Reference: 20240057-L02_flood study [A].docx

Date: April 8, 2025

La Salle Group
Attn: Joseph Touma
36 Meredith Street
Bankstown NSW 2200

Dear Sir,

RE: PROPOSED SELF-STORAGE UNITS – 88 HELEN STREET, SEFTON

FLOOD IMPACT STUDY

INTRODUCTION

The proposed industrial development is located in an industrial zone in the local government area of Canterbury Bankstown Council.

The site is bounded by Helen Street to the West, adjoining property to the South and Duck River to the East and North. The Duck Creek channel runs along the eastern boundary of the site and flows from South to North.

Canterbury Bankstown Council requires a flood study to be carried out to determine if the proposed development has any adverse impacts on the flooding regime in the vicinity of the site. Specifically, the concern raised by council relates to the obstructions caused by the proposed columns in the proposed flood void under the ground floor slab. Council requires that these columns be accounted for in the modelling. Additionally, some landscaping has been proposed in the overland flow path area.

The post developed scenario of the flood model has accounted for the change in Mannings Roughness Coefficient for the assessment of the flood behaviour.

This report should be read in conjunction with the Stormwater System Report provided Canterbury Bankstown Council, dated 18th April 2024.

REFERENCE DOCUMENTS

The following documents have been referenced in this report:-

1. Stormwater System Report (SSR) provided by Canterbury Bankstown Council, ref: WP-SIAONL-742/2024, dated 18/04/2024;
2. Stormwater Catchment Flooding from Duck River Stormwater Catchment Study (prepared by BMT WBM, 2009);
3. Site survey prepared by W. Buxton Pty Ltd, ref: 205834 dated 04/03/2024;
4. Architectural drawings prepared by Gelder Group Architects;
5. NSW Government “The Flood Risk Management Manual” (2023); and
6. Engineers Australia, Australian Rainfall & Runoff.

NATURAL & BUILT ENVIRONMENT

The site is currently made of lot X in DP 420237 with an area of 5201.8m^2. It is trapezoidal in shape and is characterised by a gentle sloping natural gradient from South to North.

Figure 1 shows the location of the site.

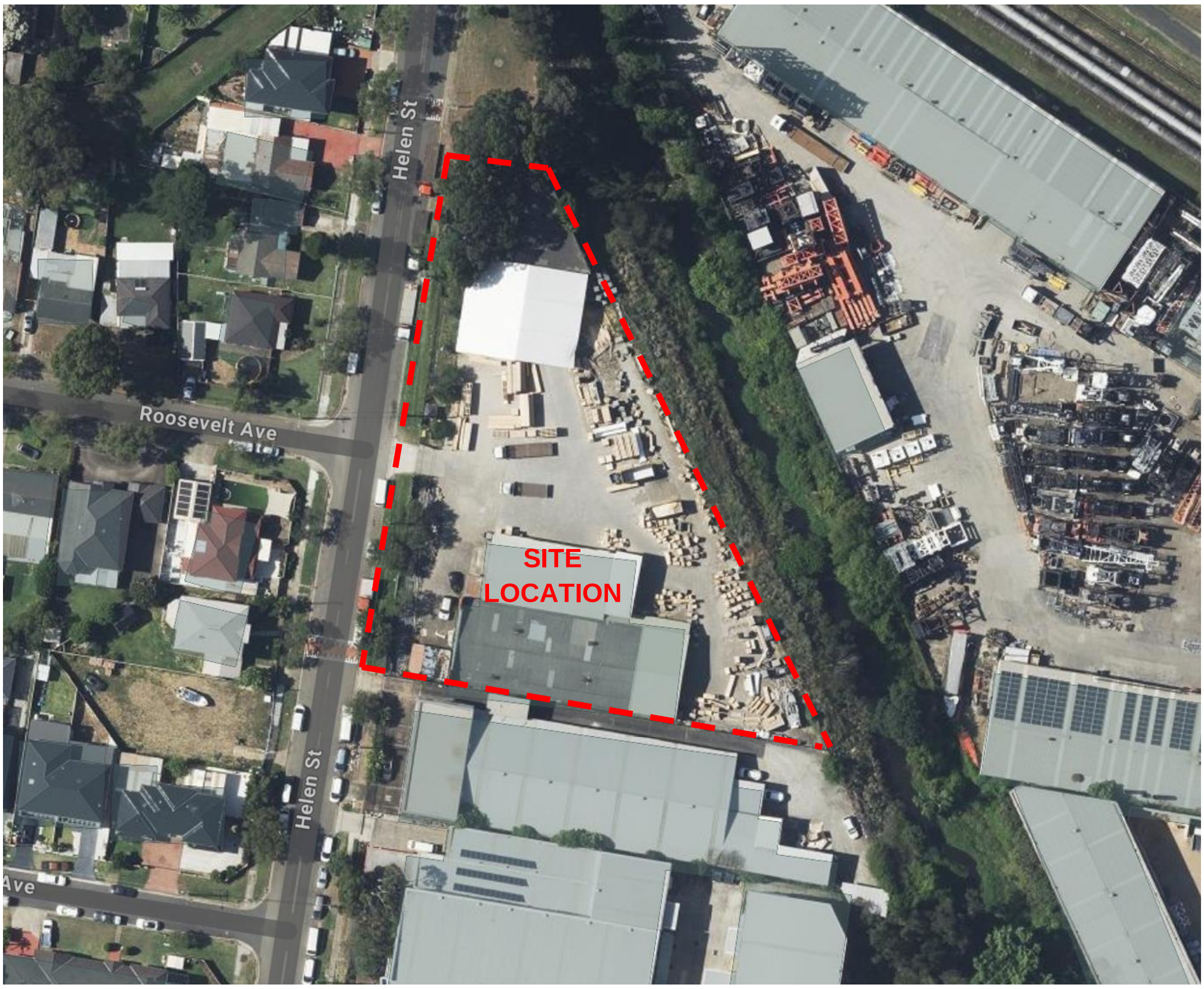


Figure 1 Locality Plan

The site is bounded by the Duck Creek channel to the east, which is located in a separate lot 52 in DP 260482. The site is also affected by an existing easement for drainage and sewerage purposes that runs along the alignment of the Duck Creek channel.

The site is affected by flooding from the 20% AEP, 1% AEP and PMF storm events as identified in the SSR. The flooding on the site is classified as MEDIUM risk. The VxD product is below 0.4m^2/s.

PROPOSED DEVELOPMENT

The proposed development is a light industrial facility suspended over the existing ground level of the site. Figure 2 below shows an extract of the site plan from the architectural drawings.

The proposed development includes a flood void under the whole building structure to allow for overland flows to go through and to eliminate any adverse impacts on flooding elsewhere. To account for structural columns within the flood void, the modelling included a 50% blockage ratio in the void.

The perimeter of the void will be closed off with a pervious screen in the shape of vertical bars spaced out 75mm to allow floodwater to enter the void but prevent persons from going in the void. A blockage ratio of 25% is applied to the perimeter screen.

The piers under the suspended slab account for an area of 1.91% of the total ground floor suspended slab. The modelling with 50% void is not showing any impact elsewhere in the floodplain so it is considered suitable.

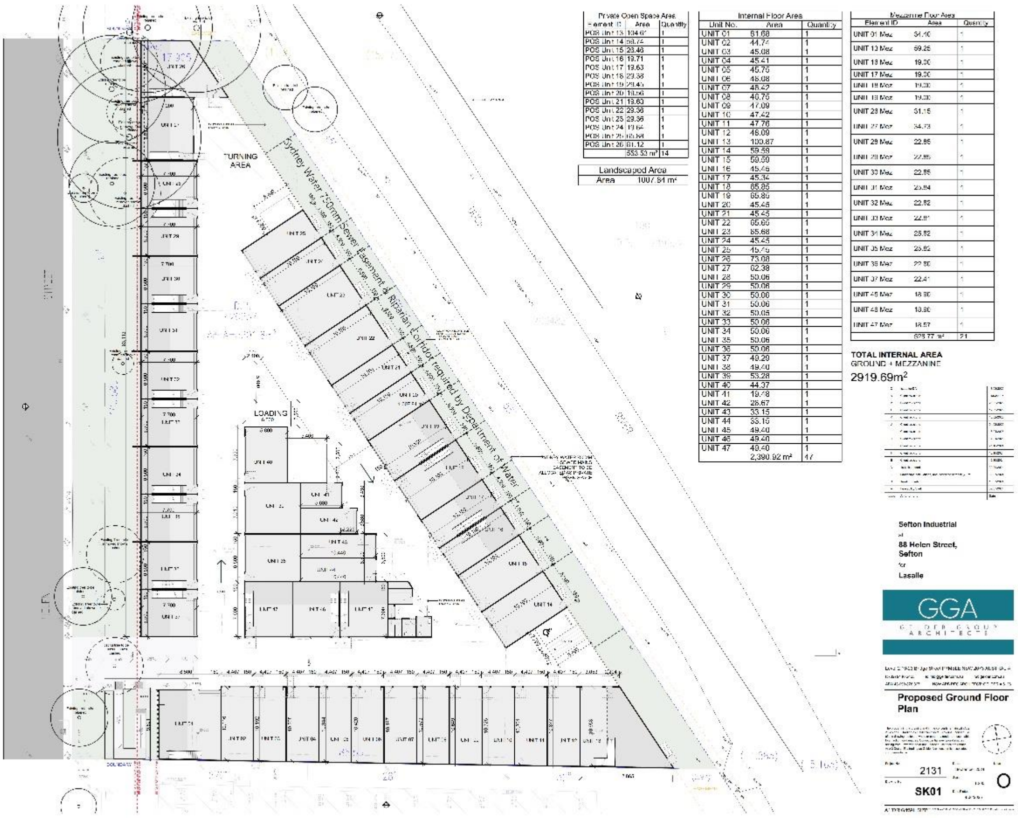


Figure 2 Proposed Ground Floor Plan

FLOOD STUDY

Canterbury Bankstown Council

At SGC's request, Canterbury Bankstown Council provided the flood extent maps in 20% AEP, 1% AEP and the PMF event. The issued SSR and the associated flooding details are included in Appendix 3.

Council also instructed to obtain a copy of the Duck River Stormwater Catchment Study model files from them, which were used in this flood impact study specific for the site.

