infrastructure & development consulting

37 Archer St, Chatswood

Flood Impact & Risk Assessment Report

April 2025

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Project Number	23-035	**Date**	29 April 2025
Project Name	37 Archer St Chatswood	**Status**	Issued for SSDA
Client	Hyecorp Property Group	**Revision**	B
Author	JK- BEng, CPEng, NER	**Reviewed**	CJA- BEng, CPEng, NER

Executive Summary

This *Flood Impact & Risk Assessment Report* has been prepared by Infrastructure & Development Consulting (IDC) to accompany a detailed State Significant Development Application (SSDA) for the development of a mixed use residential tower with infill affordable housing at 37 Archer Street, Chatswood NSW 2067. The site consists of attached townhouses within a large rectangular lot. The legal description of the site is outlined in Table 1 below.

Table 1 – Legal Description

Property Address	Title Description
37 Archer Street, Chatswood NSW 2067	SP 38065
Project Site Area	2,201m^2

This report has been prepared to address the Secretary's Environmental Assessment Requirements (**SEARs**) issued for the project (SSD-73277714)

This report concludes that the proposed development is suitable and warrants approval subject to the implementation of the following flood mitigation measures:

- Basement ramp crest is to be set at the PMF level or 1% AEP plus 300mm freeboard (RL 91.67) as agreed with Willoughby City Council; and
- Overland flows are to be safely conveyed around the proposed development to ensure no worsening on the adjacent roads and downstream properties.

Following the implementation of the above mitigation measures, the remaining impacts are appropriate. These flood mitigation measures have been prepared based on the relevant guidelines and consultation with Willoughby City Council. The correspondence with the Council has been included as Appendix B of this report.

1 Introduction

The application seeks consent for the demolition of existing structures on the site and the development of a residential apartments (including affordable housing), commercial office space, food and beverage uses and retail tenancies with servicing areas and parking contained within the building's basement. A publicly accessible through site-link is also proposed, providing a direct connection between Archer and Bertram Streets and allowing opportunities for outdoor dining and passive recreation.

Specifically, the SSDA seeks development consent for:

- Demolition of existing buildings, structures and trees.
- Excavation of the site to a basement depth of RL71.85m
- Construction of a mixed-use building to 28 storeys (RL 184.25m) comprising residential and commercial uses.
- Development of 125 apartments (including 28 affordable housing units) with residential amenities and services, commercial office space, food and beverage tenancies and retail uses.

1.1 Description

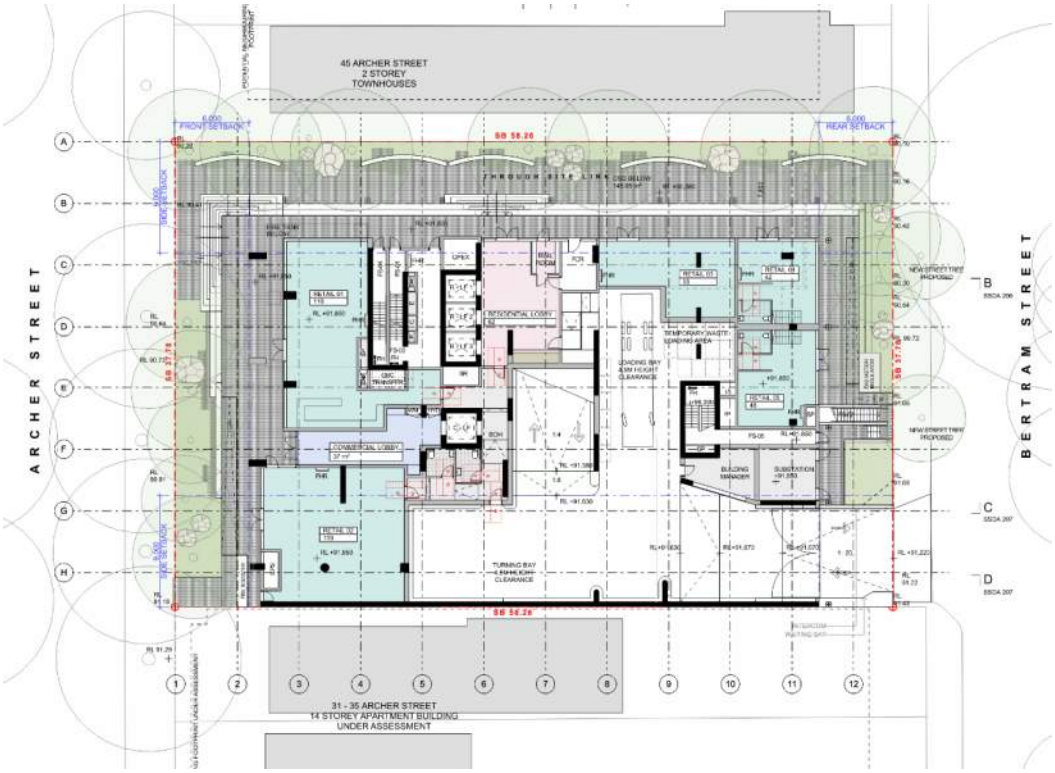
The proposal is for a 28-storey building with 6-levels of basement below. The development contains the following uses:

- Residential apartments: A total of 125 apartments (including 28 affordable housing units) comprising 29 x 1 bed apartments, 55 x 2 bed apartments, 30 x 3 bed apartments and 11 x 4 bed apartments with recreational facilities at Level 8.
- Office tenancies: occupying Levels 2 and 3.
- Retail tenancies: double storey retail units fronting Bertram Street.
- Food and beverage tenancies: ground level.
- Basement parking: 154 car spaces, 9 motorbike spaces, 28 bicycle spaces and end of trip facilities.
- Servicing and plant equipment.
- Publicly accessible landscaped through site link.
- The gross floor area (GFA) for the proposed development is described below:
- Total GFA: 14,230spm
    - Residential GFA: 12,318sqm
    - Non-residential GFA: 1,912sqm

Affordable housing will be provided in the form of a monetary contribution and floorspace within the proposed development.

The purpose of the project is to provide a high-quality mixed-use development in an accessible location within the Chatswood CBD, providing new market and affordable housing opportunities complemented by commercial and retail uses within this well services location.

Figure 1 – Development Ground Floor Plan (Source: Fuse Architects, dated 20/03/25)



1.2 SEARs Requirements

This report has been prepared in response to the requirements contained within the Secretary's Environmental Assessment Requirements (SEARs) dated 12 July 2024 and issued for the SSDA (SSD-73277714). Specifically, this report has been prepared to respond to the SEARs requirements issued below.

Table 2 – SEARs Requirements

Issue and Assessment Requirements	Where Addressed
15. Flood Risk	
• Identify any flood risk on-site having regard to adopted flood studies, the potential effects of climate change, and any relevant provisions of the *NSW Flood Risk Management Manual*.	Section 5 Section 6 Section 7
• Where the development could alter flood behaviour, affect flood risk to the existing community or expose its users to flood risk, provide a flood impact and risk assessment (FIRA) prepared in accordance with the Flood Impact and Risk Assessment – Flood Risk Management Guide LU01.	This report

• Detail design solutions and operational procedures to mitigate flood risk where required.	Section 6.1

As part of this assessment, IDC has engaged in ongoing consultation with Willoughby City Council to ensure that adequate flood related data is made available in line with Council's requirements. Details of the correspondence with Willoughby City Council have been included in Appendix B of this report.

2 The Site

The site is located at 37 Archer Street, Chatswood within the Willoughby Local Government Area (LGA). The site is legally described as SP 38065 and has an area of 2,201m^2. The existing development includes two buildings (multi-unit housing) of up to three storeys in height which accommodate a total of 14 dwellings. The existing development includes an inground swimming pool fronting Archer Street and single level of basement parking which is accessed from Bertram Street. Pedestrian entries are available from Bertram and Archer Street. Vegetation within the site includes planter boxes through the central circulation spaces and established trees around the site's perimeter. Street trees, comprising native species, along the site's western frontage form part of an attractive and distinctive avenue of trees.

The site is situated on the southern edge of the Chatswood CBD. The immediate surrounding area has been zoned for more intensive development and is intended to support mixed use development, including high density residential uses. The existing character of the area is evolving.

The urban context surrounding the site is characterised by a mix of residential, commercial, and retail uses. The surrounding locality is described below:

North: The site is bounded to the north by low scale residential development including townhouses and single dwelling properties. This land is zoned to support high-rise mixed use development including buildings with heights up to RL 246.8m. Along Archer Street proposals for mixed use towers have been lodged for properties at 51-55 Archer Street and 57-61 Archer Street.

East: The site is bound to the east by Bertram Street which comprises a two-way local road and borders the western edge of the South Chatswood Heritage Conservation Area. A locally listed heritage item at 34 Neridah Street is situated directly opposite.

South: A development application for a 14-storey mixed use development has been lodged for 31-44 Archer Street which is situated immediately to the south of the site. This area provides a transition to low scale residential uses contained within the South Willoughby Conservation Area located on the southern side of Johnson Street. There is a locally significant heritage item at 27 Archer Street.

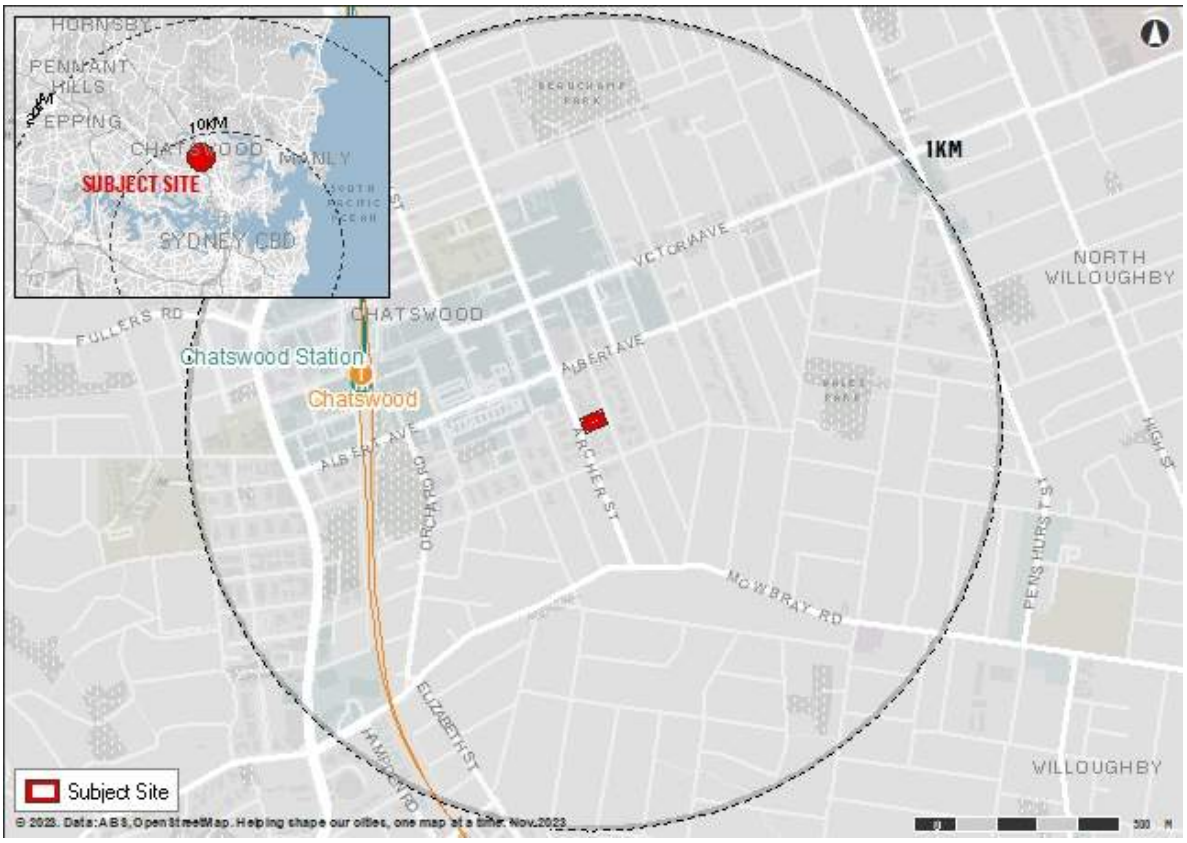
West: To the west the site is bound by Archer Street which comprises a four-lane classified road. Existing development on Archer Street comprises medium density residential towers of 7 storeys and higher. The area has been zoned for taller buildings of up to 90m. Further to the west is the Chatswood transport interchange and Pacific Highway, linking to the CBD and wider Greater Sydney region.

The site benefits from excellent access to public and active transport and is within walking distance of the Chatswood Interchange, which provides rail and metro connections to North Sydney, Macquarie Park, and the Sydney CBD. Bus services run along Archer Street and provide connections to Chatswood and Crows Nest.

Figure 2 – Site Aerial

Source: Urbis 2024

Figure 3 – Local context map



Source: Urbis 2024

2.1 Topography

The topography of the site is moderate and falls from south to north at an approximate grade of 2.5% from a high point of RL 91.2m (south east corner) to a low point of RL 90.1m (north east corner). Existing contours fall towards the centre of the development with both Archer Street and Bertram Street verge falling into the property. The upstream catchment to the subject site is bound by Mowbray Road to the south, Devonshire Street to the west and Holland Street to the east.

Downstream of the subject site, both Archer Street and Bertram Street continue to fall to the north, past Albert Avenue eventually discharging to Scotts Creek. The subject site is part of the regional Scotts Creek catchment.

Figure 4 – Site Topography

3 Controls & Guidelines

The flood mitigation measures adopted for the site are to comply with the following guidelines:

- Secretary's Environmental Assessment Requirements (SEARs) (dated 07/2024) and issued for the SSDA (SSD-73277714);
- Willoughby Local Environmental Plan 2012;
- Willoughby Development Control Plan 2023;
- NSW Government's *Flood Risk Management Manual* (dated 02/2022) prepared by State of NSW and Department of Planning and Environment;
- NSW Government's *Flood Hazard: Flood Risk Management Guide FB03* (dated 06/2023) prepared by the Department of Planning and Environment;
- NSW Government's *Shelter-in-Place Guideline for Flash Flooding* (dated 01/2025) prepared by the Department of Planning, Housing and Infrastructure; and
- *Australian Rainfall & Runoff: A guide to flood estimation Version 4.2* (dated 2024) prepared by Commonwealth of Australia (Geoscience Australia).

3.1 NSW Flood Risk Management Manual

In NSW, land identified as being flood prone and/or presenting a flood risk to the community is managed by local government through adoption of the State Government's Flood Prone Policy and *Flood Risk Management Manual*. The policy sets out to improve community flood resilience through alleviating flood impacts on owners and occupiers on properties that have been identified as being flood prone, as well as minimising public and private losses.

To accomplish this, the policy sets out to aid Councils in:

- Developing and executing flood risk management plans to manage riverine and local overland flooding, through adopting a merit-based approach;
- Using flood mitigation measures and works to minimise flood effects and risks to existing, developed areas identified in flood risk management plans;
- Ensuring that all developments located in the floodplain utilise a merit-based approach as well as consider social, economic, ecological, and flood issues; and
- Adopting ecologically sensitive planning and development controls to minimise the capacity for flood related damages to proposed development/redevelopment areas.

At a local council level, this policy is implemented through the development of effective flood risk management systems and ensuring that the relevant development guidelines are applied in accordance with state, regional, and district approaches. At a state government level, the policy is implemented through supporting councils in establishing and maintaining flood risk management.

The Flood Prone Land Policy is supported by the *Flood Risk Management Manual*. It should be noted that this manual was adopted by State Government in June 2023, replacing the *Floodplain Development Manual* (2005).

The manual defines the following as the State Government's goal for flood risk management in New South Wales:

> *"Floodplains are strategically managed for the sustainable long-term benefit of the community and the environment, and to improve community resilience to floods."*

The objective of the manual is to address the flood impacts on human uses of floodplains through acknowledging that management decisions must account for the community's social and economic welfare, as well as the management or improvement of the floodplain's natural ecosystems.

Using the flood risk management framework, the *Flood Risk Management Manual* provides councils with direction on how to control flood risk as well as create and maintain flood risk management plans for their communities.

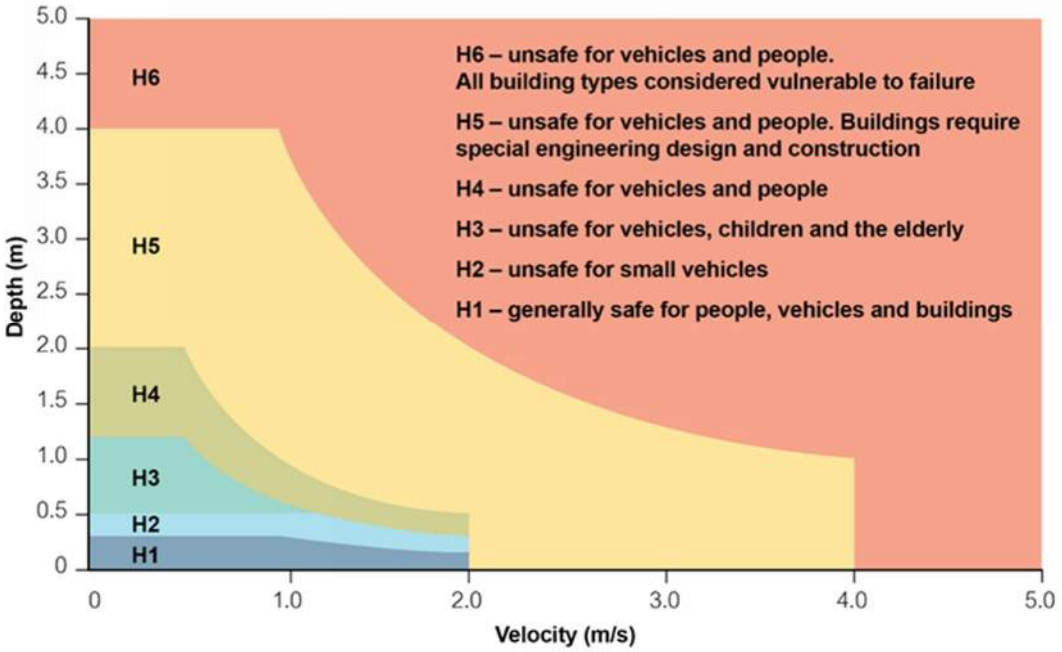
To ensure that the Willoughby City Centre's vision is realised and that its planning considers the needs of the community, as well as existing flood risk management approaches, this FIRA will utilise the state government's Flood Prone Land Policy and *Flood Risk Management Manual* as the basis for its flood assessments and proposed measures.

3.2 NSW Flood Risk Management Guide FB03

In NSW, flood hazard is related through flood depth and velocity to determine the susceptibility of the community and the built environment to flooding. It is based on the stability of people and vehicles in flood waters as well as the impacts to buildings. Categorisation of flood hazard in this manner has resulted in the development of six (6) flood hazard categories:

- **H1:** The least hazardous category, which is generally safe for people, vehicles, and buildings;
- **H2:** Unsafe for small vehicles;
- **H3:** Unsafe for vehicles, children, and the elderly;
- **H4** Unsafe for vehicles and people;
- **H5:** Unsafe for vehicles and people, with buildings requiring special engineering design and construction;
- **H6:** The most hazardous category, which is unsafe for vehicles and people and all building types are considered vulnerable to failure.

Figure 5 – General Flood Hazard Vulnerability Curve (Source: Department of Planning and Environment)



3.3 Willoughby City Council Requirements

Willoughby City Council Development Control Plan states that all public pipeline or other stormwater infrastructure should be designed for all storm events up to and including the 5% AEP storm event, with a minimum pipe size of 375mm. Additionally, on-site detention is required for all major developments to capture and detail stormwater runoff for all storm events up to and including the 1% AEP storm event.

These requirements for the site have been addressed as part of the civil report and drawings prepared by JN Engineering. Refer to Civil report (Ref: N241372 – CRPT.01A dated 07/03/2025) for details on the civil designs and the associated civil drawing set.

4 Flood Modelling

4.1 Objective

The key requirements for undertaking flood modelling for this Flood Impact & Risk Assessment are to provide a clear representation of flooding associated with the proposed development of the site and its surroundings. This report will demonstrate the flooding impact on the development site, existing properties, the community, as well as the impact the site has on the wider floodplain within the catchment.

This will be addressed by:

- assessing the impacts of contributing catchments to the existing development site;
- assessing overland flow paths and downstream system constraints;
- assessing the likely impact the proposed development has on flooding on adjacent sites;
- identifying flood hazard/flood risk for the proposed development; and
- Review the potential impacts of climate change on the proposed site.

This report will demonstrate that there are no significant detrimental impacts on flood behaviour or to the community upstream, downstream, or adjacent to the site.

4.2 Introduction

The subject site is located within the regional Scotts Creek catchment. On review of the existing Scotts Creek Flood Study (dated 03/2008) prepared by Lyall & Associates Consulting Engineers, the subject site is not covered in this report. Willoughby City Council has informed IDC that they are currently in the process of completing a Draft Floodplain Risk Management Study for the Scotts Creek catchment. Council have indicated that this study will be completed in late 2025. As such, a flood model has been constructed for the site to review the existing and proposed flood behaviour on the site and the surrounding area. A copy of this correspondence with Council has been attached as part of Appendix B.

Flood modelling has been undertaken utilising TUFLOW, a two-dimensional (2D) hydraulic modelling program that has been used to assess the existing (pre-development) and proposed (post-development) flooding scenario for a range of storm events, including the critical 1% AEP flood event within the subject site.

The TUFLOW model has been created to assess the overland flow assessment and the potential impact of the proposed site on the neighbouring properties. This model will apply direct rainfall onto the neighbouring areas to assess the local flood waters.

4.3 TUFLOW Software Package

The subject site and the surrounding catchment areas were modelled using the TUFLOW program.

TUFLOW computes flow paths by dividing the floodplain into a grid of individual cells. The flow of water between cells is then computed repeatedly at regular timesteps by solving two-dimensional shallow water equations to estimate the flood spread and flow. As each cell contains information on water levels, flows are routed in the direction that will naturally follow the modelled topography.

The flood assessment was modelled using TUFLOW build 2023_03_AD_64.

4.4 Flood Model Methodology

An overland flow analysis was undertaken to assess the potential impact of the development on the site and its neighbouring properties during the 100-year ARI (1% AEP) storm event and Probable Maximum Flood (PMF). As such, two (2) scenarios were evaluated as follows:

- **Existing Scenario –** Adopts the existing catchment characteristics for the surrounding area, i.e. represents the existing overland flows in the current urban catchment prior to any development activities which allows a comprehensive evaluation of pre-development and post-development flows.
- **Proposed Scenario –** Adopts the scenario where the proposed development has been constructed. The neighbouring area is assumed to remain as existing. This allows for evaluation of the development's potential impact on adjoining properties.

As mentioned previously in Section 3.3, the inground pipe designs and on-site detention designs have been provided as part of the civil report and drawings. As such, storm events less than the 1% AEP storm event have not been modelled as part of the TUFLOW flood model.

5 Existing Scenario Methodology

5.1 Model Build

The overland flow study has been constructed using a rainfall on grid model. A rainfall on grid model is a simplistic calculation method comparable to the loss methods included in traditional hydrology models (e.g. RORB, URBS, WBNM). The calculation utilises rainfall hyetographs (time vs depth) as a boundary condition input. Continuing and initial loss values, depending on site materials, apply the excess rainfall to the model 2D cells. TUFLOW then applies the excess rainfall across the cell area to convert the rainfall depth to a volume. By focusing on a smaller area and evenly distributing rainfall across every cell, a rainfall on grid model allows us to better assess the local flooding when compared to the mainstream flood model.

It should be noted that a rainfall on grid model can have limitations such as misleading flood depths, particularly in urban environments. This can come up as flooding appearing over buildings where the surface LiDAR does not accurately reflect the building outlines and roof elevations.

5.2 Digital Elevation Model & Processing

A digital elevation model (DEM) was generated using LiDAR (Light Detection and Ranging) aerial survey obtained from the NSW Government Spatial Services for the site and surrounding catchment area.

Figure 6 below shows the LiDAR survey DEM as a representation of the base elevations used in the model. This image was generated using QGIS Software.

Figure 6 – Pre-Development Scenario Digital Elevation Model

To represent the existing building footprints as solid object, the LiDAR was raised by 3m at the existing building locations. This ensures that the buildings act as a physical barrier and prevent water from entering such areas. The modelled buildings are shown by the yellow polygons in Figure 7 below.

Figure 7 – Pre-Development Scenario Existing Buildings

5.3 Model Extent and Grid Generation

A TUFLOW modelling grid was generated for the model extents. The finite element grid forms the basis for TUFLOW modelling and creates a readable network where each grid cell has applied characteristics such as elevation, slope, roughness, etc. The models extents have been extended upstream to the crest along Mowbray Road to show the flood behaviour for the full extent of the local catchment. The extents have also been extended downstream to Albert Avenue, northwest of the site.

A 1m x 1m grid size was selected for the model and is considered appropriate for the scale of the development site with urbanised and industrial catchments. A finer grid size is important for a rainfall on grid model as it can more accurately represent the flows across the site, reducing the mistakes in the topography and trapped sags across the model.

The model extent is shown in Figure 8 below.

Figure 8 – Model Extent

5.4 Initial and Continuous Losses and Roughness Coefficients

Manning's 'n' roughness coefficients were applied within the TUFLOW model to regions created in a TUFLOW materials file. This file bounds regions within the model area and applies a bed resistance value, in this case, a Manning's 'n' value. TUFLOW adopts these values for each 1m x 1m cells within the specified regions.

Initial and continuous loss factors have been obtained from the AR&R Data Hub and have been applied to the TUFLOW model to represent the initial loss of runoff at the start and continuing loss throughout a storm event. These losses are mainly due to infiltration and interception due to pervious surfaces.

A plan of the TUFLOW Materials file regions can be found in Figure 9 below. Each of these regions has adopted the Manning's values, as well as initial and continuous losses, set out in the Table 3.

Figure 9 – TUFLOW Materials File Regions – Pre-Development Conditions

Table 3 – Materials File Parameters

Material ID	Manning's n	Initial Losses	Continuing Losses	Description
1	0.035	33	1.8	Landscaped areas
2	1.0	0	0	Buildings
5	0.02	0	0	Roads
9	0.02	0	0	Concrete
10	0.06	33	1.8	Medium tree coverage
12	0.04	0	0	Rail rock areas

5.5 Boundary Conditions

To simulate the flood events across the site, boundary conditions (or inflow conditions) in the form of hyetographs (depth over time) have been applied to all cells within the model extent. The hyetographs for this study have been adopted from the Intensity-Frequency-Duration (IFD) data that has been obtained from the Bureau of Meteorology, which follows the AR&R standard design rainfall events. PMF rainfall data has been estimated using the Generalised Short-Duration Method (GSDM) prepared by the

Bureau of Meteorology which is suitable for applications to small catchments under 1,000km^2 and for storm durations up to 6 hours. The rainfall data has been adopted specifically for this site (see Table 4 and Table 5 below for details).

Table 4 – 1% AEP & 0.2% AEP Rainfall Intensities

Duration	1% AEP (mm/hr)	0.2% AEP (mm/hr)
5 mins	268	328
10 mins	215	262
15 mins	179	218
20 mins	154	188
25 mins	136	166
30 mins	121	149
45 mins	94	115
60 mins	77.9	95.7
90 mins	59.9	73.4
120 mins	49.8	61
180 mins	38.9	47.4
360 mins	26.4	31.9
720 mins	18.5	22.4

Source: Bureau of Meteorology (BoM) 2024

Table 5 – PMF Rainfall Intensities

Duration	PMF (mm/hr)
15 mins	680
30 mins	480
45 mins	400
60 mins	350
90 mins	300
120 mins	265
180 mins	217
360 mins	143

Source: Bureau of Meteorology (BoM) 2024

The boundary condition then distributes flow in quantity and direction across the cells of the model based on their topography, roughness, and whether upstream or downstream conditions control the flow.

Downstream boundary conditions were placed at the outlet of the TUFLOW model as shown in blue in Figure 10 at the northern limits of the model boundary.

Figure 10 – Model Boundary Conditions

5.6 Additional Assumptions

The following assumption has been made in the development of the existing scenario TUFLOW model:

- An existing pit and pipe (minor) network has not been modelled as part of this study. The flood analysis considered only overland flows over the catchment terrain and conservatively assumes all existing minor systems are blocked/full during the modelled storm events.

The above assumptions have been considered based on engineering design principles and industry standards. They are considered reasonable assumptions for the model development.

5.7 Model Controls

Within a TUFLOW model, simulation time commands are entered to control all time dependent data. For 2D models, these controls include a Start Time, End Time, and a Timestep. The starting time and finishing times specify the period in hours for which calculations are made. The timestep is the calculation interval in seconds, which is dependent on various conditions such as grid size and rainfall inputs.

