


Prescriptive Flood Control Assessment

Wollongong Surf Leisure Resort

Project No. 24088
Date: 03 March 2025

Prepared for:
Wollongong Surf Leisure Resort

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1.0 INTRODUCTION

Footprint (NSW) Pty Ltd (*Footprint*) has been engaged to update the existing prescriptive flood control assessment for the Wollongong Surf Leisure Resort (**WSLR**) located at 201 Pioneer Road, Fairy Meadow, NSW.

It is understood that a prescriptive flood control assessment is required for the site as a condition of the operation licence for the resort.

The purpose of the prescriptive flood control assessment is to inform the planning and design of development within the resort such that compliance with Chapter E13 of the Wollongong DCP will be achieved.

2.0 SUBJECT SITE

2.1. Site Description

The WSLR is located at 210 Pioneer Road, Fairy Meadow (Lot 2, DP 863756) and comprises an area of 11.4 hectares, which incorporates an additional lease area of approximately 1,650 square meters at the southern end of the site over Lots 1 and 2 DP347972.

The site has approximately 300m of frontage to Pioneer Road on its western boundary, abuts dunes associated with Towradgi Beach on its eastern boundary, Thomas Dalton Park on its southern boundary and Towradgi Beach Park on its northern boundary.

The site is bisected in a north-south direction by the Towradgi Arm (**Towradgi Arm**) of Fairy Creek which essentially splits the resort in half. The area to the east of the creek (the **eastern half**) is typically elevated above RL5.0m AHD, whilst the area to the west of the creek (the **western half**) has typical elevations in the range of RL3.5 to RL4.9m AHD. A site plan, complete with contours generated from LiDAR data, is included in Figure 1 in **Appendix A**, whilst a survey plan prepared by KF Williams in 2013, showing spot levels over the site, is included in **Appendix B**. The spot level shown on the survey plan are typically taken on existing roads and are therefore unlikely to have changed since the date of the survey.

The eastern half of the site is linked to the western half of the site via a bridge over the Towradgi Arm. The survey plan indicates that the bridge has a minimum elevation of RL 5.12m AHD.

The WSLR provides for a range of accommodation including permanent residents, holiday apartments, bungalows, cabins, powered and unpowered grassed caravan and camping sites. Facilities on the site include amenities buildings, reception building comprising shop, function centre auditorium and indoor pool, basketball and tennis courts, mini golf and laundry. A copy of the site map for the resort is included in **Appendix C**.

3.0 FLOOD LEVELS

3.1. Flood Certificate

Flood level information advice was issued for the subject property by Wollongong City Council on 15 January 2025 and is included in **Appendix D**.

3.2. Flood Information

To supplement the flood level information advice peak enveloped and filtered flood levels, depths, velocities and hazard results data for the Fairy and Cabbage Tree Creeks FRMS&P 2024 was downloaded from the NSW Flood Data Portal.

Flood mapping for the Defined Flood Event (DFE) and PMF event was created using the data from the NSW Flood Data Portal and is contained in **Appendix E**, whilst Table 1 provides a summary of flood mapping figures.

For the Fairy and Cabbage Tree Creeks FRMS&P 2024 the DFE is defined as follows:

DFE = 1% AEP + CC rainfall increase + SLR + blockage envelope

Where:

- CC rainfall increase = per RCP8.5 2090 (16.3% increase in rainfall)
- SLR = Sea level rise of 0.9 metres
- Blockage envelope = maximum envelope of blocked and unblocked structures scenarios

Table 1: Summary of Flood Mapping Figures

Figure	Title
2.1	DFE Maximum Flood Levels and Depths
2.2	DFE Maximum Flood Velocities
2.3	DFE Maximum Flood Hazard
2.4	DFE Flood Risk Precincts
2.5	DFE Flood Planning Levels and Areas
3.1	PMF Maximum Flood Levels and Depths
3.2	PMF Maximum Flood Velocities
3.3	PMF Maximum Flood Hazard

3.3. Flood Levels and Behaviour

3.3.1. Defined Flood Event (DFE)

Figure 2.1 shows that most of the site is free of flooding and where flooding it is largely restricted to the creek line (Towradgi Arm) bisecting the site, with some minor flooding (depths of up to 500mm) observed in the car parking areas adjacent to the entrance driveway and in the north-eastern corner of the site.

Flood levels within Towradgi Arm are shown to range from RL3.92m AHD at the northern end to RL3.75m AHD at the southern end.

Figure 2.2 shows that flood velocities over the site are low, and interrogation of the data shows they are typically less than 0.6m/s.

Figure 2.3 shows that that, except for the Towradgi Arm, which has a flood risk up to H5, flood risk over other parts of the site is low with a maximum flood risk of H3.

3.3.2. Probable Maximum Flood (PMF)

Figure 3.1 shows that, in the PMF event, the eastern half of the site remains relatively flood free, whilst the western half of the site is almost entirely inundated by flood water with depths of up to 1.5m in isolated areas.

Flood levels within Towradgi Arm are shown to increase by approximately 1m from the DFE event and range from RL4.91m AHD at the northern end to RL4.88m AHD at the southern end.

Figure 3.2 shows that flood velocities over the site are low, and interrogation of the data shows they are typically less than 0.6m/s in the Towradgi Arm and typically less than 0.1 m/s within the developed area of the site.

Figure 3.3 shows that that flood hazard in the Towradgi Arm increases to H6, whilst flood hazard over the western half of the site is generally up to H3 with some isolated pockets on roadways reaching H4.

3.4. Flood Hazard

Hazard vulnerability thresholds as defined in Australian Rainfall and Runoff (2019) are provided in Table 2.

Table 2: ARR Hazard Vulnerability Thresholds

Hazard Vulnerability Classification	Description
H1	Generally safe for vehicles, people and buildings
H2	Unsafe for small vehicles
H3	Unsafe for vehicles, children and the elderly
H4	Unsafe for vehicles and people
H5	Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust buildings subject to failure
H6	Unsafe for vehicles and people. All buildings types considered vulnerable to failure.

3.5. Flood Risk Precincts

Flood risk precincts directly relate to the flood planning controls defined in Chapter E13 of the Wollongong DCP 2009.

Table 3: Flood Risk Precinct Definitions

Flood Risk Precinct	Definition
High	<p>The high FRP is where high flood damages, potential risk to life and/or evacuation problems would be anticipated or where development would significantly or adversely alter flood behaviour. This area includes floodways. In this precinct, there would be a significant likelihood of flood damages and/or danger to life. The high FRP includes:</p> <ul style="list-style-type: none"> i. Areas greater than H3 hazard conditions during a 1% AEP flood ii. Land within 10m from the top of a watercourse bank; and iii. Floodways
Medium	<p>In this precinct there would be a significant likelihood of flood damage and/or danger to life, but these damages or danger can be minimised by the application of appropriate development controls. The medium FRP includes:</p> <ul style="list-style-type: none"> i. Land below the 1% AEP level plus 0.5m that is not within the high FRP

Low	<p>This precinct is where the likelihood of damages is low for most land uses. The low FRP includes:</p> <ul style="list-style-type: none"> ii. All areas within the floodplain (i.e. within the extent of the PMF) but not identified within either the high FRP or medium FRP; and iii. All areas with the 2100 Coastal Zone Inundation Extent not classified Medium Flood Risk or High Flood Risk Precinct.
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Flood risk precincts over the subject site are shown in Figure 2.4 in Appendix E.

The mapping shows that the Towradgi Arm is defined as a high flood risk precinct, whilst the western half of the site has areas of medium and low flood risk. Flood risk on the eastern half of the site is limited to a small area of low flood risk at the northern and southern ends.

The provisions of the DCP will apply to areas of the site covered by either high, medium or low flood risk precincts (typically the western half of the site and the Towradgi Arm). For areas of the site outside any defined flood risk precinct, these areas are outside the floodplain and above the flood planning level and therefore the provisions of the DCP will not apply.

3.6. Assessment Against Chapter E13 of the Wollongong DCP 2009

Proposed development on the site has been assessed against the prescriptive controls contained within Schedule 5 (Fairy and Cabbage Tree Creek Floodplain) of Chapter E13 of the Wollongong DCP 2009 (WDCP 2009).

The assessment has been based on the following land use categories as defined in Appendix A of the WDCP 2009:

- i. Tourist Related Development (T), relating to the short-term caravan and camping sites; and
- ii. Residential Development (R), relating to permanent residential dwellings,

The assessment is provided in Table 4

Table 1Table 4: Assessment Against Schedule 5 WDCP2009

Planning Consideration	Relevant Control	Low Flood Risk	Medium Flood Risk
Floor Level	(2) Habitable floor levels to be equal to or greater than the 1% AEP flood level plus freeboard	(T) & (R) - Not Relevant	(T) & (R) – Habitable floor levels for any new development on the western half of the site should be at or above the flood planning level as specified in Figure 2.5 in Appendix E .
	(7) Garage and all other non-habitable internal floor levels to be no lower than the 1% AEP flood level minus 300mm or 300mm above finished adjacent ground level (whichever is the greater)	(T) & (R) - Not Relevant	<p>(R) – Desirably any new garage should be raised a minimum of 300mm above existing ground level.</p> <p>Where this is not possible due to existing constraints (i.e. proximity of garage to existing roadway) then the garage should be raised as high as possible whilst achieving compliance vehicle access in accordance with AS2890.1. In this instance it is noted that the 1% AEP flood event is largely confined to the existing creek and therefore any garage, even if constructed and ground level, would be elevated above the 1% AEP flood level. Any assessment under this scenario would be a merit assessment subject to Council approval.</p>

Planning Consideration	Relevant Control	Low Flood Risk	Medium Flood Risk
Building Components	(1) All structures to have flood compatible building components below or at the 1% AEP flood level plus freeboard.	(T) & (R) - Not Relevant	(T) & (R) – Any building material or component below the flood planning levels defined in Figure 2.5 in Appendix E shall be constructed of flood compatible materials as defined in Appendix B of the WDCP2009, or as otherwise approved by an appropriately qualified engineer. A copy of Appendix B of the WDCP2009 is provided at Appendix F
Structural Soundness	(2) Applicant to demonstrate that any structure can withstand the forces of floodwater, debris and buoyancy up to and including the 1% AEP flood plus freeboard, PMF plus freeboard if required to satisfy evacuation criteria (see below)	<p>(R) – Other measures are in place on-site to satisfy evacuation, so PMF criteria are not relevant.</p> <p>Flood depths and velocities over the site in the 1% AEP event would equate to an equivalent AS4055 wind classification of N1 in accordance with Table C.2A of Reducing Vulnerability of Building to Flood Damage, Guidance on Building in Flood Prone Areas (2007) and therefore flood loading would be less than that required for wind loading.</p> <p>Nonetheless any application for new residential structures should be accompanied by an engineer's certificate demonstrating the structural adequacy of the structure.</p>	
	(3) Applicant to demonstrate that any structure can withstand the forces of floodwater, debris and buoyancy up to and including the PMF plus freeboard.	<p>(T) - Flood depths and velocities over the site in the PMF event would equate to an equivalent AS4055 wind classification of N1 in accordance with Table C.2A of Reducing Vulnerability of Building to Flood Damage, Guidance on Building in Flood Prone Areas (2007) and therefore flood loading would be less than that required for wind loading.</p> <p>Nonetheless any application for new residential structures should be accompanied by an engineer's certificate demonstrating the structural adequacy of the structure.</p>	

Planning Consideration	Relevant Control	Low Flood Risk	Medium Flood Risk
Flood Affectation	(1) Engineer's report required to certify that the development will not increase flood affection elsewhere, includes medium and high-density residential developments.	(T) & (R) - Not Relevant	(T) & (R) – The western half of the site is typically above the DFE flood level and therefore any further development within this area is unlikely to result in adverse flood impact elsewhere in the catchment. Furthermore, the site is already well developed, and any redevelopment would therefore likely comprise the redevelopment of existing areas, rather than any broadscale new development. The redevelopment of existing areas (i.e. replacement of existing structures with new structures) would therefore not impact existing flood behaviour.
	(2) The impact of the development on flooding elsewhere to be considered, includes low density residential.	(T) & (R) – The western half of the site is typically above the DFE flood level and therefore any further development within this area is unlikely to result in adverse flood impact elsewhere in the catchment. Furthermore, the site is already well developed, and any redevelopment would therefore likely comprise the redevelopment of existing areas, rather than any broadscale new development. The redevelopment of existing areas (i.e. replacement of existing structures with new structures) would therefore not impact existing flood behaviour.	

