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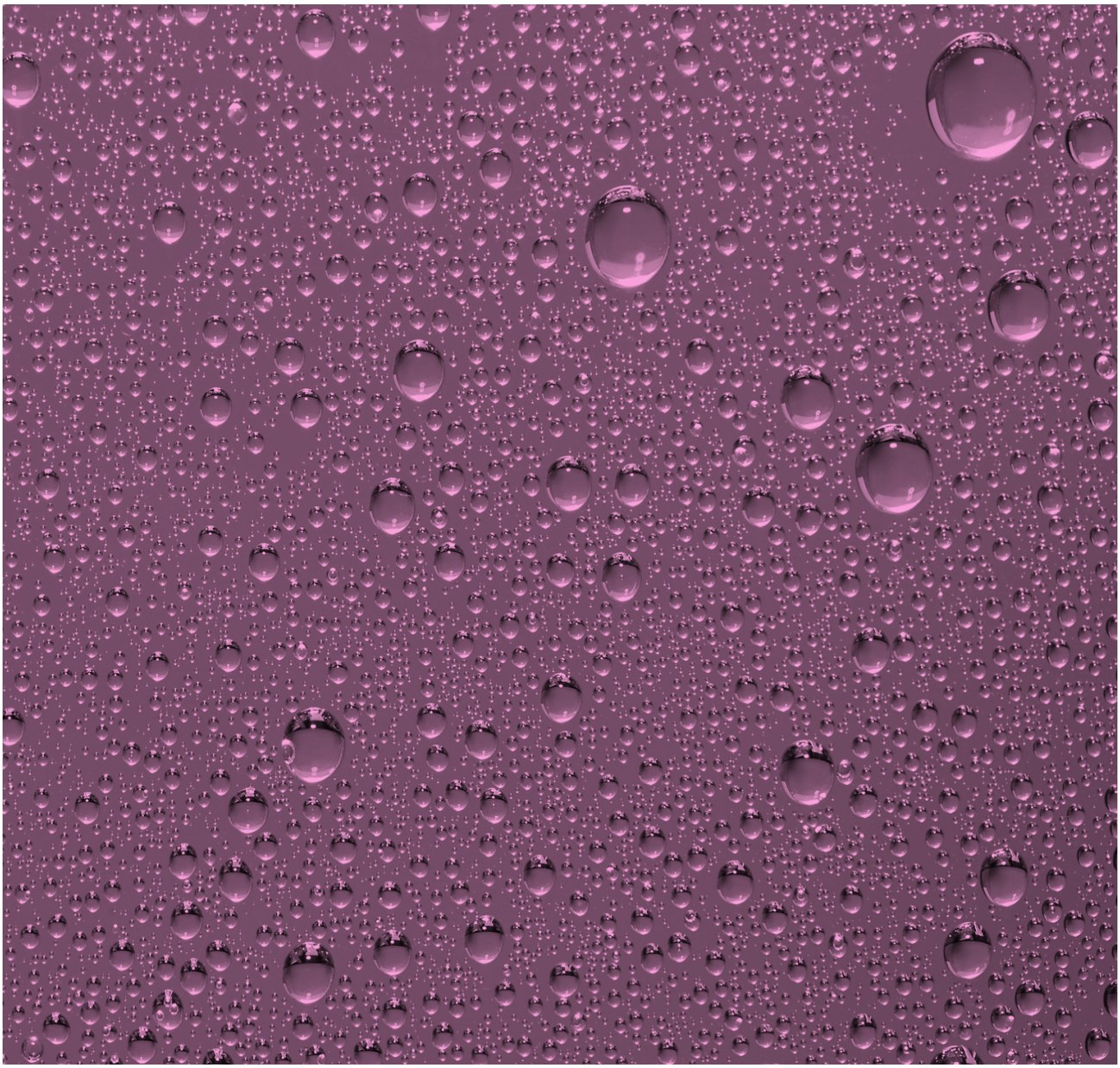
Flood Risk Assessment Report

Proposed Boarding House at 5 Buller Street, North Parramatta



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Flood Risk Assessment

Proposed Boarding House at 5 Buller Street, North Parramatta

Prepared for our client:
QRM
c/o Huxley Architects
Sydney NSW 2021

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Executive Summary

Stellen Consulting was engaged to assess the proposed development at 5 Buller Street in reference to potential risks and impacts connected with flooding.

A HECRAS 2D model was developed to assess the impact of the development on the flood characteristics in neighbouring properties.

Based on the evaluations of the proposed design, council-provided flood information and model results, the following can be concluded:

1. The design proposes a suspended slab system for the structure that allows floodwaters to pass through the site during major flood events thereby providing an overland flow path and maintaining existing flood storage on the land.
2. The proposed development is not predicted to have significant adverse impacts on the neighbouring properties for 0%, 50% and 100% blockage of the suspended slab system, and the hazards to people and vehicles are predicted to be largely unchanged.
3. The proposed boarding house as described in the drawings listed in appendix A is consistent with the Parramatta DCP (2011) objectives, design guidance and controls relating to flooding.
4. In the event of a flooding emergency, refuge can be taken within the first and second floor of the proposed development which are both set above the predicted PMF level. This approach is consistent with best practice for responding to the flood risk.

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1.0 Introduction

Stellen Consulting was engaged to assess the proposed development at 5 Buller Street in reference to potential risks and impacts connected with flooding.

Council flood modelling for the catchment notes the site as affected by overland flow during large storm events. Therefore, an assessment of the general flooding constraints and requirements is required for the site. This report provides detailed assessment of the flow information specific to the site and assesses the proposed development in accordance with the relevant requirements Parramatta DCP, Table 2.4.2.1.3.

The following documentation has been used in the preparation of this overland flow assessment report:

- Google Earth and SIX Maps aerial imagery
- Site specific survey information listed in Appendix A
- DEM with a resolution of 1m obtained from ELVIS by Geoscience Australia
- City of Parramatta Council's flood enquiry information Issued 7 October 2020 (REF: FL/143/2020)

2.0 Site Description

The subject site, 5 Buller Street, has a total area of 651m^2. Currently, there is an existing single dwelling on site. Figure 1 displays the subject site (red boundary) and location plan.

The proposed development involves demolition of the existing single dwelling and the construction of a new boarding house. Survey and architectural plans of the proposed development provided in Appendix A.

Figure 1: Site locality and previous development (SIX Maps, 2022)

3.0 Overland Flow

3.1 General

The subject site is affected by overland flooding generated by a large catchment upstream of the site, and Council has identified the site as flood prone land.

Council flood information (Appendix B) predicts that during the 5% AEP rain event and greater the site will be subject to flooding, as a result of this an assessment of the relevant flood related development controls is required to support the DA.

Flood levels for the site were obtained from council and are based on the Upper Parramatta River Flood Study (Draft 8).

Based on this information:

- In the predicted 5% AEP flood event up to half of the property would be inundated with flood waters up to a depth of 340mm, a maximum level of 10.2m AHD.
- In the predicted 1% AEP flood event up to 75% of the property would be inundated with flood waters up to a depth of 540mm, a maximum level of 10.4m AHD.
- The predicted PMF water surface level 12m AHD and would fully inundate the site.
- The site is generally a mix of low and medium hazard areas (Figure 3). A small section on the northern boundary is classified as high hazard.

