

100 Halsey Street

Coastal and Flood Risk Assessment

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Prepared for: NZCRE 100 Halsey Limited

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 NZCRE 100 Halsey Limited for a referred project under the Fast-track Approvals Act 2024 (FTAA) in respect of the 100 Halsey Street project (the 'Project'). The Project is to develop a high-quality mixed-use commercial precinct featuring premium office, retail and hospitality spaces, integrated amenities, parking, and supporting infrastructure across five buildings. The location for the project is 100 Halsey 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 masterplan comprises five buildings arranged around a central mid-block plaza, bounded by Gaunt Street, Halsey Street, Pakenham Street and Daldy Street / Amey Daldy Park.

Construction will be delivered in stages, with Buildings 1 and 2 prioritised to commence as soon as practicable, followed by Building 3 and then Buildings 4 and 5. NZ Bus will progressively vacate the site in line with the construction staging, consolidating its operations into a smaller portion of the site as each stage proceeds.

Hazards

The coastal hazards were informed by the Tonkin & Taylor Ltd (T+T) March 2026 report (refer Appendix B), while catchment flood hazard was updated with the latest modelling information from Auckland Council (refer Appendix C).

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 (80 years on current climate change projections) with a transition to safe refuge in the longer term with the establishment of a stay in place protocol and vertical evacuation for ground floor occupants.

1 Introduction

This report has been prepared in relation to a substantive application submitted by NZCRE 100 Halsey Limited for a referred project under the Fast-track Approvals Act 2024 (FTAA) in respect of the 100 Halsey Street project (the 'Project'). The location for the project is 100 Halsey Street, Auckland Central.

The project site located at 100 Halsey Street occupies a prominent central block within the Wynyard Quarter precinct, with key frontages to Amey Daldy Park and the Daldy Street Linear Park. Over the past decade, the surrounding area has undergone a significant transformation, with high-quality developments establishing elevated expectations and performance benchmarks across the precinct.

The proposed development seeks to deliver a high-quality mixed-use commercial precinct of five buildings comprising premium office accommodation, retail and food and beverage uses, integrated amenities and end-of-trip facilities, together with the supporting infrastructure, building services and car parking required to service the development.

Building 2 is proposed as a purpose-built data centre. The building will accommodate the specialist plant, infrastructure and servicing requirements associated with the data centre use, while also incorporating centralised infrastructure to support the wider development.

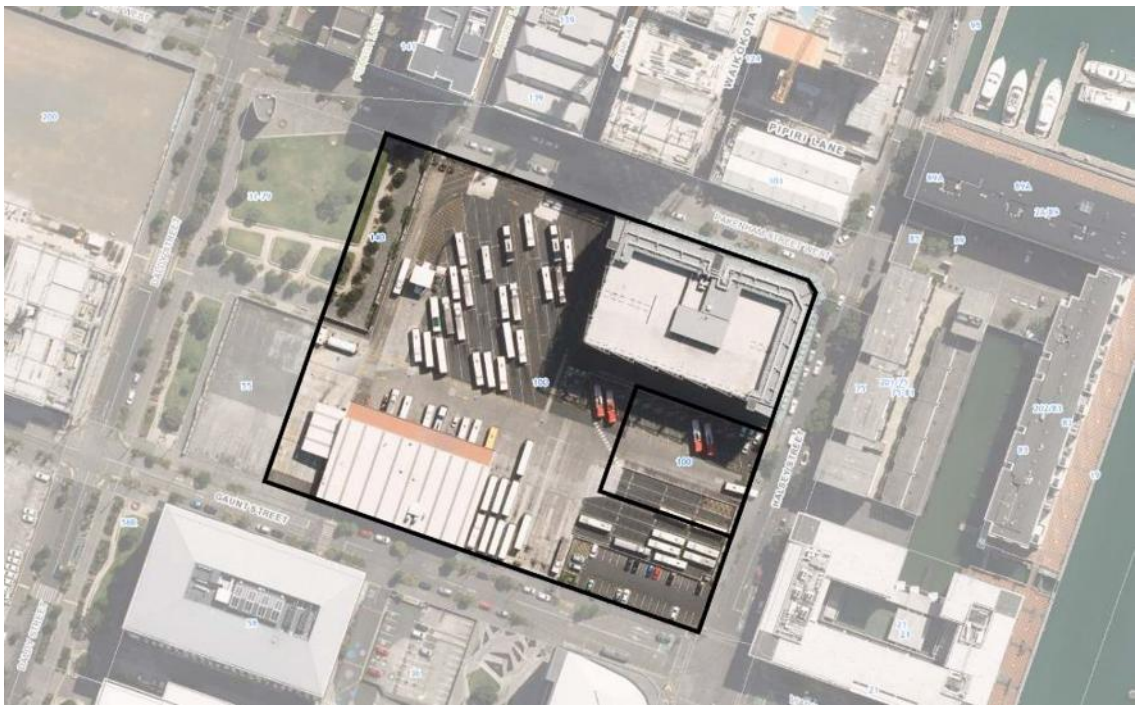


Figure 1.1: Site Location.

The project is being consented under the Fast Track Approvals Act 2024. The Minister for Infrastructure referred the project to the Fast-track on 27 June 2026. The application was lodged on 8 April 2026 by NZCRE 100 Halsey Limited.

The purpose of this report is to present a risk assessment to support the substantive application with reference to the operative Auckland Unitary Plan (AUP) and proposed Plan Change 120 provisions

based on Tonkin & Taylor Ltd's (T+T) earlier natural hazard report[1] and updated flood hazard information included in Appendix A.

This 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 tsunami.

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).

[1] T+T (2026) 100 Halsey Street: Coastal and flood natural hazard assessment prepared for RP Financial, Ref. 1101937v3, March 2026.

2 Proposed development

The masterplan comprises five buildings arranged around a central mid-block plaza, bounded by Gaunt Street, Halsey Street, Pakenham Street and Daldy Street / Amey Daldy Park. Refer Figure 2.1 below for the proposed development diagram.

- Building 1: Commercial Office Building corner Halsey Street and Gaunt Street.
- Building 2: Data Centre, sited centrally between B1 and existing Travelodge.
- Buildings 3A / 3B: Commercial Office buildings fronting Amey Daldy Park.
- Building 4: Commercial Office on Gaunt Street.
- Building 5: Commercial Office on Gaunt Street between Building 4 and VHHL site.



Figure 2.1: Proposed Development.

Construction will be delivered in stages, with Buildings 1 and 2 prioritised to commence as soon as practicable, followed by Building 3 and then Buildings 4 and 5. NZ Bus will progressively vacate the site in line with the construction staging, consolidating its operations into a smaller portion of the site as each stage proceeds.

2.1 Site location

The proposed development site is located within the Wynard Quarter to the west of Auckland's CBD, as shown in Figure 2.2. The site is on historically reclaimed land that is mostly flat. Much of the site is currently used for bus parking, with other use including a multi-story carpark, the Travel Lodge hotel, a supermarket, and a range of food and beverage shops. Ground level across the site based on 2024 LiDAR is variable, with a range between 3.0 – 3.7 mRL and a mean of 3.3 mRL.

Representative ground levels are:

- Footpath level on grade with existing shops on Halsey Street: 2.9 mRL.
- Footpath level on grade with existing shops on Pakenham St West: 3.0 mRL.
- Ground level of existing bus park area: 3.3 mRL.

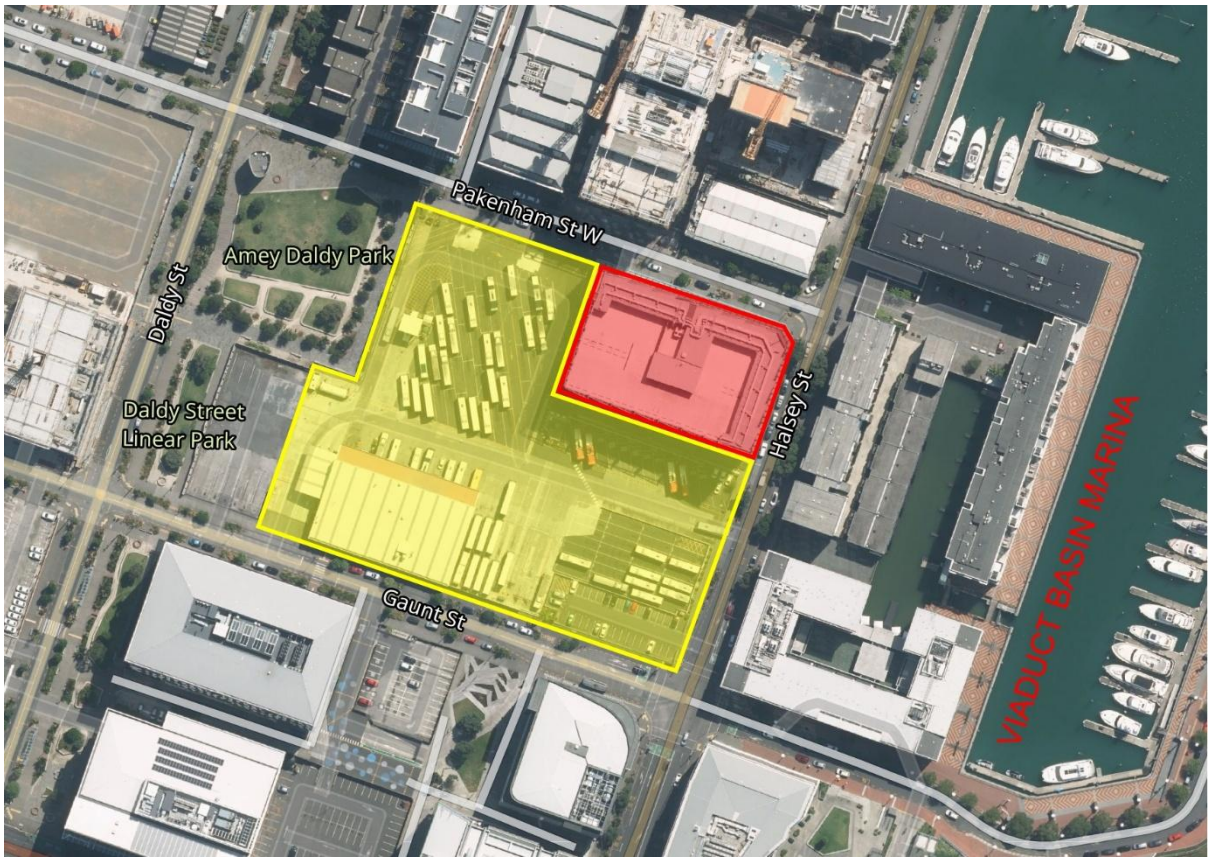


Figure 2.2: Project area shown in yellow. Existing structure shown in red, which is outside of the scope of this assessment.