Planning Consideration	Relevant Control	Low Flood Risk	Medium Flood Risk
Evacuation	(3) Reliable access for pedestrians or vehicles required from the building, commencing at a minimum level equal to the lowest habitable floor level to an area of refuge above the PMF level, or a minimum of 20sqm of the dwelling/premises to be above the PMF level.	<p>(T) & (R) – Figure 55-1 of the FRMS&P shows that, in the PMF event, the western half of the site has a flood emergency response classification of ‘flooded, isolated, submerged’, whilst the eastern half is classified as ‘flooded with exit route/elevated land’.</p> <p>Figure 55-2 of the FRMS&P shows that, in the 1% AEP event, the whole of the site is classified as ‘flooded with exit route/elevated land’.</p> <p>Based on the above it is evident that a shelter in place evacuation strategy is most suited to the site due to the impact widespread flooding in the lower reaches of the catchment has on the road network.</p> <p>The western half of the site is typically below the PMF level and much of the area is classified as H3 in the PMF event which is considered unsafe for vehicles, children and the elderly (see Table 2).</p> <p>Most of the eastern half of the site is above the PMF level and is largely occupied by permanent residents who would be well versed in flood behaviour and emergency response and can safely shelter in place.</p> <p>There are structures on site on either side of the creek with floor levels above the PMF flood level which are considered suitable as a short-term flood refuge and include:</p> <ul style="list-style-type: none"> • Pool Deck and associated amenities areas at the Conference Centre (RL5.33m* AHD) • First floor office and storage area above the amenities areas for the pool (<RL7.75m AHD) • Amenities block located on the eastern half of the site. • Other areas on the eastern half of the site <p>The bridge over the Towradgi Arm (minimum elevation of 5.12m AHD) is flood free up to and including the PMF event and therefore provides reliable vehicle and pedestrian access between the two halves of the site.</p>	

Planning Consideration	Relevant Control	Low Flood Risk	Medium Flood Risk
	(4) The development must be consistent with any relevant flood evacuation strategy or similar plan	<p>A flood emergency repose plan has been in place for the site for some time. The flood emergency response plan has been updated as part of the project and is included in Appendix G.</p> <p>The flood emergency response plan incorporates an electronically activated water level alarm in the creek to trigger the evacuation protocols.</p>	
Management and Design	(2) Site Emergency Response Flood Plan required (except for single dwelling houses) where floor levels are below the flood planning level	Not Relevant	(T) A Flood Emergency Response Plan has been prepared for the site and is included in Appendix G .
	(3) Applicant to demonstrate that area is available to store goods above the 1% AEP flood level plus freeboard	Not Relevant	<p>(T) The eastern half of the site is well above the 1% AEP flood plus freeboard level.</p> <p>Although not surveyed the majority of structures on the western half of the site would have floor level in excess of the 1% AEP flood level plus freeboard.</p> <p>There is ample area for the storage of goods above this level</p>
	(5) No external storage of materials below the flood planning level which may cause pollution or be potentially hazardous during any flood.	Not Relevant	<p>(T) The location and type of hazardous materials currently stored on the site are summarised below:</p> <ul style="list-style-type: none"> i. General cleaning chemicals in sealed drums are located in each amenities building with a minimum floor level of RL4.88m* AHD,

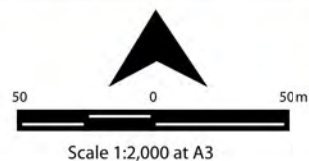
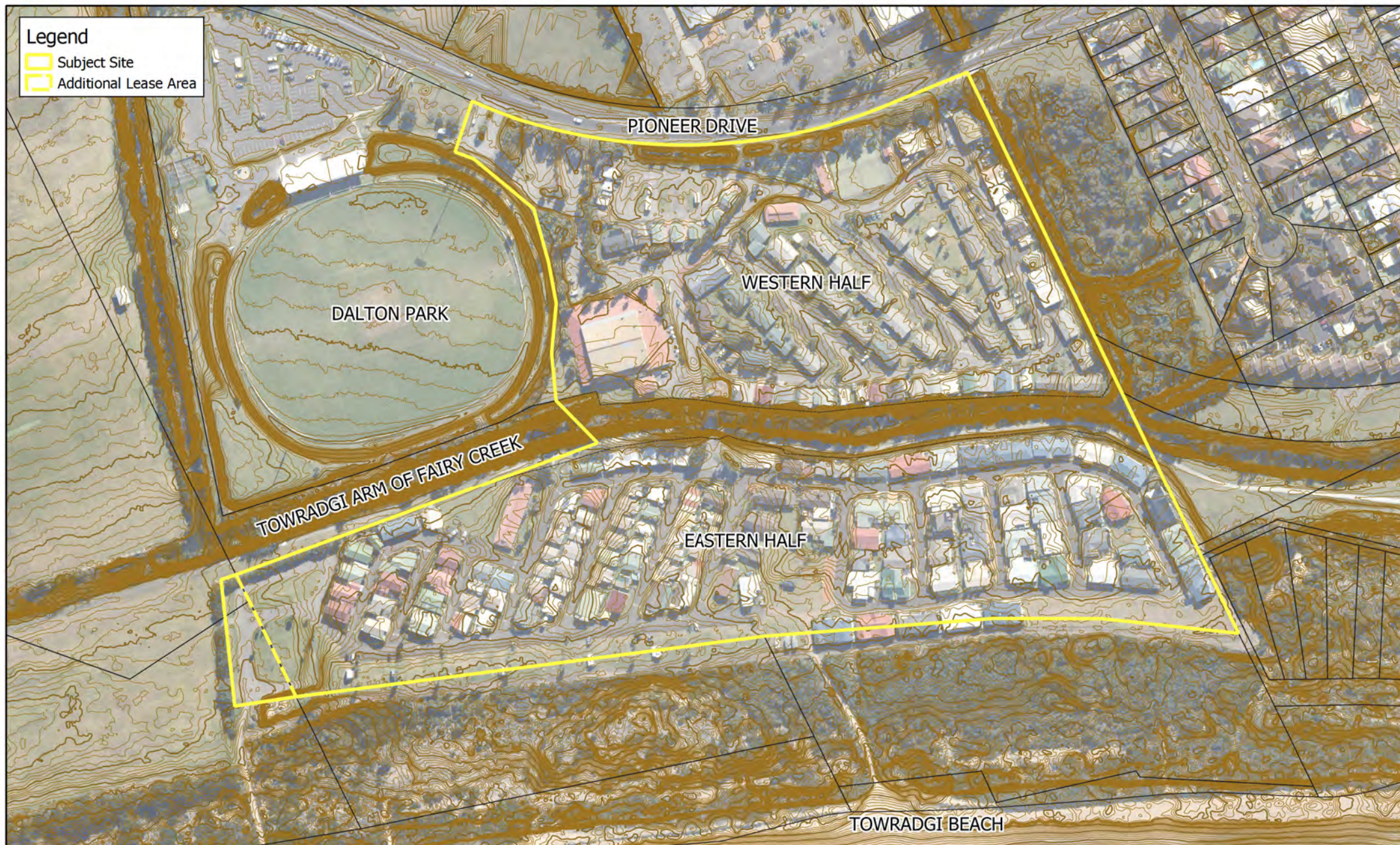
Planning Consideration	Relevant Control	Low Flood Risk	Medium Flood Risk
			<p>approximately 1.05m above the DFE and approximately equal to the PMF flood level.</p> <ul style="list-style-type: none"> ii. Pool chemicals are located adjacent to the indoor pool at a minimum elevation of RL5.33m* AHD and well above the DFE and PMF level. iii. Petrol and diesel fuel for maintenance vehicles etc are in the workshop building at RL4.38m* AHD and approximately 450mm above the DFE flood level. The fuel is stored in drums and cans and enclosed within the workshop so would be contained in a PMF flood event so as not to become hazardous. iv. Cleaning chemicals and laundry detergents etc are contained in the laundry building at RL5.02m* AHD and are above the PMF level.

* Levels not included on KFW survey but referenced in the Prescriptive Flood Control Assessment (Report KF111244) by KFW dated 05 February 2016. The levels have not been confirmed as part of this project.

APPENDIX A

Site Plan

- Legend**
- Subject Site
 - Additional Lease Area



Footprint (NSW) Pty. Ltd. endeavors to ensure that the information provided in this map is correct at the time of publication. Footprint (NSW) Pty. Ltd. does not warrant, guarantee or make representations regarding the currency and accuracy of the information contained on this map.

WOLLONGONG SURF LEISURE RESORT

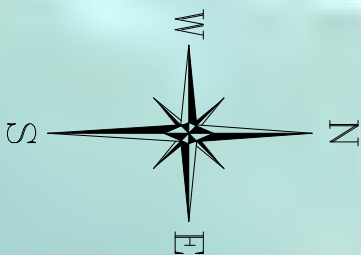
201 PIONEER ROAD, FAIRY MEADOW

FIGURE 1
SITE PLAN

Rev 1 - 23 January 2025

APPENDIX B

KFW Site Survey 2013



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Project Management, Surveying,
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Surveyor	Date
Date of Survey	Drawn NG
Height Datum AHD	Designed
Origin	Checked
Horiz. Datum	Approved

Drawing Title		Project No.
201 PIONEER ROAD FAIRY MEADOW WOLLONGONG SURF LEISURE RESORT FIGURE 2 EXISTING SURFACE LEVELS		KF111244
Drawing No.		
Sheet	Revision	
Or		

Scale @ A3

Drawing Status

APPENDIX C

Site Map

APPENDIX D

Flood Level Information Advice

Bond
210 Jamberoo Road
Jamberoo NSW 2533

CERTIFICATE	CERT-2025/89
Issued	15 January 2025
Council Property Reference	382327

Dear Sir/Madam

FLOOD LEVEL INFORMATION ADVICE

Reference is made to your request for flood level information concerning the property below:

Description	SURF LEISURE RESORT
Location	Wollongong Surf Leisure Resort 201 Pioneer Road FAIRY MEADOW NSW 2519

Historical Flood Levels

The enclosed **Map 1** shows previously recorded flood levels with approximate location, if any, in the vicinity of the subject property. Should the level/s not be located in the vicinity of the subject property, they may not be relevant to the subject property.

If there are no levels shown on the map, then Council has no historical recorded flood levels available. As Council's records are not complete, this does not mean that flooding has not occurred in the past or will not occur in the future.

These historic flood levels are approximate only and should not be relied upon for any development purpose.

Flood Level Information

Please refer to the **Map 2**, **Map 3**, **Map 4** and **Map 5** for anticipated flood levels in the vicinity of the subject property, where available. Flood levels are extracted from the Fairy and Cabbage Tree Creeks Floodplain Risk Management Study and Plan dated August 2024 and provided for a range of AEP events up to the PMF.

DFE Levels are applicable for any development on the subject property. For further information refer to the adopted Fairy and Cabbage Tree Creeks Floodplain Risk Management Study and Plan dated August 2024 on Council's website: <https://wollongong.nsw.gov.au/about/floods-and-stormwater/catchments>

It is recommended to obtain surveyed ground levels of the property and buildings in metre AHD. This information along with the flood levels can be used to determine the effect/depth of flooding, if any, on this property.

Flood Velocities

Please refer to the **Map 6** and **Map 7** for anticipated flood velocities in the vicinity of the subject property, where available. Flood velocities are extracted from the Fairy and Cabbage Tree Creeks Floodplain Risk Management Study and Plan dated August 2024. These velocities are indicative only and may vary considerably. They do not consider local conditions or changed conditions due to new development since the study commenced.

Flood Risk Precincts (FRP)

The Fairy and Cabbage Tree Creeks Floodplain Risk Management Study and Plan dated August 2024 identified the FRP classification for this catchment. Please refer to the enclosed **Map 8** for FRP, if applicable for the subject property. Please note that land within 10 metres from the top of a watercourse bank is High Flood Risk Precinct (even if not shown as such on Map 8), as per the requirements in Section 6.3 of Chapter E13 of the DCP.

Flood Hazard (FH)

The Fairy and Cabbage Tree Creeks Floodplain Risk Management Study and Plan dated August 2024 identified the Flood Hazard classification for this catchment. Please refer to the enclosed **Map 9** for Flood Hazard classification, if applicable for the subject property.

