Attachment A7

Flood Advice Report



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232 – 240 Elizabeth Street, Surry Hills

Flood Advice Report

18 January 2024

Project No. 22_261



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Document Control

Version	Date	Issue	Author		Reviewer	
01	25 October 2022	Preliminary	Prabeg Sharma	PS	Bill Masri	BM
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Revision 03:

Flood Impact and Risk Management Report updated to reflect revised Architectural Plans by Candalepas Associates, Job No. 5968, Issue P10.



232 – 240 Elizabeth Street, Surry Hills FLOOD LEVEL ADVICE.

IGS has been engaged to provide flood advice for the proposed development at 232 – 240 Elizabeth Street, Surry Hills. The purpose of this assessment is to identify the predicted flood levels around the study site and provide advice on Flood Planning Levels (FPL) based on the requirements of the City of Sydney. The report also assesses the compliance or otherwise of the proposed finish floor levels for future development at the study site.

Design flood information has been taken from the TUFLOW model established in the Darling Harbour Catchment FRMP report.



1 Development Site

The proposed development at 232 – 240 Elizabeth Street, Surry Hills, is a mixed-use commercial development. This site has access from Elizabeth Street along the western wall, Reservoir Street along the southern side, and Foster Lane along the eastern side (Refer to the locality map below).

The development consists of commercial and retail spaces with three below-ground levels. **Figure 1-1** shows the location of the study site.

The assessment is based on the following drawings and flood models:

- Ground Floor Architectural plans by Candalepas Associates, Job no. 5968, Issue P10 Attached.
- Survey Plan by ERIC SCERRI & ASSOCIATES PTY LTD, reference no. 2332/14 Rev A dated 13 January 2014.
- Flood Map During 1% AEP and PMF by IGS.
- City of Sydney Interim Floodplain Management Policy, May 2014.

(Refer to the Attachment for more details)

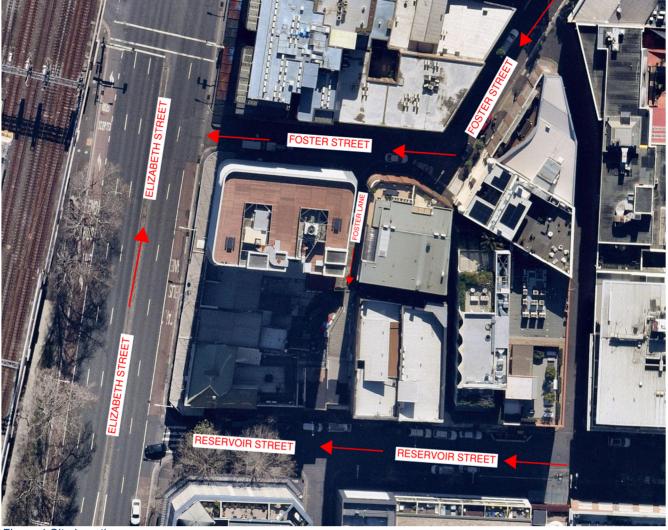


Figure 1 Site Location.



2 Existing Flood Behaviour

This site is bounded by Elizabeth Street on the West, Reservoir Street on the South, and Foster Lane on the Eastern side. The existing flood levels during 1% Annual Exceedance Probability (AEP) and Probable Maximum Flood (PMF) around the study site are adopted from the Darling Harbour Catchment TUFLOW model results from the City of Sydney Council.

As per the council's flood model, this site is affected by overland flows flowing from the eastern side along Foster Lane and Reservoir Street and towards Elizabeth Street before leaving through the railway corridor along the western side of Elizabeth Street. Elizabeth Street along the west side of the site is very flat, and an approximate flood depth of approximately 350mm can be seen along Elizabeth Street during 1% AEP storm events. (Refer to Attachments for more details).

