



100 Halsey Street

Coastal and Flood Natural Hazard Assessment

Prepared for

RP Financial

Prepared by

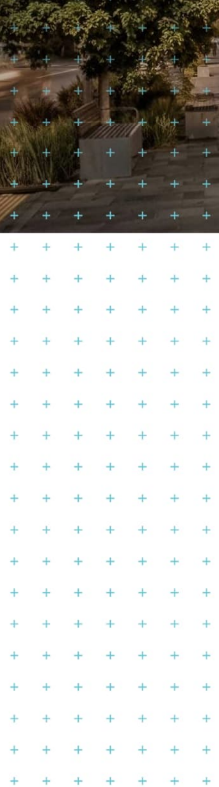
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Table of contents

1	Introduction	1
1.1	Scope	1
1.2	Policy setting	1
1.3	Guidance on climate change scenarios	2
1.4	Hazards covered	3
1.5	Datums	3
1.6	Site location	3
1.7	Proposed development	4
2	Hazard assessments	5
2.1	Coastal inundation	5
2.1.1	AUP overlays	5
2.1.2	Coastal water levels	6
2.2	Catchment flooding	7
2.2.1	AUP overlays	7
2.2.2	Catchment flooding water levels	8
2.3	Summary of coastal and catchment flooding inundation levels	10
2.3.1	Freeboard	11
2.3.2	Minimum Design levels	11
2.4	Coastal erosion	12
2.5	Tsunami	12
3	Considerations for development	13
4	Summary	13
5	Applicability	15
Appendix A	Supporting floodplain information	

Executive summary

RP Financial has engaged Tonkin & Taylor Ltd (T+T) to undertake an assessment of coastal and flood hazards with climate change.

The development includes five multiuse buildings over an area of approximately 17142 m² with ground floor use being retail and food and beverage, and the upper floors being offices. There is also an option for Building 2 to contain a substation and data centre.

The scope of this assessment is to identify coastal and flood hazards that could impact the site and expose the development to risk over the next 100 years with climate change.

Coastal hazards

The site is not exposed to coastal erosion hazards at present day or with future sea level rise due to the engineered shoreline protecting historic reclamation.

The site is not exposed to tsunami inundation at present day. Exposure to tsunami may occur in the future with sea level rise but the event likelihood is rare and any mitigation to address coastal inundation would likely provide suitable risk reduction.

The site is exposed to coastal inundation for a range of return period events and sea level projections by 2130, which is the required assessment timeframe. However, the site is not exposed to coastal inundation at present day, and is unlikely to be exposed until 2070, allowing a timeframe of 50 years for adaptation to be implemented.

Minimum floor levels are calculated for a range of activity scenarios and are presented to inform the design of the site to mitigate natural hazard exposure with climate change.

Catchment flooding

The site is not predicted to flood from current rainfall-induced catchment flooding. In the future (warmer climate), some inundation at the south-western corner is possible in a 3.8°C climate change scenario. The predicted flood levels from rainfall are lower than the predicted flood levels from coastal inundation.

Finished floor levels

A finished floor level of 3.7 m NZVD-16 (RL) is recommended for retail or food and beverage type buildings, which includes 0.3 m freeboard above the 1% annual exceedance probability (AEP) inundation level for 2130 based on climate change scenario SSP5-RCP8.5p50. Additional freeboard is recommended for habitable floors or sensitive building elements, such as power plant and electronics, resulting in a finished floor level of 3.9 mRL. The existing ground levels are between 3.0mRL and 3.3 mRL.

Conclusion

Adaptation planning can be built into the development in a way that reduces natural hazard risk to climate change and supports recovery from natural hazard events.

1 Introduction

1.1 Scope

RP Financial are preparing a referral application to access the Fast Track consenting process under the Fast Track Approvals Act (2024) for a proposed development at 100 Halsey Street in Wynard Quarter, Auckland Central.

RP Financial has engaged Tonkin & Taylor Ltd (T+T) to carry out a series of desktop studies to inform the proposed development in accordance with our Letter of Engagement Dated 15 January 2026. This report presents the findings of our climate change hazard assessment for coastal and flood related hazards. A separate report presents our infrastructure assessment.

1.2 Policy setting

Section 22(2)(a) of the Fast Track Approvals Act states that ministers may consider whether a project ... (viii) *'will support climate change adaptation, reduce risks arising from natural hazards, or support recovery from natural hazards'*.