2.2 Development description

2.2.1 Proposal

NZCRE 100 Halsey Limited has proposed to develop the site including five new multi-story buildings where the ground level will be retail, food and beverage, lobby areas and carparking. A copy of the ground floor and basement locations are included in Appendix A, and the ground level plan is shown in Figure 2.3. We understand that upper floors are commercial (e.g. office space) and that no residential units or hotel accommodation are included. Basement carparking is proposed for B3B and under buildings B4 and B5 and for the data centre (B2) as shown in Figure 2.4.



Figure 2.3: Ground level plan of building layouts and levels.

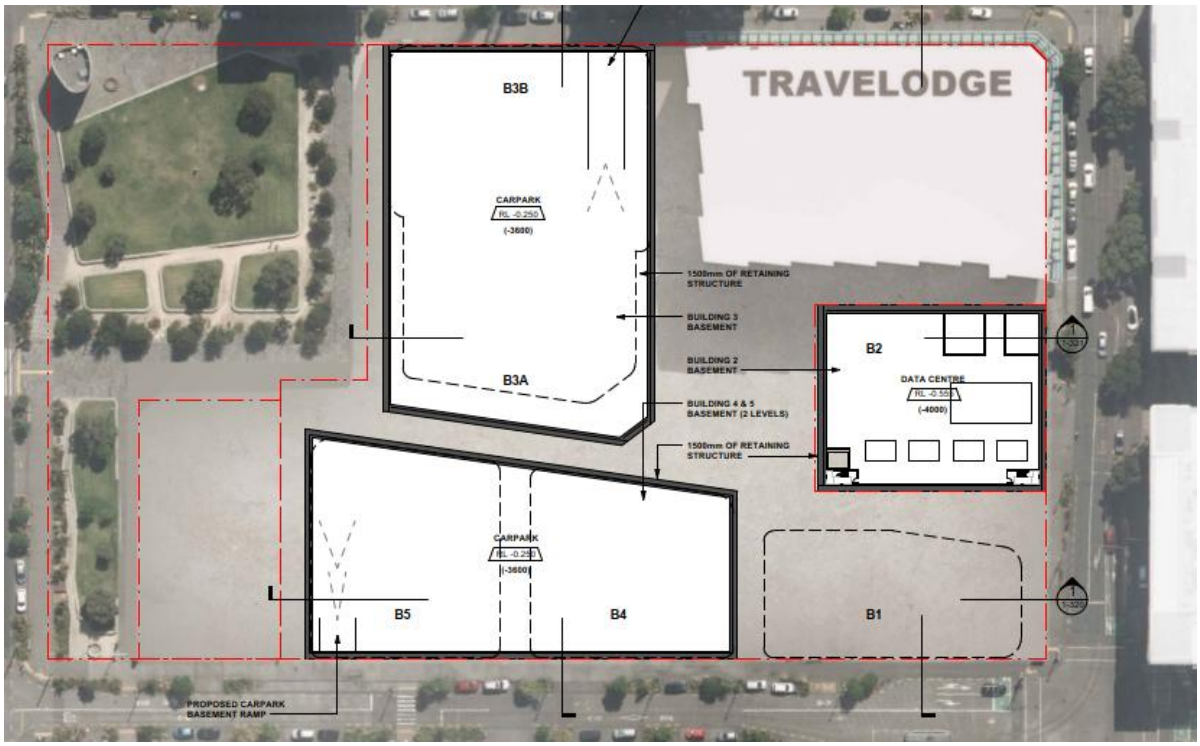


Figure 2.4: Basement plan.

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:

- 2.844 to 3.211 m RL along the pavements around the perimeter of the site.
- 3.2 to 3.35 m RL for commercial areas.
- 3.5 m RL for the basement entrance to buildings B4 and B5 (the entrance area within the building platform is elevated from the crossing level of 2.8 m RL).
- 3.6 m RL for the basement entrance to building B3B (the entrance is elevated from the crossing level of 3 m RL).
- 3.9 m RL for critical infrastructure elements, including the data centre.

As described later in this report, the 3.2 m RL level (ground floor level height for some areas of Buildings B3A and B3B) is above the 1% AEP flood level (existing and future) with 0.15 m freeboard but potentially affected by coastal inundation during storms between 2100 and 2130 (with no freeboard allowance). Coastal inundation levels (excluding freeboard) exceed 3.2 m RL at 2130 by 0.01 m and 0.18 m respectively for the 1%AEP storm tide and the higher emission scenario (SSP3-7.0p50 and SSP5-8.5p50) and by 0.66 m for the 1%AEP storm tide and the stress test SSP-8.5p83.

The 3.5 m RL and 3.6 m RL levels (basement entrance levels) are above coastal inundation levels from storm surge with all climate scenarios at 2100. These levels also provides 0.1 m and 0.2 m freeboard respectively to the 2130 high emission scenario (1%AEP storm surge plus SSP5-8.5p50) but are exceeded the stress test levels at 2130 by 0.36 m and 0.26 m respectively when considering storm surge.

The 3.9 m RL level (critical infrastructure elements, including the data centre) provides 0.5 m freeboard to the 1%AEP storm surge and 2130 high emission scenario (SSP5-8.5p50) and exceeds the stress test level by 0.04 m 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 1% AEP flooding towards the end of the 100-year period with a high emission scenario. No 1% AEP flooding is predicted under other assessed emission scenarios.

There are two parts of the adaptation plan, including the development of an adaptation response and a flood management plan. The adaptation response could involve ground floor slab raising and flood barriers to the basement car parking.

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 buildings. 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 D.

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)

Chapter E36 of the AUP '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).

The Auckland Unitary Plan (AUP) Section E36 was revised as part of Plan Change 120 (PC120) with immediate legal effect on notification (3 November 2025) and outlines specific parameters for assessing coastal erosion, coastal inundation and flooding hazards in Auckland. This includes a matrix of hazard exposure and activity sensitivity that is used to characterise tolerance for new urban developments (Table 3.1).

Table 3.1: AUP E36 definitions for different hazard levels and associated risk levels based on activity sensitivity

Hazard		Default risk level		
Catchment flooding hazard with a 1% AEP event	**Coastal inundation hazard with a 1% AEP event**	**Sensitive**	**Potentially sensitive**	**Less sensitive**
High hazard (or above): Depth ≥ 0.5 m; or DxV ≥ 0.4 m^2/s	Hazard Area 1: RSLR ≤ 0.5 m	*Significant*	*Significant*	*Acceptable*
Medium hazard: Depth > 0.3 & < 0.5 m; or DxV > 0.24 & < 0.4 m^2/s	Hazard Area 2: RSLR > 0.5 m and ≤ 1.0 m	*Potentially tolerable*	*Potentially tolerable*	*Acceptable*
Low Hazard: Depth ≤ 0.3 m; or DxV ≤ 0.24 m^2/s	Hazard Area 3: RSLR > 1.0 m and ≤ 1.5 m	*Potentially tolerable*	*Potentially tolerable*	*Acceptable*

3.2.1 Coastal inundation

Auckland Council Geomaps show the site at 100 Halsey Street is not exposed to coastal inundation at present day or with 0.5 m of RSLR at a 1% AEP event (Figure 3.1). Therefore, the site sits outside of the more restrictive 'Hazard Area 1' (Table 3.1). There is some exposure to coastal inundation with 1

m RSLR and a 1% AEP event (Hazard Area 2), increasing to most of the site being exposed to 1.5 m RSLR (Hazard Area 3) and all of the site is exposed with 2.0 m RSLR (Figure 3.1).

Therefore, based on the AUP definitions, the site is in coastal inundation Area 2 and Area 3, in which *less sensitive* activities are *acceptable* and *sensitive activities* are *potentially tolerable*. For potentially tolerable activities, a risk assessment is required to evaluate the potential effects of climate change and adopts a precautionary approach where information is uncertain or incomplete.

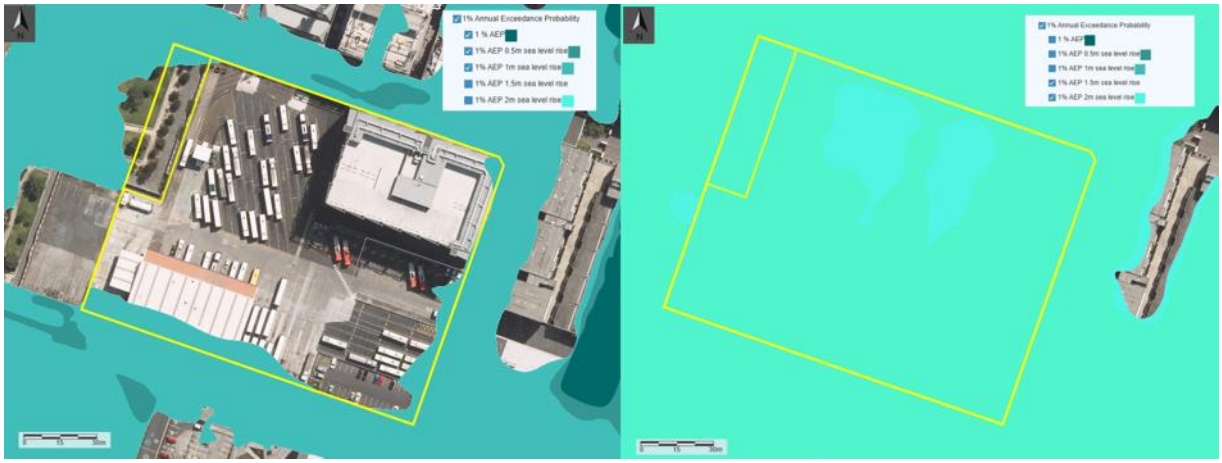


Figure 3.1: Coastal inundation overlays for coastal inundation at 100 Halsey Street for 1%AEP, 0.5 m and 1 m RSLR (LHS) and 1.5 m and 2 m RSLR (RHS).

3.2.2 Catchment flooding

Auckland Council's Geomaps show the site at 100 Halsey Street is partially exposed to rainfall-induced flood inundation, as shown in Figure 3.2. The flooding exposure occurs at the south-western corner of the site and covers an extent of 450 - 500 m^2. This is the inundation extents indicated by Auckland Council's Regionwide Urban Flood model which accounts for the 1% AEP event (Annual Exceedance Probability) with allowance for 3.8 degrees of climate change. This means that less than 3% of the unmodified site sits within the indicative future floodplain.

