Flood Risk Management Plan

17-19 Sydney Road, Manly

Issue A

Prepared For Hampic Management P/L and Cinemeccanica Australia P/L

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REVISION TABLE

Revision	Date	Issue Description	Issued by	Approved by	Signed
P1	02.11.2021	Preliminary Issue – For Information Only	SELH	SELH	
P2	09.11.2022	Amended to include Architecturals	SELH	SELH	
A	10.11.2022	Final Issue	SELH	SELH	

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1 Introduction

1.1 Brief

S&G Consultants Pty Ltd (SGC) have been engaged by Hampic Management P/L and Cinemeccanica Australia P/L to prepare a flood risk management plan for the proposed mixed-use development at 17-19 Sydney Road in the suburb of Manly as required in the Pre-Lodgement Notes.

The following tasks were carried out:-

- Supplied documents and previous studies were reviewed;
- A review of the site flooding information is undertaken;
- A review of the proposed development is undertaken; and
- This report has been compiled.

1.2 Limitations

This report is intended solely for Hampic Management P/L and Cinemeccanica Australia P/L as the sole client of S&G Consultants Pty Ltd and no liability will be accepted for use of the information contained in this report by other parties than this client.

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

This report does not imply that the site is not subject to flooding. The stakeholders should be aware that there are current and continuing risks of flooding. This report is proposing measures to manage these flooding incidences.

1.3 Reference Documents

The following documents have been referenced in this report:-

- Architectural drawings prepared by MHN Design Union Pty Ltd;
- Survey plan prepared by Bee & Lethbridge reference 13906 dated March, 03;
- Manly to Seaforth Flood Study prepared by Cardno dated 22/02/2019;
- Northern Beaches Council – Manly DCP;
- Engineers Australia publication ‘Australian Rainfall and Runoff’ 2019; and
- The Floodplain Development Manual April 2005.

2 Natural & Built Environment

2.1 Local and Regional Context

The site is located in the commercial zone of Manly, on the northern Beaches of Sydney in NSW. The site is identified as Lot 20 of DP 235980, which falls within the Local Government Authority (LGA) of Northern Beaches Council (NBC). The site is located along Sydney Road, facing Central Avenue.

The survey plan of the site indicates that the site's topography is quite flat. Refer to Appendix 2 for a copy of the survey plan.

The site is bounded by adjoining properties to the East and the West, Market Place to the South and Central Avenue to the North. Site locality plan shown in Figure 2.1 below.

Figure 2.1 Locality Plan

The site is located in a flood prone land as identified by NBC and falls in the catchment of Manly to Seaforth.

Council has carried out a flood study for the catchment area and identified the following flood levels for the site:

- The 1% AEP flood level for the site is RL5.43m AHD;
- The 1% AEP flood level for the site with climate change is RL5.49m AHD;
- The PMF flood level is RL5.73m AHD;
- The Flood Planning Level is RL5.73m AHD;
- The Flood Risk Precinct is: Medium/Low; and
- The Flood Life Hazard Category is: H2.

A flood study of Manly to Seaforth has been undertaken by Cardno in 2019, which identified flood levels across the catchment and in the vicinity of the site.

2.2 Proposed Development

The proposed development consists of a mixed use development which includes:

- Commercial spaces in the basement and on ground floor; and
- Residential apartments on levels 1 & 2 above.

Reference is made to the architectural plans by MHNDUnion. A copy is included in Appendix 3.

2.3 Objectives

The main objectives of this report are:

1. Address the requirements of Council's Manly DCP;
2. Increase awareness of stakeholders to the flooding issue; and
3. Outline the measures to be undertaken to ensure that damage caused by property inundation during storms in excess of 1% AEP event is minimised as much as possible.

2.4 Council Requirements

The site is classified as "Residential" in Table 1 of council's DCP. The flood precinct is Medium/Low so the requirements under Medium Flood Risk Precinct table is adopted for the assessment of flooding on this site.

Due to the low/medium flood precinct, the Flood Planning Level (FPL) considered acceptable is 300mm above the 1% AEP storm event. This level is identified by Council as FPL 5.73m AHD.

In the pre-DA minutes, council required that the development produces no net loss of flood storage in the 1% AEP event. Extracts of Council's requirements and Pre-DA minutes are included in Appendix 1.

3 Glossary

Annual Exceedance Probability (AEP)

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

Australian Height Datum (AHD)

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

Average Recurrence Interval (ARI)

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

Catchment

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

Flood

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

Flood Liable Land or Flood Prone Land

Land susceptible to flooding by the PMF.

Flood Planning Levels (FPLs)

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

Freeboard

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

Habitable Room

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

Peak Discharge

The maximum discharge occurring during a flood event.

Probable Maximum Flood

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

Probable Maximum Precipitation

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

Runoff

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

4 Flood Management Plan

This section of the report outlines and discusses how the proposed development addresses the requirements of council's Manly DCP Section 5.4.3.

4.1 Flood Effects

4.1.1 A1

Development shall not be approved unless it can be demonstrated in a Flood Management Report that it has been designed and can be constructed so that in all events up to the 1% AEP event:

(a) There are no adverse impacts on flood levels or velocities caused by alterations to the flood conveyance; and

(b) There are no adverse impacts on surrounding properties; and

(c) It is sited to minimise exposure to flood hazard.

Major developments and developments likely to have a significant impact on the PMF flood regime will need to demonstrate that there are no adverse impacts in the Probable Maximum Flood.

The site is currently fully development from boundary to boundary and the existing structure obstructs the overland flows in a similar manner to the proposed building structure. As such, it is anticipated that the development proposed at 17-19 Sydney Rd Manly will not have any adverse impacts on flooding within the site and the immediate surrounding. The flood characteristics including levels, velocities and hazard will remain the same in the pre and the post-development stages.

The flood hazard is Low to Medium and the flood life hazard category is H2 which is considered in the low spectrum of the hazard categories. The site's exposure to flood hazard is low.

This requirement is complied with.

4.1.2 A2

Development shall not be approved unless it can be demonstrated in a Flood Management Report that in all events up to the 1% AEP event there is no net loss of flood storage.

Consideration may be given for exempting the volume of standard piers from flood storage calculations.

If Compensatory Works are proposed to balance the loss of flood storage from the development, the Flood Management Report shall include detailed calculations to demonstrate how this is achieved.

The proposed development is located within a flood fringe area in 1% AEP event as reported by Cardno in Manly to Seaforth flood study (2019). The area is marked in light blue as can be seen in the map below extracted from the flood study. Based on this, the proposed

development would not have any impact on loss of flood storage and there will be no net loss of flood storage. This requirement is complied with.

