Flood Study Report

1-3 Rodd Street, Eden

Issue A

Prepared For Homes NSW C/- Integrated Design Group

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REVISION TABLE

Revision	Date	Issue Description	Issued by	Approved by	Signed
P1	7.11.2024	Preliminary Issue	MS	SELH	
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1 Introduction

This document is a flood study report for the proposed senior living development located at 1-3 Rodd Street, Eden. The subject site is affected by overland flow from local upstream catchment.

The site is legally described as Lot 12 & Lot 13 in DP213700. Homes NSW is proposing a senior living along Rodd Street, in the suburb of Eden.

The proposed development by Integrated Group Design is illustrated in figure below.

Figure 1.1 Site Plan

The flood assessment report provides an assessment of overland flow from the local upstream catchment.

1.1 Brief

S&G Consultants Pty Ltd (SGC) have been engaged by Homes NSW to carry out a flood study in support of the proposed senior living development at 1-3 Rodd Street, Eden.

Bega Valley Shire Council requires the flood study due to overland flow resulting from the local upstream catchment.

- Supplied documents were reviewed;
- A flood study involving the set-up of a fully dynamic 2D model is carried out to determine the peak discharges and the flood levels; and
- This report has been compiled.

1.2 Limitations

This report is intended solely for Homes NSW as the Client of SGC and no liability will be accepted for use of the information contained in this report by other parties than this client.

This report is limited to visual observations and to the information including the referenced documents made available at the time when this report was written.

1.3 Reference Documents

The following documents have been referenced in this report:-

- Site survey prepared by TSS Total Surveying Solutions;
- Architectural drawings prepared by Integrated Design Group;
- NSW Government *The Floodplain Development Manual – The management of Flood Liable Land* (2005);
- Engineers Australia, *Australian Rainfall & Runoff* (AR&R 1999);

2 Natural & Built Environment

2.1 Local & Regional Context

The site is located along Rodd Street. Made of Lot 12 & Lot 13 in DP213700 being 1-3 Rodd Street in the suburb of Eden. The site falls in the Local Government Area of Bega Valley Shire Council.

The site has a rectangular shape and is characterised by a natural gradient from North-West to South-East.

Figure 2.1 shows the location of the site.

Figure 2.1 Locality Plan

3 Glossary

Annual Exceedance Probability (AEP)

The chance of a flood of a given or a larger size occurring in any one year, usually expressed as a percentage.

Australian Height Datum (AHD)

A common national surface level datum approximately corresponding to mean sea level.

Average Recurrence Interval (ARI)

The long term average number of years between the occurrence of a flood as big as or larger than the selected event.

Catchment

The land area draining through the main stream, as well as tributary streams, to a particular site. It always relates to an area above a specific location.

Flood

Relatively high stream flow which overtops the natural or artificial banks in any part of a stream, river, estuary, lake or dam, and/or local overland flooding associated with major drainage before entering a watercourse.

Flood Liable Land or Flood Prone Land

Land susceptible to flooding by the PMF.

Flood Planning Levels (FPLs)

Are the combinations of flood levels and freeboards selected for floodplain risk management purposes.

Freeboard

Is a factor of safety typically used in relation to the setting of floor levels.

Habitable Room

In industrial or commercial situation: an area used for offices or to store valuable possessions susceptible to damage in the event of a flood.

Peak Discharge

The maximum discharge occurring during a flood event.

Probable Maximum Flood

PMF is the largest flood that could conceivably occur at a location, usually estimated from probable maximum precipitation.

Probable Maximum Precipitation

PMP is the greatest depth of precipitation for a given duration meteorologically possible over a given size storm area at a particular location at a particular time of the year.

Runoff

The amount of rainfall which actually ends up as stream flow.

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4 Flood Study

4.1 Development Description

The proposed development consists of senior living. Reference should be made to the architectural drawings prepared by Integrated Design Group for more details on the proposed development.

4.2 Objectives

The purpose of this flood study is to establish the 1% AEP flood level for the site, which will form the basis of the controls for setting the floor levels.

In summary, the objectives are as follows:-

- Develop a computer model that can be used to predict the magnitude and extent of future flood events;
- Define design flood levels, velocities and depths for the catchment;
- Define the extent of flooding for the 1% AEP for the catchment;
- Define Provisional Flood Hazard for flood-affected areas; and
- Define the Hydraulic Categories for flood-affected areas.