The floodplain characteristics are indicated as low hazard, although a small area (~190 m^2) located adjacent to Gaunt Street is identified as medium hazard (Figure 3.3). Therefore, approximately 1% of the unmodified site sits within the medium hazard area. A high flood hazard is identified adjacent to the site along Gaunt Street.

A minor overland flowpath is identified draining from the site to the west. On the basis that the site is surrounded by a floodplain, and that there will be stormwater drainage improvements, and the overland flowpath is minor in nature, the overland flowpath has not been considered further in this report.

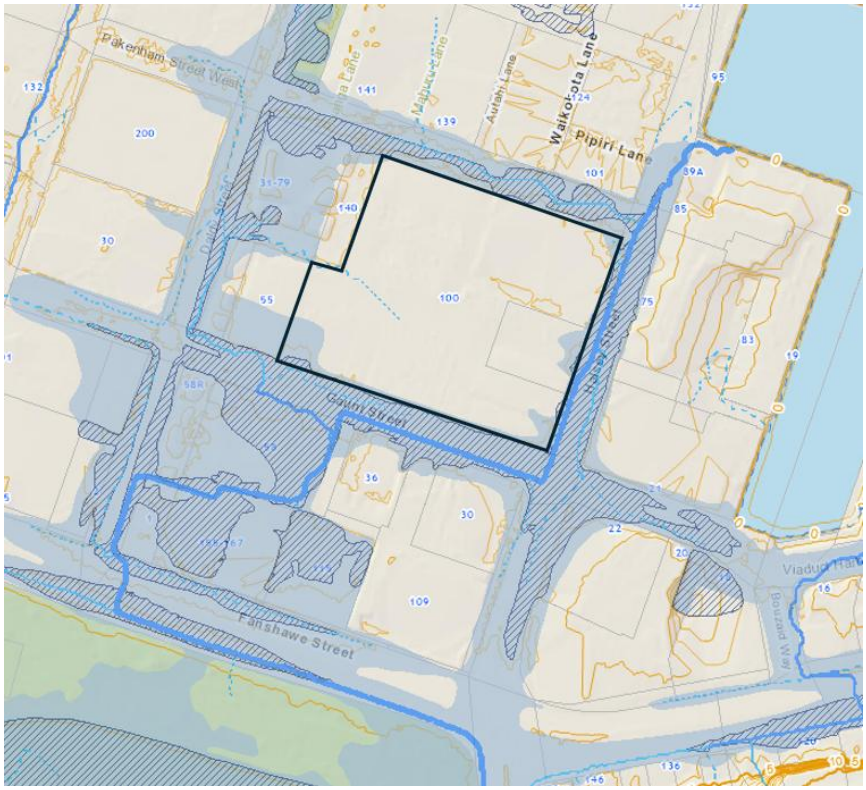


Figure 3.2: Flood prone areas and flood plains (Source: AC GIS Viewer, September 2026).

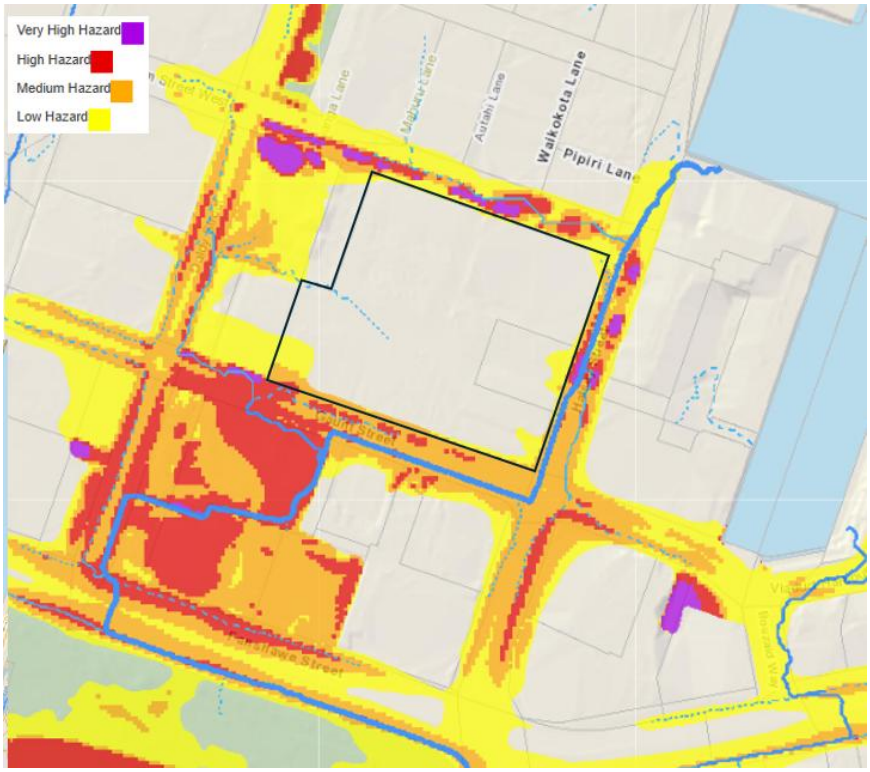


Figure 3.3: Flood hazard area classification (Source: AC GIS Viewer, September 2026).

4 Frameworks for the risk assessments

This section sets out the frameworks for the risk assessments including the National Policy Statement (NPS) on Natural Hazards from the Ministry for the Environment[2], the approach set out in the operative provisions of the Auckland Unitary Plan (AUP) and the PC120 provisions.

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.

[2] National Policy Statement for Natural Hazards 2025 | Ministry for the Environment

Consequence Level	Likelihood Level: Almost Certain	Very Likely	Likely	Possible	Unlikely	Rare	Very Rare
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 sea level 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 which are sensitive and potentially sensitive to natural hazards (in the medium flood hazard area, and coastal inundation hazard area 2) are classified as 'potentially tolerable'; activities which are less sensitive to natural hazards (in the medium flood hazard area and coastal inundation area 2) are classified as '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:

- Whether any building, structure or activity located on land subject to natural hazards can be relocated within the site or removed.
- Whether the use, design and construction of buildings and structures can mitigate risks associated with natural hazards.
- The extent to which methods for long term maintenance of areas affected by natural hazards, such as easements, are provided.
- 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 effect of structures to mitigate hazards on landscape values and public access.
- The robustness of the mitigation measures, their enforceability and the ability to carry out repairs and maintenance.
- The potential consequences of events that exceed the design parameters of mitigation measures.
- The potential effects resulting from failure of structural and nature-based mitigation measures over a 100-year timeframe.
- 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:

1 Ensuring appropriate safe refuge and safe egress are provided where possible and maintained where currently available.
2 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. Three future time periods for the coastal hazard assessment were considered: 2080 representing around 50 years for Building Consent considerations, 2100 or around 70 years that could be considered around the economic life of a building and 2130 which is the period required for consideration by PC120.

Detailed coastal hazard assessment and additional flood hazard information are provided in Appendix B and C respectively. 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.

5.1.1 Coastal inundation hazard

Error! Reference source not found. Table 5.1 summarises the 1% AEP inundation levels from coastal and rainfall-induced flood hazard for a range possible climate change scenarios and vertical land movement. These values are obtained from Table 2.1 from the flood inundation assessment report included in Appendix B. The future scenarios for coastal inundation include sea level rise (SLR) and vertical land movement (VLM) which are combined to provide relative sea level rise (RSLR). The inundation level represents the maximum flood depth at the site, which remains constant for coastal inundation and varies for rainfall-induced flooding.

Table 5.1: Key coastal inundations levels for 1% AEP events and RSLR

Hazard	Scenario	Inundation Level (m RL NZVD 2016)
Coastal	1% AEP storm tide 2030 (present day)	2.08
Coastal	1%AEP storm tide + SLR at 2080 (SSP5-8.5p50) + VLM	2.64
Coastal	1%AEP storm tide + SLR at 2100 (SSP5-8.5p50) + VLM	2.90
Coastal	1%AEP storm tide + 1 m SLR (current provisions of the operative AUP)	3.10
Coastal	1% AEP storm tide + SLR at 2130 (SSP5-8.5p50) + VLM	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 + SLR at 2130 SSP5-8.5p83) + VLM	3.86
Flood	1% AEP 2030 (present day)	3.0 – 3.2m RL (refer Note 1)
Flood	1% AEP 2080	3.1 – 3.2m RL (refer Note 1 & 2)
Flood	1% AEP 2130	3.3m RL (Note 3)
Note 1: The range represents different estimates of 1% AEP rainfall based on Regional Guidance and draft Regional Guidance released for consultation during this assessment. Note 2: The range represents the estimated effect of 0.5m sea level rise. Note 3: Estimated from existing Regional Guidance for design rainfall with allowance for 3.8 degrees climate change and 1m sea level rise. Refer Appendix C for further information.		

Table 5.2 shows the permanent inundation level of key tidal parameters HAT and Mean High Water Spring with relative sea level rise (RSLR) that includes for vertical land movement.

Table 5.2: Permanent inundation levels at 2130 based on tide levels relative to 2020 baseline

Name	Level (mRL NZVD 2016)			
	Existing	1.3 m RSLR (2130 SSP5-8.5p50 + VLM)	1.5 m RSLR (PC 120 E36.3)	1.8 m RSLR (2130 SSP5-8.5p83 + VLM)
Mean high water spring (MHWSn)	1.3	2.6	2.8	3.1
Highest astronomical tide (HAT)	1.7	3.0	3.2	3.5

5.1.2 Catchment flood hazard

Figure 5.1 shows flood levels for varying rainfall depths along the southern boundary (Gaunt Street), eastern boundary (Halsey Street) and northern boundary (Pakenham Street West) to illustrate the variability of the flood levels around the site for different rainfall depths. The present day 1% AEP 24-hour design rainfall depth is 185 mm and the following information helps explain the figure:

- The coloured lines represent the maximum levels recorded at locations along three boundaries:
  - The dashed lines represent the flood level when extreme rainfall occurs at the same time as coastal water levels equivalent to present day MHWS.