The flood model used in this study includes:

- 100yr 120min is the critical storm duration;
- Blocked drainage scenario for lintels and structures <6m; and
- 5m grid everywhere in the flood model extents except around the site which is reduced to 1m as requested by council.

Objectives

The purpose of this flood study is to understand and document the Impact of the proposed development on flooding and to determine the measures that need to be implemented for the development not to have any adverse impacts on the flooding characteristics elsewhere in the floodplain.

In summary, the objectives are as follows:-

- Use the existing flood study model for Duck River Stormwater Catchment Study as a starting point to determine the flood levels across the site and establish a benchmark;
- Define design flood levels, depths and hazards for the existing site conditions;
- Modify the site conditions to represent post-development scenario with the proposed flood void to predict the anticipated flood levels, depths and hazards for 1% AEP storm event;
- Determine if the proposed development has any adverse impact on flooding;
- Propose mitigation measures; and
- Adopt these measures in the stormwater and the architectural plans and implement them during construction.

Hydraulic Modelling

The model is a dynamic 1D-2D TUFLOW model. The grid size is 5m x 5m, which is consistent with the original TUFLOW model. In the vicinity of the site, the grid is reduced to 1m x 1m as per council's request.

Hydraulic Roughness

The hydraulic roughness zones have been updated to reflect the change in land use associated with the proposed development. The Mannings roughness value for the flood void has been revised to 0.025 as these will have smooth concrete finish in the post development scenario. The high manning roughness used for the existing building are removed in the post development scenario.

The image below shows the location and frequency of piers under the suspended slab. As can be seen, the piers are spread out and minimal in terms of area compared to the deck.

Figure 3 Structural Piers in void

Building Undercroft Void and Screening

The building's undercroft flood void reserved for flood storage has been represented by a layered flow constriction in TUFLOW model in the post development scenario. A blockage factor of 50% has been introduced to take into account the proposed structural columns. This blockage ratio is considered conservative as the columns shown on the structural and the architectural plans represent a much smaller area than 50%. The screen around the perimeter of the flood void is also modelled using a layered flow constriction in TUFLOW with a blockage factor of 25%.

2D Model Setup & Critical Storm Duration

The 120-minute duration is adopted as the critical storm which is consistent with the TUFLOW flood model for Duck Creek.

Design Flood Modelling Results

Design flood modelling was undertaken for the 1% AEP design flood event. The results are included in Appendix 1 of this report.

Flood impact maps for the modelled storm event is produced to compare the proposed flooding conditions to the existing current flooding conditions and demonstrate that the development does not increase the flood levels elsewhere in the floodplain.

DISCUSSION

This section of the report provides a review of the results and discusses Council's requirements.

1. The proposed development does not have any adverse impacts on the flooding elsewhere in the floodplain. This can be seen in the flood impact maps (difference between post and pre site conditions) which show that the proposed development does not increase the flood levels and hazards elsewhere in the floodplain. This indicates that there is no change in the flood conveyance and no loss in flood storage;
2. The 50% blockage in the flood void to simulate the structural columns does not translate in any adverse impacts and does not reduce the functionality of the flood void; and
3. The 25% blockage in the perimeter screen does not increase flooding elsewhere.

In our opinion, the proposed building footprint does not displace the floodwaters in such a manner to impact on the flooding behaviour in terms of loss of flood storage, increase in velocity and risk. The following table shows the pre vs post flood levels across the site.

Table 1 Flood Level Comparison

Location	1% AEP Flood Level (Existing)	1% AEP Flood Level (Proposed)	Difference (m)	Complies
A	19.792	19.783	-0.009	Y
B	19.867	19.880	+0.013	Y
C	19.789	19.804	+0.015	Y
D	19.783	19.774	-0.009	Y
E	19.792	19.780	-0.012	Y

The location of the flood levels is shown below.

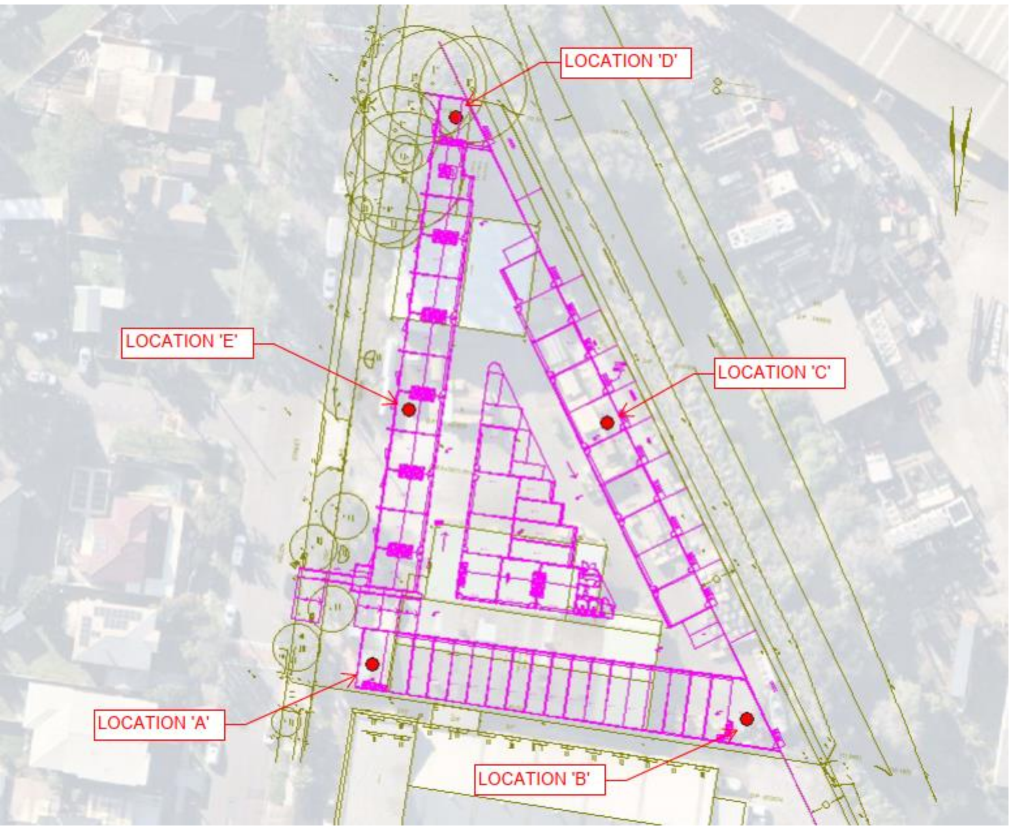


Figure 4 Flood Level Location

CONCLUSIONS

A detailed investigation on the flooding behaviour has been undertaken in the vicinity of the proposed development at 88 Helen Street, Sefton.

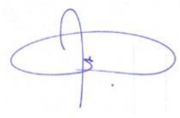
Using the established model, the study determined the flood behaviour for the 1% AEP. The primary flood characteristics reported for the design events considered include depths, levels and velocities. The study has also defined the Provisional Flood Hazard for flood-affected areas.

The impact of the proposed development was assessed and was found to be NIL in the adjoining sites. The flood maps are included under Appendix 1. The study addressed Council's requirements as per the DCP. In our opinion, Council should allow the development in its current proposal.

Should you have any further queries or questions, please do not hesitate to contact the undersigned.

Yours faithfully

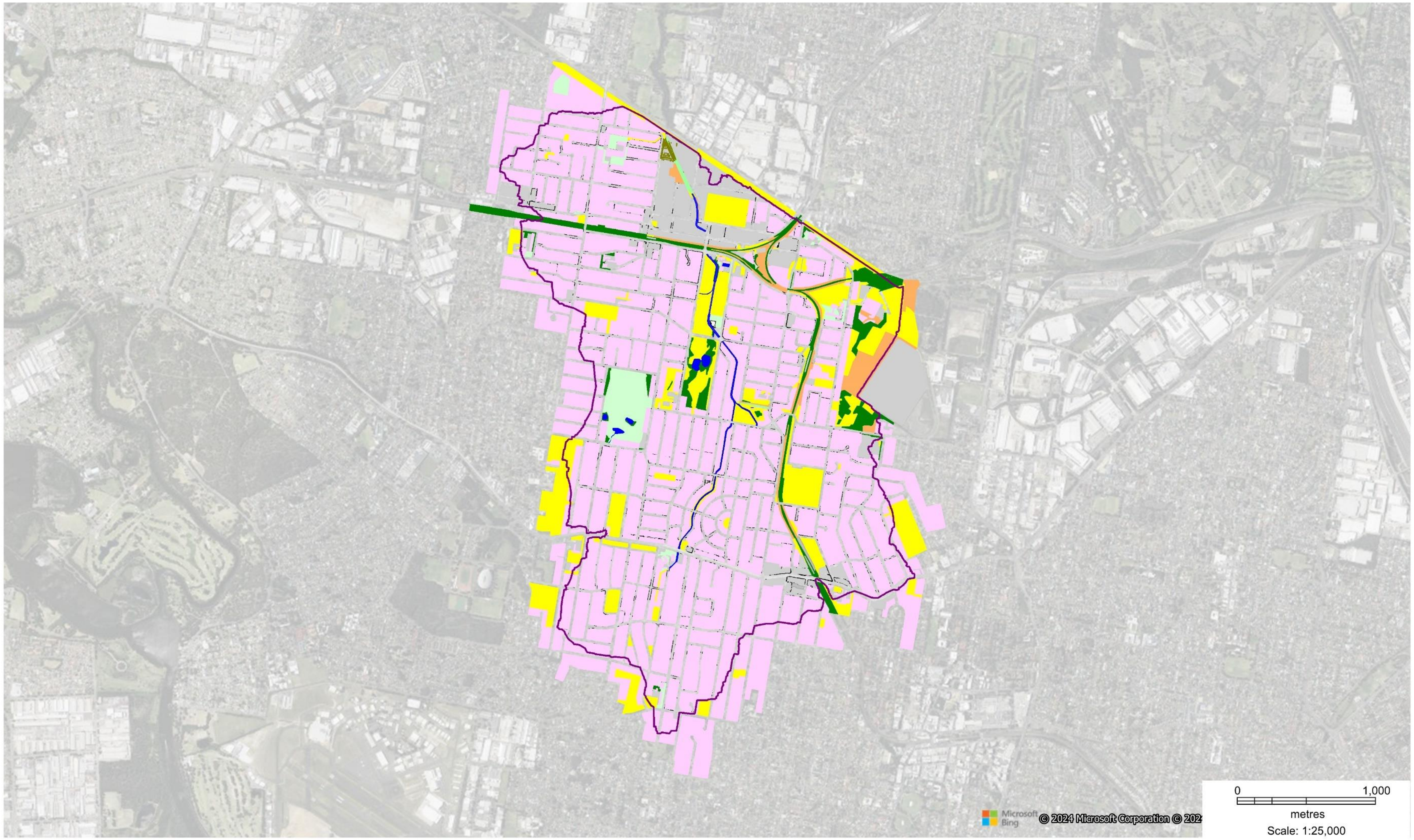
S&G Consultants Pty Limited



Sam Haddad
Civil Engineer
MIEAust CPEng NER

A1 Appendix 1

Flood Mapping



TITLE:

Model Extents

FIGURE:	REV:	
Fig A1-1	**A**	SGC has made every attempt to ensure that the information in this map is correct at time of publication. SGC does not warrant or guarantee the accuracy of the information contained in this

Filepath: X:\Flood Studies\Duck River TUFLOW Flood Model, 2009 Update\Duck_River\TUFLOW\Design\SGC20240057\MAPINFO

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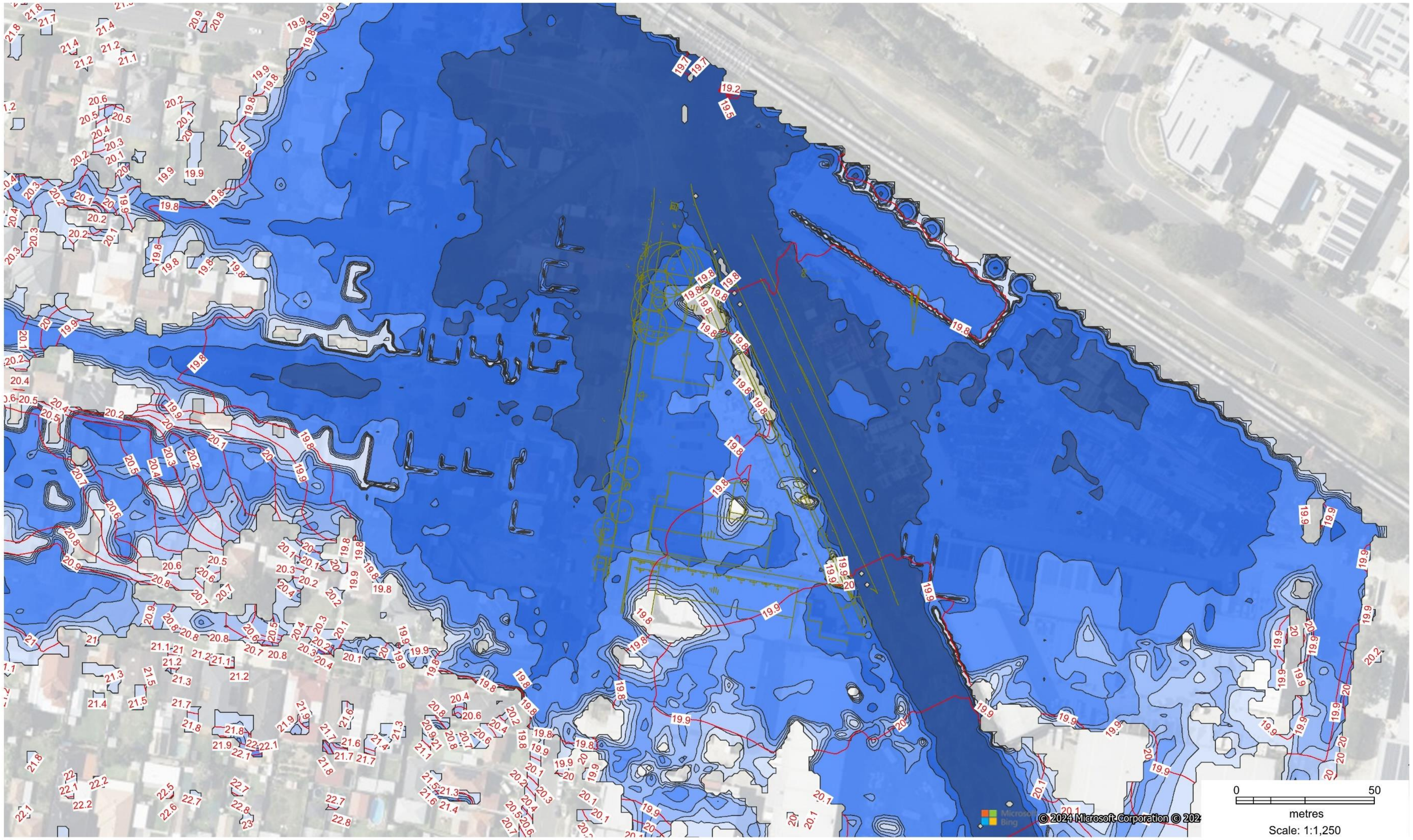
Figure A 1.1 Model Extents



TITLE:

1% AEP Flood Depth & Water Surface Contours
Existing Site Conditions - Blocked Structures Scenario

FIGURE:	REV:	
Fig A1-2	A	SGC has made every attempt to ensure that the information in this map is correct at time of publication. SGC does not warrant or guarantee the accuracy of the information contained in this

Filepath: X:\Flood Studies\Duck River TUFLOW Flood Model, 2009 Update\Duck_River\TUFLOW\Design\SGC20240057\MAPINFO

Legend

0.1m Flood Level Contours

Flood Depth (m)

- 0 to 0.1
- 0.1 to 0.15
- 0.15 to 0.2
- 0.2 to 0.25
- 0.25 to 0.5
- 0.5 to 1
- 1 to 4.67

N

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Figure A 1.2 1% AEP Flood Depth & WSL – Existing Scenario

