Flood Study Report

5 Amber Street Claremont

Issue 02

Prepared For Space Design Architecture

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REVISION TABLE

Revision	Date	Issue Description	Issued by	Approved by	Signed
01	23.03.2026	Flood Study Report	OC	SELH	
02	22.04.2026	Flood Study Report	OC	SELH	

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1 Introduction

This report outlines the flood impact assessment undertaken for the proposed development at 5 Amber Street, Claremont, Tasmania, within the Glenorchy City Council local government area.

The purpose of this assessment is to establish the existing flood conditions at the site and to evaluate the potential impacts of the proposed development.

To assess the existing and proposed flood conditions, as well as the impacts arising from the development, the following TUFLOW models were developed and applied:

- Current scenario model. This scenario involved developing a TUFLOW model that incorporates the existing site conditions.
- Proposed scenario model. This scenario modifies the land use and building footprints within the TUFLOW model to reflect the proposed development layout.

2 Site Details

2.1 Location

The proposed development site is located in a residential zone of the Claremont, bordered by Amber Street to the north and bounded by residential developments in all other sides. The subject property has a total area of 1060 m^2. The site currently contains a residential building at the front and number of sheds at the back of the house. The site locality is shown Figure 2.1.

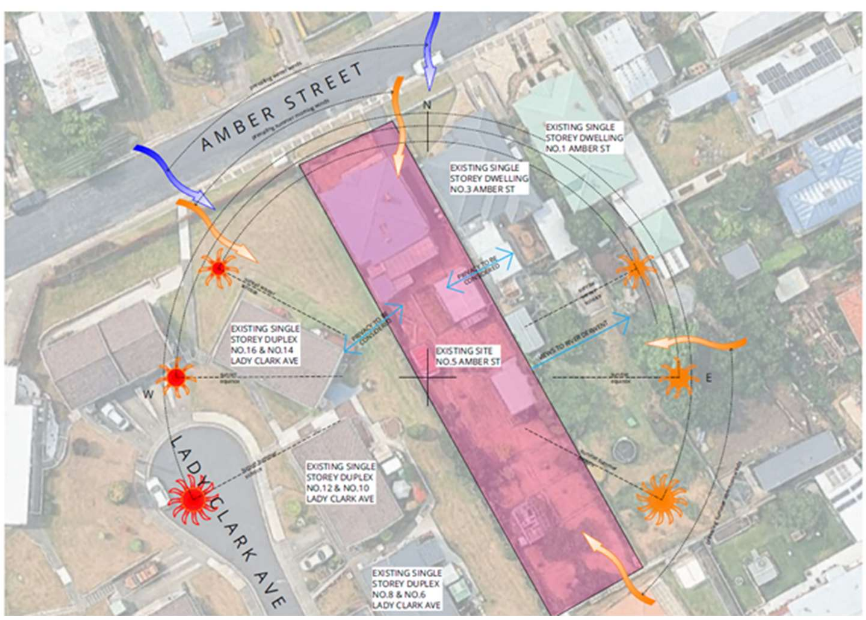


Figure 2.1 Site Plan (*Source: SDA, Amber Street NDIS Housing)*

2.2 Proposed Development

The proposed development includes the demolition of all existing structures of the site and development of three new dwellings with separate car park facilities. Refer to Figure 2.2 and Appendix A1 for the site plan of the proposed development.

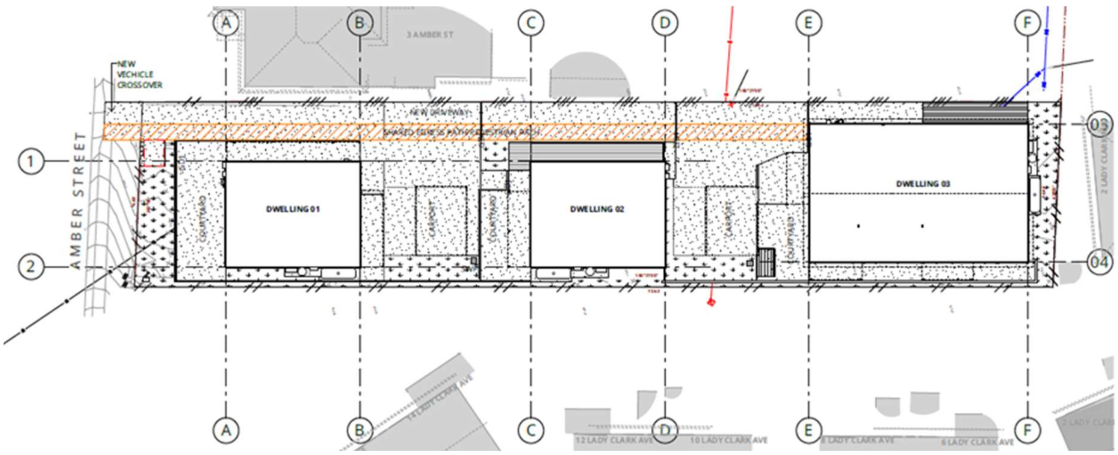


Figure 2.2 Proposed Development (*Source: SDA, Amber Street NDIS Housing*)

3 Available Information

3.1 Council flood information

According to the flood information issued by Glenorchy City Council, the 1% AEP flood extent covers only a portion of the rear of the project site. However, the available information does not clearly indicate the associated flood depths or flood levels. Refer to Appendix A2.

3.2 Review of the Existing Flood Study

A Stormwater System Management Plan was prepared for Glenorchy City Council in 2024 (SSMP 2024). As part of this study, a flood model was developed for the Glenorchy municipal catchment. The study area was modelled using the TUFLOW hydraulic modelling software with a rainfall-on-grid approach.