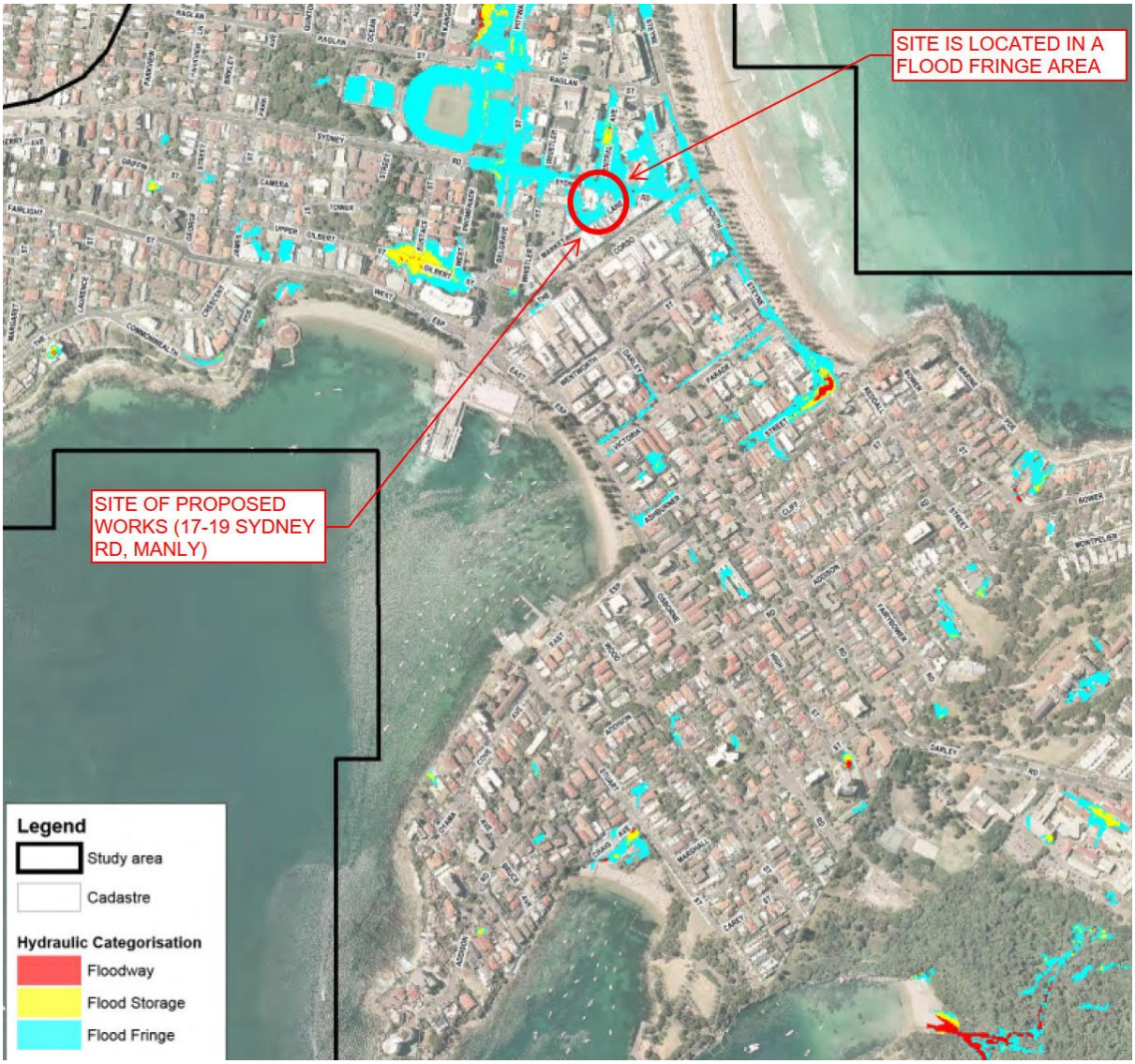

Figure 4.1 Flood

4.2 Building Components & Structural Soundness

4.2.1 B1

All buildings shall be designed and constructed with flood compatible materials in accordance with "Reducing Vulnerability of Buildings to Flood Damage: Guidance on Building in Flood Prone Areas", Hawkesbury-Nepean Floodplain Management Steering Committee (2006).

The proposed ground floor level is made of access link which would be tiled. Other areas such as bin room is concrete. The commercial tenancies will have floor materials compatible with flooding such as concrete or tiling subject to architect's requirements. In any case, it will be a flood compatible material and will be reflected on the architectural plans. This requirement is complied with.

4.2.2 B2

All new development must be designed and constructed to ensure structural integrity up to the Flood Planning Level, taking into account the forces of floodwater, wave action, flowing water with debris, buoyancy and immersion. Where shelter-in-place refuge is required, the structural integrity for the refuge is to be up to the Probable Maximum Flood level. Structural certification shall be provided confirming the above.

Because the proposed development is raised to the Flood Planning Level of RL5.73m AHD, which is the same level of the PMF flood event, the building structure will not be subject to high forces from floodwaters. At detailed design stage, the structural engineer will assess the forces of floodwaters and will design the building structure accordingly. This requirement is complied with.

4.2.3 B3

All new electrical equipment, power points, wiring, fuel lines, sewerage systems or any other service pipes and connections must be waterproofed and/or located above the Flood Planning Level. All existing electrical equipment and power points located below the Flood Planning Level within the subject structure must have residual current devices installed that turn off all electricity supply to the property when flood waters are detected.

With the ground floor level of the building raised to the Flood Planning Level, all electrical equipment, power points and service pipes will be automatically above the FPL. This requirement is complied with.

4.3 Floor Levels

4.3.1 C1

New floor levels within the development shall be at or above the Flood Planning Level.

The proposed floor level of the development is set at RL5.73m AHD which is 300mm above the 1% AEP flood level for the site. A 300mm freeboard is acceptable because the flood precinct for the site is H2. This requirement is complied with.

4.3.2 C3

All new development must be designed and constructed so as not to impede the floodway or flood conveyance on the site, as well as ensuring no net loss of flood storage in all events up to the 1% AEP event.

For suspended pier/pile footings:

(a) The underfloor area of the dwelling below the 1% AEP flood level is to be designed and constructed to allow clear passage of floodwaters, taking into account the potential for small openings to block; and

(b) At least 50% of the perimeter of the underfloor area is of an open design from the natural ground level up to the 1% AEP flood level; and

(c) No solid areas of the perimeter of the underfloor area would be permitted in a floodway

This requirement is not applicable for the proposed development.