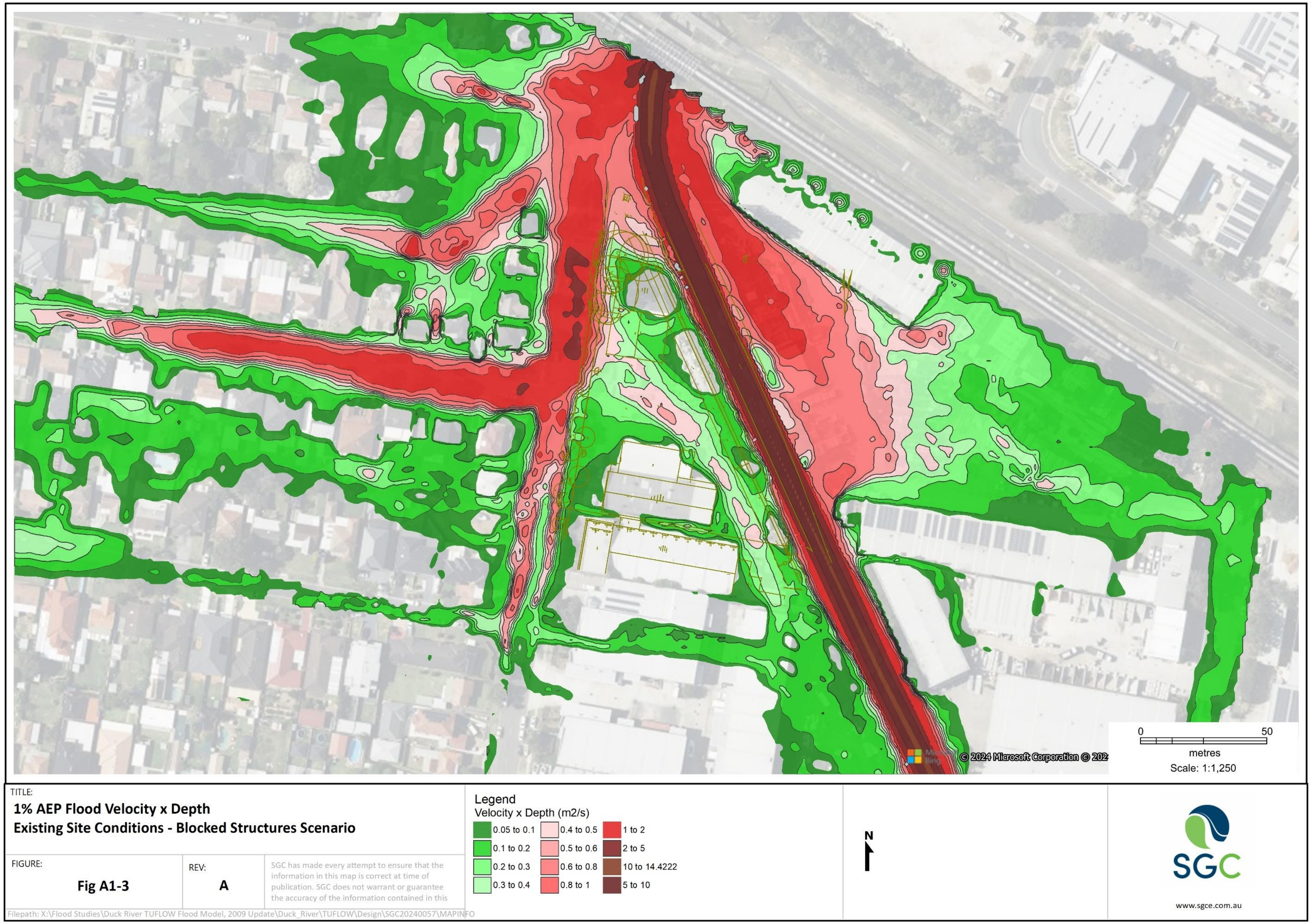

Figure A 1.3 **1% AEP Flood Velocity x Depth – Existing Scenario**

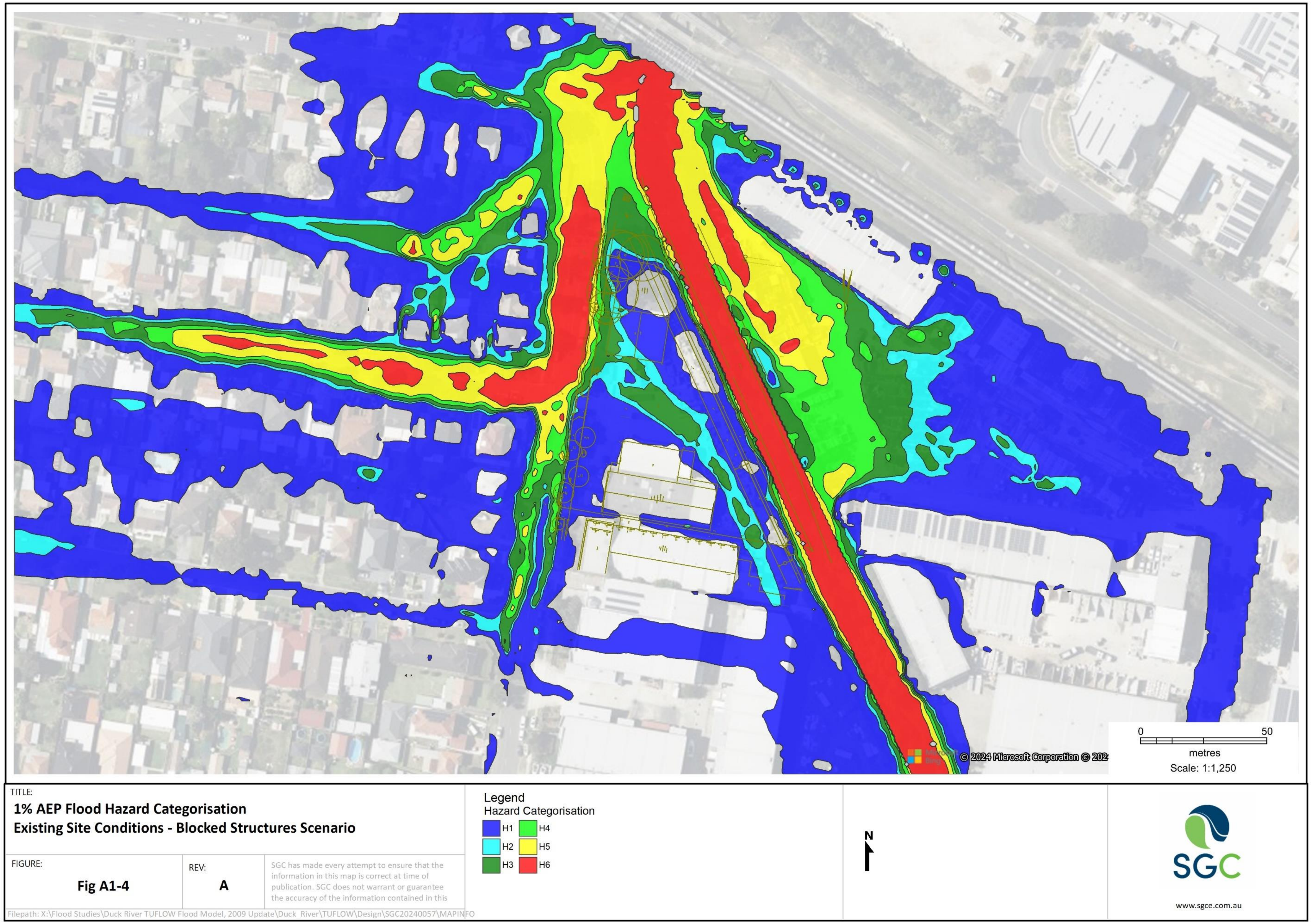

Figure A 1.4 1% AEP Flood Hazard Category – Existing Scenario

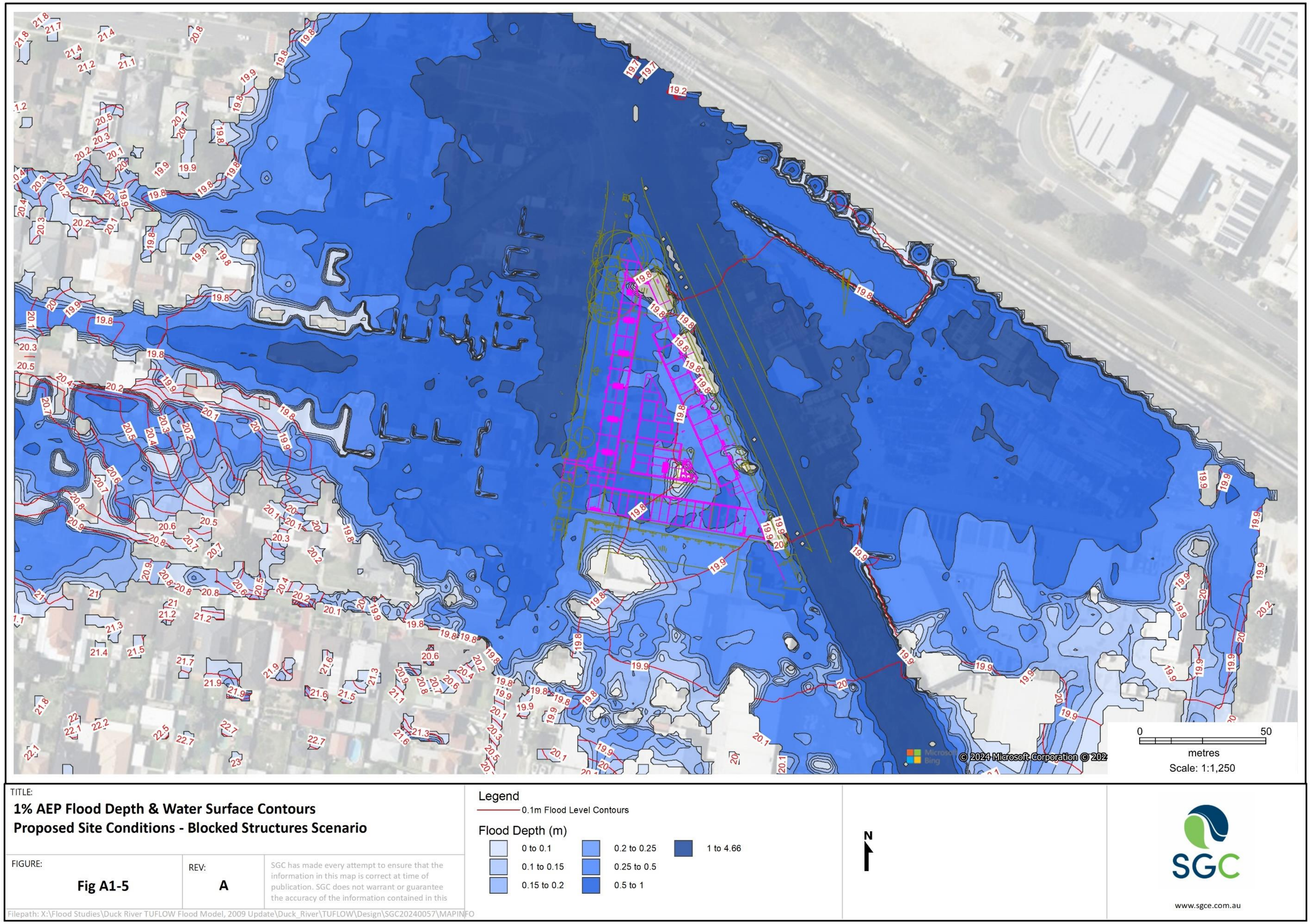

Figure A 1.5 1% AEP Flood Depth & WSL – Proposed Scenario

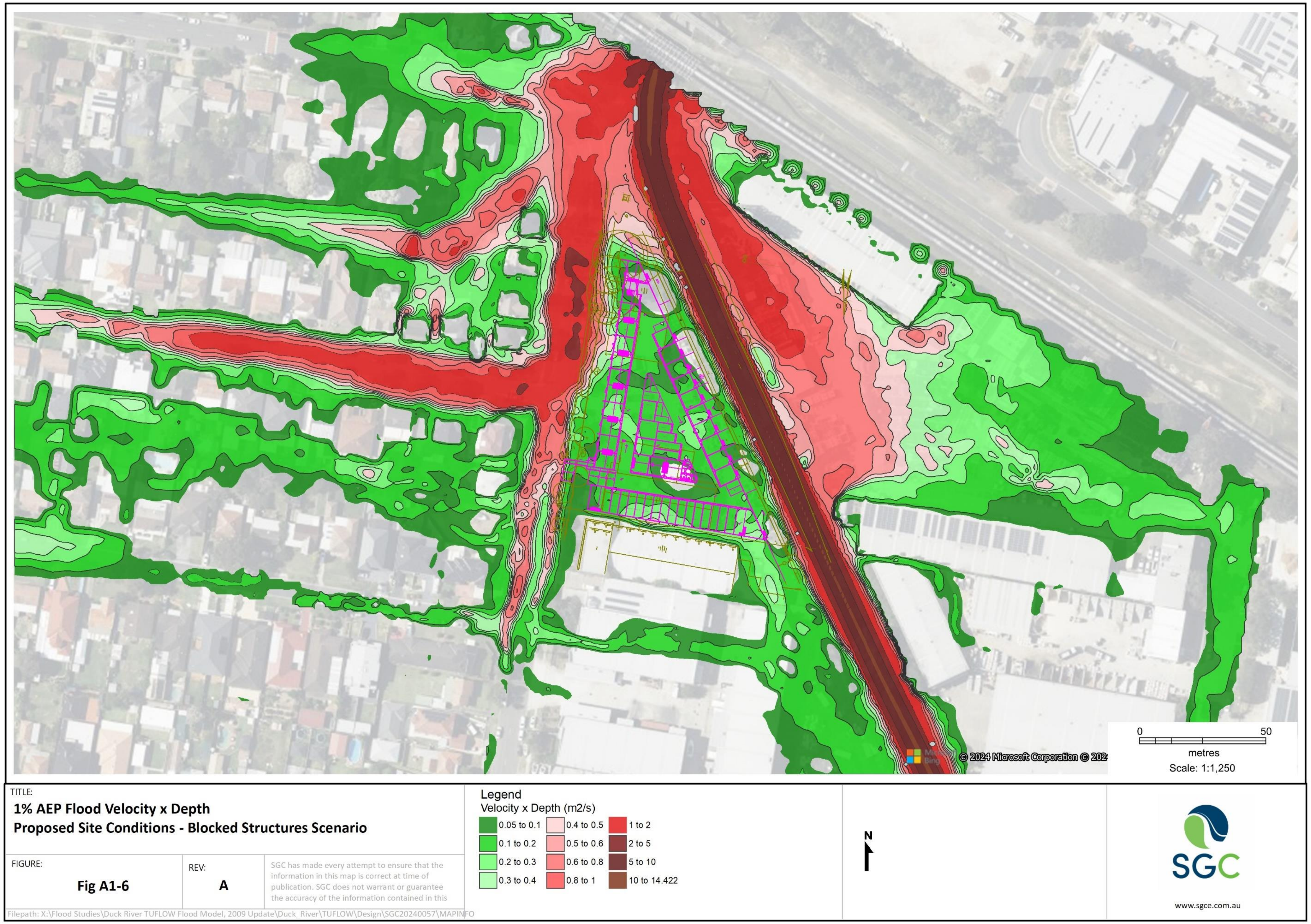

Figure A 1.6 1% AEP Flood Velocity x Depth – Proposed Scenario

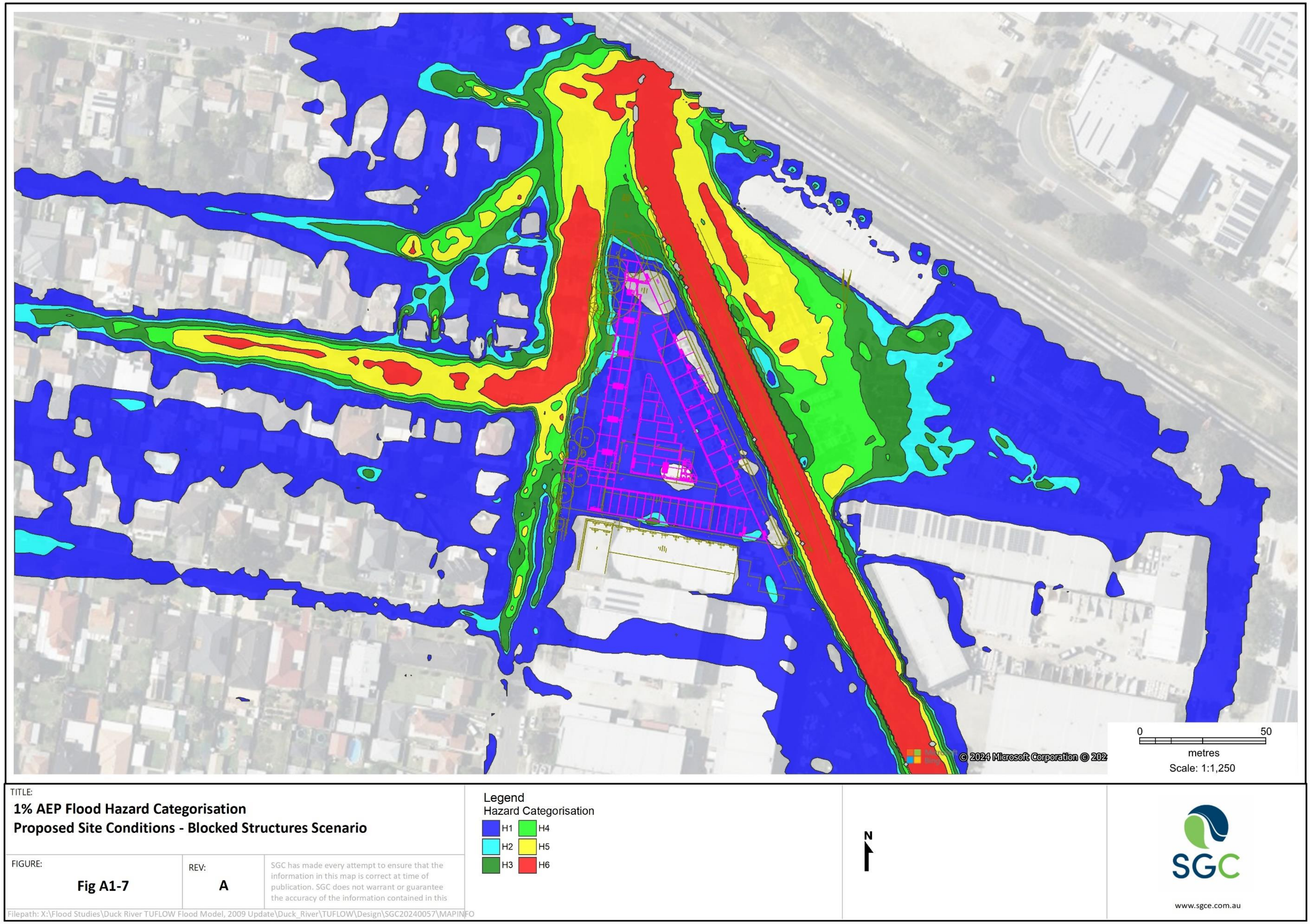

Figure A 1.7 1% AEP Flood Hazard Category – Proposed Scenario

TITLE:

1% AEP Flood Impact Map - Blocked Structures Scenario

FIGURE:	REV:	
Fig A1-8	**A**	SGC has made every attempt to ensure that the information in this map is correct at time of publication. SGC does not warrant or guarantee the accuracy of the information contained in this

Filepath: X:\Flood Studies\Duck River TUFLOW Flood Model, 2009 Update\Duck_River\TUFLOW\Design\SGC20240057\MAPINFO

Legend
Flood Level Difference (m)

- -0.1 to -0.01
- -0.01 to 0.01
- 0.01 to 0.025
- 0.025 to 0.039

N