The TUFLOW model represents both the urban and rural catchments using a two-dimensional (2D) surface terrain, and a one-dimensional (1D) pit and pipe network (≥300 mm diameter or equivalent). TUFLOW version 2020-10-AA (single precision) was used with HPC GPU settings. A 2 m × 2 m grid size was adopted to achieve improved modelling accuracy. The 2016 IFD dataset was adopted for this analysis.

Storm initial loss values were applied within TUFLOW for different land uses (Table 3.1). An initial loss of 0 mm was adopted for impervious surfaces, while 28 mm was applied to pervious surfaces. For each land use category, a fraction impervious value was assigned, and the initial loss was calculated proportionally between these two values (i.e., 0 mm and 28 mm).

The study indicates that the critical storm duration affecting the project site is 360 minutes (Figure 3.1). For the 1% AEP design event, peak flood depths across the site are estimated to range between approximately 0.05 m and 0.25 m (Figure 3.2).

Table 3.1 Losses by Land Use (Source: SSMP 2024)

Land Type/Planning Zone	Tuflow Material ID	Manning's n	Initial Loss (mm)	Continuous Loss (mm/hr)
General Business	14	0.02	1	0
Roads	11	0.02	5.6	0.3
Community Purpose	5	0.03	25.2	1.35
Recreation	7	0.045	25.2	1.35
Open Space	6	0.035	25.2	1.35
Local Business	8	0.045	2.8	0.15
Utilities	9	0.045	25.2	1.35
Inner Residential	3	0.08	11.2	0.3
General Residential	2	0.08	11.2	0.6
Waterbodies/Rivulets	12	0.04	0	0
Environmental Management	10	0.15	26.6	1.425
Environmental Living	4	0.15	22.4	1.2

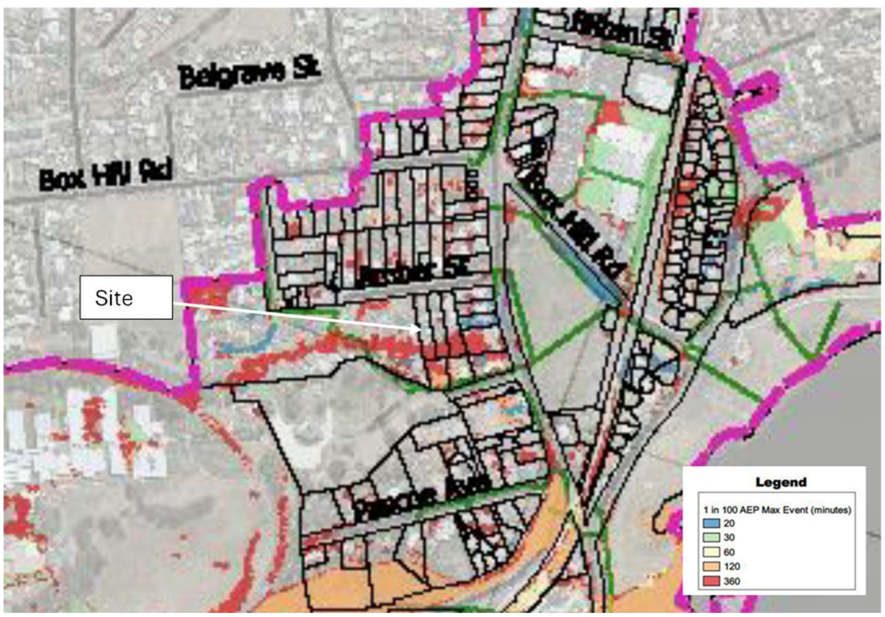


Figure 3.1 Critical Duration around the project site (Source: SSMP 2024)

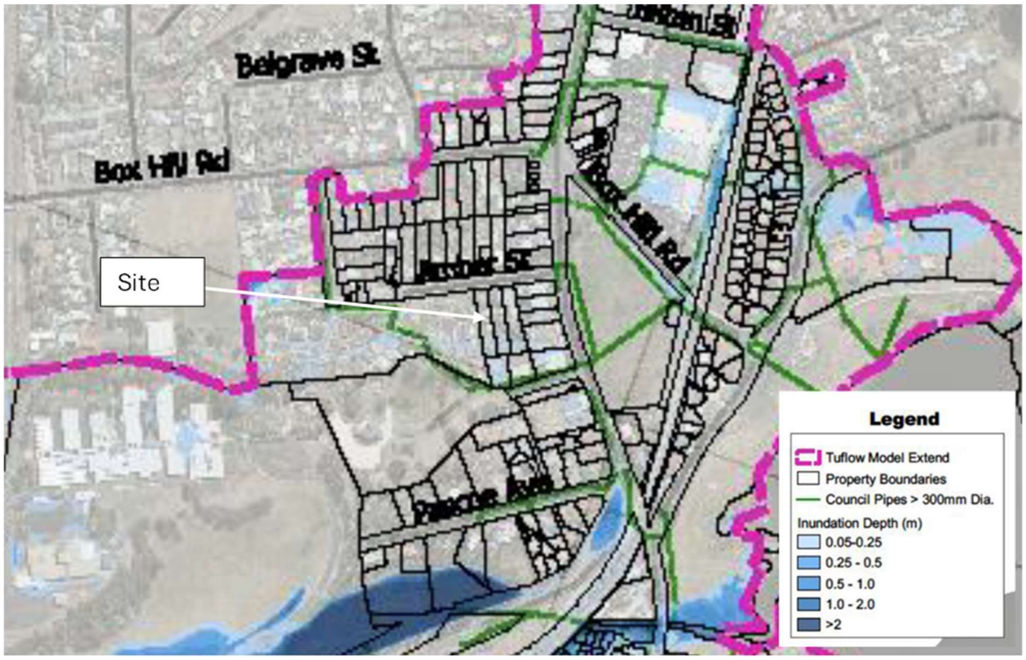


Figure 3.2 Peak flood depth around the project site - 1% AEP design event (Source: SSMP 2024)

