



**188 Beaumont Street,
Auckland Central**

**Coastal and flood hazard and risk
assessment**

Prepared for
Westhaven Residential Limited Partnership

Prepared by
Tonkin & Taylor Ltd

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Executive Summary

Purpose

This report has been prepared in relation to a substantive application submitted by Westhaven Residential Limited Partnership (WRLP) for a referred project under the Fast-track Approvals Act 2024 (FTAA) in respect of the 188 Beaumont Street project (the 'Project'). The Project is an urban development project in Auckland's city centre involving a residential-led mixed use building comprising residential apartments, ground floor retail and ancillary car parking. The location for the project is 188 Beaumont Street, Auckland Central.

The report presents coastal hazard and rainfall-induced flood hazard information and a risk assessment with reference to the operative Auckland Unitary Plan (AUP), proposed Plan Change 120 provisions and the National Policy Statement for Natural Hazards (NPS-NH), which came into force on 15 January 2026 for flooding, coastal erosion, coastal inundation and tsunami.

Proposed development

The development is primarily residential within three primary building elements ranging from 8 to 23 storeys and a shared carparking podium. The ground floor of the development includes a mix of commercial (dining/retail), lobby access to the residential levels, service infrastructure (power, waste) and parking, with ramps to parking areas on levels 1, 2 and 3.

The ground floor levels have been established balancing the requirement for urban design accessibility matters with reducing coastal inundation and flood risk. The ground floor plan shows a range of levels on the ground floor, with most of the ground floor area being at 3.7 mRL. Lower levels are present ranging from 3.0 to 3.4 mRL for commercial areas and the entrance ways and 3.0 mRL for the loading zone. The transformers and critical services are set at 3.9 mRL. A concrete tanked/waterproof upstand is present around some of the external walls to a level of 3.4 mRL and internal ramps are proposed to connect from the existing footpath levels to the raised floor levels within the development.

The proposal includes an adaptation response via a condition of consent which would trigger an assessment in the event of a flood event affecting the very lowest level (flooding reaching 3.1 mRL in the loading zone) to determine the appropriate adaptation response which could include raising the ground floor levels and associated works along the ground floor façade to avoid future coastal and catchment flooding inundation over the next 100 years. A flood management plan that includes requirements to develop safe egress and refuge plans, methods of dissemination and training/drills for occupants and users of the development is also included as part of the adaptation response.

Hazards

The main climate change hazard that will likely affect the site over at least the next 100 years is coastal inundation from sea level rise and catchment (rainfall) flooding.

The site is not identified as being inside the 'red' or 'yellow' tsunami zone mapped on the Auckland Council Hazard viewer to inform evacuation mapping, but the yellow zone is in close proximity and sea level rise will increase hazard exposure.

No erosion ASCIE lines were generated for reclaimed shorelines such as those around the Auckland CBD as it was assumed that structures supporting these shorelines will be maintained, supporting the planning definition of reclaimed land as permanent.

Risk assessment

Climate change risk has been assessed both under the new NPS-NH and the operative provisions of the AUP and provisions of PC120 E36 including consideration of residual risks.

The NPS-NH risk assessment approach determines the proposal with the proposed mitigation is assessed as low risk for coastal inundation and catchment flooding for the next 100 years for both building damage and life safety. There is a medium risk for property damage from the maximum credible tsunami (although the risk to people remains low).

The proposed development complies with the operative AUP requirements of not increasing risk associated with natural hazards (E36.3(4)).

Based on PC120 E36 the proposed design mitigates significant coastal inundation and catchment flooding risk through the design elements of floor level elevation for the ground floor. The resultant risks are low to negligible for at least the next 80 years based on the proposed ground floor levels when the building is constructed with an adaptation response that will ensure risks are low over the next 100 years for the building.

For life safety risks, these are also low due to both safe egress/refuge in the short to medium term with a transition to safe refuge in the longer term with the establishment of a stay in place protocol for residence and vertical evacuation for ground floor occupants.

1 Introduction

This report has been prepared in relation to a substantive application submitted by Westhaven Residential Limited Partnership (WELP) for a referred project under the Fast-track Approvals Act 2024 (FTAA) in respect of the 188 Beaumont Street project (the 'Project'). The Project is an urban development project in Auckland's city centre involving a residential-led mixed use building comprising residential apartments, ground floor retail and ancillary car parking. The location for the project is 188 Beaumont Street, Auckland Central.

The purpose of this report is to present coastal hazard and rainfall-induced flood hazard information and a risk assessment to support the substantive application with reference to the operative Auckland Unitary Plan (AUP) and proposed Plan Change 120 provisions. This hazard and risk assessment is also intended to meet the objectives and policies of the National Policy Statement for Natural Hazards (NPS-NH), which came into force on 15 January 2026 for flooding, coastal erosion, coastal inundation and tsunamis.

Due to considerable overlaps between information provided to meet the AUP natural hazard provisions and the requirements of the NPS-NH, we report on the NPS-NH after the AUP natural hazard risk assessment. This enables us to draw on information provided for the purposes of the AUP assessment for the NPS-NH as well.

All levels presented in this document are in New Zealand Vertical Datum 2016 (NZVD2016) referred to as reduced level (RL). An offset value of 320 mm has been applied to flood levels previously reported in Auckland vertical datum 1946 (AVD46).

2 Proposed development

2.1 Site location

The site is in Wynyard Quarter, at the corner of Beaumont Street and Jellicoe Street, with street access on the north and east sides (Figure 2-1). The west side of the site is waterfront and currently used as Silo Superyacht Marina. The south side adjoins a property currently used for ship building. The primary current use of the site is carparking. The average level of the existing roads and streets adjacent to the property is 2.6 – 2.7 mRL. Average ground level with the existing property parcel is 3.0 mRL based on 2024 LiDAR survey data, with some variation across the site.

2.2 Development description

The development comprises a design that addresses existing coastal and flood inundation hazards and includes provision for climate change effects over the next 100 years using an adaptive design approach. The proposed development is resilient for at least the next 80 years based on the climate scenarios required to be considered. An adaptation strategy that includes consideration of appropriate mitigation responses, such as raising some of the ground floor levels is proposed to address longer term hazards to present an approach that provides a consideration of natural hazard risk from coastal inundation and flooding for at least the next 100 years. The development and adaptive plan are discussed in the following sections.

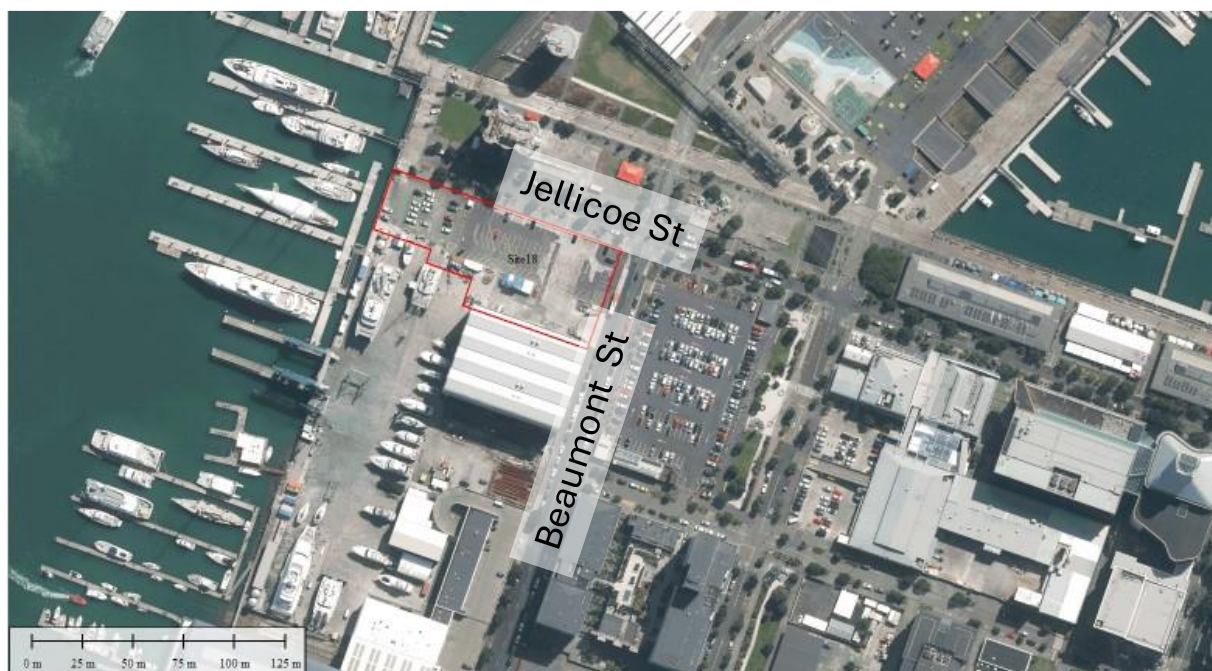


Figure 2-1: Site location.

2.2.1 Proposal

Westhaven Residential Limited Partnership has proposed to develop the site with a new multi-storey building. An overview of the proposed development is shown in Figure 2-2 and Figure 2-3. The development is primarily residential within three primary building elements ranging from 8 to 23 storeys and a shared carparking podium.

The scheme is comprised of three primary residential components.

② TOWER

The 23 storey Tower seeks to deliver a new type of residential identity reflective of its Wynyard Quarter location.

126	Homes
20	16% 1-Bed Homes
79	63% 2-Bed Homes
27	21% 3-Bed homes
120m ²	Average Apartment Size
19,126m ²	Total GFA

① THE BEAUMONT

The 10 storey Beaumont building occupies a prominent position in the heart of the Wynyard Quarter.

66	Homes
18	27% 1-Bed Homes
42	63% 2-Bed Homes
6	10% 3-Bed Homes
90m ²	Average Apartment Size
8,189m ²	Total GFA

③ MARINA

The 8 storey Marina building occupies a privileged waterfront location with unparalleled views over the Westhaven Marina.

18	Homes
18	100% 3-Bed homes
185m ²	Average Apartment Size
4,483m ²	Total GFA

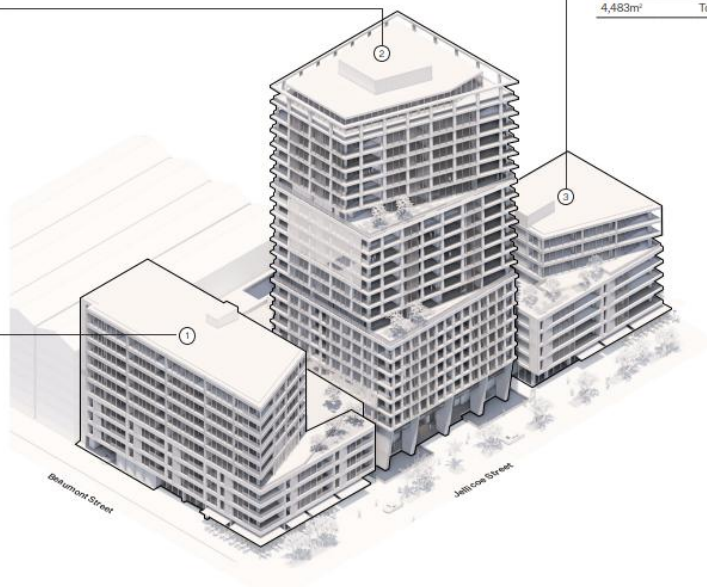


Figure 2-2: Development concept

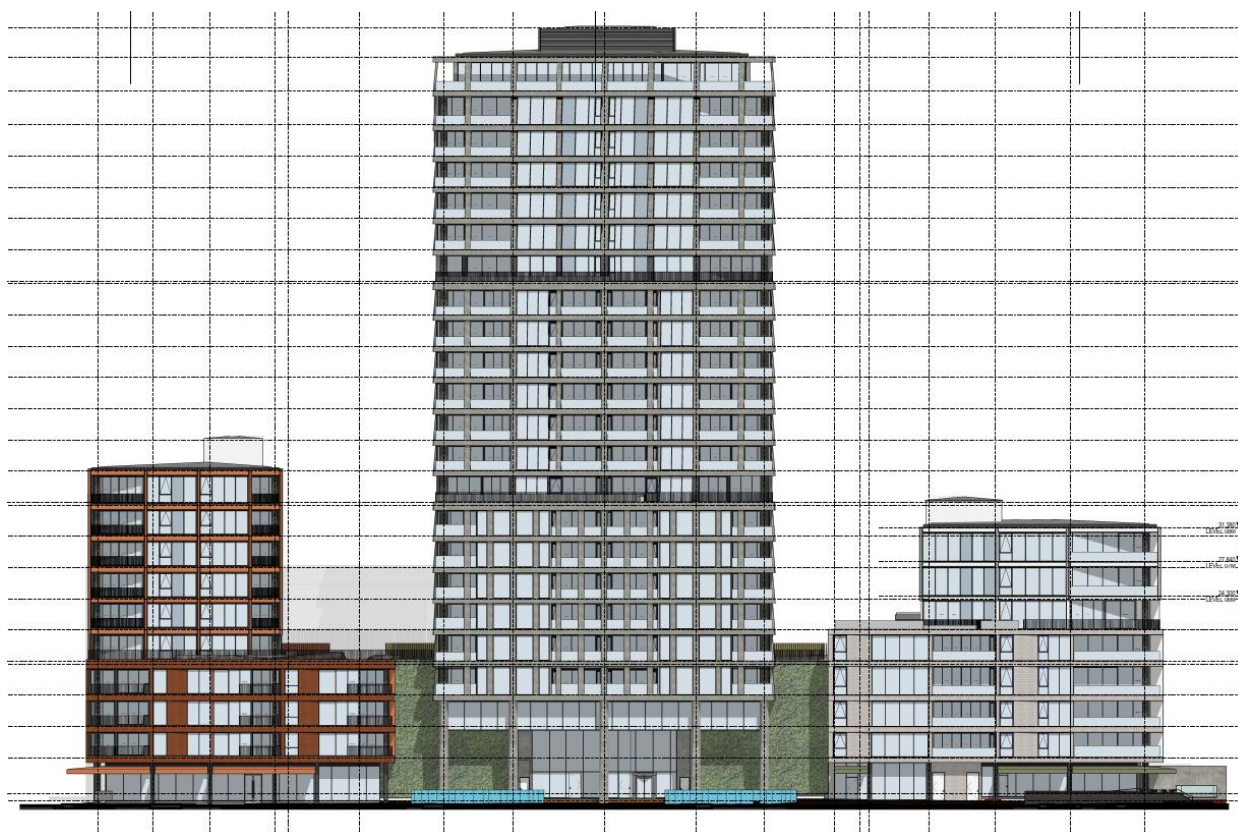


Figure 2-3: Typical long section profile

The ground floor of the development includes a mix of commercial (dining/retail), lobby access to the residential levels, service infrastructure (power, waste) and parking, with ramps to parking areas on levels 1, 2 and 3. No basements are proposed. A copy of the proposed ground floor plan is shown in Appendix A and a detail included in Figure 2-4.