4.3 Hydrological Modelling

The hydrological assumptions for the model have been based on the Australian Rainfall and Runoff file obtained from ARR Data Hub for the rainfall intensities (ARR 2019). Times of concentration for the catchments have been determined with Friend's Equation/Nomograph for Overland Sheet Flow Time from figure 5.05.2 of Queensland Urban Drainage Manual. Total Catchment area of 3.12ha approximately has been modelled.

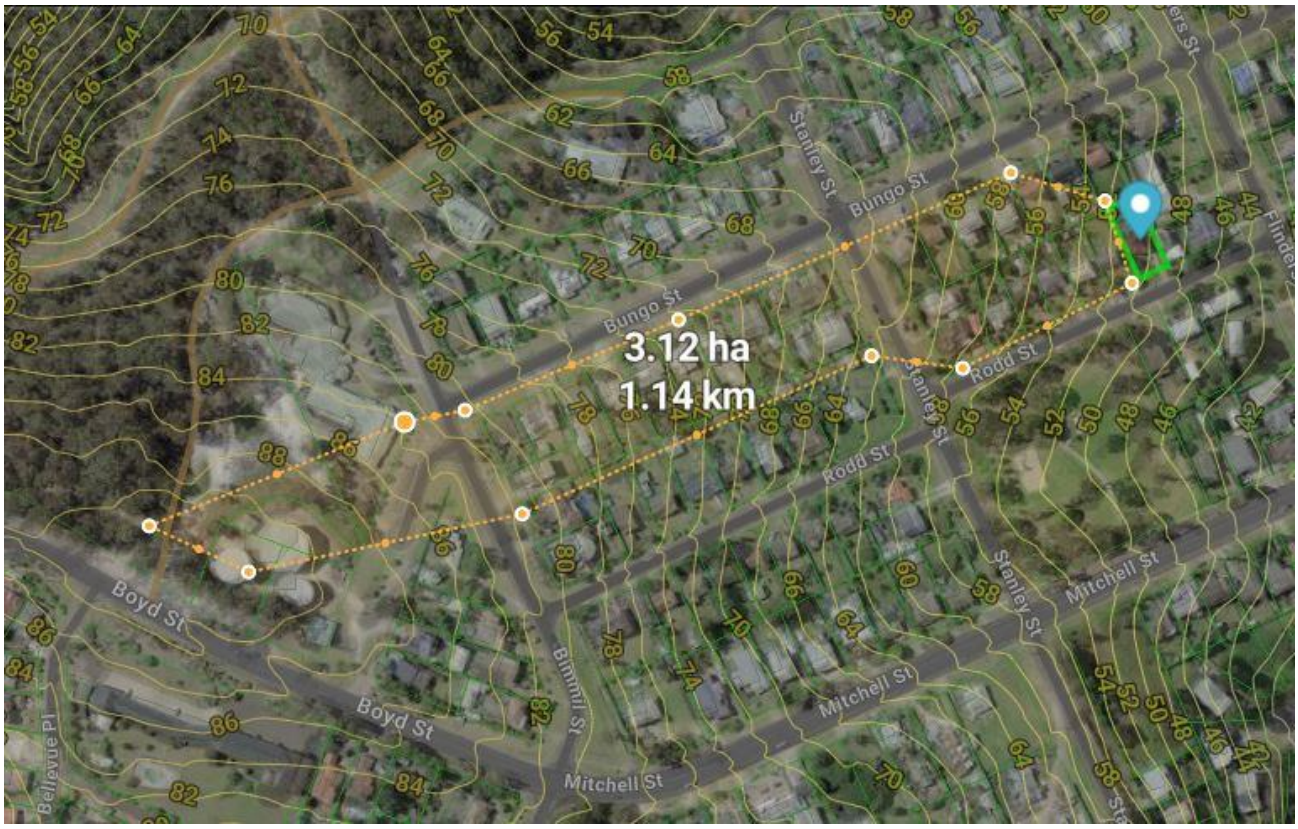

Figure 4.1 UPSTREAM CATCHMENT

Table 4.1 Catchment Details

Catchment Name	Area (Ha)	Impervious (%)
Catchment_1	3.12	60

4.3.1 Rainfall Data

The rainfall data has been obtained from the Bureau of Meteorology (BOM) 2019 Australian Rainfall and Runoff database. The rainfall data for 1% AEP between 5 minutes and 3 hours has been adopted for the DRAINS ILSAX model.

