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Flood Risk Management Plan

Thompson Health Care – 23-33 Bassett St, Mona Vale

Prepared for: Gartner Trovato Architects

Document no: SY140363

Issue no: Revision 1



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REVISIONS

Revision	Date	Purpose	Prepared By	Approved By
1	03.04.2020	Issue for DA	CR	MB

Review Panel	
Division/Office	Name
St Leonards	Gregory Lyell, Matthew Buttarelli

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Project: Thompson Health Care – 23-25 Bassett St, Mona Vale

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1 Introduction

ACOR Consultants Pty Ltd (ACOR) has been engaged by Thompson Health Care Pty Ltd to prepare a Flood Risk Management Plan in accordance with the requirements of Pittwater 21 Development Control Plan 2019 (Pittwater 21 DCP) Section B3.11 Flood Prone Land; Northern Beaches Council Flood Prone Land Design Standard; Flood Emergency Response Planning for Development in Pittwater Policy 2017; Pittwater Local Environmental Plan 2014 (Pittwater LEP 2014) Part 7.3 and 7.4 and the Floodplain Development Manual (NSW DIPNR 2005).

In the preparation of this report ACOR has relied upon certain data and information contained within the following documents:

- Architectural plans prepared by Gartner Trovato Architects, Job No. 1816, Drawing No.'s A-02 to A-12, issue P3, dated 5 March 2020 (copy enclosed under Appendix A);
- Site survey prepared by Bee & Lethbridge Pty Ltd, reference 15006, Drawing No. 15006A, dated 4 March 2016;
- Flood Information Request – Comprehensive (for 23 and 33 Bassett Street) prepared by Northern Beaches Council, dated 26 March 2020;
- Pittwater 21 DCP 2019;
- Pittwater LEP 2014;
- Northern Beaches Council Flood Prone Land Design Standard;
- Flood Emergency Response Planning for Development in Pittwater Policy 2017;
- 'McCarrs Creek, Mona Vale and Bayview Flood Study Review' (Revision 04) prepared by Royal HaskoningDHV, dated 7 July 2017;
- 'Floodplain Development Manual: the management of flood liable land' published by NSW Department of Infrastructure, Planning and Natural Resources (NSW DIPNR), dated April 2005; and
- ACOR Consultants Pty Ltd Civil Works Plan C3.01, issue A, dated 1 April 2020 (copy enclosed under Appendix D).

The purpose of this report is to provide Northern Beaches Council with sufficient information to assess the proposed development which is located on flood affected lands.

ACOR was advised during a pre-DA meeting with Northern Beaches Council that additional flood modelling for the proposed development was not required. The development is to provide adequate flood storage to match the existing site's capacity to ensure no net loss of flood storage for up to and including the 1% AEP event. No flood modelling has been undertaken in preparation of this report.

2 Site Description

The subject site is known as Lot 38 DP 7236 (No. 23) and Lot 2 DP 748426 (No. 33) Bassett Street, Mona Vale. The site is located on the southern side of Bassett Street, near the intersection with Barrenjoey Road. The site is located amongst residential dwellings. See Figure 1 below.



Figure 1 - Existing Thompson Health Care Facility, Mona Vale

The site is a developed site of area 6503 square metres and is zoned R2 Low Density Residential (Northern Beaches Council 2020b). Existing development on the site consists of a two-storey aged care facility, tennis court, carparking at the rear and two single storey dwellings.

The site falls towards the south and east. Elevations on site are within the range 3.20 m AHD to 4.71 m AHD.

The proposed re-development works will involve demolition of the existing aged care facility and single storey dwellings and construction of a new two storey, 118 bed aged care facility which will be in 24-hour operation. Aged care facilities are classified in the 'vulnerable' land use group (Northern Beaches Council 2019).

The principal features of the proposed design and site improvements are depicted in architectural plans prepared by Gartner Trovato Architects, Job No. 1816, Drawing No.'s A-02 to A-12, issue P3, dated 5 March 2020 (copy enclosed under Appendix A).

3 Existing Flood Characteristics

Information regarding the nature of overland flows at the subject site are provided in the two "Flood Information Requests – Comprehensive", prepared by Northern Beaches Council for 23 Bassett Street and 33 Bassett Street, Mona Vale, dated 26 March 2020 (copy enclosed under Appendix B).

The site is bisected by the boundary of two sub-catchments within the McCarrs Creek Catchment, as depicted in Figure 2 below. The sub-catchment boundary traverses the site diagonally from the north-western corner to the centre of the southern site boundary. The western portion of the site is part of the Mona Vale Main Drain sub-catchment, and the eastern portion of the site is located within the Hillcrest sub-catchment. The site is impacted by flows from both sub-catchments as overland flows. Overland flows are expected to inundate from the north-east, and the south-west subject site boundaries.



Figure 2 - Flooding Sub-catchment Boundary

3.1 1% AEP Flood Impacts

The 1% AEP flood level varies across the site, and between the two sub-catchments, and is expected to inundate the site to a maximum flood level of 4.35 m AHD (Northern Beaches Council 2020a). The 1% AEP floodwaters cause partial inundation of the site to depths within the range 0.00 m to 1.10 m, with inundation of the site contained to the eastern and southern sides of the site as well as the south-western corner (Northern Beaches Council 2020a). Peak 1% AEP floodwater velocities are expected to be within the range 0.0 m/s to 0.27 m/s (Northern Beaches Council 2020a).

The 1% AEP floodwaters are expected to pose Low Hazard to High Hazard to occupants of the site (Northern Beaches Council 2020a). The 1% AEP floodwaters are classified as partly Flood Storage and partly Flood Fringe (Northern Beaches Council 2020a). The critical storm duration impacting the site for the 1% AEP is the 2-hour storm event (Royal HaskoningDHV 2017).

ACOR note that the Flood Information Request provides a 1% AEP Hydraulic Categorisation of Floodway, however a review of the attached map reveals that there is only one isolated area of floodway along the western boundary which appears to be an anomaly.

3.2 PMF Flood Impacts

The PMF flood level is expected to vary across the site, with the PMF floodwaters inundating the site to a maximum flood level of 4.91 m AHD (Northern Beaches Council 2020a). The PMF floodwaters are expected to partially inundate the site to depths within the range 0.00 m to 1.58 m (Northern Beaches Council 2020a). Peak PMF floodwater velocities are expected to be within the range 0.00 m/s to 0.53 m/s (Northern Beaches Council 2020a).

The PMF floodwaters are generally expected to pose Low Hazard to High Hazard to occupants of the site with the Risk to Life Hazard category varying between H1 and H4 during the PMF. The PMF floodwaters are classified as Flood Storage (Northern Beaches Council 2020a). The critical storm duration impacting the site for the PMF is the 2-hour storm event for the Mona Vale Main Drain sub-catchment, and the 45-minute storm event for the Hillcrest sub-catchment (Royal HaskoningDHV 2017).

3.3 Flood Planning Level

The Pittwater LEP 2014 defines the Flood Planning Level (FPL) as the 1% AEP flood level plus 0.5m freeboard. The 1% AEP flood level for the site is 4.35 m AHD. Thus, the FPL for the site is 4.85 m AHD. The PMF flood level is 4.91 m AHD. Architectural plans prepared by Gartner Trovato Architects (copy enclosed under Annexure A) depict a Finished Flood Level (FFL) for the ground floor of 5.0 m AHD, and an FFL of 8.1 m AHD for the First Floor. Thus, both the ground and first floor levels are above the FPL and PMF level, satisfying Council requirements.

4 Flood Risk Management

Based on the foregoing, the following flood risk management strategy for the proposed development has been prepared, having due regard for the requirements of Pittwater 21 DCP 2019 Section B3.11 Flood Prone Land; Northern Beaches Council Flood Prone Land Design Standard; Flood Emergency Response Planning for Development in Pittwater Policy 2017; Pittwater LEP 2014 Part 7.3 and 7.4 and the Floodplain Development Manual (NSW DIPNR 2005).

4.1 Flood Effects Caused by Developments

The proposed development is required to be designed to ensure that the existing volume of flood water which inundates the site up to and including the 1% AEP storm event can be accommodated within the subject site for the post-development scenario. Thus, there is to be no net loss of flood storage by the development.

4.1.1 Pre-development Flood Storage

The flood map of the 1% AEP event water depths was overlaid on the existing site survey to determine the extent of flood waters which impact the existing site, and the respective water depths across the site. A mark-up of the flood extent for the pre- and post-development scenarios is provided in Appendix C. Measuring the surface area over the flood extent and multiplying by the water depth yields an approximate flood storage volume for the existing site. The existing site surface was modelled in 12d and a volume calculation was undertaken between existing surface levels and a constant flood water level surface at RL4.35.

Calculations of the flood storage provided during the 1% AEP event by the existing site (pre-development) based on the flood maps is approximately 1600m³. This excludes any storage shown to be provided inside building envelopes.. A review of the survey levels and flood water levels shows that for all storms up to the 1% AEP, the flood level does not breach the internal floor level of the existing aged care facility or the existing dwellings, thus these internal areas provide no storage capacity.

4.1.2 Post-development Flood Storage

The post-development site has been designed to allow similar inundation of floodwaters along the northern and eastern site boundaries by matching into the existing boundary levels and flattening of the side and rear setbacks to accommodate flood waters. A portion of the western side of the building has also been elevated above the natural surface to allow for inundation and temporary storage of flood waters below the ground floor. The rear of the site has been graded to fall towards the Bassett Street boundary, to ensure that there is an overland flow path which allows flood waters to dissipate after a large rainfall event.

Similar calculations were undertaken for the post-development site based on the designed levels and grading, including the flood storage void below the western half of the building

envelope, as this portion of the building will be constructed on piers, allowing floodwaters to temporarily store under the building during large storm events. The design surface was modelled in 12d along with the 1% AEP water level surface. The flood storage volume between the design finished surface levels and the 1% AEP flood water level within the site has been calculated to be approximately 2000m³ storage in the rear and eastern site setbacks, as well as in the subfloor flood storage void below the ground floor of the western half of the building.

Based on the above outlined calculations, the flood storage available in the post-development design provides an increase in capacity of approximately 25% compared with the existing site storage.

4.2 Drainage Infrastructure and Creek Works

The development is not proposing to develop or alter existing Council drainage infrastructure or natural flow regimes, clear riparian vegetation, artificially modify natural streams.

The proposed development is maintaining existing flood storage capacity of the site as part of the development.

4.3 Building Components and Structural Soundness

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

All structures must be designed and constructed to ensure structural integrity up to the PMF level (as shelter-in-place refuge is to be provided) taking into account the forces of floodwater, wave action, flowing water with debris, buoyancy and immersion. Structural certification shall be provided during the Construction Certificate stage confirming the above.

All existing electrical equipment and power points located below the FPL must have residual current devices installed that turn off all electricity supply to the property when flood waters are detected.

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 FPL. The proposed substation to be relocated to the north western corner of the subject site shall be set above the maximum 1% AEP flood level for the site of 4.35 m AHD.

4.4 Storage of Goods

Hazardous or potentially polluting materials shall not be stored below the FPL unless adequately protected from floodwaters in accordance with industry standards. Goods, materials or other products which may be highly susceptible to water damage are to be located/stored above the

FPL. The ground and first floor of the proposed building are both above the FPL and thus are suitably protected from flood waters for the storage of goods. The basement is also protected from inundation by flood waters as the crest in the driveway is set above the FPL.

4.5 Flood Emergency Response

The proposed development shall comply with Council's Flood Emergency Response Planning for Development in Pittwater Policy and the outcomes of any Flood Risk Emergency Assessment Report where it applies to the land.

Proposed development must provide an appropriately sized area to safely shelter in place above the PMF level and appropriate access to this area should be available from all areas within the development. Refer to Section 5 below for further details.

Adequate warning systems and signage shall be installed to allow safe and orderly movement of all staff, residents and visitors to the designated shelter in place areas without reliance upon the SES or other authorised emergency services personnel.

The Bureau of Meteorology issue Severe Thunderstorm Warnings which warn of short-term, high-intensity storms approaching which could cause flash flooding. The State Emergency Service (SES) prepare Evacuation Warnings which are passed to media outlets for general broadcast, Police and emergency services staff public address and direct via doorknock or telephone. The facility shall ensure that at all times there is sufficient trained members of staff on site to coordinate, instruct and move all personnel on site (residents, staff, visitors, etc.) to a shelter-in-place refuge area, in the event that a Severe Thunderstorm Warning or Flood Warning is received. Announcement of the need to move to a shelter-in-place refuge could be made through an alarm or facility-wide PA system when an official Flood Warning is received. In the absence of any Flood Warning, Alert of Notice from the Bureau of Meteorology or SES, a trained member of staff shall initiate inquiries to the SES or other emergency service or organisation when other evidence leads to a reasonable expectation that a flood could occur at the site.

Once notified, movement of all personnel on site to the shelter-in-place refuge areas will not rely on the SES or other authorised emergency services, as both internal levels of the facility provide shelter-in-place refuge, so no movement of people already inside the building is required, and, the building is accessible from all external areas by compliant ramps.

4.6 Floor Level

All internal floor levels within the development have been set above the PMF level. The floor has been elevated and part of the subfloor (the western half of the building envelope) has been designed to allow for inundation and temporary storage of flood waters, to ensure the flood

storage capacity for the post-developed site is equal to or greater than the current flood storage capacity of the pre-developed site.

The underfloor areas of the building envelope must be designed and constructed to allow a clear passage of flood waters. 50-75% of the perimeter of the underfloor area must be open to the adjacent external natural ground level and the 1% AEP flood level. Screening shall be installed around the perimeter of the underfloor area of the building proposed for flood storage to ensure the area is not accessible to people and not used for storage of goods. The screening shall be designed to not impeded the flow of flood waters and braced to withstand the forces of the flood water and impact by debris. Spacing of the screen shall be in accordance with the specification for fencing within flood prone areas, as outlined in Section 4.8.

A restriction shall be imposed on the Title of the land, pursuant to S88B of the Conveyancing Act confirming that the undercroft area is not to be enclosed.

4.7 Car Parking

Architectural plans prepared by Gartner Trovato Architects (copy enclosed under Annexure A) depict a driveway to an enclosed basement carpark below the ground floor of the eastern portion of the building envelope. There is a loading dock and turning back located in the north eastern corner of the site, and a drop off zone/ambulance bay located centrally along the northern boundary.

The enclosed carpark is protected from inundation up to the PMF through the provision of a crest in the driveway entrance. The proposed driveway retaining wall will be required to extend up to the PMF flood water level RL 4.91 to ensure flood waters do not top over from landscape setback areas and into the basement.

The proposed basement carpark area has been excluded from the calculation of flood storage volume available at the site. All access, ventilation and any other potential water entry points to the enclosed car parking shall be above the relevant PMF level.

The proposed drop off zone and ambulance bay is outside of the existing flood extent and generally set above the 1% AEP level, except for a portion of the entrance driveway which meets the existing boundary level of 4.30 m AHD. At this location, if inundated during the 1% AEP, it would only result in water ponding to a depth of 0.05 m, thus no vehicle barriers are required.

The proposed loading dock and turning bay are within the existing flood extent during the 1% AEP. The proposed levels as depicted on ACOR Consultants Civil Works Plan indicate that this area could be inundated up to 0.5 m. Although this is above the 300mm threshold requiring vehicle barriers as per the Pittwater DCP, the waters in this area are expected to be very slow

moving. The maximum velocity in this area is 0.18 m/s (Northern Beaches Council 2020a), which equates to a velocity x depth ratio of 0.09. Published data on the limiting stability value of velocity x depth for design storm events (e.g. *Waverley Council Water Management Technical Manual*) indicates that for 0.5m depth of flood water, a limiting velocity x depth ratio of 0.33 should be applied. In this regard, the velocity x depth ratio of 0.09 would satisfy this criteria and thus vehicle barriers or other restraint systems should not be necessary for the loading dock and turning bay area.

4.8 Fencing

Fencing shall be designed so as not to impede the flow of flood waters and not to increase flood affectation on surrounding land. Fencing (including pool fencing, boundary fencing, balcony balustrades and accessway balustrades) shall be open for passage of flood waters - All new fencing on the property must be flood compatible with 50-75% of the fence being of an open design between the natural ground level and the Flood Planning Level. Only 25-50% of the perimeter fence would be permitted to be solid. Openings should permit a 75 mm sphere to pass through and should not impede the flow of water.

4.9 Pools

Architectural plans prepared by Gartner Trovato Architects (copy enclosed under Annexure A) do not depict a pool as part of the proposed development.

5 Flood Risk Emergency Assessment and Emergency Response Plan

In accordance with the Floodplain Development Manual (NSW Government, 2005) new developments must minimise flood risk through the implementation of effective flood emergency response measures.

The areas surrounding the site become fully inundated with floodwaters during the PMF making safe evacuation unlikely. Therefore, the development shall provide shelter-in-place for all occupants within the building in the event of flooding.

5.1 Floor Level

The proposed floor level for the ground floor and first floor of the aged care facility are set above the FPL and PMF level, therefore satisfying minimum floor level requirements and making shelter in place available for all inhabitants.

5.2 Floor Space

The critical duration for both the 1% AEP and PMF event is 2 hours or less, therefore the site can be classified as being inundated for a “short duration” requiring a minimum of 1m² per person.

All internal floor space on the ground and first floor provide a total shelter-in-place area of approximately 6,000m². The facility has 118 resident beds and 50 staff. This provides a minimum of 35m² per person and provides ample space if any visitors or contractors are also on site at the time of a flood event.

5.3 Accessibility

Shelter-in-place areas must be fully accessible for all occupants and access must not rely upon elevators.

The entire inside of the building serves as a shelter-in-place refuge for the site, so any occupants inside the building can remain where they are. All areas external to the building (gardens, courtyards etc.) all have accessible paths of travel to inside the building via walkways and ramps. No access to refuge areas relies on elevators.

5.4 Building Stability

The building is required to be constructed with flood compatible materials and designed to withstand the expected forces of the floodwaters on the site – refer to Section 4.3 above.

The design and construction of the building is to be verified by a structural engineer taking into consideration lateral flow, buoyancy, suction effects and debris load impacts of the 1% AEP and PMF flood depths and velocities.

In addition, all refuge areas must comply with BCA requirements with external components rated appropriately for storm, wind and moisture.

5.5 Serviceability

As a vulnerable land use, the development must ensure that there are sufficient services available to allow the facility to continue to function during flooding. The facility will need to ensure there is sufficient supplies for all occupants of the following:

- Clean water;
- First aid kit;
- Portable radio with spare batteries;
- Torch with spare batteries; and,
- Relevant medication for all residents.

The above supplies will need to be stored on site above the PMF level to be readily available in the event of a flood.

In addition to the above the site also needs to ensure the following:

- There is a practical means of medical evacuation; and,

- Emergency power supply.

