ATTACHMENTS

DEVELOPMENT AND INFRASTRUCTURE SERVICES COMMITTEE MEETING

12 June 2024

6.00pm

City of Albany Council Chambers

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R1782 Rev 1

December 2023

City of Albany

Whalers Beach Public Infrastructure Coastal Hazard Risk Management & Adaptation Plan

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1. Introduction

The City of Albany (City) manages the popular Whalers Beach area (Site), located south-east of Albany, Western Australia. The site is a popular destination for both tourists and locals alike and with a high-end holiday accommodation development planned for the area an increase in use of the public assets is likely. The locality of the site is shown in Figure 1.1.

The Site has numerus public assets and the City is responsible for their management. As part of the management process, there is a requirement to assess the risks to the public assets from coastal hazards. The City has therefore engaged specialist coastal engineers M P Rogers & Associates Pty Ltd (MRA) to produce a Coastal Hazard Risk Management and Adaptation Plan (CHRMAP) for the public assets within the Site.

A Coastal Hazard Assessment (CHA) has recently been completed for Whalers Beach. This work was commissioned by the City, though was partly funded by the developer of the holiday accommodation. The results of the coastal hazard assessment are outlined in MRA (2022) and will be used as the basis for this CHRMAP. The CHA identified some localised erosion that was affecting the foreshore area and detailed some stabilisation works completed by the city.

The requirements and framework for a CHRMAP are outlined in State Planning Policy No. 2.6 - State Coastal Planning Policy (SPP2.6) and more specifically in the CHRMAP Guidelines (WAPC 2019). The CHRMAP for the public assets within the Whalers Beach area has been completed in accordance with those documents.

Figure 1.1 Location of Site

1.1 State Planning Policy 2.6

Within Western Australia, SPP2.6 provides guidance for land use and development decision-making within the coastal zone, including the establishment of coastal foreshore reserves to protect, conserve and enhance coastal values. SPP2.6 also provides guidance on the assessment of coastal hazard risks for assets located in close proximity to the coast.

The objectives of SPP2.6 are wide ranging, however a key component of the policy is the identification of appropriate areas for the sustainable use of the coast. This includes maintaining public access to the foreshore and provision of appropriate foreshore amenities. Table 1.1 provides details of how the City is addressing the stated objectives of SPP2.6.

Table 1.1 Alignment of asset management with SPP2.6 Objectives

SPP2.6 Policy Objective		Description of Proposed Public Asset
1	Ensure that development and the location of coastal facilities takes into account coastal processes, landform stability, coastal hazards, climate change and biophysical criteria.	The identification of Coastal Hazards is addressed within Section 3 of this CHRMAP. This section assesses the coastal processes at Whalers Beach, within the context of the coastal geomorphology and geology as recommended by SPP2.6. This CHRMAP aims to inform and provide appropriate guidance to key stakeholders with respect to future management of the aforementioned factors.
2	Ensure the identification of appropriate areas for the sustainable use of the coast for housing, tourism, recreation, ocean access, maritime industry, commercial and other activities.	The foreshore area and associated public assets facilitate access to the coast for locals and tourists alike. In addition, the Site has historic whaling station ruins accessible as tourist attractions encouraging engagement with the region's rich maritime history. This CHRMAP aims to inform the current and future uses to ensure sustainability with regard to the identified coastal hazards.
3	Provide for public coastal foreshore reserves and access to them on the coast.	The existing public foreshore reserve 21337 includes a grassed picnic area with BBQs and tables behind the sandy beach. The adaptation and management plan aims to provide public access to the beach and foreshore area for the longest timeframe.
4	Protect, conserve and enhance coastal zone values, particularly in areas of landscape, biodiversity and ecosystem integrity, indigenous and cultural significance.	The City recognises the strong support for retaining public access to the beaches and foreshore reserve as well as preserving the surrounding natural environment for future generations. The foreshore reserve also conserves and enhances engagement with the significant cultural heritage of the area, particularly the historic Norwegian whaling station.

The key requirement of a CHRMAP is to develop a risk based adaptation framework for assets that could be at risk of impact by coastal hazards over the relevant planning timeframe. Importantly, the balance of these risks needs to be considered with reference to the expected lifetime of the relevant assets.

This CHRMAP report has been prepared to provide guidance regarding the risks posed by coastal hazards. Specifically, it covers the following items:

- Establishment of the context.
- Coastal hazard assessment and identification.
- Risk/vulnerability analysis and evaluation.
- Risk management and adaptation planning.
- Implementation planning.
- Monitoring and review.

Details regarding each of these items will be provided in this report.

2. Context

2.1 Purpose

The potential vulnerability of the coastline and the subsequent risk to the community, economy and environment needs to be considered for any coastal infrastructure.

SPP2.6 requires that the responsible management authority prepares a CHRMAP where existing or proposed assets or infrastructure may be at risk from coastal hazards over the planning timeframe. The main purpose of the CHRMAP is to define areas of the coastline which could be vulnerable to coastal hazards and to outline the preferred approach to the monitoring and management of these hazards where required.

A CHRMAP can be a powerful planning tool to help provide clarity to existing and future developers, users, managers or custodians of the coastline. This is done by defining levels of risk exposure, management practices and adaptation techniques that the management authority considers acceptable in response to the present and future risks posed by coastal hazards.

Specifically, the purpose of this CHRMAP is as follows.

- Determine the specific extent of coastal hazards in relation to the City's public assets.
- Determine the coastal hazard risks associated with the City's public assets and how these risks may change over time.
- Establish the basis for present and future risk management and adaptation.
- Provide guidance on appropriate management and adaptation planning for the future, including monitoring.

2.2 Objectives

The key objectives of this CHRMAP are as follows:

- Ensure that the City and key stakeholders understand the potential likelihood of assets and infrastructure being impacted by coastal hazards over a range of planning horizons.
- Identify vulnerability trigger points and respective timeframes for risk management and adaptation actions.
- Present management and adaptation measures that are informed by, and are acceptable to, the City and key stakeholders.
- Outline the coastal adaptation approach in an Implementation Plan that is acceptable to the City and key stakeholders.
- Incorporate management and adaptation measures into short and long term decision making documentation.

2.3 Scope

The *CHRMAP Guidelines* (WAPC 2019) provide a specific framework for the preparation of a CHRMAP. This is outlined in the flowchart presented in Figure 2.1 which shows the risk management process adapted to coastal planning.

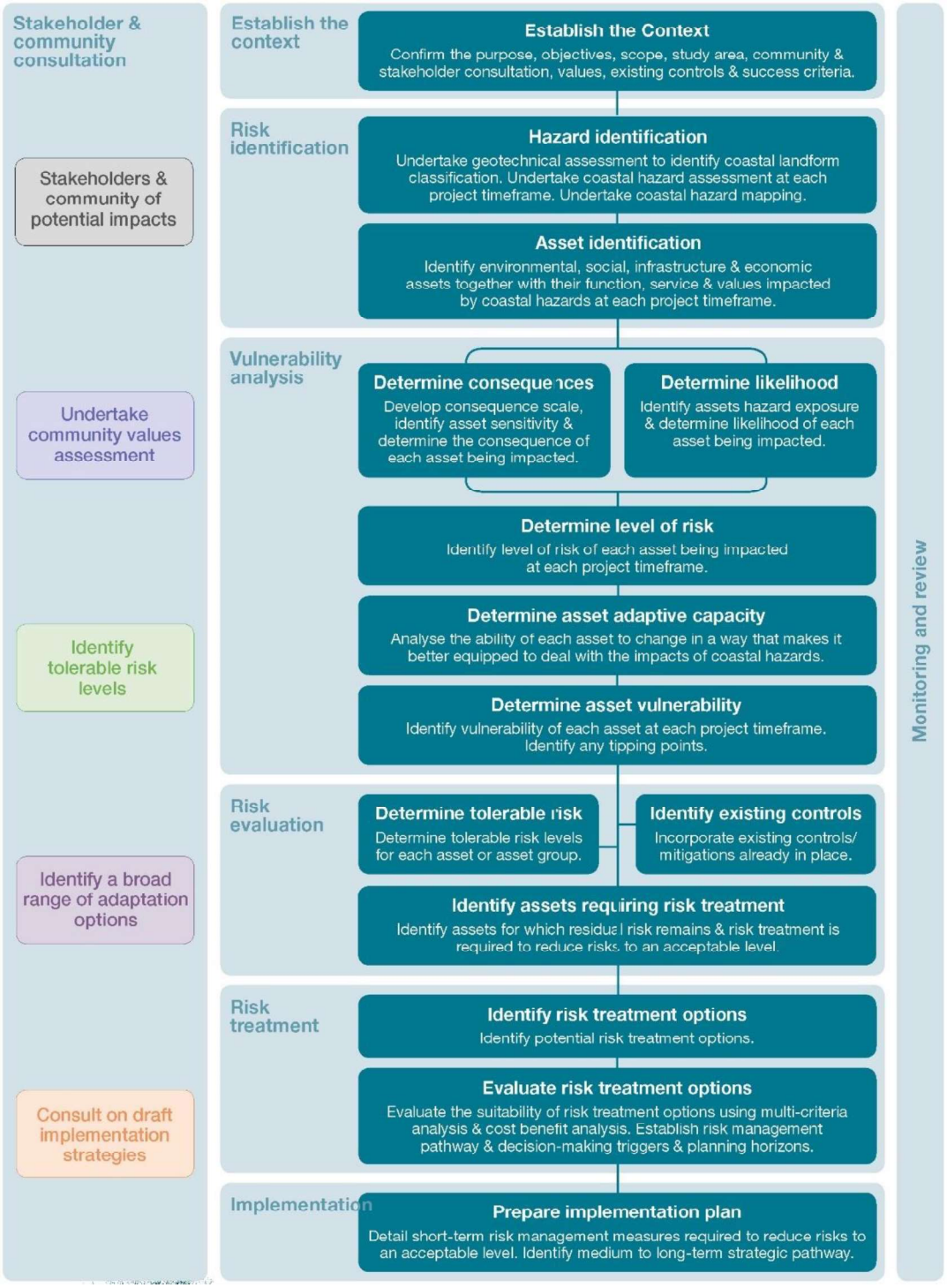

Figure 2.1 Risk Management & Adaptation Process Flow Chart (WAPC 2019)

As presented in the flowchart, the process for the development of a meaningful CHRMAP process requires a number of fundamental inputs. These inputs enable the assessment and analysis of risk, which should ultimately be informed by input received from key stakeholders, to help shape the subsequent adaptation strategies.

The management of coastal hazard risk associated with the City's public assets will be required to present a proposed adaptation plan that is acceptable to the stakeholders. As a result, the

approach that has been taken for this plan is to develop a management methodology that allows for flexibility into the future.

The development of the adaptation plan will be informed by the coastal hazard assessment completed for the site. The identification of the coastal erosion and inundation hazards for the Site is discussed within Section 3 of this report.

This CHRMAP will consider the potential risks and vulnerability to coastal assets and infrastructure over a range of horizons covering the 100 year planning timeframe. This planning timeframe is required by SPP2.6.

Intermediate planning horizons will also be considered to assess how risk profiles may change in the future and to inform the requirement for adaptation strategies. The intermediate planning horizons that will be considered in this CHRMAP are listed below, with present day taken as 2021 (the time when this CHRMAP process was initiated).

- Present day (2021).
- 20 years to 2041.
- 40 years to 2061.
- 60 years to 2081.
- 80 years to 2101.
- 100 years to 2121.

Based on the results of the risk and vulnerability assessments, risk mitigation strategies will be developed, where required, in order to provide a framework for future management. However, it is important to realise that the risk and vulnerability assessments will be based on the outcomes of the coastal hazard assessment, which, by their nature, are justifiably conservative. This is due to the uncertainty around coastal dynamics when predicting impacts over long timeframes. As a result, the framework for future risk management strategies should be considered to be a guide of future requirements.

The actual requirement for implementation of these management actions should ultimately be informed by a coastal monitoring regime. The purpose of this coastal monitoring regime is to identify changes in the shoreline or sea level that could alter, either positively or negatively, the risk exposure and vulnerability of the proposed assets and infrastructure. A recommended coastal monitoring regime is included within the implementation plan, presented within Section 7 of this report.

2.4 The Site

This site setting which forms the basis of the CHRMAP has been discussed in detail in the CHA. This report includes details of the erosion to the foreshore area and the adaptation works conducted by the City. Since the CHA further remediation works have been conducted to the foreshore, including the regrading and revegetation to areas affected by erosion. The extent of the area being considered within this CHRMAP extends from Vancouver Point to Waterbay Point, as shown in Figure 1.1.

2.5 Stakeholder Engagement

The City has consulted with the relevant stakeholders including the general public and the Frenchman Bay Association to understand their concerns. The City received four responses throughout the consultation period. The comments from the public have been considered and addressed throughout this adaptation plan.

2.6 Key Assets

Key assets within the study area and surrounds have been summarised in Table 2.1 and their location shown in Figures 2.2 and 2.3. The risk assessment will focus on these assets to identify their vulnerability and consequently the requirement for risk management. These assets have been broken down into their key components and further refinement would not be beneficial to the CHRMAP. For this type of assessment, it is the vulnerability of the overall assets that is the important factor.

Figure 2.2 Public Assets within the Whalers Beach Area

Figure 2.3 Public Assets within the Whalers Beach Recreational Area

Table 2.1 Key Assets Identified for Analysis

Type	Key Assets	Elevation (mAHD)
Public	Gravel Access Road	1.9 – 3.2
	Lower Gravel Parking	1.8 – 2.7
	Boat Access Point	0.8 – 1.9
	Beach Access Stairs	0.8 – 2.1
	Lower Bitumen Parking	2.6 – 3.2
	Bitumen Access Road	2.7 – 14.8
	Concrete Stairs	3.6 – 13.1
	Top Parking Area	14.9 – 16.3
	Eastern Picnic Area	1.8 – 3.5
	Eastern BBQ, tables and Associated Structures	1.8 – 3.5
	Central Picnic Area	2.8 – 3.1
	Central BBQ, tables and Associated Structures	2.8 – 3.1
	Western Picnic Area	2.5 – 3.5
	Western BBQs, tables and Associated Structures	2.5 – 3.5
	Toilet Block	15.1
	Lookout	>20

It is noted that the list of assets considered in this report relates solely to the public assets that are of social or economic value that are located within the Whalers Beach area. Some assets have been grouped together such as the BBQ, tables and associated structures, these include any picnic tables, gazebos or shelters within each respective picnic area. The picnic areas represent the area itself as an asset and include the smaller items such as bins, fences, bollards and signs.

Many small assets such as signage, bollards, fencing and bins are considered part of other larger assets such as roads or picnic areas and have been left off the vulnerability assessment aspect of this CHRMAP. The rationale for this is because these small assets would typically only be impacted by coastal hazards when the larger asset are also effected. An example is the bollards on the gravel access road, which are considered to be part of the road and would be impacted at the same time that the road would be impacted.

2.7 Heritage Assets

It is important to note that the area in question has significant heritage assets such as the remains of a historical Norwegian whaling station and a spring that used to supply Albany with water. The Norwegian whaling station was in use for three years between 1913 and 1915. There is very few remnants of this station left, with most already being affected by coastal erosion. The Vancouver Spring was used for fresh water supply over many years with the first dam being built in the 1850s. The use of this spring continued up until the late 1980s when a bore was sunk (Frenchman Bay Association, 2021).

These sites, while of cultural significance, have been excluded from the CHRMAP. The management of these assets into the future is governed by the City through their Archaeological Management Plan (AMP). This document provides management and adaption planning into the future, considering the ongoing effects of social connection as well as any environmental change, this includes the effects of coastal hazards. The recommendations outlined in the AMP are that the heritage assets are maintained in-situ to allow for arrested decay (Archae-Aus, 2022).

2.8 Success Criteria

The success criteria for the CHRMAP will ultimately be as follows:

- Demonstrated understanding by the key stakeholders regarding the likelihood, consequence and subsequent risk of coastal hazards impacting identified assets over each planning horizon.
- Evidence of stakeholder engagement outcomes being incorporated throughout the development of risk management and adaptation measures.
- Acceptance of a risk management and adaptation plan for the 100 year planning timeframe by key stakeholders.
- Adoption of the Implementation Plan by key stakeholders going forward.

The outcomes of the success criteria listed above are presented in later sections of this report.

3. Coastal Hazard Assessment

The CHA aspect of the CHRMAP process was completed by MRA in January 2022. The CHA was competed following SPP2.6 guidelines and provides the inundation and coastal hazard risks for the future planning timeframes. The reader is referred to Appendix A to view this section of the CHRMAP.

Figure 3.1 demonstrates an important outcome of the Coastal Hazard Assessment the coastal hazard lines. This figure shows the locations of the Coastal Erosion Hazard lines, which represent the worst possible erosion scenario for the planning timeframes. A copy of this coastal erosion hazard map is also included in Appendix B.

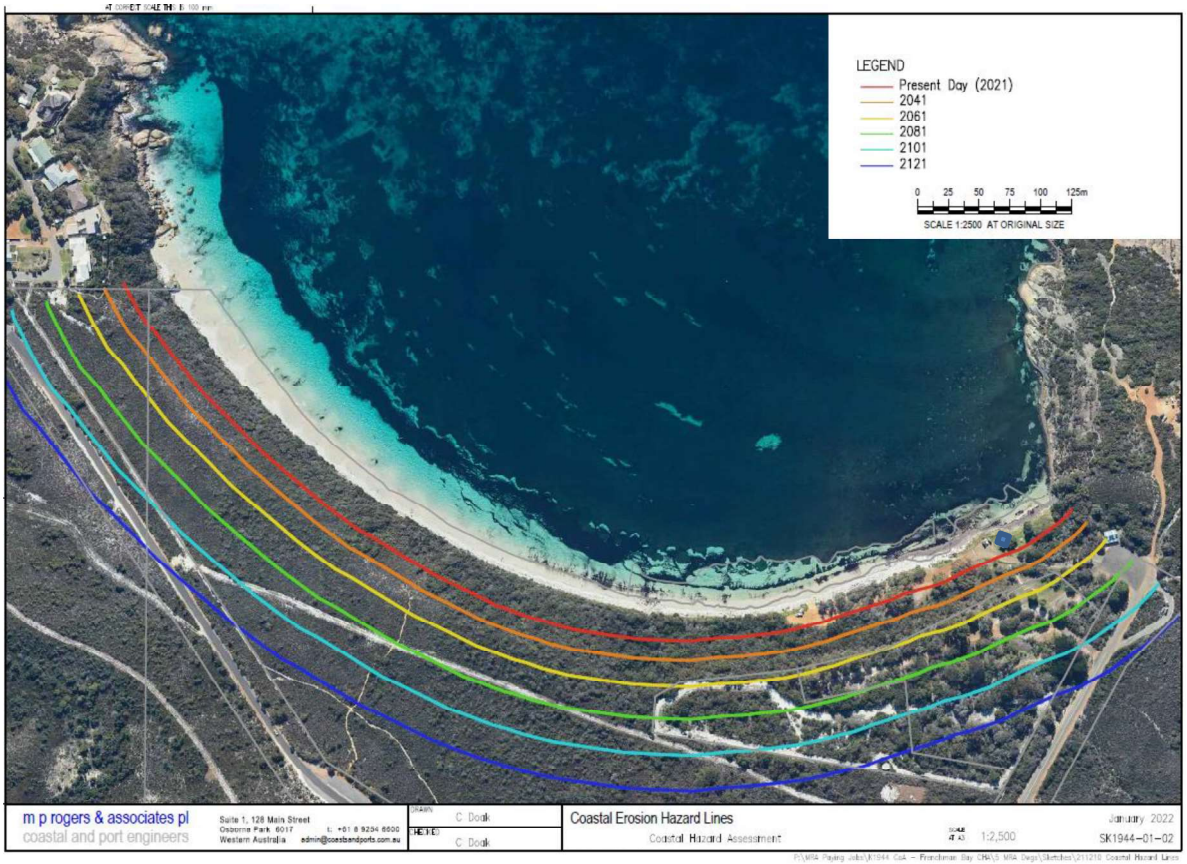

Figure 3.1 Coastal Hazard Map (MRA, 2022)

Table 3.1 shows the relevant inundation levels for the area over various planning timeframes as determined within the Coastal Hazard Assessment. It is noted that these inundation levels are likely to be conservative given that the shoreline has a northerly aspect yet the majority of the conditions that cause elevated water levels along the south coast will have a southerly component to the incident event directions.

Table 3.1 S4 Inundation Levels

Component	Planning Timeframe					
	Present Day (2021)	2041	2061	2081	2101	2121
500 year ARI peak steady water level at tide gauge (mAHD)	1.13					
Allowance for nearshore setup - wind and wave (m)	0.80					
Allowance for sea level rise (m)	0.00	0.11	0.27	0.49	0.73	0.97
Total Inundation Level (mAHD)	**1.93**	**2.04**	**2.20**	**2.42**	**2.66**	**2.90**

4. Risk Analysis

In accordance with WAPC (2019), a risk based approach will be used to assess the hazards and required mitigation and adaptation options for the City's public assets. As coastal hazards are the focus of this assessment, it is the likelihood and consequences of these coastal hazards that need to be considered.

When completing the risk assessment, it is imperative that the likelihood and the consequence speak to each other in order to provide an appropriate level of risk for each asset. This is completed to provide a conservative approach to the risk assessment. This can result in likelihood or consequence levels that at first may appear to not align with present conditions but provide an accurate representation of the likely risk. It is also noted that as the planning horizon is extended the inundation level and erosion lines become less certain with a reduced statistical likelihood of impacts being experienced, also influencing likelihood levels.

4.1 Likelihood

Likelihood is defined as the chance of something happening (AS/NZS ISO 31000:2009). WAPC (2019) defines the likelihood as the chance of erosion or storm surge inundation occurring or how often they impact on existing and future assets and values. This requires consideration of the frequency and probability of the event occurring over a given planning timeframe.

The probability of an event occurring is often related to the Average Exceedance Probability (AEP) or the ARI. The use of the AEP to define impacts of coastal hazards over the planning timeframe assumes that events have the same probability of occurring each year. In the case of climate change and sea level rise, which has a large influence on the assessed coastal hazard risk, this is not true. In addition, there is insufficient data available to properly quantify the probability of occurrence. A scale of likelihood from the City's Risk & Opportunity Management Framework, which follows the Australian Standard Risk Management Principles and Guidelines (AS/NZS ISO 31000:2009), has been used and is presented in Table 4.1.

Table 4.1 Scale of Likelihood

Level	Description	Context	Operational Frequency	Project Frequency
5	Almost Certain	Expected to occur in most circumstances	More than once in 12 months	Greater than 90% chance of occurrence
4	Likely	Will probably occur in most circumstances	At least once in 12 months	60% - 90% chance of occurrence
3	Possible	Should occur at some time	At least once in three years	40% - 60% chance of occurrence
2	Unlikely	Could occur at some time	At least once in ten years	10% - 40% chance of occurrence
1	Rare	May occur, only in exceptional circumstances	Less than once in fifteen years	Less than 10% chance of occurrence

The likelihood and consequences of coastal hazards are different for erosion and inundation. As a result, the likelihood and consequence of erosion and inundation should are considered separately. The likelihood of coastal erosion and inundation hazard impact is discussed separately in the following sections.

4.1.1 Coastal Erosion

The likelihood ratings given to the relevant assets are based on the coastal erosion hazard lines presented in Appendix B and the consideration of the probabilities of each of the allowances occurring within the respective planning horizons.

It is important to note that the hazard lines reaching a particular asset at the end of the planning horizon do not necessarily mean that this will occur. This is due to the fact that it requires all of the following to occur.

- The upper estimate of erosion caused by sea level rise.
- Long term chronic erosion of the shoreline at a rate equal to or greater than what has previously been observed.
- The 100 year ARI or 1% AEP severe storm event to be experienced at the end of the planning timeframe (ie when the other allowances have been realised).

Only if all of these occur will the erosion hazard lines be realised. This has been considered in the assessment of likelihood for the relevant assets.

An assessment of the relative likelihood of each of the identified key assets being impacted by coastal erosion hazards has been completed and is presented in Table 4.2. The assessment was completed using the coastal hazard lines presented in Appendix B.

Table 4.2 Assessment of Likelihood of Coastal Erosion Impact

Asset	Present Day	2041	2061	2081	2101	2121
Gravel Access Road	Possible (3)	Likely (4)	Almost Certain (5)	Almost Certain (5)	Almost Certain (5)	Almost Certain (5)
Lower Gravel Parking	Possible (3)	Likely (4)	Almost Certain (5)	Almost Certain (5)	Almost Certain (5)	Almost Certain (5)
Boat Access Point	Likely (4)	Almost Certain (5)	Almost Certain (5)	Almost Certain (5)	Almost Certain (5)	Almost Certain (5)
Beach Access Stairs	Likely (4)	Almost Certain (5)	Almost Certain (5)	Almost Certain (5)	Almost Certain (5)	Almost Certain (5)
Lower Bitumen parking	Possible (3)	Likely (4)	Almost Certain (5)	Almost Certain (5)	Almost Certain (5)	Almost Certain (5)
Bitumen access Road	Rare (1)	Unlikely (2)	Unlikely (2)	Possible (3)	Possible (3)	Likely (4)
Concrete stairs	Rare (1)	Rare (1)	Unlikely (2)	Unlikely (2)	Possible (3)	Likely (4)
Top parking area	Rare (1)	Rare (1)	Rare (1)	Unlikely (2)	Unlikely (2)	Likely (4)
Eastern Picnic Area	Possible (3)	Likely (4)	Almost Certain (5)	Almost Certain (5)	Almost Certain (5)	Almost Certain (5)
Eastern BBQ, tables and Associated Structures	Possible (3)	Likely (4)	Almost Certain (5)	Almost Certain (5)	Almost Certain (5)	Almost Certain (5)
Central Picnic Area	Rare (1)	Unlikely (2)	Possible (3)	Likely (4)	Almost Certain (5)	Almost Certain (5)
Central BBQ, tables and Associated Structures	Rare (1)	Unlikely (2)	Possible (3)	Likely (4)	Almost Certain (5)	Almost Certain (5)

Asset	Present Day	2041	2061	2081	2101	2121
Western Picnic Area	Rare (1)	Unlikely (2)	Possible (3)	Likely (4)	Almost Certain (5)	Almost Certain (5)
Western BBQs, tables and Associated Structures	Rare (1)	Unlikely (2)	Possible (3)	Likely (4)	Almost Certain (5)	Almost Certain (5)
Toilet Block	Rare (1)	Rare (1)	Rare (1)	Unlikely (2)	Unlikely (2)	Likely (4)
Lookout	Rare (1)	Rare (1)	Rare (1)	Unlikely (2)	Unlikely (2)	Possible (3)

Notes: 1. Based on most exposed location of each asset.

The assessment of the likelihood of coastal erosion impact shows that it is more than possible that coastal erosion will impact the assets closets to the shoreline over a 20 year planning horizon to 2041. Furthermore, over the 100 year timeframe to 2121, it is almost certain that these assets will be impacted by coastal erosion.

4.1.2 Coastal Inundation

Assessment of the likelihood of coastal inundation is slightly different to that for coastal erosion. This is due to the fact that the potential for coastal inundation will change in the future as the sea level rises. This means that an area that would only be inundated during a very severe event in the present day could potentially be inundated by a much less severe event in the future.

Assessment of the probability of an area being inundated within a given planning horizon therefore needs to consider the changing probability of event occurrence throughout that planning timeframe.

The results of the assessment of likelihood of coastal inundation for each of the key assets is presented in Table 4.3.

Table 4.3 Assessment of Likelihood of Coastal Inundation Impact

Asset	Present Day	2041	2061	2081	2101	2121
Gravel Access Road	Rare (1)	Unlikely (2)	Possible (3)	Likely (4)	Almost Certain (5)	Almost Certain (5)
Lower Gravel Parking	Rare (1)	Unlikely (2)	Possible (3)	Likely (4)	Almost Certain (5)	Almost Certain (5)
Boat Access Point	Almost Certain (5)	Almost Certain (5)	Almost Certain (5)	Almost Certain (5)	Almost Certain (5)	Almost Certain (5)
Beach Access Stairs	Almost Certain (5)	Almost Certain (5)	Almost Certain (5)	Almost Certain (5)	Almost Certain (5)	Almost Certain (5)
Lower Bitumen parking	Rare (1)	Rare (1)	Rare (1)	Rare (1)	Unlikely (2)	Unlikely (2)
Bitumen access Road	Rare (1)	Rare (1)	Rare (1)	Rare (1)	Unlikely (2)	Unlikely (2)
Concrete stairs	Rare (1)	Rare (1)	Rare (1)	Rare (1)	Rare (1)	Rare (1)
Top parking area	Rare (1)	Rare (1)	Rare (1)	Rare (1)	Rare (1)	Rare (1)
Eastern Picnic Area	Rare (1)	Unlikely (2)	Unlikely (2)	Possible (3)	Likely (4)	Almost Certain (5)
Eastern BBQ, tables and Associated Structures	Rare (1)	Rare (1)	Unlikely (2)	Possible (3)	Likely (4)	Almost Certain (5)
Central Picnic Area	Rare (1)	Rare (1)	Rare (1)	Rare (1)	Rare (1)	Unlikely (2)
Central BBQ, tables and Associated Structures	Rare (1)	Rare (1)	Rare (1)	Rare (1)	Rare (1)	Unlikely (2)
Western Picnic Area	Rare (1)	Rare (1)	Rare (1)	Unlikely (2)	Possible (3)	Likely (4)

Asset	Present Day	2041	2061	2081	2101	2121
Western BBQs, tables and Associated Structures	Rare (1)	Rare (1)	Rare (1)	Unlikely (2)	Possible (3)	Likely (4)
Toilet Block	Rare (1)	Rare (1)	Rare (1)	Rare (1)	Rare (1)	Rare (1)
Lookout	Rare (1)	Rare (1)	Rare (1)	Rare (1)	Rare (1)	Rare (1)

Notes: 1. Based on most exposed location of each asset.

The assessment of the likelihood of coastal inundation impact predicts that within the 40 year planning timeframe to 2061 the low lying assets may begin to be affected. Additionally, by the 100 year planning horizon the group of low lying assets at the bottom of the hill will have possibly been affected by inundation. While the more elevated assets are predicted to not be affected. It is noted that the beach access stairs and the boat access point have a higher exposure to inundation.

4.2 Consequence

Consequence is the impact of erosion and storm surge inundation on existing and future assets and the value assigned to that asset (WAPC 2019). Within the context of the risk assessment, consequence is used to consider the sensitivity of an asset to coastal erosion and inundation hazards over the respective timeframes.

A scale of consequence has been developed which provides a range of impacts and is generally consistent with the Australian Standard Risk Management Principles and Guidelines (ISO 31000:2009) and the Coastal Hazard Risk Management and Adaptation Planning Guidelines (WAPC 2019). The consequence scale is presented in Table 4.4.

A scale of consequence has been developed by the City which provides a range of impacts and is generally consistent with the Australian Standard Risk Management Principles and Guidelines (ISO 31000:2018). The consequence scale is presented in Table 4.4

Table 4.4 Scale of Consequences

Risk Category	Severe	Major	Moderate	Minor	Insignificant
Level	5	4	3	2	1
Service Delivery Interruption (Business Continuity Plan)	More than 24 hours, indeterminate prolonged interruption of services, non – performance.	11 to 24 hours, prolonged interruption of services, additional resources, and performance affected.	5 to 10 hours, medium term, temporary interruption, backlog cleared by additional resources.	2 to 4 hours, Short term, temporary interruption, backlog cleared < 1 day.	Less than 2 hours, No material service interruption.
Community	Major/multiple disruptions to the widespread community.	Substantiated disruptions to the wider spread community.	Significant disruption to the nearby community.	Minor disruptions to the nearby community.	Little or no disruption to the community.
Environment	Major breach of legislation or extensive environmental damage requiring third party investigation.	Significant breach of legislation/significant contamination or damage requiring third party assistance.	Environmental damage requiring restitution or internal clean-up.	Minor impact to the environment.	Little impact on environment.
Financial	More than $150,000	$50,000 to $150,000	$20,000 to $50,000	$5,000 to $20,000	Less than $5,000
Legal & Compliance	Custodial sentencing for responsible officers, multiple class actions and high-end penalties.	Major litigation & class action against Council and responsible officers. Prosecution and fines imposed.	Serious breach of regulations, with investigation and report by 3rd party, Prosecution and fines imposed.	Minor legal implications, non-compliance and breach of regulations.	Minor regulation breach.
Operational	Non-achievement of all organisation's deliverables.	Non-achievement of major organisation deliverables.	Significant delays to achieving deliverables.	Inconvenient delays in achieving deliverables.	Small impact on City deliverables.
People Health & Safety	Death(s) or severe permanent injuries, mass hospitalisation, Post-traumatic Stress Disorder.	Extensive injuries requiring hospital admission, severe trauma, extended incapacity.	Onsite medical treatment by ambulance personnel longer term illness, recovery 1 to 6 months.	First aid treatment required by first aid officer, sick leave, short term impact, recovery 1 to 3 weeks.	No injuries or injuries but not requiring first aid treatment, no leave taken.
Property	Extensive property damage resulting in prolonged period of recovery.	Significant property damage requiring external resources.	Localised damage rectified by internal and external arrangements.	Localised damage rectified by internal arrangements.	Inconsequential or no damage to property.
Reputation	Substantiated public embarrassment, very high multiple impacts, high widespread multiple news profile.	Substantiated public embarrassment, high impact news profile, third party actions.	Substantiated public embarrassment, moderate impact, and moderate news profile.	Substantiated low impact, low news profile.	Unsubstantiated, low impact, low profile, no news item.

4.2.1 Coastal Erosion

The assessed consequences of coastal erosion for each of the planning horizons are outlined in Table 4.5. As shown in the table, the consequences of erosion vary for some key assets over different timeframes due to the potential effects of increased erosion.

Table 4.5 Assessment of Consequence of Coastal Erosion Impact

Asset	Present Day	2041	2061	2081	2101	2121
Gravel Access Road	Moderate (3)	Moderate (3)	Moderate (3)	Moderate (3)	Moderate (3)	Moderate (3)
Lower Gravel Parking	Moderate (3)	Moderate (3)	Moderate (3)	Moderate (3)	Moderate (3)	Moderate (3)
Boat Access Point	Minor (2)	Minor (2)	Minor (2)	Moderate (3)	Moderate (3)	Moderate (3)
Beach Access Stairs	Minor (2)	Moderate (3)	Moderate (3)	Moderate (3)	Moderate (3)	Moderate (3)
Lower Bitumen parking	Moderate (3)	Moderate (3)	Moderate (3)	Moderate (3)	Moderate (3)	Moderate (3)
Bitumen access Road	Moderate (3)	Moderate (3)	Moderate (3)	Moderate (3)	Moderate (3)	Moderate (3)
Concrete stairs	Minor (2)	Minor (2)	Minor (2)	Minor (2)	Minor (2)	Minor (2)
Top parking area	Insignificant (1)	Insignificant (1)	Insignificant (1)	Moderate (3)	Moderate (3)	Moderate (3)
Eastern Picnic Area	Minor (2)	Minor (2)	Moderate (3)	Moderate (3)	Moderate (3)	Moderate (3)
Eastern BBQ, tables and Associated Structures	Minor (2)	Minor (2)	Moderate (3)	Moderate (3)	Moderate (3)	Moderate (3)
Central Picnic Area	Minor (2)	Minor (2)	Moderate (3)	Moderate (3)	Moderate (3)	Moderate (3)
Central BBQ, tables and Associated Structures	Minor (2)	Minor (2)	Moderate (3)	Moderate (3)	Moderate (3)	Moderate (3)
Western Picnic Area	Minor (2)	Minor (2)	Moderate (3)	Moderate (3)	Moderate (3)	Moderate (3)

Asset	Present Day	2041	2061	2081	2101	2121
Western BBQs, tables and Associated Structures	Minor (2)	Minor (2)	Moderate (3)	Moderate (3)	Moderate (3)	Moderate (3)
Toilet Block	Insignificant (1)	Insignificant (1)	Moderate (3)	Major (4)	Major (4)	Major (4)
Lookout	Insignificant (1)	Insignificant (1)	Insignificant (1)	Insignificant (1)	Minor (2)	Minor (2)

Notes: 1. Based on most exposed location of each asset.

For the assets well landward of the coastal hazard line for the assessed planning horizon, the consequence of costal erosion is deemed insignificant. A large amount of assets are seaward of early planning horizon coastal hazard lines and thus the potential consequences are greater. It is important to note that if a large quantity of the assets were impacted at the same time the consequence of the erosion to the asset is deemed to have increased compared to if only a small portion of the asset would be impacted.

4.2.2 Coastal Inundation

The assessed consequence of coastal inundation for each of the key assets and each of the planning horizons is presented in Table 4.6. Similar to erosion, the consequence of inundation changes over the planning horizons due to the likely increased consequence of a higher water level and potentially greater inundation extents as sea level rise are realised over time.

Table 4.6 Assessment of Consequence of Coastal Inundation Impact

Asset	Present Day	2041	2061	2081	2101	2121
Gravel Access Road	Insignificant (1)	Insignificant (1)	Insignificant (1)	Insignificant (1)	Insignificant (1)	Insignificant (1)
Lower Gravel Parking	Insignificant (1)	Insignificant (1)	Insignificant (1)	Insignificant (1)	Insignificant (1)	Insignificant (1)
Boat Access Point	Insignificant (1)	Insignificant (1)	Insignificant (1)	Insignificant (1)	Insignificant (1)	Insignificant (1)
Beach Access Stairs	Insignificant (1)	Insignificant (1)	Insignificant (1)	Insignificant (1)	Insignificant (1)	Insignificant (1)
Lower Bitumen parking	Insignificant (1)	Insignificant (1)	Insignificant (1)	Insignificant (1)	Insignificant (1)	Insignificant (1)
Bitumen access Road	Insignificant (1)	Insignificant (1)	Insignificant (1)	Insignificant (1)	Insignificant (1)	Insignificant (1)
Concrete stairs	Insignificant (1)	Insignificant (1)	Insignificant (1)	Insignificant (1)	Insignificant (1)	Insignificant (1)
Top parking area	Insignificant (1)	Insignificant (1)	Insignificant (1)	Insignificant (1)	Insignificant (1)	Insignificant (1)
Eastern Picnic Area	Insignificant (1)	Insignificant (1)	Insignificant (1)	Insignificant (1)	Insignificant (1)	Insignificant (1)
Eastern BBQ, tables and Associated Structures	Insignificant (1)	Insignificant (1)	Insignificant (1)	Minor (2)	Minor (2)	Minor (2)
Central Picnic Area	Insignificant (1)	Insignificant (1)	Insignificant (1)	Insignificant (1)	Insignificant (1)	Insignificant (1)
Central BBQ, tables and Associated Structures	Insignificant (1)	Insignificant (1)	Insignificant (1)	Minor (2)	Minor (2)	Minor (2)
Western Picnic Area	Insignificant (1)	Insignificant (1)	Insignificant (1)	Insignificant (1)	Insignificant (1)	Insignificant (1)
Western BBQs, tables and Associated Structures	Insignificant (1)	Insignificant (1)	Insignificant (1)	Minor (2)	Minor (2)	Minor (2)

Asset	Present Day	2041	2061	2081	2101	2121
Toilet Block	Insignificant (1)	Insignificant (1)	Insignificant (1)	Insignificant (1)	Insignificant (1)	Insignificant (1)
Lookout	Insignificant (1)	Insignificant (1)	Insignificant (1)	Insignificant (1)	Insignificant (1)	Insignificant (1)

Notes: 1. Based on most exposed location of each asset.

Whilst inundation of the of the public assets would cause short term disruption to access and use, the long term use and value of the asset is expected to not be affected once the water recedes and the interruption to access is only likely to be during the storm. This results in the majority of the consequences for inundation being classified as insignificant. The BBQs, tables and associated structures have a consequence rating of minor, this is because any possible electric parts could become damaged by the water.

5. Risk Evaluation

5.1 Risk Evaluation Matrix

The risk rating is assessed through a matrix of "likelihood" vs "consequence". A risk matrix developed by the City that defines the levels of risk has been used. This risk matrix is generally consistent with WAPC (2019) and the principles of AS 5334 (Standards Australia 2013) and is presented in Table 5.1.

Table 5.1 Risk Matrix

RISK LEVELS			CONSEQUENCE				
			Insignificant	Minor	Moderate	Major	Catastrophic
			1	2	3	4	5
LIKELIHOOD	Almost Certain	5	Medium (5)	High (10)	High (15)	Extreme (20)	Extreme (25)
	Likely	4	Low (4)	Medium (8)	High (12)	High (16)	Extreme (20)
	Possible	3	Low (3)	Medium (6)	Medium (9)	High (12)	High (15)
	Unlikely	2	Low (2)	Low (4)	Medium (6)	Medium (8)	High (10)
	Rare	1	Low (1)	Low (2)	Low (3)	Low (4)	Medium (6)

A risk tolerance scale assists in determining which risks are acceptable, tolerable and unacceptable. The risk tolerance scale used for the assessment is presented in Table 5.2. The risk tolerance scale shows that the extreme and high risks need to be managed.

Table 5.2 Risk Tolerance Scale

Level of Risk	Description	When is the Risk Acceptable	Who is Responsible	Timeline for Action
Low (1 – 4)	Acceptable	Risk acceptable with adequate controls, managed by routine procedures.	Responsible Officer	Review controls every 6 months
Medium (5 – 9)	Monitor	Risk acceptable by observing, assessing and improving current controls and council procedures.	Responsible Officer	Review controls every 3 months or as per risk register
High (10 – 16)	Urgent Attention Required	Risk acceptable by establishing and implementing new controls.	Executive & CEO	Controls implemented within 2 weeks of reporting. Review controls every month
Extreme (17 – 25)	Unacceptable	Risk only acceptable with excellent controls and all treatment plans to be explored and implemented where possible, managed by highest level of authority.	Audit & Risk Committee & Council	Controls implemented within 1 week of reporting. Review controls 2 weeks

5.2 Risk Assessment

The risk assessment for the study area will be completed in accordance with the recommendations of AS5334 (2013). The results of the risk assessment are presented below for both coastal erosion and coastal inundation.

5.2.1 Coastal Erosion

Table 5.3 presents the assessed coastal erosion risk levels for each of the identified key assets potentially at risk over the 100 year planning timeframe.