4.3.2 DRAINS Model Schematics

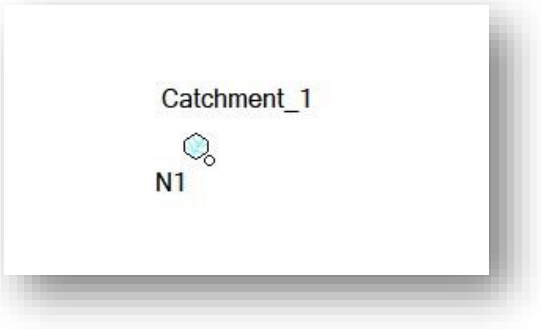

Figure 4.2 DRAINS Model Layout

4.3.3 DRAINS Model Result (1%AEP)

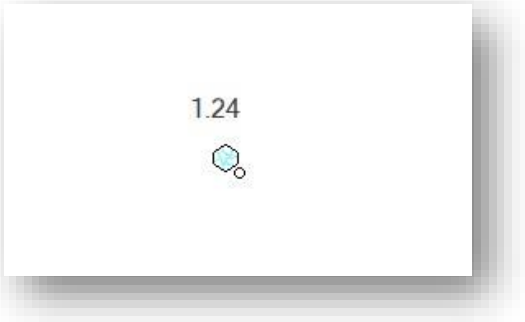

Figure 4.3 1% AEP Peak Flows

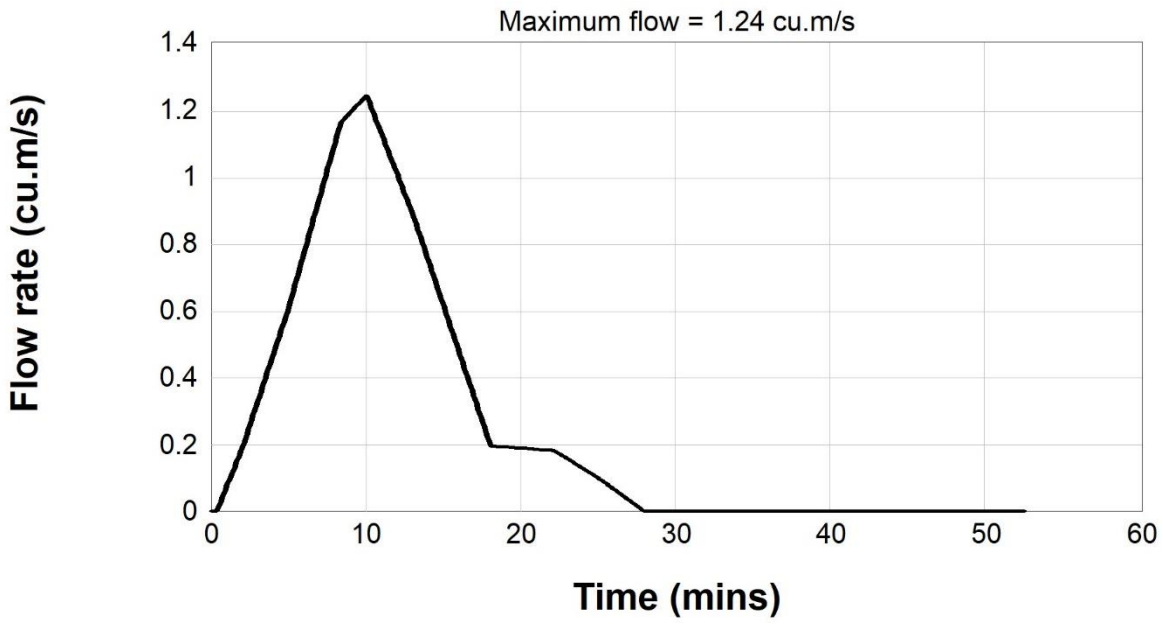

Figure 4.4 Peak Overland Flow Hydrograph

4.4 Hydraulic Modelling

4.4.1 Definition

The model is a 2D model built with TUFLOW. A grid size of 0.5m x 0.5m is used in the study area.