Although the critical duration of a storm which impacts the site is considered short (less than 6-hours), if essential services are damaged during the storm event it could be much longer before services are restored to the facility.

Therefore, the facility must ensure they have a suitable emergency power supply to ensure that the facility can still maintain function and required level of care to the residents until authority services are reinstated. The design of such emergency power supply is to be undertaken by a qualified electrical engineer during the design of the aged care facility and shall determine standby backup generator provisions required to maintain essential operations of the aged care facility whilst all access to the site (by foot or vehicle) is impeded. Once the flood water subsides, additional external supplies could then be acquired.

Appendix C of the McCarrs Creek, Mona Vale and Bayview Flood Study provides design hydrographs for 1% AEP and PMF event discharge and flood water levels which would assist with identifying the approximate timeframe that on-site emergency power supply provisions should be required for the site. The design hydrographs for the adjacent Mona Vale Main Drain suggests that the 1% AEP and PMF flood water levels will remain near their respective maximum flood water levels in excess of 10 hours. Whilst interpolation of this graph is not possible, a provision of minimum 12 hours on-site emergency power supply to allow for essential operations should be provided, unless otherwise directed by Northern Beaches Council.

In the case where medical evacuation of an occupant is required during a flood event, access by an ambulance will not be possible during the PMF for a minimum of two hours. Therefore, an alternative method of evacuation, or capacity for adequate care and treatment on-site is required.

Possible evacuation alternatives include provision for a helicopter or lifeboat to take an occupant off-site. Provision for a helicopter at the site is not feasible as it would require the installation of a helipad. In addition to this, the types of weather systems which typically generate flash flooding (including heavy rainfall and high winds) create conditions which are unsafe to fly a helicopter. Similarly, these conditions can also mean it is unsafe to pilot a boat, especially to evacuate an elderly person or person in a critical medical condition. Evacuation of an ill or elderly person during flood events often increases the fatality rate (Australian Institute for Disaster Resilience 2017).

It is ACOR's recommendation that the facility ensures that at all times, there is appropriately trained personnel on-site to be able to manage a seriously ill resident(s) for the duration of flooding until it becomes possible for ambulance access to the site.

6 Conclusion

The site is impacted by 1% AEP floodwaters which cause partial inundation of the site to depths within the range 0.0 m to 1.10 m. Inundation of the site during the 1% AEP flood event is generally confined to those parts of the site adjacent to the eastern and southern site boundaries.

The PMF floodwater level varies across the site, generally being a depth of 1.0 m or more throughout most of the inundated areas. The PMF floodwaters impact the site at elevation 4.91 m AHD. The PMF floodwaters are expected to generally pose High Hazard to occupants of the site.

The proposed redevelopment of the aged care facility is within the Medium Flood Risk Precinct. The FFL for all internal, habitable areas has been set above the FPL and PMF level, thus satisfying the requirements of minimum floor level, as well as providing adequate shelter-in-place for all occupants on the site in the event of flooding. Further requirements regarding structural soundness, use of flood compatible building materials, storage of goods, fencing and carparks apply to the site and must be considered during detailed design to ensure compliance during construction.

A Flood Emergency Response Plan (FERP) which outlines the requirements and responsibilities of the facility and staff in the event of a flood must be prepared during detailed design of the development.

The FERP shall detail the specific requirements for the site in order to satisfy all requirements as outlined by Council and the State Environment Planning Policies. They should also align with any Flood Risk Management Studies for the catchment, SES and New South Wales Government Emergency Management Plans.

Based on the foregoing, we are of the view that the proposed development generally complies with the requirements of the Medium Flood Risk Precinct Matrix of Pittwater 21 DCP 2019 Section B3.11 and Pittwater LEP 2014 provisions for vulnerable sites affected by flooding.

7 References

Australian Institute for Disaster Resilience. (2017). *Handbook 7 Managing the Floodplain*, Australian Institute for Disaster Resilience, Victoria.

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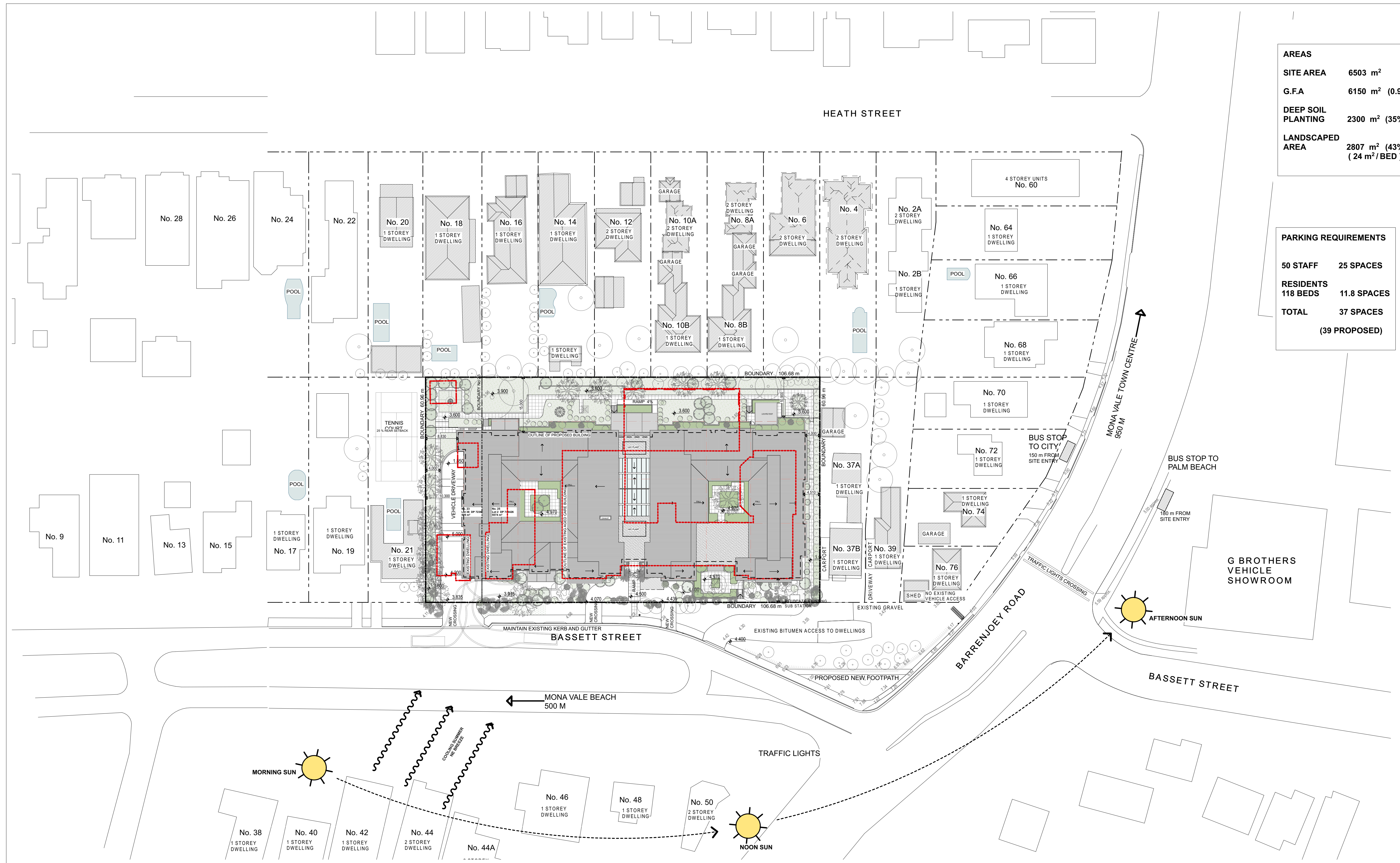
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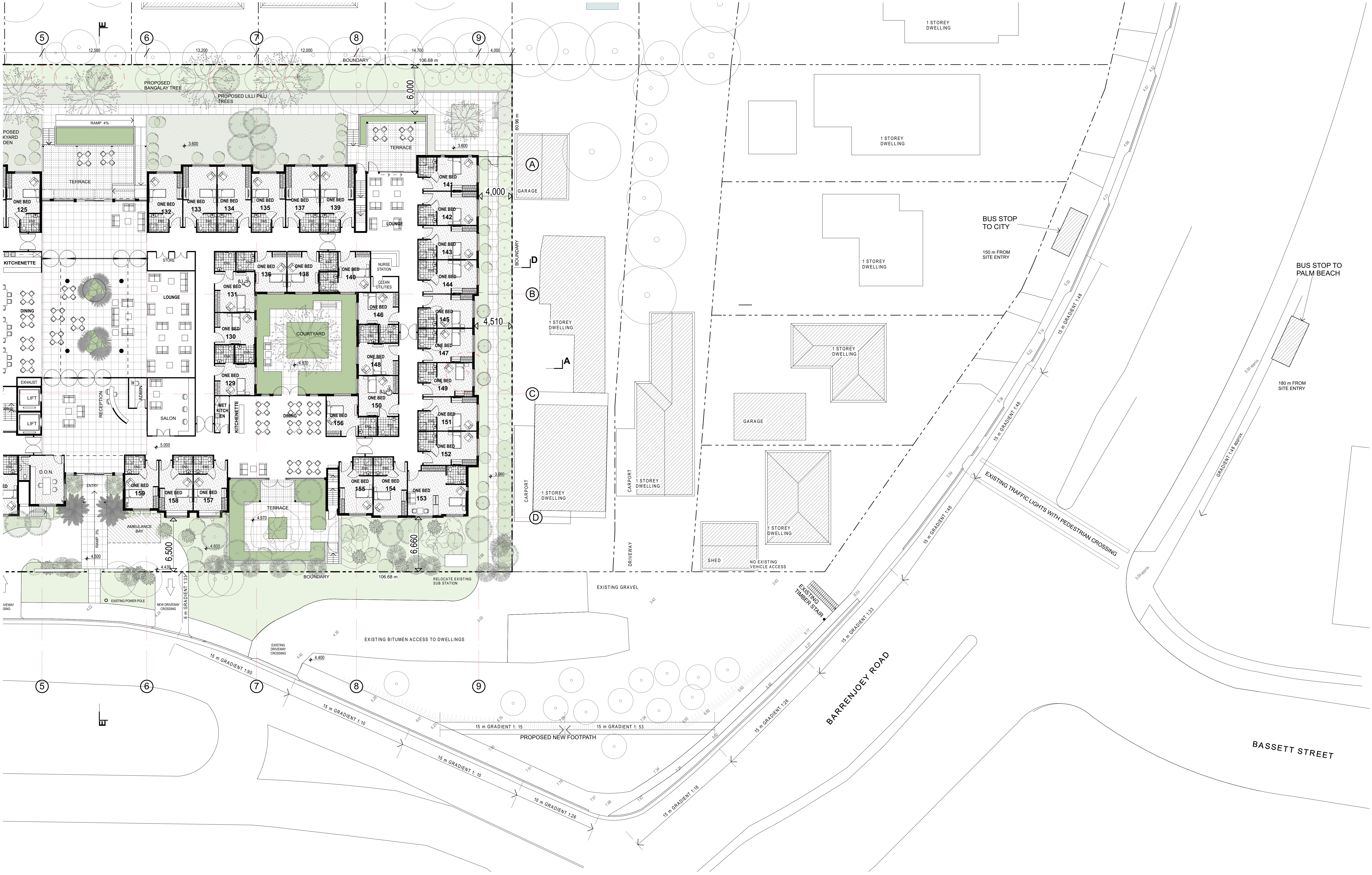
Appendix A - Architectural plans

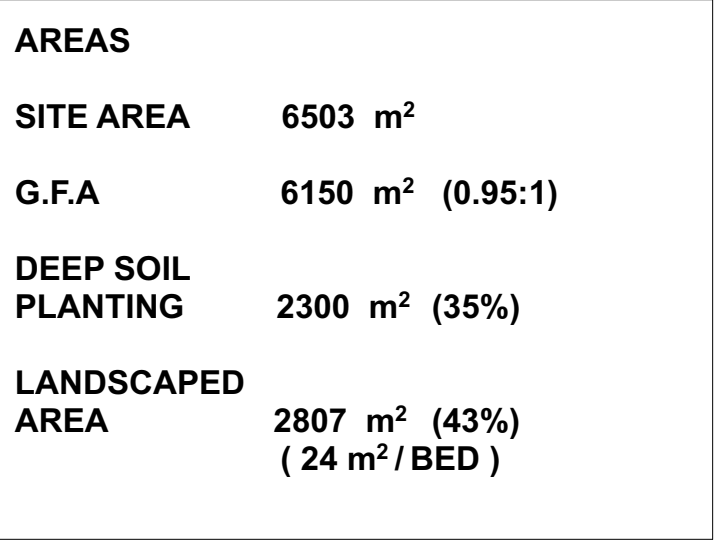
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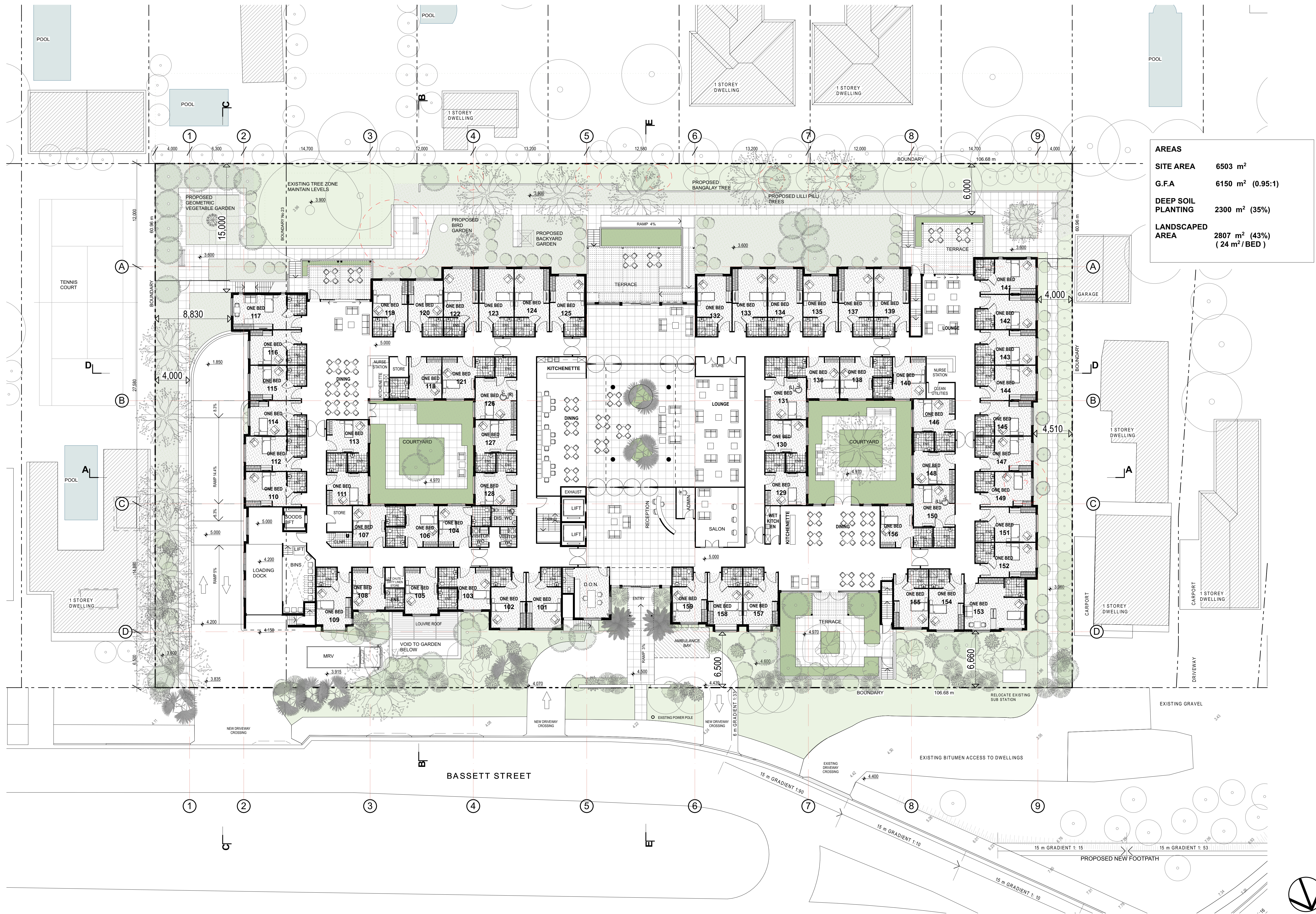
AREAS	
SITE AREA	6503 m ²
G.F.A	6150 m ² (0.95:1)
DEEP SOIL PLANTING	2300 m ² (35%)
LANDSCAPED AREA	2807 m ² (43%) (24 m ² / BED)

PARKING REQUIREMENTS	
50 STAFF	25 SPACES
RESIDENTS	118 BEDS
118 BEDS	11.8 SPACES
TOTAL	37 SPACES (39 PROPOSED)





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RESIDENTS	
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(39 PROPOSED)	

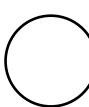


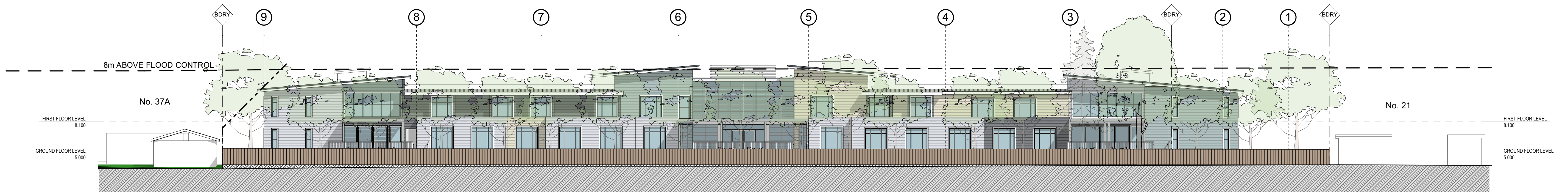
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 NORTH ELEVATION



 SOUTH ELEVATION



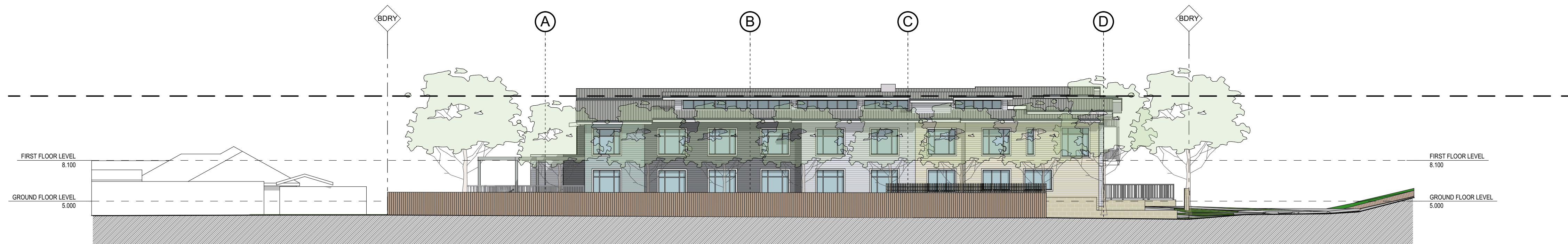
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A 477050 MONA VALE NSW
K 477050 MONA VALE NSW
P 477050 MONA VALE NSW
E 477050 MONA VALE NSW