For the 1% AEP storm event, a suite of storm durations were modelled to determine the maximum extent of flood affection within and adjacent to the site. The ensemble included the 25, 30, 45, 60, 90, 120, and 180-minute durations for the 1% AEP storm event. The results were compiled through post-processing to achieve a peak output for all durations. An additional map has been included in the appendices to

indicate where these maximum storm durations impacted various locations across the site. It is noted that both the 60 and 90-minute duration storms were deemed the most critical storm for the local site.

The TUFLOW model controls have been set to run for a variable period (depending on storm duration) at a timestep of 0.5 seconds. This variable time period was deemed suitable for each storm to allow the flows to reach a maximum extent of inundation before receding. The TUFLOW model was run for the following time periods depending on their respective storms events:

Table 6 – Event File Parameters

Storm Event (Minutes)	Time Period (Hours)
15	2
20	2
25	2
30	2
45	3
60	3
90	3
120	3.5
180	4
360	7

5.8 Existing Flood Results

The existing TUFLOW flood model was run for the 1% AEP storm event using hyetographs in a rainfall on grid model. The peak flow from the ensemble of storms was combined to create a *'peak of peaks'* flood extents to assess the peak flows across the catchment. Both the 60-minute and 90-minute storm events were very similar and both can be considered the peak duration for the key overland flow paths on/adjacent to the site. The TUFLOW model was run for a variable event length to allow the flows to 'fill' the model and settle out before the peak extents were determined.

The flood mapping and results presented in this report represent the 1% AEP and PMF events under the above mentioned conditions. Depths less than 50mm have been removed from the maps for the purpose of determining areas of ponding and overland flows. This is due to the rainfall on grid modelling approach results in all the active grid cells in the model being shown as 'wet'. The 50mm depth tolerance removes shallow sheet flows over the digital terrain.

1% AEP Flood Commentary

The pre-development flood mapping results for the 1% AEP storm event indicate that stormwater runoff for the catchment generally travels within the kerb line of Archer Street and Bertram Street. Flood waters adjacent to the subject site were observed at a depth of 0.18m and velocity of 1.3m/s along Archer Street and a depth of 0.16m and velocity of 2.0m/s along Bertram Street. The maximum water level observed along the Archer Street boundary is RL 91.35, with the maximum water level along Bertram Street is RL 91.33.

Upstream of the site, stormwater overtops the kerb at the Johnson Avenue sag point and travels north through the existing properties until it reaches the subject site. A maximum flood depth of 0.72m was observed along the southern boundary of the site however the velocity at this location is 0.3m/s. This indicates that the water is trapped between the sag in the topography and the edge of the building. Trapped waters along the southern boundary overtop crests to the east and west, eventually joining the overland flow in the Archer Street and Bertram Street kerbs.

Within the subject site, flood hazards are limited to H1 and H2 (low hazard, unsafe for small vehicles) within the site with a portion of the flooding south of the boundary classified as a H3 hazard (unsafe for all vehicles, children and the elderly). We note that flooding downstream of the site along Bertram Street is considered high H5 hazards (unsafe for all people and all vehicles. Buildings require special engineering design and construction). This is due to the velocity of flow past the site exceeding 2.0m/s which classifies any flooding as a minimum H5, regardless of its depth.

The TUFLOW output results for the existing 1% AEP scenario are shown in the following figures.

Figure 11 – Pre-development Overland Flow 1% AEP Flood Extents and Depth (m)

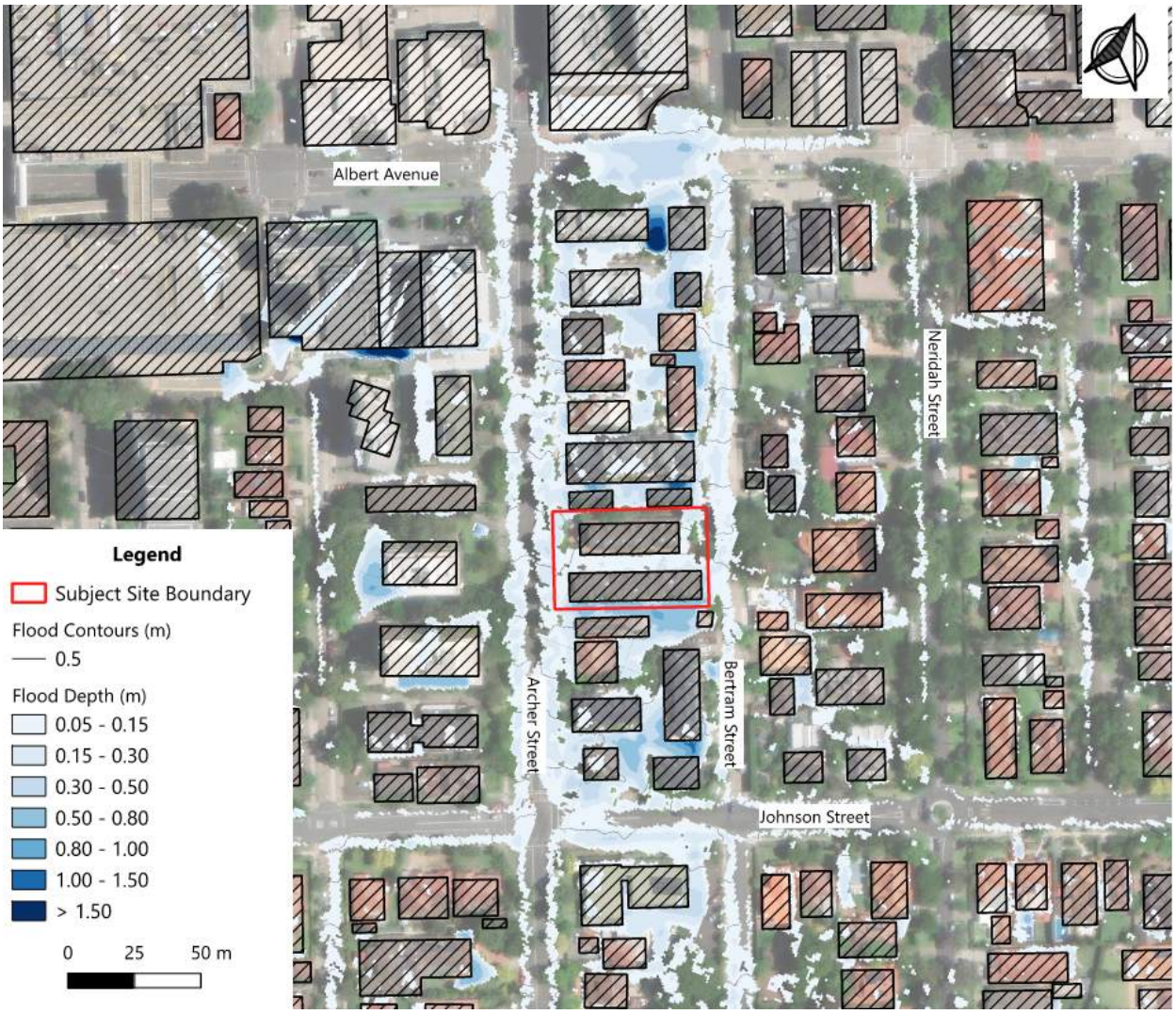


Figure 12 – Pre-development Overland Flow 1% AEP Flood Levels (m AHD)

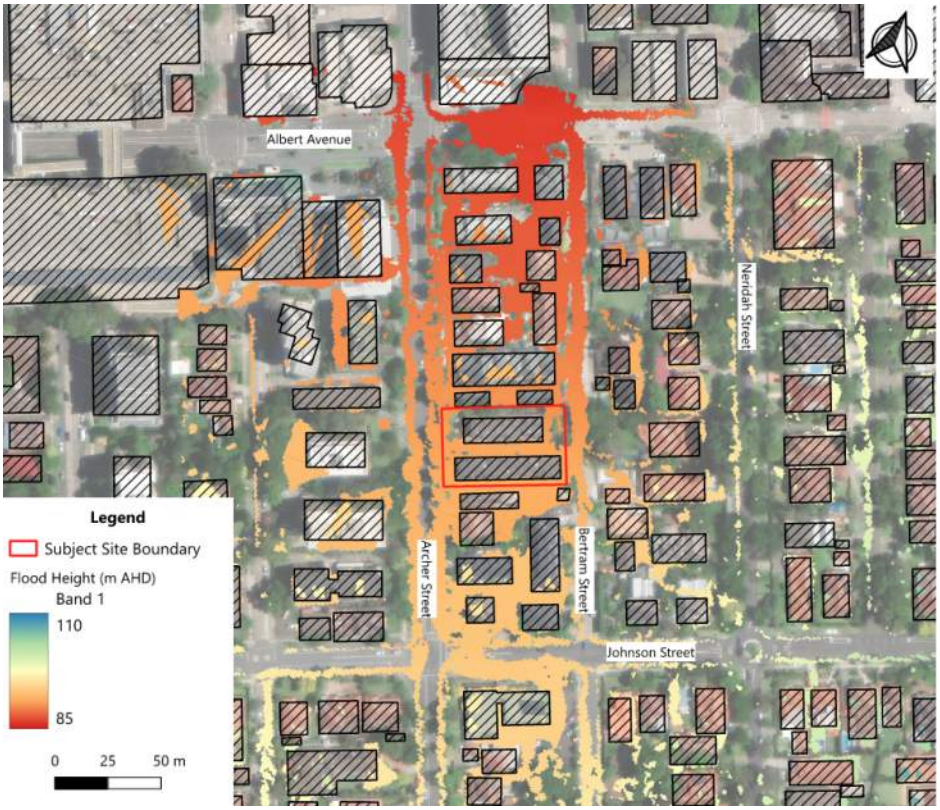


Figure 13 – Pre-development Overland Flow 1% AEP Flood Velocity (m/s)

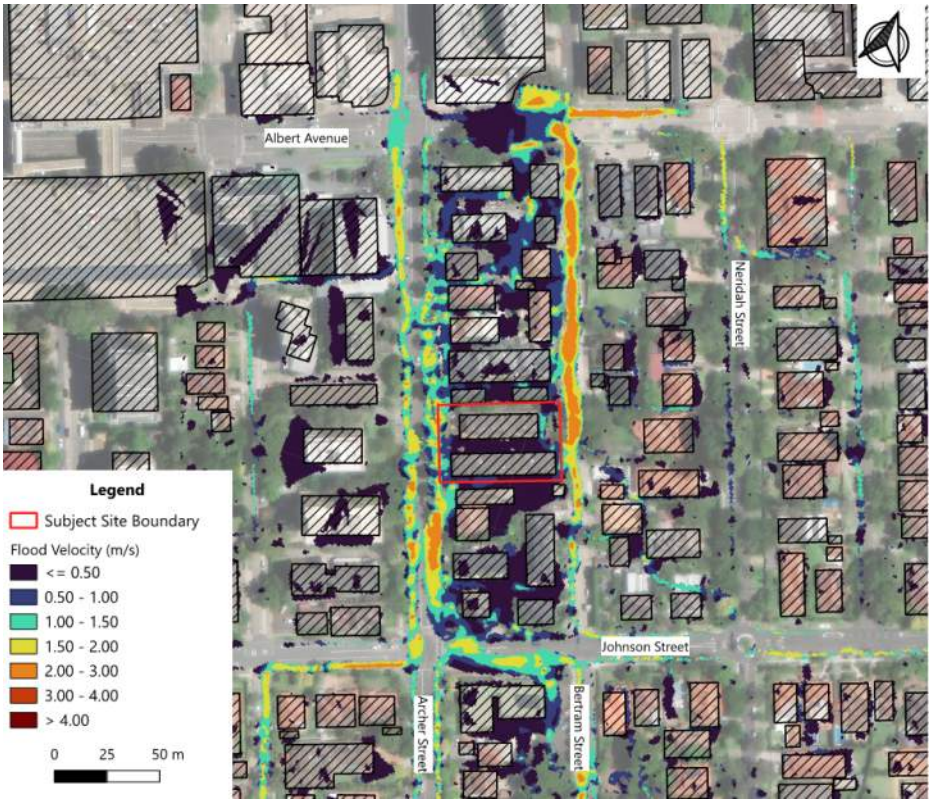
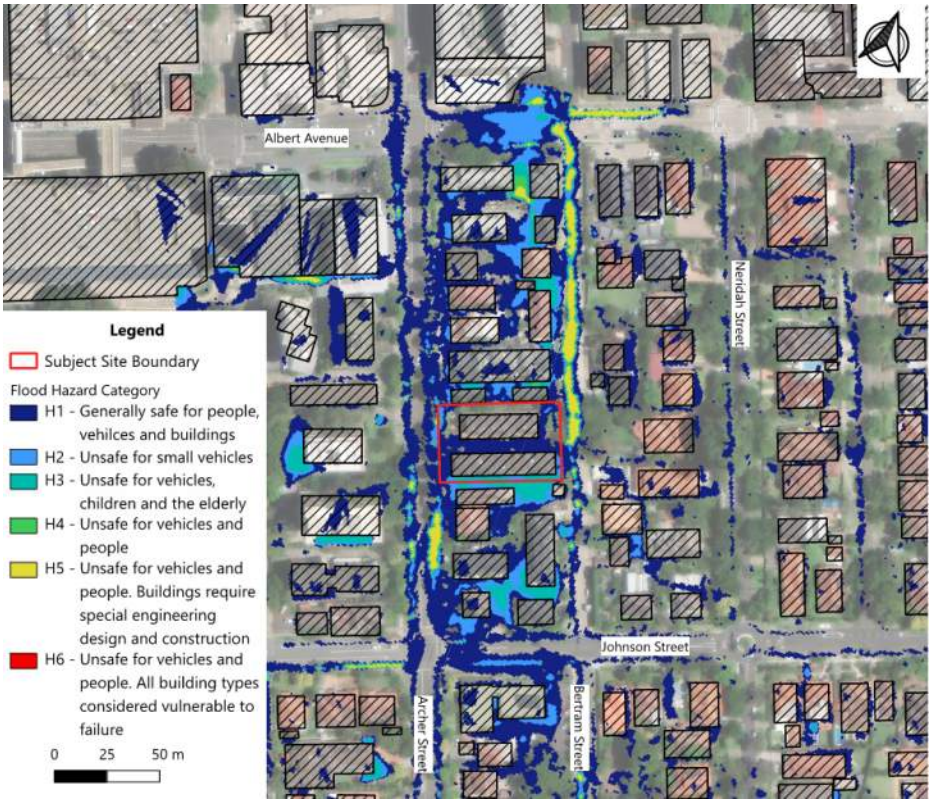


Figure 14 – Pre-development Overland Flow 1% AEP Hazard Levels



PMF Flood Commentary

In the modelled PMF event, the model extents are inundated by flood waters with Archer Street and Bertram Street completely flooded in this scenario. Within the subject site, there is a notable trap low point observed in the LiDAR causing localised flooding up to a depth of 1.7m in the north east corner of the site. We note that this low point in the LiDAR is an existing basement ramp.

Flood waters adjacent to the subject site were observed at a depth of 0.60m and velocity of 2.4m/s along Archer Street and a depth of 0.44m and velocity of 2.8m/s along Bertram Street in the PMF storm event. The maximum water level observed along the Archer Street boundary is RL 91.75, with the maximum water level along Bertram Street is RL 91.67.

Upstream of the site, Johnson Street is inundated with stormwater overtopping the kerb line between Archer Street and Bertram Street. The maximum flood depth along the southern boundary of the site is 1.14m and is still constricted by the existing building on site and ponding as per the 1% AEP flood behaviour.

With regards to flood hazards, both Archer Street and Bertram Street are classified as high hazard H5 flooding due to the velocity of flow exceeding 2.0m/s. Downstream of the subject site, pockets of flooding along Bertram Street are classified H6 within the road carriageway.

Within the subject site, flood hazards are primarily H1 and H2 (low hazard) with flooding in the trapped low point classified as H4. Along the east and west boundaries, flooding from Archer Street and Bertram

Street overtop the kerb causing some H5 flooding within the site extents. Along the southern boundary flooding is primarily classified H3. We do note a portion of the southern boundary is classified as H5 flooding in the south east corner of the site. Stormwater from the trapped low point against the building here travel north to Bertram Street forcing overland flows through a small opening causing the high hazard flooding.

The TUFLOW output results for the existing PMF scenarios are shown in the following figures.

Figure 15 – Pre-development Overland Flow PMF Flood Extents and Depth (m)

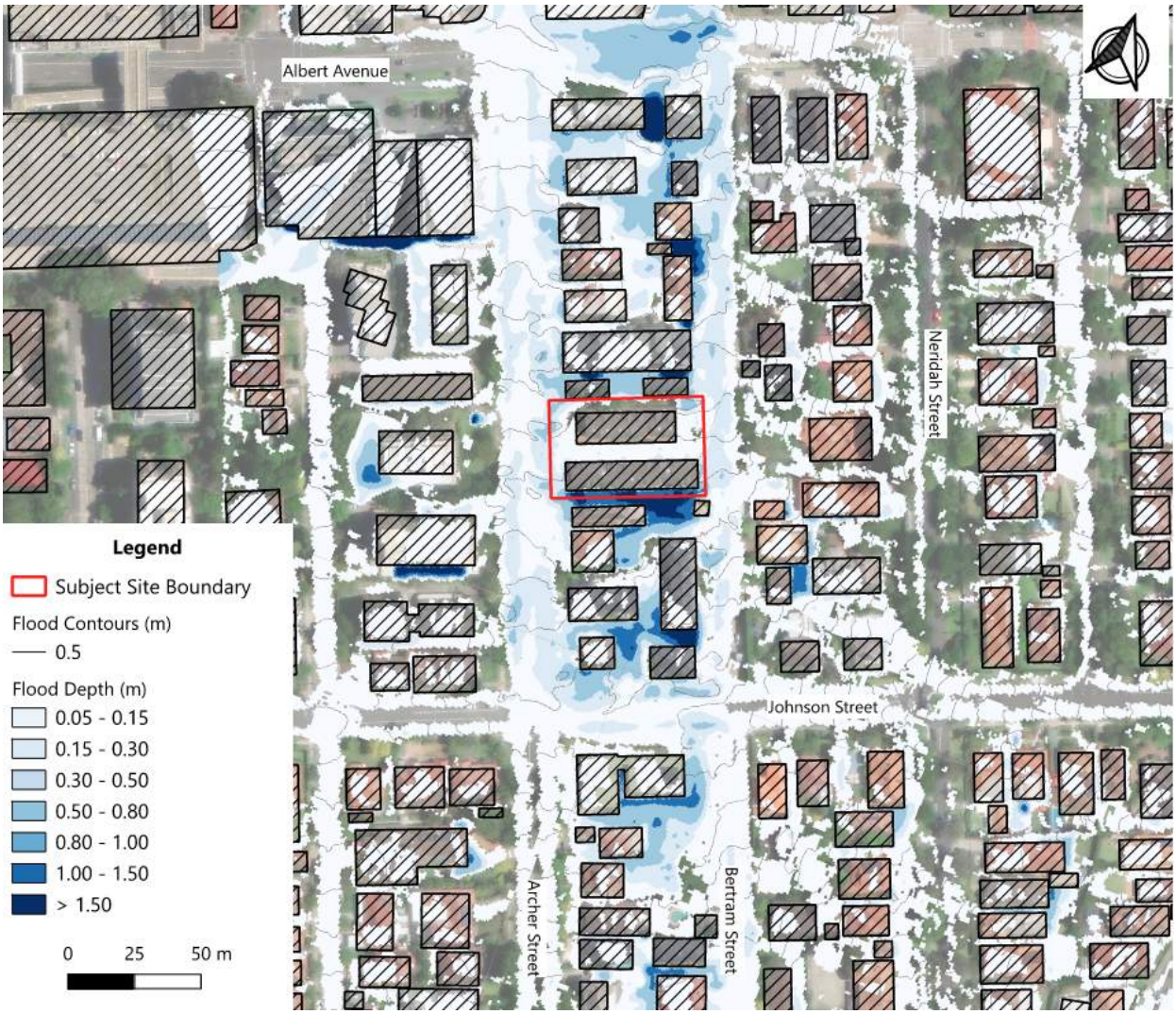


Figure 16 – Pre-development Overland Flow PMF Flood Levels (m AHD)

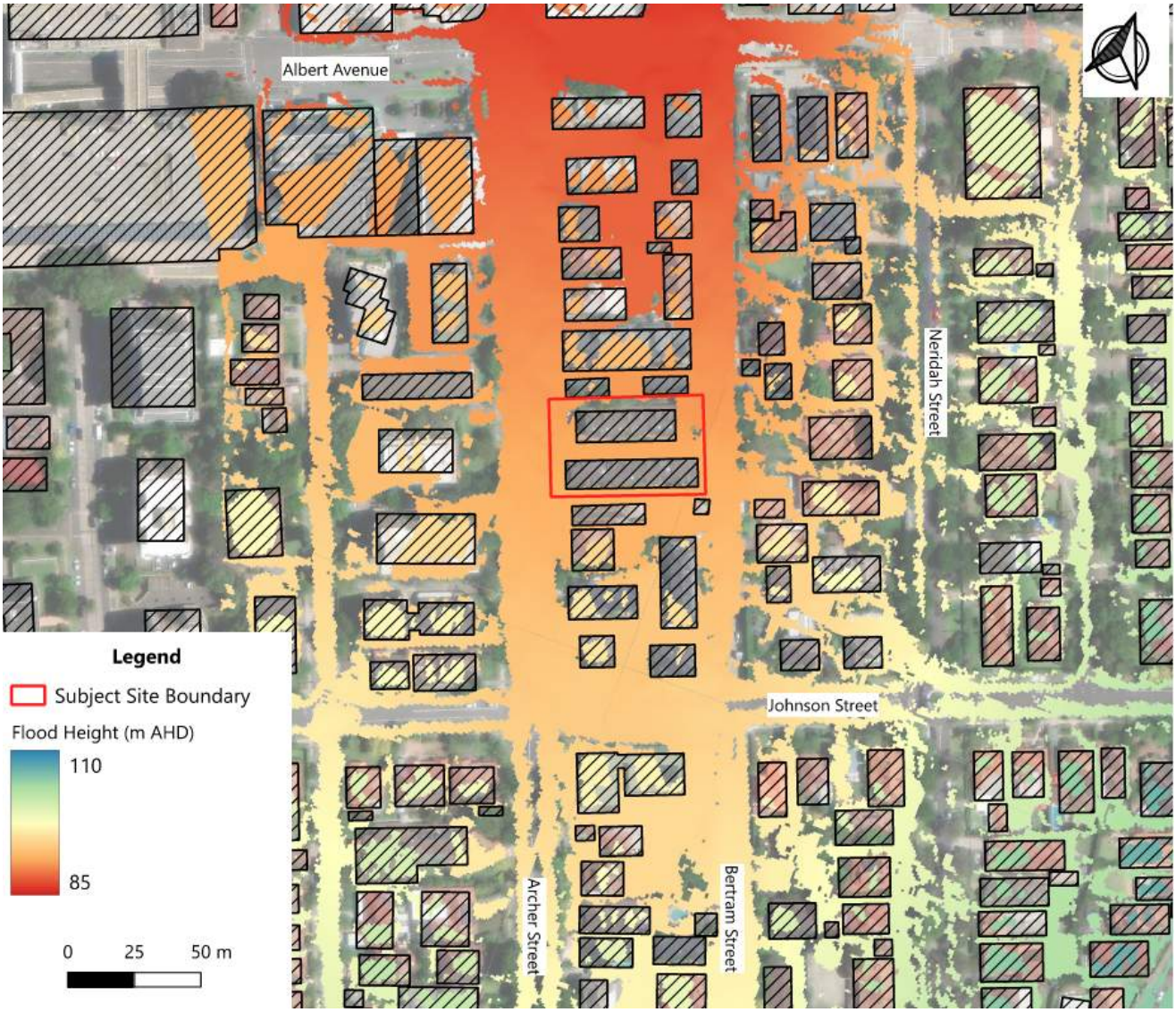


Figure 17 – Pre-development Overland Flow PMF Flood Velocity (m/s)

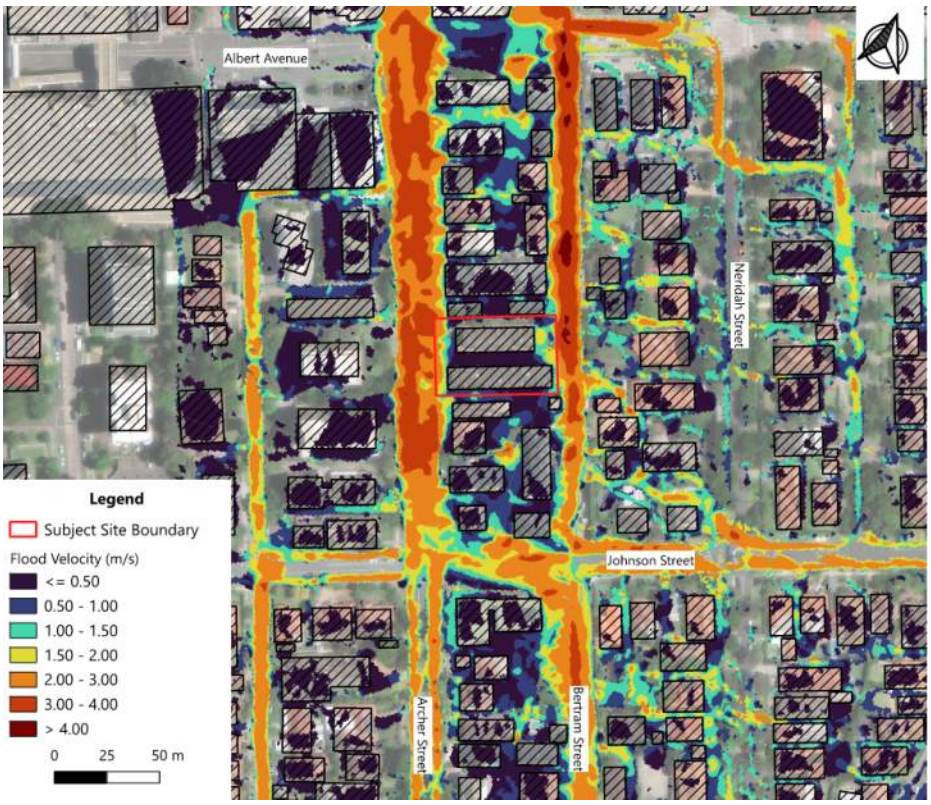
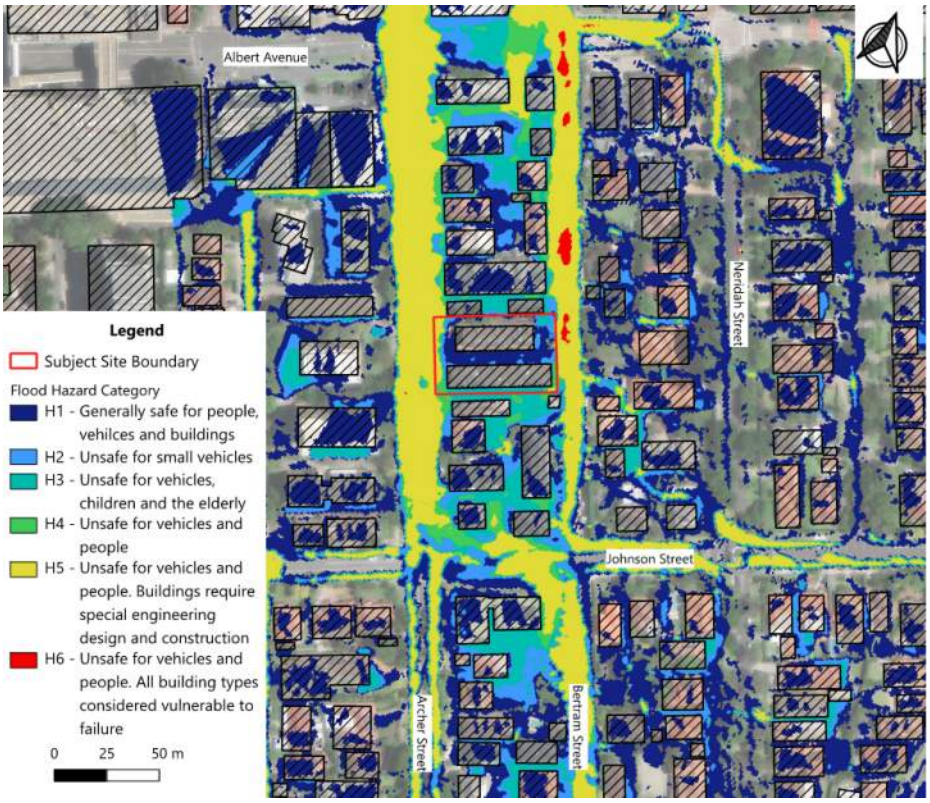


Figure 18 – Pre-development Overland Flow PMF Hazard Levels



6 Proposed Scenario Methodology

6.1 Flood Controls and Compliance

The *Willoughby Development Control Plan Part I: Stormwater Management 2023* has specified various controls for new development in areas subject to local drainage or overland flow to protect developments from flooding. These controls and the mitigation measures adopted are outlined in the table below.