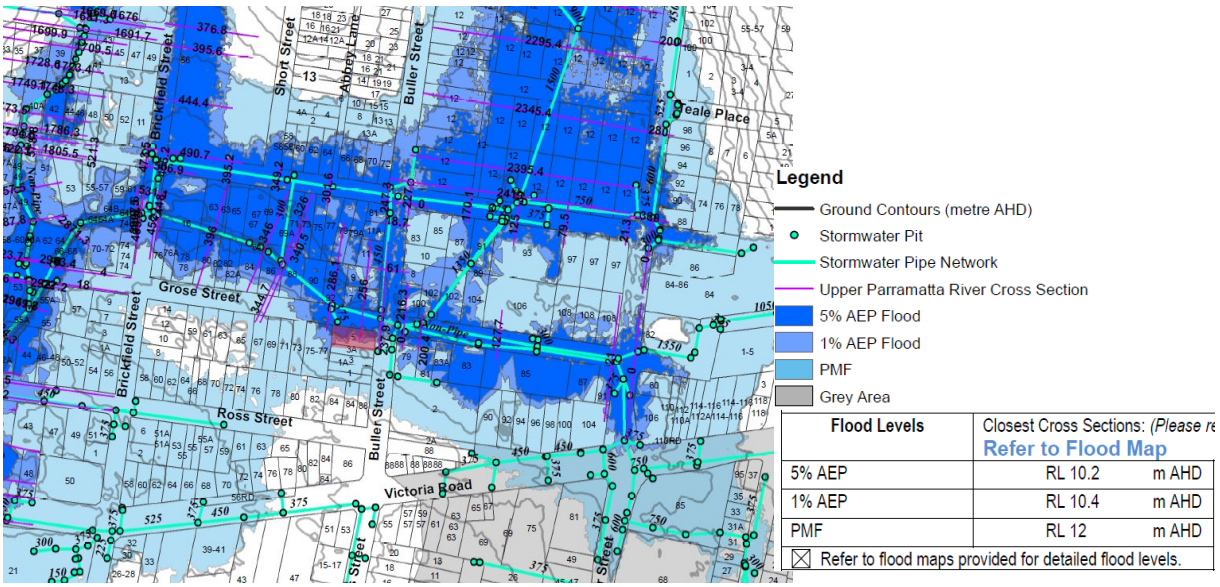

Figure 2: Flood extent at and around 5 Buller Street

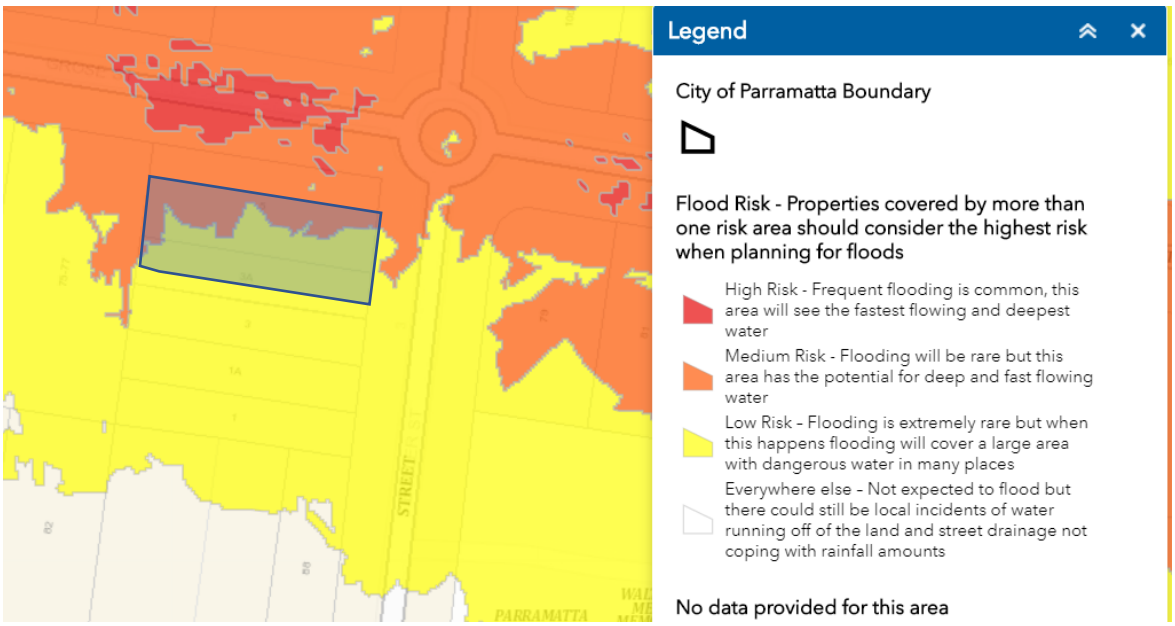

Figure 3: Flood Risk Precinct at 5 Buller

3.2 Overview of Approach

The following steps were taken to complete the site-specific flood risk assessment:

1. Obtain and review flood information from Council including flows within Grose Street.
2. Develop a predevelopment 2D HEC RAS model and calibrate against Council flood model results.
3. Develop a 2D HECRAS model for post-development scenarios.
4. Compare the post-development water surface levels, depths, velocities, and hazard classifications with the pre-developed base scenario, particularly for impacts on adjacent properties.
5. Assess the proposed development against the relevant requirements Parramatta DCP, Table 2.4.2.1.

Three different post-development scenarios were modelled:

- **Scenario 1:** suspended slab (0% blockage)
- **Scenario 2:** footprint of the proposed suspended slab with 50% blockage, and
- **Scenario 3:** post-development scenario plus a 100% blockage factor as a sensitivity analysis.

3.3 Hydraulic Model Setup

A HEC-RAS 2D model was established for pre and post-development conditions based on available survey data and architectural drawings to assess the impact of the development on the flow depths and hydraulic hazard during the 1% AEP event.

Two different 1-metre by 1-metre resolution raster grid DEM data (Data Capture Date: 2019-07-10 and Data Capture 2013-04-24) compiled from Geoscience Australia's elevation foundation database were compared with site-specific survey data. The data captured in 2019 was found to be in good agreement with the site-specific survey and was imported into HECRAS to create the 2D domain.

The HECRAS 2D model was developed approximately 40m downstream of the subject site. The location of the 2D domain extent was selected to provide logical and (where possible) defined upstream catchment input location that would see runoff propagate through the 2D domain in a manner likely to be consistent with the overall hydrological regime. This was selected based on a detailed analysis of the topography, aerial photography and information gathered via a site visit.

Peak flow obtained from Council Catchment engineer (Appendix B) was assigned to the upstream end of the 2D flow area in the HEC-RAS model. The outflow was set to a normal depth boundary condition, using bed slope as the estimated energy slope, as measured from the available terrain data.

A manning's 'n' roughness value of 0.06 was used for the general catchment surface, with the exception of impervious areas (0.025) and roads (0.02) (Figure 4).

Architectural features of the proposed development such as buildings and roads were incorporated into the model by using RASMAPPER, Civil3D and QGIS in order to satisfactorily model the impact of the proposed development on the predicted flood flows.

Breaklines and refinement areas were also used to ensure there was no leakage in the 2D flow area.

An adaptive computational time step was applied. The Full Momentum equation set was adopted in order to account for the varying flow directions.

3.4 Calibration of Hydraulic Model

The goal of this project is to create a hydraulic model to simulate flood processes with reasonable accuracy.

The following was performed to check and improve the performance of the developed hydraulic model:

- The time step is controlled by the model using the courant condition to ensure model stability
- Mass balance of the model has been checked for losses to ensure errors are less than 1% to 2% in accordance with s10.4.2 of Book 7, ARR 2019 (Ball, et al., 2019)

- Signs of instability, such as unrealistic jumps or discontinuities in flow behaviour, oscillations, and excessive reductions in time step or iterations required to achieve convergence have been checked.

The model predicts a maximum water surface level of 10.396m AHD (Figure 5) during the 1% AEP event, which is consistent with Council's model results (10.4m AHD) (Figure 4).