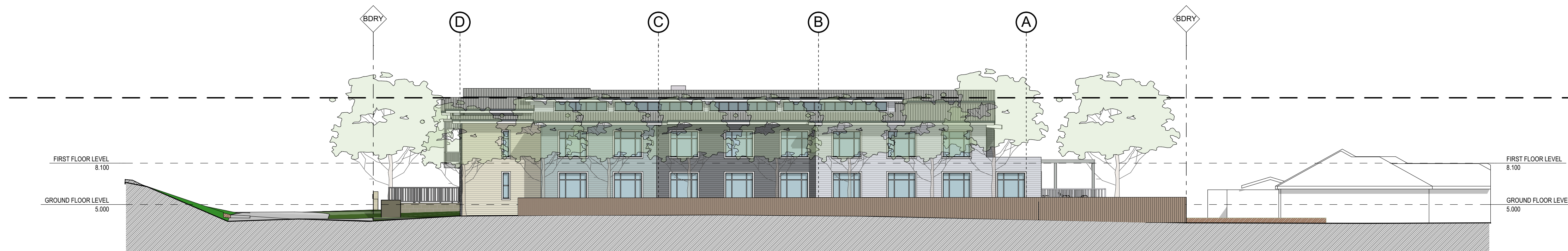


THOMPSON HEALTH BASSETT
PROPOSED AGED CARE FACILITY
23 + 25 BASSETT STREET,
MONA VALE NSW
LOTS 38 DP 7236 + 2 DP 748426
FOR THOMPSON HEALTH CARE

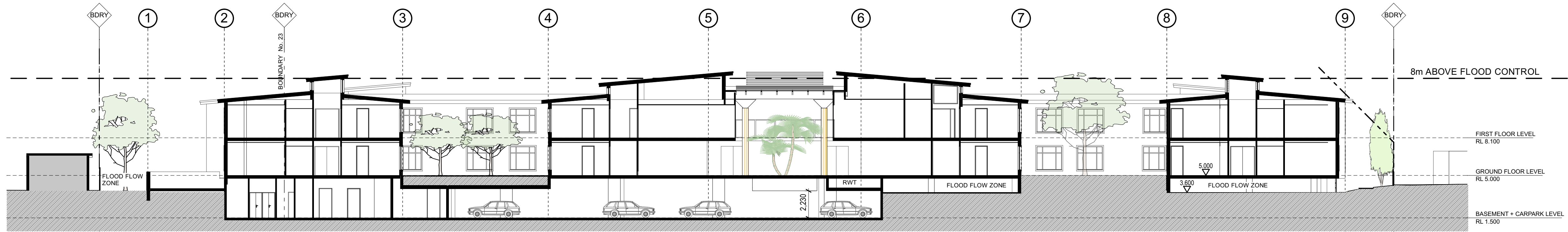
ELEVATIONS NORTH SOUTH
SCALE 1:200 @ A1
PROJECT NO. 1816
DRAWING NO. A-07
DATE 5/3/20
REVISION P3



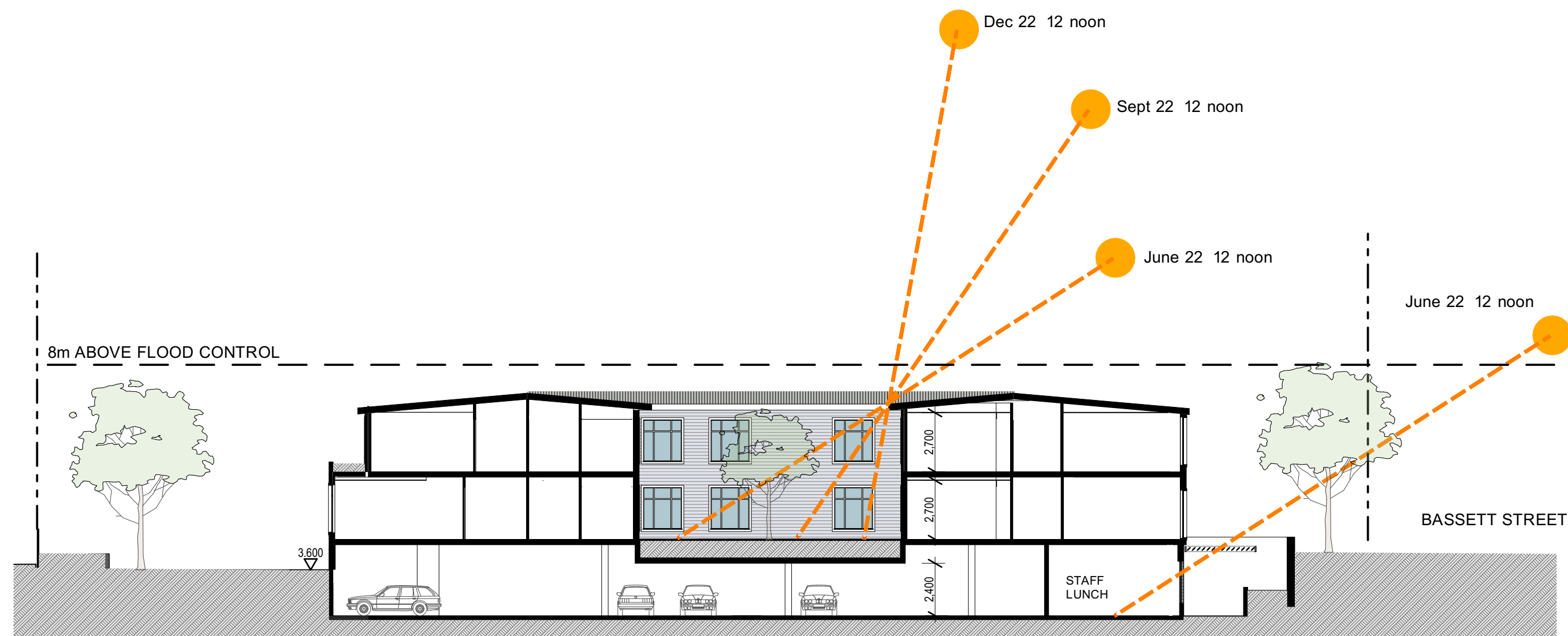
EAST ELEVATION



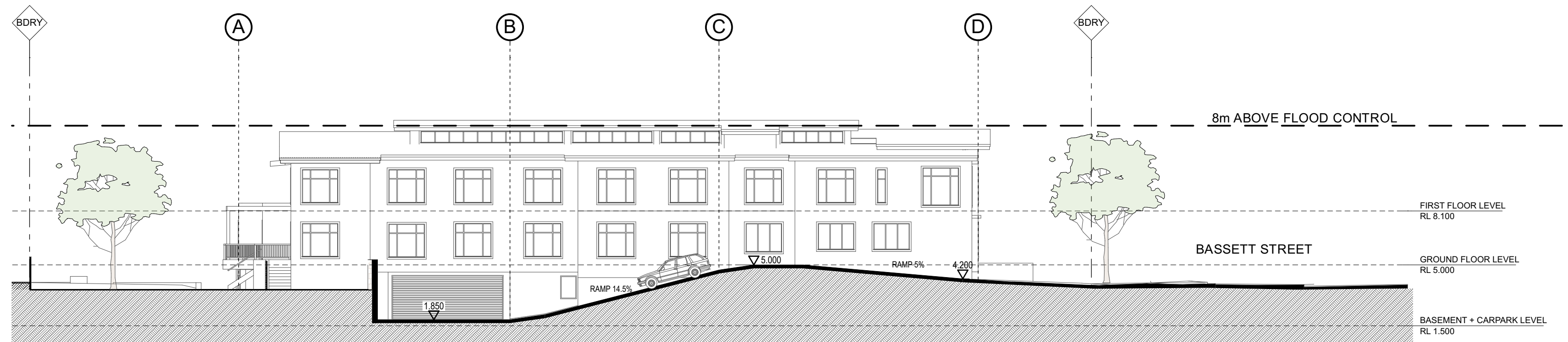
WEST ELEVATION



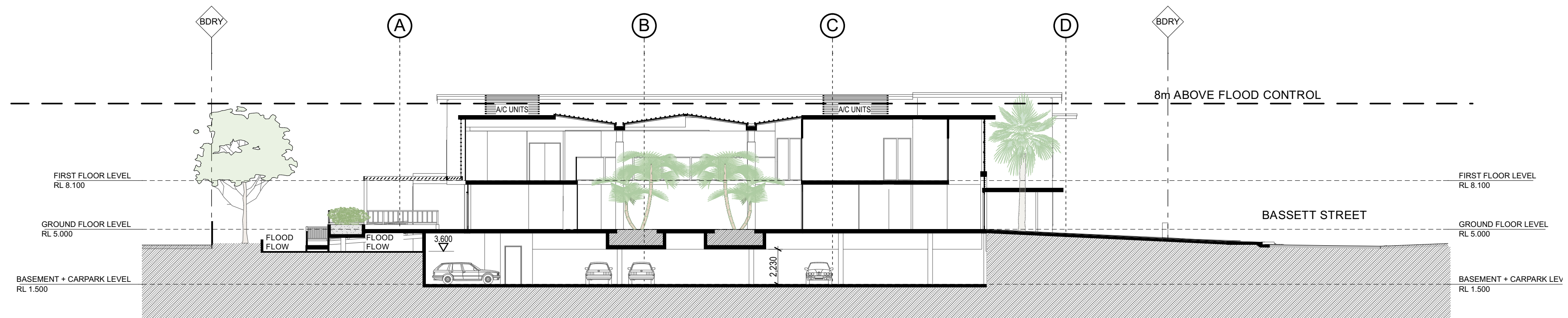
SECTION A



SECTION B



SECTION C



SECTION E



GARTNERTROVATO
ARCHITECTS

A 47700 MONA VALE NSW
NO 1000 11 02
NO 1000 11 02
NO 1000 11 02
NO 1000 11 02
NO 1000 11 02



THOMPSON HEALTH BASSETT
PROPOSED AGED CARE FACILITY
23 + 25 BASSETT STREET,
MONA VALE NSW
LOTS 38 DP 7236 + 2 DP 748426
FOR THOMPSON HEALTH CARE

SECTIONS
SCALE
1:200 @ A1
PROJECT NO.
1816

DATE
5/3/20
REVISION
P3



GARTNERTROVATO
ARCHITECTS
A 47700 MONA VALE NSW
K 00 000 11 00
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K 00 000 11 00



THOMPSON HEALTH BASSETT
PROPOSED AGED CARE FACILITY
23 + 25 BASSETT STREET,
MONA VALE NSW
LOTS 38 DP 7236 + 2 DP 748426
FOR THOMPSON HEALTH CARE

3D VIEWS
SCALE
@ A1
PROJECT NO.
1816

DATE
5/3/20
REVISION
P3

Appendix B - Flood Information Request - Comprehensive

Prepared by Northern Beaches Council for 23 Bassett Street and 33 Bassett Street, Mona Vale, dated 26 March 2020.

FLOOD INFORMATION REQUEST – COMPREHENSIVE

Property: 23 Bassett Street, Mona Vale

Issue Date: 26/03/2020

Flood Study Reference: McCarrs Creek, Mona Vale and Bayview Flood Study Review 2017, Royal HaskoningDHV

Flood Information for lot:

Flood Life Hazard Category – See Map A

1% AEP – See Flood Map B

1% AEP Maximum Water Level³: 4.34 mAHD

1% AEP Maximum Peak Depth from natural ground level³: 0.69 m

1% AEP Maximum Velocity: 0.27 m/s

1% AEP Provisional Flood Hazard: Low **See Flood Map E**

1% AEP Hydraulic Categorisation: Flood storage **See Flood Map F**

Flood Planning Area – See Flood Map C

Flood Planning Level (FPL) ^{1, 2, 3 & 4}: 4.84 m AHD

Probable Maximum Flood (PMF) – See Flood Map D

PMF Maximum Water Level²: 4.91 m AHD

PMF Maximum Depth from natural ground level: 1.26 m

PMF Maximum Velocity: 0.34 m/s

PMF Flood Hazard: High **See Flood Map G**

PMF Hydraulic Categorisation: Flood storage **See Flood Map H**

Flooding with Climate Change (See Flood Map I)

The following is for the 30% Rainfall intensity increase and 0.9m Sea Level Rise Scenario:

1% AEP Maximum Water Level with Climate change^{1&3}: 4.37 m AHD

1% AEP Maximum Depth with Climate Change³: 0.75 m

1% AEP Maximum Velocity with Climate Change³: 0.57 m/s

Flood Risk Precinct – See Map J

¹The flood information does not take into account any local overland flow issues nor private stormwater drainage systems.

²Overland flow/mainstream water levels may vary across a sloping site, resulting in variable minimum floor/flood planning levels across the site.

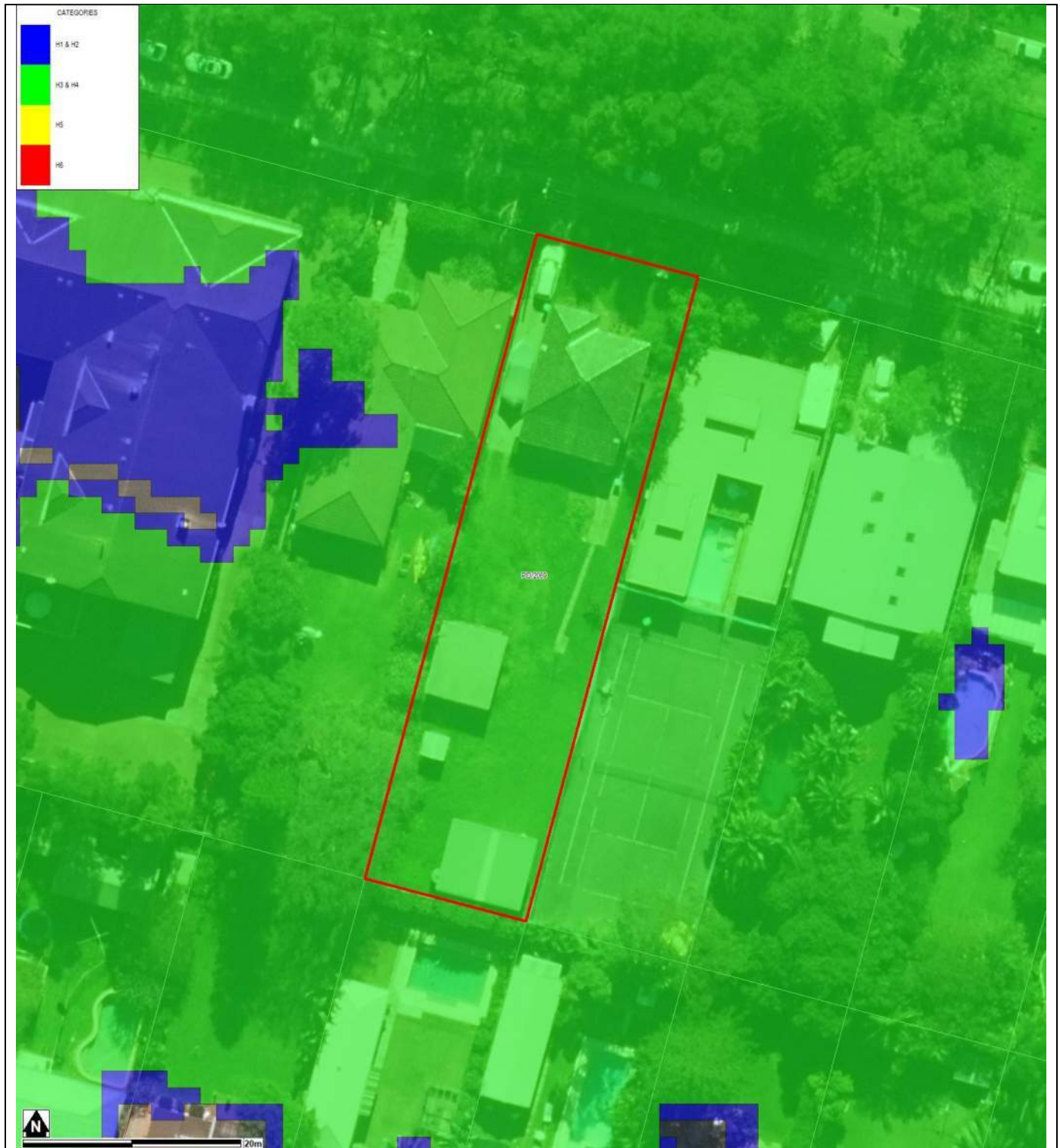
³Intensification of development in the former Pittwater LGA requires the consideration of climate change impacts which may result in higher minimum floor levels than those indicated on this flood advice.

⁴Vulnerable/critical developments require higher minimum floor levels using the higher of the PMF or Flood Planning Level

General Notes:

- All levels are based on Australian Height Datum (AHD) unless otherwise noted.
- This is currently the best available information on flooding; it may be subject to change in the future.
- Council recommends that you obtain a detailed survey of the above property and surrounds to AHD by a registered surveyor to determine any features that may influence the predicted extent or frequency of flooding. It is recommended you compare the flood level to the ground and floor levels to determine the level of risk the property may experience should flooding occur.
- Development approval is dependent on a range of issues, including compliance with all relevant provisions of Northern Beaches Council's Local Environmental Plans and Development Control Plans.
- Please note that the information contained within this letter is general advice only as a detail survey of the property as well as other information is not available. Council recommends that you engage a suitably experienced consultant to provide site specific flooding advice prior to making any decisions relating to the purchase or development of this property.
- The Flood Studies on which Council's flood information is based are available on Council's website.

