SOUTH DUNEDIN FUTURE

WORKSTREAM 3: RISK ASSESSMENT

MANA WHENUA RISK ASSESSMENT REPORT

30 June 2025

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Acknowledgements

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> *E kā toki kao Matariki, e kā pūkeka, e kā mōhio, nei ā mātau mihi maioha ki a koutou katoa.*
>
> *E te tira mana whenua, nā koutou te paparahi i whakarite, ā, i whakatika. Tēnā koutou.*
>
> *E te kaunihera, ā, e te rōpū Kia Rōpine, nā koutou mātau i tautoko i tēnei ara kōpikopiko, i tēnei ara hirahira. Tēnā koutou.*

Any errors or omissions within this report are those of the authors.

Front Cover Image

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Executive Summary

A Mana Whenua Risk Assessment has been undertaken for the South Dunedin Future programme, which has identified and rated risks through a Kāi Tahu mana whenua lens. Based on an analysis of cultural values, it takes a broad approach to the understanding of risk in the South Dunedin context. As well as risks to specific places and features important for the cultural associations to mana whenua, it considers risks to Kāi Tahu perspectives and values relating to wider environmental, social and economic factors across South Dunedin.

This mahi was facilitated by Aukaha with guidance and validation from a panel of Kāi Tahu mana whenua experts.

The Mana Whenua Risk Assessment has shown that there is substantial risk resulting from a 'keep doing what we are doing' scenario, where there are no additional interventions to address the climate and natural hazard issues facing South Dunedin. Risk to the key Te Taki Haruru (DCC Māori Strategic Framework) values is generally significant, ranging from high (mana, whakapapa, tapu & noa) to extreme (mauri) levels of risk. These results outline the case for change in response to the modelled natural hazards and climate risks.

This report provides a detailed outline of the Mana Whenua Risk Assessment inputs, methodology, and findings. The Cultural Values Framework used as the basis for identifying and assessing risk from a Kāi Tahu perspective is appended to the report.

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1 Introduction

South Dunedin is built on former wetlands, lagoons, waterways and land between Otago Harbour, the southern coastline and the surrounding hill suburbs. The area includes large tracts of reclaimed land. It houses about 13,500 people, 1,500 businesses and an array of critical infrastructure and amenities. Significant land modifications have occurred in the area, which is now effectively a basin with no natural outflows and a very shallow groundwater table. Heavy rainfalls in 2015 and in 2024 exceeded the capacity of stormwater systems, causing extensive flooding across South Dunedin. Such events are expected to increase in both intensity and frequency in future, and flood risk is further exacerbated with rising sea-levels and high groundwater levels. Coastal inundation and erosion are other major risks facing the project area.

The purpose of the wider South Dunedin Future (SDF) programme is to enable South Dunedin to prepare for, and adapt to, the impacts of climate change, while acknowledging the opportunities that come with change. Within the wider programme context, the purpose of the South Dunedin Risk Assessment is to *'assess the potential for elements at risk (people, places, assets) to be negatively affected by pluvial flooding, coastal inundation, coastal erosion, groundwater, landslide and liquefaction natural hazards in South Dunedin'*[2].

Due to the scale, complexity and implications of the project, Dunedin City Council and Otago Regional Council collaborated with external subject matter experts, collectively referred to as Kia Rōpine. The project was divided into five workstreams: Strategic Programme Management (Workstream 1), Natural Hazards (Workstream 2), Risk Assessment (Workstream 3), Adaptation Planning (Workstream 4) and Communications and Engagement (Workstream 5).

The Mana Whenua Risk Assessment has identified and rated risks through a Kāi Tahu lens as part of Workstream 3 and to inform Workstream 4. The assessment is based on an analysis of cultural values and takes a broad approach to risk. As well as risks to specific places and features important for the cultural associations to mana whenua, it considers risks to Kāi Tahu perspectives and values relating to wider environmental, social and economic factors across South Dunedin. This mahi was facilitated by Aukaha with guidance and validation from a panel of Kāi Tahu mana whenua representatives.

This report details the process and findings of the Mana Whenua Risk Assessment, which sits as a self-contained body of work within the wider SDF Risk Assessment. Both risk assessments were conducted on a 'keep doing what we are doing' scenario, where no additional interventions are made to address the climate and hazard issues facing South Dunedin. The methodology has been aligned as far as possible with the wider Workstream 3 risk assessment, including an approach based on first identifying risk elements, then assessing the level of vulnerability and exposure to those risks.

The overall risk definition and methodology has also been aligned with a Manaaki Whenua report[3] focussing the impacts to mana whenua values and on cultural associations through the lens of the DCC Māori Strategic Framework, Te Taki Haruru[4], as a basis for the evaluation. The Manaaki

[2] WSP et al., South Dunedin Future Workstream 3: Risk Assessment Report (2025), p. 10.
[3] Manaaki Whenua, *He huringa āhuarangi, he huringa ao: a changing climate, a changing world (*2021)
[4] https://www.dunedin.govt.nz/council/strategic-framework/te-taki-haruru-maori-strategic-framework

Whenua report was produced in response a national climate change risk assesment[5], after critiques that it did not fully cater for mana whenua views and values around risk.

The SDF project area lies at the confluence of a number of wāhi taoka of great significance to Kāi Tahu, including Te Awa Ōtākou (Otago Harbour), Muaupoko (Otago Peninsula) and Te Tai o Arai Te Uru (the Otago coastline). The area itself was traditionally part of a wider ara tawhito network for Kāi Tahu to travel from kāika within the harbour and further afield to access resources further south. It was largely an estuarine or marshy area, thus important for mahika kai, with tuna (eels), inaka (whitebait) and a range of bird species harvested. The upper harbour was an important kohanga (nursery) for many mahika kai species. The former Kaituna Lagoon and other coastal lagoons in the area were an important part of this mahika kai network.

Urbanisation following Pākehā settlement dramatically changed mana whenua interactions with the area, including through drainage, undergrounding of waterways, harbour reclamation, built development and a myriad of other land use changes.

In recent decades, mana whenua associations and identity within the area have been based more strongly around connections to community and institutions such as schools. The rejuvenation of Kāi Tahu associations and identity has also been enhanced through supplying design input and narratives for local projects such as the South Dunedin Library build and the Kaituna Hillside KiwiRail workshop project.

[5] Ministry for the Environment, *National Climate Change Risk Assessment for New Zealand Arotakenga Tūraru mō te Huringa Āhuarangi o Āotearoa* (2020)

2 Mana Whenua Values

The starting point for identifying mana whenua risk was to examine mana whenua values relating to South Dunedin. A series of wānaka involving the Mana Whenua Panel were used to formulate a Cultural Values Framework for SDF (refer Appendix A1). This framework was built on the foundations laid by Te Taki Haruru (the Māori Strategic Framework developed to operationalise the Dunedin City Council Treaty of Waitangi partnership with mana whenua). The key principles and key values of Te Taki Haruru are set out in Table 2.1, along with an articulation of these in the South Dunedin context. Relevant mana whenua values and cultural practices were also identified for the SDF programme, associated with the four key Te Taki Haruru principles/values.

Table 2.1: Te Taki Haruru Values in South Dunedin

Key Principle	Key Value	South Dunedin Context
Autūroa	Mana (Rakatirataka, authority, responsibility)	• Mana whenua are decision-makers in relation to te taiao, including how wai is managed, in adaptation responses to climate change and in management approaches to Three Waters. • Mana whenua are leaders able to influence decisions affecting the social and economic wellbeing of South Dunedin, with a focus on building empowered, connected and resilient communities. • Use of Kāi Tahu knowledge and reflections of Kāi Tahu identity are led and approved by mana whenua according to tikaka.
Auora	Mauri (Life force, vital essence)	• The restoration and enhancement of the mauri of te taiao is an integral part in the South Dunedin programme. • The restoration and regeneration of South Dunedin is guided by Kāi Tahu kaitiakitaka. • Socio-economic and cultural well-being are at the heart of a just transition for the South Dunedin community. • The hauora of the people and communities of South Dunedin are enhanced.
Autakata	Whakapapa (Genealogy, history, layers, connections)	• Kāi Tahu traditions and connections, including to wai, whenua and moana, are recognised in the South Dunedin programme. • Contemporary mana whenua relationships guide the journey to a just and equitable transition. • Mana whenua names and places are used and celebrated, along with Kāi Tahu design elements, to enhance sense of place and identity. • Kāi Tahu mātauraka and tikaka inform planning and decision-making approaches.
Autaketake	Tapu & Noa (Safety, restoration of balance, restriction)	• Human activities, including those relating to stormwater and wastewater, are managed to protect te taiao. • Community safety and well-being are protected through responsible regulatory measures and other processes. • Mana whenua identify and lead the appropriate tikaka regarding tapu and noa.