4.3.3 C4

A one-off addition or alteration below the Flood Planning Level of less than 30 square metres (in total, including walls) may be considered only where:

(a) it is an extension to an existing room; and

(b) the Flood Planning Level is incompatible with the floor levels of the existing room; and

(c) out of the 30 square metres, not more than 10 square metres is below the 1% AEP flood level.

This control will not be permitted if this provision has previously been utilised since the making of this Plan.

The structure must be floodproofed to the Flood Planning Level, and the Flood Management Report must demonstrate that there is no net loss of flood storage in all events up to the 1% AEP event.

This requirement is not applicable for the proposed development.

4.3.4 C6

Consideration may be given to the retention of an existing floor level below the Flood

Planning Level when undertaking a first floor addition provided that:

(a) it is not located within a floodway; and

(b) the original foundations are sufficient to support the proposed final structure above them. The Flood Management Report must include photos and the structural certification required as per Control B2 must consider whether the existing foundations are adequate or should be replaced; and

(c) none of the structural supports/framing of existing external walls of are to be removed unless the building is to be extended in that location; and

(d) the ground floor is floodproofed.

This requirement is not applicable for the proposed development.

4.4 Car Parking

The requirements of this clause are not applicable because the proposed development does not have any car parking proposed on site.

4.5 Emergency Response

As per the advice received from council in the pre-DA minutes, an emergency response is not needed because the flood life hazard is H2. This requirement is complied with.

4.6 Fencing

4.6.1 F1

Fencing, (including pool fencing, boundary fencing, balcony balustrades and accessway balustrades) shall be designed so as not to impede the flow of flood waters and not to increase flood affectation on surrounding land. At least 50% of the fence must be of an open design from the natural ground level up to the 1% AEP flood level.

Less than 50% of the perimeter fence would be permitted to be solid. Openings should be a minimum of 75 mm x 75mm.

The requirements of fencing are not applicable to this development because the proposed structure is from boundary to boundary with no provision for fencing.

4.7 Storage of Goods

4.7.1 G1

Hazardous or potentially polluting materials shall not be stored below the Flood Planning Level unless adequately protected from floodwaters in accordance with industry standards.

The proposed ground floor level consists of commercial spaces which will more likely be retail shops and will not involve the storage of hazardous material that could impact the environment in a flood. As such, this requirement is not applicable.

4.8 Pools

This requirement is not applicable. No pools are proposed.

A1 Appendix 1

Extract from pre-DA minutes and from Council's Manly DCP – Section 5.4.3

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Flood Plain Management

Council's Flood Plain Management Officer has provided the following comments:

"The subject site at 19 Sydney Rd, Manly is flood affected, and is covered by the Manly to Seaforth Flood Study, 2019. It has the following flood data:

- *1% AEP flood level: 5.43m AHD*
- *1% AEP flood level with climate change: 5.49m AHD*
- *Probable Maximum Flood Level: 5.73m AHD*
- *Flood Planning Level: 5.73m AHD*
- *Flood Risk Precinct: Medium / Low*
- *Flood Life Hazard Category: H2*

Comments on flooding include:

- *A flood management report must be submitted with the Development Application. Guidelines to undertake this as well as further information on flooding are available on Council's webpage at: https://www.northernbeaches.nsw.gov.au/planning-and-development/building-and-renovations/development-applications/guidelines-development-flood-prone-land*
- *Flood controls are found in Section 5.4.3 of the Manly DCP, which was updated in January 2021, at: https://eservices.northernbeaches.nsw.gov.au/ePlanning/live/pages/plan/book.aspx?exhibit=MDCP*
- *The flood planning requirements in the Manly LEP, Section 5.21, were updated on 14 July, 2021.*
- *With a Flood Life Hazard Category of H2, a flood emergency assessment is not required.*
- *The maximum depth in the 1% AEP event is <0.3m, and the Velocity x Depth product is <0.3m, therefore a freeboard of 0.3m is acceptable. This results in a FPL of 5.73m AHD.*
- *The floor level of the ground floor, including any basement car park crest or water entry points must be set at or above the Flood Planning Level of 5.73m AHD.*
- *Consideration may be given to a floor level below the Flood Planning Level within the first 5 metres from the street front in an existing business zone provided it can be demonstrated that: (a) The minimum floor level is no lower than the adjacent footpath level; and (b) The maximum internal distance from the front of the building is 5 metres, which can only apply to one side of an individual premises; and (c) The maximum area for the floor area to be below the Flood Planning Level for an individual premises is 30 square metres; and (d) There is direct internal access between areas above and below the Flood Planning Level for each individual premises*
- *Council will not accept any options that rely on electrical, mechanical or manual exclusion of the floodwaters from entering a premises or enclosed carpark.*

The development must produce no net loss of flood storage in the 1% AEP event."

			Heritage Advisor.
5.21 Flood planning	Flood Planning Level of 5.73m AHD applies	5.36m AHD (ground floor)	The ground floor will need to be raised to provide the FPL. This is likely to require amendment of the corresponding levels above.

Figure A 1.1 Pre-DA Minutes

		Medium Flood Risk Precinct				
		Vulnerable & Critical Use	Residential Use	Business & Industrial Use	Recreational & Environmental Use	Subdivision & Civil Works
A	**Flood effects caused by Development**	A1 A2	A1 A2	A1 A2	A1 A2	A1 A2
B	**Building Components & Structural**	B1 B2 B3	B1 B2 B3	B1 B2 B3	B1 B2 B3	
C	**Floor Levels**	C2 C3	C1 C3 C4 C6	C1 C3 C4 C6 C7	C3	C5
D	**Car Parking**	D1 D2 D3 D4 D7	D1 D2 D3 D4 D5 D6	D1 D2 D3 D4 D5 D6	D1 D2 D3 D4 D5 D6	D1
E	**Emergency Response**	E1 E2	E1	E1	E1	E3
F	**Fencing**	F1	F1	F1	F1	F1
G	**Storage of Goods**	G1	G1	G1	G1	
H	**Pools**	H1	H1	H1	H1	H1

A. FLOOD EFFECTS CAUSED BY DEVELOPMENT

A1	Development shall not be approved unless it can be demonstrated in a Flood Management Report that it has been designed and can be constructed so that in all events up to the 1% AEP event: (a) There are no adverse impacts on flood levels or velocities caused by alterations to the flood conveyance; and (b) There are no adverse impacts on surrounding properties; and (c) It is sited to minimise exposure to flood hazard. Major developments and developments likely to have a significant impact on the PMF flood regime will need to demonstrate that there are no adverse impacts in the Probable Maximum Flood.
A2	Development shall not be approved unless it can be demonstrated in a Flood Management Report that in all events up to the 1% AEP event there is no net loss of flood storage. Consideration may be given for exempting the volume of standard piers from flood storage calculations. If Compensatory Works are proposed to balance the loss of flood storage from the development, the Flood Management Report shall include detailed calculations to demonstrate how this is achieved.