Mainstream Flooding and Overland Flooding Extent

The Fairy and Cabbage Tree Creeks Floodplain Risk Management Study and Plan dated August 2024 identified the extent of mainstream flooding and overland flooding. Please refer to the **Map 10** for identified mainstream flooding and overland flooding extent, if applicable for the subject property.

Other Relevant Information

Flood studies and Floodplain Risk Management Studies and Plans may not study all watercourse tributaries/overland flow paths on the subject property. A flood investigation/study of the full extent of tributaries maybe required. The services of a suitably qualified Civil Engineer experienced in hydraulics and floodplain management can be engaged to get advice.

NSW Flood Data Portal

Council's flood data including reports, model results and inputs files are available on NSW Flood Data Portal. Registered users can download model results and input files from the portal in the following website: <https://flooddata.ses.nsw.gov.au/>

Flood Policies

For information on Council's requirements for development on flood affected lands, please refer to the DCP, the LEP, the NSW Government's Floodplain Development Manual and the relevant Flood Studies and Floodplain Risk Management Studies and Plans. The DCP and Council adopted Flood Studies and Floodplain Risk Management Studies and Plans are available on Council's website. Alternatively, the services of a suitably qualified Civil Engineer experienced in hydraulics and floodplain management can be engaged to get advice regarding development opportunities.

Disclaimer

Council is providing this information in good faith and does not warrant the accuracy of the information provided in response to this request. A suitably qualified Civil Engineer experienced in hydraulics and floodplain management should be engaged to assist in the interpretation of the information provided by the Council.

For any questions regarding flood information, please contact Wollongong City Council on the telephone number below.

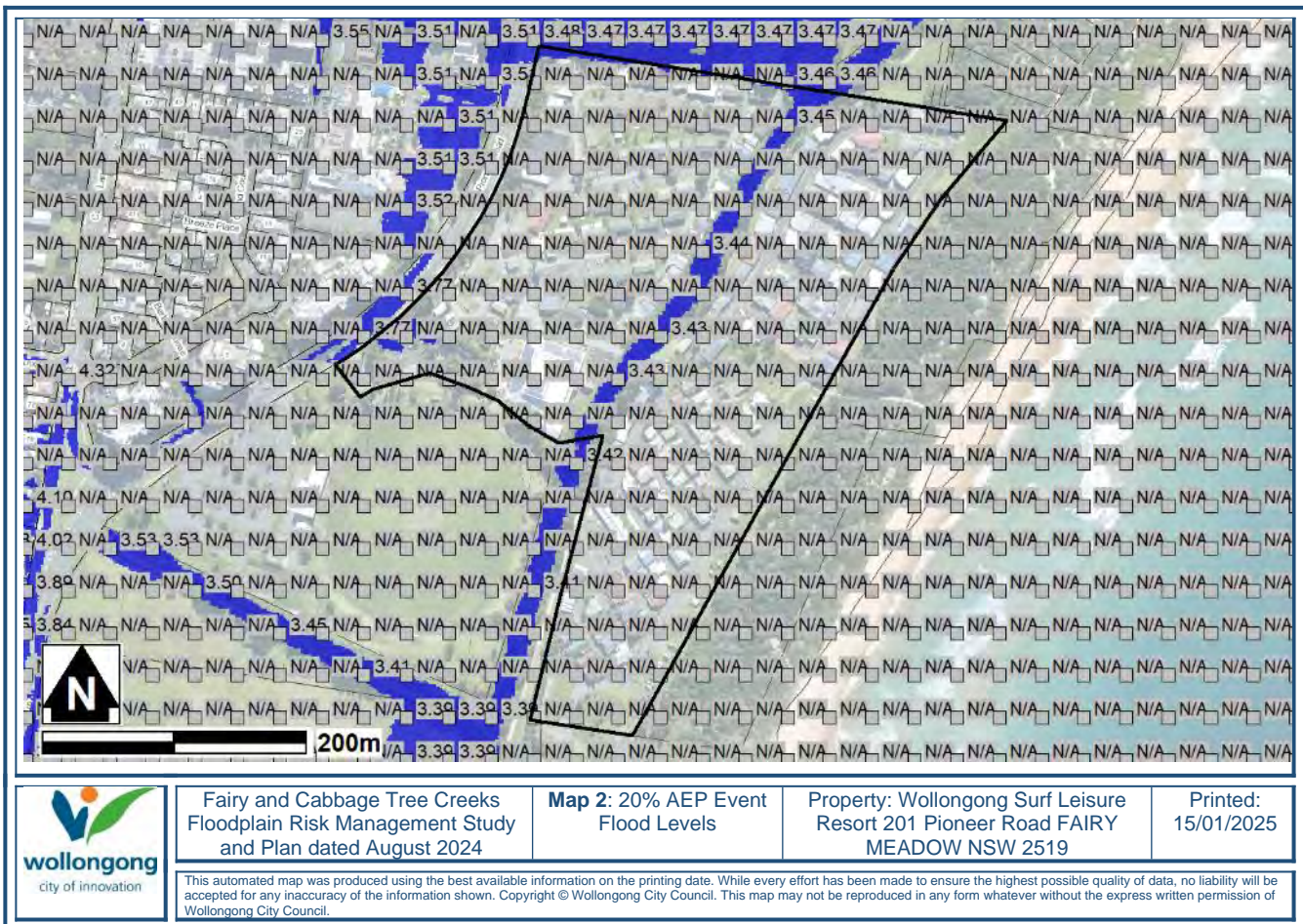
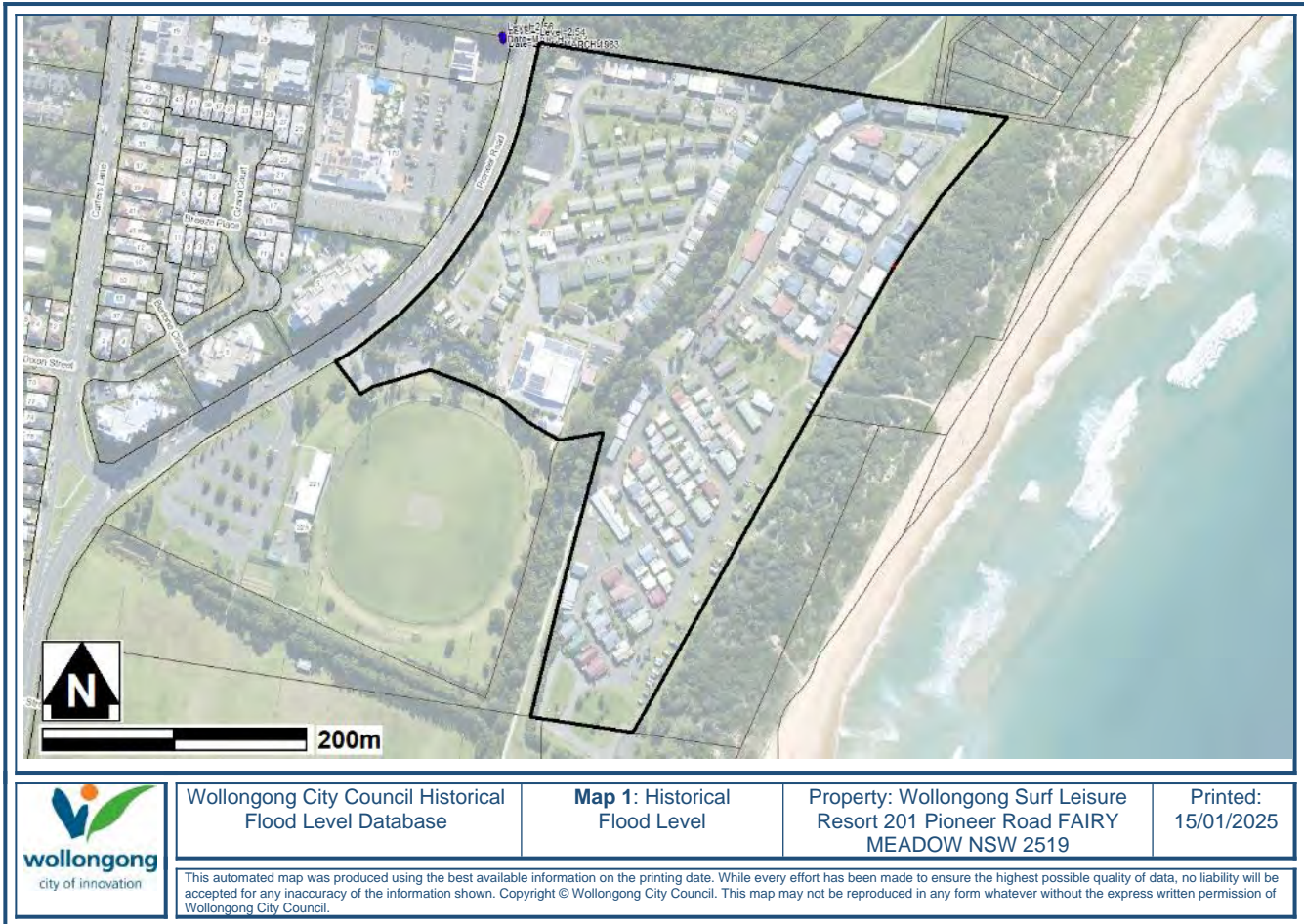
This letter is authorised by
Floodplain Management Team
Wollongong City Council
Telephone (02) 4227 7111