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Figure A 1.8 1% AEP Flood Impact

TITLE:
Flood Mitigation Measures

FIGURE: **Fig A1-9** REV: **A**

SGC has made every attempt to ensure that the information in this map is correct at time of publication. SGC does not warrant or guarantee the accuracy of the information contained in this

Filepath: X:\Flood Studies\Duck River TUFLOW Flood Model, 2009 Update\Duck_River\TUFLOW\Design\SGC20240057\MAPINFO

Figure A 1.9 Flood Mitigation

A2 Appendix 2

Survey Plan

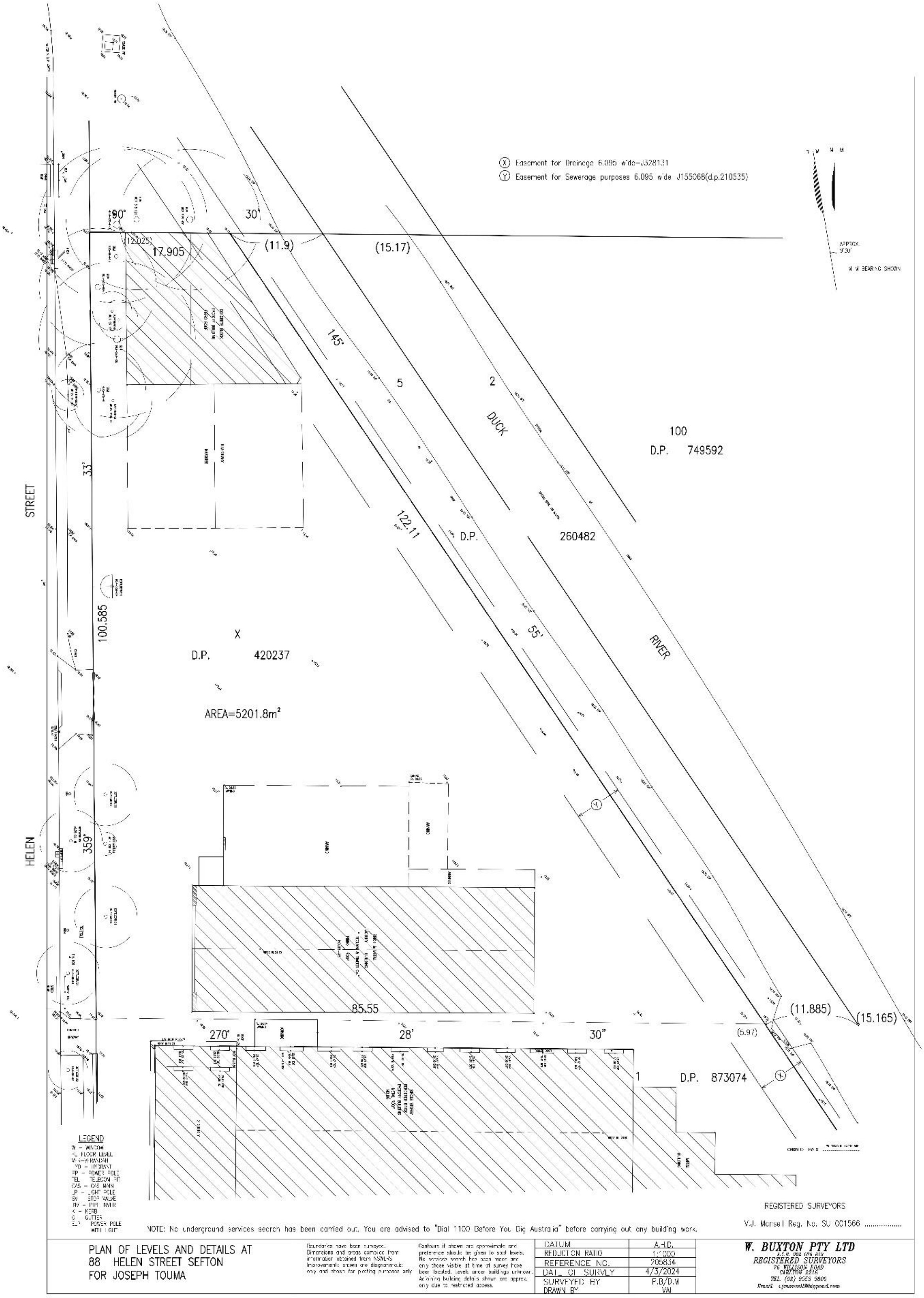


Figure A 2.1 Survey Plan

A3 Appendix 3

Flood Information – Canterbury Bankstown Council

To: S&g Consultants
PO Box 7855, BAULKHAM HILLS NSW 2153

STORMWATER SYSTEM REPORT

Property Address	**88 Helen Street Sefton 2162**
Lot/Section/Deposited Plan	Lot X DP 420237
Date Prepared:	18/04/2024
Ref:	WP-SIAONL-742/2024
Prepared By:	Amin Haddad
Development Type:	Industrial/Industrial Extension

FLOOD STUDY REQUIRED	Yes

This Stormwater System Report (SSR) provides flood and stormwater information about the property.