Figure 4: 2D flow area extents and land cover (predevelopment scenario)

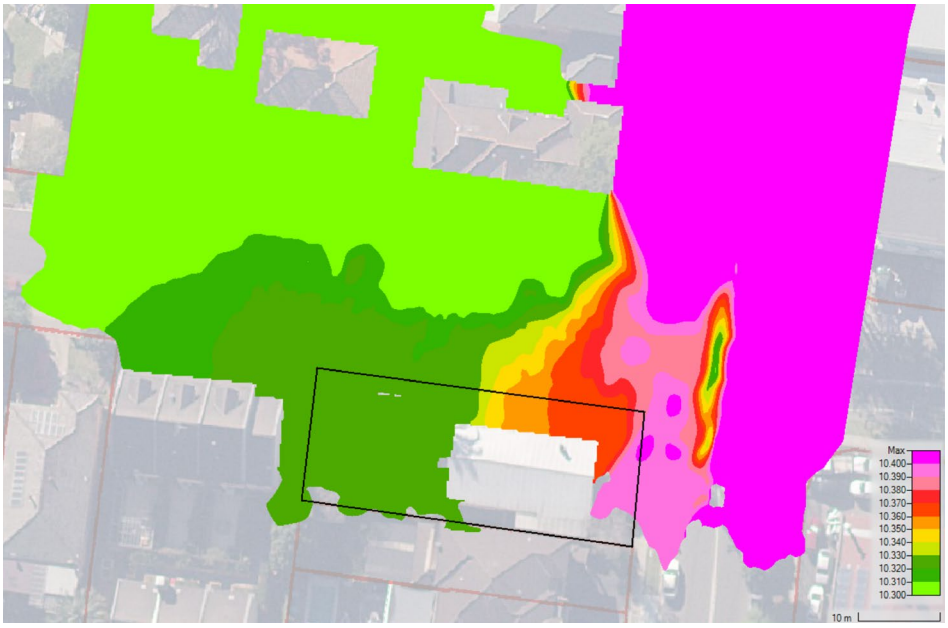

Figure 5: 1% AEP flood, Water Surface Elevation (WSE), predevelopment scenario (m AHD)

3.5 Results

3.5.1 General

The goal of this project is to create a hydraulic model to simulate flood processes with reasonable accuracy. The hydraulic model has been prepared with the data available and accessible with reasonable cost and time, given the nature and size of the project. Like any mathematical model, hydraulic modelling is sensitive to a range of inputs and assumptions, each adding some level of uncertainty to the result. Some of these inputs include rainfall intensities, temporal patterns, terrain models, new and existing buildings and the models themselves. The results have been interpreted in the context of the likely model uncertainties, its nature and risks of this project.

3.5.2 Summary of Results

Using the results of the model as described, the impact of the new development on flood behaviour immediately upstream and downstream of the new development has been examined. Figure 6 and Figure 7 show the water depths during the 1% AEP rain event. Detailed flood characteristics for both the pre and post-development scenarios are provided in Appendix C.

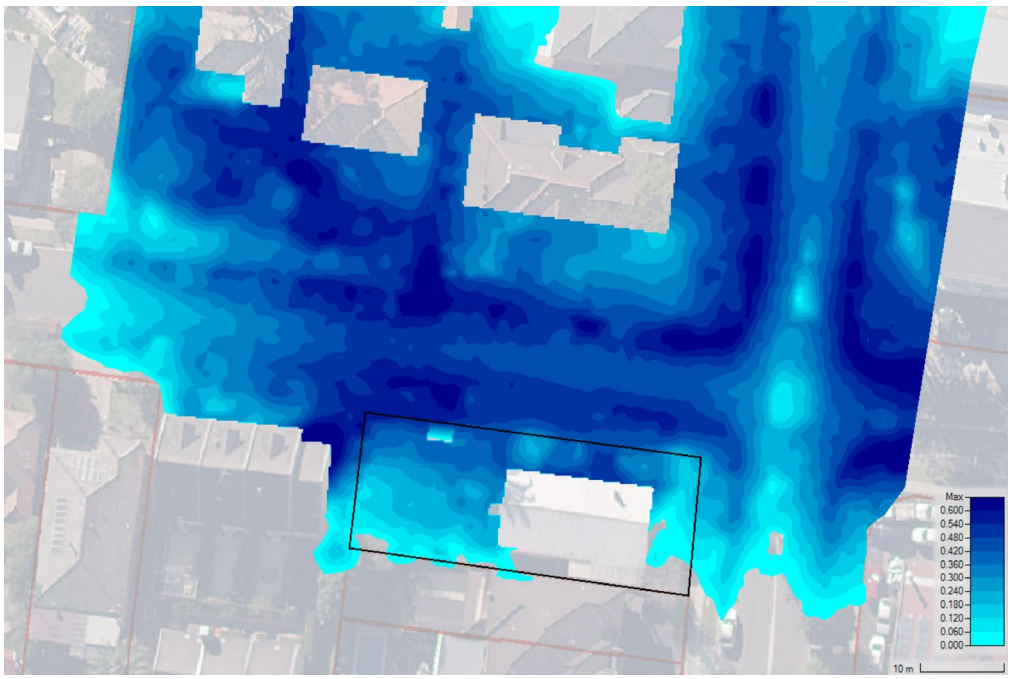

Figure 6: 1% AEP water depths (m) for pre-development base scenario

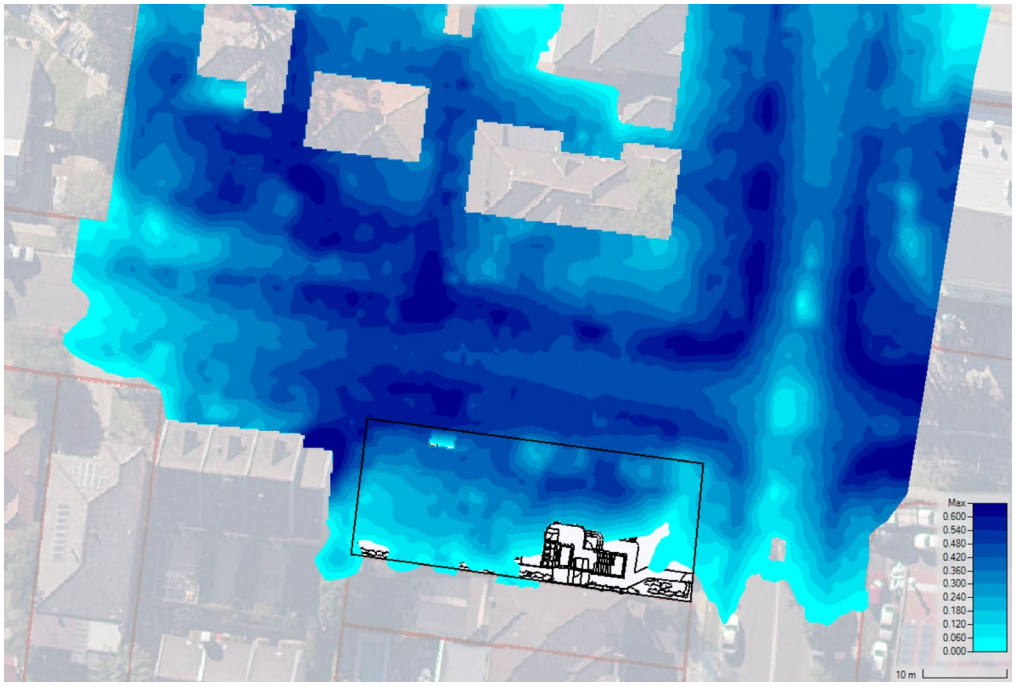

Figure 7: 1% AEP water depths (m) for post-development scenario 1 (0% blockage) (right)

Figure 8 and Figure 9 show the difference between the pre-development base case and post-development scenarios 1 (0% blockage) and 2 (50% blockage).