  - The solid lines represent the flood level when the coastal water level is 2.27 m RL (which is MHWS + 1 m).
  - The difference between the solid lines and dashed lines (of the same colour) highlights the strong influence that elevated coastal water levels will have on extreme rainfall-induced flood levels on the site. This is because as sea level rises, the drainage capacity of the stormwater network reduces, and more surface flooding occurs.
- The additional points represent "all sites" which shows the small amount of variability (<0.5 m) around the site.
- Detailed information is available in Appendix C, although the following trends are highlighted:
  - The highest water levels occur at the western end of Gaunt Street (Southern boundary).
  - Flows are conveyed along Gaunt Street in an eastward direction to Halsey Street, where the majority of flow passes northward. A small component continues eastward onto Viaduct Harbour Avenue.
  - Flood levels are lowest along Pakenham Street West where flows are conveyed in an eastward direction, onto Halsey Street.

Table 5.3 summarises estimated flood levels at each of the proposed buildings based on an analysis of the flood levels for a variety of rainfall depths and coastal water levels. Flood levels are estimated based on use of best available flood information and without carrying out new modelling. It is not considered necessary to carry out additional modelling.

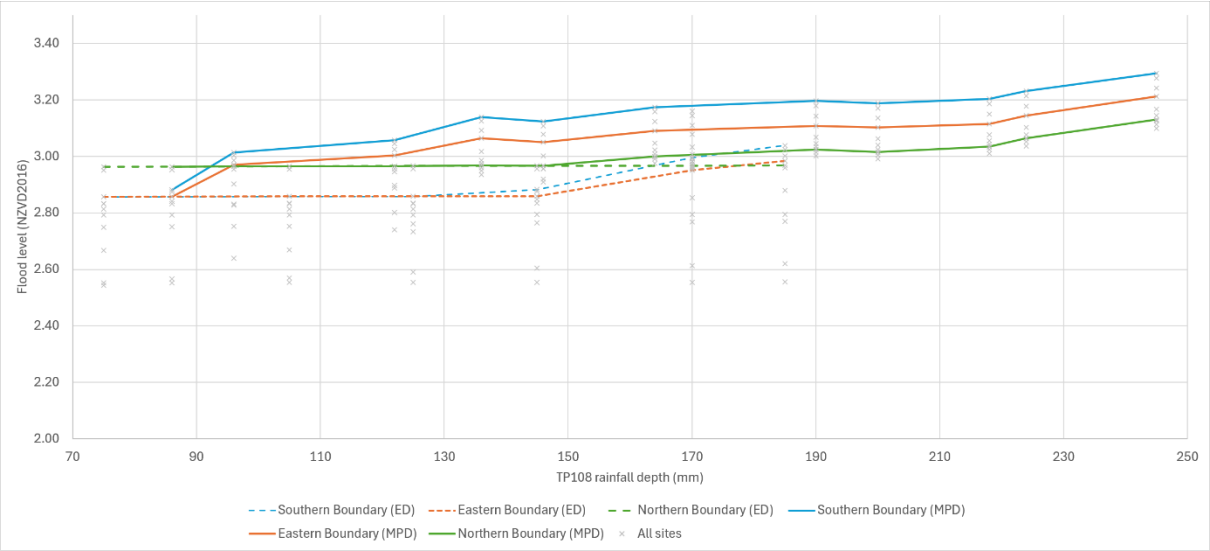


Figure 5.1: Modelled flood depth for different rainfall depths.

Auckland Council have recently released draft design rainfall guidance for industry feedback, and the design rainfall depths are considerably higher than previous guidance. The rationale for the revision appears justified, although there is currently insufficient supporting technical information to consider the appropriateness of the revised design rainfall depths. Flood model information provided by Auckland Council for this project does not reflect the updated draft design rainfall guidance and therefore the following information summarises some key analysis assumptions underlying the estimated levels:

- **2030-time horizon**: Flood levels are based on the model results provided by Auckland Council representing the existing 1% AEP flood levels plus 100 mm. The 100 mm flood level increase reflects the potential for existing 1% AEP design rainfall depths to increase[3].
- **2080-time horizon**: Flood levels are based on the model results provided by Auckland Council representing a future 1% AEP flood level based on existing design rainfall guidance and 1 m sea level rise. Under the draft design rainfall guidance, the rainfall may be underestimated although the 1 m sea level rise is a likely overestimate by 2080. Due to the stronger influence of coastal water level on the flood levels at the site the levels are a likely overestimate.
- **2130-time horizon: F**lood levels are based on the model results provided by Auckland Council representing a future 1% AEP flood level based on existing design rainfall guidance and 1 m sea level rise (i.e. the same as 2080-time horizon). There is a possibility that these levels will increase as a result of updated design rainfall guidance, however the increases are likely to be small given the close proximity to the Viaduct Harbour (i.e. increased rainfall runoff will increase flows to the coast without significantly increasing water levels).

Table 5.3: Estimated 1% AEP flood levels at each building

Building ID	1% AEP flood level estimate by time horizon		
	2030	2080	2130
B1	3.10	3.25	3.25
B2	3.00	3.15	3.15
B3A	3.10	3.15	3.15
B3B	3.10	3.15	3.15
B4	3.15	3.30	3.30
B5	3.15	3.30	3.30

5.1.3 Overview

Figure 5.2 presents a summary of predicted 1% AEP inundation level from coastal hazard and flood hazard to 2130 and 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.

[3] Based on Auckland Council modelling of higher rainfall depths (245 mm) with 1m sea level rise, the future 1% AEP flood levels increased by 200 mm in comparison with the existing 1% AEP scenario. The coastal tailwater level appears to have greater influence on the flood levels at the site than extreme rainfall (refer Figure 5.1). Given that the coastal water level will likely more significantly influence the 200 mm water level increase than the rainfall, it is a conservative assumption that water level will increase by 100mm from just rainfall alone.

Error! Reference source not found.highlights that flood hazard is the likely determinant of the 1% AEP inundation level for at least the next 70 years, after which the long-term coastal inundation becomes the dominant hazard particularly under the higher emission scenarios.

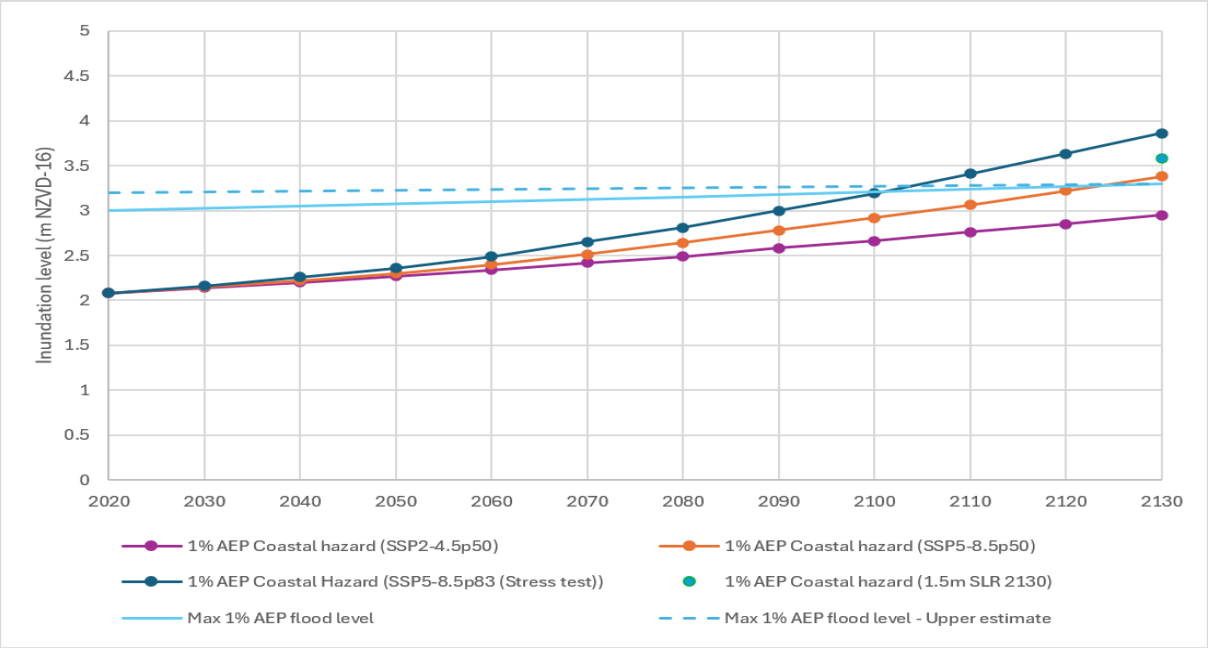


Figure 5.2: 1% AEP Inundation levels (Coastal and flooding).

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 tsunami. 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 if 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 5.4: Coastal inundation, tsunami and rainfall-induced flooding likelihood classification for NPS-NH

Hazard event	Present day	2080	2130
1%AEP storm surge + RSLR(SSP2-4.5p50)	Possible	Almost certain	Almost certain
1%AEP storm surge + RSLR(SSP5-8.5p50)	Possible	Almost certain	Almost certain
1%AEP storm surge + RSLR(SSP5-8.5p83)	Possible	Almost certain	Almost certain

Hazard event	Present day	2080	2130
500 Year ARI tsunami + RSLR(SSP5-8.5p50)	Unlikely	Unlikely	Possible
2500 Year ARI tsunami + RSLR(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.

The risk outcomes for each risk element are summarised in Table 6.1 and Table 6.2 for coastal and rainfall-induced flooding respectively. The risk assessment considers proposed design floor levels set out in Section 2.2.1. relative to flood levels without consideration of freeboard, which is discussed in Section 6.1.2.