This is consistent with the objective of the National Policy Statement-Natural Hazards (NPS-NH):

"Natural hazard risk to people and property associated with subdivision use and development is managed using a risk-based proportionate approach".

The NPS-NH specifies that a risk matrix is used to inform decisions around development in areas potentially exposed to natural hazards with a 100 year climate change horizon. Natural hazard risk is the combination of *likelihood* of a hazard occurring and *consequence* of the hazard to land, buildings and people.

To inform the Fast Track project referral process, this report focuses on the *likelihood* of coastal and flood hazards occurring at the site over the 100 year climate change timeframe. This includes assessing the sites exposure at present day and over the next 100 years based on different climate change projections. This information on hazard exposure can be used to incorporate suitable mitigation into the development design to mitigate risks associated with coastal and flooding hazard with climate change.

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 1.1). For example, a site exposed to future coastal inundation with 0.5 – 1 m of relative sea level rise (RSLR) is associated with potentially tolerable risk for sensitive activities, which could be addressed through designing the site to mitigate risk.

Table 1.1: AUP E36 definitions for different hazard levels and associated risk levels based on activity sensitivity

Hazard type		Activity sensitivity to natural hazards			
Coastal erosion	Coastal inundation	Flood hazard areas	<i>Sensitive</i>	<i>Potentially sensitive</i>	<i>Less sensitive</i>
ASCIE with 0.28 m RSLR	1% AEP + 0.5 m RSLR	Depth >0.5 m	<i>Significant</i>	<i>Significant</i>	<i>Acceptable</i>
ASCIE with 0.28 - 0.55 m RSLR	1% AEP + 0.5 - 1 m RSLR	Depth >0.3 & <0.5 m	<i>Potentially tolerable</i>	<i>Potentially tolerable</i>	<i>Acceptable</i>
ASCIE with 0.55 - 1.52 m RSLR	1% AEP + 1 - 1.5 m RSLR	Depth <0.3 m	<i>Potentially tolerable</i>	<i>Potentially tolerable</i>	<i>Acceptable</i>

1.3 Guidance on climate change scenarios

NPS-NH and AUP E36 do not specify climate change scenarios to consider when undertaking a hazard assessment for coastal hazards. Guidance is available from Auckland Council (GD2021/010) and MfE (2024) for identifying climate change and event return period parameters:

- Multiple timeframes and projections: Auckland council coastal hazard assessment guidance GD2021/10 states that timeframes of 30-, 50-, and 100 years should be assessed with climate change projections RCP8.5 and RCP8.5H+. MfE (2024) also recommend the use of multiple shared socioeconomic pathways (SSP) projections, including SSP2-4.5 for assessing coastal hazard exposure. NPS-NH and the New Zealand Coastal Policy Statement require a climate change timeframe of at least 100 years (e.g. to a planning horizon of 2130).
- Event return periods: The Auckland Unitary Plan and AC guidance documents require the use of a 1 in 100 year average return interval (ARI) event (1% Annual Exceedance Probability, AEP) for assessing inundation levels and informing floor levels, but there is also a consideration in PC120 E36 of the residual risk (i.e. lower frequency events such as a 0.5% AEP or 200 year ARI). The NPS-NH defines likelihood based on event return period including the following ARIs: 10 year (almost certain), 20 year (very likely), 50 year (likely), 100 year (possible) and 200 year (unlikely).
- Finished floor levels: Auckland council GD13 recommends the use of the 100 year ARI (1% AEP) with climate change pathway¹ SSP5-8.5p50 (50 percentile) plus consideration of vertical land movement (VLM) and additional freeboard (0.15 to 0.5 m) depending on exposure and site use (e.g. habitable, non-habitable, sensitive or less-sensitive).
- Adaptation stress test: MfE (2024) guidance on climate change and coastal hazards recommends a stress test scenario for SSP5-8.5p83 plus consideration of vertical land movement (VLM) for testing land use related to intensification.
- Safe egress/refuge: The draft AUP E36 for PC120 states that safe egress is provided for during a 1% AEP inundation event (100 yr ARI), considering 1.5 m relative sea level rise.