4.4.2 Proposed Buildings

The existing and proposed building structure on ground has been modelled as fully blocked and obstructs the flows completely.

4.4.3 2D Model Setup

The 2D model extends the entire catchment area upstream of the site as per the flood maps in Appendix 1. The 2D roughness values used in the model are tabulated below in accordance with industry best practice.

Table 4.2 2D Landuse Details

Landuse	Roughness
Lots	0.08
Roads	0.02
Buildings	Inactive Cells

4.4.4 Downstream Boundary

The downstream boundary is set further downstream of the site with a 1% hydraulic energy grade.

4.4.5 Design Flood Modelling Results

Design flood modelling was undertaken for the 1% AEP flood events. The results are presented in Appendix 1 of this report.

4.5 ARR2019

4.5.1 General Flood Hazard Curves

When dealing with specific floodplain management or emergency management analysis there may be a clear need to use specific thresholds. However, particularly in a preliminary assessment of risks or as part of a constraints analysis such as might be applied as part of a strategic floodplain management assessment, there is also an acknowledged need for a combined set of hazard vulnerability curves, which can be used as a general classification of flood hazard on a floodplain.

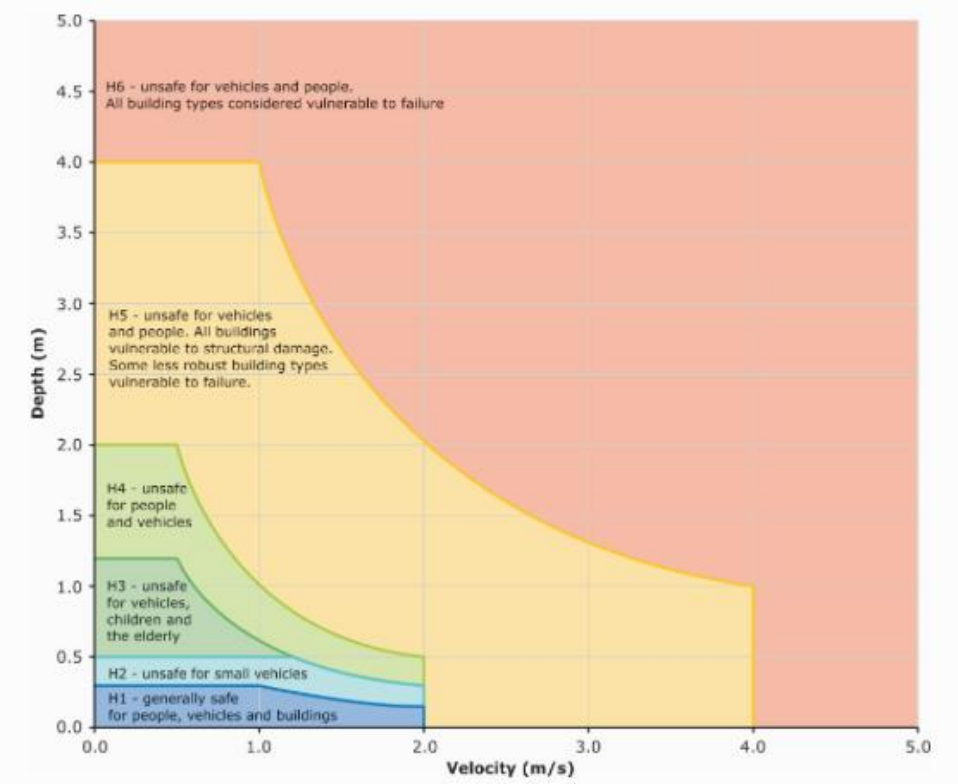

Figure 4.5 Combined Flood Hazard Curves

4.6 Flood Risk management

Due to the inclined nature of the catchment, the Hydrograph indicates that overland flow peaks at 10 minutes in 1% AEP storm event. The flood depth is not significant, and the flood hazard is very low (H1). Therefore, it is not necessary to evacuate the site in 1% AEP storm event.

4.7 Flood Mitigation Strategy

This section of the report provides a review of the proposed flood mitigation strategy.