3 Methodology: Mana Whenua Risk Factors & Ratings

3.1 Alignment to National Risk Framework

The overall risk definition and methodology has been aligned with the 2021 Manaaki Whenua report, which explains:

> *Risk is a function of climate hazards (which can be physical events or trends, such as episodic flooding, landslide or erosion events, or longer-term sea-level rise), the degree to which things we value are exposed to the hazard (people, assets, taonga), and their vulnerability to its effects.*
>
> *Vulnerability is influenced by socio economic status, physical characteristics, cultural processes, and tikanga Māori (including adaptation and mitigation actions and governance), which can increase or decrease the consequences (and therefore the risk) resulting from exposure to a hazard (Ministry for the Environment 2019a).*[6]

Figure 3.1 shows the national level conceptualisation of risk identification, and how this is a combination of three factors (Hazards, Vulnerability and Exposure):

What **environmental hazards** will affect the area // *What will happen?*
How **vulnerable to a certain hazard** the area is // *How bad will the impact be?*
How **exposed to a certain hazard** the area is // *How regularly will it happen?*

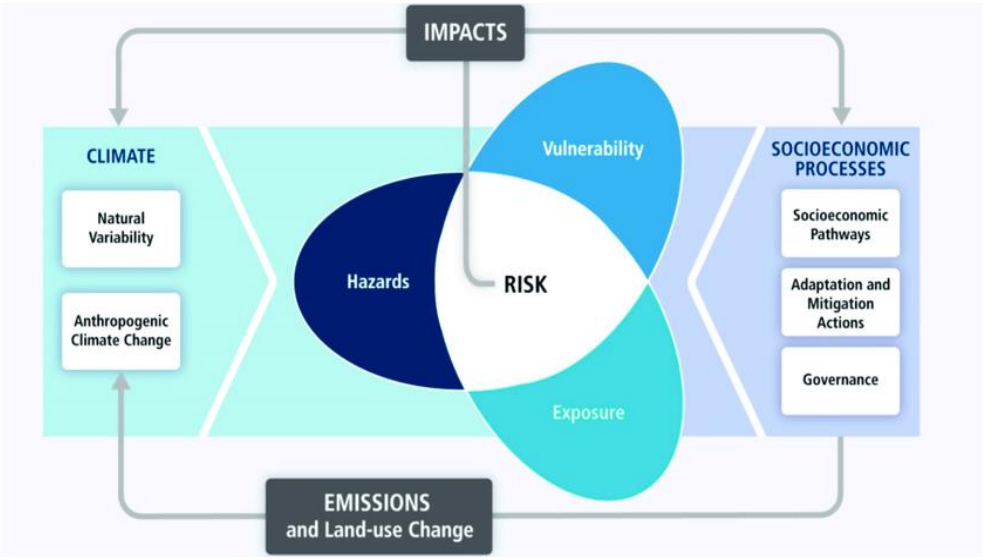


Figure 3.1: national level conceptualisation of risk identification[7]

The Socioeconomic Processes on the right of the diagram encompass how human behaviours influence the risk to climate change-related hazards. The Socioeconomic Pathways refer to the five climate change scenarios defined by the Intergovernmental Panel on Climate Change (IPCC) in their 2021 Assessment Report. These five scenarios (refer Figure 3.2 below) are the narratives for what sorts of global futures to expect, depending on mitigation measures taken now.

[6] Manaaki Whenua, *op. cit.,* p. 4.
[7] *Ibid.,* p. 4, originally sourced from Climate Adaptation Technical Working Group (2017) (adapted from IPCC, 2014b)

Figure 3.2: Representation of the five Shared Socio-economic Pathways defined by IPCC

The SDF Risk Assessment presents findings for the current (i.e. 2024), medium term (2060-2070) and long term (2100) timeframes using best available information. For the medium term and long-term scenarios, two greenhouse gas emissions scenarios were used representing mid-range (SSP2) and high end (SSP5) projections.

3.2 Integration of Mana Whenua Risk

The SDF Cultural Values Framework was used to help identify mana whenua risk factors (refer Table 4.1 below). Some risk factors are of a quantitative nature, drawing on Workstream 3 data relating to impacts of modelled natural hazards on physical assets and socio-economic factors. Other risk factors are of a qualitative nature, including those relating to the Kāi Tahu mana whenua lived experience – such as perceptions of the Treaty partnership experience, ability to exercise rakatirataka or impacts on whakapapa associations to the South Dunedin area.

Vulnerability and exposure ratings were evaluated using geospatial data provided as part of the SDF Risk Assessment (allowing distribution and likelihood of hazards to be inferred), additional quantitative data relating to business activities, and qualitative data from the Mana Whenua Panel which captured their perceptions of the risk to cultural values.

3.3 Identified Hazards

The SDF Risk Assessment identified the following as key hazards in the SDF project area: pluvial flooding, coastal inundation (including sea level rise), coastal erosion, groundwater rise, landslide and liquefaction.

The Mana Whenua Risk Assessment also utilised the Workstream 3 mapping of these hazards, which were aggregated into a single figure across different time periods, as shown below in Figure 3.3. This analysis helped with the assessment of the severity and extent of risks to mana whenua values. This was done in conjunction with a series of other maps that detailed social factors (deprivation index, population age distribution, mobility and vehicle access), economic factors (distribution of businesses), and servicing factors (three waters infrastructure and contaminated Hazardous Activities and Industries List sites).

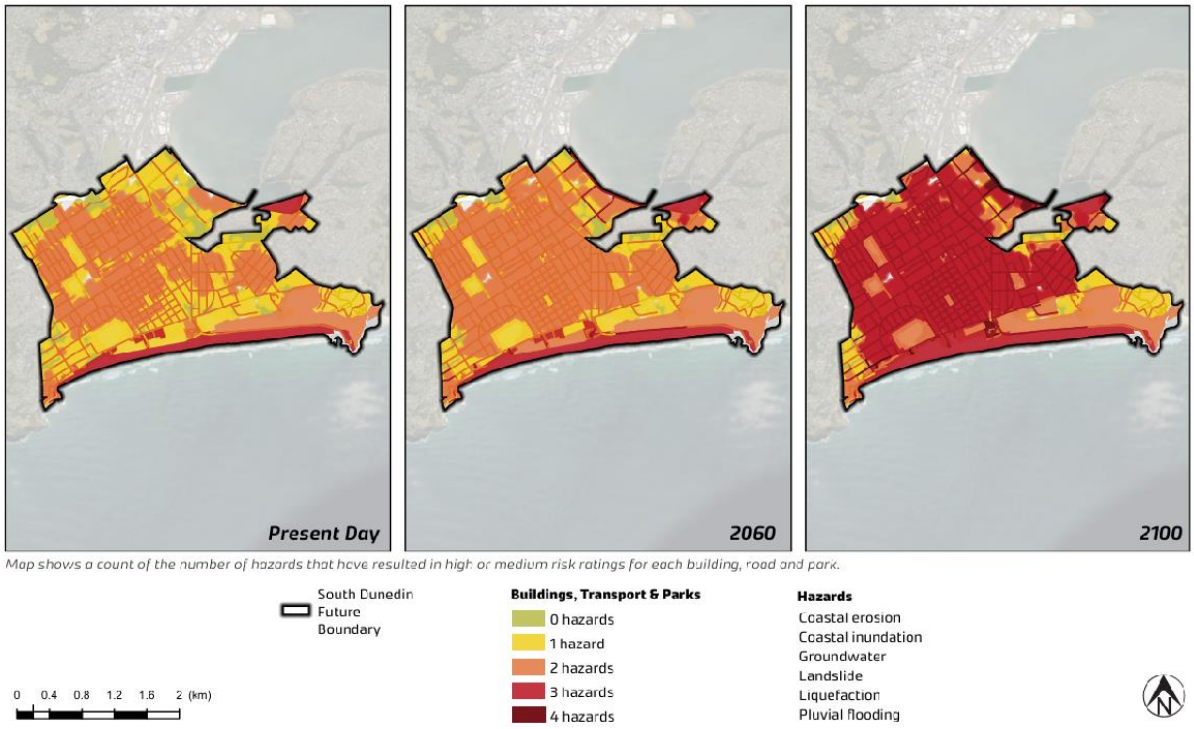


Figure 3.3: Summary of Risks to South Dunedin (buildings, parks and transport)

3.4 Vulnerability Ratings

A vulnerability rating scale for each Te Taki Haruru principle/value was developed. The scale (very low to extreme) aligns with the vulnerability ratings used across the SDF Risk Assessment, allowing risks to mana whenua values to be analysed alongside the other risks. The vulnerability ratings are shown in Table 3.1. Also included are interpretations in te reo Māori which, rather than necessarily being a direct translation, articulate the level of risk using te ao Māori concepts.