B. BUILDING COMPONENTS AND STRUCTURAL SOUNDNESS

B1	All buildings shall be designed and constructed with flood compatible materials in accordance with "Reducing Vulnerability of Buildings to Flood Damage: Guidance on Building in Flood Prone Areas", Hawkesbury-Nepean Floodplain Management Steering Committee (2006).
B2	All new development must be designed and constructed to ensure structural integrity up to the Flood Planning Level, taking into account the forces of floodwater, wave action, flowing water with debris, buoyancy and immersion. Where shelter-in-place refuge is required, the structural integrity for the refuge is to be up to the Probable Maximum Flood level. Structural certification shall be provided confirming the above.
B3	All new electrical equipment, power points, wiring, fuel lines, sewerage systems or any other service pipes and connections must be waterproofed and/or located above the Flood Planning Level. All existing electrical equipment and power points located below the Flood Planning Level within the subject structure must have residual current devices installed that turn off all electricity supply to the property when flood waters are detected.

C. FLOOR LEVELS

C1	New floor levels within the development shall be at or above the Flood Planning Level.
C2	All floor levels within the development shall be at or above the Probable Maximum Flood level or Flood Planning Level, whichever is higher.

C3	All new development must be designed and constructed so as not to impede the floodway or flood conveyance on the site, as well as ensuring no net loss of flood storage in all events up to the 1% AEP event. For suspended pier/pile footings: (a) The underfloor area of the dwelling below the 1% AEP flood level is to be designed and constructed to allow clear passage of floodwaters, taking into account the potential for small openings to block; and (b) At least 50% of the perimeter of the underfloor area is of an open design from the natural ground level up to the 1% AEP flood level; and (c) No solid areas of the perimeter of the underfloor area would be permitted in a floodway
C4	A one-off addition or alteration below the Flood Planning Level of less than 30 square metres (in total, including walls) may be considered only where: (a) it is an extension to an existing room; and (b) the Flood Planning Level is incompatible with the floor levels of the existing room; and (c) out of the 30 square metres, not more than 10 square metres is below the 1% AEP flood level. This control will not be permitted if this provision has previously been utilised since the making of this Plan. The structure must be floodproofed to the Flood Planning Level, and the Flood Management Report must demonstrate that there is no net loss of flood storage in all events up to the 1% AEP event.
C5	The applicant must demonstrate that future development following a subdivision proposal can be undertaken in accordance with this Development Control Plan.
C6	Consideration may be given to the retention of an existing floor level below the Flood Planning Level when undertaking a first floor addition provided that: (a) it is not located within a floodway; and (b) the original foundations are sufficient to support the proposed final structure above them. The Flood Management Report must include photos and the structural certification required as per Control B2 must consider whether the existing foundations are adequate or should be replaced; and (c) none of the structural supports/framing of existing external walls of are to be removed unless the building is to be extended in that location; and (d) the ground floor is floodproofed.
C7	Consideration may be given to a floor level below the Flood Planning Level within the first 5 metres from the street front in an existing business zone provided it can be demonstrated that: (a) The minimum floor level is no lower than the adjacent footpath level, and (b) The maximum internal distance from the front of the building is 5 metres, which can only apply to one side of an individual premises, and (c) The maximum area for the floor area to be below the Flood Planning Level for an individual premises is 30 square metres, and (d) There is direct internal access between areas above and below the Flood Planning Level for each individual premises

D. CAR PARKING

D1	Open carpark areas and carports shall not be located within a floodway.
D2	The lowest floor level of open carparks and carports shall be constructed no lower than the natural ground levels, unless it can be shown that the carpark or carport is free draining with a grade greater than 1% and that flood depths are not increased.

D3	Carports must be of open design, with at least 2 sides completely open such that flow is not obstructed up to the 1% AEP flood level. Otherwise it will be considered to be enclosed. When undertaking a like-for-like replacement and the existing garage/carport is located on the street boundary and ramping is infeasible, consideration may be given for dry floodproofing up to the 1% AEP flood level.
D4	Where there is more than 300mm depth of flooding in a car park or carport during a 1% AEP flood event, vehicle barriers or restraints are to be provided to prevent floating vehicles leaving the site. Protection must be provided for all events up to the 1% AEP flood event
D5	Enclosed Garages must be located at or above the 1% AEP level
D6	All enclosed car parks (including basement carparks) must be protected from inundation up to the Flood Planning Level. All access, ventilation, driveway crests and any other potential water entry points to any enclosed car parking shall be above the Flood Planning Level. Where a driveway is required to be raised it must be demonstrated that there is no net loss to available flood storage in any event up to the 1% AEP flood event and no impact on flood conveyance through the site. Council will not accept any options that rely on electrical, mechanical or manual exclusion of the floodwaters from entering the enclosed carpark
D7	All enclosed car parks must be protected from inundation up to the Probable Maximum Flood level or Flood Planning Level whichever is higher. For example, basement carpark driveways must be provided with a crest at or above the relevant Probable Maximum Flood level or Flood Planning Level whichever is higher. All access, ventilation and any other potential water entry points to any enclosed car parking shall be at or above the relevant Probable Maximum Flood level or Flood Planning Level whichever is higher.

E. EMERGENCY RESPONSE

E1	If the property is affected by a Flood Life Hazard Category of H3 or higher, then Control E1 applies and a Flood Emergency Assessment must be included in the Flood Management Report. If the property is affected by a Flood Life Hazard Category of H6, then development is not permitted unless it can be demonstrated to the satisfaction of the consent authority that the risk level on the property is or can be reduced to a level below H6 or its equivalent. If the property is flood affected but the Flood Life Hazard Category has not been mapped by Council, then calculations for its determination must be shown in the Flood Management Report, in accordance with the "Technical Flood Risk Management Guideline: Flood Hazard", Australian Institute for Disaster Resilience (2012). Where flood-free evacuation above the Probable Maximum Flood level is not possible, new development must provide a shelter-in-place refuge where: a) The floor level is at or above the Probable Maximum Flood level; and b) The floor space provides at least 2m^2 per person where the flood duration is long (6 or more hours) in the Probable Maximum Flood event, or 1m^2 per person for less than 6 hours; c) It is intrinsically accessible to all people on the site, plainly evident, and self-directing, with sufficient capacity of access routes for all occupants without reliance on an elevator; and d) It must contain as a minimum: sufficient clean water for all occupants; portable radio with spare batteries; torch with spare batteries; and a first aid kit Class 10 classified buildings and structures (as defined in the Building Codes of Australia) are excluded from this control. In the case of change of use or internal alterations to an existing building, a variation to this control may be considered if justified appropriately by a suitably qualified professional. Note that in the event of a flood, occupants would be required to evacuate if ordered by Emergency Services personnel regardless of the availability of a shelter-in-place refuge.