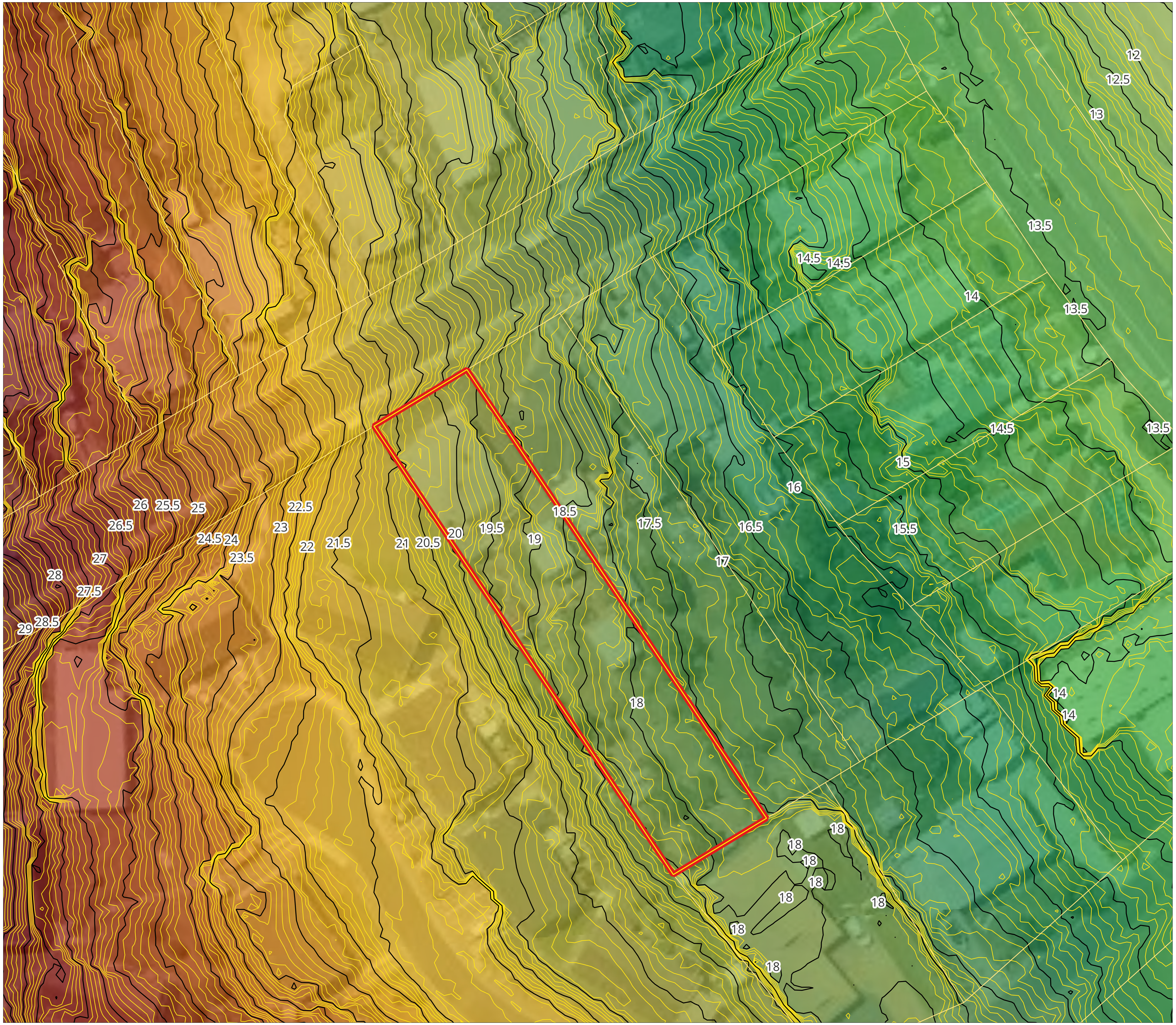
3.3 Site Topography

A detailed survey of the site has been conducted for the site. The survey data of the subject site incorporated with LiDAR data to define the existing topography of the project site. The LiDAR data downloaded from the ELVIS website. The resolution of LiDAR data is 1 m X 1 m dated 2013.

Topographic data indicates that elevations at the project site range between approximately 17.6 m AHD and 21.2 m AHD. The site is sloping towards north to south direction. Existing land elevations in the vicinity of the site are presented in Figure 3 1.

3.4 Rainfall

The TUFLOW QGIS utility tool was used to generate a rainfall hyetograph for the rain-on-grid model. This utility tool accessed the ARR 2016 Data Hub to derive design rainfall inputs in accordance with the ARR 2019 guidelines. The Data Hub also provides links to relevant data sources, including the Bureau of Meteorology Design Rainfall Data System, from which Intensity Frequency Duration (IFD) design rainfall depths are sourced. Data was extracted from the centroid of the project site. Please refer to Appendix A3 for the rainfall data.