Table 3.1: Vulnerability Ratings for Te Taki Harura Principles & Values

Autūroa - Mana		
Extreme	Rakatirataka lost, community disempowered	*He pokorehu, he whare puehu*
High	Rakatirataka compromised, community fragmented	*He ahi teretere, he whare tīwekaweka*
Moderate	Rakatirataka understood, community cohesion observed	*He ahi tāwhiri, he whare pūmahana*
Low	Rakatirataka asserted, community strengthened	*He ahi muramura, he whare ruruhau*
Very Low	Rakatirataka fully realised, community empowered and resilient	*He ahi kā roa, he whare taurikura, he āhuru mōwai*
Auora - Mauri		
Extreme	Mauri is depleted	*He mauri e mate ana*
High	Mauri is damaged	*He mauri e pakoki ana*
Moderate	Mauri is unchanged	*He mauri e noho ana*
Low	Mauri improves	*He mauri e tū ana*
Very Low	Mauri flourishes	*He mauri e puāwai ana*
Autakata - Whakapapa		
Extreme	Past/future connections to place broken	*Kua motu ngā aho o te taura takata ki inamata, ki anamata hoki*
High	Past/future connections to place diminished	*Kua tāwekoweko haere te taura takata*
Moderate	Past/future connections to place acknowledged	*Kua kitea te taura takata*
Low	Past/future connections to place improved	*Kua purutia te taura takata*
Very Low	Past/future connections to place strengthened and celebrated	*Kua whiria aukahatia te taura tangata, ā, kua whakanuia hoki ia*
Autaketake – Tapu and Noa		
Extreme	Tikaka and Kawa are trampled on	*Kua takahia a Tikaka rāua ko Kawa*
High	Tikaka and Kawa are ignored	*Kua waiho(tia) a Tikaka rāua ko Kawa*
Moderate	Tikaka and Kawa are known about but not actively utilised	*Kua mōhiotia noatia a Tikaka rāua ko Kawa*
Low	Tikaka and Kawa are utilised to maintain balance	*Kua whakamahia a Tikaka rāua ko Kawa hei whakanonoi i te taurite*
Very Low	Tikaka and Kawa are embedded into social structures and used to restore and maintain balance	*Kua whakatōria a Tikaka rāua ko Kawa ki ngā pūnaha maha, mā rāua kē te taurite e whakarauora*

3.5 Exposure Ratings

The definition of exposure levels was aligned with the SDF Risk Assessment (*extreme, high, moderate, low, very low*). The level of exposure related sometimes to more physical elements of interest (e.g. mahika kai areas, wāhi tūpuna, taoka) that may be present in the area. The level of exposure also related to more intangible elements such as rakatirataka, mātauraka and tikaka that often apply at a broader level and are not necessarily as location-specific as the physical elements of interest. Some risk factors (such as community cohesion or equitable transitions) contained aspects that are both physical/quantitative and more value-based or subjective.

If an element of interest was seldom located in the project area, then it would be rated at a very low level of exposure. Conversely, if an element of interest was prolific within or across the project area, it would be rated an extreme level of exposure. This analysis was undertaken across the entire study area with a stronger focus on what was at risk and the spread of this risk, rather than how often it was at risk. As such, the exposure component of the analysis focussed on how widespread the impacts to mana whenua values were.

4 Analysis and Scoring of Each Risk Factor

Fifteen risk factors across the four values of Te Taki Haruru were identified to capture the elements of risk identified by mana whenua. Each risk factor was determined as being either quantitative (QN), qualitative (QL) or a mixture of both. They were also assessed as being global (G) or place-based (PB) across the project area, which gave further information as to the extent of exposure. The risks and their classifications are shown in table 4.1.

Table 4.1: Risks to Mana Whenua Values

Value	Risk	QN	QL	G	PB
Mana	Risk that Te Tiriti partnership is not upheld		*	*	
	Risk of further disadvantaging communities that are currently disadvantaged and / or struggling	*			*
	Risk to ahi kā roa / Rakatirataka and subsequent manaakitaka and kaitiakitaka responsibilities		*	*	
	Risk to Te Taki Haruru not being honoured or upheld		*	*	
	Risk to social and cultural connections of whānau and hapori	*	*		*
Mauri	Risk to the protection of whenua, awa, moana, wāhi tapu, marae access, ara tawhito, archaeological sites, mahika kai, hauora	*			*
	Risk to te mana o te wai	*			*
	Risk to the ki uta ki tai perspective		*	*	
Whakapapa	Risk to mātauraka-ā-hapū, mātauraka-ā-iwi, tikaka-ā-iwi, tikaka-ā-hapū		*	*	
	Risk to economic capacity to adapt and thrive in an equitable manner	*			*
	Risk to upholding the traditions, pūrākau and relations that weave mana whenua to te taiao		*	*	
	Risk to wāhi tūpuna	*	*	*	
	Risk of ongoing social isolation, social marginalisation to communities	*			*
	Risk of overlooking intergenerational impacts (both past and potential future) of inequitable transitions		*	*	
Tapu & Noa	Risk to using / practicing of tikaka and kawa to restore and maintain balance		*	*	

4.1 Qualitative Risk Factors

Generally, the leading question for each risk factor asked for an explanation of the ideal state of that aspect, the following question asked about the current situation and how this was likely to be affected in future if nothing was done. The questions were structured specifically around the qualitative risk factors shown in Table 4.1 to fill in gaps in the knowledge which quantitative data could not necessarily fill in. The detailed answers to these questions are shown in Appendix A2: Qualitative Risk Analysis.

I. **What does ideal Te Tiriti partnership / participation / protection look like?**

How would you rate the current situation and how this is likely to be affected in future?

II. **What constitutes rakatirataka & ahi kā roa for mana whenua in the South Dunedin area?**

How would you rate the current situation and how this is likely to be affected in future?

III. **What are the risks to community cohesion?**

How would you rate the levels of community cohesion currently, and how is this likely to be affected in future?

IV. **What are the risks to the hauora of the residents and community?**

How likely is this to be affected in the future?

V. **How does the quality and movement of wai in South Dunedin relate to the wider catchment? (ki uta ki tai)**

How likely is this to be affected in the future?

VI. **What level of risk is there to Kāi Tahu connections to South D as a wāhi tūpuna?**
VII. **How readily is mātauraka ā-hapū passed across the generations?**

How is this likely to be impacted in the future?

VIII. **To what extent is tikaka used in governance and decision-making across South Dunedin?**

How would we rate the risk to the use of tikaka as a means to achieve balance / restoration?

4.2 Quantitative Risk Factors

The maps shown in Figures 4.1[8] detail the social factors (by Statistics New Zealand Statistical Area 1 boundaries) and economic factors (Statistical Area 2 boundaries) that were used to analyse risk factors with quantitative components. Figure 4.2 maps show the three waters infrastructure and Hazardous Activities and Industries List (HAIL) contaminated land sites also used to analyse quantitative risk.

[8] Maps 1, 2, 3, 4, 6, 7, 8 and 9 were taken with from the SDF Workstream 3: Risk Assessment Report or were produced by Tonkin & Taylor. Map 5 was produced by Aukaha.