E2	If a shelter-in-place refuge is required, it must contain as a minimum: sufficient clean water for all occupants; portable radio with spare batteries; torch with spare batteries; a first aid kit; emergency power; and a practical means of medical evacuation.
E3	It must be demonstrated that evacuation or a shelter-in-place refuge in accordance with the requirements of this DCP will be available for any potential development arising from a Torrens title subdivision.

F. FENCING

F1	Fencing, (including pool fencing, boundary fencing, balcony balustrades and accessway balustrades) shall be designed so as not to impede the flow of flood waters and not to increase flood affectation on surrounding land. At least 50% of the fence must be of an open design from the natural ground level up to the 1% AEP flood level. Less than 50% of the perimeter fence would be permitted to be solid. Openings should be a minimum of 75 mm x 75mm.

G. STORAGE OF GOODS

G1	Hazardous or potentially polluting materials shall not be stored below the Flood Planning Level unless adequately protected from floodwaters in accordance with industry standards.

H. POOLS

H1	Pools located within the 1% AEP flood extent are to be in-ground, with coping flush with natural ground level. Where it is not possible to have pool coping flush with natural ground level, it must be demonstrated that the development will result in no net loss of flood storage and no impact on flood conveyance on or from the site. All electrical equipment associated with the pool (including pool pumps) is to be waterproofed and/or located at or above the Flood Planning Level. All chemicals associated with the pool are to be stored at or above the Flood Planning Level.

Figure A 1.2 Extract from Manly DCP Section 5.4.3

A2 Appendix 2

Survey Plan

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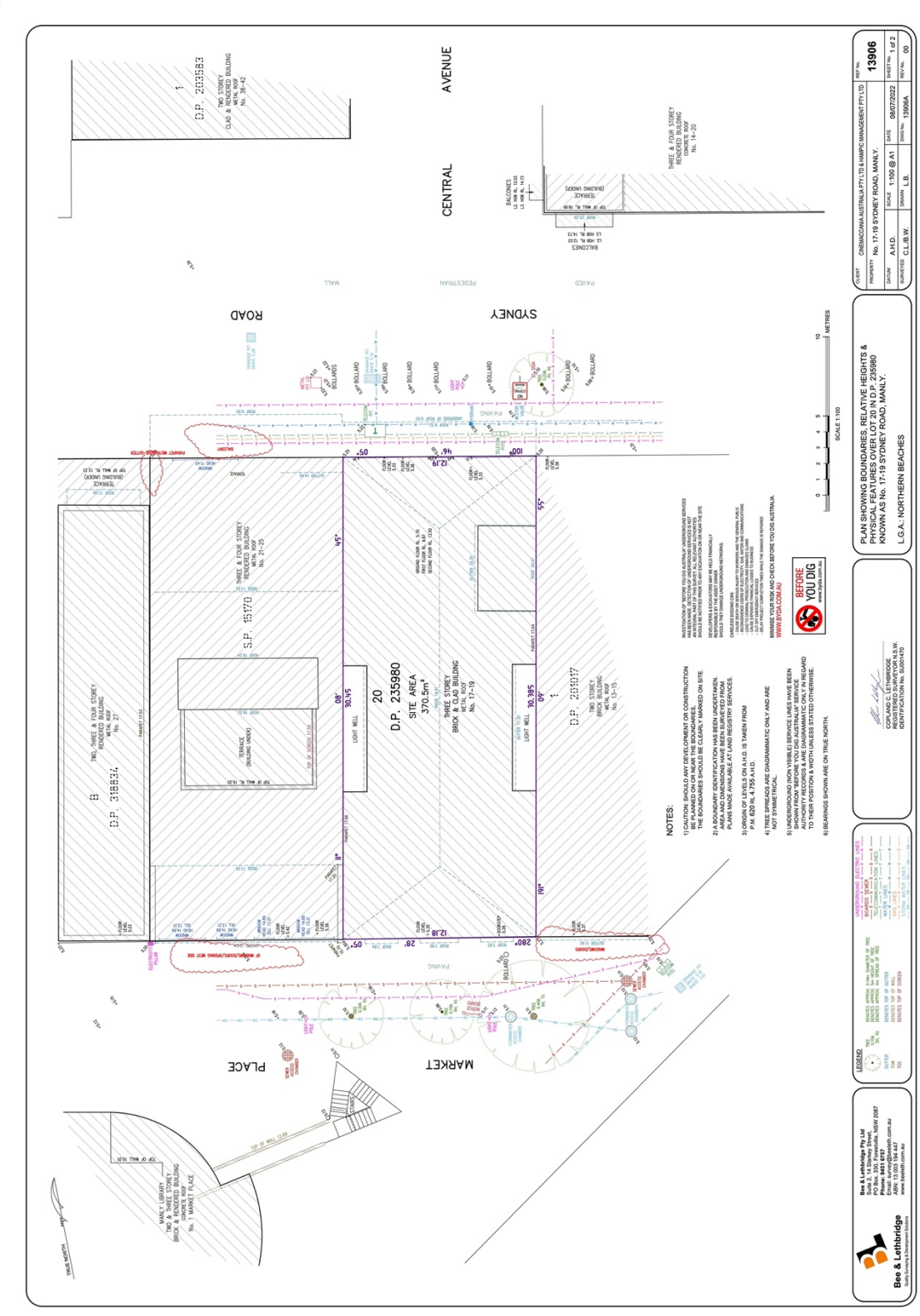