SGC

Flood Impact Assessment - 5 Amber Street, Claremont TAS 7011

Legend

Lot

Project site

Land elevation contours (mAHD) -

0.1 m interval

0.5 m interval

Land elevation (mAHD)

45

5

Figure 3.1: Existing terrain

A3 Scale: 1:500 Job ID: 20250178

GDA 1994 / MGA Zone 55 04/03/2026

0 10 20 m

4 Flood Model Development

4.1 Introduction

This section provides information on the development of a Site-Specific Flood Model for the current and proposed scenarios, which has been used to determine site flood conditions and assess the flood impacts of the proposed development. The proposed development site is located at northern edge of Faulkners Rivulet Catchment within the Glenorchy Municipality Catchment.

TUFLOW, a fully two-dimensional hydraulic modelling software package, has been used to undertake this flood impact assessment. A key consideration in assessing flood behaviour for the proposed development is the change in building footprints.

4.2 Modelling Approach

- A direct rainfall approach, where rainfall is applied directly onto the grid of the two-dimensional (2D) hydraulic model, was adopted with consistent with council model. This method, also known as 'rainfall on the grid'. It is particularly suitable for urbanised catchments like the project site and is one of the methods recommended by the Australian Rainfall and Runoff (ARR) 2019.
- ARR 2019 recommends adopting critical storm durations and temporal patterns when simulating flood behaviour. However, implementing the full range of durations and temporal patterns directly within a rain-on-grid TUFLOW model can be computationally intensive. To address this, a separate DRAINS hydrologic model was developed to identify the critical duration and temporal patterns relevant to the project site (Refer to Section 4.3.5).
- Filtering criteria similar to those adopted for the SSMP 2024 study were applied. A depth threshold of 50 mm was used in conjunction with a depth–velocity (DV) threshold of 0.008 m^2/s. In addition, isolated “puddles” with an area of 15 grid cells (i.e. 30 m^2) or smaller were removed.

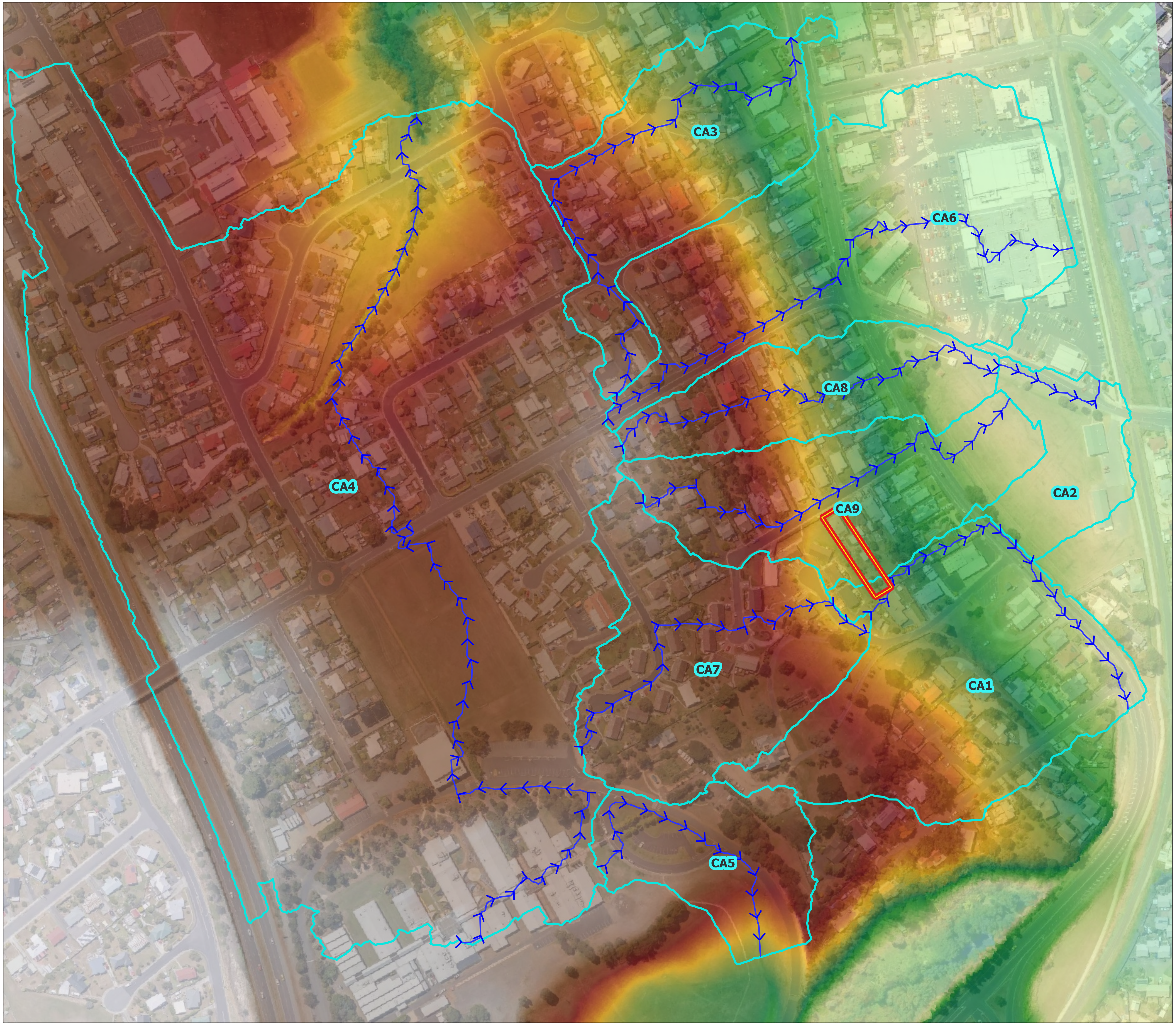
4.3 Current Scenario Model

4.3.1 General configuration TUFLOW model

TUFLOW HPC (version 2025.2.2) was used for hydraulic modelling in this study to simulate flood behaviour in the vicinity of the project site. TUFLOW HPC is a two-dimensional (2D) fixed grid hydrodynamic solver.