Table 5.3 Assessment of Risk of Coastal Erosion Impact

Asset	Present Day	2041	2061	2081	2101	2121
Gravel Access Road	Medium (9)	High (12)	High (15)	High (15)	High (15)	High (15)
Lower Gravel Parking	Medium (9)	High (12)	High (15)	High (15)	High (15)	High (15)
Boat Access Point	Medium (8)	High (10)	High (10)	High (15)	High (15)	High (15)
Beach Access Stairs	Medium (8)	High (15)	High (15)	High (15)	High (15)	High (15)
Lower Bitumen parking	Medium (9)	High (12)	High (15)	High (15)	High (15)	High (15)
Bitumen access Road	Low (3)	Medium (6)	Medium (6)	Medium (9)	Medium (9)	High (12)
Concrete stairs	Low (2)	Low (2)	Low (4)	Low (4)	Medium (6)	Medium (8)
Top parking area	Low (1)	Low (1)	Low (1)	Medium (6)	Medium (6)	High (12)
Eastern Picnic Area	Medium (6)	Medium (8)	High (15)	High (15)	High (15)	High (15)
Eastern BBQ, tables and Associated Structures	Medium (6)	Medium (8)	High (15)	High (15)	High (15)	High (15)
Central Picnic Area	Low (4)	Medium (6)	High (12)	High (15)	High (15)	High (15)
Central BBQ, tables and Associated Structures	Low (4)	Medium (6)	High (12)	High (15)	High (15)	High (15)
Western Picnic Area	Low (4)	Medium (6)	High (12)	High (15)	High (15)	High (15)
Western BBQs, tables and Associated Structures	Low (4)	Medium (6)	High (12)	High (15)	High (15)	High (15)

Asset	Present Day	2041	2061	2081	2101	2121
Toilet Block	Low (1)	Low (1)	Low (3)	Medium (8)	Medium (8)	High (16)
Lookout	Low (1)	Low (1)	Low (1)	Low (2)	Low (4)	Medium (6)

Notes: 1. Based on most exposed location of each asset.

The results of the risk assessment show that many assets are have High or Medium risk from coastal erosion hazards during the coming 20 year planning timeframe to 2041. The risk increases over the 100 year planning timeframe, with the majority of the assets deemed to be at high risk by the end of this timeframe.

5.2.2 Coastal Inundation

Table 5.4 below is a summary of the outcomes from the risk analysis, noting the coastal inundation risk levels for each of the identified key assets.

Table 5.4 Assessment of Risk of Coastal Inundation Impact

Asset	Present Day	2041	2061	2081	2101	2121
Gravel Access Road	Low (1)	Low (2)	Low (3)	Low (4)	Medium (5)	Medium (5)
Lower Gravel Parking	Low (1)	Low (2)	Low (3)	Low (4)	Medium (5)	Medium (5)
Boat Access Point	Medium (5)	Medium (5)	Medium (5)	Medium (5)	Medium (5)	Medium (5)
Beach Access Stairs	Medium (5)	Medium (5)	Medium (5)	Medium (5)	Medium (5)	Medium (5)
Lower Bitumen parking	Low (1)	Low (1)	Low (1)	Low (1)	Low (2)	Low (2)
Bitumen access Road	Low (1)	Low (1)	Low (1)	Low (1)	Low (2)	Low (2)
Concrete stairs	Low (1)	Low (1)	Low (1)	Low (1)	Low (1)	Low (1)

Asset	Present Day	2041	2061	2081	2101	2121
Top parking area	Low (1)	Low (1)	Low (1)	Low (1)	Low (1)	Low (1)
Eastern Picnic Area	Low (1)	Low (1)	Low (2)	Low (3)	Low (4)	Medium (5)
Eastern BBQ, tables and Associated Structures	Low (1)	Low (2)	Low (2)	Medium (5)	Medium (8)	High (10)
Central Picnic Area	Low (1)	Low (1)	Low (1)	Low (1)	Low (1)	Low (2)
Central BBQ, tables and Associated Structures	Low (1)	Low (1)	Low (1)	Low (2)	Low (2)	Low (4)
Western Picnic Area	Low (1)	Low (1)	Low (1)	Low (2)	Low (3)	Low (4)
Western BBQs, tables and Associated Structures	Low (1)	Low (1)	Low (1)	Low (4)	Medium (6)	Medium (8)
Toilet Block	Low (1)	Low (1)	Low (1)	Low (1)	Low (1)	Low (1)
Lookout	Low (1)	Low (1)	Low (1)	Low (1)	Low (1)	Low (1)

Notes: 1. Based on most exposed location of each asset.

The results of the risk assessment show that other than the Boat Access Point and beach access stairway, the assets are at low risk from coastal inundation hazards for the coming 40 year planning timeframe to 2061. With only the eastern BBQ, tables and associated structures increasing in risk for the further 20 years to 2081. Beyond this timeframe through to 2121, the risk to the assets from coastal inundation increases. It is important to note that the assessed risks from coastal inundation are less than those determined for potential coastal erosion impacts, therefore the coastal erosion risks are considered the most critical for future coastal adaptation planning.

6. Vulnerability

As per the recommendations of AS 5334 *Climate change adaptation for settlements and infrastructure*, a detailed risk analysis should include a vulnerability analysis to thoroughly examine how coastal hazards and climate change may affect the assets. This includes consideration of the adaptive capacity and vulnerability of the assets previously assessed for coastal hazard risk.

The vulnerability of the identified public assets are related to the risk from coastal hazards, as well as their sensitivity to the impacts caused by these hazards and their ability to respond to them (termed adaptive capacity). This is demonstrated in the *CHRMAP Guidelines* (WAPC 2019) by the following Figure 6.1.

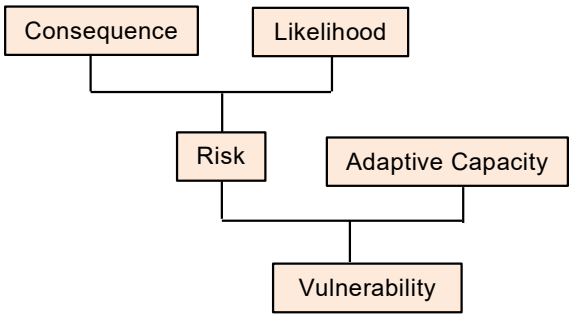

Figure 6.1 Vulnerability Assessment Flowchart (WAPC 2019)

6.1 Adaptive Capacity

Adaptive capacity is defined in AS5334 as the ability to respond to climate change to moderate potential damage, to take advantage of opportunities, or to cope with the consequences. For assets where the impact of the coastal hazard was insignificant or where the asset would be re-established naturally before further damage would likely occur, the adaptive capacity of the asset will be rated as insignificant impact or N/A

The adaptive capacity should be considered in conjunction with any changes to the current risk factors over time which may influence an assets future vulnerability. A scale of adaptive capacity has been developed for this assessment and is presented in Table 6.1.

Table 6.1 Adaptive Capacity Ratings

Rating	Description / Frequency
Insignificant Impact; N/A	The impact of the coastal hazard on the asset would have an insignificant impact. This includes where the control or asset would be re-established naturally before further damage would likely occur.
Very High	Very high ability to absorb coastal hazard impacts or where capacity can be restored at relatively low cost. Capacity would be restored naturally over time.
High	Reasonable ability to absorb coastal hazard impacts, with functionality able to be restored . Natural restoration of capacity may occur slowly over time.
Moderate	Small amount of ability to absorb coastal hazard impacts. Restoration of functionality would be difficult, though possible.
Low	Little to no ability to absorb coastal hazard impacts. Functionality would be unable to be restored.

The adaptive capacity of an asset is likely to be different in response to coastal erosion or inundation hazards. The assessed adaptive capacities are outlined in the following sections. As with the risk from coastal hazards, the adaptive capacity of an asset is likely to change over the various planning horizon. For instance, structures with very deep foundations (piles, etc) may be less prone to impacts from coastal hazards than assets with shallow foundations, which could easily be undermined. The potential extent of coastal hazard impact (i.e. the depth of erosion) would also have an impact, for similar reasons to those just described.

6.1.1 Coastal Erosion

The adaptive capacity of each of the identified assets have been determined in regards to coastal erosion and are presented in Table 6.2.

Table 6.2 Coastal Erosion Adaptive Capacity Ratings

Asset	Present Day	2041	2061	2081	2101	2121
Gravel Access Road	Moderate	Moderate	Low	Low	Low	Low
Lower Gravel Parking	Moderate	Moderate	Low	Low	Low	Low
Boat Access Point	Moderate	Moderate	Low	Low	Low	Low
Beach Access Stairs	Moderate	Moderate	Low	Low	Low	Low
Lower Bitumen parking	Moderate	Low	Low	Low	Low	Low

Asset	Present Day	2041	2061	2081	2101	2121
Lower Bitumen parking	Moderate	Low	Low	Low	Low	Low
Bitumen access Road	Insignificant Impact; N/A	Low	Low	Low	Low	Low
Concrete stairs	Insignificant Impact; N/A	Insignificant Impact; N/A	Low	Low	Low	Low
Top parking area	Insignificant Impact; N/A	Insignificant Impact; N/A	Insignificant Impact; N/A	Low	Low	Low
Eastern Picnic Area	Moderate	Moderate	Low	Low	Low	Low
Eastern BBQ, tables and Associated Structures	Moderate	Moderate	Low	Low	Low	Low
Central Picnic Area	Moderate	Moderate	Low	Low	Low	Low
Central BBQ, tables and Associated Structures	Moderate	Moderate	Low	Low	Low	Low
Western Picnic Area	Moderate	Moderate	Low	Low	Low	Low
Western BBQs, tables and Associated Structures	Moderate	Moderate	Low	Low	Low	Low
Toilet Block	Insignificant Impact; N/A	Insignificant Impact; N/A	Low	Low	Low	Low
Lookout	Insignificant Impact; N/A	Insignificant Impact; N/A	Low	Low	Low	Low

Notes: 1. Based on most exposed location of each asset.

The adaptation capacity of the City's assets in regards to erosion relate directly to the availability of space to reinstate the assets or the ability to repair the asset in situ to allow continued use. It's noted that individual items within these assets have noticeably higher adaptive capacity such as bin or signs that can be easily moved or reinstated. As the erosion is likely to continue to increase, the available appropriate space is likely going to be significantly reduced subsequently reducing the adaptive capacity of the assets.

6.1.2 Coastal inundation

The adaptive capacities of each of the identified assets in regard to inundation have been determined and are presented in Table 6.3.

Table 6.3 Coastal Inundation Adaptive Capacity Ratings

Asset	Present Day	2041	2061	2081	2101	2121
Gravel Access Road	Very High	Very High	Very High	Very High	Very High	Very High
Lower Gravel Parking	Very High	Very High	Very High	Very High	Very High	Very High
Boat Access Point	Very High	Very High	Very High	Very High	Very High	Very High
Beach Access Stairs	Very High	Very High	Very High	Very High	Very High	Very High
Lower Bitumen parking	Insignificant Impact; N/A	Insignificant Impact; N/A	Insignificant Impact; N/A	Very High	Very High	Very High
Bitumen access Road	Insignificant Impact; N/A	Insignificant Impact; N/A	Insignificant Impact; N/A	Insignificant Impact; N/A	Very High	Very High
Concrete stairs	Insignificant Impact; N/A	Insignificant Impact; N/A	Insignificant Impact; N/A	Insignificant Impact; N/A	Insignificant Impact; N/A	Insignificant Impact; N/A
Top parking area	Insignificant Impact; N/A	Insignificant Impact; N/A	Insignificant Impact; N/A	Insignificant Impact; N/A	Insignificant Impact; N/A	Insignificant Impact; N/A
Eastern Picnic Area	Very High	Very High	Very High	Very High	Very High	Very High
Eastern BBQ, tables and Associated Structures	Very High	Very High	Very High	High	High	High
Central Picnic Area	Very High	Very High	Very High	Very High	Very High	Very High
Central BBQ, tables and Associated Structures	Very High	Very High	Very High	Very High	High	High
Western Picnic Area	Very High	Very High	Very High	Very High	Very High	Very High

Asset	Present Day	2041	2061	2081	2101	2121
Western BBQs, tables and Associated Structures	Very High	Very High	Very High	Very High	High	High
Toilet Block	Insignificant Impact; N/A	Insignificant Impact; N/A	Insignificant Impact; N/A	Insignificant Impact; N/A	Insignificant Impact; N/A	Insignificant Impact; N/A
Lookout	Insignificant Impact; N/A	Insignificant Impact; N/A	Insignificant Impact; N/A	Insignificant Impact; N/A	Insignificant Impact; N/A	Insignificant Impact; N/A

Notes: 1. Based on most exposed location of each asset.

As shown in the assessment, the majority of the assets are unlikely to be affected by inundation. Those that are impacted by inundation are expected to retain all of their functionality after the water recedes and the inundation event is over.

6.2 Vulnerability Assessment

The following matrix was developed for the assessment of the vulnerability of the key public assets. The vulnerability of each identified asset is defined by the adaptive capacity and risk level, where a high adaptive capacity decreases the initial risk rating of an asset. The vulnerability matrix is shown in Table 6.4 below.

Table 6.4 Vulnerability Matrix

VULNERABILITY LEVELS		ADAPTIVE CAPACITY				
		Insignificant Impact; N/A	Very High	High	Moderate	Low
RISK LEVEL	Extreme	Low	Medium	High	Extreme	Extreme
	High	Low	Low	Medium	High	High
	Medium	Low	Low	Low	Medium	Medium
	Low	Low	Low	Low	Low	Low

A vulnerability tolerance scale is important to define the level at which adaptive capacity is deemed acceptable, tolerable or intolerable/unacceptable. The following tolerance scale has been adopted for this assessment.

Table 6.5 Vulnerability Tolerance Scale

Vulnerability Level	Further Action Required	Vulnerability Tolerance
Extreme	Asset has minimal capacity to cope with the impacts of coastal hazards without additional action. Adaptation needs to be considered as a priority.	Unacceptable / Intolerable
High	Asset has limited ability to cope with the impacts of coastal hazards. Adaptation should be considered to reduce vulnerability to acceptable levels.	Tolerable, if as low as possible
Medium	Asset has some ability to cope with the impacts of coastal hazards. Actions should be considered to reduce vulnerability as low as reasonably practical (ALARP).	Tolerable / Acceptable
Low	Assets has high resilience and is able to cope with the impacts of coastal hazards without additional action.	Acceptable

The vulnerability tolerance scale shows that assets with ***High*** and ***Extreme*** vulnerability need to be managed to reduce vulnerability levels to ***Medium*** or ***Low***. Despite being considered acceptable, assets with ***Medium*** or ***Low*** vulnerabilities should also be considered for adaptation measures to reduce vulnerability levels as low as reasonably practical. This is discussed in Section 7 of this CHRMAP.

6.2.1 Coastal Erosion

The vulnerabilities of each of the identified assets have been calculated and are shown in Table 6.6. The assets identified as having ***High*** vulnerability from coastal erosion impact are expected to require management over the respective planning horizons.

Table 6.6 Assessment of Vulnerability of Coastal Erosion Impact

Asset	Present Day	2041	2061	2081	2101	2121
Gravel Access Road	Medium	High	High	High	High	High
Lower Gravel Parking	Medium	High	High	High	High	High
Boat Access Point	Medium	High	High	High	High	High
Beach Access Stairs	Medium	High	High	High	High	High
Lower Bitumen parking	Medium	High	High	High	High	High
Bitumen access Road	Low	Medium	Medium	Medium	Medium	High
Concrete stairs	Low	Low	Low	Low	Medium	Medium
Top parking area	Low	Low	Low	Medium	Medium	High
Eastern Picnic Area	Medium	Medium	High	High	High	High
Eastern BBQ, tables and Associated Structures	Medium	Medium	High	High	High	High
Central Picnic Area	Low	Medium	High	High	High	High
Central BBQ, tables and Associated Structures	Low	Medium	High	High	High	High
Western Picnic Area	Low	Medium	High	High	High	High
Western BBQs, tables and Associated Structures	Low	Medium	High	High	High	High
Toilet Block	Low	Low	Low	Medium	Medium	High
Lookout	Low	Low	Low	Low	Low	Medium

The results of the vulnerability assessment show that the key assets will likely require management within the short term. Most assets are identified as having either a High or Medium vulnerability to coastal erosion hazards within 20 years and are assessed as having a Medium to Low level of vulnerability in the present day. The majority of assets reach a High level of vulnerability to coastal erosion hazards in the 2061 planning horizon. These high vulnerability

assets require additional adaptation measures to be implemented. These measures will be discussed in the following section of the report.

6.2.2 Coastal inundation

The vulnerabilities of each of the identified assets in regard to costal inundation have been calculated and are shown in Table 6.7.

Table 6.7 Assessment of Vulnerability of Coastal Inundation Impact

Asset	Present Day	2041	2061	2081	2101	2121
Gravel access road and parking	Low	Low	Low	Low	Low	Low
Gravel Access Road	Low	Low	Low	Low	Low	Low
Lower Gravel Parking	Low	Low	Low	Low	Low	Low
Boat Access Point	Low	Low	Low	Low	Low	Low
Beach Access Stairs	Low	Low	Low	Low	Low	Low
Lower Bitumen parking	Low	Low	Low	Low	Low	Low
Bitumen access Road	Low	Low	Low	Low	Low	Low
Concrete stairs	Low	Low	Low	Low	Low	Low
Top parking area	Low	Low	Low	Low	Low	Low
Eastern Picnic Area	Low	Low	Low	Low	Low	Low
Eastern BBQ, tables and Associated Structures	Low	Low	Low	Low	Low	Medium
Central Picnic Area	Low	Low	Low	Low	Low	Low
Central BBQ, tables and Associated Structures	Low	Low	Low	Low	Low	Low
Western Picnic Area	Low	Low	Low	Low	Low	Low
Western BBQs, tables and Associated Structures	Low	Low	Low	Low	Low	Low
Toilet Block	Low	Low	Low	Low	Low	Low
Lookout	Low	Low	Low	Low	Low	Low

The result of the coastal inundation vulnerability assessment show that for the majority of the planning timeframe the assets will not be affected by the inundation. There is a possibility that any electric systems associated with the BBQ or gazebos my be damaged by the inundation and thus the slightly increased rating. It is likely that the adaptation requirements to overcome the coastal erosion risks will negate any need for specific requirement to manage inundation. These adaptation measures are discussed in the following section of the report.

7. Risk Adaptation & Mitigation Strategies

7.1 Available Risk Mitigation Strategies

Risk adaptation and mitigation strategies are required for the city to address the coastal hazard risks and asset vulnerabilities identified in Sections 5 and 6. SPP2.6 outlines a hierarchy of risk adaptation and mitigation options, where options that allow for a wide range of future strategies are considered more favourably. This hierarchy of options is reproduced in Figure 7.1.

Figure 7.1 Risk Management & Adaptation Hierarchy

These four broad option categories are generally outlined below.

- Avoid – avoid new development within the area impacted by coastal hazards.
- Retreat – the relocation or removal of assets within an area identified as likely to be subject to intolerable risk of damage from coastal hazards.
- Accommodation – measures which suitably address the identified risks.
- Protect – used to preserve the foreshore reserve, public access and public safety, property and infrastructure.

The assessment of these options is generally done in a progressive manner, moving through the various options until an appropriate mitigation strategy is found. Adaptation options can vary depending on the type of asset, and often a range of complementary strategies may be required to mitigate coastal hazard risks.

7.2 Proposed Management Strategy

The potential future movement of the shoreline and risks posed from coastal hazards necessitates the requirement for coastal adaptation and risk mitigation planning. The public assets are currently at risk from coastal erosion and, to a much lesser extent, inundation. These assets are already constructed therefore the most applicable risk management and adaption strategy is to retreat the assets as the erosion increases.

The behaviour of the coastline is complex and subject to change, with coastal hazard lines possibly not being reached until many years after the suggested timeframes due to the justifiable

level of conservatism that is included within the assessment methodology. As the assets at risk are public assets and are actively used by the community and tourists alike, the most practical management option is to retreat the assets as they are actively impacted by coastal erosion. This method would allow for high levels of public access to the area for the largest timeframe. This will increase the risk to public safety unless monitoring and active management is completed.

As part of the management of the area it is expected the City will remediate small issues and defects cause by general use and coastal processes to maintain the safe use of assets. This is expected to include regrading of the boat access point and gravel areas and maintenance of the beach access stairs. As part of these works the City could consider adaptation measures to increase the time that the assets are available to the public. These could include works similar to the recent stabilisation works all the way up to the sand nourishment and interim protection through geosynthetic sand containers.

The remediation and adaptation works could be used to provide an erosion buffer to accommodate coastal hazards over an assets remaining life. The asset would likely still need to be removed when these adaptation measures and the erosion buffer have been diminished, this would likely be closer to the end of an asset's useful life.

The retreat of all assets will be triggered by an individual assessment relating to the risk each asset poses to public safety and City management, these triggers are outlined below.

- Vehicle accessible assets, such as the boat access point and parking areas, should be retreated once the area can no longer be maintained through regular works and voids or erosion scarps could begin to impact user safety.
- Public use assets such as the beach assess stairs, BBQs, tables, gazebos and associated structures, should be retreated before they are no longer able to be safely used by the public. These structures are expected to be retreated once the erosion scarp is in close proximity to the base or footing.
- For the picnic areas it is expected that they should gradually be retreated to allow as much access to the foreshore area into the future. This is likely to include the gradual shrinking of the picnic areas to account for the coastal erosion.
- Regarding the Toilet block, this asset is expected to be one of the last to be retreated. This asset is expected to be retreated once the top of the erosion scarp is within 10 m of the building or at the end of its service life.
- The ways to currently access the foreshore are a vehicle access way and a set of stairs. These assets should be maintained for as long as possible to allow public access to the beach and foreshore area. These assets are expected to be closed, adapted and retreated based on the remaining assets available within the foreshore area. This could include the adaption of the vehicle access way to a pedestrian access way once the lower vehicle accessible assets have been retreated.
- It is noted that for heritage assets the management plan outlined by the City is to allow for in-situ arrested decay. Appropriate signage should be monitored and retreated appropriately to provide historical knowledge to any visitors.

As public assets are retreated there is an option to reinstate these assets to allow for continued public access. The reinstatement of retreated assets should consider the location of the coastal

erosion lines and ensure that any reinstatement is behind the hazard line corresponding to the relevant planning timeframe of the asset's life span. A new assessment may be required to ascertain updated coastal hazard lines depending on when the asset is to be reinstated.

It is noted that some assets will be difficult to reinstate in similar locations due to the topography of the area.

To ensure the safe implementation of the management strategy, appropriate monitoring and inspection of the foreshore and beach area is required. The proposed monitoring is outlined in detail in Table 7.1.

Table 7.1 Proposed Coastal Monitoring

Type of Monitoring	Description	Requirement / Frequency
Visual Inspections	Visual inspection and monitoring of the beach to identity any significant changes in the shoreline. Changes would be evident through the erosion of the beach and presence of an erosion scarp with or without the loss of vegetation.	Ongoing as part of the city's management of the area. Visual inspections are especially important post storm events as these can produce significant erosion.
Shoreline Mapping	Ortho-rectified aerial photographs will be purchased and the coastal vegetation line mapped to track the movement of the shoreline. This method will help to ascertain if there is any creep in shoreline position that is not being picked up through the visual inspections.	Every 5 years or when the visual inspections suggest a significant change in the beach/shoreline.
Survey Cross Sections	Survey of the beach and foreshore along profiles fronting the high cost assets such as the toilet block. The profiles would seek to capture the foreshore out to a water depth of approximately 5 m. These surveys would help to determine the extent of the change in the shoreline profile that is occurring.	This level of survey would only be required if the eroded shoreline came within a horizontal distance of the S1 allowance plus 15m (approximately 30 m for the toilet block). If this were to occur then the survey cross sections should be completed every 1 to 2 years depending on the recommendations of a coastal engineer at that time.

This monitoring should be used to identify if the shoreline erodes to the extent that a trigger position is reached where the risk of coastal hazards becomes too great. If this were to occur, then the at-risk asset should be removed and relocated to an area that is considered safe based on the results of a coastal hazard assessment at that time.

The management of the public assets has been outlined above, with the long term adaption strategy being retreat.

8. Conclusion

This CHRMAP has been completed to provide guidance on required adaptation and management actions associated with the public assets within the foreshore. The coastal hazard assessment completed previously, and referred to in Section 3, as well as this CHRMAP report have been completed in line with the recommendations of SPP2.6 and WAPC (2019).

An assessment of the potential future areas of impact caused by the action of coastal hazards was completed in accordance with the requirements of SPP2.6. The results of this assessment show that the shoreline fronting the site could be vulnerable to change caused by a combination of severe storm erosion and sea level rise. In this regard, it is prudent to consider the potential future shoreline changes and the possible impacts on the public assets from future coastal adaptation and management requirements. It is noted however that an assessment of the historical movement of the shoreline fronting the site shows that the beach has experienced very little gross movement over the last half a century with the exception of the erosion adjacent to, and likely caused by, the redundant historical seawall. This demonstrates the apparent stability of the shoreline and highlights that the results of the coastal hazard assessment are likely to be conservative for this location.

The completion of the coastal hazard risk assessment for the public assets has shown that there is a risk of coastal hazard impact over the 100 year planning timeframe, while some assets are at risk in the present timeframe. As such, the short term (20 year plan) is to adapt, mitigate and retreat the assets while providing continued use and access to the foreshore area. The long term (100 year plan) is a managed retreat, which shall be initiated by erosion beyond the trigger points as mentioned in section 7 of this report.

A coastal management and adaptation strategy was presented within this report that outlines the proposed future management strategy. This strategy is based on retreating assets to avoiding future risk while preserving access and assets for the public. The managed retreat proposed is triggered by erosion of the shoreline, or at such time as the structures need to be replaced.

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10. Appendices

Appendix A **Whalers Beach Coastal Hazard Assessment**

Appendix B **Coastal Erosion Hazard Lines – SK1944-01-02**

Appendix A Whalers Beach Coastal Hazard Assessment

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R1630 Rev 1

January 2021

City of Albany

Whalers Beach
Coastal Hazard Assessment

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canals
breakwaters
jetties
seawalls
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1. Introduction

Whalers Beach is located on the southern shoreline of King George Sound and, unique for a shoreline along the south coastal region, has a northerly aspect (refer Figure 1.1). Whalers Beach has an interesting history, being the site of a Norwegian whaling station which was constructed in 1913. The tenure at the whaling station was short lived, with the station ultimately closing in 1915. Much of the infrastructure was removed following the closure of the whaling station; however, some relics remain on the beach (refer Figure 1.2). These relics have influenced the shoreline behaviour over the ensuing century.

Figure 1.1 Location of Whalers Beach

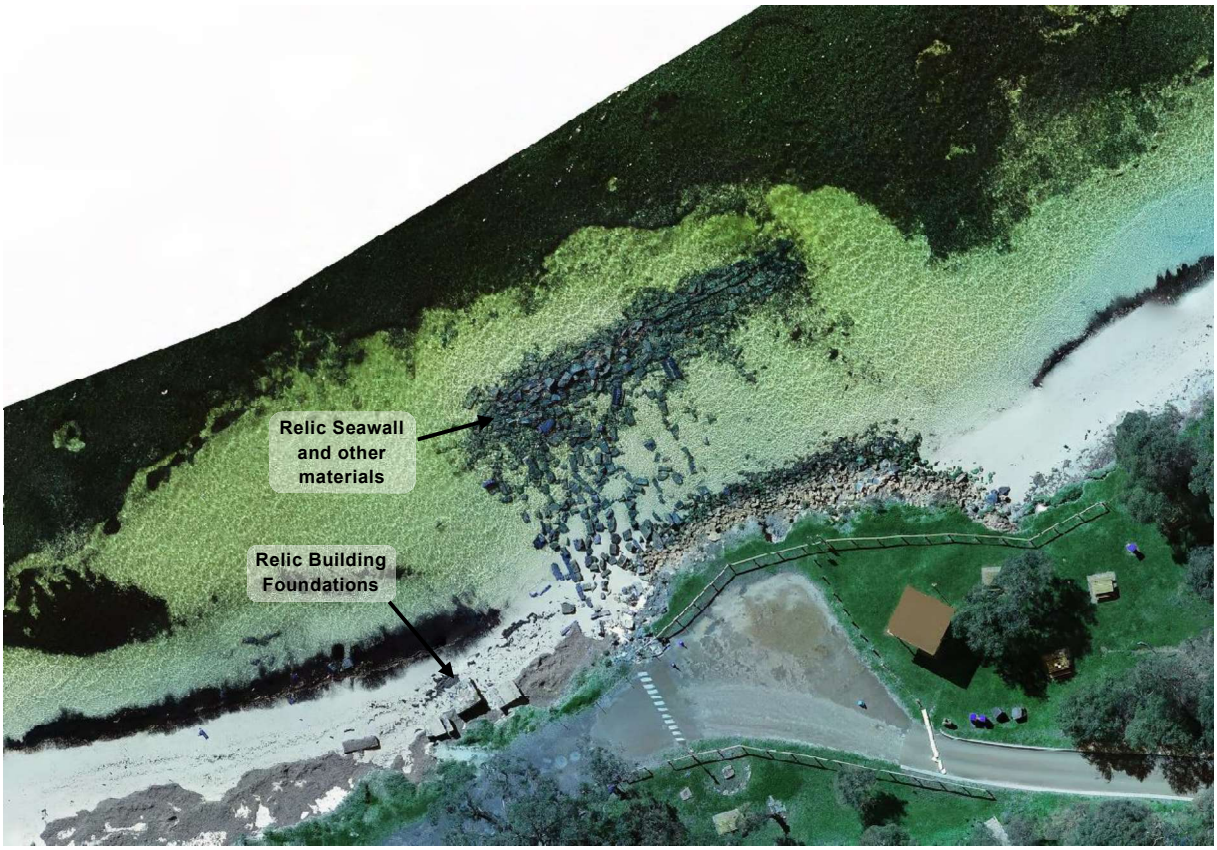

Figure 1.2 Relics from the Norwegian Whaling Station

In the present day, Whalers Beach is a popular beach and foreshore area with both locals and tourists alike. Lots 1 and 2 Frenchman Bay Road are also slated for the development of Tourist Accommodation within the City of Albany Local Planning Scheme No. 1. Whilst an approval for the development of Lots 1 and 2 is in place, the approved development is understood to not be commercially viable, so modifications to the Local Development Plan (LDP) are proposed.

To enable review of the proposed development in the context of coastal hazard risk, as well as to enable planning for the siting of public infrastructure within the foreshore, the City of Albany engaged specialist coastal engineers M P Rogers & Associates Pty Ltd (MRA) to complete a coastal hazard assessment for Whalers Beach. The requirement for the assessment of coastal hazard risk is even more profound given that the shoreline fronting the main coastal node has experienced noticeable erosion over the past few years.

Provision of guidance with regard to future coastal hazard risk requires an understanding of the potential zones of impact from local coastal processes. Within Western Australia, State Planning Policy 2.6 – the State Coastal Planning Policy (SPP2.6; WAPC, 2013) provides a methodology to determine the extent of areas adjacent to the coastline that could be influenced by coastal processes.

This report presents the results of investigations into the potential extent of impacts from coastal processes over a variety of planning horizons. These coastal hazard risk areas can then be used to guide a coastal hazard risk management and adaptation planning process in future stages of work.

2. Site Setting

2.1 Location

Whalers Beach is a curved 700 m long north-facing beach located between Vancouver Point to the west and Waterbay Point to the east (Short, 2006). The presence of the Flinders Peninsula to the south and east provides protection to Whalers Beach from offshore wave conditions, with refracted and diffracted wave heights generally less than around 1 m at the shoreline. The protrusion of Waterbay Point also provides further sheltering to the shoreline, and wave energy generally decreases from west to east along the beach (Short, 2006).

These local features are shown in Figure 2.1, which is an extract of the local nautical chart for the area.

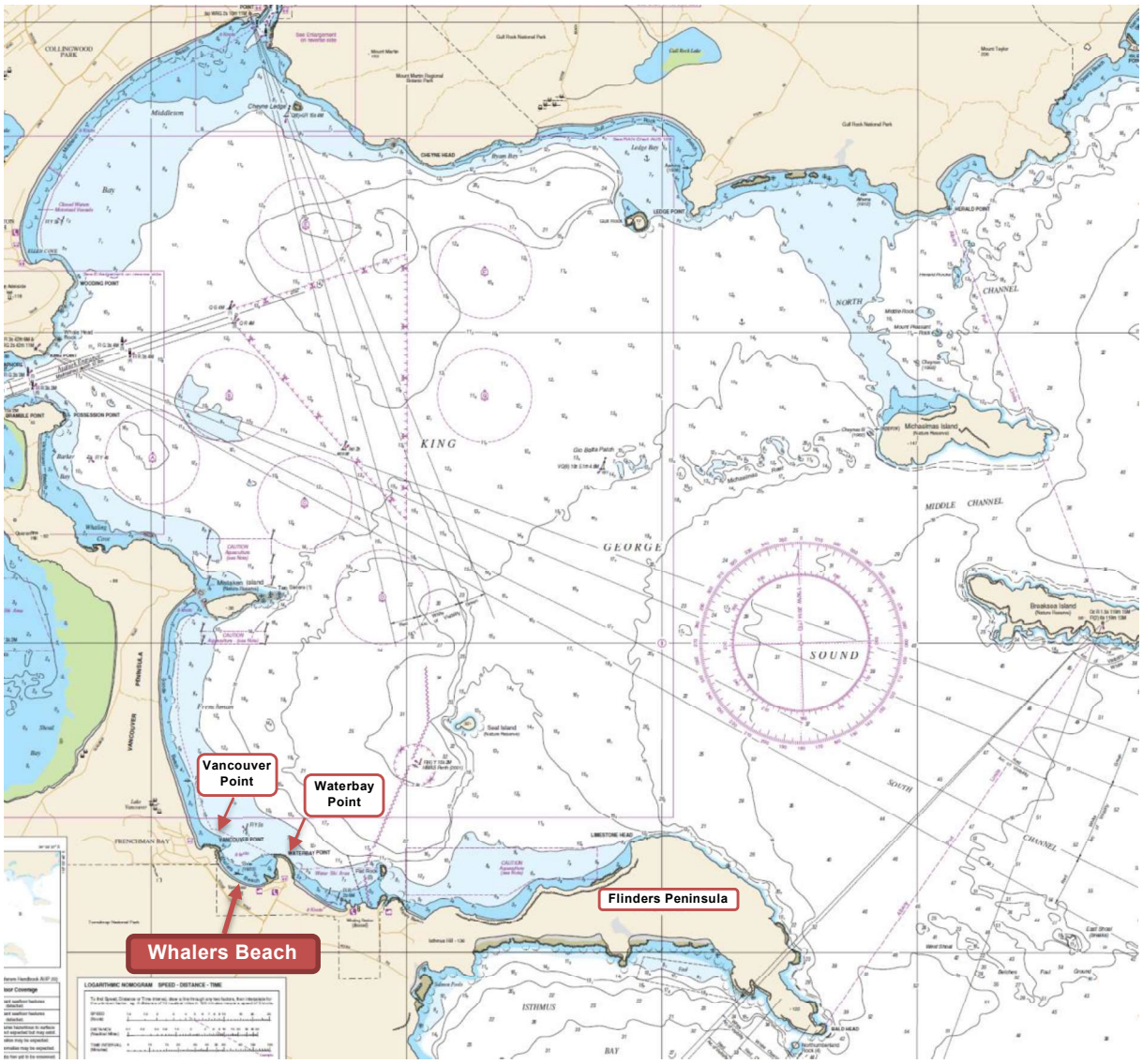

Figure 2.1 Extract from Local Nautical Chart (WA1083: DoT 2014)

2.2 Geology & Geomorphology

The Whalers Beach shoreline consists of a reflective sandy beach. Behind the beach the land slopes steeply up to an elevation of approximately 25 mAHD before the land continues to rise at a

gentler grade. The area is underlain by a basement that is PreCambrian "Granitoid Gneiss" which is overlain by a Tertiary Planagenet Group (Landform Research, 2008). The Granitoid basement outcrops to form both Vancouver and Waterbay Points.

Given the northerly aspect of the beach, which faces away from the prevailing conditions, a conventional dune system is conspicuously absent along this shoreline.

In 2008, Landform Research completed geotechnical drilling within Lots 1 and 2 to further review the local geology. The drilling determined that there was a deep layer of sand which was underlain by a siltier material. Significantly, none of the boreholes intersected the granitoid rock basement despite drill depths down to -1.7 mAHD in some areas. Whilst this drilling assessment was limited to the areas within Lots 1 and 2, it is anticipated that similar geological conditions would be encountered over the full extent of Whalers Beach. As a result, assessment of the shoreline will be based on a sandy coastline classification.

Figure 2.2 View of Granitoid Outcrop that Forms Waterbay Point

Figure 2.3 View West Along Whalers Beach Towards Vancouver Point

2.3 Historical Norwegian Whaling Station

The Norwegian Whaling Station was originally constructed in 1913, but was ultimately closed in 1915. At its peak, the whaling station boasted a range of different buildings, as shown in Figure 2.4.

Figure 2.4 Image of the Norwegian Whaling Station from 1913 (Frenchman Bay Association, 2021)

The Frenchman Bay Association (2021) provides a succinct summary of the history of the site. In particular, it is noted that following closure of the station the owners disassembled much of the machinery and relocated it to the site of their new facility at Point Cloates. However, it is noted that a large storm in 1921 wrecked the remaining slipway and loading jetty and eroded the seawall that protected the foundations of some buildings, causing them to topple. Whilst an amount of material was salvaged or removed, some of the material remained on site. An image of the remaining material is shown in Figure 2.5. This figure shows the remnants footings of some of the buildings as well as what is understood to be the remains of the initial seawall.

Figure 2.5 Remnant Material from the Norwegian Whaling Station (Frenchman Bay Association, 2021)

Given their location on the beach, the remains of the Whaling Station have impacted the local coastal processes along the eastern portion of Whalers Beach. It is currently understood that the City of Albany are reviewing heritage preservation opportunities and requirements for these relics. It must be acknowledged that any changes to the location or configuration of these relics could further influence the local shoreline dynamics. This will be discussed further in latter sections of this report.

2.4 Metocean Conditions

Consideration of beach stability and coastal processes is enhanced by an understanding of the fundamental driving forces. Consequently, data on the magnitude and variation in the winds, waves, tides and currents is important in assessing the coastal processes.

2.4.1 Wind Regime

The seasonal weather patterns at Albany are largely controlled by the position of the so called Subtropical High Pressure Belt. This is a series of discrete anticyclones that encircle the earth at the mid-latitudes (latitudes of 20 degrees to 40 degrees). Throughout the year, these high pressure cells are continuously moving from west to east across the southern portion of the Australian continent. A notional line joining the centres of these cells is known as the High Pressure Ridge.

In winter, this ridge lies across Australia typically between 25 to 30 degrees south and is to the north of Albany which is located at around 35 degrees south. Consequently, the migrating low pressure systems which exist to the south of the High Pressure Ridge, are located sufficiently northward to bring a westerly wind regime to the southwest of Western Australia and the adjacent waters. Cold fronts associated with these low pressure systems pass over the Albany region. These can bring storm force winds with directions from northwest, through west, to southwest.

During summer, the High Pressure Ridge moves south of Albany and lies between 35 and 40 degrees south. Under these circumstances, the Albany region comes under the influence of the high pressure cells of the High Pressure Ridge. These cells cause anti-cyclonic winds that rotate anti-clockwise in the Southern Hemisphere. At Albany, these winds arrive from the southeast to east as the high pressure cell approaches from the west.

In addition to these synoptic scale effects which cause seasonal variations, the meso-scale phenomenon of a land / sea-breeze system is commonly experienced during summer at Albany and adjacent coastal regions.

The Bureau of Meteorology has recorded the wind speed and direction at Albany Airport since 1965 and have used this data to prepare seasonal wind roses. These are presented as Figures 2.6 and 2.7 for the expanded winter (May to September) and summer (October to April) periods. Figure 2.6 shows the predominance of winter winds from the northwest and southwest sectors. Often the wind speeds exceed 50 kph in the winter storms.

The wind roses for summer, Figure 2.7, shows the common wind directions in summer as southeast and southwest. The detailed wind records show the land sea-breeze effect with the summer morning winds typically from the east and southeast at 20 to 40 kph, while the afternoon winds in summer tend to be of slightly stronger and generally from the southeast to southwest.

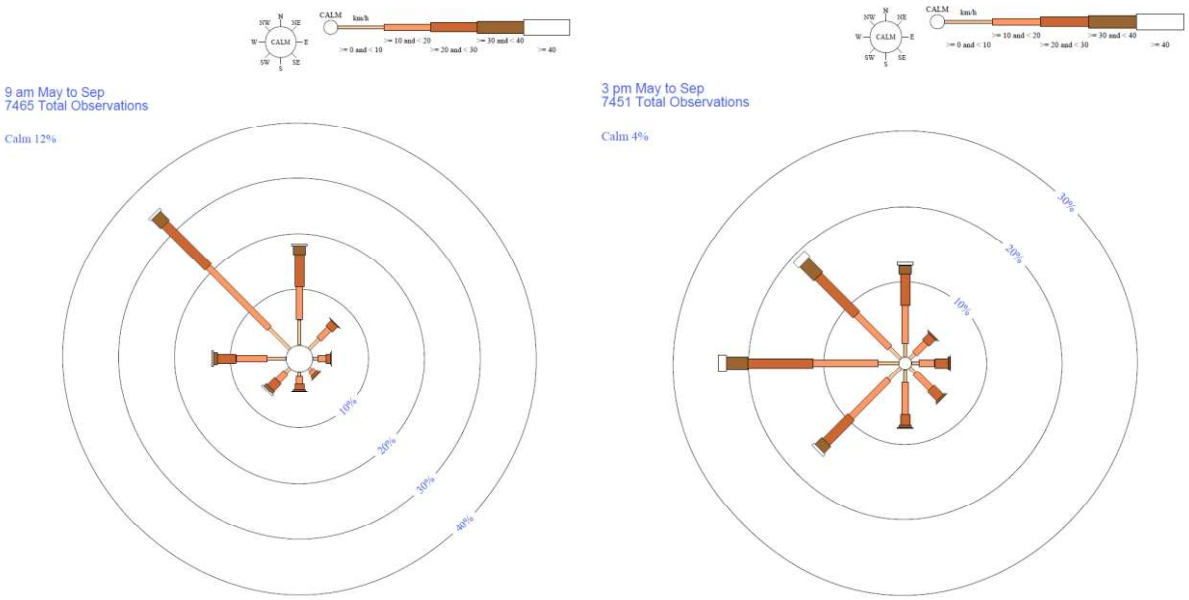

Figure 2.6 Albany Wind Roses for the Expanded Winter Period (BoM, 2014)

Figure 2.7 Albany Wind Roses for the Expanded Summer Period (BoM, 2014)

These records were taken at the Albany Airport which is about 20 km from Whalers Beach. Differences in the local topography are likely to cause changes in the wind speeds and local directions. Nevertheless, the records presented are believed to be fairly representative of the main wind patterns and the seasonal changes that are experienced at Whalers Beach.

The wind regime influences coastal processes through the generation of waves and currents.

2.4.2 Wave Climate

The nearshore wave climate at Whalers Beach comprises two distinct sources. The first is that from the open ocean to the south of Albany, and the second are those waves that are generated by local winds across the short fetches of King George Sound.

This local generation of waves across King George Sound that causes waves to be directly incident upon Whalers Beach is caused by winds from the north-easterly quadrant. However, as seen in the previous wind roses, strong winds from this quadrant are not overly persistent.

The deepwater wave climate to the south of Albany is quite severe. The Department of Transport record wave conditions in 60m of water south of Albany using a Waverider buoy. The location of the Waverider is shown in Figure 2.8. Wave measurements from this location are available since 2005.