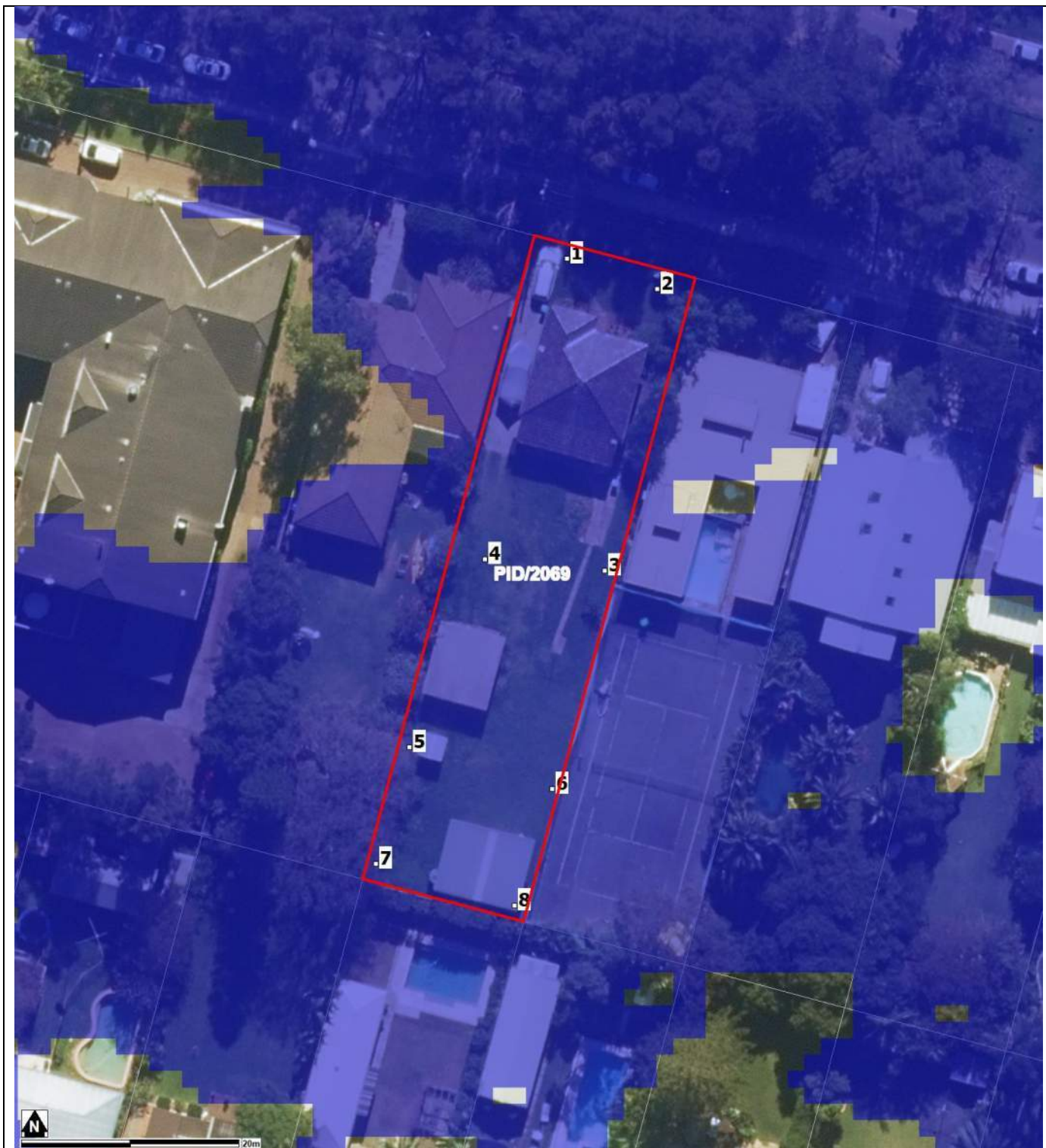
FLOOD MAP A: FLOOD LIFE HAZARD CATEGORY



Notes:

- Refer to 'Flood Emergency Response Planning for Development in Pittwater Policy for additional information on the Flood Life Hazard Categories and Pittwater 21 DCP Control B3.13.
- Cadastre Lines (Source: NSW Government Land and Property Information), flood levels/extents (Source: McCarrs Creek, Mona Vale and Bayview Flood Study Review 2017, Royal HaskoningDHV) and aerial photography (Source Near Map 2014) are indicative only.

FLOOD LEVEL POINTS



Note: Cadastre Lines (Source: NSW Government Land and Property Information), flood levels/extents (Source: McCarrs Creek, Mona Vale and Bayview Flood Study Review 2017, Royal HaskoningDHV) and aerial photography (Source: NearMap 2014) are indicative only.

Flood Levels

ID	5% AEP Max WL (m AHD)	5% AEP Max Depth (m)	1% AEP Max WL (m AHD)	1% AEP Max Depth (m)	1% AEP Max Velocity (m/s)	Flood Planning Level (m)	PMF Max WL (m AHD)	PMF Max Depth (m)	PMF Max Velocity (m/s)
1	N/A	N/A	4.34	0.58	0.11	4.84	4.91	1.15	0.25
2	N/A	N/A	4.34	0.66	0.10	4.84	4.91	1.23	0.24
3	N/A	N/A	4.33	0.51	0.12	4.83	4.89	1.07	0.24
4	N/A	N/A	4.32	0.52	0.15	4.82	4.88	1.07	0.28
5	N/A	N/A	4.31	0.55	0.09	4.81	4.86	1.09	0.20
6	N/A	N/A	4.32	0.45	0.08	4.82	4.87	0.99	0.21
7	N/A	N/A	4.31	0.34	0.27	4.81	4.84	0.87	0.32
8	N/A	N/A	4.32	0.33	0.07	4.82	4.86	0.87	0.20

WL – Water Level

PMF – Probable Maximum Flood

N/A = no peak water level/depth/velocity available in flood event

Climate Change Flood Levels (30% Rainfall intensity and 0.9m Sea Level Rise)

ID	CC 1% AEP Max WL (m AHD)	CC1 % AEP Max Depth (m)
1	4.37	0.62
2	4.37	0.71
3	4.36	0.51
4	4.36	0.56
5	4.35	0.58
6	4.36	0.47
7	4.35	0.42
8	4.35	0.36

A variable Flood Planning Level might apply - 0.5m above 1% AEP max water level (for Mainstream flooding) or 0.5m above the 1% AEP max water level flow path extent with depth greater than 0.3m and 0.3m above the 1% AEP max water level flow path with depth 0.3m and less (for overland flow)

WL – Water Level

PMF – Probable Maximum Flood

N/A = no peak water level/depth/velocity available in flood event.

FLOOD MAP B: FLOODING - 1% AEP EXTENT



Notes:

- Extent represents the 1% annual Exceedance Probability (AEP) flood event.
- Flood events exceeding the 1% AEP can occur on this site.
- Extent does not include climate change.
- Cadastre Lines (Source: NSW Government Land and Property Information), flood levels/extents (Source: McCarrs Creek, Mona Vale and Bayview Flood Study Review 2017, Royal HaskoningDHV) and aerial photography (Source Near Map 2014) are indicative only.

FLOOD MAP C: FLOOD PLANNING AREA EXTENT



Notes:

- Extent represents the 1% annual Exceedance Probability (AEP) flood event + freeboard.
- Extent does not include climate change.
- Cadastre Lines (Source: NSW Government Land and Property Information), flood levels/extents (Source: McCarrs Creek, Mona Vale and Bayview Flood Study Review 2017, Royal HaskoningDHV) and aerial photography (Source Near Map 2014) are indicative only.

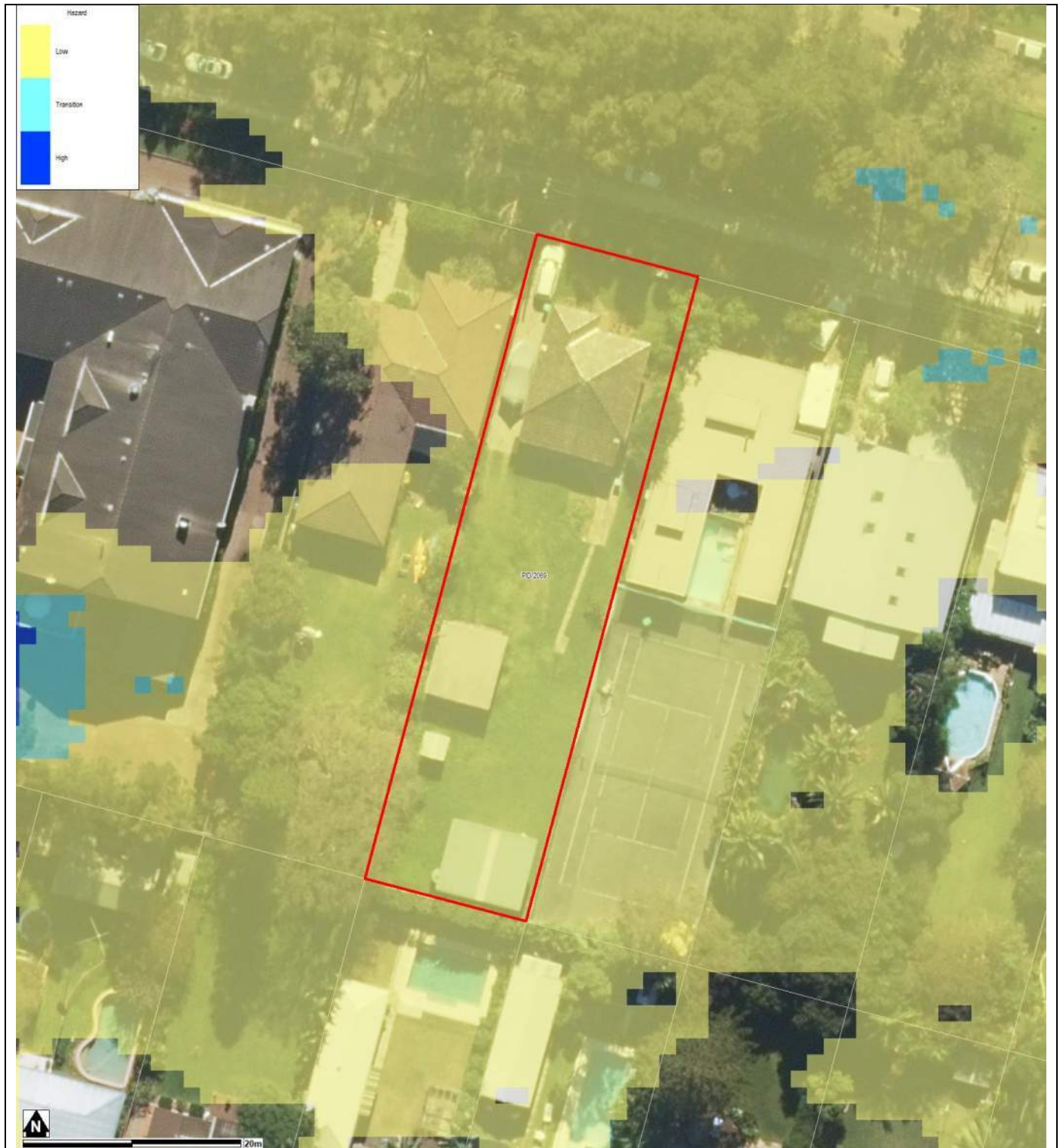
FLOOD MAP D: PMF EXTENT MAP



Notes:

- Extent represents the Probable Maximum Flood (PMF) flood event
- Extent does not include climate change
- Cadastre Lines (Source: NSW Government Land and Property Information), flood levels/extents (Source: McCarrs Creek, Mona Vale and Bayview Flood Study Review 2017, Royal HaskoningDHV) and aerial photography (Source: NearMap 2014) are indicative only

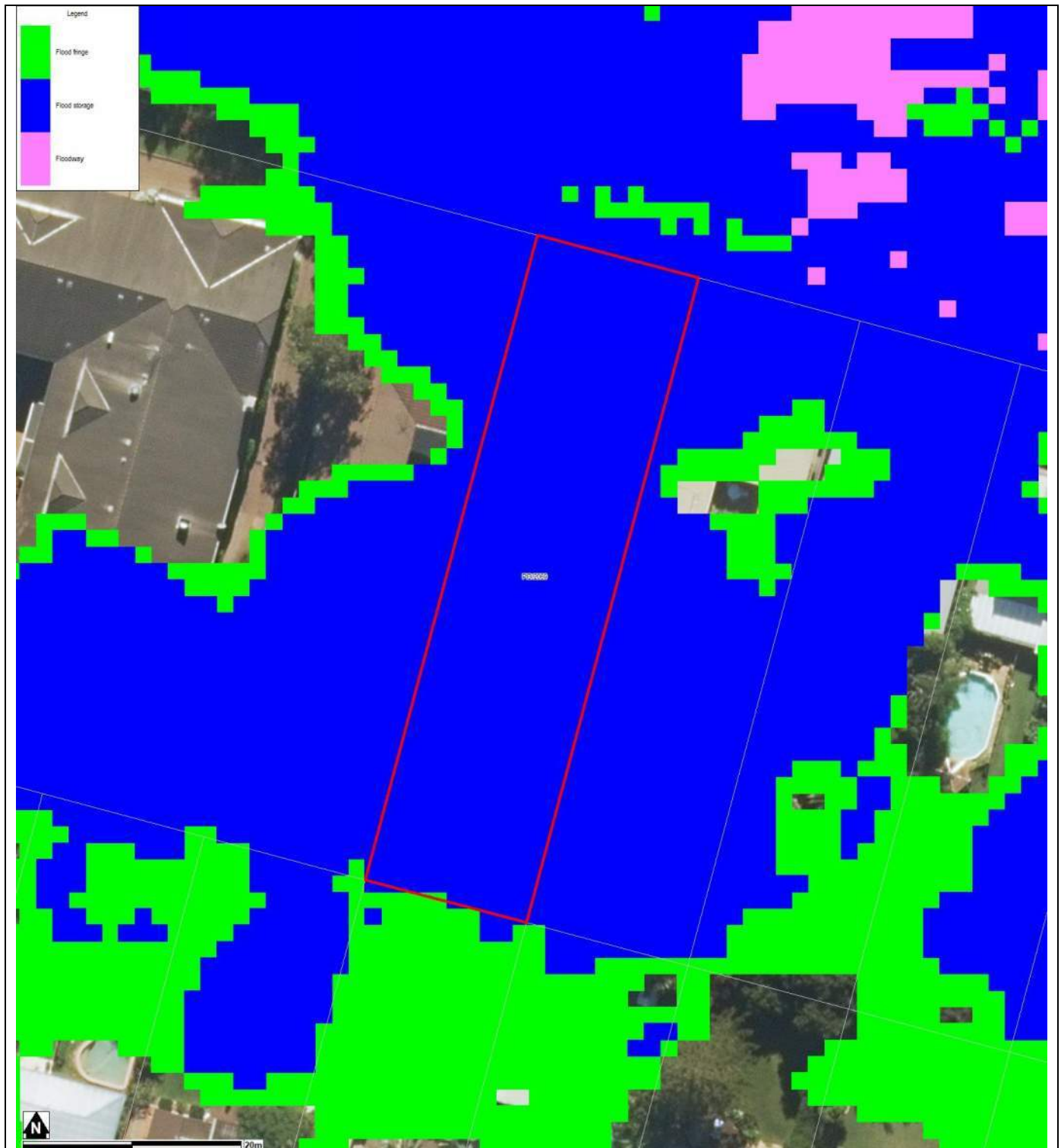
FLOOD MAP E: 1% AEP FLOOD HAZARD EXTENT MAP



Notes:

- Extent represents the 1% annual Exceedance Probability (AEP) flood event
- Extent does not include climate change
- Cadastre Lines (Source: NSW Government Land and Property Information), flood levels/extents (Source: McCarrs Creek, Mona Vale and Bayview Flood Study Review 2017, Royal HaskoningDHV) and aerial photography (Source: NearMap 2014) are indicative only

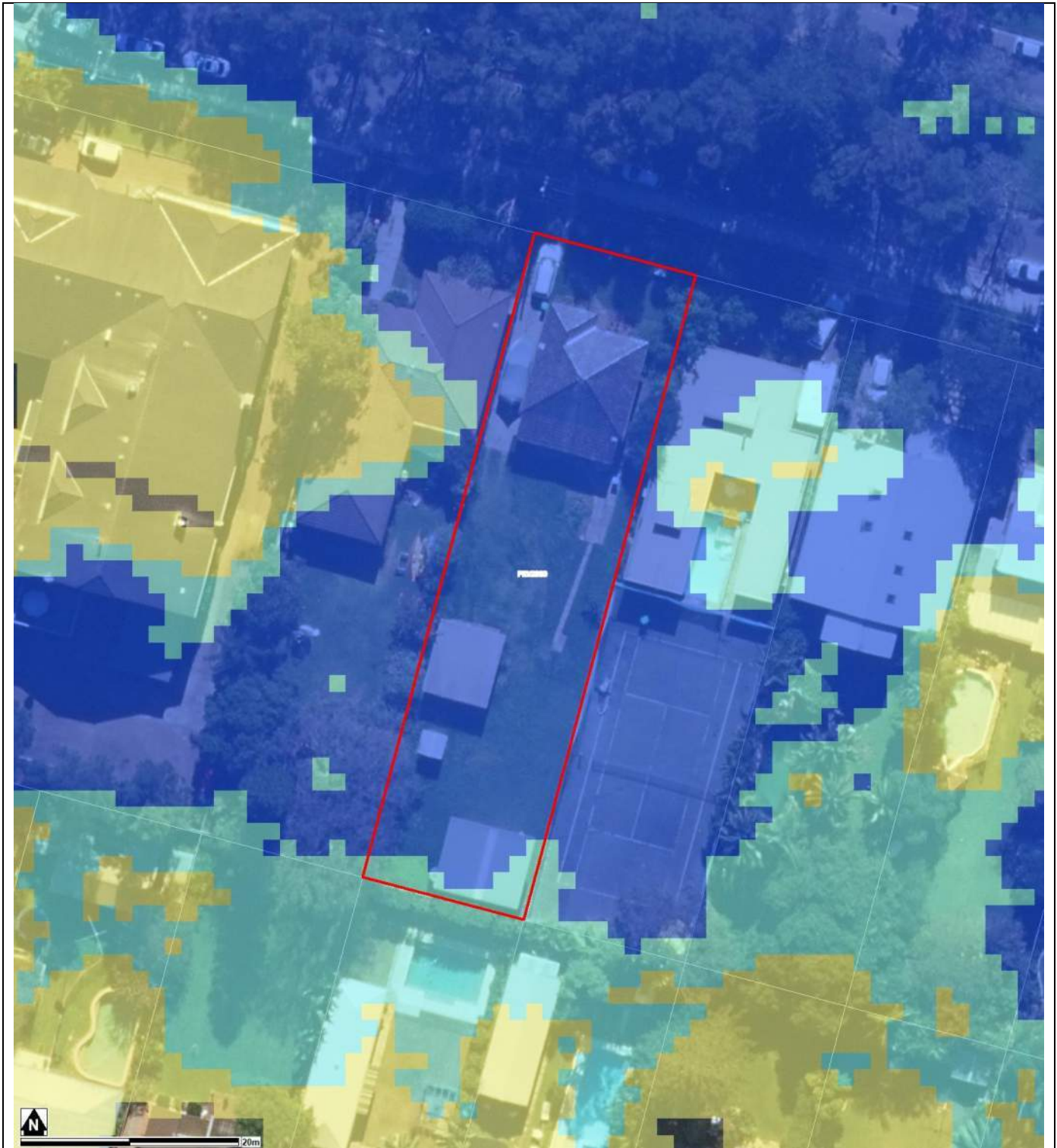
FLOOD MAP F: 1% AEP FLOOD HYDRAULIC CATEGORY EXTENT MAP