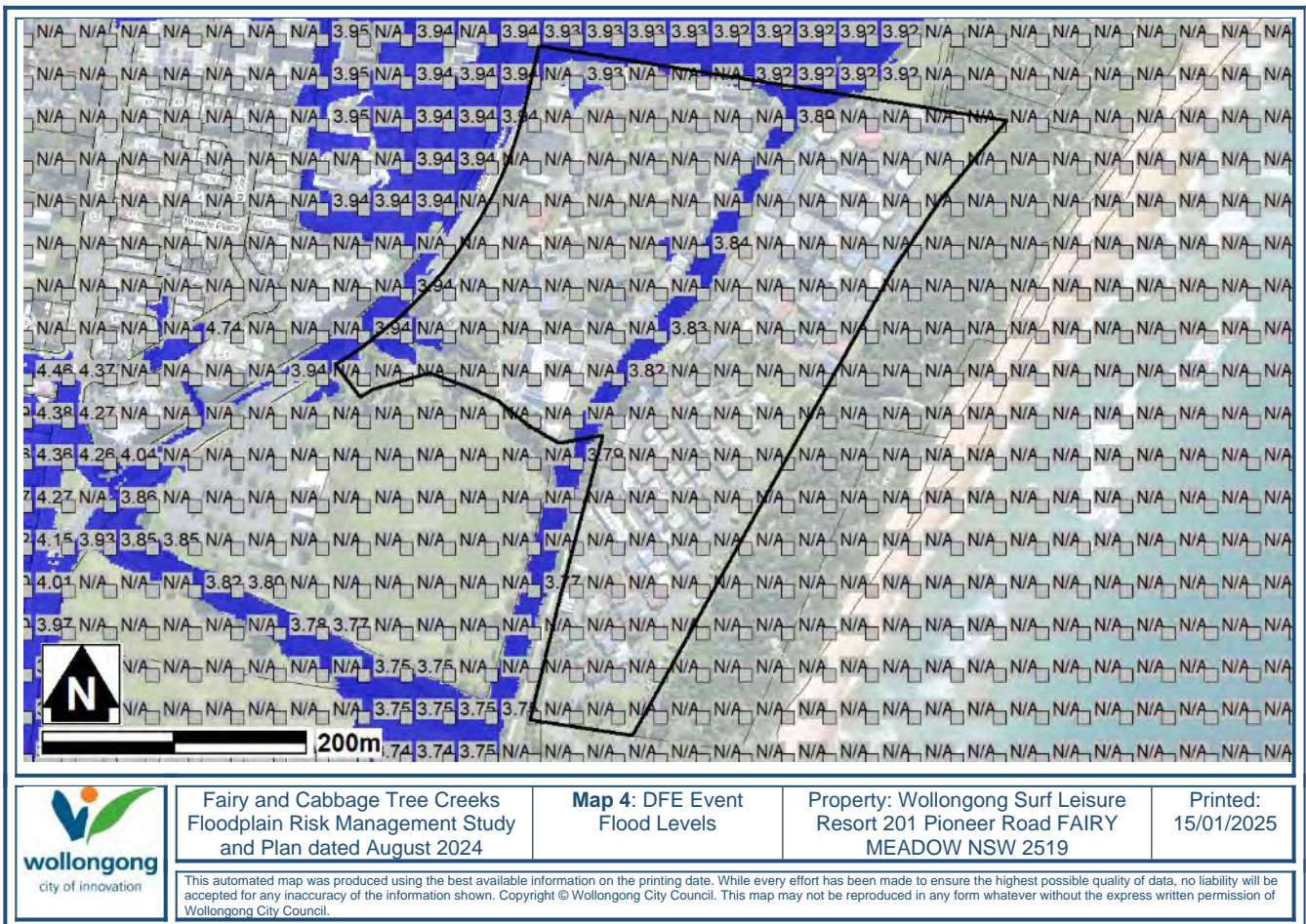
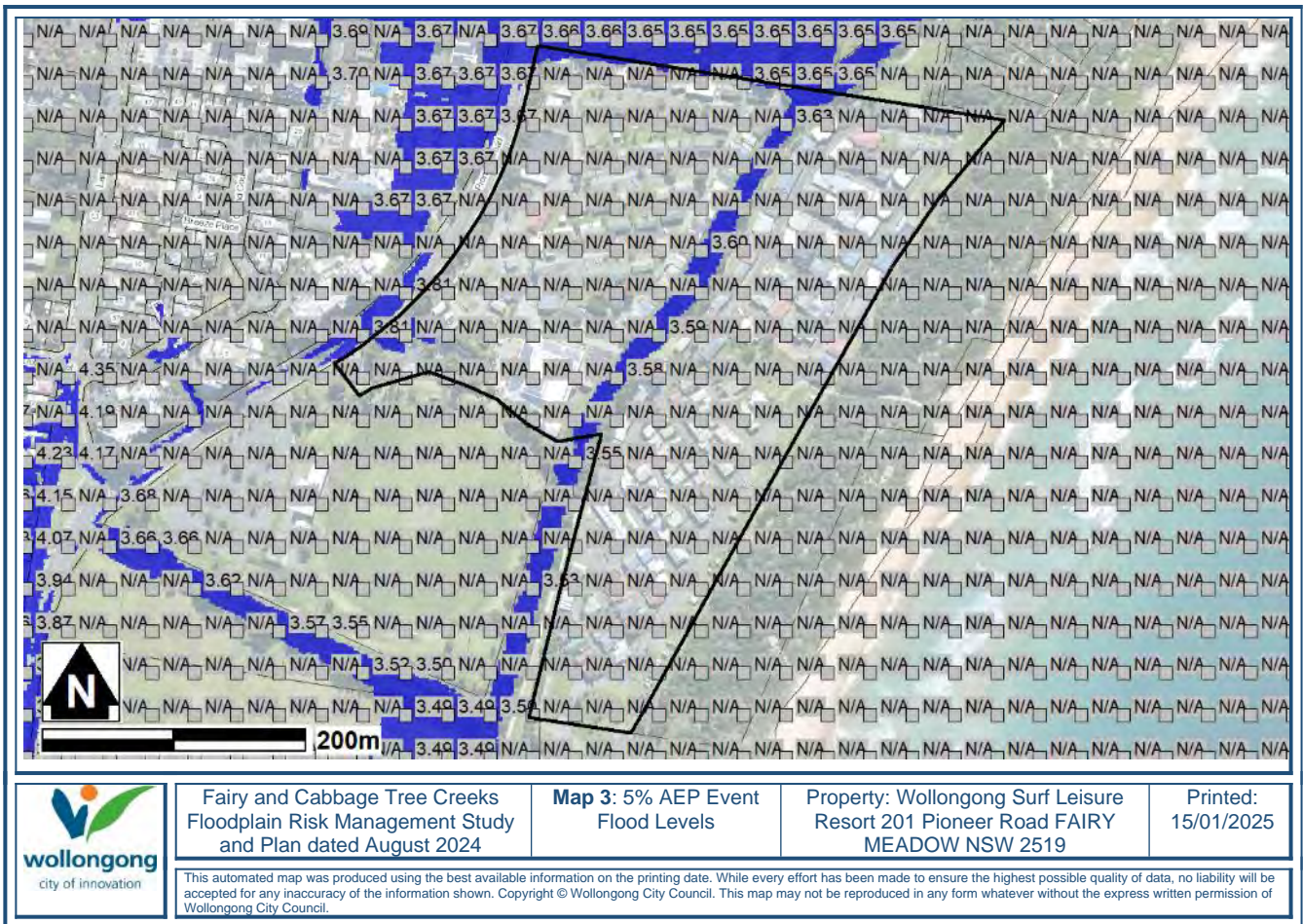
Glossary

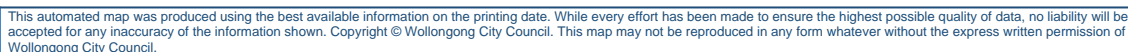
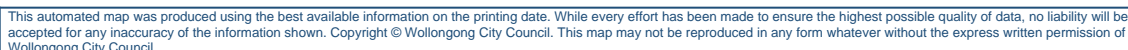
Abbreviation	Description
AEP	<i>Annual Exceedance Probability</i> indicates same meaning as described in NSW Floodplain Development Manual.
AHD	<i>Australian Height Datum</i> as described in Council's DCP. In this document levels are referenced to metre AHD.
DCP	<i>Development Control Plan</i> refers to "Wollongong Development Control Plan (DCP) 2009" adopted by Wollongong City Council.
DFE	<i>Defined Flood Event</i> has the same meaning as described in the Mullet Creek Floodplain Risk Management Study and Plan dated May 2023.
FH	<i>Flood Hazard</i> has the same meaning as described in Australian Disaster Resilience Handbook 7 (AIDR2017).
FRP	<i>Flood Risk Precincts</i> as described in Council's DCP.
LEP	<i>Local Environmental Plan</i> refers to "Wollongong LEP 2009".
NSW	The state of <i>New South Wales</i>
PMF	<i>Probable Maximum Flood</i> indicates same meaning as described in NSW Floodplain Development Manual.

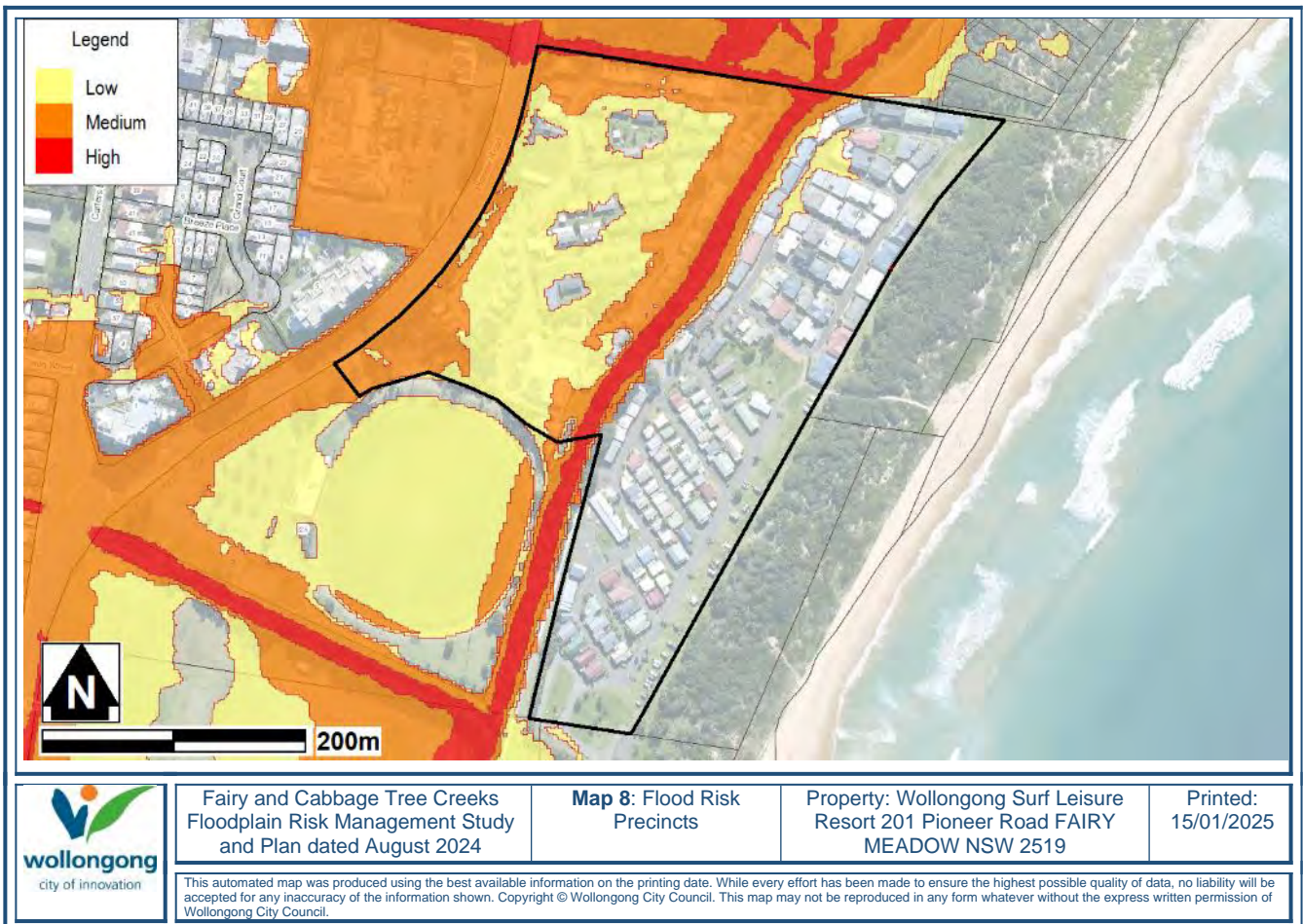
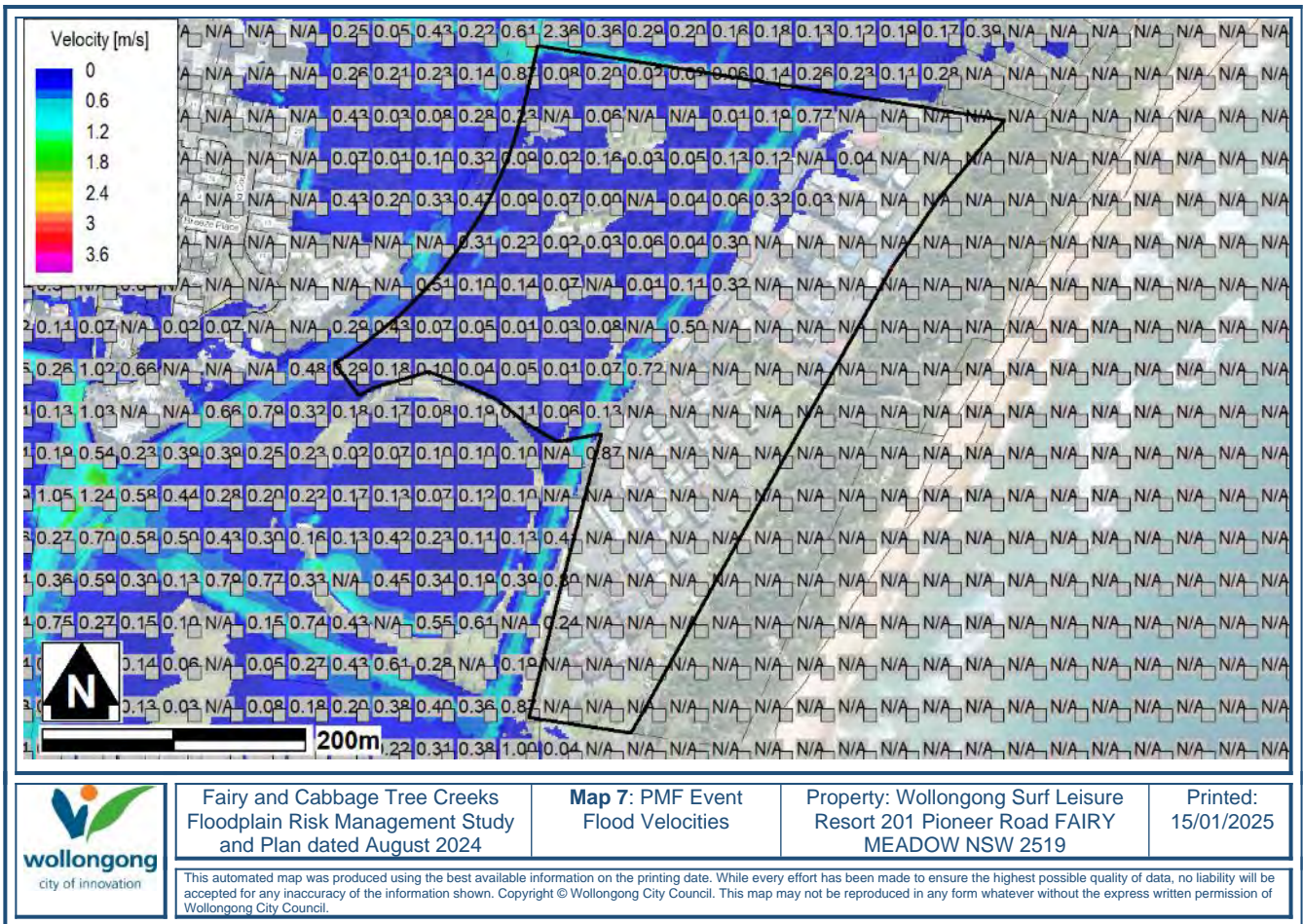
Note for Maps