To account for potential uncertainty with relative sea level rise and climate change, a range of SSP projections, including VLM and timeframes are considered. Specific RSLR values from the AUP are also included. Specific attention is given the 1% AEP event as required in Unitary plan, but event of lesser and greater likelihoods are also presented to support future risk assessments.

¹ Shared Socioeconomic Pathway

1.4 Hazards covered

The scope of the climate change and coastal/flood hazards assessment is limited to the following hazards:

- Coastal inundation.
- Catchment flooding.
- Tsunami.
- Coastal erosion.

This report does not include geohazards such as landslips, liquefaction and active faults.

1.5 Datums

New Zealand Vertical Datum 2016 is used in this report for water level and elevations, referred to as reduced level (RL).

1.6 Site location

The proposed development site is located within the Wynard Quarter to the west of Auckland's CBD, as shown in Figure 1-1. The site is on historically reclaimed land that is mostly flat (Figure 1-2). 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: 3.0 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 1-1: Site location. Project area shown in yellow. Existing structure shown in red, which is outside of the scope of this assessment.



Figure 1-2: Location of the shoreline in 1840 highlighting historic reclamation in Downtown Auckland (Source: Foreshore Heritage Walk via the Auckland Council Shoreline Adaptation Strategy)².

1.7 Proposed development

We understand the proposal include five new multi-story buildings where the ground level will be retail, food and beverage, lobby areas and carparking. We understand that upper floors are commercial (e.g. office space) and that no residential units or hotel accommodation are included. No basement levels are proposed. Some potentially sensitive infrastructure such as a substation and a data centre may be included in Building 2.

² <https://www.aucklandcouncil.govt.nz/content/dam/ac/docs/plans-projects-policies-reports-bylaws/draft-shoreline-adaptation-strategies-auckland-central.pdf>

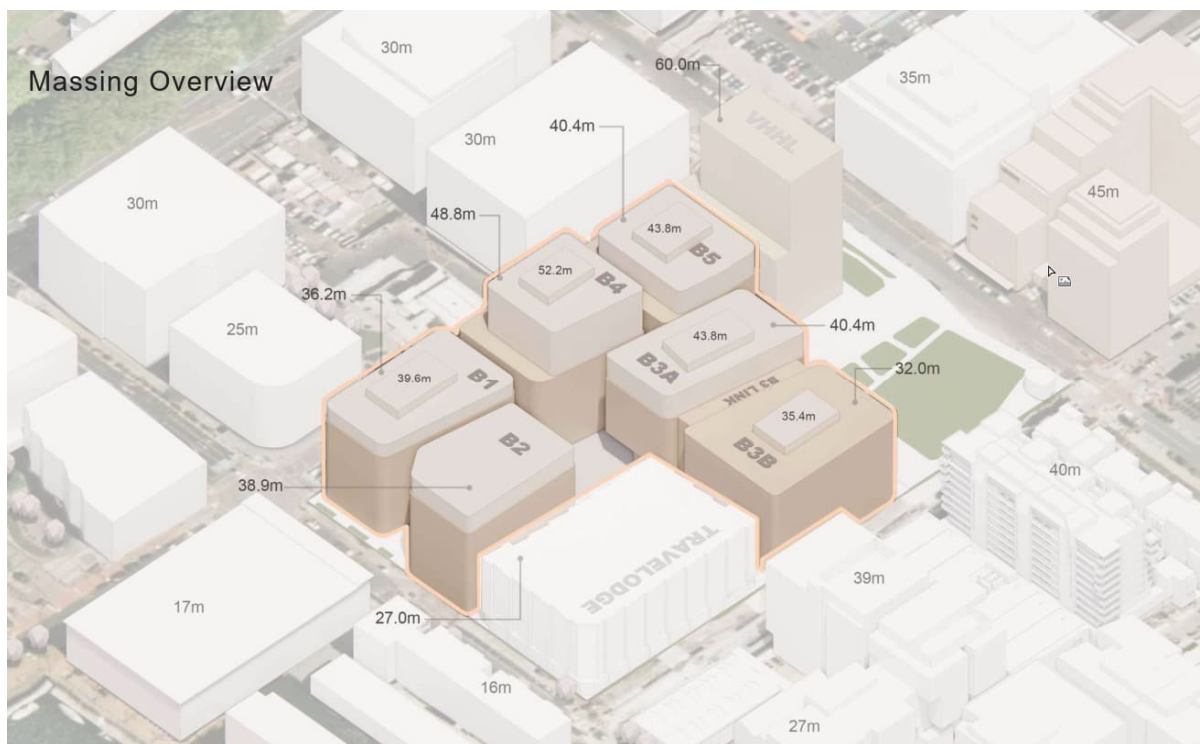


Figure 1-3: Proposed development: Peddlethorp Fast Track Referral Application (13.03.2026).

