

Tumbi Umbi Retirement Living

Flood Impact Assessment (FIA)

Prepared for: Mingara Leisure Group Pty Ltd
Date: 2nd June 2025
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Revision

Site Address:	12-14 Mingara Drive Tumbi Umbi
Real Property Description:	Lot 13/DP 1204397
Proposed Development:	Construction of retirement living village and assisted living units
Client:	Mingara Leisure Group Pty Ltd
Local Authority	Central Coast Council
Authority Reference #:	N/A
Stantec Reference:	301351398-CI-RE-FIA-001

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Key features of the site are as follows:

- The topography of the site is generally flat, with some fill historically used to level the study area, particularly in the northern portion of the site.
- The development site is vacant grassland with some mature trees located on the eastern boundary.
- The western and southern boundary of the development site has a registered easement following the drainage corridor defining the site boundaries to the west and south.
- Vehicle access will continue to be provided via the existing Wyong Road access to the north and the existing access from Mingara Drive into the broader Mingara Club precinct to the east.
- The development site does not have a direct street frontage and is bounded by the Athletics field to the north, Club access road and Mingara carpark to the east and Glengara Retirement Village to the south and west and low density residential uses to the north-west. The Mingara Club precinct has frontage to Wyong Road and Mingara Drive.
- Vehicular access to the site from the local road network is available from Wyong Road, via left in and left out and from the signalised intersection at Mingara Drive/Wyong Road and then a roundabout on Mingara Drive.
- Internal pedestrian connectivity within the broader Mingara Precinct site includes pedestrian pathways from the north and west and pedestrian crossings from the car parking area into the main club building.
- A hotel is under construction on the broader Mingara precinct to the east of the development site.
- To the north west of the site is a constructed wetland / gross pollutant trap.

The surrounding locality is described as follows:

- North: Immediately north of the development site is the athletics track/field, forming part of the broader Mingara Club precinct. Further north on the northern side of Wyong Road is industrial zoned land and the vast majority of the surrounding context comprises low density residential, environmental conservation, living and management.
- East: Directly east of the site is a hotel (under construction), the main Club building and car park, accessible from Mingara Drive and Wyong Road. Further east of the site are fast food and commercial land uses on Wyong Road, then low density residential uses. Further east is more residential development with the Bateau Bay Square shopping centre forming the major commercial node for the area.
- South: The Glengara Retirement Village is immediately south (and south west) of the site and is one to two storeys in height. Beyond that, the area of Tumby Umbi is primarily larger environmental living residential lots.
- West: A drainage corridor and some taller vegetation is located directly west of the site. Further west is the northern portion of the Glengara Retirement Village.

The site slopes from south-west toward north-east corner of the site, with the highest point within the site in the south-western corner of the site (approximately RL 9.55mAHD). The lowest point is along the north-eastern boundary of the site (approximately RL 6.9mAHD). There is a level difference of approximately 2.65m at the proposed development site. The topography of the site is illustrated in **Figure 2**.

1.3 Summary of Consultation

Refer to Table 1 for a summary of consultation undertaken with relevant authorities and agencies.

Table 1: Summary of Consultation

Stakeholder	How this group was consulted and when	Issues discussed	Project responses
Central Coast Council	Virtual meeting on 12/02/2024 between Stantec and the following Council departments: - Planning - Flood - Stormwater	- Flood planning levels applicable to the development - On-site detention (OSD) volume requirements	- Council have confirmed that the PMF flood level is to be adopted as the flood planning level for this development - OSD is to be provided to limit post development discharge rates to pre-development levels for storm events up to the 5% AEP event. Larger events would bypass the OSD system. Council has no issue with this philosophy as the development is positioned at the bottom end of the overall catchment. Peak flows from this development should be in the Trunk Drainage system before the peak flow from the catchment reaches this location.

1.4 Response to SEARs

The Flood Risk Assessment is required by the Secretary's Environmental Assessment Requirements (SEARs) for the State Significant Development Application. This table identifies the relevant SEARs requirement/s and corresponding reference/s within this report.

Table 2: SEARs and Relevant Reference

SEARs Item	Report Reference
15. Flooding Risk	
Identify any flood risk on-site having regard to adopted flood studies, the potential effects of climate change, and any relevant provisions of the NSW Floodplain Development Manual.	Refer to the Flood Emergency Management Plan (FEMP), prepared by Stantec Australia for commentary on effects of climate change. Section 4
Assess the impacts of the development, including any changes to flood risk on-site and off-site, and detail design solutions and operational procedures to mitigate flood risk where required.	Section 4

2. Project Description

The proposed development comprises subdivision of land and the construction and operation of a seniors housing development. The proposal includes thirteen villa buildings, three multi-storey independent living unit (ILU) buildings and one mixed high care and ILU building housing communal facilities together with car parking, open space and associated works including site preparation works and landscaping.

The proposed SSDA seeks approval to redevelop the site to accommodate a seniors living development inclusive of the following:

- Site establishment works, including minor excavation and tree removal and earthworks.
- Construction and operation of:
 - Thirteen (13) townhouses/villa buildings, housing four (4) independent living units in each
 - Three (3) multi storey independent living unit (ILU) buildings of:
 - i. Building 1 – undercroft car parking, 5 levels of 2-bed and 3-bed ILUs
 - ii. Building 3 - undercroft car parking, 6 levels of 2-bed and 3-bed ILUs
 - iii. Building 4 - undercroft car parking, 5 levels of 2-bed and 3-bed ILUs
 - One (1) mixed high care and ILU building (Building 2) of:
 - iv. Part undercroft car parking, part communal/amenities level at ground with 3 levels of high care suites and 3 levels of ILUs
 - v. The building will include communal facilities including a café, residential lounge, multi-function spaces, consultation/therapy rooms, library, and staff/admin areas.
- Provision of 219 x 2-bed and 3-bed independent living units and 39 high care suites
- Total site GFA of 31,739.7 sqm comprising:
 - Townhouses: 7,223.4 sqm GFA
 - Building 1: 4,595.6 sqm GFA
 - Building 2: 5,315.7 sqm GFA
 - Building 3: 5,520.0 sqm GFA
 - Building 4: 9,085.1 sqm GFA
- Vehicle access will be provided via the existing road access from Wyong Road and via Mingara Drive. The site also accommodates a north-south internal shared access road and dedicated porte cochere in front of Building 2.
- Private, passive and communal open space, landscaping and perimeter and internal pedestrian pathways
- Subdivision of the land and two stage construction.

Refer to Figure 3 for an illustration of the landscape site plan.

3. Abbreviations Definitions

AEP	Annual Exceedance Probability
AHD	Australian Height Datum
AIDR	Australian Institute of Disaster Resilience
ARI	Average Recurrence Interval
ARR	Australian Rainfall and Runoff
BoM	Bureau of Meteorology
CCC	Central Coast Council
DA	Development Application
DCP	Development Control Plan
DN	Diameter Nominal (mm)
EY	Exceedances per Year
FEMP	Flood Emergency Management Plan
FFL	Finished Floor Level
FIA	Flood Impact Assessment
FPL	Flood Planning Level
IFD	Intensity-Frequency-Duration
ILU	Independent Living Units
L/s	Litres per second
LGA	Local Government Area
LEP	Local Environmental Plan
m/s	Metres per second
PMF	Probable Maximum Flood
RCP	Representative Concentration Pathways
RL	Relative Level
SES	State Emergency Service
TURL	Tumbi Umbi Retirement Living

4. Methodology

4.1 Hydraulic model

Central Coast Council have provided the hydraulic TUFLOW model files associated with the Tuggerah Lakes Southern Catchments Flood Study undertaken by WMAwater in 2018. The hydraulic TUFLOW model provided is used as the base model for the pre- and post-scenario hydraulic models.

4.2 Pre-development scenario

4.2.1 Digital elevation model

The digital elevation model (DEM) represents the topography in the hydraulic model. Several updates were made to the base hydraulic model to improve the representation of existing topography at the site:

- Detailed survey of the site was used to update the DEM.
- As shown in Figure 3 the base hydraulic model DEM did not represent the Glengara development located to the west of the site. 2020 LiDAR information was obtained from the Department of Customer Service (DCS Spatial Services) and incorporated into the DEM.

4.2.2 Hydraulic structures

The hydraulic model associated with the *Tuggerah Lakes Southern Catchments Flood Study* (WMAwater, 2018) (the Council FS) currently adopted by Central Coast Council (Council) requires updates to more accurately represent hydraulic structures downstream of the Mingara Recreation Club.

4.2.2.1 Hydraulic model representation

The representation of hydraulic structures in the hydraulic model are shown as Figure 3 Hydraulic model layout (source: Tuggerah Lakes Southern Catchments Flood Study Figure 3).

A summary of the hydraulic structures is provided in Table 3.

Table 3 Summary of hydraulic structures

Name	Description (as reported in Council FS)	Representation in the model	Comments
Wyong Road culverts	Four 3m by 3.6m reinforced concrete box culverts (RCBC) constructed in 1993.	Represented as a two-dimensional (2D) bridge layer which constrict any flows below 4.8mAHD ¹ with a width of 16m. A blockage of 50% is applied to the bridge opening in the 1% AEP. In events rarer than the 1% AEP the structure is modelled with 100% blockage as a raised embankment in the centre of the channel with a reduced level of 4.8mAHD.	The structure should be represented as a one-dimensional structure rather than a flow constriction, because it is a series of culverts – not a bridge with piers. The 100% blockage applied during events rarer than the 1% AEP is considered too high given the size and importance of the structure. A lower design blockage should be considered or at the least a sensitivity assessment should be undertaken ² .