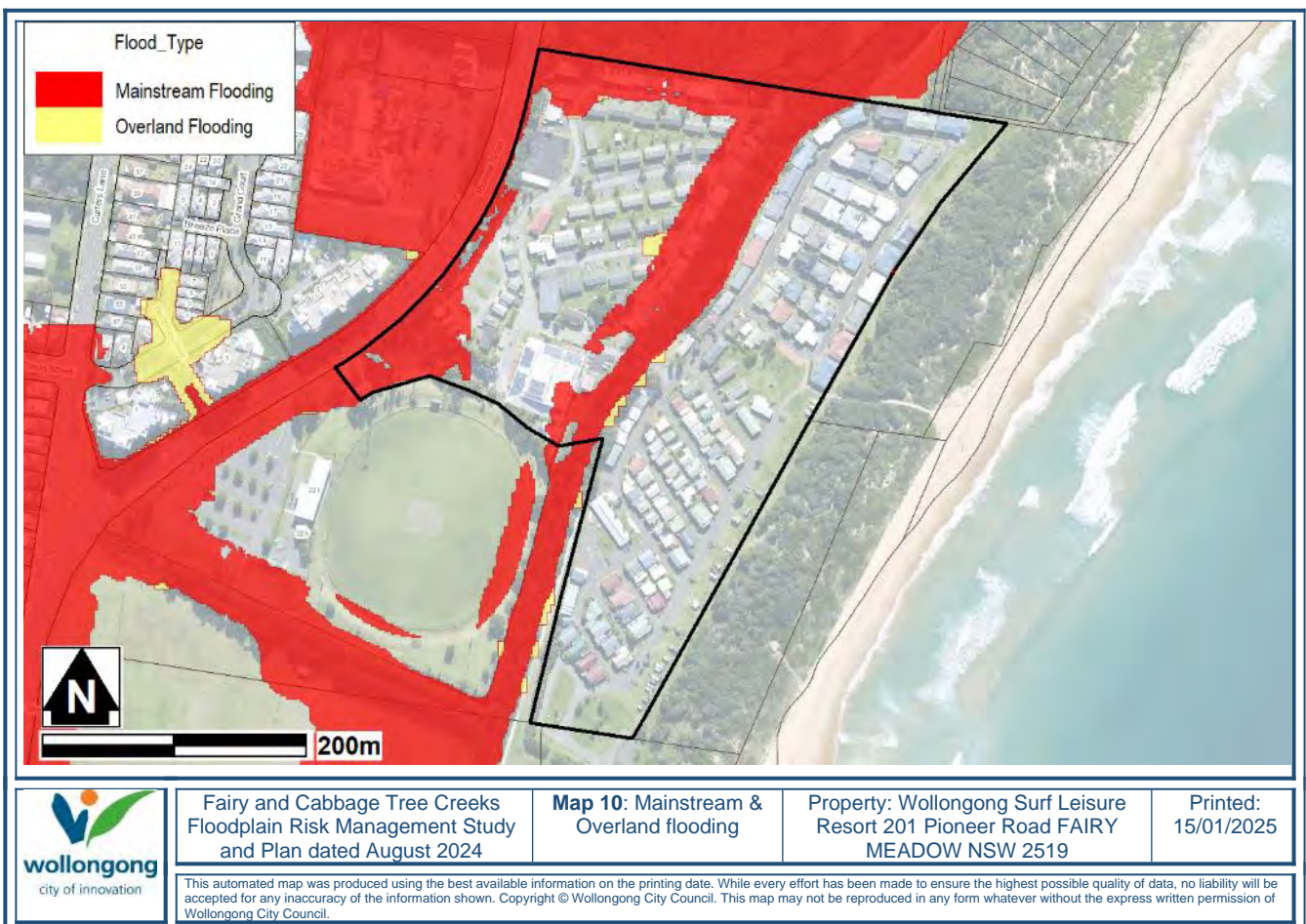
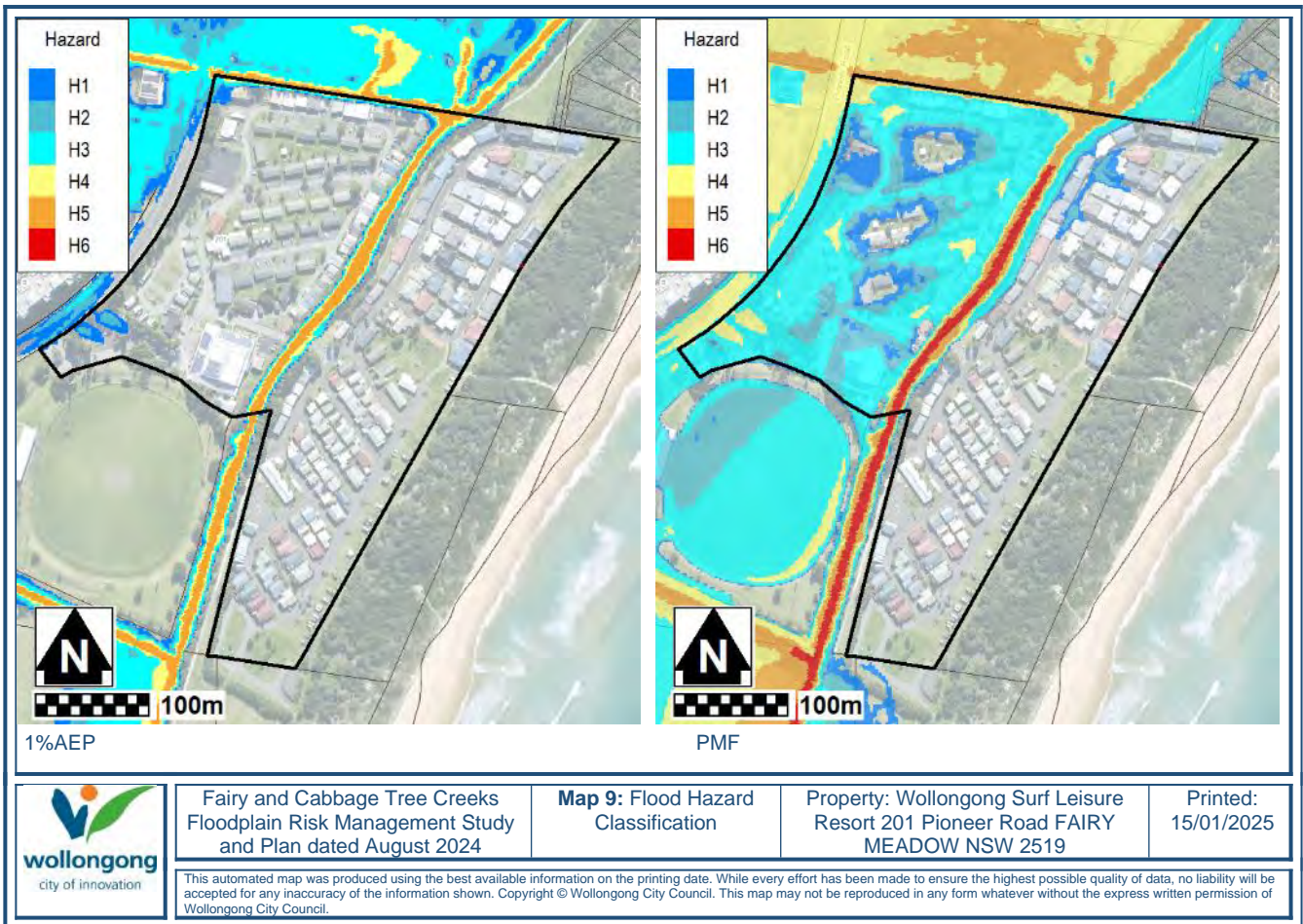
1. All maps in this advice are auto generated using the best available information on the printing date.
2. All levels are in m AHD and velocities are in m/s.
3. The abbreviation 'N/A' on the map indicates 'not applicable'.











