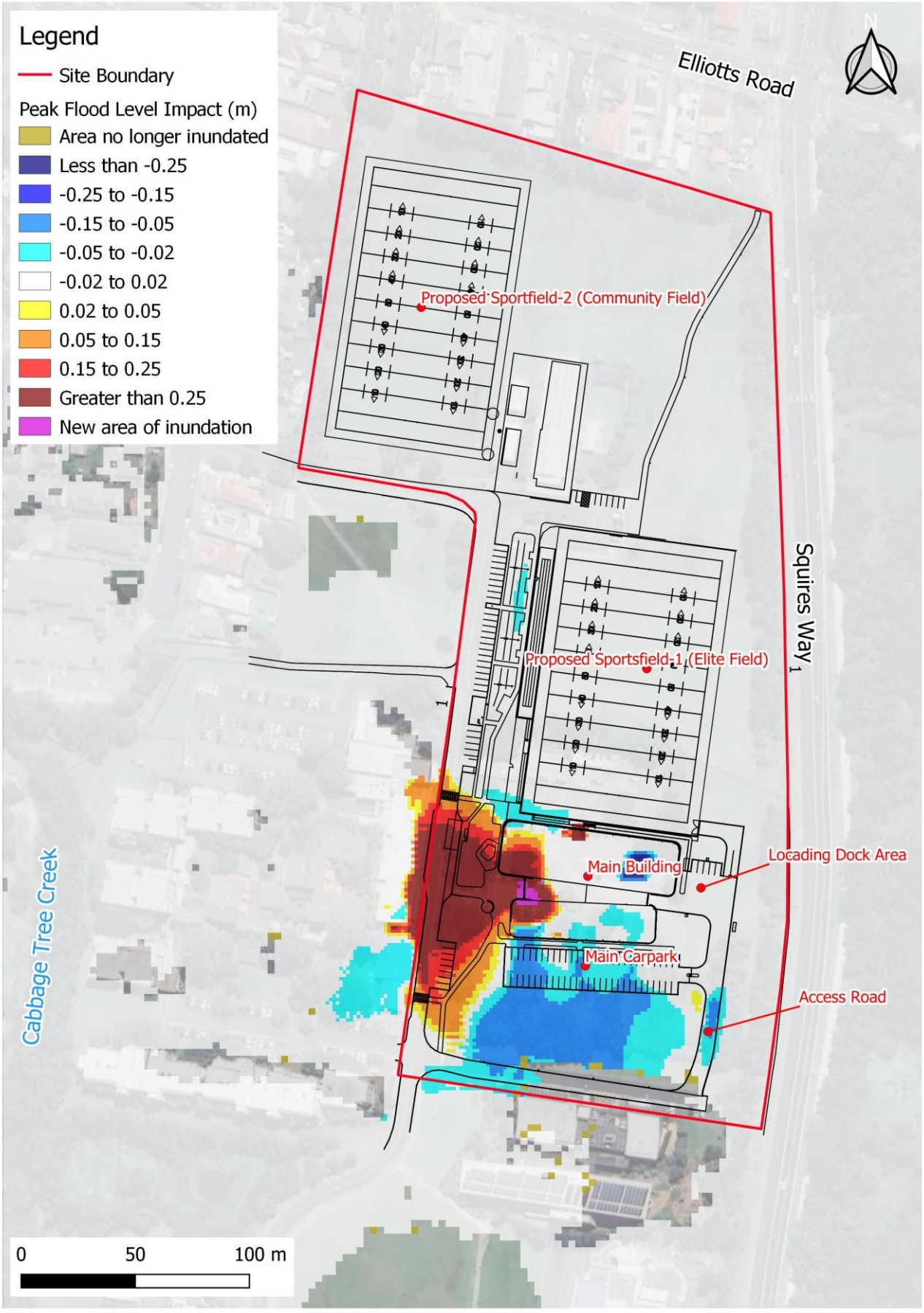

Figure 9-5 - Changes in Peak Flood Levels (Afflux) in a PMF Design Event – Zero Blocakge

9.3 Flood Hazard Categorisation in Carparks

A main carpark is situated within the proposed development site, south of the main building, and a combination of existing and new carparks are proposed along Inovation Way, west of Field 1. The modelling results indicate that the proposed main carpark (finished surface level of 4.0mAHD) is free from flooding in both 1%AEP and 5%AEP events (refer Section 8.3) . The remaining carparks that form part of the project are subject to flooding in the 1%AEP event however are predicted to have a hazard classification of H1, therefore complying with the DCP requirements (refer Section 4). Hazard mapping and the carparks are shown in Figure 9-6 and Appendix B.

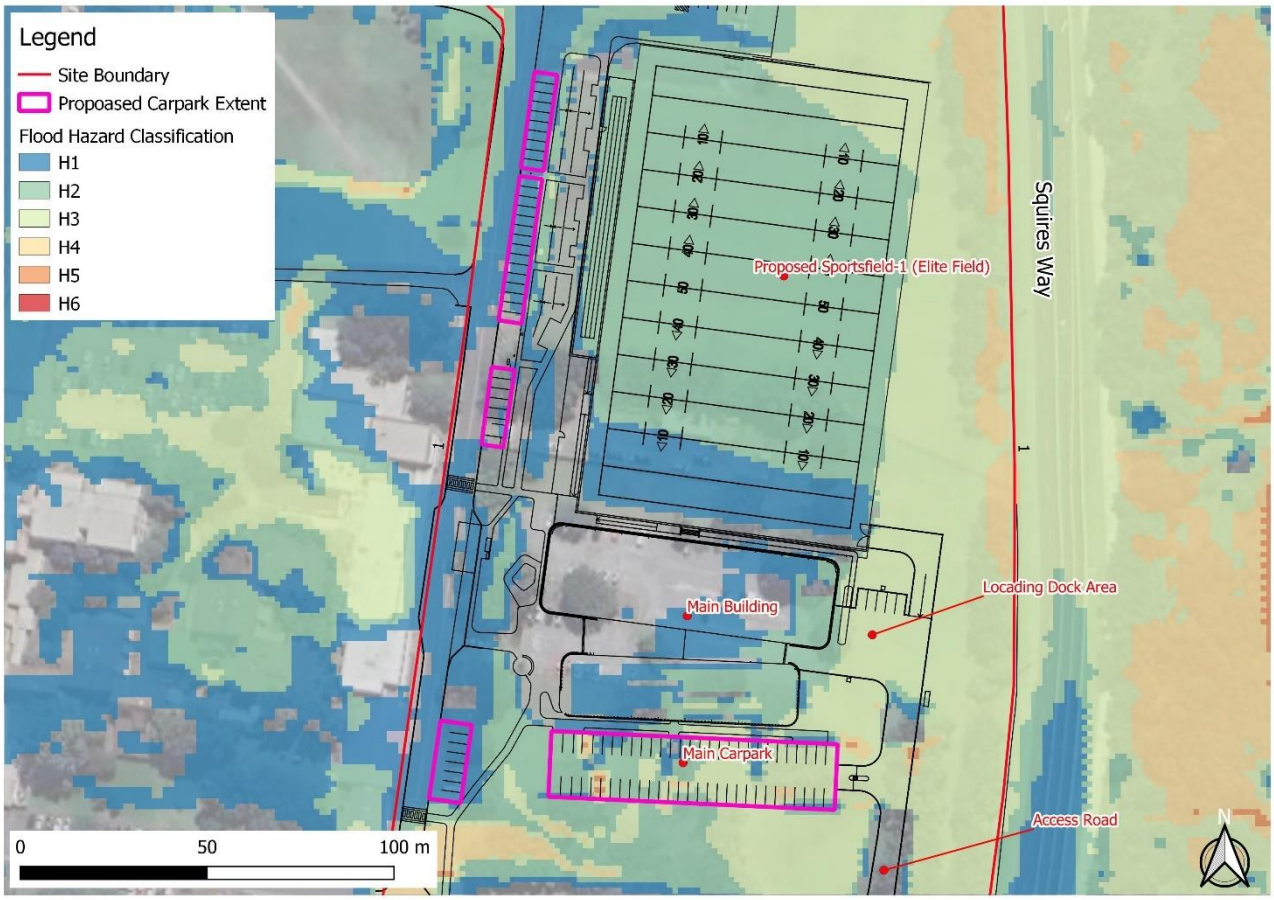

Figure 9-6 - Hazard classifications for a 1%AEP event

9.4 Floodplain storage

The change in floodplain storage as a result of the proposed development is presented in Table 9-1. The table presents the pre-development and post development flood storage based on the pre-development flood levels for the PMF, 1% AEP, 5% AEP and 20% AEP flood events. The results show that there is no expected loss in floodplain storage. This is evidenced though the cut and fill drawings provided in the civil design package that forms part of the same DA.

The flood storage volumes were calculated using 12D Model software. It compared the existing (pre-development) flood level with the existing topographic survey. This provided the baseline flood storage for the PMF, 1% AEP, 5% AEP and 20% AEP events. Using the same existing flood levels, the flood storage volume was calculated using the proposed development design surface. Both volumes were compared and the change in flood storage volume was determined.

In the larger flood events, the building and carpark superstructures are partially submerged. Furthermore, piers and walls supporting the substructure consume some of the calculated flood storage. The structureal

volume below the corresponding flood levels were then subtracted from the calculated floodplain storage volumes to provide a final change in floodplain storage.

Table 9-1 - Flood storage volumes

Scenario/component	Flood storage volume (m^3)			
	PMF	**1% AEP**	**5% AEP**	**20% AEP**
Existing volume	116366	27363	14314	8261
Proposed development volume	120916	33665	16950	10181
Structural volume (subtracted from proposed volume)	3067	331	143	75
Change in flood storage*	**1483**	**5971**	**2493**	**1845**

**Positive values indicate an increase in floodplain storage as a result of the project*

9.5 Emergency management

The DCP requires reliable evacuation access or refuge during a flood event. In flood events greater than the 1% AEP, flooding in the area increasingly impacts the ability to safely evacuate. The flood behaviour for this catchment is of a short critical duration therefore would not provide for much time to evacuate safely. On this basis, a 'shelter-in-place' strategy will be adopted for the occupants of the building at the time of a flood. Floor level(s) above the PMF flood level will consist of the required services for the people seeking refuge.

10 Summary

The flood impact assessment conducted for the proposed CHPC development confirms that the necessary flood immunity requirements have been met. Importantly, the study predicts no unfavorable flood impacts on neighboring properties, in accordance with the DCP requirements.

The proposed design achieved no net loss of floodplain storage in the PMF, 1%, 5% and 20% AEP events.This satisfies the requirements of the DCP (2009) under filling in the floodplain.

A summary of the assessment and findings are outlined below.

- This flood assessment has been prepared for a proposed High Performance & Community Centre (CHPC) for St George Illawarra Dragons. The site for the CHPC is the northern portion of the site known as Innovation Campus (iC).
- The CHPC site is located just north of the Fairy and Cabbage Tree Creeks. The proposed site generally falls from west to east with ground levels varying between 2m AHD and 5m AHD.
- The TUFLOW model developed as part of Fairy and Cabbage Tree Creeks (Advisian, June 2020) was used as a basis for this current assessment.
- The proposed development site was categorised based on a Medium Flood Risk Precinct based on the criteria outlined in the DCP (2009).
- The TUFLOW model was upgraded to include a detailed survey and the most updated design TIN available representing the proposed development. The design includes flood management bunds and diversion drains to prevent adverse flood impacts on surrounding properties.
- The TUFLOW model was run using three categories of blockage based on Council's Fairy and Cabbage Tree Creeks TUFLOW model (Zero blockage, design blockage and risk management blockage).
- The proposed development does not increase flood affectation beyond specified limits elsewhere in the 20%AEP, 1%AEP and PMF flood events. The changes to floodplain storage have been dynamically assessed using the 2D TUFLOW flood model. Results indicate that no adverse flood impacts are expected as a result of changes to floodplain storage.
- The main building achieves flood immunity in the 1% AEP with Climate Change. Current design levels are at 4.67m AHD for the main building, which includes a 0.5m freeboard.
- The proposed main carpark within the site is not flooded in the 1% AEP. This satisfies Council requirements for acceptable level of risk for carparks.
- No net loss of floodplain storage is predicted. This is achieved through elevating the main building and carpark on piers and providing for the lowest feasible levels for the sporting fields.
- A 'shelter-in-place' strategy is proposed in the event of a flood. Floor levels above the PMF flood level will provide the required servies for refuge for occupants.

Recommendations for the next stage assessment are as follows:

- Review of the design finished floor levels as the design develops to confirm adequate freeboard is achieved.
- Review the impact of the project on flood levels as the design develops to confirm no impact on adjacent properties is maintained.

11 References

Advisian (2020), Fairly and Cabbage Tree Creeks Flood Study, Wollongong City Council.

Ball J, et.al. (2019), Australian Rainfall and Runoff: A Guide to Flood Estimation, Commonwealth of Australia, Geoscience Australia.

Cardno (2017), Flood Management Strategy, Wollongong Innovation Campus, University of Wollongong.

Pilgrim DH, et.al (1987), Australian Rainfall and Runoff - A Guide to Flood Estimation, Institution of Engineers, Australia, Barton, ACT.

WCC (2009), Wollongong Development Control Plan 2009 – Chapter E13: Floodplain Management, Wollongong City Council.

WCC (2009), Wollongong Development Control Plan 2009 – Chapter D14: Wollongong Innovation Campus, Wollongong City Council.

Appendix A - Prescriptive Control Matrix

The proposed CHPC is classified as Recreational & Non-Urban with the exception of the building component(s) which can be classified as Commercial & Industrial (with reference to Schedule 5 of Chapter E13). The extract development matrix from the DCP is shown below.

SCHEDULE 5: PRESCRIPTIVE CONTROLS – FAIRY CABBAGE TREE CREEK FLOODPLAIN

	Flood Risk Precincts (FRP's)																							
	Low Flood Risk								Medium Flood Risk								High Flood Risk (& Interim Riverine Corridor)							
Planning Consideration	Essential Community Facilities	Critical Utilities	Subdivision	Residential	Commercial & Industrial	Tourist Related Development	Recreation & Non-Urban	Concessional Development	Essential Community Facilities	Critical Utilities	Subdivision	Residential	Commercial & Industrial	Tourist Related Development	Recreation & Non-Urban	Concessional Development	Essential Community Facilities	Critical Utilities	Subdivision	Residential	Commercial & Industrial	Tourist Related Development	Recreation & Non-Urban	Concessional Development
Floor Level		3										2,7	2 or 5	2	1	2,4 6							1	2,4 6
Building Components		2										1	1	1	1	1							1	1
Structural Soundness		3		2		3						2	2	3	2	2							1	1
Flood Affectation		2	2		2	2					1	1 or 2	1	1	1	2							1	1
Evacuation		2, 4	5	3, 4	4	3, 4					5	3,4	1,4	3,4	1								1	
Management & Design		4, 5	1								1		2,3 5	2,3 5	2,3 5	2,3 5							2,3 5	2,3 5
Not Relevant		Unsuitable Land Use																						

Note:

a. Filling of the site, where acceptable to Council, may change the FRP considered to determine the controls applied in the circumstances of individual applications.

b. Terms in italics are defined in the glossary of this plan and Schedule 2 specifies development types included in each land use category. These development types are generally as defined within Environmental Planning Instruments applying to the local government area.

c. *Freeboard* equals an additional height of 500mm.

The controls that apply to the proposed development is based on the Schedule 5 of the DCP applicable to the Fairy and Cabbage Tree Creeks Floodplain. The requirements are summarised in the DCP, summarised below for the current development proposal:

Floor level requirement for the Recreational/ Non-Urban category (1 from Matrix) require all floor levels greater than 5%AEP plus freeboard. For the Commercial/ Industrial category (2/5 from Matrix) habitable floors are required to be greater than 1%AEP plus freeboard or floor levels of shops as close to flood planning level as practical. Some concessions apply if floor levels are below FPL (refer DCP).

Building components come under category (1 from Matrix) for all areas, namely that all structures to have flood compatible building components below or at the 1%AEP flood level plus freeboard. These will be required as part of the proposed development application according to the DCP requirements. Flood compatible materials are stated in Appendix B of the DCP.

Structural Soundness require category (2 from Matrix) for all areas which require that the Applicant to demonstrate that any structure can withstand the forces of floodwater, debris & buoyancy up to & including a 1% AEP flood plus freeboard, PMF plus freeboard if required to satisfy evacuation criteria. No such structural analysis assessment has been undertaken in the current study.

Flood Affectation category (1 from Matrix) requires the assessment flooding to ensure adverse impacts are within acceptable levels elsewhere and includes medium and high density residential proposals. (Refer to maps of changes in flood level, and changes in flow velocities).

When assessing flood affectation, the following is required:

- *For loss of net storage of floodwaters compensatory cut to fill earthworks in the floodplain may be a means to ensure no net loss of flood water storage*
- *Flood levels and velocities*

Evacuation require reliable access or refuge during a 1%AEP flood event (1 from Matrix). Also required for Commercial and Industrial areas (4 from Matrix) are that the development to be consistent with any relevant flood evacuation strategy or flood plan.

Management and Design (2,3,5 from Matrix). These include:

- Note 2 - *Site Emergency Response Flood plan* required (except for single dwelling houses) where floor levels are below the *flood planning level*.
- Note 3 - *Applicant to demonstrate that area is available to store goods above the 1% AEP flood level plus freeboard.*
- Note 5 - *No external storage of materials below the Flood Planning Level (FPL) which may cause pollution or be potentially hazardous during any flood.*

Appendix B – Flood Maps

Figure ID	Result mapped	Scenario	Blockage
Figure B-1	PMF Peak Flood Level and Depth	Existing	Zero Blockage
Figure B-2	PMF Peak Flood Velocity	Existing	Zero Blockage
Figure B-3	PMF Peak Flood Velocity x Depth	Existing	Zero Blockage
Figure B-4	PMF Peak Flood Hazard	Existing	Zero Blockage
Figure B-5	PMF Hydraulic Categories	Existing	Zero Blockage
Figure B-6	1% AEP+Climate Change Peak Flood Level and Depth	Existing	Zero Blockage
Figure B-7	1% AEP+Climate Change Peak Flood Velocity	Existing	Zero Blockage
Figure B-8	1% AEP+Climate Change Peak Flood Velocity x Depth	Existing	Zero Blockage
Figure B-9	1% AEP+Climate Change Peak Flood Hazard	Existing	Zero Blockage
Figure B-10	1% AEP Peak Peak Flood Level and Depth	Existing	Zero Blockage
Figure B-11	1% AEP Peak Flood Velocity	Existing	Zero Blockage
Figure B-12	1% AEP Peak Flood Velocity x Depth	Existing	Zero Blockage
Figure B-13	1% AEP Peak Flood Hazard	Existing	Zero Blockage
Figure B-14	1% AEP Hydraulic Categories	Existing	Zero Blockage
Figure B-15	20 % AEP Peak Flood Level and Depth	Existing	Zero Blockage
Figure B-16	20 % AEP Peak Flood Velocity	Existing	Zero Blockage
Figure B-17	20 % AEP Peak Flood Velocity x Depth	Existing	Zero Blockage
Figure B-18	20 % AEP Peak Flood Hazard	Existing	Zero Blockage
Figure B-19	PMF Peak Flood Level and Depth	Developed	Zero Blockage
Figure B-20	PMF Peak Flood Velocity	Developed	Zero Blockage
Figure B-21	PMF Peak Flood Velocity x Depth	Developed	Zero Blockage
Figure B-22	PMF Peak Flood Hazard	Developed	Zero Blockage
Figure B-23	PMF Hydraulic Categories	Developed	Zero Blockage
Figure B-24	1% AEP+Climate Change Peak Flood Level and Depth	Developed	Zero Blockage
Figure B-25	1% AEP+Climate Change Peak Flood Velocity	Developed	Zero Blockage
Figure B-26	1% AEP+Climate Change Peak Flood Velocity x Depth	Developed	Zero Blockage
Figure B-27	1% AEP+Climate Change Peak Flood Hazard	Developed	Zero Blockage
Figure B-28	1% AEP Peak Peak Flood Level and Depth	Developed	Zero Blockage
Figure B-29	1% AEP Peak Flood Velocity	Developed	Zero Blockage
Figure B-30	1% AEP Peak Flood Velocity x Depth	Developed	Zero Blockage
Figure B-31	1% AEP Peak Flood Hazard	Developed	Zero Blockage
Figure B-32	1% AEP Hydraulic Categories	Developed	Zero Blockage
Figure B-33	20 % AEP Peak Flood Level and Depth	Developed	Zero Blockage
Figure B-34	20 % AEP Peak Flood Velocity	Developed	Zero Blockage
Figure B-35	20 % AEP Peak Flood Velocity x Depth	Developed	Zero Blockage
Figure B-36	20 % AEP Peak Flood Hazard	Developed	Zero Blockage
Figure B-37	PMF Peak Flood Level and Depth	Existing	Design Blockage
Figure B-38	PMF Peak Flood Velocity	Existing	Design Blockage
Figure B-39	PMF Peak Flood Velocity x Depth	Existing	Design Blockage
Figure B-40	PMF Peak Flood Hazard	Existing	Design Blockage
Figure B-41	PMF Hydraulic Categories	Existing	Design Blockage
Figure B-42	1% AEP+Climate Change Peak Flood Level and Depth	Existing	Design Blockage
Figure B-43	1% AEP+Climate Change Peak Flood Velocity	Existing	Design Blockage
Figure B-44	1% AEP+Climate Change Peak Flood Velocity x Depth	Existing	Design Blockage
Figure B-45	1% AEP+Climate Change Peak Flood Hazard	Existing	Design Blockage
Figure B-46	1% AEP Peak Peak Flood Level and Depth	Existing	Design Blockage
Figure B-47	1% AEP Peak Flood Velocity	Existing	Design Blockage
Figure B-48	1% AEP Peak Flood Velocity x Depth	Existing	Design Blockage

Figure ID	Result mapped	Scenario	Blockage
Figure B-49	1% AEP Peak Flood Hazard	Existing	Design Blockage
Figure B-50	1% AEP Hydraulic Categories	Existing	Design Blockage
Figure B-51	20 % AEP Peak Flood Level and Depth	Existing	Design Blockage
Figure B-52	20 % AEP Peak Flood Velocity	Existing	Design Blockage
Figure B-53	20 % AEP Peak Flood Velocity x Depth	Existing	Design Blockage
Figure B-54	20 % AEP Peak Flood Hazard	Existing	Design Blockage
Figure B-55	PMF Peak Flood Level and Depth	Existing	Risk Blockage
Figure B-56	PMF Peak Flood Velocity	Existing	Risk Blockage
Figure B-57	PMF Peak Flood Velocity x Depth	Existing	Risk Blockage
Figure B-58	PMF Peak Flood Hazard	Existing	Risk Blockage
Figure B-59	PMF Hydraulic Categories	Existing	Risk Blockage
Figure B-60	1% AEP+Climate Change Peak Flood Level and Depth	Existing	Risk Blockage
Figure B-61	1% AEP+Climate Change Peak Flood Velocity	Existing	Risk Blockage
Figure B-62	1% AEP+Climate Change Peak Flood Velocity x Depth	Existing	Risk Blockage
Figure B-63	1% AEP+Climate Change Peak Flood Hazard	Existing	Risk Blockage
Figure B-64	1% AEP Peak Peak Flood Level and Depth	Existing	Risk Blockage
Figure B-65	1% AEP Peak Flood Velocity	Existing	Risk Blockage
Figure B-66	1% AEP Peak Flood Velocity x Depth	Existing	Risk Blockage
Figure B-67	1% AEP Peak Flood Hazard	Existing	Risk Blockage
Figure B-68	1% AEP Hydraulic Categories	Existing	Risk Blockage
Figure B-69	20 % AEP Peak Flood Level and Depth	Existing	Risk Blockage
Figure B-70	20 % AEP Peak Flood Velocity	Existing	Risk Blockage
Figure B-71	20 % AEP Peak Flood Velocity x Depth	Existing	Risk Blockage
Figure B-72	20 % AEP Peak Flood Hazard	Existing	Risk Blockage
Figure B-73	PMF Peak Flood Level	Impact	Zero Blockage
Figure B-74	1% AEP+Climate Change Peak Flood Level	Impact	Zero Blockage
Figure B-75	1% AEP Peak Flood Level	Impact	Zero Blockage
Figure B-76	20 % AEP Peak Flood Level	Impact	Zero Blockage
Figure B-77	PMF Peak Flood Level Impact	Impact	Design Blockage
Figure B-78	1% AEP+Climate Change Peak Flood Level	Impact	Design Blockage
Figure B-79	1% AEP Peak Flood Level	Impact	Design Blockage
Figure B-80	20 % AEP Peak Flood Level	Impact	Design Blockage
Figure B-81	PMF Peak Flood Level	Impact	Risk Blockage
Figure B-82	1% AEP+Climate Change Peak Flood Level	Impact	Risk Blockage
Figure B-83	1% AEP Peak Flood Level	Impact	Risk Blockage
Figure B-84	20 % AEP Peak Flood Level	Impact	Risk Blockage

aurecon

Legend

- Site Boundary
- Cadaster
- Peak Flood Level (m AHD)

Peak Flood Depth (m)

Band 1

- <= 0.05
- 0.05 - 0.10
- 0.10 - 0.30
- 0.30 - 0.50
- 0.50 - 1.00
- > 1.00

Notes:

* For Information Only
* Hyrology ARR1987
* Hdraulics TUFLOW Classic Version 2018-03-AD

Workspace: C:\Users\Abhishek.Darekar\OneDrive - Aurecon Group\Flooding\05_Figures\240222_Reportfigures\Mapping 3\Mapping\240222_Dragons_Mapping_Backup.qgz

0 100 200 m

A3 Scale: 1:2,600

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Figure B-1: PMF Peak Flood Level and Depth - Existing Condition - Zero Blockage

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Legend

- Site Boundary
- Cadaster

Peak Flood Velocity (m/s)

Band 1

- <= 0.25
- 0.25 - 0.5
- 0.5 - 0.75
- 0.75 - 1
- 1 - 1.5
- 1.5 - 1.75
- > 1.75

Notes:

* For Information Only
* Hyrology ARR1987
* Hdraulics TUFLOW Classic Version 2018-03-AD

Workspace: C:\Users\Abhishek.Darekar\OneDrive - Aurecon Group\Flooding\05_Figures\240222_Reportfigures\Mapping 3\Mapping\240222_Dragons_Mapping_Backup.qgz

0 100 200 m

A3 Scale: 1:2,600

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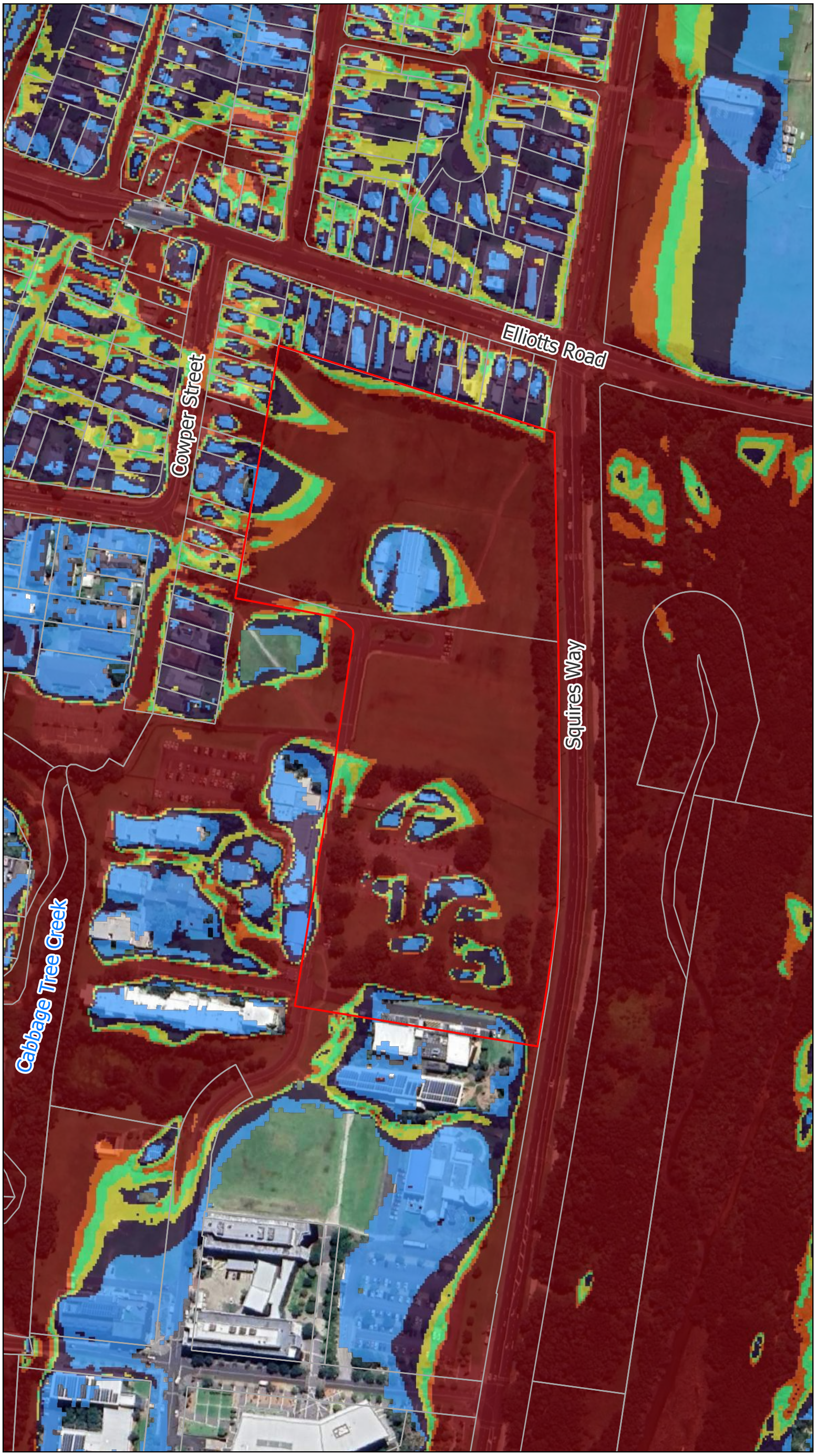
Figure B-2: PMF Peak Flood Velocity - Existing Condition - Zero Blockage



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Legend

- Site Boundary
- Cadaster

Peak Flood Vel x Depth (m2/s)
Band 1

- <= 0.05
- 0.05 - 0.15
- 0.15 - 0.20
- 0.20 - 0.25
- 0.25 - 0.30
- > 0.30

Notes:

* For Information Only
* Hyrology ARR1987
* Hdraulics TUFLOW Classic Version 2018-03-AD

Workspace: C:\Users\Abhishek.Darekar\OneDrive - Aurecon Group\Flooding\05_Figures\240222_Reportfigures\Mapping 3\Mapping\240222_Dragons_Mapping_Backup.qgz

0 100 200 m

A3 Scale: 1:2,600

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Figure B-3: PMF Peak Flood Velocity x Depth - Existing Condition - Zero Blockage

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Legend

- Site Boundary
- Cadaster

Peak Flood Hazard Classification Band 1

- H1
- H2
- H3
- H4
- H5
- H6

Notes:

* For Information Only
* Hyrology ARR1987
* Hdraulics TUFLOW Classic Version 2018-03-AD

Workspace: C:\Users\Abhishek.Darekar\OneDrive - Aurecon Group\Flooding\05_Figures\240222_Reportfigures\Mapping 3\Mapping\240222_Dragons_Mapping_Backup.qgz

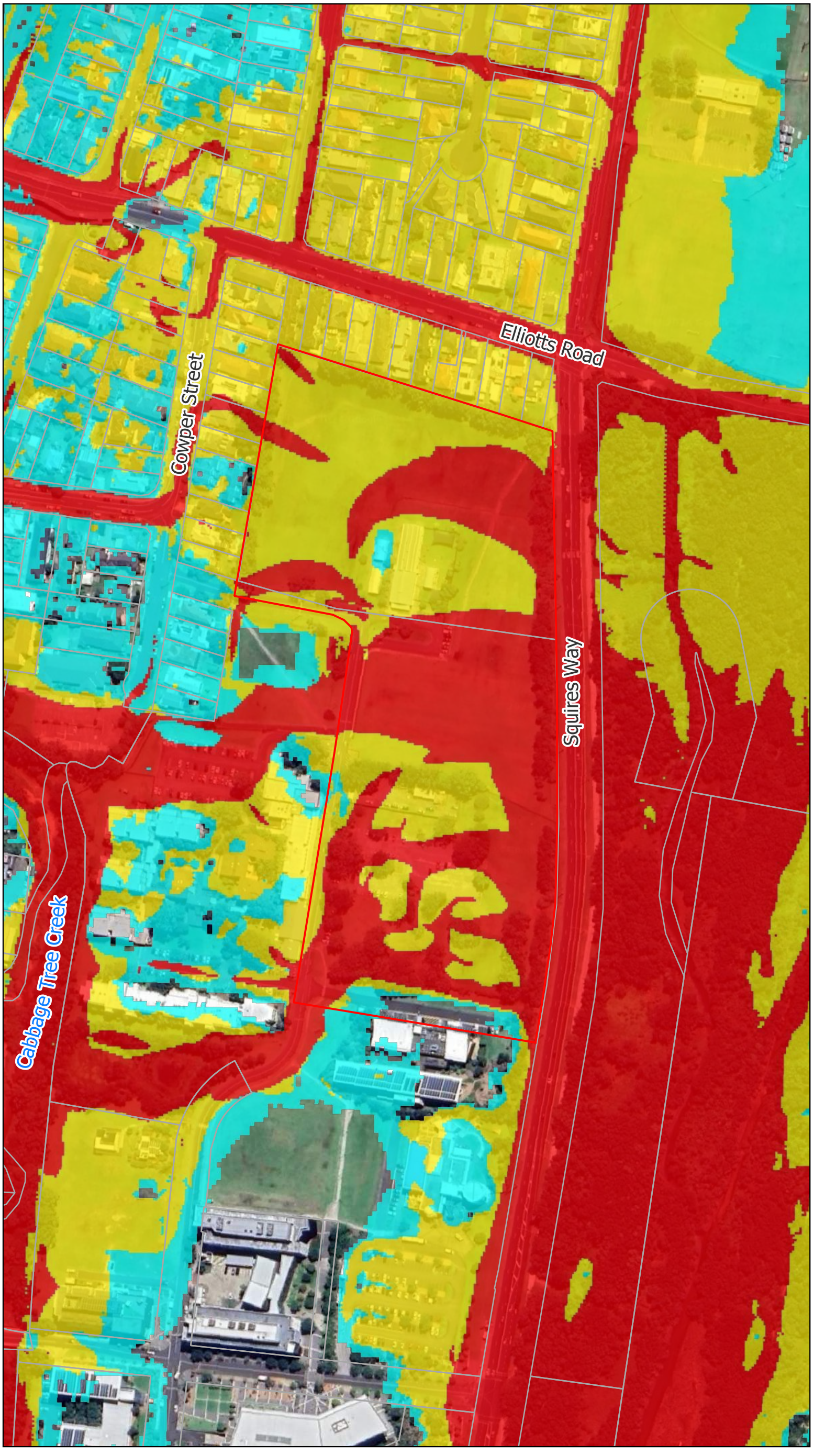
0 100 200 m

A3 Scale: 1:2,600

St George Illawarra Dragons Community & High Performance Centre

24/2/2024 GDA94 / MGA zone 56

Figure B-4: PMF Peak Flood Hazard - Existing Condition - Zero Blockage



aurecon

Legend

- Site Boundary
- Cadaster

Hydraulic Categories
Band 1
- Floodway
- Flood Storage
- Flood Fringe

Notes:

* For Information Only
* Hyrology ARR1987
* Hdraulics TUFLOW Classic Version 2018-03-AD

Workspace: C:\Users\Abhishek.Darekar\OneDrive - Aurecon Group\Flooding\05_Figures\240222_Reportfigures\Mapping 3\Mapping\240222_Dragons_Mapping_Backup.qgz

0 100 200 m

A3 Scale: 1:2,600

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Figure B-5: PMF Hydraulic Categories - Existing Condition - Zero Blockage

aurecon

Legend

- Site Boundary
- Cadaster
- Peak Flood Level (m AHD)

Peak Flood Depth (m)

Band 1

- <= 0.05
- 0.05 - 0.10
- 0.10 - 0.30
- 0.30 - 0.50
- 0.50 - 1.00
- > 1.00

Notes:

* For Information Only
* Hyrology ARR1987
* Hdraulics TUFLOW Classic Version 2018-03-AD

Workspace: C:\Users\Abhishek.Darekar\OneDrive - Aurecon Group\Flooding\05_Figures\240222_Reportfigures\Mapping 3\Mapping\240222_Dragons_Mapping_Backup.qgz

0 100 200 m

A3 Scale: 1:2,600

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Figure B-6: 1% AEP+Climate Change Peak Flood Level and Depth - Existing Condition - Zero Blockage

aurecon

Legend

- Site Boundary
- Cadaster

Peak Flood Velocity (m/s)

Band 1

- <= 0.25
- 0.25 - 0.5
- 0.5 - 0.75
- 0.75 - 1
- 1 - 1.5
- 1.5 - 1.75
- > 1.75

Notes:

* For Information Only
* Hyrology ARR1987
* Hdraulics TUFLOW Classic Version 2018-03-AD

Workspace: C:\Users\Abhishek.Darekar\OneDrive - Aurecon Group\Flooding\05_Figures\240222_Reportfigures\Mapping 3\Mapping\240222_Dragons_Mapping_Backup.qgz

0 100 200 m

A3 Scale: 1:2,600

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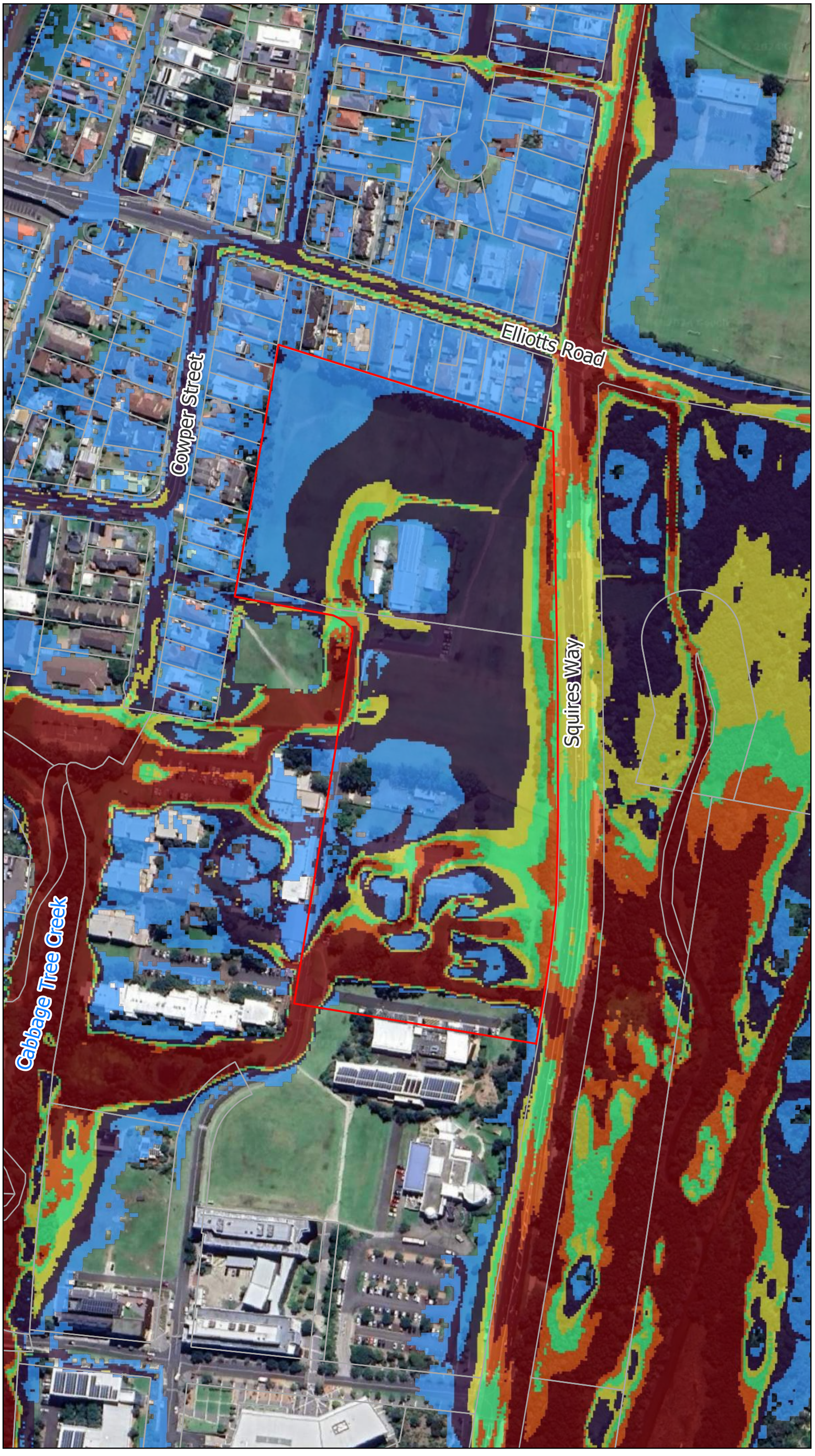
Figure B-7: 1% AEP+Climate Change Peak Flood Velocity - Existing Condition - Zero Blockage



aurecon

Legend

- Site Boundary
- Cadaster

Peak Flood Vel x Depth (m2/s)
Band 1

- <= 0.05
- 0.05 - 0.15
- 0.15 - 0.20
- 0.20 - 0.25
- 0.25 - 0.30
- > 0.30

Notes:

* For Information Only
* Hyrology ARR1987
* Hdraulics TUFLOW Classic Version 2018-03-AD

Workspace: C:\Users\Abhishek.Darekar\OneDrive - Aurecon Group\Flooding\05_Figures\240222_Reportfigures\Mapping 3\Mapping\240222_Dragons_Mapping_Backup.qgz

0 100 200 m

A3 Scale: 1:2,600

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Figure B-8: 1% AEP+Climate Change Peak Flood Velocity x Depth - Existing Condition - Zero Blockage

aurecon

Legend

- Site Boundary
- Cadaster

Peak Flood Hazard Classification Band 1

- H1
- H2
- H3
- H4
- H5
- H6

Notes:

* For Information Only
* Hyrology ARR1987
* Hdraulics TUFLOW Classic Version 2018-03-AD

Workspace: C:\Users\Abhishek.Darekar\OneDrive - Aurecon Group\Flooding\05_Figures\240222_Reportfigures\Mapping 3\Mapping\240222_Dragons_Mapping_Backup.qgz

0 100 200 m

A3 Scale: 1:2,600

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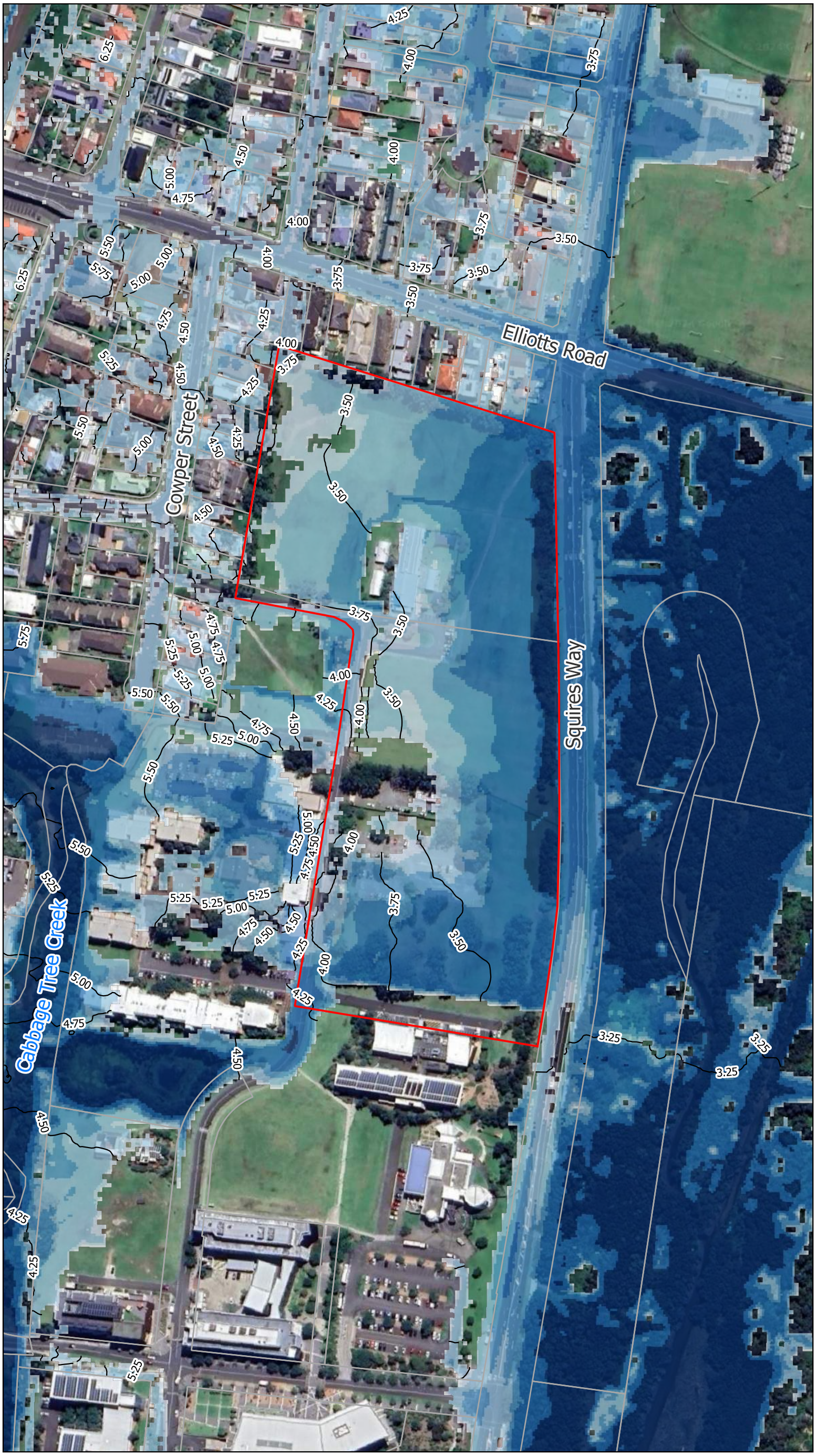
Figure B-9: 1% AEP+Climate Change Peak Flood Hazard - Existing Condition - Zero Blockage

aurecon



Legend

- Site Boundary
- Cadaster
- Peak Flood Level (m AHD)

Peak Flood Depth (m)

Band 1

- <= 0.05
- 0.05 - 0.10
- 0.10 - 0.30
- 0.30 - 0.50
- 0.50 - 1.00
- > 1.00

Notes:

* For Information Only
* Hyrology ARR1987
* Hdraulics TUFLOW Classic Version 2018-03-AD

Workspace: C:\Users\Abhishek.Darekar\OneDrive - Aurecon Group\Flooding\05_Figures\240222_Reportfigures\Mapping 3\Mapping\240222_Dragons_Mapping_Backup.qgz

0 100 200 m

A3 Scale: 1:2,600

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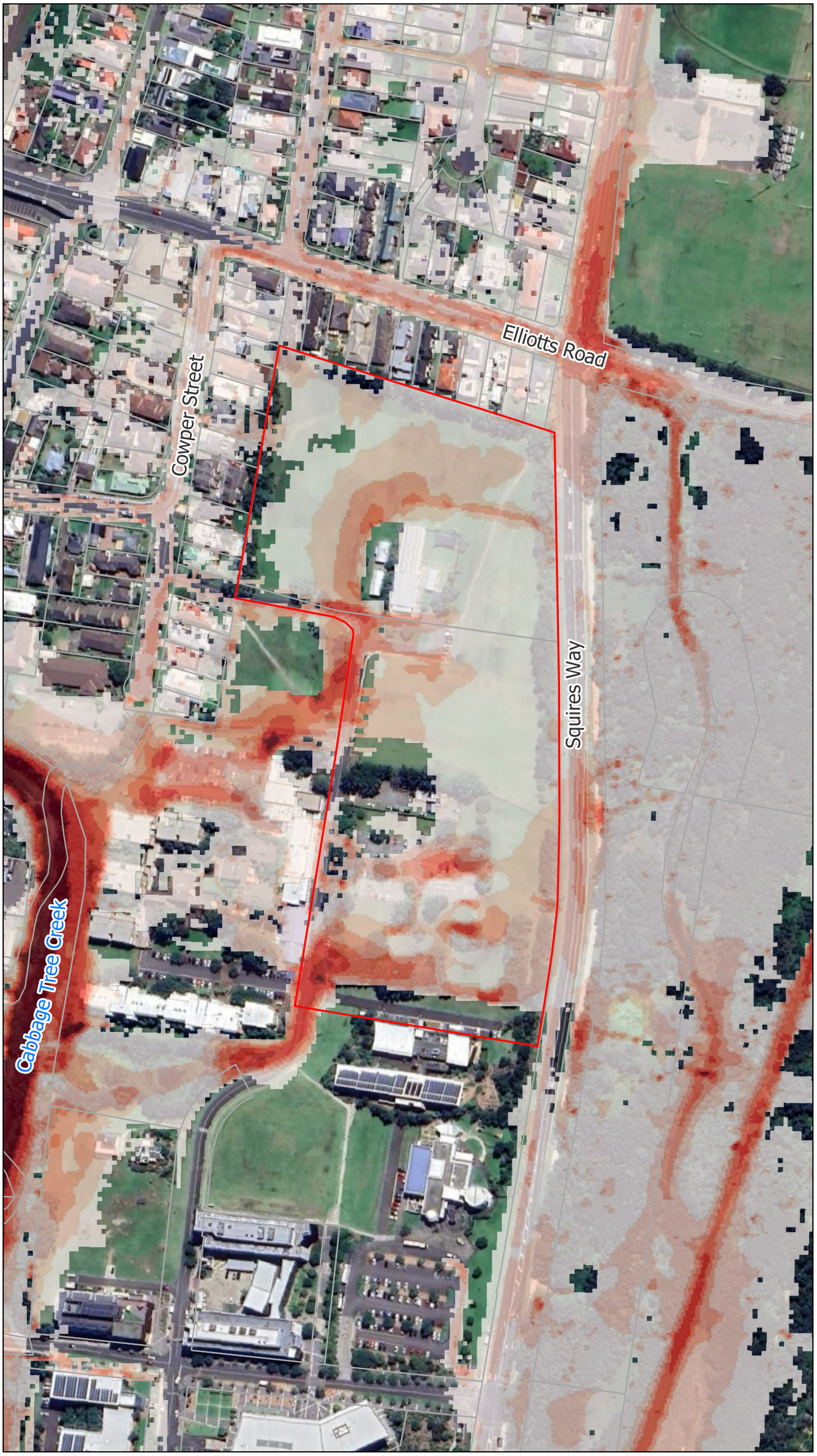
Figure B-10: 1% AEP Peak Peak Flood Level and Depth - Existing Condition - Zero Blockage



aurecon

Legend

- Site Boundary
- Cadaster

Peak Flood Velocity (m/s)

Band 1

- <= 0.25
- 0.25 - 0.5
- 0.5 - 0.75
- 0.75 - 1
- 1 - 1.5
- 1.5 - 1.75
- > 1.75

Notes:

* For Information Only
* Hyrology ARR1987
* Hdraulics TUFLOW Classic Version 2018-03-AD

Workspace: C:\Users\Abhishek.Darekar\OneDrive - Aurecon Group\Flooding\05_Figures\240222_Reportfigures\Mapping 3\Mapping\240222_Dragons_Mapping_Backup.qgz

0 100 200 m

A3 Scale: 1:2,600

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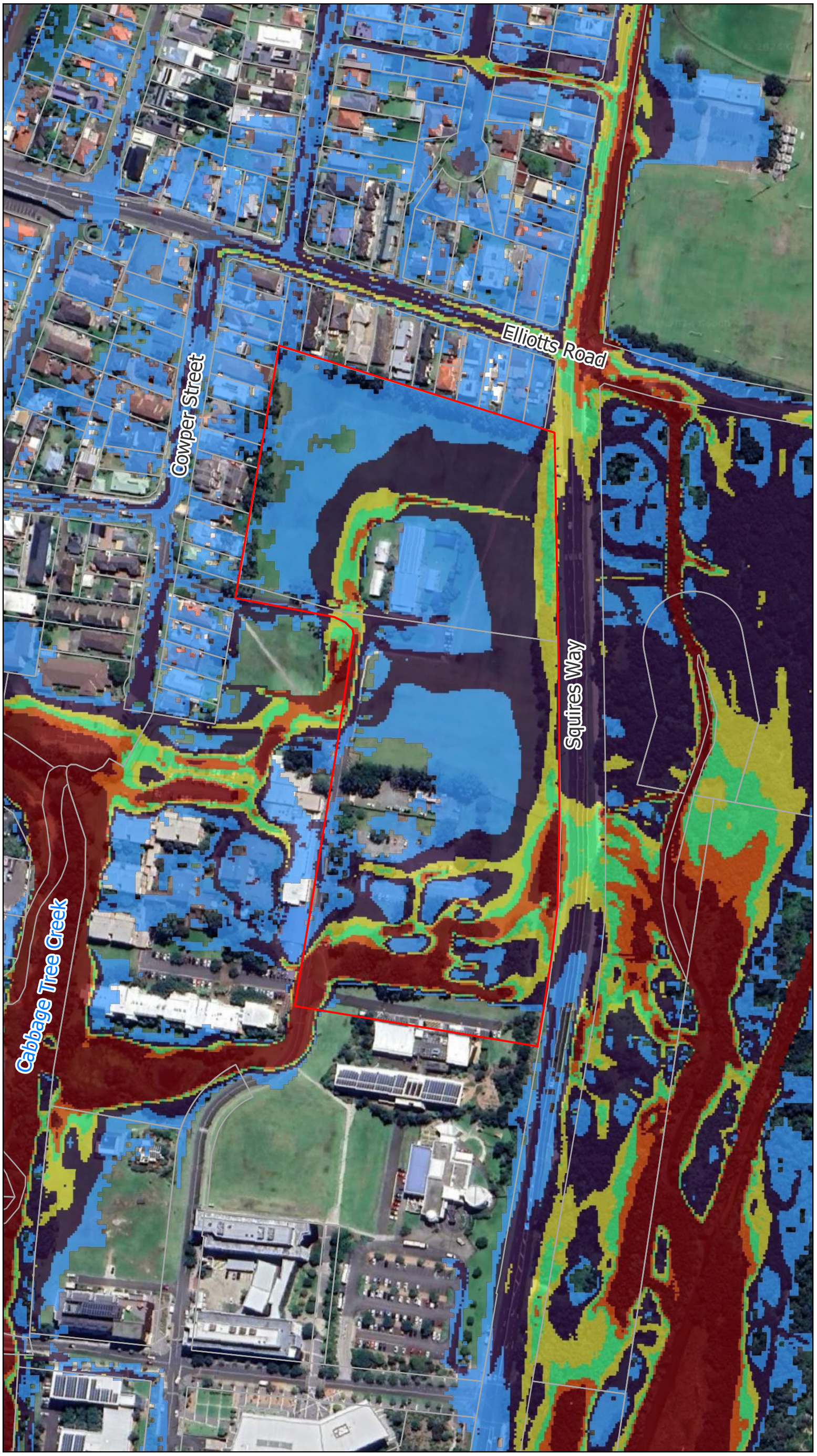
Figure B-11: 1% AEP Peak Flood Velocity - Existing Condition - Zero Blockage



aurecon

Legend

- Site Boundary
- Cadaster

Peak Flood Vel x Depth (m2/s)
Band 1

- <= 0.05
- 0.05 - 0.15
- 0.15 - 0.20
- 0.20 - 0.25
- 0.25 - 0.30
- > 0.30

Notes:

* For Information Only
* Hyrology ARR1987
* Hdraulics TUFLOW Classic Version 2018-03-AD

Workspace: C:\Users\Abhishek.Darekar\OneDrive - Aurecon Group\Flooding\05_Figures\240222_Reportfigures\Mapping 3\Mapping\240222_Dragons_Mapping_Backup.qgz

0 100 200 m

A3 Scale: 1:2,600

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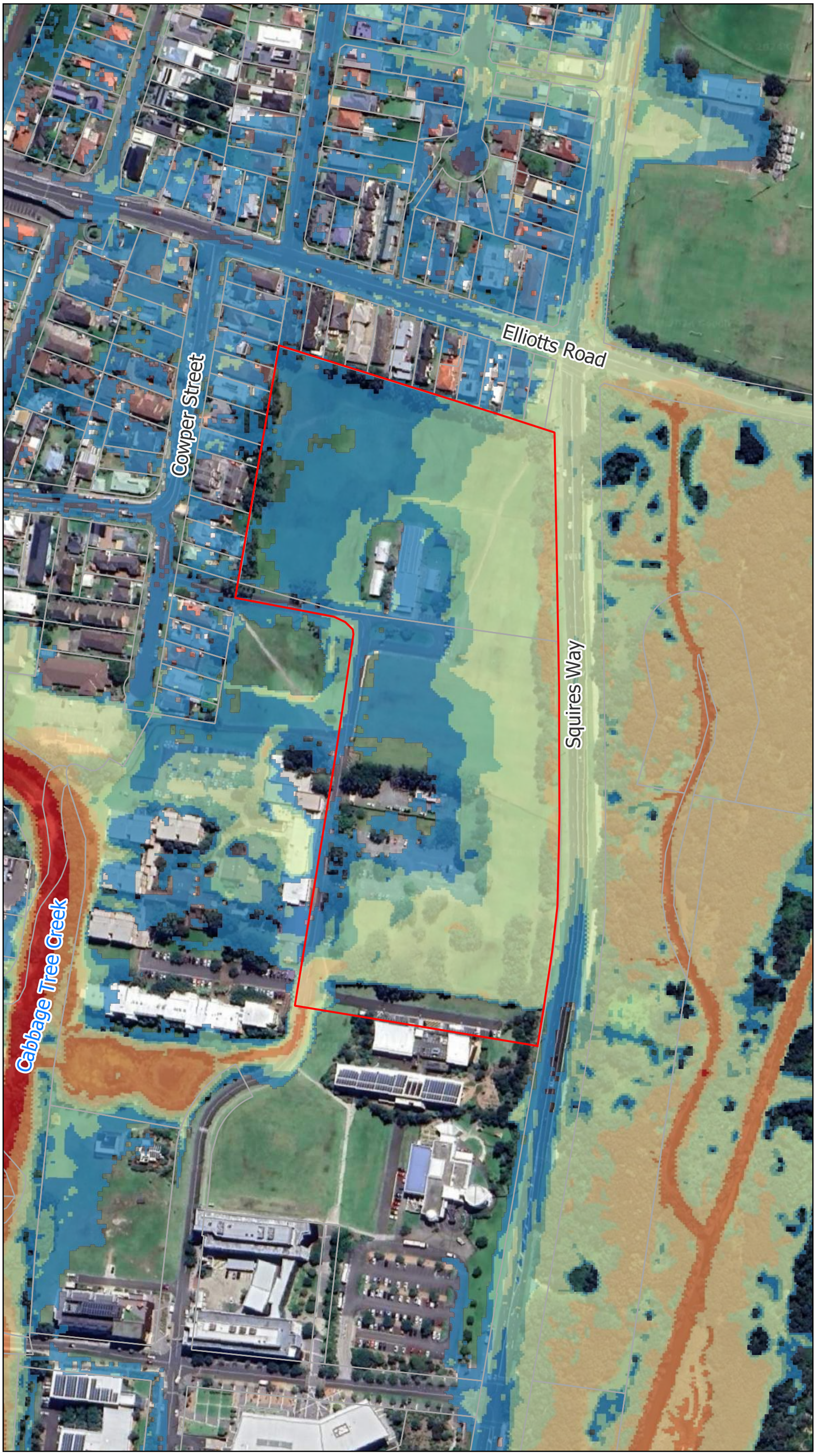
Figure B-12: 1% AEP Peak Flood Velocity x Depth - Existing Condition - Zero Blockage



aurecon

Legend

- Site Boundary
- Cadaster

Peak Flood Hazard Classification Band 1

- H1
- H2
- H3
- H4
- H5
- H6

Notes:

* For Information Only
* Hyrology ARR1987
* Hdraulics TUFLOW Classic Version 2018-03-AD

Workspace: C:\Users\Abhishek.Darekar\OneDrive - Aurecon Group\Flooding\05_Figures\240222_Reportfigures\Mapping 3\Mapping\240222_Dragons_Mapping_Backup.qgz

0 100 200 m

A3 Scale: 1:2,600

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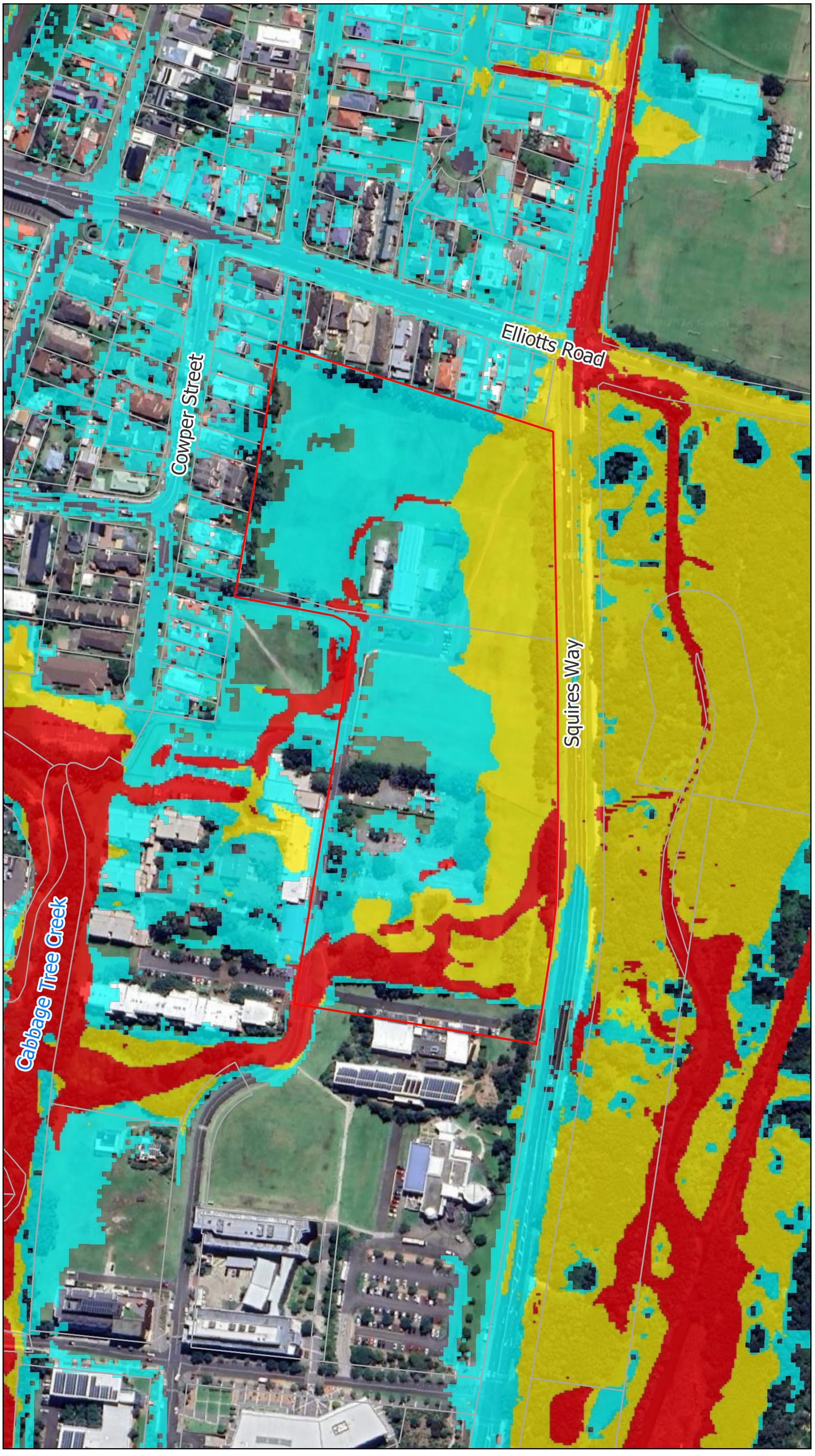
Figure B-13: 1% AEP Peak Flood Hazard - Existing Condition - Zero Blockage



aurecon

Legend

- Site Boundary
- Cadaster

Hydraulic Categories
Band 1

- Floodway
- Flood Storage
- Flood Fringe

Notes:

* For Information Only
* Hyrology ARR1987
* Hdraulics TUFLOW Classic Version 2018-03-AD

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0 100 200 m

A3 Scale: 1:2,600

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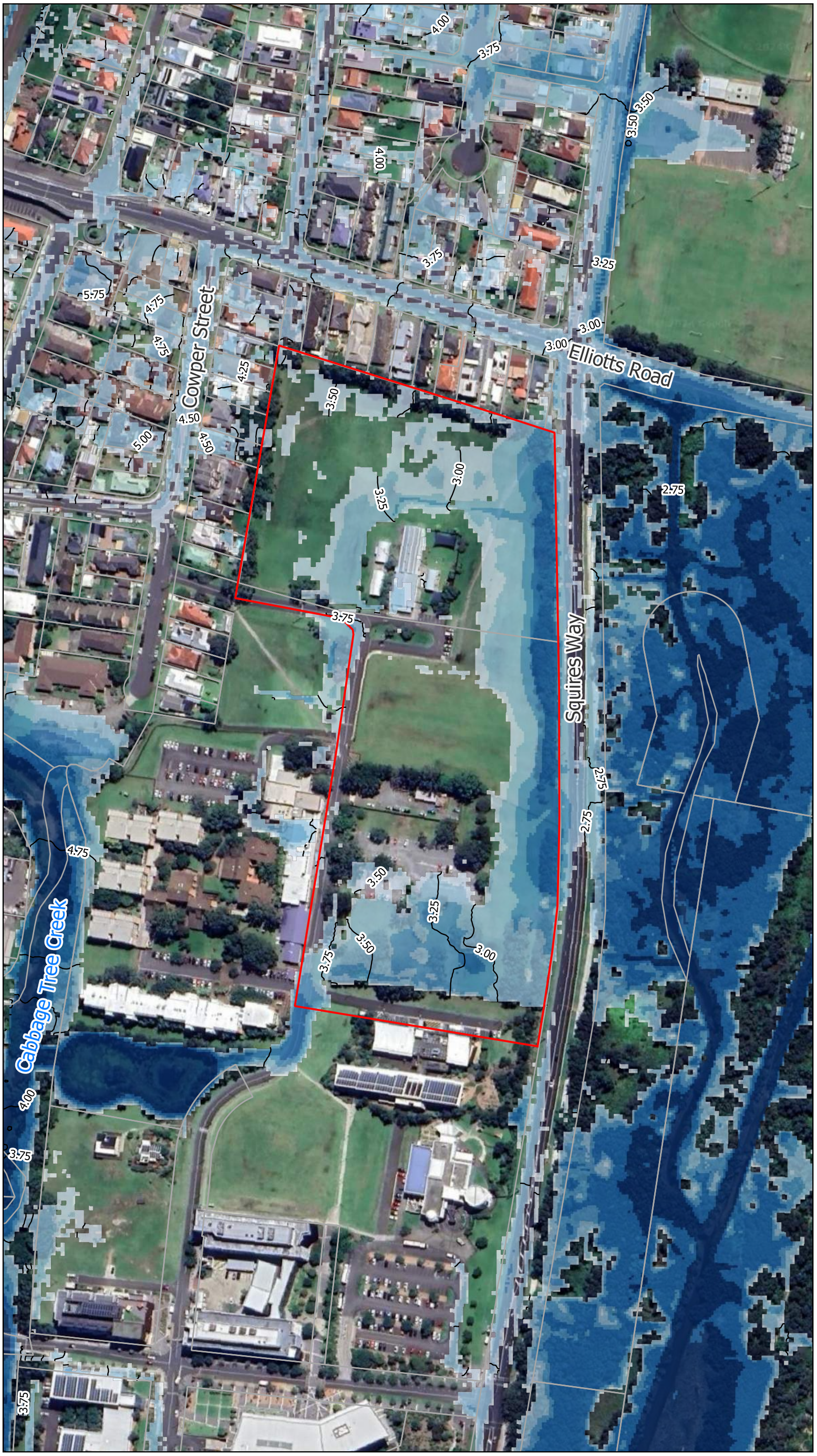
Figure B-14: 1% AEP Hydraulic Categories - Existing Condition - Zero Blockage



aurecon

Legend

- Site Boundary
- Cadaster
- Peak Flood Level (m AHD)