- it is recommended that a suitably sized swale is constructed along the western boundary to intercept and dispose the overland flow.
- The fencing and screenings along western boundary are to be open style to allow floodwater to traverse downstream via the flood void

4.8 Results & Discussion

This section of the report provides a review of the results.

- The pre-development flood extent and water level elevation contour is demonstrated in the flood map Figure A1.2. The flood depth is insignificant (between 0.02m to 0.1m).
- The flooding across the site is classified as between very low risk H1 category.
- The proposed habitable areas must be raised at or above the Flood Planning Level (FPL) which is Flood Level + 0.5m freeboard.

5 Conclusions

A detailed investigation on the flooding behaviour has been undertaken in the vicinity of the proposed planning at 1-3 Rodd Street, Eden.

A TUFLOW model has been prepared for the catchment area. The study determined the flood behaviour for the 1% AEP design flood. 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 area.

A1 Appendix 1

Flood Mapping

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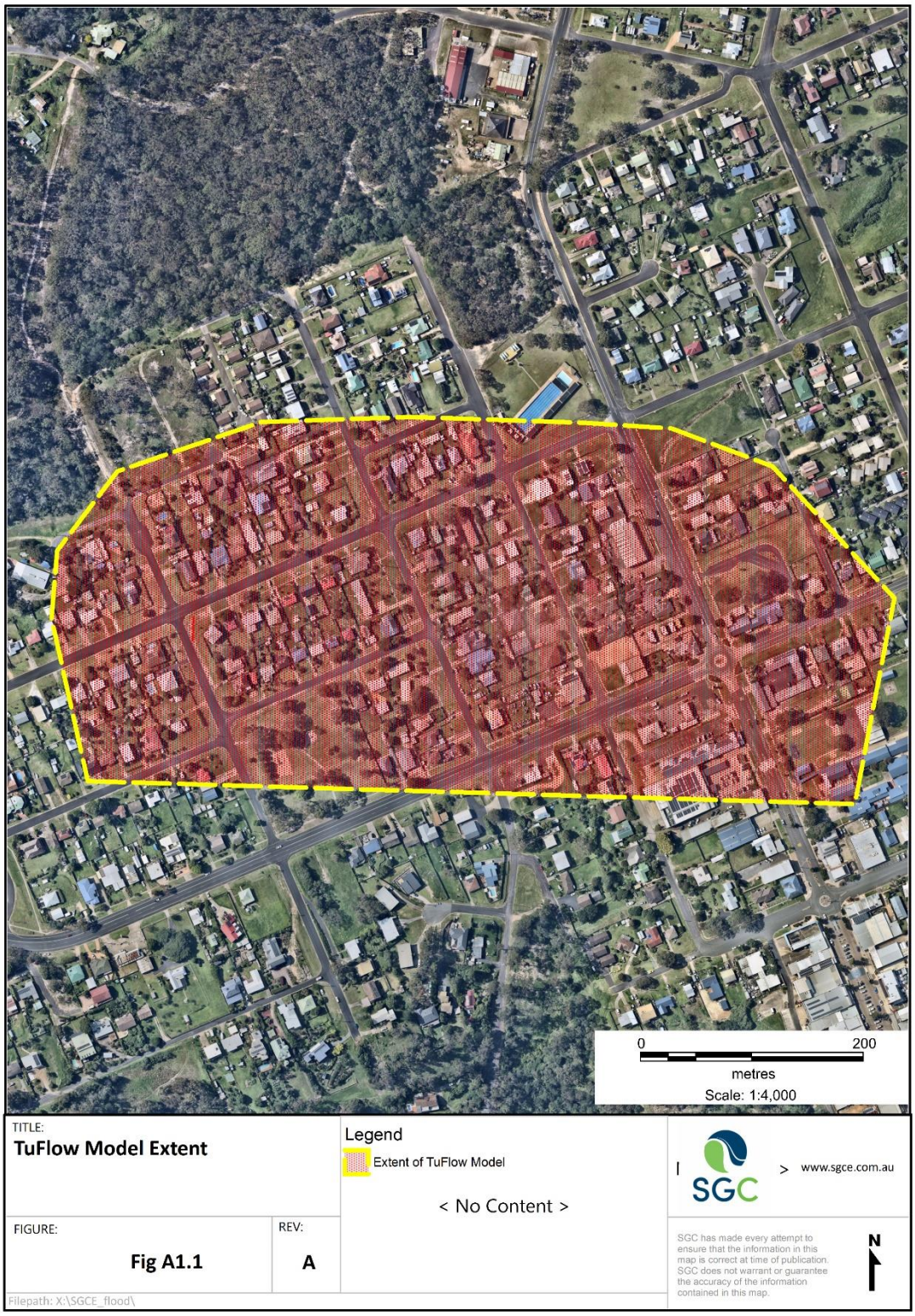