APPENDIX E

Flood Mapping

Legend

- Subject Site
- Additional Lease Area
- Maximum Water Surface Level


Maximum Flood Depth


0.02

1.1

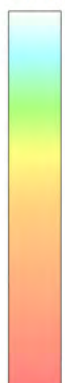


Legend

 Subject Site

 Additional Lease Area

Maximum Flood Velocity



0

4



Legend

Subject Site

Additional Lease Area

Maximum Flood Hazard

H1

H2

H3

H4

H5

H6

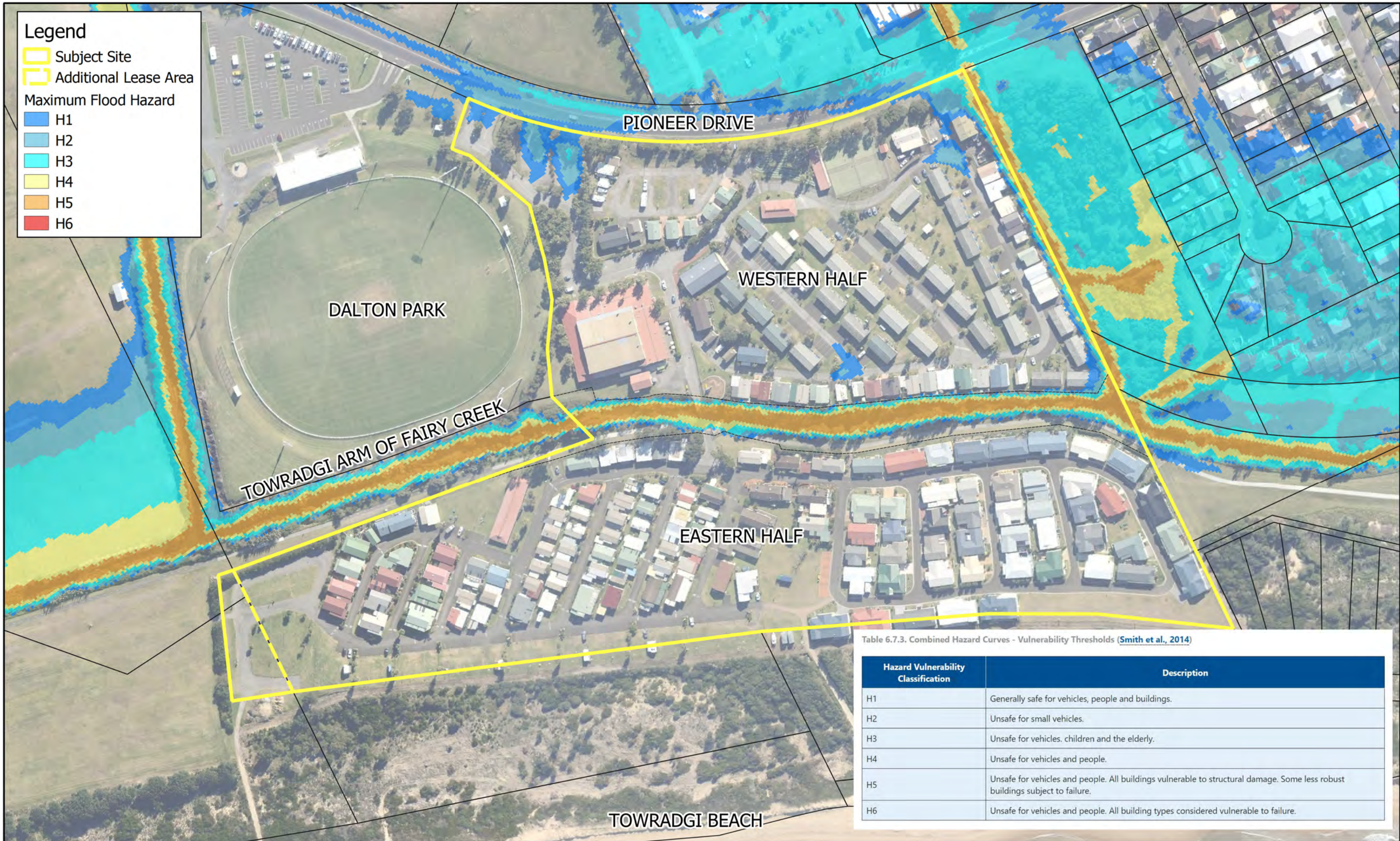
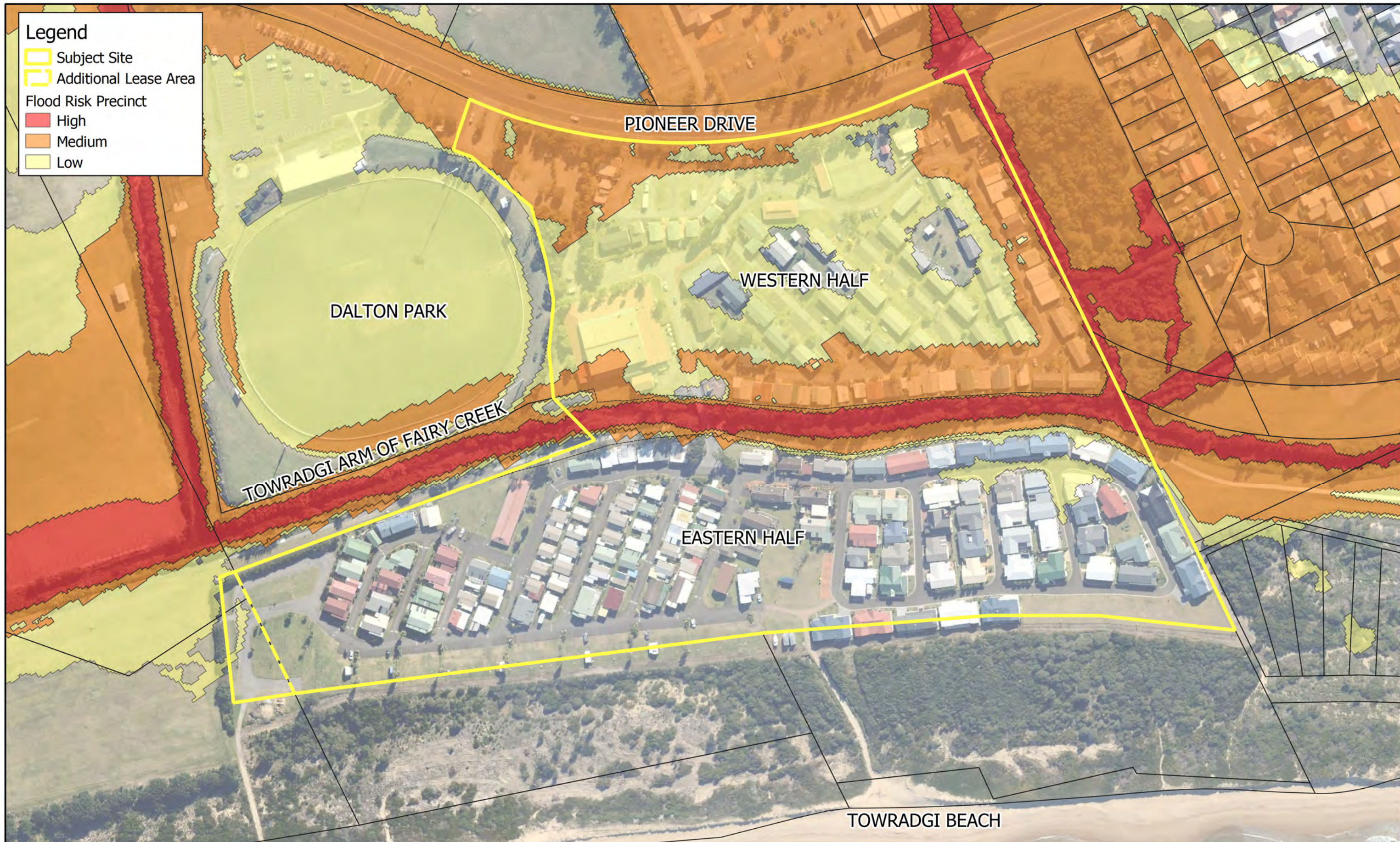


Table 6.7.3. Combined Hazard Curves - Vulnerability Thresholds (Smith et al., 2014)

Hazard Vulnerability Classification	Description
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H4	Unsafe for vehicles and people.
H5	Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust buildings subject to failure.
H6	Unsafe for vehicles and people. All building types considered vulnerable to failure.



Legend

- Subject Site
- Additional Lease Area
- DFE Maximum Water Surface Level

Flood Planning Levels

- 4.35m AHD
- 4.40m AHD
- 4.45m AHD



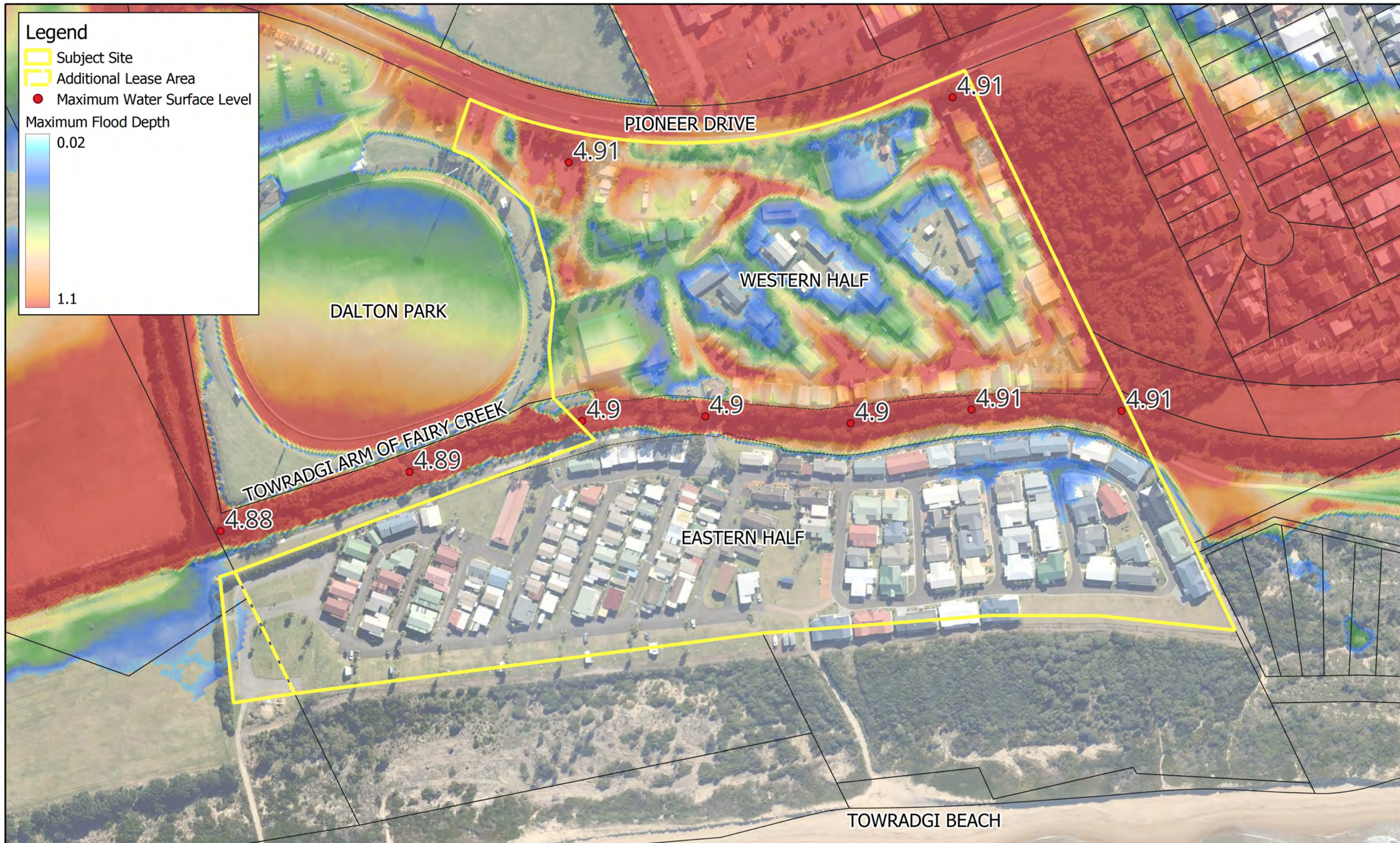
Legend

- Subject Site
- Additional Lease Area
- Maximum Water Surface Level


Maximum Flood Depth


0.02

1.1

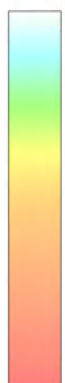


Legend

 Subject Site

 Additional Lease Area

Maximum Flood Velocity



0

4



Legend

Subject Site
 Additional Lease Area

Maximum Flood Hazard

- H1
- H2
- H3
- H4
- H5
- H6

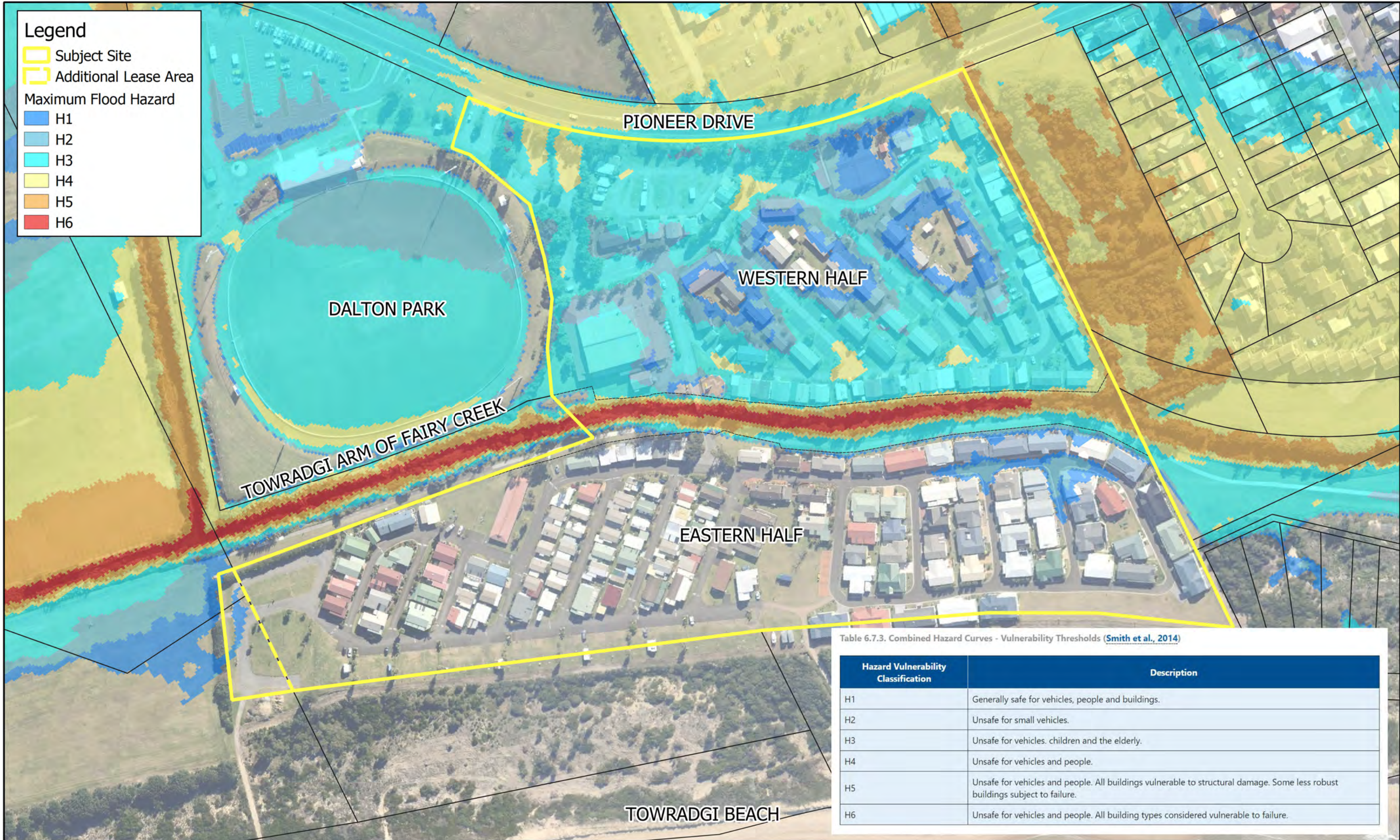


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H6	Unsafe for vehicles and people. All building types considered vulnerable to failure.