Peak Flood Depth (m)

Band 1

- <= 0.05
- 0.05 - 0.10
- 0.10 - 0.30
- 0.30 - 0.50
- 0.50 - 1.00
- > 1.00

Notes:

* For Information Only
* Hyrology ARR1987
* Hdraulics TUFLOW Classic Version 2018-03-AD

Workspace: C:\Users\Abhishek.Darekar\OneDrive - Aurecon Group\Flooding\05_Figures\240222_Reportfigures\Mapping 3\Mapping\240222_Dragons_Mapping_Backup.qgz

0 100 200 m

A3 Scale: 1:2,600

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Figure B-15: 20 % AEP Peak Flood Level and Depth - Existing Condition - Zero Blockage

aurecon

Legend

- Site Boundary
- Cadaster

Peak Flood Velocity (m/s)

Band 1

- <= 0.25
- 0.25 - 0.5
- 0.5 - 0.75
- 0.75 - 1
- 1 - 1.5
- 1.5 - 1.75
- > 1.75

Notes:

* For Information Only
* Hyrology ARR1987
* Hdraulics TUFLOW Classic Version 2018-03-AD

Workspace: C:\Users\Abhishek.Darekar\OneDrive - Aurecon Group\Flooding\05_Figures\240222_Reportfigures\Mapping 3\Mapping\240222_Dragons_Mapping_Backup.qgz

0 100 200 m

A3 Scale: 1:2,600

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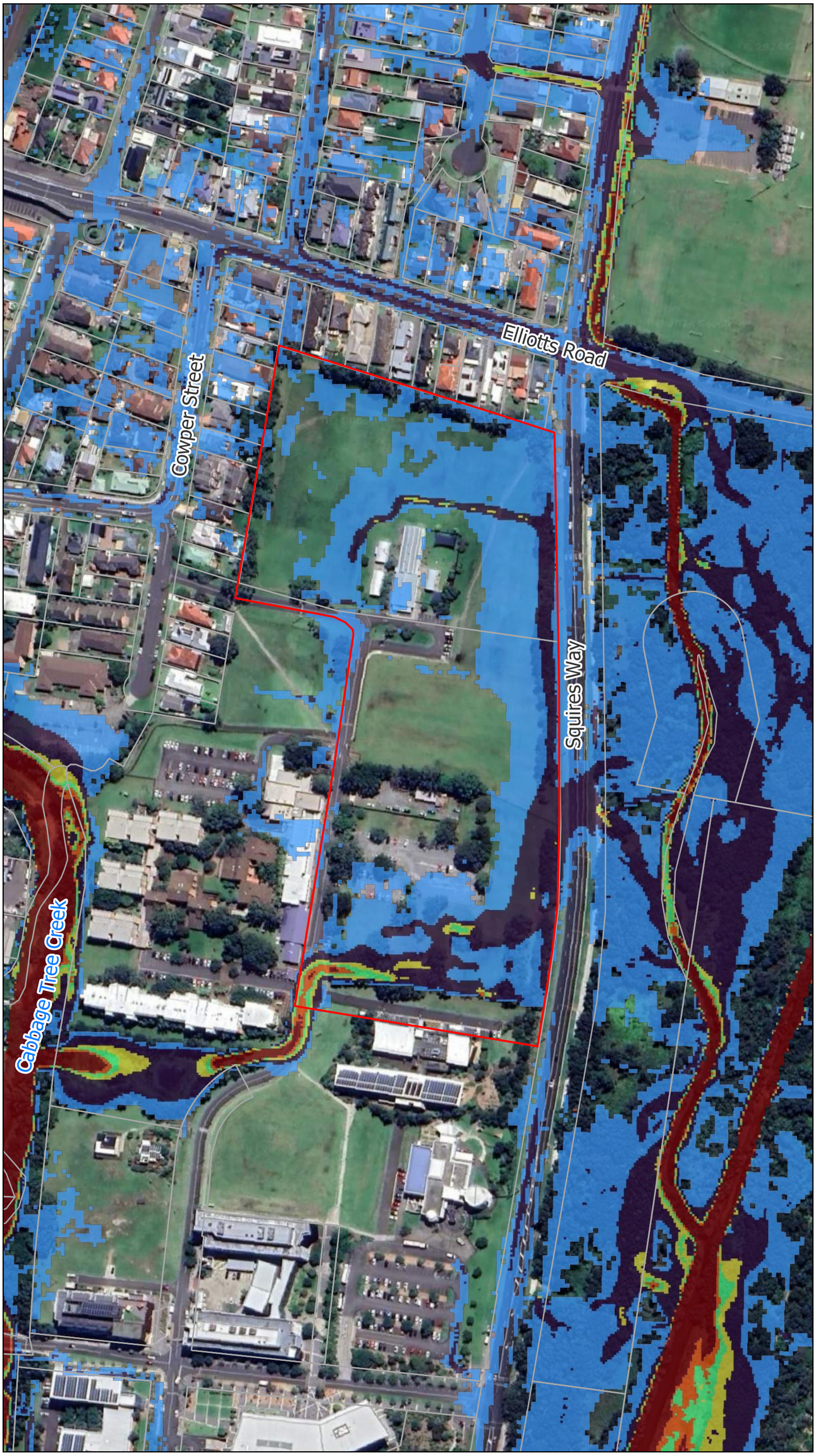
Figure B-16: 20 % AEP Peak Flood Velocity - Existing Condition - Zero Blockage



aurecon

Legend

- Site Boundary
- Cadaster

Peak Flood Vel x Depth (m2/s)
Band 1

- <= 0.05
- 0.05 - 0.15
- 0.15 - 0.20
- 0.20 - 0.25
- 0.25 - 0.30
- > 0.30

Notes:

* For Information Only
* Hyrology ARR1987
* Hdraulics TUFLOW Classic Version 2018-03-AD

Workspace: C:\Users\Abhishek.Darekar\OneDrive - Aurecon Group\Flooding\05_Figures\240222_Reportfigures\Mapping 3\Mapping\240222_Dragons_Mapping_Backup.qgz

0 100 200 m

A3 Scale: 1:2,600

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Figure B-17: 20 % AEP Peak Flood Velocity x Depth - Existing Condition - Zero Blockage

aurecon

Legend

- Site Boundary
- Cadaster

Peak Flood Hazard Classification Band 1

- H1
- H2
- H3
- H4
- H5
- H6

Notes:

* For Information Only
* Hyrology ARR1987
* Hdraulics TUFLOW Classic Version 2018-03-AD

0 100 200 m

A3 Scale: 1:2,600

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Figure B-18: 20 % AEP Peak Flood Hazard - Existing Condition - Zero Blockage

Workspace: C:\Users\Abhishek.Darekar\OneDrive - Aurecon Group\Flooding\05_Figures\240222_Dragons_Mapping_Backup.qgz

Workspace: C:\Users\Abhishek.Darekar\OneDrive - Aurecon Group\Flooding\05_Figures\240222_Reportfigures\Mapping 3\Mapping\240222_Dragons_Mapping_Backup.qgz

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Figure B-19: PMF Peak Flood Level and Depth - Developed Condition - Zero Blockage

aurecon

Legend

- Site Boundary
- Cadaster
- Design Lines

Peak Flood Velocity (m/s)

Band 1

- <= 0.25
- 0.25 - 0.5
- 0.5 - 0.75
- 0.75 - 1
- 1 - 1.5
- 1.5 - 1.75
- > 1.75

Notes:

* For Information Only
* Hyrology ARR1987
* Hdraulics TUFLOW Classic Version 2018-03-AD

Workspace: C:\Users\Abhishek.Darekar\OneDrive - Aurecon Group\Flooding\05_Figures\240222_Reportfigures\Mapping 3\Mapping\240222_Dragons_Mapping_Backup.qgz

0 100 200 m

A3 Scale: 1:2,600

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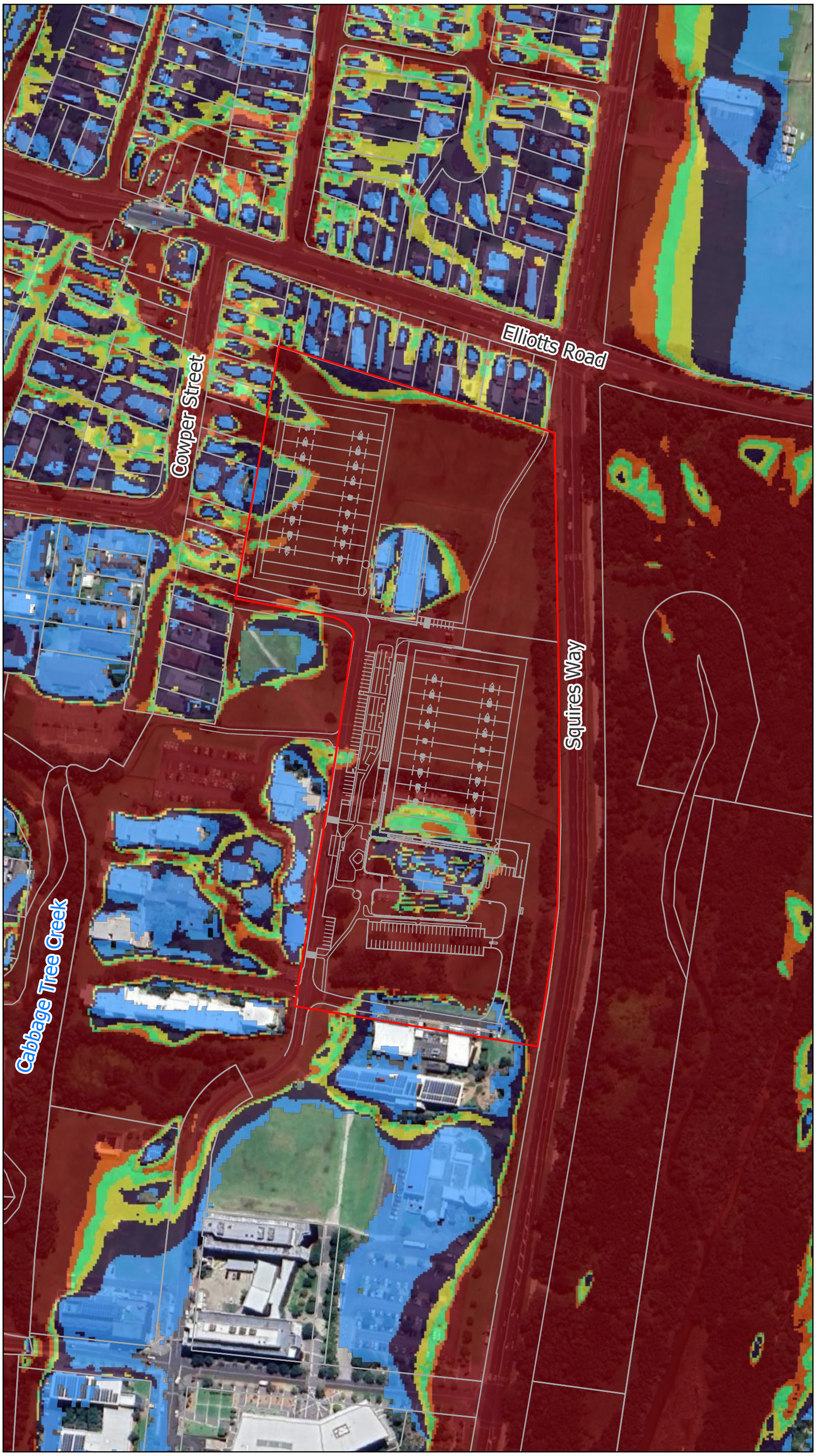
Figure B-20: PMF Peak Flood Velocity - Developed Condition - Zero Blockage



aurecon

Legend

- Site Boundary
- Cadaster
- Design Lines

Peak Flood Vel x Depth (m2/s)
Band 1

- <= 0.05
- 0.05 - 0.15
- 0.15 - 0.20
- 0.20 - 0.25
- 0.25 - 0.30
- > 0.30

Notes:

* For Information Only
* Hyrology ARR1987
* Hdraulics TUFLOW Classic Version 2018-03-AD

Workspace: C:\Users\Abhishek.Darekar\OneDrive - Aurecon Group\Flooding\05_Figures\240222_Reportfigures\Mapping 3\Mapping\240222_Dragons_Mapping_Backup.qgz

0 100 200 m

A3 Scale: 1:2,600

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Figure B-21: PMF Peak Flood Velocity x Depth - Developed Condition - Zero Blockage

aurecon

Legend

- Site Boundary
- Cadaster
- Design Lines

Peak Flood Hazard Classification
Band 1

- H1
- H2
- H3
- H4
- H5
- H6

Notes:

* For Information Only
* Hyrology ARR1987
* Hdraulics TUFLOW Classic Version 2018-03-AD

Workspace: C:\Users\Abhishek.Darekar\OneDrive - Aurecon Group\Flooding\05_Figures\240222_Reportfigures\Mapping 3\Mapping\240222_Dragons_Mapping_Backup.qgz

0 100 200 m

A3 Scale: 1:2,600

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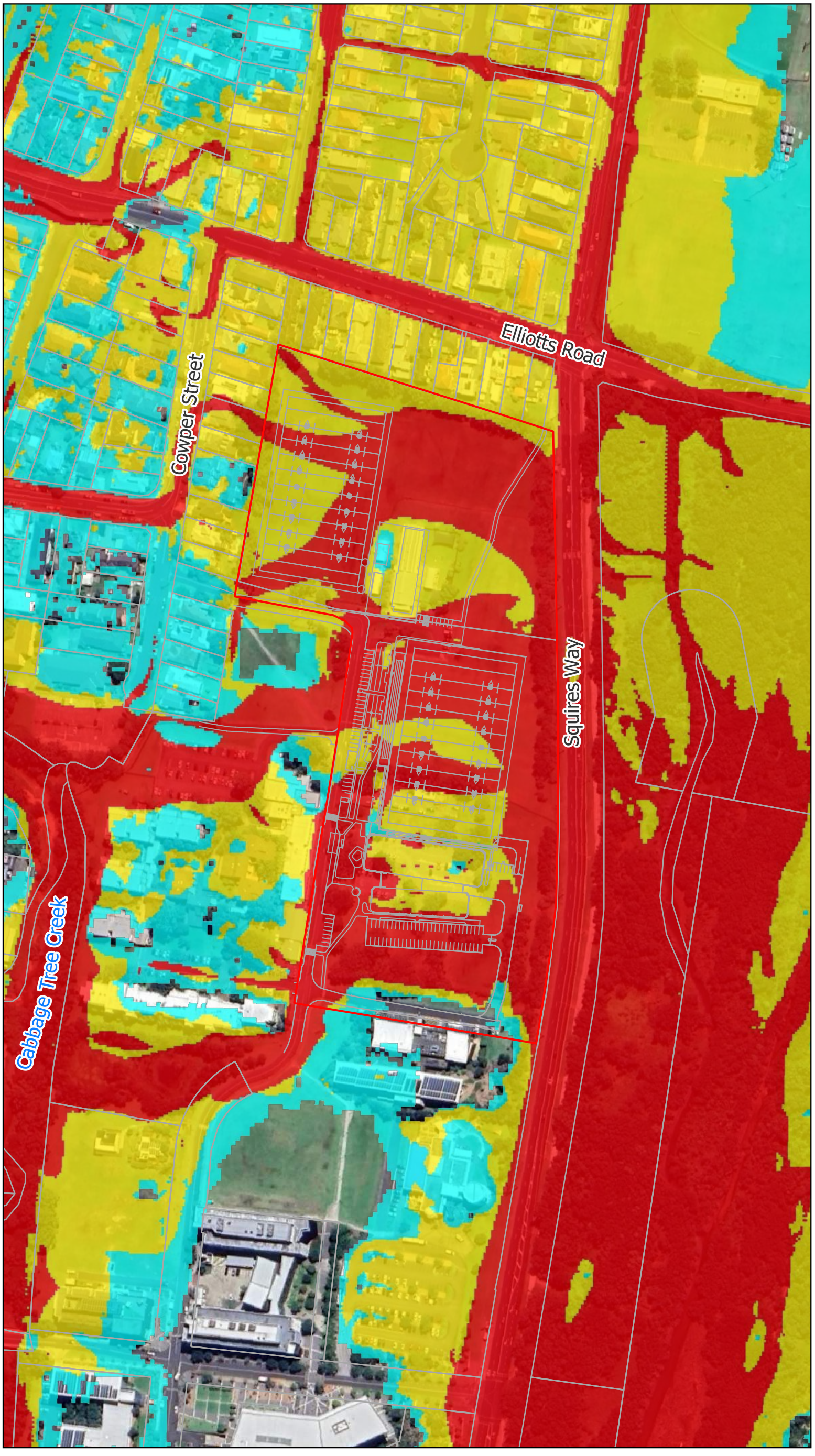
Figure B-22: PMF Peak Flood Hazard - Developed Condition - Zero Blockage



aurecon

Legend

- Site Boundary
- Cadaster
- Design Lines

Hydraulic Categories
Band 1
- Floodway
- Flood Storage
- Flood Fringe

Notes:

* For Information Only
* Hyrology ARR1987
* Hdraulics TUFLOW Classic Version 2018-03-AD

Workspace: C:\Users\Abhishek.Darekar\OneDrive - Aurecon Group\Flooding\05_Figures\240222_Reportfigures\Mapping 3\Mapping\240222_Dragons_Mapping_Backup.qgz

0 100 200 m

A3 Scale: 1:2,600

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Figure B-23: PMF Hydraulic Categories - Developed Condition - Zero Blockage

aurecon

Legend

- Site Boundary
- Cadaster
- Design Lines
- Peak Flood Level (m AHD)

Peak Flood Depth (m)

Band 1

- <= 0.05
- 0.05 - 0.10
- 0.10 - 0.30
- 0.30 - 0.50
- 0.50 - 1.00
- > 1.00

Notes:

* For Information Only
* Hyrology ARR1987
* Hdraulics TUFLOW Classic Version 2018-03-AD

Workspace: C:\Users\Abhishek.Darekar\OneDrive - Aurecon Group\Flooding\05_Figures\240222_Reportfigures\Mapping 3\Mapping\240222_Dragons_Mapping_Backup.qgz

0 100 200 m

A3 Scale: 1:2,600

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Figure B-24: 1% AEP+Climate Change Peak Flood Level and Depth - Developed Condition - Zero Blockage

aurecon

Legend

- Site Boundary
- Cadaster
- Design Lines

Peak Flood Velocity (m/s)

Band 1

- <= 0.25
- 0.25 - 0.5
- 0.5 - 0.75
- 0.75 - 1
- 1 - 1.5
- 1.5 - 1.75
- > 1.75

Notes:

* For Information Only
* Hyrology ARR1987
* Hdraulics TUFLOW Classic Version 2018-03-AD

Workspace: C:\Users\Abhishek.Darekar\OneDrive - Aurecon Group\Flooding\05_Figures\240222_Reportfigures\Mapping 3\Mapping\240222_Dragons_Mapping_Backup.qgz

0 100 200 m

A3 Scale: 1:2,600

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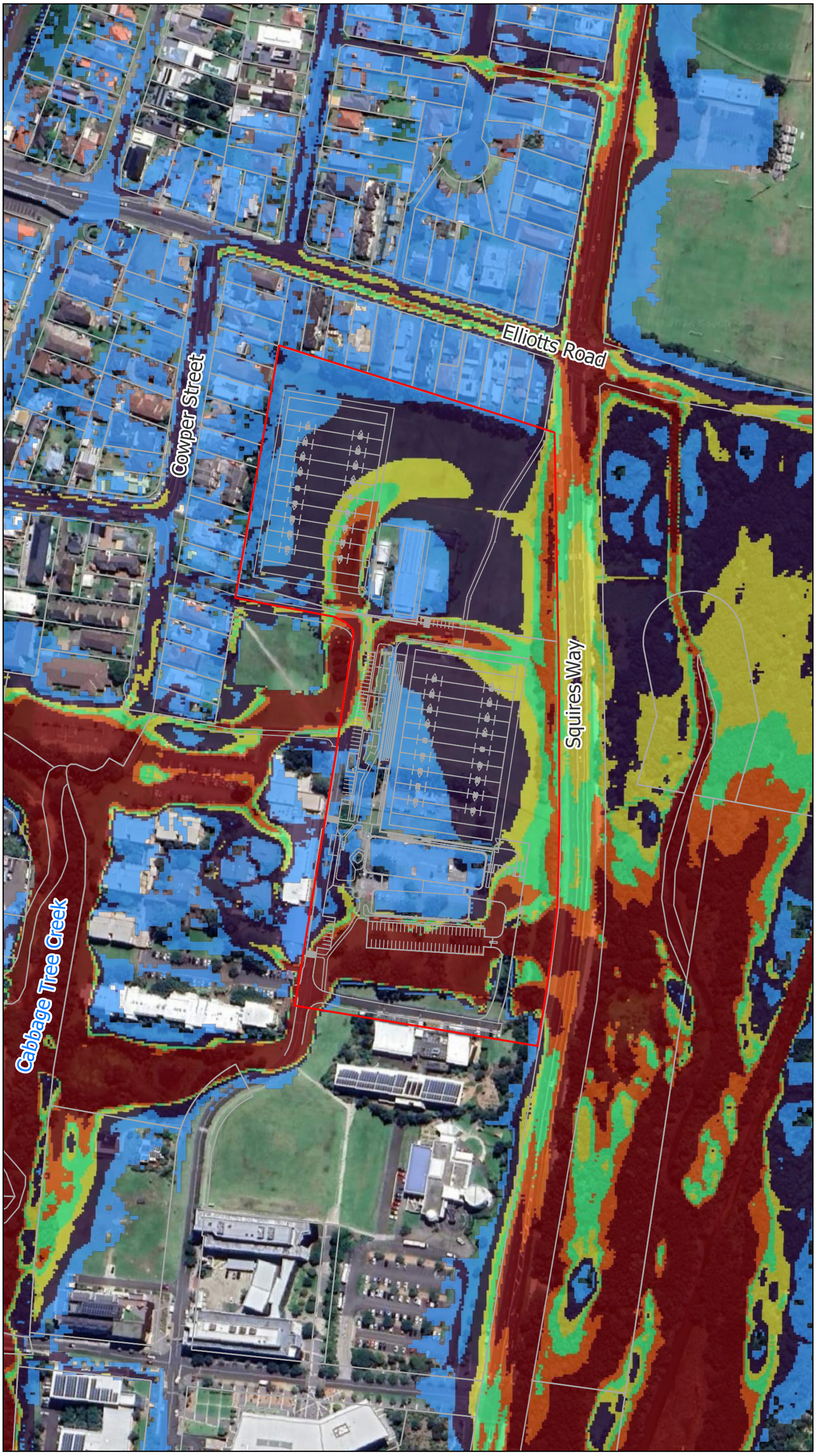
Figure B-25: 1% AEP+Climate Change Peak Flood Velocity - Developed Condition - Zero Blockage



aurecon

Legend

- Site Boundary
- Cadaster
- Design Lines

Peak Flood Vel x Depth (m2/s)
Band 1

- <= 0.05
- 0.05 - 0.15
- 0.15 - 0.20
- 0.20 - 0.25
- 0.25 - 0.30
- > 0.30

Notes:

* For Information Only
* Hyrology ARR1987
* Hdraulics TUFLOW Classic Version 2018-03-AD

Workspace: C:\Users\Abhishek.Darekar\OneDrive - Aurecon Group\Flooding\05_Figures\240222_Reportfigures\Mapping 3\Mapping\240222_Dragons_Mapping_Backup.qgz

0 100 200 m

A3 Scale: 1:2,600

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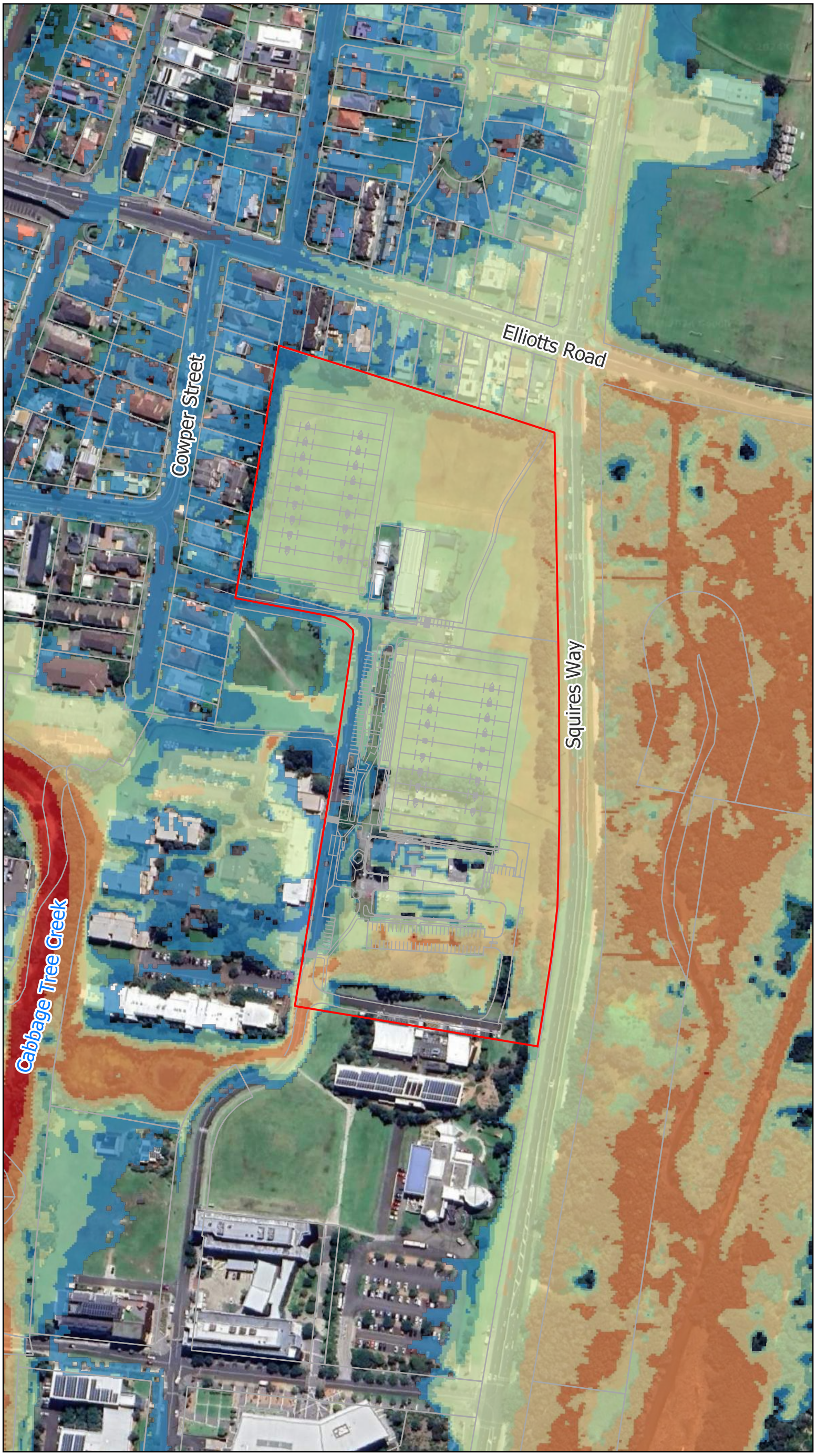
Figure B-26: 1% AEP+Climate Change Peak Flood Velocity x Depth - Developed Condition - Zero Blockage

aurecon



Legend

- Site Boundary
- Cadaster
- Design Lines

Peak Flood Hazard Classification Band 1

- H1
- H2
- H3
- H4
- H5
- H6

Notes:

* For Information Only
* Hyrology ARR1987
* Hdraulics TUFLOW Classic Version 2018-03-AD

Workspace: C:\Users\Abhishek.Darekar\OneDrive - Aurecon Group\Flooding\05_Figures\240222_Reportfigures\Mapping 3\Mapping\240222_Dragons_Mapping_Backup.qgz

0 100 200 m

A3 Scale: 1:2,600

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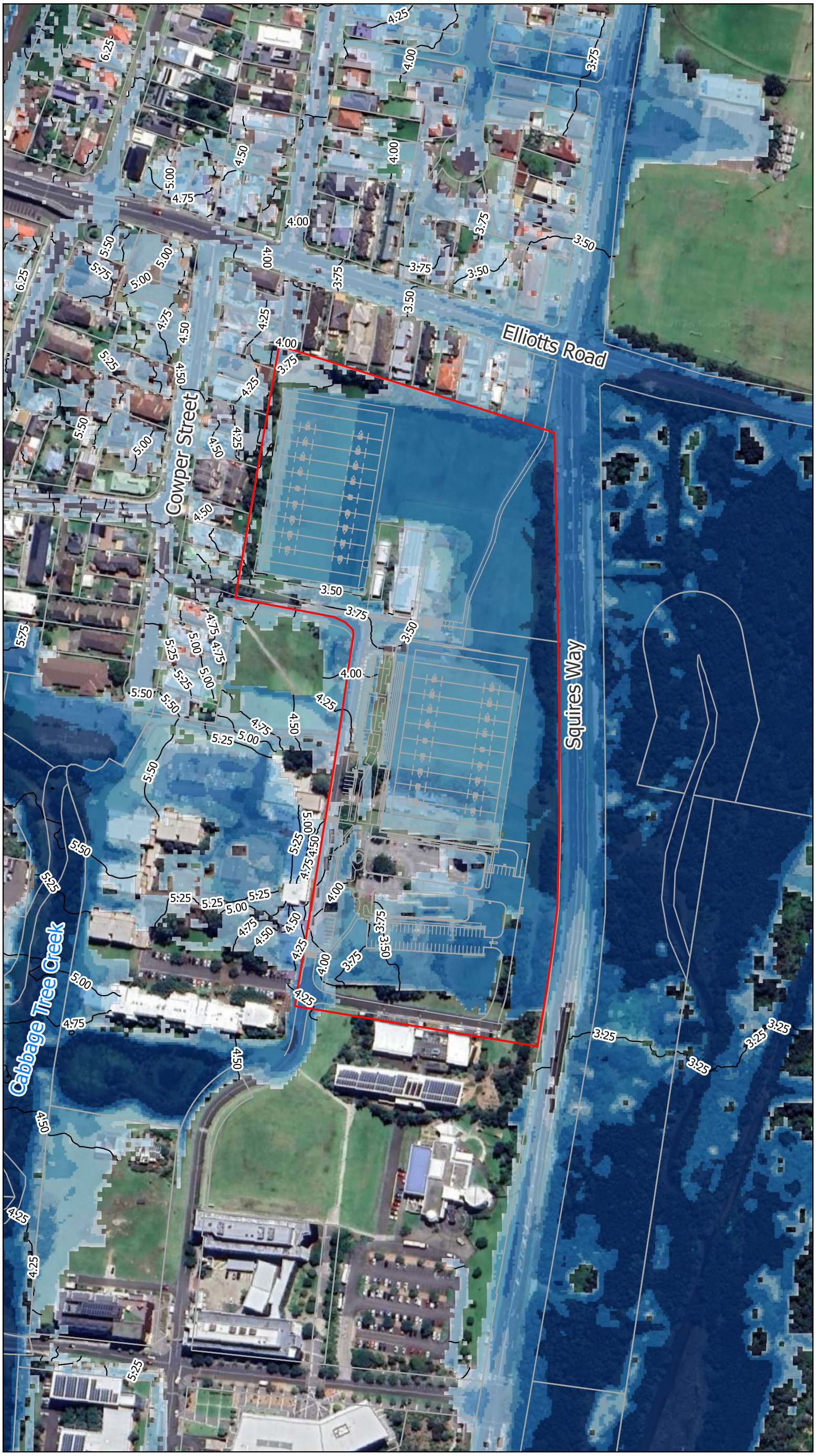
Figure B-27: 1% AEP+Climate Change Peak Flood Hazard - Developed Condition - Zero Blockage



aurecon

Legend

- Site Boundary
- Cadaster
- Design Lines
- Peak Flood Level (m AHD)

Peak Flood Depth (m)

Band 1

- <= 0.05
- 0.05 - 0.10
- 0.10 - 0.30
- 0.30 - 0.50
- 0.50 - 1.00
- > 1.00

Notes:

* For Information Only
* Hyrology ARR1987
* Hdraulics TUFLOW Classic Version 2018-03-AD

Workspace: C:\Users\Abhishek.Darekar\OneDrive - Aurecon Group\Flooding\05_Figures\240222_Reportfigures\Mapping 3\Mapping\240222_Dragons_Mapping_Backup.qgz

0 100 200 m

A3 Scale: 1:2,600

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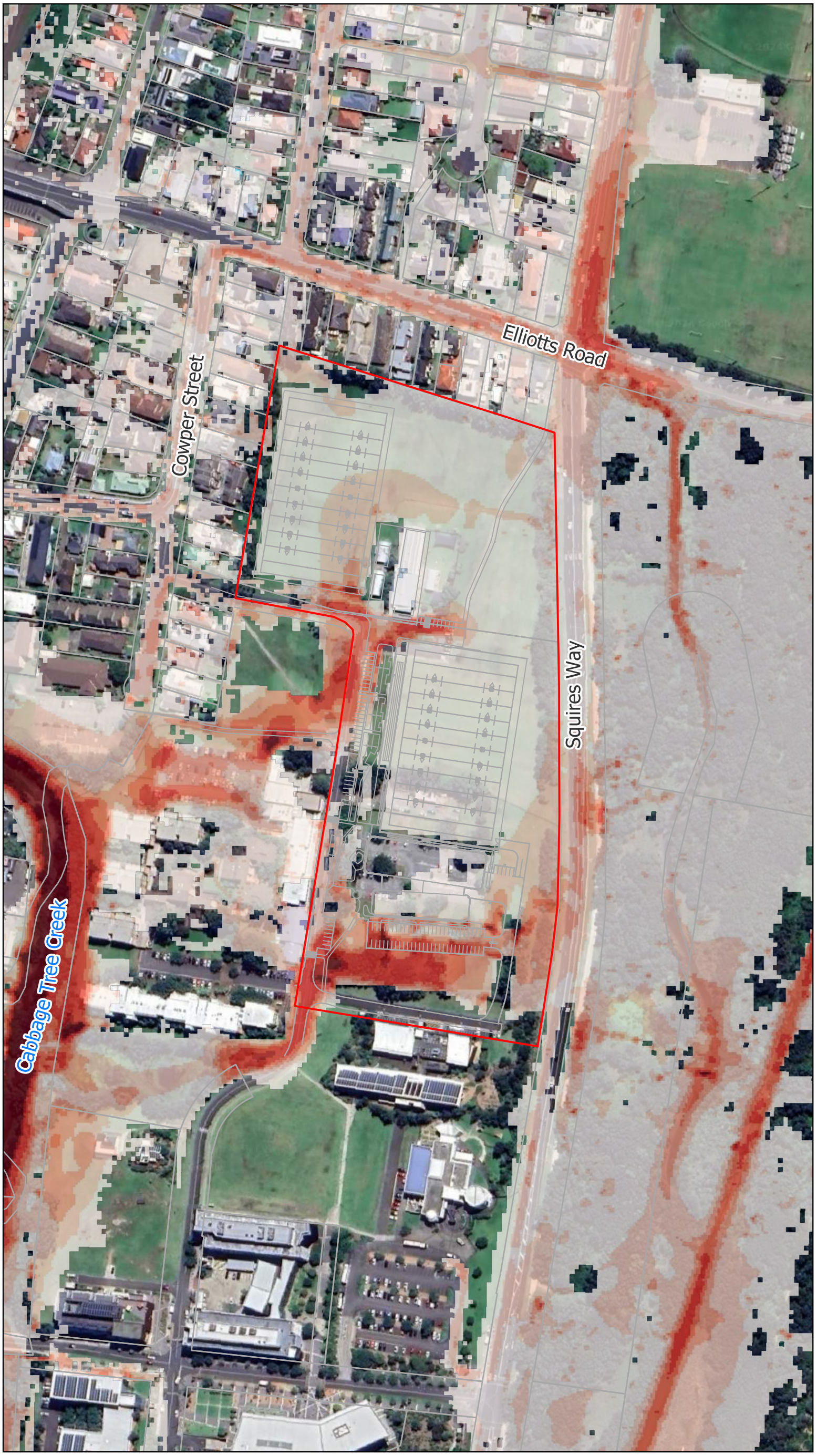
Figure B-28: 1% AEP Peak Peak Flood Level and Depth - Developed Condition - Zero Blockage



aurecon

Legend

- Site Boundary
- Cadaster
- Design Lines

Peak Flood Velocity (m/s)

Band 1

- <= 0.25
- 0.25 - 0.5
- 0.5 - 0.75
- 0.75 - 1
- 1 - 1.5
- 1.5 - 1.75
- > 1.75

Notes:

* For Information Only
* Hyrology ARR1987
* Hdraulics TUFLOW Classic Version 2018-03-AD

Workspace: C:\Users\Abhishek.Darekar\OneDrive - Aurecon Group\Flooding\05_Figures\240222_Reportfigures\Mapping 3\Mapping\240222_Dragons_Mapping_Backup.qgz

0 100 200 m

A3 Scale: 1:2,600

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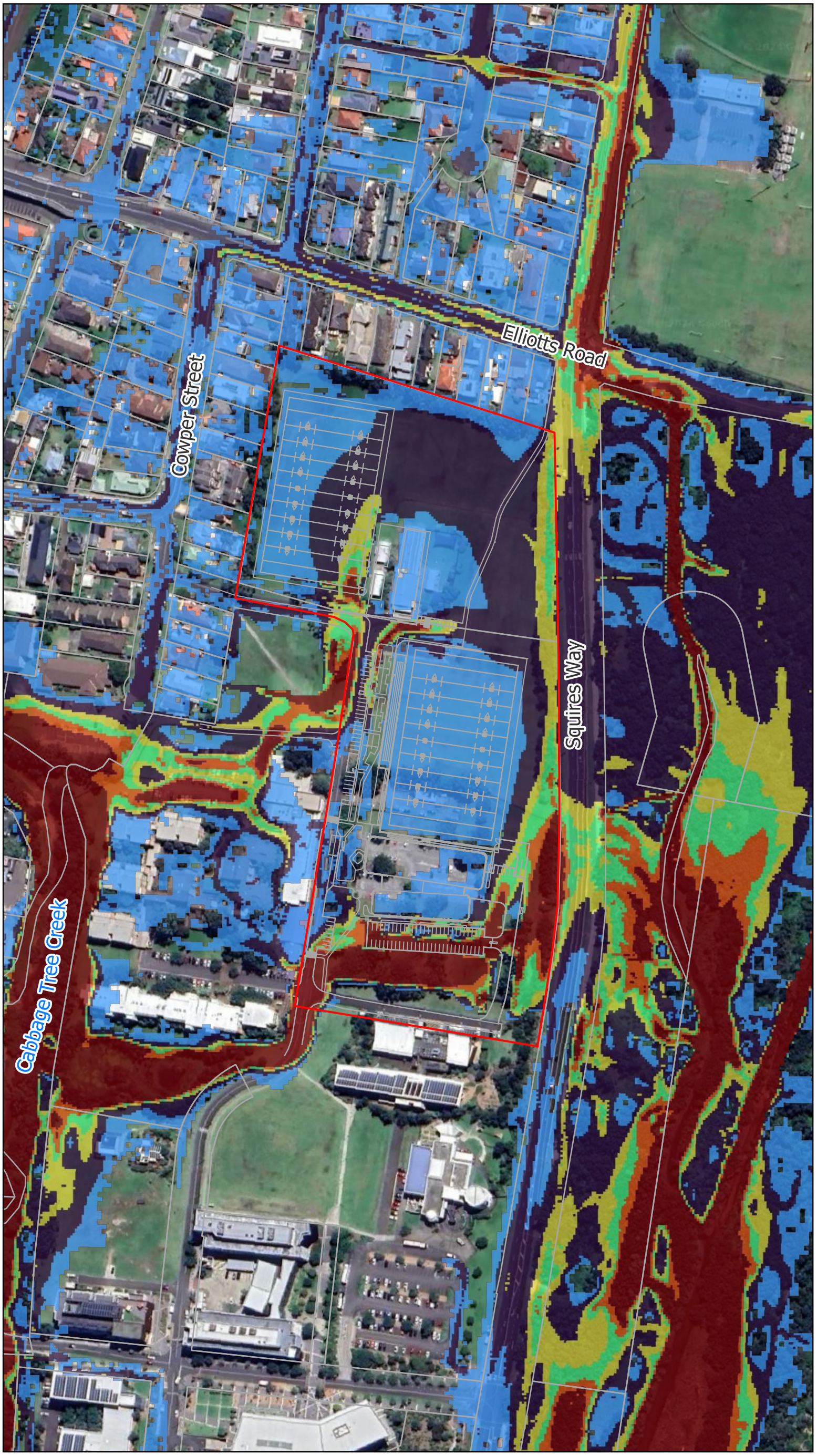
Figure B-29: 1% AEP Peak Flood Velocity - Developed Condition - Zero Blockage



aurecon

Legend

- Site Boundary
- Cadaster
- Design Lines

Peak Flood Vel x Depth (m2/s)
Band 1
- <= 0.05
- 0.05 - 0.15
- 0.15 - 0.20
- 0.20 - 0.25
- 0.25 - 0.30
- > 0.30

Notes:

* For Information Only
* Hyrology ARR1987
* Hdraulics TUFLOW Classic Version 2018-03-AD

Workspace: C:\Users\Abhishek.Darekar\OneDrive - Aurecon Group\Flooding\05_Figures\240222_Reportfigures\Mapping 3\Mapping\240222_Dragons_Mapping_Backup.qgz

0 100 200 m

A3 Scale: 1:2,600

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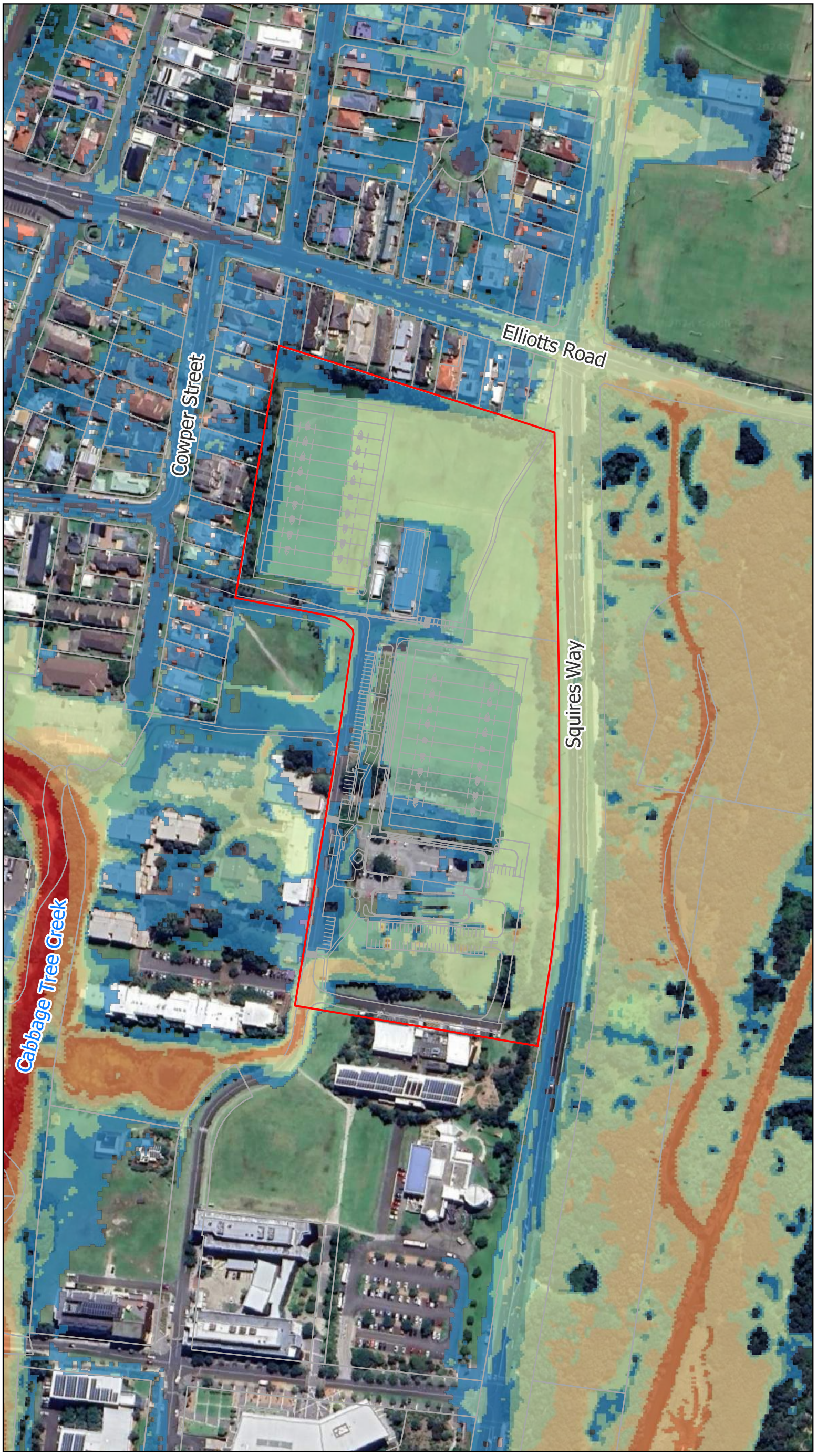
Figure B-30: 1% AEP Peak Flood Velocity x Depth - Developed Condition - Zero Blockage

aurecon



Legend

- Site Boundary
- Cadaster
- Design Lines

Peak Flood Hazard Classification Band 1

- H1
- H2
- H3
- H4
- H5
- H6

Notes:

* For Information Only
* Hyrology ARR1987
* Hdraulics TUFLOW Classic Version 2018-03-AD

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0 100 200 m

A3 Scale: 1:2,600

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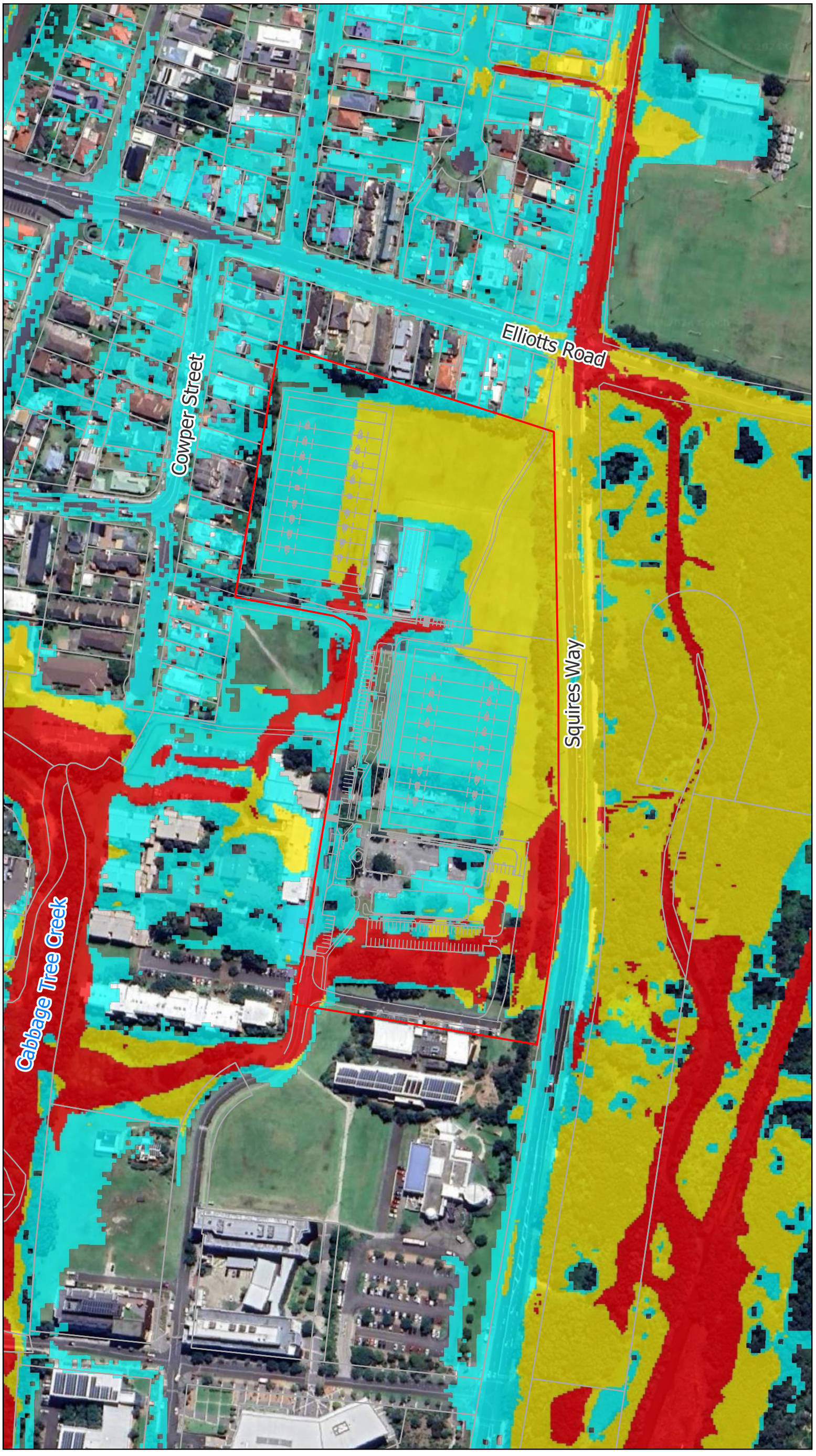
Figure B-31: 1% AEP Peak Flood Hazard - Developed Condition - Zero Blockage



aurecon

Legend

- Site Boundary
- Cadaster
- Design Lines

Hydraulic Categories

Band 1

- Floodway
- Flood Storage
- Flood Fringe

Notes:

* For Information Only
* Hyrology ARR1987
* Hdraulics TUFLOW Classic Version 2018-03-AD

0 100 200 m

A3 Scale: 1:2,600

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Figure B-32: 1% AEP Hydraulic Categories - Developed Condition - Zero Blockage

aurecon

Legend

- Site Boundary
- Cadaster
- Design Lines
- Peak Flood Level (m AHD)

Peak Flood Depth (m)

Band 1

- <= 0.05
- 0.05 - 0.10
- 0.10 - 0.30
- 0.30 - 0.50
- 0.50 - 1.00
- > 1.00

Notes:

* For Information Only
* Hyrology ARR1987
* Hdraulics TUFLOW Classic Version 2018-03-AD

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0 100 200 m

A3 Scale: 1:2,600

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Figure B-33: 20 % AEP Peak Flood Level and Depth - Developed Condition - Zero Blockage

aurecon

Legend

- Site Boundary
- Cadaster
- Design Lines

Peak Flood Velocity (m/s)

Band 1

- <= 0.25
- 0.25 - 0.5
- 0.5 - 0.75
- 0.75 - 1
- 1 - 1.5
- 1.5 - 1.75
- > 1.75

Notes:

* For Information Only
* Hyrology ARR1987
* Hdraulics TUFLOW Classic Version 2018-03-AD

Workspace: C:\Users\Abhishek.Darekar\OneDrive - Aurecon Group\Flooding\05_Figures\240222_Reportfigures\Mapping 3\Mapping\240222_Dragons_Mapping_Backup.qgz

0 100 200 m

A3 Scale: 1:2,600

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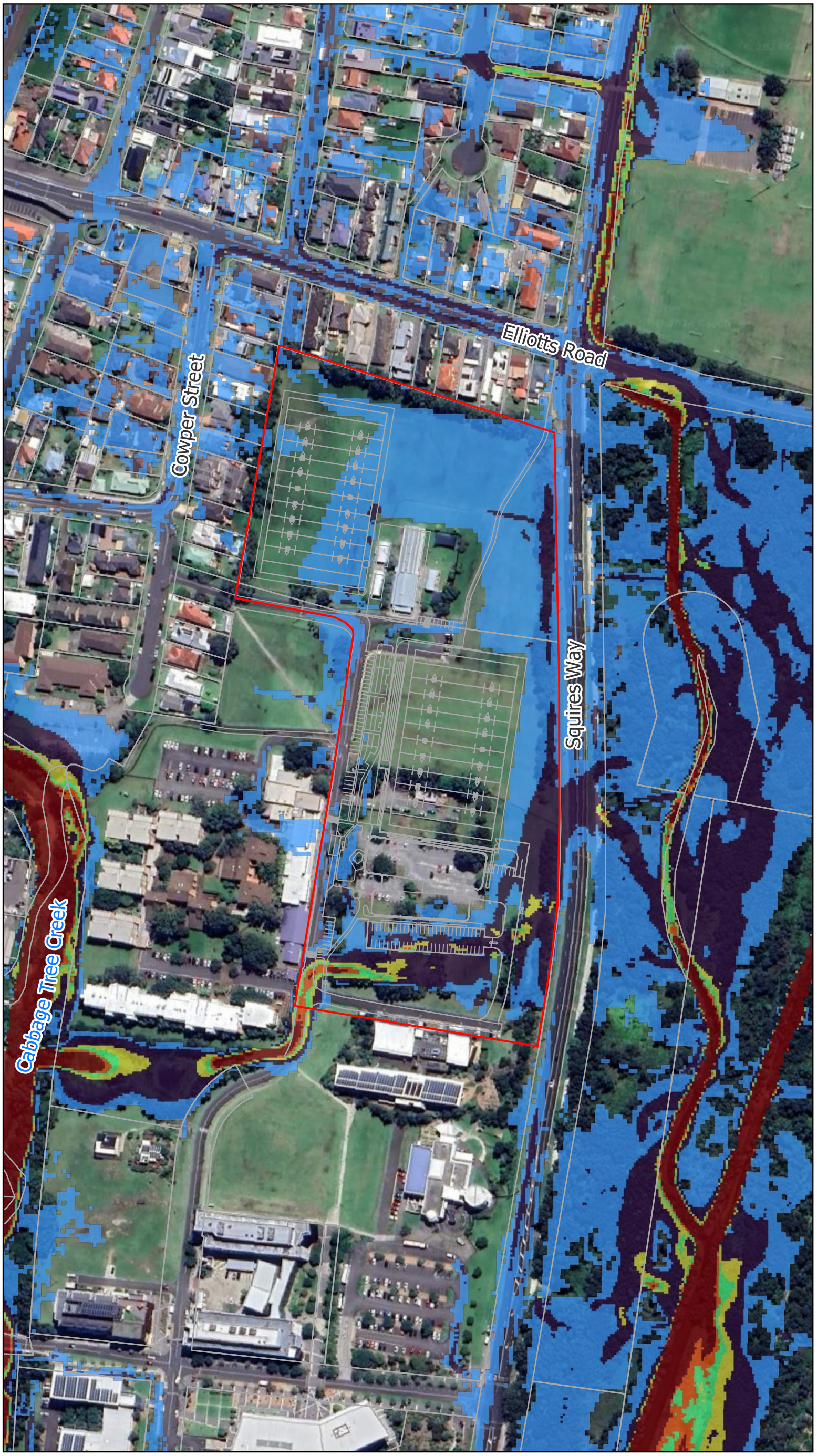
Figure B-34: 20 % AEP Peak Flood Velocity - Developed Condition - Zero Blockage



aurecon

Legend

- Site Boundary
- Cadaster
- Design Lines

Peak Flood Vel x Depth (m2/s)
Band 1
- <= 0.05
- 0.05 - 0.15
- 0.15 - 0.20
- 0.20 - 0.25
- 0.25 - 0.30
- > 0.30

Notes:

* For Information Only
* Hyrology ARR1987
* Hdraulics TUFLOW Classic Version 2018-03-AD

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0 100 200 m

A3 Scale: 1:2,600

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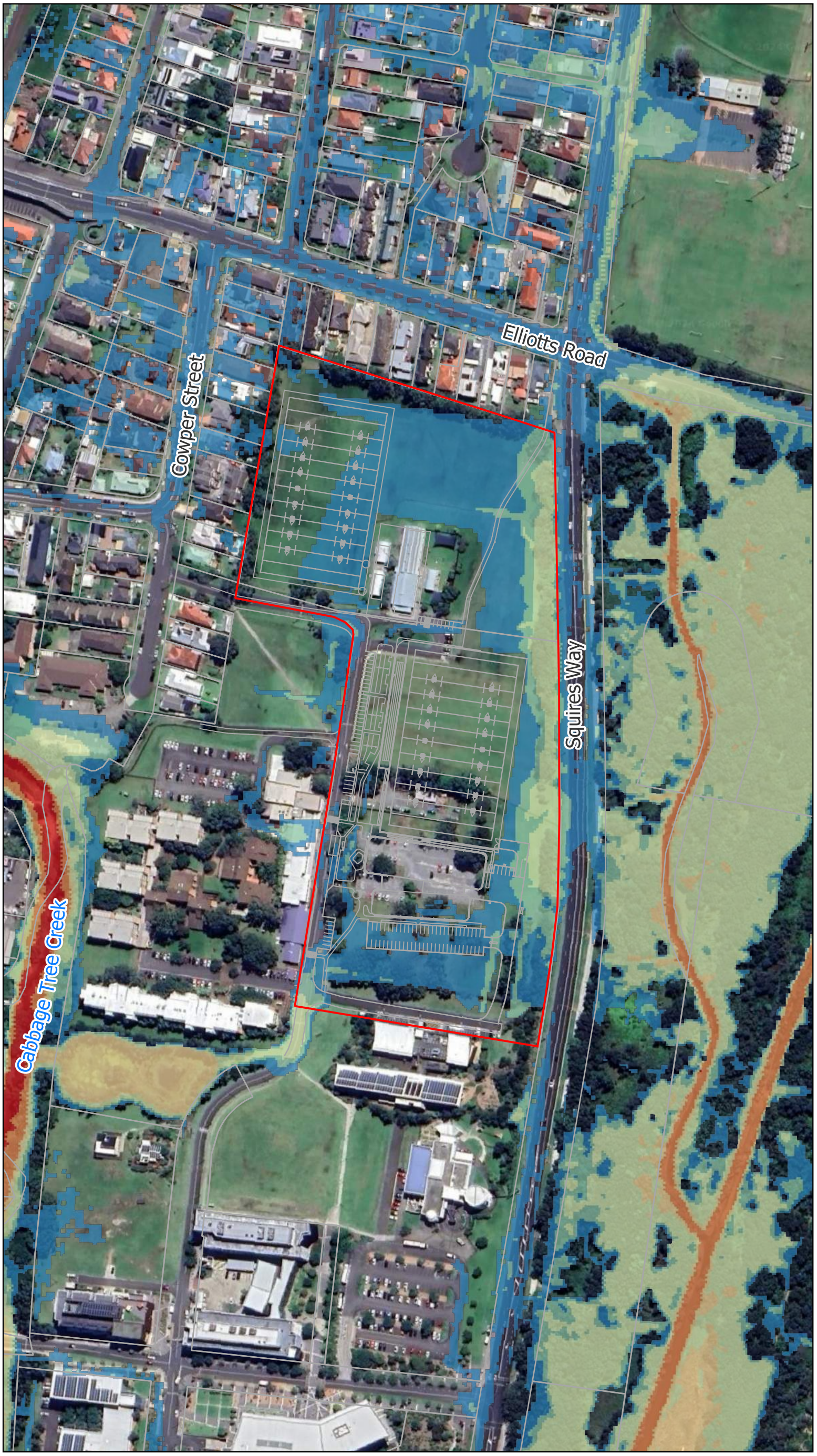
Figure B-35: 20 % AEP Peak Flood Velocity x Depth - Developed Condition - Zero Blockage



aurecon

Legend

- Site Boundary
- Cadaster
- Design Lines

Peak Flood Hazard Classification Band 1

- H1
- H2
- H3
- H4
- H5
- H6

Notes:

* For Information Only
* Hyrology ARR1987
* Hdraulics TUFLOW Classic Version 2018-03-AD

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0 100 200 m

A3 Scale: 1:2,600

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Figure B-36: 20 % AEP Peak Flood Hazard - Developed Condition - Zero Blockage

aurecon

Legend

- Site Boundary
- Cadaster
- Peak Flood Level (m AHD)

Peak Flood Depth (m)

Band 1

- <= 0.05
- 0.05 - 0.10
- 0.10 - 0.30
- 0.30 - 0.50
- 0.50 - 1.00
- > 1.00

Notes:

* For Information Only
* Hyrology ARR1987
* Hdraulics TUFLOW Classic Version 2018-03-AD

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0 100 200 m

A3 Scale: 1:2,600

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Figure B-37: PMF Peak Flood Level and Depth - Existing Condition - Design Blockage

aurecon

Legend

- Site Boundary
- Cadaster

Peak Flood Velocity (m/s)

Band 1

- <= 0.25
- 0.25 - 0.5
- 0.5 - 0.75
- 0.75 - 1
- 1 - 1.5
- 1.5 - 1.75
- > 1.75

Notes:

* For Information Only
* Hyrology ARR1987
* Hdraulics TUFLOW Classic Version 2018-03-AD

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0 100 200 m

A3 Scale: 1:2,600

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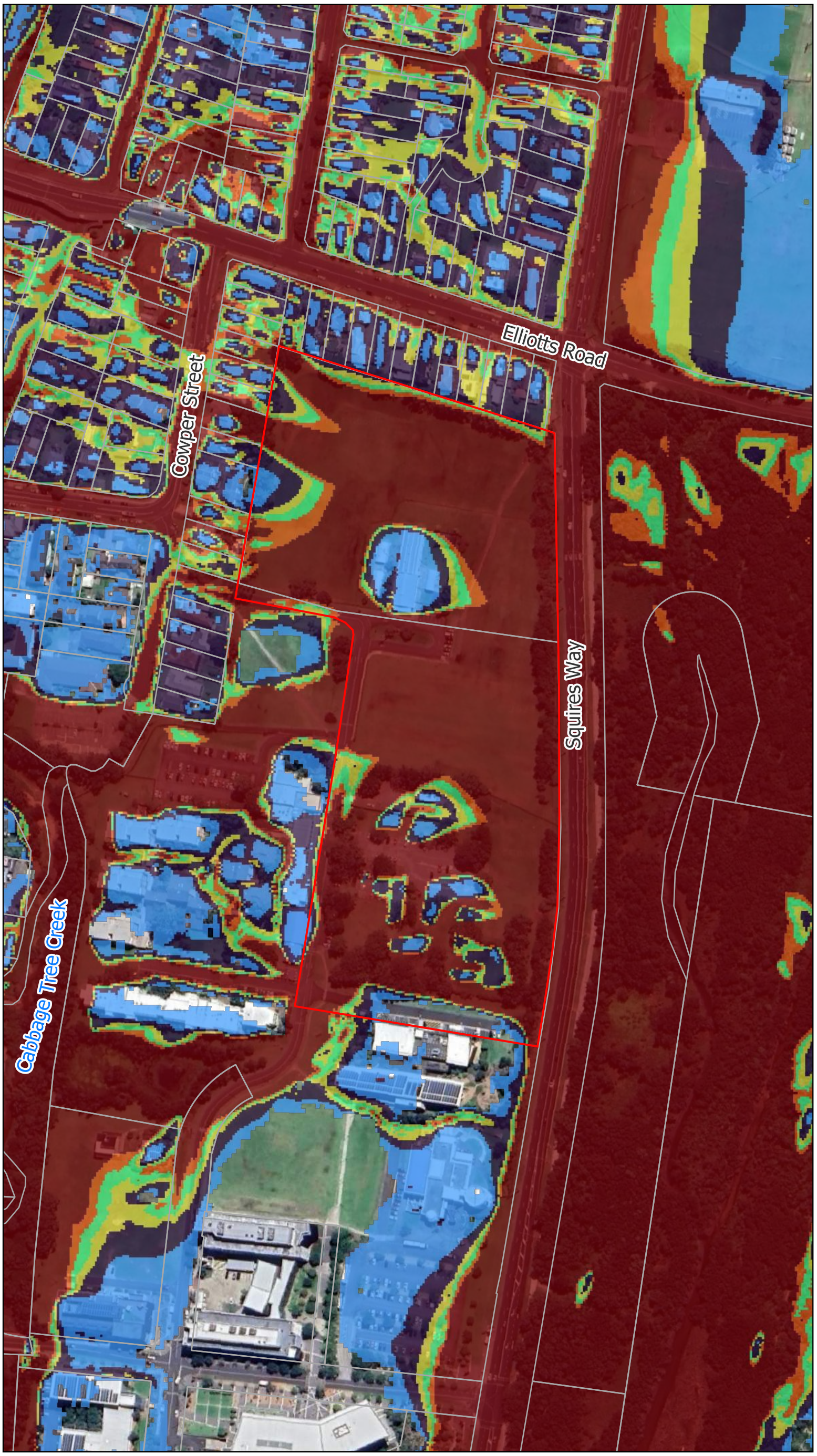
Figure B-38: PMF Peak Flood Velocity - Existing Condition - Design Blockage



aurecon

Legend

- Site Boundary
- Cadaster

Peak Flood Vel x Depth (m2/s)
Band 1

- <= 0.05
- 0.05 - 0.15
- 0.15 - 0.20
- 0.20 - 0.25
- 0.25 - 0.30
- > 0.30

Notes:

* For Information Only
* Hyrology ARR1987
* Hdraulics TUFLOW Classic Version 2018-03-AD

Workspace: C:\Users\Abhishek.Darekar\OneDrive - Aurecon Group\Flooding\05_Figures\240222_Reportfigures\Mapping 3\Mapping\240222_Dragons_Mapping_Backup.qgz

0 100 200 m

A3 Scale: 1:2,600

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Figure B-39: PMF Peak Flood Velocity x Depth - Existing Condition - Design Blockage

aurecon

Legend

- Site Boundary
- Cadaster

Peak Flood Hazard Classification Band 1

- H1
- H2
- H3
- H4
- H5
- H6

Notes:

* For Information Only
* Hyrology ARR1987
* Hdraulics TUFLOW Classic Version 2018-03-AD

Workspace: C:\Users\Abhishek.Darekar\OneDrive - Aurecon Group\Flooding\05_Figures\240222_Reportfigures\Mapping 3\Mapping\240222_Dragons_Mapping_Backup.qgz

0 100 200 m

A3 Scale: 1:2,600

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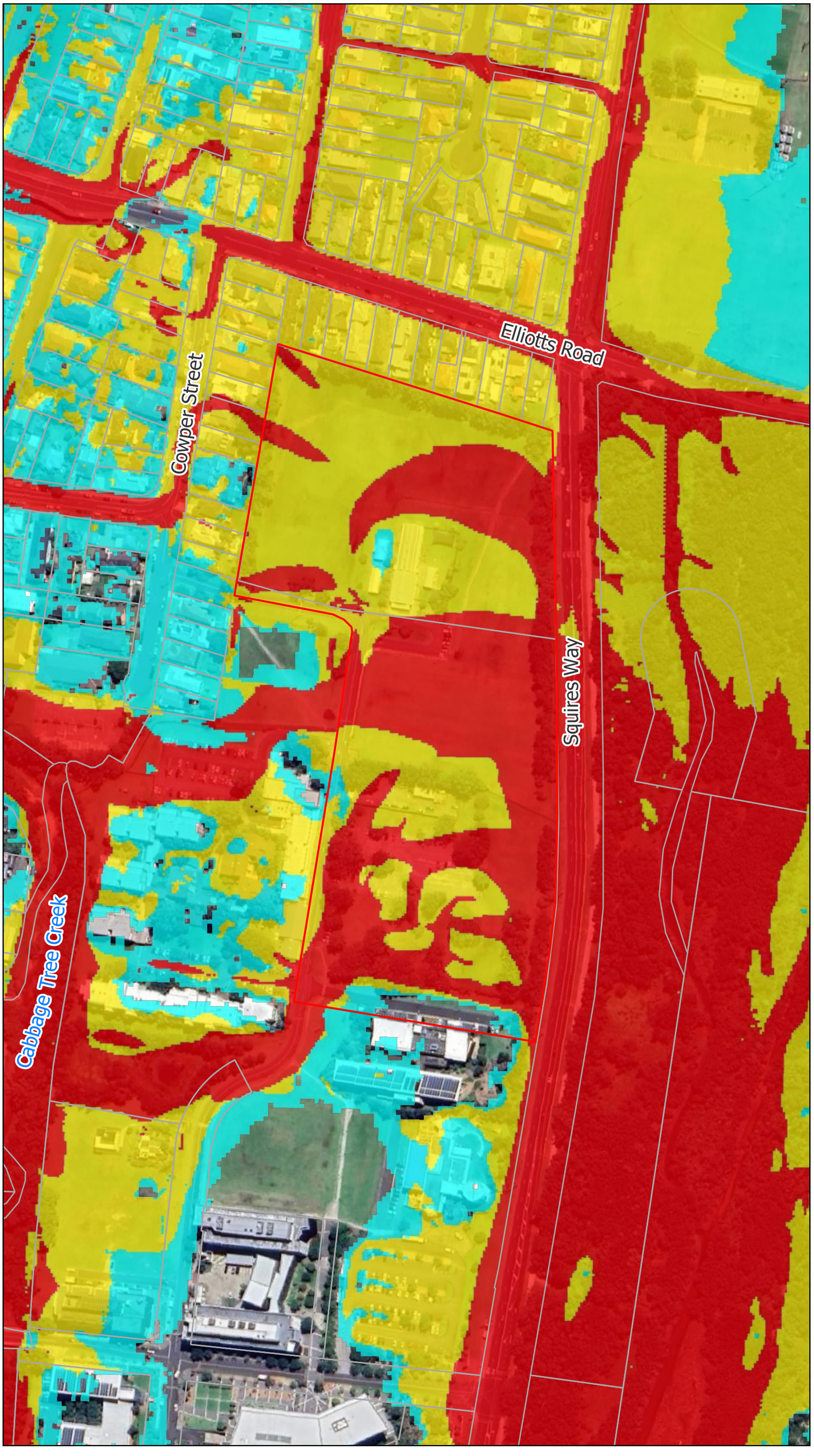
Figure B-40: PMF Peak Flood Hazard - Existing Condition - Design Blockage



aurecon

Legend

- Site Boundary
- Cadaster

Hydraulic Categories
Band 1
- Floodway
- Flood Storage
- Flood Fringe

Notes:

* For Information Only
* Hyrology ARR1987
* Hdraulics TUFLOW Classic Version 2018-03-AD

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0 100 200 m

A3 Scale: 1:2,600

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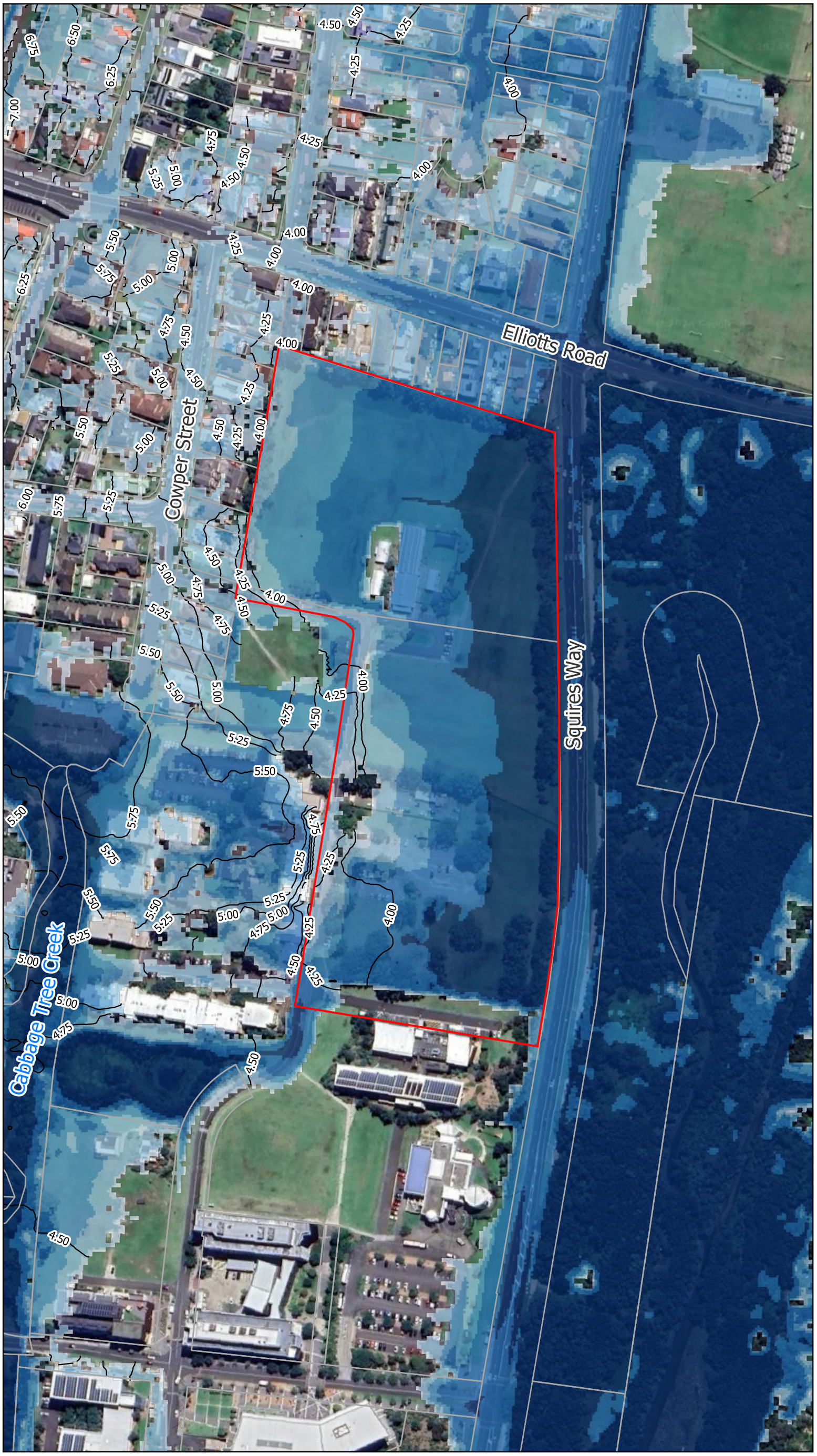
Figure B-41: PMF Hydraulic Categories - Existing Condition - Design Blockage



aurecon

Legend

- Site Boundary
- Cadaster
- Peak Flood Level (m AHD)

Peak Flood Depth (m)

Band 1

- <= 0.05
- 0.05 - 0.10
- 0.10 - 0.30
- 0.30 - 0.50
- 0.50 - 1.00
- > 1.00

Notes:

* For Information Only
* Hyrology ARR1987
* Hdraulics TUFLOW Classic Version 2018-03-AD

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0 100 200 m

A3 Scale: 1:2,600

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Figure B-42: 1% AEP+Climate Change Peak Flood Level and Depth - Existing Condition - Design Blockage

aurecon

Elliotts Road

Cowper Street

Squires Way

Cabbage Tree Creek

Legend

- Site Boundary
- Cadaster

Peak Flood Velocity (m/s)

Band 1

- <= 0.25
- 0.25 - 0.5
- 0.5 - 0.75
- 0.75 - 1
- 1 - 1.5
- 1.5 - 1.75
- > 1.75

Notes:

* For Information Only
* Hyrology ARR1987
* Hdraulics TUFLOW Classic Version 2018-03-AD

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0 100 200 m

A3 Scale: 1:2,600

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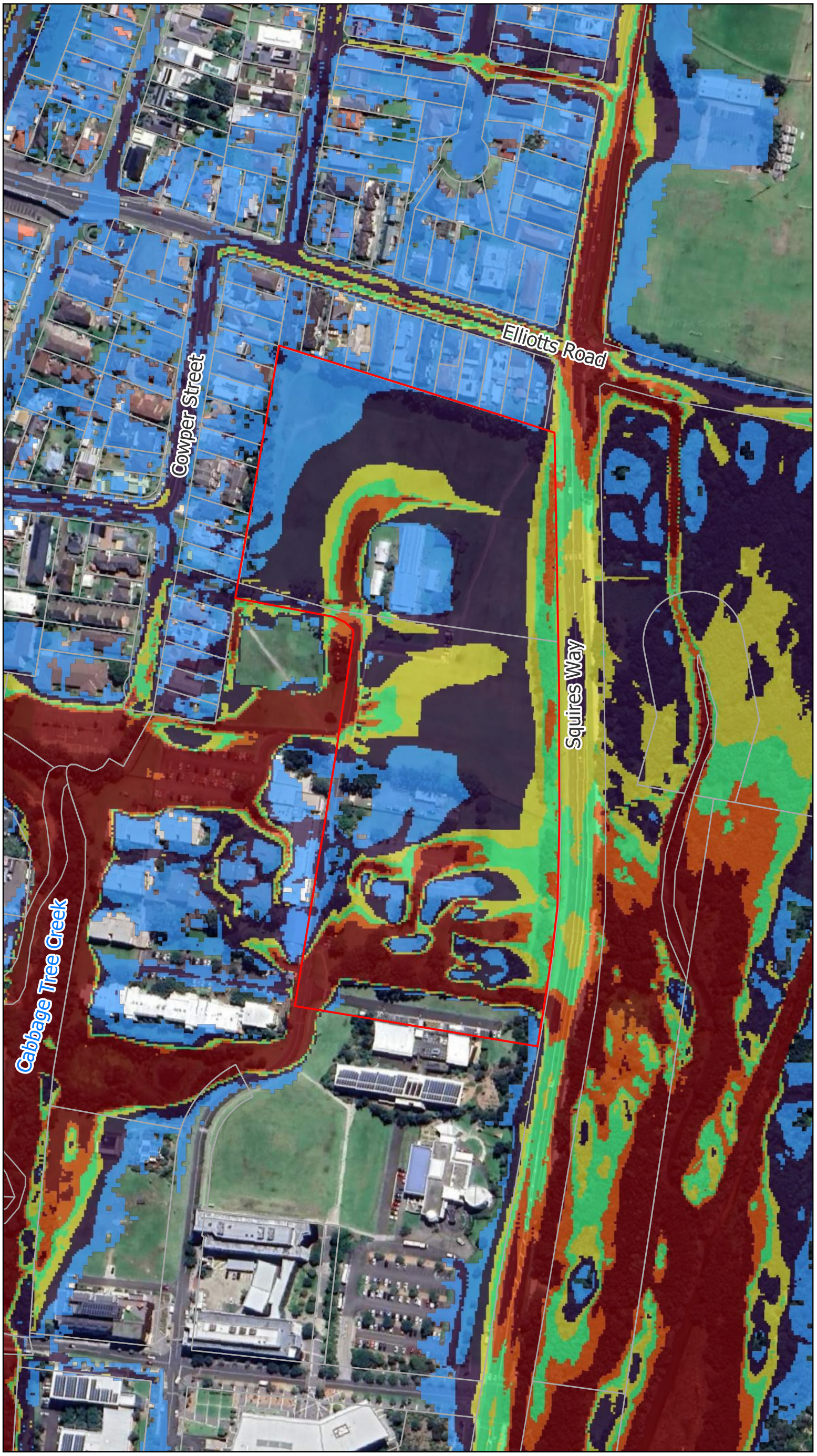
Figure B-43: 1% AEP+Climate Change Peak Flood Velocity - Existing Condition - Design Blockage



aurecon

Legend

- Site Boundary
- Cadaster

Peak Flood Vel x Depth (m2/s)
Band 1

- <= 0.05
- 0.05 - 0.15
- 0.15 - 0.20
- 0.20 - 0.25
- 0.25 - 0.30
- > 0.30

Notes:

* For Information Only
* Hyrology ARR1987
* Hdraulics TUFLOW Classic Version 2018-03-AD

Workspace: C:\Users\Abhishek.Darekar\OneDrive - Aurecon Group\Flooding\05_Figures\240222_Reportfigures\Mapping 3\Mapping\240222_Dragons_Mapping_Backup.qgz

0 100 200 m

A3 Scale: 1:2,600

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Figure B-44: 1% AEP+Climate Change Peak Flood Velocity x Depth - Existing Condition - Design Blockage

aurecon

Elliotts Road

Cowper Street

Squires Way

Cabbage Tree Creek

Legend

- Site Boundary
- Cadaster

Peak Flood Hazard Classification Band 1

- H1
- H2
- H3
- H4
- H5
- H6

Notes:

* For Information Only
* Hyrology ARR1987
* Hdraulics TUFLOW Classic Version 2018-03-AD

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0 100 200 m

A3 Scale: 1:2,600

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Figure B-45: 1% AEP+Climate Change Peak Flood Hazard - Existing Condition - Design Blockage

aurecon

Legend

- Site Boundary
- Cadaster
- Peak Flood Level (m AHD)

Peak Flood Depth (m)

Band 1

- <= 0.05
- 0.05 - 0.10
- 0.10 - 0.30
- 0.30 - 0.50
- 0.50 - 1.00
- > 1.00

Notes:

* For Information Only
* Hyrology ARR1987
* Hdraulics TUFLOW Classic Version 2018-03-AD

Workspace: C:\Users\Abhishek.Darekar\OneDrive - Aurecon Group\Flooding\05_Figures\240222_Reportfigures\Mapping 3\Mapping\240222_Dragons_Mapping_Backup.qgz

0 100 200 m

A3 Scale: 1:2,600

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Figure B-46: 1% AEP Peak Peak Flood Level and Depth - Existing Condition - Design Blockage

aurecon

Legend

- Site Boundary
- Cadaster

Peak Flood Velocity (m/s)

Band 1

- <= 0.25
- 0.25 - 0.5
- 0.5 - 0.75
- 0.75 - 1
- 1 - 1.5
- 1.5 - 1.75
- > 1.75

Notes:

* For Information Only
* Hyrology ARR1987
* Hdraulics TUFLOW Classic Version 2018-03-AD

Workspace: C:\Users\Abhishek.Darekar\OneDrive - Aurecon Group\Flooding\05_Figures\240222_Reportfigures\Mapping 3\Mapping\240222_Dragons_Mapping_Backup.qgz

0 100 200 m

A3 Scale: 1:2,600

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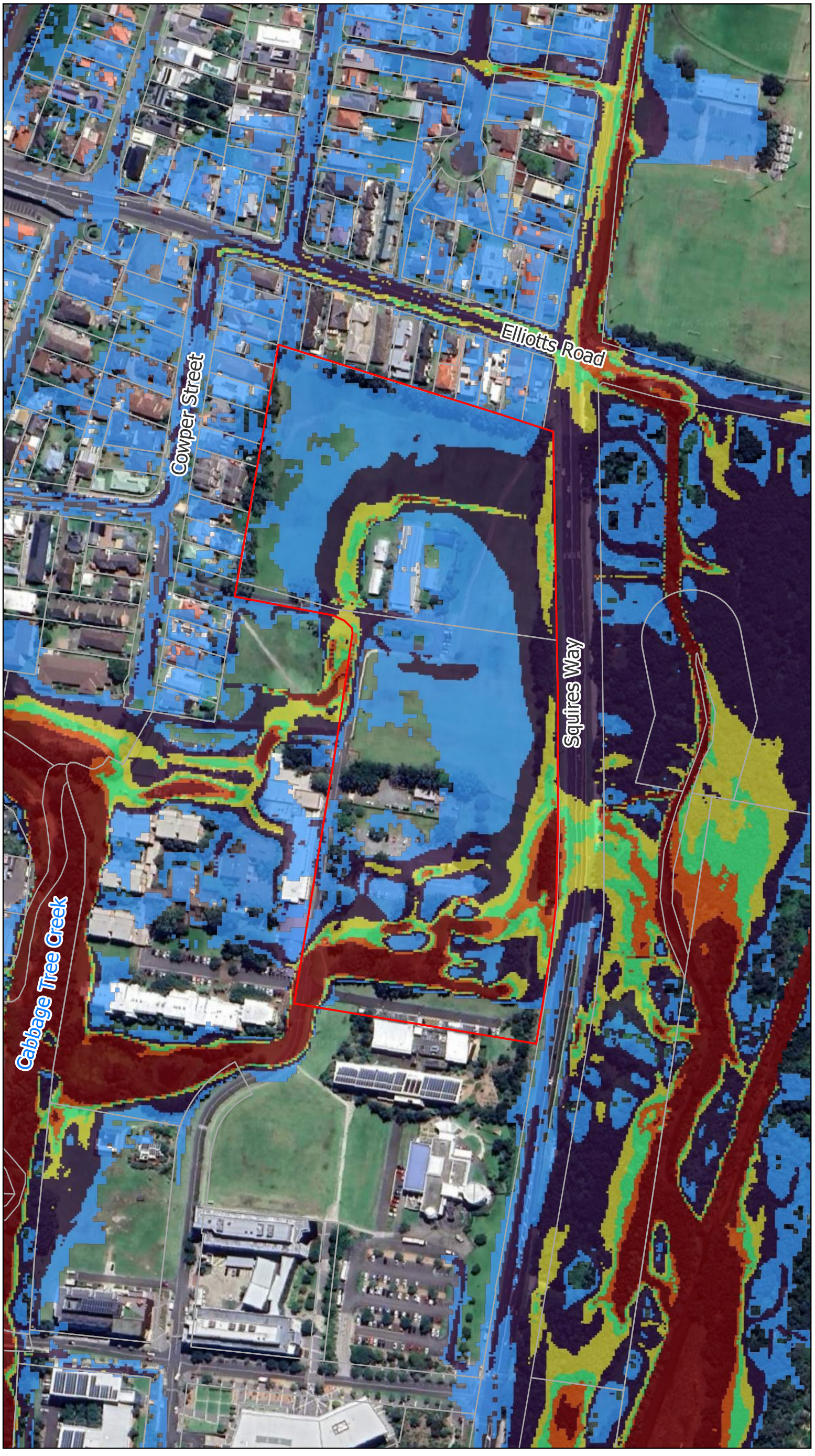
Figure B-47: 1% AEP Peak Flood Velocity - Existing Condition - Design Blockage



aurecon

Legend

- Site Boundary
- Cadaster

Peak Flood Vel x Depth (m2/s)
Band 1

- <= 0.05
- 0.05 - 0.15
- 0.15 - 0.20
- 0.20 - 0.25
- 0.25 - 0.30
- > 0.30

Notes:

* For Information Only
* Hyrology ARR1987
* Hdraulics TUFLOW Classic Version 2018-03-AD

0 100 200 m

A3 Scale: 1:2,600

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Figure B-48: 1% AEP Peak Flood Velocity x Depth - Existing Condition - Design Blockage

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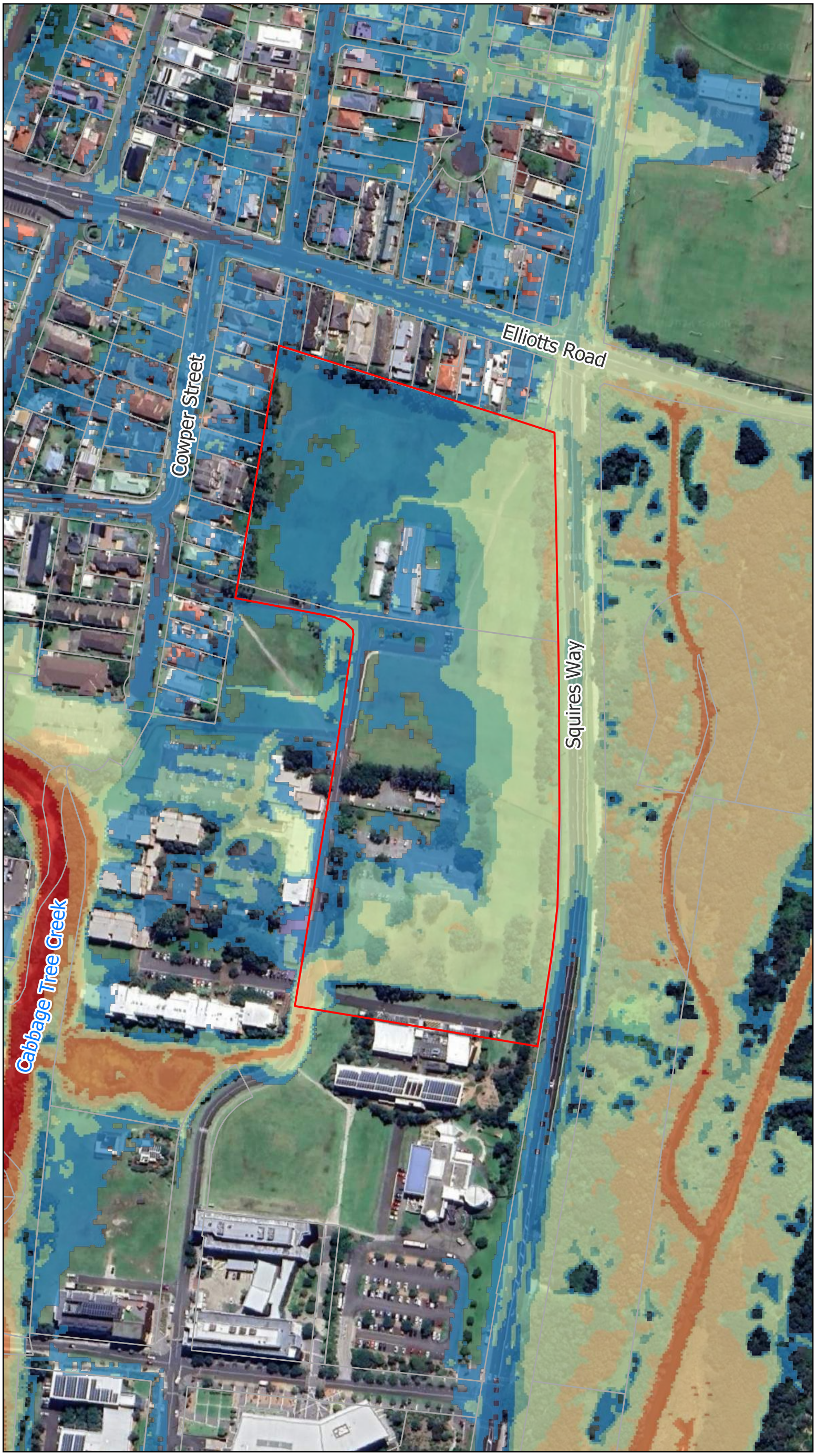

aurecon

Legend

- Site Boundary
- Cadaster

Peak Flood Hazard Classification Band 1

- H1
- H2
- H3
- H4
- H5
- H6

Notes:

* For Information Only
* Hyrology ARR1987
* Hdraulics TUFLOW Classic Version 2018-03-AD

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0 100 200 m

A3 Scale: 1:2,600

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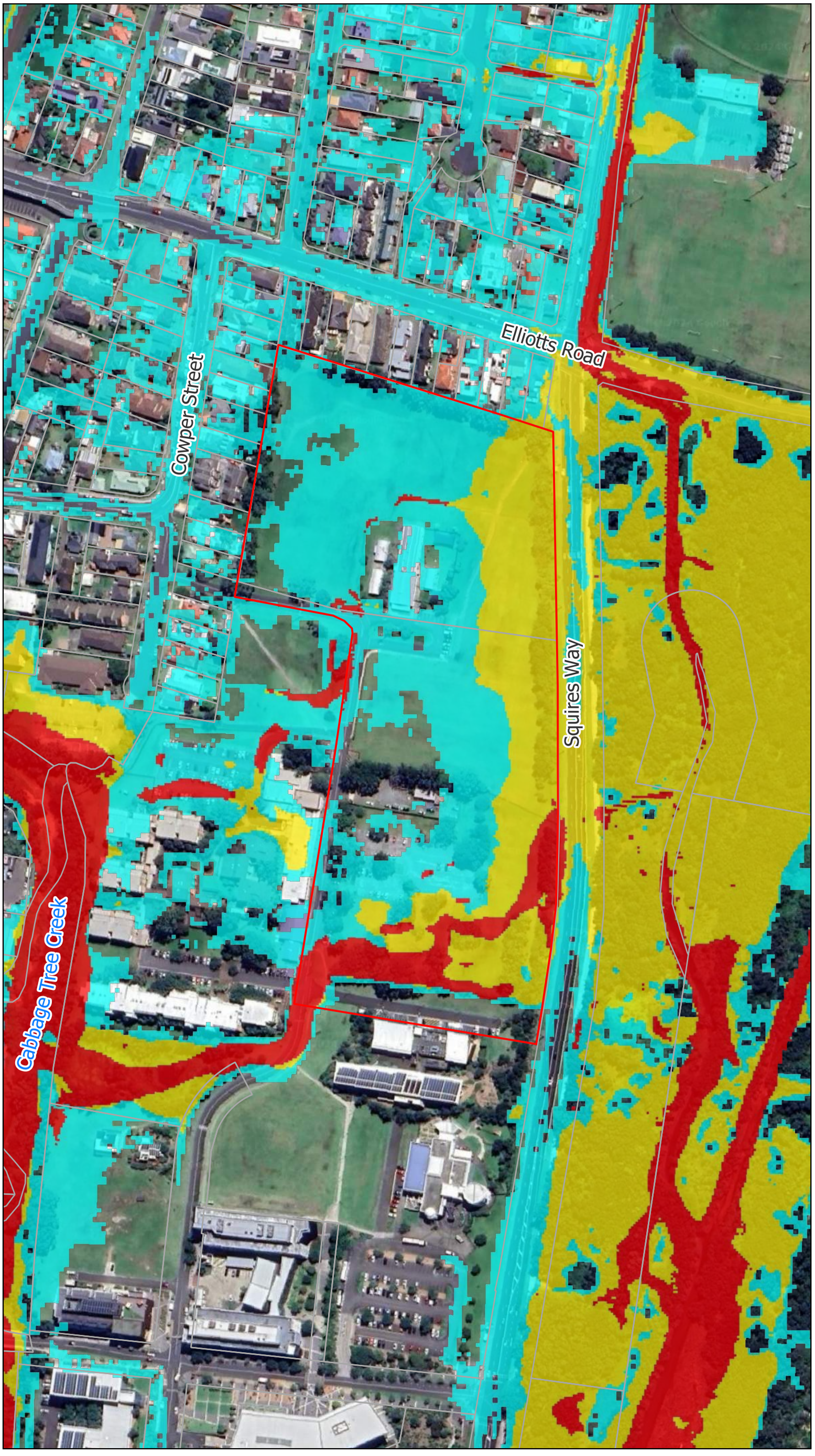
Figure B-49: 1% AEP Peak Flood Hazard - Existing Condition - Design Blockage



aurecon

Legend

- Site Boundary
- Cadaster

Hydraulic Categories
Band 1

- Floodway
- Flood Storage
- Flood Fringe

Notes:

* For Information Only
* Hyrology ARR1987
* Hdraulics TUFLOW Classic Version 2018-03-AD

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0 100 200 m

A3 Scale: 1:2,600

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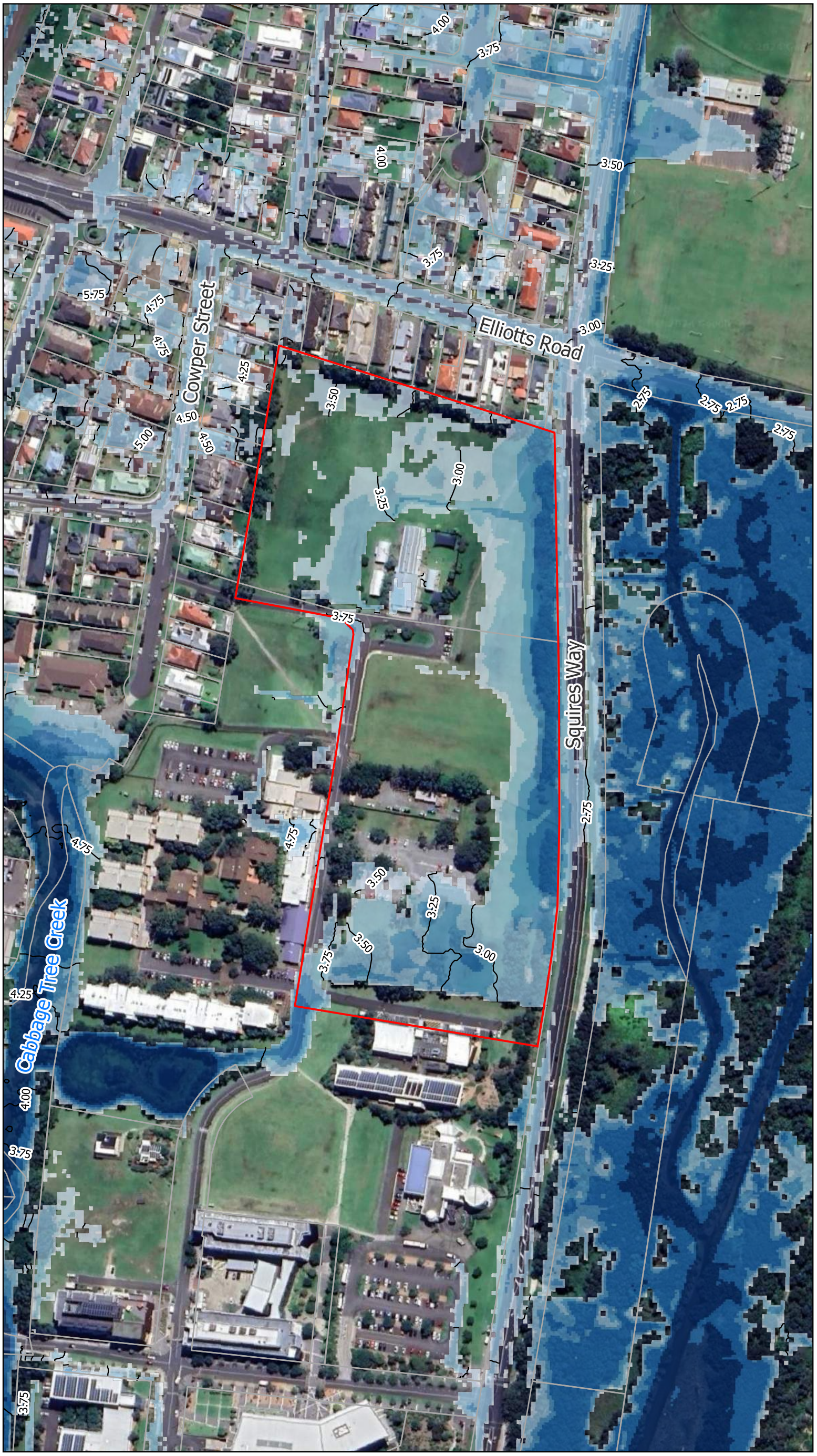
Figure B-50: 1% AEP Hydraulic Categories - Existing Condition - Design Blockage



aurecon

Legend

- Site Boundary
- Cadaster
- Peak Flood Level (m AHD)

Peak Flood Depth (m)

Band 1

- <= 0.05
- 0.05 - 0.10
- 0.10 - 0.30
- 0.30 - 0.50
- 0.50 - 1.00
- > 1.00

Notes:

* For Information Only
* Hyrology ARR1987
* Hdraulics TUFLOW Classic Version 2018-03-AD

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0 100 200 m

A3 Scale: 1:2,600

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Figure B-51: 20 % AEP Peak Flood Level and Depth - Existing Condition - Design Blockage

aurecon

Legend

- Site Boundary
- Cadaster

Peak Flood Velocity (m/s)

Band 1

- <= 0.25
- 0.25 - 0.5
- 0.5 - 0.75
- 0.75 - 1
- 1 - 1.5
- 1.5 - 1.75
- > 1.75

Notes:

* For Information Only
* Hyrology ARR1987
* Hdraulics TUFLOW Classic Version 2018-03-AD

Workspace: C:\Users\Abhishek.Darekar\OneDrive - Aurecon Group\Flooding\05_Figures\240222_Reportfigures\Mapping 3\Mapping\240222_Dragons_Mapping_Backup.qgz

0 100 200 m

A3 Scale: 1:2,600

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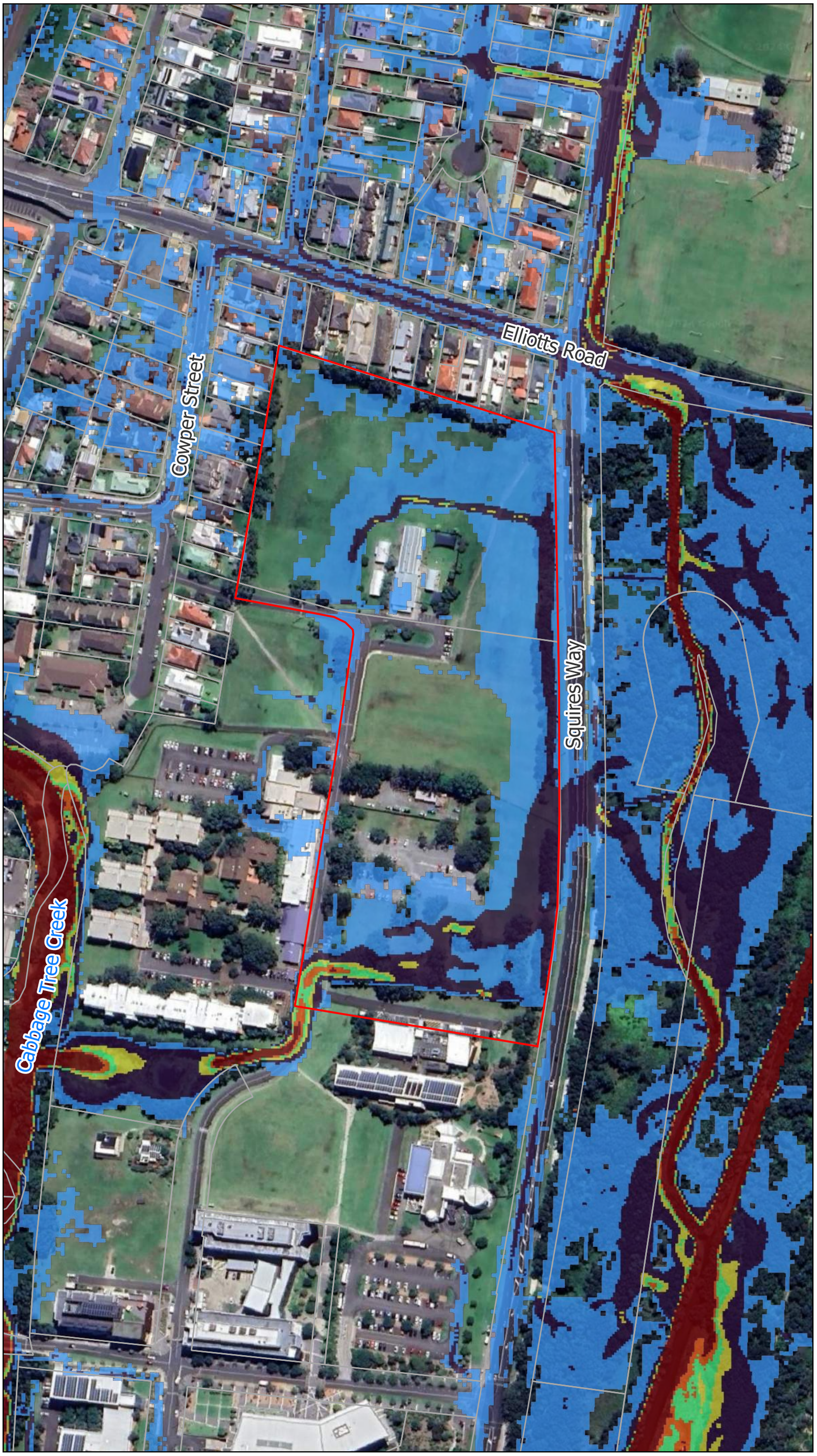
Figure B-52: 20 % AEP Peak Flood Velocity - Existing Condition - Design Blockage



aurecon

Legend

- Site Boundary
- Cadaster

Peak Flood Vel x Depth (m2/s)
Band 1

- <= 0.05
- 0.05 - 0.15
- 0.15 - 0.20
- 0.20 - 0.25
- 0.25 - 0.30
- > 0.30

Notes:

* For Information Only
* Hyrology ARR1987
* Hdraulics TUFLOW Classic Version 2018-03-AD

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0 100 200 m

A3 Scale: 1:2,600

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Figure B-53: 20 % AEP Peak Flood Velocity x Depth - Existing Condition - Design Blockage

aurecon

Legend

- Site Boundary
- Cadaster

Peak Flood Hazard Classification Band 1

- H1
- H2
- H3
- H4
- H5
- H6

Notes:

* For Information Only
* Hyrology ARR1987
* Hdraulics TUFLOW Classic Version 2018-03-AD

0 100 200 m

A3 Scale: 1:2,600

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Figure B-54: 20 % AEP Peak Flood Hazard - Existing Condition - Design Blockage

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aurecon

Legend

- Site Boundary
- Cadaster
- Peak Flood Level (m AHD)

Peak Flood Depth (m)

Band 1

- <= 0.05
- 0.05 - 0.10
- 0.10 - 0.30
- 0.30 - 0.50
- 0.50 - 1.00
- > 1.00

Notes:

* For Information Only
* Hyrology ARR1987
* Hdraulics TUFLOW Classic Version 2018-03-AD

Workspace: C:\Users\Abhishek.Darekar\OneDrive - Aurecon Group\Flooding\05_Figures\240222_Reportfigures\Mapping 3\Mapping\240222_Dragons_Mapping_Backup.qgz

0 100 200 m

A3 Scale: 1:2,600

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Figure B-55: PMF Peak Flood Level and Depth - Existing Condition - Risk Blockage

aurecon

Legend

- Site Boundary
- Cadaster

Peak Flood Velocity (m/s)

Band 1

- <= 0.25
- 0.25 - 0.5
- 0.5 - 0.75
- 0.75 - 1
- 1 - 1.5
- 1.5 - 1.75
- > 1.75

Notes:

* For Information Only
* Hyrology ARR1987
* Hdraulics TUFLOW Classic Version 2018-03-AD

Workspace: C:\Users\Abhishek.Darekar\OneDrive - Aurecon Group\Flooding\05_Figures\240222_Reportfigures\Mapping 3\Mapping\240222_Dragons_Mapping_Backup.qgz

0 100 200 m

A3 Scale: 1:2,600

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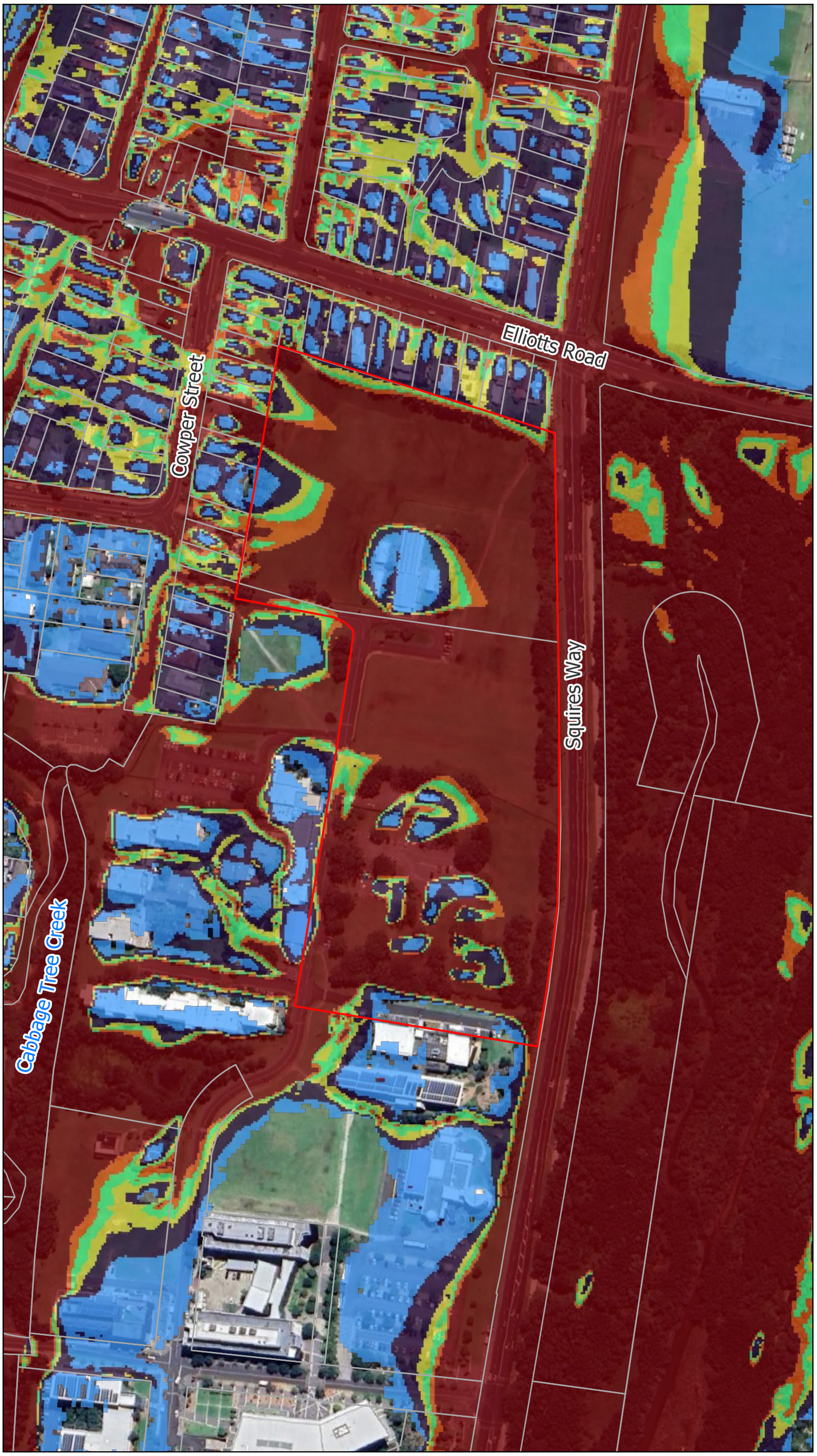
Figure B-56: PMF Peak Flood Velocity - Existing Condition - Risk Blockage



aurecon

Legend

- Site Boundary
- Cadaster

Peak Flood Vel x Depth (m2/s)
Band 1

- <= 0.05
- 0.05 - 0.15
- 0.15 - 0.20
- 0.20 - 0.25
- 0.25 - 0.30
- > 0.30

Notes:

* For Information Only
* Hyrology ARR1987
* Hdraulics TUFLOW Classic Version 2018-03-AD

Workspace: C:\Users\Abhishek.Darekar\OneDrive - Aurecon Group\Flooding\05_Figures\240222_Reportfigures\Mapping 3\Mapping\240222_Dragons_Mapping_Backup.qgz

0 100 200 m

A3 Scale: 1:2,600

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Figure B-57: PMF Peak Flood Velocity x Depth - Existing Condition - Risk Blockage

aurecon

Legend

- Site Boundary
- Cadaster

Peak Flood Hazard Classification Band 1

- H1
- H2
- H3
- H4
- H5
- H6

Notes:

* For Information Only
* Hyrology ARR1987
* Hdraulics TUFLOW Classic Version 2018-03-AD

0 100 200 m

A3 Scale: 1:2,600

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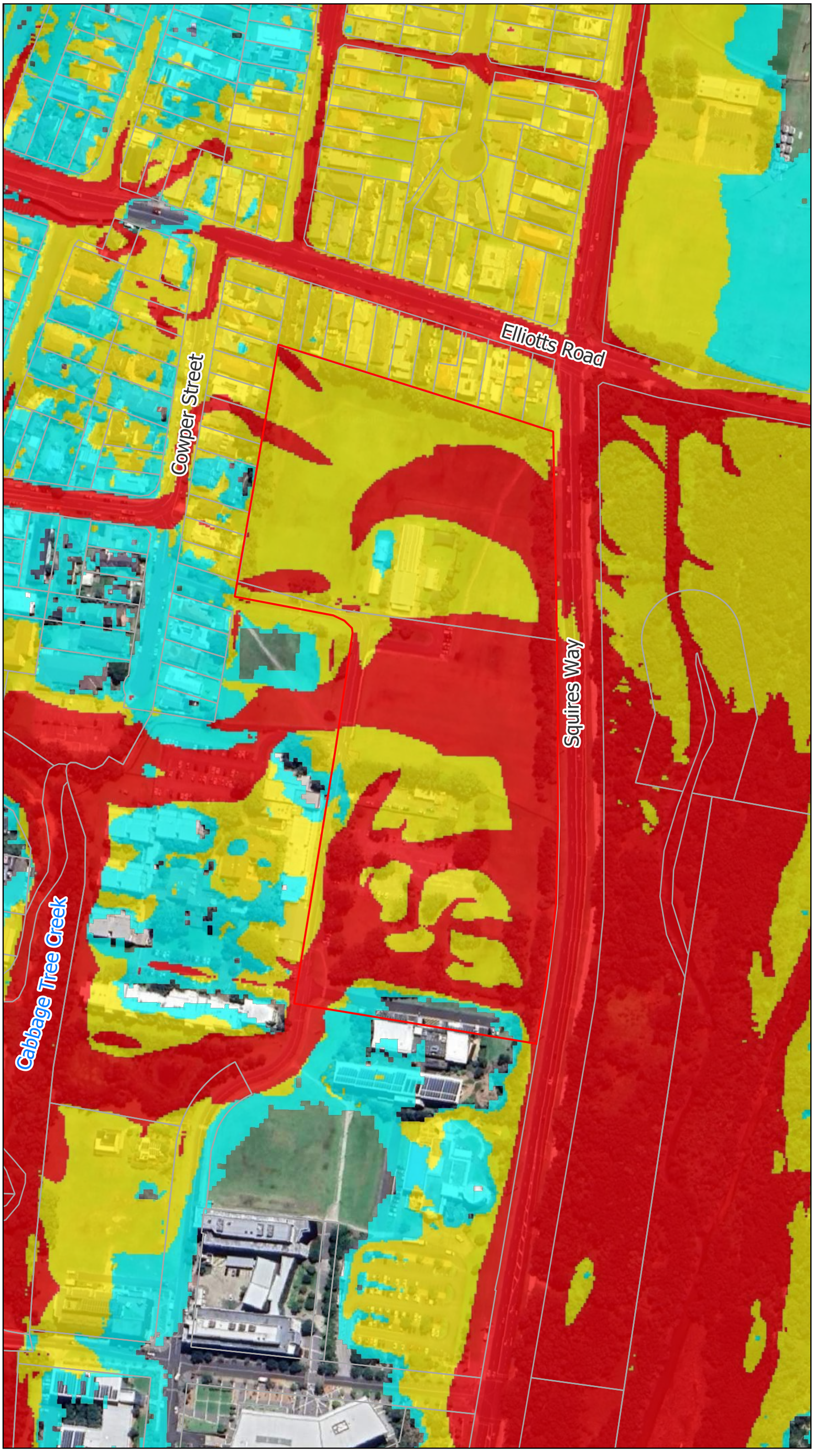
Figure B-58: PMF Peak Flood Hazard - Existing Condition - Risk Blockage

Workspace: C:\Users\Abhishek.Darekar\OneDrive - Aurecon Group\Flooding\05_Figures\240222_Reportfigures\Mapping 3\Mapping\240222_Dragons_Mapping_Backup.qgz



aurecon

Legend

- Site Boundary
- Cadaster

Hydraulic Categories

Band 1

- Floodway
- Flood Storage
- Flood Fringe

Notes:

* For Information Only
* Hyrology ARR1987
* Hdraulics TUFLOW Classic Version 2018-03-AD

Workspace: C:\Users\Abhishek.Darekar\OneDrive - Aurecon Group\Flooding\05_Figures\240222_Reportfigures\Mapping 3\Mapping\240222_Dragons_Mapping_Backup.qgz

0 100 200 m

A3 Scale: 1:2,600

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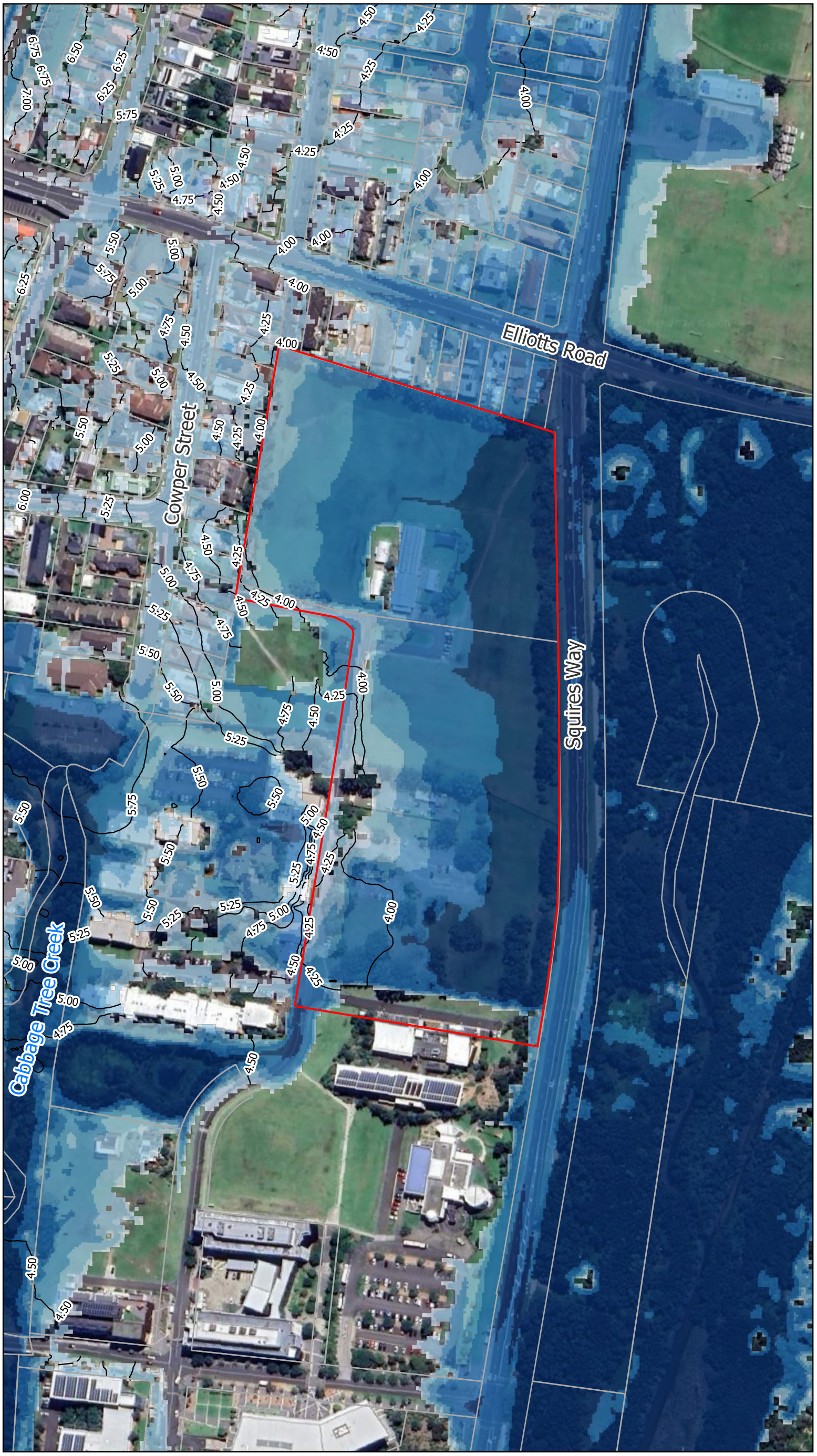
Figure B-59: PMF Hydraulic Categories - Existing Condition - Risk Blockage



aurecon

Legend

- Site Boundary
- Cadaster
- Peak Flood Level (m AHD)

Peak Flood Depth (m)

Band 1

- <= 0.05
- 0.05 - 0.10
- 0.10 - 0.30
- 0.30 - 0.50
- 0.50 - 1.00
- > 1.00

Notes:

* For Information Only
* Hyrology ARR1987
* Hdraulics TUFLOW Classic Version 2018-03-AD

0 100 200 m

A3 Scale: 1:2,600

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Figure B-60: 1% AEP+Climate Change Peak Flood Level and Depth - Existing Condition - Risk Blockage

Workspace: C:\Users\Abhishek.Darekar\OneDrive - Aurecon Group\Flooding\05_Figures\240222_Reportfigures\Mapping 3\Mapping\240222_Dragons_Mapping_Backup.qgz

aurecon

Legend

- Site Boundary
- Cadaster

Peak Flood Velocity (m/s)

Band 1

- <= 0.25
- 0.25 - 0.5
- 0.5 - 0.75
- 0.75 - 1
- 1 - 1.5
- 1.5 - 1.75
- > 1.75

Notes:

* For Information Only
* Hyrology ARR1987
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Workspace: C:\Users\Abhishek.Darekar\OneDrive - Aurecon Group\Flooding\05_Figures\240222_Dragons_Mapping 3\Mapping\240222_Dragons_Mapping_Backup.qgz

0 100 200 m

A3 Scale: 1:2,600

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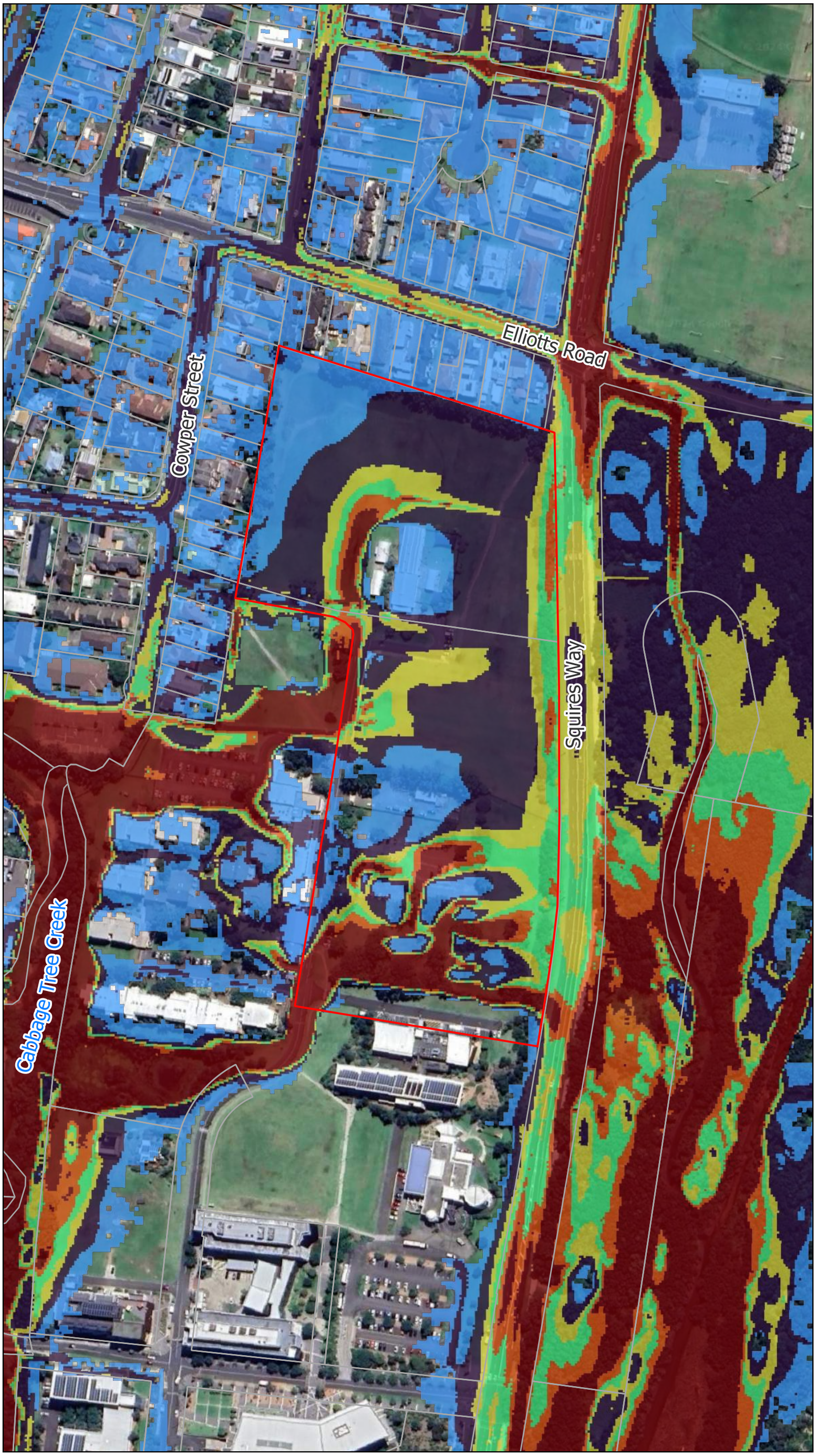
Figure B-61: 1% AEP+Climate Change Peak Flood Velocity - Existing Condition - Risk Blockage



aurecon

Legend

- Site Boundary
- Cadaster

Peak Flood Vel x Depth (m2/s)
Band 1

- <= 0.05
- 0.05 - 0.15
- 0.15 - 0.20
- 0.20 - 0.25
- 0.25 - 0.30
- > 0.30

Notes:

* For Information Only
* Hyrology ARR1987
* Hdraulics TUFLOW Classic Version 2018-03-AD

Workspace: C:\Users\Abhishek.Darekar\OneDrive - Aurecon Group\Flooding\05_Figures\240222_Reportfigures\Mapping 3\Mapping\240222_Dragons_Mapping_Backup.qgz

0 100 200 m

A3 Scale: 1:2,600

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Figure B-62: 1% AEP+Climate Change Peak Flood Velocity x Depth - Existing Condition - Risk Blockage

aurecon

Legend

- Site Boundary
- Cadaster

Peak Flood Hazard Classification Band 1

- H1
- H2
- H3
- H4
- H5
- H6

Notes:

* For Information Only
* Hyrology ARR1987
* Hdraulics TUFLOW Classic Version 2018-03-AD

Workspace: C:\Users\Abhishek.Darekar\OneDrive - Aurecon Group\Flooding\05_Figures\240222_Reportfigures\Mapping 3\Mapping\240222_Dragons_Mapping_Backup.qgz

0 100 200 m

A3 Scale: 1:2,600

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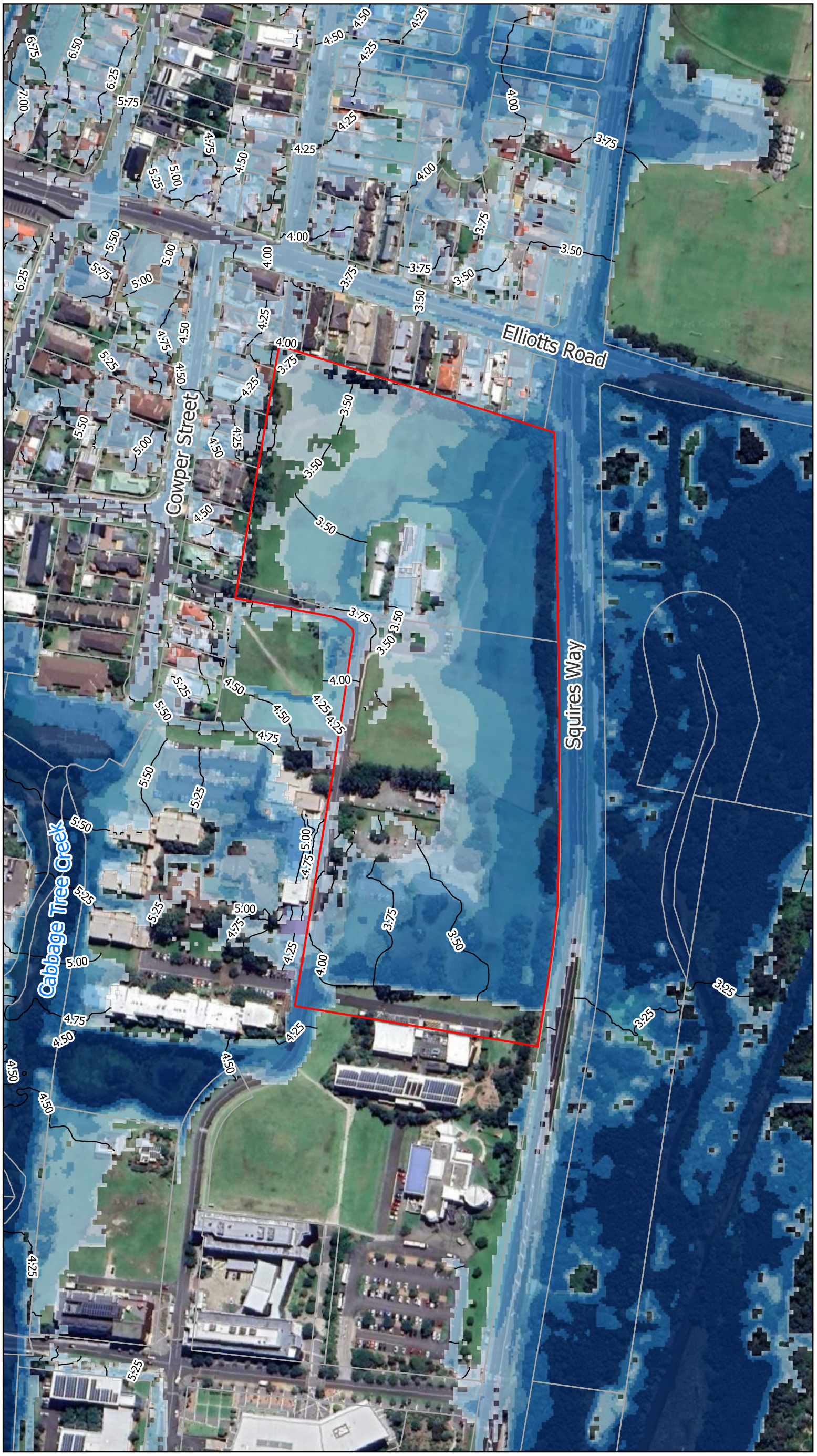
Figure B-63: 1% AEP+Climate Change Peak Flood Hazard - Existing Condition - Risk Blockage



aurecon

Legend

- Site Boundary
- Cadaster
- Peak Flood Level (m AHD)

Peak Flood Depth (m)

Band 1

- <= 0.05
- 0.05 - 0.10
- 0.10 - 0.30
- 0.30 - 0.50
- 0.50 - 1.00
- > 1.00

Notes:

* For Information Only
* Hyrology ARR1987
* Hdraulics TUFLOW Classic Version 2018-03-AD

Workspace: C:\Users\Abhishek.Darekar\OneDrive - Aurecon Group\Flooding\05_Figures\240222_Reportfigures\Mapping 3\Mapping\240222_Dragons_Mapping_Backup.qgz

0 100 200 m

A3 Scale: 1:2,600

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Figure B-64: 1% AEP Peak Peak Flood Level and Depth - Existing Condition - Risk Blockage

aurecon

Legend

- Site Boundary
- Cadaster

Peak Flood Velocity (m/s)

Band 1

- <= 0.25
- 0.25 - 0.5
- 0.5 - 0.75
- 0.75 - 1
- 1 - 1.5
- 1.5 - 1.75
- > 1.75

Notes:

* For Information Only
* Hyrology ARR1987
* Hdraulics TUFLOW Classic Version 2018-03-AD