Figure 2.8 Location of the DoT Waverider Buoy

The data recorded from the Albany Waverider is plotted in Figure 2.9. This figure shows both the time history of recorded wave heights as well as cross plots of the sea and swell wave heights verses their associated directions.

Figure 2.9 shows that the most common direction for these offshore waves is from the southwest, but they also approach King George Sound from the south and occasionally the southeast. The severity of the wave heights also mirrors the persistence, with the most severe waves from the south through west. Interestingly, the plot of recorded wave heights shows that the winter of 2020 was relatively severe, with a cluster of higher wave heights than previously observed within the data record. This may explain some of the erosion pressures that have been experienced at Whalers Beach over the past couple of years.

Figure 2.9 Wave Data Recorded from the Albany Waverider Buoy

The shape of King George Sound provides Whalers Beach with excellent natural protection from these open ocean waves (refer to Figure 2.1). In particular, the extent and position of Flinders Peninsula limits the energy of ocean waves that reach Whalers Beach. The large ocean waves are greatly attenuated by the processes of refraction, diffraction, bottom friction and breaking as they travel from the open ocean to the sheltered shore.

Small to very small swell waves reach the shores of Whalers Beach throughout the year. Because of the extensive refraction, the swell waves are bent around and arrive at the shore with crests generally parallel to the beach. This is an important feature as it means that if there are changes to swell conditions then the alignment of the beach will likely change as a result.

Given the location of Whalers Beach, the most important fetches for locally generated waves are from the north-east quadrant. During the summer months there will be periods of winds that generate local seas from this direction across King George Sound. These seas will often reach 1 metre in height with wave periods of about 4 seconds. During very extreme events of strong winds from the east, the local seas may reach 2 metres in Whalers Beach.

The waves that break on the beach are very important in the transport of sand in the littoral zone.

2.4.3 Tides & Water Levels

The astronomical tides at Albany are predominantly diurnal (one tidal cycle each day) and relatively limited in range. The daily range is typically about 0.6 metres during spring tides and about 0.3 metres during neap tides.

Seasonal shifts in the sea level occur due to meteorological effects. Typically, the mean sea level at Albany rises 0.1 metre during winter and falls 0.1 metre during summer.

During storms events, barometric and wind effects can cause significant storm surges. In typical winter storms, the surge is often about 0.4 metres above the astronomical tide level. The storm surge can be in the order of 1 metre during a very rare winter storm.

Given the small astronomical tides, the level of the sea would generally have a secondary effect on the sand transport along the beaches, except during storm events when high water levels would enable the waves to attack the rear of the sandy beaches.

2.4.4 Nearshore Currents

As the tidal range is quite small, it is likely that the nearshore tidal currents in Whalers Beach are also small. From work in Princess Royal Harbour (Environmental Protection Authority, 1990) it is expected that the largest currents in the nearshore area at Whalers Beach would result from the action of the wind blowing over the water surface. These wind driven currents are generally less than 0.5 m/s.

The magnitude of these nearshore currents is such that they will have a minor effect on the movement of sand on the adjacent beaches.

2.5 Coastal Processes

Whalers Beach is located within the Possession Point to Bald Head coastal compartment (refer Figure 2.10). This compartment is characterised by embayed beaches generally separated by granite outcrops that exhibit morphological control.

Over the planning horizons considered in this assessment (up to 100 years) Whalers Beach can be treated as a closed sediment cell. This is due to the fact that Vancouver and Waterbay Points essentially restrict sediment transport into or out of the Bay.

Figure 2.10 Extent of Coastal Sediment Cells

Based on the above information regarding the various physical processes, the movement of sand within Whalers Beach is believed to be dominated by wave induced processes.

The transport of sand along a coast is a fundamental mechanism in beach dynamics. A simplistic description of this mechanism is that in the surf zone of sandy beaches, the breaking waves agitate the sand and place it into suspension. If the waves are approaching the beach at an angle, then a longshore current can form and this can transport the suspended sand along the beach. The suspended load transport is accompanied by a bed load transport where sand is rolled over the bottom by the shear of the water motion.

At Whalers Beach the swell waves generally approach normal to the shoreline, though there is the potential for changes to the swell wave periods to change the alignment of the swell waves slightly as they approach the beach. Given the protection provided by Waterbay Point, the incident wave heights will also be higher at the western end of the Bay than they are at the eastern end. The western end of the Bay is also more exposed to summer easterly seas, increasing the potential for sediment transport along the western shoreline. Despite these different processes, the fact that Whalers Beach is essentially a closed sediment cell means that the alignment of the shoreline would not be expected to change markedly over time. There may be reorientations or rotations of the overall beach driven by the incident wave energy, but ultimately such changes are expected to be relatively small.

The other significant coastal process, is by the onshore / offshore movement of beach sand. During storm events the steep waves and high water levels would cause sand to be eroded from

the beach and carried offshore. The long, low swell that persistently arrives at this coast between storm events would tend to move sand back onto the beach. This cyclical onshore / offshore movement of sand is not expected to be large by volume within Whalers Beach, however the absence of a defined dune, which would typically provide a buffer against storm erosion, means that any erosion effects are generally more noticeable.

3. Coastal Hazard Identification

An understanding of potential future coastal hazards and risks is critical for the assessment and determination of appropriate locations for siting of new development as well as for the development of management and adaptation actions.

SPP2.6 provides guidance on the assessment criteria and methodology required to determine the potential extent of coastal hazard impacts, whilst incorporating an appropriate level of conservatism for coastal planning. This assessment methodology seeks to incorporate allowances for landform stability, natural variability and climate change over the proposed planning horizon. Specifically, the following items are considered in order to assess the appropriate allowances for coastal processes and climate change over the proposed planning timeframes.

- Severe storm erosion (S1 Allowance).
- Historical shoreline movement (S2 Allowance).
- Climate change induced sea level rise (S3 Allowance).
- Storm surge inundation (S4 Allowance).

These criteria are discussed in further detail in the following sections of this report. This coastal hazards assessment has been completed for a 100 year planning horizon in accordance with SPP2.6 requirements. Interim planning horizons of 25, 50 and 75 years have also been considered in order to assess the changes to coastal vulnerability over time.

3.1 Severe Storm Erosion (S1 Allowance)

SPP2.6 outlines that the S1 allowance should provide an adequate buffer to accommodate the potential erosion caused by a storm with an Annual Encounter Probability (AEP) of 1%. This is equivalent to a 100 year average recurrence interval (ARI) storm.

Estimation of the S1 allowance for Whalers Beach first requires selection of an appropriate storm event. This is particularly relevant given the level of sheltering that the shoreline receives. The selected storm will then be modelled to determine the potential extent of shoreline erosion that could result.

3.1.1 Storm Event

As outlined previously, Whalers Beach has a northerly aspect and so is protected from the most severe wave energy from the south by the Flinders Peninsula. As a result, wave energy that arrives at the shoreline during the largest wave events (typically from the south to south west) is significantly attenuated due to the extent of diffraction required for the waves to reach the shoreline. For example, based on diffraction diagrams provided in Goda (2010) (refer Figure 3.2), even a wave coming directly from the south would be attenuated to less than 10% of its total offshore wave height by the time that it diffracted around Bald Head and made it to the nearshore area fronting Whalers Beach.

Given the above, storm events that are predominately from the west through south would be expected to have little impact on the shoreline fronting the resort. Events with the majority of the wave energy originating from the south through east would have a much greater impact on this

section of shoreline since less wave diffraction would be required for the wave to reach the shoreline.

MRA (2018) completed a review of storm conditions appropriate for the simulation of potential coastal erosion events and discussed the effects of event directionality with particular focus on the Albany region. Results of that analysis showed that even though a storm event experienced in August 1984 was not classified as one of the top storm events, the directionality of the event being from the south east, resulted in significant erosion of shorelines within King George Sound. The extent of erosion observed during the August 1984 event was actually greater than for any other storm event within the period of record, which dated back to 1943.

Given the critical nature of a south easterly wave for the realisation of storm erosion impacts along Whalers Beach, wave records were therefore interrogated to assess only those events with severe waves arriving from the south through east. The assessed wave data included the information from the DoT Waverider Buoy as well as results from the WW3 global hindcast wave model (NOAA 2016), and other available hindcast modelling results completed by WNI (1996).

An extreme analysis was completed on the filtered wave events to show the average recurrence of wave heights from the south through east. Results of this extreme analysis are presented in Figure 3.1.

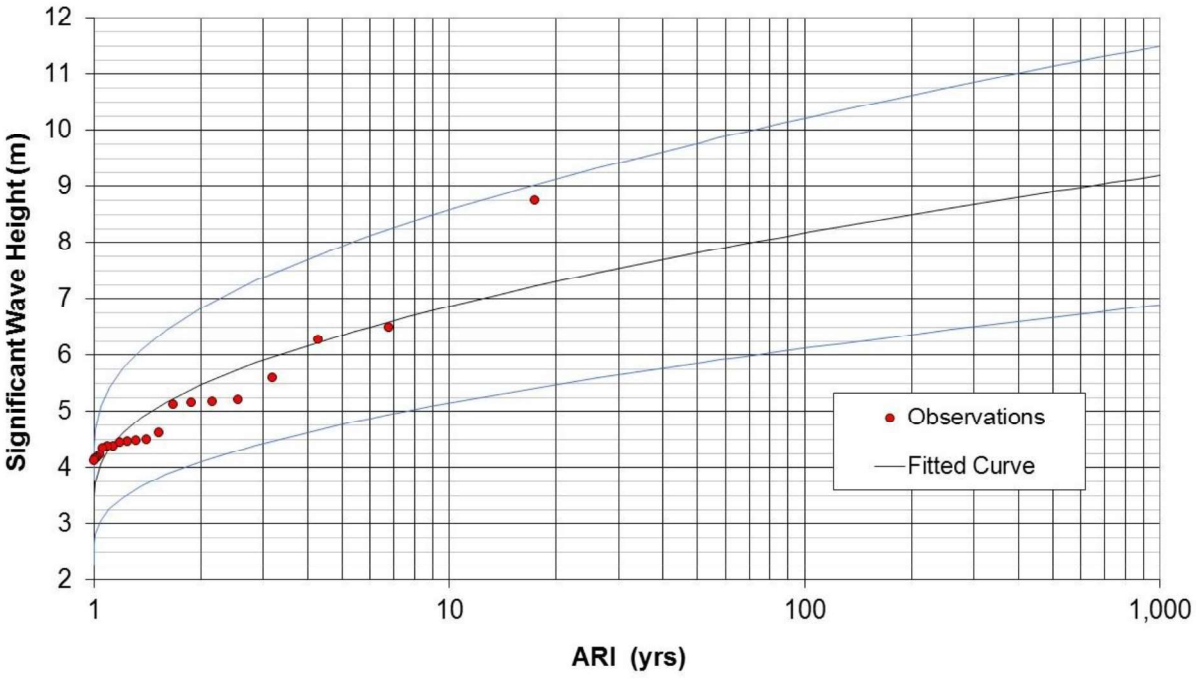

Figure 3.1 Extreme Wave Height Analysis for Waves from the South through East

The most notable feature of the extreme analysis is that there is one event that is significantly more severe than the over events. This event is the August 1984 event.

Even though this event was predominately from a south easterly direction, waves still need to diffract around Bald Head in order to reach the nearshore area adjacent to Whalers Beach. The hindcast wave conditions were therefore adjusted to account for the attenuation caused by this diffraction using the diffraction diagrams presented in Goda (2010) (refer Figure 3.2). Using this diffraction diagram, it was possible to estimate the wave conditions offshore from Whalers Beach.

This method is akin to that used by MRA (2017). For clarity, two examples showing how the wave transformation was completed are shown in Figure 3.3.

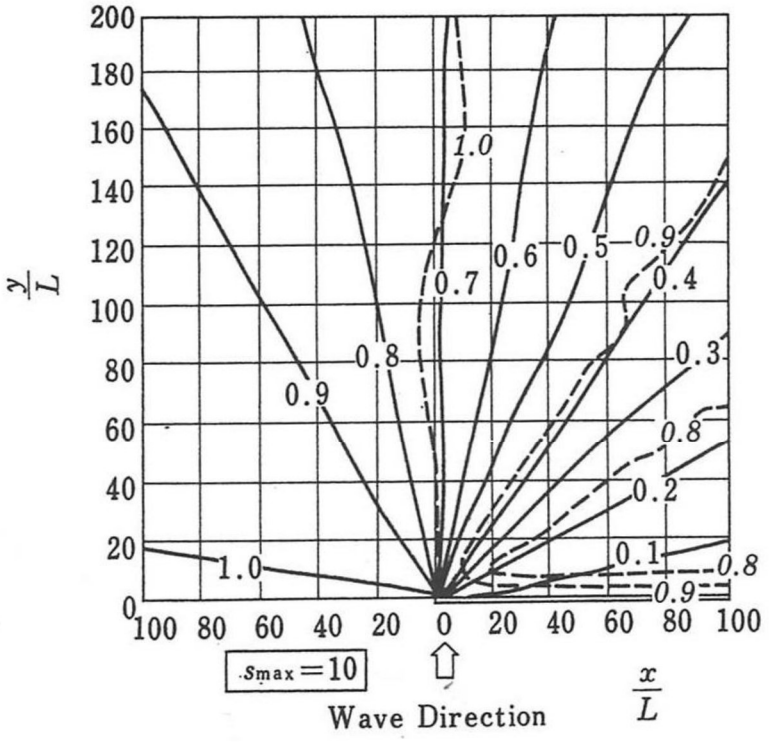

Figure 3.2 Diffraction Diagram from Goda (2010)

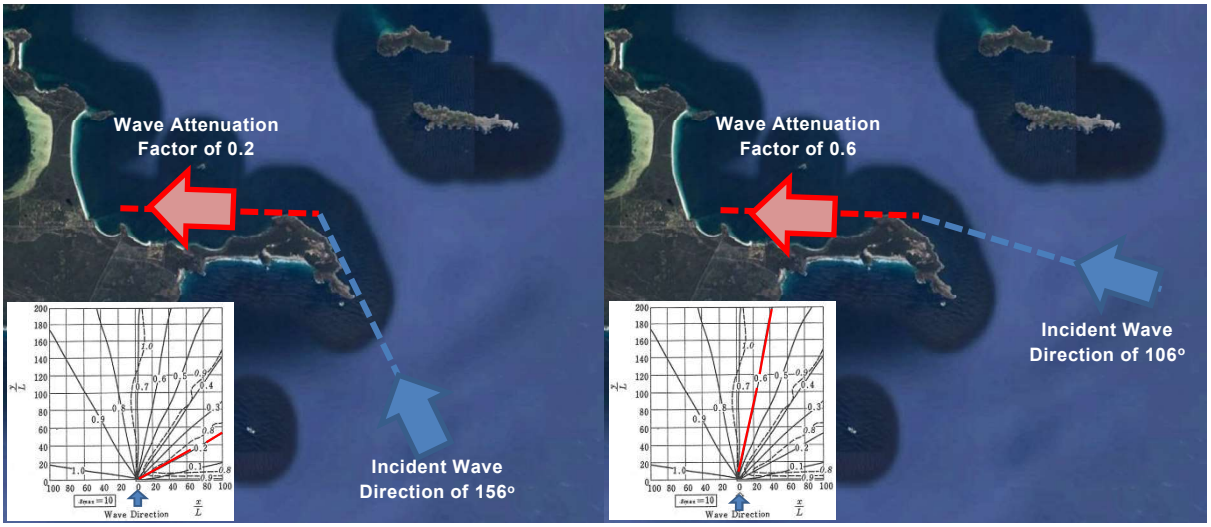

Figure 3.3 Examples of Wave Diffraction Attenuation Calculations

The diffracted wave conditions were determined for a location offshore from Waterbay Point. From this location incident waves would be further diffracted around the point or would be refracted over the local bathymetry. However, as the ensuing processes are relatively complex and will not necessarily result in energy losses that are consistent with an additional application of the diffraction diagrams due to changes in the incident wave directions, the conditions as determined at this location have been used to assess the potential for beach erosion. This is a somewhat conservative approach.

Unfortunately no water level records are available for the duration of the August 1984 event. As a result, the predicted tidal level during this event was scaled to peak at the 10 year ARI water level as determined within MRA (2018).

It is noted that scaling of the water level to peak at the 10 year ARI level is likely to be conservative for this event since the event was actually associated with the passage of a strong high pressure system. The high atmospheric pressure of this system is likely to have resulted in a set-down of water level over the general area, rather than a storm surge. However in the absence of more detailed information the 10 year ARI water level has been used to maintain conservatism within the assessment.

The August 1984 event had sustained waves from the south through east for a period of around 60 hours. The full duration of this event was therefore used for the modelling of the severe storm erosion impact. In accordance with the recommendation of SPP2.6, three repeats of this event have been used to determine the potential extent of storm erosion within Whalers Beach. The wave heights and water level used in the modelling are presented in Figure 3.4.

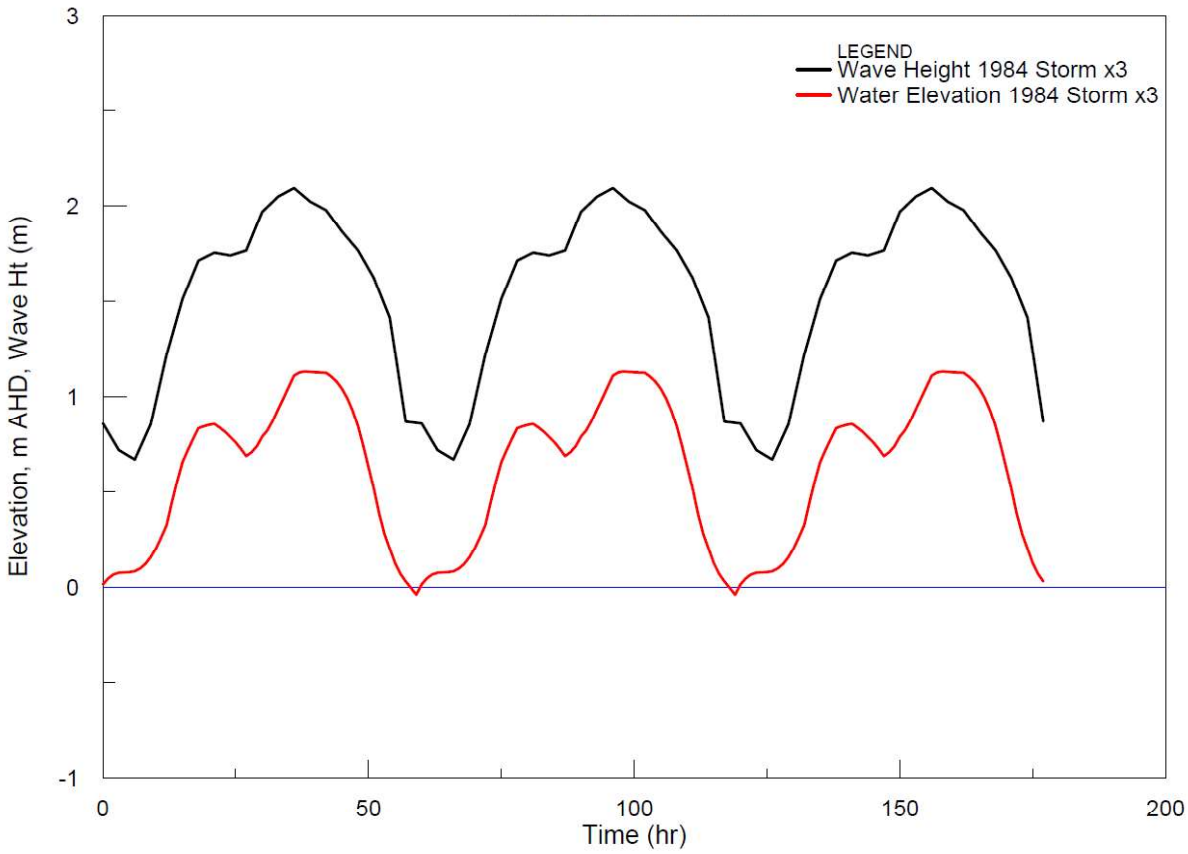

Figure 3.4 Storm Conditions for use in Storm Erosion Modelling (as determined for the area immediately offshore from the Resort site)

3.1.2 SBEACH Storm Modelling

The SBEACH computer model was developed by the Coastal Engineering Research Centre (CERC) to simulate beach profile evolution in response to storm events. It is described in detail by Larson & Kraus (1989). Since this time the model has been further developed, updated and verified based on field measurements (Wise et al 1996, Larson & Kraus 1998, Larson et al 2004).

MRA has validated SBEACH for use on sandy coasts in Western Australia (Rogers et al 2005). This validation has shown that SBEACH can provide useful and relevant predictions of the storm induced erosion, provided the inputs are correctly applied and care is taken to ensure that the model is accurately reproducing the recorded wave heights and water levels. Primary inputs include time histories of wave height, period and water elevation, as well as pre-storm beach profile and median sediment grain size.

Given the change in aspect of Whalers Beach, two different beach profiles have been used to simulate the potential extent of severe storm erosion. The input beach profiles used in the modelling were taken from a combination of topographic survey data, hydrographic survey information and local nautical charts. The approximate location and alignment of the profiles are presented in Figure 3.5.

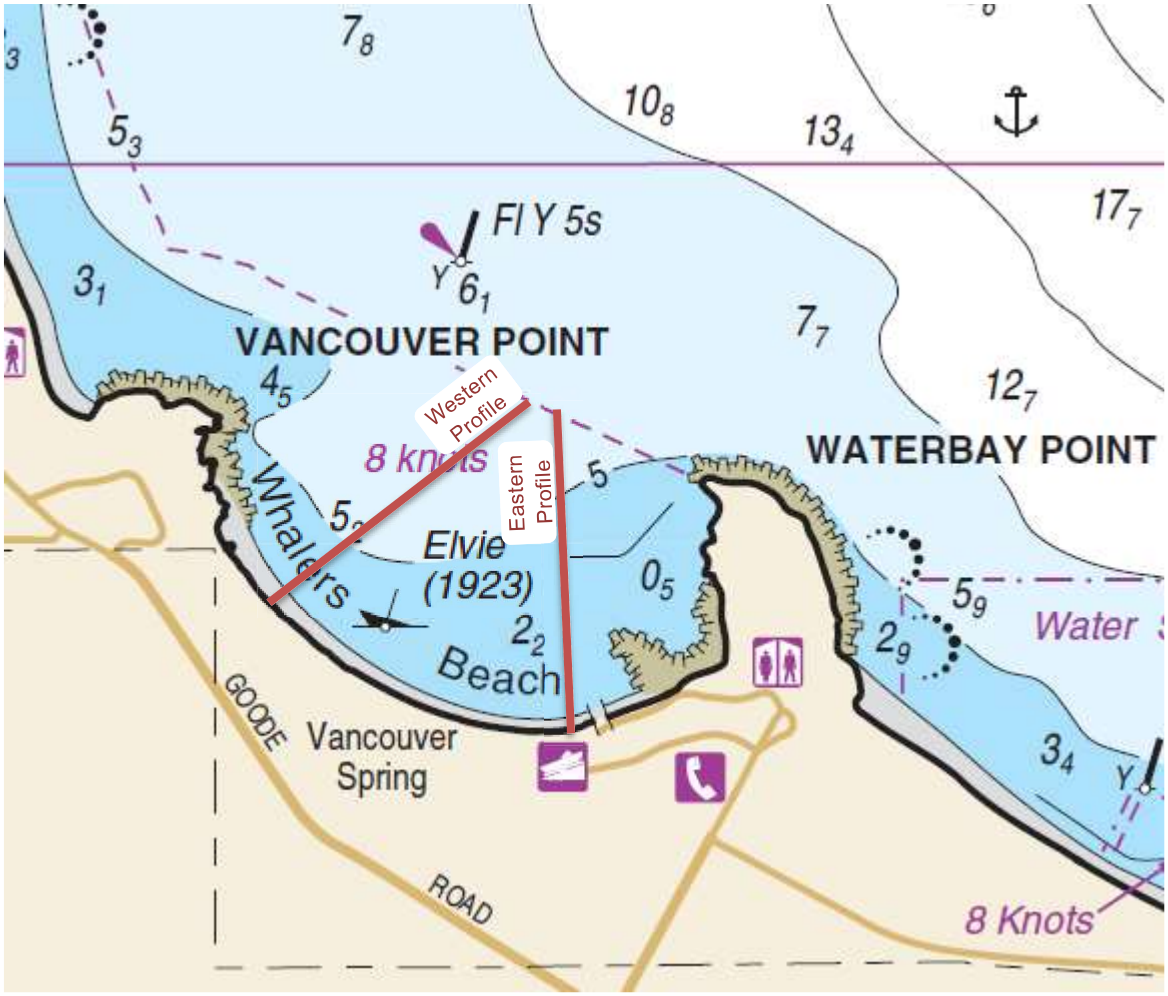

Figure 3.5 SBEACH Profile Location & Alignment

The results of the storm simulation are presented in Figures 3.6 and 3.7. These figure present the pre- and post-storm beach profiles, the maximum water elevation and maximum wave height during the event. The output from the model, the SBEACH Reports, have also been included in Appendix A.

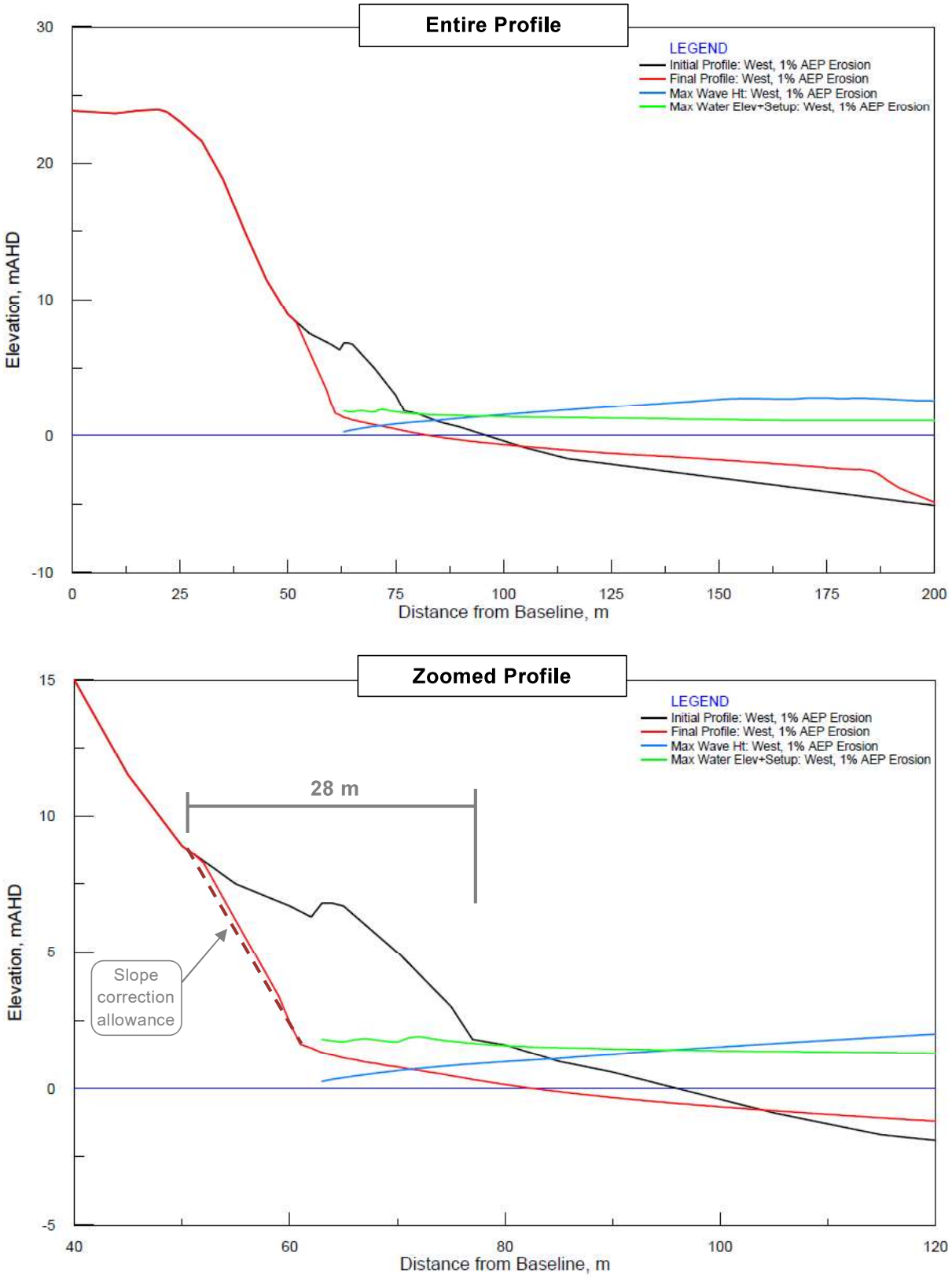

Figure 3.6 Severe Storm Erosion Modelling Results for the Western Profile

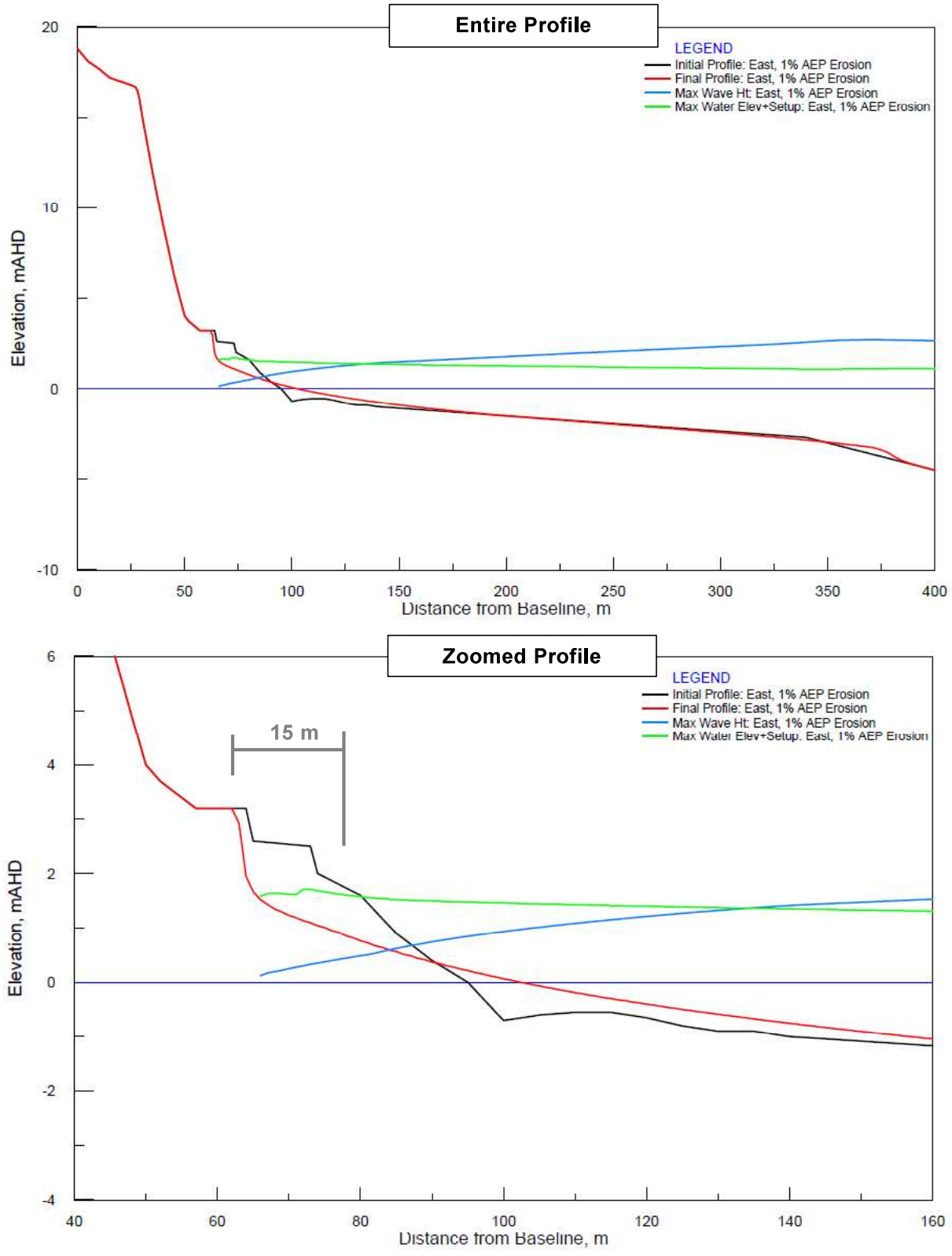

Figure 3.7 Severe Storm Erosion Modelling Results for the Eastern Profile

The S1 allowance is determined as the maximum extent of erosion behind the Horizontal Shoreline Datum (HSD). The HSD corresponds to the seaward shoreline contour representing the peak steady water level of the modelled event. The HSD was calculated as the 1.8 mAHD contour based on the results of the SBEACH modelling.

The results of the modelling show that there is potentially a greater degree of erosion potential along the western end of the bay compared to the east. There are a number of contributing factors to this, however the modelling shows that differences arise due to the shallower offshore bathymetry at the eastern end of the bay, which helps to reduce wave heights at the shoreline.

The total extents of predicted shoreline erosion caused by the storm sequence were 28 m and 15 m respectively for the western and eastern profiles. This estimate includes an allowance for dune slope correction based on a maximum avalanching slope of 30° to the horizontal to ensure stability of the eroded dune face. This applies to the result from the modelling of the western profile as shown on Figure 3.6.

Given that different erosion extents have been predicted between the western and eastern ends of the bays, and the fact that there is an intuitive understanding of why this result is reasonable, it follows that a different S1 allowance should be applied along the western and eastern ends of the shoreline. The areas covered by each allowance have been reviewed based on the nearshore bathymetry and the required allowances are shown in Figure 3.8. It should be noted that the same S1 allowance is required for each planning timeframe, as SPP2.6 requires a design storm with 1% AEP, regardless of the timeframe being considered.

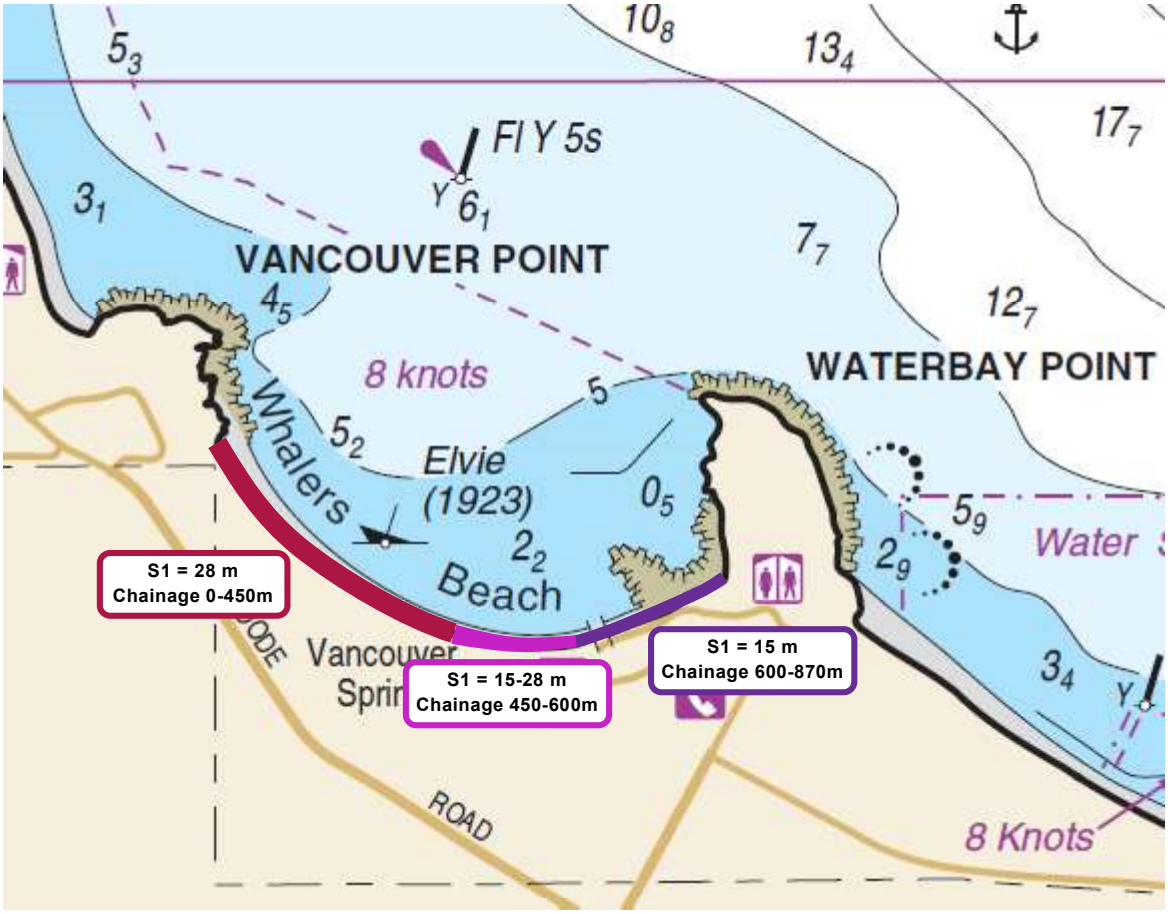

Figure 3.8 Summary of S1 Allowances

3.2 Historical Shoreline Movement (S2 Allowance)

Historically, changes in shoreline positions occur on varying timescales from storm to post storm, seasonal and longer term (Short 1999). The severe storm erosion allowance accounts for the short term storm induced component of beach change. The long term trends allowed for in the Historical Shoreline Movement (S2) Allowance account for the chronic movement of the shoreline that may occur within the planning timeframes. To estimate the S2 Allowance, long term historical shoreline movement trends are examined and likely future shoreline movements predicted.

3.2.1 Shoreline Movement

MRA mapped the position of the coastal vegetation line from aerial photography captured in 1977, 1988, 1996, 2001, 2007, 2011, 2014, 2016, 2019, 2020 and 2021. Mapping of the coastal vegetation lines was completed in accordance with DoT's methodology and specification for mapping (DoT, 2009). The accuracy of the position of these vegetation lines is believed to be in the order of ±5 m, depending on the resolution of the aerial photographs and the rectification process. A shoreline movement plan presenting the mapped vegetation lines is presented in Appendix B.

Using the mapped vegetation lines, the position of the shoreline was determined at intervals of 50 m or less along Whalers Beach. The chainage intervals for the measurement of shoreline change are shown in Figure 3.9. The position of the shoreline relative to the 1977 location was determined at each interval from the shoreline movement plan, with results presented in Figure 3.10.

Figure 3.9 Intervals for Measurement of Shoreline Movement

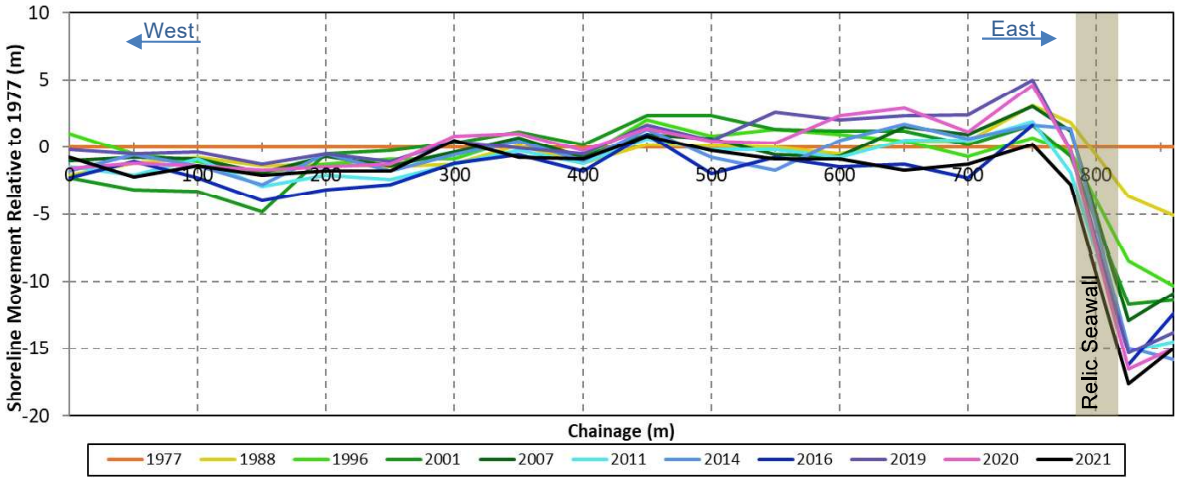

Figure 3.10 Historical Shoreline Movement Relative to 1977

The historical shoreline movement plot shows a stark difference between the behaviour of the majority of the Whalers Beach shoreline and the small section of shoreline to the east of the relic seawall. The area to the east of the relic seawall has experienced erosion in the order of 15 to 20 metres since 1977, whilst the remainder of the bay has experienced a slight rotation, with a general accretion at the eastern end and erosion at the western end. Nevertheless, total movement of the shoreline across the majority of the Bay has been less than plus or minus 5 metres from the 1977 position.

Overall, the observed movements of the shoreline confirm the assertion that the shoreline is essentially an enclosed sediment cell, as the volume of sediment within the Bay appears to be conserved. Importantly for the management of the current infrastructure and assets at the site, the shoreline movements do show an erosion of the eastern end of the beach in the period between 2020 and 2021. Noting that these lines are from the 1st of May 2020 and September 2021 respectively, this period covers two winter seasons. It was identified through the review of metocean conditions that the 2020 winter appeared to be quite severe, and the expectation is that 2021 would also have been similar. This likely provides the reasoning behind the observed erosion in this area.

To better illustrate the trends in shoreline movement over time, time history plots have been prepared for selected chainages. These time history plots are shown in Figure 3.11.