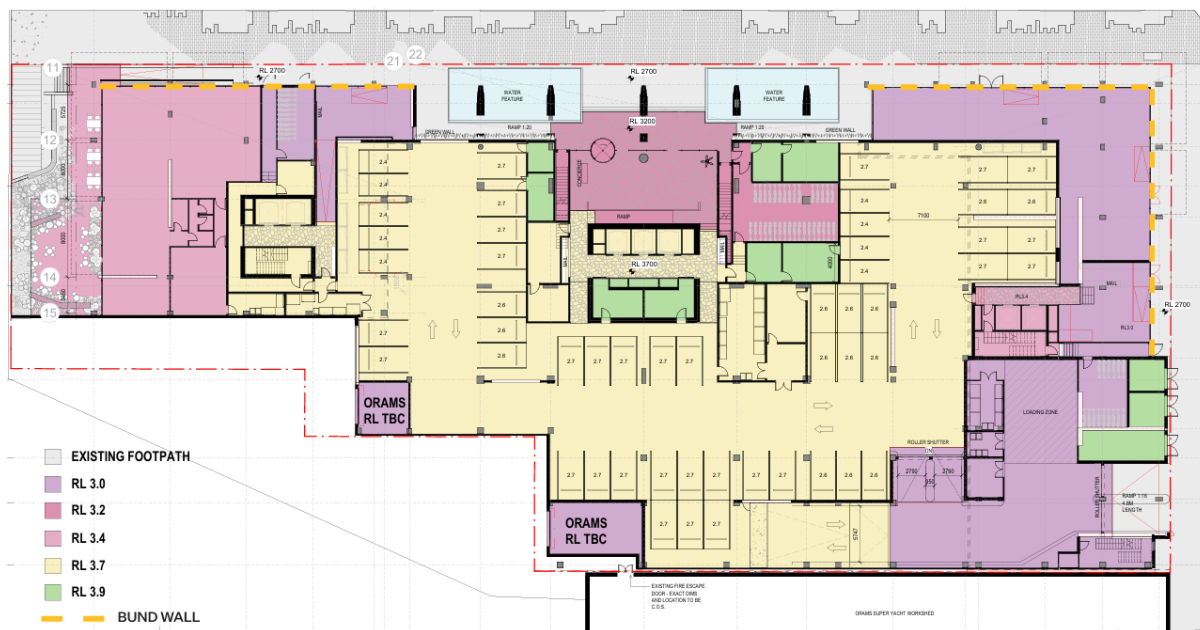


Figure 2-4: Proposed ground floor layout and elevations

The ground floor levels have been established balancing the requirement for urban design accessibility matters with reducing coastal inundation and flood risk. The ground floor plan shows a range of levels on the ground floor, with most of the ground floor area being at 3.7 mRL. Lower levels are present ranging from 3.0 to 3.4 mRL for commercial areas and the entrance ways and 3.0 mRL for the loading zone. The transformers and critical services are set at 3.9 mRL. A concrete tanked/waterproof upstand is present around some of the external walls to a level of 3.4 mRL and internal ramps are proposed to connect from the existing footpath levels to the raised floor levels within the development.

As described later in this report, the 3.0 mRL level is above the 1%AEP flood level (existing and future) with 0.15 m freeboard but potentially affected by coastal inundation during storms between 2090 and 2130 (with no freeboard allowance). Coastal inundation exceeds 3.4 m RL at 2130 for the high emission scenario (SSP5-8.5p50) and the stress test. The 3.7 mRL level provides 0.3 m freeboard to the 2130 scenario and 3.9 m RL exceeds the stress test level over the next 100 years.

2.2.2 Adaptation plan

An adaptation plan response is required to ensure the development is resilient from coastal and flood inundation over at least 100 years, as there is a possibility of flooding towards the end of the 100-year period with a high emission scenario (no inundation is possible over the next 100 years with lower emission scenarios).

There are two parts of the adaptation plan, including the development of an adaptation response and a flood management plan.

The proposed adaptation response is included via a condition of consent which would trigger an assessment in the event of a flood event affecting the very lowest level (flooding reaching 3.1 mRL in

the 3.0 mRL loading zone) to determine the appropriate adaptation response which could include raising the ground floor levels for parts of the building (such as retail space, common lobby areas and bike storage) and associated works along the ground floor façade to avoid future coastal and catchment flooding inundation over the next 100 years. The design of the building has been done to ensure there is space for this to occur without affecting the remaining floors and levels.

The flood management plan that includes requirements to develop safe egress and refuge plans, methods of dissemination and training/drills for occupants and users of the development is also included as part of the adaptation response.

An example of a possible adaptation response which could be recommended in the adaptation assessment is the raising of floor levels and is shown in Appendix A and a detail provided in Figure 2-5.

The adaptation plan approach is to avoid coastal inundation and flooding over the 100-year period required if sea levels rise as predicted by the higher emission scenarios. However, if sea levels do not rise to these higher emission scenario levels, the proposed design levels should avoid flooding and coastal inundation over the 100-year period.

The signal to monitor and observe climate change is flooding impact on the property. This is anticipated to be observed and reported by occupants/users of the development and reported to the body corporate. The requirement to consider raising the ground floor levels by way of an assessment on an adaptation response would be triggered by flooding occurring to the loading zone reaching a level of 3.1 m RL. At the time that this trigger is reached, consideration would need to be made as to the extent and form of the raising required also taking into account the wider context (e.g. actions that may be being considered for the wider precinct). The requirement for adaptation and the proposed adaptation response is included as a condition of consent.

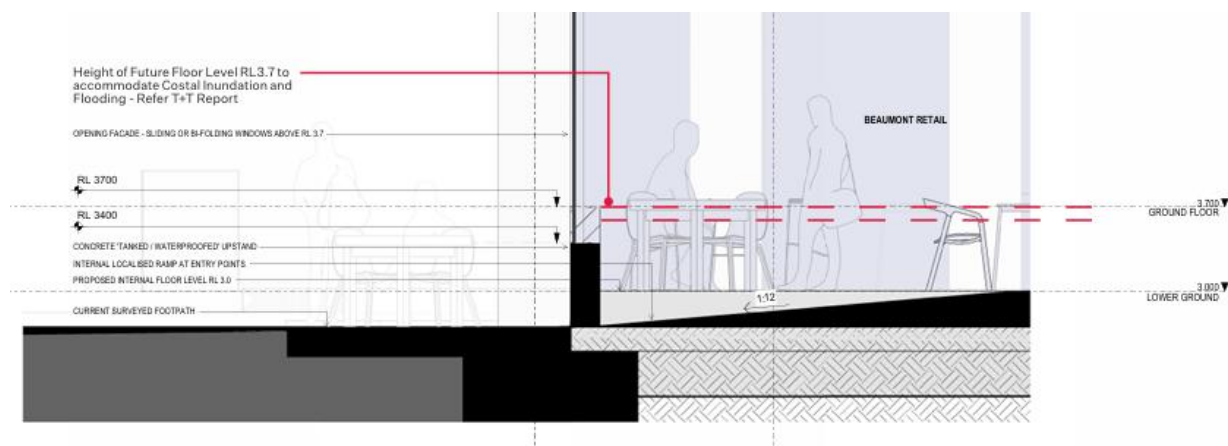


Figure 2-5: Extract of adaptation plan showing future modifications to ground levels if required as a result of the climate adaptation assessment

Safe egress will be possible via the existing road network to adjacent reserve areas that can avoid risk, but with ongoing sea level rise, egress may become less safe if road levels (outside the development and site) are not raised. However, safe refuge is possible within the proposed development. A flood management plan that includes details of safe egress and refuge should be developed during the detailed design process and submitted as part of the requirements for code of compliance that includes methods of dissemination and training/drills for occupants and users of the development. A draft table of contents for the flood management plan is included in Appendix F.

3 Need for a risk assessment

3.1 National Policy Statement for Natural Hazards (NPS-NH)

The objective of the NPS-NH is that “Natural hazard risk to people and property associated with subdivision use and development is managed using a risk-based proportionate approach”.

The NPS-NH requires the level of risk associated with subdivision, use or development to be assessed using the risk matrix (Policy 1), with the assessment considering the potential impacts of climate change to at least 100 years into the future (Policy 6) using the best available information (Policy 5). In this instance it is considered that the information in Auckland Council’s GIS viewer and other published data sources for vertical land movement constitute the best available information.

3.2 Auckland Unitary Plan (AUP PC120)

The proposed plan change 120 to the AUP with Chapter E36 ‘Natural Hazards and Flooding’ requires the completion of natural hazard risk assessments when a subdivision, use or development requiring resource consent is proposed to be undertaken on land which may be subject to natural hazards considering the effects of climate change over at least a 100-year timeframe (rounded up here to 2130).

Based on the hazard overlays in the Auckland Council (AC) GIS viewer the site is located on land subject to coastal inundation with a 1%AEP storm surge and between 0.5 m and 1 m sea level rise (Figure 3-1) and edges of the site are within the flood prone areas and flood plains that are present along Beaumont and Jellicoe Streets (Figure 3-2) with a level of around 2.71 m RL in the vicinity of the site. Note that the floodplain shown on AC GIS Viewer originates from the regionwide Urban Framework model (Ewaters, 2025). The flood hazard area classification for rainfall is low to medium (Figure 3-3).

There are no ASCIE (Area Susceptible to Coastal Instability and Erosion) lines in the Auckland Council GIS viewer for reclaimed shorelines such as those around the Auckland Central Business District (CBD) as it was assumed by Council that structures supporting these shorelines will be maintained, supporting the planning definition of reclaimed land as permanent.

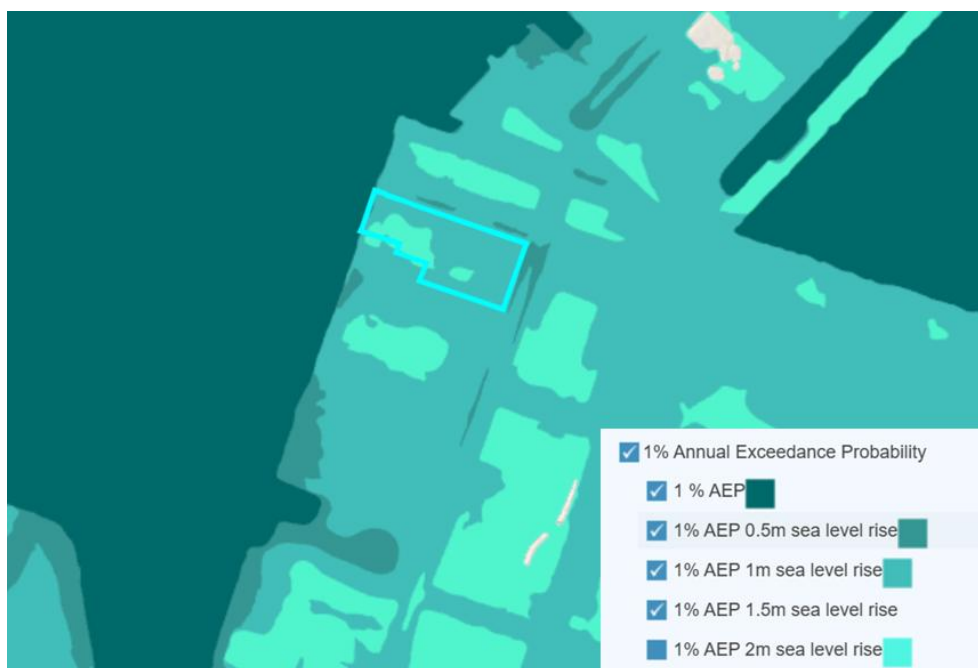


Figure 3-1: Coastal inundation extents (Source: AC GIS viewer)

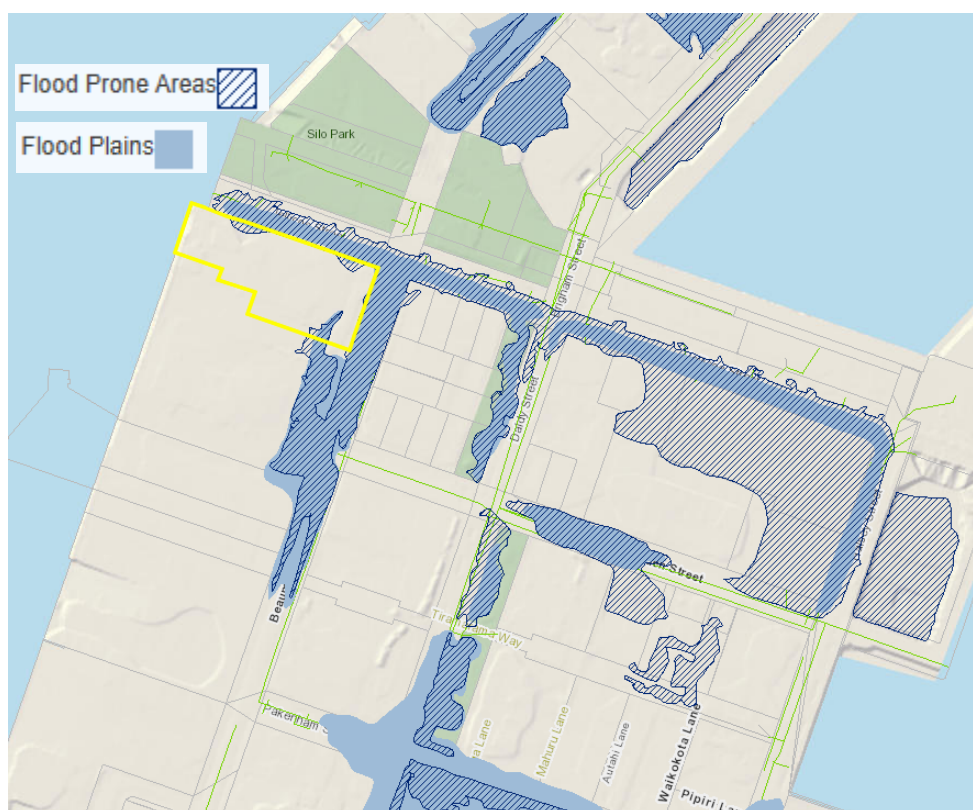


Figure 3-2: Flood prone areas and flood plains (Source: AC GIS Viewer)

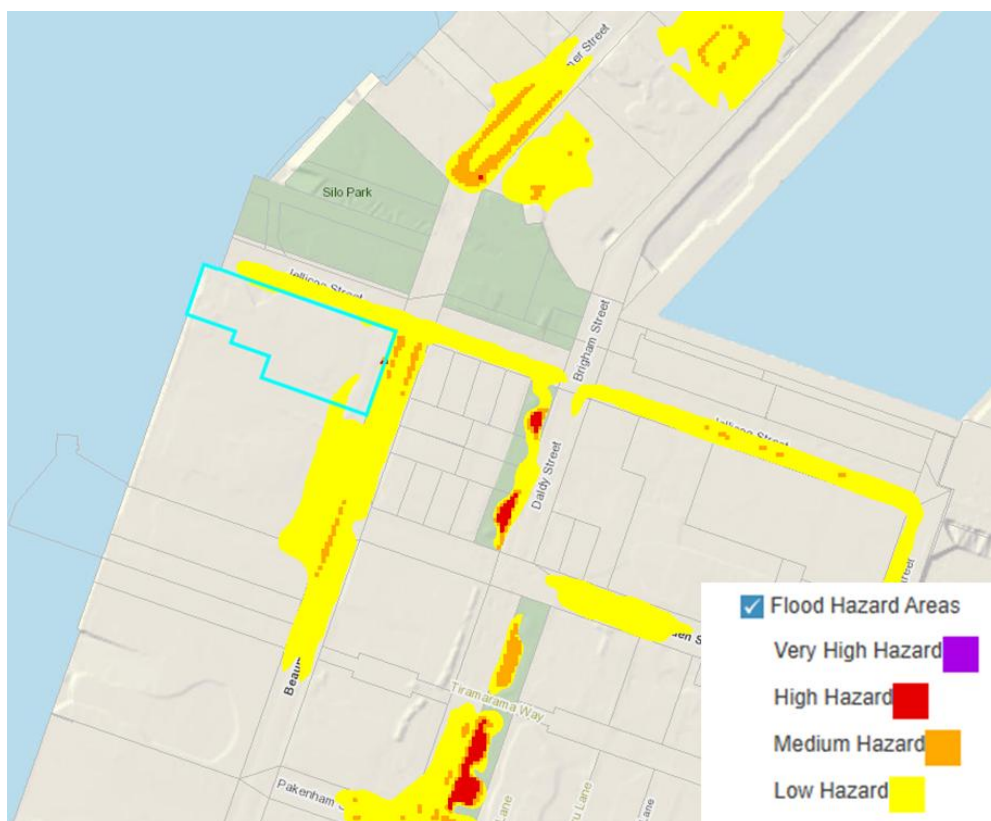


Figure 3-3: Flood hazard area classification (Source: AC GIS Viewer)

4 Framework for the risk assessments

4.1.1 NPS-Natural Hazards

Natural hazard risk associated with subdivision, use or development must be assessed using the likelihood of a natural hazard event occurring combined with the consequence of a natural hazard event for both life and property to determine the level of risk. The likelihoods are shown in Table 4-1 and the consequences in Table 4-2.