¹ The invert of Tumby Umbi creek at the Wyong Road culverts is approximately 0.6mAHD.

² A sensitivity assessment of the blockage was only undertaken for the 1% AEP, in which the structure is only 50% blocked.

Name	Description (as reported in Council FS)	Representation in the model	Comments
Mingara Drive culverts	Four 2.4m by 1.2m RCBC	Represented as a two-dimensional (2D) bridge layer which constrict any flows below 4.9mAHD³ with a width of 10m. A blockage of 50% is applied to the bridge opening in the 1% AEP. In events rarer than the 1%AEP the structure is modelled with 100% blockage as a raised embankment in the centre of the channel with a reduced level of 4.9mAHD.	The structure should be represented as a one-dimensional structure rather than a flow constriction, because it is a series of culverts – not a bridge with piers. The 100% blockage applied during events rarer than the 1% AEP is considered too high given the size and importance of the structure. A lower design blockage should be considered or at the least a sensitivity assessment should be undertaken⁴. The structure should also be updated to reflect upgrades undertaken during the <i>Upgrade of Wyong Road at the Intersections of Mingara Drive and Tumbi Road</i> project completed by Transport for NSW in 2017.
Moss Drain culverts	Not discussed in the model. Likely constructed during the enlargement of Moss Drain and other drainage works associated with the Mingara Recreation Club completed in 2000.	Not represented in the model.	The Moss Drain culverts should be represented in the model as a one-dimensional structure with a 20% design blockage applied for the 1% AEP event and the PMF.

³ The invert of Moss Drain at the Mingara Road culverts is approximately 2.9mAHD.

⁴ A sensitivity assessment of the blockage was only undertaken for the 1% AEP, in which the structure is only 50% blocked.

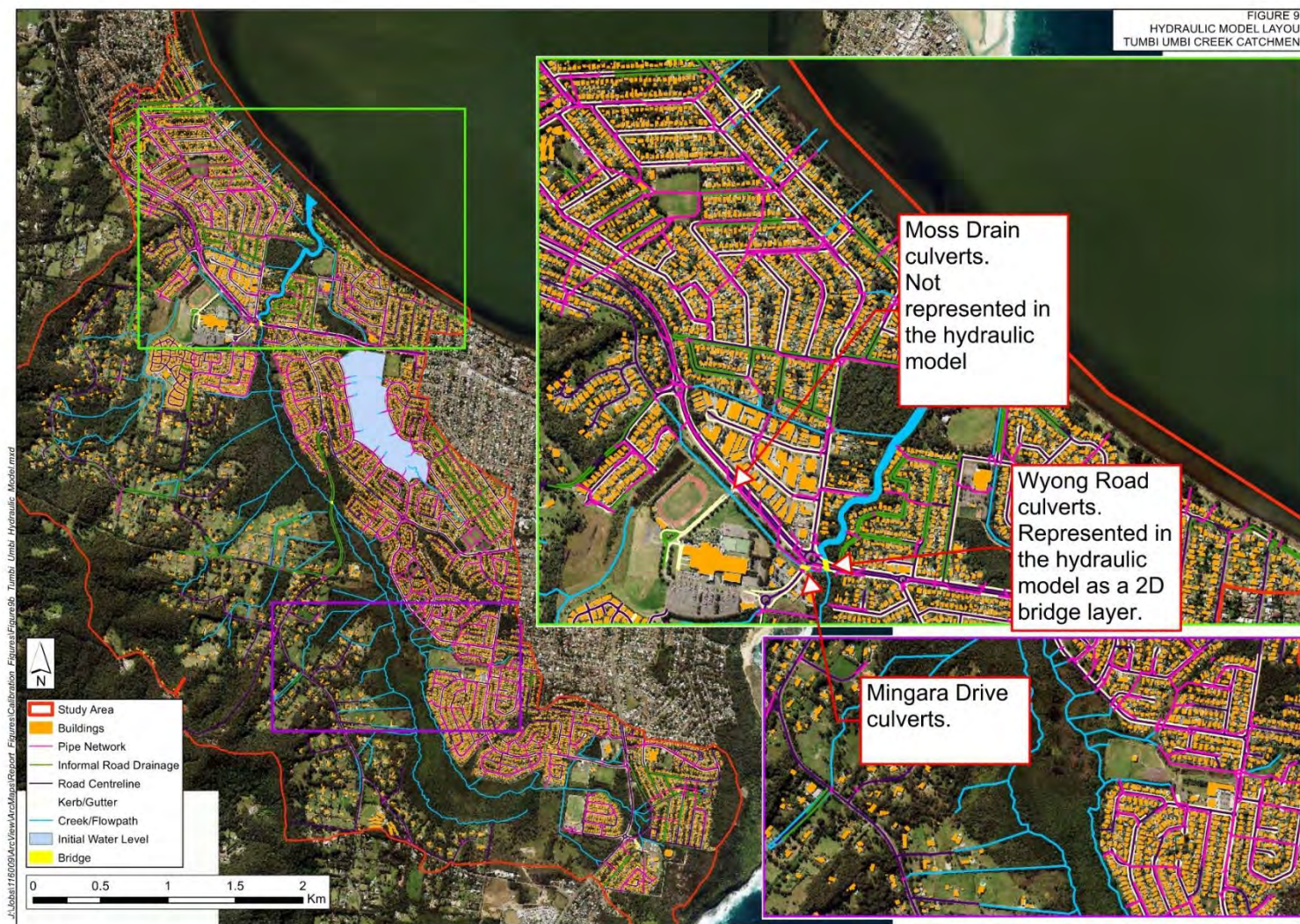


Figure 3 Hydraulic model layout (source: Tuggerah Lakes Southern Catchments Flood Study (WMAwater, 2018))

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Quality
ISO 9001
SAI GLOBAL

4.2.2.2 Updates to hydraulic model structures

Wyong Road culverts

The Wyong Road culverts were strengthened during road upgrade works completed by Transport for NSW in 2017 however there are no visible changes to the culvert arrangement. The number and size of culverts following the upgrade should be confirmed with Council or Transport for NSW. If this information is not available, the culverts should be modelled as four 3m by 3.6m culverts.

Mingara Drive culverts

The Mingara Drive culverts were replaced during road upgrade works completed by Transport for NSW in 2017. As shown in Figure 4 there are now five culverts underneath the road. Information of the structures should be requested from Council or Transport for NSW. If not available, the culverts should be modelled as five 2.4m by 1.2m culverts.



Figure 4 Mingara Drive culverts (source: <https://cmc.net.au/projects/wyong-road-upgrade/>)

Moss Drain culverts

The current hydraulic model excludes the hydraulic structure located at the intersection of Mingara Drive and Wyong Road. The structures are identified as the 'Moss drain' culverts and they are shown below.



Figure 5 Moss Drain culverts looking downstream (Source: Google street view)



Figure 6 Moss Drain culverts looking upstream (Source: Google street view)

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The span of the culvert structures is between 21 and 22 metres based on aerial imagery measurements, and six openings are observed from street view imagery. It is assumed each culvert is 3.6m wide.

An analysis of the digital elevation model shows the northern and southern embankments of the structure have an elevation of approximately 6.4mAH and a channel invert of approximately 3.8mAH. It is assumed that the height of each culvert is 2m which considers 600mm depth for the slab above.

4.2.2.3 Changes to blockage applied to hydraulic structures

The blockage of hydraulic structures is updated in accordance with *Australian Rainfall and Runoff Revision Project 11 – Blockage of Hydraulic Structures*. This approach was confirmed during a virtual meeting held 9 April 2025 (10:00 AM-11:00 AM) between Stantec and the Council flood risk department)

Debris potential

The debris availability, mobility and transportability of each catchment is summarised in Table 5. The Moss Drain catchment (upstream of Mingara Drive and Moss Drain culverts) and Tumbi Umbi Creek catchment (Upstream of Wyong Road culverts) are considered separately.

Table 4 Debris potential (Moss Drain catchment)

Debris potential factor	Rating	Explanation
Availability	Medium	The Moss Drain catchment does have some a localised area of vegetation area upstream of the Mingara Recreation Club, however the catchment overall is predominantly a cleared urban area. The drain is regularly maintained.
Mobility	Medium	The Moss Drain does overtop during the 1% AEP and some source material is located along its alignment and adjacent to its banks.
Transportability	Medium	The Moss Drain is a relatively flat channel with a grade of approximately 1%. Even during the PMF the velocity of the channel does not exceed 2.5 m/s. The channel width is approximately 20m so this does present a medium risk for transportation of debris.

The debris potential for the Moss Drain catchment is medium (based on factors being Medium-Medium-Medium (MMM)).

Table 5 Debris potential (Tumbi Umbi catchment)

Debris potential factor	Rating	Explanation
Availability	High	Tumbi Umbi Creek is heavily vegetated.
Mobility	High	Tumbi Umbi Creek overtops during the 1% AEP and significant source material is located along its alignment and adjacent to its banks.
Transportability	Medium	The Tumbi Umbi creek centreline is a relatively flat channel with a grade of approximately 1%. Even during the PMF the velocity of the channel predominantly does not exceed 2.5 m/s except for some localised areas. The channel width is wide and so does present a medium risk for transportation of debris.