2 Hazard assessments

2.1 Coastal inundation

2.1.1 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 2-1). Therefore, the site sits outside of the more restrictive 'Hazard Area 1' (Table 1.1). 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 2-1).

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 2-1: Geomaps overlays for coastal inundation at 100 Halsey Street.

2.1.2 Coastal water levels

Relevant tide and storm tide³ levels are presented in Table 2.1 for present day (adjusted to mean sea level in 2020). Tide levels were sourced from LINZ (2025)⁴ and storm tide levels were from point ID#4 in Table 3.3 of Auckland Council Technical Report 2020/024⁵, 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 Rise⁶ 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 2.1 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 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.

³ Storm tide is storm surge on top of the astronomic tide. Storm surge is caused by low atmospheric pressure and on shore wind.

⁴ https://www.linz.govt.nz/sites/default/files/doc/hydro_202425-almanac_full-nautical-almanac_pdf.pdf

⁵ <https://www.aucklandcouncil.govt.nz/environment/what-we-do-to-help-environment/Documents/coastal-inundation-in-auckland.pdf>

⁶ <https://searise.takiwa.co/map/6245144372b819001837b900/embed>

Table 2.1: Coastal water levels for present day and future sea level rise projections (red highlights indicate water level above representative ground level)

Water levels		Water level (mRL)								
		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
100 year (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

2.2 Catchment flooding

2.2.1 AUP overlays

Auckland Council's Geomaps show the site at 100 Halsey Street is partially exposed to rainfall-induced flood inundation, as shown in Figure 2-2. The flooding exposure occurs at the south-western corner of the site and covers an extent of 450 - 500 m². 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 m²) located adjacent to Gaunt Street is identified as medium hazard (Figure 2-3). Therefore approximately 1% of the unmodified site sits within the medium hazard area.

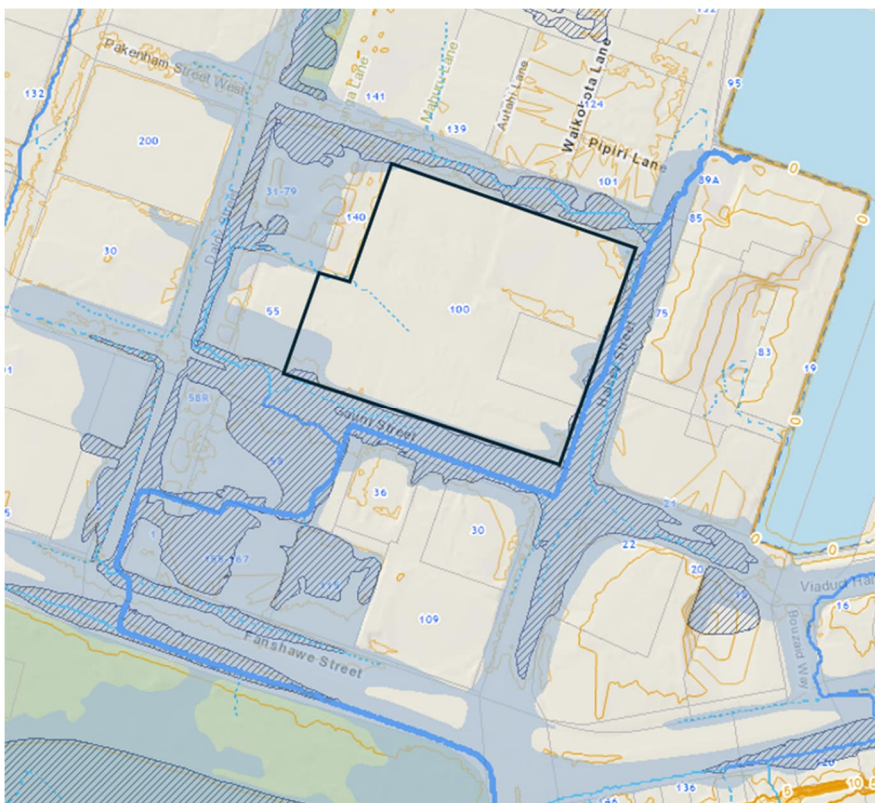


Figure 2-2: Site location in relation to floodplain (Regionwide Urban Flood Model, 2025).