Table 4-1 NPS-NH Likelihood table

Likelihood level	Annual exceedance probability (AEP)	Average recurrence interval (ARI) or 'return period'
Almost Certain	10% or more	Up to and including 10 years
Very Likely	10% to 5%	Over 10 and up to and including 20 years
Likely	5% to 2%	Over 20 and up to and including 50 years
Possible	2% to 1%	Over 50 and up to and including 100 years
Unlikely	1% to 0.2%	Over 100 and up to and including 500 years
Rare	0.2% to 0.02%	Over 500 and up to and including 5,000 years
Very Rare	<0.02%	More than 5,000 years

Table 4-2: Consequence table (Source: NPS-NH)

Consequence level	Damage to property	Potential for injury or fatalities
Catastrophic	Severe damage to land and building(s), potential for collapse or total destruction of structures. Building(s) need to be demolished, rebuilt or relocated.	High threat to life safety, with probable fatalities and/or critical injuries.
Major	Major damage to land and building(s), including structural damage. Loss of use and substantial repair required.	Unsafe for people, with potential for many injuries, or critical injuries and/or fatalities.
Moderate	Some damage to land and non-structural damage to building(s). Limited loss of use, repairs required.	Unsafe for people, with potential for injuries, although expected to be minor.
Minor	Minor damage to land and building(s). No loss of use, minimal repairs required.	Isolated minor injuries possible.
Negligible	No loss of use, no building repairs required	No injury

Risks are graded from low, medium, high or very high with the risk frameworks shown in Figure 4-1 , with a requirement to avoid very high natural risk and avoiding high or medium natural risk or mitigating proportionate to the level of risk, while ensuring creation or increasing natural risk on other sites is avoided or mitigated.

		Likelihood Level						
		Almost Certain	Very Likely	Likely	Possible	Unlikely	Rare	Very Rare
Consequence Level	ARI (years)	up to 10	10-20	20-50	50-100	100-500	500-5000	> 5000
	AEP	10% or more	10% to 5%	5% to 2%	2% to 1%	1% to 0.2%	0.2% to 0.02%	< 0.02%
	Catastrophic	Very High	Very High	Very High	High	Medium	Medium	Medium
	Major	Very High	Very High	High	High	Medium	Medium	Medium
	Moderate	High	High	High	Medium	Medium	Low	Low
	Minor	Medium	Medium	Medium	Medium	Low	Low	Low
	Negligible	Low	Low	Low	Low	Low	Low	Low

Figure 4-1: Risk matrix (Source: NPS- NH)

When assessing natural hazard risk, consideration must be made of existing and proposed mitigation measures; and residual risk that arises when design thresholds of any existing and proposed mitigation measures are exceeded.

4.1.2 Operative provisions of AUP

The current provisions from the AUP require consideration of coastal erosion, coastal storm inundation and flooding. The objectives (E36.2(2)) are that subdivision, use and development, including redevelopment in urban areas only occurs where the risk of adverse effects from natural hazards to people, buildings, infrastructure and the environment are not increased overall, and where practicable are reduced, taking into account the likely long term effects of climate change.

This requires identification of land subject to hazards (E36.3(1)) and consider the type, frequency and scale of the hazard and whether adverse effects will be temporary or permanent as well as the type of activity and its vulnerability, the consequence of the natural hazard in relation to the activity and potential effects on public safety and other property (E36.3(3)). However, no guidance is provided on the form of the risk assessment.

E36.3(8) requires locating any new infrastructure in areas potentially subject to natural hazards to consider, where appropriate, an adaptive management response taking into account of a longer term rise in sea level, and E36.3(9) requires habitable areas of new buildings to be above the 1%AEP coastal storm inundation level including an additional rise of 1 m.

4.1.3 AUP PC120

AUP PC120 E36 also provides a proportionate risk-based approach to address the risks associated with natural hazards. A risk reduction approach applies to land that has been developed for urban use, such as the present site, with a risk assessment matrix included in Table E36.3.1B.1 that states activities sensitive and potentially sensitive to natural hazards are potentially tolerable and activities less sensitive to natural hazards are acceptable.

PC120 E36 (3) requires consideration all of the following, taking into account the potential effects of climate change and adopting a precautionary approach where information is uncertain or incomplete:

- 1 The type, frequency, range and scale of the natural hazard(s), including:
 - where there may be coinciding, compounding and/or cascading hazards
 - whether the hazard risks will be temporary or permanent

- whether natural hazard events of lower intensity and higher frequency than the 1 per cent AEP event will impact the property and proposed activity
- 2 The consequences of the natural hazard in relation to the proposed activity, including consideration of the following matters
- accelerating or exacerbating the natural hazard and/or its potential impacts
 - creating natural hazard risks that previously were not present at the location
 - the type of activity being undertaken and its sensitivity to natural hazard events
 - creating or increasing the natural hazard risk(s) to people and communities, including long-term impacts from more frequent hazard events
 - creating or increasing the natural hazard risk(s) to other properties, infrastructure and the environment
 - cultural impacts, including consequences for Māori land, Treaty Settlement, Land, marae, urupā, mana whenua cultural heritage and values
- 3 Existing and proposed mitigation measures
- 4 Residual risk
- 5 Any relevant management plan, strategy or hazard risk assessment relating to the area.

PC120 E36 (4B) requires the following matters to be considered as part of a risk assessment of existing and future mitigation measures and residual risk:

- a whether any building, structure or activity located on land subject to natural hazards can be relocated within the site or removed
- b whether the use, design and construction of buildings and structures can mitigate risks associated with natural hazards
- c the extent to which methods for long term maintenance of areas affected by natural hazards, such as easements, are provided
- d the ability for site layout and management to limit exposure of people and property to natural hazards, including safe egress during a natural hazard event
- e the effect of structures to mitigate hazards on landscape values and public access
- f the robustness of the mitigation measures, their enforceability and the ability to carry out repairs and maintenance
- g the potential consequences of events that exceed the design parameters of mitigation measures
- h the potential effects resulting from failure of structural and nature-based mitigation measures over a 100-year timeframe
- i the impacts of the mitigation on other people, properties, infrastructure and the environment.

Relevant parts of PC120 E36 (4C) relates to adaptation in natural hazard areas and includes consideration of the following in flood hazard and coastal inundation hazard areas:

- i ensuring appropriate safe refuge and safe egress are provided where possible and maintained where currently available
- ii raising floor levels to reduce the extent of flooding or inundation within the building

5 Natural hazards

5.1 The type, frequency, range and scale of the natural hazards for the current provisions of the AUP E36.3(2)(a) and PC120 E36.3(3)(a)

The two natural hazards relevant for this site for consideration with the current provisions of the AUP and PC120 are coastal inundation and flooding from rainfall.

This section summarises coastal and flood hazard information respectively at 188 Beaumont Street. Detailed coastal hazard and flood hazard assessments, with the detailed assessments provided in Appendix B and Appendix C respectively.

Table 5-1 shows the permanent inundation level of key tidal parameters HAT and Mean High Water Spring with RSLR and Table 5-2 shows the storm inundation levels for 1%AEP and relative sea levels for a range of possible climate change scenarios and the catchment flood level as well as the level required under the existing provisions of the AUP (1%AEP storm surge + 1 m sea level rise). The 1% AEP flood level includes consideration of a 100-year ARI rainfall event inclusive of 3.8°C increase in temperature for climate change and the Maximum Probable Development land use. The maximum does not change over this time period because flood levels in this area are determined by the overflow level to the coast.

Figure 5-1 presents a summary of predicted 1% AEP inundation level from coastal hazard and flood hazard to 2130, the inundation level resulting from the 1%AEP coastal inundation level plus 1.5 m relative sea level rise (RSLR) that informs the consideration of safe egress. The figure shows RSLR values associated with the SSP2-4.5p50, SSP5-8.5p50 climate change scenarios as well as the SSP5-8.5p83, that are the mean and 83rd percentile values of the high emission scenario.

Figure 5-1 highlights that flood hazard is the likely determinant of the 1% AEP inundation level up to around 2080 after which there the long-term coastal inundation increasingly becomes the dominant hazard particularly with the higher emission scenarios.

A detailed assessment of coinciding hazards and cascading hazards is not recommended for this site. This is because once coastal processes cause flooding (i.e. instead of rainfall-induced flooding), it becomes the dominant process since the additional contribution of rainfall is relatively small in relation to the volume of water available from the sea. Cascading hazards, such as rainfall exacerbating landslide and slope stability have not been considered at this location due to the reclaimed, relatively low-lying nature of land and the coastal protection around the edge of the reclamation.

Table 5-1 Permanent inundation levels based on tide levels relative to 2020 baseline

Name	Level (mRL NZVD 2016)			
	Existing	1.2 m SLR (p50 SSP5-8.5)	1.5 m SLR (PC 120 E36.3)	1.8 m SLR p83 SSP5-8.5)
Mean high water spring (MHWSn)	1.30	2.5	2.8	3.1
Highest astronomical tide (HAT)	1.68	2.88	3.18	3.48

Table 5-2 Storm inundations levels (coastal and flood hazard) for 1%AEP events and RSLR

Hazard	Scenario	Inundation Level (mRL NZVD 2016)
Coastal	1% AEP storm tide 2030	2.08
Coastal	1%AEP storm tide 2080 (SSP5-8.5p50)	2.64
Coastal	1%AEP storm tide + 1 m SLR (current provisions of AUP)	3.1
Coastal	1% AEP storm tide 2130 (SSP5-8.5p50)	3.38
Coastal	1% AEP storm tide + 1.5 m RSLR (PC 120 E36.3 (5K))	3.58
Coastal	Stress test inundation (1% AEP storm tide 2130 p83 SSP5-8.5)	3.86
Flood	1% AEP (existing and future)	2.75

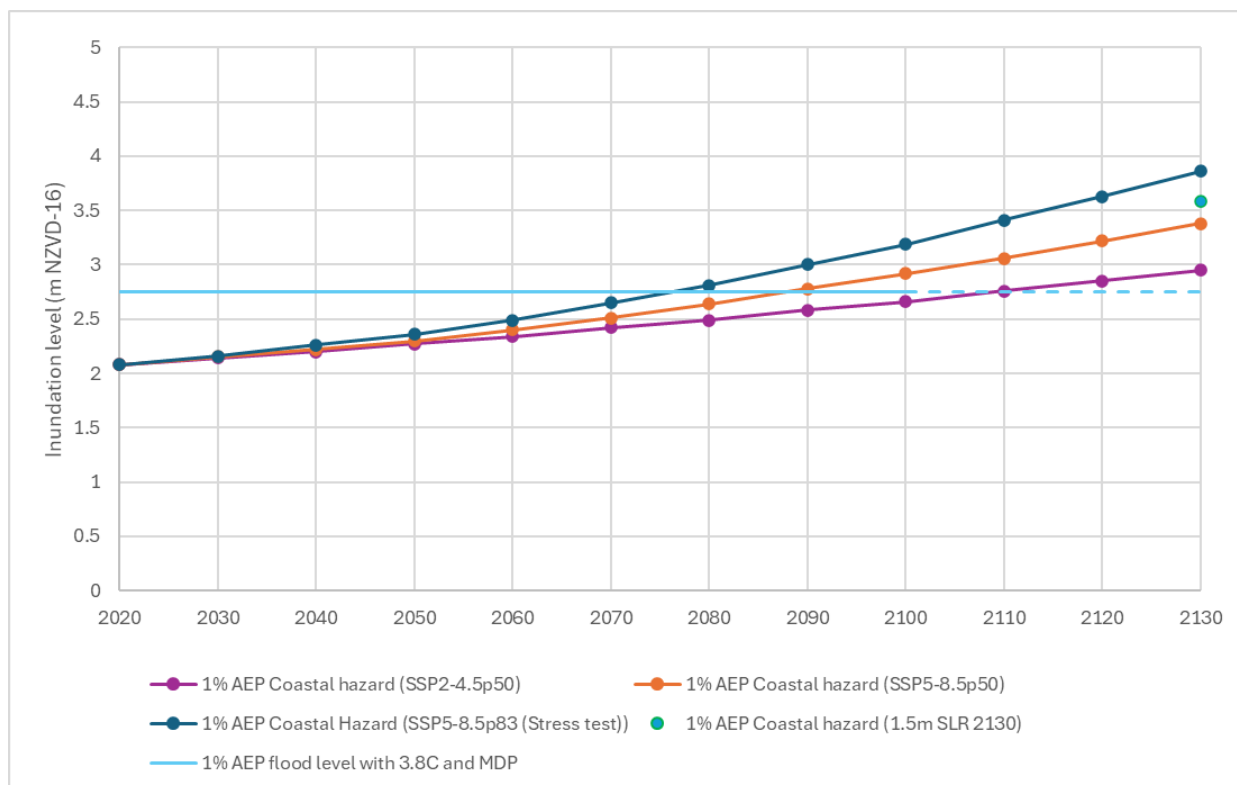


Figure 5-1 1% AEP Inundation levels (Coastal and flooding)

5.2 NPS-NH Likelihood assessment

In addition to coastal inundation and flooding that is addressed in the previous section the NPS-NH also requires consideration of coastal erosion and tsunamis. An erosion assessment is not required as there are no ASCIE (Area Susceptible to Coastal Instability and Erosion) lines generated for reclaimed shorelines such as those around the Auckland CBD as it was assumed that structures supporting these shorelines will be maintained, supporting the planning definition of reclaimed land as permanent.

Use is made of the scenarios considered for the AUP assessment in the first instance (i.e. the 1%AEP events), with more frequent events only assessed if risks were moderate or high. The likelihood changes over time is done based on the calculated 0.18 m difference in sea level for a 1%AEP event and a 10%AEP event in the present day, which means the sea level reached by a 1%AEP event in the present day will occur due to a 10%AEP event with an additional 0.18 m of sea level rise. This change in sea level is exceeded by all sea level rise scenarios at 2080 and 2130. With the 1%AEP event being almost certain for future scenarios, this means all higher frequency events that may occur in the present day are also almost certain based on the NPS-NH definitions of likelihood. For tsunami the likelihood is considered rare for all time periods.

Table 5-3: Coastal inundation, tsunami and rainfall-induced flooding likelihood classification for NPS-NH

Hazard event	Present day	2080	2130
1%AEP storm surge + SSP2-4.5 p50	Possible	Almost certain	Almost certain
1%AEP storm surge + SSP5-8.5p50	Possible	Almost certain	Almost certain
1%AEP storm surge + SSP5-8.5p83	Possible	Almost certain	Almost certain
500 Year ARI tsunami+SSP5-8.5p50	Unlikely	Unlikely	Possible
2500 Year ARI tsunami+SSP5-8.5p50	Rare	Rare	Rare
1%AEP rainfall-induced flooding	Possible	Possible	Possible

6 Risk assessment

This section summarises the risk assessment process that meets the requirements of AUP policy and the NPS-NH.