Figure A 1.1 Flood Model Extent

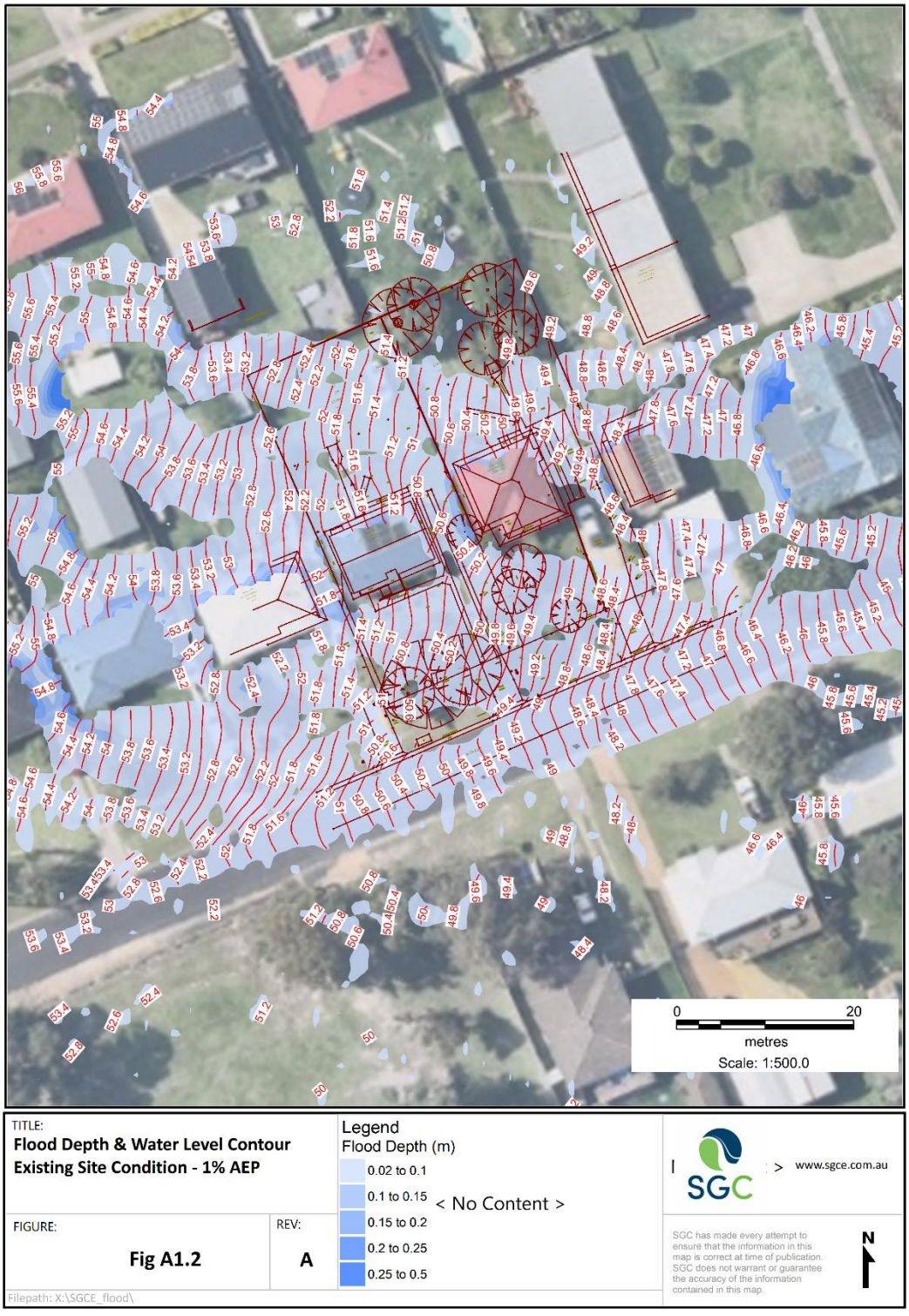

Figure A 1.2 Pre-Development Flood Depth and Contour – 1% AEP