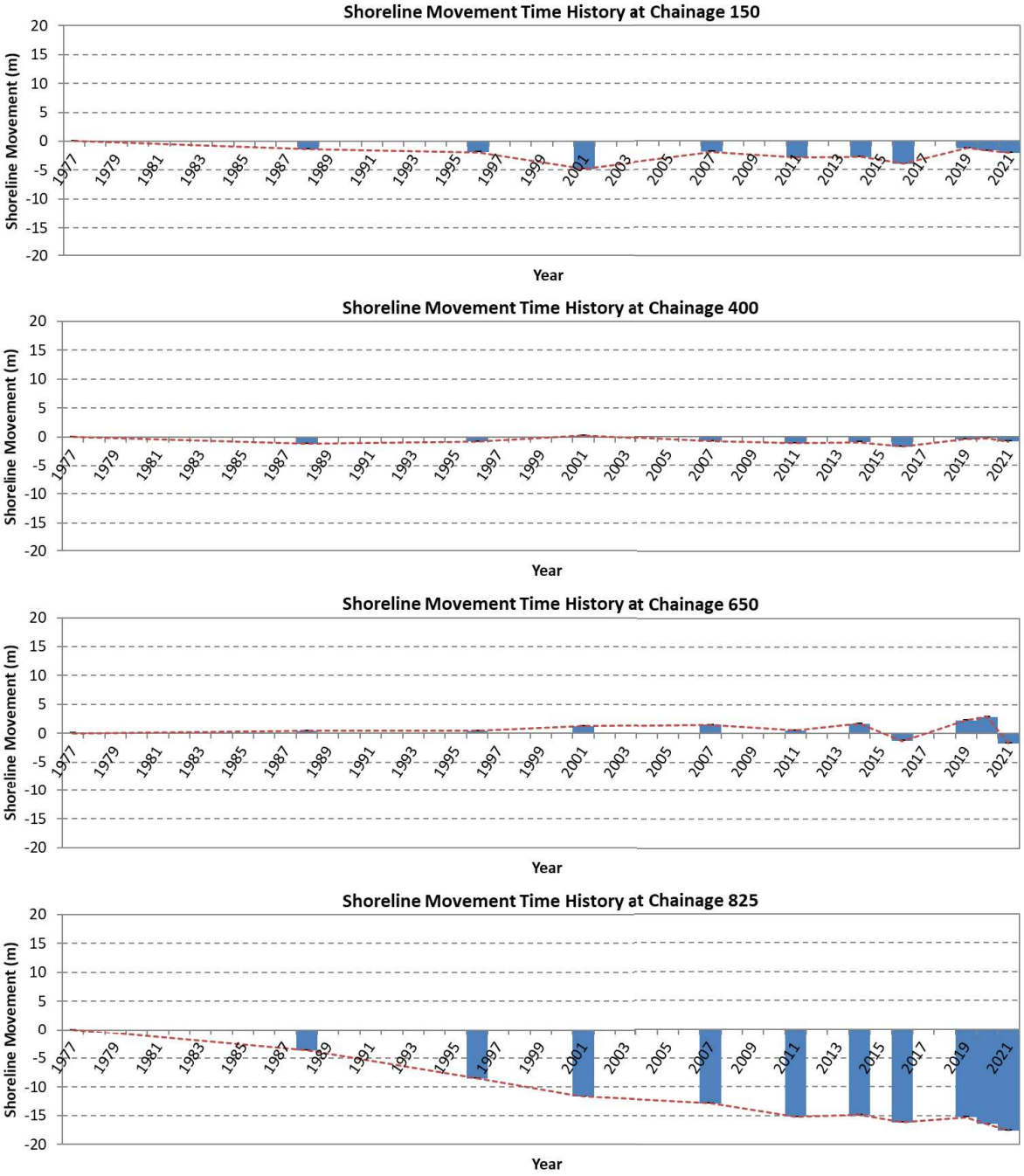

Figure 3.11 Time History Plots of Shoreline Movements at Selected Chainages

The time history plots show generally consistent trends across the duration of the record at each location. In particular the time history plots show the following.

- At the western end of the site, the plot from chainage 150 shows a reasonably consistent erosion trend, with some degree of fluctuation.
- The plot from the eastern end of the beach at chainage 650 shows a slight accretion trend, with the observed recent erosion between 2020 and 2021, though a similar erosion event was also observed in 2016.

- Chainage 400 is approximately the midpoint of the Bay and shows very little movement. This observation is not uncommon for enclosed bays such as this, as sediment dynamics generally result in rotations of the beach about the midpoint of the Bay.

- The shoreline movement at chainage 825 shows a consistent rate of erosion across the duration of record. The rate of erosion observed in this area is far greater than across the remainder of the bay. In this regard, it must be considered that this rate of erosion is attributable to other factors, in particular the presence of the relic seawall and its resultant impact on the position of the shoreline.

Figure 3.12 shows a zoomed in view of a selection of mapped shoreline positions adjacent to the relic seawall. The figure shows an obvious disparity between the historical positions of the shoreline to the west and east of the structure. Note that this figure also includes a coastal vegetation line from 1961 which was mapped for this project but ultimately not used due to issues at the western end of Whalers Beach.

Figure 3.12 Shoreline Positions Adjacent to the Relic Seawall

The figure shows that the shoreline position to the east of the seawall was very similar between 1961 and 1977, though this position was significantly further seaward than the shoreline to the west of the seawall. Thereafter the shoreline east of the structure began to experience the observed erosion, although in some areas this erosion hasn't really continued beyond 2011.

Based on review of aerial imagery and the associated shoreline movement lines, it seems that the relic seawall was providing a strong degree of shoreline control and was holding material on its eastern side. As a result, the shoreline to the east of the seawall was essentially an artificial shoreline. At some point, most likely between 1977 and 1988, it appears that the degree of shoreline control provided by the structure decreased and sediment held to the east of the seawall

was able to be transported westwards out of this area. The change in the structure that resulted in this reduction in shoreline control could have been associated with a settlement of the structure under storm conditions, such as those associated with the 1984 storm event.

Regardless of the cause of the change to the seawall, and its associated level of shoreline control, it appears that the shoreline east and west of the structure are now better aligned and as a result, it is anticipated that chronic movement of the shoreline in this area would reduce in the future. Nevertheless, the fact that between 15 and 20 m of foreshore has been lost in this area means that the existing foreshore does not interface well with the adjoining beach. The absence of a dune system, or the mechanism for the natural formation of a dune system, in this area therefore further exacerbates the issue as it means that the foreshore is prone to impacts from severe storm erosion events and high water levels. This has been observed over the winter of 2021, with the City of Albany installing coir logs (refer Figure 3.13) to try and combat erosion of the foreshore area.

Figure 3.13 Coir Logs Installed by the City of Albany in 2021 to Combat Erosion

On the whole, the examination of shoreline movement suggests that the shoreline is likely to be quite stable in the future from a chronic shoreline movement perspective. This is on the basis that the erosion to the east of the relic seawall has now reached a point where the embayed alignment of the shoreline is generally consistent along its entire extent. Impacts associated with storm events and high water levels would still be expected in this area, however these considerations are dealt with by the S1 Allowance.

To determine the appropriate S2 allowance a review of longer term shoreline movement rates has been completed. These long term shoreline movement rates are shown in Figure 3.14. Rates across different long term periods have been considered to reduce the potential for a single abnormal shoreline position to influence the results. Based on this review, it is apparent that a 0.05 m/year allowance should be provided across the full extent of Whalers Beach. This will provide security against fluctuations in shoreline position over and above those caused by storm events.

The resulting S2 allowances for the different planning horizons are provided in Table 3.1.

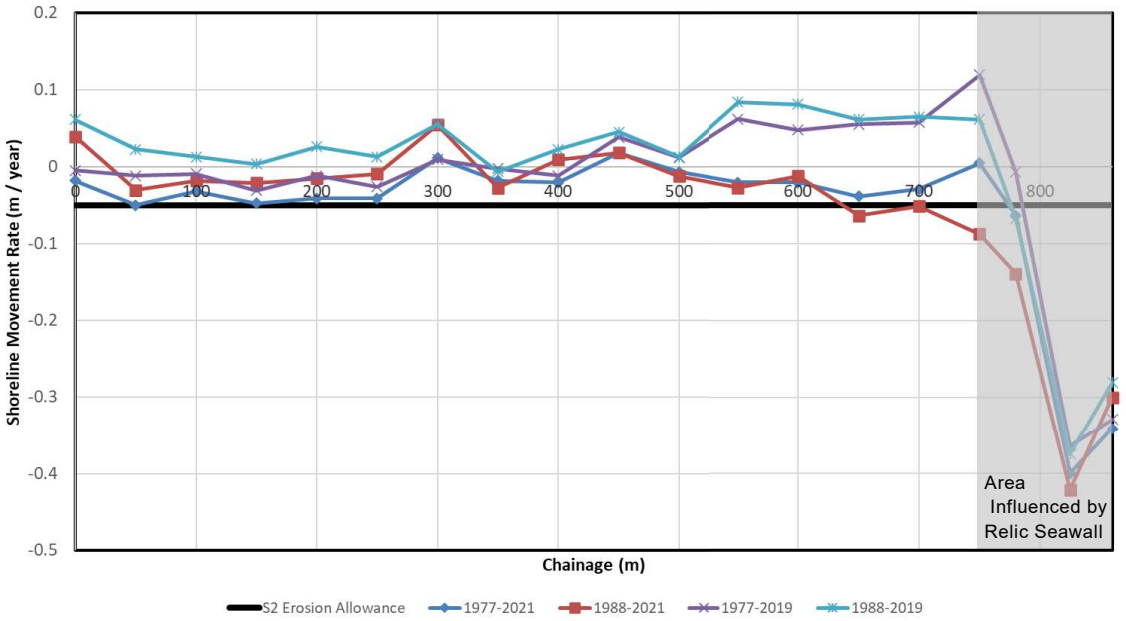

Figure 3.14 Shoreline Movement Rates

Table 3.1 S2 Shoreline Movement Allowances

Planning Timeframe	S2 Allowance (m)
Present Day (2021)	0
2041	1
2061	2
2081	3
2101	4
2121	5

3.3 Sea Level Rise (S3 Allowance)

Climate change is believed to cause an increase in mean sea level as a result of two main processes:

- the melting of land based ice, increasing the volume and height of the ocean waters; and
- a decrease in ocean density through thermal expansion, which increases the volume and thus the ocean height (CSIRO 2007).

Observations of sea levels have been carried out for centuries, at some locations, allowing historical trends to be identified. The global mean sea level rose by between 0.12 to 0.22 m over the 20th century, which equates to an average of around 1.8 mm/yr (IPCC 2007).

Within Western Australia reliable water level data is available from Fremantle for the period from 1950. The Fremantle records indicate that between 1950 and 1991, there was a relatively slow rise in sea levels, however over the ensuing period there has been a more rapid sea level rise. Figure 3.15, shows a plot of sea level rise at Fremantle since 1950.

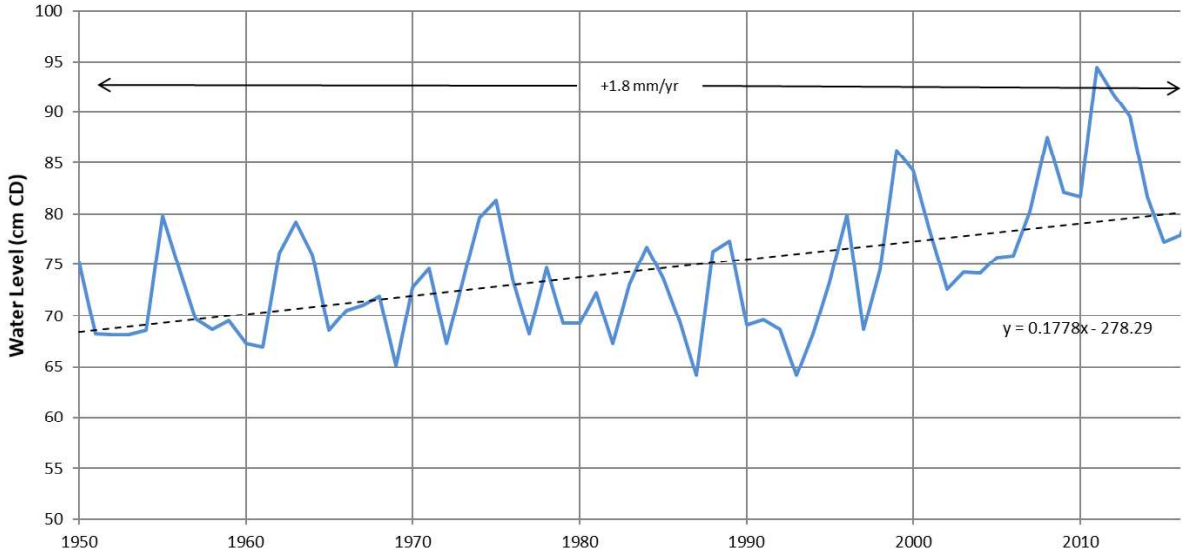

Figure 3.15 Fremantle Water Level 1950 to 2020

Through review of this and other data and research, DoT released recommendations on the appropriate allowances for future climate change and sea level rise to be used for coastal planning and development in Western Australia (DoT 2010). These recommendations were adopted by SPP2.6 and are presented in Figure 3.16.

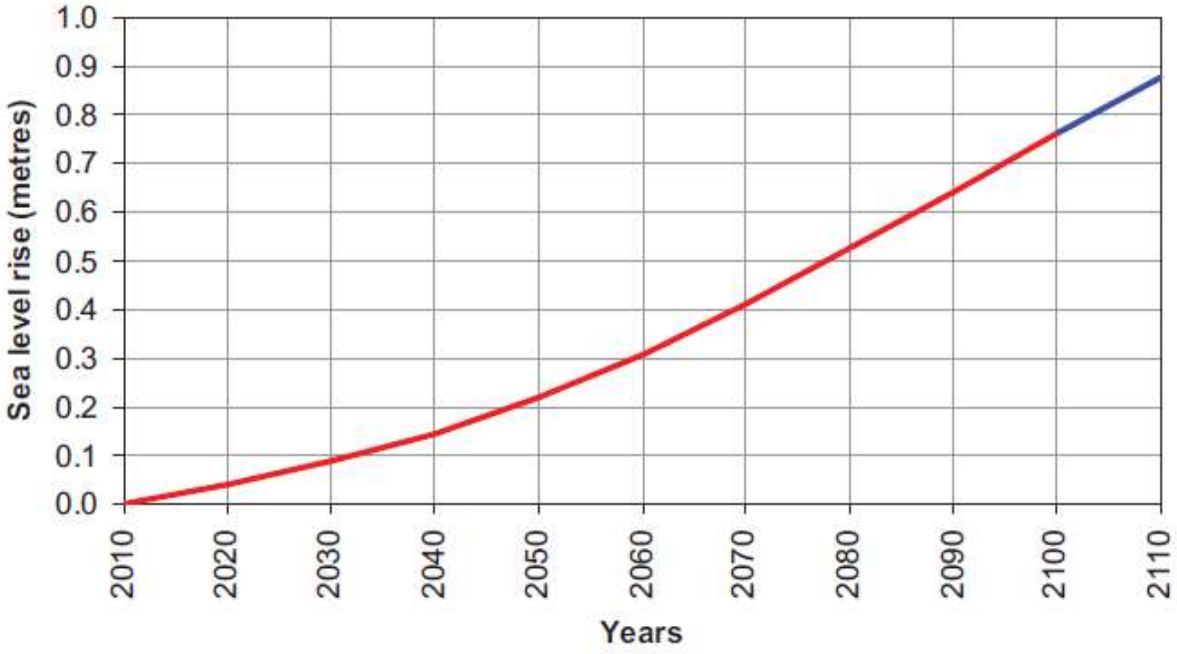

Figure 3.16 Recommended Allowance for Sea Level Rise (DoT 2010)

The recommended allowances for future sea level rise for each of the planning timeframes have been determined and are presented in Table 3.2. All of these increases in sea level are referenced to 2021.

Table 3.2 Sea Level Rise Allowances

Planning Timeframe	SLR Allowance (m)
Present Day (2021)	0.00
2041	0.11
2061	0.27
2081	0.49
2101	0.73
2121	0.97

The effect of sea level rise on the coastline is difficult to predict. Komar (1998) provides a reasonable treatment for sandy shorelines, including examination of the Bruun Rule (Bruun 1962).

The Bruun Rule relates the recession of the shoreline to the sea level rise and slope of the nearshore sediment bed:

$$R = \frac{1}{\tan(\theta)} S$$

where: R = recession of the shore.

θ = average slope of the nearshore sediment bed.

S = sea level rise.

Komar (1998) suggests that the general range for a sandy shore is R = 50S – 100S. SPP2.6 requires that for sandy shorelines the recession be taken as 100 times the estimated rise in sea level. Therefore, the required allowances for shoreline recession due to sea level rise are presented in Table 3.3.

Table 3.3 S3 Shoreline Recession Due to Sea Level Rise Allowances

Planning Timeframe	SLR Allowance (m)
Present Day (2021)	0
2041	11
2061	27
2081	49
2101	73
2121	97

3.4 Summary of Coastal Erosion Allowances

The allowances for coastal processes determined hereto are presented in Table 3.4. As required by SPP2.6, a 0.2 m/year allowance for uncertainty has also been included. The total allowances should be measured from the HSD.

Table 3.4 Summary of Allowances for Coastal Erosion Hazards

Timeframe	Chainage (m)	S1 (m)	S2 (m)	S3 (m)	Uncertainty (0.2 m/yr)	Total Allowance (m)
Present Day (2021)	0 - 450	28	0	0	0	**28**
	450 - 600	28 - 15				**28 - 15**
	600 - 870	15				**15**
2041	0 - 450	28	1	11	4	**44**
	450 - 600	28 - 15				**44 - 31**
	600 - 870	15				**31**
2061	0 - 450	28	2	27	8	**65**
	450 - 600	28 - 15				**65 - 52**
	600 - 870	15				**52**
2081	0 - 450	28	3	49	12	**92**
	450 - 600	28 - 15				**92 - 79**
	600 - 870	15				**79**
2101	0 - 450	28	4	73	16	**121**
	450 - 600	28 - 15				**121 - 108**
	600 - 870	15				**108**
2121	0 - 450	28	5	97	20	**150**
	450 - 600	28 - 15				**150 - 137**
	600 - 870	15				**137**

The sum of each of the allowances outlined in the above table provides an indication of the areas that may be at risk from coastal erosion in the respective planning timeframes. These are presented on Coastal Hazard Maps included in Appendix C. In preparing the coastal hazard maps it should be note that the presence of the existing seawall has been neglected. This is on the basis that the seawall structure is in extreme disrepair and it is expected that the influence it will have on the coastline will diminish over time. This has already been seen with respect to the loss of shoreline control, and therefore its stabilising effect, on the beach immediately east of the structure.

3.5 Storm Surge Inundation (S4 Allowance)

With respect to inundation, SPP2.6 requires that development consider the potential effects of an event with an AEP of 0.2% per year. This is equivalent to an inundation event with an ARI of 500 years.

Assessment of the inundation level requires consideration of peak storm surge, including wave setup. A storm surge occurs when a storm with high winds and low pressures approaches the coastline (refer Figure 3.17). The strong onshore winds and large waves push water against the coastline (wind and wave setup) and the barometric pressure difference creates a region of high water level. These factors acting in concert create the storm surge. The size of the storm surge is influenced by the following factors.

- Wind strength and direction.
- Pressure gradient.
- Seafloor bathymetry.
- Coastal topography.

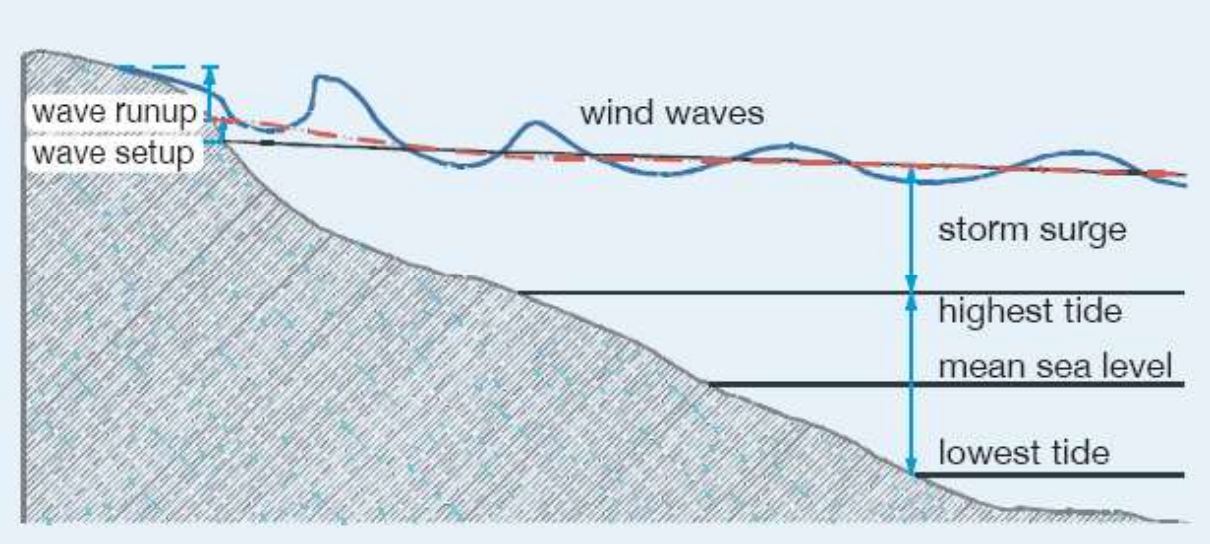

Figure 3.17 Storm Surge Components

The extreme analysis of the Albany water level record was completed by MRA (2018). This analysis showed that the estimated 500 year ARI water level at the tide gauge is approximately 1.13 mAHD (refer Figure 3.18).

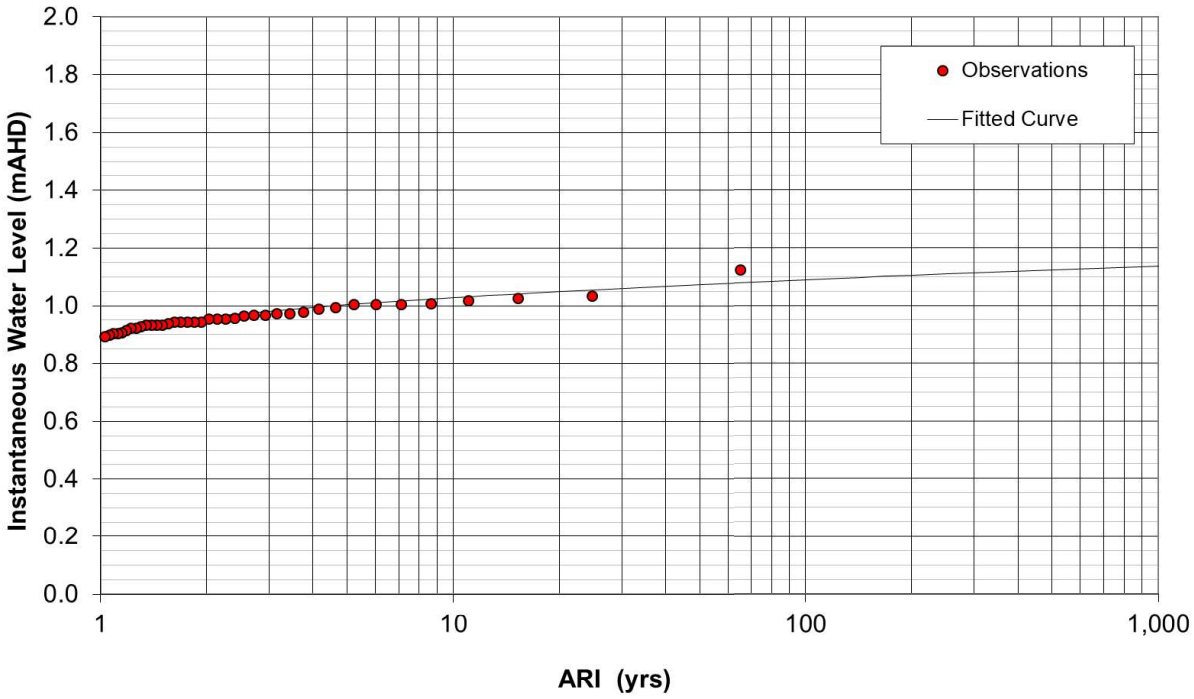

Figure 3.18 Extreme Water Level Analysis for Albany (MRA, 2018)

As indicated in Figure 3.17, closer to the shore, wave setup can increase the water levels. Dean and Walton (2008) provide a comprehensive review of wave setup on beaches, which confirms that the majority of setup occurs on the beach face. This is not entirely accounted for in the measurements at the Albany tide gauge and therefore needs to be determined.

The SBEACH model was setup and run for the 500 year ARI water level, to translate the water level from the nearshore area to the shoreline to estimate the additional wind and wave setup. It was estimated that an additional setup in the order of 0.8 metres could be expected at the site. This has been included in estimates of the appropriate inundation levels for the various planning timeframes, presented in Table 3.5. It is noted that these inundation levels are likely to be conservative given that the shoreline has a northerly aspect yet the majority of the conditions that cause elevated water levels along the south coast will have a southerly component to the incident event directions.

Table 3.5 S4 Inundation Levels

Component	Planning Timeframe					
	Present Day (2021)	2041	2061	2081	2101	2121
500 year ARI peak steady water level at tide gauge (mAHD)	1.13					
Allowance for nearshore setup - wind and wave (m)	0.80					
Allowance for sea level rise (m)	0.00	0.11	0.27	0.49	0.73	0.97
Total Inundation Level (mAHD)	**1.93**	**2.04**	**2.20**	**2.42**	**2.66**	**2.90**

These potential inundation levels should be considered in the planning for any future development along the foreshore. Nevertheless, it is noted that due to the topography of the site, any development associated with Lots 1 and 2 would be well above these elevations.

4. Conclusions

This report presents the results of the coastal hazard assessment for the Whalers Beach shoreline. The coastal hazard assessment has been completed in accordance with the recommendations and requirements of SPP2.6. As such, the potential extent of coastal hazard impacts that have been mapped provide a justifiably conservative representation of areas that could potentially be vulnerable to coastal hazard risk in the future. It must be noted that the coastal hazard lines are not a prediction of future shoreline location, but rather a representation of areas that could be at low risk of coastal hazards over each of the respective timeframes. Coastal hazard risk management and adaptation planning is therefore required as the next step in this process to ascertain the interplay between the likelihood and consequence of each of these lines being realised and what it would mean for any existing or proposed assets or infrastructure.

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6. Appendices

Appendix A **SBEACH Reports**

Appendix B **Shoreline Movement Plan**

Appendix C **Coastal Hazard Map**

Appendix A SBEACH Reports

K1944 Frenchman Bay
Reach: West Storm: 1% AEP Erosion

Report
Project: K1944 Frenchman Bay
Reach: West
Storm: 1% AEP Erosion
MODEL CONFIGURATION

INPUT UNITS (SI=1, AMERICAN CUST.=2): 1
NUMBER OF CALCULATION CELLS: 215
GRID TYPE (CONSTANT=0, VARIABLE=1): 0
CONSTANT CELL WIDTH: 1.0
NUMBER OF TIME STEPS AND VALUE OF TIME STEP IN MINUTES: 2124, 5.0
TIME STEP(S) OF INTERMEDIATE OUTPUT 1: 708
TIME STEP(S) OF INTERMEDIATE OUTPUT 2: 1416
NO COMPARSION WITH MEASURED PROFILE.
PROFILE ELEVATION CONTOUR 1: 5.00
PROFILE ELEVATION CONTOUR 2: 0.00
PROFILE ELEVATION CONTOUR 3: -1.00
PROFILE EROSION DEPTH 1: 0.50
PROFILE EROSION DEPTH 2: 1.00
PROFILE EROSION DEPTH 3: 1.50
REFERENCE ELEVATION: 0.00
TRANSPORT RATE COEFFICIENT (m^4/N): 1.75E-6
COEFFICIENT FOR SLOPE DEPENDENT TERM (m^2/s): 0.0020
TRANSPORT RATE DECAY COEFFICIENT MULTIPLIER: 0.50
WATER TEMPERATURE IN DEGREES C : 16.0

WAVE TYPE (MONOCHROMATIC=1, IRREGULAR=2): 2
WAVE HEIGHT AND PERIOD INPUT (CONSTANT=0, VARIABLE=1): 1
TIME STEP OF VARIABLE WAVE HEIGHT AND PERIOD INPUT IN MINUTES: 180.0
WAVE ANGLE INPUT (CONSTANT=0, VARIABLE=1): 0
CONSTANT WAVE ANGLE: 0.0
WATER DEPTH OF INPUT WAVES (DEEP WATER = 0.0): 5.0
SEED VALUE FOR WAVE HEIGHT RANDOMIZER AND % VARIABILITY: 4567, 20.0
TOTAL WATER ELEVATION INPUT (CONSTANT=0, VARIABLE=1): 1
TIME STEP OF VARIABLE TOTAL WATER ELEVATION INPUT IN MINUTES: 60.0
WIND SPEED AND ANGLE INPUT (CONSTANT=0, VARIABLE=1): 1
TIME STEP OF VARIABLE WIND SPEED AND ANGLE INPUT IN MINUTES: 180.0

TYPE OF INPUT PROFILE (ARBITRARY=1, SCHEMATIZED=2): 1
DEPTH CORRESPONDING TO LANDWARD END OF SURF ZONE: 0.30
EFFECTIVE GRAIN SIZE DIAMETER IN MILLIMETERS: 0.26
MAXIMUM PROFILE SLOPE PRIOR TO AVALANCHING IN DEGREES: 45.0

NO BEACH FILL IS PRESENT.

NO SEAWALL IS PRESENT.

NO HARD BOTTOM IS PRESENT.

COMPUTED RESULTS

DIFFERENCE IN TOTAL VOLUME BETWEEN FINAL AND INITIAL PROFILES:
0.0 m^3/m

MAXIMUM VALUE OF WATER ELEVATION + SETUP FOR SIMULATION
1.91 m

-Page 1-

K1944 Frenchman Bay
Reach: West Storm: 1% AEP Erosion

TIME STEP AND POSITION ON PROFILE AT WHICH MAXIMUM VALUE
OF WATER ELEVATION + SETUP OCCURRED
447, 72.0 m
MAXIMUM ESTIMATED RUNUP ELEVATION: 5.20 m
(REFERENCED TO VERTICAL DATUM)

POSITION OF LANDWARD MOST OCCURRENCE OF A 0.50 m EROSION DEPTH:
54.0 m

DISTANCE FROM POSITION OF REFERENCE ELEVATION ON INITIAL PROFILE
TO POSITION OF LANDWARD MOST OCCURRENCE OF A 0.50 m EROSION DEPTH:
42.0 m

POSITION OF LANDWARD MOST OCCURRENCE OF A 1.00 m EROSION DEPTH:
55.0 m

DISTANCE FROM POSITION OF REFERENCE ELEVATION ON INITIAL PROFILE
TO POSITION OF LANDWARD MOST OCCURRENCE OF A 1.00 m EROSION DEPTH:
41.0 m

POSITION OF LANDWARD MOST OCCURRENCE OF A 1.50 m EROSION DEPTH:
56.0 m

DISTANCE FROM POSITION OF REFERENCE ELEVATION ON INITIAL PROFILE
TO POSITION OF LANDWARD MOST OCCURRENCE OF A 1.50 m EROSION DEPTH:
40.0 m

MAXIMUM RECESSION OF THE 5.00 m ELEVATION CONTOUR:
13.33 m

MAXIMUM RECESSION OF THE 0.00 m ELEVATION CONTOUR:
13.78 m

MAXIMUM RECESSION OF THE -1.00 m ELEVATION CONTOUR:
6.09 m

K1944 Frenchman Bay
Reach: East Storm: 1% AEP Erosion

```
                    Report
Project:  K1944 Frenchman Bay
Reach:  East
Storm:  1% AEP Erosion
                    MODEL CONFIGURATION

INPUT UNITS (SI=1, AMERICAN CUST.=2): 1
NUMBER OF CALCULATION CELLS:  440
GRID TYPE (CONSTANT=0, VARIABLE=1): 0
CONSTANT CELL WIDTH:   1.0
NUMBER OF TIME STEPS AND VALUE OF TIME STEP IN MINUTES:   2124,  5.0
TIME STEP(S) OF INTERMEDIATE OUTPUT 1:    708
TIME STEP(S) OF INTERMEDIATE OUTPUT 2:   1416
 NO COMPARSION WITH MEASURED PROFILE.
PROFILE ELEVATION CONTOUR 1:   5.00
PROFILE ELEVATION CONTOUR 2:   0.00
PROFILE ELEVATION CONTOUR 3:  -5.00
PROFILE EROSION DEPTH 1:   0.50
PROFILE EROSION DEPTH 2:   1.00
PROFILE EROSION DEPTH 3:   1.50
REFERENCE ELEVATION:   0.00
TRANSPORT RATE COEFFICIENT (m^4/N): 1.75E-6
COEFFICIENT FOR SLOPE DEPENDENT TERM (m^2/s): 0.0020
TRANSPORT RATE DECAY COEFFICIENT MULTIPLIER: 0.50
WATER TEMPERATURE IN DEGREES C : 16.0

WAVE TYPE (MONOCHROMATIC=1, IRREGULAR=2): 2
WAVE HEIGHT AND PERIOD INPUT (CONSTANT=0, VARIABLE=1): 1
TIME STEP OF VARIABLE WAVE HEIGHT AND PERIOD INPUT IN MINUTES: 180.0
WAVE ANGLE INPUT (CONSTANT=0, VARIABLE=1): 0
CONSTANT WAVE ANGLE:   0.0
WATER DEPTH OF INPUT WAVES (DEEP WATER = 0.0):   5.0
SEED VALUE FOR WAVE HEIGHT RANDOMIZER AND % VARIABILITY: 4567, 20.0
TOTAL WATER ELEVATION INPUT (CONSTANT=0, VARIABLE=1): 1
TIME STEP OF VARIABLE TOTAL WATER ELEVATION INPUT IN MINUTES:  60.0
WIND SPEED AND ANGLE INPUT (CONSTANT=0, VARIABLE=1): 1
TIME STEP OF VARIABLE WIND SPEED AND ANGLE INPUT IN MINUTES: 180.0

TYPE OF INPUT PROFILE (ARBITRARY=1, SCHEMATIZED=2): 1
DEPTH CORRESPONDING TO LANDWARD END OF SURF ZONE: 0.30
EFFECTIVE GRAIN SIZE DIAMETER IN MILLIMETERS: 0.26
MAXIMUM PROFILE SLOPE PRIOR TO AVALANCHING IN DEGREES: 45.0

 NO BEACH FILL IS PRESENT.

 NO SEAWALL IS PRESENT.

 NO HARD BOTTOM IS PRESENT.

-------------------------------------------------------------------------------

 COMPUTED RESULTS

 DIFFERENCE IN TOTAL VOLUME BETWEEN FINAL AND INITIAL PROFILES:
    0.0 m^3/m

 MAXIMUM VALUE OF WATER ELEVATION + SETUP FOR SIMULATION
  1.71 m
```

K1944 Frenchman Bay
Reach: East Storm: 1% AEP Erosion

TIME STEP AND POSITION ON PROFILE AT WHICH MAXIMUM VALUE
OF WATER ELEVATION + SETUP OCCURRED
438, 73.0 m
MAXIMUM ESTIMATED RUNUP ELEVATION: 3.10 m
(REFERENCED TO VERTICAL DATUM)

POSITION OF LANDWARD MOST OCCURRENCE OF A 0.50 m EROSION DEPTH:
64.0 m

DISTANCE FROM POSITION OF REFERENCE ELEVATION ON INITIAL PROFILE
TO POSITION OF LANDWARD MOST OCCURRENCE OF A 0.50 m EROSION DEPTH:
31.0 m

POSITION OF LANDWARD MOST OCCURRENCE OF A 1.00 m EROSION DEPTH:
64.0 m

DISTANCE FROM POSITION OF REFERENCE ELEVATION ON INITIAL PROFILE
TO POSITION OF LANDWARD MOST OCCURRENCE OF A 1.00 m EROSION DEPTH:
31.0 m

A 1.50 m EROSION DEPTH DID NOT OCCUR ANYWHERE ON THE PROFILE.

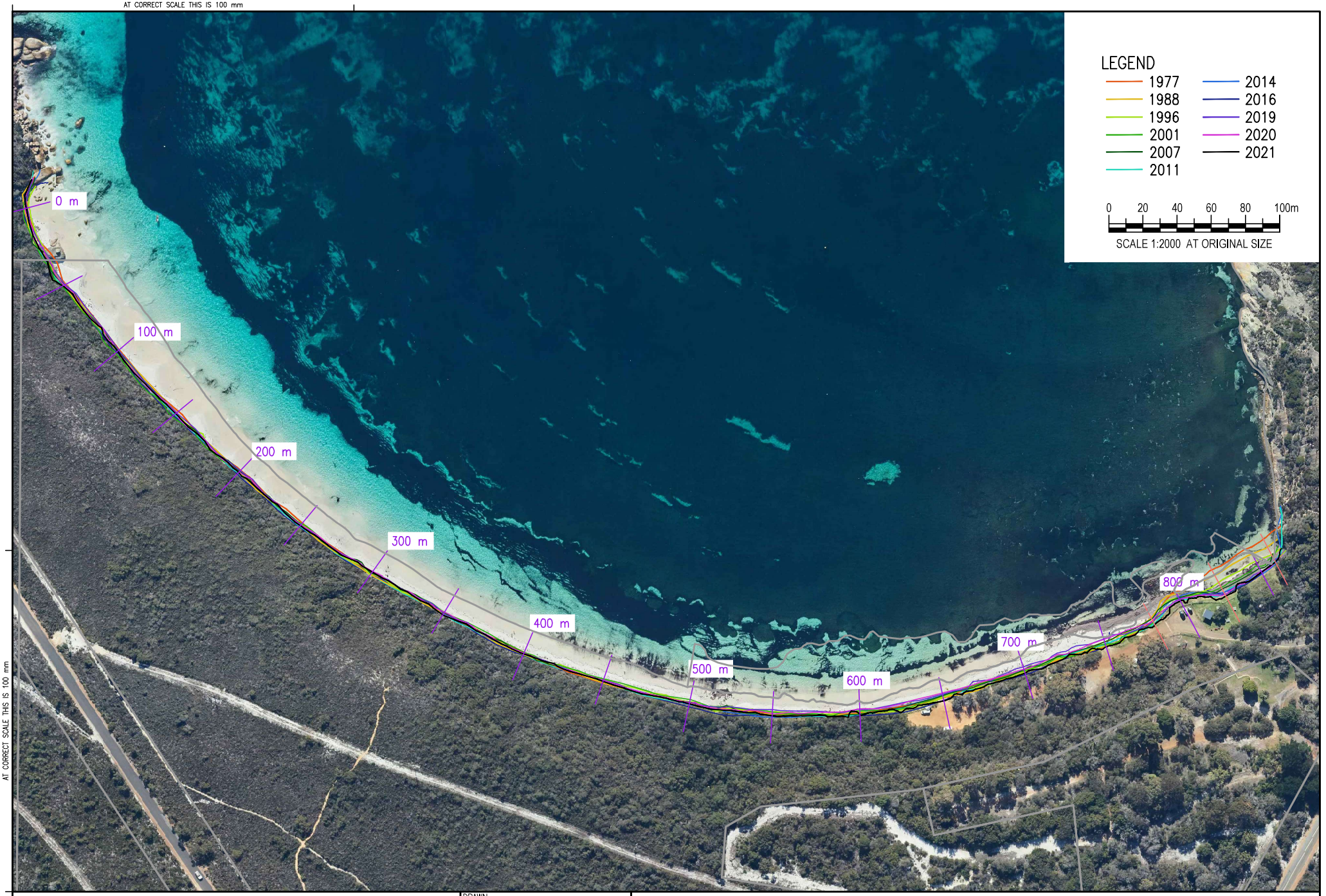
THE 5.00 m CONTOUR DID NOT RECEDE

MAXIMUM RECESSION OF THE 0.00 m ELEVATION CONTOUR:
0.08 m

MAXIMUM RECESSION OF THE -5.00 m ELEVATION CONTOUR:
0.00 m

Appendix B Shoreline Movement Plan

AT CORRECT SCALE THIS IS 100 mm



AT CORRECT SCALE THIS IS 100 mm

REPORT ITEM DIS397 REFERS

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t: +61 8 9254 6600
admin@coastsandports.com.au

DRAWN C Doak
CHECKED C Doak

Shoreline Movement Plan
Whalers Beach Coastal Hazard Assessment

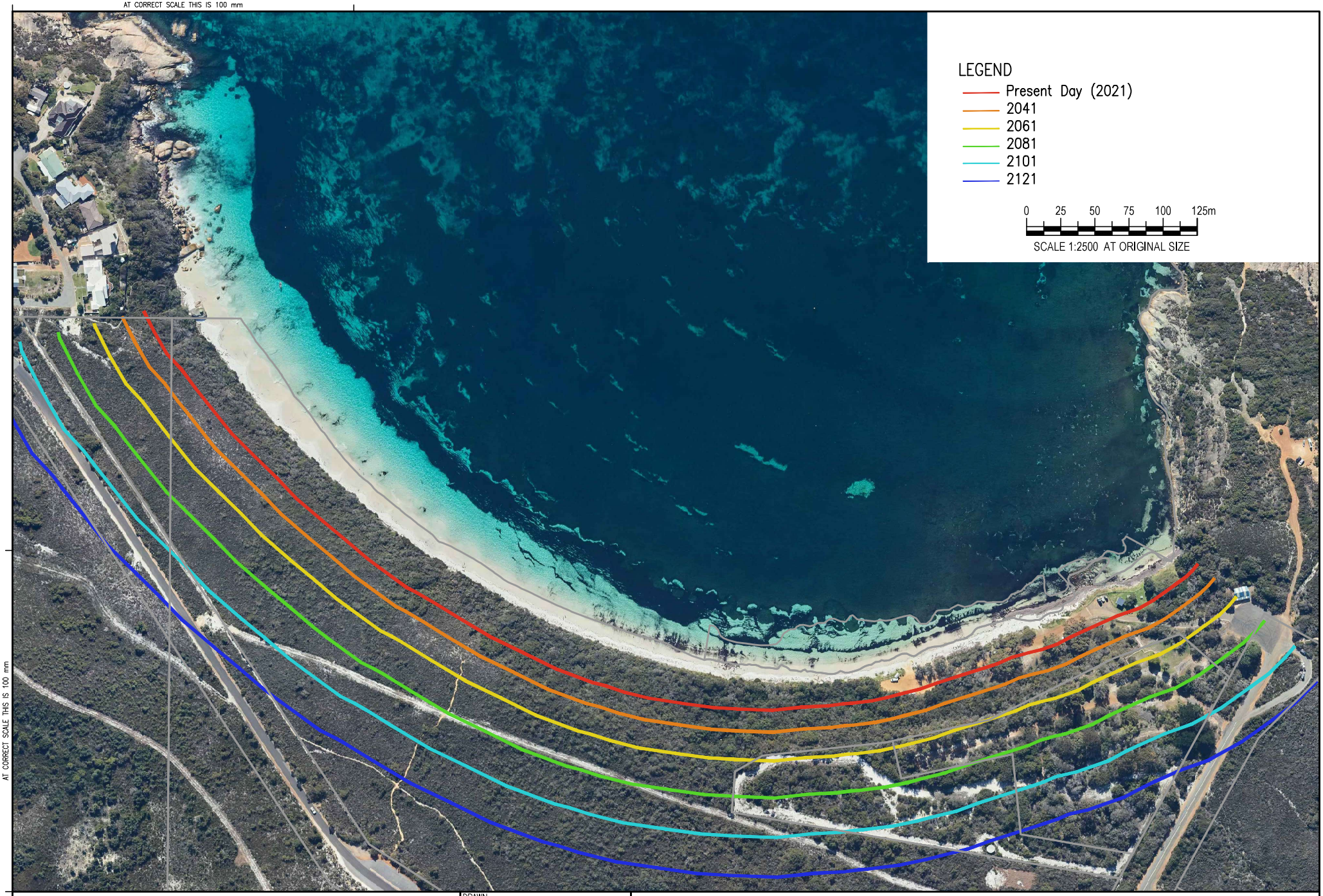
SCALE AT A3 1:2,000

January 2021
SK1944-01-01

P:\MRA Paying Jobs\K1944 CoA - Frenchman Bay CHA\5 MRA Dwgs\Sketches\211210 Coastal Hazard Lines