6.1 AUP Risk assessment

In relation to the specific requirements of the both the operative provisions and PC120 Chapter E36 of the AUP, this section summarises the risk assessment covering (E36.3(3)):

- The consequences of the natural hazard in relation to the proposed activity
- Existing and proposed mitigation measures
- Residual risk
- Any relevant management plan, strategy or hazard risk assessment relating to the area.

6.1.1 The consequences of the natural hazard in relation to the proposed activity

This item is in reference to E36.3(2)(c) under the operative provisions of the AUP and E36.3(3)(c) and E36.3(4A) of PC120.

To identify the consequences of the natural hazard in relation to the proposed activity, a site-specific risk assessment methodology has been adopted to assess the activities being undertaken.

Section 6.1.1.1 identifies the types of activities being undertaken (and elements at risk) in relation to the requirements of PC120 and Appendix D provides an overview of the risk assessment methodology. The subsequent sections draw on the risk assessment results, which can be found in Appendix E for each element at risk with the proposed design.

The assessment considers potential risks relating to coastal inundation and rainfall-induced flooding, based on a *'risk-based approach'* using a semi-quantitative approach based on the templates included in MfE (2021)¹ guide to local climate change risk assessments. Importantly, the risk assessment primarily considers the consequences associated with the activity and not the number of people doing the activity².

6.1.1.1 The type of activity being undertaken and its sensitivity to natural hazard events

Both the current provisions of the operative AUP (E36.3(3)(b)) and the PC120 provision identifies a range of activities that should be considered in the risk assessment.

The current provisions of the AUP identify flood tolerant activities to include car parking and loading areas, with less vulnerable activities including commercial and community facilities and more vulnerable activities including residential, care centres and healthcare facilities with overnight accommodation.

PC120 provides additional definitions of activities sensitive, potentially sensitive and less sensitive to natural hazards that were not defined in the operative AUP. The overall development is primarily residential development which will result in additional people permanently residing in this area.

¹ MfE (2021) He kupu ārahi mō te aromatawai tūraru huringa āhuarangi ā-rohe / A guide to local climate change risk assessments. Wellington: Ministry for the Environment.

² This is broadly in line with the E36.1 (background) which states that "While activities (use) and their associated buildings (development) are separated within the provisions of this chapter, their risk from the natural hazards is required to be considered comprehensively in any assessment required with a resource consent. This ensures that due consideration is given to the consequences of new activities sensitive or potentially sensitive to natural hazards being established, or existing activities expanding in existing buildings that are currently located within natural hazard areas."

Table 6-1 identifies the operative AUP and PC120 activities of relevance to the site. The table identifies the “Risk element” which is the site-specific interpretation of the AUP activity. The table identifies some activities (i.e. residential dwellings) that are proposed on the site that are not included in the risk assessment because they take place at elevations above the coastal and flooding inundation levels.

Table 6-1 Operative AUP and PC120 activities and 188 Beaumont Street risk elements

Operative AUP	AUP PC120	Risk element	Potential risk
More vulnerable activities	Sensitive	Residential dwellings are located on Level 1 at RL 7.5 m Critical services/electrical at a minimum of 3.9 mRL	Excluded – above hazard levels (refer Note 1) Included
Less vulnerable activities	Potentially sensitive	Ground floor commercial/non-habitable development with floor levels of 3.0 mRL, 3.2 mRL, 3.4 mRL and 3.7 mRL.	Included
Flood tolerant activities	Potentially sensitive	Street access and loading zones with levels of 3.0 m RL	Included

The proposed development complies with the operative AUP requirements of not increasing risk associated with natural hazards (Policy E36.3(4)), with no vulnerable or less vulnerable activities below the 1%AEP storm surge + 1 m sea level rise requirements (i.e. 3.1 m RL excluding freeboard requirements), with only the flood tolerant activities of parking and loading affected by coastal inundation with sea levels higher than 0.9 m.

The matters set out below relate to PC120 considerations.

6.1.1.2 Creating natural hazard risks that previously were not present at the location (PC120 E36.3(4A)(b))

There are no new natural hazards at the location as a result of the proposed activities.

The proposed development creates new activities on the site that is subject to natural hazards, including residential apartments and commercial retail spaces as shown by the elements at risk discussed in Table 6-1. The mitigation of these risks is discussed in Section 6.1.2.

6.1.1.3 Potential to accelerate or exacerbate the natural hazard and/or its potential impacts (PC120 E36.3(4A)(a))

The natural hazard assessments (coastal and flooding) have not identified any exacerbation of the natural hazard as a result of the activities.

The proposed development creates potential impacts with the addition of people residing in the development, as shown by the elements at risk discussed in Table 6-1.

6.1.1.4 Creating or increasing the natural hazard risk(s) to people and communities, including long-term impacts from more frequent hazard events (PC120 E36.3(4A)(d))

The proposed development is considered potentially tolerable within the identified hazard overlays with the appropriate risk treatment to reduce risk to tolerable levels (i.e. risks are low). The proposed design levels for the Project avoid coastal inundation over the next 100 years for the 1%AEP coastal inundation events with RSLR for the SSP5-8.5p50 scenario and avoids flooding for the 1%AEP rainfall flooding including allowance for 3.8C, and therefore also reduce flooding from more frequent hazard events. Key matters to consider are the requirement of safe refuge and safe egress which are discussed in Section 6.1.2.4. The proposed adaptation plan responses reduce potential long term impacts from increasing the natural hazard risks to people and communities.

6.1.1.5 Creating or increasing the natural hazard risk(s) to other properties, infrastructure and the environment (PC120 E36.3(4A)(e))

The natural hazard assessments (coastal and flooding) have not identified that the activities will create or increase the natural hazard risk(s) to other properties, infrastructure and the environment.

The detailed flood assessment of the post-development scenario (refer Appendix C) identified that the flood level in the vicinity of the site is determined by the topographic depression and spillway level to the coast. The proposed development will reduce the flood storage of the floodplain on the site by around 50 m³ due to the building footprint occupying this area and the raised levels proposed. This small change in flood storage will not be an increase in surrounding flood levels due to the close proximity and overflow to the coast. This also means that there are no adverse effects predicted as a result of filling in the floodplain.

The building design will not adversely affect neighbours' exposure to coastal inundation hazards. This is because coastal inundation from the sea is time and level limited but is not volume limited and is therefore not mass-balanced like catchment flows. For example, neighbouring areas that would be exposed to the same hazard will have the same exposure after the development is complete. Likewise, neighbouring areas that are not exposed will remain unexposed after this development is complete.

6.1.1.6 Cultural impacts, including consequences for Māori land, Treaty Settlement, Land, marae, urupā, mana whenua cultural heritage and values (PC120 E36.3(4A)(f))

This has not been assessed as part of this risk assessment.

6.1.2 Existing and proposed mitigation measures (PC120 E36.3(3)(l))

The development comprises a design that addresses existing coastal and flood inundation hazards and includes provision for climate change effects over the next 100 years using an adaptive design approach. The proposed development is resilient for at least the next 80 years based on the climate scenarios required to be considered. An adaptation strategy is proposed to address longer term hazards to present an approach that provides a consideration of natural hazard risk from coastal inundation and flooding for at least the next 100 years.

6.1.2.1 Freeboard guidance

Table 6-2 summarises freeboard guidelines in relation to more vulnerable and less vulnerable activities (as defined in the AUP). The reader is referred to Freeboard for the Auckland Region Guidelines document GD13 (December 2024) for further guidance and information³.

³ https://www.aucklanddesignmanual.co.nz/content/dam/adm/adm-website/developing-infrastructure/infrastructure-technical-guides/gd13-freeboard/FINAL_Freeboard_GD13v1_December_2024.pdf

Freeboard is typically added above the 1% AEP inundation level to inform finished floor levels, typically 0.3 m for less vulnerable activities such as non-habitable areas and 0.5 m for more vulnerable activities including residential/habitable areas

Freeboard is a factor of safety that provides for the uncertainties in the estimation of flood/inundation water levels and an allowance for processes not included in the estimate (e.g. wake from cars driving through floodwater).

Table 6-2: Freeboard guidelines for 1%AEP scenario

Scenario	Freeboard	Relevance to Project
Sensitive activities	500 mm	N/a – vulnerable activities (habitable floor levels/dwellings) are located above Level 00.
Potentially sensitive activities	300 mm	Entrance/s to the retail areas/residential lobby.
Less sensitive activities	150 mm	
* As defined in the AUP J1 Definitions		

6.1.2.2 Floor level using deterministic approach

Minimum floor levels for the building design, based on coastal and flood inundation levels plus freeboard based on regional guidance (Auckland Council, 2024b) is shown in Table 6-3.

These floor levels are based on the 1% AEP p50 coastal inundation levels forecast to 2130. They do not take into account a risk-based approach, solely applying a freeboard level above a hazard elevation rather than considering the outcomes of the risk assessment that include both likelihood and consequence. A comparison with the stress test (p83 scenario) inundation levels is included in the “additional” column.

Table 6-3: Floor level using deterministic approaches

Variable	Level (m NZVD-16)	Additional
Critical services/ Sensitive activities	3.9	Freeboard of 0.5 m above 1% AEP 2130 (p50) This is above the stress test value.
Non-habitable floor	3.7	Freeboard of 0.3 m above 1% AEP 2130 (p50) coastal inundation level. This is <u>below</u> the ‘stress test’ coastal inundation level of 3.86 m RL.
Habitable floor/ Critical services	3.9	Freeboard of 0.5 m above 1% AEP 2130 (p50) Level is above the ‘stress test’ coastal inundation level of 3.86 m RL.
Other areas	3.55	Freeboard of 0.15 m above 1% AEP 2130 (p50)

6.1.2.3 Assessment of design proposal using risk-based methods

In relation to each of the elements at risk and the proposed elevations included in Appendix A, the risk associated with selected 1% AEP inundation events for the present day, 2080 and 2130 is shown in Table 6-4 and the high emission scenario SSP5-8.5 that take into account likelihood and consequence. For risk-based assessments freeboard allowances are not typically considered as this includes a deterministic value. All other climate scenarios (including “permanent” risks) are provided

in Appendix E along with additional information regarding the derivation of the risk score. These are risk scores for the high emission scenario. All these other scenarios have lower risks than shown in the table below.

Table 6-4 Summary of 1% AEP inundation risk (coastal and flood)

Element at risk	Present day	Scenario		
	2030	SSP5-8.5 (p50) 2080	SSP5-8.5 (p50) 2130	SSP5-8.5 (p83) 2130 (Stress test)
Residential development and safe egress	Low	Low	Very High	Very High
Residential and safe refuge	Low	Low	Low	Low
Critical services/electrical @3.9 m RL	Low	Low	Low	Low
Commercial services (street access/loading) @ 3.0 m RL	Insignificant	Insignificant	Insignificant	Low
Commercial/non habitable FL @ 3.0 m RL	Insignificant	Insignificant	Insignificant	Medium
Commercial/non habitable FL @ 3.2 m RL	Insignificant	Insignificant	Insignificant	Low
Commercial/non habitable FL @ 3.4 m RL	Insignificant	Insignificant	Insignificant	Insignificant
Commercial/non habitable FL @ 3.7 m RL	Insignificant	Insignificant	Insignificant	Insignificant

Risk from coastal inundation is very high at 2130 for the safe egress element due to flood depths on the surrounding areas being of sufficient depth to make egress unsafe.

The minimum floor level of 3.0 mRL reduces risk to low or insignificant for all activities except for the stress test scenario at 2130. The critical services risk is low for all scenarios due to the level of 3.9 m RL.

With the use of freeboard to provide for uncertainty and over design events, there is the potential for inundation of ground floor levels lower than 3.7 mRL. Therefore, an adaptation response to raise all ground floor levels should be considered in the event of a flood occurring to the lower level of the development (i.e. flooding of 3.0 mRL areas).

6.1.2.4 Safe egress or refuge

The operative AUP (E36.8(10)(f)) requires methods to manage activities and uses within the site including safe egress from buildings and the management of people and property during a flood event. PC120 E36 (4C)(f) requires ensuring appropriate safe refuge and safe egress are provided where possible and maintained where currently available, with PC120 E36.3(5L) and E36.3(5I) suggesting either safe egress and/or refuge is possible for new subdivision, use and development where potential flood hazard risk is tolerable, which is the case at this location. The safe egress requirements (PC120 E36(5K)) for coastal inundation include consideration of 1.5 m of RSLR which results in a level of around 3.6 mRL.

Safe refuge and egress will be considered as part of the adaptation response which includes the Flood Management Plan (refer Appendix F for an outline table of contents).

Safe refuge in the building is provided because the coastal inundation will not enter habitable floors with sufficient provision of freeboard and that the building is structurally stable. The residual risk associated with refuge also identifies no risk to life, injury or significant property damage. The residential areas can sustain basic human needs as well as the occupants being aware that the building is safe. Specifically:

- All residential development is at least on level 1 or higher, well above all possible coastal inundation and flood levels. On the ground floor there is only commercial development, and vertical evacuation from the ground floor to higher levels is possible via the stairs and vehicle ramps.
- The ground floor is constructed from durable materials, and the building can sustain basic human needs for the expected short-term duration of the hazard exposure with all residents having accessibility to basic human needs, and occupants of the commercial areas able to relocate to the podium. With the provision of appropriate guidelines and advice, the proposed residential development can accommodate a safe refuge strategy and has sufficient space at elevated levels to accommodate guests and others and does not need to rely on safe egress.

Therefore, provision for safe refuge in accordance with PC120 Policy E36(5L) is proposed within the building.

In addition to the safe refuge approach, access and egress from the property can be permitted for a number of decades. However, there will likely be a point in time when access and egress is unsafe for a period of hours (discussed later).

Safe egress requires a safe evacuation route that is free from permanent obstacles and can be easily traversed by foot from a building through the property to a safe public place. This route is to be:

- free from floodwaters wherever possible, or the floodwaters having depth and velocity that does not pose a risk to life for the vulnerable
- connected to a safe place where assistance can be rendered
- remain safely traversable through an event
- usual route taken and not reliant on neighbouring property
- Not subject to hazardous residual risks.

Catchment flood risk is low and does not pose a risk to life now or in the future. Catchment flooding including 3.8°C and the maximum development scenario results in flood depths of low flood hazard (Figure 3-3), with flood depths along the existing road network of less than 0.22 m meaning that over the next few decades safe egress can be achieved when considering rainfall-induced flooding alone.

With the street levels at 2.7 m RL adjacent to the property, access and egress routes from the building could be inundated by up to 0.9 m depth in the future as a result of coastal inundation and sea level rise to ~2115 (see Figure 5-1). Flood depths to 0.9 m are unsafe and cause potential risk to life.

Coastal inundation exposure is typically able to be forecast ahead of time with the consideration of storm conditions coinciding with high tide conditions, meaning that egress can be permitted with sufficient warning time. This egress option (with warning) is in addition to the safe refuge approach. Once water levels reach ~3.1 mRL (i.e. depths exceed 0.3 m on the road), safe refuge will be required.

Based on current flood and coastal hazards information, safe egress across Beaumont Street to the car park area or to Silo Park areas is achievable, with the flood depth being low enough to allow emergency vehicle access to render necessary assistance until relative sea level rise reaches more than 0.8 m. These areas remain safely traversable, are not reliant on neighbouring property and are not subject to residual risks.

6.1.3 Residual risk

This section considers the potential effects of lower frequency events (i.e. less than 1%AEP). These could be lower frequency storm surge event such as the 0.5%AEP set out in Table Appendix B.1, or higher intensity rainfall events than the 1%AEP with climate change considerations.