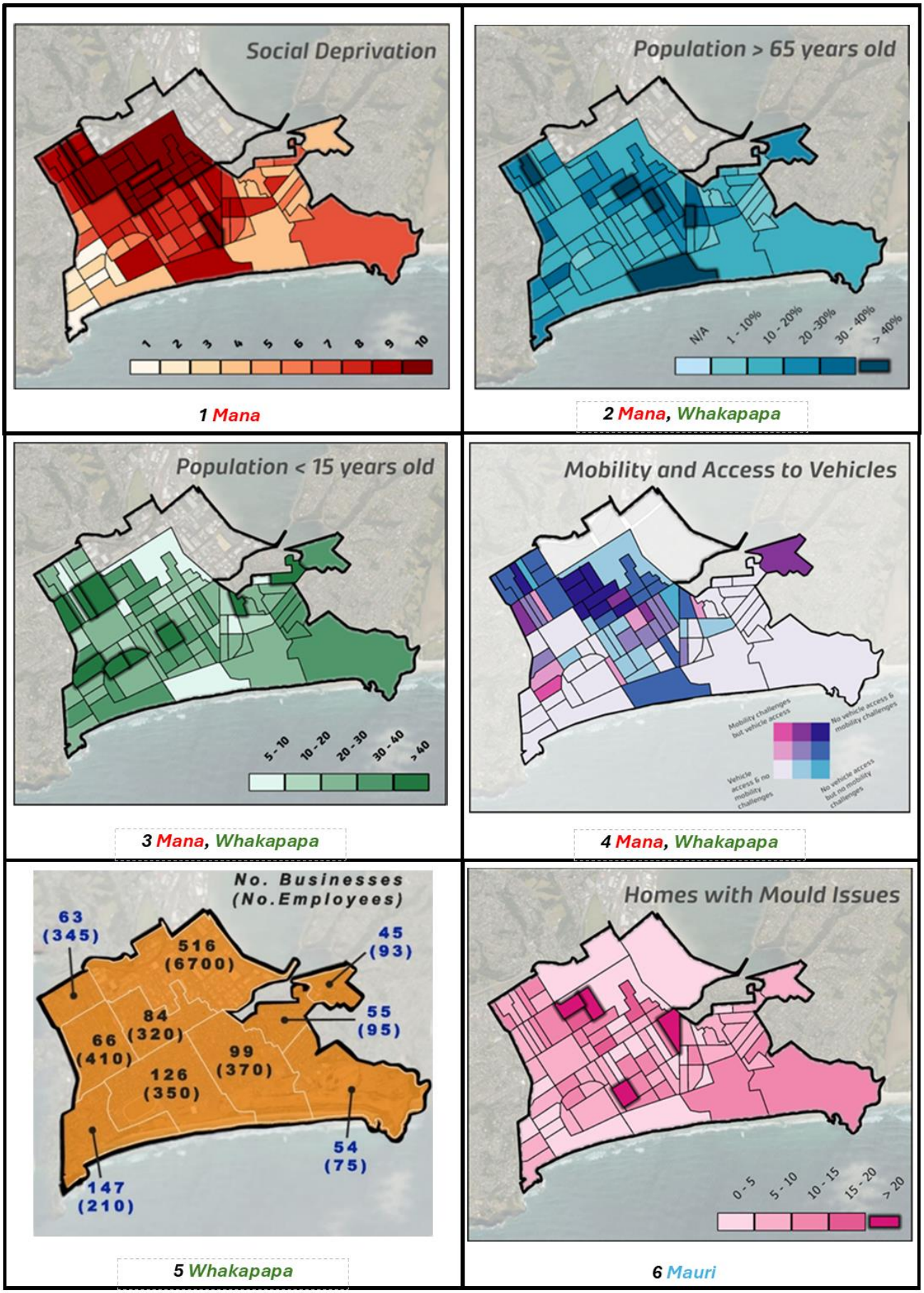
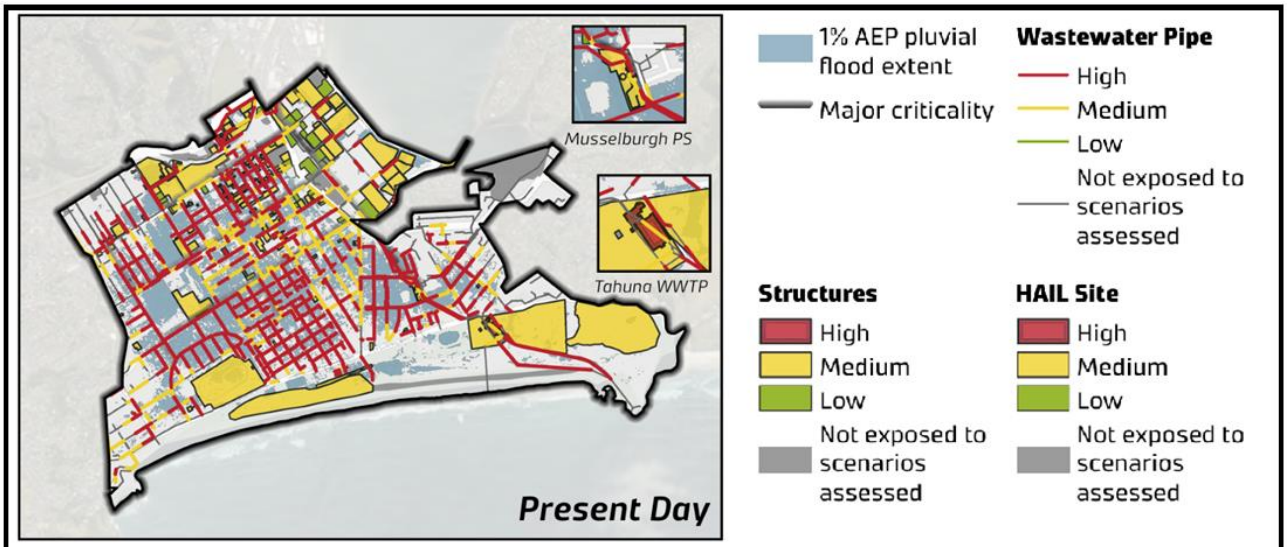
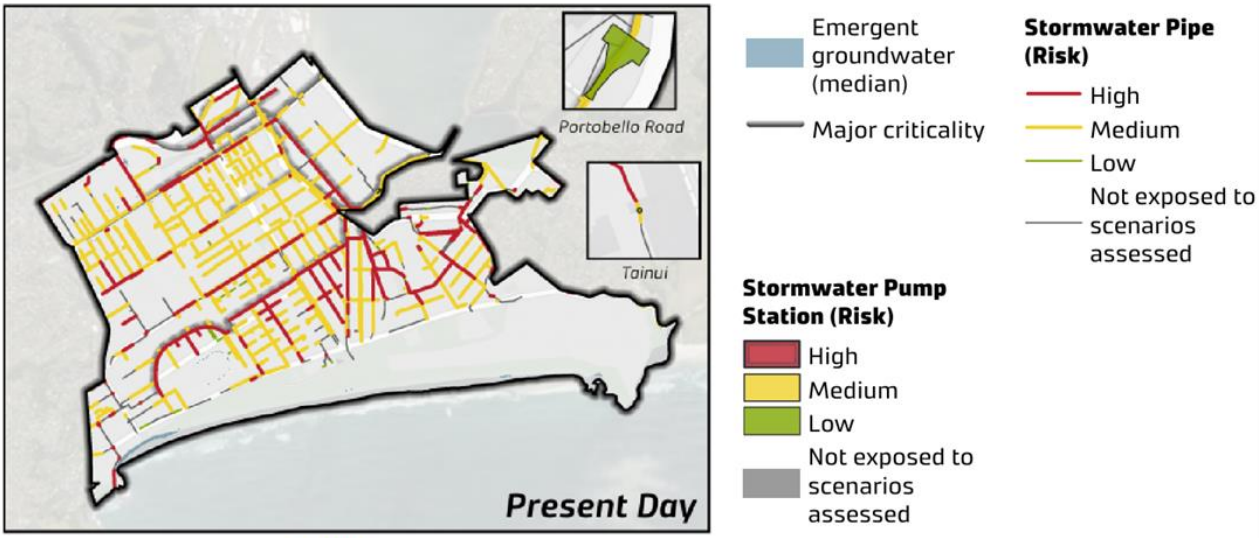


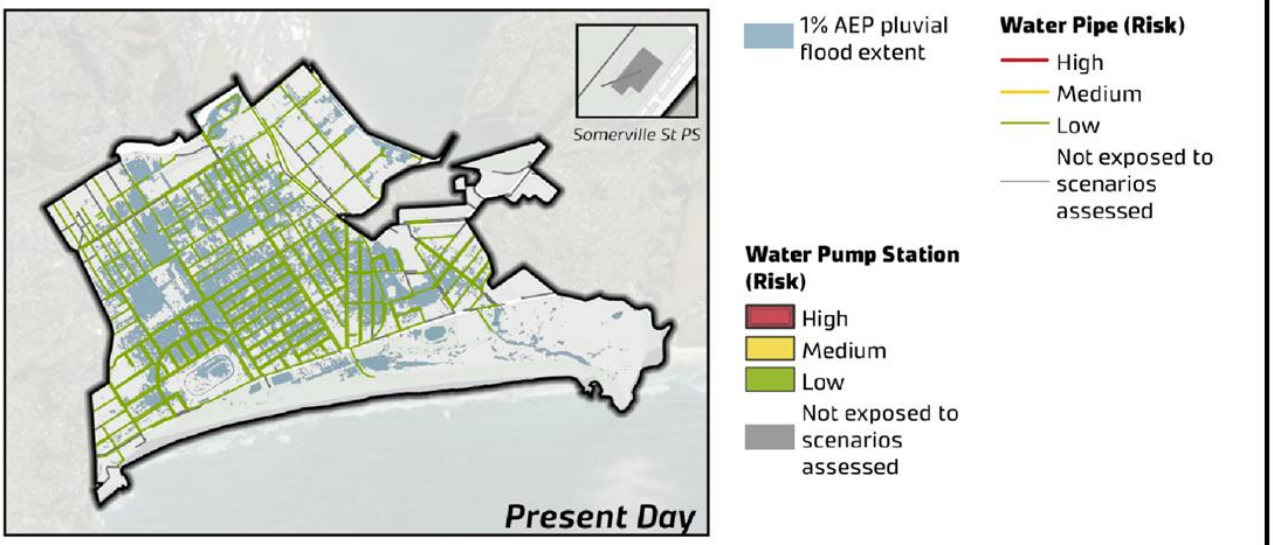
Figure 4.1: Maps of social demographics and economic distribution, with related Te Taki Haruru Values



7 Mauri: Wastewater infrastructure and contaminated land (HAIL sites) risk due to pluvial



8 Mauri: Stormwater infrastructure risk due to groundwater



9 Mauri: Water supply infrastructure risk due to pluvial flooding

Figure 4.2: Maps of three waters infrastructure and HAIL sites, with related Te Taki Haruru Values

4.3 Risk Factor Scoring

Table 4.2 is a matrix that shows how the vulnerability metrics across all four values and the exposure ratings were combined to give an overall risk score. Each of the 15 identified risk factors were evaluated against this matrix. The five-level categorisation of consequence (very low, low, moderate, high, extreme) was retained, aligning with the 2020 MfE report, which is also endorsed by the 2021 Manaaki Whenua report. This latter document has a particular focus on Māori values and is therefore seen as being appropriate to align the scorings with. Note that a five-level categorisation of consequence has been used rather than the three-level categorisation used in the SDF Risk Assessment (refer Appendix A3).