The bulk of afflux values are shown to occur within the subject site due to the proposed development. The results also show that there would be some areas of afflux at location A. This can be attributed to the error tolerance of the DEM data and calculations within the flood model, and it is less than 20mm, which is typically an industry acceptable level of variance. Overall, the increase in depths is not expected to have a significant effect on the downstream properties for the following reasons:

- the increased depths are localised and marginal, and
- the flood hazard classifications at these locations remain similar for pre and post development, refer to the following section 3.5.4 for discussion.

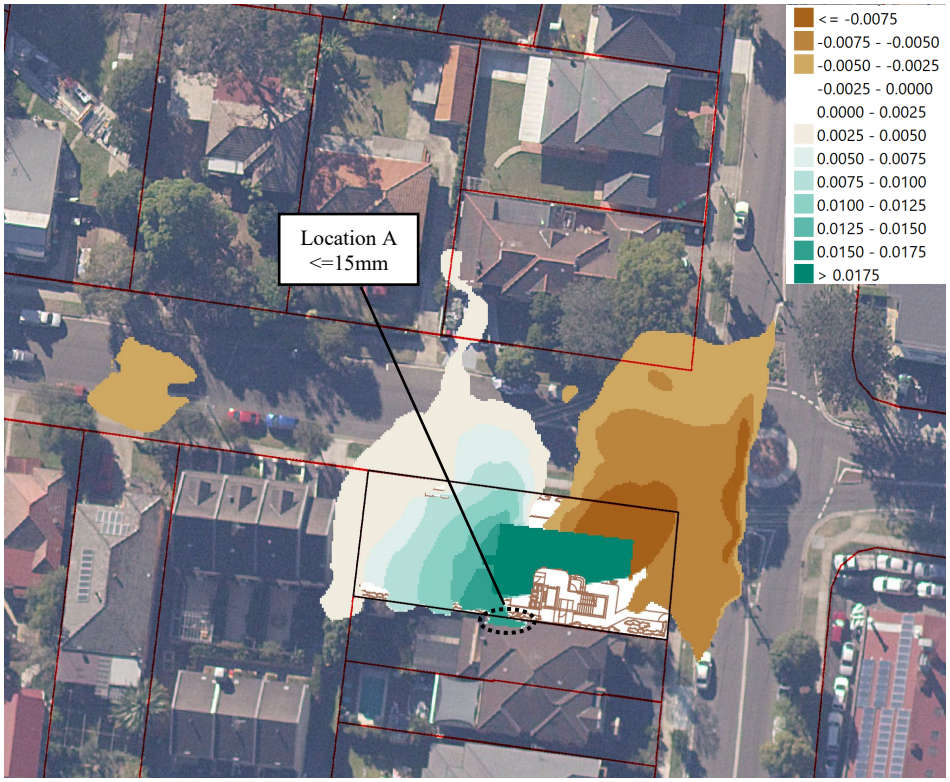

Figure 8: 1% AEP Flood Afflux (pre vs. post) – 0% blockage

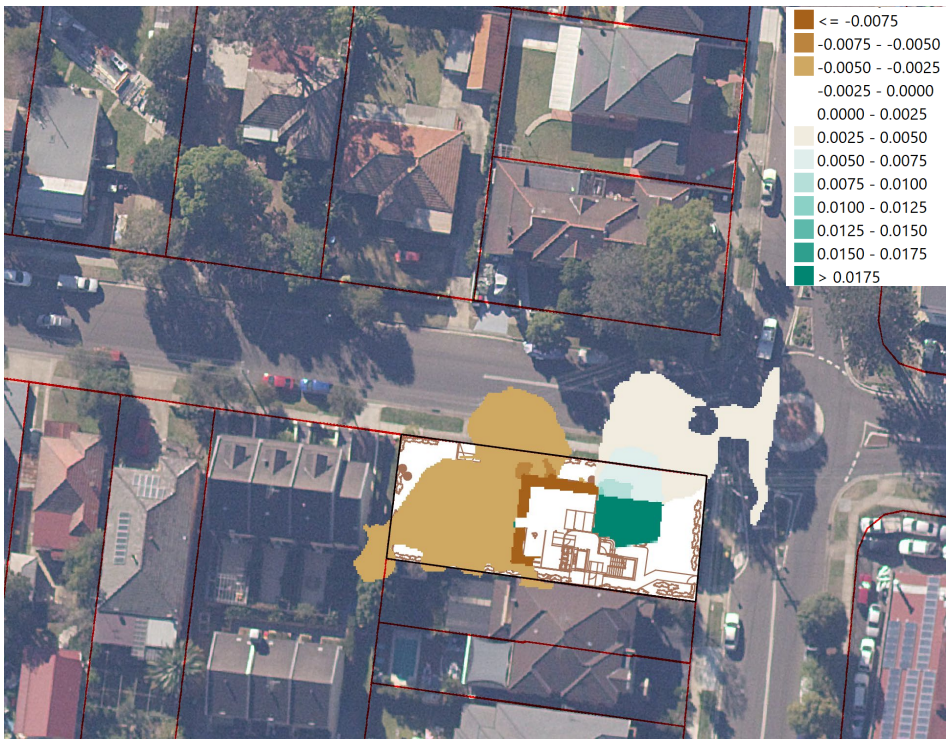

Figure 9: 1% AEP Flood Afflux (pre vs. post) – 50% blockage

3.5.3 Model Sensitivity

For the post-development scenario, an additional scenario with the footprint of the proposed building fully blocked was modelled as a sensitivity analysis to assess whether a significant change in flood level results. However, this is not adopted as a design criterion. The difference between the pre-development and post-development flood depths for this scenario is clearly demonstrated in the flood afflux, as shown in in Figure 10. The results show that a 100% blockage does not result in any significant increase in flood levels.

The proposed solution is therefore considered robust as the proposed development is not predicted to increase the risk of the inundation of adjoining properties in the event of 100% blockage of building sub-floor area.

Figure 10: 1% AEP Flood Afflux (pre vs. post) – 100% blockage

3.5.4 Hydraulic Hazard

Hydraulic hazard classification maps were prepared with hydraulic hazards assigned in accordance with the recommendations outlined in ARR 2019 (Book 6, Chapter 7 – Table 6.7.3, 6.7.4 & Figure 6.7.9). Pre and post-development hydraulic hazard maps are shown side by side in Figure 11 below. Hydraulic hazard for pre vs. post development scenarios remains largely unchanged outside of the subject site.

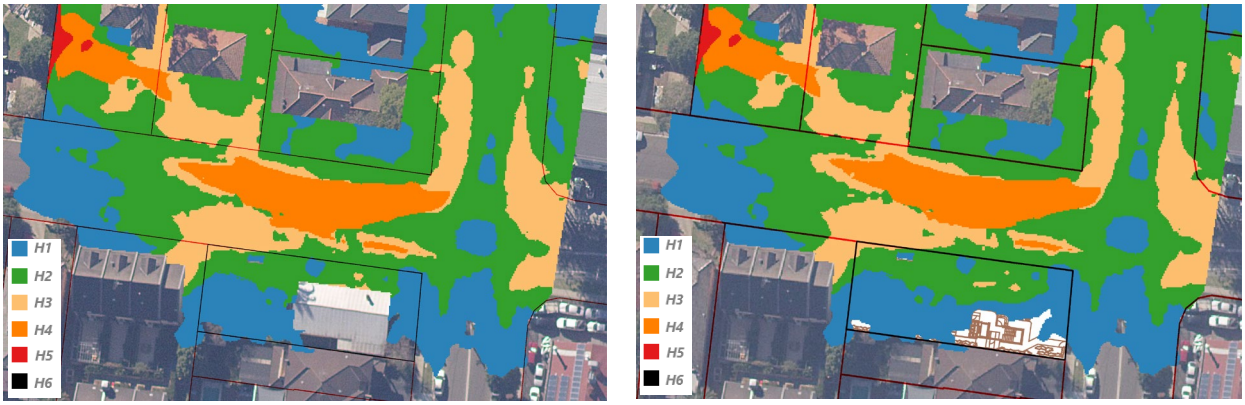

Figure 11: Hazard Classification – Predevelopment base scenario (left) and post-development scenario (0% Blockage) (right)