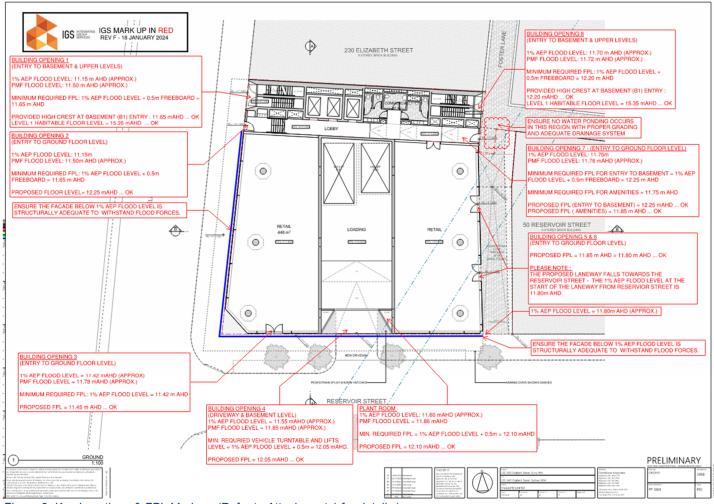


Figure 2. Key Locations & FPL Markup. (Refer to Attachment 1 for details.)



The 1% AEP and PMF flood levels at these locations are presented in **Table 1**. Flood levels have been rounded up to the nearest 0.01m.

Description	1% AEP Flood Level (m AHD)	PMF Flood Level (m AHD)
Building Opening 1	11.15	11.50
(Entry to Basement & Upper Levels)		
Building Opening 2	11.15	11.50
(Entry to Ground Floor Level)		
Building Opening 3	11.42	11.78
(Entry to Ground Floor Level)		
Building Opening 4	11.55	11.85
(Driveway & Basement Level)		
Building Opening to Plant Room	11.60	11.86
Building Opening 5 & 6	11.80	N/A
(Entry to Ground Floor Level)		
Building Opening 7	11.75	11.76
(Entry to Ground Floor Level)		
Building Opening 8	11.70	11.70
(Entry to Basement and Upper Levels)		

Table 1: 1% AEP and PMF Water Levels at Key Locations



3 Flooding and the Proposed Development

In accordance with the Sydney Development Control Plan 2012 (City of Sydney, 2012) and the Interim Floodplain Management Policy (City of Sydney, 2014), the development will need to comply with a series of controls as outlined in the following sections.

3.1 Flood Planning Requirements

The requirements for Flood Planning Levels are given in **Table 2**, as per the City of Sydney's Interim Floodplain Management Policy (2014).

Development	Flood Planning Level (FPL)	
Residential – Habitable Rooms	Local drainage flooding: 1% AEP flood level + 0.5 m or Two times the depth of flow with a minimum of 0.3 m above the surrounding surface if the depth of flow in the 1% AEP flood is less than 0.25 m.	
Industrial or Commercial - Business	Merits approach with a minimum of 1% AEP flood level	
Industrial or Commercial – Retail Floor Levels	Merits approach with a minimum of 1% AEP flood level. Must demonstrate a reasonable balance between flood protection and urban design outcomes for street-level activation.	
Below-ground car park / Basement	1% AEP flood level + 0.5m or the PMF (Whichever is higher)	

Table 2, Flood Planning Level Requirements per the Interim Floodplain Management Policy

Notes (as per City of Sydney Interim Floodplain Management Policy):

- 1. Local drainage flooding occurs where:
 - a. The maximum cross-sectional depth of flooding in the local overland flow path through and upstream of the site is less than 0.25m for the 1% AEP flood; and
 - b. The development is at least 0.5m above the 1% AEP flood level at the nearest downstream trapped low point; and
 - c. The development does not adjoin the nearest upstream trapped low point; and
 - d. Blockage of an upstream trapped low point is unlikely to increase the depth of flow past the property to greater than 0.25m in the 1% AEP flood.
- 2. Mainstream flooding occurs where the local drainage flooding criteria cannot be satisfied.
- 3. A property is considered to be outside the floodplain where it is above the mainstream and local drainage flood planning levels including freeboard.