Appendix C Coastal Hazard Map

AT CORRECT SCALE THIS IS 100 mm



100

AT CORRECT SCALE THIS IS 100 mm

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Coastal Erosion Hazard Lines
Whalers Beach Coastal Hazard Assessment

SCALE AT A3 1:2,500

January 2021
SK1944-01-02

P:\MRA Paying Jobs\K1944 CoA – Frenchman Bay CHA\5 MRA Dwgs\Sketches\Z1210 Coastal Hazard Lines

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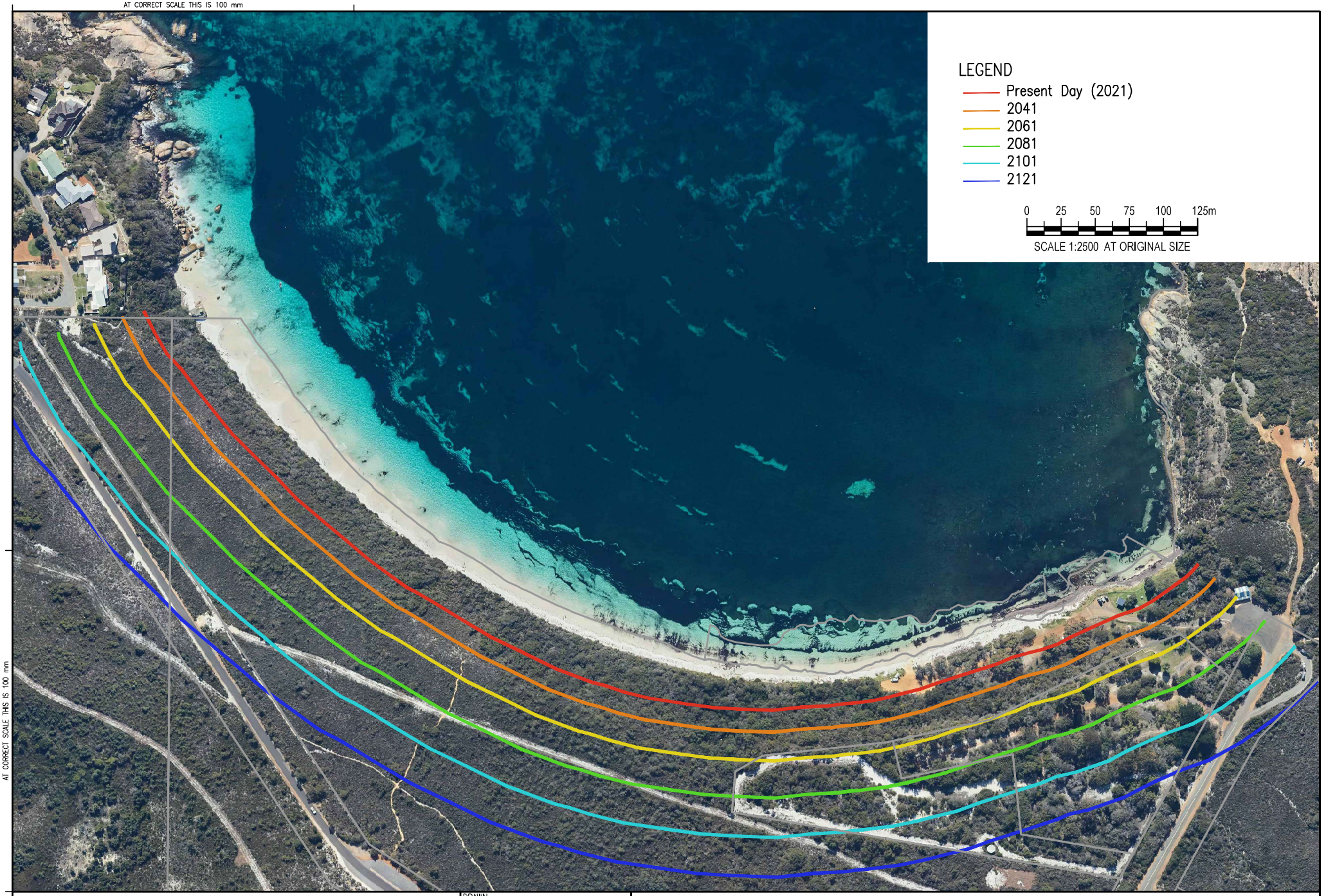
Appendix B Coastal Erosion Hazard Lines – SK1944-01-02

AT CORRECT SCALE THIS IS 100 mm



103

AT CORRECT SCALE THIS IS 100 mm

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DRAWN C Doak
CHECKED C Doak

Coastal Erosion Hazard Lines
Whalers Beach Coastal Hazard Assessment

SCALE AT A3 1:2,500

January 2021
SK1944-01-02

P:\MRA Paying Jobs\K1944 CoA – Frenchman Bay CHA\5 MRA Dwgs\Sketches\Z1210 Coastal Hazard Lines

m p rogers & associates pl

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WHALERS BEACH CHRMAP SCHEDULE OF SUBMISSIONS	
Summary of submissions	**Officer Comment**
I don't have a lot say, in that I find it hard to get my head around the science of behind the predication of coastal erosion. I do however understand the rationale for managed retreat rather than trying to hold back the sea with hard barriers. Nor much value in relying on divine intervention – a la King Canute. My main concern is the risk that the CoA initiates actions prematurely – after all we know that storms can have a severe impact one year and two or three years later the beach has fully recovered. We've seen it at Goode Beach within the last 5 years, and historically much worse has happened, with the dunes breached and Lake Vancouver inundated way back in the 1920's. Looking at the lake and beach now you wouldn't know it had happened. More benignly, we have seen this summer the wreck of the Runnymede more exposed than it has been for decades, with long time residents – I'm talking 50 years – having never seen it so exposed. In Frenchman Bay we see something similar with the wreck of the Elvie, which emerges and retreats into the beach over and over again. For me this begs the question as to how the CoA will determine when and how coastal dynamics have changed to the extent that retreat is necessary. My other concern is that whatever the CoA does in terms of reinstatement is well considered and appropriately engineered. Late last year we saw a quick-fix of the Frenchman Bay boat ramp consisting of a few loads of compacted gravel which didn't last a fortnight before being washed away.	Noted. Rather than relying on the coastal hazard lines, which can be an imperfect science and have been listed as being conservative within the document, it is instead proposed that retreat of assets be triggered by individual assessment (page 39). For instance, vehicle parking should be retreated when they can no longer be maintained through regular works and voids or erosion scarps could impact user safety. This approach will allow for high levels of public access to the area for the largest timeframe. Urgent repair works to the foreshore reserve were identified as a short-term solution until a Foreshore Management Plan has been prepared for the area (likely to commence late this year).
I wish to draw attention to the problem of place naming in the Frenchman Bay area illustrated by the mapping the draft CHRMAP submission. The errors need to be corrected and standard usage adopted. There are four geographic place names that are fixed by statutes.	Noted. The consultants have updated the report to reflect the correct naming protocols (Whalers Beach, Frenchman Bay).

WHALERS BEACH CHRMAP SCHEDULE OF SUBMISSIONS	
Summary of submissions	**Officer Comment**
1. The waters named Frenchman Bay consisting of the western third of King George Sound; 2. The locality of Frenchman Bay consisting of a portion of the Torndirrup Peninsula and recognised by the Local Planning Scheme with respect to roads and subdivisions; 3. The shoreline named Whalers Beach situated below the Frenchman Bay locality; and 4. The ruins of the Norwegian Whaling Station constructed on Whalers Beach and on the escarpment of the locality of Frenchman Bay As I understand the situation, the adoption of these names is not optional. The following four place names are invalid; 1. 'Frenchman Bay Beach' 2. 'Frenchman Bay' defined in geographic terms as the waters situated between Waterbay Point and Vancouver Point 3. The 'Frenchman Bay Whaling Station' 4. The Frenchman Bay Recreation Area In addition, Whalers Cove (or 'Whaling Cove') is being mistakenly shown as the beach adjacent to the former Cheynes Beach Whaling Station. These names have crept into popular usage because of a lack of official signage, the failure of officials to invigilate the correct geographic place names, and because various recent reports commissioned by the City of Albany have begun to substitute the invalid names for the correct names. Three of the commissioned reports, including the CHRMAP report, produced the coastal engineering firm MP Rogers, contain a large proportion of these errors. The recent Development Plan for Lots 1 & 2 Frenchman Bay by the firm Taylor Burrell Burnett has perhaps the largest number of naming errors. And surprisingly, some of the errors recur in the report of Archae-aus for the City, naming the Norwegian Whaling Station as 'the Frenchman Bay Whaling	

WHALERS BEACH CHRMAP SCHEDULE OF SUBMISSIONS	
Summary of submissions	**Officer Comment**
Station'. For example, In the early 1990s the City installed a metal sign above the slipway stating '(REMAINS OF NORWEGIAN WHALING STATION 1912–1915: WA Maritime Museum no.82, 1994. It was removed and never replaced. Local newspapers sometimes referred to the 'Norwegian Whaling Station at Frenchman Bay', but that usage has now morphed into Frenchman Bay Whaling' Station.' I recommend that the City attend to these matter and make sure that correct geographic names are shown on all reports that it commissions. Otherwise, ad hoc changes to placenames will proliferate. Albany is justifiably proud of its Aboriginal and European heritage. Arbitrary changes to the authentic names of geographic places will gradually weaken our shared understanding of who we are.	
This draft plan initially appears to be an impressive document with its numerous dot points, graphs and annotated photographic illustrations. Closer inspection reveals a number of problems with this paper. Predicting rising sea levels and storm impacts due to climate change remains an inexact science, but there is little doubt that some of the assumptions in this document could be much more consistent with current research and theory. It appears that Rogers et al were also constricted by the current inadequate state government guidelines. Hopefully the CoA planners and Councillors will be more cognizant of historical data as well as readily available local data and international research; and consequently will significantly adjust this plan accordingly. **1. Historical Data**	1. The CHRMAP has been prepared by qualified coastal engineers in accordance with the requirements of State Planning Policy 2.6 – Coastal Planning. The CHRMAP does not propose any coastal intervention measures such as sand nourishment or a rock groyne, rather it proposes managed retreat of City public assets once certain trigger points have been met. This approach allows for high levels of public access to the area for the largest timeframe and given it is event based, it is not as reliant on coastal science. 2. Refer above. The Local Government is required to prepare CHRMAPs in accordance with State Planning Policy 2.6 – Coastal Planning. 3. Refer above. The ever-evolving science of coastal engineering and all science for that matter, is acknowledged however, the local government is required to prepare CHRMAP in accordance with the

WHALERS BEACH CHRMAP SCHEDULE OF SUBMISSIONS	
Summary of submissions	**Officer Comment**
The CHRMAP acknowledges the presence of the former Norwegian Whaling Station site (2.7, p.10), but doesn't refer to the storm event of 1921 which wrecked it. This event was recalled by local identity Harold Hartman, who witnessed salt water breaching the dunes at Goode Beach and entering Lake Vancouver/ Naaranyirrap. Professor Max Angus is currently writing a book on the Norwegian Whaling Station and, along with local historian Councillor Malcolm Trail would be able to provide pertinent information on this event. In 2022 the CoA closed beach access to Frenchman Bay beach due to storm damage and erosion near the picnic area. (It is still partially fenced off in the hope that the sand and grass will recover.) This demonstrates the current vulnerability of this much loved site. Rogers et al cite their own observations "that storm events that are predominantly from the west through south would be expected to have little impact on this shoreline..." "From a review of the historical movement of the shoreline fronting the site, it is obvious that Frenchman Bay Beach has experienced very little gross movement over the last half a century." This fails to take into account the vast majority of climate change research which indicates that future events will be far more frequent and more extreme. Research conducted by Albany Senior High Fish Research group over a period of >20 years has shown the ineffectiveness of dumping soil at the north end of Emu Beach in an attempt to stop or delay dune retreat. Their research on the effect of sea encroachment on the relocated bike path in this area should be well known to CoA planners.	science recognised by the State Government and contained within State Planning Policy 2.6 – Coastal Planning.

WHALERS BEACH CHRMAP SCHEDULE OF SUBMISSIONS	
Summary of submissions	**Officer Comment**
The ill-advised rock groyne at Whaleworld provides further evidence of poor research leading to a costly and ugly mistake. Instead of providing deep anchorage for the glass-bottom tourist boat as intended, it scoured out at the west end of Whalers Beach, eroded dunes and created a shallow beach at Whaleworld instead of the deeper anchorage which was envisaged. The CHRMAP entirely omits knowledge that Menang elders could provide concerning their pre-European history. Their knowledge of much older sea levels and storm behaviour in this area may provide further background to what could happen during our grandchildren's lifetime. **2. Outdated and Inadequate Research** It is disappointing that the draft CHRMAP refers to research findings which, in some cases, are unreliable and inaccurate. i. Table 3.2, p.32 cites the Bruun Rule for predicting sea level and shoreline changes. Bruun's (very outdated) work has been shown by numerous researchers to be discredited. This document appears to be premised on outdated sea-level data, citing the discredited Bruun Rule and assuming a <1.0m sea-level rise by 2100 as its baseline. Current well-publicised coastal science researchers Prof Charitha Pattiaratchi [UWA], Dr Serena Lee [Griffiths Uni]) have indicated the need for Councils to better prepare for coastal erosion due to storm surges and increased cyclonic activity. According to Prof Pattiaratchi, Western Australia could be hit with some of the worst flooding and coastal erosion it has ever seen in the next decade. (Cyclones Alby [1978] & Bianca [2011] caused damage in the Albany region.) Researcher Serena Lee, a coastal dynamics specialist at Griffith University, has stated that a 2.0m rise by 2100 "would probably be more towards the conservative mean" of outcomes. The 0.73m rise shown in this chart is very misleading.	

Summary of submissions	Officer Comment
ii. Similarly, the document refers to work by Larson and Kraus on storm modelling and beach change (Figure 3.4, p.20). Yet, Robert S. Young et al have serious reservations about Kraus' studies and since, most (if not all) of Kraus' work refers to shorelines dissimilar to the fine sand shorelines found facing King George Sound, their assessments appear to be, at best, of little value in this plan. "All of this uncertainty makes GENESIS, at best, a qualitative, not quantitative model, and at worst a model that, after a certain amount of assuming and adjusting input parameters, produces a result that the coastal "expert" employing its services expected a way of backing up one's judgment with what appear to be real numbers." (Robert S. Young, et al.) **3. Failure to Use Local Research** It is unfortunate that this CHRMAP fails to reference available modelling provided to CoA (and available to the public) by geologist, (the late) Dr John Myers. Myers (a highly respected geologist with international credentials) conducted careful analysis of the shorelines near Frenchman Bay with relevant reference to research available prior to 2018. His modelling, including the scaled 3D model of Goode Beach dunes, should be considered in conjunction with this CHRMAP. His discussion of work prepared by A P Rogers for Cherry Martin (referenced in this draft CHRMAP) should be read in reference to this plan. **Conclusion** I commend the CoA for commissioning a CHRMAP for the various shorelines for which CoA has some responsibility. I acknowledge the difficulty of preparing such a draft plan of action, however even in the short time available	

WHALERS BEACH CHRMAP SCHEDULE OF SUBMISSIONS	
Summary of submissions	**Officer Comment**
given to respond (< 2 weeks!), some serious flaws are evident in this current document. Of course “real numbers” refered to by Young in the science of climate change, are sometimes “best guesses,” but the CoA should be aware that most current climate observers are acknowledging that the changes that climatologists are now observing and recording in many cases exceed the “worst-case” scenarios previously predicted. I would be very concerned if the CoA adopted this plan without considerable modifications.	
1 of 2 **<u>Overview</u>** This submission is mainly about inconsistencies associated with the naming/location of places within (i) the recent City of Albany CHRMAP report; and (ii) various Lots 1 and 2, FBR studies, including the various Seashells reports (DA, consultants, and the CHRMAP). **1. <u>Background Article shown on City Website</u>** • I have recently read the information statement (‘Frenchman Bay CHRMAP’), on the City’s website, issued I guess as a summary to help the public both understand the CHRMAP process and make a submission. • The article is helpful; however, I noticed the incorrect and inconsistent naming that occurred in this article and the way that ‘Frenchman Bay’ is used incorrectly throughout the article, with no reference to Whalers Beach. I feel that the correct title for the article should be ‘Whalers	1. Noted. The consultants have updated the report to reflect the correct naming protocols (Whalers Beach, Frenchman Bay). 2. Agreed – refer above. 3. Agree – refer above.

Summary of submissions	Officer Comment
Beach, Frenchman Bay CHRMAP' or perhaps (my preferred) 'CHRMAP Project, Whalers Beach, Frenchman Bay'. I think the name 'Whalers Beach' has to be in the title. • Perhaps someone feels that the liberal use of the name 'Frenchman Bay' is advantageous as a better marketing tool than 'Whalers Beach'? It sounds better and will not affect people's sensitivities as much? If this is the case, I think the history of this place should come first and recognising this history needs to be realised, discussed, and acted upon – by using correct place names and promoting the history of the place, using 'Whalers Beach' signage and publications. **2. Other 'Frenchman Bay' Problems** • On further inspection and research, I found that this type of incorrect place naming (and location) occurs in many of the reports and report figures associated with work on the Seashells development (including the DA/CHRMAP) and other City reports about the 'Whalers Beach' area. I am not sure of the reasons for this, but it is not acceptable and should be rectified. It shows disrespect for the official names and history of these features. • While I appreciate that the name 'Frenchman Bay' is being used in various ways (including marketing, I think) by Seashells for their proposed Lots 1 and 2 development, I don't think that anyone can (or should attempt to) change the official government name/location of a place, just by changing that place name and location in reports and correspondence with the possible aim to get these incorrect names/locations eventually accepted as correct. Does 'Frenchman Bay' sound better than 'Whalers Beach'? Is 'Whalers Beach' not as grand a name as 'Frenchman Bay'? As for other reports, the correct	

Summary of submissions	Officer Comment

CHRMAP project location is 'Whalers Beach', including the slope/escarpment area above, not 'Frenchman Bay'.
• As a simple example, I attach the first figure from Appendix A of the Seashells DA. You will notice the following:
  o The name 'Whalers Beach' is shown in the wrong location.
  o The name 'Frenchman Bay Beach' is not an official name and a beach with this name does not officially exist. This incorrect name is shown in the correct position for the 'Whalers Beach' name.
  o The name 'Whaling Cove Beach' is not official and a beach with this name does not officially exist. The nearest official place with a similar name is 'Whaling Cove', a small cove north of Mistaken Island with an underwater recreational 'trail'.
  o How did this type of thing get past the City editors? To me, it seems to indicate that the City is in full agreement with using incorrect nomenclature?
• We need to ensure that this incorrect naming does not continue to occur in the future and that the mistakes to date are rectified.
 	
3. <u>The CHRMAP Study and Frenchman Bay</u>
• The CHRMAP study was completed along a portion of 'Whalers Beach', not 'Frenchman Bay Beach' as the article implies. There is no official place named 'Frenchman Bay Beach', according to the government 1983 1:25,000 hydrographic map of King George Sound that I have.
• On this map, it is obvious that the area of Frenchman Bay is large, and the approximate shoreline extends from ,say, near Limestone Point to Mistaken Island, a distance of about 7km. The placement of the	

Summary of submissions	Officer Comment
caption 'Frenchman Bay' on this map, suggests that Goode Beach is probably the central geographical feature of the bay. • There is no mention of 'Whalers Beach' in the above-mentioned City article and very minor mention in most reports associated with the proposed Seashells development and City planning. Why is that? I feel that this is misleading, because 'Whalers Beach' is where the subject CHRMAP study took place; completed here to help manage the interaction between developments on Lots 1 and 2, FBR and public beach usage/facilities below? Although I am not a coastal engineer, I'm pretty sure that the CHRMAP results at 'Whalers Beach' will not apply to the entire Frenchman Bay coastline? Therefore, this study should not be titled with only the name 'Frenchman Bay', because the results are not representative of the entire Frenchman Bay coastline, as the study was only done for 'Whalers Beach', most importantly including the section below the proposed Seashells development and this has to be specified in the title. I have suggested name changes above and in the recommendations, which include the name 'Whalers Beach'. • "*The City of Albany engaged specialist coastal engineers……..to complete a CHRMAP for public assets at Frenchman Bay*." Aren't these public assets located at Whalers Beach and currently comprise the ablution block above Whalers Beach next to the upper parking area and the various recreational facilities on and along Whalers Beach. Based on this quote, it appears that incorrect naming started very early in the Seashells work on Lots 1 and 2, FBR; the CHRMAP project; and in the DA and most of the associated consultants' reports. As the City is the ultimate client for this work, it appears that the incorrect naming and locations of places is acceptable to the City. If so, why is it acceptable?	

WHALERS BEACH CHRMAP SCHEDULE OF SUBMISSIONS	
Summary of submissions	**Officer Comment**
• Would we get the same results for all coastline types in Frenchman Bay? If the results for the CHRMAP project at Whalers Beach are not representative of the entire Frenchman Bay coastline, Whalers Beach should be mentioned often in the current work, both in both report texts and titles/content of figures. • The name Whalers Beach should never be changed because of the important history/connection of the place related to the location of the Norwegian Whaling Station operations and the associated ruins (including Vancouver Spring) in a registered heritage site. This name should not be changed or replaced by 'Frenchman Bay Beach', although that appears to be what is happening and the City seems to agree with this. This should be rectified by advising contractors, consultants and CofA staff of the correct naming and promoting the name 'Whalers Beach'. Including erecting historical-type signage, describing the Norwegian Whaling Station and features of the heritage-listed site, in both the upper parking area and the lower beach area. • Apparently the CHRMAP study was done *"….to enable planning for the future provision of public infrastructure within the foreshore".* I assume that this was also done to: (i) help the City evaluate whether the proposed Seashells infrastructure on Lots 1 and 2, FBR was in a safe long-term stable position behind the escarpment of a high steep slope; and (ii) help manage the existing public infrastructure on the beach below, under changing climactic conditions. • You could argue that the incorrect naming of 'official' places in the area in question could potentially change the public's perceived history of the place. In terms of the whaling station, this is doubly unacceptable as this site is heritage listed. The name 'Whalers Beach' is an official name.	

WHALERS BEACH CHRMAP SCHEDULE OF SUBMISSIONS	
Summary of submissions	**Officer Comment**
Conclusions and Recommendations • I feel that something must be done about this incorrect naming - by the City of Albany. Do not promote the continued use of incorrect names. We need to ensure that this incorrect naming does not continue to occur in the future and that the mistakes to date are rectified and publicised. This is true of developers, consultants and the City reports. • Correction of incorrect names and locations. Correct the various incorrect uses of names/locations and only include name/locations where officially named features actually occur. • The name 'Whalers Beach' should never be changed, and the name and area should be publicised more by the City, starting in the very near future. It should always be associated with the historical Norwegian Whaling Station. • Historical-type signage ('Whalers Beach' and 'Norwegian Whaling Station') should be erected in both the upper parking area and at the lower beach level to remind visitors and locals of the correct name and identify the important historical story of this place. Previously the City had erected a sign at the base of the access ramp, but it was removed and never replaced. • It should not be the aim of the City or Seashells to get these incorrect names/locations used so often that they become accepted as correct. • The City should take more pride in the listed heritage site comprising the eastern portion of 'Whalers Beach', protect its name, and advertise its history. • I recommend that the correct title for the City's CHRMAP article/report should be 'CHRMAP Project, Whalers Beach, Frenchman Bay'. While	

WHALERS BEACH CHRMAP SCHEDULE OF SUBMISSIONS	
Summary of submissions	**Officer Comment**
the study may have occurred in the Frenchman Bay region, the actual location of the study is 'Whalers Beach', within the regional bay area.	
2 of 2 Both of my submissions address the incorrect nomenclature being used in these reports and most others in projects completed for Seashells (proposed development on Lots 1 and 2, FBR) and the City, in the vicinity of Whalers Beach (as identified on nautical charts of King George Sound) in Frenchman Bay. The mention of Whalers Beach in these reports is generally missing or shown incorrectly, even though this is the historical location where these studies have been completed,. An overview of the intent of the CHRMAP reports at Whalers Beach includes: • *"The main purpose of the CHRMAP is to define areas of the coastline which could be vulnerable to coastal hazards and to outline the preferred approach to the monitoring and management of these hazards where required*". • *This CHRMAP will consider the potential risks and vulnerability to coastal assets and infrastructure over a range of horizons covering the 100 year planning timeframe. This planning timeframe is required by SPP2.6*". • "*The adaptation and management plan aims to provide public access to the beach and foreshore area for the longest timeframe*". • "*The foreshore reserve also conserves and enhances engagement with the significant cultural heritage of the area, particularly the historic Norwegian whaling station*". <u>On Whalers Beach</u>! **1. <u>SOME EXAMPLES OF SELECTED NAMING ERRORS CHRMAP Report</u>**	1. Noted. The consultants have updated the report to reflect the correct naming protocols (Whalers Beach, Frenchman Bay). The CHRMAP was advertised on the City of Albany website and letters sent directly to Goode Beach residential and the Frenchman Bay Association. 2. Noted. The consultants have updated the report to reflect the correct naming protocols (Whalers Beach, Frenchman Bay). 3. Noting the majority of public assets are located seaward of the escarpment, which may be subject to a private development, an updated geotechnical investigation of the slope/embankment would be a costly exercise and is not considered necessary at this stage. It is also considered most relevant to the private development rather than City assets. A study was previously undertaken on Lots 1 and 2 which determined there was a deep layer of sand underlain by siltier material with no rock present. It was therefore anticipated that these conditions would extend over the full extent of Whalers Beach. Given the drillholes were located in very close proximity to the escarpment, a sandy coastline classification has been used. This is both a conservative assessment and represents a 'worst case' scenario.

WHALERS BEACH CHRMAP SCHEDULE OF SUBMISSIONS	
Summary of submissions	**Officer Comment**
• The title of this report is misleading. The title does not mention Whalers Beach and suggests that this study covers any public infrastructure on the coastline of Frenchman Bay (Mistaken Island, Goode Beach, Vancouver Road, Lots 1 and 2 FBR). Whalers Beach was probably selected for the study because of: (i) the tourist development potential of Lots 1 and 2, FBR ; (ii) this location potentially representing the most difficult coastal conditions for development on Frenchman Bay; (iii) the iconic popularity and public facilities of Whalers Beach for locals and tourists; and (iv) the importance of this heritage-listed site, due to the Norwegian Whaling Station ruins. 'Whalers Beach' is a standalone, important, historical name because of all of these reasons and should be <u>in the title</u> of the CHRMAP report and throughout it and any other studies completed in this area. The importance of the name should be recognised and publicised by the City. • Figure 1.1 shows 'Frenchman Bay Beach, there is no such official name, the official name is Whalers Beach. • "*This section assesses the coastal processes at Frenchman Bay……*". Actually, the report assesses coastal processes and management at Whalers Beach. "*The extent of the area being considered within this CHRMAP extends from Vancouver Point to Waterbay Point*". This area defines Whalers Beach. • "…..*the Site has historic whaling station ruins accessible as tourist attractions encouraging engagement with the region's rich maritime history*". But the name Whalers Beach is not used to identify the site.	The private development on lots 1 and 2 will be required to implement coastal monitoring on a regular basis and will 'retreat' when one of a number of trigger points have been reached. Given the results of the CHRMAP, future public carparking and other assets may be located away from the foreshore. The provision of a geological assessment for the escarpment would not be expected to impact the long-term management of both the foreshore and the private development, being events based managed retreat. The coastal engineer preparing the report has also confirmed that a different geotechnical investigation is unlikely to change the long-term management strategy.

WHALERS BEACH CHRMAP SCHEDULE OF SUBMISSIONS	
Summary of submissions	**Officer Comment**
• "*The City is planning on consulting with the relevant stakeholders including the general public and the Frenchman Bay Association to understand their concerns and be able to address them when implementing the adaptation plan*". To date, there has been no consultation with the FBA. • Figure 2.2 (*Public Assets within the Frenchman Bay Area*) identifies the public assets in the study area and includes the "Frenchman Bay Recreational Area". This should be identified as the Whalers Beach Recreational Area as there are numerous recreational areas along the Frenchman Bay coastline. • Figure 2.3 identifies "Public Assets within the Frenchman Bay Recreational Area". Not within Whalers Beach. • It is noted that the list of assets considered in this report relates solely to the public assets that are of social or economic value that are located at Whalers Beach within the Frenchman Bay area. It is noticed that one of the key assets is Lookout, but this is not shown on Figure 2.3. There are numerous other key assets in Frenchman Bay including facilities at Mistaken Island, Goode Beach, and Vancouver Road that are not considered, only Whalers Beach. • "*It is important to note that the area in question has significant heritage assets such as the remains of a historical Norwegian whaling station and a spring that used to supply Albany with water. The Norwegian whaling station was in use for three years between 1913 and 1915*". Whalers Beach is not identified.	

Summary of submissions	Officer Comment
• Although the CHRMAP reports are of a high standard, there are many other such errors in nomenclature in these and other reports. **2. <u>Coastal Hazard Assessment (Appendix A) of CHRMAP report</u>** • Figure 1.1 in Appendix A (Coastal Hazard Assessment) incorrectly shows the location of Frenchman Bay. This is, in fact, Whalers Beach. Frenchman Bay covers a much larger length of coastline. • Figure 2.1 in Appendix A (Extract from Local Nautical Chart (WA1083: DoT 2014)) identifies Whalers Beach as Frenchman Bay. • "*In 2008, Landform Research completed geotechnical drilling within Lots 1 and 2 to further review the local geology*". "*Whilst this drilling assessment was limited to the areas within Lots 1 and 2, it is anticipated that similar geological conditions would be encountered over the full extent of Frenchman Bay*". This refers only to Whalers Beach. • Figure 2.2 is incorrectly labelled, as it shows a picture of Whalers Beach. • Section 2.3 describes the history of the Norwegian Whaling Station in some detail, without mentioning that these historical ruins are located on Whalers Beach. • "*Given their location on the beach, the remains of the Whaling Station have impacted the local coastal processes along the eastern portion of Frenchman Bay*". This should be the eastern portion of Whalers Beach.	

Summary of submissions	Officer Comment
• Section 2.4.1. Note the use of Frenchman Bay in this section is correct, as it could apply to the entire bay. • Why is Lot 660 shown on Figure 2.8? • Figure 3.5 and 3.8 show Whalers Beach!! • Conclusions. "*This report presents the results of the coastal hazard assessment for the Frenchman Bay Shoreline*". All 7km of it? <u>These are just a few examples of the errors in nomenclature in these and other reports of the Whalers Beach area. The errors are widespread.</u> 3. **<u>CHRMAP MANAGED RETREAT DESIGN AND SLOPE GEOTECHNICAL PARAMETERS</u>** There have been two CHRMAP reports completed recently by M P Rogers - for the recent Seashells projects and the City of Albany (December 2023). These reports basically describe: (i) current and future coastal conditions at Whalers Beach; (ii) the impact these conditions have on the beach and land above the beach; and (ii) the implications for future planning of development and public beach facilities on and above Whalers Beach. These are detailed, complicated and comprehensive reports, which are probably difficult for the layperson to understand completely. In my simple terms, this report describes the interaction between the predicted future coastal processes along the eastern section of Whalers Beach and whether/how these processes will impact on future development planning for Lots 1 and 2, FBR and public recreational infrastructure on Whalers Beach.	

WHALERS BEACH CHRMAP SCHEDULE OF SUBMISSIONS	
Summary of submissions	**Officer Comment**
• As well as managing the longevity and safety of the positioning of any development infrastructure on Lots 1 and 2, there has to be allowances in this process to ensure that public access to the foreshore, beach, picnic area, boat launching area and associated parking at Whalers Beach can be maintained in the face of future beach (and slope) erosion - as sought by WA's coastal planning policy SPP2.6. A tricky question is: "*How far back from the edge of the Lots 1 and 2 escarpment does any development infrastructure have to be setback to satisfy acceptable safety, and design, requirements over the long-term?* ". I think to answer this requires input from both Coastal Engineers (quantify and manage the erosional impact of coastal processes) and Geotechnical Engineers (characterize the geotechnical aspects of the embankment stability under this erosion). Will any future erosion of the beach area cause the edge of the escarpment to move landwards because of coastal processes which result in the progressive failure of the slope, below the escarpment? • To partly answer these questions and allow infrastructure design and placement, a programme of 'managed retreat' has been designed into the proposed Seashells development, based largely on the results of the CHRMAP-related studies, which have indicated that the managed retreat of project assets could be required after about 40 years, but are considered of very minor consequence, viz., "*The key assets of the development are situated landward of the coastal erosion hazard lines up to 2061 and, therefore, are assessed to have an insignificant level of consequence to coastal erosion*". "*It must be noted that the coastal hazard lines are not a prediction of future shoreline location, but rather a representation of areas that could be at low risk of coastal hazards over each of the respective time frames"*. This is because these retreat	

Summary of submissions	Officer Comment
designs are considered conservative and include the assumption that the embankment above Whalers Beach can be classified as 'sand' (held together by vegetation!), with the associated geotechnical properties. • The last geotechnical-type study of the Whalers Beach area was completed by Landform Research in 2008. The geological cross sections from these reports indicates mainly sand above a granitic basement, but with varying sub-horizontal layers of finer-grained (lower permeability) materials such as silt, clay, and fine silty sand. Like a layer cake. The groundwater from Vancouver Spring probably travels along one of these lower permeability layers, before discharging at the embankment. • These early geotechnical studies included no computer modelling simulations of slope failure caused by beach erosion at the embankment toe. This isa useful predictive tool and when combined with CHRMAP data, might provide additional predictions of any escarpment movement. Geotechnical modelling of slope failure, combined with updated coastal processes, seems a good fit. I am not a geotechnical professional but feel that the managed retreat programme and coastal hazard mapping should be tied more closely to updated geotechnical studies of the embankment. This may allow refinement of the managed retreat parameters. An updated geotechnical study of the slope between the escarpment and the beach should be completed and these results related to the potential beach erosion damage estimated to be caused by coastal hazards. For example, erosion and subsidence at the toe of a slope, due to coastal hazard processes, may cause instability in the slope above the subsidence, resulting in landward slope and escarpment movement. The 2008 Landform Research report indicates that failure of	

Summary of submissions	Officer Comment
the slope toe by beach erosion may provide some 'bund' protection from further beach erosion. But does the toe failure result in failure in the slope above and any associated movement of the escarpment landward towards infrastructure? Combining CHRMAP results and updated geotechnical studies in the areas of steep, high slopes above Whalers Beach could be another way of quantifying slope movement with time and quantifying any predicted landward movement of the escarpment on Lots 1 and 2, FBR. CONCLUSIONS AND RECOMMENDATIONS • Errors in nomenclature are rife in these and other reports associated with studies at Whalers Beach and Lots 1 and 2, FBR and need to be corrected. Examples include the lack of mentioning the name Whalers Beach (the main study area), and the invention of unofficial place names like Frenchman Bay Beach, Whaling Cove Beach, and the Frenchman Bay Recreational Area. Whalers Beach is the actual official location where all these studies took place, not Frenchman Bay Beach (this 'beach' extends over the 7km long coastline of Frenchman Bay). Whalers Beach occurs is a small portion of the Frenchman Bay coastline. How did these nomenclature errors in consultants' reports get past the City editors? This implies that the City supports the incorrect use of these names. • We need to correct these errors now and insure they don't continue in the future. There seems to be a push by the City and the developer to change feature names (unofficially) in the vicinity of Whalers Beach, without mentioning Whalers	

Summary of submissions	Officer Comment
Beach in the reports. It appears that the name Frenchman Bay is being 'pushed' to identify the beach under Lot 1 and 2, FBR, the public infrastructure at Whalers Beach, and the general potential development of Lots 1 and 2. The historical location/importance of the officially named location Whalers Beach, as identified on nautical charts of King George Sound, is being ignored. • If these errors are ignored, these reports and continued development activity on Lots 1 and 2 will gradually become the 'official' names of the place in visitor's minds. This will decrease the importance and historical value of the Whalers Beach name, the Whaling Station ruins, and the heritage-registered site. • Also, several explanatory signs with pictures, describing the Whaling Station history and the heritage site, should be erected by the City at 2 locations in the upper parking lot and at 2 locations in the lower recreational area. This will celebrate and publicise the historical importance of Whalers Beach and inform visitors of the European history of the place. • Complete an updated geotechnical investigation of the slope/embankment between the escarpment and the beach, including computer modelling simulations of potential embankment failure caused by beach erosion and slope failure at the toe of the embankment. Relate these results to the potential damage from coastal hazards and the design of managed retreat resulting from the CHRMAP studies.	

WHALERS BEACH CHRMAP SCHEDULE OF SUBMISSIONS	
Summary of submissions	**Officer Comment**
Refinement of geotechnical parameters for the embankment slope may help to refine managed retreat design and whether the escarpment will be predicted to move landwards. • The results of such updated geotechnical investigations of the slope/embankment below the resort, combined with the potential beach damage estimated to be caused by coastal hazards, may help to refine managed retreat predictions.	

Planning Report to support a Planning Application

for A Proposed Mobile Telecommunications Facility

February 2024

Address: 322 Lancaster Road, MCKAIL WA 6330

Document Controls

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This report has been prepared as a supporting document to the Development Application. The report relies upon data, surveys, measurements and results taken at or under particular times and conditions specified herein. Any findings and conclusions or recommendations only apply to the aforementioned circumstances. BMM Group does not accept any responsibility for the use of this report by any parties other than the intended recipient, without its prior written permission.

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Executive Summary

Proposal	Key elements of the proposed telecommunications facility are as follows: • Establishment of a 120m² (12m x 10m) fenced lease area; • Excavation of the footing for the monopole; • The installation of a new 40m monopole with a triangular headframe; • The installation of six (6) new Telstra panel and six (6) AIR antennas for the provision of 4G and 5G technologies to be mounted on the headframe at a maximum height of 41.3m elevation; • The installation of an equipment shelter to accommodate internal Telstra equipment; and • The installation of ancillary equipment including transceivers, remote radio units, amplifiers, antenna mounts, cable trays, feeders, cabling, combiners, diplexers, splitters, couplers, jumpers, filters, electrical equipment, signage, and other associated equipment. The facility will accommodate the immediate and future coverage and capacity requirements of Telstra's network and improve coverage in the locality.
Site Description / Location	Address: 322 Lancaster Road, MCKAIL WA 6330 Legal Address: Lot 200 on P424596 Total Area of Site: ~4.17Ha
Planning Scheme	**Council Area:** Albany Council **Planning Scheme:** Albany Planning Scheme **Zoning:** General Agriculture Zone **Existing Use**: Cleared Agriculture Land **Proposed Use:** Telecommunications Infrastructure (Telecommunications Facility)
Application Details	Development permit sought for the development of Telecommunications Infrastructure (Telecommunications Facility)

1.0 Introduction

1.1 Overview of the Report

BMM Group Pty Ltd acts as Project Manager to Amplitel Pty Ltd, a subsidiary of Telstra that deploys telecommunications infrastructure. This Planning Report has been prepared by BMM Group, on behalf of Amplitel to support Telstra's wireless network with the development of a new telecommunications facility at 322 Lancaster Road, MCKAIL 6330. The proposed facility is a new standalone monopole structure (telecommunications facility) to improve Telstra coverage to the local McKail area.

The report and appendices address the merits of the proposed development with regards to the provisions of the WA Planning and Development Act 2005 and the provisions of the Albany Scheme No. 2. It is considered that the development is appropriate and justified; therefore, Council's approval of the application is sought, subject to reasonable and relevant conditions. The telecommunications facility will operate within all current and relevant standards regulated by the Australian Communications and Media Authority (ACMA).

The report supports a development permit application for the development of a new telecommunications facility.

1.2 Objectives of the Proposal

Telstra (The Carrier) regularly undertakes detailed assessment and review of the performance and coverage of their digital mobile telecommunications networks to ensure they are achieving the required objectives and servicing demand within defined areas. The review also provides an indication of areas of poor performance or where coverage does not exist. For the subject location, the immediate objective of the facility is to deliver improved Telstra coverage to the local area. Customer demand for access to high quality telecommunications networks is continually growing with the increased uptake of mobile devices. The proposed facility will fulfill each of these priorities.

The proposed telecommunications facility will provide essential telecommunications infrastructure to the locality and maintain an important and necessary link to Telstra's existing telecommunications networks. The facility will deliver overall mobile and mobile broadband performance in the area and provide a high-quality service which enhances the depth of coverage and call capacity within the area. The facility will also provide capacity for other telecommunications carriers to co-locate on the facility.

1.3 Objectives of the Report

This report provides an assessment relevant to a Development Application for the development of a 'Telecommunications Facility'. The purpose of this planning report is to assess and describe:

The need for the proposal (Section 2)
The site selection process and potential candidates (Section 2)
Site description and locality (Section 3)
The proposed mobile telecommunications facility and consultation (Sections 4,5)
How the proposed development meets the planning objectives of the various applicable Commonwealth, State and Local laws (Sections 6,7)
Other environmental planning implications associated with the proposed facility (Section 8)

2.0 Telecommunications Objective and Site Selection

2.1 Telstra's Network

The proposed telecommunications facility will deliver improved Telstra coverage to the local area.

2.2 Mobile Base Station Information

A Mobile Base Station is essentially a radio transmitter / transceiver and an antenna, which transmits and receives radio frequency (RF) or electromagnetic energy (EME) signals from mobile phones. The base stations are linked to the rest of the mobile and fixed phone network and pass the signal/call on into those networks.

A base station typically consists of an Equipment Cabin (which houses all the electronics required to send and receive mobile phone calls), a series of Panel Antennas (which transmit and receive signals to and from the handset) and a Radio Transmission (RT) Dish or optical fibre cable which links the base station to the rest of the network. It is essential that when a call is made, coverage is available within the area. A base station establishes the call connection, holding the call as long as the phone user remains on the call and in the range of that base station.

The location of the base station is determined by a number of factors, including topography and other physical constraints such as trees and buildings, the immediate network 'capacity' or number of calls expected to be made in the area, and the radio frequency at which the base station will operate. Antennas need to be located clear of obstructions like trees and geographical features such as hills, in order to provide a clear line of uninterrupted sight and ensure good signal quality.

2.3 Need for the proposed telecommunications facility

Mobile telecommunications connectivity has grown significantly since the introduction of smart phones and tablets. These devices, with increased mobile broadband speeds, capacity and capability, are changing the way we live and operate our day to day lives and businesses. The availability of high-speed, reliable, mobile telecommunications services is becoming an expectation of Australia's population.

The nearest Telstra telecommunications facility is located approximately 4.44km to the south east of the proposed facility at **9 Locke St, Orana WA 6330 (**RFNSA site number 6330014). The closest telecommunications facility with no Telstra antennas is located approximately 3.09km to the south east at **43 Bottlebrush Road GLEDHOW WA 6330 (**RFNSA site number 6330022).