Notes:

- Extent represents the 1% annual Exceedance Probability (AEP) flood event
- Extent does not include climate change
- Cadastre Lines (Source: NSW Government Land and Property Information), flood levels/extents (Source: McCarrs Creek, Mona Vale and Bayview Flood Study Review 2017, Royal HaskoningDHV) and aerial photography (Source: NearMap 2014) are indicative only

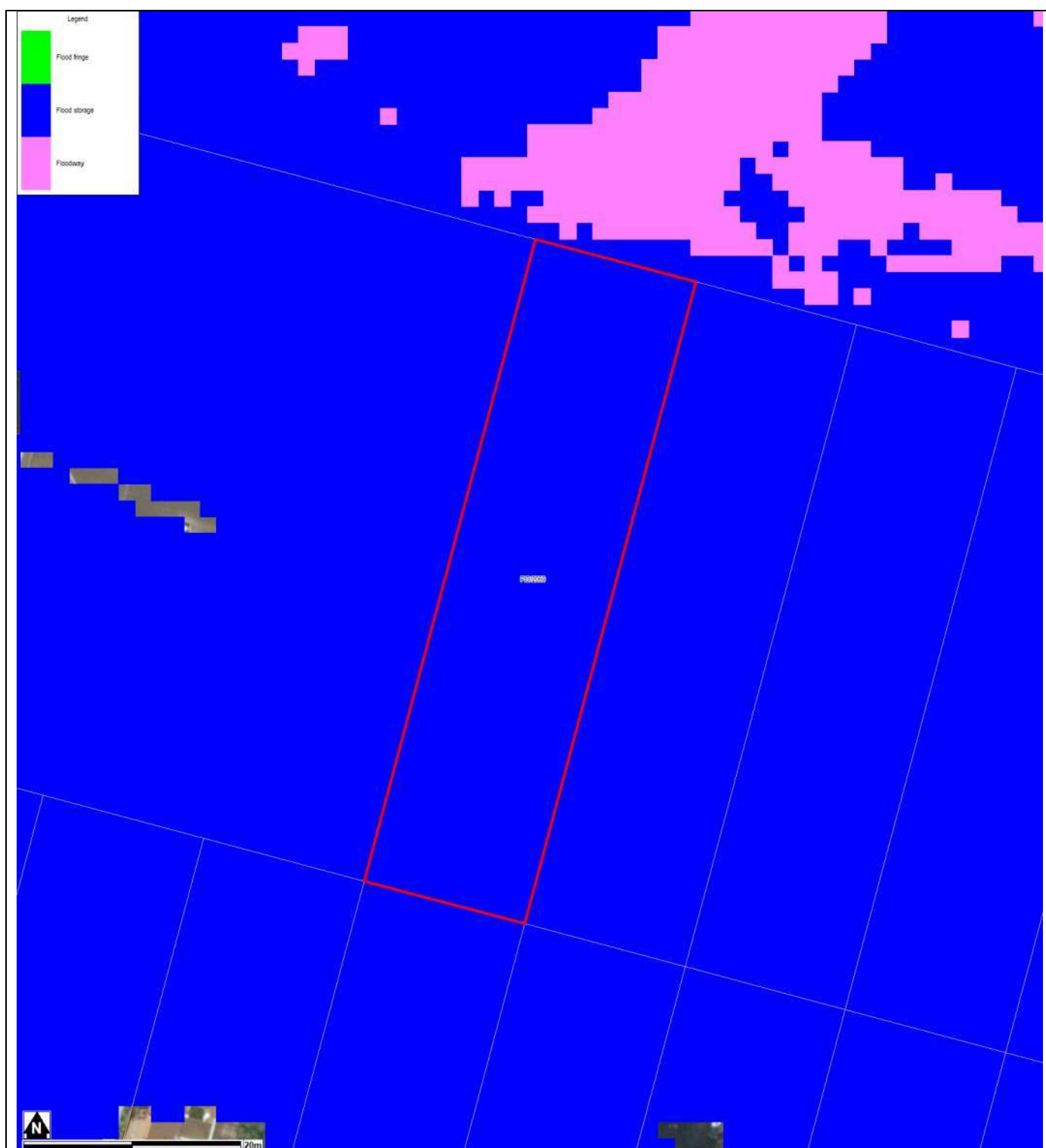
FLOOD MAP G: PMF FLOOD HAZARD EXTENT MAP



Notes:

- Extent represents the 1% annual Exceedance Probability (AEP) flood event
- Extent represents the Probable Maximum Flood (PMF) event
- Extent does not include climate change
- Cadastre Lines (Source: NSW Government Land and Property Information), flood levels/extents (Source: McCarrs Creek, Mona Vale and Bayview Flood Study Review 2017, Royal HaskoningDHV) and aerial photography (Source: NearMap 2014) are indicative only

FLOOD MAP H: PMF FLOOD HYDRAULIC CATEGORY EXTENT MAP



Notes:

- Extent represents the Probable Maximum Flood (PMF) event
- Extent does not include climate change
- Cadastre Lines (Source: NSW Government Land and Property Information), flood levels/extents (Source: McCarrs Creek, Mona Vale and Bayview Flood Study Review 2017, Royal HaskoningDHV) and aerial photography (Source: NearMap 2014) are indicative only

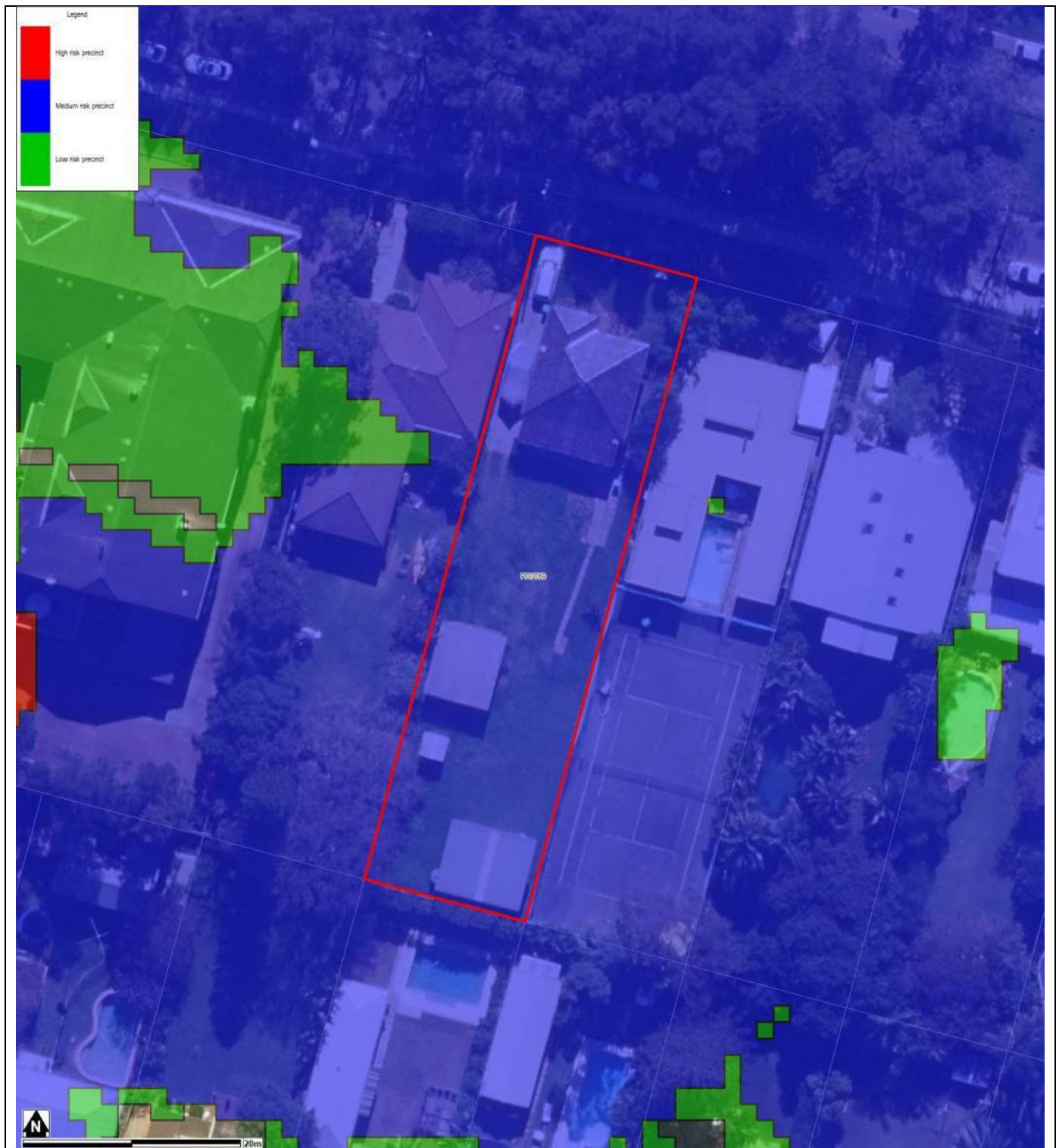
FLOOD MAP I: FLOODING – 1% AEP EXTENT PLUS CLIMATE CHANGE



Note:

- Extent represents the 1% annual Exceedance Probability (AEP) flood event including 30% rainfall intensity and 0.9m Sea Level Rise climate change scenario
- Flood events exceeding the 1% AEP can occur on this site.
- Cadastre Lines (Source: NSW Government Land and Property Information), flood levels/extents (Source: McCarrs Creek, Mona Vale and Bayview Flood Study Review 2017, Royal HaskoningDHV) and aerial photography (Source: NearMap 2014) are indicative only

FLOOD MAP J: FLOOD RISK PRECINCT MAP



Notes:

- **Low Flood Risk precinct** means all flood prone land not identified within the High or Medium flood risk precincts.
- **Medium Flood Risk precinct** means all flood prone land that is (a) within the 1% AEP Flood Planning Area; and (b) is not within the high flood risk precinct.
- **High Flood Risk precinct** means all flood prone land (a) within the 1% AEP Flood Planning Area; and (b) is either subject to a high hydraulic hazard, within the floodway or subject to significant evacuation difficulties (H5 and or H6 Life Hazard Classification).
- Does not include climate change

GUIDELINES for Preparing a Flood Management Report

Introduction

These guidelines are intended to provide advice to applicants on preparing a Flood Management Report. The purpose of a Flood Management Report is to help applicants measure and manage the flood risk to life and property on their site.

When is a Flood Management Report required?

A Flood Management Report must be submitted with any Development Application on flood prone land, for Council to consider the potential flood impacts and controls. For Residential or Commercial development, it is required for development on land identified within the Medium or High Flood Risk Precinct. For Vulnerable or Critical development, it is required if it is within any Flood Risk Precinct.

Note that the flood extents shown on the mapping are indicative only. It is recommended that flood levels are compared to registered ground survey to more accurately determine the flood extent.

There are some circumstances where a Flood Management Report undertaken by a professional engineer may not be required. However, the relevant parts of the DCP and LEP would still need to be addressed, so as to demonstrate compliance. Examples where this may apply include:

- If all proposed works are located outside the relevant Flood Risk Precinct extent
- First floor addition only, where the floor level is above the Probable Maximum Flood level
- Internal works only, where habitable floor areas below the Flood Planning Level are not being increased

Note that development on flood prone land will still be assessed for compliance with the relevant DCP and LEP, and may still be subject to flood related development controls.

What is in a Flood Management Report?

The aim of a Flood Management Report is to demonstrate how a proposed development will comply with the flood related development controls outlined in the relevant LEP and DCP clauses. The report must detail the design, measures and controls needed to achieve compliance, following the steps outlined below.

A Flood Management Report should reflect the size, type and location of the development, proportionate to the scope of the works proposed, and considering its relationship to surrounding development. The report should also assess the flood risk to life and property.

Technical requirements of a Flood Management Report

The technical requirements of a Flood Management Report should include (where relevant):

1. Description of development

The description of development should identify:

- Outline of the proposed development, with plans if necessary for clarity
- Use of the building, hours of operation, proposed traffic usage or movement
- Type of use, ie, critical, vulnerable, subdivision, residential, business, industrial, recreational, environmental or concessional

2. Flood analysis

The flood analysis should include:

- Predicted 1 in 100 year flood level
- Flood Planning Level (FPL)
- Probable Maximum Flood (PMF) level
- Flood Risk Precinct, ie High, Medium or Low
- Flood Life Hazard Category (in former Pittwater Council area only)
- Mapping of relevant extents
- Flood characteristics for the site, eg depth, velocity, hazard and hydraulic category, and the impact these have on the proposed development

Note that if the property is affected by estuarine flooding or other coastal issues, these need to be addressed separately under the relevant DCP.

3. Assessment of impacts

The assessment of impacts should address the various elements of the relevant LEP and DCP. A simple compliance table should be provided, similar to the table one below.

	Compliance		
	Not Applicable	Yes	No
A Flood effects caused by Development			
B Drainage Infrastructure & Creek Works			
C Building Components & Structural			
D Storage of Goods			
E Flood Emergency Response			
F Floor Levels			
G Car Parking			
H Fencing			
I Pools			

Further details of what is required for each of these categories can be found in the *Development Control Plan for Flood Prone Land*.

For any of these categories which are applicable, the assessment should demonstrate how the development complies, or if it doesn't, provide an explanation of why the development should still be considered.

Reporting requirements for a Flood Management Report

The Flood Management Report should include:

- a) Executive summary
- b) Location plan, at an appropriate scale, that includes geographical features, street names and identifies all waterways and Council stormwater pipes, pits and easements
- c) Plan of the proposed development site showing the extent of the predicted 100 year, any high hazard or floodway conditions and the PMF flood event
- d) Development recommendations and construction methodologies
- e) Calculation formulae (particularly for flood storage)
- f) Clear referencing using an accepted academic referencing system (eg. Harvard)
- g) Analysis of development against relevant State Environmental Planning Policies
- h) Analysis of development against relevant Local Environment Plan and Policies
- i) Conclusion detailing key points
- j) Standard Hydraulic Certification (Form A/A1)
- k) Qualifications of author
- l) Any flood advice provided by Council
- m) Any other details which may be relevant

NOTE: Qualifications of Author

Council requires that the Flood Management Report be prepared by a suitably qualified Engineer with experience in flood design / management who has, or is eligible for, membership to the Australian Institute of Engineers.

For further information please contact Stormwater and Floodplain Team on 1300 434 434 or via email at floodplain@northernbeaches.nsw.gov.au

Attachment A

NORTHERN BEACHES COUNCIL STANDARD HYDRAULIC CERTIFICATION FORM

FORM A/A1 – To be submitted with Development Application

Development Application for

Address of site: _____

Declaration made by hydraulic engineer or professional consultant specialising in flooding/flood risk management as part of undertaking the Flood Management Report:

I, _____ on behalf of _____
(Insert Name) (Trading or Business/ Company Name)

on this the _____ certify that I am engineer or a
(Date)

professional consultant specialising in flooding and I am authorised by the above organisation/ company to issue this document and to certify that the organisation/ company has a current professional indemnity policy of at least \$2 million.

Flood Management Report Details:

Report Title:

Report Date:

Author:

Author's Company/Organisation:

I: _____
(Insert Name)

Please tick all that are applicable (more than one box can be ticked)

☐ have obtained and included flood information from Council (must be less than 12 months old) **(This is mandatory)**

☐ have followed Council's Guidelines for Preparing a Flood Management Report

☐ have requested a variation to one or more of the flood related development controls. Details are provided in the *Flood Management Report*.

Signature

Name

FLOOD INFORMATION REQUEST – COMPREHENSIVE

Property: 33 Bassett Street, Mona Vale

Issue Date: 26/03/2020

Flood Study Reference: McCarrs Creek, Mona Vale and Bayview Flood Study Review 2017, Royal HaskoningDHV

Flood Information for lot:

Flood Life Hazard Category – See Map A

1% AEP – See Flood Map B

1% AEP Maximum Water Level³: 4.35 mAHD

1% AEP Maximum Peak Depth from natural ground level³: 1.10 m

1% AEP Maximum Velocity: 0.54 m/s

1% AEP Provisional Flood Hazard: High **See Flood Map E**

1% AEP Hydraulic Categorisation: Floodway **See Flood Map F**

Flood Planning Area – See Flood Map C

Flood Planning Level (FPL) ^{1, 2, 3 & 4}: 4.84 m AHD

Probable Maximum Flood (PMF) – See Flood Map D

PMF Maximum Water Level²: 4.91 m AHD

PMF Maximum Depth from natural ground level: 1.58 m

PMF Maximum Velocity: 0.82 m/s

PMF Flood Hazard: High **See Flood Map G**

PMF Hydraulic Categorisation: Floodway **See Flood Map H**

Flooding with Climate Change (See Flood Map I)

The following is for the 30% Rainfall intensity increase and 0.9m Sea Level Rise Scenario:

1% AEP Maximum Water Level with Climate change^{1&3}: 4.43 m AHD

1% AEP Maximum Depth with Climate Change³: 1.13 m

1% AEP Maximum Velocity with Climate Change³: 0.83 m/s

Flood Risk Precinct – See Map J

¹The flood information does not take into account any local overland flow issues nor private stormwater drainage systems.

²Overland flow/mainstream water levels may vary across a sloping site, resulting in variable minimum floor/flood planning levels across the site.