Table 7 – Flood Controls & Compliance

DCP Control No.	Control	Mitigation Measure	Compliance (Y/N)
5.1.2a	Minimum floor level for buildings = 1% AEP water level + 500mm	Floor level set to the 1% AEP + 500mm = FFL91.85	Y
5.1.2c	Minimum crest level for driveway to basement parking = PMF water level or 1% AEP water level + 500mm, whichever is higher	Crest level for driveway to basement parking set to PMF water level = RL91.67	N Refer to Section 6.2
5.1.2f	Construct on high side of property	The minimum floor level of the building has been set to the required minimum 1% AEP water level at the high side of the property (See above, DCP Control No. 5.1.2a)	Y
5.1.2g	Flood evacuation route at 1% AEP +500mm level	Refer to Section 6.8	Y
5.1.2h	Flood impact assessment required; a flood study may be required where works potentially impact flood levels.	Flood impact assessment provided. Development does not affect flood levels – no flood study required.	Y

In addition to the above controls, overland flows from the upstream catchment must either match or improve the flooding on adjacent properties, both upstream and downstream due to the proposed development.

Overland flows entering the site via the southern adjacent property (31-35 Archer Street) will need to either meet or reduce the existing flood behaviour in the southern property. We note that stormwater currently ponds along the southern boundary of the site due to the existing topography. The proposed development building frontages have been designed to ensure the overland flows, both to Archer Street and Bertram Street, are unimpeded and either meet or reduce the existing flooding behaviour in the southern property. Proposed building frontages are to be unimpeded for the first 6m from the site boundary at the south east and south west corners of the building to ensure safe overland flows from the south. Works proposed have been confined to our subject site with no works proposed in the adjacent property.

We note that the southern adjacent property (31-35 Archer Street) is currently in design development for its own proposed development. This site has yet to submit a Development Approval to Willoughby City Council. If approved and constructed, the extent of this building will match the site boundary with the subject site, diverting overland flows from the south towards Archer Street and Bertram Street before reaching our subject site boundary, eliminating flooding at the southern site boundary. There will be no overland flows entering our subject site along the southern boundary should this development be approved and constructed.

6.2 DCP Non-Compliance & Authority Correspondence

IDC have approached Willoughby City Council to request if Council would consider an alternate approach to the DCP guidelines that still ensures the development has an acceptable flood planning outcome. The key item discussed with Council was the minimum crest level for basement parking ramps. As outlined in Table 7 above, Council's DCP states that the basement crest level is to be set to either the PMF water level or the 1% AEP water level + 500mm, whichever is higher.

The proposed development basement crest level on Bertram Street has been set to the PMF water level, which is approximately 300mm above the 1% AEP water level and thus 200mm lower than the DCP minimum crest level requirement (1% AEP water level + 500mm freeboard. Since the lower level has been adopted for this control, this item has been deemed a non-compliance with Willoughby DCP control 5.1.2c

In discussions with Council, it was noted that the subject site is not affected by mainstream flooding with only overland flows affecting the site. The site falls at a grade of 2.6% to the north with the PMF flood depths between 0.3m to 0.7m. The PMF flood level is approximately 200mm below the 1% AEP flood level plus 500mm. Considering the depth of flow and the grade of the roads adjacent to the site, and that the PMF flood level would still provide freeboard to the 1% AEP storm event, IDC requested that the basement ramp crest be set to the PMF level.

On review, Willoughby City Council has agreed that in this instance they would be willing to consider the PMF level as the basement crest level so long as it maintains a 300mm freeboard to the 1% AEP storm event. As such, a basement ramp level of RL 91.67 has been adopted for the site. For details on the correspondence between Council and IDC, refer to Appendix B.

6.3 Model Build

The post-development flood model builds on the pre-development model that has been outlined in Section 5.1 above. The only change between the existing and proposed models is that the existing building on site has been replaced with the proposed building structure. Similarly to the existing model, the proposed building structure was raised 3m to provide a physical barrier to overland flows.

The proposed model provides a representation of the intended development scenario, while also accounting for the existing surroundings. This approach facilitates the quantitative evaluation of the potential effects the proposed development might exert on neighbouring properties and local settings. Refer to Figure 19 below for updated building layout. We note that the proposed building frontage to Bertram Street has been increased when compared to the existing southern building. This will allow additional overland flows to travel around the building from the upstream property until a future

scenario when the southern property is developed and diverts this water before it reaches the subject site boundary.

The basement ramp is proposed in the south east corner of the site, entering from Bertram Street. The crest of the ramp will be within the proposed building outline. As part of the flooding analysis, the basement ramp crest or RL 91.67 is to be 300mm above the 1% AEP flood level or the PMF flood level along the Bertram Street road frontage. Refer to the architectural drawing package for further details on the basement access and ramp.

Figure 19 – Post Development Building Scenario

6.3.1 Topography Modifications

Topography modifications were made to the existing DEM file in the form of 2D z-shapes. These were included to more accurately portray the proposed site topography in certain locations. The key locations of these include:

1. The removal of the existing basement ramp in the north east corner of the subject site.
2. The Archer Street and Bertram Street existing verge falls into the subject site. The proposed development frontages are to be regraded to direct overland flows away from the development and towards Archer Street and Bertram Street.

6.4 Post Development Results

The proposed TUFLOW flood model was run for the 1% AEP storm event using hyetographs in a rainfall on grid TUFLOW model. The peak flow from the ensemble of storms was combined to create a peak of peaks flood extents to assess the peak flows across the catchment. Similar to the predevelopment model, the peak duration primarily was the 90-minute storm event for the key overland flow paths adjacent to the site.

The flood mapping and results presented for the post developed flood model presented in this report represent the 1% AEP and PMF events to match the pre developed flood model conditions. The pre and post developed models were run under the same conditions, only changing the development works, ensuring the differences between the models will identify the proposed developments impacts on its site and the surrounding flood behaviour.

The TUFLOW output results for the post development 1% AEP and PMF scenarios are shown in the following figures.

1% AEP Flood Commentary

The following is a summary of key results from the 1% AEP flood modelling:

1. The proposed development has removed flooding through the site. We note a portion of the roof is showing some minor ponding, however, this is due to the rainfall getting trapped on the roof due to the nature of the rainfall-on-grid modelling methodology and should be disregarded.
2. The maximum flood level along the Bertram Street frontage is RL 91.25 which is more than 300mm below the proposed basement ramp crest.
3. The maximum flood depths along the southern boundary is observed at 0.65m which is less than the predevelopment model.
    a. We note that while flows will still be restricted in the trapped low point south of the subject boundary, the proposed development adequately directs overland flows around the site to improve the flood behaviour when compared to the existing scenario.
    b. We note this is a potential interim scenario. Flows from the south will be diverted to Archer Street and Bertram Street prior to reaching the site boundary if the development at 31-35 Archer Street is approved and constructed.
4. The building floor level of RL 91.85 is suitably set above the 1% AEP flood level plus 500mm freeboard.

Figure 20 – Post-development Overland Flow 1% AEP Flood Extents and Depth (m)

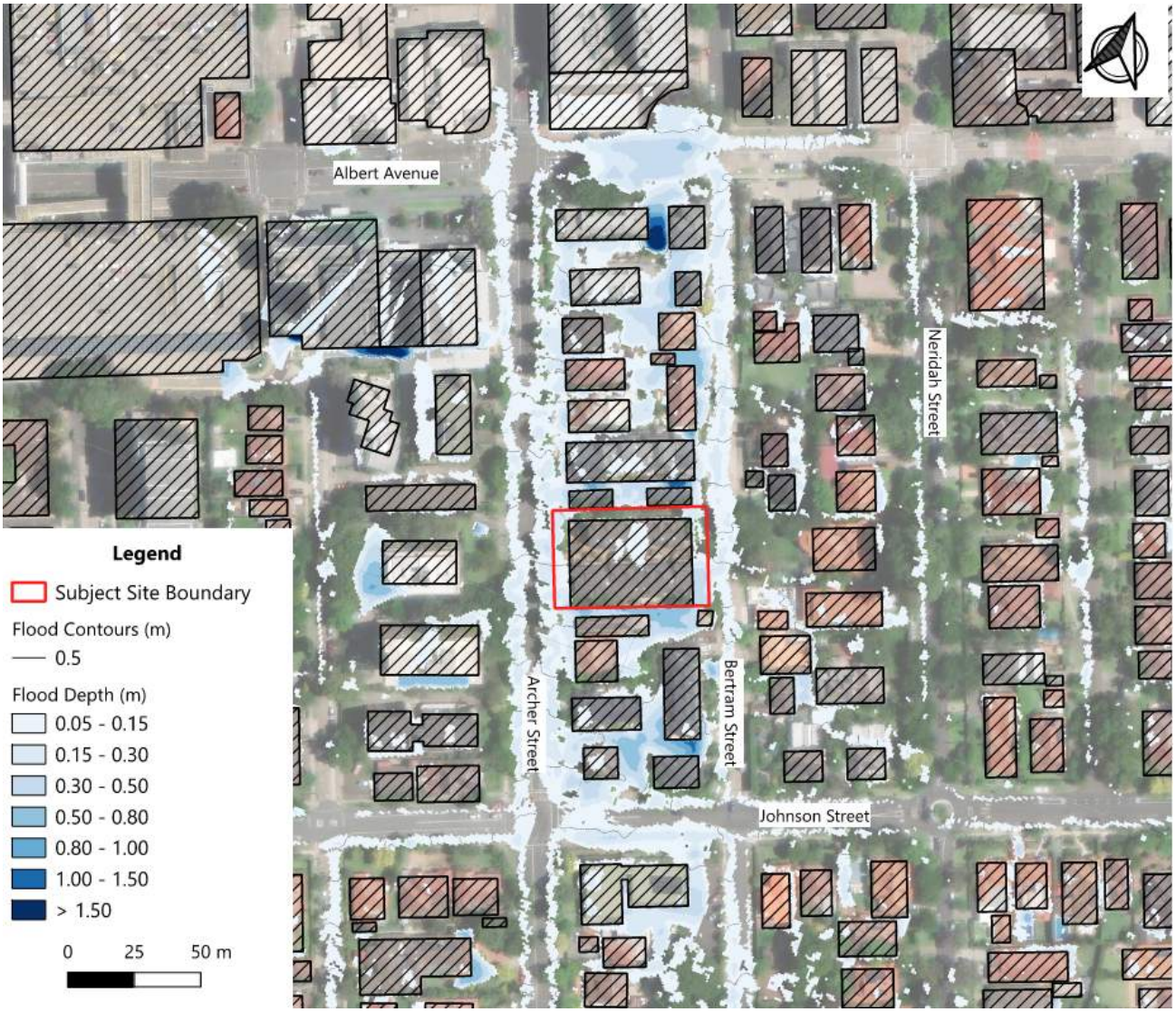


Figure 21 – Post-development Overland Flow 1% AEP Flood Levels (m AHD)

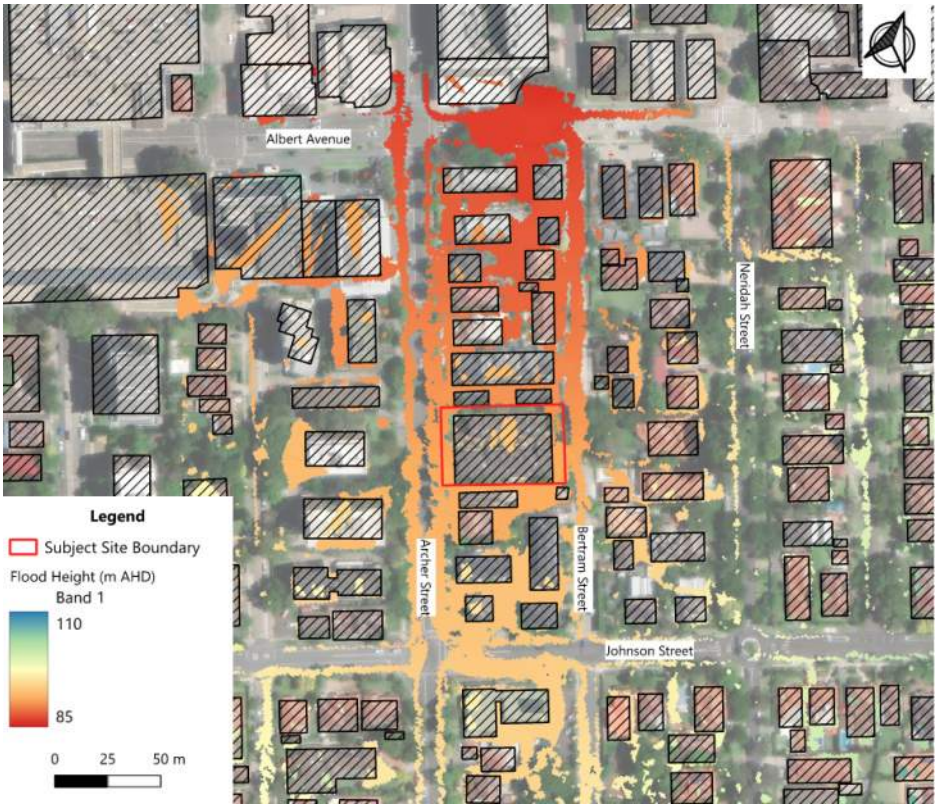


Figure 22 – Post-development Overland Flow 1% AEP Flood Velocity (m/s)

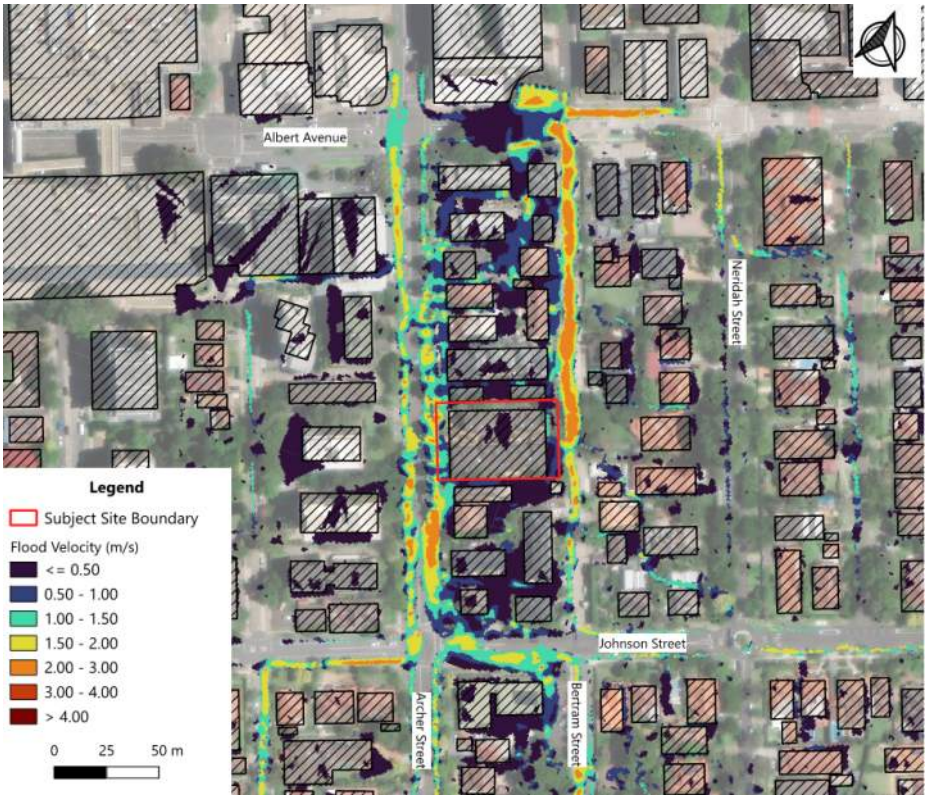
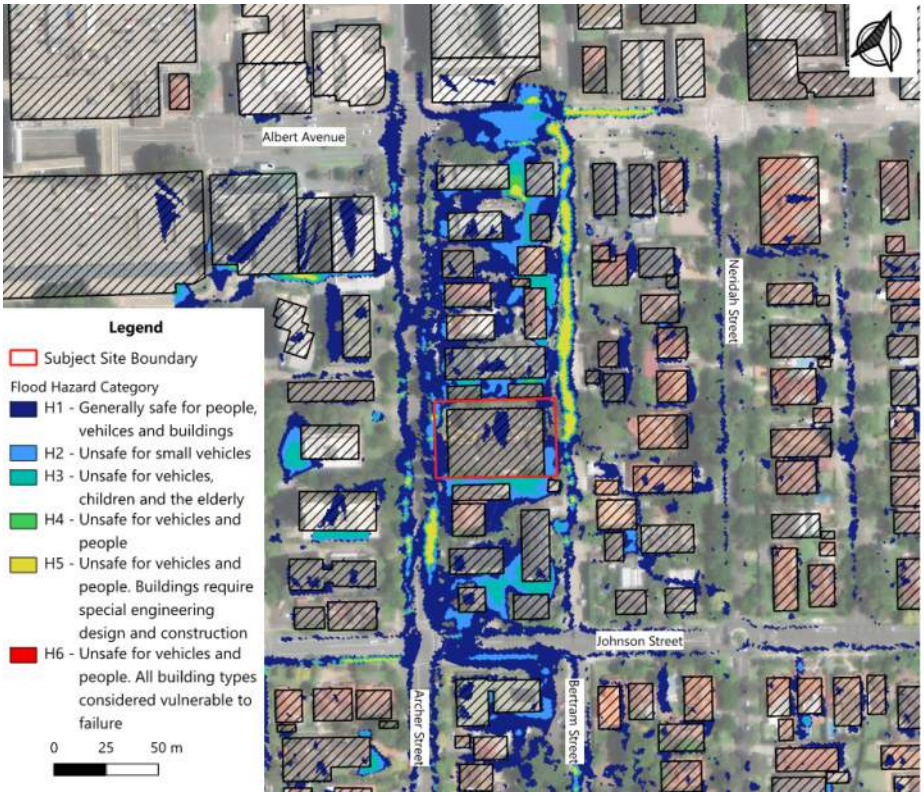


Figure 23 – Post-development Overland Flow 1% AEP Hazard Levels



PMF Flood Commentary

The following is a summary of key results from the PMF flood modelling:

1. The maximum PMF flood level along the Bertram Street frontage is RL 91.58 which is lower than the proposed basement ramp crest.
2. The maximum flood depths along the southern boundary is observed at 1.14m which matches the predevelopment model.

Figure 24 – Post-development Overland Flow PMF Flood Extents and Depth (m)

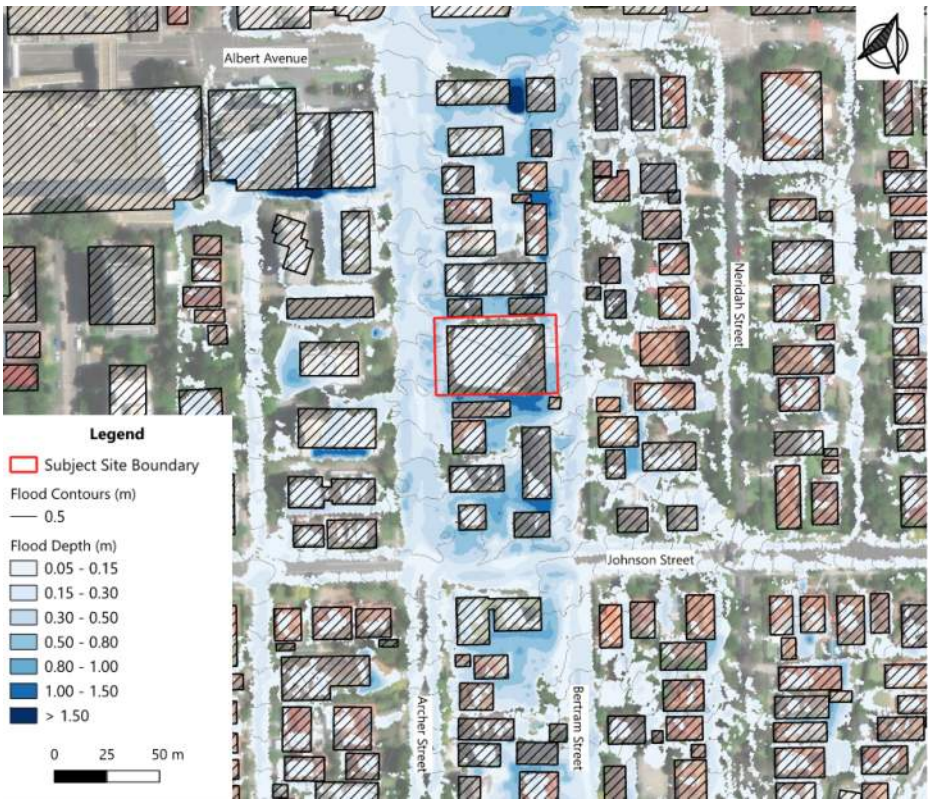


Figure 25 – Post-development Overland Flow PMF Flood Levels (m AHD)

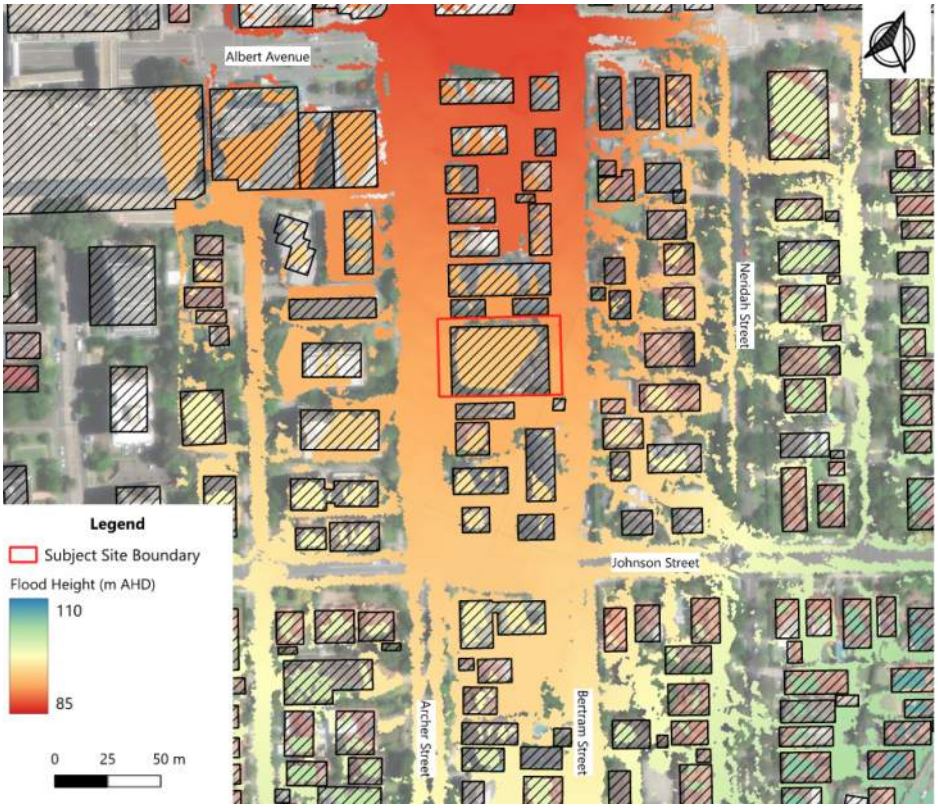


Figure 26 – Post-development Overland Flow PMF Flood Velocity (m/s)

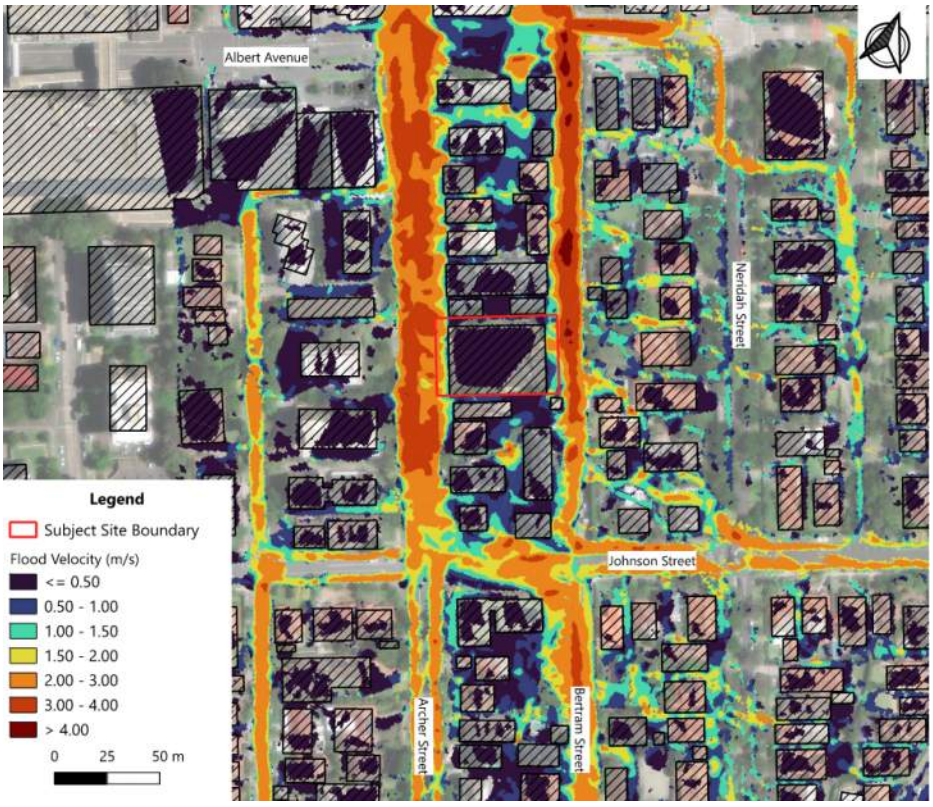
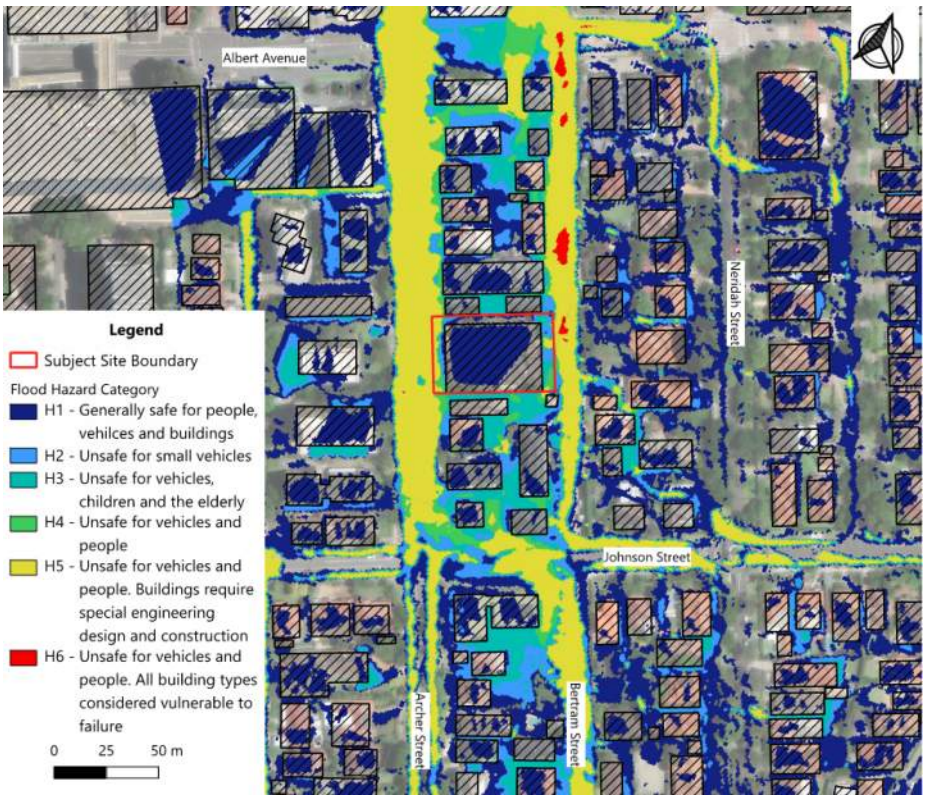


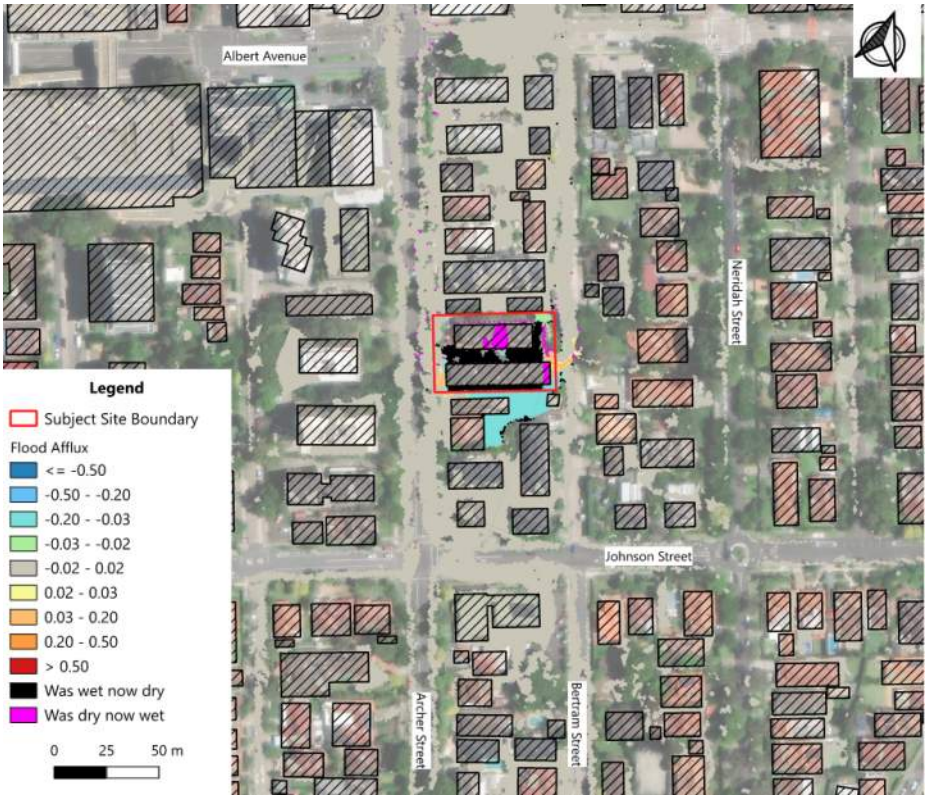
Figure 27 – Post-development Overland Flow PMF Hazard Levels



6.5 Pre-to-Post Development Comparison and Flood Affectation Analysis (Afflux)

A direct comparison of the existing and post developed 1% AEP scenario flood depths was undertaken to assess flood affectation adjacent to the site. Increases in the water surface level were separated from decreases and are identified in Figure 28 below.