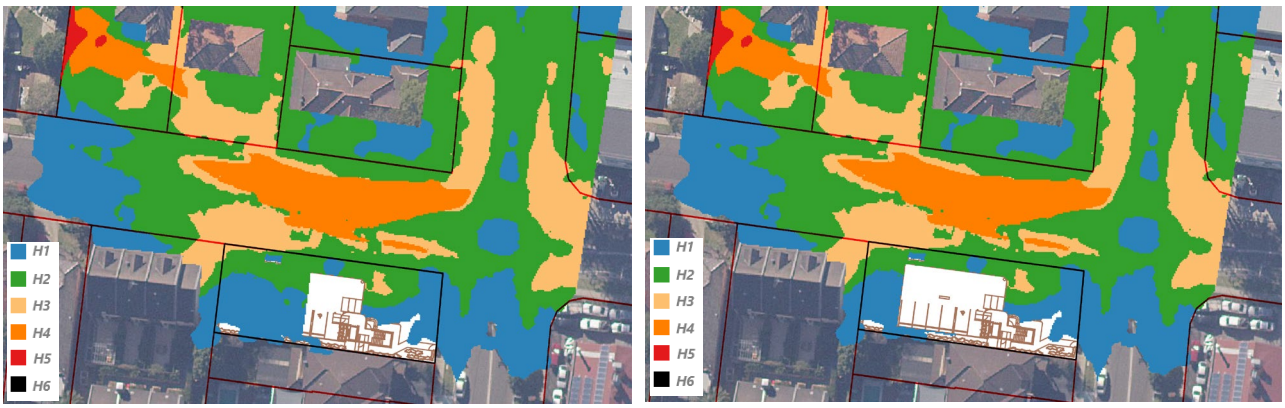

Figure 12: 1% AEP Event Hazard Classification – Post-development 50% blockage scenario (left) and 100% blockage scenario (right)

4.0 Assessment of Council Flood Controls

The proposed development is assessed as a residential development type and classified as medium risk in accordance with the Parramatta DCP (2011). As such, some flood related development controls apply (Flood Planning Matrix and Development Control (Table 2.4.2.1.2 in the DCP).

Table 1 outlines the applicable flood related development controls from the Parramatta DCP, Table 2.4.2.1.3.

Table 1. DCP flood controls, Medium flood risk precinct, Residential development

Prescriptive controls	Compliance with controls			Applicable Controls
	NA	Yes	No	
Floor level		✓		2, 5
Building components and method		✓		1
Structural soundness		✓		1
Flood affectation		✓		1
Car parking & driveway access		✓		1, 3, 5, 6, 7
Evacuation		✓		3, 4, 6
Management and design		✓		2, 3, 4

NA – Not Applicable

The following tables provide an assessment of the proposed development against the requirements of the Parramatta DCP (2011) section 2.4.2.1.

Table 2: Response to the objectives in 2.4.2.1 of DCP 2011

O.1 To ensure the proponents of development and the community in general are aware of the potential flood hazard and consequent risk and liability associated with the use and development of flood liable land.	Complies - The proponents are aware of the potential flood hazard and have designed the development accordingly.
O.2 To manage flood liable land in an economically, environmentally and socially sustainable manner.	Complies - The open ground floor housing the parking has been designed to ensure no flood storage capacity is lost whilst allowing any overland flows unimpeded passage through the site. The development as designed improves flood performance whilst also more efficiently utilising the site through additional floors for residence.
O.3 To ensure that developments with high sensitivity to flood risk (e.g. critical public utilities) are sited and designed to provide reliable access and minimise risk from flooding.	N/A
O.4 To allow development with a lower sensitivity to the flood hazard to be located within the floodplain, subject to appropriate design and siting controls and provided that the potential consequences that could still arise from flooding remain acceptable.	Complies - The proposal minimises flood risks by locating residential space above the PMF level which would be used for refuge in flood events. The site is accessible on foot and by vehicles in a 1% AEP flood events.
O.5 To prevent any intensification of the development and use of High Flood Risk Precinct or floodways, and wherever appropriate and feasible, allow for their conversion to natural waterway corridors.	N/A
O.6 To ensure that the proposed development does not expose existing development to increased risks associated with flooding.	Complies - The open ground floor space reduces flood risks to neighbouring properties compared to the existing building (refer to s3.5).
O.7 To ensure building design and location address flood hazard and do not result in adverse flood impact and unreasonable impacts upon the amenity or ecology of an area.	Complies -The open ground floor reduces flood risks in the area and allows overland flows to pass unhindered.
O.8 To minimise the risk to life by ensuring the provision of appropriate access from areas affected by flooding up to extreme events.	Complies - The residential floor space is above the PMF levels which can be accessed for shelter in extreme flood events.
O.9 To minimise the damage to property, including motor vehicles, arising from flooding.	Complies - Residential space is above the PMF level. The parking space is above the 1% AEP flooding which would be safe for vehicles.

O.10 To incorporate the principles of Ecologically Sustainable Development (ESD).	Complies - The proposed development will not have additional adverse impact on the biodiversity and ecological balance of the area compared to the existing use. The proposed use as a boarding house serves an important party to an important demographic in the society that may otherwise struggle to access affordable housing.

Table 3: Response to the design principles in 2.4.2.1 of the DCP 2011

P.1 New development should not result in any increased risk to human life.	The existing dwelling FFL is below PMF level whilst the proposed development will put the FFL for the residential space above the PMF. The site remains accessible in 1% AEP flood events.
P.2 The additional economic and social costs which may arise from damage to property from flooding should not be greater than that which can reasonably be managed by the property owner, property occupants and general community.	Achievable - The structural design of the proposed development to account for additional forces caused by flooding. In the event of a PMF damage would be to property on the ground level which would be limited to vehicles.
P.3 New development should only be permitted where effective warning time and reliable access is available for the evacuation of an area potentially affected by floods to an area free of risk from flooding. Evacuation should be consistent with any relevant flood evacuation strategy where in existence.	The proposed development would have floor levels above the PMF and so shelter in-place is available to residents.
P.4 Development should not adversely increase the potential flood affectation on other development or properties, either individually or in combination with similar developments that are likely to occur within the same catchment.	The open ground level floor increases flood storage and flood conveyance of the land vs. pre-development.
P.5 New developments must make allowances for motor vehicles to be relocated to an area with substantially less risk from flooding, within an effective warning time.	The FFL of the parking spaces are set above the 1% AEP flood level.
P.6 New developments must provide an evacuation plan detailing procedures that would be in place for an emergency (such as warning systems, signage or evacuation drills).	A shelter-in-place procedure is to be put in place.