The predicted flooding depths around the site vary from 50 – 20mm during 1% AEP storm events, and there is no downstream trapped low point. As flood depths are low, even during PMF events, expecting the finished floor levels to be set 500 mm above the 1% AEP level is unreasonable. Adopting the FPL standard for commercial premises outside the floodplain, a flood planning level at or above the 1% AEP would protect the ground floor ingress points and allows more reasonable finished floor levels to be adopted.



3.2 Flood Planning Levels

A comparison of floor levels at key entrances and required FPLs is provided below in **Table 3**.

Description	1% AEP Flood Level (m AHD)	Proposed Finished Floor Level (m AHD)	Freeboard Provided (mm)	Compliance with Council Requirements?
Building Opening 1 (Entry to Basement &	11.15	To Basement = 11.65	500	YES
Upper Levels)	11.15	Level 1 = 15.35	4200	
Building Opening 2 (Entry to Ground Floor Level)	11.15	12.25	1100	YES
Building Opening 3 (Entry to Ground Floor Level)	11.42	11.45	N/A	YES
Building Opening 4 (Driveway & Basement Level)	11.55	12.05	500	YES
Building Opening to Plant Room	11.60	12.10	500	YES
Building Opening 5 & 6 (Entry to Ground Floor Level)	11.80	11.85	50	YES
Building Opening 7 (Entry to Amenities) (Entry to Basement)	11.75 171.75	11.85 12.25	100 500	YES YES
Building Opening 8 (Entry to Basement and Upper Levels)	11.70	12.20	500	YES

 Table 3, Proposed Finished Floor Levels and Minimum FPLs

The proposed finished floor level (m AHD) was taken from the Architectural plans by Candalepas Associates, Job no. 5968, Issue P10. The minimum FPL required was based on the Darling Harbour Catchment Model obtained from the City of Sydney Council.

3.3 **Proposed Flood Mitigation Measures**

The following flood mitigation is recommended to ensure the proposed development is well protected from overland flows:

- No water pondage should occur along the site's northeast corner ensure that the section falls towards Foster Lane with proper grading and an adequate drainage system.
- Ensure the proposed laneway falls towards Reservoir Street per the proposed architectural plans.
- Ensure the façade below 1% AEP Flood Level is structurally adequate to withstand flood forces. Refer to the flood-compatible materials table from the City of Sydney attached Materials not listed may be accepted by the council subject to certification- of the suitability of the material of the manufacturer.
- All flood levels proposed on the architectural plans must be maintained to protect from the overland flows.

We believe the revised architectural plans, Job No. 5968, Issue P10, have incorporated all recommended flood mitigation measures and flood planning requirements per the City of Sydney Council's requirements. For more details, refer to the attached architectural plans (Attachment 5) and Flood Planning level Markups (Attachment 1).

3.4 **Possible Changes in Flood Extent**

The overland flows flowing towards the site have a shallow depth varying from 20 – 50mm during 1% AEP storm events. The Council's Drainage system will cater to the shallow sheet flows within the vicinity. However, flood mitigation measures are recommended to protect the proposed development from overland flows. There is no significant change in the building footprint; hence, the flood extent will not change.