Table 4.2: Risk matrix used for basis of analysis

		Vulnerability				
		Extreme	*High*	*Moderate*	*Low*	*Very Low*
	Mana	Rakatirataka lost, community disempowered	Rakatirataka compromised, community fragmented	Rakatirataka understood, community cohesion observed	Rakatirataka asserted, community strengthened	Rakatirataka fully realised, community empowered and resilient
	Mauri	Mauri is depleted	Mauri is damaged	Mauri is maintained at current levels	Mauri improves	Mauri flourishes
	Whakapapa	Past / future connections to place broken	Past / future connections to place diminished	Past / future connections to place at current levels	Past / future connections to place improved	Past / future connections to place strengthened & celebrated
	Tapu and Noa	Tikaka and Kawa are trampled on	Tikaka and Kawa are ignored	Tikaka and Kawa are known about but not actively utilised	Tikaka and Kawa are utilised to maintain balance	Tikaka and Kawa are embedded into social structure and used to restore and maintain balance
Exposure	*Extreme*	**Extreme**	**Extreme**	**High**	**High**	**Moderate**
	High	**Extreme**	**High**	**High**	**Moderate**	**Low**
	Moderate	**High**	**High**	**Moderate**	**Moderate**	**Low**
	Low	**High**	**Moderate**	**Moderate**	**Low**	**Low**
	Very Low	**Moderate**	**Low**	**Low**	**Low**	**Very Low**

The risk analysis is compiled in Table 4.3, which is divided according to each of the four core values and provides the rationale for the exposure and the vulnerability component of each risk score.

Table 4.3: Summary of Risk Ratings and Rationale

TABLE 4.3.1: AUTŪROA - MANA			
Risk	***Rating*** ***(Exp, Vul)***	***Exposure***	***Vulnerability***
Risk that Te Tiriti partnership is not upheld	**(H, H)**	This is not a particularly localised risk. There are large tracts of council or Crown infrastructure (e.g. roads, pipes, schools, parks) but also many private assets (residential, industrial, commercial). The variance between public and private ownership makes it a high rather than extreme risk to Te Tiriti partnership.	Hazard events risk Te Tiriti delivery through socio-economic impacts, effects on whānau and diversion of central and local government resources. However, there may be room for Te Tiriti-led adaptation responses. A high rather than extreme vulnerability due to opportunities for reshaping partnership responses.
Risk of further disadvantaging communities that are currently disadvantaged and / or struggling	**(E, E)**	An extreme exposure rating as the socio-economic factors which disadvantage residents apply widely across the SDF area. These factors include social deprivation, lack of mobility & access to vehicles, and high proportions of younger & older residents.	The socio-economic landscape of South Dunedin is such that residents already face challenges to respond to hazard events as they happen but may also be limited in their ability / capacity to relocate or adapt in place.
Risk to ahi kā roa / Rakatirataka and subsequent manaakitaka and kaitiakitaka responsibilities	**(H, H)**	This is not a particularly localised risk. There are large tracts of council or Crown infrastructure (e.g. roads, pipes, schools, parks), and many private assets (residential, industrial, commercial). If these public and private sectors do not acknowledge Kāi Tahu connection and /or leadership in the area, then the risk to ahi kā and associated rakatirataka duties and responsibilities are spread across the entire area.	There is growing awareness of the on-going rakatirataka responsibilities of Kāi Tahu mana whenua amongst local government and other agencies. It is harder to gauge general community awareness. While there are some realisations of mana whenua identity currently underway (e.g. South Dunedin library, rail overbridge mural), there is a historic lack of acknowledgement of Kāi Tahu connection/lack of space for Kāi Tahu leadership – this situation is still far from being addressed. As growing uncertainties face the wider community in South Dunedin, there is a high risk to the ability of mana whenua being able to assume rakatirataka duties.
Risk to Te Taki Haruru not being honoured or upheld	**(H, H)**	This is not a localised, or geography specific risk. There are large tracts of council infrastructure (e.g. roads, pipes, parks) which they are responsible for maintaining and upgrading. If Te Taki Haruru is not upheld, it will extensively affect the SDF project area.	There is risk that there are continual delays to the implementation of Te Taki Haruru. The SDF programme provides a lead example of use of Te Taki Haruru, so if the programme is not delivered, it may undermine wider use.
Risk to social and cultural connections of whānau and hapori	**(E, H)**	Across the project area, the mobility & vehicle access limitations, the low social deprivation index scorings and the higher vulnerability populations (young and old) are all widespread. The areas prone to 2 or more hazards tend to also be the areas where residents face combinations of the above limitations to movement.	A significant proportion of residents in South Dunedin face challenges with mobility and vehicle access, and face limitations in their capacity to relocate or adapt in place following hazard events (social deprivation index, mobility & access to vehicles, and high proportions of younger & older residents are contributing factors here). Without adaptative measures those that can relocate will probably be inclined to do so, impacting the socio-cultural fabric of the area. Those that remain in place will likely experience negatively impacts on their ability to maintain connections within the study area - through loss of community, disruption to transport and social networks etc.

TABLE 4.3.2: AUORA - MAURI

Risk	*Rating (Exp, Vul)*	*Exposure*	*Vulnerability*
Risk to the protection of whenua, awa, moana, wāhi tapu, marae access, ara tawhito, archaeological sites, mahika kai, hauora	**(E, E)**	The sites and infrastructure with the potential to further degrade the mauri of the area and its various taoka are widespread around the project area; as such the exposure has been rated extreme.	The project area is heavily modified and heavily degraded, containing several Hazardous Activities and Industries List (HAIL) sites, a Wastewater Treatment Plant discharging directly to the coastal marine area and a large portion of the Dunedin industrial area at the head of the harbour. Climate-related changes will lead to on-going events that result in contamination of and extreme risk to te taiao. The following factors also have extreme impact on the hauora of residents: - Substandard housing and unhealthy homes - Widespread three waters network capacity issues and potential for wastewater contamination - Continued concern and uncertainty amongst residents around future risks, outcomes and ability to adapt - Increased likelihood of severe flooding events
Risk to te mana o te wai	**(E, H)**	The widespread three waters network capacity issues and potential for wastewater contamination contribute to an extreme level of exposure to risks to Te Mana o Te Wai in the project area.	The extent of three waters network capacity issues and potential for contamination contribute to a high level of vulnerability for Te Mana o Te Wai. The mauri in the area is severely damaged and lack of intervention and adaptation will exacerbate this vulnerability.
Risk to the ki uta ki tai perspective	**(E, E)**	Much of the natural environment in the project area has been modified. These modifications have generally been done (historically) without considering the holistic or whole-of-catchment effects on water or mauri. As such there are very widespread risks to a ki uta ki tai perspective.	Being low-lying, the water entering South Dunedin tends to be more contaminated than further up the catchment; the movement is constrained almost entirely to pipes. The former connections to Te Tai o Arai te Uru and ability for natural functioning of the moana have been drastically altered. The increased frequency and magnitude of severe weather events pose an extreme risk to whole-of-catchment management approaches.

TABLE 4.3.3a: AUTAKATA - WHAKAPAPA

Risk	*Rating (Exp, Vul)*	*Exposure*	*Vulnerability*
Risk to mātauraka ā-hapū, mātauraka ā-iwi, tikaka ā-iwi, tikaka ā-hapū	**(M, H)**	Digital archives such as Kā Huru Manu atlas have allowed mātauraka to be archived on a scale unavailable to tūpuna Māori. Passing the kōrero down to subsequent generations now has more avenues than were previously available. Mana Whenua connections to the area are enshrined in the Ngāi Tahu Claims Settlement Act 1998 (NTCSA), which formally acknowledges the repeated breaches of Te Tiriti o Waitangi in the southern takiwā. With the NTCSA comes proper acknowledgement of the Ngāi Tahu authority held in the area, and of the cultural associations with the area. Although significant amounts of mātauraka have been lost and significant land use change has occurred within the SDF project area, there are tools and resources available which drastically reduce the chances of more mātauraka and cultural associations being lost.	When the connections to the place and its resources are severely impacted by outside influences (e.g. colonisation, urbanisation, suppression of language and culture) the ability to transfer mātauraka is always affected. Land use change has detrimentally affected areas that were previously important for mahika kai and other purposes. However, there has been a wider rekindling of Kāi Tahu cultural identity in recent decades. This, in conjunction with newer communication tools (e.g. online) and a wider renaissance in appreciation of te ao Māori (including growth of kohanga reo and kura, along with a more balanced school curriculum), has likely had a positive effect on the ability to retain and transfer mātauraka-ā-hapū. Continuation of the 'keep doing what we are doing' scenario limits mātauraka- and tikaka -led actions from being integrated in the area.
Risk to economic capacity to adapt and thrive in an equitable manner	**(H, H)**	The hazard mapping shows a current widespread distribution of 1-3 moderate to high level hazards across the entire project area, with the majority of the commercial and industrial zones being exposed to 3 hazards by 2060; as such the exposure level has been scored as being high.	The SDF project area encompasses substantial commercial and industrial sectors (~1300 businesses employing ~9 000 people). The anticipated impacts of climate change related hazard events under a 'keep doing what we are doing' scenario will have substantial negative impacts on the continued operation for many of these businesses. It therefore poses a high risk for residents and employees in the project area to adapt and thrive equitably to the economic challenges that will occur as a flow on effect.
Risk to upholding the traditions, pūrākau and associations that weave mana whenua to te taiao	**(M, H)**	Many of the traditional cultural associations with the area are no longer available due to land use change, reclamation or drainage, and significant urbanisation of the area. Over time new associations with the area have formed, but te taiao has changed significantly. The pūrākau associated with and cultural uses of te taiao that are currently still available may not be widespread within the SDF project area. As there have already been significant negative impacts from past factors, the exposure level has been scored as moderate.	More contemporary associations and reconnection to te taiao have largely come through mana whenua involvement in institutions such as schools, or cultural input (designs, narratives) into projects run by council (e.g. South Dunedin Library) and other agencies. The increasing potential for the area to become uninhabitable is likely to cause whānau to migrate elsewhere, while loss of social and economic investment in the area may limit opportunities for cultural input, revitalisation and the embedding of Kāi Tahu narratives.