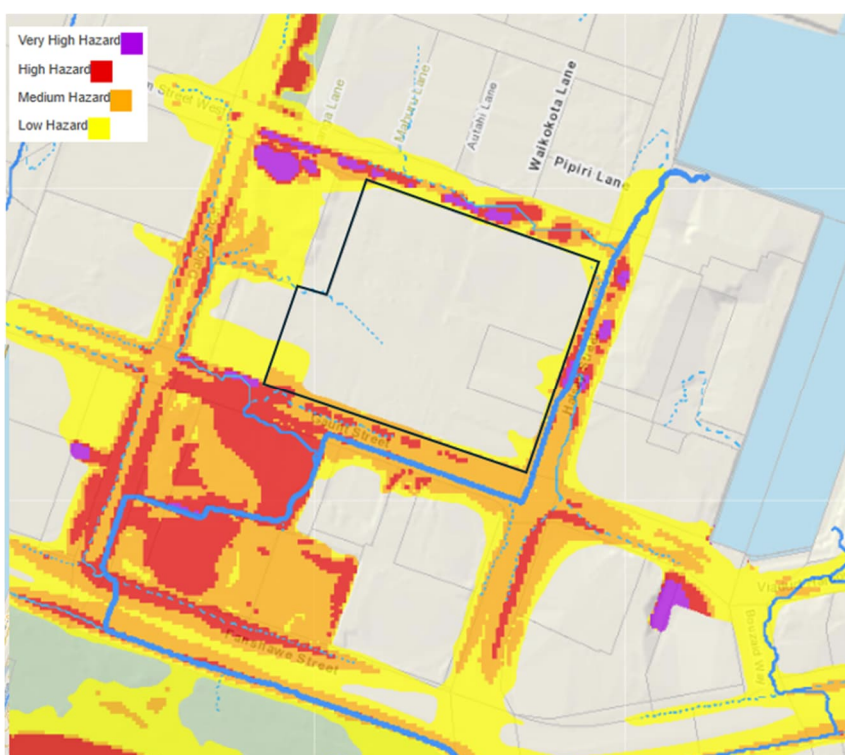


Figure 2-3: Site location in relation to floodplain (Regionwide Urban Flood Model, 2025).

2.2.2 Catchment flooding water levels

There are three sources of flood information near the Project site:

- Overland flowpath.
- Flood prone area.
- Floodplain.

The overland flowpath information provided on Geomaps identifies that the upstream catchment area is approximately 160 ha (1.6 km²) and that it extends up to Ponsonby Road in the west, Hopetown Street in the south and Hobson Street in the east. The overland flowpath helps identify that the floodplain and flood prone areas drain to the Viaduct Harbour adjacent to approximately 70 m to the northwest of the site. Due to the size of the catchment, the floodplain characteristics are best informed by the flood prone area and modelled floodplain information.

Flood prone areas (FPA) are *“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.”* The FPA information indicates the following:

- The spill level to the Viaduct Harbour is 2.85 mRL (NZVD2016).
- If outlets are blocked, it takes only 7 mm of rainfall to fill the flood prone area, suggesting that under a full blockage scenario the area would fill frequently⁷.

The floodplain information comes from two information sources:

- An interpretation of flood levels from the Regionwide Framework model (2025)⁸.
- Freemans Bay Catchment Stormwater Modelling report (Aecom, 2016).

Two information sources are used to identify similarities and differences to help reflect uncertainty in flood levels. In general, the more recent 2025 modelling represents future climate scenarios that represent higher emission scenarios that have been adopted into Auckland planning policy; however the 2016 modelling outputs provides more information about the flood levels for a greater range of storm events. The flood levels from the 2025 modelling are estimated based on contour information where flood levels below 3 mRL do not cause flooding on the site, but may cause flooding of adjacent roads and property.