Storm surge for a 0.5% AEP (1 in 200-year event) is only 5 cm higher than the 1%AEP event (refer Appendix B) and will result small changes in the levels of inundation to the ground floor at 2130 with no change to the risk outcomes. For sea level rise and rainfall intensity, the climate change scenarios considered include high emission scenarios and stress tests that represent a conservative and precautionary scenario (MfE, 2024). Therefore, residual risk for over design events is adequately addressed with the selected freeboard allowance for the commercial areas on the ground floor and the proposed adaptation plan approach.

6.1.4 Any relevant management plan, strategy or hazard risk assessment relating to the area.

There is no relevant management plan or strategy relating to this area. A draft assessment was carried out as part of AC's Shoreline Adaptation Plan programme with Hold The Line as the preferred strategy⁴. Hold the Line is a management strategy that aims to fix the coastal edge at a specific, current location to protect existing assets and infrastructure from coastal erosion and inundation. However, this is on hold pending further engagement.

6.1.5 Additional matters to be considered

Table 6-5 sets out matters to be considered under the operative AUP Policies E36.3 and our assessment. Table 6-6 sets out additional matters to be considered under Policy E36.3(4B) of PC120 and our assessment of those matters. The proposed development meets both of these policy requirements.

Table 6-5: Summary of matters to be considered under operative AUP Policies E36.3

Matters to be considered	Assessment
<p>Policy 4: Control subdivision, use and development of land that is subject to natural hazards so that the proposed activity does not increase, and where practicable reduces, risk associated with all of the following adverse effects:</p> <ul style="list-style-type: none"> a accelerating or exacerbating the natural hazard and/or its potential impacts; b exposing vulnerable activities to the adverse effects of natural hazards; c creating a risk to human life; and 	<p>Proposed development does not increase risk to matters identified in a) to d). The development does not accelerate or exacerbate existing or potential future natural hazards and the proposed levels and requirements of the adaptation plan avoid exposing vulnerable activities to the adverse effect of natural hazards. Therefore, there not a risk to human life.</p>

⁴ <https://new.aucklandcouncil.govt.nz/content/dam/ac/docs/plans-projects-policies-reports-bylaws/draft-shoreline-adaptation-strategies-auckland-central.pdf>

Matters to be considered	Assessment
d increasing the natural hazard risk to neighbouring properties or infrastructure.	
Policy 7: Ensure that buildings in areas subject to coastal hazards are located and designed to minimise the need for hard protection structures.	The site is within an area of reclamation with existing hard protection structures. No additional hard protection structures are required.
Policy 13(b): In existing urban areas require new buildings designed to accommodate more vulnerable activities to be located within or above the 1 per cent annual exceedance probability (AEP) floodplain where safe evacuation routes or refuges are provided.	Proposed development provides for safe refuge and evacuation and locates vulnerable activities (residential development) above the 1%AEP floodplain.
Policy 15: Within existing urban areas, enable buildings containing less vulnerable activities to locate in the 1 per cent annual exceedance probability (AEP) floodplains where that activity avoids, remedies or mitigates effects from flood hazards on other properties.	The ground floor which is the only level potentially affected by coastal inundation in the longer term only has less vulnerable activities. The proposed development avoids effects from flood hazards on other properties as it does not exacerbate existing or possible future coastal inundation and flood hazards.

Table 6-6: Summary of matters to be considered under PC120 Policy E36.3(4B)

Matters to be considered	Assessment
a) whether any building, structure or activity located on land subject to natural hazards can be relocated within the site or removed	The proposed building is a permanent structure and cannot be readily relocated or removed.
b) whether the use, design and construction of buildings and structures can mitigate risks associated with natural hazards	The design and construction of the building can mitigate risks due to the selection of floor levels, the choice of durable construction materials in areas exposed to coastal inundation and flood risk and enabling an adaptive response to raise ground floor elevations in the future.
c) the extent to which methods for long term maintenance of areas affected by natural hazards, such as easements, are provided	The building can be accessed and maintained. The surrounding road network which provides egress routes from the site are managed by Auckland Council
d) the ability for site layout and management to limit exposure of people and property to natural hazards, including safe egress during a natural hazard event	The site layout and the provision of residential development and critical services on higher elevations and less sensitive activities on the ground floor, as well as a plan for safe refuge and safe egress further reduces natural hazard risk.
e) the effect of structures to mitigate hazards on landscape values and public access	Not required to be considered as part of this natural hazard risk assessment because no hard protection structures are proposed or required to mitigate hazards.
f) the robustness of the mitigation measures, their enforceability and the ability to carry out repairs and maintenance	The adaptation plan which may include raising floor levels and preventing the ingress of flood waters is achievable with the proposed design and can be carried out within the building footprint. The safe

Matters to be considered	Assessment
	refuge plan will provide an effective risk reduction process.
g) the potential consequences of events that exceed the design parameters of mitigation measures	<p>Events that exceed the design parameters have been considered in the risk test including:</p> <ul style="list-style-type: none"> • less frequent coastal inundation events • the stress test high emission scenarios • the proposed floor levels including freeboard • durable construction materials, and uses on the ground floor <p>All these factors reduce the potential consequences of over events which exceed design parameters to be low.</p>
h) the potential effects resulting from failure of structural and nature-based mitigation measures over a 100-year timeframe	Structural failure as a result of the natural hazards considered is unlikely due to the proposed construction materials.
i) the impacts of the mitigation on other people, properties, infrastructure and the environment	The proposed adaptation plan is achievable within the proposed building footprint and only impacts those areas lower than 3.7 m RL., There are no change to natural hazards to the surrounding areas
j) whether natural hazard risks can be reduced for Māori Land, Treaty Settlement Land, marae, urupā, mana whenua cultural heritage and values	Assessed by others, but area not identified as treaty settlement land on Council GIS viewer
k) the use of conditions of consent, including the duration of consent, to monitor changes in risk and to limit the exposure of people and property to natural hazards	The proposed adaption response will be included as a proposed condition of consent.
l) the extent to which it is practicable to mitigate residual risk where infrastructure has a functional or operational need to locate in a natural hazard area	Not applicable to this natural hazard risk assessment as it is related to infrastructure.

6.1.6 AUP Risk summary

The proposed development complies with the operative AUP requirements of not increasing risk associated with natural hazards (Policy E36.3(4)), with no vulnerable or less vulnerable activities below the 1%AEP storm surge + 1 m sea level rise requirements (i.e. 3.1 m RL excluding freeboard requirements), with only the flood tolerant activities of parking and loading affected by coastal inundation with sea levels higher than 0.9 m.

Considering PC120 E36, the proposed development is situated in a coastal inundation hazard area subject to future coastal inundation exposure with sea level rise of between 0.5 and 1.0 m. The proposed design levels have a low coastal inundation risk for at least the next 80 years, and with the provision for the proposed adaptation plan, mitigates significant coastal inundation risk for at least the next 100 years.

Residual risks have been identified and quantified. The proposed finished floor levels and infrastructure levels on the ground floor including the selected freeboard allowances, mitigate the coastal inundation risk to be low for the development.

Due to the low levels of the adjacent roads and footpaths safe refuge will become the longer-term strategy (i.e. after at least 0.5 m of RSLR). The proposal enables safe refuge during significant events

and the proposal avoids creating or exacerbating coastal inundation risk on other properties, infrastructure and the environment.

6.2 NPS-NH Risk assessment

The NPS-NH risk assessment has been completed based on:

- 1 Hazard likelihood information provided in Section 0
- 2 Consequence information provided in Table 4-2 with a focus on:
 - Damage to property
 - Potential for injury or fatalities, which we have assessed based on consideration of refuge and access/egress

The risk rating, and hazard-specific issues relating to the assessment of hazard and consequence are discussed in the relevant section below.

6.2.1 Coastal Inundation and Tsunami

As discussed earlier, coastal erosion is not identified as a hazard at this location, so coastal hazards are inundation and tsunami. Likelihood ratings are provided in Table 5-3. Consequence definitions have been related to flood depth increments for coastal storm surge and tsunami inundation in Table 6-7 for both damage to property and potential for injury or fatalities. These depth increments are adopted from international guidance, where the greater consequences from tsunami relative to storm surge reflect an allowance for higher velocity.

Table 6-7: Coastal consequence criteria based on flood depth

Consequence level	Potential for property damage		Potential for injury of fatality	
	Storm surge depth range (m)	Tsunami depth range (m)	Storm surge depth range (m)	Tsunami depth range (m)
Catastrophic	>2 m	> 1 m	>1 m	>0.5 m
Major	>1.2 to 2 m	>0.5-to 1 m	>0.5 to 1 m	>0.3 to 0.5 m
Moderate	>0.5 to 1.2 m	>0.3 to 0.5 m	>0.3 to 0.5 m	>0.15 to 0.3 m
Minor	>0.3 to 0.5 m	0 to 0.3 m	>0.15 to 0.3 m	0 to 0.15 m
Negligible	0 to 0.3 m	N/A	0 to 0.15 m	N/A

The level of inundation for the present day, 2080 and 2130 is shown in for a 1%AEP storm surge with various climate change sea level rise scenarios and for a damaging tsunami and the high emission sea level rise scenario (i.e. SSP5-8.5).

The resulting risks for property damage with the proposed mitigation measures, including the proposed floor levels and adaptation responses is included in Table 6-8 and Table 6-9 for coastal inundation and tsunami scenarios.

Table 6-8: Resulting NPS-NH risk rating for property damage including mitigation measures

Hazard event	Present day	2080	2130
1%AEP storm surge + SSP2-4.5p50	Low	Low	Low
1%AEP storm surge + SSP5-8.5p50	Low	Low	Low
1%AEP storm surge + SSP5-8.5p83	Low	Low	Low
Tsunami+SSP5-8.5p50	Low	Low	Medium

Table 6-9: Resulting NPS-NH risk rating for potential injury including safe egress and/or refuge

Hazard event	Present day	2090	2130
1%AEP storm surge + SSP2-4.5p50	Low	Low	Low
1%AEP storm surge + SSP5-8.5p50	Low	Low	Low
1%AEP storm surge + SSP5-8.5p83	Low	Low	Low
Tsunami+SSP5-8.5p50	Low	Low	Low

6.2.2 Flood

There is potential for up to 50 m² of flooding up to 0.22 m depth at 188 Beaumont Street in events with likelihoods classified as “Unlikely” to “Very Rare” by the NPS-NH. The floodplain is determined by the topographic depression (i.e. the flood prone area) and spillway level to the coast therefore any increase in flood levels would simply cause more water to flow to the coast. As a result, the flood level is insensitive to increased rainfall depth and unlikely to change as a result of climate change.

The consequences to flood depths up to 0.22 m are negligible for property damage.

The “refuge” approach to manage risk to people under inundation events (including coastal) means that the consequence is considered “negligible”. Where people chose to evacuate through floodwaters, there are routes available through shallow floodwaters less than 0.15 m deep for events classified as unlikely, rare or very rare. Evacuating through shallow floodwaters increases the consequence level for people (potential for injuries or fatalities) to “Minor”. However, the risk rating remains “Low” for both “Negligible” and “Minor” consequences in events with an “Unlikely” likelihood and therefore the flood risk rating is not sensitive to the refuge or egress approach.

The risk assessment results for damage to property and potential for injuries of fatalities from flooding are summarised in Figure 6-1 and Figure 6-2 for the current timeframe. Figure 6-3 and Figure 6-4 presents the risk assessment results for a 100-year timeframe (~2130).

		Likelihood Level						
		Almost Certain	Very Likely	Likely	Possible	Unlikely	Rare	Very Rare
Consequence Level	ARI (years)	up to 10	10-20	20-50	50-100	100-500	500-5000	>5000
	AEP	10% or more	10% to 5%	5% to 2%	2% to 1%	1% to 0.2%	0.2% to 0.02%	<0.02%
	Catastrophic	Very High	Very High	Very High	High	Medium	Medium	Medium
	Major	Very High	Very High	High	High	Medium	Medium	Medium
	Moderate	High	High	High	Medium	Medium	Low	Low
	Minor	Medium	Medium	Medium	Medium	Low	Low	Low
	Negligible	Low	Low	Low	Low	Low	Low	Low
No exposure*		None	None	None	None	None	None	None

*Additional category added by T+T to account for "No exposure", which means there is no identified direct risk.

Figure 6-1 Damage to properties risk assessment (existing timeframe)

		Likelihood Level						
		Almost Certain	Very Likely	Likely	Possible	Unlikely	Rare	Very Rare
Consequence Level	ARI (years)	up to 10	10-20	20-50	50-100	100-500	500-5000	>5000
	AEP	10% or more	10% to 5%	5% to 2%	2% to 1%	1% to 0.2%	0.2% to 0.02%	<0.02%
	Catastrophic	Very High	Very High	Very High	High	Medium	Medium	Medium
	Major	Very High	Very High	High	High	Medium	Medium	Medium
	Moderate	High	High	High	Medium	Medium	Low	Low
	Minor	Medium	Medium	Medium	Medium	Low	Low	Low
	Negligible	Low	Low	Low	Low	Low	Low	Low
No exposure*		None	None	None	None	None	None	None

*Additional category added by T+T to account for "No exposure", which means there is no identified direct risk.

Figure 6-2 Potential for injuries or fatalities (existing timeframe)

		Likelihood Level						
		Almost Certain	Very Likely	Likely	Possible	Unlikely	Rare	Very Rare
Consequence Level	ARI (years)	up to 10	10-20	20-50	50-100	100-500	500-5000	>5000
	AEP	10% or more	10% to 5%	5% to 2%	2% to 1%	1% to 0.2%	0.2% to 0.02%	<0.02%
	Catastrophic	Very High	Very High	Very High	High	Medium	Medium	Medium
	Major	Very High	Very High	High	High	Medium	Medium	Medium
	Moderate	High	High	High	Medium	Medium	Low	Low
	Minor	Medium	Medium	Medium	Medium	Low	Low	Low
	Negligible	Low	Low	Low	Low	Low	Low	Low
No exposure*		None	None	None	None	None	None	None

*Additional category added by T+T to account for "No exposure", which means there is no identified direct risk.

Figure 6-3 Damage to properties risk assessment (~2130 timeframe)

		Likelihood Level						
		Almost Certain	Very Likely	Likely	Possible	Unlikely	Rare	Very Rare
Consequence Level	ARI (years)	up to 10	10-20	20-50	50-100	100-500	500-5000	>5000
	AEP	10% or more	10% to 5%	5% to 2%	2% to 1%	1% to 0.2%	0.2% to 0.02%	<0.02%
	Catastrophic	Very High	Very High	Very High	High	Medium	Medium	Medium
	Major	Very High	Very High	High	High	Medium	Medium	Medium
	Moderate	High	High	High	Medium	Medium	Low	Low
	Minor	Medium	Medium	Medium	Medium	Low	Low	Low
	Negligible	Low	Low	Low	Low	Low	Low	Low
No exposure*		None	None	None	None	None	None	None
<i>*Additional category added by T+T to account for "No exposure", which means there is no identified direct risk.</i>								

Figure 6-4 Potential for injuries or fatalities (existing timeframe)

6.2.3 NPS-NH risk summary

The NPS-NH risk assessment approach results for the proposal with mitigation is assessed as low risk for coastal inundation and catchment flooding for the next 100 years for both building damage and life safety. There is a medium risk of property damage for the maximum credible tsunami with flood depths of around 1.8 m that include sea level rise for the high emission scenario at 2130, but with the safe refuge plan the risk for injury or fatality is low.

7 Conclusion

7.1 Site exposure to climate change and natural hazards

No erosion ASCIE lines were generated for reclaimed shorelines such as those around the Auckland CBD as it was assumed that structures supporting these shorelines will be maintained, supporting the planning definition of reclaimed land as permanent.