Table 6.1: Summary of coastal inundation risks for climate change trajectories at 2030, 2080 and 2130

Risk element	Risk (Exposure x Sensitivity x Consequence)			
	2030	2080	2130	2130 (stress test)
Safe egress	Acceptable	Acceptable	Significant	Significant
Safe refuge	Acceptable	Acceptable	Acceptable	Acceptable
Street access/ Loading Zone 2.9 - 3.0 mRL	Insignificant	Insignificant	Acceptable	Acceptable
Street access/loading Zone 3.1 -3.2 mRL	Insignificant	Insignificant	Insignificant	Acceptable
Ground floor @ 3.2 mRL	Insignificant	Insignificant	Acceptable	Significant
Ground floor at 3.35 mRL	Insignificant	Insignificant	Insignificant	Significant
Basement entrance @ 3.5 m RL	Acceptable	Acceptable	Acceptable	Significant
Basement access @ 3.6 m RL	Acceptable	Acceptable	Acceptable	Potentially tolerable

Risk element	Risk (Exposure x Sensitivity x Consequence)			
	2030	2080	2130	2130 (stress test)
Electrical/critical @ 3.9 m RL	Acceptable	Acceptable	Acceptable	Acceptable

Table 6.2: Summary of rainfall-induced flooding risk at 2030, 2080 and 2130

Risk element	Risk		
	2030	2080	2130
Safe egress	Potentially tolerable	Significant	Significant
Safe refuge	Acceptable	Acceptable	Acceptable
Street access/Loading Zone Gaunt Street (2.9 mRL)	Acceptable	Acceptable	Acceptable
Street access/Loading Zone Halsey Street (2.9-3.0 mRL)	Acceptable	Acceptable	Acceptable
Street access/Loading Zone Pakenham Street West (3.0 mRL)	Acceptable	Acceptable	Acceptable
Street access/Loading Zone Pakenham Street West (3.2 mRL)	Acceptable	Acceptable	Acceptable
Offices, ground floor commercial, non habitable (buildings 1-3 - lowest floor level 3.2 mRL)	Acceptable	Acceptable	Acceptable
Offices, ground floor commercial, non habitable (buildings 4 & 5 - lowest floor level 3.35 mRL)	Acceptable	Acceptable	Acceptable
Basement access @ 3.5 m RL	Acceptable	Acceptable	Acceptable
Electrical/critical @ 3.9 m RL	Acceptable	Acceptable	Acceptable

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)[4] guide to local climate change risk assessments with risk language aligned to PC120 descriptors. Importantly, the risk assessment primarily considers the consequences associated with the activity and not the number of people doing the activity[5].

[4] 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.

[5] 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."

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 that are sensitive, potentially sensitive and less sensitive to natural hazards. The overall development is primarily commercial development and classified as potentially sensitive, with some critical elements such as the data centre which is sensitive. We have adjudged that basement car parking areas are classified as potentially sensitive.

Table 6.3 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.

Table 6.3: Operative AUP and PC120 activities and 100 Halsey Street risk elements

Operative AUP	AUP PC120	Risk element
More vulnerable activities	Sensitive	• Critical services/ electrical (e.g. data centre) at a minimum of 3.9 mRL.
Less vulnerable activities	Potentially sensitive	• Offices above the ground floor. • Ground floor offices and other commercial/ non-habitable development with minimum floor levels of 3.2 to 3.35 m RL. • Basement car parks with entrances at 3.5 to 3.6 m RL.
Flood tolerant activities	Less sensitive	• Street access and loading zones with minimum levels of 2.9-3.0 m RL.

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 commercial retail spaces as shown by the elements at risk discussed in Table 6.3. The level of risk to the various elements considered is summarised in Table 6.1 and the mitigation of these risks is discussed in Section 6.1.2. The highest risk relates to safe egress, which is discussed further in Section 6.1.2.3. For the remainder of the elements and levels that make up the proposed development these risks are acceptable.

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 working in the development, as shown by the elements at risk discussed in Table 6.3.

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. As shown in Table 6.1 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 to 2130. The site will not be flooded by more frequent flood hazard events.

Key matters to consider are the requirement of safe refuge and safe egress which are discussed in Section 6.1.2.3. 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 flood assessment 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 m^3 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 for potentially sensitive activities on the ground floor. Mitigation for vulnerable/sensitive activities are not required due to the floor levels used for these activities.

The proposed development is likely resilient for at least the next 80-100 years based on the median projections of the climate scenarios required to be considered, but after this time 1% AEP coastal inundation is possible causing the risks to be high for floor levels lower than 3.4 m RL.

An adaptation strategy is proposed to address natural hazard risk from coastal inundation and flooding for at least the next 100 years. The following sections address floor levels and freeboard and building resilience as part of the adaptation strategy, and safe access or refuge.

6.1.2.1 Freeboard

Freeboard is a factor of safety that provides for imprecision and/or uncertainties in the estimation of flood and coastal inundation water levels as well as including provision for phenomena which are

not explicitly included (e.g. vehicle generated waves)[6]. The Auckland Council guidance on freeboard levels for buildings in Auckland is shown in Table 6.4.

Table 6.4: Default freeboard levels for Auckland buildings (Source: Freeboard for the Auckland Region GD13, 2024)

Scenario	Freeboard
More Vulnerable Activities* in floodplains	• 500 mm
Less Vulnerable Activities* in floodplains	• 300 mm
Overland flow paths where flow is less than 2 m^3/s	• 500 mm where surface water has a depth of 100 mm or more and extends from the building directly to a road or car park, other than a car park for a single dwelling • 150 mm for all other cases
Overland flow paths, where flow is equal to or in excess of 2 m^3/s	• 500 mm for More Vulnerable Activities* • 300 mm for Less Vulnerable Activities*
Coastal Storm Inundation Areas (1% AEP including 1 m sea-level rise) **	• 500 mm for dwellings and habitable rooms which are subject to wave action from the sea • 150 mm for all other cases

* As defined in the AUP.

Table 6.5 presents the provided freeboard for the proposed floor levels for each of the buildings at 2030. The green cells shown indicate that the floor level is above the Auckland Council freeboard guidance, and the orange cells indicate that the lower 1% AEP flood level estimate provides sufficient freeboard to meet the guidance, although the upper estimate of flood level does not. Red cells indicate those floor levels that do not comply with Council's freeboard requirements.

Table 6.5 also shows the available freeboard for 2080 and 2130 rainfall-induced flood levels and the 2130 1% AEP coastal inundation level for the SSP5-8.5p50 scenario (level = 3.38 m RL). The comparison has been done to highlight the reducing factor of safety over time.

[6] FINAL_Freeboard_GD13v1_December_2024.pdf

Table 6.5: Comparison of floor levels with freeboard guidance for existing 1% AEP flood levels

Building	Current proposed floor (NZVD-2016)	Freeboard provided in the present day	Available freeboard in future scenarios	
			2080 & 2130 time horizon (rainfall-induced flooding)	2130 1% AEP Coastal level (3.38 m RL SSP5-8.5p50
Building 1	3.35	250-350 mm	100 mm	-30 mm
Building 2	3.35	350-450 mm	200 mm	-30 mm
	3.9	900 mm – 1 m	750 mm	+100 mm
Building 3A	3.2	100-200 mm	50 mm	-180 mm
	3.35	250-300 mm	200 mm	-30 mm
	3.9	800-900 mm	750 mm	520 mm
Building 3B	3.2	100-200 mm	50 mm	-180 mm
	3.35	250-300 mm	200 mm	-30 mm
	3.9	800-900 mm	750 mm	520 mm
Building 3 Basement entrance	3.6	500-600 mm	450 mm	220 mm
Building 4	3.35	200-300 mm	50 mm	-30 mm
	3.9	750-850 mm	600 mm	520 mm
Building 5	3.35	200-300 mm	50 mm	-30 mm
	3.5	350-400 mm	200 mm	120 mm
	3.9	750-850 mm	600 mm	520 mm
Building 5 Basement entrance	3.5	350-450 mm	200 mm	120 mm

Freeboard-related decisions are a key component of the adaptation pathway approach, because the factor of safety (i.e. the freeboard) applied at the start of the building life slowly reduces as the effects of climate change are realised.

The comparison of floor levels with the freeboard guidelines shows that the lower floor levels (3.2 m RL) at Building 3A and 3B do not meet the present-day freeboard guidance for less vulnerable activities in a flood plain. This means that there are lower factors of safety and increased likelihood of flooding. Section 6.1.2.2 identifies building resilience measures as another way to reduce risk.

With regards to units where floor levels meet the freeboard guidance for the current 1% AEP flood levels (lower estimate) but not the upper estimate (i.e. those with floor levels of 3.35 m RL):

- The risk is lower for areas located on the opposite side of the main roads (Gaunt Street, Halsey Street and Pakenham Street West) in comparison with areas facing the main roads. This is because the likelihood of vehicular wake is less.
- For areas facing away from the main roads, it is considered appropriate that the uncertainty in the current 1% AEP flood level estimates can be included in the freeboard for these floor levels because they are less prone to vehicle induced wake. The buildings are shown in Figure 6.1.

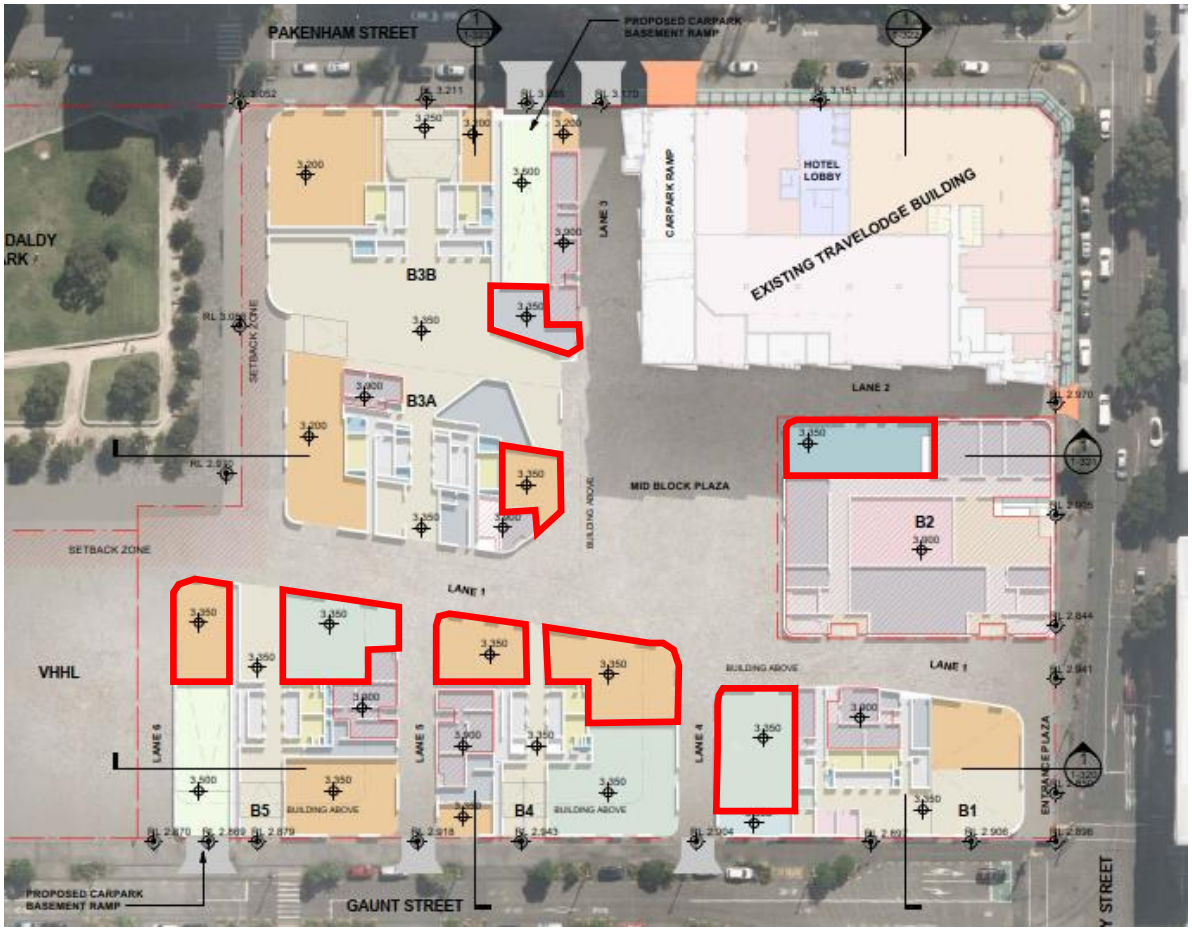


Figure 6.1: Buildings where freeboard considered suitable given 1% AEP flood level uncertainty.