Table 2.2: Summary of rainfall-induced flood levels at 100 Halsey Street

	Regionwide Framework model (2025)	Freemans Bay Catchment Stormwater Modelling report (2016) Levels reported in NZVD 2016 ⁹
1% AEP rainfall		190 mm (24 hr rainfall depth)
1% AEP rainfall with allowance for 2.1°C climate change		221.9 mm (24 hr rainfall depth)
1% AEP rainfall with allowance for 3.8°C climate change	~252 mm (refer Note 1)	Not assessed
1% AEP flood level (without allowance for climate change)		2.8 - 2.85 mRL (Refer Note 2)
1% AEP flood level with allowance for 2.1°C climate change		2.95 - 3.1 mRL (Refer Note 2)

⁷ Note that the rainfall depth is likely too low for what would occur in reality given infiltration and other hydrological losses. However the point that it would fill frequently remains valid.

⁸ An interpretation was required because modelled flood levels are not reported on in a publicly accessible format. As part of the substantive application, additional information can be requested by Council.

⁹ Levels have been converted from Auckland Vertical datum 1946 to NZVD 2016 using the following adjustment ($H_{NZVD2016} = H_{AVD1946} - 0.309$).

	Regionwide Framework model (2025)	Freemans Bay Catchment Stormwater Modelling report (2016) Levels reported in NZVD 2016 ⁹
1% AEP flood level with allowance for 3.8°C climate change	~3.1-3.2mRL (NZVD2016)	Not assessed
2% AEP flood level (without allowance for climate change)		2.8 mRL
2% AEP flood level with allowance for 2.1°C climate change		2.9 mRL
Additional		No flooding identified for more frequent events (including with climate change allowance)
<p>Note 1: Rainfall estimated based on information provided in Regionwide Urban Flood Model Report (Auckland Council, 2025). Rainfall adopted from TP108, distributed at 500m resolution grids for Model Unit F. Approximate 1% AEP existing rainfall for catchment (190 mm) and adjusted upwards by 32.7% to account for 3.8 degrees of warming due to climate change. (190 mm * 1.327 = 252 mm).</p> <p>Note 2: The range in water level reflects the highest and lowest water levels recorded on the site. In general, the highest water levels occur at the south-western corner and the lowest levels occur on the north-eastern side. Refer Appendix A for supporting information.</p>		

The flood level information provided in Table 2.2 shows that the site is not currently exposed to 1% AEP flood levels, although shallow flooding is likely on the adjacent roads and property (i.e. flood levels are below the ~3 mRL representative site level).

Future flood levels vary by up to 150 mm between the south-western end of the site and the north-eastern end of the site and is indicative of the hydraulic gradient as the floodplain drains to the north.

The maximum predicted 1% AEP flood level is 3.2mRL for a future 3.8 °C temperature increase. The results indicate that flood levels reduce by approximately 10 - 15 mm when the rainfall reduces from ~250 mm to 220 mm, and a further 150 mm when the rainfall reduces from 220 mm to 190 mm. This suggests that the maximum flood levels are relatively insensitive to rainfall. Furthermore, additional increases in rainfall (e.g. for more extreme events) are unlikely to significantly increase the flood levels because of the close proximity to the Viaduct Harbour (i.e. increased rainfall runoff will increase flows to the coast without significantly increasing water levels).

2.3 Summary of coastal and catchment flooding inundation levels

Table 2.3 provides a summary of the coastal and rainfall-induced flood water levels at 100 Halsey Street. Note these levels do not include freeboard.

Table 2.3: Summary of coastal and rainfall-induced flood levels at 100 Halsey Street

Activity	AEP	Timeframe	Climate Scenario	Water level (mRL)
Coastal design level	1% AEP	Existing	Existing climate	2.08
	1% AEP	2130	SSP5p50+VLM	3.38
Coastal egress test (PC120)	1% AEP	n/a	1.5 m RSLR	3.58
Coastal stress test (MfE 2024)	1% AEP	2130	SSP5p83+VLM	3.86
Rainfall-induced catchment flooding	1% AEP	Existing	Existing climate	2.85
	1% AEP	n/a	3.8° Climate change	3.2
	Flood prone area spillway level			2.85

2.3.1 Freeboard

Freeboard is the height between the inundation level and the finished ground or finished building floor level. Guidance on freeboard from GD13 (December 2024) indicates that freeboard can vary depending on the locations exposure to flooding and based on the sensitivity of the activity. A general interpretation is that habitable residential floor levels should be informed by a freeboard of 0.5 m above the 1% AEP inundation level. For non-habitable commercial or retail a freeboard of 0.3 m above the 1% AEP inundation level could be considered. Freeboard of 0.15 may be considered for less sensitive activities exposed to coastal inundation away from wave influence.