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0 100 200 m

A3 Scale: 1:2,600

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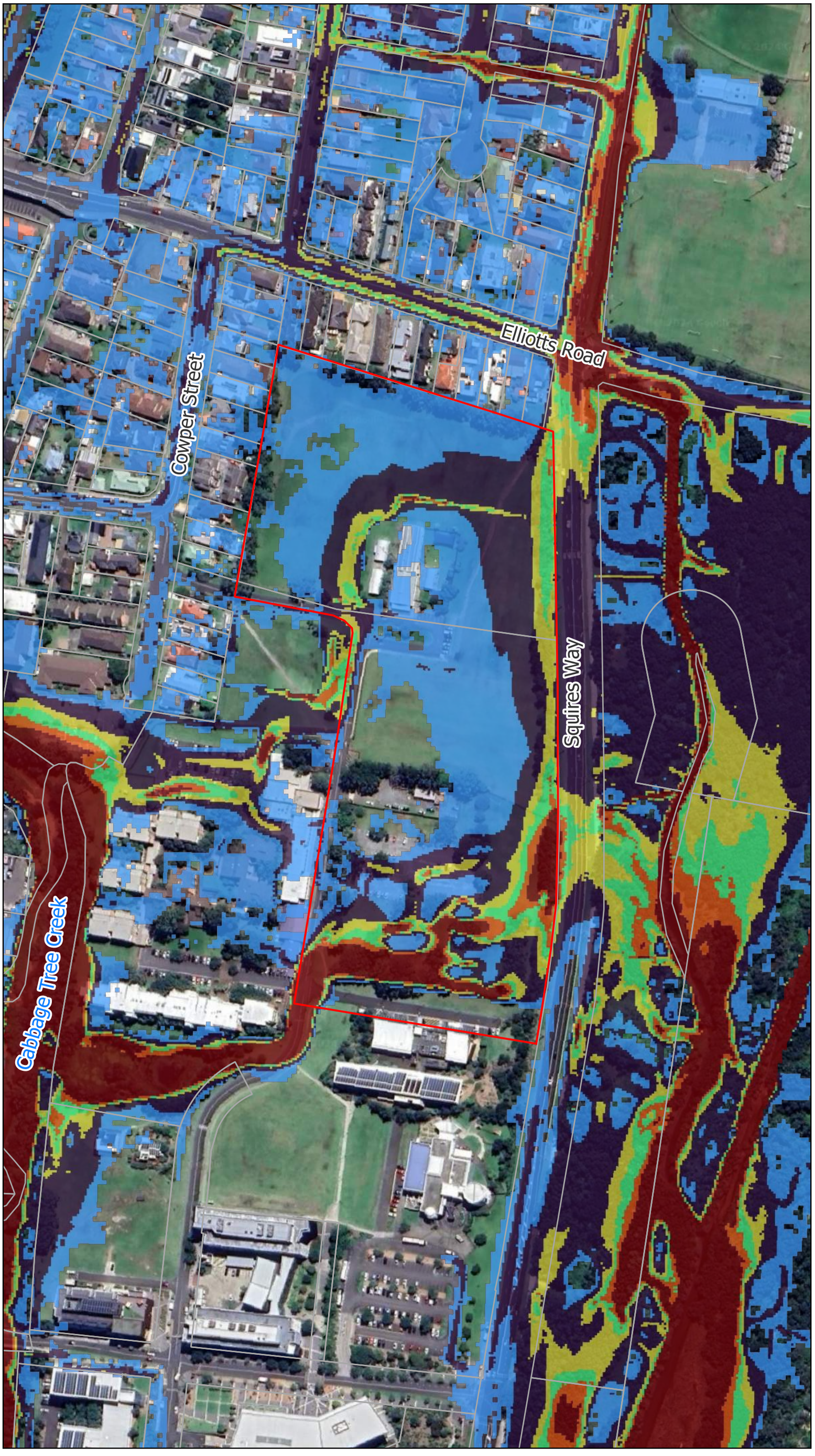
Figure B-65: 1% AEP Peak Flood Velocity - Existing Condition - Risk Blockage



aurecon

Legend

- Site Boundary
- Cadaster

Peak Flood Vel x Depth (m2/s)
Band 1

- <= 0.05
- 0.05 - 0.15
- 0.15 - 0.20
- 0.20 - 0.25
- 0.25 - 0.30
- > 0.30

Notes:

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* Hyrology ARR1987
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0 100 200 m

A3 Scale: 1:2,600

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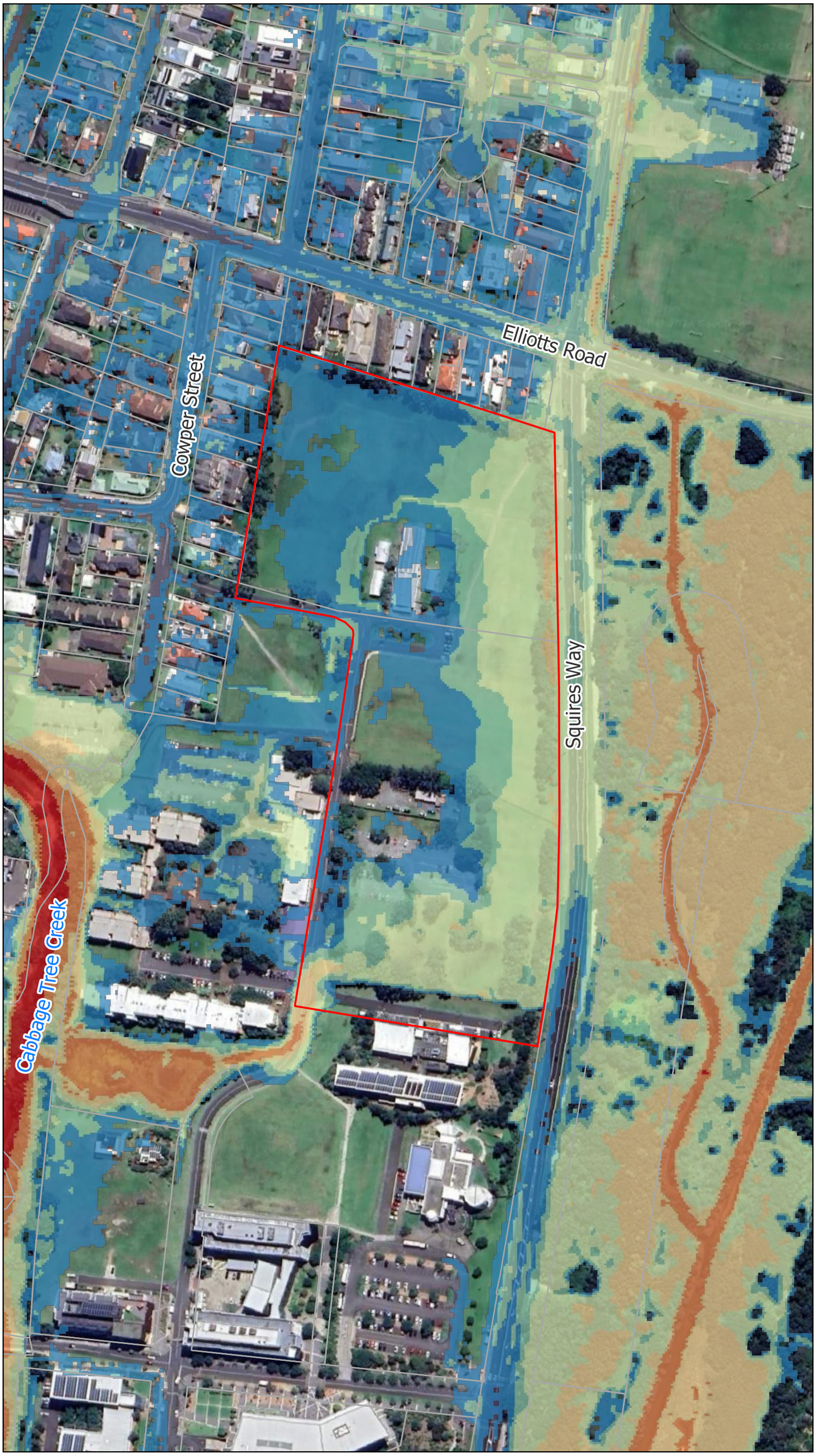
Figure B-66: 1% AEP Peak Flood Velocity x Depth - Existing Condition - Risk Blockage



aurecon

Legend

- Site Boundary
- Cadaster

Peak Flood Hazard Classification Band 1

- H1
- H2
- H3
- H4
- H5
- H6

Notes:

* For Information Only
* Hyrology ARR1987
* Hdraulics TUFLOW Classic Version 2018-03-AD

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0 100 200 m

A3 Scale: 1:2,600

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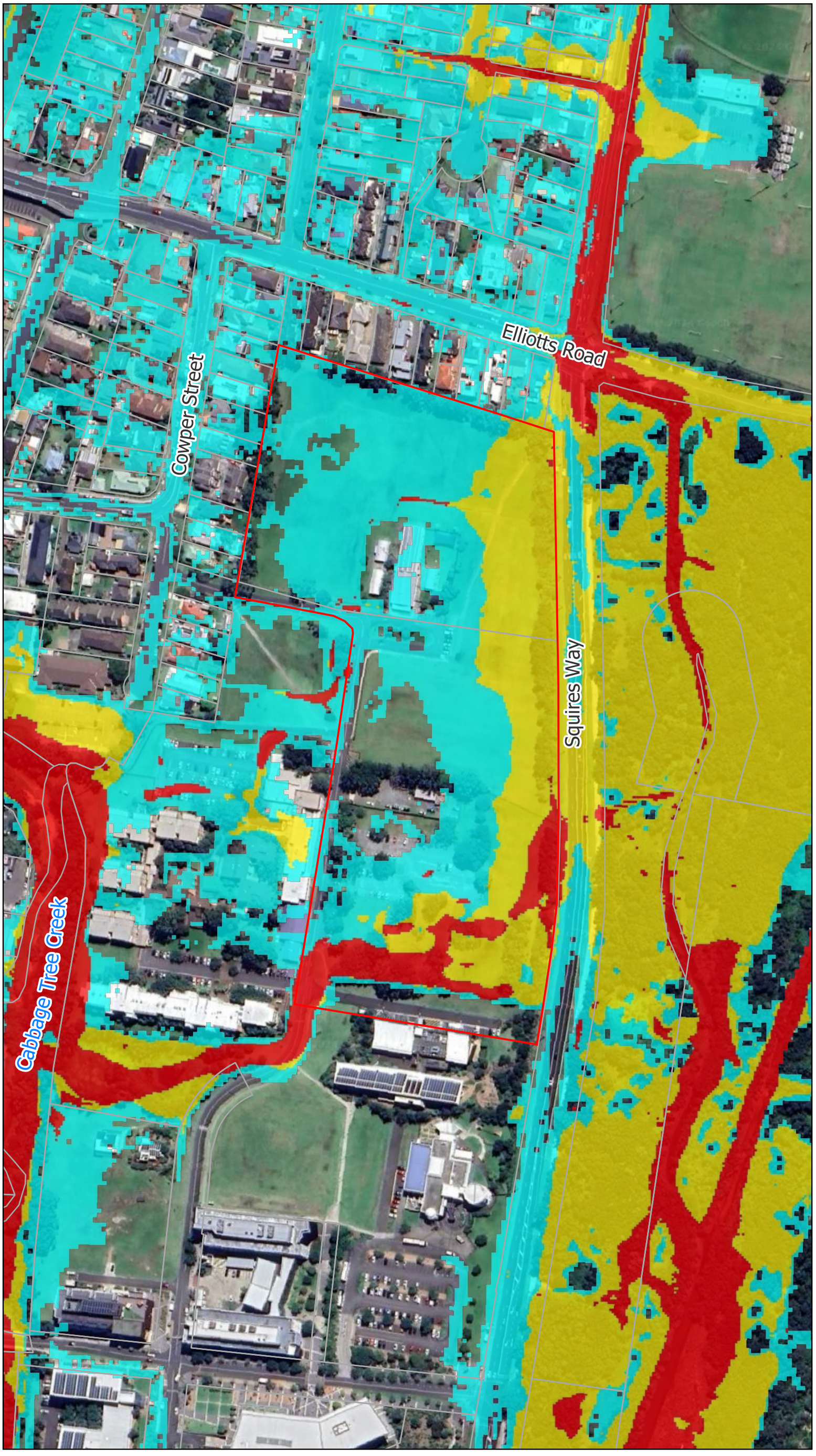
Figure B-67: 1% AEP Peak Flood Hazard - Existing Condition - Risk Blockage

aurecon



Legend

- Site Boundary
- Cadaster

Hydraulic Categories
Band 1

- Floodway
- Flood Storage
- Flood Fringe

Notes:

* For Information Only
* Hyrology ARR1987
* Hdraulics TUFLOW Classic Version 2018-03-AD

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0 100 200 m

A3 Scale: 1:2,600

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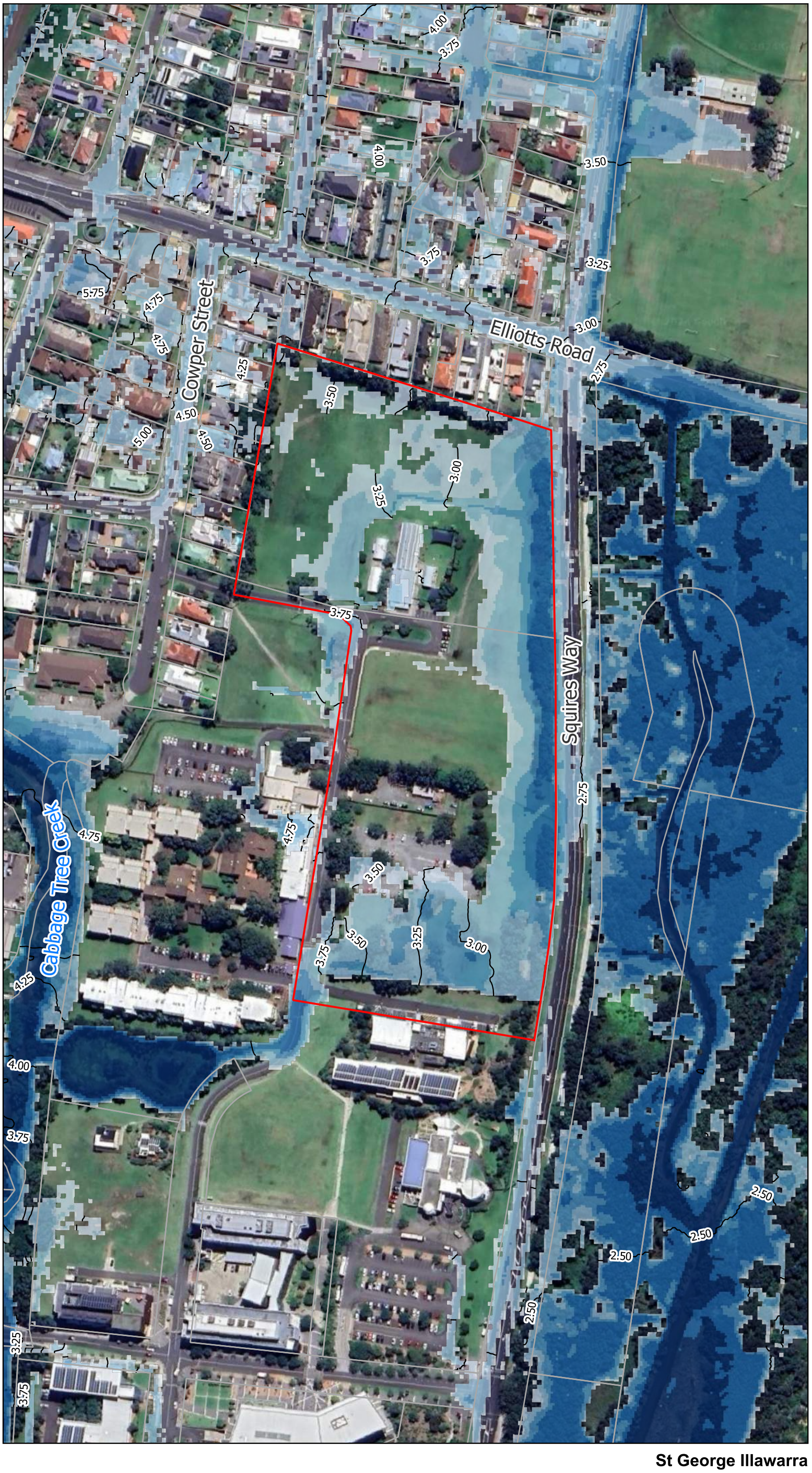
Figure B-68: 1% AEP Hydraulic Categories - Existing Condition - Risk Blockage



aurecon

Legend

- Site Boundary
- Cadaster
- Peak Flood Level (m AHD)

Peak Flood Depth (m)

Band 1

- <= 0.05
- 0.05 - 0.10
- 0.10 - 0.30
- 0.30 - 0.50
- 0.50 - 1.00
- > 1.00

Notes:

* For Information Only
* Hyrology ARR1987
* Hdraulics TUFLOW Classic Version 2018-03-AD

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0 100 200 m

A3 Scale: 1:2,600

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Figure B-69: 20 % AEP Peak Flood Level and Depth - Existing Condition - Risk Blockage

aurecon

Legend

- Site Boundary
- Cadaster

Peak Flood Velocity (m/s)

Band 1

- <= 0.25
- 0.25 - 0.5
- 0.5 - 0.75
- 0.75 - 1
- 1 - 1.5
- 1.5 - 1.75
- > 1.75

Notes:

* For Information Only
* Hyrology ARR1987
* Hdraulics TUFLOW Classic Version 2018-03-AD

Workspace: C:\Users\Abhishek.Darekar\OneDrive - Aurecon Group\Flooding\05_Figures\240222_Reportfigures\Mapping 3\Mapping\240222_Dragons_Mapping_Backup.qgz

0 100 200 m

A3 Scale: 1:2,600

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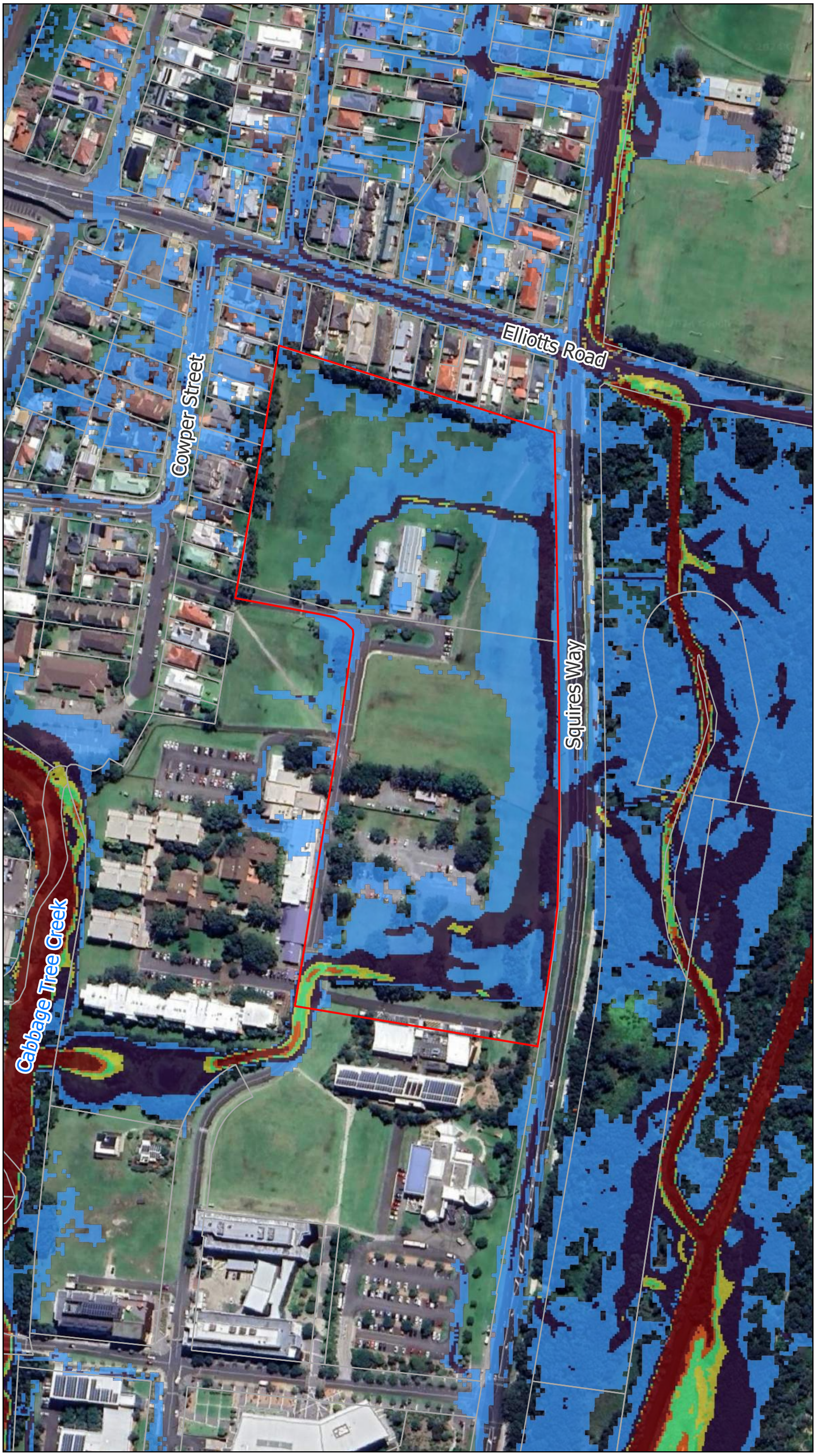
Figure B-70: 20 % AEP Peak Flood Velocity - Existing Condition - Risk Blockage



aurecon

Legend

- Site Boundary
- Cadaster

Peak Flood Vel x Depth (m2/s)
Band 1

- <= 0.05
- 0.05 - 0.15
- 0.15 - 0.20
- 0.20 - 0.25
- 0.25 - 0.30
- > 0.30

Notes:

* For Information Only
* Hyrology ARR1987
* Hdraulics TUFLOW Classic Version 2018-03-AD

Workspace: C:\Users\Abhishek.Darekar\OneDrive - Aurecon Group\Flooding\05_Figures\240222_Reportfigures\Mapping 3\Mapping\240222_Dragons_Mapping_Backup.qgz

0 100 200 m

A3 Scale: 1:2,600

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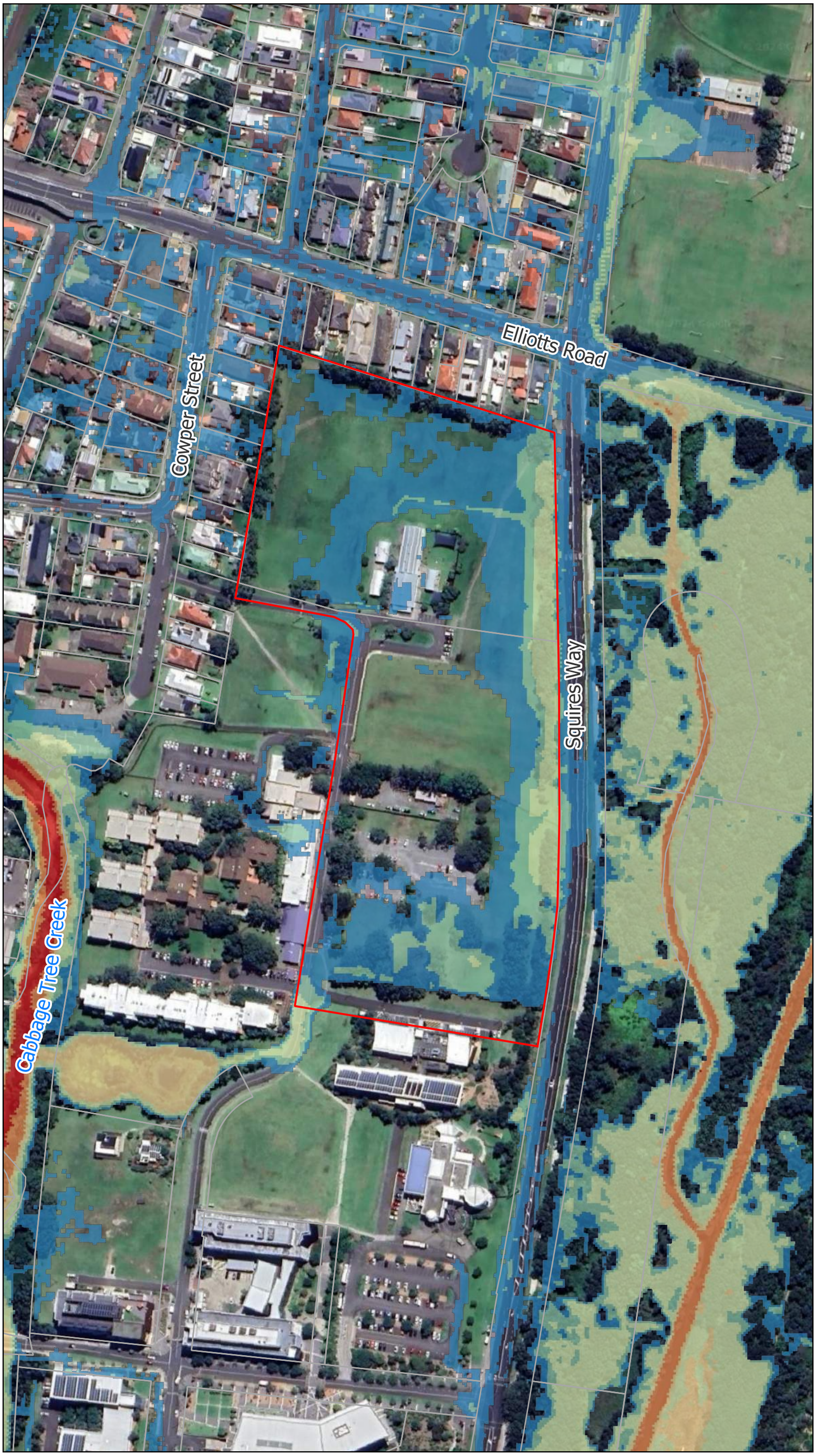
Figure B-71: 20 % AEP Peak Flood Velocity x Depth - Existing Condition - Risk Blockage



aurecon

Legend

- Site Boundary
- Cadaster

Peak Flood Hazard Classification Band 1

- H1
- H2
- H3
- H4
- H5
- H6

Notes:

* For Information Only
* Hyrology ARR1987
* Hdraulics TUFLOW Classic Version 2018-03-AD

0 100 200 m

A3 Scale: 1:2,600

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Figure B-72: 20 % AEP Peak Flood Hazard - Existing Condition - Risk Blockage

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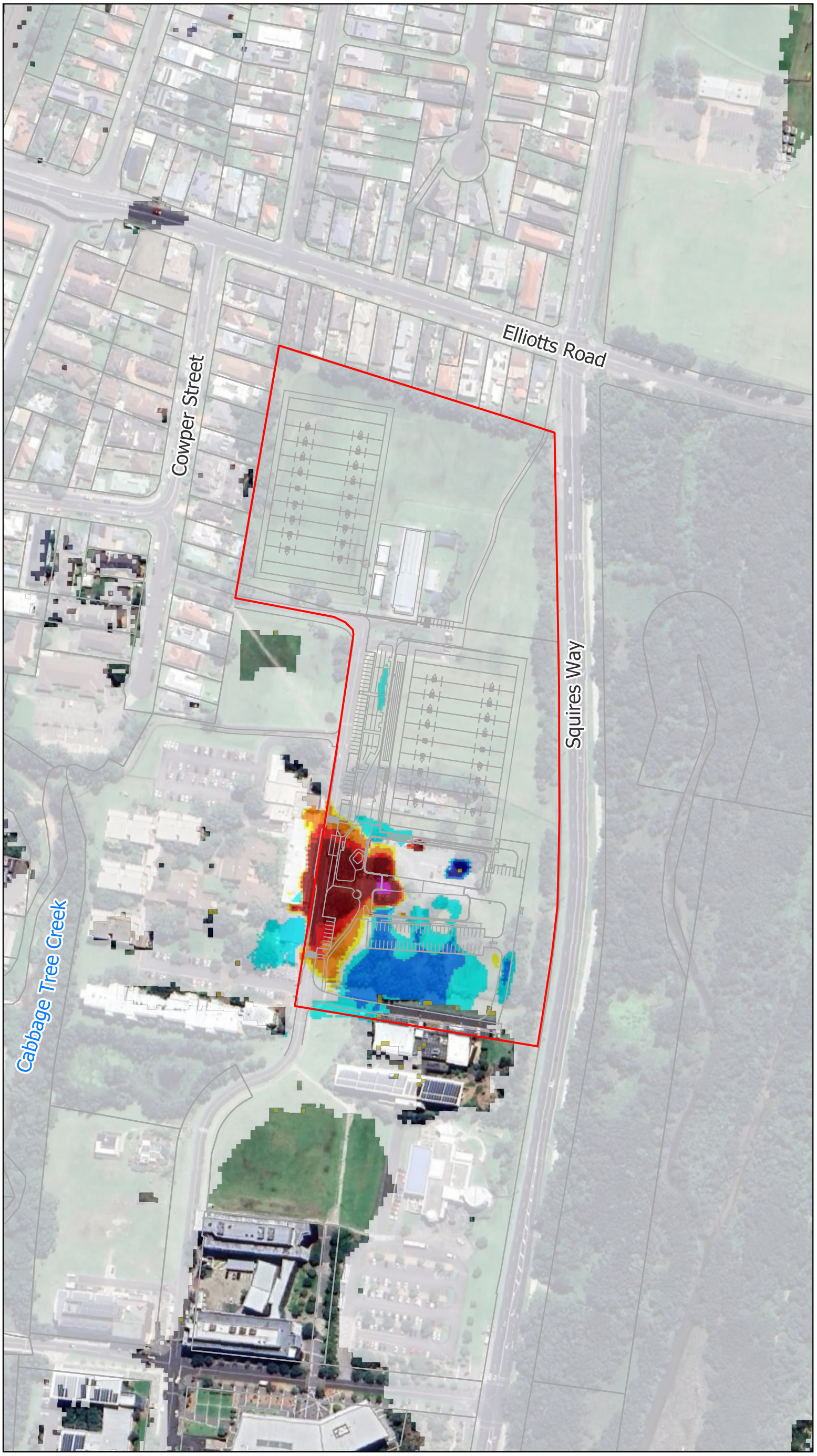
aurecon



Legend

- Site Boundary
- Cadaster
- Design Lines

Peak Flood Level Impact (m)
Band 1

- Area no longer inundated
- Less than -0.25
- -0.25 to -0.15
- -0.15 to -0.05
- -0.05 to -0.02
- -0.02 to 0.02
- 0.02 to 0.05
- 0.05 to 0.15
- 0.15 to 0.25
- Greater than 0.25
- New area of inundation

Notes:

* For Information Only
* Hyrology ARR1987
* Hdraulics TUFLOW Classic Version 2018-03-AD

0 100 200 m

A3 Scale: 1:2,600

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Figure B-73: PMF Peak Flood Level Impact - Zero Blockage

Workspace: C:\Users\Abhishek.Darekar\OneDrive - Aurecon Group\Flooding\05_Figures\240222_Reportfigures\Mapping 3\Mapping\240222_Dragons_Mapping_Backup.qgz

aurecon

Legend

- Site Boundary
- Cadaster
- Design Lines

Peak Flood Level Impact (m)
Band 1

- Area no longer inundated
- Less than -0.25
- -0.25 to -0.15
- -0.15 to -0.05
- -0.05 to -0.02
- -0.02 to 0.02
- 0.02 to 0.05
- 0.05 to 0.15
- 0.15 to 0.25
- Greater than 0.25
- New area of inundation

Notes:

* For Information Only
* Hyrology ARR1987
* Hdraulics TUFLOW Classic Version 2018-03-AD

Workspace: C:\Users\Abhishek.Darekar\OneDrive - Aurecon Group\Flooding\05_Figures\240222_Reportfigures\Mapping 3\Mapping\240222_Dragons_Mapping_Backup.qgz

0 100 200 m

A3 Scale: 1:2,600

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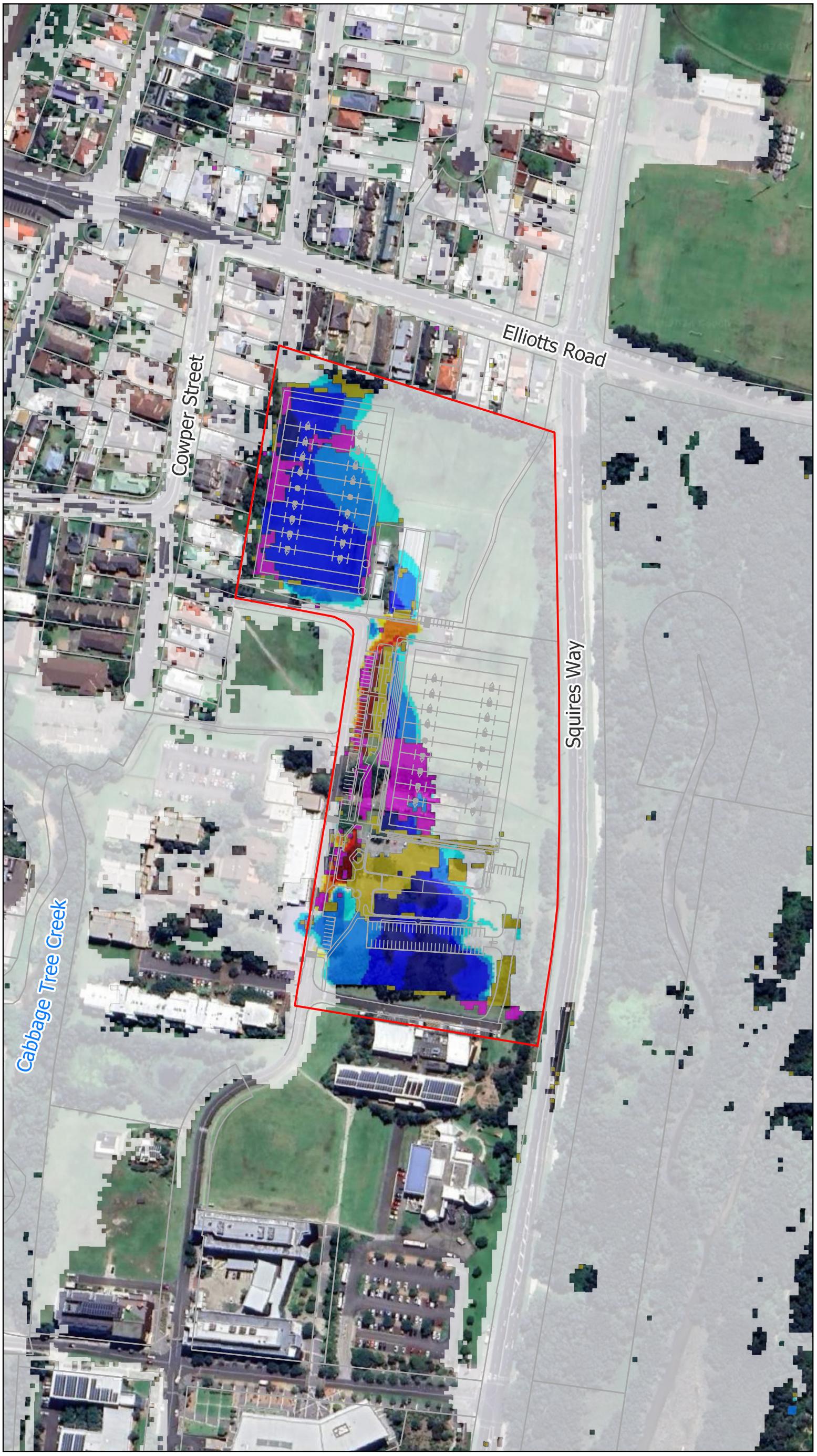
Figure B-74: 1% AEP+Climate Change Peak Flood Level Impact - Zero Blockage



aurecon

Legend

- Site Boundary
- Cadaster
- Design Lines

Peak Flood Level Impact (m)
Band 1

- Area no longer inundated
- Less than -0.25
- -0.25 to -0.15
- -0.15 to -0.05
- -0.05 to -0.02
- -0.02 to 0.02
- 0.02 to 0.05
- 0.05 to 0.15
- 0.15 to 0.25
- Greater than 0.25
- New area of inundation