P.7 Flood mitigation measures associated with new developments should not result in significant impacts upon the amenity of an area by way of unacceptable overshadowing of adjoining properties, privacy impacts (e.g. by unsympathetic house raising) or by being incompatible with the streetscape or character of the locality (including heritage).	The open ground floor level design is part of flood measures that are part of the building design. The overall building design is consistent with building design in the area.
P.8 Proposals for raising structures must provide a report from a suitably qualified engineer demonstrating that the raised structure will not be at risk of failure from the forces of floodwaters.	A structural engineer's report stating that the design accounts for forces from predicted flood waters will be provided.
P.9 Development is to be compatible with any relevant Floodplain Risk Management Plan, Flood Studies, or Sub-Catchment Management Plan.	Complies
P.10 Development must not divert flood waters, nor interfere with floodwater storage or the natural function of waterways.	Complies
P.11 Filling of land up to 1:100 Average Recurrence Interval (ARI) (or flood storage area if determined) is not permitted. Filling of and above 1:100 ARI up to the Probable Maximum Flood (PMF) (or in flood fringe) must not adversely impact upon flood behaviour.	Complies – No net filling is proposed as recommended in this report.
P.12 New development must consider the impact of flooding resulting from local overland flooding whether it is a result of Local Drainage or Major Drainage.	Complies – the ground floor parking space has been designed to accommodate overland flows.
P.13 Where hydraulic flood modelling is required, flow hazard categories should be identified and adequately addressed in the design of the development.	Complies – refer to s3.5 of this report.
P.14 Council strongly discourages basement car parks on properties within the floodplain. Where site conditions require a basement car park on a property within the floodplain, development applications must provide a detailed hydraulic flood study and design demonstrating that the proposed basement car park has been protected from all flooding up to and including the PMF event. An adequate emergency response and evacuation plan must also be provided where basement car parks are proposed in the floodplain.	N/A – No basement parking is proposed. A suspended floor system is proposed instead of a basement in this design. The removal of the basement is consistent with the de-risking approach to this site. The proposed design does not include a basement thus avoiding the potential for people being caught below ground in rising flood waters.

Table 4: Response to development controls recommended for low flood risk properties in 2.4.2.1 of the Parramatta DCP

Floor Level	
Control 2 Habitable floor levels to be equal to or greater than the 100-year ARI flood level plus freeboard.	Complies – Habitable floors are 2.9m above the 1% AEP flood level.
Control 5 A restriction is to be placed on the title of the land, pursuant to S.88B of the Conveyancing Act, where the lowest habitable floor area is elevated more than 1.5m above finished ground level, confirming that the subfloor space is not to be enclosed.	Achievable - The development proposes a driveway access and parking below the building, due to this a restrictive covenant on the title is not recommended. It is highly unlikely that this area would be enclosed in the future (without an additional DA process).
Building Components & Method	
Control 1 All structures to have flood compatible building components below the 100-year ARI flood level plus freeboard.	Complies - Concrete and/or bricks will be the main structural material for the ground floor structure and foundation.
Structural Soundness	
Control 1 An engineer's report is required to certify that the structure can withstand the forces of floodwater, debris and buoyancy up to and including a 100 year ARI flood level plus freeboard.	Achievable – Structural engineer to provide certification that the structure has been designed to withstand the forces of floodwaters and debris up to the PMF (shelter-in-place proposed).
Flood Affectation	
Control 1 An engineer's report is required to certify that the development will not increase flood affectation elsewhere, having regard to: (i) loss of flood storage; (ii) changes in flood levels, flows and velocities caused by alterations to flood flows; and (iii) the cumulate impact of multiple potential developments in the vicinity.	Complies - The proposed development is designed as a suspended structure and is not expected to increase flood affectation elsewhere in the catchment (refer to s3.5).

Car Parking and Driveway Access	
Control 1 The minimum surface level of open spaces or carports shall be as high as practical, but no lower than 0.1m below the 100 year ARI flood level. In the case of garages, the minimum surface level shall be as high as practical, but no lower than the 100 year ARI flood level.	Complies - The proposed parking space is set at 10.6mAHD which is 0.2m above the 1% AEP flood level.
Control 3 Garages capable of accommodating more than 3 motor vehicles on land zones for urban purposes, or enclosed car parking, must be protected from inundation by floods equal to or greater than the 100 year ARI flood. Ramp levels to be no lower than 0.5m above the 100 year ARI flood level.	N/A – The development does not propose enclosed parking.
Control 5 The level of the driveway providing access between the road and parking spaces shall be no lower than 0.2m below the 100 year ARI flood level.	Complies - The proposed driveway is set at 10.26 m AHD which is 0.14m below the 1% AEP level
Control 6 Enclosed car parking and car parking areas accommodating more than 3 vehicles, with a floor below the 100 year ARI flood level, shall have adequate warning systems, signage, exits and evacuation routes.	N/A – The development does not propose any enclosed parking.
Control 7 Restraints or vehicle barriers to be provided to prevent floating vehicles leaving a site during a 100 year ARI flood.	N/A – the parking spaces are above the 100-year ARI flood level.
Evacuation	
Control 3 Reliable access for pedestrians and vehicles is required from the site to an area of refuge above the PMF level, either on site (eg. second storey) or off site.	Complies - Residents can shelter-in-place in the first and second floor levels of the development that are set at 13.30m AHD and 16.21m AHD which are both above the PMF level of 12m AHD.
Control 4 Applicant is to demonstrate the development is consistent with any relevant flood evacuation strategy or similar plan.	Complies - Shelter-in-place is an effective evacuation strategy for this development.

Control 6 Adequate flood warning is available to allow safe and orderly evacuation without increased reliance upon SES or other authorised emergency services personnel.	Complies- Floodsmart Parramatta will be a source of flood warning information. The availability of shelter-in-place on the site makes evacuation easier if required.
Management and Design	
Control 2 Site Emergency Response Flood plan required where the site is affected by the 100 year ARI flood level, (except for single dwelling-houses).	Complies – Refer section 5 of this report for the recommended emergency response plan.
Control 3 Applicant is to demonstrate that area is available to store goods above the 100 year flood level plus freeboard.	Complies – Storage space is available on the first and second floors which are above the 1% AEP level
Control 4 No storage of materials below the 100-year ARI flood level.	Complies – Storage space is available on the first and second floors which are above the 1% AEP level.

5.0 Emergency Response Plan

During the predicted critical storm events, the area surrounding the development will become inundated with floodwaters. The recommended Flood Emergency Response Plan during critical storm events is to shelter-in-place until floodwaters subside or emergency services advise otherwise. The space, water and food available is adequate for this.

In the event that floodwaters begin to overtop the kerb along any of the street frontage of the site, the recommended actions are:

- The occupants of the property shall be directed to remain within the building to level 1 (13.30m AHD) or above which is higher than the predicted PMF water level (12.0m AHD).
- The occupants must not exit until advised by emergency services or floodwaters subside.
- Emergency services shall be contacted stating the property's location; the situation faced, number of people on the property and any additional measures to be carried out.

Nevertheless, if someone does need to evacuate, the property is not isolated. It is on the edge of the predicted flow path. There is a route safe for pedestrians, even at the peak of the probable maximum flood, via the stairs, through low-risk flow down to Buller Street which has rising road access to the south. Compared to the existing situation there will be fewer people requiring evacuation.

6.0 Conclusions and Recommendations

This Flood Risk Assessment Report has been undertaken by Stellen Consulting based on information obtained from Council flood data and development in the site-specific flood model.

The design proposes suspended slab system, and the void below will allow floodwaters to pass during the major events thereby providing an overland flow path and maintaining existing flood storage on the land. This solution for developing flood prone land is widely accepted throughout New South Wales. The model predicts a reduction of flow depths upstream of the subject site during the post-development scenario (0% blockage). While the model also does predict an increase in flood depth for some areas within the immediate vicinity of the site, this level of increase is considered minimal and is within the accuracy of the hydraulic model itself. Therefore, it is concluded that these affluxes will not result in any adverse impacts to the surrounding properties.

Based on the evaluations of the proposed architectural drawings, flood information available from Council and the flood model, the following can be concluded:

- The proposed finished floor levels are set above the FPL.
- In the event of an emergency, safe refuge can be taken to the upper floor of the dwelling where the floor level is higher than the predicted Probable Maximum Flood (PMF) level.
- The proposed development is consistent with the flood hazard of the land and will not create any additional adverse impacts to upstream and downstream property owners.
- The proposed development can comply with the relevant flood related development controls outlined in the Parramatta DCP (2011).