Figure A 2.1 Site Survey

A3 Appendix 3

Architectural Plans

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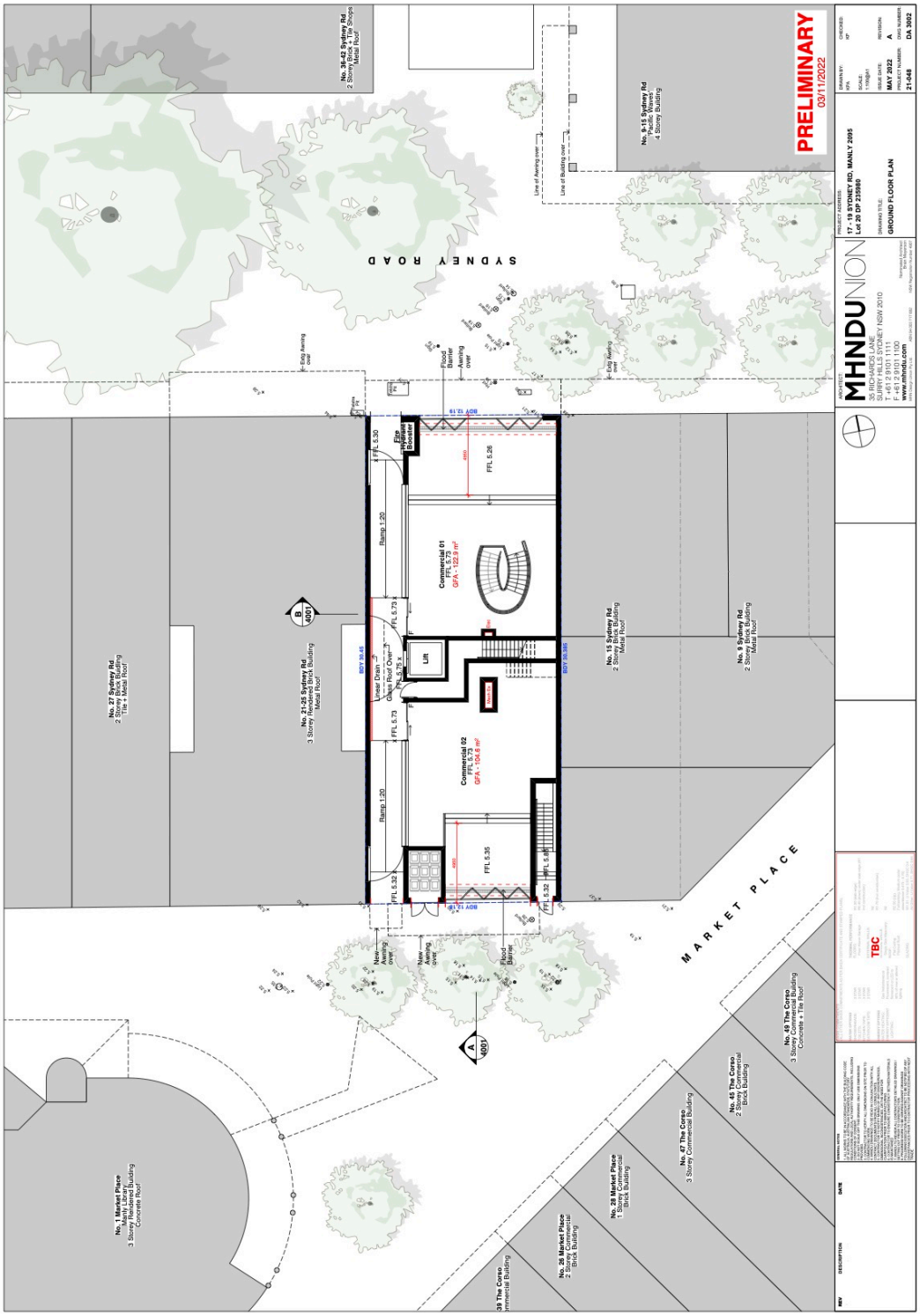

Figure A 3.1 Ground Floor Plan

A4 Appendix 4

Extracts from Flood Study by Cardno

Figure A 4.1 Flood Maps (Source Cardno Flood Study Report 2019)