APPENDIX F

Flood Compatible Materials

Appendix: B FLOOD COMPATIBLE MATERIALS

BUILDING COMPONENT	FLOOD COMPATIBLE MATERIAL
Flooring and Sub-floor Structure	<ul style="list-style-type: none"> Concrete slab-on-ground monolith construction. Suspended reinforced concrete slab.
Floor Covering	<ul style="list-style-type: none"> Clay tiles. Concrete, precast or in situ. Concrete tiles. Epoxy, formed-in-place. Mastic flooring, formed-in-place. Rubber sheets or tiles with chemical-set adhesives. Silicone floors formed-in-place. Vinyl sheets or tiles with chemical-set adhesive. Ceramic tiles, fixed with mortar or chemical-set adhesive. Asphalt tiles, fixed with water resistant adhesive.
Wall Structure	<ul style="list-style-type: none"> Solid brickwork, blockwork, reinforced, concrete or mass concrete.
Roofing Structure (for Situations Where the Relevant Flood Level is Above the Ceiling)	<ul style="list-style-type: none"> Reinforced concrete construction. Galvanised metal construction.
Doors	<ul style="list-style-type: none"> Solid panel with water proof adhesives. Flush door with marine ply filled with closed cell foam. Painted metal construction. Aluminium or galvanised steel frame.
Wall and Ceiling Linings	<ul style="list-style-type: none"> Fibro-cement board. Brick, face or glazed. Clay tile glazed in waterproof mortar. Concrete.

BUILDING COMPONENT	FLOOD COMPATIBLE MATERIAL
	<ul style="list-style-type: none"> • Concrete block. • Steel with waterproof applications. • Stone, natural solid or veneer, waterproof grout. • Glass blocks. • Glass. • Plastic sheeting or wall with waterproof adhesive.
Insulation	<ul style="list-style-type: none"> • Foam (closed cell types).
Windows	<ul style="list-style-type: none"> • Aluminium frame with stainless steel rollers or similar corrosion and water resistant material.
Nails, Bolts, Hinges and Fittings	<ul style="list-style-type: none"> • Brass, nylon or stainless steel. • Removable pin hinges. • Hot dipped galvanised steel wire nails or similar.

APPENDIX G

Flood Emergency Response Plan


Flood Emergency Response Plan for Wollongong Surf Leisure Report

**201 Pioneer Road,
Fairy Meadow**

Project No. 24088
Date: 24 January 2025

Prepared for:
Wollongong Surf Leisure Report

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APPENDICES

APPENDIX A

Flood Level Maps

APPENDIX B

Flood Risk Maps

1.0 WHY IS A FLOOD PLAN REQUIRED

The subject site is identified as being flood affected in the Fairy and Cabbage Tree Creeks Flood Risk Management Study and Plan (FRMS&P) 2024 and as such it is important for owners and occupiers of the site to be aware of the level of flood risk and know how to respond in the event of a flood event.

2.0 EXISTING FLOOD CONDITIONS

The subject site is susceptible to flash flooding due to its location on a flat coastal plain adjacent to the Illawarra Escarpment.

Flash flooding occurs when large rain falls during a short period of time, causing the water in creeks and drainage channels to rise quickly and with little warning time before entering properties. Flash flooding is an unpredictable natural hazard and can occur at any time.

The subject site is traversed in a north south direction by the Towradgi Arm of Fairy Creek.

Flood levels over the site are shown in Figures 2.1 and 3.1 in **Appendix A** and are summarised below:

Flood Event	Flood Level Range
Defined Flood Event (DFE) - 1% AEP plus impacts of climate change	3.75 – 3.94m AHD
Probable Maximum Flood (PMF)	4.88 – 4.91m AHD

Except for the Towradgi Arm of Fairy Creek, the site remains relatively flood free in a 1% AEP event and as flood hazards are low is considered safe for occupation.

PMF flood levels are approximately 1m higher than the 1% AEP flood levels and in the PMF event the western half of the site is inundated by flood water to depths of up to 1.5m and at flood hazard levels that are considered unsuitable for vehicles and pedestrians.

That part of the site east of the Towradgi Arm of Fairy Creek remains relatively flood free in all events up to and including the PMF event and is therefore considered safe for occupation in all flood events.

The FRMS&P states the following in relation to the subject site:

Towradgi Arm passes north-south through the centre of the property with a bridge joining land on the west and east.

The entire site would remain essentially flood-free in events up to and including the 1 in 500 AEP. However, Pioneer Rd would become unsafe (H2) to the north of the property in a 20% AEP. The alternative evacuation route north along Carters Ln would become unsafe (H2) in the 2% AEP. In the PMF most of the western part of the site would be inundated with conditions that would be unsafe for people (H3-H4). The eastern part of the site would remain flood-free as would the bridge across the Towradgi Arm watercourse. The west of the site could be evacuated to the east if necessary.

Flood hazard maps for the DFE and PMF events are provide in Figures 2.3 and 3.3 in **Appendix B**.

3.0 ABOUT THIS FLOOD PLAN

This Flood Plan has been prepared in general accordance with the NSW SES Business FloodSafe Toolkit and Plan.

4.0 POTENTIAL IMPACT OF FLOODING ON THIS BUSINESS

The impacts of flooding on this business and their level of severity include;

Potential Impact	Severity
People's health and safety are compromised	High
Property is damaged or destroyed	Moderate
Profits are lost or service provision is stopped	Low
Paperwork and records are ruined.	Low

5.0 GENERAL FLOOD EVACUATION PROCEDURES

The emergency warning process in NSW is well developed. Emergency services such as the RFS and SES use communications technology to issue SMS messages to all serviceable mobile phones within the emergency response area.

The NSW SES will issue emergency warnings by SMS to all mobile phones which are within an area subject to an emergency warning.

ABC radio stations and commercial radio stations also issue advice from the Bureau of Meteorology in relation to extreme weather events.

The BOM website also posts weather alerts and weather warnings.

It is therefore anticipated that persons within the Wollongong Local Government Area will receive a flood evacuation emergency warning from the NSW SES or radio station, should an extreme flood event be developing.

The Wollongong Surf Leisure Resort has its own flood warning system comprising a flood gauge install on the bank of the creek behind the reception area. When flood levels reach the trigger level for the gauge, SMS warnings are sent to relevant staff and members of the residents' association as a trigger for implementation for emergency evacuation procedures contained herein.

6.0 FLOOD EVACUATION PROCEDURE

Due to the flashy nature of flooding on the site peak flood levels are likely to occur within one to two hours from the commencement of heavy rainfall and therefore very little time exists for evacuation to off site locations so a 'shelter in place' approach is recommended within structures on the site that are above the PMF level.

Except for the creek through the site, flooding is limited to events greater than the 1 in 100-year flood event, so evacuation of the site is only required for events of greater magnitude than this. Roads external to the site are inundated and become impassible during lower magnitude events and therefore off-site evacuation may not be possible.

That part of the site east of the creek is elevated above the PMF level and therefore considered safe for occupation during any flood event. Occupants in the eastern part of the site should 'shelter in place' in their accommodation, or the eastern amenities building for those occupants that may be camping, unless early evacuation is desirable for other reasons (i.e. medical requirements).

Those occupants on the western side of the creek should be evacuated in accordance with the procedures outlined in this report.

Once flooding commences, those visitors in caravans and the like will have insufficient time to pack up and evacuate the resort with their caravans, due to the flashy nature of the flooding that occurs on site. For these patrons early evacuation should be considered, either by relocating to the area east of the creek, or by off-site evacuation when flooding is deemed likely (Refer Section 8 below).

7.0 PHASE I – FLOOD PREPARATION

Triggers for Actions

- These actions can be done immediately and maintained to reduce the potential impact of flooding on the property.

List of Actions

- Incorporate flood awareness in staff induction training

- Provide staff and permanent residents with readily available access to this Flood Emergency Response Plan
- Encourage staff and permanent resident participation in development and implementation of Flood Emergency Response Plan
- Ensure WH&S procedures cover specific risk associated with floods
- Maintain an up-to-date list of emergency contact numbers for staff and permanent residents.
- Select and train suitable emergency wardens in flood procedures
- Prepare and maintain an emergency flood kit containing portable radio, batteries, torch, first aid kit, any essential medication, fresh water, tinned food, waterproof bag, candles and waterproof matches and store in an accessible location in each flood refuge area.

8.0 PHASE II – WHEN FLOODING IS LIKELY

Triggers for Actions

- The Bureau of Meteorology issuing a Flood Watch
- The Bureau of Meteorology issuing a Severe Weather Warning or Severe Thunderstorm Warning indicating a likelihood of flash flooding.
- The State Emergency Service issuing a Flood Bulletin.
- Forecast Rainfall with Depths exceeding 100mm

List of Actions

- Inform staff and/or occupants of Flood Watch or Severe Weather Warning
- Keep radio tuned to a local radio station (i.e. ABC Local Radio 97.3FM, Wave 96.5FM, i98 98.1FM)
- Ensure all flood sensitive items such as electronic equipment is on tables, desk or shelves at least 0.5m above the flood level.
- Advise occupants with caravans and the like of impending flood risk and provide an opportunity for early evacuation either off site or to higher ground east of the creek.

9.0 PHASE III – DURING A FLOOD

Triggers for Actions

- The Bureau of Meteorology issuing a Flood Warning
- The State Emergency Service Issuing a Flood Bulletin
- A direction by the Resort Manager or delegate, Police or SES
- Announcements through the local media
- When flood levels trigger the flood warning system for the resort.

List of Actions

- Keep any staff and occupants updated on the situation
- Evacuate all staff and occupants on that part of the site west of the creek to the designated emergency evacuation assembly point (i.e. Reception) via the most direct route. **Under no circumstance should anyone enter flood waters.**
- Flood wardens to check each dwelling or site to confirm that all occupants and visitors have been evacuated.
- If flood waters rise to inundate the area surrounding the reception buildings vertically evacuate all staff and occupants to refuge areas above the PMF flood level, including pool deck and associated amenities area and first floor office and storage area above the pool deck amenities area.

10.0 PHASE IV – AFTER A FLOOD

Triggers for Actions

- The Bureau of Meteorology issues a final Flood Warning
- The State Emergency Service issuing an all clear

List of Actions

- Keep radio tuned to local radio station and keep listening for updates on forecast flood height and timings
- Do not enter flood water
- If above floor flooding has occurred only re-enter the structures after floodwater has completely subsided and the SES has advised it is safe to do so. Before re-entering the premises undertake a WH&S risk assessment which includes; structural safety of buildings, safety of electrical and gas supplies, slips trip and falls in mud and water, cleaning up, repairing and re-stocking as required
- Remove debris and clean, repair and disinfect premises as required
- Replace damaged furniture, essential plant, equipment and stock as soon as practical as required
- If above floor flooding has occurred avoid using electrical equipment until an electrician has indicated it is safe to do so.