This distance to existing mobile telecommunications facilities means that a new facility is required to enhance coverage to the local area. The proposed site will service the current and increasing demand for mobile services by existing customers, and by the growing residential population in McKail and the higher volume of commuters using the local road network.

To accommodate improved coverage and an increase in customers, the subscriber service area must be divided into multiple sub-areas creating an interlinked network of sub-areas or radio cells. All the available radio spectrum is able to be re-used within each individual radio cell.

The proposal will maintain and improve "depth of coverage". This term refers to the level of coverage received by a mobile phone user in the urban and rural environment, such as inside residential and commercial buildings. The performance objective for the proposed site is therefore to improve the call quality, network capacity and overall performance in the target area.

Failure to provide a suitably located and correctly configured replacement radio facility in this location will have a detrimental effect on network operation and performance. This includes radio cell sizes being geographically larger than the desired optimal size for the amount of demand being serviced by that existing radio facility, leading to increased demand on that radio cell and ultimately in its underperformance and redundancy.

2.4 Site Selection

In areas where the deployment of a new site is required, a "search ring" is identified by Telstra's radiofrequency engineers describing where a facility is required in order to deliver improved network coverage and improvement to the local network.

There are many competing factors to be considered in determining possible suitable locations to site a telecommunications facility. These include the availability of land, requirements of the landowner, visual effect, cost, access for maintenance purposes, construction issues, planning objectives and radio frequency requirements such as coverage objectives, capacity, network design constraints, line of sight and height of surrounding buildings, trees, hills and other structures. An in-depth site selection process was undertaken in the area prior to confirming the preferred candidate location.

Carriers are required to apply a precautionary approach when designing their radio communications networks. A number of candidates were therefore identified through this selection process and evaluated against the criteria within Table 1. N.B. the criteria may not represent an exhaustive list of issues that need to be addressed when designing mobile network infrastructure.

Table 1: Site Selection Criteria

Key Factors	Key Criteria
Planning	Compliance with the Albany Planning Scheme
	Acceptability to the local Council and community
	Suitable location with regard to sensitive land uses and environmental factors
	Minimal potential visual impacts
	Compliance with the EME standards mandated by the Australian Communications and Media Authority (ACMA), and the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA)
	Minimal environmental impact on the subject site and surrounding area
	Potential co-siting with another existing telecommunications facility
Property	Willingness by the owner to enter into a lease agreement and provide access during construction and operation
Engineering	Feasibility of construction, availability of infrastructure such as power, and access to the facility for construction and maintenance
Radio Frequency and Coverage	Ability to be linked to the existing telecommunications networks and meet the radio frequency coverage objectives for the area

These considerations are applied to the site selection process with differing weight. Firstly, the applicant

cannot locate a facility on a site without the landowners willing consent. There is also no point in locating a facility where radio frequency requirements are not met. Generally, greater coverage is achieved with an elevated base station combined with a taller base station structure. Additional base stations may be required if height is restricted. The best location to build base stations to maximise network performance efficiency is closest to where those services are required.

Mobile telecommunication facilities provide coverage to an area with three sectors of antennas that cover approximately 120 degrees each. By locating within the search area, the telecommunications facility is able to provide coverage and capacity to customers on all three sectors.

The nature of any base stations is such that reliable communication is limited mainly to "line of sight" of the mobile. Whilst some buildings and foliage can be penetrated to a limited extent, radio signals cannot penetrate more substantial objects, such as hills. Accordingly, in order to achieve Telstra's network performance and quality requirements for the area, the base station must be located in an elevated location and have antennas above the treeline. The subject site, which is located near to the highest point in the search area, is suitable to achieve Telstra's coverage objectives.

To establish criteria for site selection, an assessment of the immediate area was undertaken to determine the best long-term plan for the design and configuration of the network. The proposed standalone facility provides for the most effective and sustainable long-term plan for Telstra's network and is deemed to satisfy the requirements of the Albany Planning Scheme, contributes to the local area and broader success as a sustainable and connected community, and has been appropriately sited and designed to ensure that the amenity of the locality will not be compromised.

2.4 Opportunities to Collocate

State, Federal and Local government legislation encourages the use of existing telecommunication facilities for the colocation of antennas. When it was determined that a new facility was required in the area to improve network coverage to the area, Amplitel explored potential colocation options.

Figure 1 below shows the proposed site and the closest existing telecommunications facilities in the area.

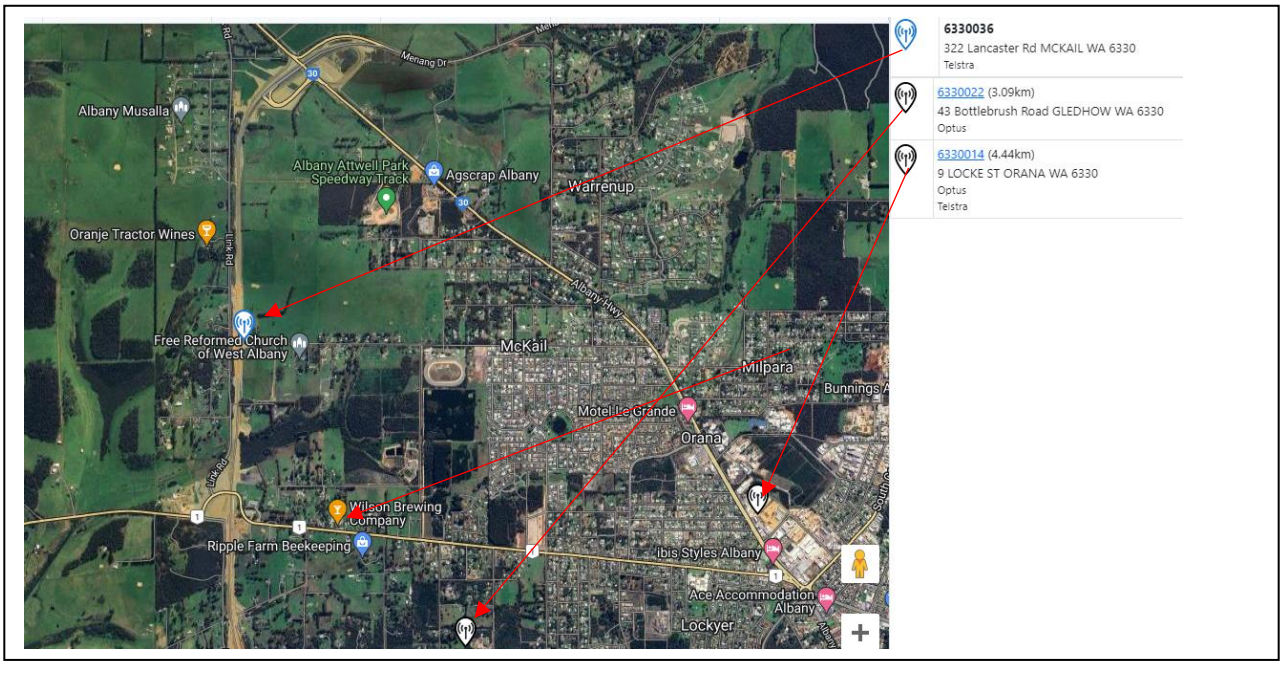


Figure 1: *RFNSA Map demonstrating that there are no other existing sites within the immediate McKail area (Source: RFNSA)*

As can be seen, there is a paucity of telecommunications facilities in the area with no existing mobile telecommunications facilities within a 3.09km radius. The nearest telecommunications facility is located at 43 Buttlebrush Road, Gledhow. The facility is located too far from the targeted coverage area at McKail to effectively provide coverage.

2.5 Candidate Sites

Following the identification of the search area, a total of 4 candidate sites were examined. Each candidate was assessed based on the ability to meet the coverage objectives and site considerations detailed above. The search area is comprised of a number of different land uses that are to be serviced by the proposed facility.

Figure 2 below indicates the location of the candidates considered within the site selection process. A summary of the candidate assessment is set out in Table 2 below.

Figure 2: *Location of potential candidate sites (Source: Google Earth)*

Table 2: Candidate Site Details

Candidate	Address	Facility Type	Description
A (Proposed Candidate)	322 Lancaster Road, MCKAIL 6330	Monopole	The site is suitable from an engineering and radio frequency perspective. The location will deliver a suitable coverage solution. The proposed location can be established without compromising the existing and future use of the land within the General Agriculture Zone. The facility location is well located to service the highway and and is not in close proximity to any residences or sensitive uses. The landowner is willing to proceed with a proposal along the south western boundary corner of the lot. Proposed site location does not require clearance of any vegetation and access and power can be provided to the site with little or no disturbance.
B	291 LANCASTER ROAD MCKAIL WA 6330	Monopole	Amplitel investigated the installation of a new monopole at this location. This site is General Agriculture Zone. The landowner was not interested in accommodating the facility. This candidate was therefore eliminated.
C	303 LANCASTER ROAD MCKAIL, WA, 6330	Monopole	Amplitel investigated the installation of a new monopole at this location. This site is General Agriculture Zone. The landowner was not interested in accommodating the facility. This candidate was therefore eliminated.
D	277 LANCASTER RD, MCKAIL, WA, 6330	Monopole	Amplitel investigated the installation of a new monopole at this location. This site is General Agriculture Zone. The landowner was not interested in accommodating the facility. This candidate was therefore eliminated.

The site selection process also incorporates mandatory Deployment Code (C564:2020) activities which are undertaken in order to justify the proposed location of the subject site. This is inclusive of a "traffic light model" system which determines community-based sensitivities, within both social and legislative based frameworks.

2.7 Preferred Site

The candidate at 322 Lancaster Road was selected as the preferred site for the following reasons:

- The proposed site location is within an already cleared area,
- The availability of viable connections to the power and transmission networks in the area,
- No clearing is required to establish a power supply, or access. The proposed development footprint does not contain significant biodiversity value and will not impact upon the general biodiversity value,
- Visual impact – As the proposal involves the provision of a new monopole set in a rural area that is surrounded by mature vegetation, it is considered that the proposed site location will not result in unacceptable loss of amenity or the obstruction of any significant viewing corridors. In particular, the adjacency to the new Albany Ring Road upgrade and associated road light poles ensures that the facility will integrate well in the locality,
- The proposal is considered to be consistent with and provides acceptable solutions in relation to local and state environmental planning requirements. The proposal is not expected to have an adverse impact on the environment during construction and operation of the facility. Town planning considerations (such as zoning, design codes, surrounding land uses, environmental significance, compliance with the planning scheme and visual impact),
- The proposed facility will be unstaffed on a continuous basis (other than occasional access for maintenance) and will have no measurable impact on traffic, and
- The proposed location will enable superior RF coverage and capacity to the surrounding residential and farming precincts.

As a result of the extensive selection process for this site, Amplitel has decided to proceed with the proposed facility at 322 Lancaster Road. There are no existing telecommunications facilities capable of providing the desired coverage. The proposed new 40m facility will meet Telstra's radio frequency objectives whilst satisfying construction feasibility, town planning considerations, environmental impacts, visual amenities, and engineering factors. In addition, the new site will meet strict government regulations on electromagnetic energy (EME) ensuring the safety of the general public.

Section 8 provides a detailed assessment of these potential environmental impacts and describes proposed mitigations. The assessment concludes that the development is unlikely to have a detrimental impact on the environment or the locality.

3.0 Facility Location Description and Surrounding Locality

3.1 Facility Location and Surrounds

The subject site is located on a large allotment adjacent to Lancaster Road at MCKAIL. The exact location of the proposal is at GDA94 coordinates -34.98489, 117.81522 on Lot 200 on P424596. The land is zoned as General Agriculture Zone under the Albany Planning Scheme.

The proposed facility is located in the south western corner of the subject property on an existing cleared area of land adjacent to the intersection of Lancaster Road and the new Albany Ring Road. The facility location is surrounded by mature vegetation along the property driveway and southern boundary. The site is located approximately 105m north west from the nearest residential dwelling and there are no sensitive uses within the immediate area. None of the existing vegetation is proposed for removal as part of the proposal.

Figure 3: *Site location. (Source: Google Earth)*

The general area is cleared and primarily used as a paddock for agricultural use. Located to the north, east and south of the proposal are large paddocks for agricultural use. To the west of the proposed site is a freeway, which is part of the Albany Ring Road upgrade. The proposed location is approximately 2.3km west of the McKail town and contains a variety of land uses including rural, educational and horticultural. The area is undulating and has been substantially cleared with corridors of vegetation generally along roadways and property boundaries.

The Local Government Authority for the proposal is the Albany City Council and the principal planning instrument at the location is the *Albany Planning Scheme No. 2* (Scheme). Table 3 provides a summary of the site details. **Figure 3** illustrates the location of the site and the proposed facility.

Table 3: Proposed Site Details

Details	Comment
Street Address	322 Lancaster Road, MCKAIL WA 6330
Legal Description	Lot 200 on P424596
Total Site Area	~4.17ha
Zone	General Agriculture Zone
Planning instrument	Albany Planning Scheme
Current Use	Rural
Access	Existing access track via Lancaster Road

***Figure 4**: View of proposed monopole location looking north west from Lancaster Road (Source BMM)*

***Figure 5**: View looking west towards the proposed facility location from within the property (Source BMM)*

***Figure 6**: View looking south west towards the proposed facility location from within the property (Source BMM)*

***Figure 7**: View looking north towards the proposed facility from Lancaster Road (Source BMM)*

4.0 Proposed Development

4.1 Proposal Summary and Construction

A summary of the proposed development is as follows:

- Establishment of a 120m2 (12m x 10m) fenced lease area;
- Excavation of the footing for the monopole;
- The installation of a new 40m monopole with a triangular headframe;
- The installation of six (6) new Telstra panel and six (6) AIR antennas for the provision of 4G and 5G technologies to be mounted on the headframe at a maximum height of 41.3m;
- The installation of an equipment shelter to accommodate internal Telstra equipment; and
- The installation of ancillary equipment including transceivers, remote radio units, amplifiers, antenna mounts, cable trays, feeders, cabling, combiners, diplexers, splitters, couplers, jumpers, filters, electrical equipment, signage, and other associated equipment.

A diagram of the proposed telecommunications facility is displayed below in **Figure 8**. The full design drawings are available in the appendix to this report. Refer to **Appendix A** – Proposal Plans.

Given the unique nature of the proposed development, the development and construction of the mobile phone base station primarily consists of the following processes:

- Pre-construction – ensuring that the land is suitable for construction. This is inclusive of confirming existing structural assessments and the provisioning of cabling;
- Installation of new equipment – reflective of the scope of works outlined within this Development Application; and
- Network Integration – Ensuring that the mobile phone base station can connect with both end users and other sites within the Telstra network.

Throughout the construction phase of the proposed development, any construction works will not disturb existing traffic flows. If a road closure is required for the erection and installation of equipment, the appropriate approvals will be obtained from the relevant authorities.

A total construction period of approximately six weeks (including civil works and network integration and equipment commissioning) is anticipated. Construction activities will involve four basic stages:

- Stage 1 (Week 1) – Site preparation works, including field testing, ground preparation and construction of foundations and footings;
- Stage 2 (Week 2) – Installation of the pole;
- Stage 3 (Week3) – Construction of the equipment shelter and fences;
- Stage 4 (Weeks 4 – 6) – Installation of antennas and radio equipment, as well as equipment testing.

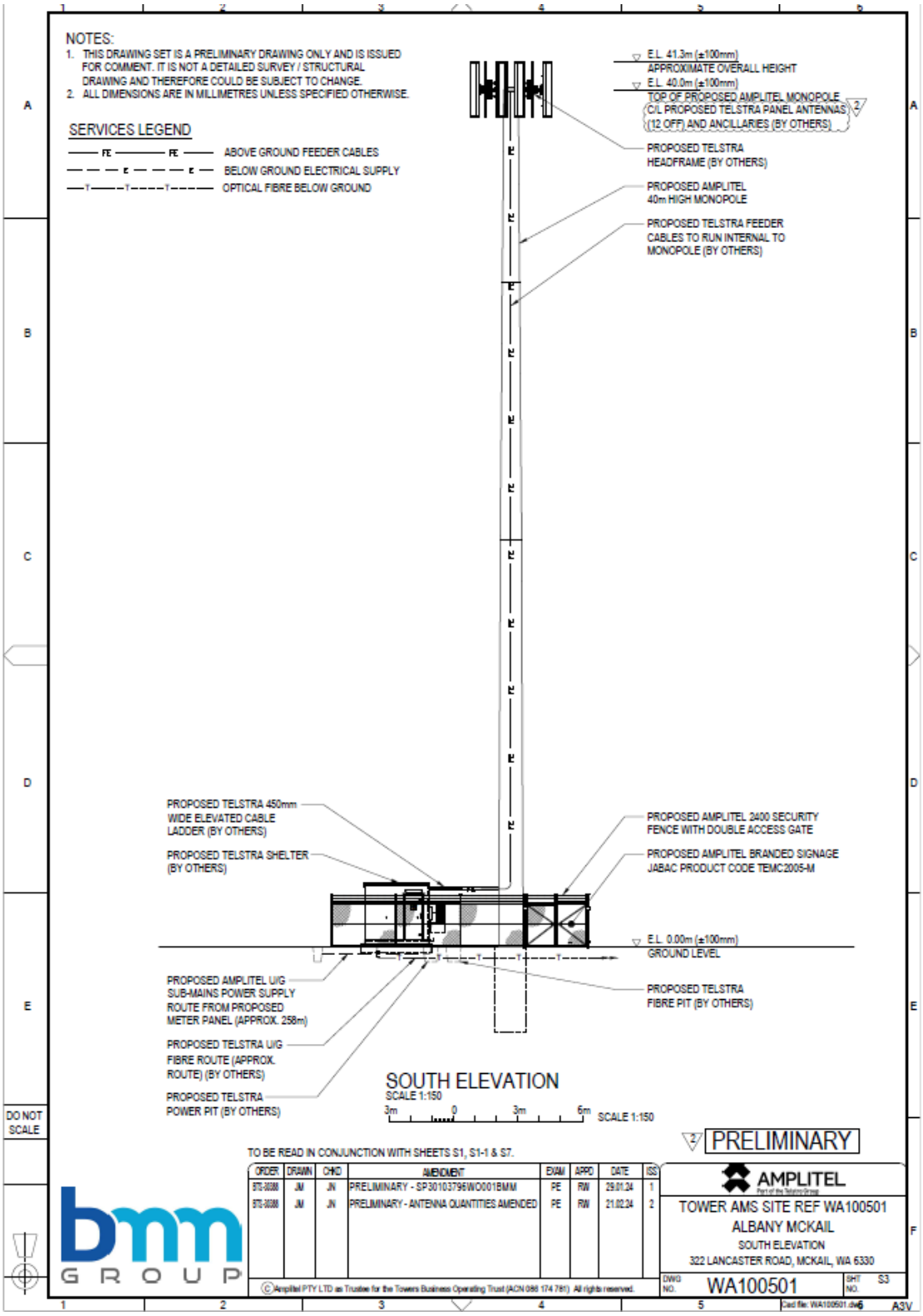


Figure 8: *Elevation of the proposed facility*

4.2 Traffic, access and parking

Access to the proposed facility location will be via Lancaster Road and existing internal access roads. Once operational there will be no measurable impact on the road network. The facility will not compromise the safety, efficiency, function or convenience of use or capacity of the operation of the existing and future road hierarchy. The facility will be unstaffed and operated remotely. Only occasional access is required for maintenance up to approximately three times per year by one passenger vehicle for approximately one day. Traffic management will be utilised if required to facilitate occasional heavy vehicle (EWP) access when upgrading or replacing equipment on the monopole.

4.3 Construction and noise

There will be minimal noise and vibration emissions associated with construction of the proposed facility. Noise generated during the construction phase is anticipated to be of short duration and accord with the standards outlined in the relevant EPA guidelines. Construction works are planned only to occur between the hours of 7.00am and 5.00pm or otherwise in accordance with Council's conditions.

4.4 Utility services

Power to the proposed structure will be sourced from the existing power supply. No tree clearing is anticipated for establishment of the power and fibre alignments.

4.5 Maintenance

Once operational, the facility is designed to function on a continuously unstaffed basis and will typically only require maintenance works up to three times per year, for approximately one day.

5.0 Consultation

5.1 Council

A discussion was held with Council's planning team at Albany City Council on 11th August 2023 to review Amplitel's intentions to install a new facility at the proposed site. Council provided development application planning advice and a summary of the relevant codes and policies applicable to the proposed development on 7th September 2023. These codes have been addressed within this Planning Report.

5.2 Community Notification

As the proposed land use for the 'telecommunications Infrastructure' (facility) falls under the 'D' symbol and under the General Agriculture Zone in Section 3.4 (Interpretation of the Zoning Table) of the Albany Planning Scheme, public notification is at the discretion of the Albany Council by way of Clause 64 of the deemed provision.

As part of any Council public notification process, a sign would be placed on the land and adjoining landowners would be notified directly via letter. BMM Group will review any submissions made available by Council and where required provide additional information or clarification.

5.3 Other Stakeholders

A local community may often have concerns about particularly sensitive locations in the vicinity of the proposal e.g. schools, childcare centres and aged care facilities. During the facility location selection process community sensitive locations are identified and avoided wherever possible. A key criteria for selection of the proposed facility location was that it is not within close proximity to any sensitive land uses. As such, no additional stakeholders were identified.

6.0 Relevant Local, State and Federal Legislation

The following legislation is relevant to assessment of the proposed telecommunications facility;

- Telecommunications Act 1997 (the Act);
- Telecommunications (Low-impact Facilities) Determination 2018 (the Determination) and Telecommunications (Low Impact Facilities) Determination 2021 (Amendment);
- Telecommunications Code of Practice 2021 (the Code);
- Industry Code C564:2020 - Mobile Phone Base Station Deployment (the Deployment Code);
- Planning and Development Act 2005;
- State Planning Policy 5.2 (Telecommunications Infrastructure 2015);
- Albany Planning Scheme.

6.1 Federal Government Legislation

6.1.1 Telecommunications Act 1997

The installation of certain telecommunications facilities (as defined in the *Telecommunications Act 1997)* is regulated by the Australian Communications and Media Authority (ACMA) under the *Telecommunications Act 1997*. The legislative requirements are discussed below in further detail.

The *Telecommunications Act 1997 (TA)* came into operation in July 1997. This legislation establishes the criteria for 'low impact' telecommunication facilities. If a proposed facility satisfies the requirements of a 'low impact' facility, the development is exempt from the planning approval process.

Part 1 of Schedule 3 of the *TA* authorises a carrier to enter on land and exercise any of the following powers:

- Inspect the land;
- Install a facility; and to
- Maintain a facility.

A Carrier's power to install a facility is contingent upon:

- the Carrier being authorised to do so by a Facility Installation Permit, or the facility being a low-impact facility (as defined by the Telecommunications (Low-Impact Facilities) Determination 1997 (as amended)), or
- the facility being temporary and used for a defence organisation for defence purposes, or
- if other conditions are satisfied in relation to the facility concerned.

As the proposal involves the installation of a 40-metre monopole, it does not constitute a low-impact facility under the *Telecommunications (Low-Impact Facilities) Determination 1997* (as amended).

As the proposed facility does not meet the criteria mentioned above, the applicant is not empowered to undertake the proposed works without approval under Western Australian legislation and must obtain development consent from Albany Council.

6.1.2 Telecommunications Code of Practice 2021

The Telecommunications Code of Practice 2021 (TCP) is made under Schedule 3 of the Telecommunications Act 1997. The TCP ensures good practice measures under which a Carrier must operate and outlines conditions which carrier conduct must adhere to.

This proposal has taken into consideration the requirements of carriers in the best practice conditions of the TCP and thus includes the best design, planning and location measurements to ensure the development is in accordance with sections 2.11 and 3.11 of the Act.

6.1.3 Telecommunications (Low-Impact Facilities) Determination 2018

The Telecommunications (Low-impact Facilities) Determination 2018 was made under subclause 6 (3) of Schedule 3 of the *TA*. The Act outlines under subclauses 6 (4), (5) and (7), that certain facilities cannot be low-impact facilities, these include the following:

- Designated overhead lines;
- A tower that is not attached to a building;
- A tower attached to a building and more than 5 metres high;
- An extension to a tower that has previously been extended; and
- An extension to a tower, if the extension is more than 5 metres high.

The proposal is not classed as a low-impact facility under the Determination as it involves the installation of a 40-metre monopole and is therefore subject to the assessment under the *Planning Scheme*.

6.1.4 Deployment Code

The 'Mobile Phone Base Station Deployment Code' Communications Alliance Ltd Industry Code (C564:2020) is a code developed by a working committee with representatives from carriers, various levels of government, an industry group and a community action group. The Code is designed to:

- Allow the community and councils to have greater participation in decisions made by carriers when deploying mobile phone base stations; and
- Provide greater transparency to local community and councils when a carrier is planning, selecting sites for, installing and operating Mobile Phone Radiocommunications Infrastructure.

The carriers' activities are published on the internet based Radio Frequency National Site Archive (RFNSA) as well as information relevant to each site such as EME Reports.

In the site selection and design stages of this proposal, the precautionary approach outlined in the Deployment Code has been considered.

6.1.5 Environment Protection and Biodiversity Conservation Act 1999

The Environment Protection and Biodiversity Conservation (EPBC) Act 1999 obliges telecommunications carriers to consider 'matters of national environmental significance'. Under this legislation, an action will require approval from the Minister of Environment if the action has or is likely to have an impact on a matter of 'national environmental significance'. According to the EPBC Act 1999, there are seven matters of national significance which must be considered.

All relevant EPBC matters have been considered and it is not anticipated that the proposal will have a significant impact on any matters of national environmental significance. Accordingly, approval from the Minister of Environment is not deemed necessary in this instance.

6.1.6 Native Title Act 1993

The Native Title Act 1993 (the Native Title Act) was given effect on 1 January 1994 and recognises

the rights and interests of Aboriginal and Torres Strait Islander people in land and waters according to their traditional laws and customs. The Native Title Act also sets out processes through which development as a Future Act can proceed with regards to the rights and interests of Traditional Owners.

The subject site is identified on a site that has no Native Title claim (Figure 9).

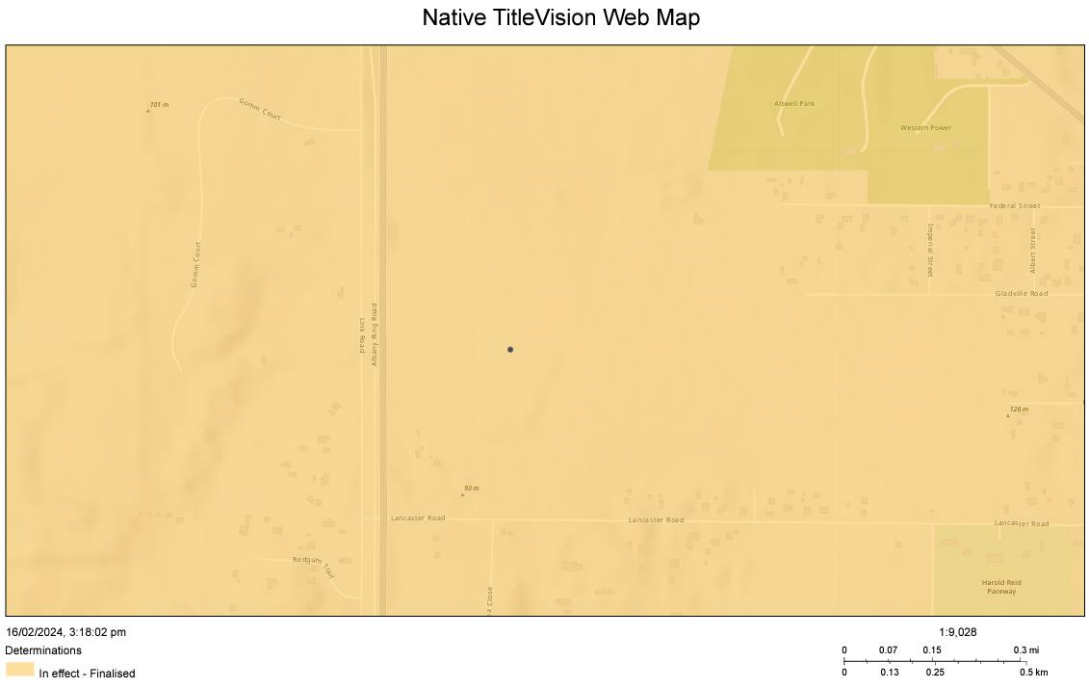


Figure 9 *- Excerpt of Native Title Tribunal Vision showing no Native Title area on or surrounding subject site Source: Native Title Tribunal Vision, 2024*

6.2 State Government Legislation

The following information provides a summary of the State legislation/guidelines relevant to the proposed telecommunications facility.

6.2.1 Aboriginal Heritage Act 2021

The subject property at 322 Lancaster Road, MCKAIL is not impacted by a Cultural Heritage Place. The proposed facility location is approximately 3.2km north of the closest Heritage Place, number: 21837. Figure 13 below shows the location of the proposed facility in relation to the Heritage Place.

Figure 10 – *Cultural Heritage Place 21837 (DPLH – Aboriginal Cultural Heritage Enquiry System)*

6.2.2 Planning and Development Act 2005

The proposed facility is subject to assessment under the Planning and Development Act 2005. The Minister of Planning and Infrastructure has ultimate authority for town planning in Western Australia. Development within Western Australia is controlled by the Planning and Development Act 2005 through the application of environmental planning instruments.

Under the Planning and Development Act 2005, the Western Australian Planning Commission (WAPC) is the responsible authority for land use planning and development matters and this report seeks to demonstrate compliance with the WAPC and other items of relevant legislation which pertain to the subject application.

6.2.3 State Planning Policy for Telecommunications Infrastructure (SPP 5.2)

The *State Planning Policy for Telecommunications Infrastructure* (SPP 5.2) in Western Australia is a State Planning Policy prepared under Part 3 of the *Planning and Development Act 2005*.

The aim of this policy is to 'balance the need for effective telecommunications services and effective roll-out of networks, with the community interest in protecting the visual character of local areas. Using a set of land use planning policy measures, the policy intends to provide clear guidance pertaining to the siting, location and design of telecommunications infrastructure.'

Under section 5.1.1 of the State Planning Policy 5.2: Telecommunications Infrastructure Policy the West Australian Planning Commission provides a set of measures in assessing the visual impact of a proposed telecommunications facility.

The assessment has found that the proposed telecommunications facility has been located and designed to comply with the intent and requirements of the State Planning Policy 5.2: Telecommunication Infrastructure Policy. Section 5.2 of the Policy establishes policy measures to be

applied where relevant to guide the visual impact, location, siting, and design of the telecommunications facility structure. These policy measures are addressed in Table 5 below:

Table 5 – Assessment against State Planning Policy 5.2, Policy Measure 5.1.1	
Policy Measures	**Proposal Assessment**
Be located where it will not be prominently visible from significant viewing locations such as scenic routes, lookouts and recreation sites;	A critical criterion for the preferred site location was based on maximising the setback of the facility from residential areas and any sensitive uses. The proposed location will not adversely impact on the amenity of nearby residential, community or other sensitive uses. Key factors in achieving this outcome are as follows: Whilst undertaking site selection for a new base station facility in the locality, BMM Group considered the nature of existing land uses, visual impact and aesthetics of its facility on the surrounding environment. The facility has been sited and designed to maximise visual integration in the locality and ensure that the existing and future amenity of the locality is not compromised. Matters such as viewing distance, number of viewers and period of view are key factors taken into consideration in the siting and design of the facility and the mitigation of visual impact. The proposed facility is well located to mitigate any potential visual impact. The immediate adjoining land is characterised by large rural and rural residential allotments and the newly constructed Albany Ring Road. The nearest residence is located approximately 105m south east. There are no sensitive uses in close proximity. A slimline monopole design has been utilised at this location in place of a lattice tower design in order to minimise any potentially adverse visual effects. This slimline design creates a minimal profile in the landscape, significantly reducing the bulk of the facility. The setback of the facility from the road frontage also ensures that it will not be highly visible to road users as it avoids the dominant sight lines from surrounding roads and is set behind mature vegetation. The monopole is proposed to be finished in a recessive colour in order to blend the facility into the sky so it is not a dominant feature. The design and location of the facility will achieve a high level of visual absorption of the facility into the landscape associated with the setback, colour and design of the facility. Other vertical elements in the landscape such as existing mature vegetation and light poles along the Ring Road also ensures that the facility will integrate well and have a low level of visual impact. The proposed location of the facility is setback approximately 5m from Lancaster Road and approximately 20m from the Albany Ring Road Upgrade to the west. The setback ensures that the dominant sight lines, views and vistas from adjoining and surrounding residential areas and from surrounding roads, will not be materially impacted by the development. In terms of the potential visual effects of the upper section of the proposed facility, it is important to note that the antennas need to have "line of sight" to the area that they are servicing (i.e. they

	need to be visible to the devices in the area they service) in order to function effectively – this is an inherent feature of cellular technology. Antennas cannot be placed below a topographical line, or surrounded by trees or tall buildings, otherwise they will not be effective in providing the service to the user. It is a result of the technology that telecommunications facilities must be visible in order that they operate effectively. In this case, any views of the facility are considered to be a low level of visual impact. The proposed facility location and design demonstrate a successful balance between the provision of essential infrastructure and a low-level impact on amenity.
Be located to avoid detracting from a significant view of a heritage item or place, a landmark, a streetscape, vista or a panorama, whether viewed from public or private land;	Amplitel has selected a site and location that seeks to minimise perceived negative impacts on the visual amenity of the area. The facility is not located in close proximity to a heritage item or place and will not detract from the significance of any heritage item or place. The proposed location of the facility is well setback from the road frontage which ensures that the dominant sight lines, views and vistas from adjoining and surrounding residential areas and from surrounding roads, will not be materially impacted by the development. While the proposed facility will introduce a visible element in the landscape, any adverse impacts are substantially mitigated through the site location and slim line profile of the proposed pole and the screening of the lower sections by existing mature vegetation.
Not be located on sites where environmental, cultural heritage, social and visual landscape values may be compromised;	There are no known items of environmental, cultural, social significance located on the proposed site of the facility. A cultural heritage search shows that a place of cultural significance is registered approximately 3.2km north of the facility location. The visual landscape of the area will not be compromised as the area is predominantly rural and agricultural use.
Display design features, including scale, materials, external colours and finishes that are sympathetic to the surrounding landscape;	This slimline design creates a minimal profile in the landscape, significantly reducing the bulk of the facility. The monopole is proposed to be finished in a non-reflective recessive colour (concrete or steel grey) in order to blend the facility into the sky so it is not a dominant feature. These design features combined with the backdrop and screening of mature vegetation ensures that the facility will integrate well in the locality.
Be located where it will facilitate continuous network coverage and/or improved telecommunications services to the community;	The proposed telecommunications facility located at McKail is integral to Telstra's ability to deliver mobile network coverage through the delivery of a high quality and reliable service to the area. Delivering on this objective is vital in order to enhance connectivity, economic development and safety in McKail and surrounding communities. The proposed location satisfies the coverage objectives for the area.

Telecommunications infrastructure should be co-located and whenever possible: Cables and lines should be located within an existing underground conduit or duct; and Overhead lines and towers should be co-located with existing infrastructure and/or within an existing infrastructure corridor and/or mounted on existing or proposed buildings.	No suitable opportunities for co-location at alternative sites were identified. The proposed structure will also allow for other service providers co-locate their infrastructure on the facility. Overhead lines are not applicable to the design of the facility.

Overall, the proposed development application is consistent with the intent and requirements of the Statement 5.2

6.3 Local Government Legislation

The following information provides a summary of the local provisions relevant to telecommunications development proposal.

6.3.1 Strategic Community Plan 2032

The Strategic Community Plan 2023 aims to ensure the Albany LGA is a thriving city with an abundance of opportunities.

The strategic outcomes and objectives of the plan for the LGA are as below:

Outcomes	Objectives
4.1 A strong, diverse and resilient economy with work opportunities for everyone.	4.1.1 Attract, retain and support a diverse range of businesses and industries to grow the economy and create more local jobs. 4.1.2 Facilitate access to quality education, training and work opportunities.
4.2 A highly sought-after tourist destination.	4.2.1 Create a competitive and sustainable tourism offer.

The provision of modern and efficient telecommunications infrastructure in this location aligns well with the above objectives as it will support resilience and diversity in the community and promote economic development. The proposed facility will achieve these objectives without negatively impacting on the environment. The proposal accords with the Council Plan as the telecommunications facility is an essential form of infrastructure which will significantly increase access to wireless communications in the area and allow the community to connect and communicate more effectively.

The proposed facility will enable the delivery of a telecommunications service for rural and business customers within the immediate area. Additionally, customers operating small or home-based businesses within the locality will benefit from the proposed facility. Key benefits are:

- Greater business accessibility and flexibility for locals, commuters and home-based businesses. Reliable personal safety through maintaining a mobile phone for critical communications and emergencies.
- Increased physical capacity for improving telecommunications infrastructure, resulting in improved customer connectivity, and rapid delivery of technology improvements.

The proposed development will enable carriers to remain competitive and increase the choice of mobile telephone services available to consumers. Increased competition in the market brings direct economic benefits for individual consumers and the community as a whole.

Telstra are also responsive to public safety issues. High quality telecommunications services significantly benefit community safety by providing a vital 'first response' tool for emergency services. A strong mobile network is highly beneficial in an emergency situation, as well as more general public safety.

Telstra believe that it is in the public interest to provide a strong, resilient mobile network that, in turn, provides a high quality of service to local communities across Australia. Given the demand for the service, and the benefits noted above, we believe there is a strong justification for the telecommunications facility to be constructed at this location.

The proposed facility will maintain quality communication infrastructure, enhancing mobile phone and broadband coverage within the area. The proposed facility will thus have a positive impact on social and economic development of the locality.

6.3.2 City of Albany Local Planning Scheme No. 2

The City of Albany Local Planning Scheme No. 1 provides the basis for planning in the local government area.

6.3.2.1 Zoning

The proposed structure is within the General Agriculture Zone (Figure 11). Telecommunications infrastructure is a permitted use in the zone.

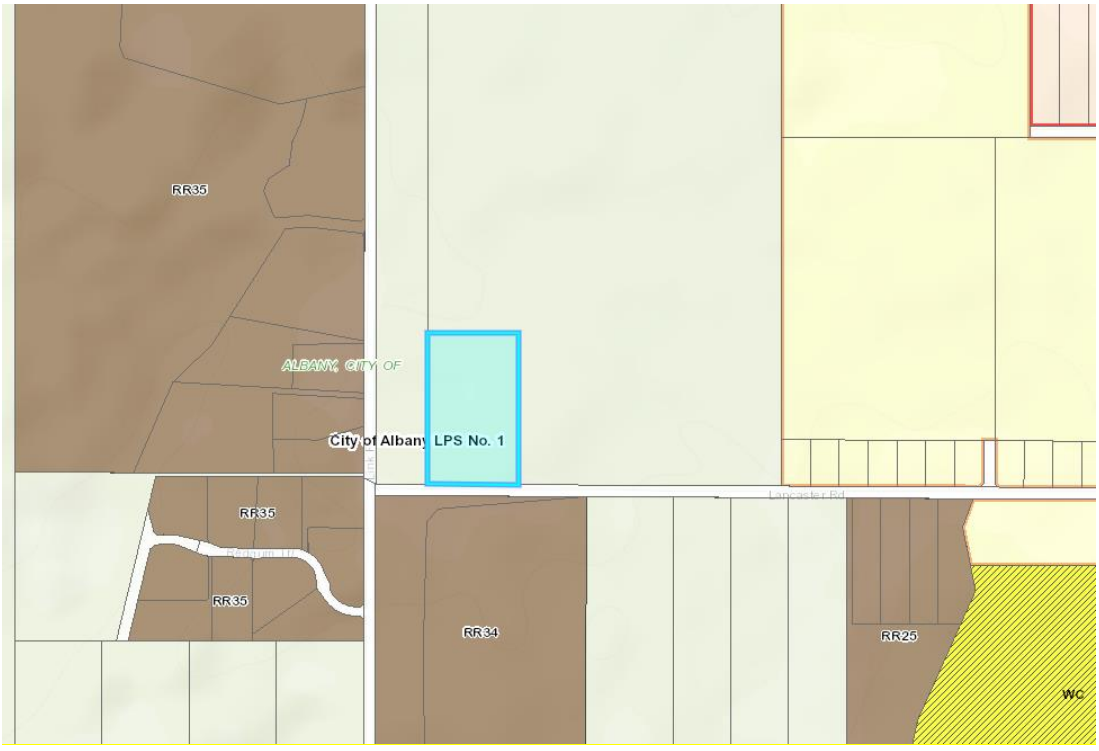


Figure 11: Zoning Map *Source: PlanWA (Albany Local Planning Scheme No. 1)*

Telecommunications Infrastructure is defined in the planning scheme as a:

> *'premises used to accommodate the infrastructure used by or in connection with a telecommunications network including any line, equipment, apparatus, tower, antenna, tunnel, duct, hole, pit or other structure related to the network.'*

The planning scheme does not contain any specific requirements for telecommunications infrastructure, so the requirements of the State Policy Section 5.2 (refer Section 6) are addressed in this report.

The stated objectives of the General Agriculture Zone are as follows:

The objectives of the General Agriculture zone are to:

a) Provide for the sustainable use of land for agricultural and rural activities;
b) Support complementary land uses where those land uses do not detract from adjoining agricultural and rural activities and are compatible with the character and amenity of the area;
c) Prevent land uses and development within the zone that may adversely impact on the continued use of the zone for agricultural and rural purposes;
d) Provide for value-adding opportunities to agricultural and rural products onsite; and
e) Provide for tourism experiences where those developments do not impact upon adjoining agricultural and rural land uses.

The proposed telecommunications facility is considered an appropriate and compatible use within the zone. The proposed facility will support residents, local business, agricultural and rural industries, and tourism. The facility will also improve safety for residents/businesses during emergencies.

The telecommunications service is an enabler for the use of advanced technologies to improve efficiencies and enhance productivity in a rural setting through improved monitoring, tracking, and analysis.

The proposed facility will occupy a small footprint and will not diminish the rural productivity of the land. The facility can be established without the need for clearing of any mature vegetation.

6.3.2.2 Planning in Special Control Area - Albany speedway noise special control area

The facility will not impact on or be impacted by the Albany speedway noise special controls. The facility is operated remotely and will be unstaffed on a continuous basis.

8.0 Other Environmental Constraints and Opportunities

8.1 Visual Impact

Mobile base stations are relatively commonplace in today's landscape – thousands of telecommunications facilities are in operation across Australia, over a variety of land uses and environments.

Mobile telecommunications facilities are required to protrude above the surrounding landscape in order to function correctly, and at this site, a 40m facility is required. The proposal adopts the lowest height necessary to achieve the Radio Frequency (RF) objectives of Telstra and to mitigate the impact of the topography of the area on signal propagation.