4 Summary



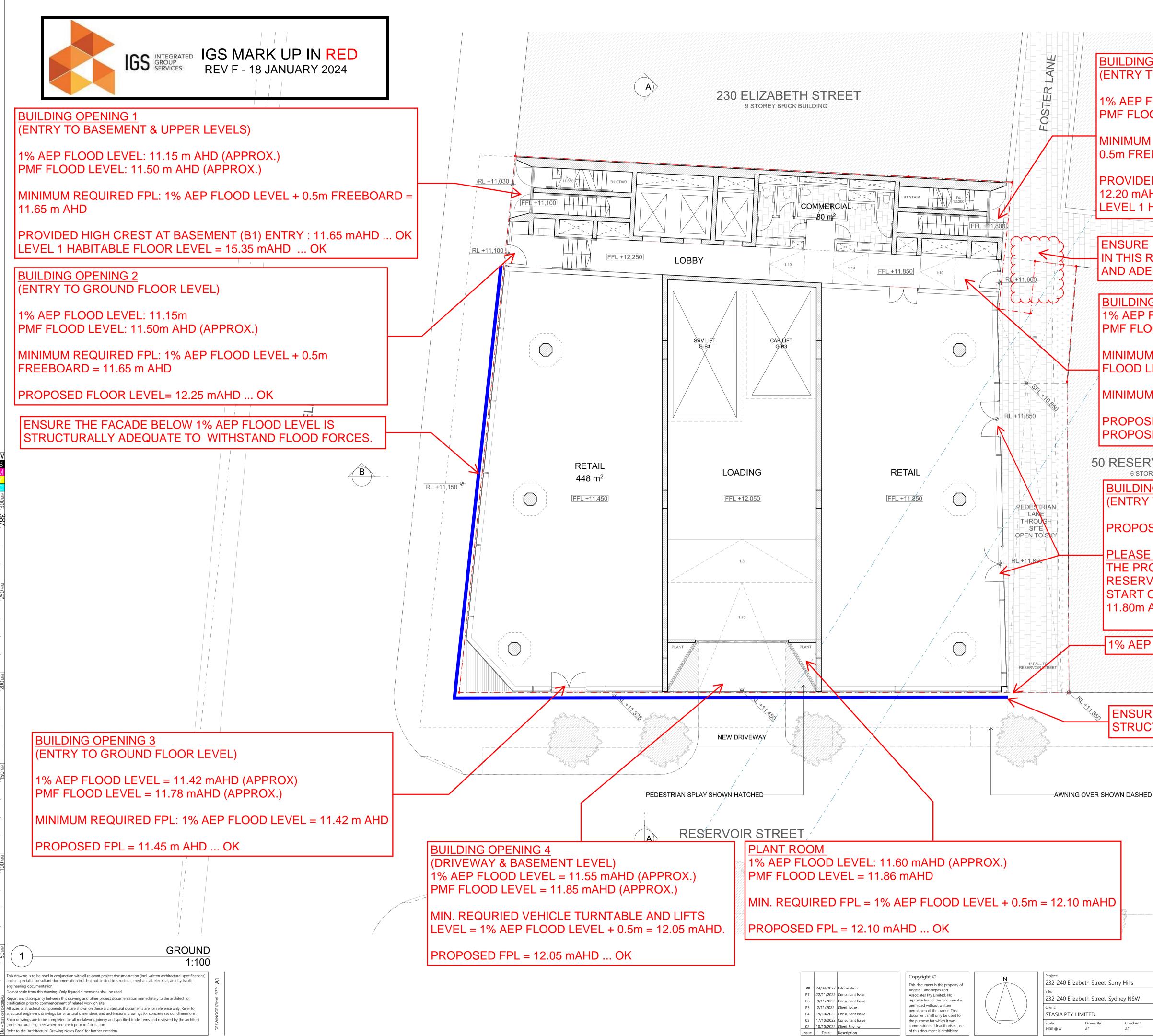
IGS has completed a Site-Specific Flood Assessment for the proposed development of 232 – 240 Elizabeth Street, Surry Hills.

Predicted flood levels were extracted from the Darling Harbour Catchment Flood Model obtained from the City of Sydney Council and used to determine Flood Planning Levels for the proposed development as per the City of Sydney Interim Floodplain Management Policy. The finished ground floor of the proposed development was compared to the Flood Planning Levels to determine compliance with the policy.