TABLE 4.3.3b: AUTAKATA - WHAKAPAPA

Risk	*Rating (Exp, Vul)*	*Exposure*	*Vulnerability*
Risk to wāhi tūpuna	**(M, H)**	The physical connections to wāhi tūpuna in the area (e.g. mahika kai, awa tawhito and tauraka waka) are no longer available or severely degraded due to land use change, reclamation or drainage (e.g. loss of Kaituna), and significant urbanisation of the area. Cultural associations with the area have been damaged through these physical changes and historic lack of respect and concern for mana whenua (repeated breaches of Te Tiriti). As there have already been significant negative impacts from past factors, the exposure level has been scored as moderate.	While connections to wāhi tūpuna were damaged by post-colonial development, there has been a rekindling of associations through mana whenua involvement in institutions such as schools, or cultural input (designs, narratives) into projects run by council (e.g. South Dunedin Library), and other agencies. Mana whenua will always be connected to the area through ahi kā roa, but loss of further opportunities to enhance Kāi Tahu presence as the area degrades is a high risk to the Kāi Tahu associations with wāhi tūpuna.
Risk of ongoing social isolation, social marginalisation to communities	**(E, H)**	Across the project area, the mobility & vehicle access limitations, the low social deprivation index scorings and the higher vulnerability populations (young and old) are all widespread. The areas prone to 2 or more hazards tend to also be the areas where residents face combinations of the above limitations to movement.	A significant proportion of residents in South Dunedin face challenges with mobility and vehicle access, and face limitations in their capacity to relocate or adapt in place following hazard events (social deprivation index, mobility & access to vehicles, and high proportions of younger & older residents are contributing factors here). Without adaptative measures those that can relocate will probably be inclined to do so, impacting the socio-cultural fabric of the area.
Risk of overlooking intergenerational impacts (both past and potential future) of inequitable transitions	**(M, E)**	The risk of inequitable transitions, including through overlooking historic and socioeconomic factors that have led to the current composition of the wider South Dunedin community, is ranked as moderate. Future opportunities exist to build on the shared recognition and understanding of South Dunedin's past, its strong and resilient community networks tackling climate challenges head-first, and the growing recognition of the rakatira and kaitiaki role of Kāi Tahu mana whenua, to reinforce the need for transition to a more equitable future for South Dunedin.	Land use and economic changes have already disproportionately affected mana whenua and other residents in the SDF project area, and further down the peninsula (specifically the unserviced areas past Portobello). Some of the factors which compound these effects are current and historical infrastructure challenges, closure of industry, and resourcing constraints from local and central government. The current central government does not appear to be not prioritising equitable transitions or actualisation of mana motuhake for mana whenua, which contributes to a higher risk for mana whenua and other communities that have been disadvantaged in the past to be disadvantaged again.

TABLE 4.3.4: AUTAKETAKE – TAPU & NOA

Risk	*Rating (Exp, Vul)*	*Exposure*	*Vulnerability*
Risk to using / practicing of tikaka and kawa to restore and maintain balance	**(H, H)**	This is not a localised, or geography specific risk. There are large tracts of council infrastructure (e.g. roads, pipes, parks) that they are responsible for maintaining and upgrading, and large tracts of private infrastructure (residential, commercial and industrial). The issue of ignoring tikaka and kawa has the potential to have widespread effects across the entire SDF project area.	The intent to abide by tikaka is sometimes apparent in the public and private sectors, but historical and other factors usually limit the full use and understanding of it (beyond use as a ceremonial tool, i.e. karakia, waiata, whakatau). As an example, local councils are aware of the associations of Te Tai o Arai te Uru as the traditional food source for mana whenua and appreciate that it is culturally inappropriate to discharge wastewater into the marine environment, however, despite upgrades into levels of treatment, the Tāhuna Wastewater Treatment Plant still discharges into the marine environment. Due to the historical lack of mana whenua voices in governance or strategic roles for works affecting the area, there has been limited actualisation of tikaka and kawa in the South Dunedin area, which in turn affects how readily and easily this facet is integrated in for future works. It is expected through the hazard mapping that hazard events with direct tikaka / kawa / tapu and noa implications are likely to impact the project area (further degradation of the coastal marine area through wastewater and industrial run-off, wastewater overflows in residential areas etc).

5 Summary of Mana Whenua Risk Findings

Each risk factor shown in Table 5.1 was assessed using the methodology described in sections 3 and 4 to determine the vulnerability and exposure. These were aggregated up to the four Te Taki Haruru principles to give an overarching picture of risk, shown in Figure 5.1.

Table 5.1: Risks to mana whenua values in South Dunedin

Autūroa Mana	01. Risk that Te Tiriti partnership is not upheld 02. Risk of further disadvantaging communities that are currently disadvantaged and / or struggling 03. Risk to ahi kā / Rakatirataka and subsequent manaakitaka and kaitiakitaka responsibilities 04. Risk to Te Taki Haruru not being honoured or upheld 05. Risk to social and cultural connections of whānau and hapori
Auora Mauri	06. Risk to the protection of whenua, awa, moana, wāhi tapu, marae access, ara tawhito, archaeological sites, mahika kai, hauora 07. Risk to te mana o te wai 08. Risk to the ki uta ki tai perspective
Autakata Whakapapa	09. Risk to mātauraka-ā-hapū, mātauraka-ā-iwi, tikaka-ā-iwi, tikaka-ā-hapū 10. Risk to economic capacity to adapt and thrive in an equitable manner 11. Risk to upholding the traditions, pūrākau and relations that weave mana whenua to te taiao 12. Risk to wāhi tūpuna 13. Risk of ongoing social isolation, social marginalisation to communities 14. Risk of overlooking intergenerational impacts (past & potential future) of inequitable transitions
Autaketake Tapu & Noa	15. Risk to using / practicing of tikaka and kawa to restore and maintain balance

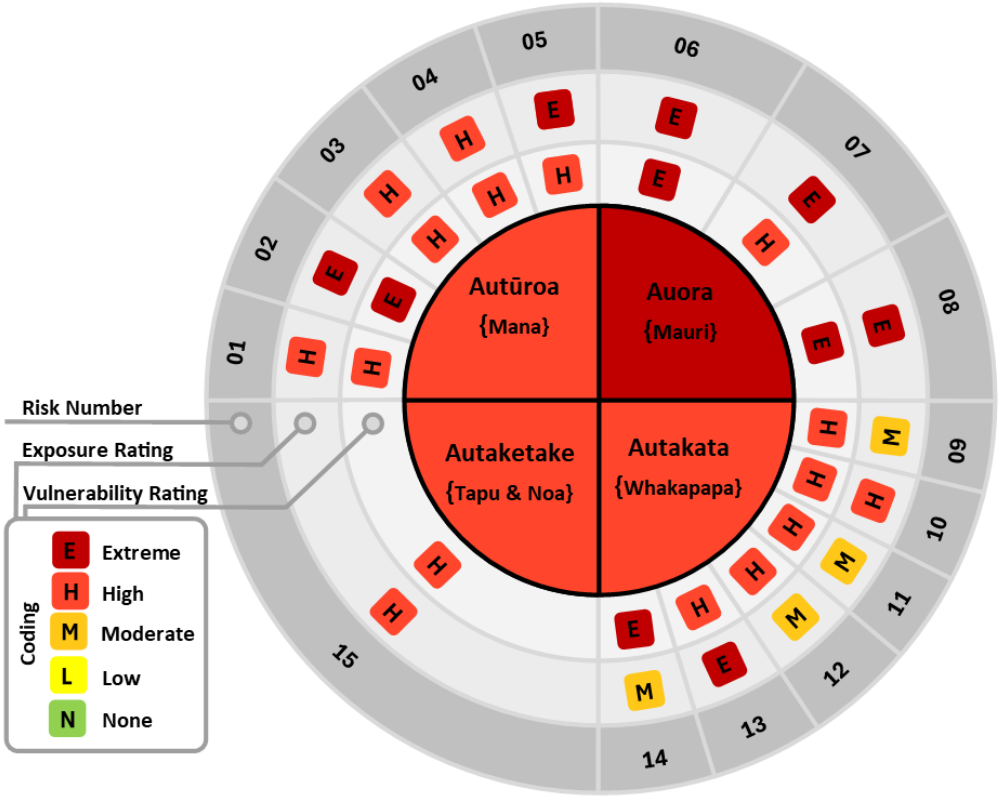


Figure 5.1: Combined risk to each Te Taki Haruru Principle / Value

The Mana Whenua Risk Assessment has shown that, from a Kāi Tahu perspective, there is substantial risk resulting from a 'keep doing what we are doing' scenario, where there are no additional interventions to address the issues facing South Dunedin. The level of risk to all four Te Taki Haruru values is significant, ranging from high (mana, whakapapa, tapu & noa) to extreme (mauri). The results from the mana whenua risk analysis support the case for change in response to the modelled natural hazards and climate risks.