By 2130 there is a likelihood that most of the ground floor areas less than 3.6 m RL will be subject to coastal inundation or have lower than the recommended freeboard level, and therefore adaptation responses will be required prior to 2130. This could be achieved by raising the level of the ground floor slabs and there is sufficient provision of the ground floor ceiling height to enable this to be done.

6.1.2.2 Building resilience

Flood resistant products and flood resilient materials may be introduced into the building design and fitout to reduce flood damage. These products and materials aim to either keep water out (resistance) or support rapid recovery in the aftermath of flooding. Specific details for proposed measures will be addressed during detailed design.

Examples of measures are provided below (non-exhaustive):

1 Resistance measures:

- Flood doors.
- Barriers.
- Air vents.
- Waterproof membrane (wall, floor).
- Sewage and drainage valves.
- Some resistance measures may be permanent or require activation (e.g. barriers).

2 Recoverability measures:

- Water resistant lining material (wall, floor).
- Cavity drainage membrane.
- Closed cell insulation.
- Raised electrical sockets.
- Raised appliances.
- Water resistance materials for furniture, furnishings, fabrics and other interior components (e.g. stainless steel, bio composite, plastic etc) and unit position.

6.1.2.3 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, with PC120 E36.3(5L) and E36.3(5I) suggesting either safe egress and/or refuge is possible for new 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 D for an outline table of contents).

Safe refuge within all new buildings is provided because the coastal inundation will not enter floors above the ground level floor and the buildings are considered structurally stable. The residual risk associated with refuge also identifies no risk to life, injury or significant property damage.

The ground floors of all new buildings will be constructed from durable materials, and the building can sustain basic human needs for the expected short-term duration of the hazard exposure. With the provision of appropriate guidelines and advice, the proposed commercial development can accommodate a safe refuge strategy and has sufficient space at elevated levels to accommodate ground floor occupants and guest and does not need to rely on safe egress.

Therefore, provision for safe refuge in accordance with PC120 Policy E36(5L) is achieved.

In addition to the safe refuge approach, safe egress has been considered. 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.

Egress is considered separately for coastal inundation and rainfall-induced flooding in the following paragraphs.

Safe egress from coastal hazard can be permitted for many 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 from the coastal hazard to Victoria Park adjacent to Fanshawe Street is achievable, with the flood depth being low enough to allow emergency vehicle access to render necessary assistance

until RSLR reaches more than 0.8 m (in 20XX). These areas remain safely traversable, are not reliant on neighbouring property and are not subject to residual risks.

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 an alternative to the safe refuge approach. However, once water levels reach ~3.2 mRL (i.e. depths exceed 0.3 m on the road), safe refuge will be required.

Catchment flooding along Gaunt Street, Halsey Street, Daldy Street and Pakenham Street West mean that the site could be surrounded in the future by low hazard floodwaters along the footpaths. The roads, particularly Gaunt Street, experience higher hazard flood areas in the lower lying areas and there are pockets of high hazard identified (refer Figure 3.3). Based on Council's current 1% AEP flood modelling (refer Appendix C) there are safe egress routes to the north and west, and in the future these areas provide low hazard egress routes for pedestrians although they may not be free from floodwaters. The depths and velocities are not considered to pose a risk to life. Assistance from support vehicles to the site can be maintained under all rainfall flood events (without using Gaunt Street). If an egress approach was adopted there are other similar sites in vicinity that could be a destination, although none that appear to offer a significantly lower risk profile. Unlike the coastal hazard scenario, Victoria Park is not recommended as an egress location during a rainfall flood event due to the high flood hazard in the area.

Given that there is safe refuge within the subject site, where assistance can be rendered, an egress approach is not recommended and a refuge approach has been taken.

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 the coastal hazard report in Appendix B, 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 and will only 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 strategy[7]. 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.

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

6.1.5 Additional matters to be considered

Table 6.6 sets out matters to be considered under the operative AUP Policies E36.3 and our assessment. Table 6.7 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 6.6: Summary of matters to be considered under operative AUP Policies E36.3

Matters to be considered	Assessment
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: 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 d Increasing the natural hazard risk to neighbouring properties or infrastructure.	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 is not a risk to human life.
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 less vulnerable activities (retail and offices) and more vulnerable activities (data centre) 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 (with the exception of the data centre, which constitutes a 'more vulnerable activity' but is raised appropriately to meet the minimum 500 mm freeboard requirement above the 1% AEP floodplain). The proposed development does not exacerbate existing or possible future coastal inundation and flood hazards.

Table 6.7: 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 buildings are permanent structures which 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 buildings 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

Matters to be considered	Assessment
	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 buildings 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 critical services on higher elevations and less sensitive activities on the ground floor, as well as a plan for safe refuge 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 footprints. The safe refuge plan will provide an effective risk reduction process.
g The potential consequences of events that exceed the design parameters of mitigation measures.	Events that exceed the design parameters have been considered in the risk test including: • 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. All these factors reduce the potential consequences of over events which exceed design parameters to be low.
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 relates to those areas lower than 3.5 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.

6.2 NPS-NH Risk assessment

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

- Hazard likelihood information provided in Table 5.4.

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 5.4. Consequence definitions have been related to flood depth increments for coastal storm surge and tsunami inundation in Table 6.8 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 6.8: 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 Figure 5.2 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 6.9 and Table 6.10 for coastal inundation and tsunami scenarios.

Table 6.9: 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 6.10: 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

The proposed development elevates floor levels above the existing and future 1% AEP rainfall-induced flood levels. Maximum future 1% AEP flood levels are predicted at ~3.3 m RL along Gaunt Street with lower levels predicted Halsey Street and Pakenham Street West (100 mm and 200 mm lower respectively). The flood levels in the area are relatively insensitive to rainfall depth due to the flat topography and proximity to the coast. Therefore, the future 1% AEP flood levels are considered an approximate upper limit for rainfall-induced flooding and representative of less frequent rainfall events (i.e. more extreme); this is because higher rainfall and runoff flows would simply cause more water to flow to the coast.

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 pathways available to the north and west which are free from flooding in the predicted 1% AEP rainfall event, however in the future there may be low hazard flooding surrounding the site on the footpaths. The roads, particularly Gaunt Street, experience higher hazard flood areas in the lower lying areas and there are pockets of high hazard identified (refer Figure 3.3). The depths and velocities are not considered to pose a risk to life. Assistance from support vehicles to the site can be maintained under all rainfall flood events (without using Gaunt Street).

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 6.2 and Figure 6.3 for the current timeframe. Note that due to the low freeboard at some building units, the likelihood level has been raised from “no exposure” to Possible in the 50-100 year ARI likelihood. Figure 6.4 and Figure 6.5 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%	.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: 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%	.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: 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%	.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 6.4: 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
	Additional category added by T+T to account for "No exposure", which means there is no identified direct risk.							

Figure 6.5: Potential for injuries or fatalities (~2130 timeframe).

7 Conclusion

This report has been prepared in relation to a substantive application submitted by NZCRE 100 Halsey Limited for a referred project under the Fast-track Approvals Act 2024 (FTAA) in respect of the 100 Halsey Street project (the 'Project'). The location for the project is 100 Halsey Street, Auckland Central.

The purpose of this report is to present a risk assessment to support the substantive application with reference to the operative Auckland Unitary Plan (AUP) and proposed Plan Change 120 provision. This risk assessment is also intended to meet the objectives and policies of the National Policy Statement for Natural Hazards (NPS-NH) for flooding, coastal erosion, coastal inundation and tsunami.

AUP and Proposed PC120

The proposed development complies with the operative AUP requirements of not increasing risk associated with natural hazards, with only the flood tolerant activities of parking and loading affected by 1% AEP rainfall-induced flooding and coastal inundation scenarios higher than 3.0 m RL.

Considering PC120 E36, the proposed development is situated in a coastal inundation hazard area subject to future coastal inundation exposure with sea level rise greater than 1.0 m. The proposed design levels have an acceptable coastal inundation risk for at least the next 80 years, and with the provision an adaptation plan, mitigates significant coastal inundation risk (which otherwise, is 'significant') for at least the next 100 years down to an 'acceptable' risk level.

Rainfall-induced flood risk is considered acceptable for the next 100 years for the proposed development and safe refuge can be provided to people over this time horizon (coastal and rainfall induced flooding). However due to the low levels of the adjacent roads and some potentially hazardous egress routes (e.g. along Gaunt Street during extreme rainfall), safe refuge is preferred as an approach to ensure safety of people (as opposed to an egress option). Based on Council's current 1% AEP flood modelling there are safe egress routes to the north and west, although in the future these areas provide low hazard egress routes for pedestrians (despite not being free from floodwaters). Whilst safe egress from coastal inundation can be provided, safe refuge will become the longer-term strategy when coastal inundation levels exceed 3.0 m RL.

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

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.

8 Applicability

This report has been prepared for the exclusive use of our client NZCRE 100 Halsey 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.

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.

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 NZCRE 100 Halsey 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:



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Authorised for Tonkin & Taylor Ltd by:



.....

Andrew Hope
Project Director

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Appendix A Site Plan

Proposed Ground Plane

Floor plans denote indicative ground floor uses.

peddlethorp

EXISTING VEHICLE CROSSINGS RETAINED

PROPOSED VEHICLE CROSSINGS

0 25 50 m

Legend

- RAISED FLOORS
- RETAIL
- LOBBY
- OFFICE
- TOILETS
- END OF TRIP / BICYCLE
- RISERS
- CIRCULATION
- SERVICES / REFUSE
- LOADING DOCK

Appendix B Coastal natural hazard assessment

The following content is extracted from the T+T, March 2026 report "100 Halsey Street; Coastal and Flood Natural Hazard Assessment" (T+T ref. 1101937 v3.0.)