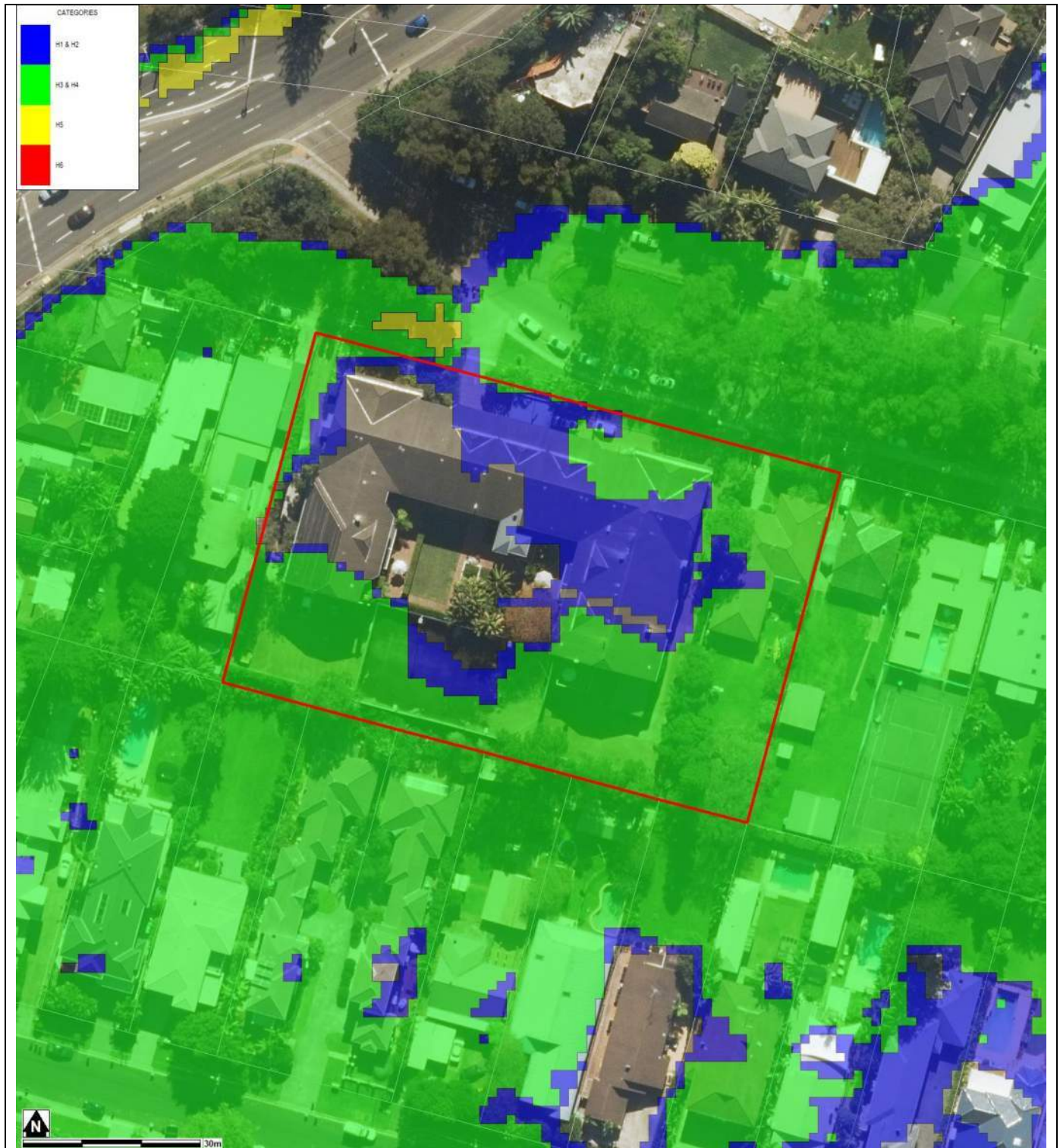
³Intensification of development in the former Pittwater LGA requires the consideration of climate change impacts which may result in higher minimum floor levels than those indicated on this flood advice.

⁴Vulnerable/critical developments require higher minimum floor levels using the higher of the PMF or Flood Planning Level

General Notes:

- All levels are based on Australian Height Datum (AHD) unless otherwise noted.
- This is currently the best available information on flooding; it may be subject to change in the future.
- Council recommends that you obtain a detailed survey of the above property and surrounds to AHD by a registered surveyor to determine any features that may influence the predicted extent or frequency of flooding. It is recommended you compare the flood level to the ground and floor levels to determine the level of risk the property may experience should flooding occur.
- Development approval is dependent on a range of issues, including compliance with all relevant provisions of Northern Beaches Council's Local Environmental Plans and Development Control Plans.
- Please note that the information contained within this letter is general advice only as a detail survey of the property as well as other information is not available. Council recommends that you engage a suitably experienced consultant to provide site specific flooding advice prior to making any decisions relating to the purchase or development of this property.
- The Flood Studies on which Council's flood information is based are available on Council's website.

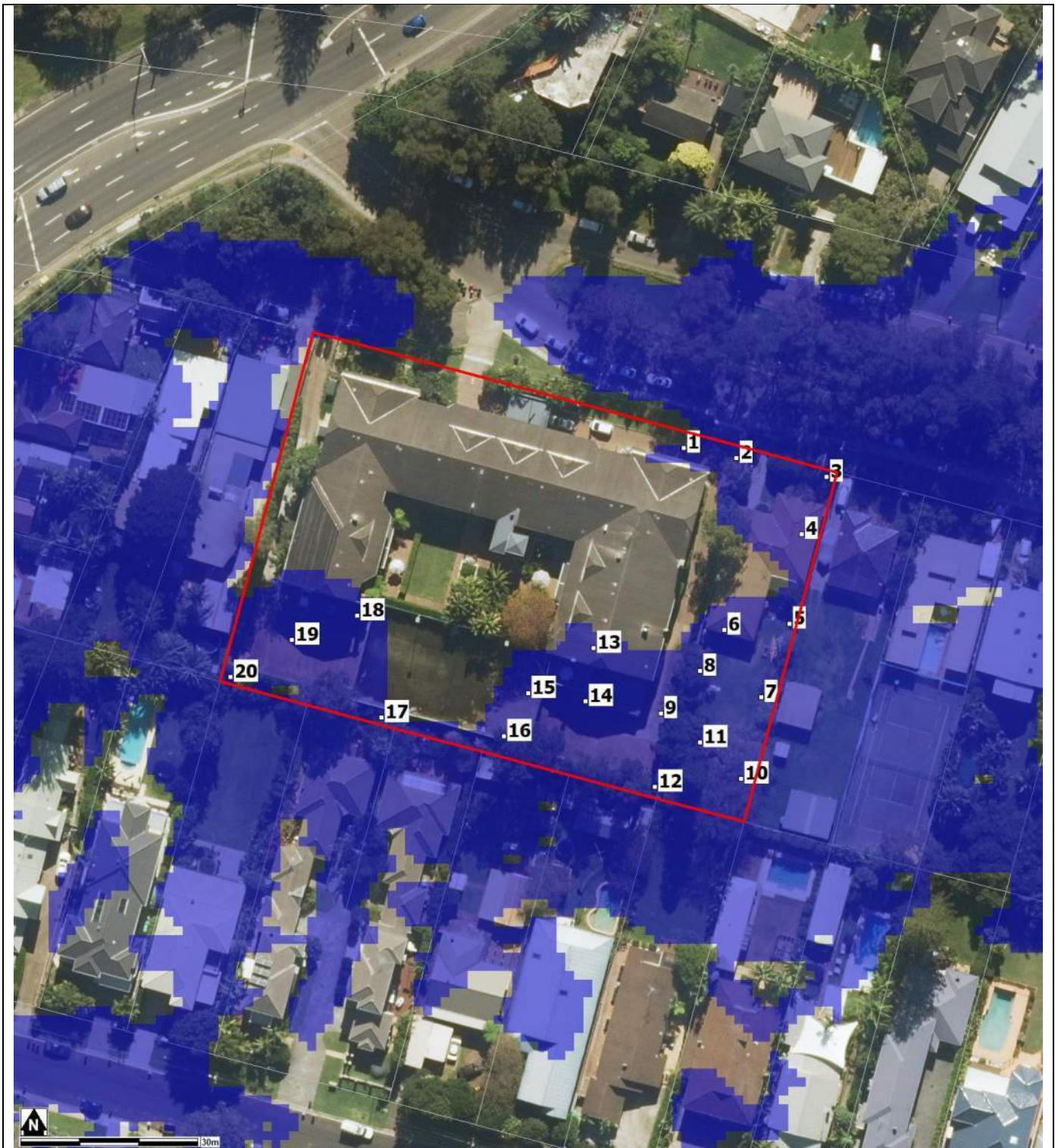
FLOOD MAP A: FLOOD LIFE HAZARD CATEGORY



Notes:

- Refer to 'Flood Emergency Response Planning for Development in Pittwater Policy for additional information on the Flood Life Hazard Categories and Pittwater 21 DCP Control B3.13.
- Cadastre Lines (Source: NSW Government Land and Property Information), flood levels/extents (Source: McCarrs Creek, Mona Vale and Bayview Flood Study Review 2017, Royal HaskoningDHV) and aerial photography (Source Near Map 2014) are indicative only.

FLOOD LEVEL POINTS



Note: Cadastre Lines (Source: NSW Government Land and Property Information), flood levels/extents (Source: McCarrs Creek, Mona Vale and Bayview Flood Study Review 2017, Royal HaskoningDHV) and aerial photography (Source: NearMap 2014) are indicative only.

Flood Levels

ID	5% AEP Max WL (m AHD)	5% AEP Max Depth (m)	1% AEP Max WL (m AHD)	1% AEP Max Depth (m)	1% AEP Max Velocity (m/s)	Flood Planning Level (m)	PMF Max WL (m AHD)	PMF Max Depth (m)	PMF Max Velocity (m/s)
1	N/A	N/A	4.34	0.20	0.09	4.84	4.90	0.76	0.17
2	N/A	N/A	4.34	0.46	0.08	4.84	4.91	1.03	0.09
3	N/A	N/A	4.34	0.60	0.18	4.84	4.91	1.17	0.28
4	N/A	N/A	4.33	0.61	0.06	4.84	4.90	1.18	0.10
5	N/A	N/A	4.32	0.47	0.10	4.82	4.88	1.03	0.20
6	N/A	N/A	4.31	0.46	0.10	4.81	4.86	1.01	0.19
7	N/A	N/A	4.31	0.46	0.07	4.81	4.86	1.00	0.16
8	N/A	N/A	4.30	0.47	0.10	4.80	4.84	1.00	0.19
9	N/A	N/A	4.27	0.71	0.14	4.77	4.78	1.22	0.22
10	N/A	N/A	4.31	0.46	0.10	4.81	4.84	0.99	0.19
11	N/A	N/A	4.29	0.52	0.11	4.79	4.81	1.05	0.19
12	N/A	N/A	4.28	0.30	0.43	4.77	4.78	0.81	0.53
13	N/A	N/A	4.26	0.45	0.09	4.76	4.77	0.95	0.10
14	N/A	N/A	4.25	0.82	0.09	4.76	4.75	1.31	0.18
15	N/A	N/A	4.25	0.70	0.06	4.75	4.74	1.19	0.12
16	N/A	N/A	4.25	0.58	0.09	4.74	4.72	1.05	0.20
17	N/A	N/A	4.06	0.37	0.18	4.56	4.63	0.95	0.21
18	N/A	N/A	4.02	0.69	0.06	4.52	4.63	1.29	0.07
19	N/A	N/A	4.02	0.49	0.05	4.52	4.62	1.09	0.07
20	N/A	N/A	4.00	0.22	0.05	4.50	4.61	0.83	0.10

WL – Water Level

PMF – Probable Maximum Flood

N/A = no peak water level/depth/velocity available in flood event

Climate Change Flood Levels (30% Rainfall intensity and 0.9m Sea Level Rise)

ID	CC 1% AEP Max WL (m AHD)	CC1 % AEP Max Depth (m)
1	4.37	0.16
2	4.37	0.53
3	4.37	0.65
4	4.37	0.61
5	4.36	0.50
6	4.35	0.62
7	4.35	0.49
8	4.34	0.51
9	4.31	0.55
10	4.34	0.50
11	4.33	0.54
12	4.30	0.42
13	4.29	0.64
14	4.29	0.89
15	4.29	0.78
16	4.28	0.67
17	4.13	0.37
18	4.12	0.82
19	4.12	0.59
20	4.11	0.28

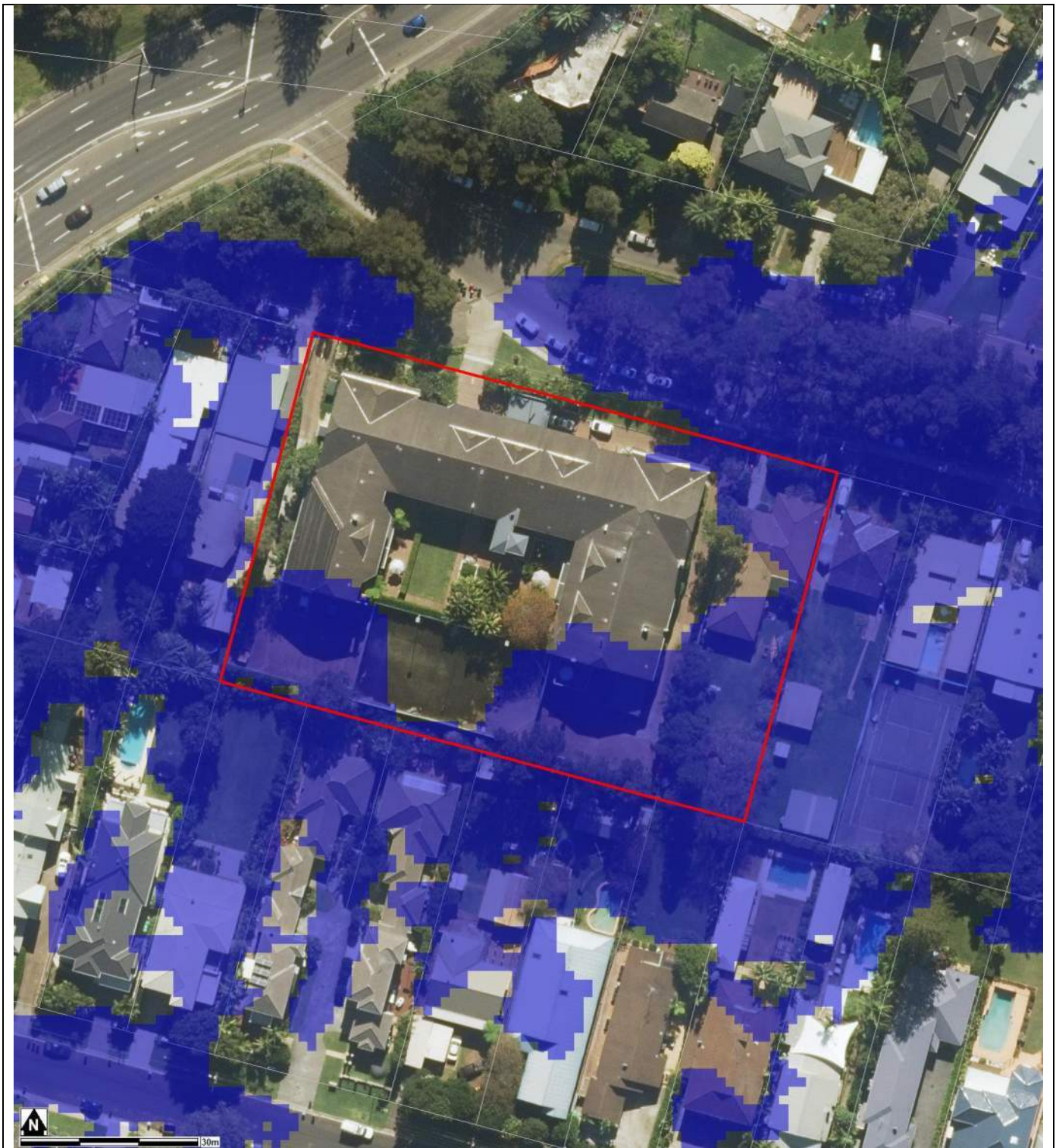
A variable Flood Planning Level might apply - 0.5m above 1% AEP max water level (for Mainstream flooding) or 0.5m above the 1% AEP max water level flow path extent with depth greater than 0.3m and 0.3m above the 1% AEP max water level flow path with depth 0.3m and less (for overland flow)

WL – Water Level

PMF – Probable Maximum Flood

N/A = no peak water level/depth/velocity available in flood event.

FLOOD MAP B: FLOODING - 1% AEP EXTENT



Notes:

- Extent represents the 1% annual Exceedance Probability (AEP) flood event.
- Flood events exceeding the 1% AEP can occur on this site.
- Extent does not include climate change.
- Cadastre Lines (Source: NSW Government Land and Property Information), flood levels/extents (Source: McCarrs Creek, Mona Vale and Bayview Flood Study Review 2017, Royal HaskoningDHV) and aerial photography (Source Near Map 2014) are indicative only.

FLOOD MAP C: FLOOD PLANNING AREA EXTENT



Notes:

- Extent represents the 1% annual Exceedance Probability (AEP) flood event + freeboard.
- Extent does not include climate change.
- Cadastre Lines (Source: NSW Government Land and Property Information), flood levels/extents (Source: McCarrs Creek, Mona Vale and Bayview Flood Study Review 2017, Royal HaskoningDHV) and aerial photography (Source Near Map 2014) are indicative only.