Figure 28 – Proposed to Existing 1% AEP Flood Afflux



6.6 Summary of Results

The following is a summary of key results from the modelling:

- Results of the flood comparison show minimal increases in flood levels around the site. The grey areas shown in Figure 28 above indicates no water level change greater than 20mm.
- Flood levels along the southern site boundary and in the southern neighbouring property are reduced by a maximum of 0.12m. This is caused by the increase to the building frontage along Bertram Street, allowing flood water to more readily flow away from the trapped low point and onto Bertram Street;
- 40mm of afflux is observed at the southwest corner of the site where the overland flows from the south move past the building extent. We note this is a small pocket of afflux (2m by 1m) and is considered negligible and will not adversely impact the surrounding area. We also note that this afflux will not occur if the property to the south has been constructed.
- Within the subject boundary, pockets of afflux is observed where the overland flows are pushed away from the building line and towards Archer Street and Bertram Street.
    - A maximum of 80mm of afflux is observed along the western boundary and is mostly contained within the subject site boundary.
    - A maximum of 110mm of afflux is observed within the eastern boundary of the site along Bertram Road with a pocket of afflux extending past the site boundary into Bertram Street. This is due to the proposed development frontage along Bertram Street

increasing. This increase has allowed flood waters in the property to the south to reduce however has also allowed overland flows to reach areas previously blocked by the building.

While we note there is some afflux across the site, the afflux is isolated and dissipates shortly downstream. This also removed the existing flooding observed between the two existing buildings. This is an improvement to the existing and has been considered acceptable as the impact on the surrounding area downstream is negligible while also improving the existing flood behaviour to the property to the south and the subject site.

6.7 Cumulative Impact Assessment

As outlined in Section 6.5 above, the proposed development has no material or adverse impact on the surrounding properties, both upstream and downstream of the subject site.

We note that there are several approved developments within the vicinity of our site, these include:

- 42 Archer Street, Chatswood.
- 57-61 Archer Street, Chatswood.
- 51-55 Archer Street, Chatswood.
- 31-33 Archer Street, Chatswood.

Similar to our site, these sites will all be required to provide their own stormwater infrastructure including on site detention for storm events up to and including the 1% AEP storm event in accordance with Council's DCP. The afflux map above in Figure 28 shows that the proposed development will not impact the water level in either Archer Street or Bertram Road, and as such, will not impact the flood behaviour of the surrounding developments and the wider area.

6.8 Flood Evacuation Strategy

Whilst the Willoughby DCP specifies that a flood evacuation route at the '1% AEP + 500mm level' (DCP Control 5.1.2g) be provided, NSW DPHI has issued a Shelter in Place Guideline for Flash Flooding (dated 01/2025). This new guideline outlines that where flooding for a subject site is due to flash flooding (inundation for less than 12 hours), evacuation may pose a higher risk than sheltering-in-place for a short period of time.

A Shelter in place strategy is recommended over evacuation due to the following:

1. The development is only affected by localised overland flows with the upstream catchment only extending up to Mowbray Road;
2. The roads adjacent to the development are flood affected during the 1% AEP flood and PMF. This is an existing issue. We note that flood waters in these streets will build quickly however will also dissipate quickly;
3. The building minimum floor level complies with the Willoughby DCP flood controls as it allows for 500mm freeboard above the 1% AEP flood level and is based off of the flood levels on the high side of the property. This is also above the PMF flood level; and

4. The basement remains protected during the PMF;

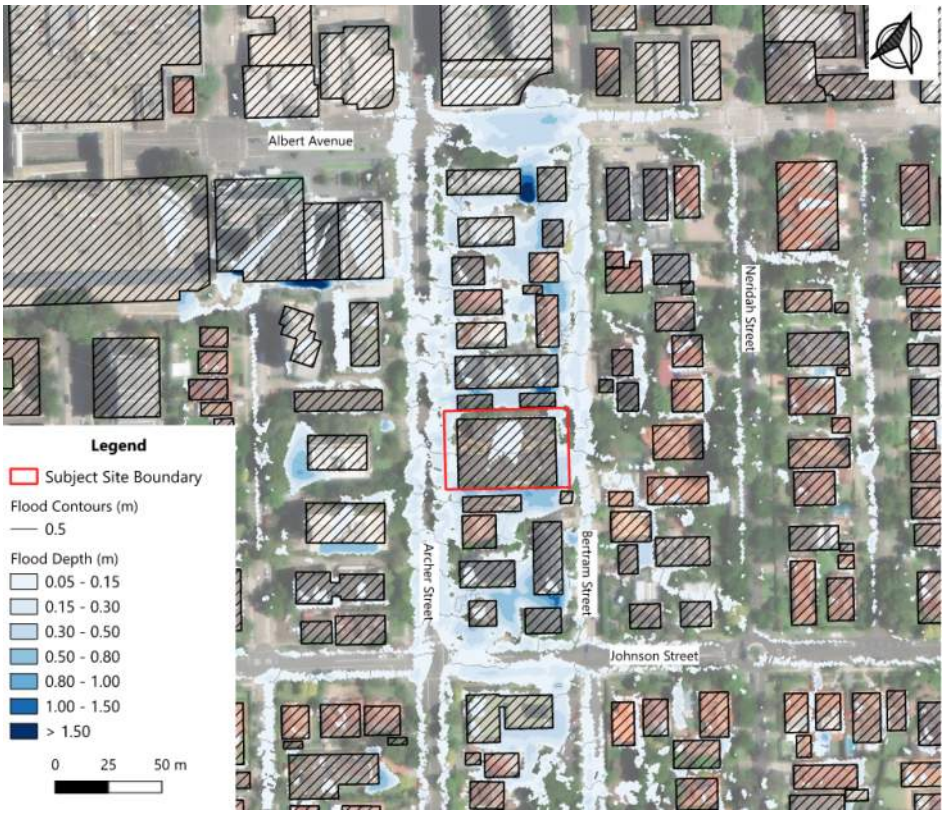
Therefore, a 'Shelter-in-Place' response is deemed to suitable for the subject site as evacuation would pose a higher risk to the residents. Additionally, the site and its surroundings are not affected by regional flooding and the flood-affected areas are expected to be inundated for only a short duration of time.

7 Flood Function Practical Consideration of Climate Change

The effects of climate change have been considered as a part of this development. This Flood Impact & Risk Assessment (FIRA) addresses the impacts of climate change on design flood modelling comparing the 0.2% AEP to the 1% AEP storm as a proxy for assessing sensitivity to an increase in rainfall intensity due to climate change. The impacts of climate change have been assessed in the overland flow flood model.

This event has been run as a sensitivity on the final development outcome. Figure 29 below shows the depths and extent of the 0.2% AEP storm event and the impact on the proposed development.

Figure 29 – Proposed Development 0.2% AEP Flood Extent for Climate Change Consideration



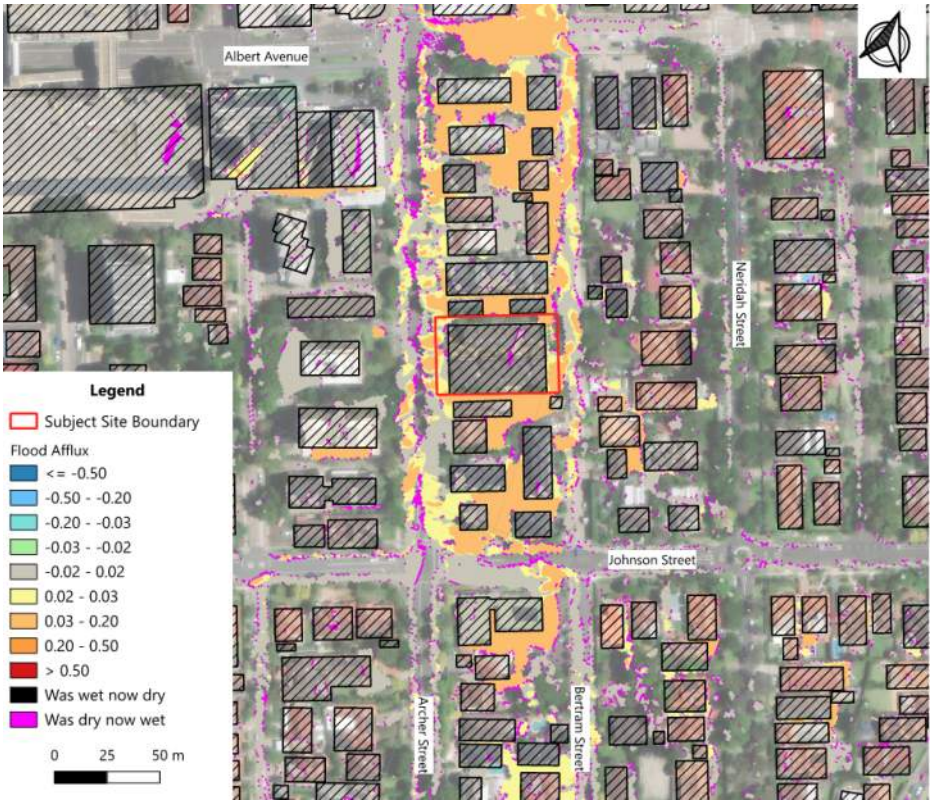
As can be seen from the above mapping, the climate change scenario resembles the 1% AEP flood extents. Due to the increase in rainfall intensity, rainfall depths across the site increased by 30 to 60mm when comparing the 1% EP to the 0.2% AEP storm events. This is consistent around the site boundary and across the wider model extents.

Although the site is flood affected in the 0.2% AEP flood event, it is acknowledged that the finished floor level is set to RL91.85, which is higher than the flood levels along the north, east, and west site boundaries, where openings to the building are located. Additionally, the basement driveway crest has been set to RL91.67, which is also higher than the flood levels at the basement entry.

7.1 Pre-to-Post Development Comparison and Flood Affectation Analysis (Afflux)

A direct comparison of the existing and post developed 0.2% AEP scenario flood depths was undertaken to assess flood affectation adjacent to the site. Increases in the water surface level were separated from decreases and are identified in the figure below.

Figure 30 – Proposed 0.2% AEP to Proposed 1% AEP Flood Afflux (For Climate Change Increase)



7.2 Summary of Results

- The flood extents of the 0.2% AEP flood are similar to those for the 1% AEP flood and showed there was a slight increase in the extents within the 0.2% AEP flood; and
- Increases in flood depth were observed in the 0.2% AEP flood with approximately a 30 to 60mm difference in the peak flood depths between the 1% AEP and the 0.2% AEP results along the site boundary;

Further mapping for the 1% AEP, 0.2% AEP, & PMF events are contained in Appendix A.

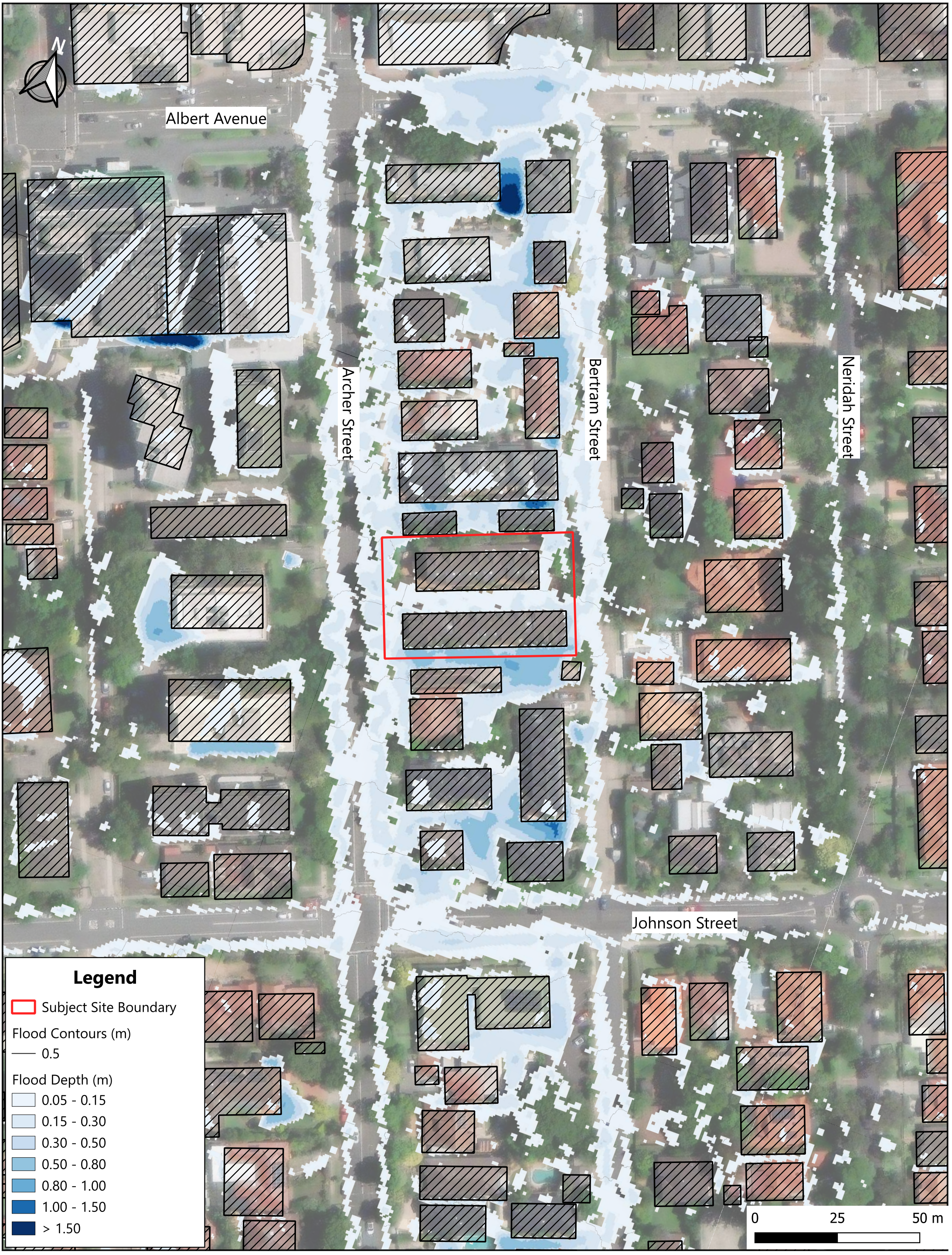
8 Summary and Recommendations

The following key results and recommendations were determined for the site based on a pre-development to post-development comparison of flood levels:

- The site is only affected by localised overland flow flooding;
- The proposed development floor level has been set to the 1% AEP + 0.5m freeboard;
- The basement crest has been set to the PMF flood level as agreed with Willoughby Council;
- The proposed development decreases flooding to the southern property.
- Minor afflux is observed along the east and west boundaries of the site. The afflux is considered minor and dissipates once it enters the street;
- The proposed development does not impact Archer Street or Bertram Street or any adjacent properties downstream of the site;
- In the interim scenario, the flood levels and extents are reduced at the southern boundary. It is recommended that the areas between the proposed building face and Archer Street and Bertram Street remain unimpeded so that flows can be conveyed around the building; and
- If the southern neighbouring property is constructed, upstream overland flows entering the subject site from the south will be eliminated as the neighbouring development will divert the water upstream of their site.

Appendices

A. Flood Maps



Title:
Existing 1% AEP Flood Depth

Figure:
100E-1

IDC endeavours to ensure that the information provided in this map is correct at the time of publication. IDC does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.

Project Name	**37 Archer Street, Chatswood**	Project ID	**23-035**
Client	**Hyecorp Property Group**	Date	**14/02/2025**
		Revision	**A**

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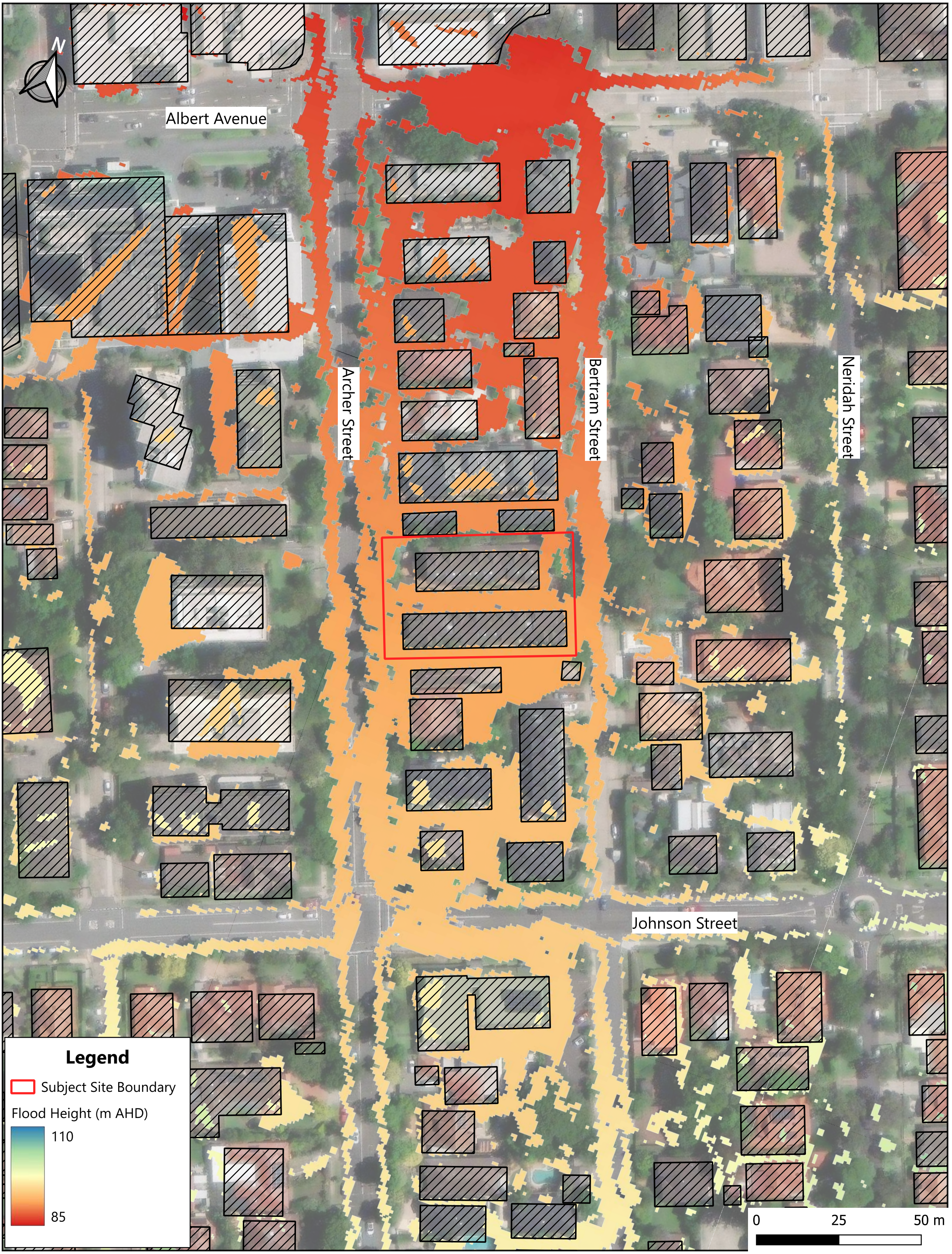

Title:
Existing 1% AEP Flood Height

Figure:
100E-2

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Client	**Hyecorp Property Group**	Date	**14/02/2025**
		Revision	**A**

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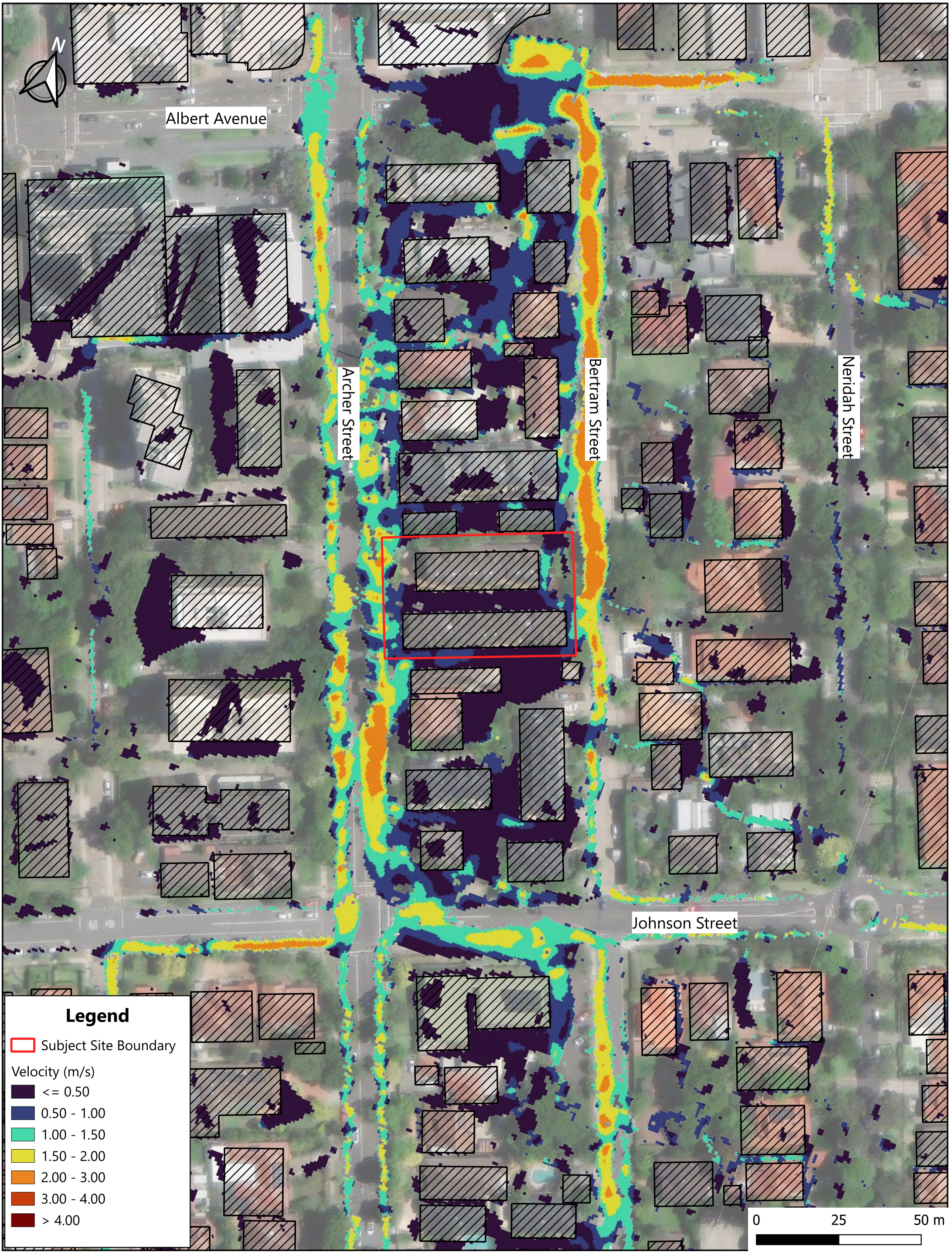

Title:
Existing 1% AEP Flood Velocity

Figure:
100E-3

IDC endeavours to ensure that the information provided in this map is correct at the time of publication. IDC does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.

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Client	**Hyecorp Property Group**	Date	**14/02/2025**
		Revision	**A**

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N

Albert Avenue

Archer Street

Bertram Street

Neridah Street

Johnson Street

Legend

Subject Site Boundary

Flood Hazard Category

- H1 - Generally safe for people, vehilces and buildings
- H2 - Unsafe for small vehicles
- H3 - Unsafe for vehicles, children and the elderly
- H4 - Unsafe for vehicles and people
- H5 - Unsafe for vehicles and people. Buildings require special engineering design and construction
- H6 - Unsafe for vehicles and people. All building types considered vulnerable to failure

0 25 50 m

Title:

Existing 1% AEP Flood Hazard

Figure: **100E-4**

Project Name **37 Archer Street, Chatswood**	Project ID **23-035**	Revision **A**	
Client **Hyecorp Property Group**	Date **14/02/2025**		

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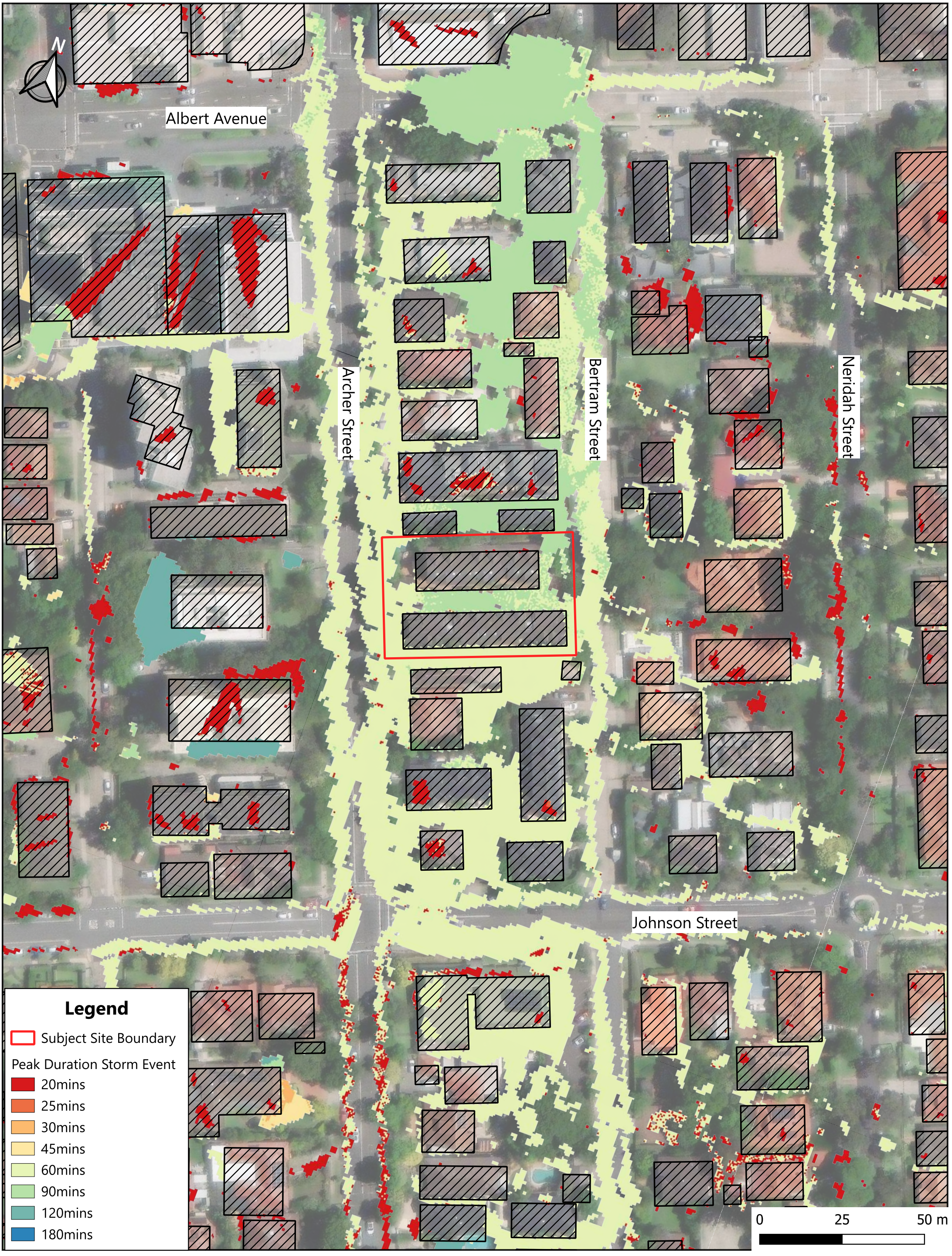

Title:
Existing 1% AEP Flood Duration

Figure:
100E-5

IDC endeavours to ensure that the information provided in this map is correct at the time of publication. IDC does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.