The site is not identified as being inside the 'red' or 'yellow' tsunami zone mapped on the Auckland Council Hazard viewer to inform evacuation mapping, but the yellow zone is in close proximity and sea level rise will increase exposure.

Information on the Council GIS viewer shows a small area of the site adjacent to the roads is covered by an overland flow path and is a flood plain during a 100-year ARI event and flooding from more significant events, such as the Auckland Anniversary Floods of 2023 can occur.

The main climate change hazard that will likely affect the site over at least the next 100 years is coastal inundation from sea level rise and catchment (rainfall) flooding.

7.2 Climate change risk

Climate change risk has been assessed both under the new NPS-NH, the operative provisions of the AUP and the proposed provisions of PC120 E36 including consideration of residual risks.

The NPS-NH risk assessment approach determines the proposal with mitigation is assessed as low risk for coastal inundation and catchment flooding for the next 100 years for both building damage and life safety. There is a medium risk for the maximum credible tsunami.

The proposed development is consistent with the operative AUP requirements of not increasing risk associated with natural hazards (Policy E36.3(4)).

Based on PC120 E36 the proposed design mitigates significant coastal inundation and catchment flooding risk through the design elements of floor level elevation for the ground floor with the resultant risks being low to negligible for at least the next 80 years based on the proposed ground floor levels with an adaptation response that will ensure essential services situated on the ground floor are above the predicted flood levels to at least 2130 resulting in low risk over the next 100 years for the building.

For life safety risks, these are also low due to both safe egress/refuge in the short to medium term with a transition to safe refuge in the longer term with the establishment of a stay in place protocol for residence and vertical evacuation for ground floor occupants.

8 Applicability

This report has been prepared for the exclusive use of our client Westhaven Residential Partners Ltd, with respect to the particular brief given to us and it may not be relied upon in other contexts or for any other purpose, or by any person other than our client, without our prior written agreement.

We understand and agree that our client will submit this report as part of an application under the Fast-track Approvals Act 2024 and that an Expert Panel as the consenting authority will use this report for the purpose of assessing that application. We understand and agree that this report will be used by the Expert Panel in undertaking its regulatory functions.

Compliance with the Environment Court Practice Note 2023

We confirm that, in our capacity as authors of this report, we have read and abided by the Environment Court of New Zealand's Code of Conduct for Expert Witnesses contained in the Practice Note 2023.

Richard Reinen-Hamill is a Technical Director: Coastal Engineering at Tonkin & Taylor Ltd (T+T), where I specialise in coastal hazard risk assessments. I have worked at T+T since 1994. I have more than 35 years' experience in coastal engineering. I am a Member of Engineering New Zealand (Fellow). I hold the following qualifications – BE (hons), ME.

Dr Eddie Beetham is a Senior Coastal Geomorphologist at Tonkin & Taylor Ltd (T+T), where I specialise in coastal hazards. I have worked at T+T since 2019. Prior to joining T+T, I was a Research Fellow at The University of Auckland. I have 12 years' experience in coastal processes and hazards. I am a member of the New Zealand Coastal Society management committee. I hold the following qualifications – PhD, MSc, BSc [Hons].


Jon Rix is a Principal Flood Risk Consultant at T+T where he specialises in flood hazard, flood risk and adaptation-related work for private sector and public sector clients. He brings more than 20 years experience and has worked at T+T since 2006. He holds the following qualifications MSc, BSc (Hons).

This report has been prepared for the exclusive use of our client Westhaven Residential Developments Limited, with respect to the particular brief given to us and it may not be relied upon in other contexts or for any other purpose, or by any person other than our client, without our prior written agreement.

Tonkin & Taylor Ltd
Environmental and Engineering Consultants

Report prepared by:

Authorised for Tonkin & Taylor Ltd by:



Richard Reinen-Hamill
Dr Eddie Beetham
Jon Rix



Richard Reinen-Hamill
Project Director

EDBE:RRH:JRR
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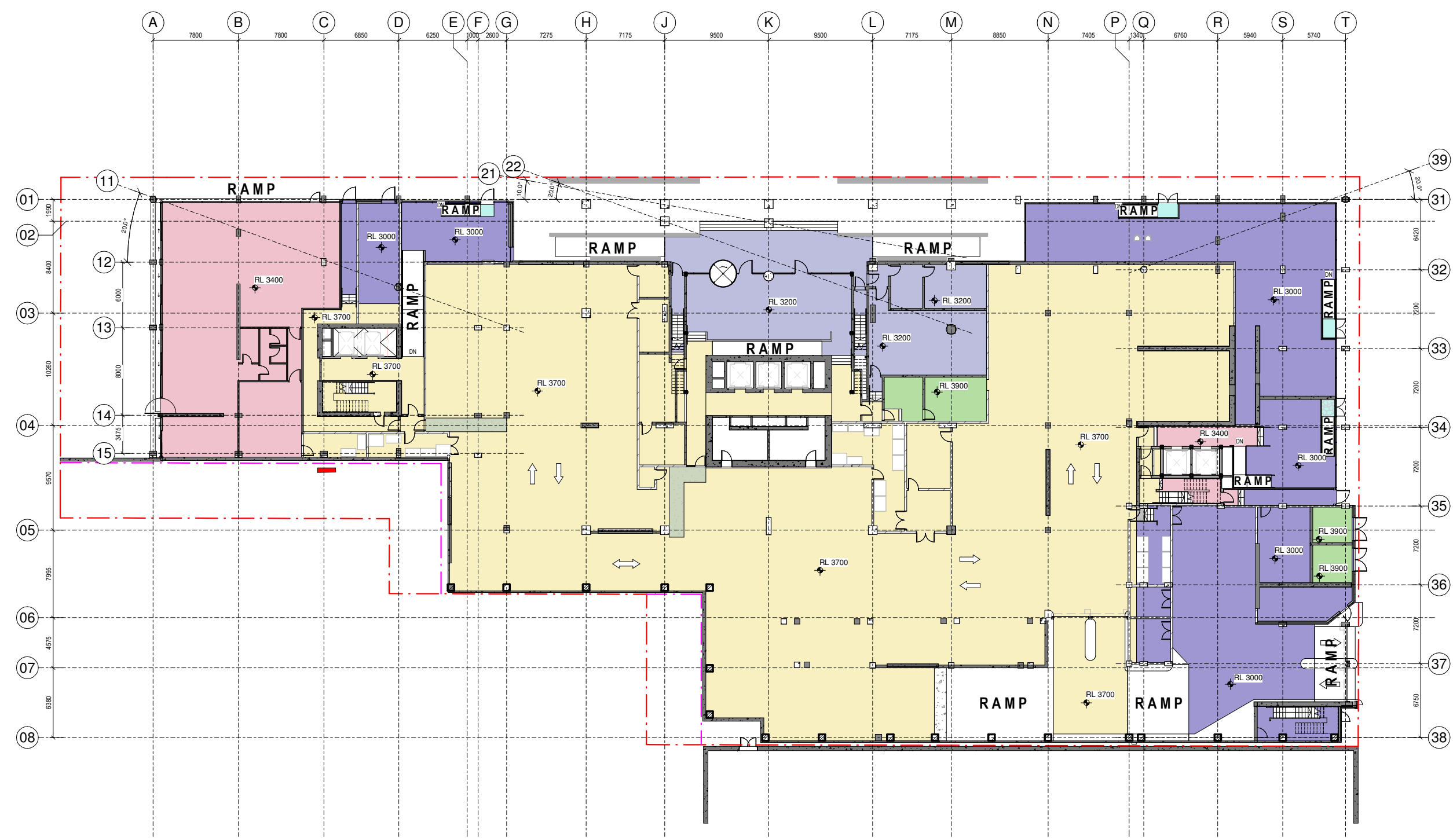
**Appendix A Proposed ground floor plan and
adaptation plan**

All dimension to be verified on site before producing shop drawings or commencing any work. Do not scale. The copyright of this drawing remains with Warren and Mahoney Living New Zealand Ltd.

Revisions

A	19/12/2025	RESOURCE CONSENT
B	06/03/2026	RESOURCE CONSENT

Notes



SLAB HEIGHT LEGEND

Light Blue	RL 2700mm
Purple	RL 3000mm
Light Purple	RL 3200mm
Yellow	RL 3700mm
Green	RL 3900mm

- Consultants**
- AECOM
Project Manager
 - ROBERT BIRD GROUP
Structural Engineer
 - NDY
Mechanical Engineer
 - JENSEN HUGHES
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 - NDY
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Project Title
188 BEAUMONT STREET
BEAUMONT
WYNYARD QUARTER

Drawing Title
GROUND LEVEL - LEVELS PLAN

Drawing Status
PRELIMINARY DESIGN
Drawing Details

Scale As indicated@ A1
Date 6/03/2026 12:14:33 pm
Job No 10442
Drawn WAM
Checked WAM

Drawing No RC05.004
Revision (B)

Appendix B Coastal hazards

B1 Coastal erosion

No ASCIE (Area Susceptible to Coastal Instability and Erosion) lines were generated for reclaimed shorelines such as those around the Auckland CBD as it was assumed that structures supporting these shorelines will be maintained, supporting the planning definition of reclaimed land as permanent.

B2 Coastal inundation

The main climate change hazard at this location is coastal inundation from relative sea level rise (RSLR) affecting tidal extents as well as storm tide flooding. RSLR includes both climate change induced increases in sea level as well as changes that may occur due to vertical land movement (VLM). Storm tide is the super-elevation of storm surge above the tide during storm conditions, caused by low atmospheric pressure and onshore wind.

This section provides more information on tide levels, storm surge, and relative sea level rise exposure at the site for a range of plausible relative sea level rise projections based on different Shared Socioeconomic Pathways (SSPs).

Consistent with MfE (2024) guidance related to coastal hazards and climate change (particularly sea level rise), we are considering:

- A timeframe of at least 100 years, with 2130 proposed by MfE.
- Including SSP5-8.5 H+ (83rd percentile) pathway for sea level rise.
- Including vertical land movement (VLM).

The SSP5-8.5 projection is one of a suite of shared socioeconomic pathways (SSPs) that look at five different ways in which the world might evolve. Details of these pathways are available from NZSeaRise⁵ along with data on relative sea level rise magnitudes around New Zealand. SSP5-8.5 is a high emission scenario and the 83rd percentile includes allowance for uncertainty.

B2.1 Present day sea levels

Present day tide and storm tide levels for a range of return period events including both lower intensity and higher frequency as well as lower frequency events that the 1%AEP storm tide are shown in Table Appendix B.1 for a range of datums. Nautical tide levels (n) were sourced from LINZ (2025)⁶ and storm tide levels were from point ID#4 in Table 3.3 of Auckland Council Technical Report 2020/024⁷, adjusted by +0.04 m to be relative to a mean sea level baseline in 2020, based on MSL values in LINZ (2025). The site is not currently exposed to coastal inundation during the typical tide or during rare storm tide events.

⁵ <https://searise.nz/resources/education-about-global-sea-level-rise/shared-socioeconomic-pathways/>

⁶ https://www.linz.govt.nz/sites/default/files/doc/hydro_202425-almanac_full-nautical-almanac_pdf.pdf

⁷ <https://www.aucklandcouncil.govt.nz/environment/what-we-do-to-help-environment/Documents/coastal-inundation-in-auckland.pdf>

Table Appendix B.1: Present day water levels relative to 2020 baseline

Name	Level (m, Chart Datum)	Level (mRL, NZVD-16)
Lowest Astronomical Tide (LAT)	0.08	-1.98
Mean low water spring (MLWSn)	0.52	-1.54
Mean sea level (MSL)	1.93	-0.13
Mean high water spring (MHWSn)	3.36	1.30
Highest astronomical tide (HAT)	3.74	1.68
39% AEP (2yr ARI)	3.82	1.76
10% AEP (10yr ARI)	3.96	1.90
2% AEP (50yr ARI)	4.09	2.03
1% AEP (100yr ARI)	4.14	2.08
0.5% AEP (200yr ARI)	4.19	2.13

B2.2 Relative sea level rise

An increase in mean sea level from global climate change will elevate the present-day tide and storm tide levels. The timing and magnitude of SLR is uncertain and in areas of land subsidence can be compounded by vertical land movement (VLM) causing relative sea level rise (RSLR).

RSLR values for the site were sourced from the closest NZ Sea Rise⁸ point, at the end of Wynyard Point (ID 1230) associated with a change of -0.9 ± 1.4 mm/yr (i.e. subsidence). This adds to 0.12 m of subsidence for the 2130 timeframe, adopting the median (p50) projection, or 0.19 m subsidence adopting the H+ (p83) projection which includes RSLR uncertainty. NZ Sea Rise projections for neighbouring wharf sites are similar, but landward near Victoria Park and Westhaven Drive have greater VLM rates of -3.0 ± 1.9 mm/yr. However, based on limited evidence of subsidence since the land was reclaimed, this higher rate of subsidence is not adopted.

Projected SLR and RSLR for a range of SSPs are presented in Table Appendix B.2, relative to a mean sea level baseline in 2020 based on NZ Sea Rise point 1230. This range is provided as consideration of a range of SSPs including SSP2-4.5p50 and SSP5-8.8p50 as these scenarios are recommended to be used for detailed coastal hazard or risk assessment.

For the development stress test scenario SSP5-8.5-p83-2130 which is appropriate for the initial screening of coastal hazard risk, the relevant SLR value is $1.59 + 0.19$ VLM = **1.78 m RSLR** above 2020 sea level. In comparison the 50 percentile values for SSP5-8.5 result in 1.19 m SLR and 1.3 m of RSLR.

⁸ <https://searise.takiwa.co/map/6245144372b819001837b900/embed>

Table Appendix B.2: Relative sea level rise (RSLR) from NZ Sea Rise point 1230 (Wynyard Point)

Year	SSP2-4.5 p50 (mRL)	SSP3-7.0 p50 (mRL)	SSP5-8.5 p50 (mRL)	SSP5-8.5 p83 (mRL)
2020	0.00	0.00	0.00	0.00
2030	0.06	0.06	0.07	0.08
2040	0.12	0.12	0.14	0.18
2050	0.19	0.20	0.22	0.28
2060	0.26	0.29	0.32	0.41
2070	0.34	0.38	0.43	0.57
2080	0.41	0.49	0.56	0.73
2090	0.50	0.61	0.70	0.92
2100	0.58	0.74	0.84	1.11
2110	0.68	0.85	0.98	1.33
2120	0.77	0.99	1.14	1.55
2130	0.87	1.13	1.30	1.78
2140	0.97	1.28	1.47	2.02
2150	1.07	1.43	1.64	2.26

B2.3 Future permanent inundation

A proxy for regular permanent inundation is when the increase in the Highest Astronomic Tide (HAT) exceeds land level and causes shallow inundation that could flood ground floor buildings, back up drainage, and limit the use of transport networks due to flooded roads and footpaths. HAT is around 0.4 m higher than MHWs which typically represents the tide level exceeded by 10% of the spring tides. Table Appendix B.3 presents the HAT level for different RSLR pathways for each decade between 2020 and 2150, allowing assessment of when regular nuisance inundation could occur.

Table Appendix B.4 shows the year when HAT is projected to exceed the existing road level of 2.7 mRL and the existing site ground level of 3.0 mRL for the different projections. The onset of road inundation at HAT would be 2100 for the stress test scenario (SSP5-8.5p83+VLM-2130), or later for the other RSLR pathways. The onset of ground level flooding at the existing site would be 2110 for the SSP5-8.5p83 pathway. The projected HAT level for the stress test scenario of SSP5-8.5p83+VLM-2130 is ~3.5 mRL, which would result in inundation depth of 0.8 m on the road and 0.5 m on the existing ground.