FLOOD MAP D: PMF EXTENT MAP



Notes:

- Extent represents the Probable Maximum Flood (PMF) flood event
- Extent does not include climate change
- Cadastre Lines (Source: NSW Government Land and Property Information), flood levels/extents (Source: McCarrs Creek, Mona Vale and Bayview Flood Study Review 2017, Royal HaskoningDHV) and aerial photography (Source: NearMap 2014) are indicative only

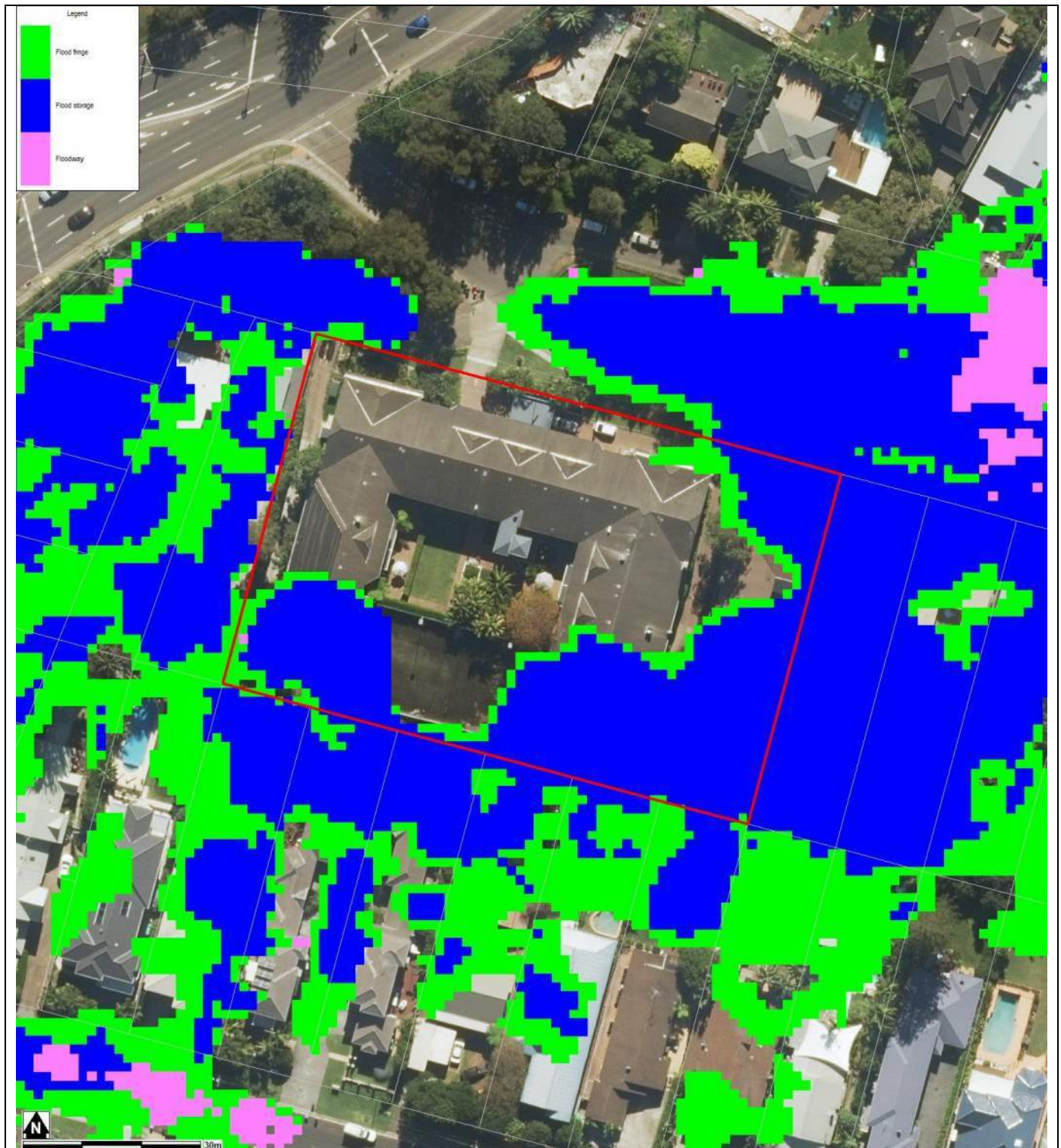
FLOOD MAP E: 1% AEP FLOOD HAZARD EXTENT MAP



Notes:

- Extent represents the 1% annual Exceedance Probability (AEP) flood event
- Extent does not include climate change
- Cadastre Lines (Source: NSW Government Land and Property Information), flood levels/extents (Source: McCarrs Creek, Mona Vale and Bayview Flood Study Review 2017, Royal HaskoningDHV) and aerial photography (Source: NearMap 2014) are indicative only

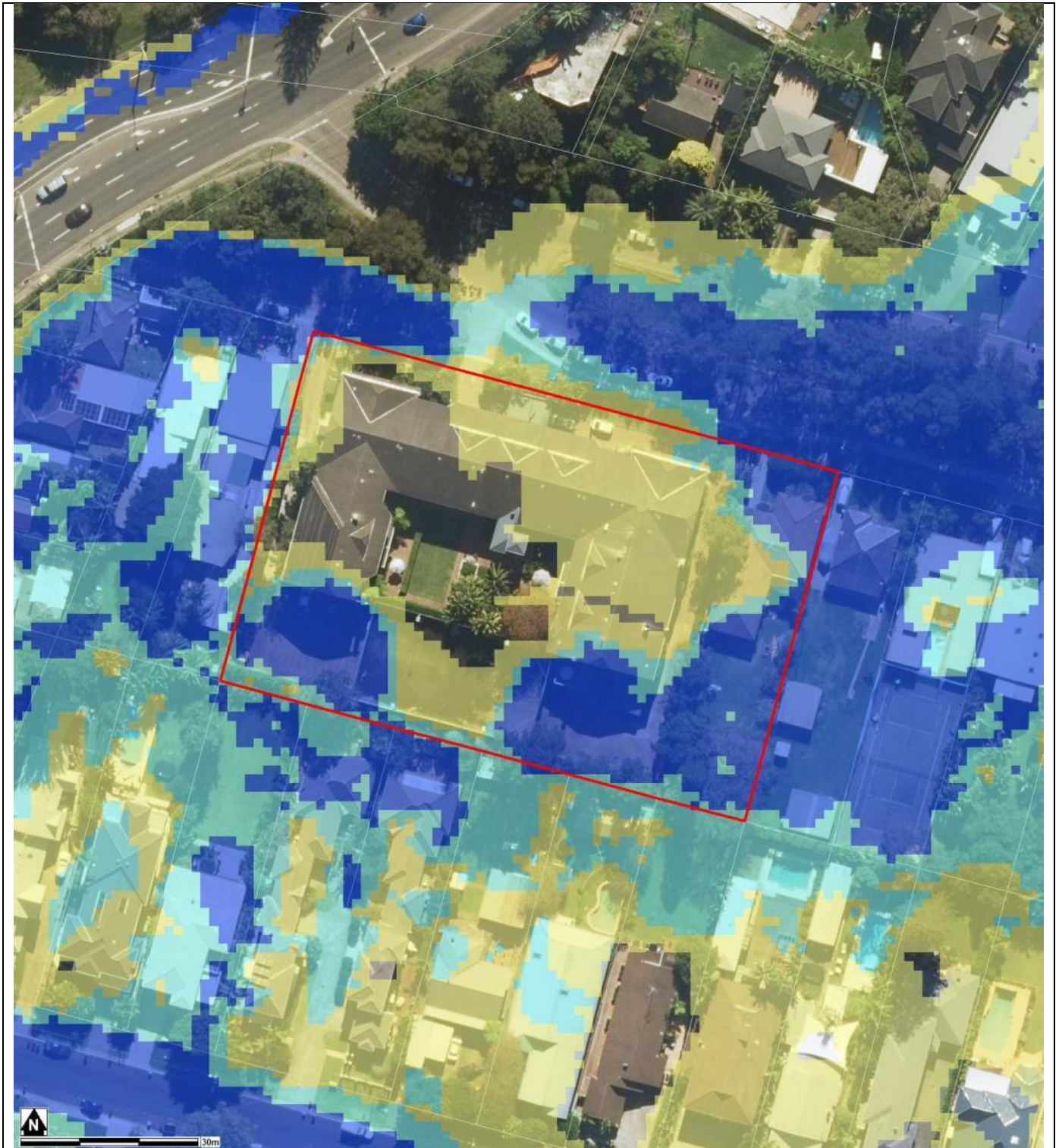
FLOOD MAP F: 1% AEP FLOOD HYDRAULIC CATEGORY EXTENT MAP



Notes:

- Extent represents the 1% annual Exceedance Probability (AEP) flood event
- Extent does not include climate change
- Cadastre Lines (Source: NSW Government Land and Property Information), flood levels/extents (Source: McCarrs Creek, Mona Vale and Bayview Flood Study Review 2017, Royal HaskoningDHV) and aerial photography (Source: NearMap 2014) are indicative only

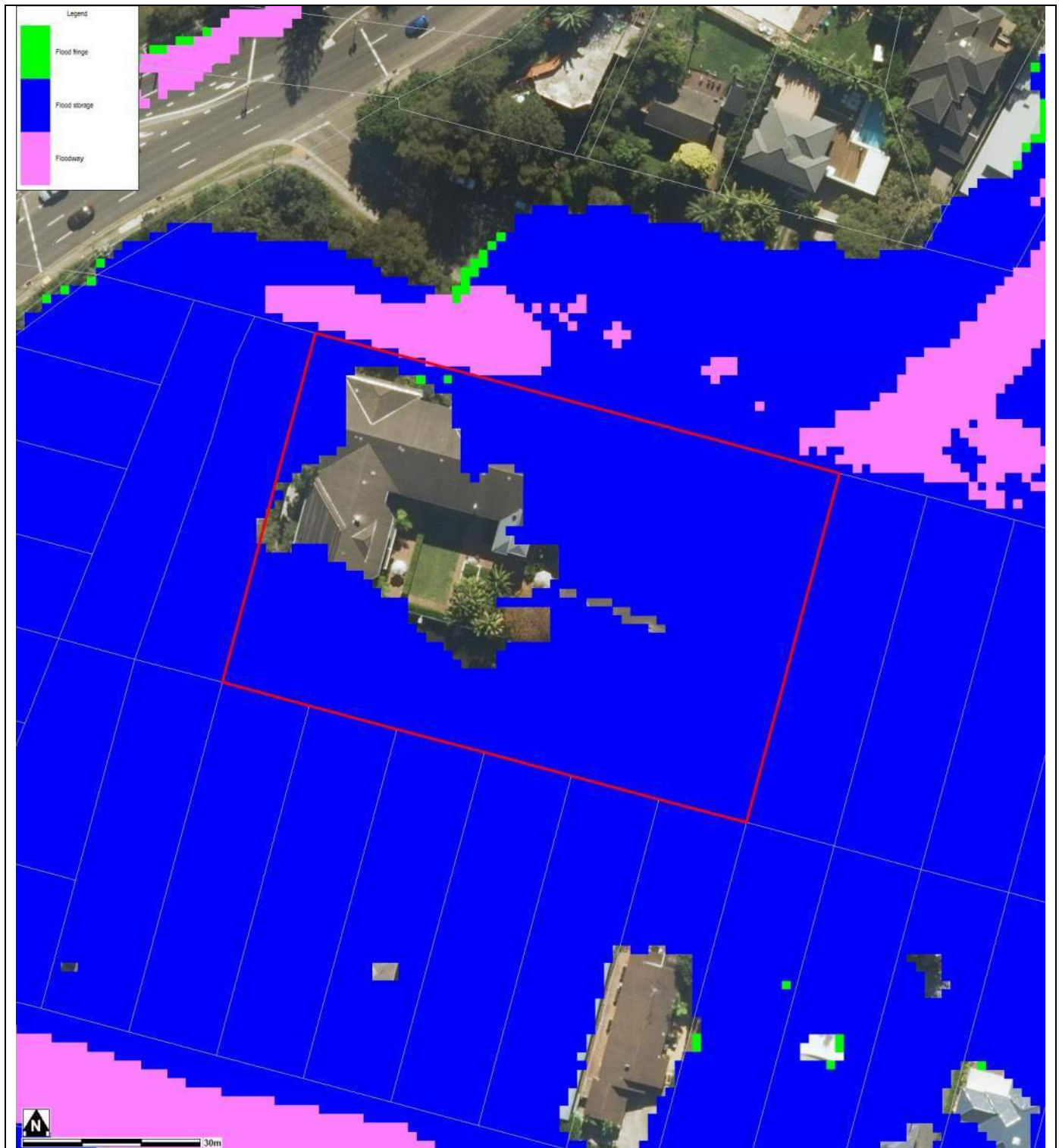
FLOOD MAP G: PMF FLOOD HAZARD EXTENT MAP



Notes:

- Extent represents the 1% annual Exceedance Probability (AEP) flood event
- Extent represents the Probable Maximum Flood (PMF) event
- Extent does not include climate change
- Cadastre Lines (Source: NSW Government Land and Property Information), flood levels/extents (Source: McCarrs Creek, Mona Vale and Bayview Flood Study Review 2017, Royal HaskoningDHV) and aerial photography (Source: NearMap 2014) are indicative only

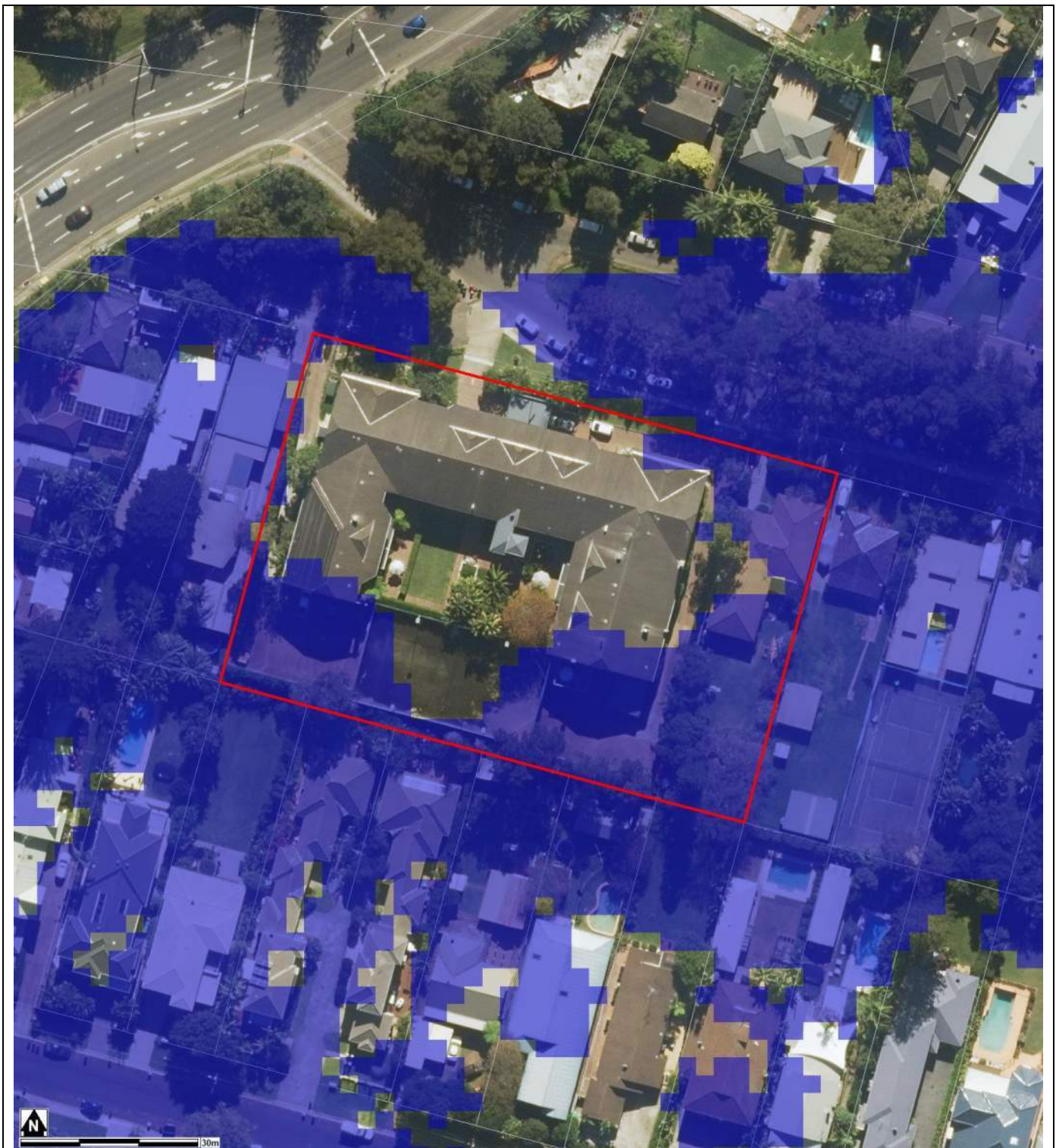
FLOOD MAP H: PMF FLOOD HYDRAULIC CATEGORY EXTENT MAP



Notes:

- Extent represents the Probable Maximum Flood (PMF) event
- Extent does not include climate change
- Cadastre Lines (Source: NSW Government Land and Property Information), flood levels/extents (Source: McCarrs Creek, Mona Vale and Bayview Flood Study Review 2017, Royal HaskoningDHV) and aerial photography (Source: NearMap 2014) are indicative only

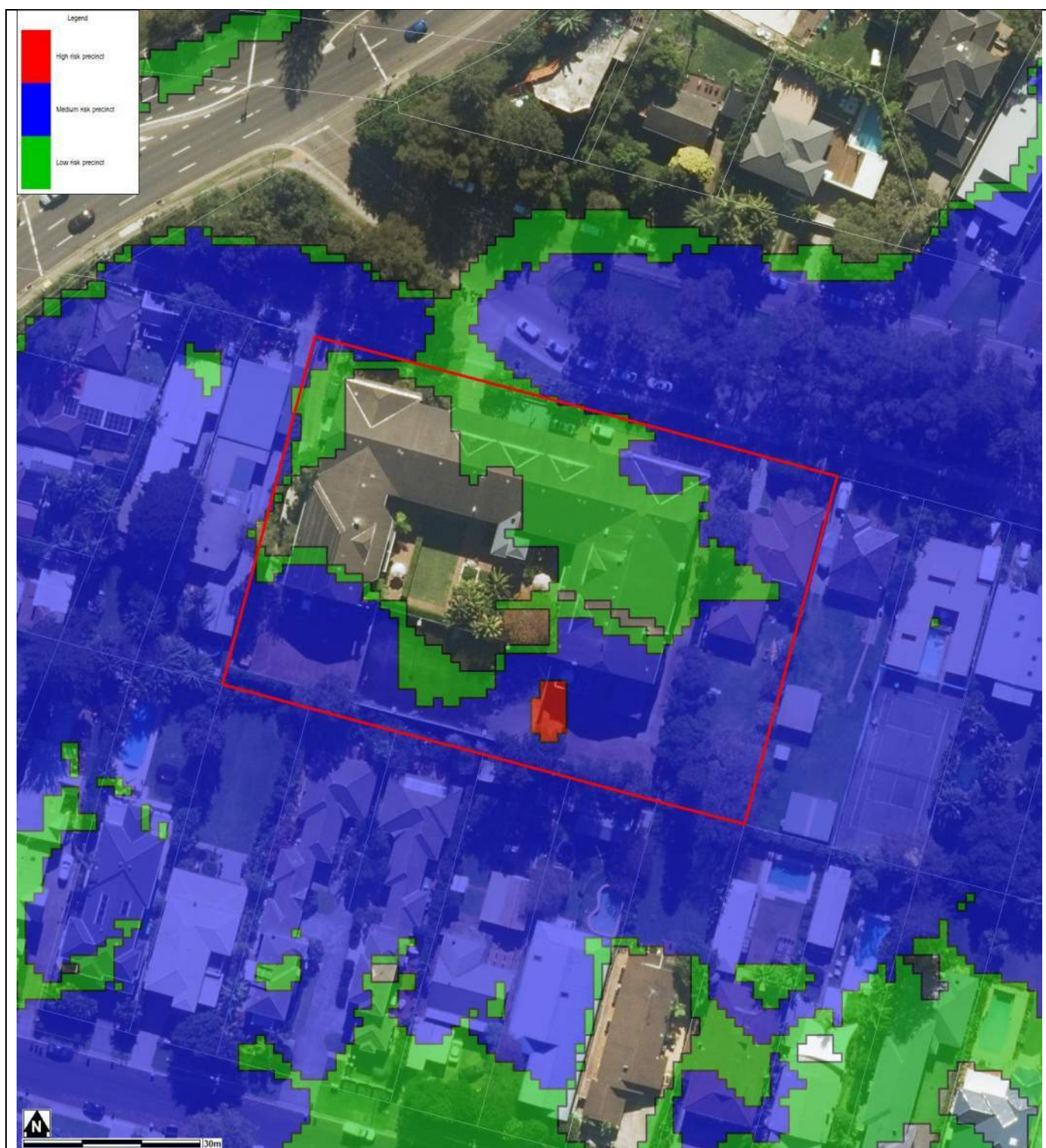
FLOOD MAP I: FLOODING – 1% AEP EXTENT PLUS CLIMATE CHANGE



Note:

- Extent represents the 1% annual Exceedance Probability (AEP) flood event including 30% rainfall intensity and 0.9m Sea Level Rise climate change scenario
- Flood events exceeding the 1% AEP can occur on this site.
- Cadastre Lines (Source: NSW Government Land and Property Information), flood levels/extents (Source: McCarrs Creek, Mona Vale and Bayview Flood Study Review 2017, Royal HaskoningDHV) and aerial photography (Source: NearMap 2014) are indicative only

FLOOD MAP J: FLOOD RISK PRECINCT MAP



Notes:

- **Low Flood Risk precinct** means all flood prone land not identified within the High or Medium flood risk precincts.
- **Medium Flood Risk precinct** means all flood prone land that is (a) within the 1% AEP Flood Planning Area; and (b) is not within the high flood risk precinct.
- **High Flood Risk precinct** means all flood prone land (a) within the 1% AEP Flood Planning Area; and (b) is either subject to a high hydraulic hazard, within the floodway or subject to significant evacuation difficulties (H5 and or H6 Life Hazard Classification).
- Does not include climate change

GUIDELINES for Preparing a Flood Management Report

Introduction

These guidelines are intended to provide advice to applicants on preparing a Flood Management Report. The purpose of a Flood Management Report is to help applicants measure and manage the flood risk to life and property on their site.