In terms of the potential visual effects of the upper section of the proposed facility, it is important to note that the antennas need to have "line of sight" to the area that they are servicing (i.e. they need to be visible to the devices in the area they service) in order to function effectively – this is an inherent feature of cellular technology. Antennas cannot be placed below a topographical line, or surrounded by trees or tall buildings, otherwise they will not be effective in providing the service to the user. It is a result of the technology that telecommunications facilities must be visible in order that they operate effectively. In this case, any views of the facility are considered to be a moderate level of visual impact and the facility has been designed to the minimum height necessary to deliver the targeted coverage and overcome any constraints associated with surrounding topography and vegetation.

Several steps have been taken to reduce the visual impact of the proposed facility. The proposed location is surrounded by some mature vegetation which will screen the lower parts of the monopole. The monopole maintains a minimum of 100m setback from the nearest residence on adjoining land and will not impact on the amenity of the location. The proximity of the Albany Ring Road will also assist in the integration of the facility by providing a substantial buffer to the residential allotments to the west..

A slimline monopole design has been utilised at this location in order to minimise any potentially adverse visual effects. This slimline design creates a minimal profile in the landscape, significantly reducing the bulk of the facility.

The monopole is proposed to be finished in a recessive colour in order to blend the facility into the background, so it is not a dominant feature in the landscape.

8.2 Social and Economic Benefits

Expansion of mobile infrastructure is a reflection of required utility services in modern society. As new technologies arise and the demand for this service grows exponentially, so does the demand for improved telecommunications infrastructure and reliable services.

According to the Australian Communication and Media Authority (ACMA), the number of mobile service (voice and data) subscriptions in Australia exceeds the Australian population, with 35.9 million voice and data service subscriptions current as at June 2020 – and over the last 6 years, the number of subscriptions (those using only a mobile phone to make calls) has doubled from 29% in the 12 months to June 2015, to 60% in 2020, against a reduction of fixed line telephone subscriptions of -4.9% over the same period. These Australian Government statistics demonstrate that consumers have an increasing expectation for reliable, fast and cost-effective mobile phone network services across all areas of Australia. https://www.acma.gov.au/publications/2020-12/report/mobile-only-australia-living-without-fixed-line-home

Usage of mobile services continues to widen as new technologies become progressively more affordable and accessible for the wider community. The previous decade has also seen a significant rise in use of the wireless network for smart devices. Australia has one of the highest penetrations of "smartphone" usage in the world, with reliance on this technology increasing – the abovementioned ACMA study estimates 83% of Australian adults were using smartphones at June 2019, against 79% in May 2018.

According to the Australian Competition and Consumer Commission (ACCC), the COVID-19 pandemic has led to a greater demand for data driven by working and schooling from home as well as increased usage of video and gaming streaming services. The total volume of data downloaded in 2020 in the three months to 30 June 2020 was 8.2 million Terabytes. This reflects a 38 per cent increase from the same period last year (6 million Terabytes).

https://www.accc.gov.au/regulated-infrastructure/communications/monitoring-reporting/internet-activity-record-keeping-rule-rkr/june-2020-report

8.3 The Suitability of the Site for Development

The proposal is considered suitable for the following reasons:

• The proposal is technically feasible in this location achieving Telstra's network objectives for the area, resulting in significantly improved telecommunications services benefitting the McKail community, residents, businesses and as well as promoting the primary industries within the area.

• The facility has been sited to minimise impacts on the surrounding area. The site has been located in an area where there is no public access and on a land parcel that will not interfere with current or future lawful activities of the site and adjoining land parcels. There are no specific sensitive uses, such as schools, childcare centres or aged care facilities close to the proposed facility.

• The site is within a General Agriculture Zone and is considered to be an appropriate land use within this zone.

• Ecological impacts as a result of the proposal will be very minor. The site is on a predominantly cleared area and will not require removal of any significant mature vegetation.

• The site is not on land retaining heritage or cultural significance.

Based an assessment of relevant planning constraints, this site was considered most appropriate for establishment of a new telecommunications facility in McKail. The compatibility between the proposed development and the guiding policies of the Planning Policy Framework are in general terms well met, in that there is a demonstrated need for the facility. The facility will be constructed so that other carriers may co-locate and improve mobile services in the area. Any proposed upgraded telecommunications will complement local rural and home based businesses, and will provide improved safety and security for residents, businesses and road users in the event of an emergency.

8.4 Health and Safety

Telstra understands that some people have genuine concerns about the levels of electromagnetic fields (EMF) that the proposed facility will emit and is committed to addressing those concerns responsibly. EMF is sometimes known as electromagnetic radiation (EMR) or electromagnetic energy (EME). Often, there is a misconception regarding the perceived health risks surrounding mobile phone base stations and Electromagnetic Energy (EME).

Electromagnetic fields are present everywhere in our environment – the earth, sun and ionosphere are all natural sources of EMF. Telstra rely on the expert advice of international and national health authorities including the World Health Organization (WHO) and the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) for overall assessments of health and safety impacts. The International Commission on Non-Ionizing Radiation Protection (ICNIRP) has issued guidelines on levels of allowable public exposure to Radio Frequency (RF) fields, including guidelines on RF from mobile phones and base stations, which Telstra adheres to. These guidelines have a large safety margin built into them.

EME is non-ionising radiation, meaning that it has insufficient energy to break chemical bonds or remove electrons (ionisation). In contrast, ionising radiation (such as X-rays) can remove electrons from atoms and molecules thus leading to damage in biological tissue (Source: ARPANSA).

In addition, further information is available at: www.telstra.com.au/eme and EMF Explained Series www.emfexplained.info.

There has been extensive research (over 25,000 studies) which spans decades into health impacts of radio frequency exposure. This research has been conducted by numerous health authorities and experts around the world, including the WHO, ICNIRP and ARPANSA. We note that APRANSA issued a statement noting there is a lot of concerning misinformation circulating, urging the public to be cautious of campaigns generating unfounded fear and concern within the community about health effects of 5G or radio waves generally.

Any proposed 5G technology will produce similar EME as the current 3G and 4G base stations and will also operate well below the maximum safety limit. Whilst 3G and 4G antennas typically send signals in a range of directions, 5G antennas will focus the signal only to where they are needed, when they are needed. 5G technology will use higher spectrum frequencies than previous technologies, which means that it will carry more data but won't travel as far as 4G. ARPANSA notes that:

> *"higher frequencies no not mean higher or more intense exposure. Higher frequencies are already used in security screening units at airports, police radar guns to check speed, remote sensors and in medicine and these uses have been thoroughly tested and found to have no negative impacts on human health."*

It is Telstra's obligation to comply with the mandated standard (RPS3) for EMF set by ARPANSA, which is based on the safety guidelines recommended by the WHO. The safety standard works by limiting the network signal to a level which will protect all people, in all environments, 24 hours a day.

To demonstrate compliance with the safety standard, an Environmental EME Report is available in **Appendix B** – Environmental EME Report or via the RFNSA website www.rfnsa.com.au (search site number 6330036). The maximum cumulative EME level at 1.5m above ground level is estimated to be **1.97%** (out of a 100% of the public exposure limit) as mandated by ACMA.

The EME Report predicts the maximum signal strength from the proposed facility at 1.5m above ground level is well within the allowable limit. This is typical of Telstra's responsible approach to network performance and environmental compliance. However, in reality, base stations are designed to operate at the lowest possible power level to accommodate only the number of customers using the facility at any one time. This design function is called "adaptive power control" and ensures that the base station operates at minimum, not maximum, power levels at all times. This means that the actual EME level at this site will be even lower than the predicted EME level.

Furthermore, the ARPANSA Fact sheet "Mobile Base Stations and Health" March 2015 states "Health authorities around the world, including ARPANSA and the WHO have examined the scientific evidence regarding possible health effects from base stations. Current research indicates that there are no established health effects from the low exposure to the RF EME exposure from mobile phone base station antennas."

Telstra undertakes further measures when designing the facility, to minimise the EME exposure to the general public, by installing the facility in accordance with the Australian Mobile Telecommunications Association (AMTA) Radio frequency (RF) Safety Compliance Program – Base Station Design Guidelines Engineering for Access Control to minimise EME.

Other preventative measures also include:

Power Control network feature that automatically adjusts the power of the network transmission based on consumer demand.

Varying the facility's transmit power to the minimal required level in order to save electricity and lower RF emissions from the facility.

Further information about EMF can be obtained from:

Commonwealth Department of Health (ARPANSA): www.arpansa.gov.au

Australian Communications and Media Authority (ACMA): www.acma.gov.au

World Health Organisation (WHO): www.who.int/en/

9.0 Conclusion

The proposed telecommunication facility located at 322 Lancaster Road, MCKAIL is essential to deliver improved network coverage in the area. The proposal will deliver high quality and reliable service to the benefit of residents, businesses and travellers in the area. Delivering on this objective is vital in order to enhance connectivity, economic development and opportunities for growth in the region.

The proposed development is considered permissible with consent within the General Agriculture Zone under the provisions of the Albany Planning Scheme. Furthermore, it is generally compliant with the relevant planning considerations and the aims of objectives of the Planning Scheme and will operate within the regulatory framework of Commonwealth, State Governments and will operate within all current and relevant Australian Standards. The proposed facility will also comply with all Government health standards outlined by ARPANSA.

BMM Group has undertaken a thorough analysis of potential site alternatives and during this process has selected the most appropriate location for the facility. Factors such as the ability to meet the required coverage and technical objectives, opportunities for co-location by other carriers, the surrounding landscape and community needs have all been carefully considered as part of this selection process.

The report demonstrates that the proposed facility has been designed and sited in the most appropriate location in response to coverage objectives and in the context of adjacent and surrounding land uses. The facility location, setbacks, screening, colour and design of the proposed facility ensure that the natural environment and ecological processes are not compromised, and any potential visual impacts are mitigated so that the amenity of the locality and wellbeing of the community will not be detrimentally affected.

It is requested that Council grant a Development Permit to support this development application, subject to relevant and appropriate conditions.

Appendix A – Proposal Plans

Appendix B – ARPANSA EME Report

DRAWING DESCRIPTION	DRAWING NUMBER	SHEET NO.	ISSUE NO.	ISSUE DATE	DRAWING STATUS				
					CANCELED	PRELIMINARY	FOR CONSTRUCTION	AS BUILT	REFERENCE ONLY
SITE LAYOUT AND ACCESS	WA100501	S1	1	29/01/24		✓			
SITE SETOUT PLAN	WA100501	S1-1	2	21/02/24		✓			
SOUTH ELEVATION	WA100501	S3	2	21/02/24		✓			
AERIAL PHOTO LOCALITY PLAN	WA100501	S7	1	29/01/24		✓			

AMPLITEL
Part of the Telstra Group

ALBANY MCKAIL

TOWER AMS SITE: WA100501

ADDRESS: 322 LANCASTER ROAD
MCKAIL
WA 6330

bmm GROUP

ORDER	DRAWN	CHKD	AMENDMENT	EXAM	APPD	DATE	ISS
BTS-30388	JM	JN	PRELIMINARY - SP30103796WO001BMM	PE	RW	29.01.24	1
BTS-30388	JM	JN	PRELIMINARY - ANTENNA QUANTITIES AMENDED	PE	RW	21.02.24	2

AMPLITEL
Part of the Telstra Group

TOWER AMS SITE REF WA100501
ALBANY MCKAIL
DRAWING INDEX AND DOCUMENT CONTROL
322 LANCASTER ROAD, MCKAIL, WA 6330

DWG NO. WA100501 | SHT NO. DC

A3

TN

PROPOSED AMPLITEL U/G SUB-MAINS POWER SUPPLY ROUTE FROM PROPOSED METER PANEL (APPROX. 258m)

PART OF LOT 156 ON PLAN P419225

45000

LANCASTER RD

EXISTING DRIVEWAY

EXISTING TREE (TYP.)

EXISTING FENCE

PROPOSED AMPLITEL COMPOUND. REFER TO SHEET S1-1 FOR SITE SETOUT PLAN

PROPOSED ACCESS ROUTE (APPROX. 45m)

EXISTING PROPERTY GATE

EXISTING FENCE

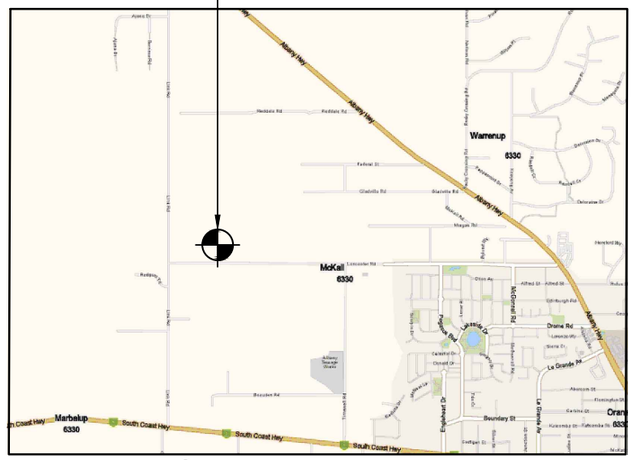
PROPOSED AMPLITEL U/G FIBRE ROUTE

SITE LAYOUT

SCALE 1:500

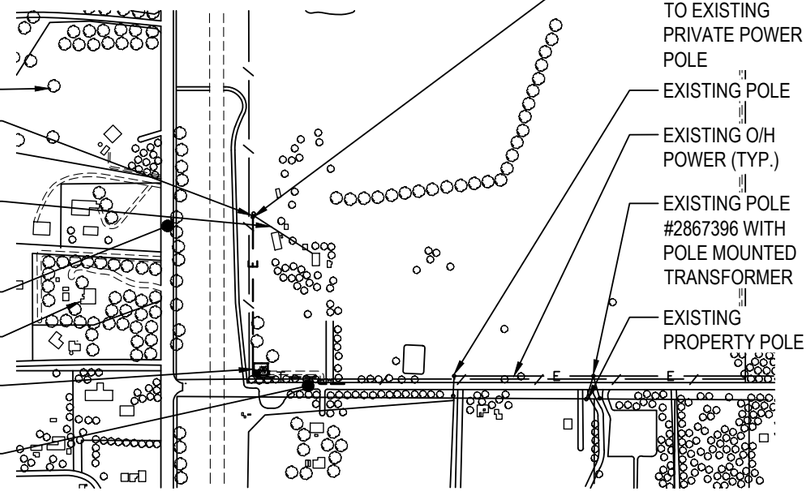
5m 0 5m 10m 15m 20m 25m SCALE 1:500

RFNSA SITE No. 6330036



LOCALITY PLAN

NOT TO SCALE



SITE ACCESS

SCALE 1:5000

50m 0 50m 100m 150m 200m 250m SCALE 1:5000

SERVICES LEGEND

FE FE — ABOVE GROUND FEEDER CABLES

E E — BELOW GROUND ELECTRICAL SUPPLY

T T T — OPTICAL FIBRE BELOW GROUND

NOTES:

1. THIS DRAWING SET IS A PRELIMINARY DRAWING ONLY AND IS ISSUED FOR COMMENT. IT IS NOT A DETAILED SURVEY / STRUCTURAL DRAWING AND THEREFORE COULD BE SUBJECT TO CHANGE.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS SPECIFIED OTHERWISE.

PROPERTY DESCRIPTION

PART OF LOT 156 ON PLAN P419225

SITE STRUCTURE CO-ORDINATES (GDA94) GPS READING ACCURACY: ± 10m CENTRE OF MONOPOLE	
LATITUDE	-34.98489° (GDA94)
LONGITUDE	117.81522° (GDA94)

bmm GROUP

TO BE READ IN CONJUNCTION WITH SHEETS S1-1, S3 & S7.

PRELIMINARY

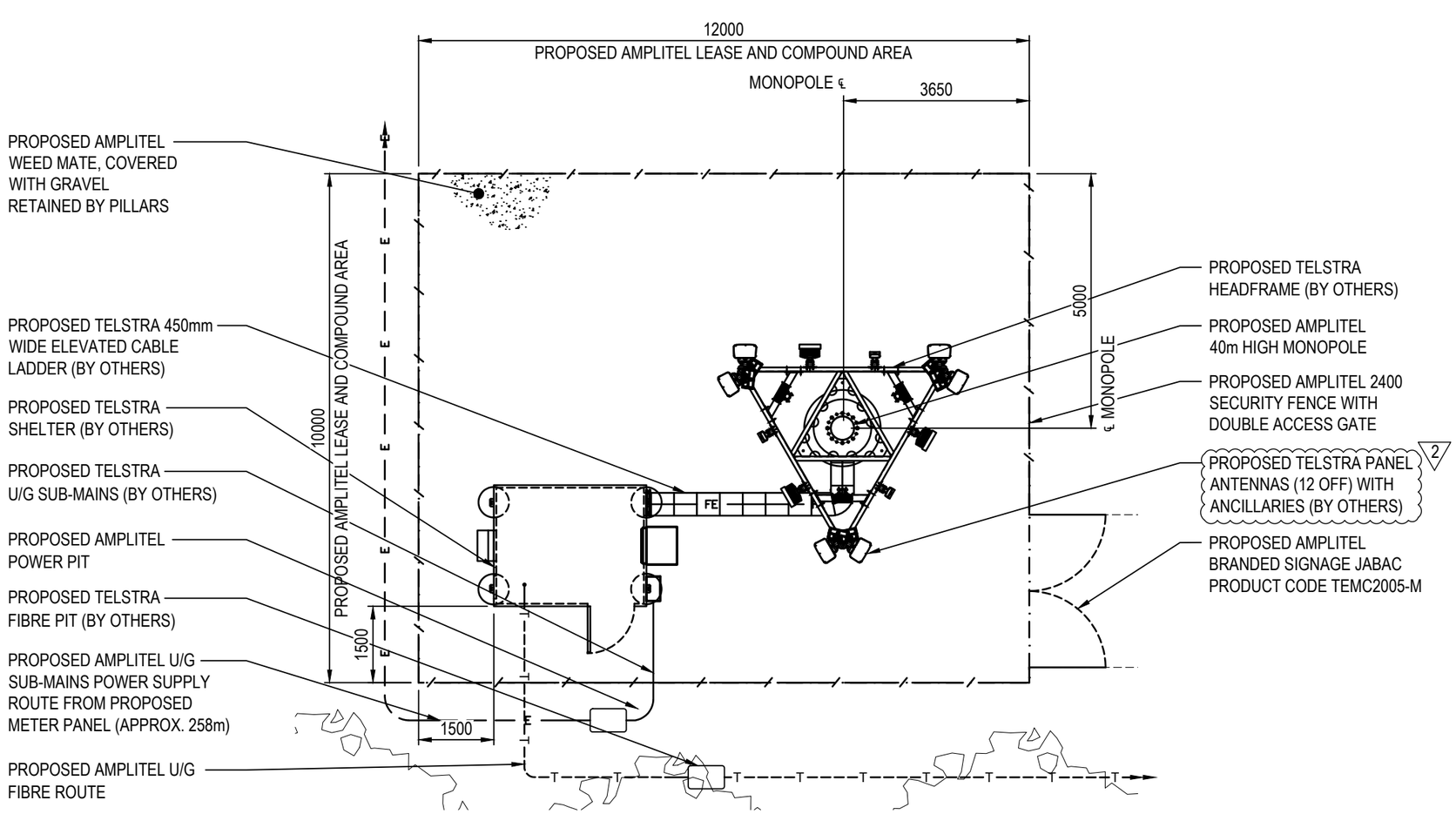
ORDER	DRAWN	CHKD	AMENDMENT	EXAM	APPD	DATE	ISS
BTS-30388	JM	JN	PRELIMINARY - SP30103796WO001BMM	PE	RW	29.01.24	1

AMPLITEL Part of the Telstra Group

TOWER AMS SITE REF WA100501
ALBANY MCKAIL
SITE LAYOUT AND ACCESS
322 LANCASTER ROAD, MCKAIL, WA 6330

DWG NO. WA100501 SHT NO. S1

A3



SITE SETOUT PLAN

SCALE 1:100

1m 0 1m 2m 3m 4m 5m SCALE 1:100

SERVICES LEGEND

FE FE — ABOVE GROUND FEEDER CABLES

E E — BELOW GROUND ELECTRICAL SUPPLY

T T T — OPTICAL FIBRE BELOW GROUND

NOTES:

1. THIS DRAWING SET IS A PRELIMINARY DRAWING ONLY AND IS ISSUED FOR COMMENT. IT IS NOT A DETAILED SURVEY / STRUCTURAL DRAWING AND THEREFORE COULD BE SUBJECT TO CHANGE.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS SPECIFIED OTHERWISE.

bmm GROUP

TO BE READ IN CONJUNCTION WITH SHEETS S1, S3 & S7.

ORDER	DRAWN	CHKD	AMENDMENT	EXAM	APPD	DATE	ISS
BTS-30388	JM	JN	PRELIMINARY - SP30103796WO001BMM	PE	RW	29.01.24	1
BTS-30388	JM	JN	PRELIMINARY - ANTENNA QUANTITIES AMENDED	PE	RW	21.02.24	2

2 PRELIMINARY

AMPLITEL
Part of the Telstra Group

TOWER AMS SITE REF WA100501
ALBANY MCKAIL
SITE SETOUT PLAN
322 LANCASTER ROAD, MCKAIL, WA 6330

DWG NO. WA100501 SHT NO. S1-1

A3

NOTES:

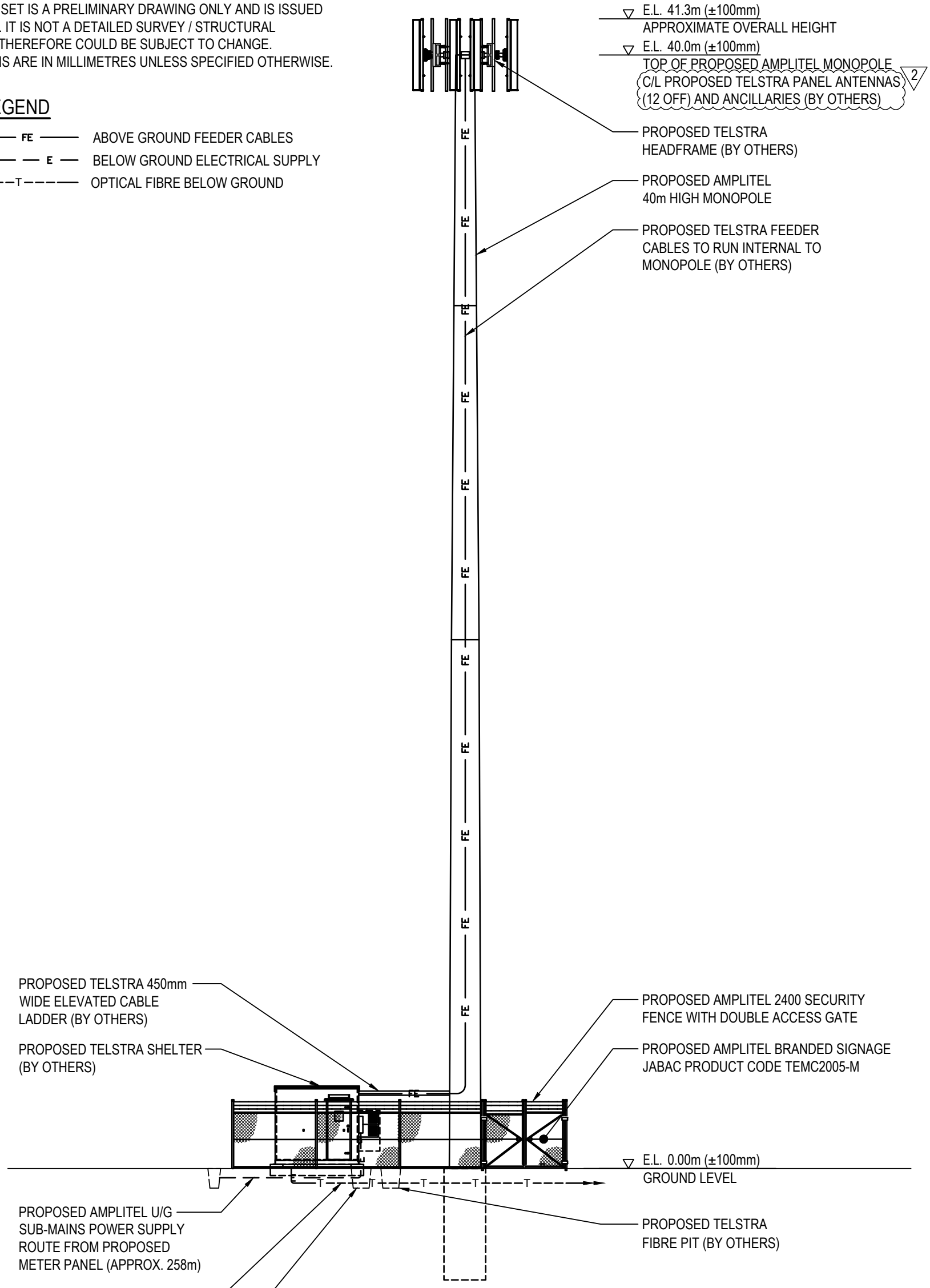
1. THIS DRAWING SET IS A PRELIMINARY DRAWING ONLY AND IS ISSUED FOR COMMENT. IT IS NOT A DETAILED SURVEY / STRUCTURAL DRAWING AND THEREFORE COULD BE SUBJECT TO CHANGE.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS SPECIFIED OTHERWISE.

SERVICES LEGEND

FE ABOVE GROUND FEEDER CABLES

E BELOW GROUND ELECTRICAL SUPPLY

T OPTICAL FIBRE BELOW GROUND



SOUTH ELEVATION

SCALE 1:150

3m 0 3m 6m SCALE 1:150

2 PRELIMINARY

TO BE READ IN CONJUNCTION WITH SHEETS S1, S1-1 & S7.

ORDER	DRAWN	CHKD	AMENDMENT	EXAM	APPD	DATE	ISS
BTS-30388	JM	JN	PRELIMINARY - SP30103796WO001BMM	PE	RW	29.01.24	1
BTS-30388	JM	JN	PRELIMINARY - ANTENNA QUANTITIES AMENDED	PE	RW	21.02.24	2

AMPLITEL Part of the Telstra Group

TOWER AMS SITE REF WA100501
ALBANY MCKAIL
SOUTH ELEVATION
322 LANCASTER ROAD, MCKAIL, WA 6330

DWG NO. WA100501 SHT NO. S3

Cad file: WA100501.dwg A3V

DO NOT SCALE

TN

PROPOSED AMPLITEL COMPOUND

AERIAL PHOTO LOCALITY PLAN

NOT TO SCALE

PRELIMINARY

TO BE READ IN CONJUNCTION WITH SHEETS S1, S1-1 & S3.

ORDER	DRAWN	CHKD	AMENDMENT	EXAM	APPD	DATE	ISS
BTS-30388	JM	JN	PRELIMINARY - SP30103796WO001BMM	PE	RW	29.01.24	1

AMPLITEL
Part of the Telstra Group

TOWER AMS SITE REF WA100501
ALBANY MCKAIL

AERIAL PHOTO LOCALITY PLAN
322 LANCASTER ROAD, MCKAIL, WA 6330

DWG NO. WA100501

SHT NO. S7

Environmental EME Report

Location	322 Lancaster Rd, MCKAIL WA 6330		
Date	16/02/2024	**RFNSA No.**	6330036

How does this report work?

This report provides a summary of levels of radiofrequency (RF) electromagnetic energy (EME) around the wireless base station at 322 Lancaster Rd, MCKAIL WA 6330. These levels have been calculated by BMM Group using methodology developed by the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA).
A document describing how to interpret this report is available at ARPANSA's website:
A Guide to the Environmental Report.

A snapshot of calculated EME levels at this site

There are currently no existing radio systems for this site.

The maximum EME level calculated for the **proposed** changes at this site is

1.97%

out of 100% of the public exposure limit, 127 m from the location.

EME levels with the proposed changes

Distance from the site	Percentage of the public exposure limit
0-50 m	0.95%
50-100 m	1.33%
100-200 m	1.97%
200-300 m	1.27%
300-400 m	0.76%
400-500 m	0.41%

For additional information please refer to the EME ARPANSA Report annexure for this site which can be found at *http://www.rfnsa.com.au/6330036*.

Radio systems at the site

This base station currently has equipment for transmitting the services listed under the existing configuration.
The proposal would modify the base station to include all the services listed under the proposed configuration.

	Existing		Proposed	
Carrier	**Systems**	**Configuration**	**Systems**	**Configuration**
Telstra			4G, 5G	LTE700 (proposed), LTE1800 (proposed), NR3500 (proposed), NR26000 (proposed), NR850 (proposed), LTE2100 (proposed), NR/LTE2600 (proposed)

An in-depth look at calculated EME levels at this site

This table provides calculations of RF EME at different distances from the base station for emissions from existing equipment alone and for emissions from existing equipment and proposed equipment combined. All EME levels are relative to 1.5 m above ground and all distances from the site are in 360º circular bands.

	Existing configuration			Proposed configuration		
Distance from the site	Electric field (V/m)	Power density (mW/m²)	Percentage of the public exposure limit	Electric field (V/m)	Power density (mW/m²)	Percentage of the public exposure limit
0-50m				5.96	94.36	0.95%
50-100m				7.05	131.84	1.33%
100-200m				8.58	195.33	1.97%
200-300m				6.55	113.90	1.27%
300-400m				4.92	64.32	0.76%
400-500m				3.59	34.24	0.41%

Calculated EME levels at other areas of interest

This table contains calculations of the maximum EME levels at selected areas of interest, identified through consultation requirements of the Communications Alliance Ltd Deployment Code C564:2020 or other means. Calculations are performed over the indicated height range and include all existing and any proposed radio systems for this site.

Maximum cumulative EME level for the proposed configuration

Location	Height range	Electric field (V/m)	Power density (mW/m²)	Percentage of the public exposure limit
No locations identified				

Josh Dallimore

From: Mitchell MacKenzie <[redacted]>
Sent: Wednesday, 1 May 2024 11:41 AM
To: Josh Dallimore
Cc: [redacted]
Subject: RE: EF24309208 - A27175 - RE: EF24306818 - A27175 - Development Application - P2240018

Hi Josh,

Thank you for your email and for the opportunity to provide justification around how the current proposal creates a better outcome than what the scheme minimums require.

Whilst establishing the preferred location for a new base station facility on the lot, BMM Group considered the nature of existing land uses, visual impact and aesthetics of its facility on the surrounding environment. The facility has been sited and designed to maximise visual integration in the locality and ensure that the amenity of the locality is not substantially impacted. The siting, setback, screening, colour, and design of the facility combine to ensure that the natural environment, including the dominant sight lines, views and vistas from adjoining and surrounding areas and from surrounding roads and properties, will not be materially impacted by the development.

The context of this location is defined by the urban area to the west being physically divided from the rural properties to the east by the recently upgraded State owned Ring Road. Matters such as viewing distance, number of viewers and period of view are key factors taken into consideration in the siting and design of the facility and the mitigation of visual impact. In particular, the setbacks of the facility ensure that road users and adjacent property owners will view the proposed structure in the context of other vertical elements associated with the Ring Road construction, including power lines and light poles. Further, the location maximises the screening of the facility at ground level by being sited directly adjacent to existing mature vegetation and separated from properties to the west by the newly constructed Ring Road.

The proposed facility has therefore been located in an area of the site which results in the least amount of disturbance to the natural features of the site or surrounding area, and ground level views of the facility are obscured and better integrated in the locality for the reasons described above.

Distant views of the proposed facility will be possible given the need for the facility to be higher than the surrounding tree canopy and at a height which will deliver a quality service to the precinct, however given the careful siting of the facility, the impact on visual amenity has been mitigated to the maximum extent possible.

Strict compliance with prescribed 15m/10m setbacks to the primary and secondary roads will locate the facility in a cleared area of the paddock which is more open to views from the road and from adjoining properties. Given the context of the locality and proposed location directly adjacent to a State Controlled Road and its associated infrastructure, we request that Council vary the minimum setback requirements of LPS 2 as the facility location represents a sensible planning outcome which serves to improve the ongoing use of the subject lot as well as adjoining and surrounding properties.

Please see the attached and below images, which show the area in question.

Looking North:

Looking South-West:

Looking West:

Regards,

Mitchell MacKenzie
Senior Town Planner | BMM Group
[redacted]

CITY OF ALBANY LOCAL PLANNING SCHEME No. 2

P2240018 – Proposed Telecommunications Infrastructure

SUMMARY OF SUBMISSIONS
Note: This is a broad summary of submissions only

7 submissions received objecting to the proposed works.
Submissions addressed the following areas.

Summary of Submissions	Applicant Response	Officer Comment
Location & Amenity • The tower is too close to neighbouring properties. • Unhappy that the tower is closer to neighbouring houses than the house on the development site given the amount of land that could potentially be used. • The height and proximity will create a visual eyesore and disrupt the pleasantness of the panorama. • The proximity of the tower to houses may lead to a devaluing of properties and reduce resale potential. • Suggestions that a better location would be on the eastern boundary and as far north as possible to	The siting of a new mobile base station facility is primarily guided by the radio frequency coverage target area. Based on this a 'search area' is provided by the carrier to the contractor which guides where a new mobile base station must be sited to deliver the required coverage. In determining the exact location, consideration is given to property (the ability to find a willing owner and suitable location), engineering (the constraints of constructing the facility and availability of power and fibre) and town planning. In this case, a key aspect of determining a suitable location for the facility was to ensure that the use of the allotment would not be adversely affected by the proposed facility. To this end, the proposed location on the property at 322 Lancaster Road was agreed in close consultation with the landowner as it represents the most practical solution from a property, engineering, and town planning perspective, and would not adversely impact on the future plans to develop the property. The proposal was also strategically positioned close to the new Albany Ring Road which is considered grouping of infrastructure. Whilst we appreciate the proposed location may be visible from neighbouring properties, mobile telecommunications facilities must have line of site to the devices they are servicing. This means they must protrude over surrounding vegetation and the topography. In this instance a slim line monopole design has been preferred to a lattice tower structure to reduce	The proposed site is not located in a prominent topographical location (such as on a ridge line). The applicant has also proposed to use a monopole design in a grey tone to assist in reducing the visual impact of the proposed development. The development has been located to take advantage of existing vegetation around the property to act as screening at ground level.

increase the separation distance.	the visual profile. As a result, we consider the proposal to be the most suitable and practical given the constraints.	
Quality of Supporting Report • The report included with the application references a fact sheet from ARPANSA dated March 2015 which would have been conducted based on 3G technology. • Wanting clarification on how the adjoining rig road will act as a buffer from the radiation. • Questions on the validity of the reference to "25000 studies being done on the health impacts", stating instead that these were just opinion papers reviewed by WHO. • Refuting the claim that 5G will produce a similar amount of EME as 3G and 4G technologies. • The need for the tower has not been established with any supporting data or review.	EME levels, which are based on safety guidelines recommended by the International Commission on Non-Ionizing Radiation Protection (ICNIRP), are set by the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) and regulated by the Federal Government's, Australian Communications and Media Authority (ACMA). The ACMA's regulatory arrangements require base stations to comply with the exposure limits set in the relevant Australian safety standard; the Radiation Protection Standard for Limiting Exposure to Radiofrequency Fields – 100 kHz to 300 GHz (2021), known as RPS S-1 or the ARPANSA Standard. The RPS S-1 series was adopted in 2021 and includes 4G and 5G frequency fields. The new standard was introduced to align with updated ICNIRP guidelines published in 2020. Prior to the adoption of the RPS S-1, the relevant standard was the Radiation Protection Standard for Maximum Exposure Levels to Radiofrequency Fields - 3 kHz to 300 GHz (2002). This standard included the frequencies utilised in 3G, 4G and 5G technologies. All Telstra mobile base stations are designed to comply with the relevant Australian safety standard. The EME report provided with the application provides a calculation of the maximum EME associated with the proposed facility measured in accordance with the ARPANSA methodology. The Australian Media and Communications Authority (ACMA) has recently undertaken 5G Audits on EME level across 129 base stations in NSW. The audit found the average EME levels from all technologies including 3G, 4G and 5G across 129 base stations was less than 1.2% of the public safety limits and the majority of sites were under 1%.	The City is not the regulatory body for this component of the development and therefore facts and figures presented regarding EME do not influence this decision.

	The ACMA audit also compared the measured values to those reported by Carriers in the ARPANSA EME Report prepared for all mobile base station sites in Australia and available on the Radiofrequency National Site Archive (RFNSA). In all cases the measured values from the ACMA audit were below the Carriers' predictions and in the vast majority of cases were less than half the levels reported on the RFNSA at: https://amta.org.au/acma-audit-reassures-5g-is-safe-2/. With regards to the need for the tower, this is informed by Telstra Radiofrequency engineers who regularly undertake detailed assessments and reviews of the performance and coverage of their mobile telecommunications networks. The proposal is intended to improve mobile services in particular depth of coverage in the areas of McKail, Marbelup and major connecting roads in the area.	
Health Effects • The effects of long term exposure to EMR has yet to be proven and this could put people at risk. • Owner is sensitive to EMF's and therefore her health will be compromised.	Over 50 years of scientific research has already been conducted into the possible health effects of the radio signals used for mobile phones, base stations and other wireless services, including the frequency bands now being redeployed for 5G. We agree that it is important that scientists perform long term studies on possible adverse effects of mobile-phone type exposure. There are a number of studies underway (e.g. COSMOS, see http://www.thecosmosproject.org/) and it is important to monitor the outcomes of these. The ARPANSA website describes that Electromagnetic hypersensitivity (EHS) is a wide range of non-specific health problems that are attributed to low-level exposure of electromagnetic fields (EMF) and "… EHS has no clear diagnostic criteria and the science so far has not provided evidence that EMF exposure is the cause." ARPANSA advises: On the basis of current scientific information, there is no established evidence that EHS is caused by EMF at levels below exposure guidelines. ARPANSA acknowledges that the health symptoms experienced by the affected individuals are real and can be a disabling	The City is not a regulatory body in respect to electromagnetic energy (EME). The Federally established Australian Protection and Nuclear Safety Agency (ARPANSA) enforce the Radiation Protection Standard for Maximum Exposure Levels to Radiofrequency Fields – 3kHz to 300GHz. The EME report submitted by the applicant states that the maximum EME level from the site will be 1.97% of the maximum public exposure level.

	problem, and advise those affected to seek medical advice from a qualified medical specialist. ARPANSA remains actively engaged with the EHS community, researchers and medical specialists in this area. ARPANSA will continue to review the research into potential health effects of exposure to EMF in order to provide accurate and up-to-date advice. See https://www.arpansa.gov.au/understanding-radiation/radiation-sources/moreradiation-sources/electromagnetic-hypersensitivity The scientific foundation of the ARPANSA Safety Standard (RPS S-1) is based on the ICNIRP 2020 RF Safety Guidelines. See 'Appendix B – Health Risk Assessment Literature' in the Guidelines and in particular the section 'Symptoms and Wellbeing' for further discussion on scientific studies related to EHS. ICNIRP concludes that "… no reports of adverse effects of radiofrequency EMF exposures on symptoms and wellbeing have been substantiated, …" at exposure levels that satisfy the safety limits.	
Environmental • Research has found that bee's are affected by EMF's which cause them to get disorientated and lose their way causing Colony Collapse Disorder. • Potential loss of bees will have negative impacts on fruit trees and vegetable patch.	With respect to possible effects of RF EME on flora and fauna, in 2019 Telstra asked ARPANSA for their response on the issue of possible effects on flora and fauna. They replied, "There is no established evidence that EME exposure from wireless telecommunications sources is harmful to flora or fauna. It should be remembered that many of the studies investigating human health are performed in the laboratory on animals and plant cells." In regard to the ARPANSA 2020 Safety Standard RPS S-1, ARPANSA has written "… existing studies on the effects of low-level RF EME exposure on plants and animals indicate that the exposure limits set within the Standard are adequate in providing protection to the environment." See	The City is not the regulatory body for health concerns whether that be human or environmental. The development will be required to comply with the relevant environmental regulations.

	https://www.arpansa.gov.au/regulation-and-licensing/regulatorypublications/radiation-protection-series/codes-and-standards/rpss-1-qa In 2019, the German Federal Office for Radiation Protection (BfS) organized an international workshop titled “Environmental effects of electric, magnetic and electromagnetic fields: flora and fauna”. Leading international researchers were invited and the outcomes for frequencies as used by Telstra’s infrastructure and devices were published in a paper available at https://journals.lww.com/healthphysics/Fulltext/9900/Biological_Effects_of_Radiofrequency.47.aspx. The working group ’concluded “The results presented at the workshop did not show any sound scientific evidence of adverse effects of low-level anthropogenic RF-EMFs at frequencies exceeding 100 MHz on animals or plants under realistic environmental conditions.” ARPANSA and Swinburne University of Technology have conducted a systematic 'map’ that has collated the available evidence on the effect of RF EME on flora and fauna. The paper is available at: https://environmentalevidencejournal.biomedcentral.com/articles/10.1186/s13750- 023-00304-3 ARPANSA also discusses their systematic map at their website https://www.arpansa.gov.au/arpansa-reviews-radio-wave-effects-plants-andanimals An ICNIRP working group has commenced a systematic review of studies that consider effects on flora and fauna (‘Environment and EMFs’). See https://www.icnirp.org/en/about-icnirp/project-groups/index.html As ARPANSA wrote on their website, their systematic map will help inform the ICNIRP review.	