To meet Parramatta Council's requirements, it is recommended that the following be implemented in the design:

- Open style fencing shall be adopted within areas subject to the 1% AEP flow to ensure no blockage or obstruction of flows.
- Adequate Warning Systems, Signage and Exits shall be installed to allow safe refuge within the site during emergency.
- Filling within any flood-affected areas must be accompanied with equivalent compensatory works (cut) elsewhere to ensure no loss of flood storage.

Provided that the recommendations within this report are followed, no signifcant adverse flooding impacts are expected to occur to the neighbouring upstream and downstream properties as a result of the proposed development.

Appendix A

Architectural Drawings by Huxley Architects

SHEET LIST				
NUMBER	NAME	REVISION	PURPOSE OF ISSUE	DATE
A_000	COVER SHEET	7	DA SUBMISSION	17/12/2021
A_000.1	BASIX REQUIREMENTS	1	DA SUBMISSION	10/01/2022
A_001	SITE ANALYSIS	3	DA SUBMISSION	05/11/2021
A_002	SITE PLAN - EXISTING	3	DA SUBMISSION	05/11/2021
A_003	AREA PLANS	5	DA SUBMISSION	30/11/2021
A_004	NOTIFICATION PLAN	3	DA SUBMISSION	30/11/2021
A_005	STREET CONTEXT	3	DA SUBMISSION	30/11/2021
A_006	SITE SURVEY	3	DA SUBMISSION	05/11/2021
A_007	SITE PLAN - PROPOSED	3	DA SUBMISSION	05/11/2021
A_050	DEMOLITION PLAN	3	DA SUBMISSION	05/11/2021
A_051	SEDIMENT AND EROSION CONTROL PLAN	3	DA SUBMISSION	30/11/2021
A_100	GA PLAN - GROUND & LVL 1	8	DA SUBMISSION	10/01/2022
A_101	GA PLAN - LVL 01 & ROOF	8	DA SUBMISSION	10/01/2022
A_152	DETAIL PLANS	2	DA SUBMISSION	17/12/2021
A_200	GA SECTIONS	6	DA SUBMISSION	17/12/2021
A_300	GA ELEVATIONS	5	DA SUBMISSION	10/01/2022
A_800	SHADOW STUDIES	3	DA SUBMISSION	17/12/2021
A_801	SHADOW STUDIES	2	DA SUBMISSION	05/11/2021
A_802	SHADOW STUDIES	2	DA SUBMISSION	05/11/2021
A_850	MATERIALS	2	DA SUBMISSION	05/11/2021
A_900	PERSPECTIVE	2	DA SUBMISSION	05/11/2021

Survey by Surveying Solutions Pty Ltd dated 01/06/2018 (REF: 1954 – 1)

Stellen
Civil Engineering

Appendix B

Council Supplied Flood Information

RE: Attn: Aziz Hoque | 5 Buller Street - request for flood information - flow rates

AH

Aziz Hoque <AHoque@cityofparramatta.nsw.gov.au>
To Mohamud Ibrahim

You replied to this message on 18/11/2021 11:37 PM.

Hi Ibrahim,

Sorry for delaying. The 100yr flow data is 12.8m³/sec

Regards

Aziz Hoque | **Catchment Management Engineer**
City of Parramatta
PO Box 32, Parramatta NSW 2124
☎ (02) 9806 8253 |Mobile: 0439373633 ✉ ahoque@cityofparramatta.nsw.gov.au
Links | **www.cityofparramatta.nsw.gov.au**

CITY OF PARRAMATTA

From: Mohamud Ibrahim <mohamud.ibrahim@stellenconsulting.com.au>
Sent: Monday, 15 November 2021 3:40 PM
To: Aziz Hoque <AHoque@cityofparramatta.nsw.gov.au>
Subject: RE: Attn: Aziz Hoque | 5 Buller Street - request for flood information - flow rates

Our Reference: FL/143/2020
Contact: Peter Sirianni
Telephone: 02 9806 8250
Fax: 02 9806 5906

Freedom Mawoyo
Unit 23, 2 Stuart Avenue
NORMANHURST NSW 2076

7 October 2020

FLOOD ENQUIRY APPLICATION

Property Details

Address	5 Buller Street, NORTH PARRAMATTA NSW 2151
	This form applies for up to three adjoining sites relating to the same development. A separate Flood Enquiry form and fee will be required for more than 3 or separate lots.

Delivery Preference

freedom.mawoyo@stelenconsulting.com.au

Reason for Enquiry

Flood drainage Investigation Emailed

Property Type

***** GST not applicable from 1 July 2013*****

Flooding Application - Development Duplex	$300.50

Disclaimer: Flood levels and flood extent lines are based on current information held by Council. Council does not accept responsibility for the accuracy of this information. Any pipe sizes and location of pits and pipe lines should be confirmed by site investigation.
The flood levels shown on the back of this form are only an approximate guide and have been derived using the current computer simulated model.
The information provided in this document is presented in good faith to assist the public in understanding Council's drainage requirements that apply within the Parramatta Local Government Area. It is the responsibility of each individual using this information to undertake their own checks and confirm this information prior to its use.
City of Parramatta Council, its agents and employees are not liable (whether by reason of negligence, lack of care or otherwise) to any person for any damage or loss whatsoever which has occurred or may occur in relation to that person taking or not taking (as the case may be) action in respect of any representation, statement, or advice referred to above.

Refer to back of this form for level information issued

Flood Enquiry Information Issued - 7 October 2020

Mainstream Flooding

Is this property affected by mainstream flooding? **5 Buller Street, NORTH PARRAMATTA**			☒ Yes ☐ No
Flood Levels	Closest Cross Sections: *(Please refer to Flood Study):* **Refer to Flood Map**		
5% AEP	RL 10.2	m AHD	**Comments**: **See Note on Flood/Hazard Map**
1% AEP	RL 10.4	m AHD	
PMF	RL 12	m AHD	
☒ Refer to flood maps provided for detailed flood levels.			
Flood information is obtained from the following flood study report: **Upper Parramatta River Flood Study – Draft 8 (UPRCT)**			

Note: Flood inundation can be verified by detail survey to AHD undertaken by a Registered Surveyor.

Local Flooding

Is the property located within a Hatched Grey Area? *Properties located within a **Hatched Grey Area** are subjected to flooding from the local catchment.*	☐ Yes ☒ No
Is the property located within a Grey Area? *Properties located within a **Grey Area** are subjected to additional site drainage controls to manage flooding in the local catchment.*	☐ Yes ☒ No
Is the property likely to be affected by overland stormwater run-off from the local catchment? ***Note:** No site inspection conducted for this assessment. Based solely on the information supplied for this flood enquiry application.*	☐ Yes ☒ Subject to Detailed Investigation
***Note:** You are required to contact Council's Development Service Engineer for any details and requirements relating to development that is affected by local flooding.*	

Additional Recommended Actions

☒	The Applicant needs to discuss the proposal to re-develop this site with Council's Town Planner and Development Services Engineer.
☒	The Applicant needs to contact Council's Town Planner and organise a pre-lodgement meeting to discuss any proposal to redevelop this property.
☒	The Applicant needs to refer to Council's Local Floodplain Risk Management policy for details relating to developing a land affected by flooding.

Definitions: (As per NSW Floodplain Development Manual dated April 2005)

1. **AHD** – a common national surface level datum approximately corresponding to mean sea level.
2. **ARI** – the long term average number of years between the occurrences of a flood as big as or larger than, the selected event.
3. **PMF** – is the largest flood that could conceivably occur at a particular location, usually estimated from probable maximum precipitation.
4. **AEP** – Annual Exceedance Probability is the chance of a flood of a given or larger size occurring in any one year, usually expressed as a percentage.