The review demonstrates that the proposed development floor levels meet the minimum required Flood planning levels per the City of Sydney's Interim Flood plain management policy.

5 Attachments:

- Attachment 1 Flood Markups with proposed Flood Planning Levels.
- Attachment 2 Water surface elevation map during 1% AEP storm events.
- Attachment 3 Water Surface elevation map during PMF Storm events.
- Attachment 4 List of Flood-Compatible Materials from the City of Sydney Interim Floodplain Management Policy.
- Attachment 5 Ground Floor Architectural plans by Candalepas Associates, Job no. 5968, Issue P10.
- Attachment 6 Survey Plan by ERIC SCERRI & ASSOCIATES PTY LTD, reference no. 2332/14 Rev A dated 13 January 2014.



BUILDING OPENING 8 (ENTRY TO BASEMENT & UPPER LEVELS)

1% AEP FLOOD LEVEL: 11.70 m AHD (APPROX.) PMF FLOOD LEVEL: 11.72 m AHD (APPROX.)

MINIMUM REQUIRED FPL: 1% AEP FLOOD LEVEL + 0.5m FREEBOARD = 12.20 m AHD

PROVIDED HIGH CREST AT BASEMENT (B1) ENTRY : 12.20 mAHD ... OK LEVEL 1 HABITABLE FLOOR LEVEL = 15.35 mAHD ... OK

ENSURE NO WATER PONDING OCCURS IN THIS REGION WITH PROPER GRADING AND ADEQUATE DRAINAGE SYSTEM

BUILDING OPENING 7 - (ENTRY TO GROUND FLOOR LEVEL) 1% AEP FLOOD LEVEL: 11.75m PMF FLOOD LEVEL: 11.76 mAHD (APPROX.)

MINIMUM REQUIRED FPL FOR ENTRY TO BASEMENT = 1% AEP FLOOD LEVEL + 0.5m FREEBOARD = 12.25 m AHD

MINIMUM REQUIRED FPL FOR AMENITIES = 11.75 m AHD

PROPOSED FPL (ENTRY TO BASEMENT) = 12.25 mAHD ... OK PROPOSED FPL (AMENITIES) = 11.85 m AHD ... OK

50 RESERVOIR STREET B 6 STOREY BRICK BUILDING

BUILDING OPENING 5 & 6 (ENTRY TO GROUND FLOOR LEVEL)

PROPOSED FPL = 11.85 m AHD > 11.80 m AHD ... OK

PLEASE NOTE : THE PROPOSED LANEWAY FALLS TOWARDS THE RESERVOIR STREET - THE 1% AEP FLOOD LEVEL AT THE START OF THE LANEWAY FROM RESERVIOR STREET IS 11.80m AHD.

1% AEP FLOOD LEVEL = 11.80m AHD (APPROX.)

ENSURE THE FACADE BELOW 1% AEP FLOOD LEVEL IS STRUCTURALLY ADEQUATE TO WITHSTAND FLOOD FORCES.

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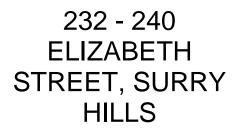
Candalepas Associates Registration No. NSW 5773 Registration No. VIC 17978 Registration No. WA 2405 Registration No. ACT 2603 Registration No. QLD 5463 309 Sussex Street, Sydney NSW 2000 info@candalepas.com.au T: 02 9283 7755 F: 02 9283 7477

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NOT FOR CONSTRUCTION - DESIGN INTENT	ONLY
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GROUND	5968

Drawing Numbe PP 1004 Issue:

P10





FLOOD MAP DURING 1% AEP STORM EVENTS

DATE: 18 JANUARY 2024

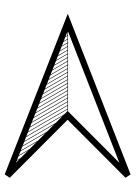
LEGEND

20mm INTERVAL CONTOUR DURING 1% AEP STORM EVENT

11.00

WATER SURFACE LEVEL DURING 1% AEP STORM EVENTS

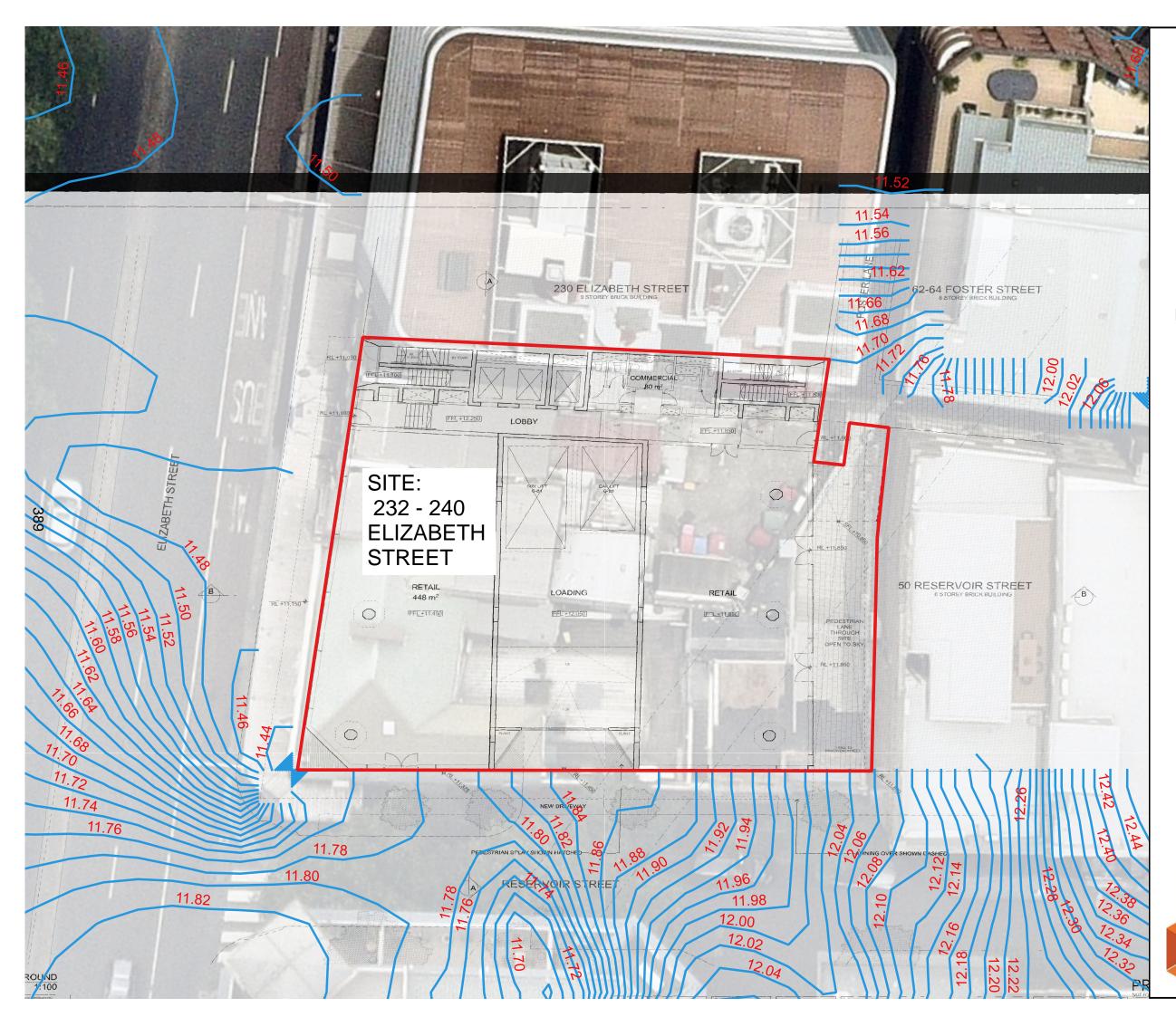
PROPERTY BOUNDARY

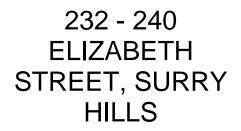


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FLOOD MAP DURING PMF STORM EVENTS