The information in this report should be reviewed by those who are knowledgeable in flooding or have a technical requirement to understand more about Council's building development controls (such as surveyors, builders, certifiers, architects and engineers).

Stormwater Infrastructure

The site is/may be affected by the following Council / Sydney Water / Private stormwater system components.

• Pipe Type (diameter in mm):
- Pipe(375) stormwater pipeline (according to Council records - pipe size are to be confirmed by survey);

BANKSTOWN CUSTOMER SERVICE CENTRE
Upper Ground Floor, Civic Tower, 66-72 Rickard Road, Bankstown NSW 2200, PO Box 8, Bankstown NSW 1885

CAMPSIE CUSTOMER SERVICE CENTRE
137 Beamish Street, Campsie NSW 2194
PO Box 8, Bankstown NSW 1885

CANTERBURY-BANKSTOWN COUNCIL
ABN 45 985 891 846 **E.** council@cbcity.nsw.gov.au
W. cbcity.nsw.gov.au **P.** 9707 9000 **F.** 9707 9700

Property Levels

Description	Minimum (m AHD)	Maximum (m AHD)
Approximate Ground Level	18.6	19.9

Flooding Levels

Stormwater Catchment Flooding from Duck River Stormwater Catchment Study (BMT WBM, 2009)

Flood Event	Minimum Level (m AHD)	Maximum Level (m AHD)
5% AEP (20 year ARI)	19.2	19.6
1% AEP (100 year ARI)	19.9	20.0
PMF (Probable Maximum Flood)	21.2	21.3

Terms and Definitions

Annual Exceedance Probability (AEP)	The probability of a flood event of a given size occurring in any one year, usually expressed as a percentage annual chance.
Average Recurrence Interval (ARI):	Similar to AEP. The long-term average number of years between the occurrence of a flood as big as (or larger than) the selected event.
metres above Australian Height Datum (m AHD)	The reference level for defining ground levels in Australia. The level of 0.0m AHD is approximately mean sea level.
Maximum and Minimum Ground Level –	Highest and lowest ground levels on the property based on available ground level information. A Registered Surveyor can confirm exact ground levels.
Probable Maximum Flood	An extreme flood deemed to be the largest flood that could conceivably occur at a specific location The PMF defines the extent of flood prone land (i.e. the floodplain).

Further Information
For further information on flood-related development controls which may be applicable to this property, refer to the following guidelines:

- Canterbury Bankstown Development Control Plan (2023)

Disclaimer
The information contained in this document is not endorsed by the Council as without error, omission or mis-description. Council accordingly expressly disclaims all and any liability and responsibility in respect of loss, damage or injury to person or property arising from anything done or omitted to be done by any person in reliance, whether wholly or in part, upon any part of this information.

Any person having regard to the information contained in this document is encouraged to seek, at their discretion, all other sources of information on the subject matter as they consider appropriate, which may include local knowledge and/or professional advice.

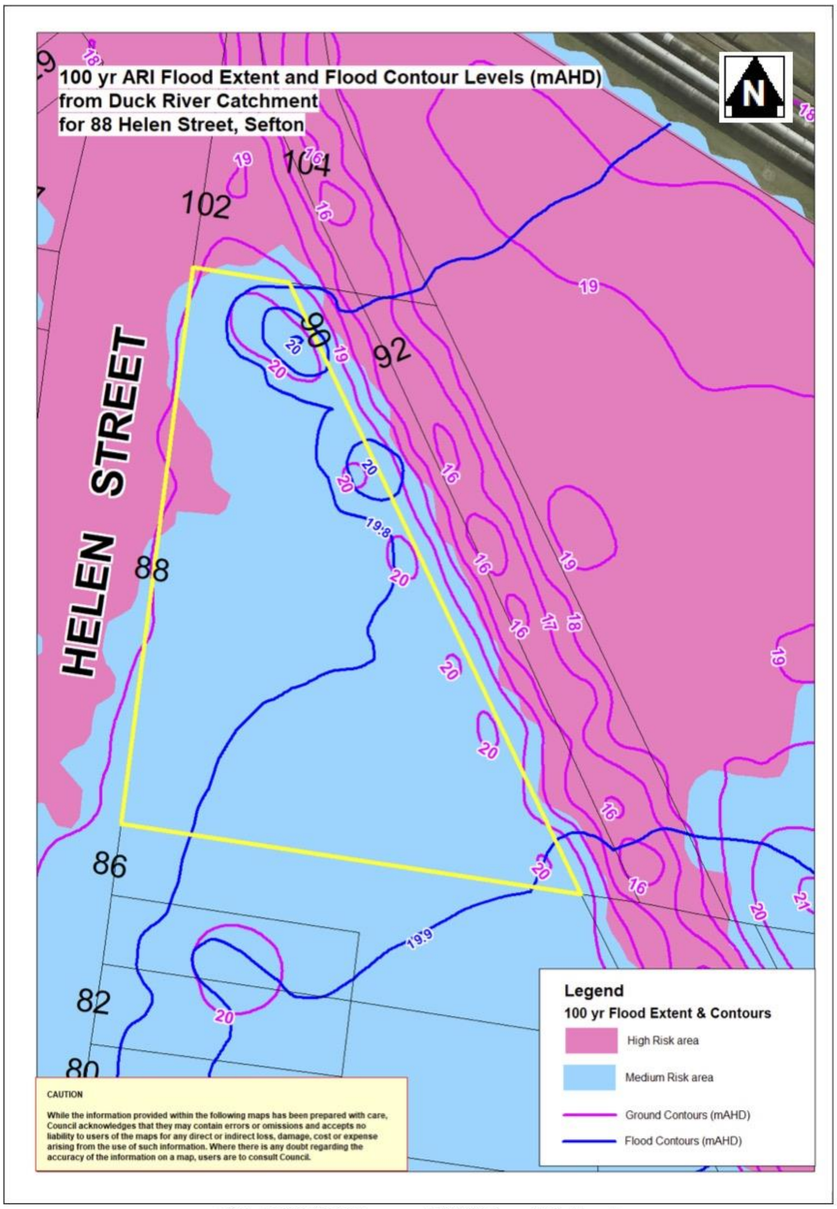
ATTACHMENTS

For 1% AEP (100 year ARI)