Chainage	Flood Level (metre AHD)		
	5% AEP	1% AEP	PMF
0 216.3	10.21	10.38	12.00
61	10.21	10.39	12.00
237.9	10.21	10.39	12.00
256	10.18	10.36	11.96
286.1	10.02	10.31	11.98
340.5	9.57	10.29	11.97

NOTE: The Upper Parramatta River Flood Study is currently being updated. Flood levels may change.

N

1:4,000

City of Parramatta Council Flood Map

Legend

- Ground Contours (metre AHD)
- Stormwater Pit
- Stormwater Pipe Network
- Upper Parramatta River Cross Section
- 5% AEP Flood
- 1% AEP Flood
- PMF
- Grey Area

Printed 7/10/2020

NOTE: The Upper Parramatta River Flood Study is currently being updated. Hazard extents may change.

City of Parramatta Council Flood Hazard Map

N

1:4,000

Legend

- Ground Contours (metre AHD)
- Stormwater Pit
- Stormwater Pipe Network
- Upper Parramatta River Cross Section
- High Hazard - 1% AEP (Upper Parramatta River)
- Low Hazard (Upper Parramatta River)
- Grey Area

Printed 7/10/2020

Appendix C

Modelling Results

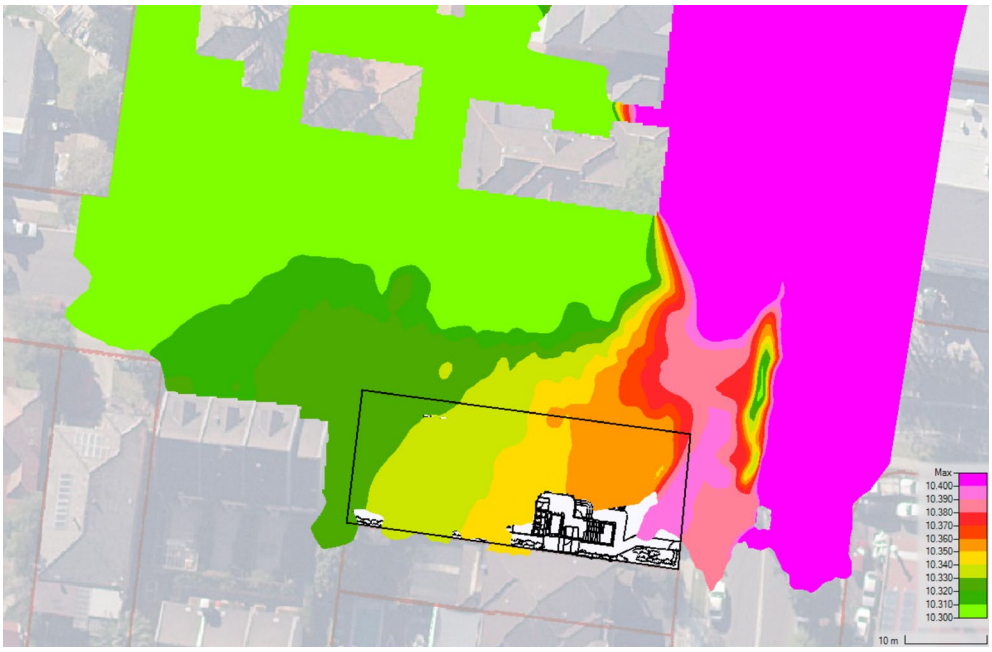

Figure 13: 1% AEP flood, Water Surface Elevation (WSE), post-development scenario 1 (0% blockage) (m AHD)

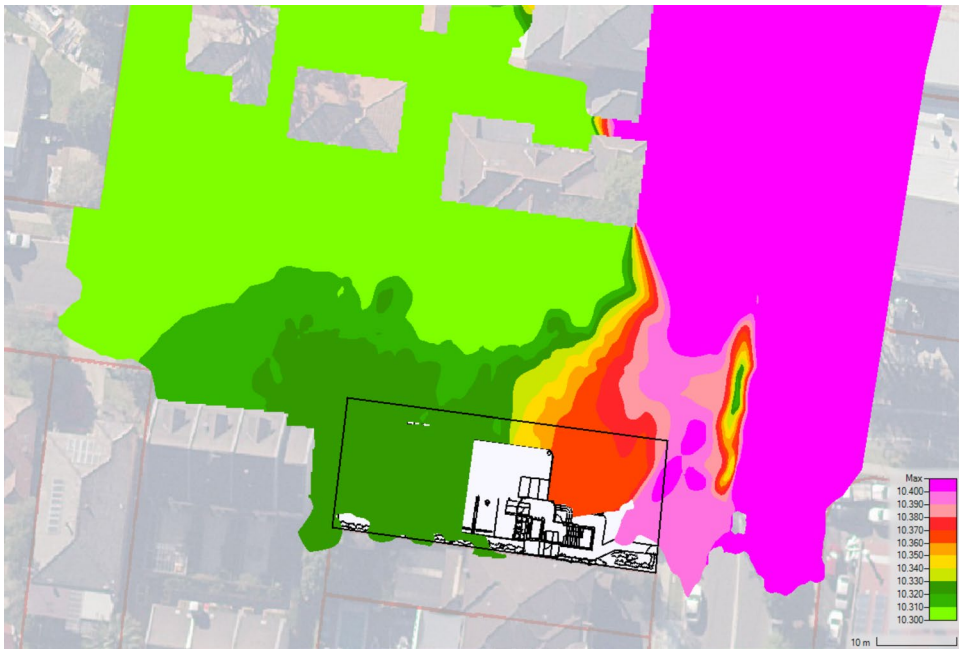

Figure 14: 1% AEP flood, Water Surface Elevation (WSE), post-development scenario 2 (50% blockage) (m AHD)

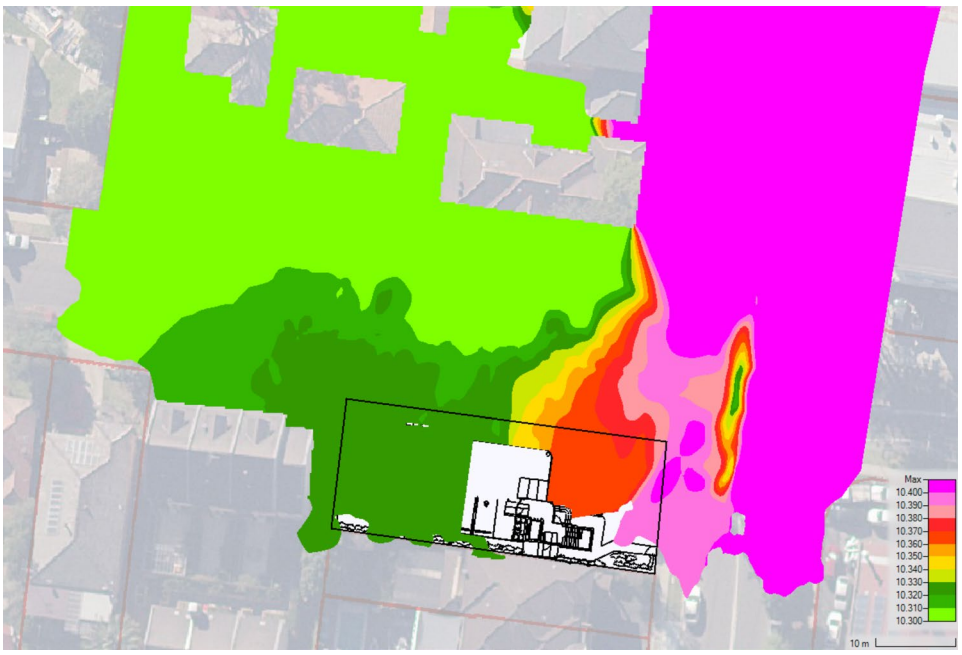

Figure 15: 1% AEP flood, Water Surface Elevation (WSE), post-development scenario 3 (100% blockage) (m AHD)