DATE: 18 JANUARY 2024

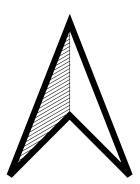
LEGEND

20mm INTERVAL CONTOUR DURING 1% AEP STORM EVENT

11.00

WATER SURFACE LEVEL DURING 1% AEP STORM EVENTS

PROPERTY BOUNDARY



SCALE: 1:200 @ A3



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6 Flood Compatible Materials

Where required for development, the following materials are to be applied. Materials not listed may be accepted by Council subject to certification of the suitability of the material of the manufacturer.

Component	Flood Compatible Material
Flooring and	 Concrete slab-on-ground monolith construction
Sub-floor	 Suspended reinforced concrete slab
Wall Structure	 Solid brickwork, blockwork, reinforced concrete or mass concrete
Wall and	Fibro-cement board
Ceiling Linings	 Brick, face or glazed
	 Clay tile glazed in waterproof mortar
	Concrete
	 Concrete block
	 Steel with waterproof applications
	 Stone, natural solid or veneer, waterproof grout
	 Glass blocks
	 Glass
	 Plastic sheeting or wall with waterproof adhesive
Roof Structure	 Reinforced concrete construction
	 Galvanised metal construction
Doors	 Solid panel with water proof adhesives
	 Flush door with marine ply filled with closed cell foam
	 Painted metal construction
	 Aluminium or galvanised steel frame
Insulation	Closed cell solid insulation
	 Plastic/polystyrene boards
Windows	• Aluminium frame with stainless steel rollers or similar corrosion and water
	resistant material.
Nails, Bolts,	 Brass, nylon or stainless steel
Hinges and	 Removable pin hinges
Fittings	 Hot dipped galvanised steel wire nails or similar
Main Power	 Subject to the approval of the relevant authority the incoming main
Supply	commercial power service equipment, including all metering equipment,
	shall be located above the designated flood planning level. Means shall be
	available to easily disconnect the dwelling from the main power supply.
Wiring	 All wiring, power outlets, switches, etc., should be located above the
	designated flood planning level. All electrical wiring installed below this level
	should be suitable for continuous underwater immersion and should contain
	no fibrous components. This will not be applicable for below-ground car
	parks where the car park complies with flood planning level requirements.
	 Earth leakage circuit-breakers (core balance relays) or Residual Current
	Devices (RCD) must be installed.
	 Only submersible type splices should be used below maximum flood level.
	 All conduits located below the relevant designated flood level should be so
	installed that they will be self-draining if subjected to flooding.
Electrical	 All equipment installed below or partially below the designated flood
Equipment	planning level should be capable of disconnection by a single plug and socke
	assembly.