2.3.2 Minimum Design levels

Based on the information summarised in Table 2.3, the coastal inundation levels are higher than the rainfall-induced flood levels and therefore most likely to inform minimum design levels. A summary of coastal inundation levels and freeboard scenarios used to inform coastal hazard exposure of the development are in Table 2.4 below.

We note that during subsequent design stage, the client/design team should consider the wide range of other commercial risk and design factors in determining whether to exceed the minimum design levels.

Table 2.4: Coastal inundation and freeboard scenario levels

Activity	AEP	Timeframe	Climate Scenario	Water level (mRL)	Freeboard (m)	Total (mRL)
Floor level for non-habitable and less-sensitive activities	1% AEP	2130	SSP5p50+VLM	3.38	0.15	3.55
Floor level for non-habitable and potentially sensitive activities	1% AEP	2130	SSP5p50+VLM	3.38	0.3	3.7
Floor level for habitable or sensitive activities	1% AEP	2130	SSP5p50+VLM	3.38	0.5	3.9
MfE (2024) Stress Test	1% AEP	2130	SSP5p83+VLM	3.86	n/a	3.9

There are some examples of different sensitivity activities in the PC120 definition, but not a full definition. Sensitive activities appear to be focused on habitable buildings and people focused care services or activities that could cause a high risk of pollution or health effect. Some examples are presented in Table 2.5.

Table 2.5: Examples of activity sensitivity

Sensitivity	Examples
Less sensitive	Parks, reserves, carparking
Potentially sensitive	Offices, retail, day schools
Sensitive	Retirement village, habitable dwellings, medical centres

2.4 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.

2.5 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 2-4: Tsunami hazard overlays from Auckland Council Hazard Viewer.

3 Considerations for development

To mitigate risk of flooding over the next 100 years, a minimum finished floor scenario based on the 1% AEP coastal water level with sea level rise is recommended. Over the 100 year duration the coastal inundation levels are higher than the rainfall-induced catchment flooding levels, however the existing 1% AEP catchment flooding level (~2.85 mRL) is higher than the 1% AEP coastal inundation level (~2.08 mRL), both of which are below the existing ground level of the site.

A 1% AEP coastal inundation level of 3.38 mRL is consistent with the Auckland Council guidance on minimum floor levels (SSP5-RCP8.5 p50 with allowance for vertical land movement). Additional freeboard is recommended for different building activities to allow for wave and wake action levels as follows:

- We understand the site has ground floor land use that includes parking, food and beverage, retail and lobby areas and that the development does not include habitable residential buildings. Minimum freeboard of 0.15 m to 0.3 m for activities including parking, food and beverage, retail and lobby areas, subject to the sensitivity of the building and occupants. This is a finished floor level of 3.55 to 3.7 mRL, which is above the existing ground floor level of food and beverage shops along Halsey St that are on grade with the 3.0 mRL footpath level.
- Critical services such as building power and communications plants, or activities that pose a pollution risk if exposed, are recommended to have additional freeboard of 0.5 m, resulting in a finished floor level of 3.9 mRL. For infrastructure that is designed to be flood resilient the floor level could be lower.

Adaptation in the form of raised floor levels could be built into the development today, providing mitigation for the 100 year timeframe specified in the AUP and NPS-UD. Raising ground or floor levels is consistent with the Auckland Council Shoreline Adaptation Plan for Downtown Auckland which is to hold the line (defend) in the short, medium and long term¹⁰.

Alternatively, since coastal inundation is unlikely to be an issue until after 2070, the development could plan for future ground floor raising in 30 to 50 year's time. This would require sufficient head room between the ground floor and higher floors, and the creation of an adaptation pathway plan with clear triggers for when pre-determined adaptation actions are to be implemented.