The debris potential for the Tumbi Umbi Creek catchment debris potential is high (based on factors being High-High-Medium (HHM)).

The debris potential is adjusted for each event in accordance with Table 6. It is noted that the debris potential for both catchments is adjusted to high potential for the PMF (event rarer than 0.5% AEP).

Table 6 Debris potential adjustment for event AEP

Event AEP	Debris potential (during 1% AEP)		
	DP _{High}	DP _{Medium}	DP _{Low}
AEP > 5% (frequent)	Medium	Low	Low
AEP 5% - AEP 0.5%	High	Medium	Low
AEP < 0.5% (rare)	High	High	Medium

Recommended blockage factor

The debris blockage factor considers the length of the longest 10% of debris that could arrive at the site (L_{10}), and its relationship with the width of each culvert. Based on the relationship a blockage percentage is applied to the structure in accordance with *Australian Rainfall and Runoff Revision Project 11 – Blockage of Hydraulic Structures*.

Table 7 Blockage factor applied based on control dimension inlet width

Control Dimension Inlet Width W (m)	At-Site Debris Potential (Generally)		
	High	Medium	Low
$W < L_{10}$	100%	50%	25%
$W \geq L_{10} \leq 3 * L_{10}$	20%	10%	0%
$W > 3 * L_{10}$	10%	0%	0%

The Council FS identified an L_{10} of 5m across both catchment areas which is conservative based on review of the site catchment using google street view. The adoption of this value results in all structures (since all culverts have a width of less than 5m) being modelled with severe 100% blockage during the PMF.

It is recommended that a reduced L_{10} of 3m is adopted for the Tumby Umbi Creek catchment and 2m for the Moss Drain catchment. This would result in a blockage factor of 20% being applied to the Wyong Road, Mingara Drive, and Moss Drain culverts in the PMF. This is in line with the guide design blockage scenario suggested in Table 3.16 of *Australian Rainfall and Runoff Revision Project 11 – Blockage of Hydraulic Structures*.

It is recommended that a site inspection of the Wyong Road culvert is undertaken to confirm L_{10} given the importance of the structure and heavily vegetated area located upstream of the structure. Sensitivity assessment of the blockage factor of this structure can be undertaken to understand the risk of the structure becoming 50% or 100% blocked.

There was a Virtual meeting held 9 April 2025 (10:00 AM-11:00 AM) between Stantec and the Council flood risk department) during which Council agreed that the Wyong Road Culvert and Mingara Drive Culvert were to be modelled with a 100% blockage factor. The Moss Drain culverts were to be updated and modelled with a 50% blockage factor for all events.

4.3 Post-development scenario

4.3.1 Digital elevation model

The DEM for the post-development scenario was updated using the proposed design land grading surface to represent the proposed landform. In the post-development scenario, the land is raised above the PMF.

5. Hydraulic model results

5.1 Pre-development

5.1.1 1% AEP

5.1.1.1 Flood extent, velocity and hazard

Flood depth and level contours, velocity and hazard maps, respectively, in the existing scenario for the 1% AEP flood event are attached as **Appendix B**.

An unnamed second order tributary of Tumbi Umbi creek conveys water from the south-west in a general north-east direction across the site. The channel has been historically realigned during the Lower Tumbi Valley Urban Release Area, the existing key drainage features of the site are shown on Figure 7.

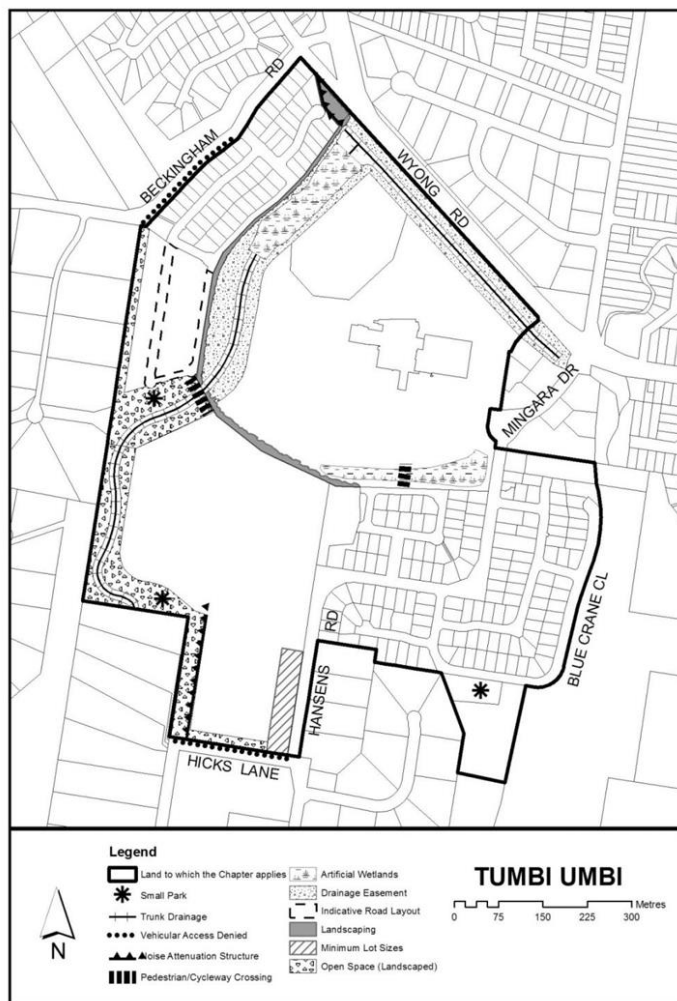


Figure 7 Lower Tumbi Valley Urban Release Area (source: Chapter 5.33 of Central Coast Development Control Plan 2022 (CCDCP 2022))

The existing trunk drainage conveys water north toward Wyong Road and then east toward Mingara Drive. The depth in the trunk drainage is between 1 to 1.5m at a peak velocity of 2 to 2.5 m/s which results in a high hazard category of H5.

The site is located above the 1% AEP flood level in the trunk drainage line, however shallow overland flow enters the site from Hummingbird Avenue.

5.1.2 PMF

5.1.2.1 Flood extent, velocity and hazard

Flood depth and level contours, velocity and hazard maps, respectively, in the existing scenario for the PMF flood event are attached as **Appendix B**.

During the PMF, the existing trunk drainage and easement exceeds capacity and breakout flows enter the site from east to west. The hazard category is mostly low (H1) with some localised areas of high (H4) hazard along the internal access road to the club.

Wyong Road is inundated as water overtops the road at the northern wetland with a hazard of mostly low (H2) with some localised areas of moderate (H3-H4) hazard. Areas of high (H5) hazard are attributed to high velocity forming due to the hydrology model approach (surface area inflow approach) along Wyong Road, it is not considered true hazard and would likely be resolved by refining the Council hydrology model.

The Moss drain culverts underneath the internal access road are at capacity and water overtops the road. The road is subject to low (H2) hazard which is unsafe for small vehicles.

5.2 Post Development

5.2.1 1% AEP

5.2.1.1 Flood extent, velocity and hazard

The flood depth and level contours, velocity and hazard maps, respectively, in the post development scenario for the 1% AEP flood event are attached as **Appendix B**.

During the 1% AEP, the site is flood free due to the south-east of the site being raised.

5.2.1.2 Flood impact

The 1% AEP flood level difference maps (post-development flood level less the pre-development flood levels) are presented as **Appendix B**.

The proposed development lowers the flood level within the trunk drainage easement due to earthworks associated with landscaped ponds. There is a slight increase of flood levels in exceedance of 10mm to the north and southeast of the proposed works however the impact is localised and within the site bounds.

5.2.2 PMF

5.2.2.1 Flood extent, velocity and hazard

The flood depth and level contours, velocity and hazard maps, respectively, in the post development scenario for the PMF are attached as **Appendix B**.

During the PMF, the site is flood free due to east and south-east of the site being raised.

5.2.2.2 Flood impact

The PMF level difference maps (post-development flood level less the pre-development flood levels) are presented as **Appendix B**.

The raising of the site results in flood impact upstream and downstream of the site. The impact to off-site properties is below 100mm and generally in the range of 60 to 70mm. The proposal does not result in any newly flooded areas, and impacted properties are already subject to flooding in the pre-development scenario. The flood level increases to neighbouring properties or roads do not result in an increase of the maximum flood hazard category experienced by the property and are therefore considered to be acceptable.

There is a localised impact in Tumby Creek far downstream which is a model error, this is caused by the model becoming unstable where the 100% blockage is applied across the road. It is not a result of the proposal.

6. Flood Planning Requirements

With reference to the Central Coast Council Development Control Plan (DCP) 2022, Chapter 3.1 Floodplain Management, the following flood-related development controls apply for all proposed developments.

Proposed Land use	Precinct 1 FPL to PMF	Precinct 2 Below FPL	Precinct 3 Flood Storage and Flow Paths (up to 10% AEP)	Precinct 4 High Hazard (up to 50% AEP)
1 Single Dwelling Houses		1, 9	2, 5, 7	
2 Agriculture & Recreation		2	2, 5, 7	
3 Sheds / Garages / ancillary Residential		1	2, 5, 7	
4 Commercial and Industrial Uses		2, 6		
5 Medium to High Density Residential				
6 Critical or Sensitive Facilities	3			
7 Land Subdivision	4			
8 Tourist Development				
9 Caravan parks - short-term sites		6	5, 6	
10 Permissible Earthworks		8		

	Flood related development controls do not apply
	Flood related development controls apply (refer to numbered prescriptive criteria below)
	If the proposal is to be pursued further, a performance based assessment is to be provided demonstrating that the proposed development is compatible with the flooding characteristics of the site (refer to Section 3.2 and Appendix C).