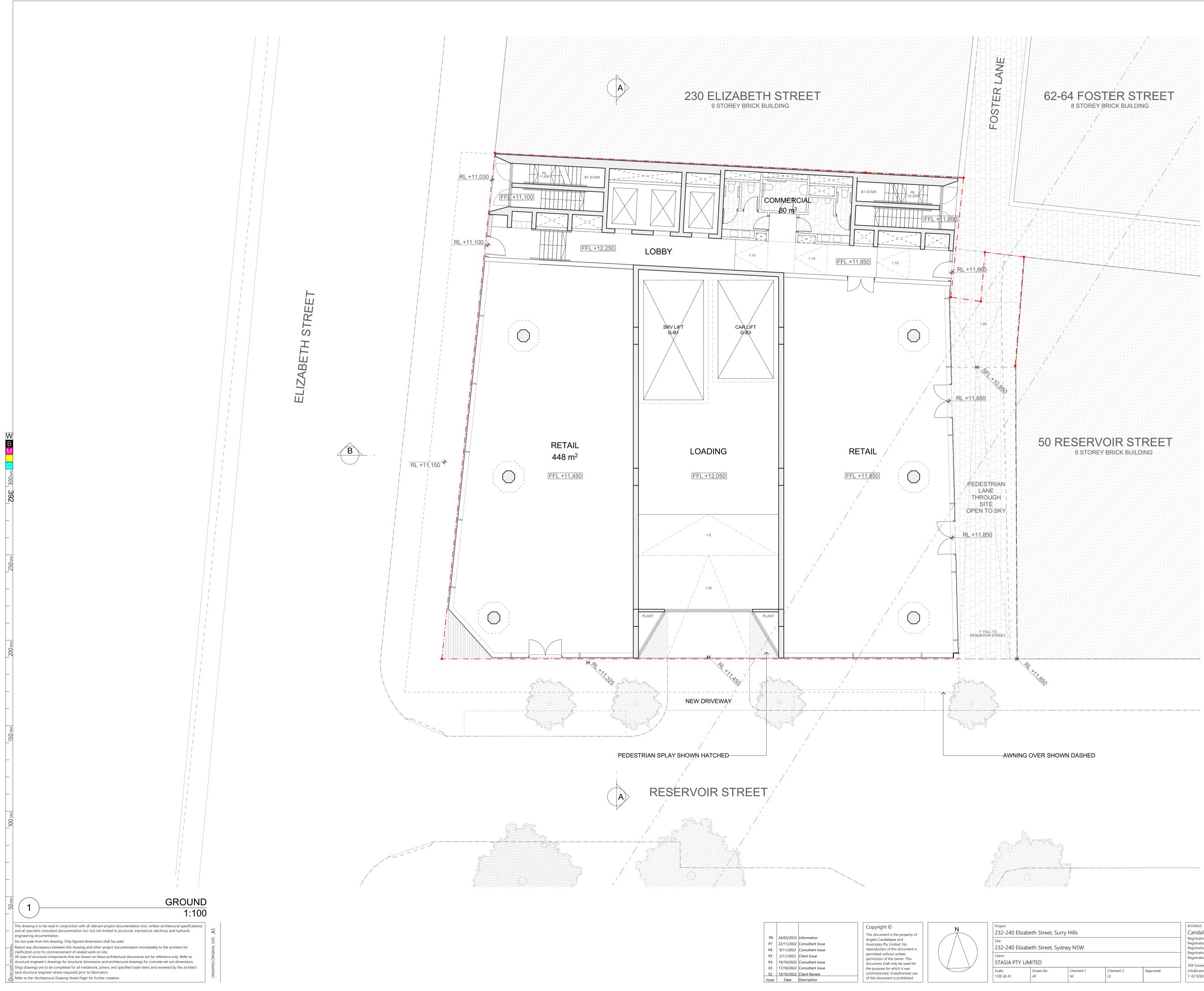


Component	Flood Compatible Material
Heating and Air Conditioning Systems	 Heating and air conditioning systems should be installed in areas and spaces of the house above the designated flood planning level.
Fuel storage for heating purposes	 Heating systems using gas or oil as a fuel should have a manually operated valve located in the fuel supply line to enable fuel cut-off. The heating equipment and related fuel storage tanks should be mounted on and securely anchored to a foundation pad of sufficient mass to overcome buoyancy and prevent movement that could damage the fuel supply line. The tanks should be vented above the flood planning level.
Ducting for heating/cooling purposes	 All ductwork located below the relevant flood level should be provided with openings for drainage and cleaning. Self-draining may be achieved by constructing the ductwork on a suitable grade. Where ductwork must pass through a water-tight wall or floor below the relevant flood level, a closure assembly operated from above relevant flood level should protect the ductwork.



Interim Floodplain Management Policy Approved: May 2014

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NSW		
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