Notes:

* For Information Only
* Hyrology ARR1987
* Hdraulics TUFLOW Classic Version 2018-03-AD

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0 100 200 m

A3 Scale: 1:2,600

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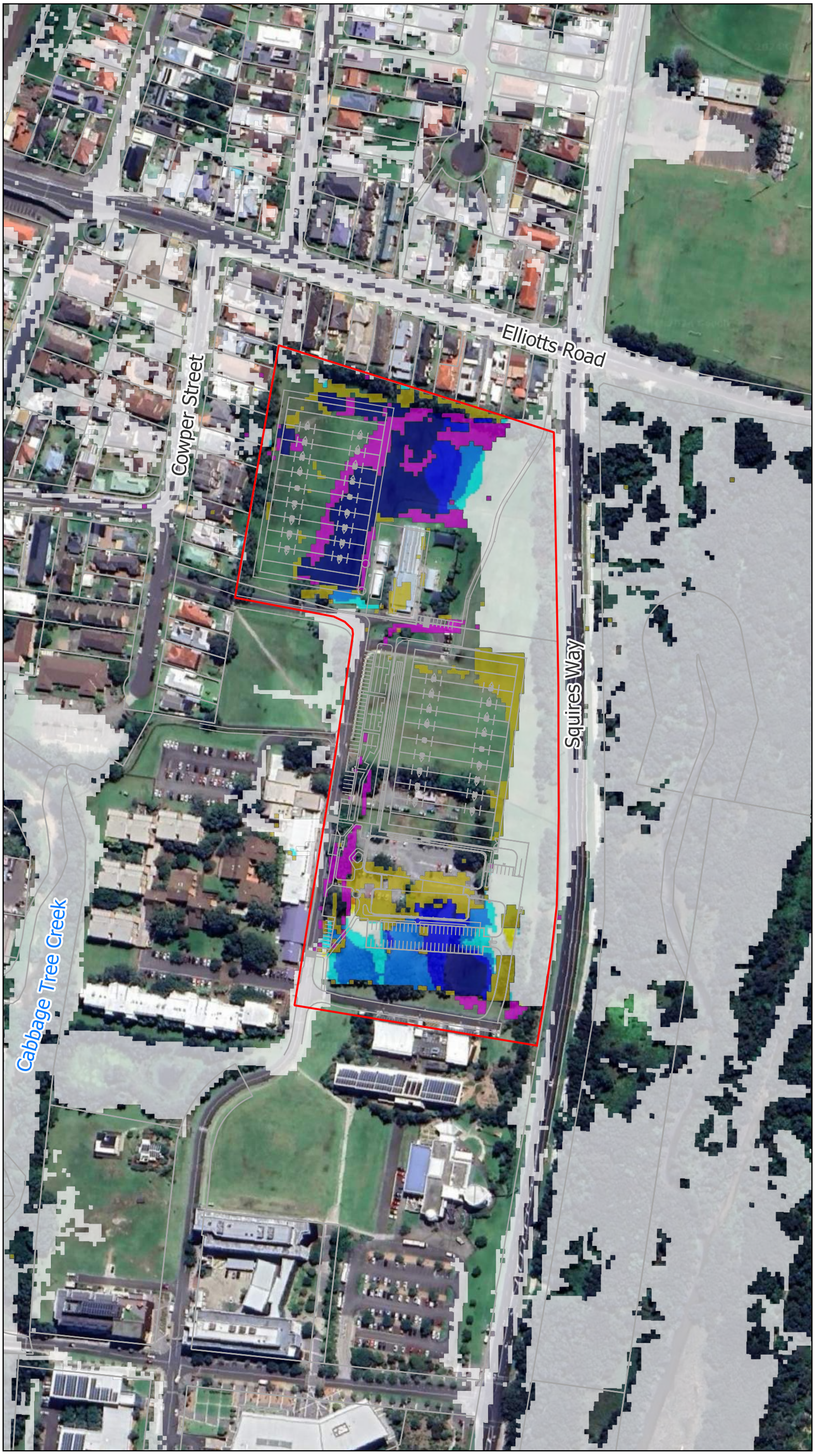
Figure B-75: 1% AEP Peak Flood Level Impact - Zero Blockage



aurecon

Legend

- Site Boundary
- Cadaster
- Design Lines

Peak Flood Level Impact (m)
Band 1

- Area no longer inundated
- Less than -0.25
- -0.25 to -0.15
- -0.15 to -0.05
- -0.05 to -0.02
- -0.02 to 0.02
- 0.02 to 0.05
- 0.05 to 0.15
- 0.15 to 0.25
- Greater than 0.25
- New area of inundation

Notes:

* For Information Only
* Hyrology ARR1987
* Hdraulics TUFLOW Classic Version 2018-03-AD

Workspace: C:\Users\Abhishek.Darekar\OneDrive - Aurecon Group\Flooding\05_Figures\240222_Reportfigures\Mapping 3\Mapping\240222_Dragons_Mapping_Backup.qgz

0 100 200 m

A3 Scale: 1:2,600

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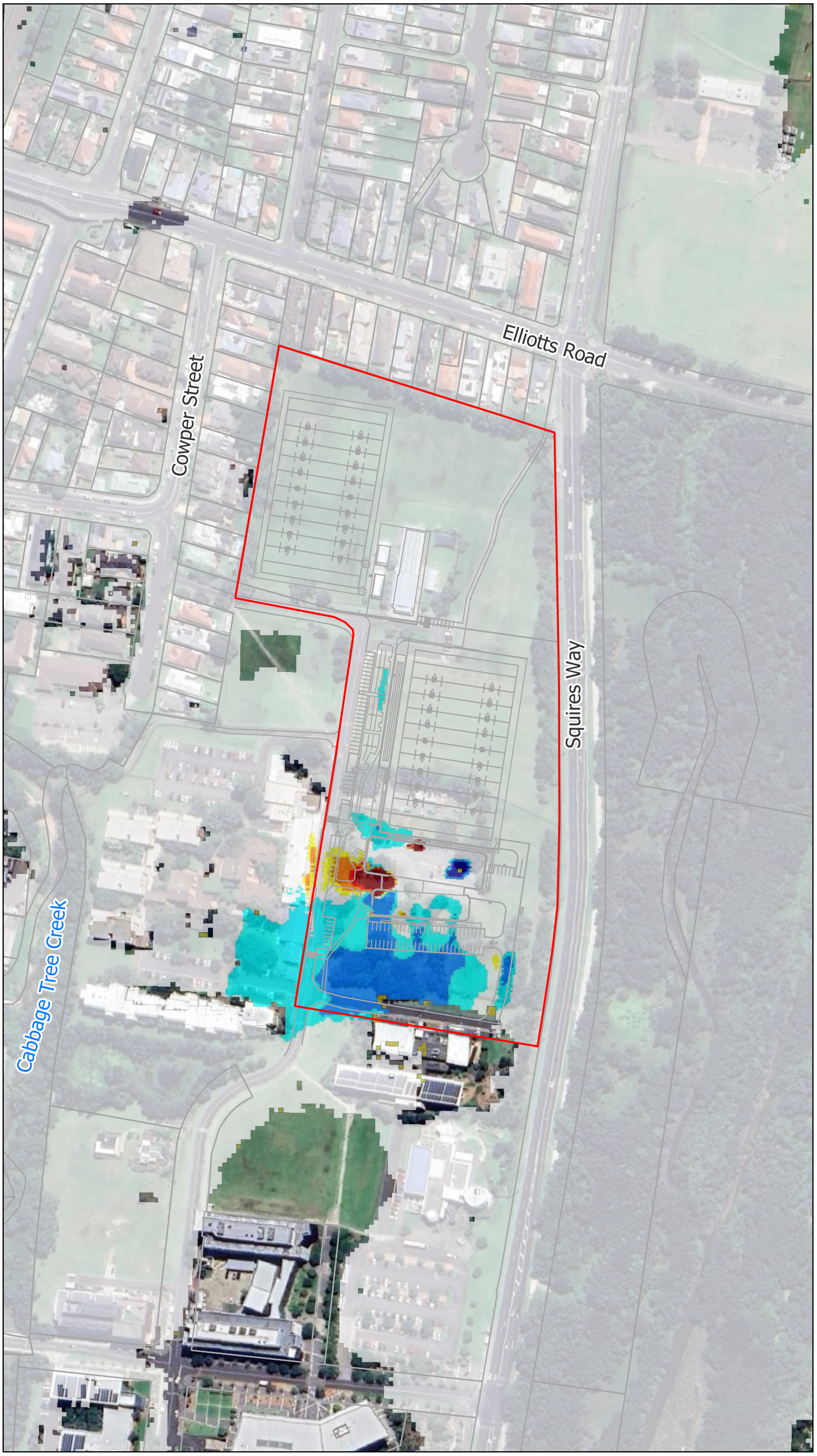
Figure B-76: 20 % AEP Peak Flood Level Impact - Zero Blockage



aurecon

Legend

- Site Boundary
- Cadaster
- Design Lines

Peak Flood Level Impact (m)

Band 1

- Area no longer inundated
- Less than -0.25
- -0.25 to -0.15
- -0.15 to -0.05
- -0.05 to -0.02
- -0.02 to 0.02
- 0.02 to 0.05
- 0.05 to 0.15
- 0.15 to 0.25
- Greater than 0.25
- New area of inundation

Notes:

* For Information Only
* Hyrology ARR1987
* Hdraulics TUFLOW Classic Version 2018-03-AD

0 100 200 m

A3 Scale: 1:2,600

24/2/2024 GDA94 / MGA zone 56

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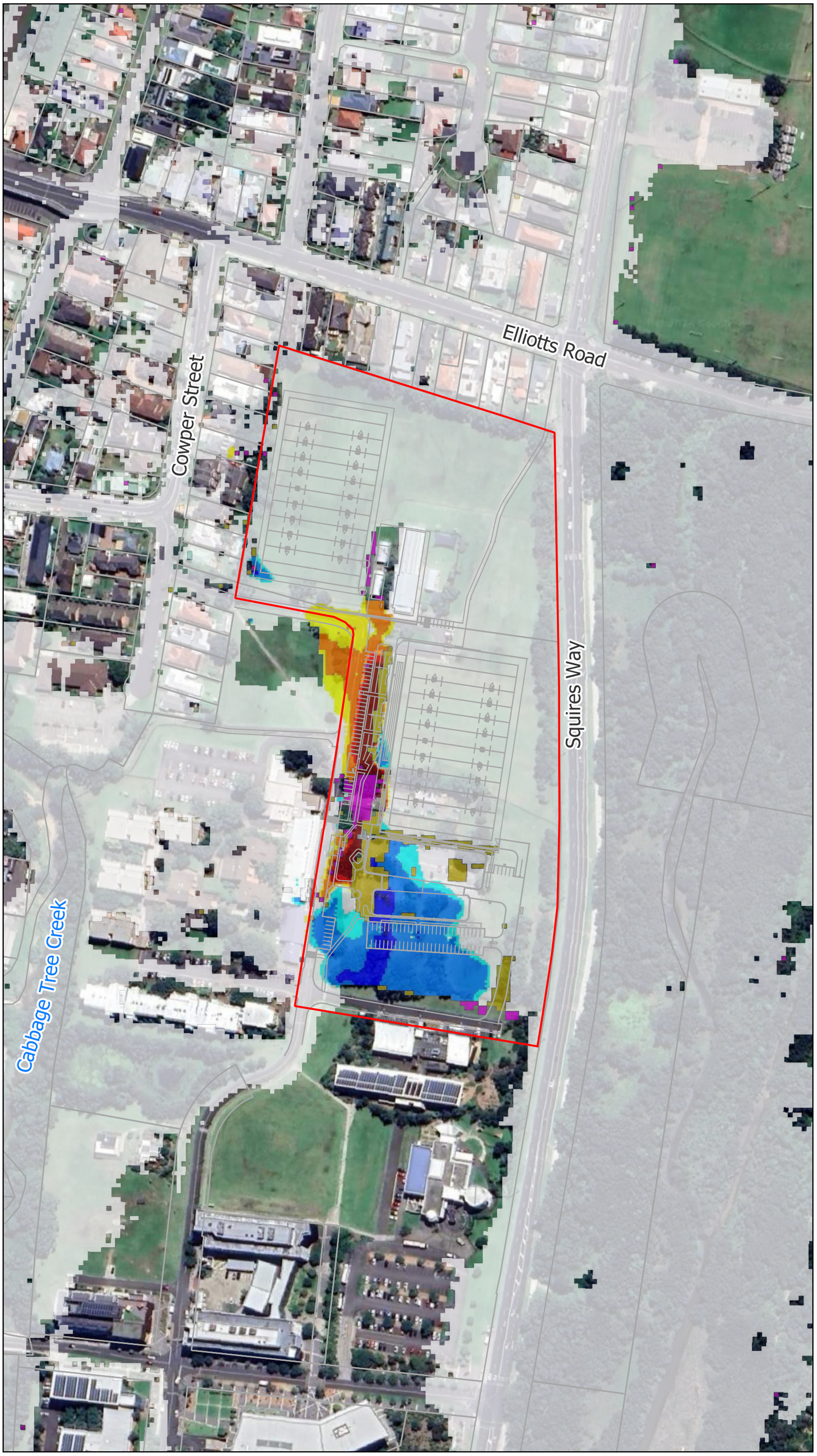
Figure B-77: PMF Peak Flood Level Impact - Design Blockage

Workspace: C:\Users\Abhishek.Darekar\OneDrive - Aurecon Group\Flooding\05_Figures\240222_Reportfigures\Mapping 3\Mapping\240222_Dragons_Mapping_Backup.qgz



aurecon

Legend

- Site Boundary
- Cadaster
- Design Lines

Peak Flood Level Impact (m)
Band 1

- Area no longer inundated
- Less than -0.25
- -0.25 to -0.15
- -0.15 to -0.05
- -0.05 to -0.02
- -0.02 to 0.02
- 0.02 to 0.05
- 0.05 to 0.15
- 0.15 to 0.25
- Greater than 0.25
- New area of inundation

Notes:

* For Information Only
* Hyrology ARR1987
* Hdraulics TUFLOW Classic Version 2018-03-AD

Workspace: C:\Users\Abhishek.Darekar\OneDrive - Aurecon Group\Flooding\05_Figures\240222_Reportfigures\Mapping 3\Mapping\240222_Dragons_Mapping_Backup.qgz

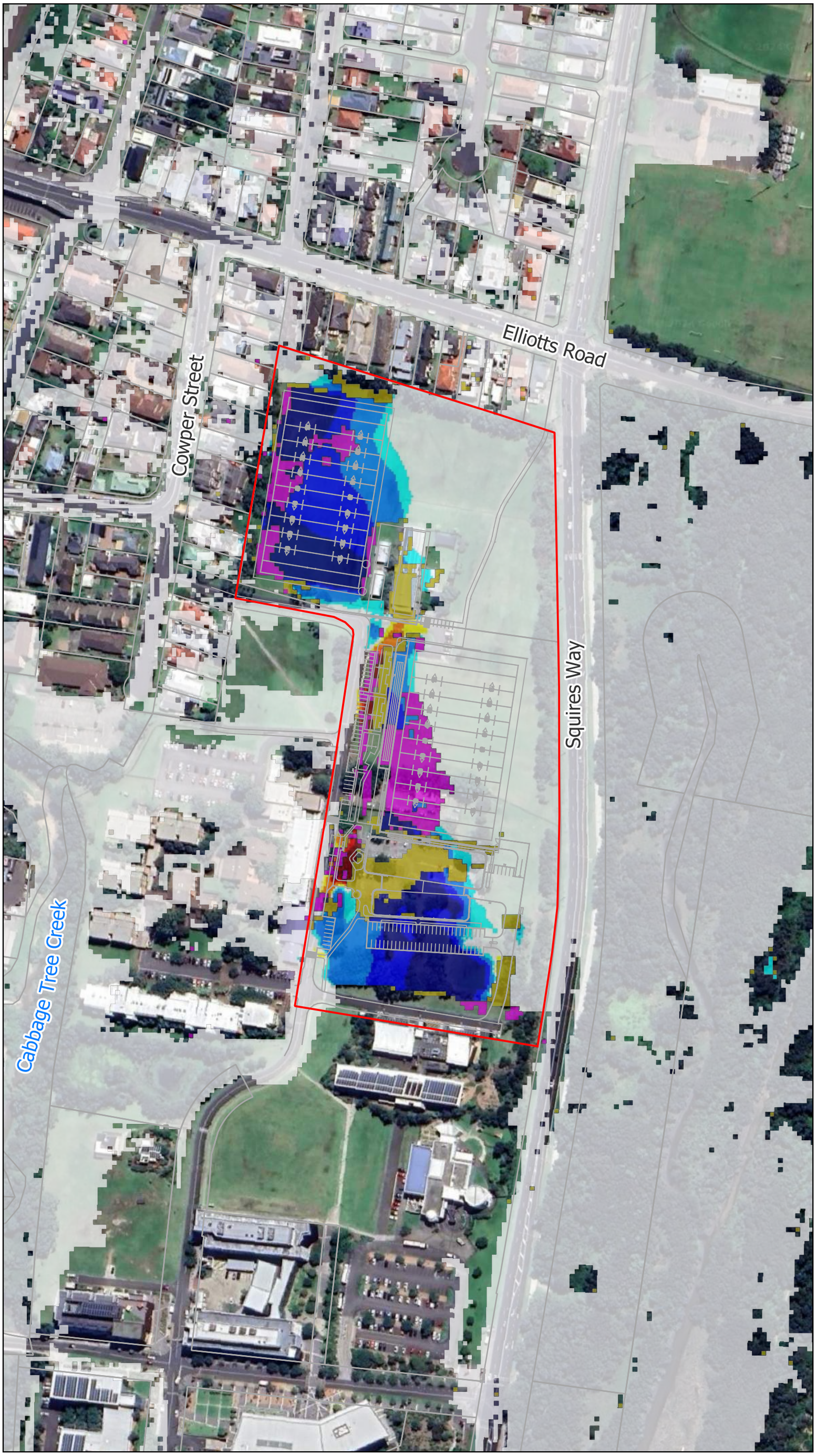
0 100 200 m

A3 Scale: 1:2,600

24/2/2024 GDA94 / MGA zone 56

St George Illawarra Dragons Community & High Performance Centre

Figure B-78: 1% AEP+Climate Change Peak Flood Level Impact - Design Blockage



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Legend

- Site Boundary
- Cadaster
- Design Lines

Peak Flood Level Impact (m)

Band 1

- Area no longer inundated
- Less than -0.25
- -0.25 to -0.15
- -0.15 to -0.05
- -0.05 to -0.02
- -0.02 to 0.02
- 0.02 to 0.05
- 0.05 to 0.15
- 0.15 to 0.25
- Greater than 0.25
- New area of inundation

Notes:

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0 100 200 m

A3 Scale: 1:2,600

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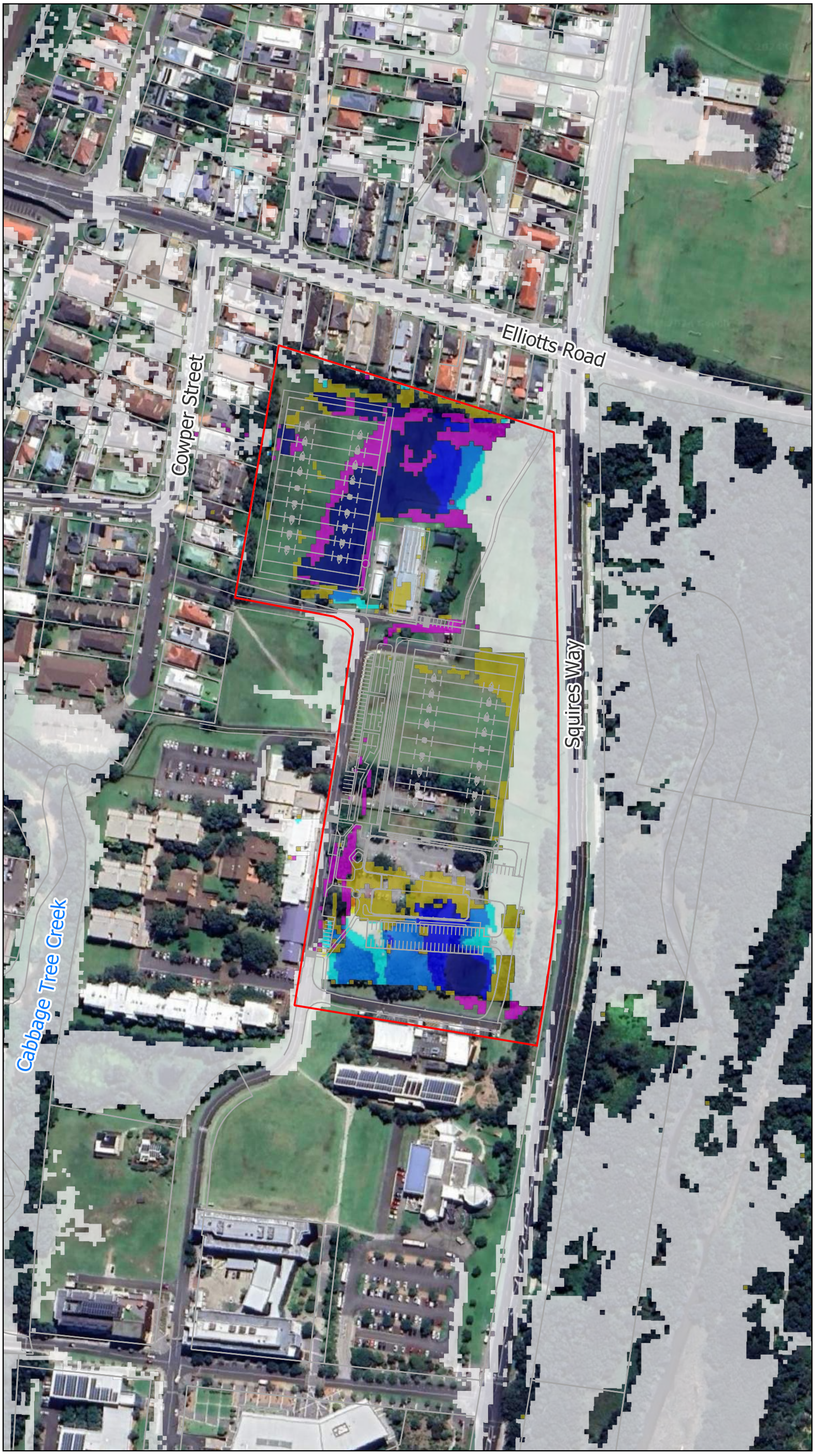
Figure B-79: 1% AEP Peak Flood Level Impact - Design Blockage



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Legend

- Site Boundary
- Cadaster
- Design Lines

Peak Flood Level Impact (m)

Band 1

- Area no longer inundated
- Less than -0.25
- -0.25 to -0.15
- -0.15 to -0.05
- -0.05 to -0.02
- -0.02 to 0.02
- 0.02 to 0.05
- 0.05 to 0.15
- 0.15 to 0.25
- Greater than 0.25
- New area of inundation

Notes:

* For Information Only
* Hyrology ARR1987
* Hdraulics TUFLOW Classic Version 2018-03-AD

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0 100 200 m

A3 Scale: 1:2,600

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Figure B-80: 20 % AEP Peak Flood Level Impact - Design Blockage

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Legend

- Site Boundary
- Cadaster
- Design Lines

Peak Flood Level Impact (m)

Band 1

- Area no longer inundated
- Less than -0.25
- -0.25 to -0.15
- -0.15 to -0.05
- -0.05 to -0.02
- -0.02 to 0.02
- 0.02 to 0.05
- 0.05 to 0.15
- 0.15 to 0.25
- Greater than 0.25
- New area of inundation

Notes:

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0 100 200 m

A3 Scale: 1:2,600

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Figure B-81: PMF Peak Flood Level Impact - Risk Blockage

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Legend

- Site Boundary
- Cadaster
- Design Lines

Peak Flood Level Impact (m)
Band 1

- Area no longer inundated
- Less than -0.25
- -0.25 to -0.15
- -0.15 to -0.05
- -0.05 to -0.02
- -0.02 to 0.02
- 0.02 to 0.05
- 0.05 to 0.15
- 0.15 to 0.25
- Greater than 0.25
- New area of inundation

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0 100 200 m

A3 Scale: 1:2,600

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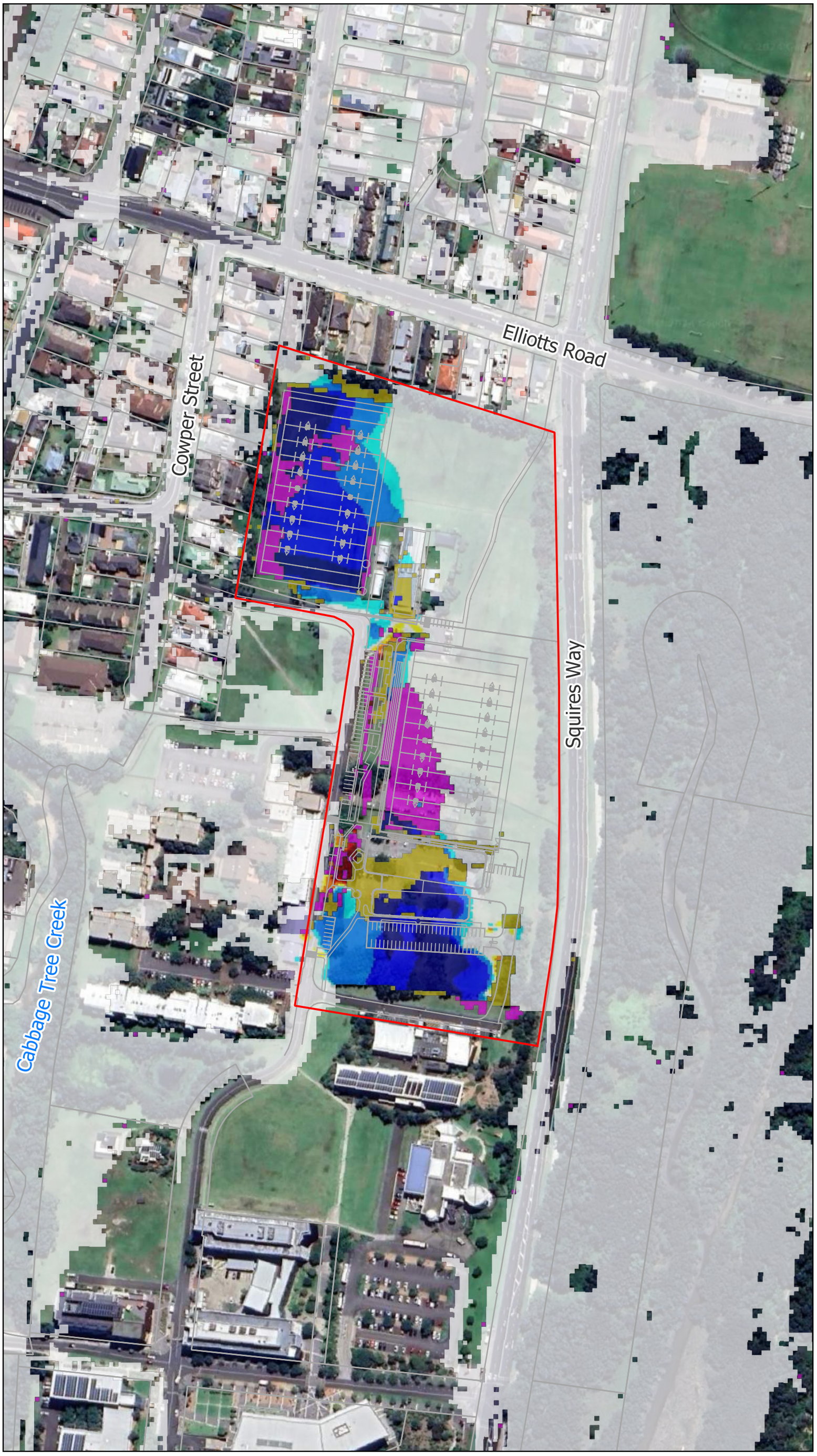
Figure B-82: 1% AEP+Climate Change Peak Flood Level Impact - Risk Blockage



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Legend

- Site Boundary
- Cadaster
- Design Lines

Peak Flood Level Impact (m)
Band 1

- Area no longer inundated
- Less than -0.25
- -0.25 to -0.15
- -0.15 to -0.05
- -0.05 to -0.02
- -0.02 to 0.02
- 0.02 to 0.05
- 0.05 to 0.15
- 0.15 to 0.25
- Greater than 0.25
- New area of inundation

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0 100 200 m

A3 Scale: 1:2,600

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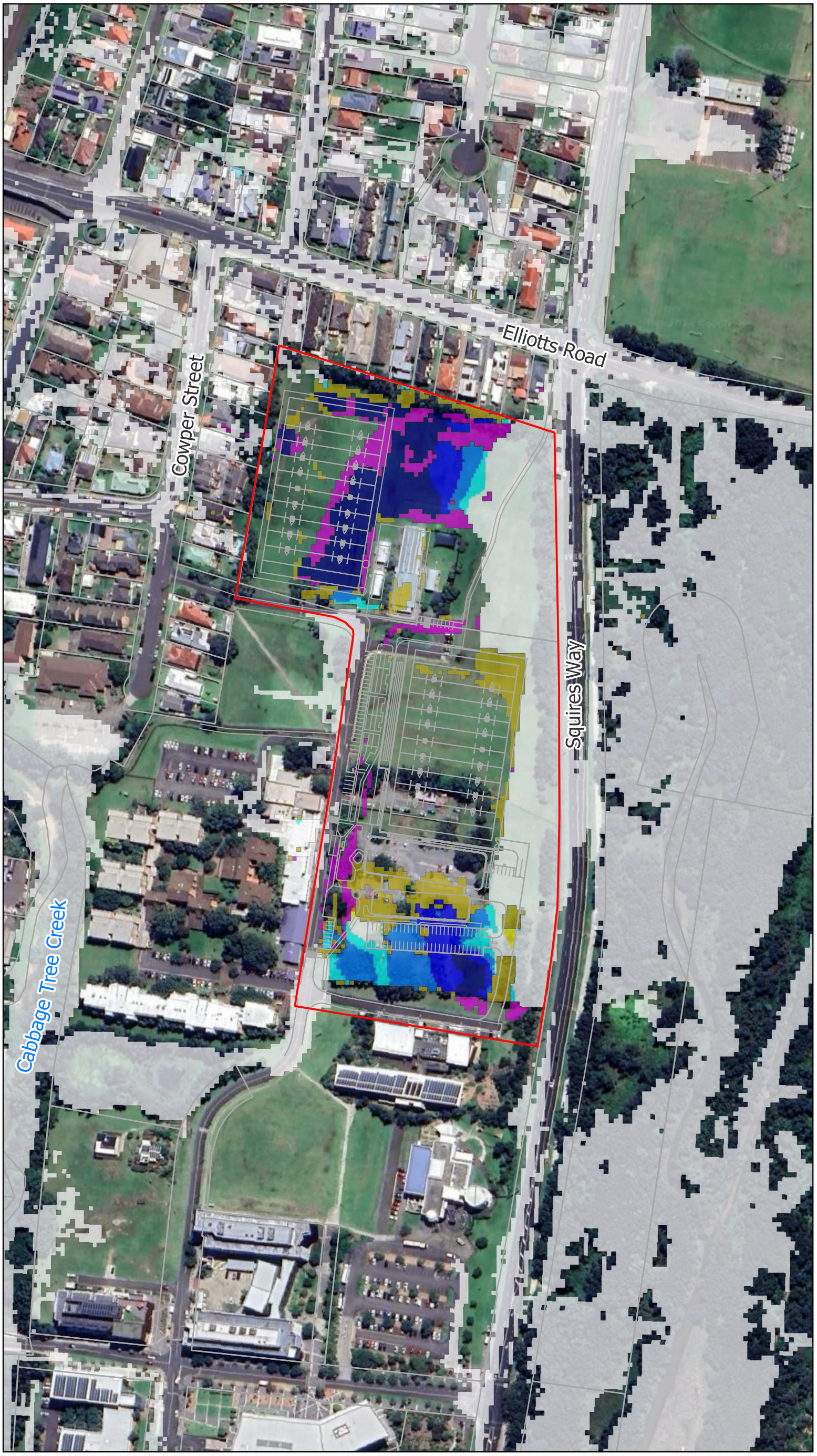
Figure B-83: 1% AEP Peak Flood Level Impact - Risk Blockage



aurecon

Legend

- Site Boundary
- Cadaster
- Design Lines

Peak Flood Level Impact (m)
Band 1

- Area no longer inundated
- Less than -0.25
- -0.25 to -0.15
- -0.15 to -0.05
- -0.05 to -0.02
- -0.02 to 0.02
- 0.02 to 0.05
- 0.05 to 0.15
- 0.15 to 0.25
- Greater than 0.25
- New area of inundation

Notes:

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0 100 200 m

A3 Scale: 1:2,600

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Figure B-84: 20 % AEP Peak Flood Level Impact - Risk Blockage

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