Appendix A1: Cultural Values Summary

South Dunedin Futures

Cultural Values Summary

October 2024

Aukaha

KIA KAHA, AU KAHA

Kupu whakataki / Introduction

This document summarises Kāi Tahu mana whenua informed values for the South Dunedin Futures programme. These core concepts have been derived from wānaka with a panel of mana whenua representatives, utilising a cultural values-based system to understand the significance of place, whakapapa and the programme's wider context. This values mahi also draws on Te Taki Haruru, the Dunedin City Council's Māori strategic framework.

Mana whenua, in conjunction with Aukaha, have recognised key opportunities to embed these cultural values throughout the entirety of this programme. These cultural values should be treated as preliminary and applicable to this programme alone. As such they are not to be used for external publication without the approval of Aukaha, who have prepared this document alongside, and on behalf of mana whenua.

Intellectual Property

This body of work contains mātauraka Kāi Tahu knowledge and is intellectual property held collectively and represented by Aukaha and mana whenua. It is important that any contractual undertaking acknowledge the **Wai 262 Claim** which address the ownership and use of Māori knowledge, cultural expressions, indigenous species of flora and fauna, all known as taoka (treasure), and inventions and products derived from indigenous flora and fauna and/or utilised Māori knowledge.

As such ownership of any work produced by Aukaha are retained by Aukaha, or by mana whenua as outlined above. Integration of cultural values therefore cannot be subject to re-use, alteration, manipulation, removal without consultation with Aukaha and mana whenua.

It is also our expectation that mana whenua is referenced for their involvement from the outset.

Kā uara / core values

Mana

Rakatirataka, authority, responsiblility

- Mana whenua are decision-makers in relation to te taiao, including how wai is managed, in adaptation responses to climate change and in management approaches to Three Waters.
- Mana whenua are leaders able to influence decisions affecting the social and economic wellbeing of South Dunedin, with a focus on building empowered, connected and resilient communities.
- Use of Kāi Tahu knowledge and reflections of Kāi Tahu identity are led and approved by Mana Whenua according to tikaka.

Related values: Ahi kā/Rakatirataka, Tiakina, Manaakitaka, Kāika, Kiri tuna, Aroha tetahi ki tetahi, Whakamana, Whaikaha,

Related practices: Tikaka (restoration), Whakatere

Whakapapa

Genealogy, history, layers, connections

- Kāi Tahu traditions and connections, including to wai, whenua and moana, are recognised in the South Dunedin programme.
- Contemporary mana whenua relationships guide the journey to a just and equitable transition.
- Mana whenua names and places are used and celebrated, along with Kāi Tahu design elements, to enhance sense of place and identity.
- Kāi Tahu mātauraka and tikaka inform planning and decision making approaches.

Related values: Whakapapa, Mātauraka, Auahataka, Pukumahi, Pōhara, Pākehā, Whairawa, Poutama, Haere whakamua,

Related practices: Ara tāwhito, Ara hikoi, Whakatere, Tikaka

Mauri

Life Principle, vital essence

- The restoration and enhancement of the mauri of te taiao is an integral part in the South Dunedin programme.
- The restoration and regeneration of South Dunedin is guided by Kāi Tahu kaitiakitaka.
- Socio-economic and cultural well-being are at the heart of a just transition for the South Dunedin community.
- The Hauora of the people and communities of South Dunedin are enhanced.

Related values:	Te taiao: oraka whenua/oraka takata
Related practices:	Mahika kai, Whakatere, Tikaka

Tapu & Noa

Restricted, prohibited, safety, restoration of balance

- Human activities, including those relating to stormwater and wastewater, are managed to protect te taiao.
- Community safety and well-being are protected through responsible regulatory measures and other processes.
- Mana whenua will identify and lead the appropriate tikaka regarding tapu and noa.

Related values:	Utu
Related practices:	Whakatere, Tikaka

Related cultural values (Mana)

Ahi Kā / Rakatirataka

Reinforcing mana whenua rakatirataka, including through recognition of the on-going Kāi Tahu presence in South Dunedin and relationship to the surrounding catchment

Tiakina

The exercise of guardianship, care and protection by mana whenua in relation to te taiao

Manaakitaka

The role of mana whenua to support their people, the wider community, and the environment; the ability for mana whenua to action this role

Kāika / Resilience (kiri tuna)

Building resilient communities, ensuring healthy homes for all

Aroha tetahi ki tetahi

Building caring, connected and equitable communities across South Dunedin

Whakamana / Whaikaha

The South Dunedin community is strengthened, empowered and uplifted

Related cultural values (Whakapapa)

Whakapapa

Whānau memory of and connection to South Dunedin, including Kaituna, te awa moana o Ōtākou, Te Tai o Arai Te Uru, Te Moananui-a-kiwa.

Mātauraka

Connecting and building knowledge to help shape generations. Supporting and celebrating schools and other educational institutes within the area.

Auahataka / Pukumahi

Recognising and restoring South Dunedin's role in innovation (whakaihu waka), industry and leadership.

Pōhara / Pākehā / Whairawa

The movement and restoration of wealth and equity in the context of South Dunedin's socio economic history and changes in the area. Seeking and securing abundance for all parts of society.

Poutama / Haere whakamua

Different steps along the journey to a just transition and adaption, based on understanding the values and needs of te hapori whānui. Having a focus on future generations, while not forgetting the past.

Related cultural values (Mauri)

Te Taiao - Oraka whenua / Oraka Takata

The health of people is based on the health of the whenua, waimāori and the moana

Tiakina

The exercise of guardianship, care and protection by mana whenua in relation to te taiao

Related cultural values (Tapu)

Utu

Restoration of degraded mauri, recognising and restoring the mana of wai and moana, of hapū and hapori

Related cultural practices

Tikaka

Applying tikaka in the restoration of te taiao and communities, and the associated practices (karakia, rāhui, etc)

Mahika Kai

Resource harvesting areas and practises (e.g. hauhake, different fishing methods). Loss of mahika kai including through environmental degradation and contamination. Future opportunities through restoring balance to te taiao.

Ara Tāwhito / Ara Hīkoi

Old pathways and practices, seeking new pathways and practices.

Whakatere (navigations)

Navigating the future, navigating the space, setting new directions for South Dunedin.

Linking related values and practises to four core values

Core Principles	**Autūroa**	**Autakata**	**Auora**	**Autaketake**
Values	**Mana**	**Whakapapa**	**Mauri**	**Tapu**
Related values	Ahi kā Rakatirataka Tiakina Manaakitaka Kāika Kiri tuna Aroha tetahi ki tetahi Whakamana Whaikaha	Whakapapa Mātauraka Auahataka Pukumahi Pōhara Pākehā Whairawa Poutama Haere whakamua	Te Taiao: oraka whenua/ oraka takata	Utu
Cultural practices		Ara tāwhito Ara hīkoi	Mahika kai	
	Whakatere, Tikaka (restoration)			

Appendix A2: Qualitative Risk Analysis

South Dunedin Futures – Mana Whenua Risk Factors (qualitative responses)

1. What does ideal Te Tiriti partnership / participation / protection look like?

Mana whenua have an intergenerational connection to the South Dunedin area and are natural partners in relation to key projects and programmes affecting the project area.

This includes being able to co-design and/or be joint decision-makers on:

- Adaptation responses to climate and natural hazard risk
- Management approaches to Three Waters projects
- Major resource consents and plan changes affecting te taiao
- Council long term planning approaches to community and economic well-being

How would you rate the current situation and how this is likely to be affected in future?

Local councils are including mana whenua representatives in major projects affecting South Dunedin; however, the governance structures do not provide space for mana whenua leadership. There are also legacy issues (e.g. past approaches such as inappropriate wastewater treatment and disposal, inadequate funding allocations for upgrade and replacement) that limit the ability of councils to align project outcomes with mana whenua aspirations. Further, external factors such as central government positioning are likely to exacerbate difficulties in achieving meaningful Te Tiriti partnership.