When is a Flood Management Report required?

A Flood Management Report must be submitted with any Development Application on flood prone land, for Council to consider the potential flood impacts and controls. For Residential or Commercial development, it is required for development on land identified within the Medium or High Flood Risk Precinct. For Vulnerable or Critical development, it is required if it is within any Flood Risk Precinct.

Note that the flood extents shown on the mapping are indicative only. It is recommended that flood levels are compared to registered ground survey to more accurately determine the flood extent.

There are some circumstances where a Flood Management Report undertaken by a professional engineer may not be required. However, the relevant parts of the DCP and LEP would still need to be addressed, so as to demonstrate compliance. Examples where this may apply include:

- If all proposed works are located outside the relevant Flood Risk Precinct extent
- First floor addition only, where the floor level is above the Probable Maximum Flood level
- Internal works only, where habitable floor areas below the Flood Planning Level are not being increased

Note that development on flood prone land will still be assessed for compliance with the relevant DCP and LEP, and may still be subject to flood related development controls.

What is in a Flood Management Report?

The aim of a Flood Management Report is to demonstrate how a proposed development will comply with the flood related development controls outlined in the relevant LEP and DCP clauses. The report must detail the design, measures and controls needed to achieve compliance, following the steps outlined below.

A Flood Management Report should reflect the size, type and location of the development, proportionate to the scope of the works proposed, and considering its relationship to surrounding development. The report should also assess the flood risk to life and property.

Technical requirements of a Flood Management Report

The technical requirements of a Flood Management Report should include (where relevant):

1. Description of development

The description of development should identify:

- Outline of the proposed development, with plans if necessary for clarity
- Use of the building, hours of operation, proposed traffic usage or movement
- Type of use, ie, critical, vulnerable, subdivision, residential, business, industrial, recreational, environmental or concessional

2. Flood analysis

The flood analysis should include:

- Predicted 1 in 100 year flood level
- Flood Planning Level (FPL)
- Probable Maximum Flood (PMF) level
- Flood Risk Precinct, ie High, Medium or Low
- Flood Life Hazard Category (in former Pittwater Council area only)
- Mapping of relevant extents
- Flood characteristics for the site, eg depth, velocity, hazard and hydraulic category, and the impact these have on the proposed development

Note that if the property is affected by estuarine flooding or other coastal issues, these need to be addressed separately under the relevant DCP.

3. Assessment of impacts

The assessment of impacts should address the various elements of the relevant LEP and DCP. A simple compliance table should be provided, similar to the table one below.

	Compliance		
	Not Applicable	Yes	No
A Flood effects caused by Development			
B Drainage Infrastructure & Creek Works			
C Building Components & Structural			
D Storage of Goods			
E Flood Emergency Response			
F Floor Levels			
G Car Parking			
H Fencing			
I Pools			

Further details of what is required for each of these categories can be found in the *Development Control Plan for Flood Prone Land*.

For any of these categories which are applicable, the assessment should demonstrate how the development complies, or if it doesn't, provide an explanation of why the development should still be considered.

Reporting requirements for a Flood Management Report

The Flood Management Report should include:

- a) Executive summary
- b) Location plan, at an appropriate scale, that includes geographical features, street names and identifies all waterways and Council stormwater pipes, pits and easements
- c) Plan of the proposed development site showing the extent of the predicted 100 year, any high hazard or floodway conditions and the PMF flood event
- d) Development recommendations and construction methodologies
- e) Calculation formulae (particularly for flood storage)
- f) Clear referencing using an accepted academic referencing system (eg. Harvard)
- g) Analysis of development against relevant State Environmental Planning Policies
- h) Analysis of development against relevant Local Environment Plan and Policies
- i) Conclusion detailing key points
- j) Standard Hydraulic Certification (Form A/A1)
- k) Qualifications of author
- l) Any flood advice provided by Council
- m) Any other details which may be relevant

NOTE: Qualifications of Author

Council requires that the Flood Management Report be prepared by a suitably qualified Engineer with experience in flood design / management who has, or is eligible for, membership to the Australian Institute of Engineers.

For further information please contact Stormwater and Floodplain Team on 1300 434 434 or via email at floodplain@northernbeaches.nsw.gov.au

Attachment A

NORTHERN BEACHES COUNCIL STANDARD HYDRAULIC CERTIFICATION FORM

FORM A/A1 – To be submitted with Development Application

Development Application for

Address of site: _____

Declaration made by hydraulic engineer or professional consultant specialising in flooding/flood risk management as part of undertaking the Flood Management Report:

I, _____ on behalf of _____
(Insert Name) (Trading or Business/ Company Name)

on this the _____ certify that I am engineer or a
(Date)

professional consultant specialising in flooding and I am authorised by the above organisation/ company to issue this document and to certify that the organisation/ company has a current professional indemnity policy of at least \$2 million.

Flood Management Report Details:

Report Title:

Report Date:

Author:

Author's Company/Organisation:

I: _____
(Insert Name)

Please tick all that are applicable (more than one box can be ticked)

☐ have obtained and included flood information from Council (must be less than 12 months old) **(This is mandatory)**

☐ have followed Council's Guidelines for Preparing a Flood Management Report

☐ have requested a variation to one or more of the flood related development controls. Details are provided in the *Flood Management Report*.

Signature

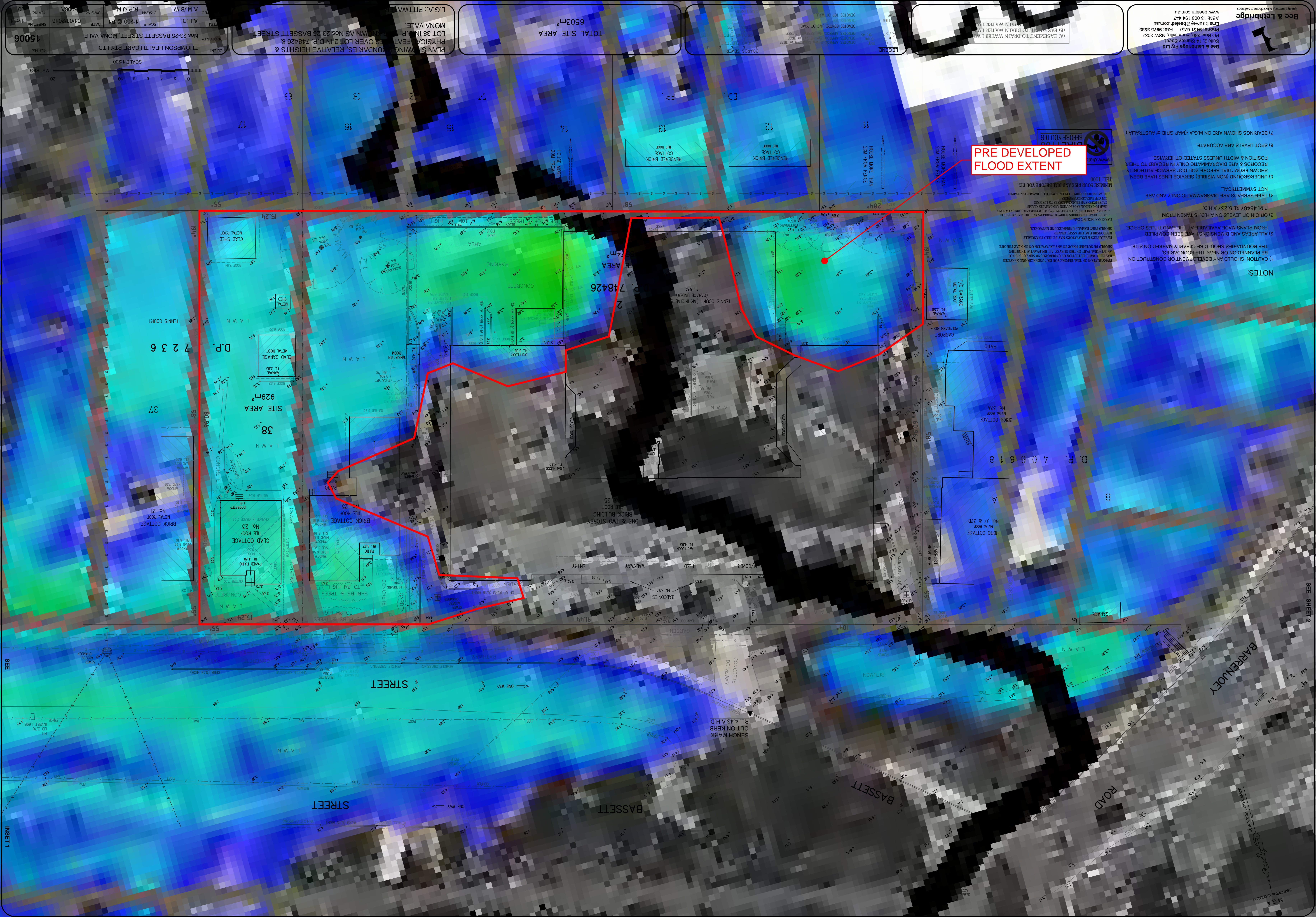
Name

Appendix C - Pre and Post Development Flood Extent Plans

MINIMISE YOUR RISK AND DEAL BEFORE YOU DIE.

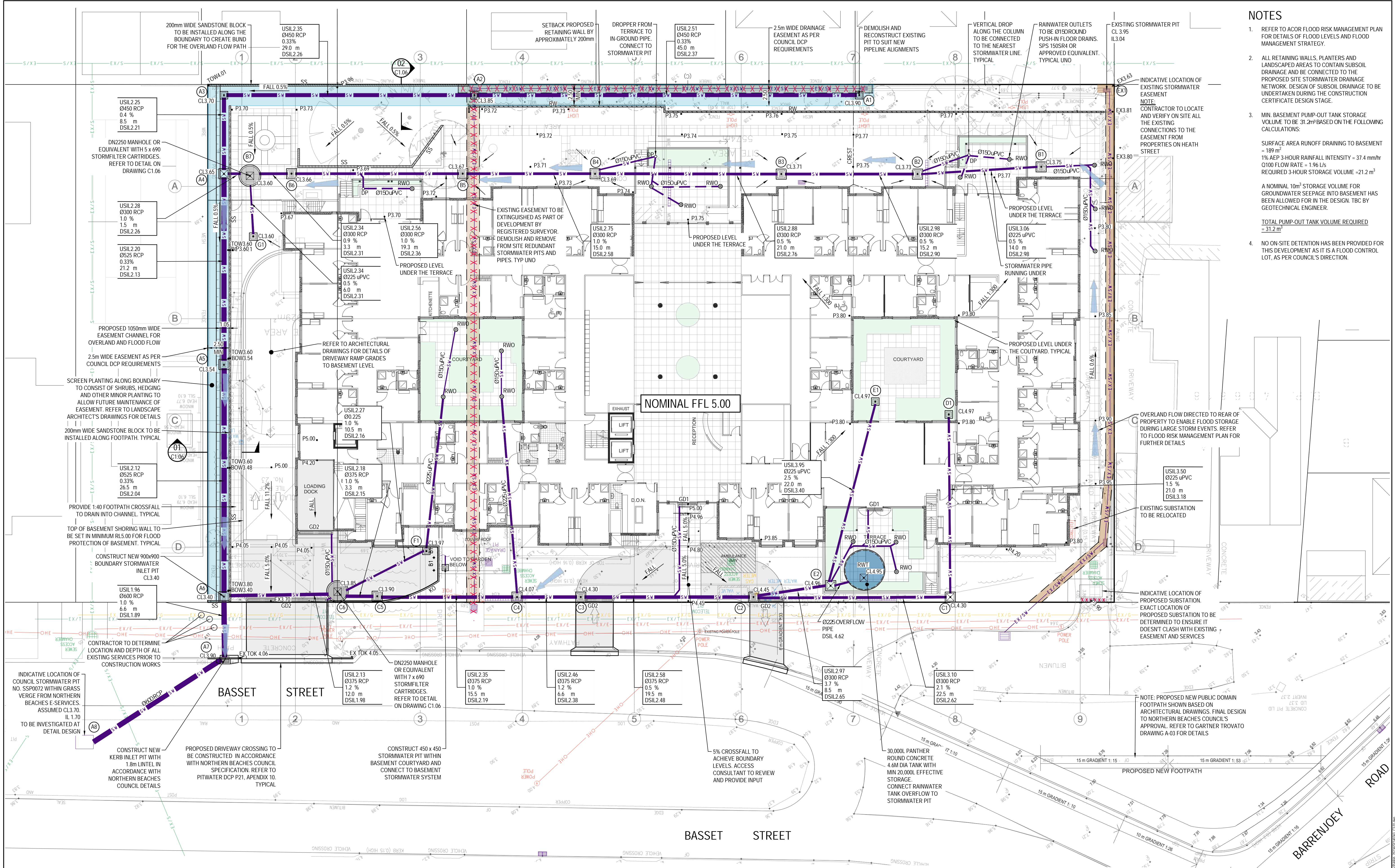
NOTES:

- 1) CAUTION: SHOULD ANY DEVELOPMENT OR CONSTRUCTION BE PLANNED ON OR NEAR THE BOUNDARIES, THE BOUNDARIES SHOULD BE CLEARLY MARKED ON SITE.
- 2) ALL AREAS AND DIMENSIONS HAVE BEEN COMPILED FROM PLANS MADE AVAILABLE IN THE LAND TITLES OFFICE.
- 3) ORIGIN OF LEVELS ON A.H.D. IS TAKEN FROM 449467 BL 5 237 A.H.D.
- 4) TREE SPECIES ARE DIAGRAMMATIC ONLY AND ARE NOT SYMMETRICAL.
- 5) UNDERGROUND (NOT VISIBLE) SERVICE LINES HAVE BEEN SHOWN FROM DIAL BEFORE YOU DIG. SERVICE AUTHORITY RECORDS & MAPS DIAGRAMMATIC ONLY IN REGARD TO THEIR POSITION & WIDTH (INNESS STATED OTHERWISE).
- 6) SPOT LEVELS ARE ACCURATE.
- 7) BEARINGS SHOWN ARE ON N.G.A. (NADP GRID OF AUSTRALIA).



Appendix D - Proposed Civil Works Plan

**Prepared by ACOR Consultants, Job No. SY140363, Drawing No. C3.01,
issue A, dated 1 April 2020.**



- ### NOTES
- REFER TO ACOR FLOOD RISK MANAGEMENT PLAN FOR DETAILS OF FLOOD LEVELS AND FLOOD MANAGEMENT STRATEGY.
 - ALL RETAINING WALLS, PLANTERS AND LANDSCAPED AREAS TO CONTAIN SUBSOIL DRAINAGE AND BE CONNECTED TO THE PROPOSED SITE STORMWATER DRAINAGE NETWORK. DESIGN OF SUBSOIL DRAINAGE TO BE UNDERTAKEN DURING THE CONSTRUCTION CERTIFICATE DESIGN STAGE.
 - MIN. BASEMENT PUMP-OUT TANK STORAGE VOLUME TO BE 31.2 m^3 BASED ON THE FOLLOWING CALCULATIONS:

SURFACE AREA RUNOFF DRAINING TO BASEMENT = 189 m^2
1% AEP 3-HOUR RAINFALL INTENSITY = 37.4 mm/hr
Q100 FLOW RATE = 1.96 L/s
REQUIRED 3-HOUR STORAGE VOLUME = 21.2 m^3

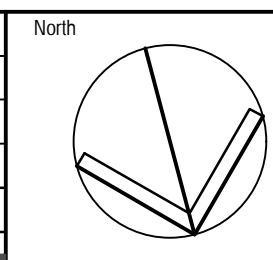
A NOMINAL 10 m^3 STORAGE VOLUME FOR GROUNDWATER SEEPAGE INTO BASEMENT HAS BEEN ALLOWED FOR IN THE DESIGN. TBC BY GEOTECHNICAL ENGINEER.

TOTAL PUMP-OUT TANK VOLUME REQUIRED = 31.2 m^3
 - NO ON-SITE DETENTION HAS BEEN PROVIDED FOR THIS DEVELOPMENT AS IT IS A FLOOD CONTROL LOT, AS PER COUNCIL'S DIRECTION.

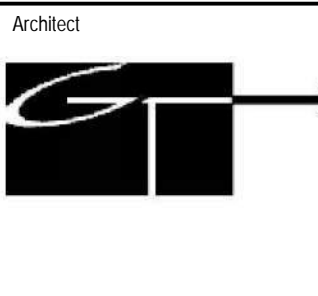
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This drawing has been assigned an electronic code that signifies the drawing has been checked and approved by: MATTHEW BUTTARELLI

A		ISSUE FOR DEVELOPMENT APPLICATION	01.04.20	DK	SK
Issue	Description	Date	Drawn	Approved	



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Project
**THOMPSON HEALTH BASSETT
PROPOSED AGED CARE FACILITY**

Drawing Title		CIVIL WORKS PLAN GROUND FLOOR LEVEL	
Drawn	Date	Scale	A1
DK	Mar-20	1:200	MB
Designed	Project No.	Dwg No.	Issue
SK	SY140363	C3.01	A