Table Appendix B.3: HAT with different RSLR pathways (m, NZVD-16)

Year	SSP2-4.5 p50 (mRL)	SSP3-7.0 p50 (mRL)	SSP5-8.5 p50 (mRL)	SSP5-8.5 p83 (mRL)
2020	1.68	1.68	1.68	1.68
2030	1.74	1.74	1.75	1.76
2040	1.80	1.80	1.82	1.86
2050	1.87	1.88	1.90	1.96
2060	1.94	1.97	2.00	2.09
2070	2.02	2.06	2.11	2.25
2080	2.09	2.17	2.24	2.41
2090	2.18	2.29	2.38	2.60
2100	2.26	2.42	2.52	2.79
2110	2.36	2.53	2.66	3.01
2120	2.45	2.67	2.82	3.23
2130	2.55	2.81	2.98	3.46
2140	2.65	2.96	3.15	3.70
2150	2.75	3.11	3.32	3.94

Table Appendix B.4: Onset year for HAT inundation of the present-day road and site level

Event	SSP2-4.5 p50	SSP3-7.0 p50	SSP5-8.5 p50	SSP5-8.5 p83
HAT > road (2.7 mRL)	>2150	2150	2135	2115
HAT > site (3.0 mRL)	>2150	>2150	>2150	2125

B2.4 Future 1% AEP storm tide inundation

Coastal inundation hazards are typically assessed using the 1% AEP storm tide level, which represents a 1% probability of occurring any year and could cause disruption, damage and potentially present a risk to life, particularly when water enters buildings, basements and floods roads and egress routes. Table Appendix B.5 presents the 1% AEP level for different RSLR pathways for each decade between 2020 and 2150.

Table Appendix B.6 presents the year when the existing road level of 2.7 mRL and the existing site ground level of 3.0 mRL is exceeded by the 1% AEP event for the different projections. The onset of road inundation for a 1% AEP event would be 2080 for the SSP5-8.5p83+VLM scenario, or later for the other RSLR pathways. The onset of ground level flooding at the site would be 2100 SSP5-8.5p83+VLM scenario. The projected 1% AEP water level for the stress test scenario of SSP5-8.5p83+VLM-2130 is ~3.9 mRL, which would result in inundation depth of 1.2 m on the road and a depth around 0.9 m on the existing site ground.

Table Appendix B.5: 1% AEP water level for different RSLR pathways (m, NZVD-16)

Year	SSP2-4.5 p50 (mRL)	SSP3-7.0 p50 (mRL)	SSP5-8.5 p50 (mRL)	SSP5-8.5 p83 (mRL)
2020	2.08	2.08	2.08	2.08
2030	2.14	2.14	2.15	2.16
2040	2.20	2.20	2.22	2.26
2050	2.27	2.28	2.30	2.36
2060	2.34	2.37	2.40	2.49
2070	2.42	2.46	2.51	2.65
2080	2.49	2.57	2.64	2.81
2090	2.58	2.69	2.78	3.00
2100	2.66	2.82	2.92	3.19
2110	2.76	2.93	3.06	3.41
2120	2.85	3.07	3.22	3.63
2130	2.95	3.21	3.38	3.86
2140	3.05	3.36	3.55	4.10
2150	3.15	3.51	3.72	4.34

Table Appendix B.6: Onset year for 1% AEP inundation of the present-day road and site level

Event	SSP2-4.5 p50		SSP3-7.0 p50		SSP5-8.5 p50		SSP5-8.5 p83	
	1%AEP > road (2.7 mRL)	2120	2110	2100	2100	2090	2090	2090
1%AEP > site (3.0 mRL)	2150	2140	2130	2120	2120	2110	2100	2100

B2.5 Tsunami

Tsunami information for the present day is available from the Auckland Council hazard viewer. The site is not identified as being inside the 'red' or 'yellow' tsunami zone mapped on the Auckland Council Hazard viewer to inform evacuation mapping (Figure Appendix B 1), which indicate likely to rare tsunami inundation extents. However, this may change with future sea level rise.

Future levels were estimated by adding RSLR to the 3 mRL contour where the landward extent of yellow tsunami zone reached (refer Figure Appendix B 1). For the SSP5-8.5p50 scenario this means that by 2080 the level reached is 3.73 mRL and by 2130 is 4.78 m RL.



Figure Appendix B 1: Tsunami evacuation areas from Auckland Council Natural Hazard Maps:
<https://aucklandcouncil.maps.arcgis.com/apps/MapSeries/index.html?appid=81aa3de13b114be9b529018ee3c649c8>

Appendix C Flood hazard

C1 Background

The flood hazard assessment includes information about the *floodplain*, *flood prone area* and *flood hazard*, which are defined terms under the Auckland Unitary Plan (Refer Section J1). A summarised definition of the terms is provided below to support this assessment:

- A *Floodplain* is the area of land that is inundated by runoff from a specified rainfall event, with an upstream catchment generating 2 m³/s or greater of above ground flow.
- A *flood prone area* is an area of land within a topographical depression where water will pond in a 1 per cent AEP rainfall event if soakage is restricted or the primary drainage outlet is blocked.
- *Flood hazard areas* include floodplains and flood prone areas where:
 - Flood hazard in floodplains is based on depth and velocity in a 1% AEP event
 - Flood hazard in flood prone areas is based on flood depth associated with 50 mm rainfall.
 - There are four flood hazard classifications:
 - o Very high flood hazard areas
 - o High flood hazard areas
 - o Medium flood hazard area
 - o Low flood hazard area

C2 Flood assessment

C2.1.1 Pre-development flood assessment

A *floodplain* and a *flood prone area* is located along the eastern and northern boundaries of the site, as shown in Figure Appendix C 1.

The flood hazard shows that the area surrounding the site is low hazard, with small pockets of medium hazard in the Beaumont Street road corridor.

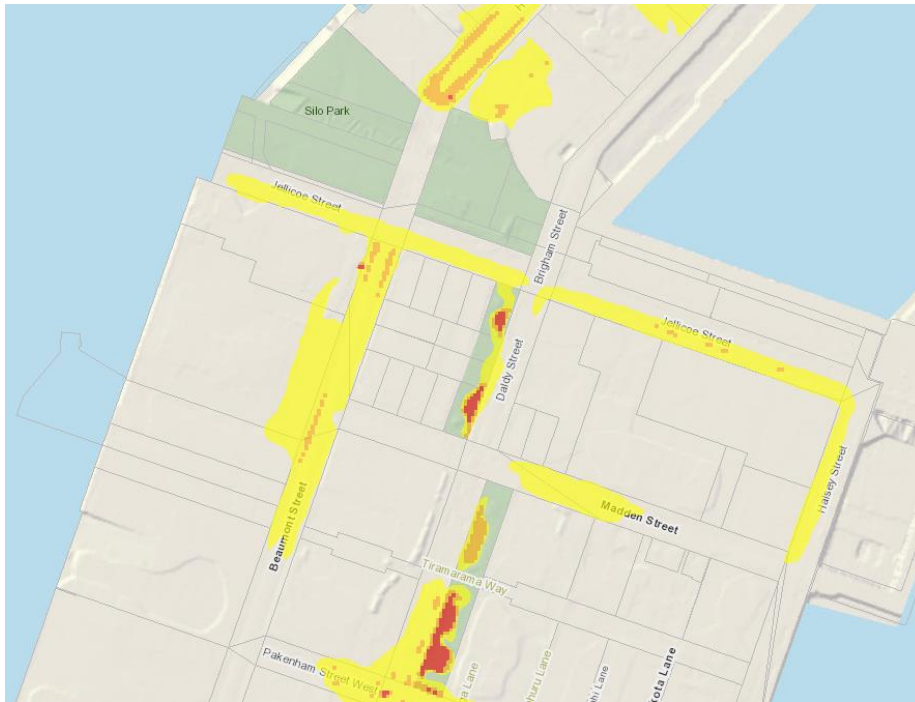


Figure Appendix C 1: Flood hazard (sourced from AC GIS Viewer)

Flood levels and supporting information for the floodplain are derived from two sources of information, which are summarised in Figure Appendix C 1.

Flood levels and supporting information for the flood prone area are summarised in Table Appendix C.1 and Table Appendix C.2.

Overall, the different sources of floodplain and flood prone information align on a 1% AEP flood level around the site of 2.75 m \pm 0.05 (NZVD-16). This is because the floodplain in the area is determined by the topographic depression (i.e. the flood prone area) and spillway level to the coast. In other words, any increase in flood levels would simply cause more water to flow to the coast. As a result the flood level is insensitive to increased rainfall depth and therefore the predicted flood level is unlikely to change as a result of temperature changes due to climate change.

Table Appendix C.1: Summary of floodplain information

Model	Regionwide Urban Flood model (Model Unit F)	Freemans Bay Catchment Stormwater Modelling
Reference	(Ewaters, 2025)	(Aecom, 2016)
Flood level for 1% AEP MPD scenario mapped at 188 Beaumont Street	~2.71 m (Estimated – refer note 1)	2.791 m (Refer note 2)
Flood level for 2% AEP MPD scenario mapped at 188 Beaumont Street		2.681 m (Refer note 2)
Flood level for 5% AEP to 50% AEP MPD scenario mapped at 188 Beaumont Street		No flooding
Other flood level information available		Flood model results indicate that flooding adjacent to site starts to

Model	Regionwide Urban Flood model (Model Unit F)	Freemans Bay Catchment Stormwater Modelling
		occur when TP108 design rainfall is ~195 mm. ⁹
Maximum flood depth 1% AEP MPD scenario -existing ground (refer note 3)	0-0.13 m	0-0.22 m
1% AEP scenario mapped	100 year ARI, 3.8° increase in temperature for climate change. Maximum Probable Development land use (AUP 2016)	100 year ARI, 2.1° increase in temperature for climate change. Maximum Probable Development land use (80.9% impervious in catchment)
1% AEP Rainfall depth/duration	~252 mm (Refer Note 4)	222 mm
LiDAR	2016	2013
<p>Notes:</p> <ol style="list-style-type: none"> (1) The flood level estimate is based on the flood prone area level which appears to be very similar to the floodplain level. Flood levels are not available from the regionwide flood model (Ewaters, 2025). (2) 2.791 m is based on the 1% AEP MPD flood level reported at 164-188 Beaumont Street, and Cross Sections 9 and 12 (Aecom, 2016). 2.681 m is based on the 2% AEP MPD flood level reported at Cross Sections 9 and 12 (Aecom, 2016). The reported levels have been converted to NZVD-16 using a 0.309 m adjustment. (3) These are T+T calculated depths based on the published flood levels in comparison with the minimum existing ground level, which is 2.58 m RL and located on the northern boundary at one survey point. Refer Yeoman survey (October 2025) for full details (Drawing set 9064/SS). An extract from the survey drawings is provided in (C2.2.1). (4) Rainfall estimated based on information provided in Regionwide Urban Flood Model Report (Auckland Council, 2025). Rainfall adopted from TP108, distributed at 500 m resolution grids. Approximate 1% AEP existing rainfall for catchment (190 mm) and adjusted upwards by 32.7% to account for 3.8 degrees of warming due to climate change. (190 mm * 1.327=252 mm). 		

Table Appendix C.2: Flood prone area information (AC GIS Viewer)

Flood prone area ID	28625320
Spill elevation (m RL NZVD2016)	2.71
Volume (m ³)	2148
Rainfall required to fill (mm)	10
Flood prone elevation in 100yr ARI event (m RL NZVD2016)	2.71
Spill location	Western end of Jellicoe Street (refer note 1)
<p>Notes:</p> <ol style="list-style-type: none"> (1) The spill location has been identified by T+T (i.e. not AC Geomaps). This has been determined based on site visit, topographic survey information (Jellicoe Street and 188 Beaumont) and validated in conversation with on-site personnel from the January 2023 flood event. 	

⁹ The AECOM (2016) model does not predict flooding on or adjacent to the site when there is 190 mm rainfall although some flooding is predicted with 198.6 mm rainfall (190 mm = existing 100 year ARI TP108 rainfall. 198.6 mm rainfall = future 50 year ARI future depth with allowance for 2.1 degrees of warming).

C2.1.2 Post-development flood assessment

Given the predicted 1% AEP flood level of 2.75 m \pm 0.05 (NZVD-16) there is approximately 50 m³ floodplain and flood prone area flood volume potentially displaced¹⁰.

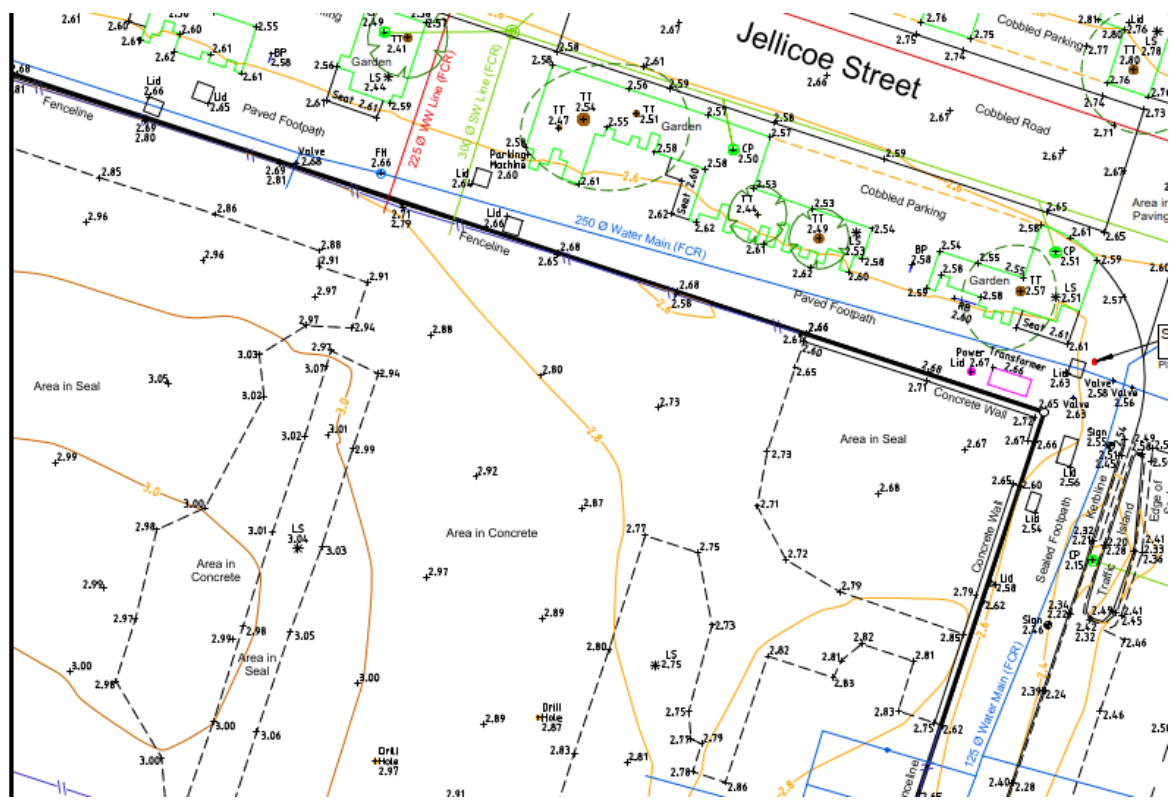
As indicated in the previous section, the flood level in this area is determined by the topographic depression (i.e. the flood prone area) and spillway level to the coast. Reducing the volume of the floodplain and flood prone area at this site by the occupation of the building footprint will not increase surrounding flood levels due to the overflow to the coast.