There is a **HIGH RISK** to upholding Te Tiriti partnership in a meaningful way without involving mana whenua at a governance level in responding to the challenges facing South Dunedin.

2. What constitutes rakatirataka & ahi kā roa for mana whenua in the South Dunedin area?

The authority of mana whenua in South Dunedin is respected and mana whenua are enabled to exercise manaakitaka and other key responsibilities associated with rakatirataka. Rakatirataka is recognised through the visible presence of mana whenua in South Dunedin in leadership roles, in physical manifestations of Kāi Tahu identity (e.g. design elements, tohu whenua) and in wider community awareness of Kāi Tahu associations with the area.

How would you rate the current situation and how this is likely to be affected in future?

There is growing awareness of the on-going rakatirataka responsibilities of Kāi Tahu mana whenua amongst local government and other agencies. It is harder to gauge general community awareness. While there are some physical realisations of mana whenua identity currently underway (e.g. South Dunedin library, rail overbridge mural), there is a historic lack of acknowledgement of Kāi Tahu connection/lack of space for Kāi Tahu leadership – this situation is still far from being addressed. As growing uncertainties face the wider community in South Dunedin, there is a **HIGH RISK** to the ability of mana whenua being able to assume rakatirataka duties.

3. What are the risks to community cohesion?

- Loss of or major disruption to community infrastructure such as meeting spaces, cultural spaces, schools and parks
- Disruption to transport links
- Increasing community migration outside of the area

- Disruption to community groups, clubs and other social networks
- Disruption to whānau and other extended family networks across South Dunedin

How would you rate the levels of community cohesion currently, and how is this likely to be affected in future?

South Dunedin is a connected community with strong networks. In the absence of any intervention, there is a **HIGH RISK** to maintaining community cohesion as disruptive factors associated with hazards and climate change increase.

4. What are the risks to the hauora of the residents and community?

- Substandard housing, unhealthy homes, and significant loss of household wealth
- Widespread three waters network capacity issues and potential for wastewater contamination
- Continued concern and uncertainty amongst residents around future risks, outcomes and ability to adapt
- Increased likelihood of severe flooding events
- Increased movement of human and financial capital, and concentration of poor socio-economic outcomes

How likely is this to be affected in the future?

There is a **HIGH** to **EXTREME RISK** to the hauora of residents and the community. Climate change impacts are likely to increase the frequency and severity of risk across the project area.

5. How does the quality and movement of wai in South Dunedin relate to the wider catchment? (ki uta ki tai)

Being low-lying, the water entering South Dunedin tends to be more contaminated than further up the catchment, the movement is constrained almost entirely to pipes. The former hydrological connections to Te Tai o Arai te Uru have been drastically altered.

How likely is this to be affected in the future?

Increased storm and other climate events will lead to greater contaminant loadings, risk of system failure, wastewater overflows. This will lead to severe impacts on the quality and migration of wai as it tries to move within a constrained system not designed for these events. Contaminated water has the potential to leach into Te Tai o Arai te Uru and conversely there is risk of incursion of the moana at Kettle Park with associated buried contaminants.

There is an **EXTREME RISK** to mauri from a ki uta ki tai perspective.

6. What level of risk is there to Kāi Tahu connections to South D as a wāhi tūpuna?

The project area includes longstanding cultural associations such as mahika kai / nohoaka, ara tawhito and tauraka waka. The traditional connections to these sites have already been damaged due to post-colonial development. More contemporary associations have come through different avenues, such as mana whenua involvement in institutions (e.g. schools) or cultural input (designs, narratives) into projects run by council (e.g. South Dunedin Library) and other agencies.

In terms of risk, the increasing potential for the area to become uninhabitable is likely to cause whānau to migrate elsewhere, which may impact on Kāi Tahu connection to the area. Loss of

social and economic investment in the area as it degrades may affect opportunities for cultural input and revitalisation. Mana whenua will always be connected to the area through ahi kā roa, but past modification of the area has diminished the visible sense of this connection (e.g. loss of Kaituna) and the situation is unlikely to improve.

There is a **MODERATE** to **HIGH RISK** to Kāi Tahu connections to South Dunedin.

7. How readily is mātauraka ā-hapū passed across the generations?

When the connections to the place and its resources are severely impacted by outside influences (e.g. colonisation, urban development) the ability to transfer mātauraka is always affected. Land use change, reclamation and other factors have detrimentally affected areas that were previously important for mahika kai and other purposes. However, there has been a wider rekindling of Kāi Tahu cultural identity in recent decades. This, in conjunction with newer communication tools (particularly digital tools) and a wider renaissance in appreciation of te ao Māori (including growth of kohanga reo and kura, along with a more balanced school curriculum), has likely had a positive effect on the ability to retain and transfer mātauraka-ā-hapū.

How is this likely to be impacted in the future?

There is a **MODERATE** to **HIGH RISK** to the ability to transfer mātauraka ā-hapū across generations. The loss of direct physical connection to certain areas previously important for practices such as mahika kai is unlikely to change. However, the growth in younger generations eager to embrace their Kāi Tahutaka is likely having a positive impact on knowledge transfer.

8. To what extent is tikaka used in governance and decision-making across South Dunedin?

Tikaka is not used in decision making or governance forums. In recent times, councils have often displayed intent to abide by tikaka but historical and other factors usually limit the full use of it (beyond its use as a ceremonial tool, i.e. use of karakia, waiata, whakatau). As an example, local councils are aware of the associations of Te Tai o Arai te Uru as the traditional food source for mana whenua and appreciate that it is culturally inappropriate to discharge wastewater into the marine environment, however, despite upgrades into levels of treatment, the Tāhuna Wastewater Treatment Plant still discharges into the marine environment.

An example of use of tikaka that employs tapu and noa is around the declaration of rāhui when there are deaths in the environment. However, this is a rare example of where the tapu and noa balance is used as a management tool.

How would we rate the risk to the use of tikaka to achieve balance / restoration?

There is a **HIGH RISK** to the use of tikaka to achieve balance and restoration in South Dunedin.

Appendix A3: Element Level Risk Assessment

The matrices below show the classification of risk in the SDF risk assessment (Figure A3.1) and the Mana Whenua Risk Assessment (Figure A3.2). Due to the non-physical nature of some risks facing mana whenua values, it was decided it would be appropriate to classify the (Extreme, Moderate) and (High, High) risks as being High, rather than medium as per the SDF risk matrix.

During the analysis, it was decided that three levels of risk were not sufficient, and the final analysis was conducted in alignment with the Manaaki Whenua 2021 report, the five-level risk categorisation is shown in Figure A3.3. A numerical value was assigned to each level, which helped to quantify how to categorise each level of risk.

Exposure	**Vulnerability**				
	Very low	Low	Moderate	High	Extreme
Extreme					
High					
Moderate					
Low					
Very low					

Green = low risk | Yellow = medium risk | Red = high risk

Figure A3.1: SDF Element Level Physical Risk Matrix

Exposure	**Vulnerability**				
	Very low	Low	Moderate	High	Extreme
Extreme					
High					
Moderate					
Low					
Very low					

Green = low risk | Yellow = medium risk | Red = high risk

Figure A3.2: Modified Element Level Matrix for Mana Whenua Risk

		Vulnerability				
		Extreme	High	Moderate	Low	V. Low
	Numerical value	**5**	**4**	**3**	**2**	**1**
Exposure Extreme	**5**	**25**	**20**	**15**	**10**	**5**
High	**4**	**20**	**16**	**12**	**8**	**4**
Moderate	**3**	**15**	**12**	**9**	**6**	**3**
Low	**2**	**10**	**8**	**6**	**4**	**2**
V. Low	**1**	**5**	**4**	**3**	2	**1**

Figure A3.3: Final Mana Whenua Element Level Risk Matrix

The numerical values included in Figure A3.3 show that the relationship between vulnerability and exposure components of risk can be viewed as multiplicative; to represent the compounding impact as the two contributing factors increase. Under this rationale, the increase in risk consequence is quadratic (i.e. following an x^2 relationship).

As such, the five levels of overall risk are defined by which two consecutive square numbers (1, 4, 9, 16, 25) they sit between; inclusive of the upper limit but not the lower limit. Table A3.1 details the logic behind ranking the risk severity.

Range of Risk Values	*Associated Risk Consequence Rating*
4^2 < Risk Value ≤ 5^2	**EXTREME**
3^2 < Risk Value ≤ 4^2	**HIGH**
2^2 < Risk Value ≤ 3^2	**MODERATE**
1^2 < Risk Value ≤ 2^2	**LOW**
Risk Value ≤1^2	**VERY LOW**

Table A3.1: Assigning risk consequence based on numerical risk values

This does not distribute the levels equally; there is only one option for a '*very low*' risk outcome, there are seven options for each of the '*low*', '*moderate*' and '*high*' outcomes, and there are three options for an '*extreme*' risk outcome. The distribution is also symmetrical about the line of increasing vulnerability and increasing exposure, indicating that the severity of a high exposure and moderate vulnerability is the same as a moderate exposure and high vulnerability.