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Client	**Hyecorp Property Group**	Date	**14/02/2025**
		Revision	**A**

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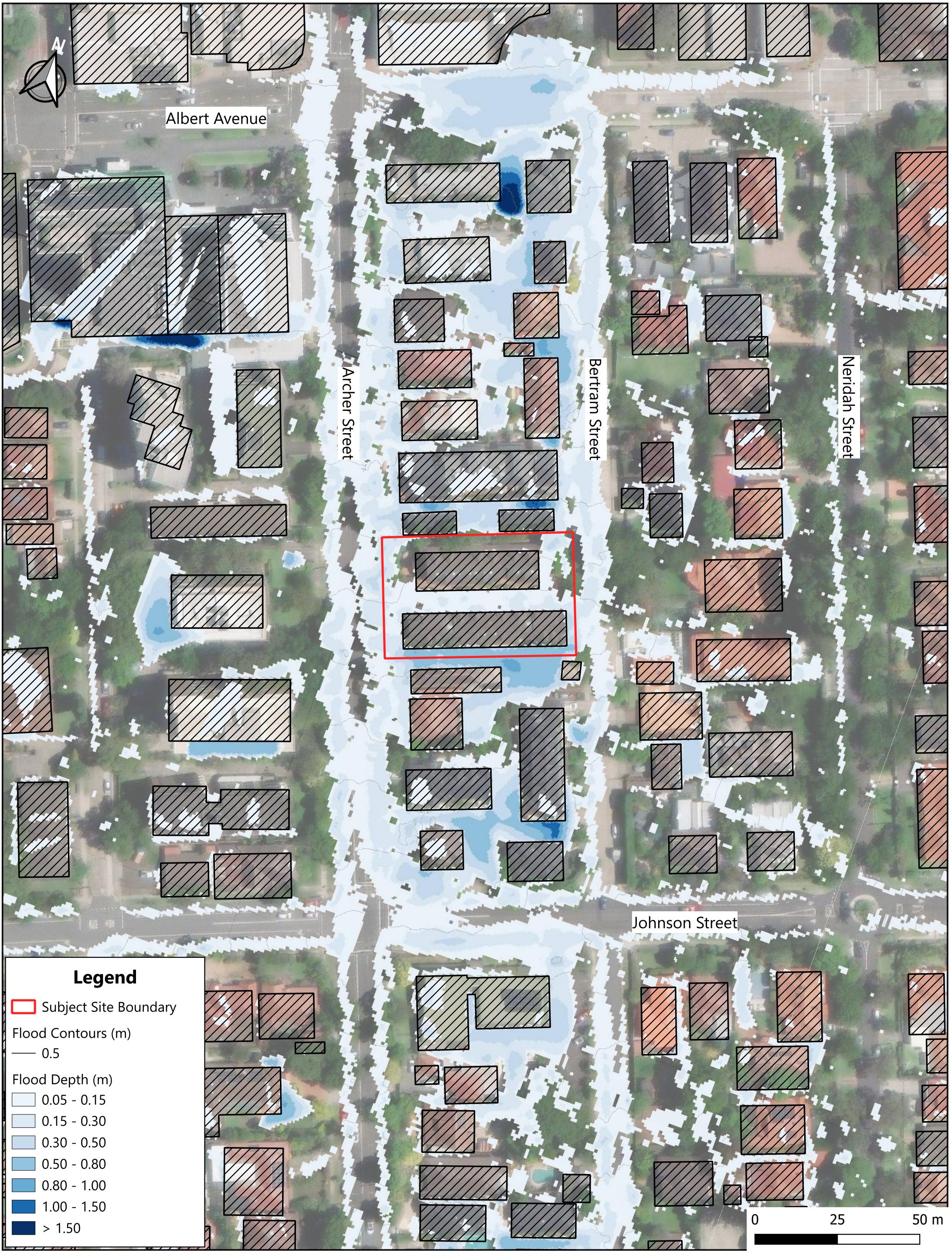

Title:
Existing 0.2% AEP Flood Depth

Figure:
500E-1

Project Name **37 Archer Street, Chatswood**		Project ID **23-035**	Revision **A**
Client **Hyecorp Property Group**		Date **14/02/2025**	

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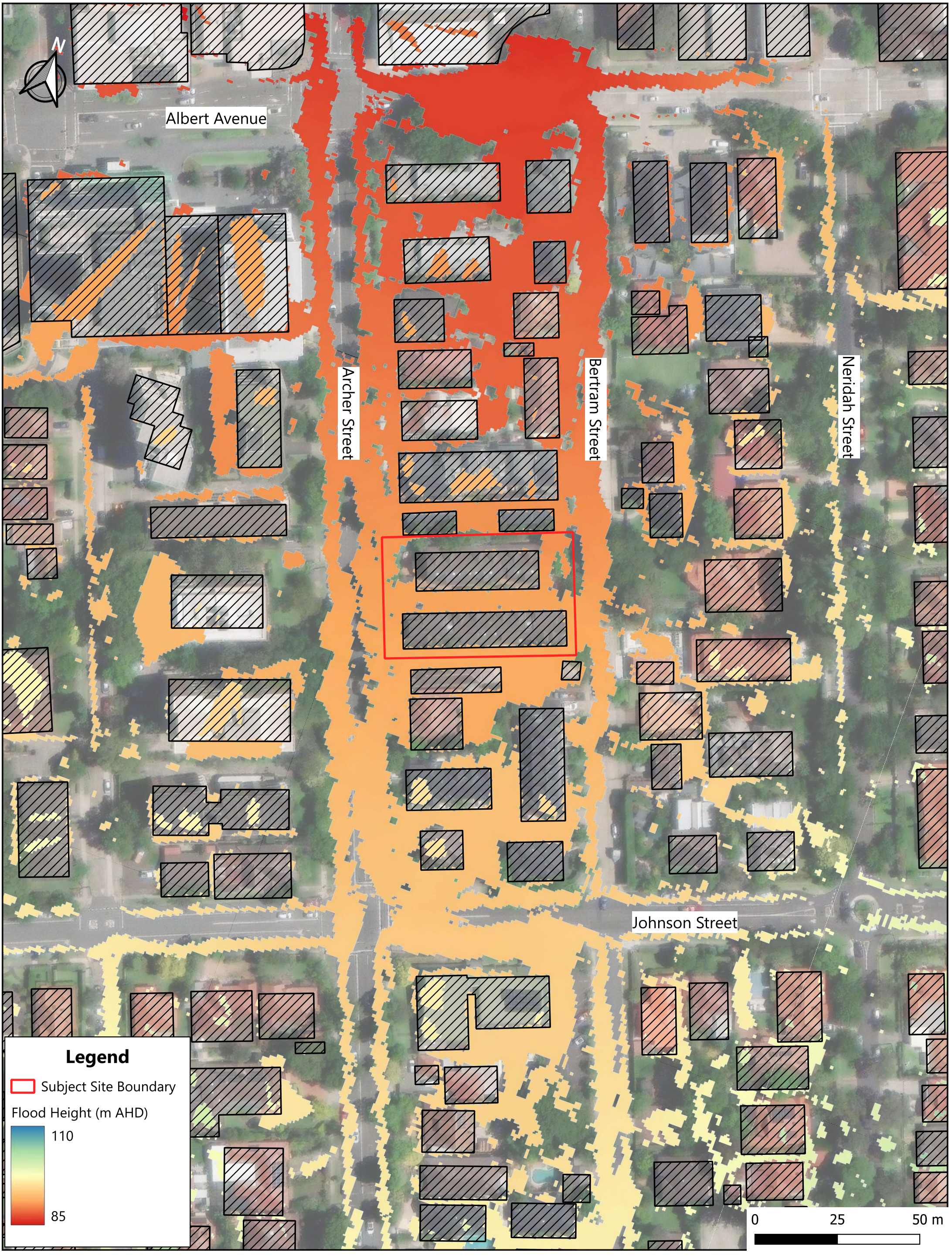

Title:
Existing 0.2% AEP Flood Height

Figure:
500E-2

IDC endeavours to ensure that the information provided in this map is correct at the time of publication. IDC does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.

Project Name	**37 Archer Street, Chatswood**	Project ID	**23-035**
Client	**Hyecorp Property Group**	Date	**14/02/2025**
		Revision	**A**

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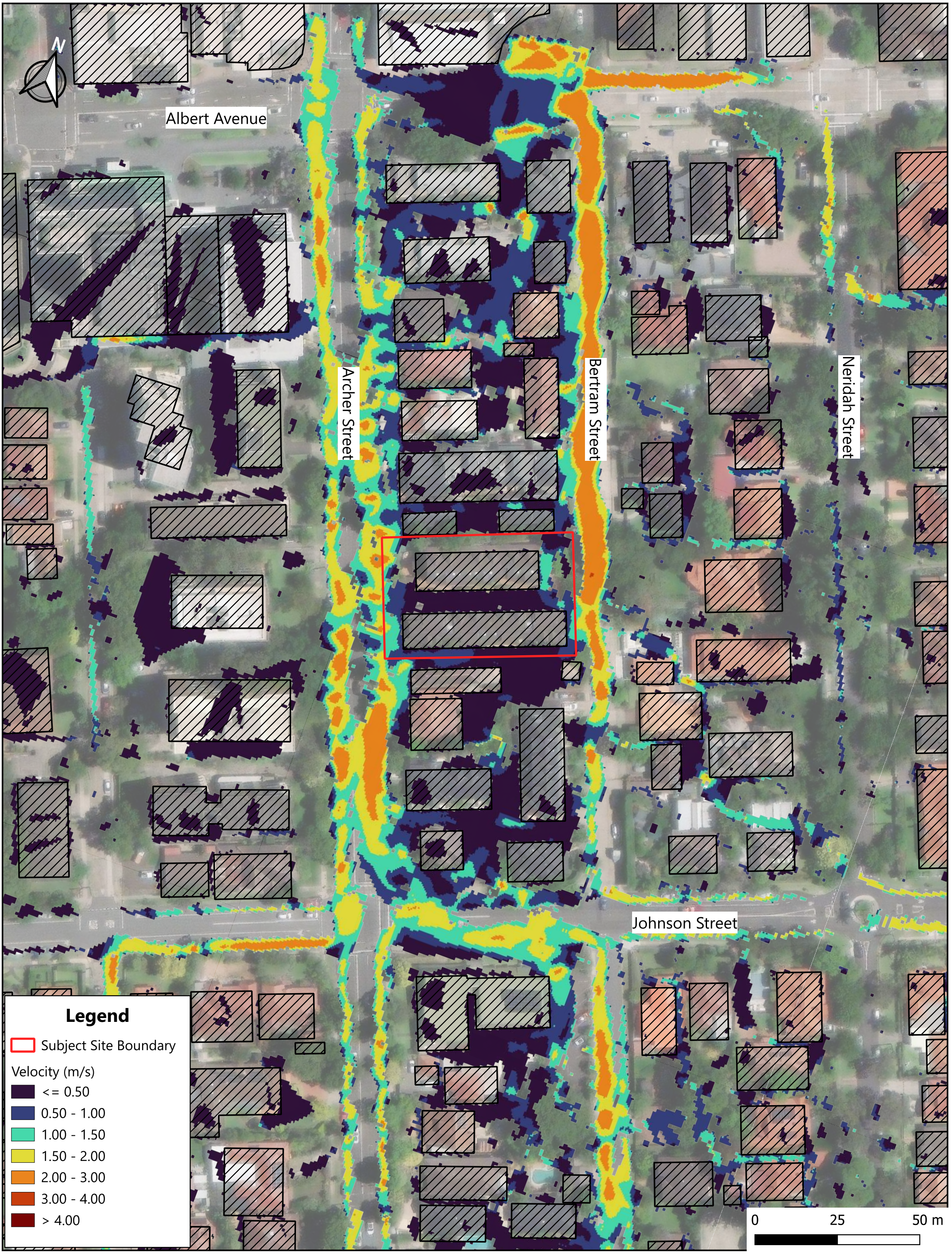

Title:
Existing 0.2% AEP Flood Velocity

Figure:
500E-3

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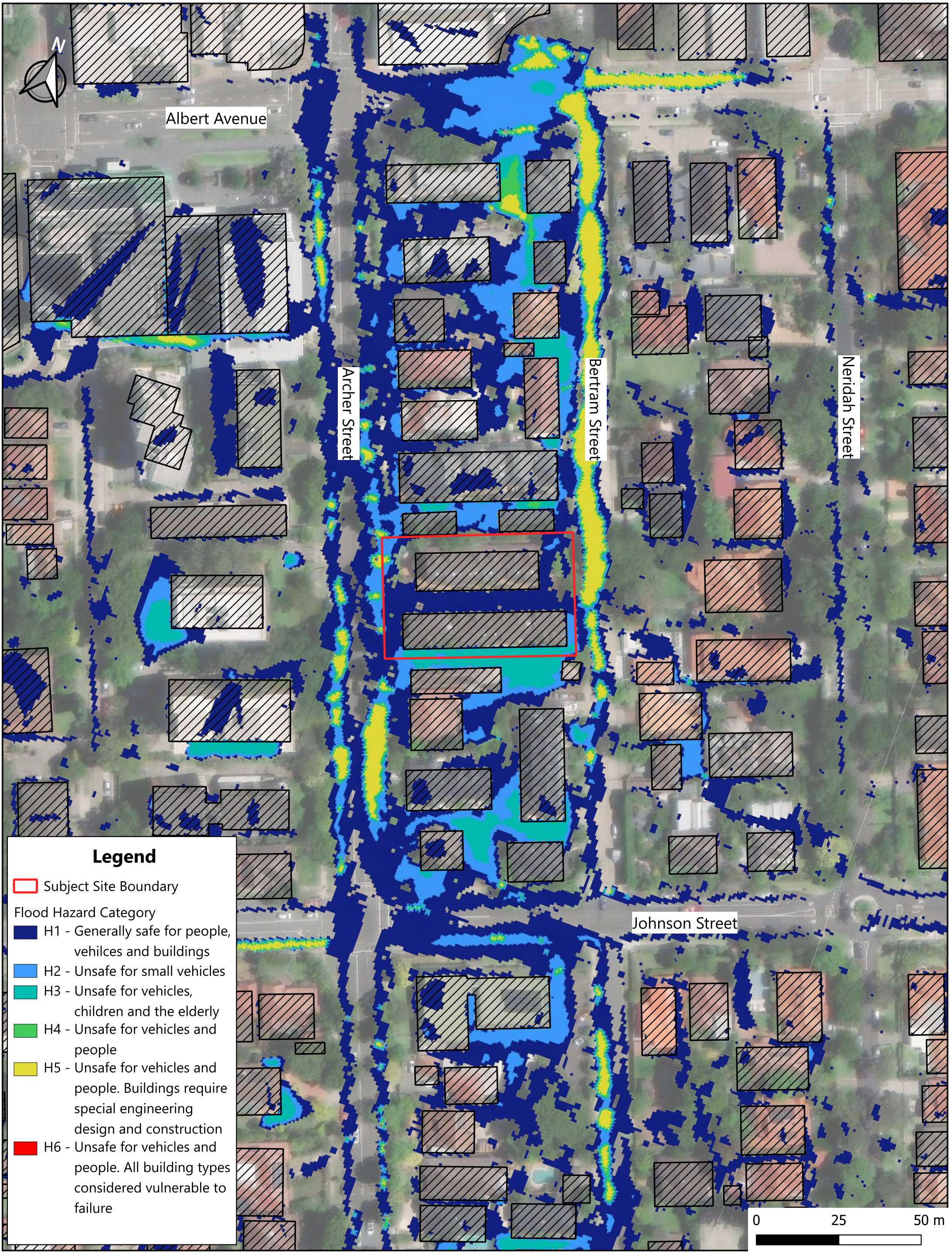
Project Name	**37 Archer Street, Chatswood**	Project ID	**23-035**
Client	**Hyecorp Property Group**	Date	**14/02/2025**
		Revision	**A**

idc
infrastructure & development consulting



Title:
Existing 0.2% AEP Flood Hazard

Figure:
500E-4

Project Name **37 Archer Street, Chatswood**	Project ID **23-035**	Revision **A**
Client **Hyecorp Property Group**	Date **14/02/2025**	

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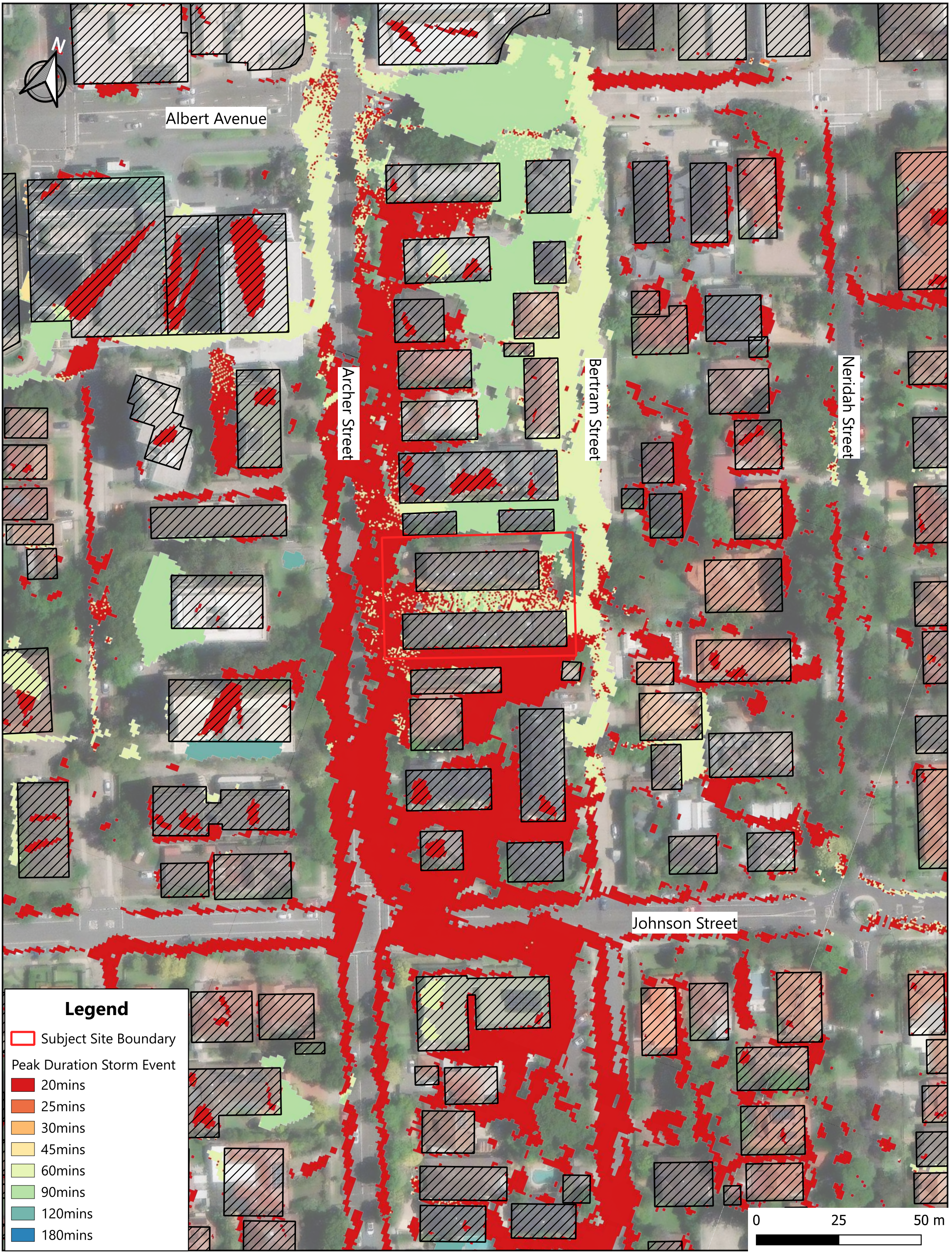
infrastructure & development consulting



Title:
Existing 0.2% AEP Flood Duration

Figure:
500E-5

IDC endeavours to ensure that the information provided in this map is correct at the time of publication. IDC does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.

Project Name	**37 Archer Street, Chatswood**	Project ID	**23-035**
Client	**Hyecorp Property Group**	Date	**14/02/2025**
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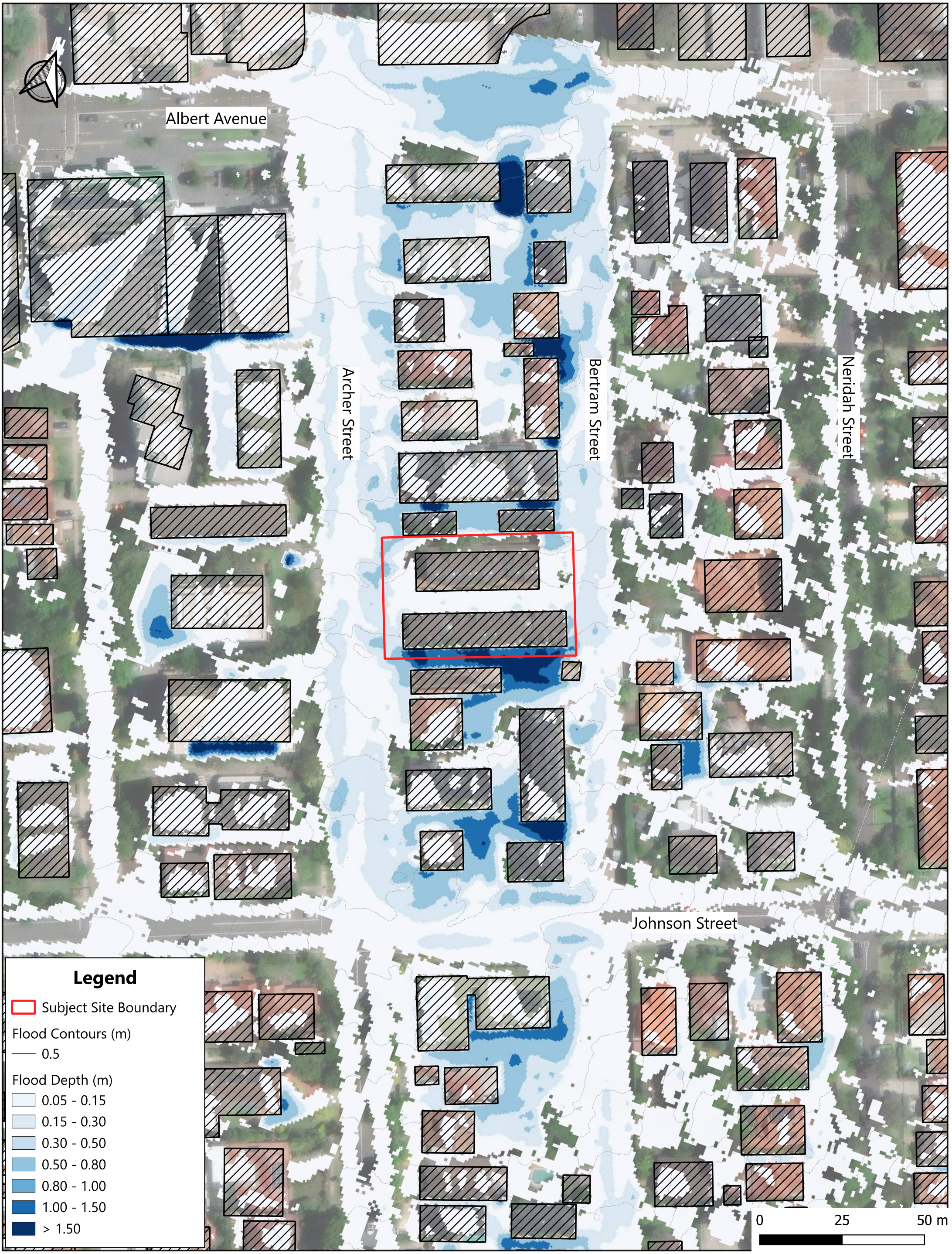

Title:
Existing PMF Flood Depth

Figure:
PMF-E-1

IDC endeavours to ensure that the information provided in this map is correct at the time of publication. IDC does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.

Project Name **37 Archer Street, Chatswood**		Project ID **23-035**	Revision **A**
Client **Hyecorp Property Group**		Date **14/02/2025**	

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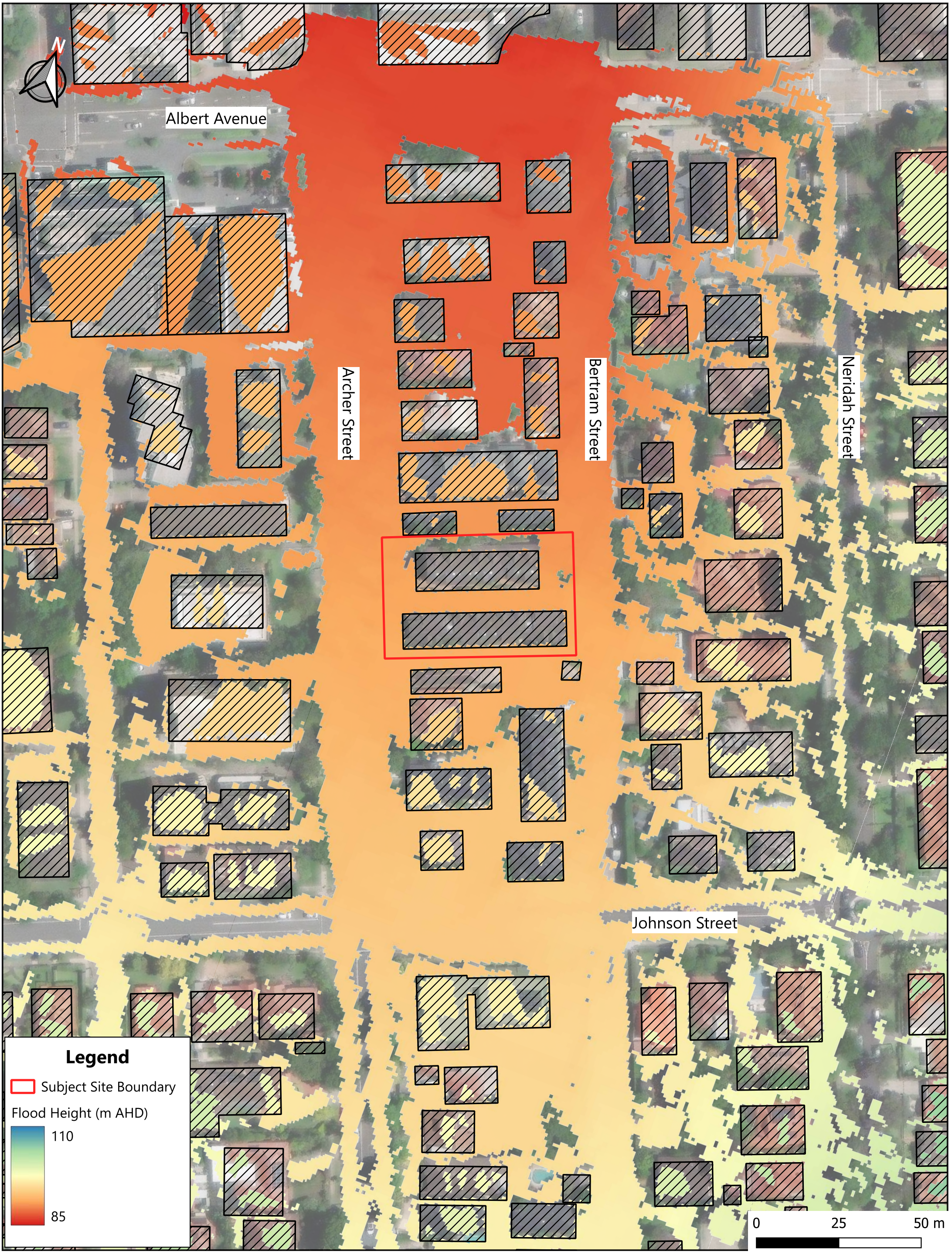

Title:
Existing PMF Flood Height

Figure:
PMF-E-2

IDC endeavours to ensure that the information provided in this map is correct at the time of publication. IDC does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.