The AUP E36 requires consideration of safe egress or refuge with a 1% AEP event and 1.5 m RSLR. In the future coastal scenarios, this relates to a water level of 3.6 mRL at the peak of the storm tide. The closest land elevated above 3.6 mRL is 150 m away to the south, across Fanshaw Street near Victoria Park. Based on present day pavement and road levels of 3.0 mRL, the flood depth would be 0.6 m at the peak, with minimal velocity expected. The depth threshold that is considered to be 'generally safe for people and vehicles' is 0.3 m. Therefore, egress would not be 'generally safe' with a depth of 0.6 m under the 1.5 m RSLR scenario. The site would therefore need to consider safe refuge, which allows occupants to shelter in place at an elevation above 3.6 mRL for several hours until the tide turns and water recedes below the ground level.

It is also possible that Auckland Transport may consider raising the road levels in the Wynyard Precinct over the next 50 to 100 years to reduce their exposure to sea level rise hazards. However, this should not be relied on for site specific mitigation.

4 Summary

The site is not exposed to tsunami and coastal erosion hazards but is exposed to a coastal inundation with storm surge and sea level rise. The site is not predicted to flood from current rainfall-induced

¹⁰ <https://www.aucklandcouncil.govt.nz/content/dam/ac/docs/plans-projects-policies-reports-bylaws/draft-shoreline-adaptation-strategies-auckland-central.pdf> page 24

catchment flooding. In the future (warmer climate), some inundation at the south-western corner is possible in a 3.8°C climate change scenario. The predicted flood levels from rainfall are lower than the predicted flood levels from coastal inundation. The site is unlikely to be exposed to coastal inundation before 2070 but is likely to be exposed by 2130 for a range of return periods and climate change scenarios. 2130 is the minimum 100 year timeframe required by the NPS-NH for assessing climate change hazards.

Mitigation in the form of a raised building platform and minimum floor levels can be implemented as part of the current development, or as part of an adaptation plan to avoid risks of coastal inundation and flooding exposure with climate change.

Safe refuge will need to be considered for the coastal inundation event with 1.5 m RSLR, allowing people to shelter in place during a 1% AEP event that would make egress unsafe.

This development can support climate change adaptation and natural hazard recovery by building in coastal and flood mitigations that avoid exposure over the next 100 years.

The following next steps may be suitable for progressing the substantive application:

- Incorporating natural hazard resilience into the design finished floor and ground levels.
- Undertake a coastal and flood hazard risk assessment based on the final design being submitted for resource consent, following guidance from NPS-NH and AUP E36 (PC120 version).

5 Applicability

This report has been prepared for the exclusive use of our client RP Financial, 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

Dr Eddie Beetham: Eddie is a Senior Coastal Geomorphologist at Tonkin & Taylor Ltd (T+T) specialising in specialise in coastal hazards. Eddie has worked at T+T since 2019 and was previously a Research Fellow at The University of Auckland. Eddie has 12 years' experience in coastal processes and hazards and is a member of the New Zealand Coastal Society management committee. Qualifications include – PhD, MSc, BSc [Hons].

Jon Rix: 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 MSc and BSc (Hons) qualifications.

Tonkin & Taylor Ltd
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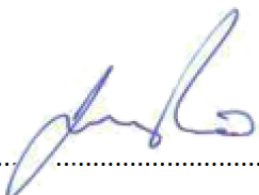
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- Flood prone area information (Geomaps)

Flood Prone Areas	
Attribute	Value
Flood prone area ID	28811514
Can fill in a 100yr ARI rainfall event	Yes
Catchment Area (m2)	1662251
Minimum elevation (m RL)	1.12
Minimum elevation (m RL NZVD2016)	0.78
Spill elevation (m RL)	3.19
Spill elevation (m RL NZVD2016)	2.85
Spill ponding depth (m)	2.07
Volume to spill elevation (m3)	3441
Rainfall required to fill flood prone area (mm)	7
Rainfall depth 100yr ARI future scenario (mm)	222
Flood prone elevation in 100yr ARI event (m RL)	Spills – specific calculation is required
Flood prone elevation in 100yr ARI event (m RL NZVD_2016)	Spills – specific calculation is required
Flood prone depth in 100yr ARI event (m)	Spills – specific calculation is required
Flood prone volume stored in 100yr ARI event (m3)	Spills – specific calculation is required
NZVD2016 Confidence	NZVD2016 Calculated
Auckland 1946 Confidence	Null