A grid size of 1m x 1m was adopted for the model domain to represent the best combination of grid resolution and model simulation time. 1 m DEM (Section 3.3) was utilized to represent the topography of the model domain.

A schematic diagram of the TUFLOW model was presented in Figure 4.1.



Flood Impact Assessment - 5 Amber Street, Claremont TAS 7011

Legend

Lot
Project site
Approximate flow paths
Sub-catchment boundaries
Land elevation (mAHD)
45
5

Figure 4.1: Hydrology catchment boundary at project site

A3 Scale: 1:2,800
Job ID: 20250178
GDA 1994 / MGA Zone 55
04/03/2026

0 50 100 m

4.3.2 Hydraulic Roughness and Loss Parameters

Land types within the TUFLOW model extent were delineated based on the 2021 Land Use Data sourced from The LIST (Land Information System Tasmania) available at www.thelist.tas.gov.au. Appropriate Manning's n roughness values and initial and continuing loss values were applied in accordance with the Council's Stormwater System Management Plan for Glenorchy City Council (SSMP 2024), as described in Section 3.1 (Refer to Table 3.1).

4.3.3 Building Footprint

Building footprints within the catchment of the project site were adopted from the 2d_building_polys_glenorchy dataset sourced from The LIST (Land Information System Tasmania). The representation of buildings as solid elevated surfaces is consistent with the approach adopted in the Council's adopted flood study (SSMP 2024).

4.3.4 Downstream Boundary

Water level and discharge relationships were adopted as the downstream boundary conditions and were located at least 200 m downstream of the project site.

In TUFLOW, the HQ curves were automatically generated based on the assigned boundary slopes, which range from approximately 0.15 to 0.01 depending on the local terrain slope. As the downstream boundary is located approximately 3 m to 12 m lower than the project site, flood behaviour at the site is not expected to be sensitive to the adopted downstream boundary condition for the assessed design events.

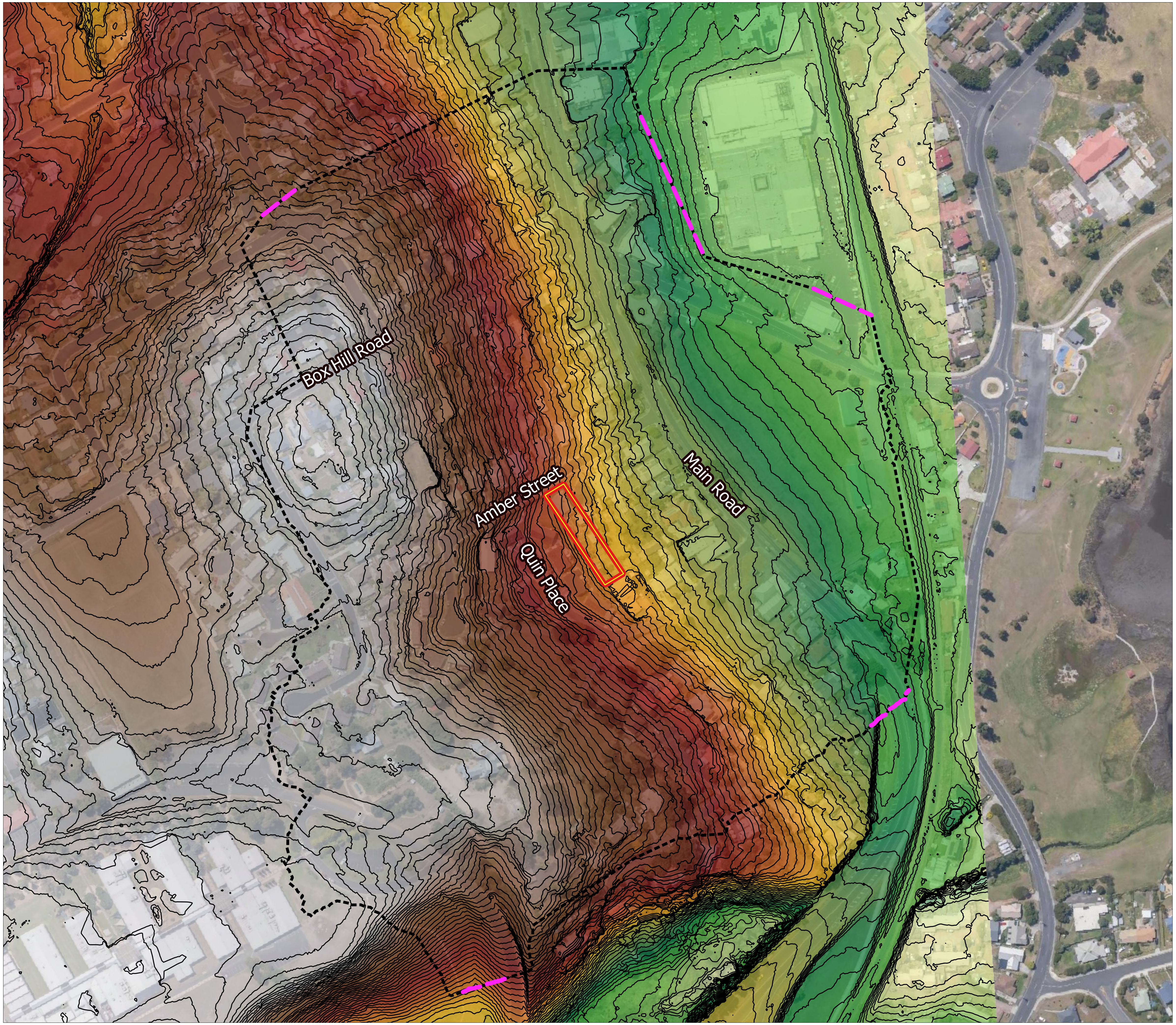
4.3.5 Selection of critical duration and temporal pattern