Project Name	**37 Archer Street, Chatswood**	Project ID	**23-035**
Client	**Hyecorp Property Group**	Date	**14/02/2025**
		Revision	**A**

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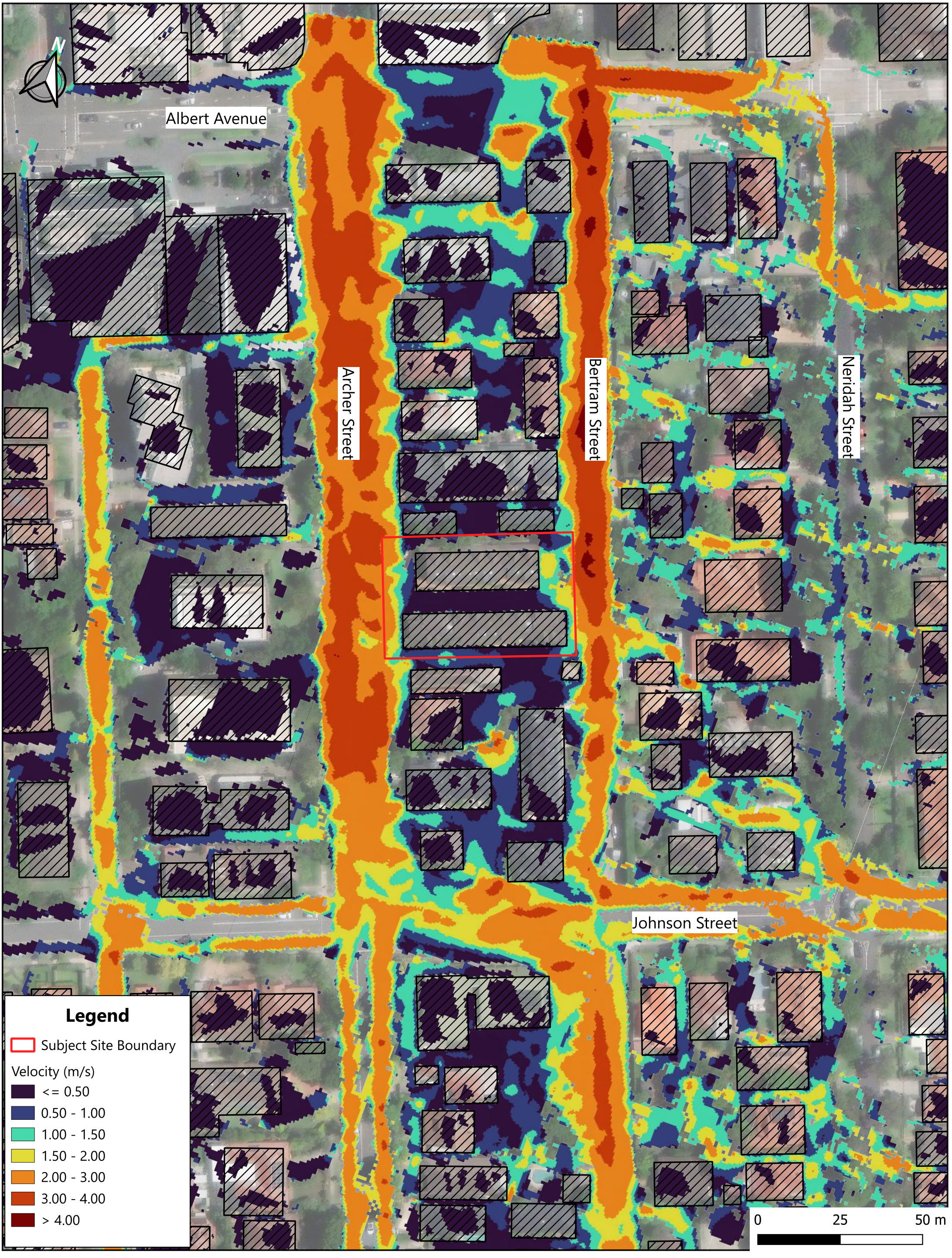

Title:
Existing PMF Flood Velocity

Figure:
PMF-E-3

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Client	**Hyecorp Property Group**	Date	**14/02/2025**
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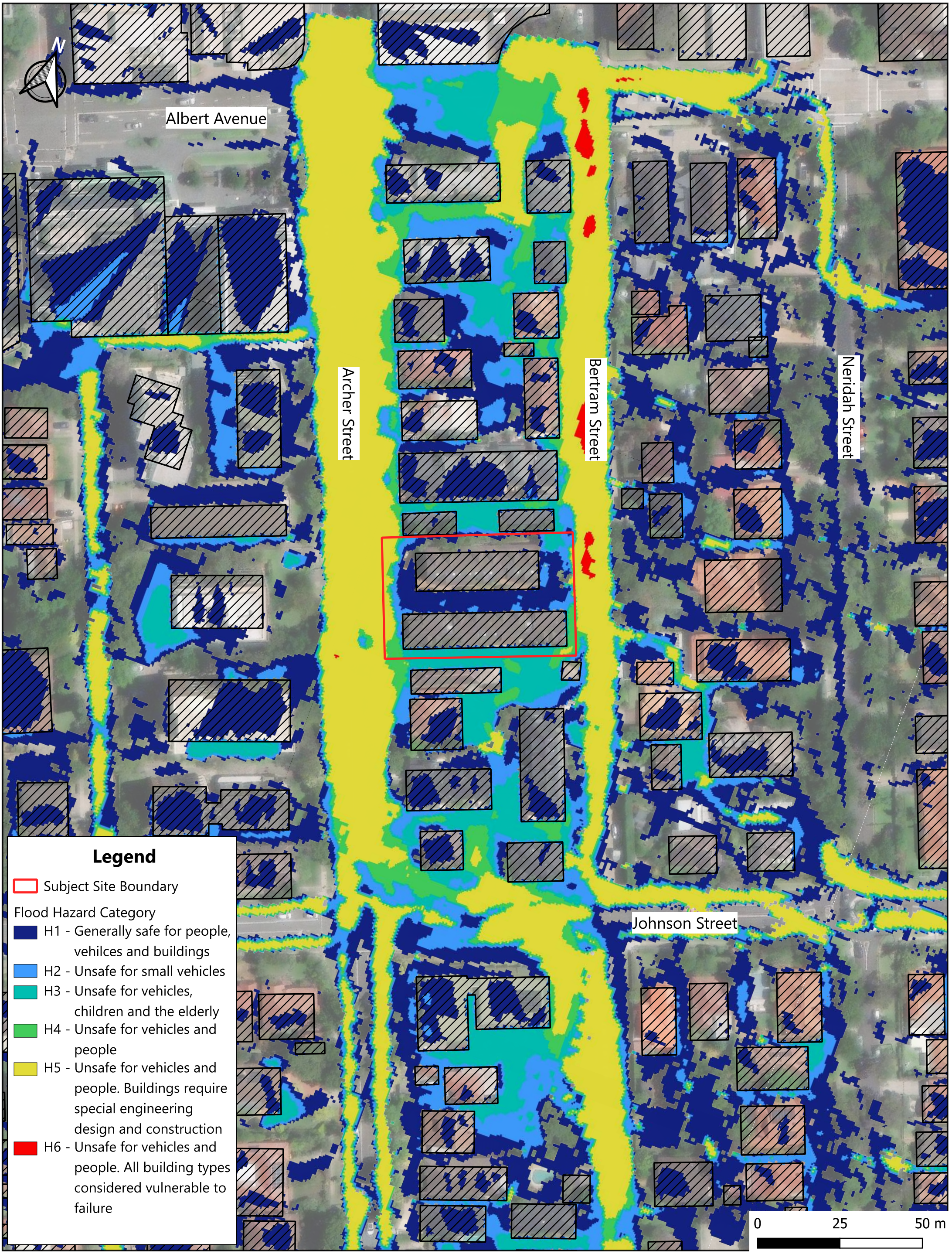

Title:
Existing PMF Flood Hazard

Figure:
PMF-E-4

Project Name	**37 Archer Street, Chatswood**	Project ID	**23-035**
Client	**Hyecorp Property Group**	Date	**14/02/2025**

Revision **A**

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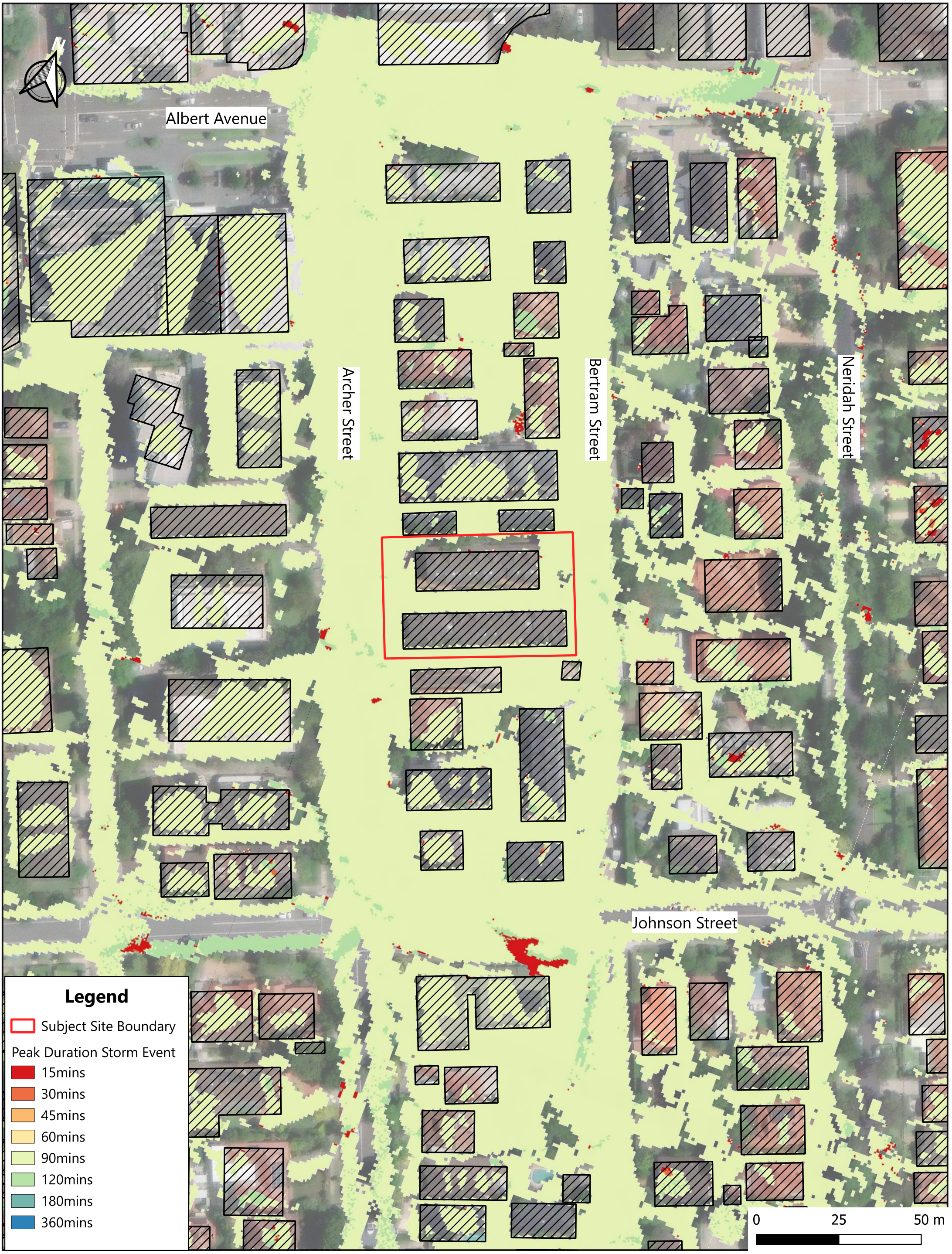

Title:
Existing PMF Flood Duration

Figure:
PMF-E-5

IDC endeavours to ensure that the information provided in this map is correct at the time of publication. IDC does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.

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Client	**Hyecorp Property Group**	Date	**14/02/2025**
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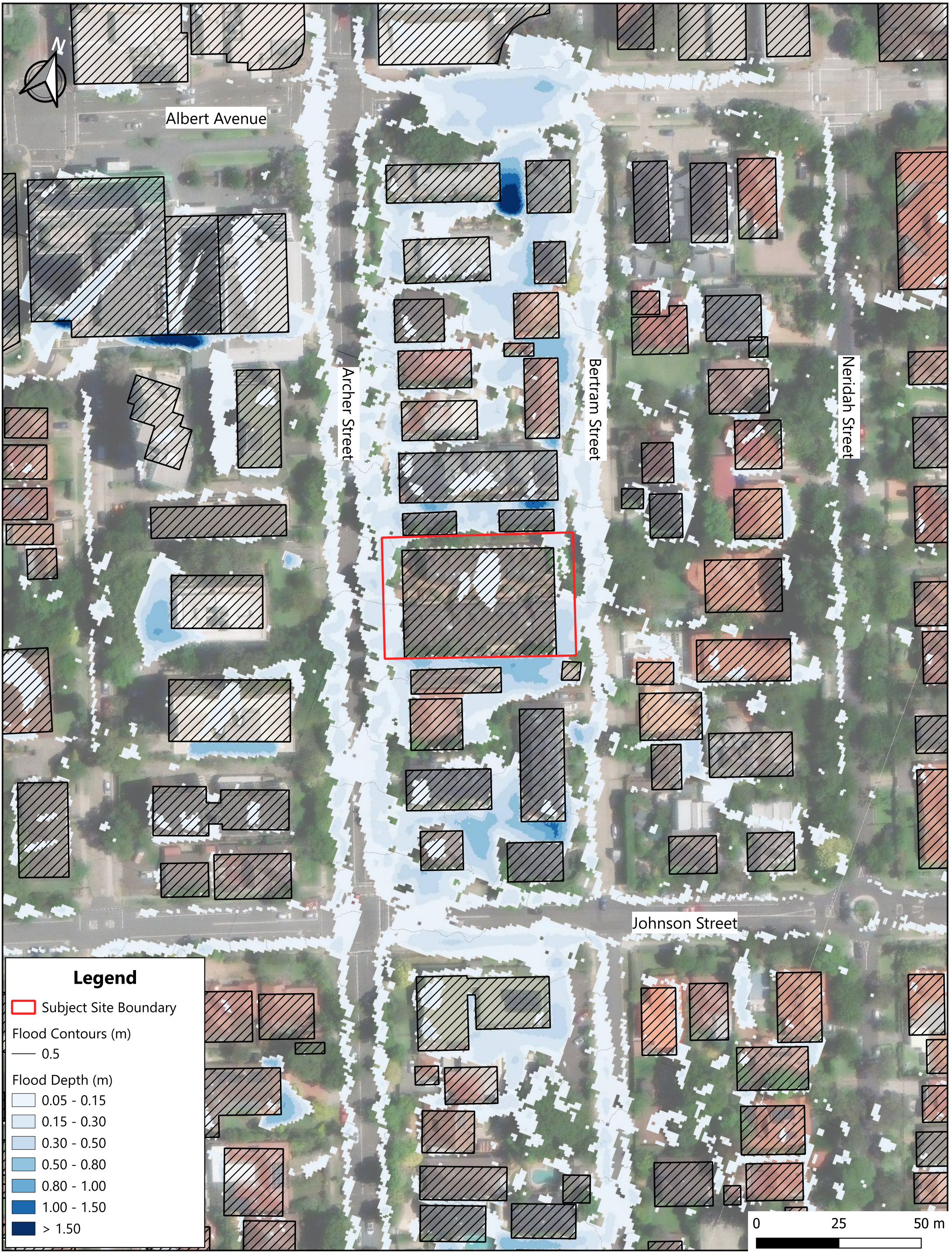

Title:
Proposed 1% AEP Flood Depth

Figure:
100P-1

IDC endeavours to ensure that the information provided in this map is correct at the time of publication. IDC does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.

Project Name	**37 Archer Street, Chatswood**	Project ID	**23-035**
Client	**Hyecorp Property Group**	Date	**14/02/2025**
		Revision	**A**

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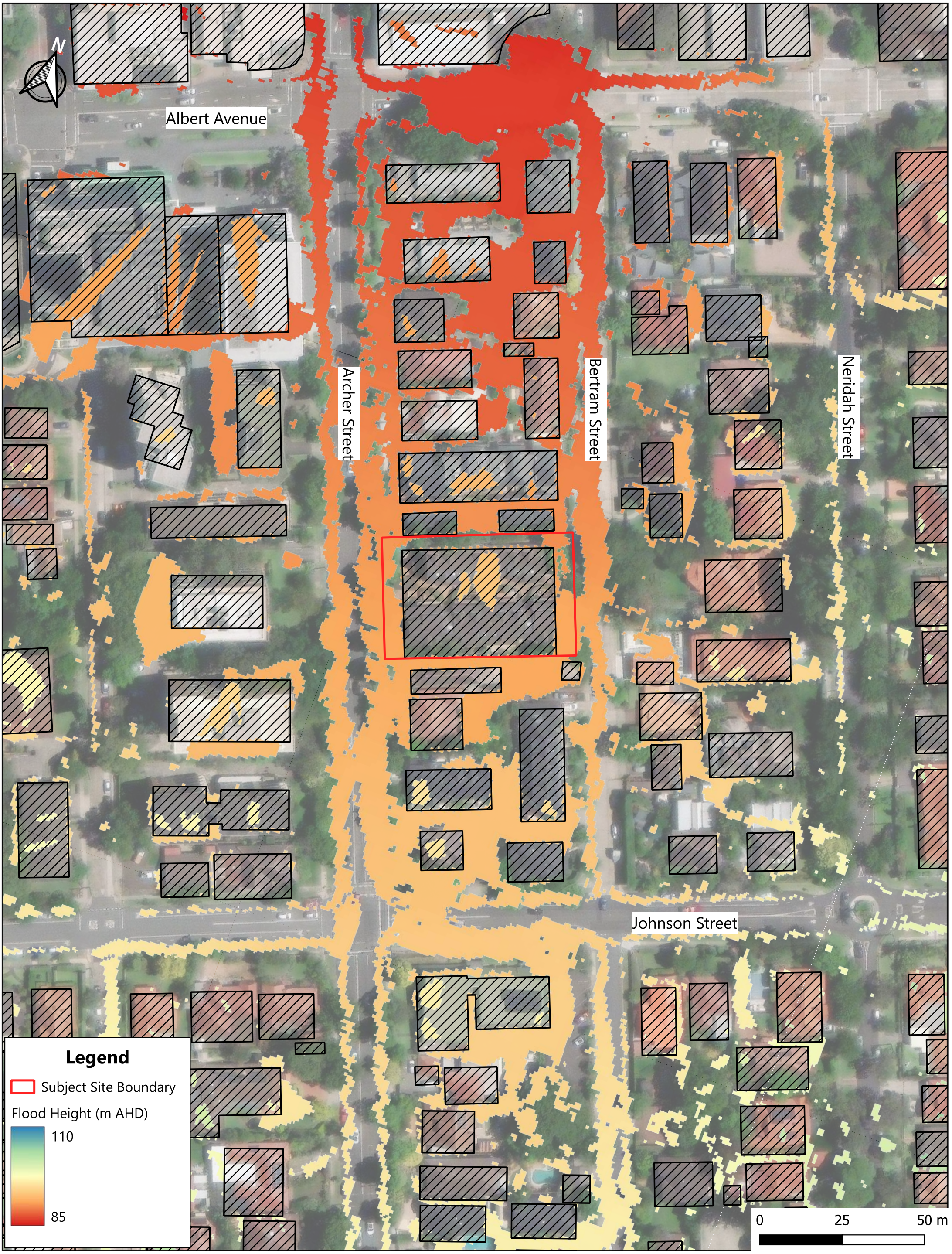

Title:
Proposed 1% AEP Flood Height

Figure:
100P-2

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Client	**Hyecorp Property Group**	Date	**14/02/2025**
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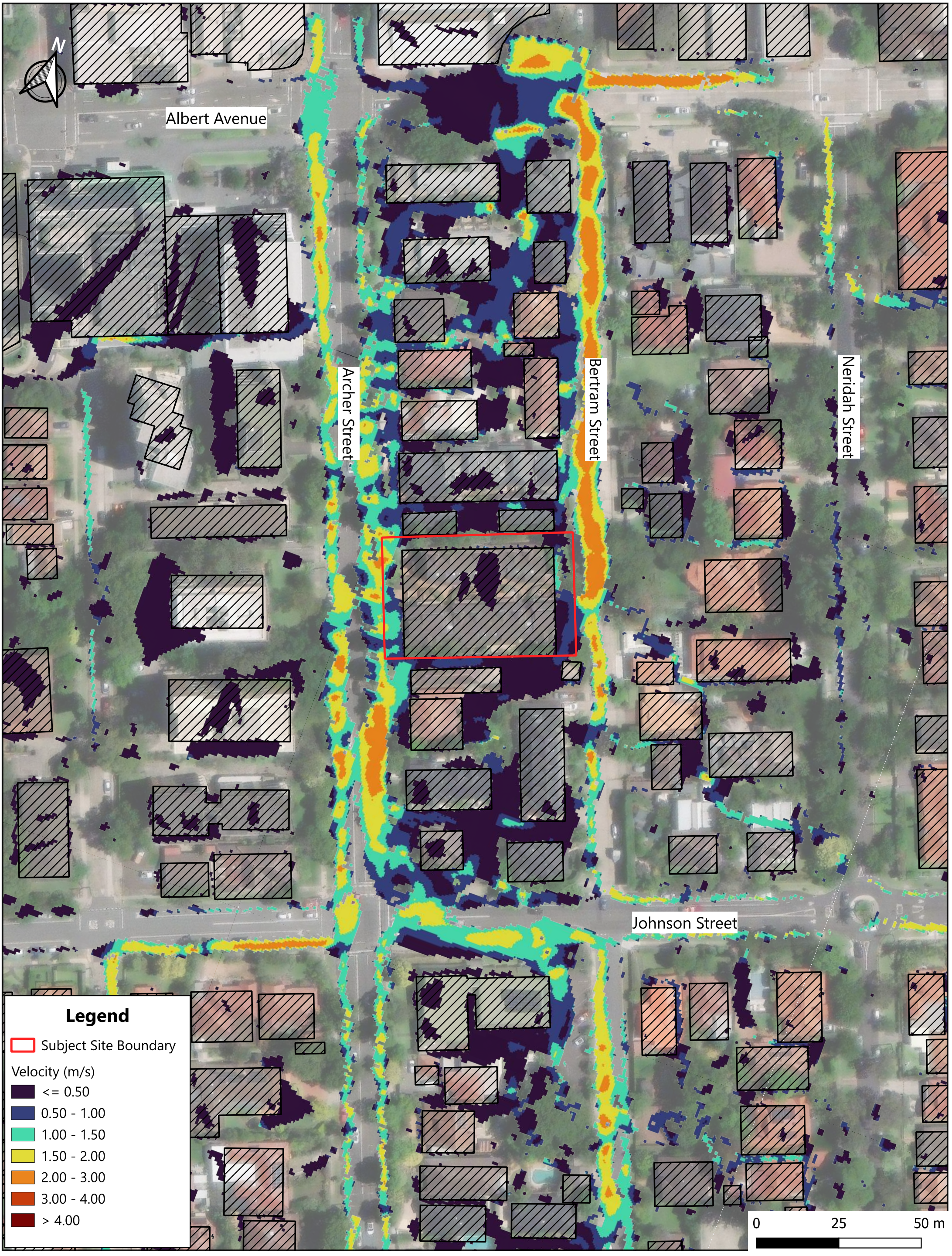

Title:
Proposed 1% AEP Flood Velocity

Figure:
100P-3

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Client	**Hyecorp Property Group**	Date	**14/02/2025**
		Revision	**A**

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N

Albert Avenue

Archer Street

Bertram Street

Neridah Street

Johnson Street

Legend

Subject Site Boundary

Flood Hazard Category

- H1 - Generally safe for people, vehilces and buildings
- H2 - Unsafe for small vehicles
- H3 - Unsafe for vehicles, children and the elderly
- H4 - Unsafe for vehicles and people
- H5 - Unsafe for vehicles and people. Buildings require special engineering design and construction
- H6 - Unsafe for vehicles and people. All building types considered vulnerable to failure

0 25 50 m

Title:

Proposed 1% AEP Flood Hazard

Figure: **100P-4**

Project Name **37 Archer Street, Chatswood**	Project ID **23-035**	Revision **A**
Client **Hyecorp Property Group**	Date **14/02/2025**	

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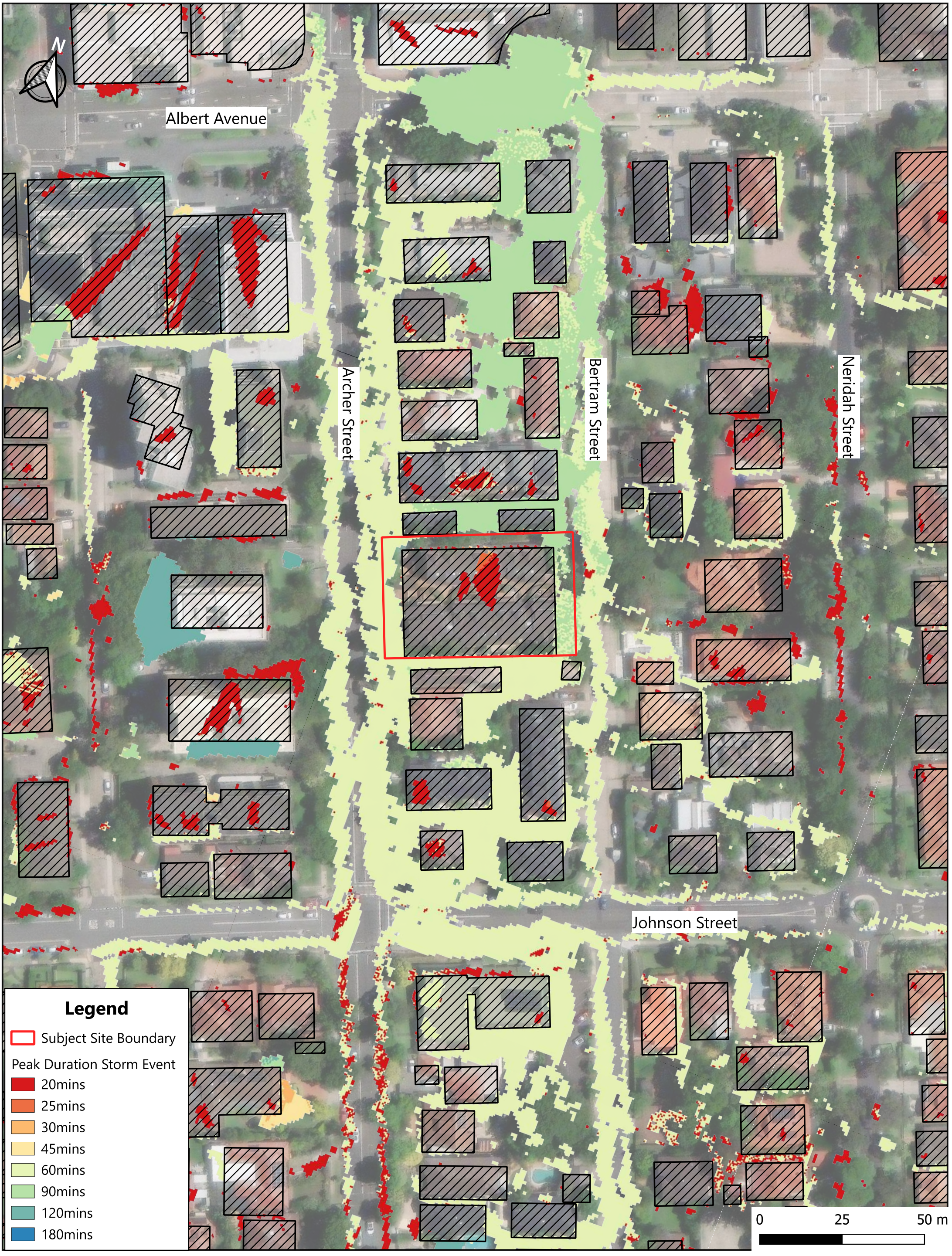