1 Coastal inundation

1.1 AUP overlays

Auckland Council Geomaps show the site at 100 Halsey Street is not exposed to coastal inundation at present day or with 0.5 m of RSLR at a 1% AEP event (Figure 1-1). Therefore, the site sits outside of the more restrictive 'Hazard Area 1'. There is some exposure to coastal inundation with 1 m RSLR and a 1% AEP event, increasing to most of the site being exposed to 1.5 m RSLR and all of the site with 2.0 m RSLR (Figure 1-1).

Based on the AUP definitions, the site is in coastal inundation Area 2, in which *less sensitive* activities are *acceptable* and *sensitive activities* are *potentially tolerable*. For potentially tolerable activities, a risk assessment is required to evaluate the potential effects of climate change and adopts a precautionary approach where information is uncertain or incomplete.



Figure 1-1: Geomaps overlays for coastal inundation at 100 Halsey Street.

1.2 Coastal water levels

Relevant tide and storm tide[1] levels are presented in Table 1.1 for present day (adjusted to mean sea level in 2020). Tide levels were sourced form LINZ (2025)[2] and storm tide levels were from point ID#4 in Table 3.3 of Auckland Council Technical Report 2020/024[3], adjusted by +0.04 m to be relative to a mean sea level baseline in 2020, based on MSL values in LINZ (2025). The present day mean high water spring (MHWS) is 1.29 mRL and the 100 year ARI water level including storm surge is 2.08 mRL.

To inform a coastal inundation risk assessment for the proposed development, various relative sea level rise (RSLR) pathways were sourced from NZ Sea Rise[4] based on different future emission projections. RSLR considers vertical land movement (VLM), which in areas of land subsidence can compound with increasing ocean level to cause a higher rate of relative sea level increase. RSLR values for the site were sourced from the closest NZ Sea Rise point (ID 1233) associated with a vertical land movement of -0.9 ± 1.5 mm/year (i.e. subsidence). Relative sea level rise and the change in the tide and storm tide levels are presented in Table 1.1 for a range of SSP projections and timeframes. The coastal inundation level for 2130 with SSP5-8.5p50+VLM is 3.38 mRL. Values above the adjacent ground level of

[1] Storm tide is storm surge on top of the astronomic tide. Storm surge is caused by low atmospheric pressure and on shore wind.
[2] https://www.linz.govt.nz/sites/default/files/doc/hydro_202425-almanac_full-nautical-almanac_pdf.pdf
[3] https://www.aucklandcouncil.govt.nz/environment/what-we-do-to-help-environment/Documents/coastal-inundation-in-auckland.pdf
[4] https://searise.takiwa.co/map/6245144372b819001837b900/embed

3.0 mRL are highlighted to indicate the onset of inundation occurring. This does not occur until around 2100 based on the most extreme climate projections but occurs for 2130 for a range of climate projections and ARI events.

The site is in a sheltered harbour environment with no surf zone. Therefore, wave setup is not relevant to the coastal inundation level. Some consideration for freeboard is recommended as the site could be exposed to vessel wake, small wind waves, or car wake during an inundation event.

Table 1.1: Coastal water levels for present day and future sea level rise projections (red highlights indicate water level above representative ground level)

		Water level (mRL)								
Water levels		RSLR (m)	MSL	MHWS	HAT	10 year	20 year	50 year	100 year	200 year
Present day		0.00	-0.14	1.29	1.67	1.89	1.94	2.02	2.08	2.12
30 year (2060)	SSP2-4.5 p50	0.26	0.12	1.55	1.93	2.15	2.20	2.28	2.34	2.38
	SSP3-7.0 p50	0.29	0.15	1.58	1.96	2.18	2.23	2.31	2.37	2.41
	SSP5-8.5 p50	0.32	0.18	1.61	1.99	2.21	2.26	2.34	2.40	2.44
	SSP5-8.5 p83	0.41	0.27	1.70	2.08	2.30	2.35	2.43	2.49	2.53
50 year (2080)	SSP2-4.5 p50	0.41	0.27	1.70	2.08	2.30	2.35	2.43	2.49	2.53
	SSP3-7.0 p50	0.49	0.35	1.78	2.16	2.38	2.43	2.51	2.57	2.61
	SSP5-8.5 p50	0.56	0.42	1.85	2.23	2.45	2.50	2.58	2.64	2.68
	SSP5-8.5 p83	0.73	0.59	2.02	2.40	2.62	2.67	2.75	2.81	2.85
70 year (2100)	SSP2-4.5 p50	0.58	0.44	1.87	2.25	2.47	2.52	2.60	2.66	2.70
	SSP3-7.0 p50	0.74	0.60	2.03	2.41	2.63	2.68	2.76	2.82	2.86
	SSP5-8.5 p50	0.84	0.70	2.13	2.51	2.73	2.78	2.86	2.92	2.96
	SSP5-8.5 p83	1.11	0.97	2.40	2.78	3.00	3.05	3.13	3.19	3.23
100year (2130)	SSP2-4.5 p50	0.87	0.73	2.16	2.54	2.76	2.81	2.89	2.95	2.99
	SSP3-7.0 p50	1.13	0.99	2.42	2.80	3.02	3.07	3.15	3.21	3.25
	SSP5-8.5 p50	1.30	1.16	2.59	2.97	3.19	3.24	3.32	3.38	3.42
	SSP5-8.5 p83	1.78	1.64	3.07	3.45	3.67	3.72	3.80	3.86	3.90

2 Coastal erosion

The site is not exposed to coastal erosion at present day or over the next 100 years. The site is part of a historic reclamation that is protected by marine engineering works that support the Viaduct Harbour and Westhaven Harbour. This area was excluded from the Auckland Councils regional assessment of areas exposed to coastal erosion and instability.

3 Tsunami

The site sits outside of the tsunami evacuation area for present day sea level, but the corner of Halsey St and Gaunt St is in the Yellow Land Threat Zone, which is 5 m away from the site boundary. Given this proximity it is likely that the site at 100 Halsey Street would become exposed tsunami hazards in the future with sea level rise. The present-day Yellow Land Threat Zone has a level of approximately 2.9 mRL when overlayed with the 2024 LiDAR contours. A simplistic approach is to add sea level rise to 2.9 to assess future tsunami inundation with sea level rise. For example, a level of 3.4 mRL could be achieved with 0.5 m of RSLR in the future. Tsunamis are rare likelihood events with typical assessment return periods of 500 to 2,500 years and therefore generally have lower risk profiles due to the rare occurrence. Tsunami hazards are not a requirement of the Auckland Council Unitary Plan but are required under the NPS-NH.



Figure 3-1: Tsunami hazard overlays from Auckland Council Hazard Viewer.

Appendix C Flood hazard additional information

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 m^3/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*:*
    - Very high flood hazard areas.
    - High flood hazard areas.
    - Medium flood hazard area.
    - Low flood hazard ivrea.

C2 Flood assessment

The main body of the report highlighted flood levels along the property boundaries for a variety of rainfall depths and coastal water levels (presented as ED and MPD). The figure is reproduced below Figure C1, and the subsequent table (Appendix C Table 1) provides further information regarding the rainfall depths and tailwater levels used.

The information is sourced from Auckland Council Healthy Waters Regionwide Urban Framework Model. Terms and conditions associated with its use are presented in Appendix C3.

Flood maps are available for all modelled scenarios although modelled flood depths from selected scenarios are provided in screenshots in Figure C2 to C5 (scenarios highlighted grey in Appendix C Table 1). The flood maps show the low flood depth associated with more frequent flooding. A comparison between Figure C4 and C5 also shows the greater influence of sea level rise on flood levels at the site than rainfall depth. C5 has lower rainfall depth (136 mm) than C4 but due to the 1m higher coastal water level, the flood depths are greater.

Detailed full-page flood maps including depth and level information are provided in Figure 1.1 and 1.2 for the scenarios highlighted in green in Appendix C Table 1.

It is important to note that the flood depth information remains as provided by Auckland Council (i.e. no post-processing). Post-processing, for example, would remove small isolated areas of floodplains. The scenario titles shown on the flood maps are based on the TP108 (1999) ARI and climate change scenario.

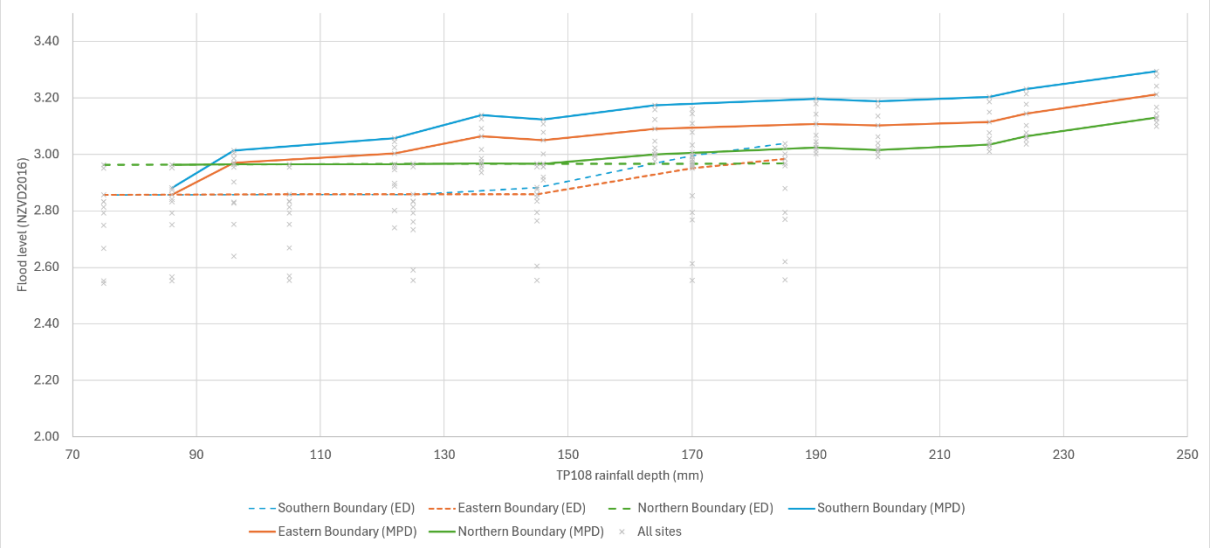


Figure Appendix C.1: Modelled flood depth for different rainfall depths.