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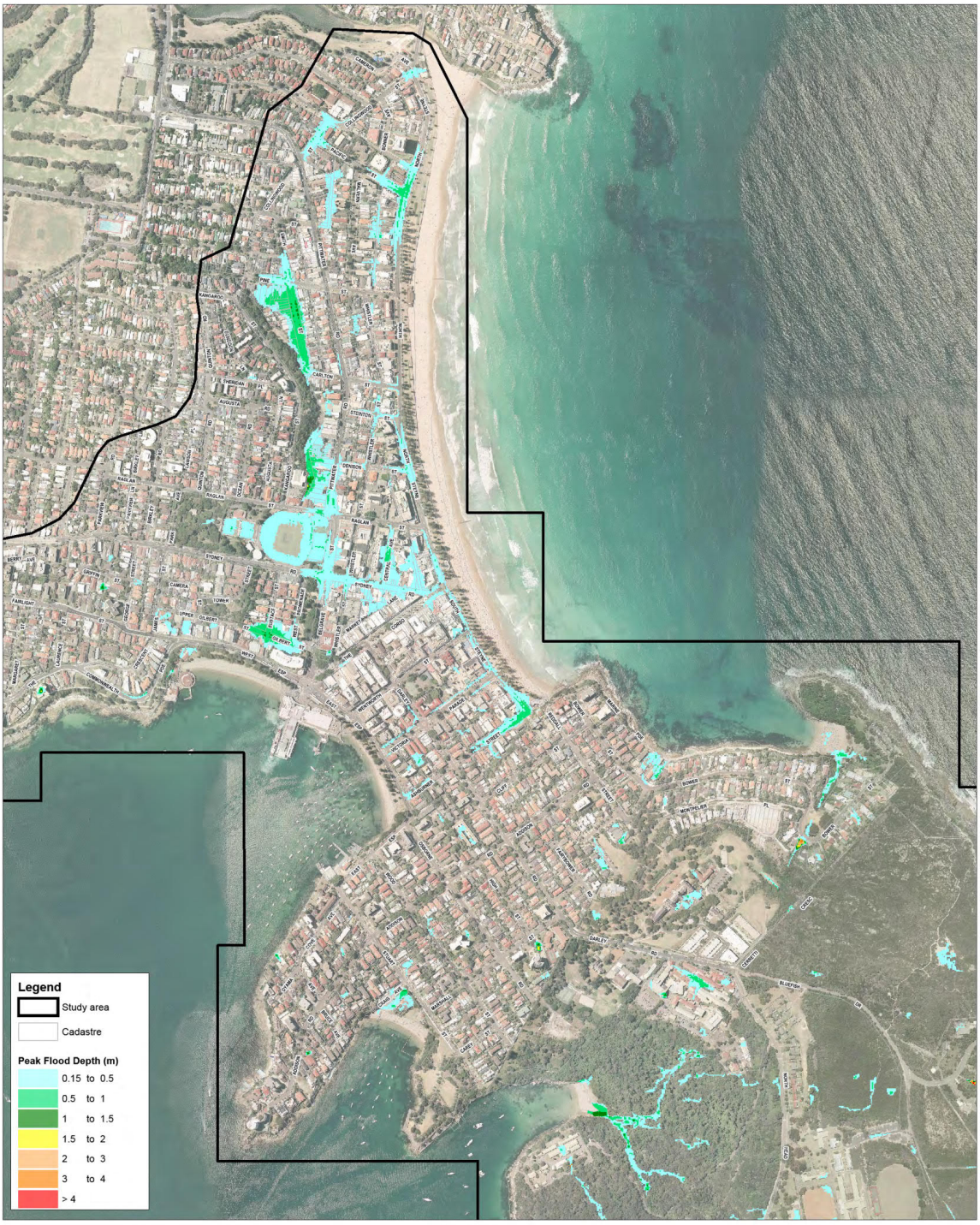
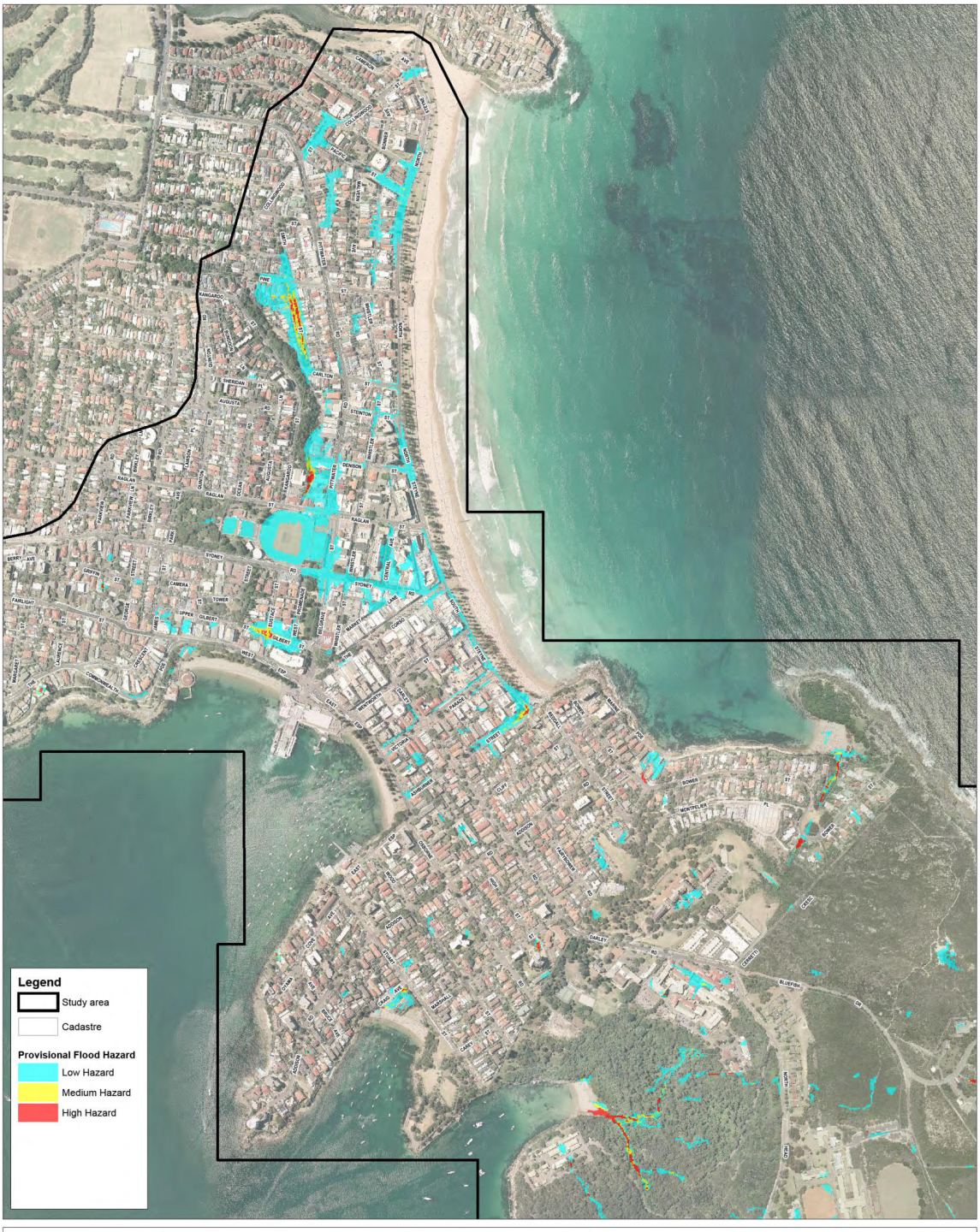