Title:
Proposed 1% AEP Flood Duration

Figure:
100P-5

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Project Name	**37 Archer Street, Chatswood**	Project ID	**23-035**
Client	**Hyecorp Property Group**	Date	**14/02/2025**
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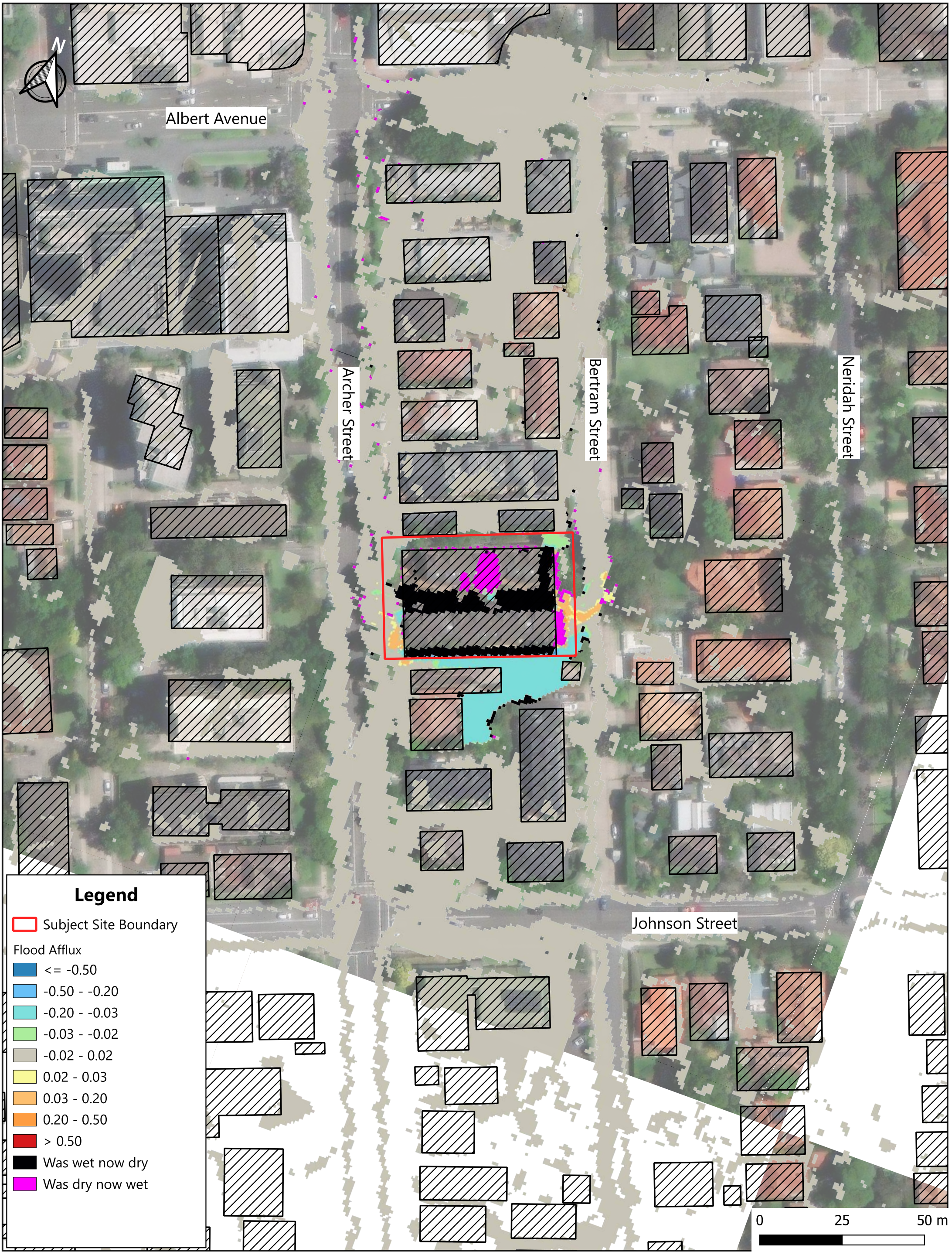

Title:
Proposed 1% AEP Flood Afflux

Figure:
100P-6

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Client	**Hyecorp Property Group**	Date	**14/02/2025**
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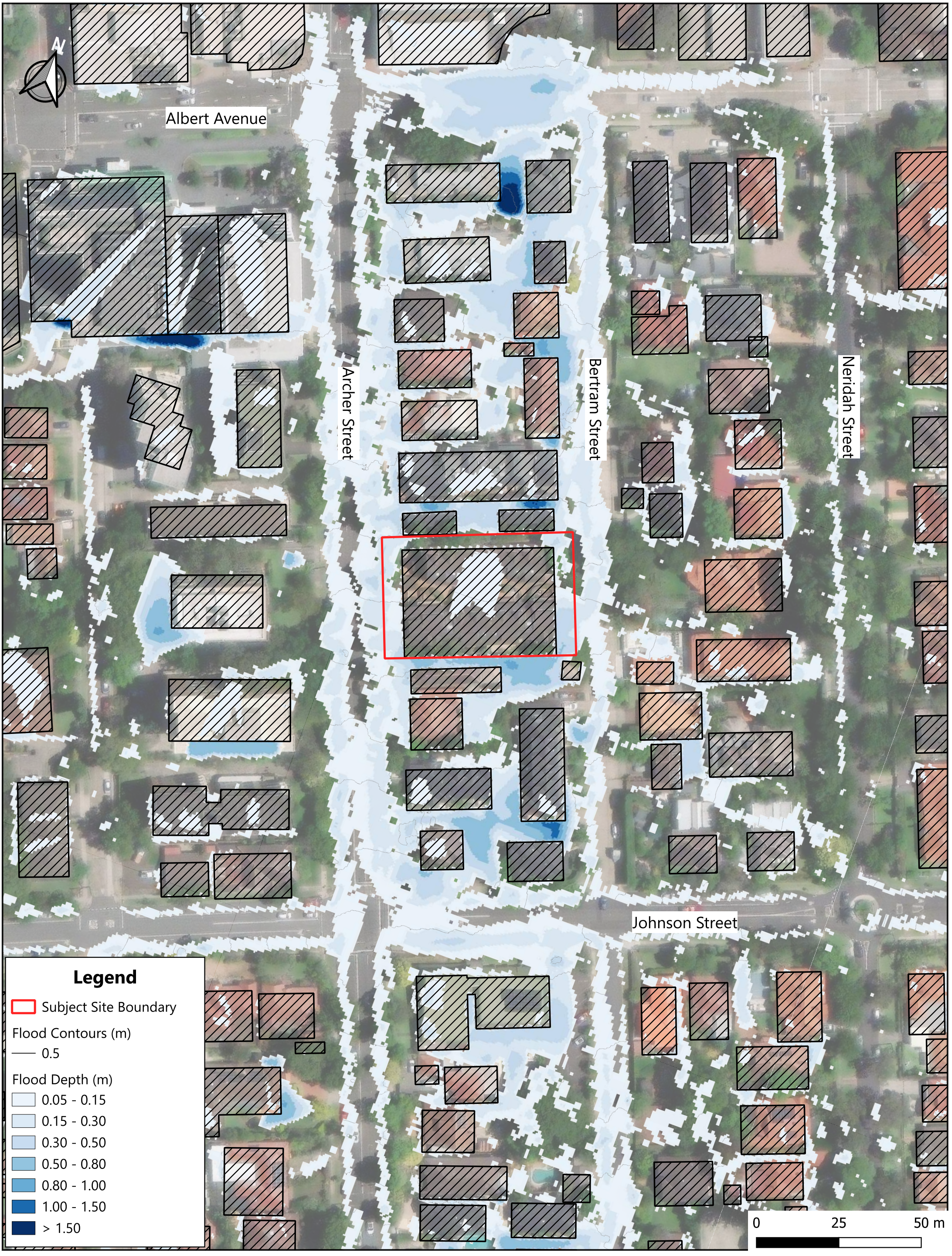

Title:
Proposed 0.2% AEP Flood Depth

Figure:
500P-1

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Project Name	**37 Archer Street, Chatswood**	Project ID	**23-035**
Client	**Hyecorp Property Group**	Date	**14/02/2025**
		Revision	**A**

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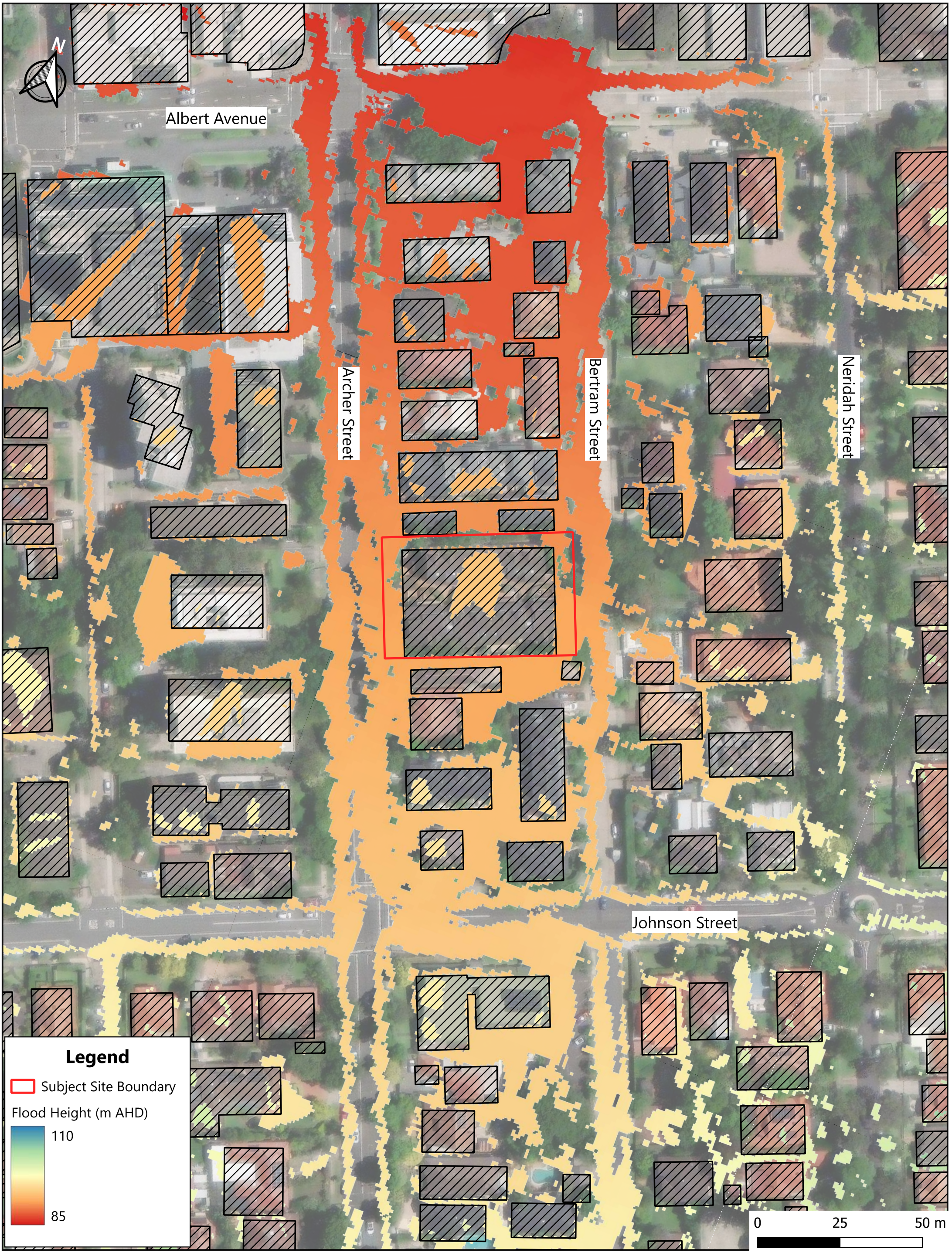

Title:
Proposed 0.2% AEP Flood Height

Figure:
500P-2

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Project Name	**37 Archer Street, Chatswood**	Project ID	**23-035**
Client	**Hyecorp Property Group**	Date	**14/02/2025**
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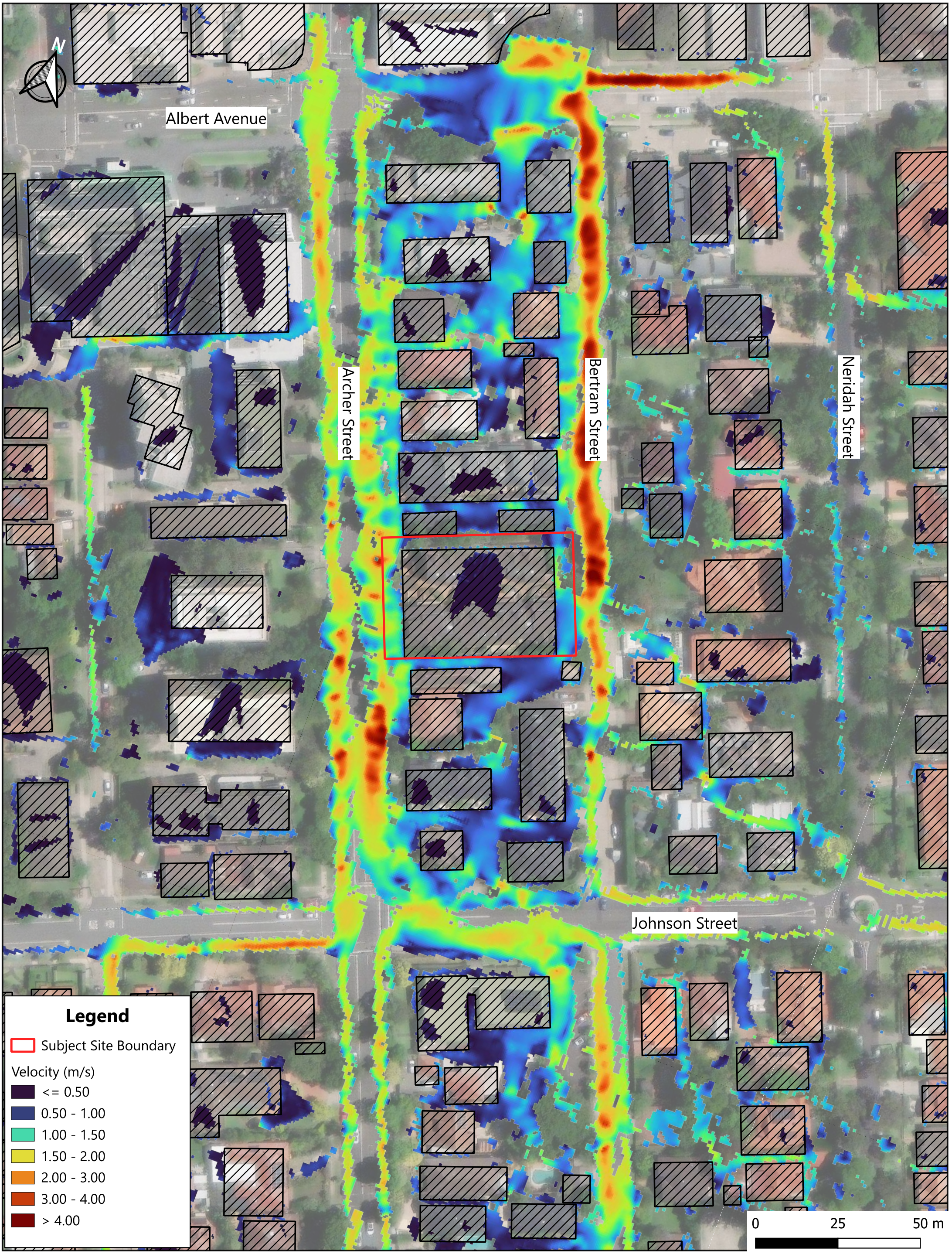

Title:
Proposed 0.2% AEP Flood Velocity

Figure:
500P-3

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Client	**Hyecorp Property Group**	Date	**14/02/2025**
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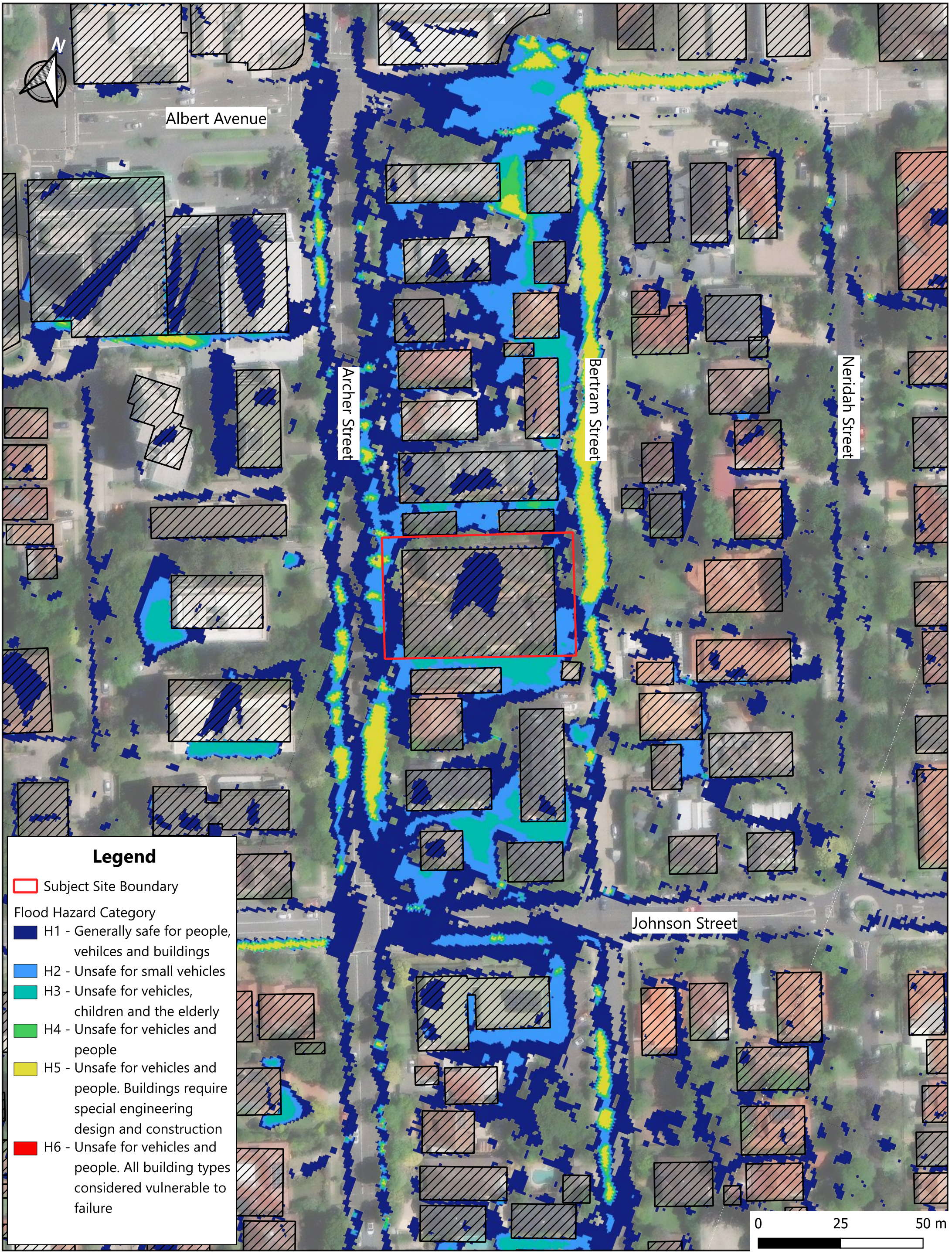

Title:
Proposed 0.2% AEP Flood Hazard

Figure:
500P-4

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Project Name	**37 Archer Street, Chatswood**	Project ID	**23-035**
Client	**Hyecorp Property Group**	Date	**14/02/2025**
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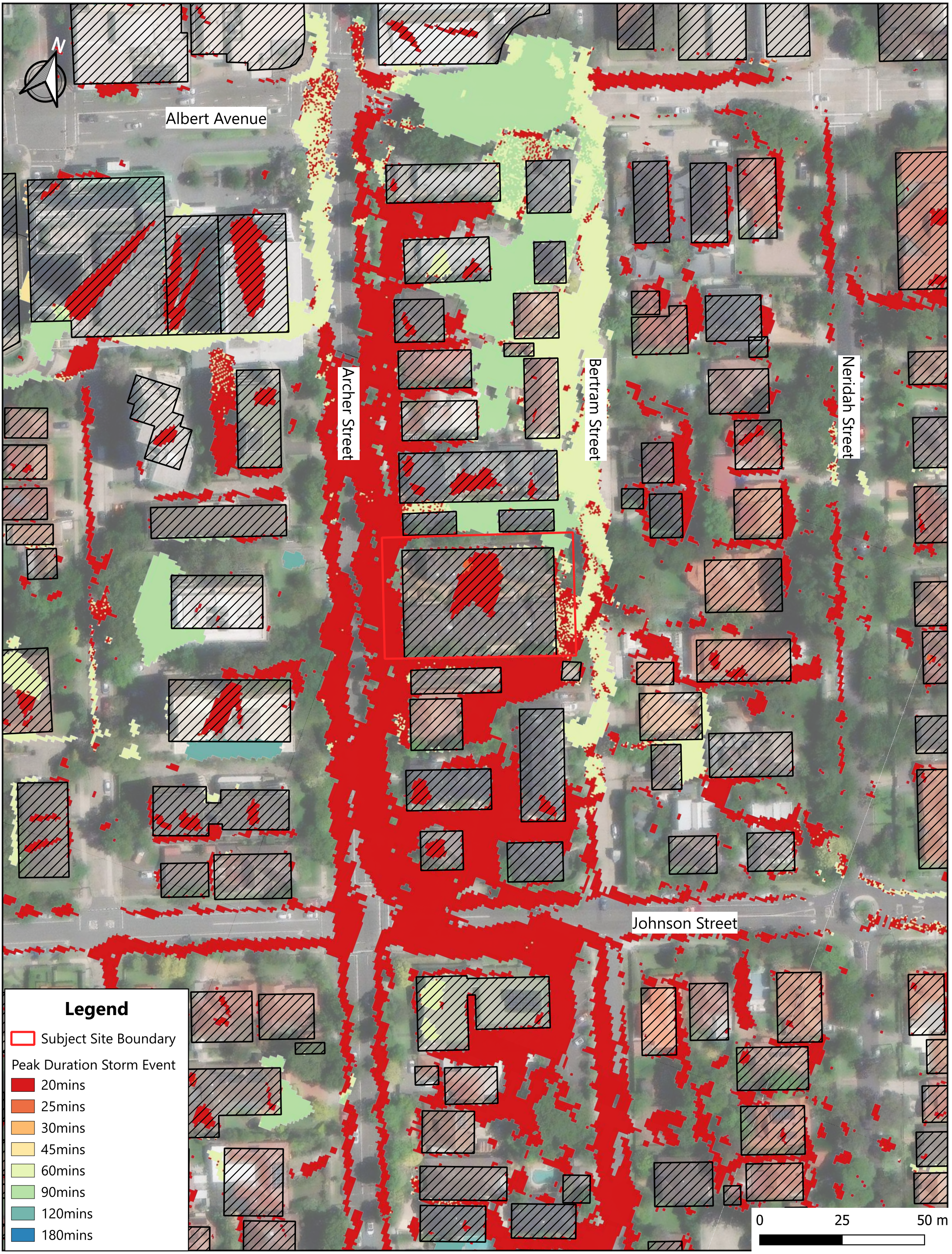

Title: **Proposed 0.2% AEP Flood Duration**			Figure: **500P-5**
IDC endeavours to ensure that the information provided in this map is correct at the time of publication. IDC does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.	Project Name **37 Archer Street, Chatswood** Client **Hyecorp Property Group**	Project ID **23-035** Date **14/02/2025**	Revision **A**

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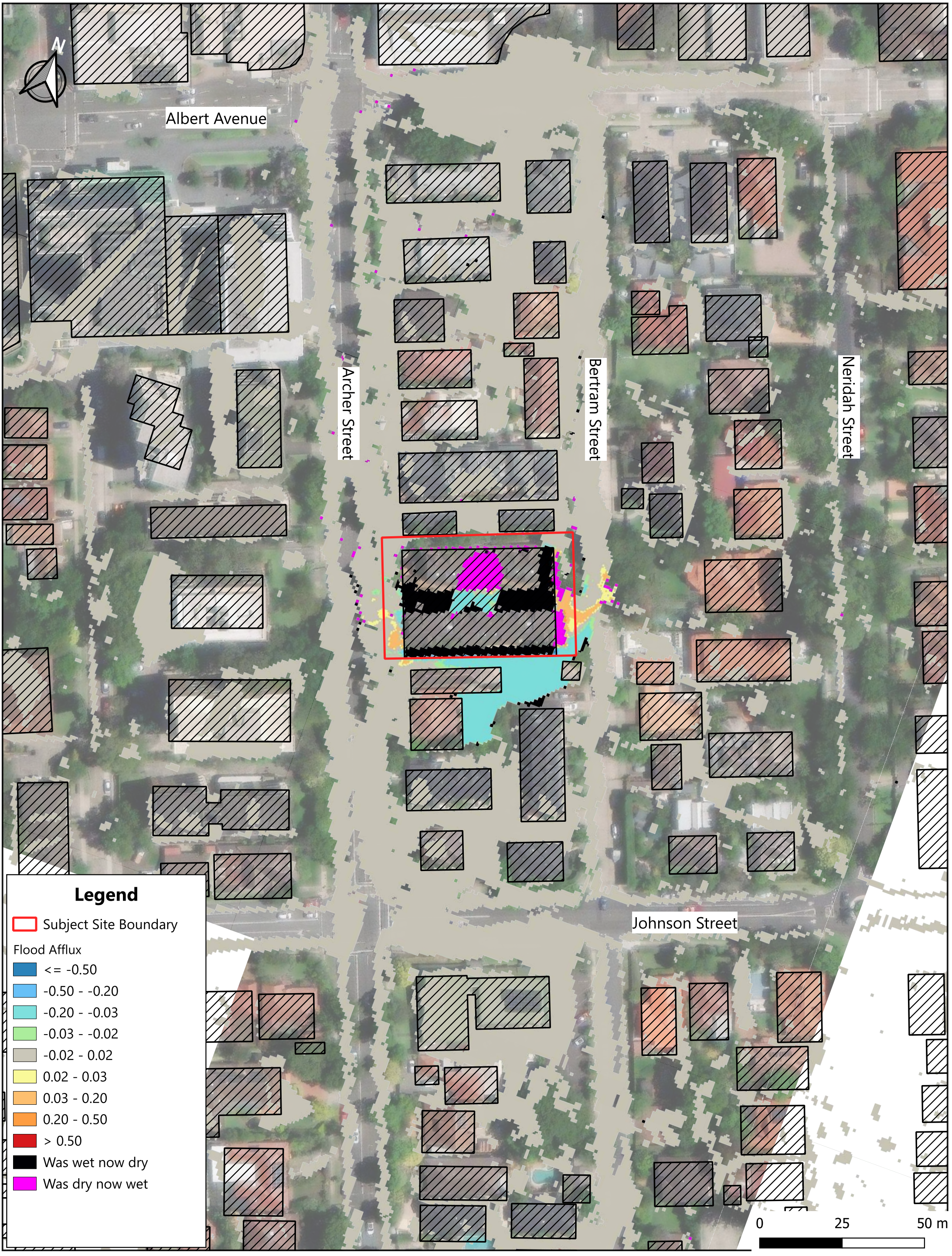

Title:
Proposed 0.2% AEP Flood Afflux

Figure:
500P-6

IDC endeavours to ensure that the information provided in this map is correct at the time of publication. IDC does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.