Figure 8: Floodplain Management Provisions (Source: Central Coast Council DCP, 2022)

The proposed development site is located within Precinct 1 and Precinct 2, as determined by the Central Coast Council online mapping system and shown in Figure 9 below.



Figure 9: Flood Development Controls based on Flood Precinct (Source: Central Coast Council)

As the development shall consist of a retirement village for elderly residents, the following flood-related development controls apply to the proposed development in line with Central Coast Council's DCP 2022. The development complies with all requirements.

6.1 Development within Central Coast Council Flood Precinct 1

For areas within Central Coast Council Flood Precinct 1, the following flood-related development controls apply:-

Control #3:- Joint report by professional engineer who specializes in civil engineering to certify that the development provides:-

- Minimum floor levels = PMF level plus mine subsidence allowance, if applicable
- Low flood hazard access and egress for pedestrians during a PMF flood to an appropriate area of refuge located above the PMF
- Low flood hazard emergency vehicle road access (Ambulance, SES, RFS) during a PMF flood event
- Consideration of the impacts of climate change

In nominating floor levels for the proposed villas and buildings, the post development flood levels have been interrogated to obtain the maximum PMF flood level adjacent to the buildings. Refer to Figure 10 and Appendix A for the flood planning levels (FPLs) across the site and the floor levels of the buildings, demonstrating compliance with the FPLs.



Figure 10 Flood Planning Levels (FPLs) and proposed Finished Floor Levels (FFLs)

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Refer to the Flood Emergency Management Plan (FEMP) for the site for details on low flood hazard pedestrian and vehicular access and egress from the site in a PMF flood event.

6.2 Development within Central Coast Council Flood Precinct 2

For areas within Central Coast Council Flood Precinct 2, the following flood-related development controls apply:-

Prescriptive Criteria

- A performance based assessment is to be provided demonstrating that the proposed development is compatible with the flooding characteristics of the site.

A performance based assessment shall ensure the development:-

- Is compatible with the established flood hazard of the land, including:-
 - Impact of flooding and flood liability is to be managed ensuring the development does not divert floodwaters or interfere with flood storage or natural function of the waterway;
 - Flood behaviour (flood depth, flow velocities, flood hazard, rate of rise);
 - Duration of flooding;
 - Appropriate flood mitigation works;
 - Freeboard;
 - Council's duty of care;
 - Depth and velocity of flood waters for relative flood event
- Will not significantly adversely affect flood behaviour resulting in detrimental increases in the potential flood affectation of other development or properties, including:-
 - Development should not detrimentally increase the potential flood affectation on other development or properties or infrastructure, either individually or in combination with the cumulative impact of development that is likely to occur in the same floodplain;
 - Cumulative effects of the development and precedents created for further cumulative development.
- Incorporates appropriate measures to manage risk to life and property from flood, including:-
 - Controls for risk of life for flood events up to the Flood Planning Level (FPL);
 - Controls for risk of life for flood events greater than the FPL;
 - Existing floor levels of development in relation to FPL and floods greater than the FPL;
 - Council's duty of care;
 - What level of flooding should apply to the development;
 - Effective flood access and evacuation issues;
 - Flood readiness.
- Will not significantly adversely affect the environment or cause avoidable erosion, siltation, destruction of riparian vegetation or a reduction in the stability of river banks or watercourses:-
 - The additional economic and social costs that may arise from damage to property from flooding should not be greater than that which can reasonably be managed by the property owner and general community;
 - Land values and social equity – effect both negative and positive; e.g. development increasing land values, restrictions decreasing land values, etc;
 - Future development (specifically, the ability of the community and individuals to recover from flood events);
 - Economic factors both in regards to doing and not doing development;
 - Social issues;
 - Servicing the development safely in flood; e.g. potable water, sewer, etc.
- Is not likely to result in unsustainable social and economic costs to the community as a consequence of flooding;
- Is consistent with the principles of Ecologically Sustainable Development:-
 - Intergenerational equity – namely, that the present generation should ensure that the health;
 - Diversity and productivity of the environment are maintained or enhanced for the benefit of future generations;

- The precautionary approach - namely, that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation;
- Biodiversity conservation - namely, that conservation of biological diversity and ecological integrity should be a fundamental consideration;
- Improved valuation, pricing and incentive mechanisms - namely, that environmental factors should be included in the valuation of assets and services.
- Adequately considers the impact of climate change:-
 - It is to be noted that with regards to climate change, appropriate benchmarks based on the best available current information have been used in producing the flood risk management studies and plans that inform this document.
- Emergency Services:-
 - The development will not unduly increase dependency on emergency services.

General Requirements

- Fencing:-
 - Fencing is to be constructed in such a manner that it will not modify the flow of floodwaters or cause damage to surrounding land;
 - Fencing construction is to withstand flood waters including debris loads.
- Car Parking:-
 - Proposed car parks should not increase the risk of vehicle damage by flooding inundation. Any car park is to allow for a maximum of 300mm still water flood water depth unless otherwise provided through a flood study;
 - The proposed garage/car park should not increase the likelihood on other developments, properties or infrastructure;
 - Open car parking – The minimum surface level of open space car parking subject to inundation should be designed having regard to vehicle stability in terms of depth and velocity during inundation by flood waters.
- Filling of Flood Prone Land:-
 - In Flood Planning Precinct 2, filling will not be permitted unless a report from a suitably qualified engineer has been submitted and approved by Council that certifies that the development will not increase flood affectation elsewhere;
 - Filling of individual sites in isolation, without consideration of the cumulative effects is not permitted. Any proposal to fill a site must be accompanied by an analysis of the effect on flood levels of similar filling of developable sites in the area. This analysis would form part of a flood study prepare by a suitably qualified professional.
- Requirements for on-Site Sewer Management:-
 - The treatment tank/holding device is to be located above the 1% AEP flood contour;
 - The land application area is to be above the 5% AEP flood contour except in Wyong Shire's drinking water catchment where systems are not to be located on land below the 1% AEP flood contour.
- Requirements for the Storage of Hazardous Substances:-
 - The storage of products which, in the opinion of Council, may be hazardous or pollute floodwaters, must be places at a minimum of 500mm above the height of the 1% AEP flood or places within an area protected by bunds or levees such that no flood waters can enter the bunded area if the flood level rose to a level of 500m above the height of the 1% AEP flood.

This flood impact assessment confirms that the development is compatible with the existing flood behaviour and hazard of the land and does not adversely impact other development or properties. It is recommended that as the design and construction progress, the flood model is updated with any changes to confirm no negative impacts as a result of the development. This FIA is to be read in conjunction with the FEMP for the development.

7. Flood Impact Assessment

7.1 Impact of Flooding on Development

Based on the flood level differences presented in **Appendix B**, it can be confirmed that by achieving the flood planning level of the PMF flood level, the proposed flooding will not significantly impact on the proposed development.

7.2 Discussion

Based on the flood level differences presented in **Appendix B**, the development of the site will not adversely impact flooding through the precinct in the 1% AEP and PMF flood events.

8. Conclusion

The proposed development consists of retirement village for elderly residents and is classified as “Critical or Sensitive Facilities” in Central Coast DCP 2022, which requires a flood planning level to probable maximum flood (PMF). The development complies with the DCP requirements as discussed in section 6 of this report.

In the pre-development scenario, the site is affected by shallow flows during the 1% AEP and the PMF. In the post-development scenario the site is raised above the PMF, resulting in localised flood level differences across the site during the 1% AEP.