As discussed, to identify critical duration and temporal pattern at the project site a hydrology model was developed. For this purpose, a lumped hydrologic modelling using the RAFTS hydrology module in the DRAINS modelling software was used.

4.3.5.1 Sub-catchment Delineation

The CatchmentSIM tool was utilised to delineate the project site catchment and to identify overland flow paths using 1 m LiDAR data. Based on the distribution of these flow paths and the location of the proposed development, the catchment was subdivided into nine smaller sub-catchments using CatchmentSIM Figure 4.2 presents a map illustrating the boundaries of these sub-catchments.

The analysis determined that the slopes of the sub-catchment flow paths range from 1% to 21% (as detailed in Table 4.1). The project site is predominantly located within sub-catchment CA9, with a small portion extending into CA1.



Flood Impact Assessment - 5 Amber Street, Claremont TAS 7011

Legend

- Lot
- Project site
- TUFLOW model extent
- DS/overland slope boundary
- Land elevation contours (mAHD) - 0.5m interval

Land elevation (mAHD)

40
0

Figure 4.3: Schematic diagram of site specific flood model

A3 Scale: 1:2,500
Job ID: 20250178
GDA 1994 / MGA Zone 55
06/03/2026

0 50 100 m

Table 4.1 Area and slope of sub-catchments

Name	Total Area, ha	Impervious Area (%)	Vectored Slope (%)
CA1	3.89	35	4.74
CA2	1.04	10	1.57
CA3	2.69	80	4.29
CA4	21.16	50	3.15
CA5	1.50	25	13.02
CA6	4.74	90	3.27
CA7	3.12	45	6.21
CA8	1.79	75	6.27
CA9	2.56	65	5.7

4.3.5.2 Development of Hydrology Model

Lumped hydrologic modelling was undertaken using the RAFTS module within the DRAINS modelling software solely to identify critical duration and temporal pattern at project site. The RAFTS module is suitable for modelling sub-catchments up to approximately 100 hectares and enables runoff routing through the catchment. DRAINS also incorporates ARR 2019 design rainfall data and associated procedures. The DRAINS-RAFTS model was developed using the catchment parameters presented in Table 4.1, with ARR 2019 rainfall and modelling parameters applied using the software's built-in functionality. DRAINS in-built functionality was used to incorporate ARR2019 parameter and rainfall. A schematic diagram of the DRAINS model is shown in Figure 4.3.

4.3.5.3 Critical Durations and Temporal Pattern

The DRAINS hydrologic model was simulated across a range of durations and all temporal patterns for a 1% AEP design event, in line with the AR&R2019 guidelines. Storm durations considered ranged from 5 minutes to 6 hours. The DRAINS model indicated that the critical durations around the site are 10 minutes (TP06), 2 hours (TP03) (refer to Table 4.2). In addition, a 6-hour duration event (TP02) was adopted to simulate flood behaviour to maintain consistency with the Council flood study (SSMP 2024) (refer to Figure 3.1).

Table 4.2 Critical duration and temporal pattern at the project site

Name	Critical Duration (min)	Critical Temporal Pattern
CA1	120	03
CA7	10	06
CA9	10	06