Therefore, the post-development 1% AEP flood level of 2.75 m \pm 0.05 (NZVD-16) is predicted (i.e. the same as pre-development). This also means that there are no adverse effects predicted for filling in the floodplain.

C2.2 Site survey

C2.2.1 Site survey extract (Yeoman Survey Solutions, Oct 2025)

- Drawing 9064/SS/3



¹⁰ Based on 2.75 m RL flood level which floods an area of approximately 300 m² based on the topographic survey (Yeomans, 2025). Average flood depth of 0.05 m assumed.

Appendix D Risk assessment methodology for PC120

D1 Risk rating

A five-class risk rating system ranging from “Insignificant” to “Very high” has been adopted based on the product of **Likelihood of damage** and **Consequence** as shown in Figure Appendix D 1.

Risk			Likelihood of damage				
			Rare	Unlikely	Possible	Likely	Almost Certain
			R	U	P	L	AC
Consequence	Extreme	5	R5	U5	P5	L5	AC5
	Major	4	R4	U4	P4	L4	AC4
	Moderate	3	R3	U3	P3	L3	AC3
	Minor	2	R2	U2	P2	L2	AC2
	Insignificant	1	R1	U1	P1	L1	AC1

Risk
Very high
High
Medium
Low
Insignificant

Figure Appendix D 1: Risk results based on likelihood of damage and consequence ratings

D2 Definitions

Risk is a combination of the likelihood of a hazard causing damage / disruption and consequence of that damage / disruption. The general model for risk is presented in Figure Appendix D 1, based on the following variable descriptions:

- **Adaptive capacity:** kept constant in this assessment. Refer Table Appendix D.4 for categories.
- **Consequence:** The magnitude of impact that result from an element being damaged or disrupted by the hazard, directly and indirectly. Refer Table Appendix D.5 for categories.
- **Exposure:** How much of the asset (e.g. percent asset area or length of shoreline) is exposed to the hazard and to what level or magnitude for different probabilities (e.g. flooded to a depth of 1 m in a 1% AEP event). Refer Table Appendix D.1 for categories.
- **Likelihood of damage:** a five class rating system which is based on the product of exposure and vulnerability (see) and the risk rating is the resulting likelihood and consequence (Figure Appendix D 1).The combination of **vulnerability** and **exposure** developed from the matrix shown in Table Appendix D.6.
- **Sensitivity:** How resilient or sensitive is the asset to the hazard once exposed. For example, cladding on the interior of a building can be significantly damaged if submerged in seawater. However, a paved surface has low sensitivity to static inundation as operational function would return with minimal clean up once the water recedes. Refer Table Appendix D.3 for categories
- **Vulnerability:** The combination of **sensitivity** and **adaptive capacity**.
- **Risk:** The combination of **likelihood** and **consequence**.

Table Appendix D.1: Exposure ratings

Exposure rating	Inundation categories
Very high	Depth >1.2 m
High	Depth 0.5 to 1.2 m
Moderate	Depth 0.3 to 0.5 m
Low	Depth 0.15-0.3 m
Very Low	Depth <0.15

Table Appendix D.2: Vulnerability ratings

Vulnerability rating	Definition
Extreme	Extremely likely to be adversely affected, because the element or asset is extremely sensitive to a given hazard.
High	Highly likely to be adversely affected, because the element or asset is highly sensitive to a given hazard.
Moderate	Moderately likely to be adversely affected, because the element is moderately sensitive to a given hazard.
Low	Low likelihood of being adversely affected, because the element has low sensitivity to a given hazard.
Very Low	Very low likelihood of being adversely affected, because the element has low sensitivity to a given hazard.

Table Appendix D.3: Sensitivity ratings

Sensitivity rating	Definition
Extreme	Extremely likely to be adversely affected, because the element or asset is extremely sensitive to a given hazard.
High	Highly likely to be adversely affected, because the element or asset is highly sensitive to a given hazard.
Moderate	Moderately likely to be adversely affected, because the element is moderately sensitive to a given hazard.
Low	Low likelihood of being adversely affected, because the element has low sensitivity to a given hazard.
Very Low	Very low likelihood of being adversely affected, because the element has low sensitivity to a given hazard.

Table Appendix D.4: Adaptive capacity ratings

Adaptive capacity rating	Definition
Very low	The organisation, element or asset has a very low capacity to adapt. Major capital works required to continue operating or achieve compliance, requiring international expertise.
Low	The organisation, element or asset has a low capacity to adapt. Significant capital works required to continue operating or achieve compliance, requiring national expertise.
Medium	The organisation, element or asset has a moderate capacity to adapt. Some down time in operation, requiring specialist repairs to return to safe operation.
High	The organisation, element or asset has a high capacity to adapt. Local repairs or maintenance with minimal disruption.
Very High	The organisation, element or asset has a very high capacity to adapt. No repairs required and operation returns after the event.

Table Appendix D.5: Consequence ratings

Consequence rating	Definition
Extreme	Significant damage or loss of infrastructure and service Total disruption to residents
Major	Extensive infrastructure damage Severe disruption to residents
Moderate	Limited infrastructure damage and loss of service Frequent disruptions to residents
Minor	Localised infrastructure serviced disruption short-term disruption to residents
Insignificant	No damage, little change in service No disruption

Table Appendix D.6: Matrix of Likelihood of damage based on exposure and vulnerability rating

Likelihood of damage			Exposure*				
			Very low	Low	Moderate	High	Very High
			VL	L	M	H	E
Vulnerability	Extreme	5	VL5	L5	M5	H5	E5
	High	4	VL4	L4	M4	H4	E4
	Moderate	3	VL3	L3	M3	H3	E3
	Low	2	VL2	L2	M2	H2	E2
	Very low	1	VL1	L1	M1	H1	E1

Likelihood of Damage
Almost Cert (5)
Likely (4)
Possible (3)
Unlikely (2)
Rare (1)

Appendix E Risk assessment results for PC120

E1 Risk elements

Based on the development plan included in Appendix A, the potential 'risk elements' are:

- Street access and loading zones with levels of 3.0 m RL
- Ground floor commercial/non-habitable development with floor levels of 3.0 mRL, 3.2 mRL, 3.4 mRL and 3.7 mRL.
- Critical services/electrical at a minimum of 3.9 mRL
- Provision for safe egress and refuge

E2 Exposure thresholds

Exposure thresholds were set based on the depth of flooding set out in PC120 Chapter J to define flood hazard areas that range from low (less than 0.3 m) to very high (greater than 1.2 m) as set out in Appendix D. We added an additional threshold of less than 0.15 m to represent very low exposure giving a five-point scale from very low to very high.

E3 Sensitivity/vulnerability thresholds

Sensitivity relates to how the element will fare when exposed to a hazard, which is a function of its properties or characteristics. Sensitivity can be influenced by age, condition, material, design etc. The element's sensitivity/vulnerability were aligned to the PC120 definitions of sensitive, potentially sensitive and low sensitivity activities., i.e.:

Residential development and safe egress/refuge: Extreme sensitivity/vulnerability

Street access and loading zones – less sensitive activity – low sensitivity/vulnerability

Retail/commercial/office space – potentially sensitive activity – moderate sensitivity/vulnerability

Critical services affecting dwellings – sensitive activity – Extreme sensitivity/vulnerability

E4 Consequence

The consequence of an event that may result from a hazard occurring using a five-point scale ranging from minor to extreme. For the three main areas considered the ratings were:

Residential development and safe egress/refuge: Extreme consequences

Street access and loading zones – minor consequences due to durable materials not significantly impacted by flooding and short term disturbance with quick recovery

Retail/commercial/office space – moderate consequences with some infrastructure damage and loss of service to areas and a longer recovery time

Critical services affecting dwellings – extreme with loss of infrastructure and significant disruption to residents and occupants over a long period.

Risk ID	Climate Hazard / Driver	Risk element	Exposure							Vulnerability	Combined likelihood (Exp x Vuln)							Consequence	Risk (Exposure x Sensitivity x Consequence)						
			2030	HAT or 1%AEP and SSP2-4.5 2080 (M)	HAT or 1%AEP and SSP5-8.5 2080 (M)	HAT or 1%AEP and SSP2-4.5 2130 (M)	HAT or 1%AEP and SSP3-7.0 2130 (M)	HAT or 1%AEP and SSP5-8.5 2130 (M)	HAT or 1%AEP and SSP5-8.5 2130 (H+)		2030	HAT or 1%AEP and SSP2-4.5 2080 (M)	HAT or 1%AEP and SSP5-8.5 2080 (M)	HAT or 1%AEP and SSP2-4.5 2130 (M)	HAT or 1%AEP and SSP3-7.0 2130 (M)	HAT or 1%AEP and SSP5-8.5 2130 (M)	HAT or 1%AEP and SSP5-8.5 2130 (H+)		2030	HAT or 1%AEP and SSP2-4.5 2080 (M)	HAT or 1%AEP and SSP5-8.5 2080 (M)	HAT or 1%AEP and SSP2-4.5 2130 (M)	HAT or 1%AEP and SSP3-7.0 2130 (M)	HAT or 1%AEP and SSP5-8.5 2130 (M)	HAT or 1%AEP and SSP5-8.5 2130 (H+)
IH and CH	Combined hazards	Residential and safe egress	Very low	Very low	Very low	Very low	High	High	Very High	Extreme	Rare	Rare	Rare	Rare	Almost Certain	Almost Certain	Almost Certain	Extreme	Low	Low	Low	Low	Very High	Very High	Very High
IH and CH	Combined hazards	Residential and safe refuge	Very low	Very low	Very low	Very low	Very low	Very low	Very low	Extreme	Rare	Rare	Rare	Rare	Rare	Rare	Rare	Extreme	Low	Low	Low	Low	Low	Low	Low

Figure Appendix E 1: Risk outcome for residential and safe egress and refuge

Risk ID	Climate Hazard / Driver	Risk element	Exposure							Vulnerability	Combined likelihood (Exp x Vuln)							Consequence	Risk (Exposure x Sensitivity x Consequence)						
			2030	HAT or 1%AEP and SSP2-4.5 2080 (M)	HAT or 1%AEP and SSP5-8.5 2080 (M)	HAT or 1%AEP and SSP2-4.5 2130 (M)	HAT or 1%AEP and SSP3-7.0 2130 (M)	HAT or 1%AEP and SSP5-8.5 2130 (M)	HAT or 1%AEP and SSP5-8.5 2130 (H+)		2030	HAT or 1%AEP and SSP2-4.5 2080 (M)	HAT or 1%AEP and SSP5-8.5 2080 (M)	HAT or 1%AEP and SSP2-4.5 2130 (M)	HAT or 1%AEP and SSP3-7.0 2130 (M)	HAT or 1%AEP and SSP5-8.5 2130 (M)	HAT or 1%AEP and SSP5-8.5 2130 (H+)		2030	HAT or 1%AEP and SSP2-4.5 2080 (M)	HAT or 1%AEP and SSP5-8.5 2080 (M)	HAT or 1%AEP and SSP2-4.5 2130 (M)	HAT or 1%AEP and SSP3-7.0 2130 (M)	HAT or 1%AEP and SSP5-8.5 2130 (M)	HAT or 1%AEP and SSP5-8.5 2130 (H+)
CH1	Permanent inundation (MHWS + RSLR)	Ground floor @ 3.0 mRL	Very low	Very low	Very low	Very low	Very low	Moderate	High	Low	Rare	Rare	Rare	Rare	Rare	Unlikely	Unlikely	Minor	Insignificant	Insignificant	Insignificant	Insignificant	Insignificant	Low	Low
CH1	Permanent inundation (MHWS + RSLR)	Ground floor @ 3.0 mRL	Very low	Very low	Very low	Very low	Very low	Low	Moderate	Moderate	Rare	Rare	Rare	Rare	Rare	Unlikely	Possible	Moderate	Insignificant	Insignificant	Insignificant	Insignificant	Insignificant	Low	Medium
CH2	Storm inundation (1% + RSLR)	Ground floor @ 3.0 mRL	Very low	Very low	Very low	Low	High	High	Very High	Low	Rare	Rare	Rare	Rare	Unlikely	Unlikely	Possible	Minor	Insignificant	Insignificant	Insignificant	Insignificant	Low	Low	Low
CH2	Storm inundation (1% + RSLR)	Ground floor @ 3.0 mRL	Very low	Very low	Very low	Very low	Low	Moderate	High	Moderate	Rare	Rare	Rare	Rare	Unlikely	Possible	Possible	Moderate	Insignificant	Insignificant	Insignificant	Insignificant	Low	Medium	Medium
CH2	Storm inundation (1% + RSLR)	Ground floor at 3.2 mRL	Very low	Very low	Very low	Very low	Very low	Low	High	Moderate	Rare	Rare	Rare	Rare	Rare	Unlikely	Possible	Moderate	Insignificant	Insignificant	Insignificant	Insignificant	Low	Medium	
CH2	Storm inundation (1% + RSLR)	Ground floor @ 3.4 mRL	Very low	Very low	Very low	Very low	Very low	Very low	Moderate	Moderate	Rare	Rare	Rare	Rare	Rare	Rare	Possible	Moderate	Insignificant	Insignificant	Insignificant	Insignificant	Insignificant	Insignificant	Medium
CH2	Storm inundation (1% + RSLR)	Ground floor @ 3.7 mRL	Very low	Very low	Very low	Very low	Very low	Very low	Low	Moderate	Rare	Rare	Rare	Rare	Rare	Rare	Unlikely	Moderate	Insignificant	Insignificant	Insignificant	Insignificant	Insignificant	Insignificant	Low
CH2	Storm inundation (1% + RSLR)	Electrical/critical @ 3.9 mRL	Very low	Very low	Very low	Very low	Very low	Very low	Very low	Extreme	Rare	Rare	Rare	Rare	Rare	Rare	Rare	Extreme	Low	Low	Low	Low	Low	Low	Low
IF1	1% AEP flood with 3.8C and MPD	Ground floor @ 3.0 mRL	Very low	Very low	Very low	Very low	Very low	Very low	Very low	Low	Rare	Rare	Rare	Rare	Rare	Rare	Rare	Minor	Insignificant	Insignificant	Insignificant	Insignificant	Insignificant	Insignificant	Insignificant
IF1	1% AEP flood with 3.8C and MPD	Ground floor @ 3.0 mRL	Very low	Very low	Very low	Very low	Very low	Very low	Very low	Moderate	Rare	Rare	Rare	Rare	Rare	Rare	Rare	Moderate	Insignificant	Insignificant	Insignificant	Insignificant	Insignificant	Insignificant	Insignificant

Figure Appendix E 2: Risk outcomes for elements of the proposed development

Appendix F Flood management plan

The table of contents outlined below are the proposed matters to include in the flood management plan which is required by a condition of consent (including but not limited to, and acknowledging that a management plan should continuously evolve as design development progresses and over the design life of the property):

- Overview:
 - Purpose of the FMP.
 - Scope of the FMP.
 - Summary of key flood risks and response objectives.
 - Reference to flood hazard and risk assessment.
- Site information:
 - Address and site plan.
 - Building details.
 - Occupancy details.
- Roles and responsibilities:
 - Key contact details.
 - Emergency response contact details.
- Emergency response plan:
 - Roles and responsibilities.
 - Trigger for action/response order.
 - Evacuation routes.
 - Signage and safe refuge points.
 - Instructions for occupants.
 - Lift operation.
 - Alarm operation.
- Integration with other emergency management plans:
 - Wider precinct/area.
 - Fire.
 - Hazardous substances.
 - Sensitive equipment and stock.
- Maintenance schedule.
- Inspection schedule.
- FMP review schedule.
- Staff training schedule (occupants, tenants, managers).