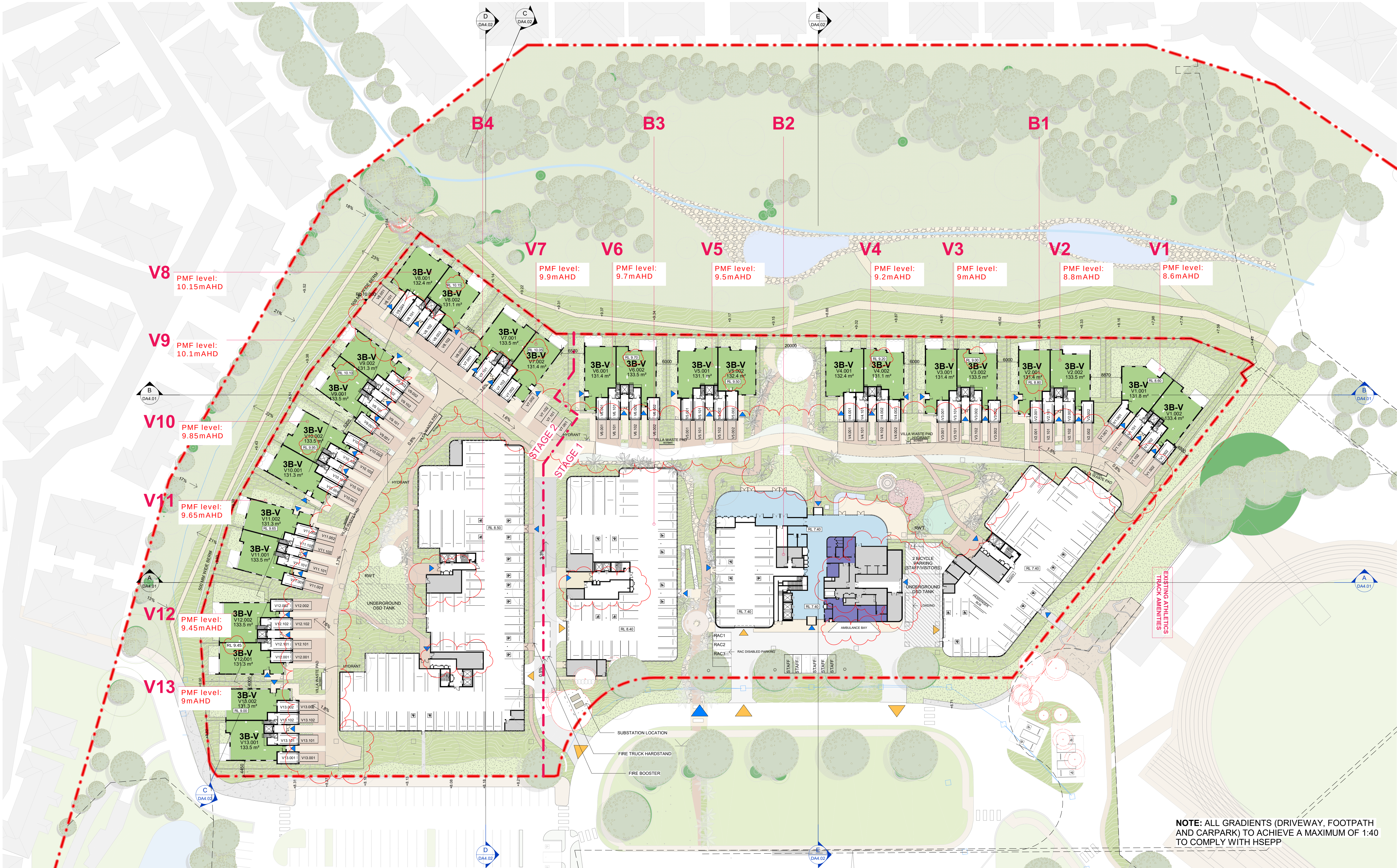
For the PMF the raising of the site results in flood impact to off-site properties in exceedance of 10mm. The flood level differences are below 100mm and generally in the range of 60 to 70mm. The proposal does not result in any newly flooded areas, and impacted properties are already subject to flooding in the pre-development scenario. The flood level increases to neighbouring properties or roads do not result in an increase of the maximum flood hazard category experienced by the property and are therefore considered to be acceptable.

In accordance with Council DCP requirements, the finished floor levels for all buildings are set to PMF level or higher. The flood level differences presented in **Appendix B** demonstrate that the proposed retirement living development will not significantly impact adjacent properties. This FIA is to be read in conjunction with the FEMP for the development.

9. References

WMAwater. (2018). *Tuggerah Lakes Southern Catchments Flood Study*.

Appendix A Flood Planning Levels



IMPORTANT NOTES
Do not scale from drawings. All dimensions to be checked on site before commencement of work. All discrepancies to be brought to the attention of the Architect. Larger scale drawings and written dimensions take preference. This drawing is copyright and the property of the author, and must not be retained, copied or used without the express authority of MARCHESE PARTNERS INTERNATIONAL PTY. LTD.

FOR APPROVAL
NOT FOR CONSTRUCTION

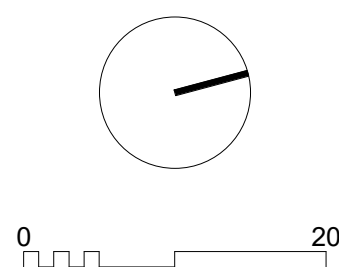
REV	DATE	DESCRIPTION
1	11/04/2024	TOA SUBMISSION
2	29/07/2024	SSD SUBMISSION
3	14/05/2025	SSD RESUBMISSION

BY
AK
AK
AK

LEGEND

- SURVEYED TREES TO BE RETAINED (TPZ)
- PROPOSED TREES
- EXISTING TREES TO BE REMOVED
- VEHICLE ENTRY
- PEDESTRIAN ENTRY

TN



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Life^{3A}

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Level 1, 53 Walker Street, North Sydney, NSW 2060 Australia
P +61 2 9922 4375 E info@marchesepartners.com W www.marchesepartners.com

CLIENT

PARITER

M
MINGARA

PROJECT
TUMBI UMBI RETIREMENT VILLAGE
12-14 MINGARA DRIVE, TUMBI UMBI

DRAWING TITLE
GROUND LEVEL

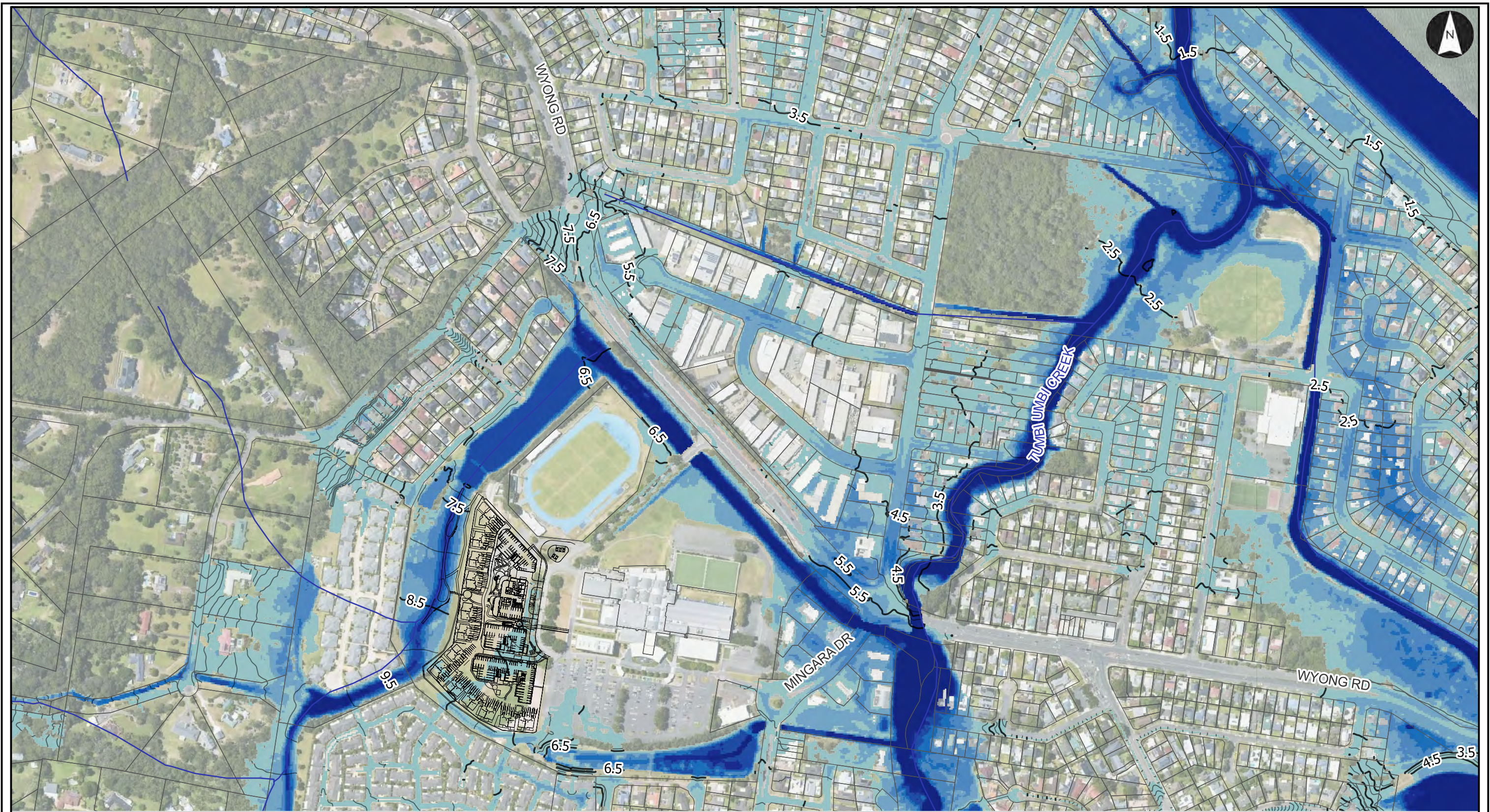
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JOB
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DATE
14/05/2025
DRAWING
DA2.01

DRAWN
ML

CHECKED
AK
REVISION
3

Appendix B Flood maps



Tumby Umbi Retirement Living

Existing Flood Depth and Level 1% AEP
Project: Tumby Umbi Retirement Living

Client: Mingara Leisure Group Pty Ltd
Project Code: 301351398
Drawn By: AA, Checked By: JL
Date: (2025-06-02)
Figure No: GIS-Q-01

Legend

— Proposed development
— Watercourse
— Cadastre

Pre-development 1% AEP Flood Depth (m)

0 - 0.25
0.25 - 0.5
0.5 - 0.75
0.75 - 1
1 - 1.25
1.25 - 1.5
>1.5

Pre-development 1% AEP Flood Level (m)

— 0.5m contour (m)
— 0.5m contour (m)

Notes:

1. Map displayed in EPSG:28356

References:

1. Aerial photo: Metromap
2. Cadastre: NSW Spatial Collaboration Portal

60 0 60 120 180 240 m

Scale at A3: 1:5000





Tumby Umbi Retirement Living

Existing Flood Velocity 1% AEP

Project: Tumby Umbi Retirement Living

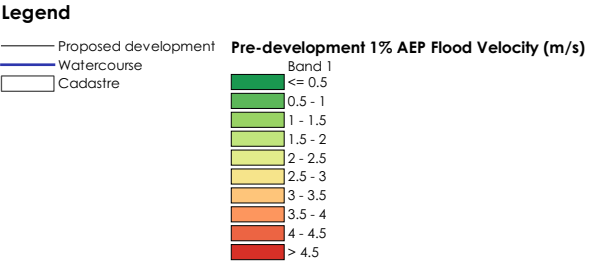
Client: Mingara Leisure Group Pty Ltd

Project Code: 301351398

Drawn By: AA, Checked By: JL

Date: (2025-06-02)

Figure No: GIS-Q-02



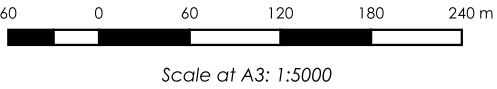
Notes:

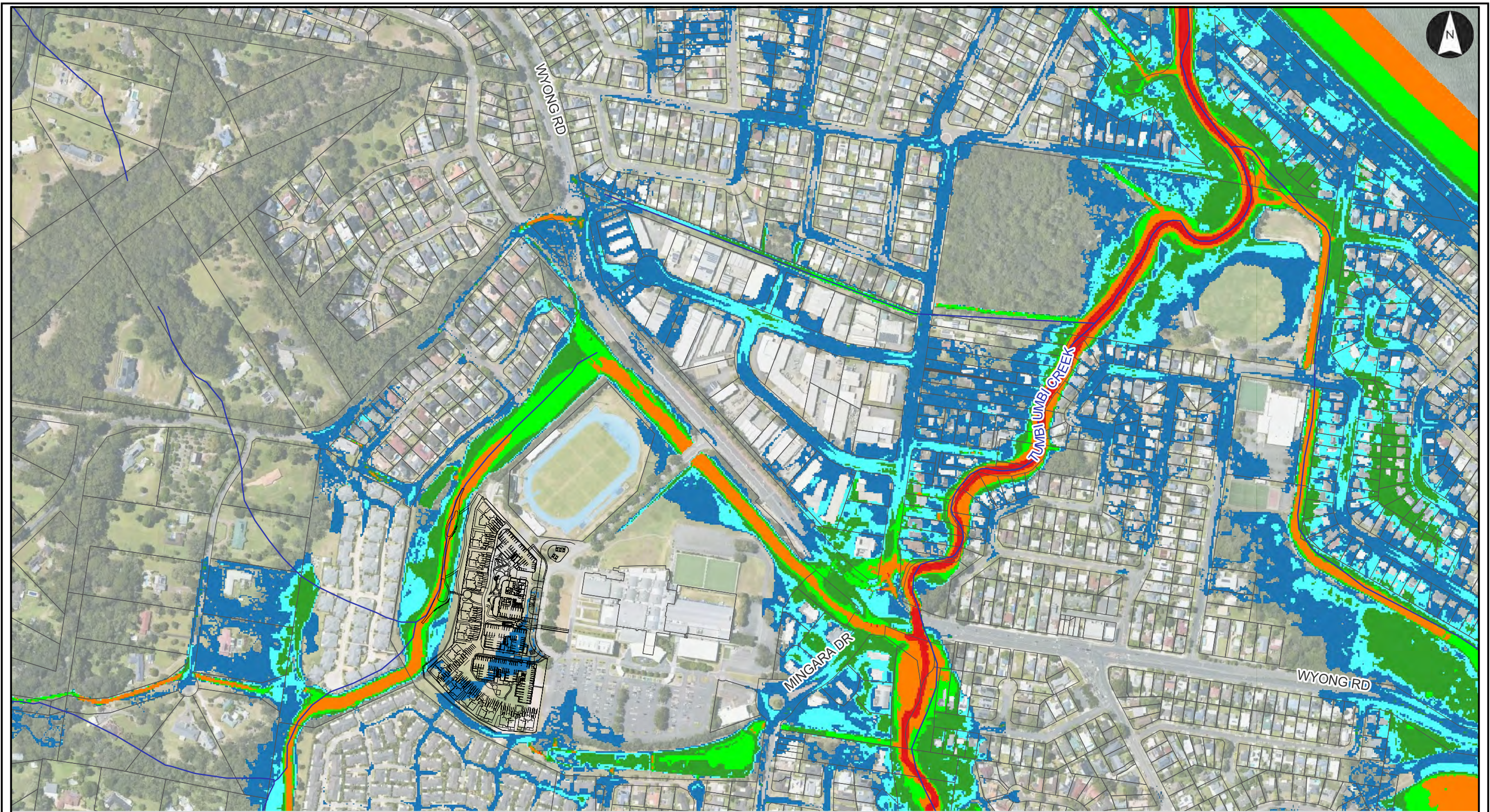
1. Map displayed in EPSG:28356

References:

1. Aerial photo: Metromap

2. Cadastre: NSW Spatial Collaboration Portal





Tumby Umbi Retirement Living

Existing Flood Hazard 1% AEP

Project: Tumby Umbi Retirement Living

Client: Mingara Leisure Group Pty Ltd

Project Code: 301351398

Drawn By: AA, Checked By: JL

Date: (2025-06-02)

Figure No: GIS-Q-03

Legend

- Proposed development
- Watercourse
- Cadastre

Pre-development 1% AEP Flood Hazard Category

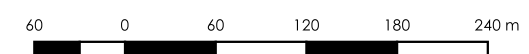
- Band 1
- H1 - Generally safe for vehicles, people and buildings
- H2 - Unsafe for small vehicles
- H3 - Unsafe for vehicles and children / elderly
- H4 - Unsafe for vehicles and people
- H5 - Unsafe for vehicles, people, and some buildings.
- H6 - Unsafe for vehicles, people, and all buildings.

Notes:

1. Map displayed in EPSG:28356

References:

1. Aerial photo: Metromap
2. Cadastre: NSW Spatial Collaboration Portal



Scale at A3: 1:5000





Tumby Umbi Retirement Living

Existing Flood Depth and Level PMF

Project: Tumby Umbi Retirement Living

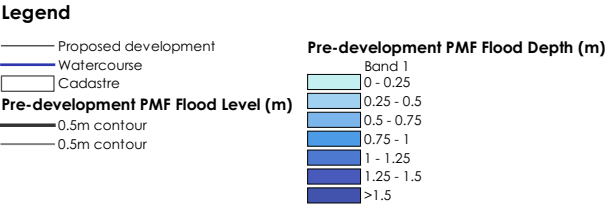
Client: Mingara Leisure Group Pty Ltd

Project Code: 301351398

Drawn By: AA, Checked By: JL

Date: (2025-06-02)

Figure No: GIS-Q-04



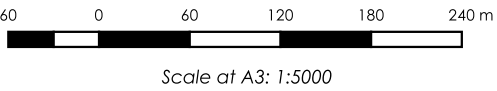
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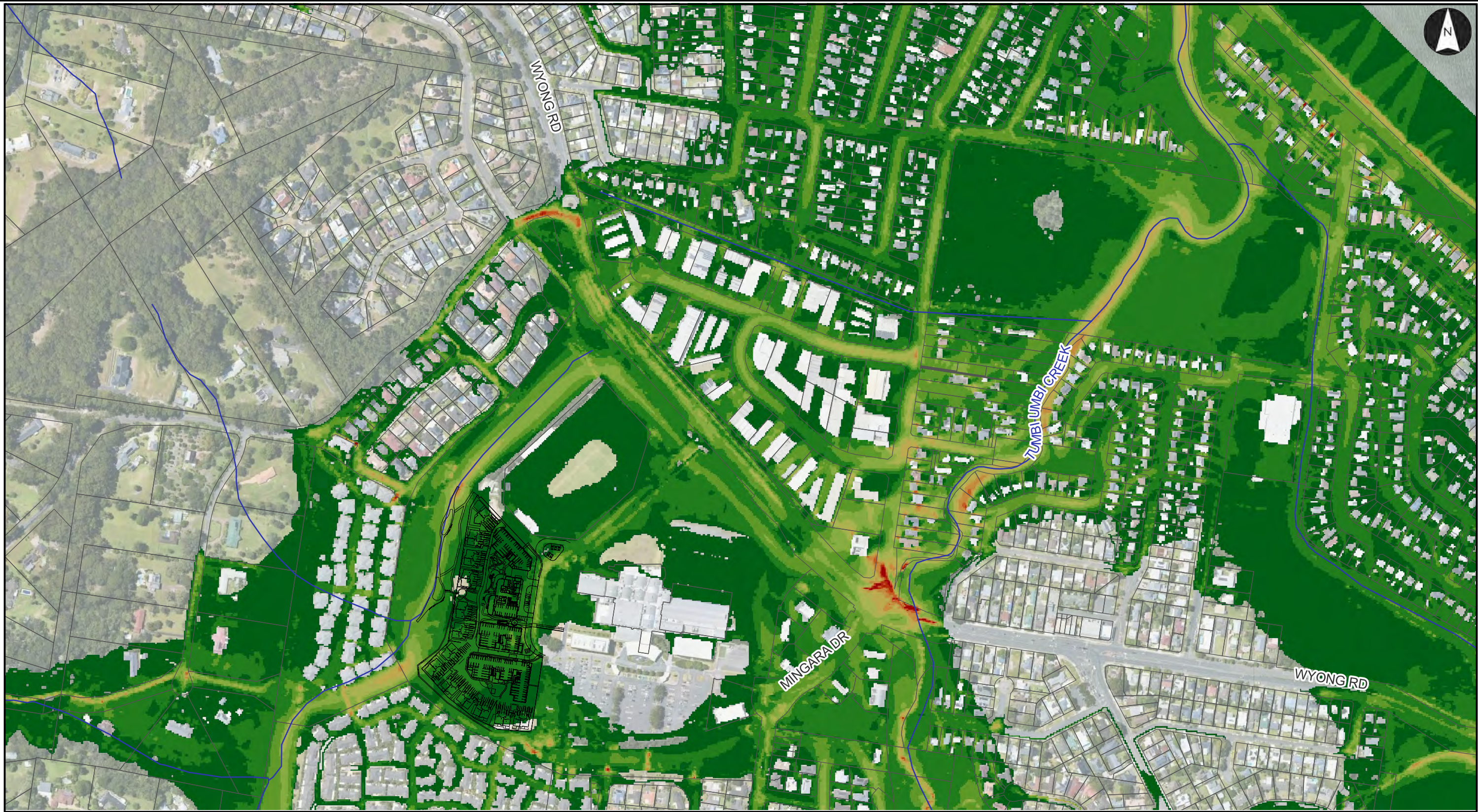
1. Map displayed in EPSG:28356