1. Flood Extent & Flood Contours Map
2. Flood Depth Map
3. Velocity Depth Product Map

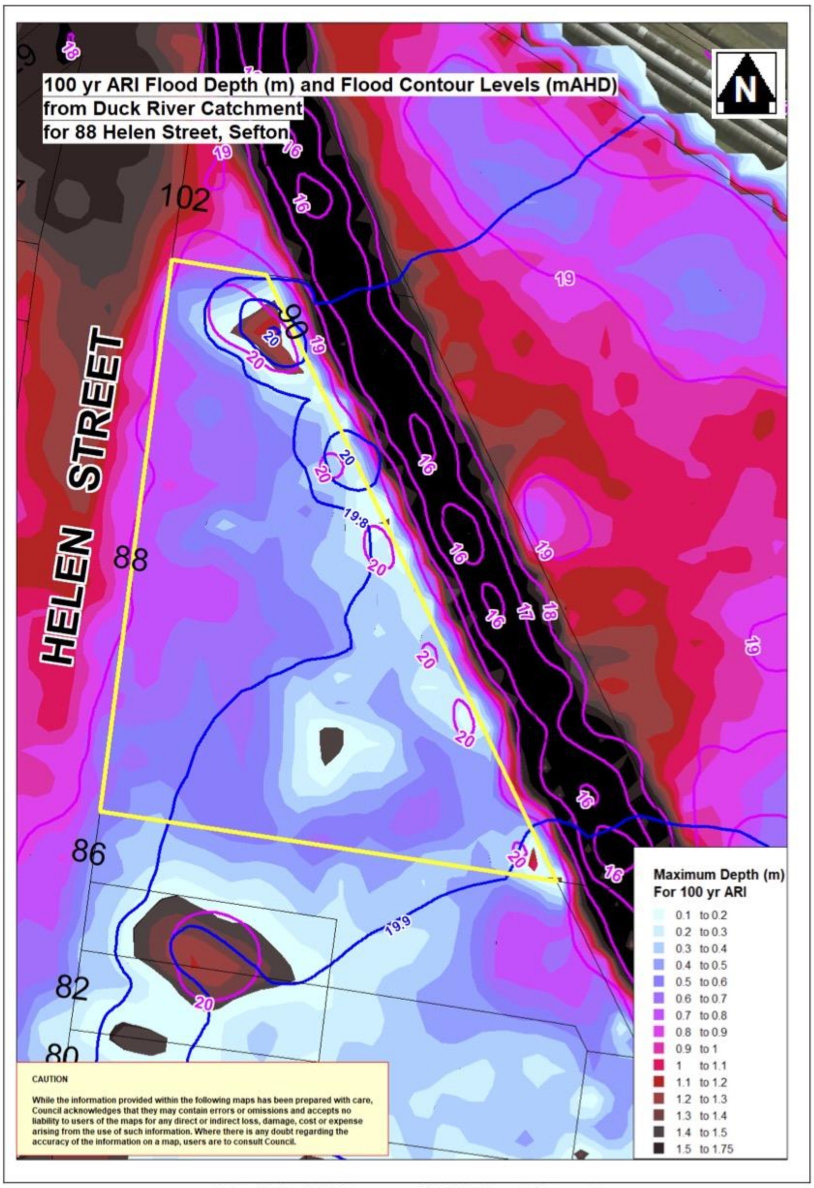
For PMF

4. Flood Contours & Flood extent Map
5. GIS Map (from Council's Data)
6. Aerial Map (from Council 's Data)

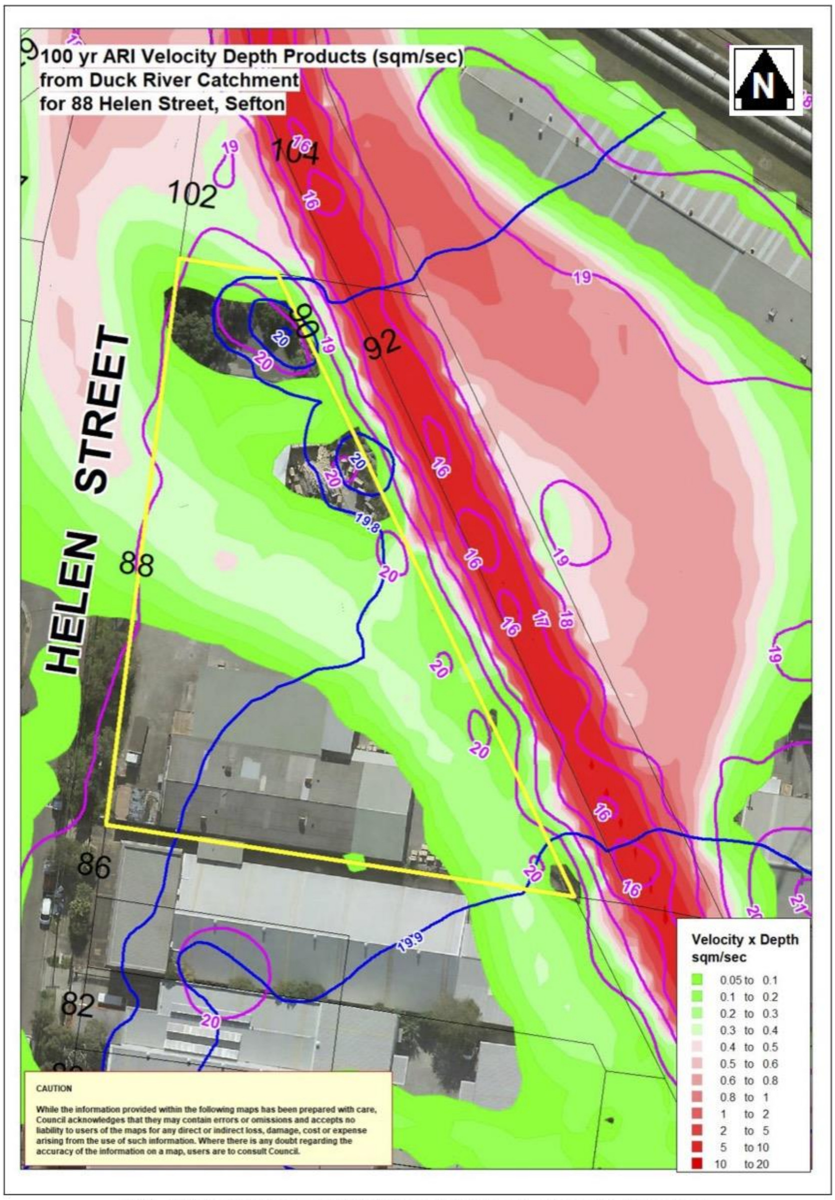


1% AEP (100 year ARI) Flood Extent

Page **4** of **10**

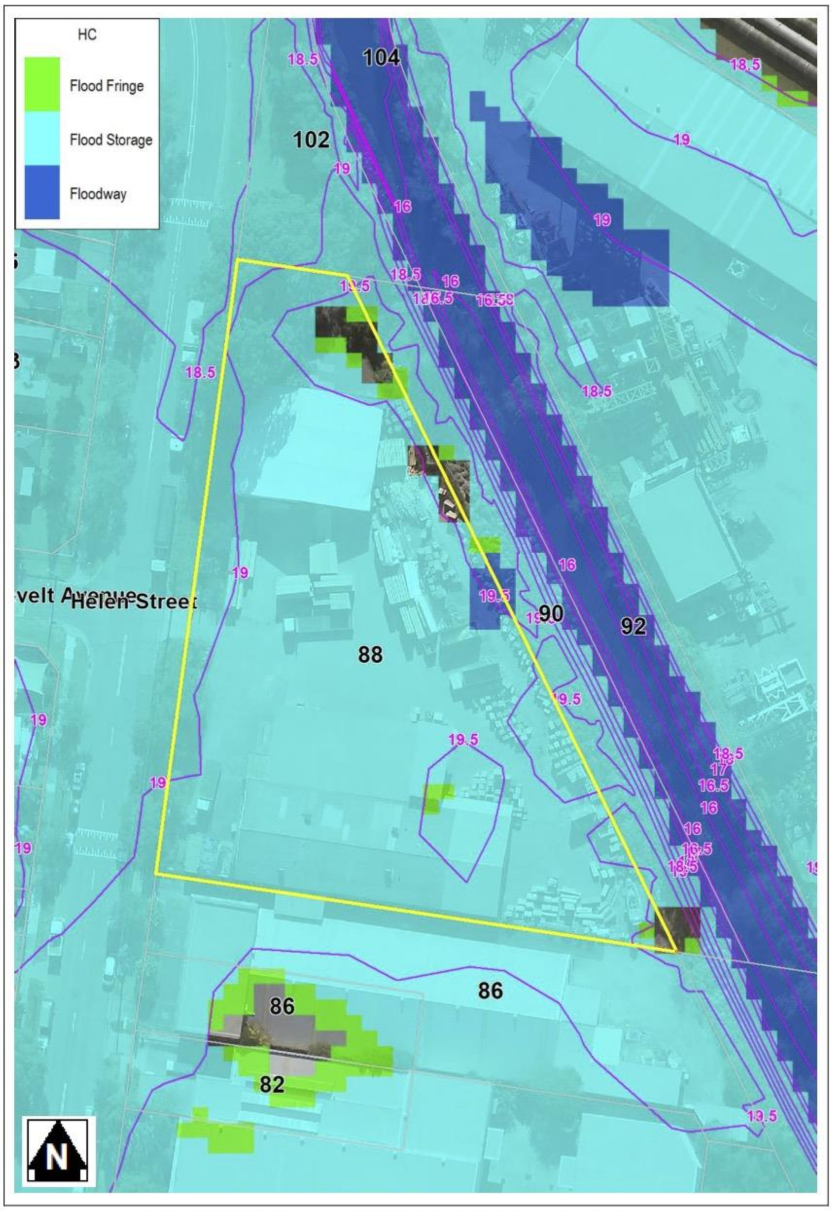


1% AEP (100 year ARI) Flood Depth



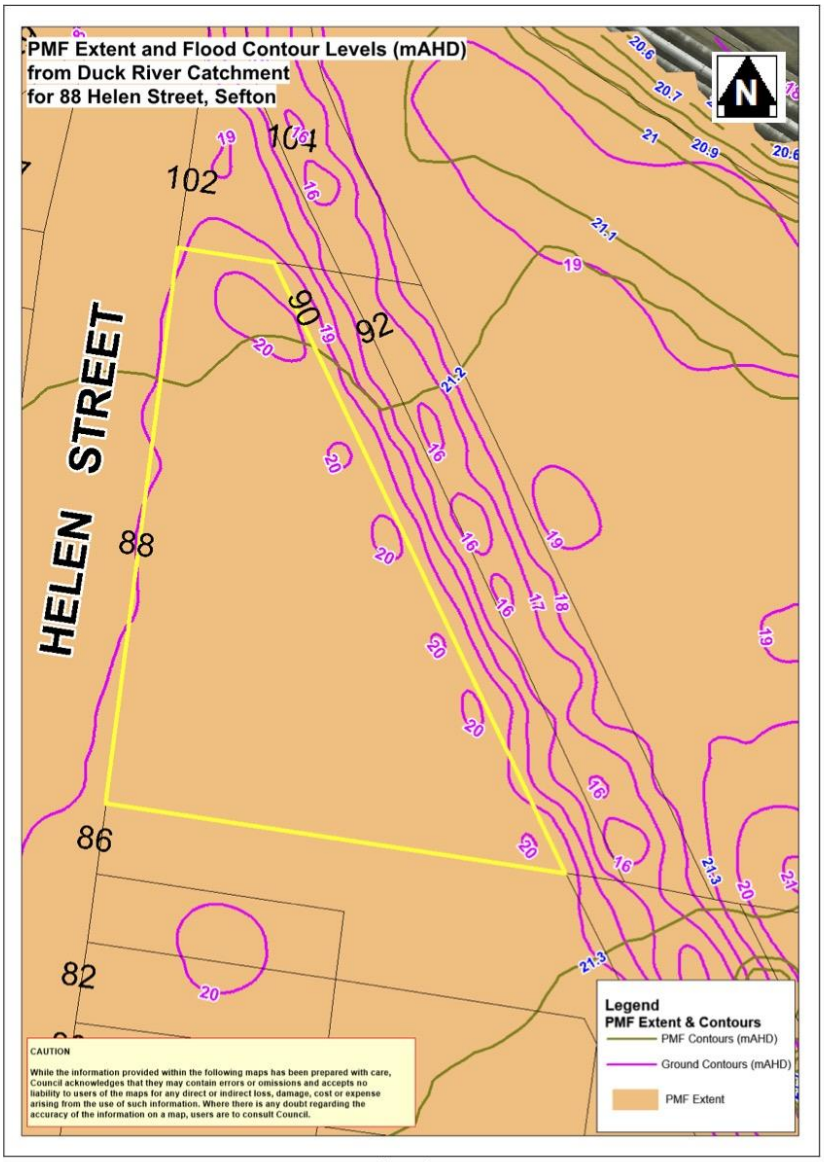
1% AEP (100 year ARI) Flood Velocity Depth Product