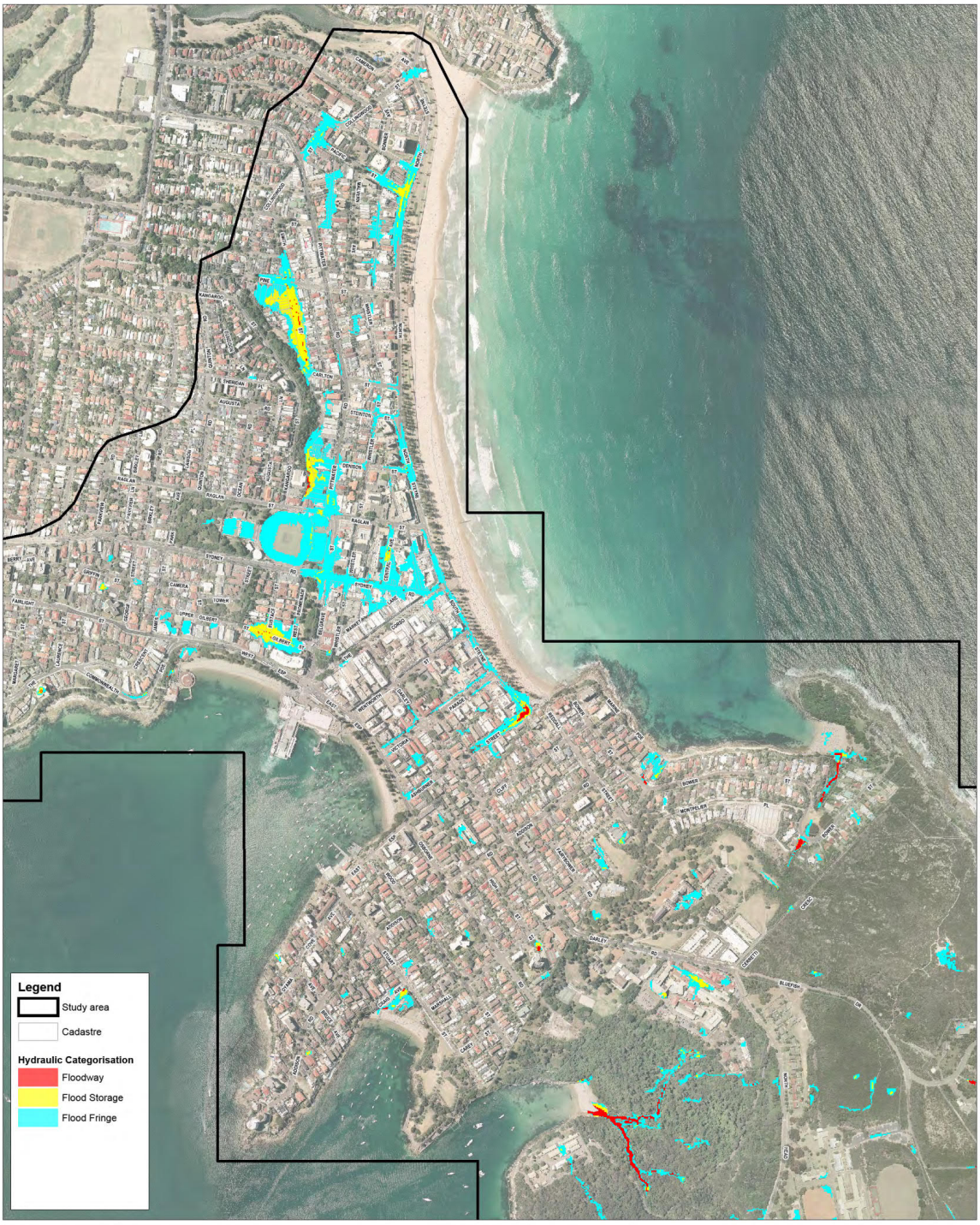
Manly to Seaforth Flood Study
1% Peak Flood Depths
Map 3/4

Figure 23



Manly to Seaforth Flood Study
1% Provisional Flood Hazard
Map 3/4

Figure 59



Manly to Seaforth Flood Study
1% Hydraulic Categories
Map 3/4

Figure 47

Cardno

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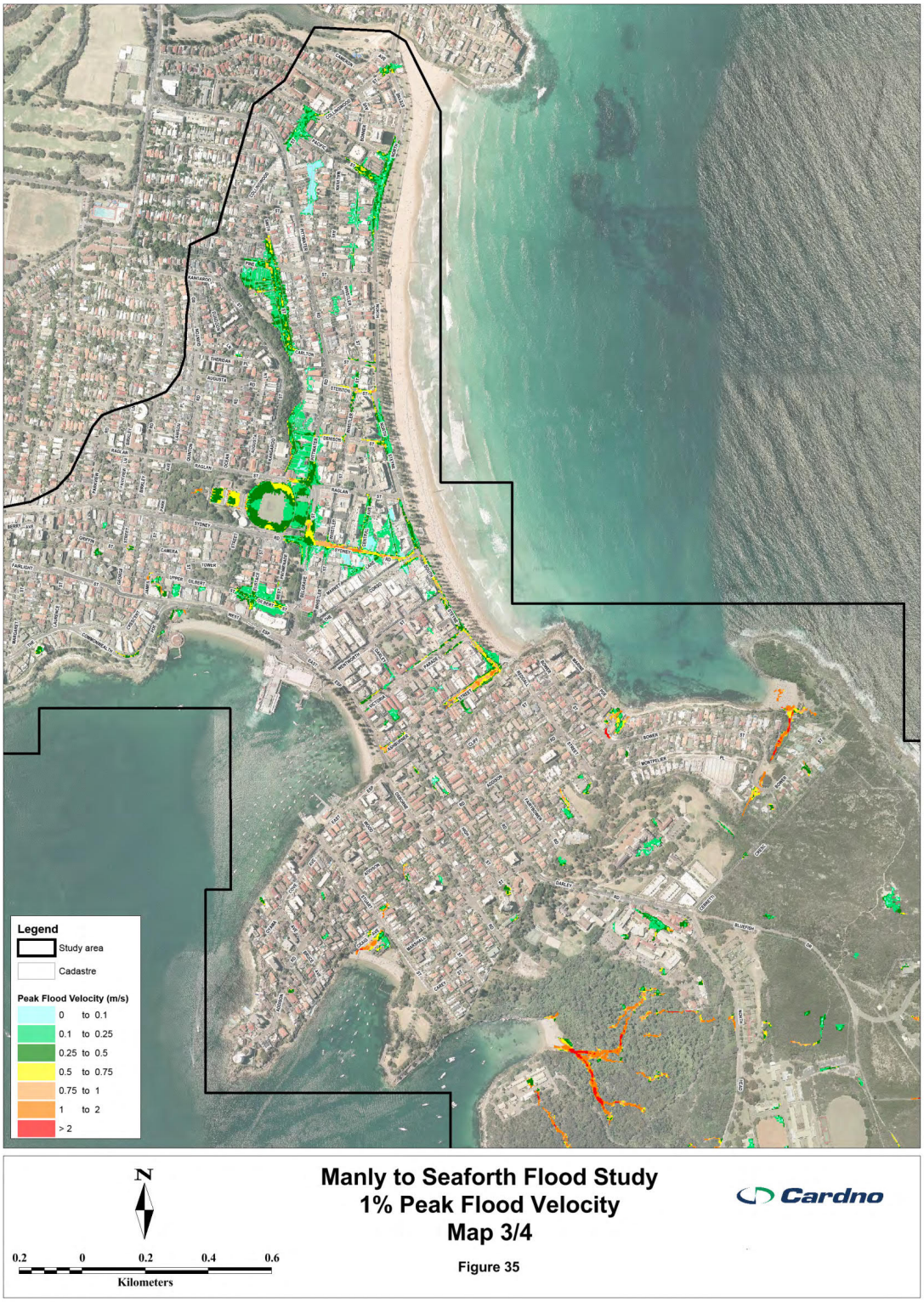

Figure A 4.1 Flood Maps (Source Cardno Flood Study Report 2019)

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