Appendix C Table 1: Rainfall information sources

Rainfall depth (mm/24hrs)	Rainfall source (TP108, 1999)		Coastal water level (NZVD2016)	Additional info based on draft rainfall guidance (TP108, 2026 existing climate)
	ARI	Climate scenario		
75	2 year ARI	Existing	1.27m RL	80 mm is 2 year ARI
86	2 year ARI	2.1° warming	2.27m RL	
96	2 year ARI	3.8° warming	2.27m RL	
105	5 year ARI	Existing	1.27m RL	110 mm is 5 year ARI
122	5 year ARI	2.1° warming	2.27m RL	
125	10 year ARI	Existing	1.27m RL	
136	5 year ARI	3.8° warming	2.27m RL	140 mm is 10 year ARI
145	20 year ARI	Existing	1.27m RL	
146	10 year ARI	2.1° warming	2.27m RL	
164	10 year ARI	3.8° warming	2.27m RL	
170	50 year ARI	Existing	1.27m RL	170 mm is 20 year ARI
185	100 year ARI	Existing	1.27m RL	
190	20 year ARI	3.8° warming	2.27m RL	
200	50 year ARI	2.1° warming	2.27m RL	210 mm is 50 year ARI
218	100 year ARI	2.1° warming	2.27m RL	
224	50 year ARI	3.8° warming	2.27m RL	
245	100 year ARI	3.8° warming	2.27m RL	250 mm is 100 year ARI



Figure Appendix C.2: 105 mm rainfall, 1.27 m RL coastal level; TP108 (1999) 5 year ARI existing scenario.



Figure Appendix C.3: 125 mm rainfall, 1.27 m RL coastal level; TP108 (1999) 10 year ARI existing scenario.

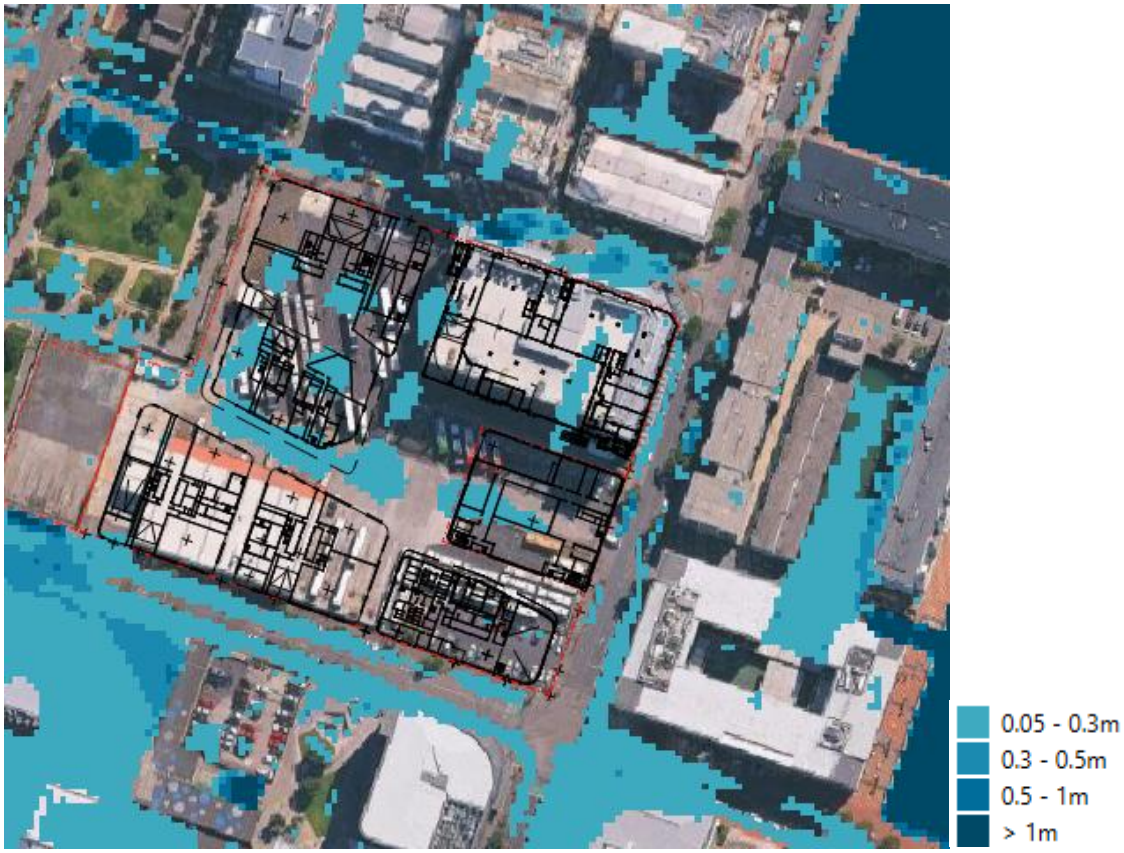


Figure Appendix C.4: 145 mm rainfall, 1.27 m RL coastal level; TP108 (1999) 20 year ARI existing scenario.

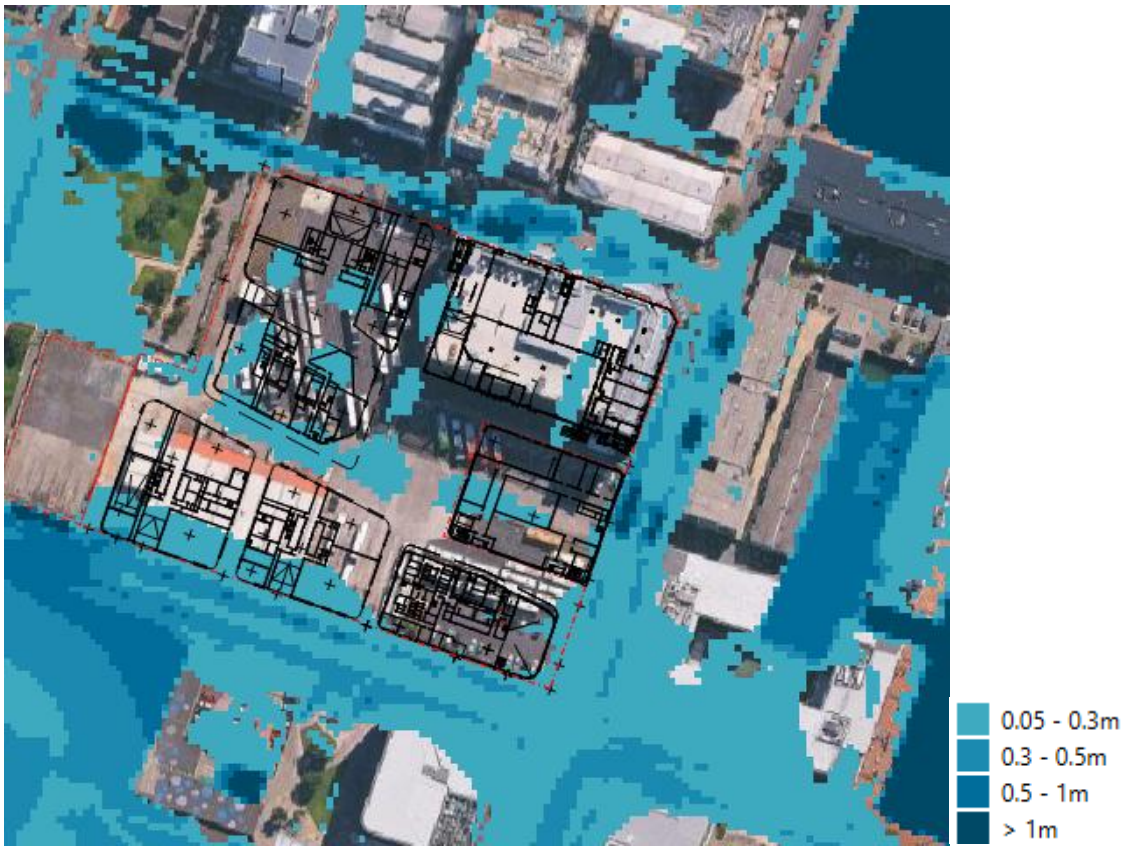


Figure Appendix C.5: 136 mm rainfall, 2.27 m RL coastal level; TP108 (1999) 5 year ARI with 3.8^{o} climate change.

C3 Auckland Council Healthy Waters – terms and conditions of model use

GENERAL TERMS AND CONDITIONS

1 Auckland Council owns the copyright on the data.

2 Auckland Council shall be acknowledged as the source of the data used in any publication, media statement or other documents, or oral statements which include the data and are made available to third parties, including the general public.

3 The data is provided with the understanding that it is for the sole use of the recipient, or its agents, and it is not intended that this data will be sold, lent or given to any third party other than for the purposes it is provided for. Data may not be sold, given to and/or lent to any third party in an unmodified and/or modified form without agreement of Auckland Council.

4 Data can only be used by the recipient for the purpose agreed by Auckland Council. In this instance, the purpose is for flood risk assessment.

5 The user of the attached data agrees to indemnify Auckland Council for any losses sustained as a consequence of a breach of any of these conditions.

6 Any materials that could identify a person need to be blurred/masked to protect their privacy, for example faces and number plates.

7 This agreement applies both to the recipient and to the recipient's agents.

DISCLAIMER

While Auckland Council has applied all reasonable skill, professional judgement and care in modelling, compiling, and providing this data, Auckland Council accepts no liability in contract, tort or otherwise howsoever, for any loss, damage, injury or expense (whether direct, indirect or consequential) arising out of the provision of this data or its use by you.

NOTE ON DATA

The data supplied under this agreement represents a snapshot of the information available at the time of extraction and release [07/09/2026]. Auckland Council's underlying datasets, models, and associated information may be updated, amended, refined, or superseded after the release date. Accordingly, the data provided should be considered a point-in-time representation only and is subject to change without notice. Users should consult Auckland Council where the most current information is required.

Data users are cautioned to consider carefully the nature of this data before using it for decisions that concern personal or public safety or the conduct of business that involves monetary or operational consequences.

The user is responsible for understanding any assumptions and limitations built into the modelling in their use and interpretation of the model output data.

Data users are cautioned to consider carefully using or interpreting this data for purposes other than that for which it was collected. Auckland Council should be consulted to verify whether the data is being correctly interpreted.

Appendix D 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).



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