Page **6** of **10**



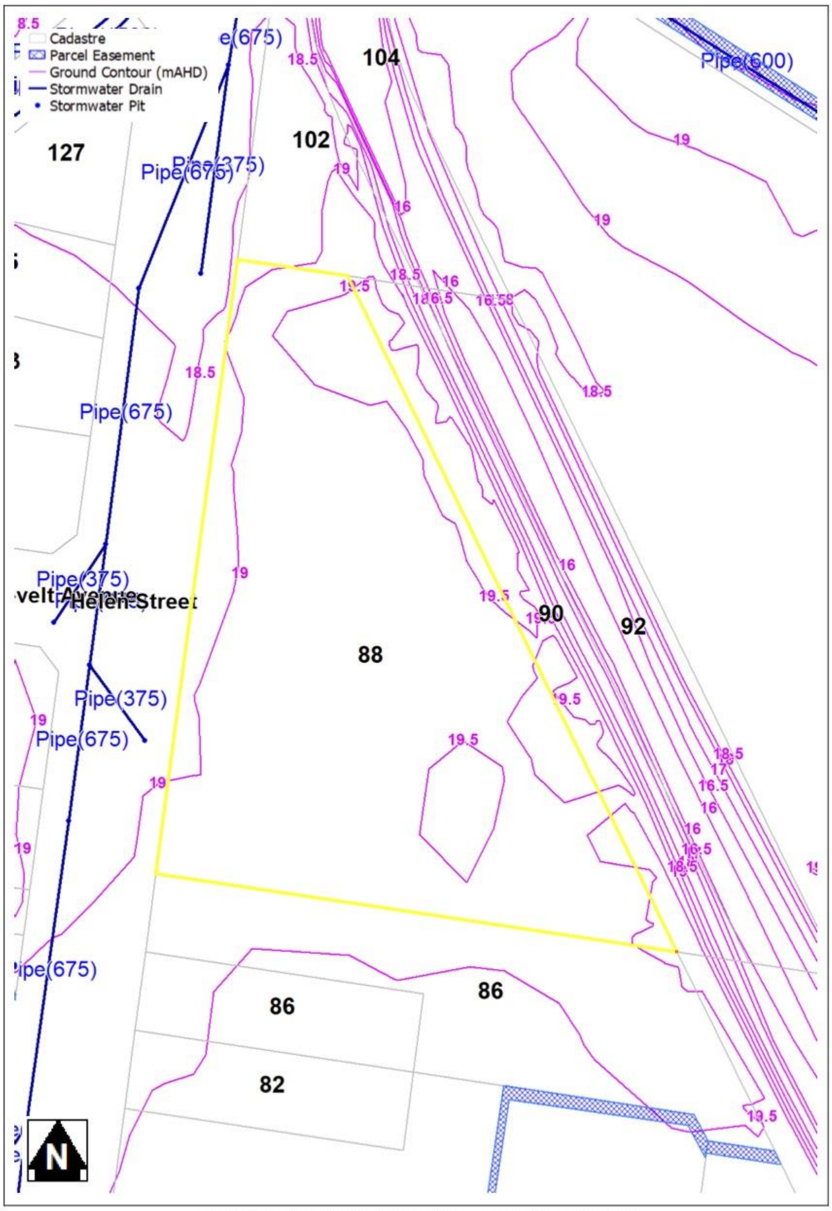
1% AEP (100 year ARI) Flood Hydraulic Category

Page **7** of **10**



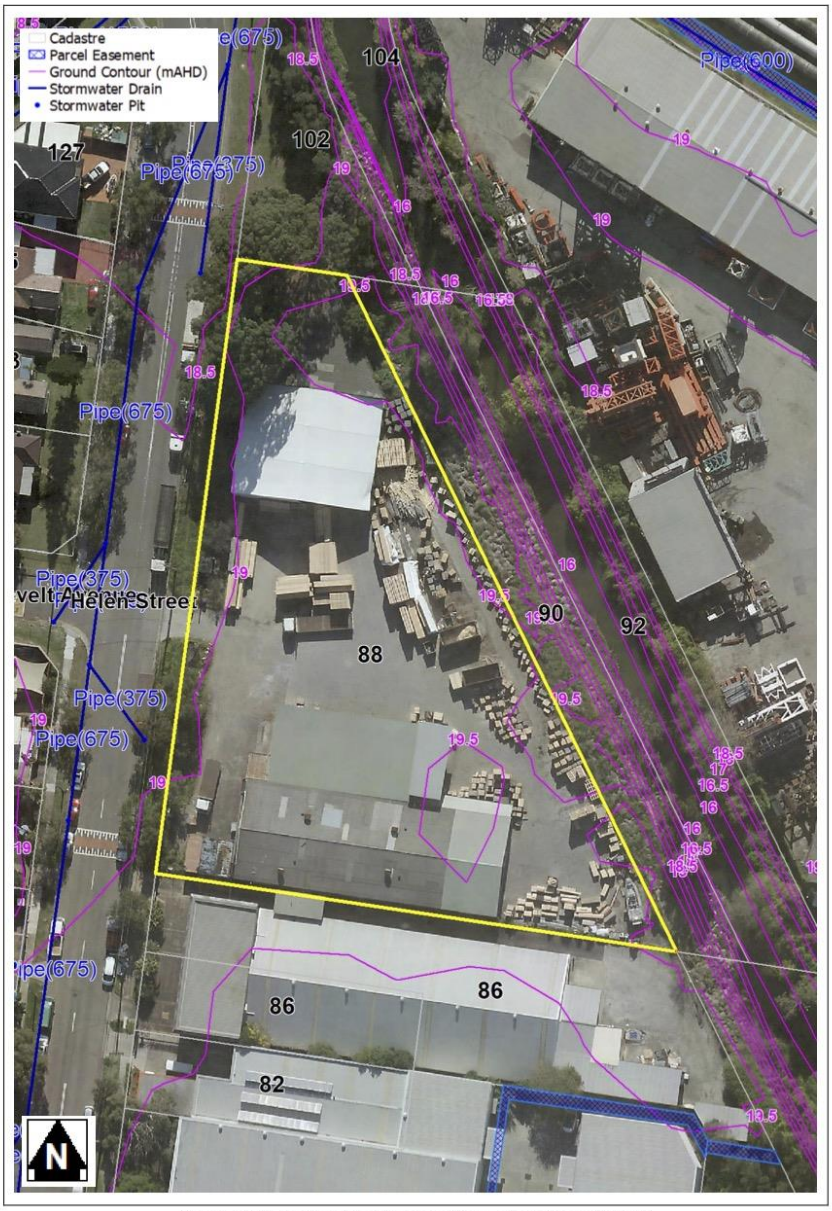
PMF Flood Extent

Page **8** of **10**



GIS Map for 88 Helen Street Sefton 2162

Page **9** of **10**



Aerial Map for 88 Helen Street Sefton 2162

Page **10** of **10**

Figure A 3.1 Stormwater System Report – Canterbury Bankstown Council

A4 Appendix 4

Architectural Plans

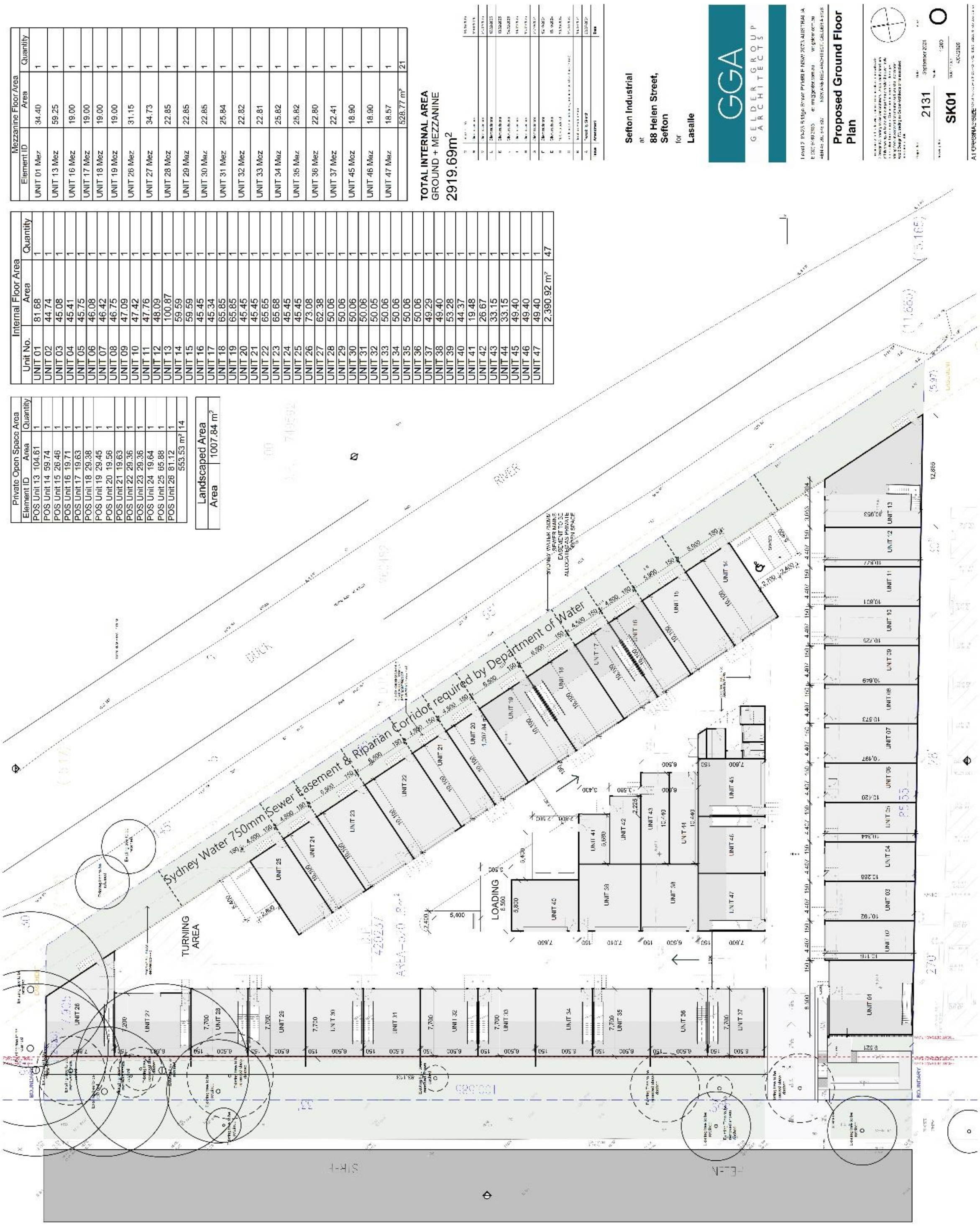


Figure A 4.1 Extract from architectural plan