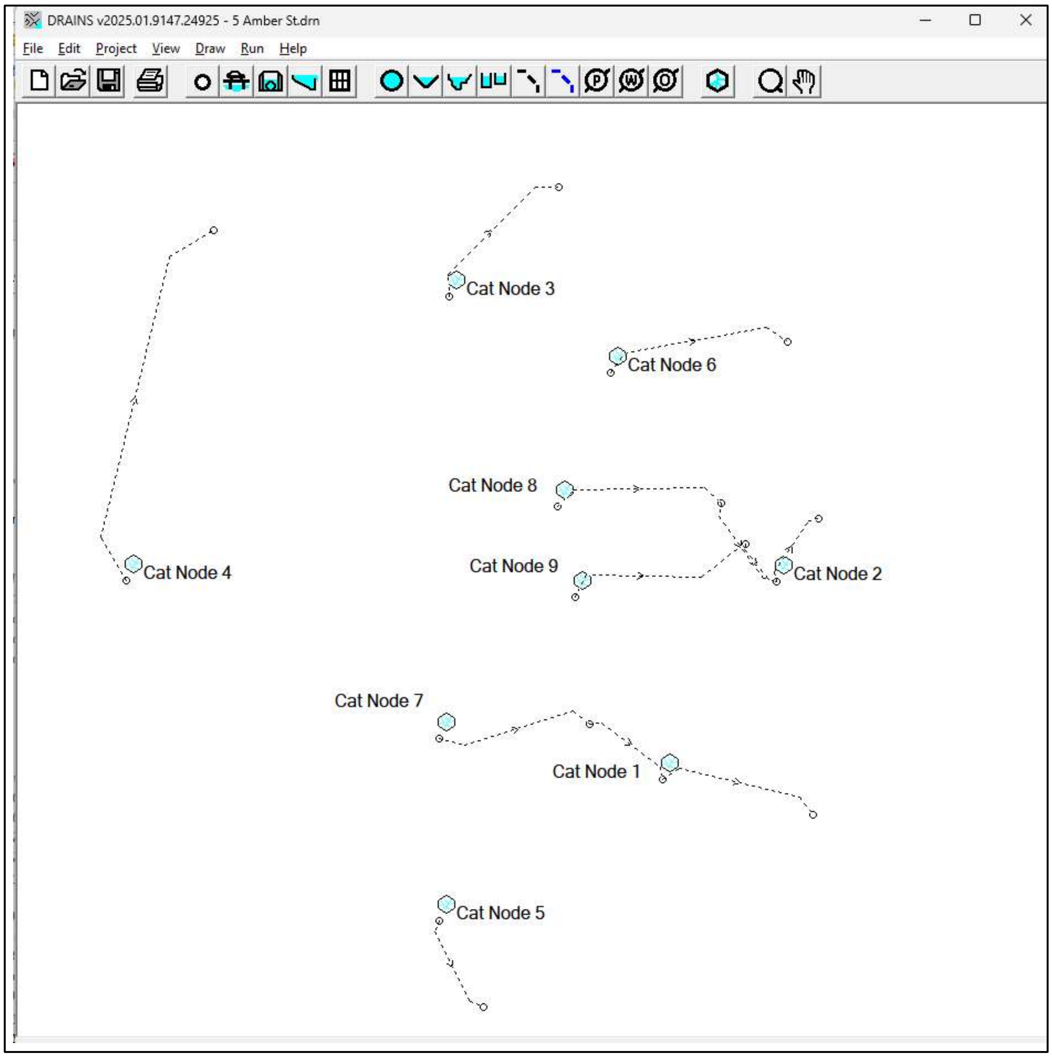


Figure 4.3 Schematic diagram of DRAINS hydrology model

4.3.6 Hydraulic hazard mapping

Flood hazard mapping was prepared on the basis of recent research undertaken into the hazard that flooding poses and the vulnerability of the public and assets when interacting with floodwaters. A combined flood hazard classification is presented in Australian Disaster Resilience Handbook 7. Managing the Floodplain: A Guide to Best Practice in Flood Risk Management in Australia (AIDR, 2017a) and Guideline 7-3 Flood Hazard (AIDR, 2017b) based on this research and is illustrated in Figure 4.4. Flood hazard has been defined for both the present and proposed case. The flood hazard categories according to the AIDR definition are:

- 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 people and vehicles. Buildings require special engineering design and construction; and
- H6 – Unsafe for people or vehicles. All buildings types considered vulnerable to failure.

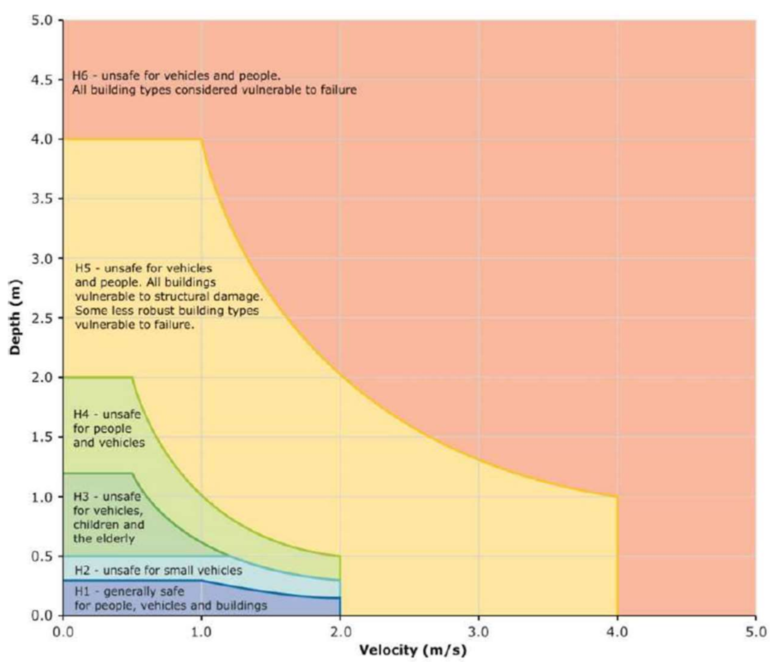


Figure 4.4 General flood hazard vulnerability curves

4.3.7 Simulation of flood model

The Site Specific TUFLOW model was simulated for the identified critical duration and temporal pattern defined in Section 4.3.5, assessing both current and proposed development conditions. Enveloped peak flood results have been derived from the maximum grid outputs across all critical durations for 1% AEP design event.

4.3.8 Model Validation

Figure 4.5 presents a comparison of the 1% AEP flood extent from the Council's adopted study and the flood extent derived from this site-specific study. The results are broadly consistent with the flood model developed for the Council's Stormwater System Management Plan.

Minor differences in flood extents are observed between the two models. The Council's model was developed at a catchment scale and utilised a 2 m grid resolution without incorporating detailed lot-level features. In contrast, the model developed for this study represents local conditions at a finer scale, incorporating detailed site features and a 1 m grid resolution.

These refinements allow this site-specific model to better represent local flow paths and conveyance characteristics. The minor variations in flood extent are therefore expected and do not materially affect flood behaviour at the site, with flood depths remaining generally consistent between the two studies.