Project Name	**37 Archer Street, Chatswood**	Project ID	**23-035**
Client	**Hyecorp Property Group**	Date	**14/02/2025**
		Revision	**A**

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N

Albert Avenue

Archer Street

Bertram Street

Neridah Street

Johnson Street

Legend

Subject Site Boundary

Flood Afflux

- <= -0.50
- -0.50 - -0.20
- -0.20 - -0.03
- -0.03 - -0.02
- -0.02 - 0.02
- 0.02 - 0.03
- 0.03 - 0.20
- 0.20 - 0.50
- > 0.50
- Was wet now dry
- Was dry now wet

0 25 50 m

Title:

Proposed 0.2% AEP to 1% AEP Flood Afflux (Climate Change Consideration)

Figure: **CC-P-1**

Project Name	**37 Archer Street, Chatswood**	Project ID	**23-035**
Client	**Hyecorp Property Group**	Date	**14/02/2025**
		Revision	**A**

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Albert Avenue

Archer Street

Bertram Street

Neridah Street

Johnson Street

Legend

Subject Site Boundary

Flood Contours (m)

0.5

Flood Depth (m)

0.05 - 0.15

0.15 - 0.30

0.30 - 0.50

0.50 - 0.80

0.80 - 1.00

1.00 - 1.50

> 1.50

0 25 50 m

Title:

Proposed PMF Flood Depth

Figure:

PMF-P-1

Project Name **37 Archer Street, Chatswood**		Project ID	**23-035**
Client	**Hyecorp Property Group**	Date	**14/02/2025**

Revision **A**

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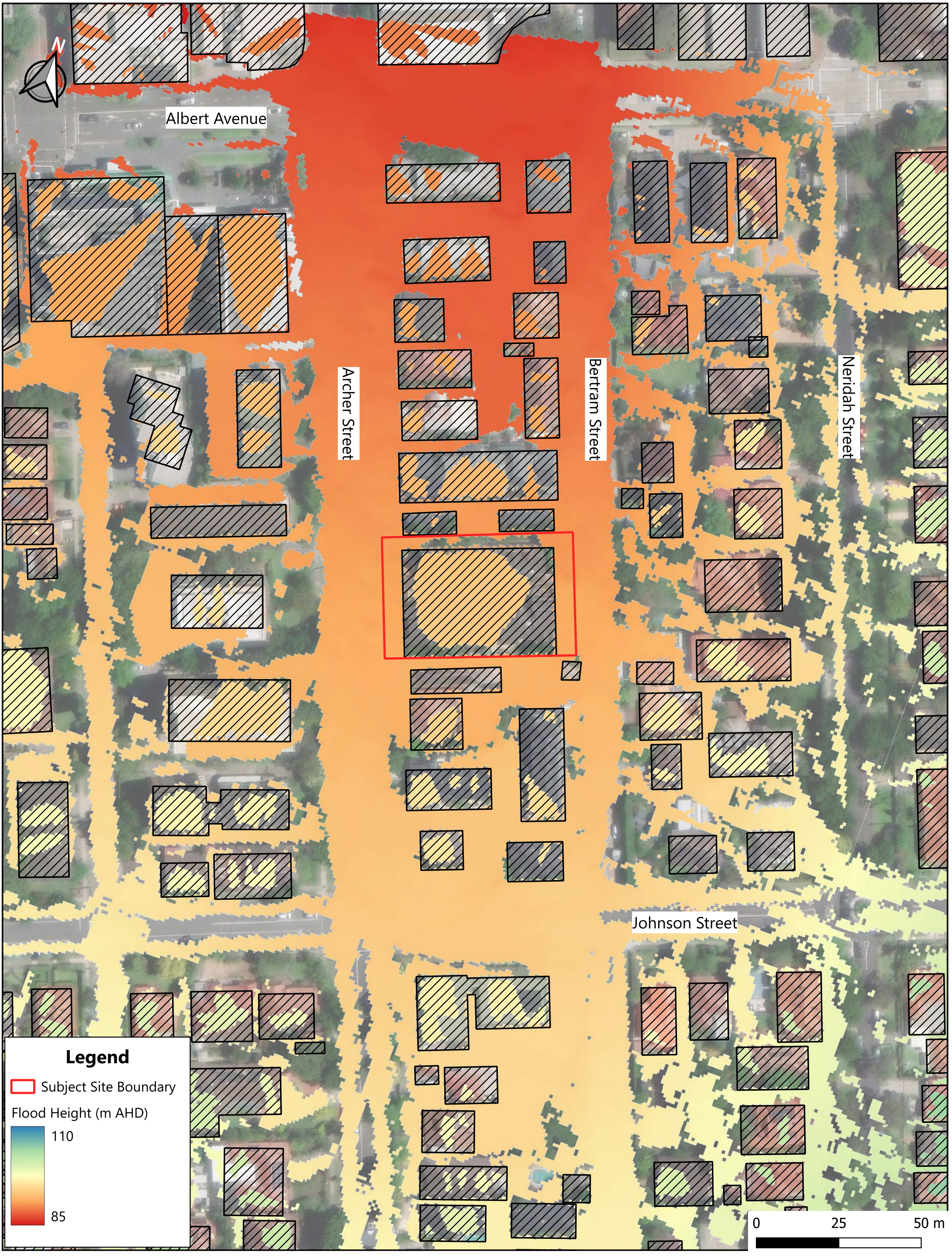

Title:
Proposed PMF Flood Height

Figure:
PMF-P-2

IDC endeavours to ensure that the information provided in this map is correct at the time of publication. IDC does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.

Project Name	**37 Archer Street, Chatswood**	Project ID	**23-035**
Client	**Hyecorp Property Group**	Date	**14/02/2025**
		Revision	**A**

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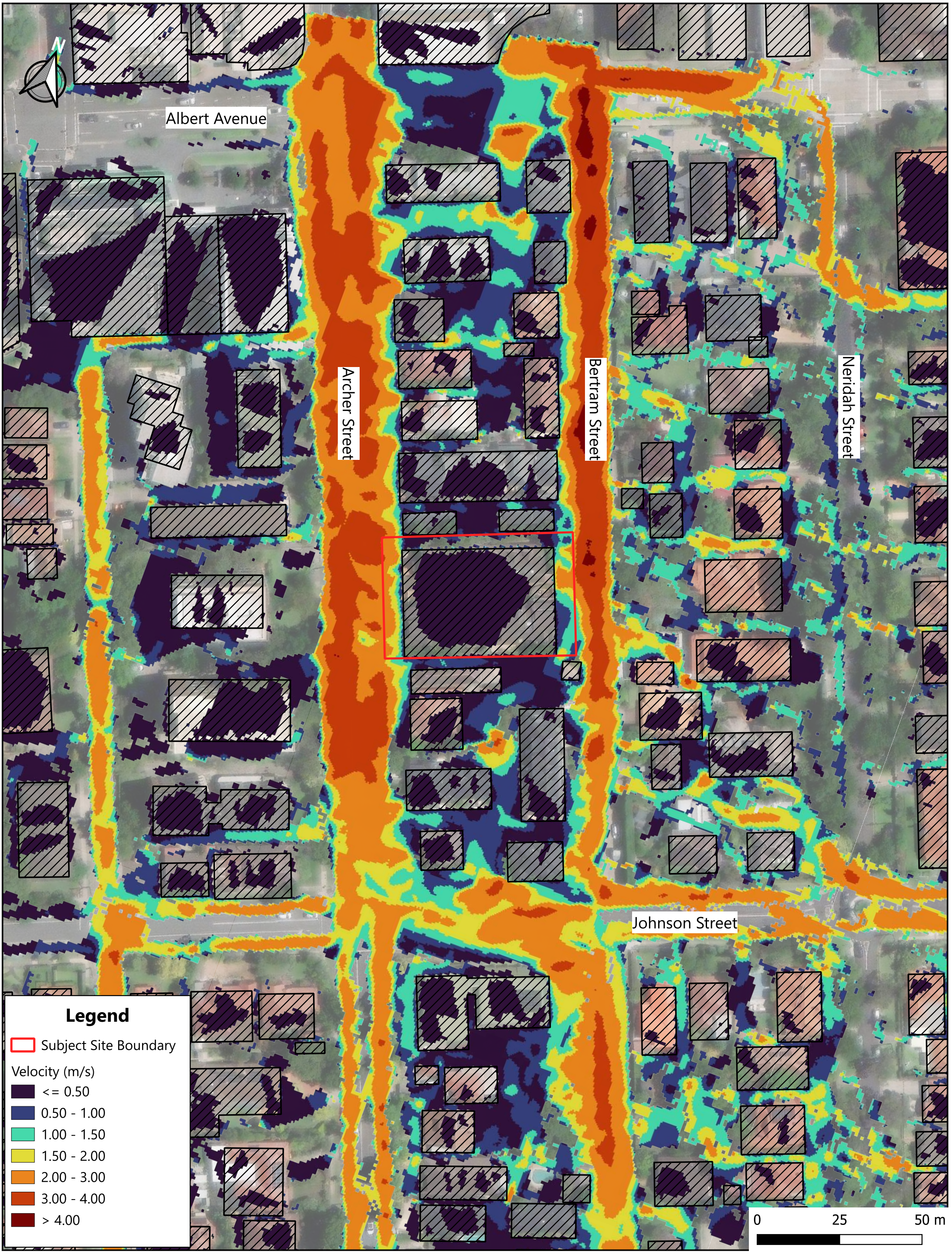

Title:
Proposed PMF Flood Velocity

Figure:
PMF-P-3

IDC endeavours to ensure that the information provided in this map is correct at the time of publication. IDC does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.

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Client	**Hyecorp Property Group**	Date	**14/02/2025**
		Revision	**A**

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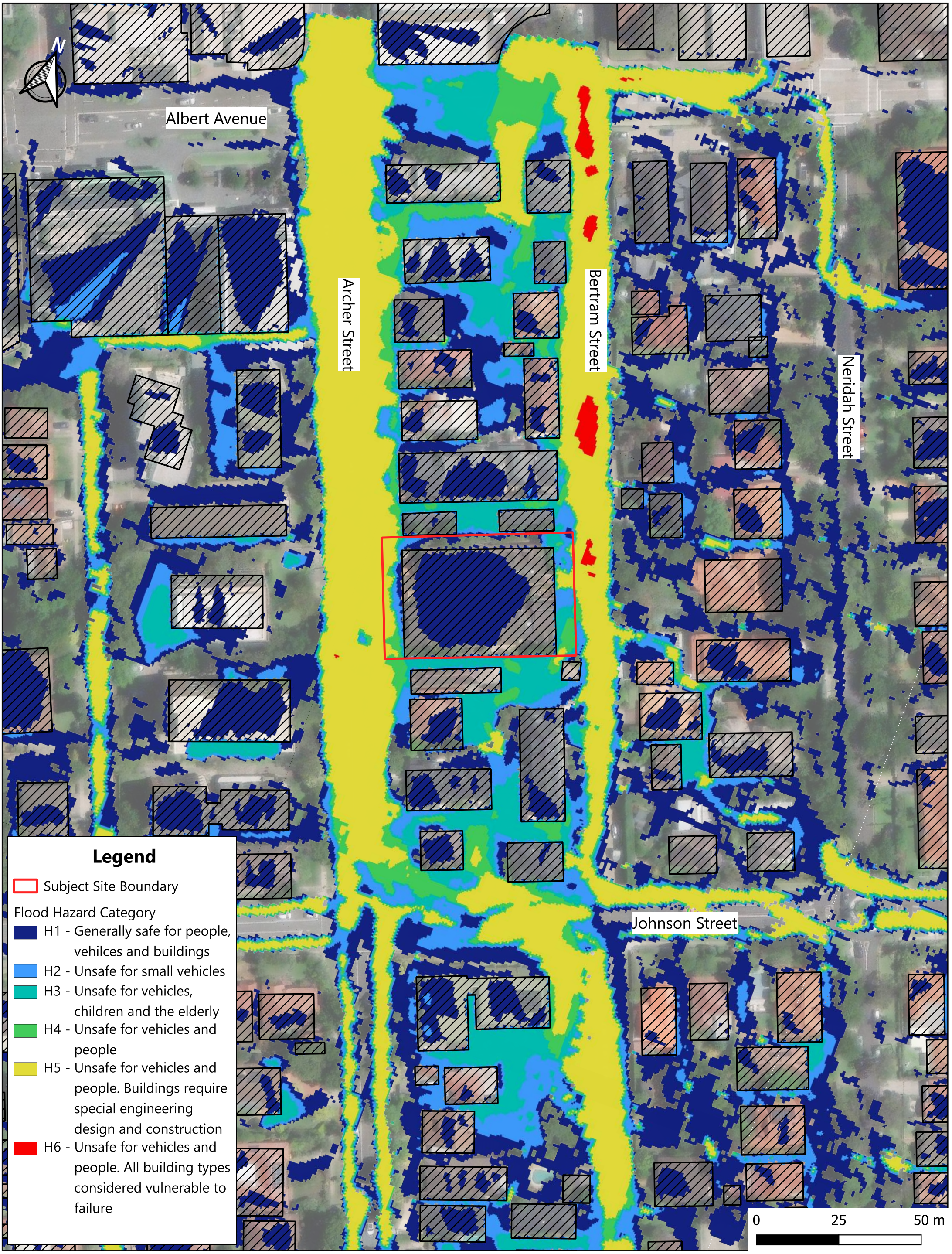

Title:
Proposed PMF Flood Hazard

Figure:
PMF-P-4

Project Name	**37 Archer Street, Chatswood**	Project ID	**23-035**
Client	**Hyecorp Property Group**	Date	**14/02/2025**

Revision **A**

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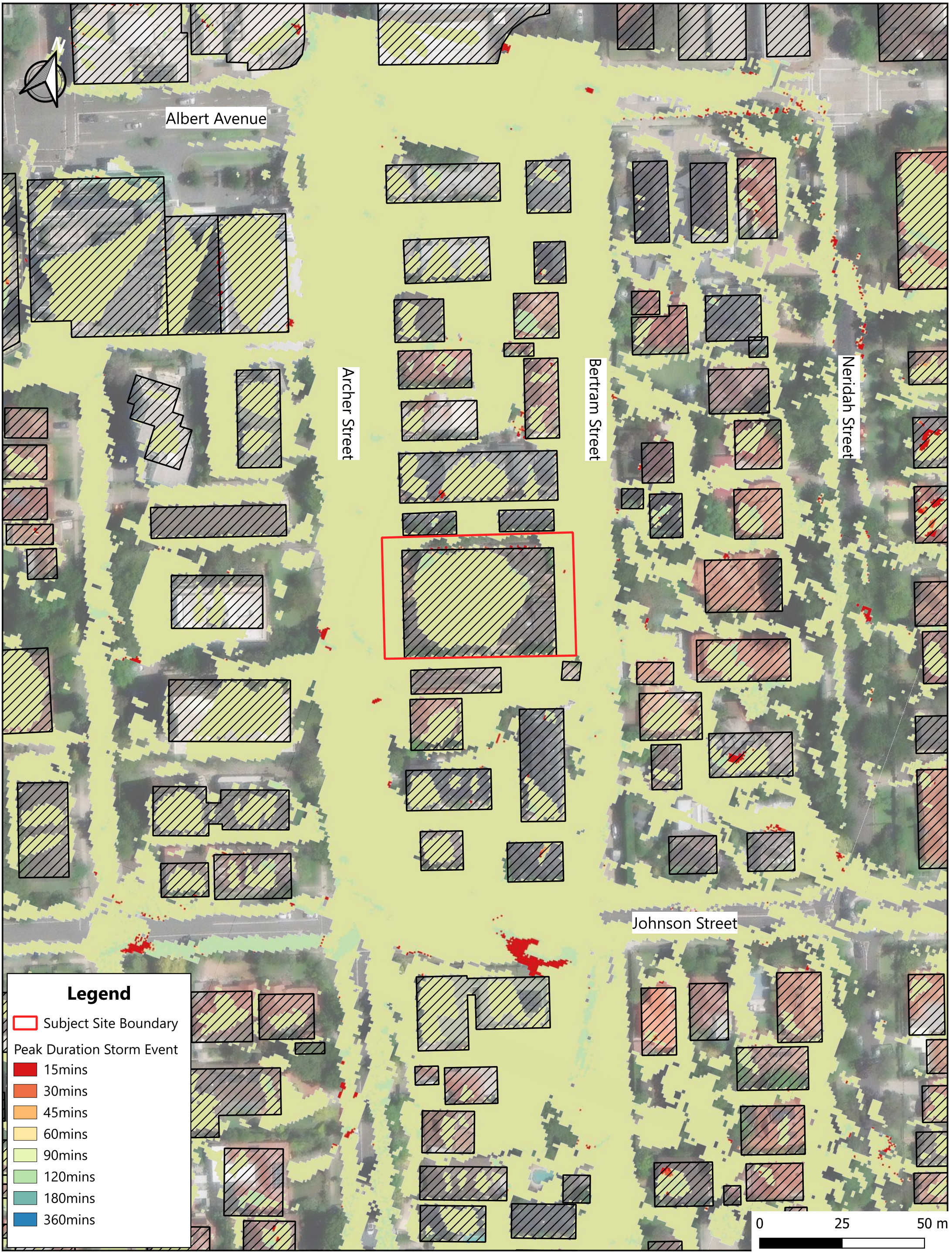

Title:
Proposed PMF Flood Duration

Figure:
PMF-P-5

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Project Name	**37 Archer Street, Chatswood**	Project ID	**23-035**
Client	**Hyecorp Property Group**	Date	**14/02/2025**
		Revision	**A**

idc
infrastructure & development consulting

B. Council Correspondence

Julalak Laokittichai

From: Woods, Clare <Clare.Woods@Willoughby.nsw.gov.au>
Sent: Tuesday, 24 December 2024 8:47 AM
To: Julalak Laokittichai; Pei, Aston
Cc: Jonathon Kafes; O'Brien, Craig
Subject: RE: SSD 37 Archer St Chatswood - Basement Driveway Level

Hi Julalak,

Aston and I have discussed this site and the flood level details you provided.

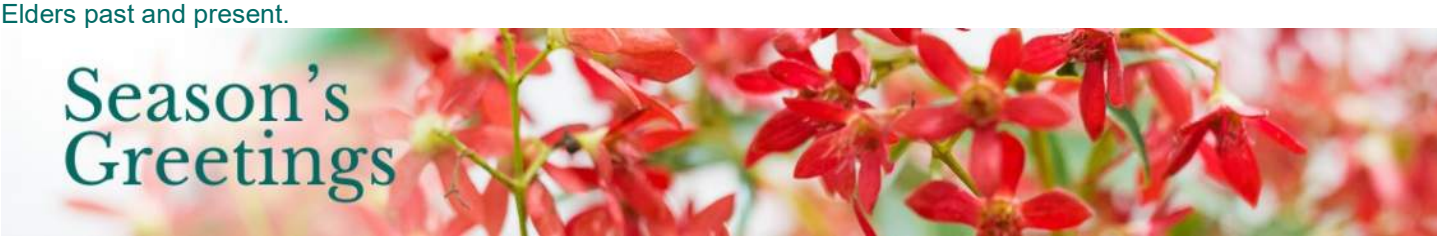
In this instance, we would accept setting the crest level for the basement at the PMF, provided a freeboard of 300mm above the 1%AEP event is also achieved.

Regards,

Clare Woods

Clare Woods - *Development Control Team Leader*
WILLOUGHBY CITY COUNCIL
PO Box 57 Chatswood NSW 2057
P +61 2 9777 7717 | M
E Clare.Woods@Willoughby.nsw.gov.au
willoughby.nsw.gov.au | visitchatswood.com.au | theconcourse.com.au

Council acknowledges the Gamaragal People as the Traditional Owners of these lands. We pay our respects to their Elders past and present.



From: Julalak Laokittichai <Julalak.Laokittichai@idcaus.com>
Sent: Friday, 20 December 2024 2:40 PM
To: Woods, Clare <Clare.Woods@Willoughby.nsw.gov.au>; Pei, Aston <Aston.Pei@Willoughby.nsw.gov.au>
Cc: Jonathon Kafes <jonathon.kafes@idcaus.com>
Subject: SSD 37 Archer St Chatswood - Basement Driveway Level

Hi Clare and Aston,

Hope you are both well. My name is Julz and I am assisting with the SSD project at 37 Archer St in Chatswood.
We were referred to you by Craig O'Brien and wanted to ask if Council have any leniency regarding basement ramp crest levels in overland flow paths.

In the Willoughby Development Control Plan Part I: Stormwater Management 2023, there is a floodplain management control for new development, in areas subject to local drainage/overland flow, that specifies the minimum crest level for driveways to basement parking – please see the screenshot below:

5.1.2 New development in areas subject to local drainage or overland flow

a. minimum floor level for buildings = 1% AEP water level + 500mm

b. minimum garage floor level = 1% AEP water level + 300mm

c. minimum crest level for driveway to basement parking = PMF water level or 1% AEP water level + 500mm, whichever is higher

d. minimum floor level for carport = 1% AEP water level + 100mm

e. underside of any structure to be 300mm above 1% AEP flood level

f. construct on high side of property

g. flood evacuation route at 1% AEP +500mm level

h. flood impact assessment required; a flood study may be required where works potentially impact flood levels.

We note that Archer Street and Bertram Street adjacent to the proposed site fall at an approximate grade of 2.58% and 2.70% respectively towards the north and that the stormwater depth is 0.32m - 0.69m in the roadway (Bertram St) in the PMF event.
Considering the depth of flow and grade in the road, we believe that setting the ramp to the PMF water level would be sufficient as the development is only affected by overland flow flooding and the building still remains flood protected with this option.
The PMF level is approximately 200mm lower than the 1% AEP + 500mm which we note does not meet the Council DCP. Could Council provide comment on this approach or advise if they would be willing to accept the PMF as an acceptable crest level?

Please let us know if you'd like to hold a meeting to discuss this further.

Regards,

infrastructure & development consulting
Julalak Laokittichai
Civil Engineer

m +61 450 680 376
e julalak.laokittichai@idcaus.com
a Suite 8.01, 56 Clarence Street, Sydney NSW 2000

Jonathon Kafes

From: Pei, Aston <Aston.Pei@Willoughby.nsw.gov.au>
Sent: Thursday, 15 August 2024 4:11 PM
To: Jonathon Kafes
Cc: Woods, Clare
Subject: RE: 37 Archer St - Draft Scotts Creek Floodplain Risk Management Study

Follow Up Flag: Follow up
Flag Status: Completed

Hi Jonathon,

I have been forwarded your enquiry by Clare.

The draft flood study of the Scotts Creek Floodplain Risk Management Study (Study) is proposed to go on exhibition later this year. A pdf version will be available for comment during exhibition but the raw flood model data will not be provided.

Please note, the data cannot be provided until the full Study is completed and adopted by Council. This includes the flood study with the floodplain risk management study and plan (next stage) which are expected to be completed late 2025.

Kind regards,
Aston

From: Jonathon Kafes <jonathon.kafes@idcaus.com>
Sent: Wednesday, 14 August 2024 1:55 PM
To: Woods, Clare <Clare.Woods@Willoughby.nsw.gov.au>
Subject: FW: 37 Archer St - Draft Scotts Creek Floodplain Risk Management Study

Hi Clare,

My colleague Chris previously reached out to you regarding our site at 37 Archer Street, Chatswood (please see below).
We note that you mentioned that the Draft Scotts Creek Floodplain Risk Management Study was anticipated to go on exhibition earlier this year.

We were wondering if the study is available for us to access.
If so, are we able to get access to the flood modelling information for us to review the flooding behaviour on our site?

Feel free to call me on the below number should you wish to discuss this further.

Regards,
infrastructure & development consulting
Jonathon Kafes
Senior Civil Engineer

m +61 0431 088 799
e Jonathon.kafes@idcaus.com
a Suite 8.01, 56 Clarence Street, Sydney NSW 2000

From: Chris Avis <chris.avis@idcaus.com>
Sent: Wednesday, August 14, 2024 1:49 PM
To: Jonathon Kafes <jonathon.kafes@idcaus.com>
Subject: FW: 37 Archer St - Draft Scotts Creek Floodplain Risk Management Study

Regards,
infrastructure & development consulting
Chris Avis
Director

m +61 0425 264 551
e chris.avis@idcaus.com
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From: Woods, Clare <Clare.Woods@Willoughby.nsw.gov.au>
Sent: Tuesday, October 17, 2023 2:50 PM
To: Chris Avis <chris.avis@idcaus.com>
Cc: Simon Truong <simon@hyecorp.com.au>; Lachlan Rovers <lachlan@hyecorp.com.au>; Stephen Abolakian <stephen@hyecorp.com.au>; Pei, Aston <Aston.Pei@Willoughby.nsw.gov.au>
Subject: RE: 37 Archer St - Draft Scotts Creek Floodplain Risk Management Study

Hi Chris,

I have been advised that the Draft Floodplain Risk Management Study will probably go on exhibition around March or April next year.

With regards flood impacts associated with the site, the 2009 study only focused on the mainstream open channel and we don't have detailed information on depths, volumes, flows for the site. The site is tagged as flood affected – overland flow (major) and the initial overland flow study indicated depths of 300mm. Council does have reports of flooding of properties in Archer Street and there is a past instance of flooding of the basement carpark at corner of Archer Street and Albert Avenue.

Based on the above, you will need to develop your own modelling and undertake a flood impact study for the site, which is to be in accordance with the requirements of Technical Standard 2.

Regards,

Clare

Clare Woods - *Development Control Team Leader*
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Council acknowledges the Gamaragal People as the Traditional Owners of these lands. We pay our respects to their Elders past and present.

From: Chris Avis <chris.avis@idcaus.com>
Sent: Tuesday, 17 October 2023 8:23 AM
To: Woods, Clare <Clare.Woods@Willoughby.nsw.gov.au>; Pei, Aston <Aston.Pei@Willoughby.nsw.gov.au>
Cc: Simon Truong <simon@hyecorp.com.au>; Lachlan Rovers <lachlan@hyecorp.com.au>; Stephen Abolakian <stephen@hyecorp.com.au>
Subject: 37 Archer St - Draft Scotts Creek Floodplain Risk Management Study

Hi Clare,

I hope you are well.

We are currently looking at the potential redevelopment of a site at 37 Archer Street, Chatswood. Based on a recent phone call between Hyecorp and Aston at Council we understand that there is a Draft Floodplain Risk Management Study for the Scotts Creek catchment currently being finalised that identifies the site as affected by overland flows. The 2009 Scotts Creek flood study available on Council's website does not identify the site as flood affected.

As you would appreciate, we are most eager to understand the extent and nature of overland flows in the vicinity of the site to undertake adequate site investigations and planning so that any future designs comply with Council's requirements.

Could you please provide me with an update regarding the timing of this study and let me know if there is any mapping/reporting that we would be able to see in draft format prior to it's release? We will obviously need to wait for the final study to go on exhibition and be implemented prior to using fully, but any early indication of the flooding conditions will be very useful for us at the early planning phases.

Please feel free to give me a call if you'd like to discuss.

Kind Regards,
infrastructure & development consulting
Chris Avis
Director

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e chris.avis@idcaus.com

a Suite 414, 410 Elizabeth Street Surry Hills NSW 2010

From: Simon Truong <simon@hyecorp.com.au>
Sent: Thursday, October 12, 2023 9:07 PM
To: 'Pei, Aston' <Aston.Pei@Willoughby.nsw.gov.au>
Cc: 'Stephen Abolakian' <stephen@hyecorp.com.au>; 'Lachlan Rovers' <lachlan@hyecorp.com.au>
Subject: RE: Draft Scotts Creek Floodplain Risk Management Study

Hi Aston,

Thank you for the chat this afternoon. I note your comments:

- 37 Archer St is identified to be within an Overland Flow path under an unadopted draft flood study.
- As there is no relevant flood study, it means any redevelopment will be required to prepare a site specific flood study to understand any implications as part of future redevelopment.

As discussed, if you could kindly put me in contact with Claire Woods – Team Leader of Development Engineering so I can discuss the flooding impacts in greater detail with her.

Thanks and regards

From: Simon Truong <simon@hyecorp.com.au>
Sent: Thursday, October 12, 2023 12:20 PM
To: 'Pei, Aston' <Aston.Pei@Willoughby.nsw.gov.au>
Cc: Stephen Abolakian <stephen@hyecorp.com.au>; Lachlan Rovers <lachlan@hyecorp.com.au>
Subject: RE: Draft Scotts Creek Floodplain Risk Management Study

Hi Aston,

Hope this email finds you well.

I just left a voicemail regarding the status of the draft Scotts Creek Flood study. I'd like to also understand if you are aware of any updates to flooding at 37 Archer St, Chatswood in the current study.

Can you please give me a call back when you get a chance.

Thanks and regards

From: Pei, Aston <Aston.Pei@Willoughby.nsw.gov.au>
Sent: Monday, September 18, 2023 10:00 AM
To: simon@hyecorp.com.au
Cc: stephen@hyecorp.com.au
Subject: FW: Draft Scotts Creek Floodplain Risk Management Study

Hi Simon

Council has awarded the contact to the consultant. They are currently updating the flood extents of the model before running design storms.

We anticipate the draft ready towards end of Q3 this year.

Kind regards
Aston

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Council acknowledges the Gamaragal People as the Traditional Owners of these lands. We pay our respects to their Elders past and present.

From: Simon Truong <simon@hyecorp.com.au>
Sent: Sunday, 17 September 2023 9:49 PM
To: Pei, Aston <Aston.Pei@Willoughby.nsw.gov.au>
Cc: Stephen Abolakian <stephen@hyecorp.com.au>
Subject: Draft Scotts Creek Floodplain Risk Management Study

Hi Aston,

Hope this email finds you well. Are you able to advise on the status of the Draft Scotts Creek flood study noting Council's website indicated this would be ready Q2/Q3 this year.

https://www.haveyoursaywilloughby.com.au/scott-s-creek-floodplain-risk-management-study

Thanks and regards

Simon Truong
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LinkedIn | **Instagram** | **Facebook**

HYECORP