References:

1. Aerial photo: Metromap

2. Cadastral: NSW Spatial Collaboration Portal

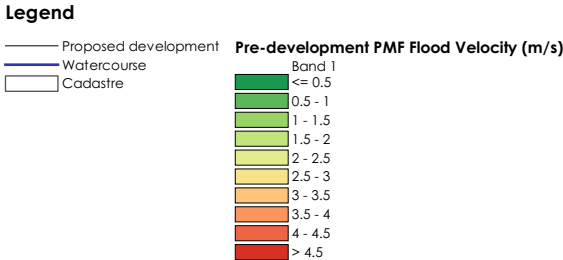




Tumby Umbi Retirement Living

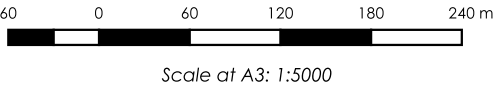
Existing Flood Velocity PMF
Project: Tumby Umbi Retirement Living

Client: Mingara Leisure Group Pty Ltd
Project Code: 301351398
Drawn By: AA, Checked By: JL
Date: (2025-06-02)
Figure No: GIS-Q-05



Notes:
1. Map displayed in EPSG:28356

References:
1. Aerial photo: Metromap
2. Cadastre: NSW Spatial Collaboration Portal





Tumbi Umbi Retirement Living

Existing Flood Hazard PMF
Project: Tumbi Umbi Retirement Living

Client: Mingara Leisure Group Pty Ltd
Project Code: 301351398
Drawn By: AA, Checked By: JL
Date: (2025-06-02)
Figure No: GIS-Q-06



Legend

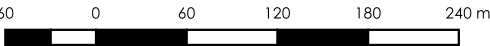
- Proposed development
- Watercourse
- Cadastre

Pre-development PMF Flood Hazard Category

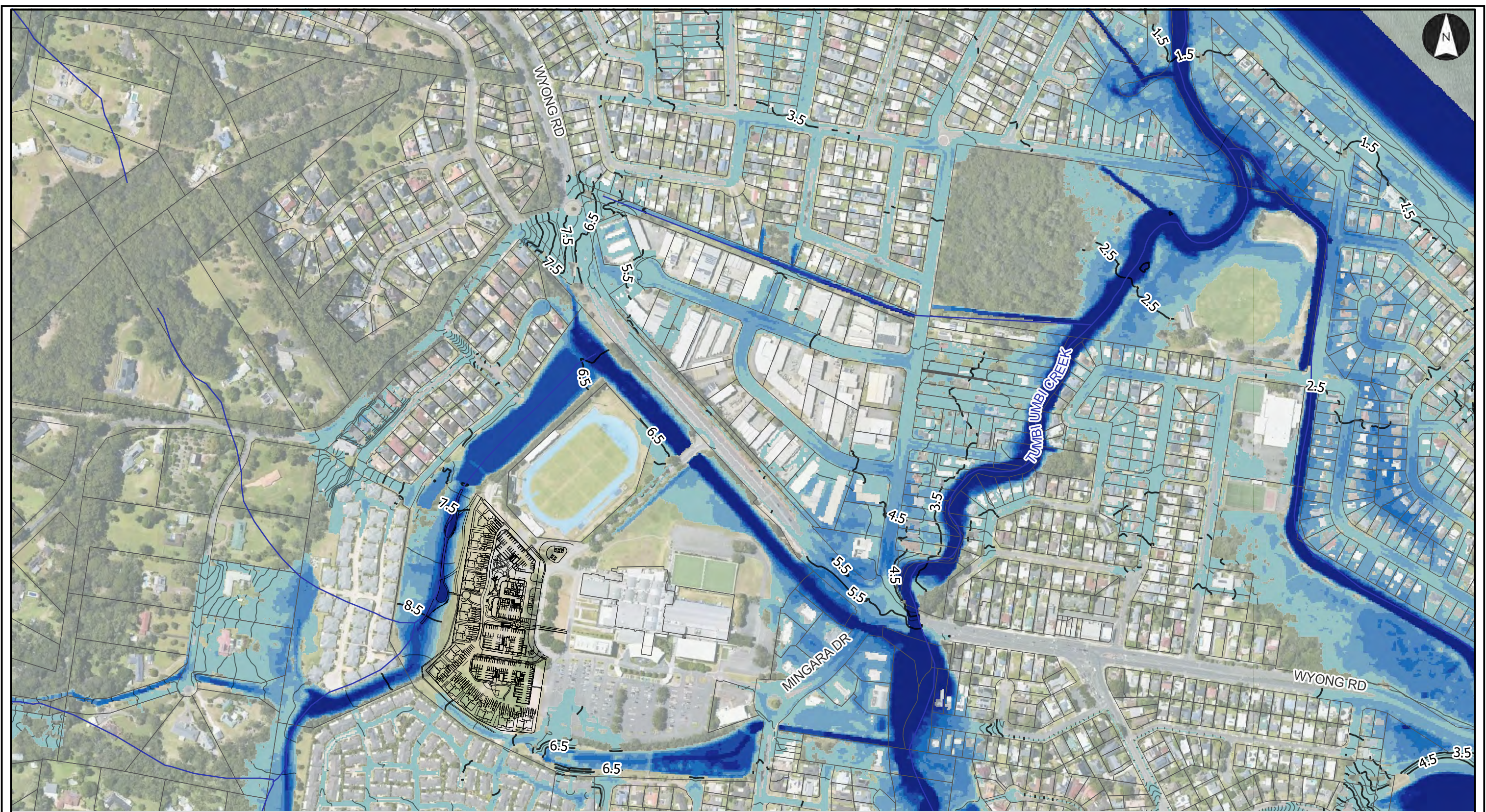
- Band 1
- H1 - Generally safe for vehicles, people and buildings
- H2 - Unsafe for small vehicles
- H3 - Unsafe for vehicles and children / elderly
- H4 - Unsafe for vehicles and people
- H5 - Unsafe for vehicles, people, and some buildings.
- H6 - Unsafe for vehicles, people, and all buildings.

Notes:
1. Map displayed in EPSG:28356

References:
1. Aerial photo: Metromap
2. Cadastre: NSW Spatial Collaboration Portal



Scale at A3: 1:5000



Tumby Umbi Retirement Living

Developed Flood Depth and Level 1% AEP
Project: Tumby Umbi Retirement Living

Client: Mingara Leisure Group Pty Ltd
Project Code: 301351398
Drawn By: AA, Checked By: JL
Date: (2025-06-02)
Figure No: GIS-Q-07

Legend

- Proposed development
- Watercourse
- Cadastre

Post-development 1% AEP Flood Depth (m)

- Band 1
- 0 - 0.25
 - 0.25 - 0.5
 - 0.5 - 0.75
 - 0.75 - 1
 - 1 - 1.25
 - 1.25 - 1.5
 - >1.5

Post-development 1% AEP Flood Level (m)

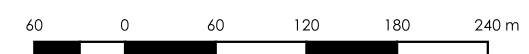
- 0.5m contour
- 0.5m contour

Notes:

- Map displayed in EPSG:28356

References:

- Aerial photo: Metromap
- Cadastre: NSW Spatial Collaboration Portal



Scale at A3: 1:5000





Tumby Umbi Retirement Living
Developed Flood Velocity 1% AEP
Project: Tumby Umbi Retirement Living

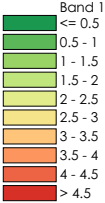
Client: Mingara Leisure Group Pty Ltd
Project Code: 301351398
Drawn By: AA, Checked By: JL
Date: (2025-06-02)
Figure No: GIS-Q-08