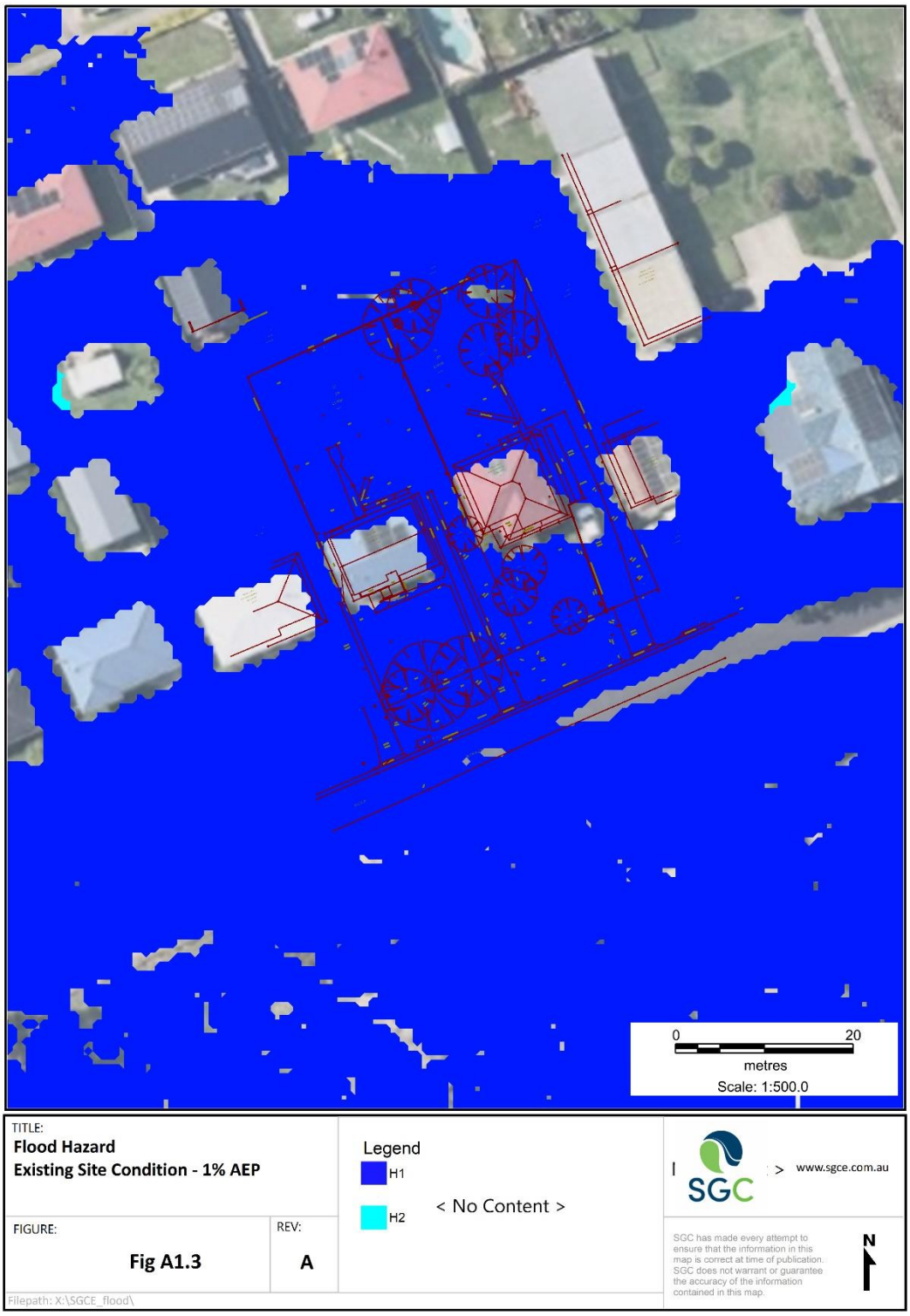

Figure A 1.3 Pre-Development Flood Hazard (Velocity x Depth) – 1% AEP

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