11.0 EMERGENCY CONTACTS

Police, Fire, Ambulance	000 (Triple Zero – 112 from mobile phone)
State Emergency Service (SES)	132 500
Wollongong City Council	4227 7111
Wollongong Hospital	4222 5000
Electricity Provider	To be completed
Gas Provider	To be completed
Telephone Provider	To be completed

APPENDIX A

Flood Level Maps

Legend

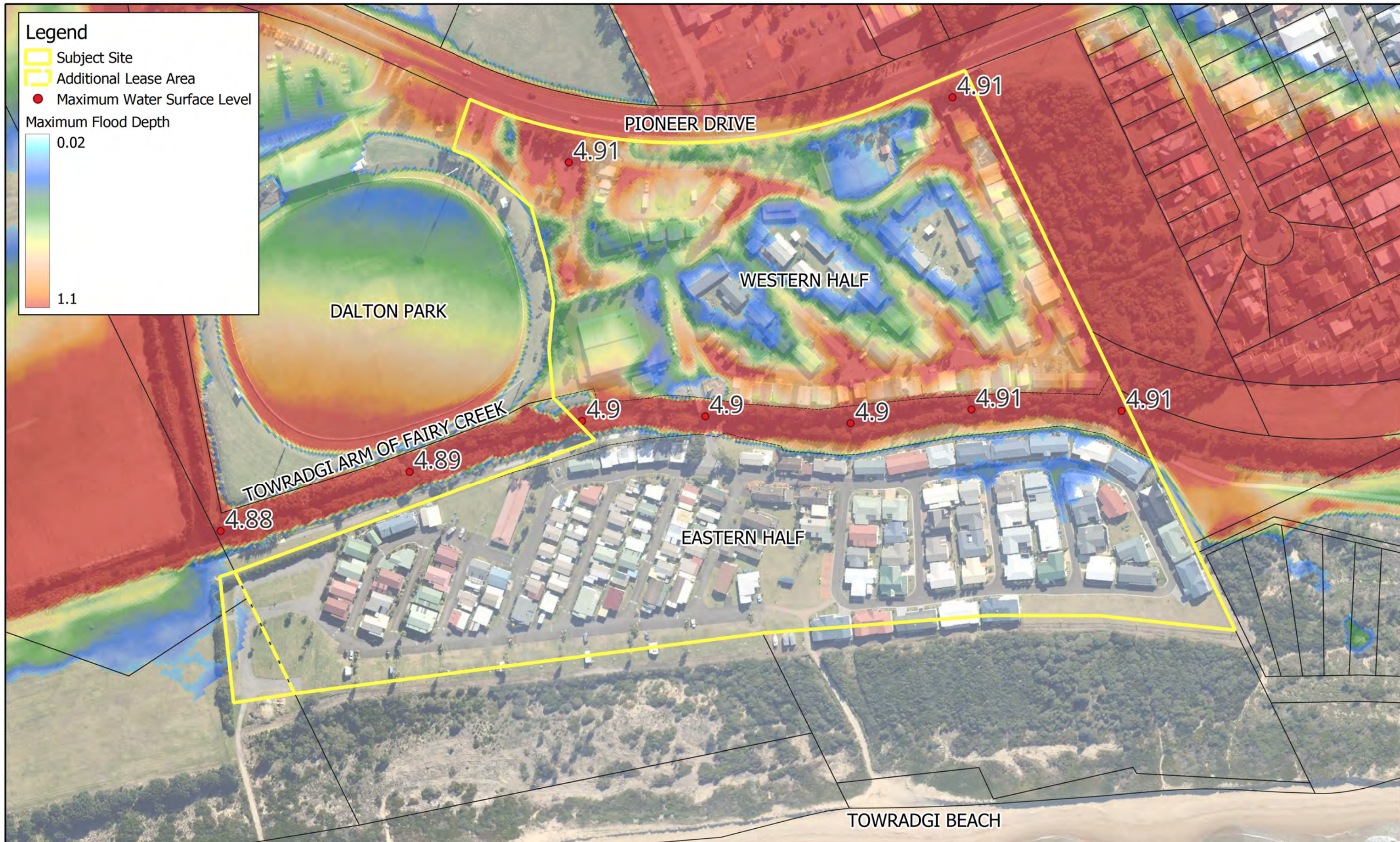
- Subject Site
- Additional Lease Area
- Maximum Water Surface Level

Maximum Flood Depth

0.02

1.1





APPENDIX B

Flood Risk Maps

Legend

Subject Site

Additional Lease Area

Maximum Flood Hazard

H1

H2

H3

H4

H5

H6

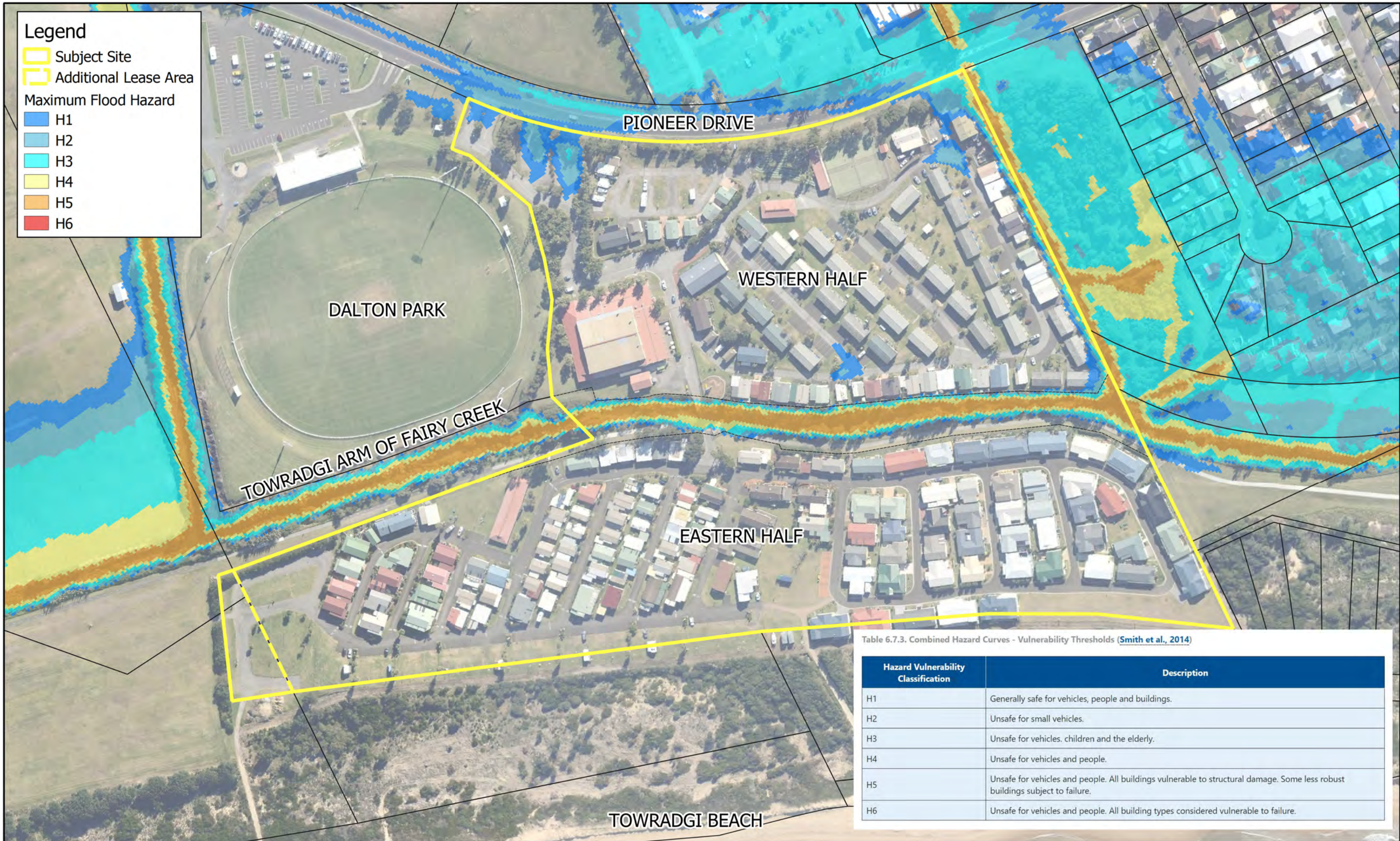


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Legend

Subject Site

Additional Lease Area

Maximum Flood Hazard

H1

H2

H3

H4

H5

H6

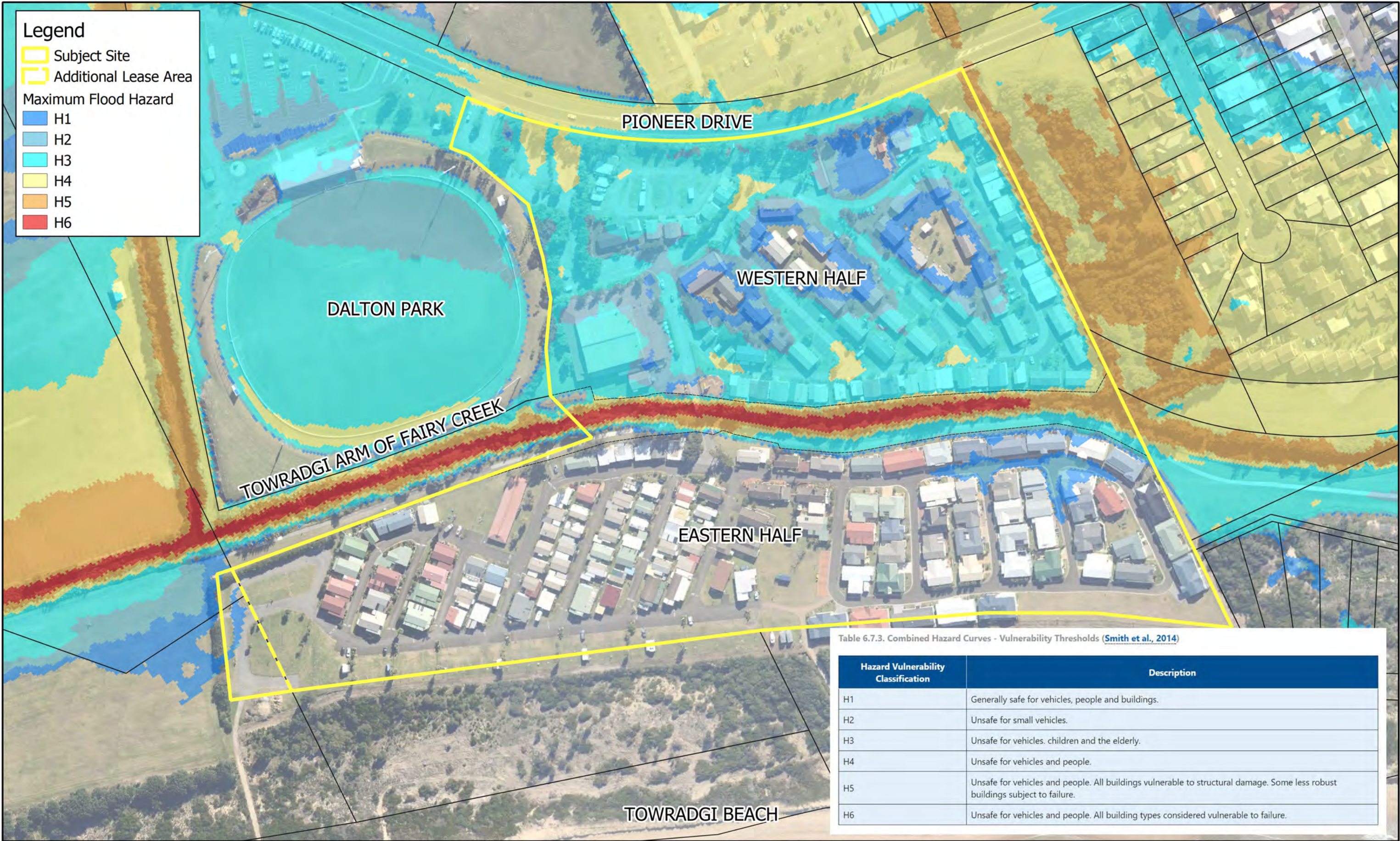


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sustainable engineering.

210 jambaroo road, jambaroo, nsw 2533

m: 0430 421 661

50

0

50 m

Scale 1:2,000 at A3

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WOLLONGONG SURF LEISURE RESORT

201 PIONEER ROAD, FAIRY MEADOW

FIGURE 3.3

PMF Maximum Flood Hazard