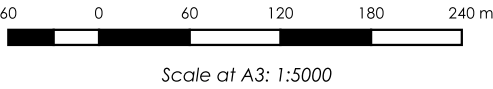
Legend

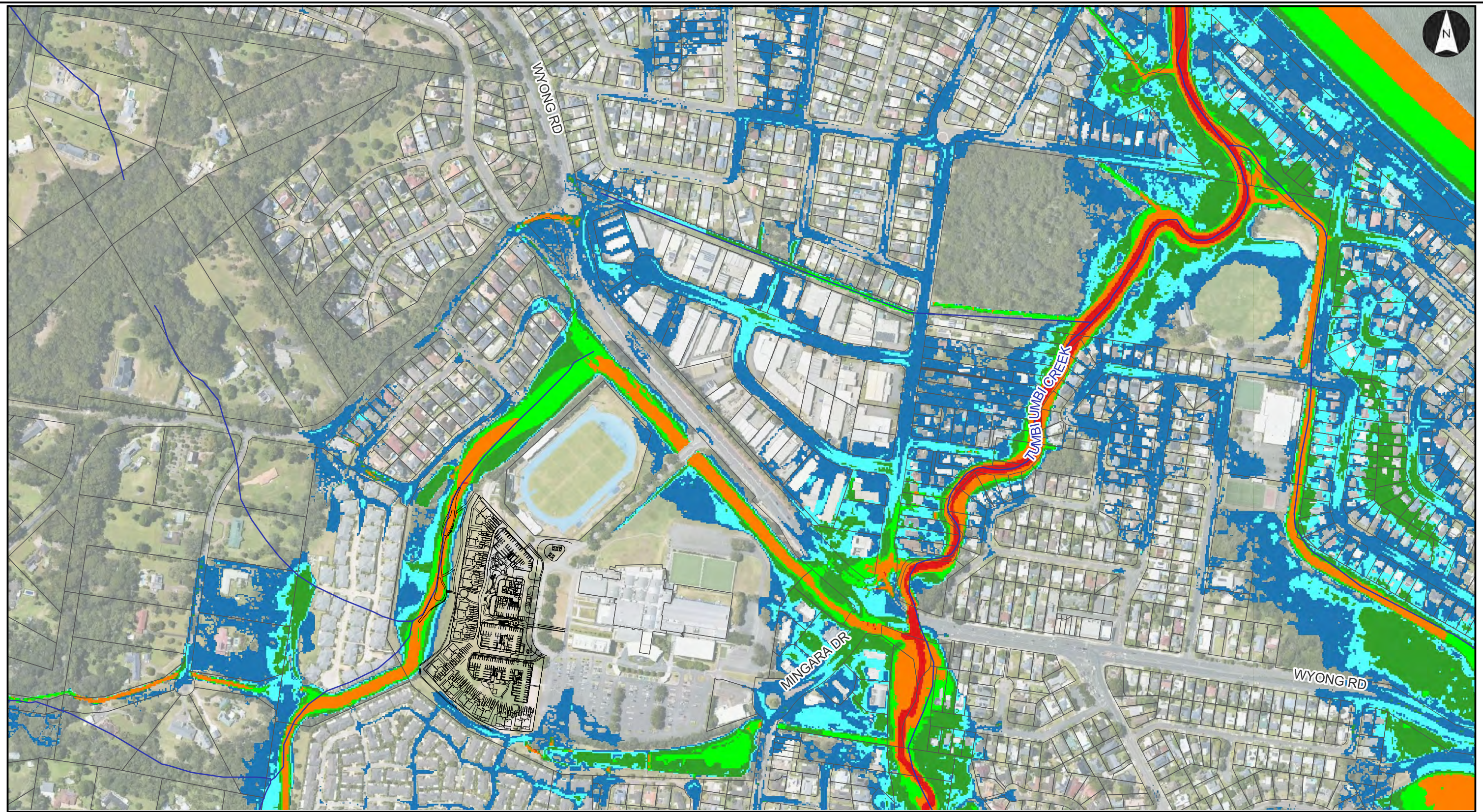
- Proposed development
- Watercourse
- Cadastre

Post-development 1% AEP Flood Velocity (m/s)



- Notes:
- 1. Map displayed in EPSG:28356
- References:
- 1. Aerial photo: Metromap
 - 2. Cadastre: NSW Spatial Collaboration Portal





Tumby Umbi Retirement Living

Developed Flood Hazard 1% AEP

Project: Tumby Umbi Retirement Living

Client: Mingara Leisure Group Pty Ltd

Project Code: 301351398

Drawn By: AA, Checked By: JL

Date: (2025-06-02)

Figure No: GIS-Q-09

Legend

— Proposed development
— Watercourse
— Cadastre

Post-development 1% AEP Flood Hazard Category

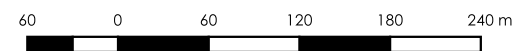
Band 1
H1 - Generally safe for vehicles, people and buildings
H2 - Unsafe for small vehicles
H3 - Unsafe for vehicles and children / elderly
H4 - Unsafe for vehicles and people
H5 - Unsafe for vehicles, people, and some buildings.
H6 - Unsafe for vehicles, people, and all buildings.

Notes:

1. Map displayed in EPSG:28356

References:

1. Aerial photo: Metromap
2. Cadastre: NSW Spatial Collaboration Portal



Scale at A3: 1:5000





Tumby Umbi Retirement Living

Developed Flood Depth and Level PMF
Project: Tumby Umbi Retirement Living

Client: Mingara Leisure Group Pty Ltd
Project Code: 301351398
Drawn By: AA, Checked By: JL
Date: (2025-06-02)
Figure No: GIS-Q-010

Legend

— Proposed development
— Watercourse
— Cadastre

Post-development PMF Flood Depth (m)

Band 1
0 - 0.25
0.25 - 0.5
0.5 - 0.75
0.75 - 1
1 - 1.25
1.25 - 1.5
>1.5

Post-development PMF Flood Level (m)

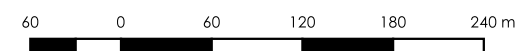
— 0.5m contour
— 0.5m contour

Notes:

1. Map displayed in EPSG:28356

References:

1. Aerial photo: Metromap
2. Cadastre: NSW Spatial Collaboration Portal



Scale at A3: 1:5000





Tumby Umbi Retirement Living

Developed Flood Velocity PMF

Project: Tumby Umbi Retirement Living

Client: Mingara Leisure Group Pty Ltd

Project Code: 301351398

Drawn By: AA, Checked By: JL

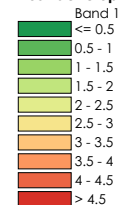
Date: (2025-06-02)

Figure No: GIS-Q-011

Legend

- Proposed development
- Watercourse
- Cadastre

Post-development PMF Flood Velocity (m/s)

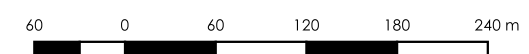


Notes:

1. Map displayed in EPSG:28356

References:

1. Aerial photo: Metromap
2. Cadastre: NSW Spatial Collaboration Portal



Scale at A3: 1:5000





Tumbi Umbi Retirement Living

Developed Flood Hazard PMF

Project: Tumbi Umbi Retirement Living

Client: Mingara Leisure Group Pty Ltd

Project Code: 301351398

Drawn By: AA, Checked By: JL

Date: (2025-06-02)

Figure No: GIS-Q-012



Legend

- Proposed development
- Watercourse
- Cadastre

Post-development PMF Flood Hazard Category

- Band 1
- H1 - Generally safe for vehicles, people and buildings
- H2 - Unsafe for small vehicles
- H3 - Unsafe for vehicles and children / elderly
- H4 - Unsafe for vehicles and people
- H5 - Unsafe for vehicles, people, and some buildings.
- H6 - Unsafe for vehicles, people, and all buildings.

Notes:

1. Map displayed in EPSG:28356

References:

1. Aerial photo: Metromap
2. Cadastre: NSW Spatial Collaboration Portal



Scale at A3: 1:5000



Tumby Umbi Retirement Living

Developed less Existing Flood Impact 1% AEP
Project: Tumby Umbi Retirement Living

Client: Mingara Leisure Group Pty Ltd
Project Code: 301351398
Drawn By: AA, Checked By: JL
Date: (2025-06-02)
Figure No: GIS-Q-013

Legend

— Proposed development
— Watercourse
— Cadastre

1% AEP Flood level difference (m)
Band 1
Was Wet Now Dry
< -0.1
-0.1 - -0.05
-0.05 - -0.01
-0.01 - 0.01
0.01 - 0.1
0.1 - 0.3
> 0.3
Was Dry Now Wet

Notes:

1. Map displayed in EPSG:28356

References:

1. Aerial photo: Metromap
2. Cadastre: NSW Spatial Collaboration Portal



Scale at A3: 1:5000





Tumby Umbi Retirement Living

Developed less Existing Flood Impact PMF
Project: Tumby Umbi Retirement Living

Client: Mingara Leisure Group Pty Ltd
Project Code: 301351398
Drawn By: AA, Checked By: JL
Date: (2025-06-02)
Figure No: GIS-Q-014

Legend

— Proposed development
— Watercourse
— Cadastre

PMF Flood level difference (m)

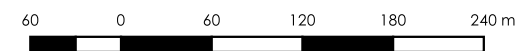
Band 1
Was Wet Now Dry
< -0.1
-0.1 - -0.05
-0.05 - -0.01
-0.01 - 0.01
0.01 - 0.1
0.1 - 0.3
> 0.3
Was Dry Now Wet

Notes:

1. Map displayed in EPSG:28356

References:

1. Aerial photo: Metromap
2. Cadastre: NSW Spatial Collaboration Portal



Scale at A3: 1:5000



Design with
community in mind

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