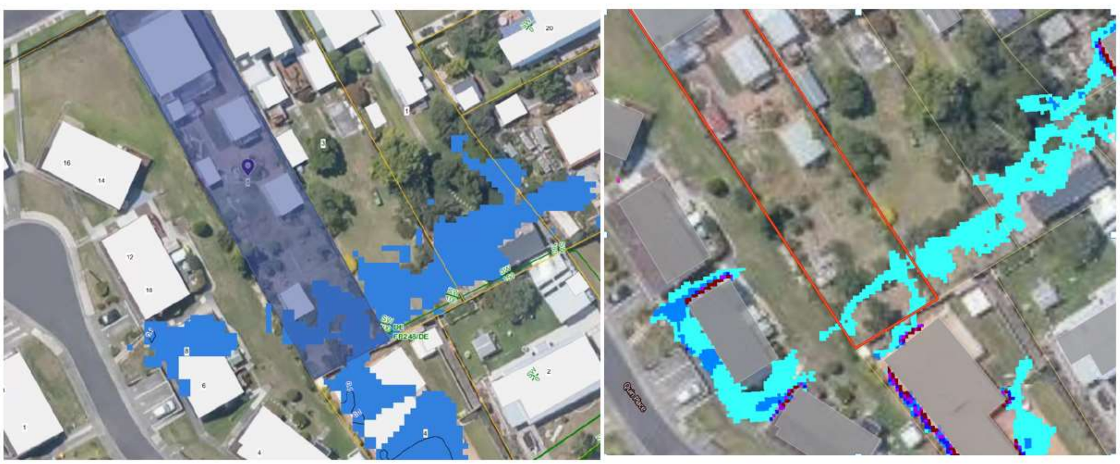


Figure 4.5 1% AEP Flood Extent; Council Flood Model (left) vs Site Specific Study (Right)

4.3.9 Current Scenario Model Result

The Figure A4.1 to A4.3 in Appendix A4 represents the flood depths with flood level contour, velocity and hazard maps respectively, respectively, for the 1% AEP flood event. Below are the key findings from the current scenario model results:

- The majority of the site remains flood-free during the design event, which is consistent with the findings of the Council's Stormwater Management System Study. Only the rear (southern) portion of the property is subject to minor inundation, with a very shallow flood depth of approximately 70 mm.
- Flood levels across the site range between 16.9 m AHD and 17.8 m AHD, while flood velocities remain below 0.5 m/s.

- The site is classified under Hazard Category H1, which is generally considered safe for people, vehicles, and buildings.

4.4 Proposed Scenario Model

This model incorporates all changes associated with the proposed development within the site. The proposed development includes the demolition of all existing structures and the construction of three new buildings.

For the proposed scenario, the building footprints within the existing-conditions TUFLOW model were updated to reflect the planned development layout (Figure 4.6) and topography was updated based on proposed design surface. All other modelling inputs and parameters remained the same as those adopted for the current scenario model.

To maintain the existing flood behaviour, approximately half of Dwelling 3 is proposed to be constructed on piers, as shown in Figure 4.6.. The piers are assumed to have a diameter of 300 mm, and a blockage factor of 30% was adopted for the grid cells in which they are located (1 m grid resolution).

Figure 4.6 Proposed Development adopted in Flood Modelling

4.4.1 Proposed Scenario Model Result

Figures A4.4 to A4.6 in Appendix A4 present the flood depths with flood level contours, velocity, and hazard maps, respectively, for the 1% AEP flood event. Below are the key findings from the current scenario model results:

- Consistent with the existing conditions model, flooding is generally confined to the rear (southern) portion of the site, with shallow inundation depths of up to approximately 150 mm.
- Proposed Dwelling 3, located on the southern side of the site, is situated within a shallow overland flow path. The adoption of a pier-supported design allows the conveyance of flow to be maintained, resulting in negligible alteration to the existing flow path.
- Predicted flood levels across the site range between RL 17.5 m AHD and RL 18.3 m AHD, with flow velocities generally less than 0.5 m/s.
- The hydraulic hazard classification remains unchanged at H1, indicating conditions that are generally safe for people, vehicles, and buildings.
- Figure A4.7 (Appendix A4) illustrates the change in flood levels associated with the proposed development. The results indicate minor afflux in the order of 10–20 mm, localised to a small area downstream of the proposed piers. Flood depths in this area remain shallow (typically less than 100 mm), and the predicted changes are considered negligible, with no adverse impacts on adjoining properties.

5 Recommendation

Below are the recommendations to ensure that the proposed development will not have a negative impact on existing flood conditions.

- Fences along the flood extent should be open style fence to allow un-interrupted overland flow.
- Under post-development conditions, the maximum 1% AEP flood level in the vicinity of the proposed Dwelling 3 is approximately 17.8 m AHD. Allowing for a 0.3 m freeboard, the minimum habitable floor level for Dwelling 3 should be set at 18.1.0 m AHD.

6 Conclusion

A local level detailed investigation of flooding behaviour has been undertaken in the vicinity of 5 Amber Street, Claremont, Tasmania.

A detailed 1D/2D hydraulic model was developed to assess flood behaviour for the 1% AEP storm event. The primary flood characteristics assessed for the design event include flood depths, levels, velocities, and hazard categories.

The study assessed the potential flood impacts associated with the proposed development. The flood impact assessment indicates that the proposed development at 5 Amber Street, Claremont, Tasmania, will not result in any significant adverse flood impacts and does not pose a risk to life or neighbouring properties.