PARK INSPECTION FORM

PARK NAME:

DR NUMBER:

DATE:

INSPECTED BY:

			CONDITION RATING (Tick appropriate box)			
TYPE	**ACTIVITY**	***LOS 1S REGIONAL*** *Maintenance Standard*	**GOOD** Standard met	**AVERAGE** Some issues with standard being met	**POOR** Standard not met, requires immediate attention	**COMMENT**
Turf/grassland	Mowing	*40mm*				
	Turf Up keep	*Biannually*				
	Fertilising lawn areas	*2 x month*				
Gardens/feature areas	Fertilize	*Quarterly*				
	Planting	*Seasonal*				
	Mulch / gravels	*Biannually*				
	Pruning	*Biannually*				
	Weed management	*As required*				
Beach areas	Sand management	*As required*				
	Seagrass management	*As required*				
	Boardwalks / paths sweeping	*2 x week*				
Irrigation	Turf irrigated	*25-40mm / week*				
	Irrigation system maintenance	*3 weekly*				
General/ whole park	Aboricultural	*Quarterly*				
	Insect and disease control	*As required*				
	Rubbish Management	*3 x week*				
	BBQs	*3 x week*				
	Playground equipment / furniture	*Fortnightly*				
	Kerbing / edging	*Fortnightly*				
	Path / hardstand	*Fortnightly*				

PARK INSPECTION FORM

PARK NAME:

DR NUMBER:

DATE:

INSPECTED BY:

			CONDITION RATING (Tick appropriate box)			
TYPE	**ACTIVITY**	***LOS 1 DISTRICT*** *Maintenance Standard*	**GOOD** Standard met	**AVERAGE** Some issues with standard being met	**POOR** Standard not met, requires immediate attention	**COMMENT**
Turf/grassland	Mowing	*60mm*				
	Turf Up keep	*Annually*				
	Fertilising lawn areas	*Annually*				
Gardens/feature areas	Fertilize	*Biannually*				
	Planting	*Seasonal*				
	Mulch / gravels	*Biannually*				
	Pruning	*Biannually*				
	Weed management	*As required*				
Irrigation	Turf irrigated	*10-15mm / week*				
	Irrigation system maintenance	*Monthly*				
General/ whole park	Aboricultural	*Quarterly*				
	Insect and disease control	*As required*				
	Rubbish Management	*3 x week*				
	BBQs	*Weekly*				
	Playground equipment / furniture	*Monthly*				
	Kerbing / edging	*Monthly*				
	Path / hardstand	*Monthly*				

PARK INSPECTION FORM

PARK NAME:

DR NUMBER:

DATE:

INSPECTED BY:

			CONDITION RATING (Tick appropriate box)			
TYPE	**ACTIVITY**	***LOS 1 NEIGHBOUR-HOOD*** *Maintenance Standard*	**GOOD** Standard met	**AVERAGE** Some issues with standard being met	**POOR** Standard not met, requires immediate attention	**COMMENT**
Turf/grassland	Mowing	*100mm*				
	Turf Up keep	*As required*				
	Fertilising lawn areas	*N/A*				
Gardens/feature areas	Fertilize	*As required*				
	Planting	*Seasonal*				
	Mulch / gravels	*Annually*				
	Pruning	*As required*				
	Weed management	*As required*				
Irrigation	Turf irrigated	*8-10mm / week*				
	Irrigation system maintenance	*Monthly*				
General/ whole park	Aboricultural	*2 yearly*				
	Insect and disease control	*As required*				
	Rubbish Management	*Weekly*				
	BBQs	*Fortnightly*				
	Playground equipment / furniture	*Monthly*				
	Kerbing / edging	*As required*				
	Path / hardstand	*As required*				

PARK INSPECTION FORM

PARK NAME:

DR NUMBER:

DATE:

INSPECTED BY:

			CONDITION RATING (Tick appropriate box)			
TYPE	**ACTIVITY**	***LOS 2 NEIGHBOUR-HOOD*** *Maintenance Standard*	**GOOD** Standard met	**AVERAGE** Some issues with standard being met	**POOR** Standard not met, requires immediate attention	**COMMENT**
Turf/grassland	Mowing	*150mm*				
	Turf Up keep	*As required*				
	Fertilising lawn areas	*N/A*				
Gardens/feature areas	Fertilize	*As required*				
	Planting	*Seasonal*				
	Mulch / gravels	*Annually*				
	Pruning	*As required*				
	Weed management	*As required*				
Irrigation	Turf irrigated	*5-8mm / week*				
	Irrigation system maintenance	*Monthly*				
General/ whole park	Aboricultural	*2 yearly*				
	Insect and disease control	*As required*				
	Rubbish Management	*Weekly*				
	BBQs	*N/A*				
	Playground equipment / furniture	*Monthly*				
	Kerbing / edging	*As required*				
	Path / hardstand	*As required*				

PARK INSPECTION FORM

PARK NAME:

DR NUMBER:

DATE:

INSPECTED BY:

			CONDITION RATING (Tick appropriate box)			
TYPE	**ACTIVITY**	***LOS 1 LOCAL*** *Maintenance Standard*	**GOOD** Standard met	**AVERAGE** Some issues with standard being met	**POOR** Standard not met, requires immediate attention	**COMMENT**
Turf/grassland	Mowing	*200mm*				
	Turf Up keep	*As required*				
Gardens/feature areas	Fertilize	*As required*				
	Planting	*Seasonal*				
	Mulch / gravels	*Annually*				
	Pruning	*As required*				
	Weed management	*As required*				
General/ whole park	Aboricultural	*5 yearly*				
	Insect and disease control	*As required*				
	Rubbish Management	*Weekly*				
	BBQs*	*N/A*				
	Playground equipment / furniture	*Monthly*				
	Kerbing / edging	*As required*				
	Path / hardstand	*As required*				

* Moon Park only

PARK INSPECTION FORM

PARK NAME:

DR NUMBER:

DATE:

INSPECTED BY:

			CONDITION RATING (Tick appropriate box)			
TYPE	**ACTIVITY**	***LOS 2 LOCAL*** *Maintenance Standard*	**GOOD** Standard met	**AVERAGE** Some issues with standard being met	**POOR** Standard not met, requires immediate attention	**COMMENT**
Turf/grassland	Mowing	*250mm*				
	Turf Up keep	*N/A*				
Gardens/feature areas	Fertilize	*As required*				
	Planting	*Seasonal*				
	Mulch / gravels	*Annually*				
	Pruning	*As required*				
	Weed management	*As required*				
General/ whole park	Aboricultural	*5 yearly*				
	Insect and disease control	*As required*				
	Rubbish Management	*Weekly*				
	Playground equipment / furniture	*Monthly*				
	Kerbing / edging	*As required*				
	Path / hardstand	*As required*				

City of Albany

Policy

Developed Managed Space
Parks & Gardens

Document Approval	
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Position Title	Executive Member Position Title

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1.0	Position Title	User version numbering 1.0 when adopted or approved. Example descriptions: *Adopted by Council on 26/11/2024 Report Item ED005.* *Approved by Executive on 11/11/2014.*	dd/mm/20yy
1.1	Position Title	User version numbering 1.1, 1.2 for minor administrative changes. For example: *Minor administrative amendments: formatting, table of contents update, document control page, position title changes.*	dd/mm/20yy

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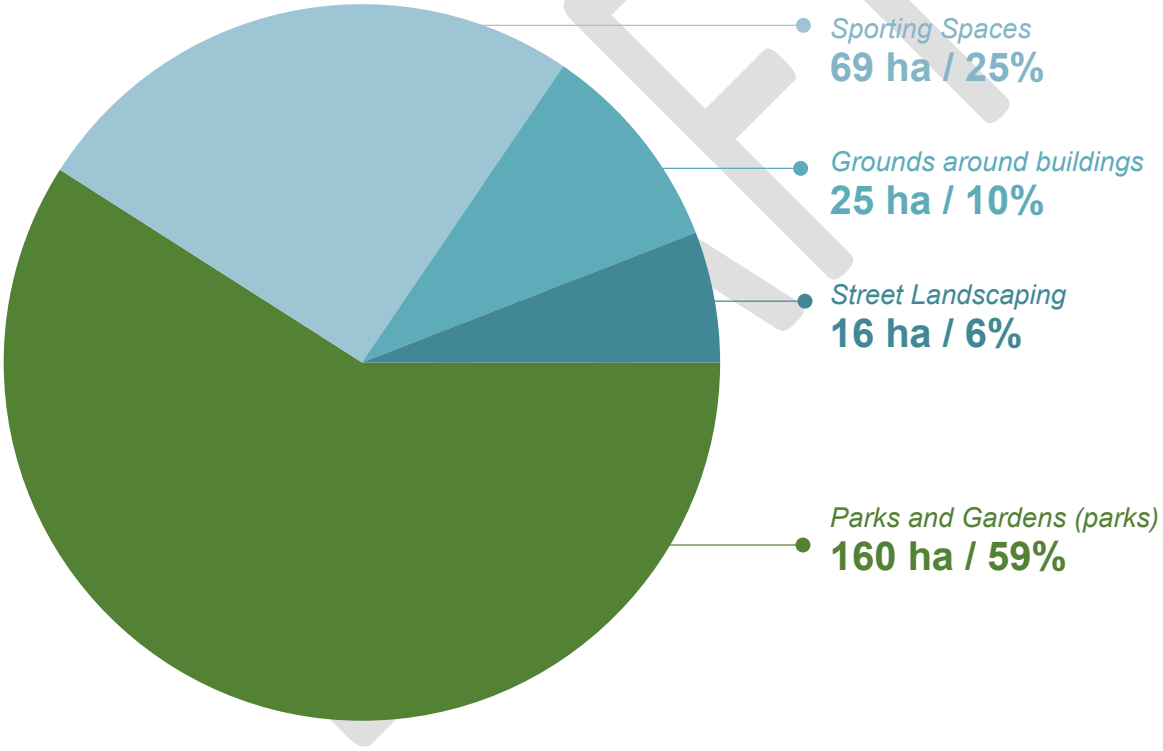
Introduction

Developed Managed Space (DMS) is defined in the Strategic Asset Management Plan 2017 (SAMP) as *being typically in the urban environment* and includes recreation areas as follows:

- ***Parks and Gardens (parks)***
- Sporting fields
- Grounds around buildings
- Street landscaping

The City of Albany (City) is responsible for these four (4) categories of DMS totalling 270 ha within the urban area (refer to Figure 1).

This policy addresses ***parks only*** and applies to all parks within the urban area under the care and control of the City. This totals 160 ha, spread over 70 parks.



Objective

The objective of this policy is to ensure the City provides equitable access to a diverse network of recreational experiences that enhance the lives of the whole community, regardless of a resident's address.

This policy will assist in:

- Bringing all parks to a consistent level of service appropriate to size and location
- Ensuring development and upgrades are considered as part of a City wide network
- Communicating to community the role and provision of their parks
- Guiding implementation and prioritisation of park upgrades
- Optimising City resources to meet City and Community needs.

Scope

This policy addresses ***parks only*** and applies to all parks within the urban area under the care and control of the City – excluding leased areas.

For the purposes of this policy, parks refer to one component of the public open space (POS) network across the Albany urban area.

This policy provides direction and guidance for provision of infrastructure and maintenance operations at each of the City's parks based on an associated Level of Service (LOS).

This policy should be read in conjunction with the Public Parkland Policy for determining allocation, type, and location of new public open space.

Policy Statement

Parks form one of the vital components of Albany's POS network. This POS network is an integral part of the City's environment – providing access to nature, community meeting places, and recreational opportunities.

Parks generally go hand in hand with a variety of built infrastructure such as lighting, playgrounds, shelter, paths, signage, fencing, bins, barbeques, public toilets, and skate parks.

There is considerable pressure from the community to provide an increasing level of infrastructure in many of the City's parks, however, this is not sustainable. Infrastructure needs to be distributed equitably across Albany, with equal consideration given to the cost of implementing ***and*** maintaining that infrastructure in the long term. This is critical to ensure parks remain high quality, valuable public assets.

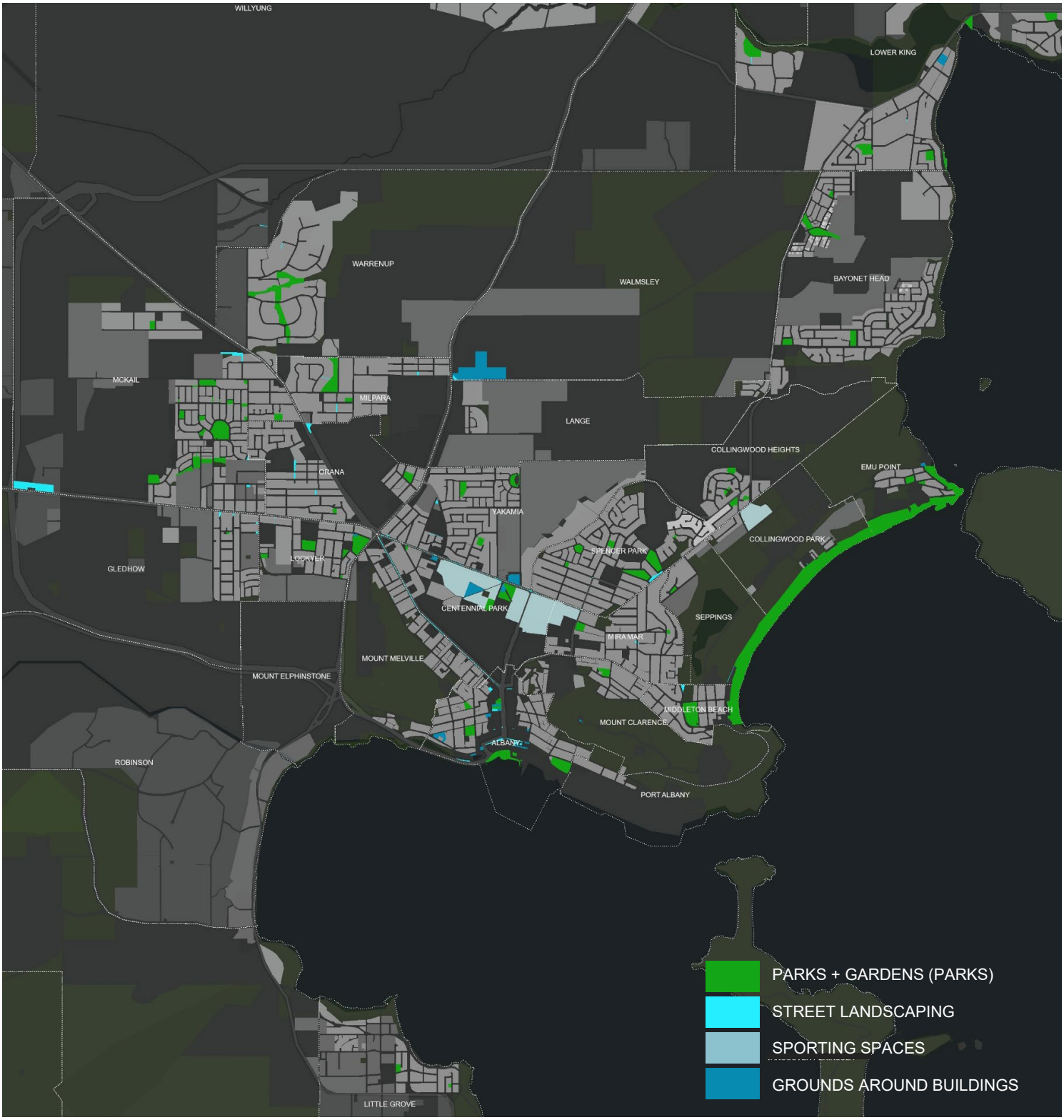


FIGURE 1: DMS CATEGORIES AND THEIR DISTRIBUTION ACROSS THE URBAN AREA

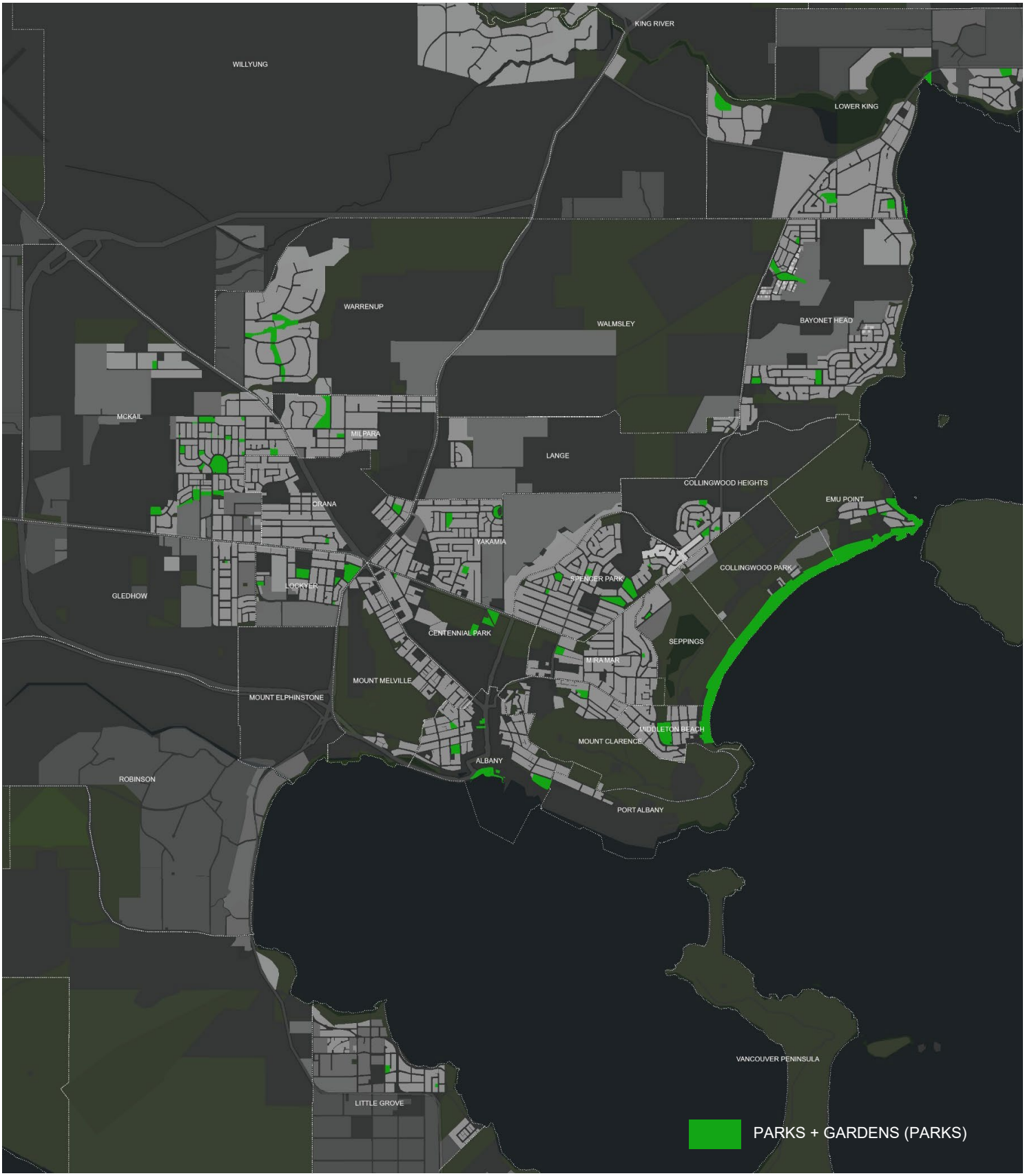


FIGURE 2: DMS PARKS + GARDENS (PARKS) COVERED UNDER THIS POLICY

Park Hierarchy

Albany's parks are categorised as per an established POS hierarchy defined in the Department of Local Government, Sport, and Cultural Industries (DLGSC) *Classification Framework for Public Open Space (2012).* This hierarchy is used to achieve a level of consistency across the opportunities and infrastructure available to residents in all suburbs.

The City's SAMP states: *to effectively manage our assets it is important to allocate a hierarchy for categorising and determining what level of service is most appropriate for Albany's Parks.* As such, each park in Albany has been allocated a category within the POS hierarchy, which informs the levels of service, and thereby both the infrastructure and maintenance provision for each park.

A summary of the park hierarchy is included below:

Category	Description	Size & Location
Regional Park	Large reserves including Foreshore Space that have significant active area, high leisure, social, and tourism function. These parks are a destination draw card for tourism and usually have high levels of amenity. *Example: Binalup/Middleton Beach, Emu Point, Anzac Peace Park*	Not defined by size or accessibility to proximate residents.
District Park	Designed for neighbourhood interaction encouraging sporting and social events. District Parks are designed to service a cluster of neighbourhoods, accessible by an arterial network and ideally serviced by public transport. As District Parks service multiple neighbourhoods, they reduce the City's number of Parks and allow a higher level of development and amenity more cost efficiently. *Example: Eyre Park, Foundation Park, Lakeside Park*	Generally greater than 5ha and accessible to residents within 2km radius.
Neighbourhood Park	Serve a recreational and social purpose for the entire neighbourhood. Ideally located at the edge or between neighbourhoods, providing a variety of options to the local community. *Example: Lake Weerlara / Apex Park, Lawley Park, Becker Park*	Generally between 1ha and 5ha and accessible to residents within 800m radius.
Local Park	Local Parks accommodate daily recreation for the community within walking distance. Primarily designed for nature and passive recreation and are dispersed throughout the suburbs. *Examples: Baltic Ridge, Moon Park, Wansborough Park*	Generally up to 1ha and accessible to residents within 300m radius.

Table 1: Park Hierarchy Definitions

Note: Across Albany, some parks may serve multiple functions within the hierarchy if, for example, there is an under allocation of parks in a precinct (i.e. District open space may also function as local open space).

FIGURE 3: PARK HIERARCHY

Current Park Distribution

Based on the park hierarchy described in Table 1, the current distribution of parks across Albany offers most local communities' reasonable access to a variety of infrastructure and experiences within a walkable distance (400m radius).

Future Park Distribution – 5 Year Plan

Substantial park improvement works or redevelopments, including new POS handed over to the City as a result of subdivision development, may impact on overall distribution and access to POS. An updated gaps analysis and audit of infrastructure should be undertaken every 5 years to assess any changes to equitable access and provision.

Park Category	Number of Parks	Area of Parks (ha)
Regional Park	4	74
District Park	6	14
Neighbourhood Park	25	40
Local Park	35	32
Total	70	160

Table 2: Current Park Distribution

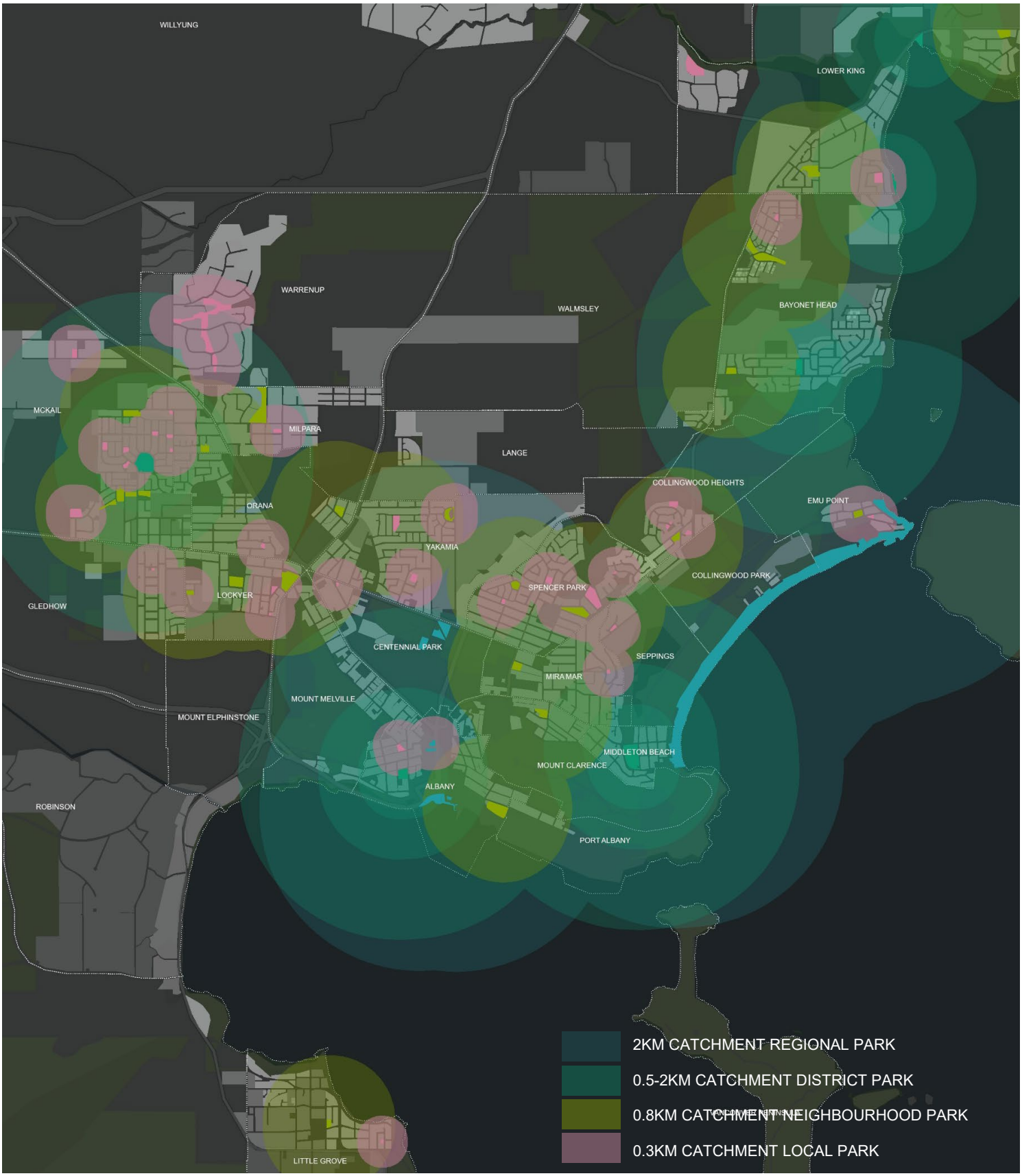


FIGURE 4: PARK CATCHMENT AREAS

Levels of Service (LOS)

Levels of Service (LOS) guide what, how, and where services are delivered across the park hierarchy.

The LOS for each park has been determined as either **LOS 1S (High – Seasonally impacted)**, **LOS 1 (Medium)** or **LOS 2 (Low).**

These levels are utilised to ensure equity and consistency is delivered across City parks. LOS 1S, LOS 1 or LOS 2 are defined by a range of factors including; park hierarchy, level of use, community expectations, whole of life costs, and what amenity and infrastructure is already available nearby.

The below table explains the difference between LOS 1S, LOS 1, and LOS 2.

Level of Service	Quality Standard	Description
LOS 1S*	High	***This level has the smallest number of parks, serviced to the highest quality.*** High use/high profile regional parks that people often take visitors to or will travel longer distances to use. This standard has the highest level of asset provision, using quality materials and bespoke designs. Maintenance is undertaken to the highest affordable standards, with quick response times and proactive programmed operations.
LOS 1	Medium	***This level has a larger number of parks, serviced to a standard quality.*** Well used district and larger neighbourhood and local parks people will often travel several kilometres to use. This standard has a moderate level of asset provision, using robust materials and simple designs. Maintenance is undertaken to good standards, with standard response times and programmed operations.
LOS 2	Basic	***This level forms the majority of parks, with basic quality assets and maintenance.*** Smaller neighbourhood parks and local parks, generally developed to be used by local residents, often within walking distance of their home. This standard has the lowest level of asset provision, using robust materials and simple designs. Maintenance is undertaken to a basic standard, with longer response times and fewer programmed operations.

Table 3: LOS Definitions

LOS 1S is allocated to high profile parks that are subject to distinct seasonal conditions that require higher than normal servicing during peak weather events / tourism periods.

Development and Operational LOS

The following section provides guidance on asset provision, maintenance operations and standards, and an estimated range of capital and operational costs for each park category.

Development LOS

Development LOS defines the range of assets provided, their quality, and their quantity.

The table below identifies what infrastructure is considered suitable for each park category. These Development LOS should be used to form the basis of any brief when undertaking park planning or for consultation with the community. However, in all instances, addition of infrastructure is always assessed on a case-by-case basis.

Park Category	LOS	Access for All	Toilet	Shade Shelter	BBQ	Minor Play Equipment	Major Play Equipment	Skate Park	Sport Equip	Furniture	Bins	Drink Fountain	Public Art	Shared Path	Parking	Lighting	Lawn Garden & Irrigation
Regional Park	LOS 1S	✓	✓	✓✓	✓✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
District Park	LOS 1	✓	✓	✓✓	✓✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Neighbourhood Park	LOS 1	✓	✓	✓✓	✓✓		✓	✓	✓	✓	✓	✓	●	✓	✓	✘	✓
	LOS 2	●	✘	●	●	✓	●	✘	✓	✓	✓	●	●	●	✓	✘	✓
Local Park	LOS 1	●	✘	●	●	✓	✘	✘	✓	✓	✘	✘	●	✓	✘	✘	✓
	LOS 2	●	✘	✘	✘	●	✘	✘	●	✓	✘	✘	●	●	✘	✘	●

✓ May be provided

✓✓ Multiple may be suitable

✘ Not recommended

● Considered under special circumstances

Table 4: LOS Recommended Park Infrastructure

Note: Special Residential areas generally do not include large infrastructure such as playgrounds due to the size of yards and proximity to natural areas.

Operational LOS

Operational LOS defines the standard to which parks and their infrastructure are maintained.

The ability to maintain the assigned LOS relies on ongoing resource availability. Any park improvements or redevelopment must give due consideration to these ongoing operational costs and staff resourcing.

The tables below identify recommended visual inspection frequencies and maintenance performance standards to ensure the park is serviced to the required LOS.

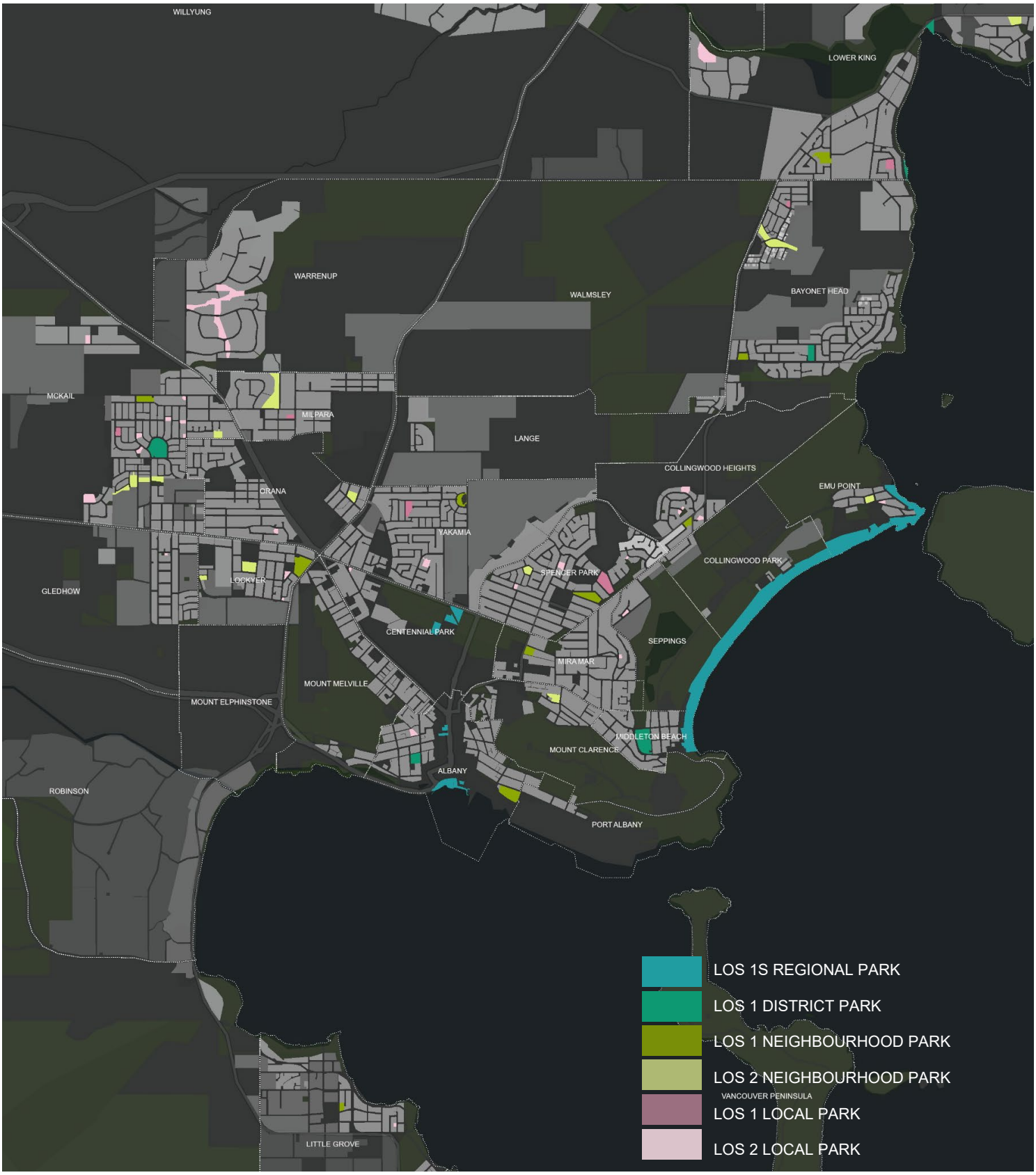


FIGURE 5: LEVELS OF SERVICE (LOS) HIERARCHY

Levels of Service (LOS)	Inspection Frequency
LOS 1S	Weekly (Seasonally 2 x week)
LOS 1	Fortnightly
LOS 2	Monthly

Table 5: LOS Inspection Frequency Standard (refer to Appendix 2 for Park Inspection Forms)

		Regional	District	Neighbourhood		Local	
Type	Activity	LOS 1S	LOS 1	LOS 1	LOS 2	LOS 1	LOS 2
Turf/grassland	Mowing	40mm	60mm	100mm	150mm	200mm	250mm
	Turf Up keep	Biannually	Annually	As required	As required	As required	N/A
	Fertilising lawn areas	2 x month	Annually	N/A	N/A	N/A	N/A
Gardens/feature areas	Fertilize	Quarterly	Biannually	As required	As required	As required	As required
	Planting	Seasonal	Seasonal	Seasonal	Seasonal	Seasonal	Seasonal
	Mulch/gravels	Biannually	Biannually	Annually	Annually	Annually	Annually
	Pruning	Biannually	Biannually	As required	As required	As required	As required
	Weed management	As required	As required	As required	As required	As required	As required
Beach areas	Sand management	As required	N/A	N/A	N/A	N/A	N/A
	Seagrass management	As required	N/A	N/A	N/A	N/A	N/A
	Boardwalks/paths sweeping	2 x week	N/A	N/A	N/A	N/A	N/A
Irrigation	Turf irrigated	25-40mm / week	10-15mm / week	8-10mm / week	5-8mm / week	N/A	N/A
	Irrigation system maintenance	3 weekly	Monthly	Monthly	Monthly	N/A	N/A
General/ whole park	Arboriculture	Quarterly	Quarterly	2 yearly	2 yearly	5 yearly	5 yearly
	Insect and disease control	As required	As required	As required	As required	As required	As required
	Rubbish Management	3 x week	3 x week	Weekly	Weekly	Weekly	Weekly
	BBQs	3 x week	Weekly	Fortnightly	N/A	N/A	N/A
	Playground equipment/Street furniture	Fortnightly	Monthly	Monthly	Monthly	Monthly	Monthly
	Kerbing/edging	Fortnightly	Monthly	As required	As required	As required	As required
	Path/hardstand	Fortnightly	Monthly	As required	As required	As required	As required

Table 6: LOS Maintenance Performance Standards

Note: The above tables outline recommended standards for City operational services, however it is acknowledged that climatic conditions can, and often do, affect frequency and/or ability to carry out certain tasks. Activities that are scheduled 'As required' are assessed as per specific maintenance plans and schedules.

Budget Allocations

Generally, capital expenditure allocated to parks is low in comparison to other City infrastructure, however, the annual operating expenditure for parks is significant due to the continuous upkeep requirements of the asset. As such, an annual budget range is set for each park category to ensure that the infrastructure can be maintained and upgraded as required as per the asset renewal schedule.

The following budget allocations include capital and operational to ensure the ongoing maintenance expenditure for each park is secured.

Category	Levels of Service (LOS)	Capital (Infrastructure / Upgrades) Budget Allocation	Operational (Maintenance) Budget Allocation
Regional Park	LOS 1S	$250,000 to $500,000 (Funding opportunities)	$75,000 to $95,000
District Park	LOS 1	$150,000 to $250,000	$30,000 to $75,000
Neighbourhood Park	LOS 1	$100,000 to $150,000	$15,000 to $30,000
	LOS 2	$70,000 to $100,000	$10,000 to $20,000
Local Park	LOS 1	$30,000 to $70,000	$10,000 to $20,000
	LOS 2	Nil or up to $30,000	Up to $10K

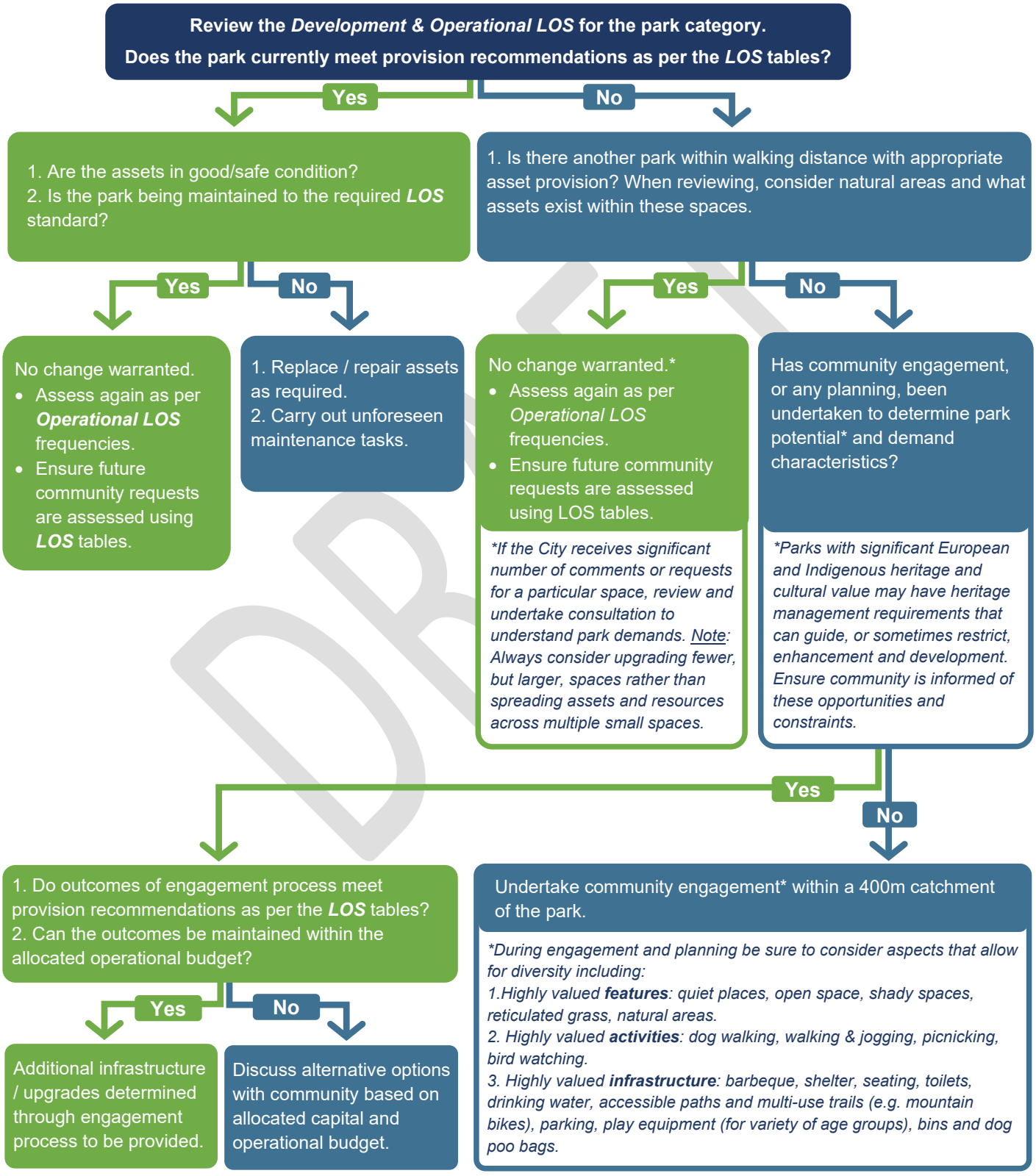
Table 7: LOS Allocated Budget Range - Capital and Operational

Decision Framework

The DMS capital and operational budget is delivered to ensure equitable and sustainable provision of infrastructure and upgrades. This is determined by balancing the following factors:

- The allocated LOS for the park (i.e LOS 1S, LOS 1, or LOS 2)
- Community engagement process
- Demand characteristics of the locality (Community demographics and values)

The framework below has been developed to assist in the decision-making process.



Considerations for the Decision-Making Process

There are several recurring themes that are commonly raised with the City. The following outlines key factors that should be given due consideration in determining park upgrade and infrastructure provision.

Community Engagement Process
A person's location (as well as their age, gender, ability, or other attributes) can affect their access to the park network. It is essential to adapt to change and ensure a rigorous engagement process to understand the needs of all users in a locality. Engagement provides the opportunity for local users of the park to provide input into how the park is enhanced.

Acknowledging any enhancements will ultimately be determined by both the capital and operational budget, the City utilises budgetary participation. The budget allocation is provided to the community so they can provide input into the upgrades most suitable for their precinct, community, and park. This process ensures the City considers the current demographics, cultures and users of each park.

Demand Characteristics
The park hierarchy and LOS identify recommended services and infrastructure based on the category, size, and function of the park. However, a community's priorities often shift over time depending on changing demographics in a particular location. For example, consultation outcomes may support removal or reduction of a playground, and replacement with more suitable infrastructure such as shelters and BBQs. Therefore, it is important to provide appropriate infrastructure based on the unique demand characteristics of each location gathered through the consultation process.

Play Spaces
The City approaches playground provision with the aim to provide modern, imaginative, inclusive, and all-ages playgrounds where feasible.

Renewal and enhancement of all playgrounds is determined as per safety audits and outcomes of the community engagement process. As playgrounds require renewal, the City engages with the local community, generally within 400m of a park, to determine appropriate upgrades.

Shade
Albany, like most Australian cities, now has a high UV rating for much of the year. Shade cover can be provided from a variety of means including built and natural. The City approaches the requirement for shade provision on a case-by-case basis for each park.

Shade structures over playgrounds are not provided as a standard and are assessed based on existing site characteristics such as wind patterns, trees, and existing infrastructure.

Fences
Generally fencing is not provided in City parks. Play Australia note that fences are not seen as inclusive and limit where play can take place, although it is acknowledged that this can assist those with some conditions such as autism.

Fencing around play areas may be considered in situations where a barrier is required between the play space and hazards, or at parks that are designated as off leash dog exercise areas.

Fenced Dog Off Leash Parks
There is increasing demand for fenced dog exercise areas within City parks. These areas require a relatively large, grassed area to enable dogs to run unleashed, good accessibility by car and foot, and adequate parking provision. Additionally, they need to be located where they won't impede on other infrastructure or amenity.

Outdoor Basketball Courts
Within parks, full size basketball courts are not provided as they are not for the purpose of formal sport. The size of park courts are generally 12 x 18m. There are also opportunities to install multipurpose courts in appropriate parks where the demand is determined. Multipurpose courts facilitate basketball, netball, handball, mini tennis, cricket, and other recreational activities on a hard surface.

Drainage Reserves
A portion of the City parks are utilised for stormwater management and drainage. The main function of these parks is to manage large flows and assist infiltration and retention of stormwater. Due to their primary function as storage, introduction of vegetation and infrastructure can affect the capacity, as such there are limitations on what may be provided in these locations.

Review Position and Date

This policy was adopted on [Insert Date]. This policy must be reviewed every year by the document owner on or before [Insert Date], or earlier if Council considers it necessary.

Legislative and Strategic Context

The following key legislation, strategies and management plans guide the planning of the City's Parks.

Associated Documents

Related strategies, procedures, references, guidelines, or other documents that have a bearing on this policy and that may be useful reference material for users of this policy, follow:

- Park Inspection Forms
- Playground and Skate Park Annual Audits
- Bike Skills Parks Maintenance Plan

Definitions

Public Open Space (POS) as defined in Public Parkland Policy: Public parkland contributed free of cost by the owner through the subdivision process (local park, neighbourhood park, district park, community purpose site-community centre, meeting hall).

POS may also include **'Restricted Use'** areas' (remnant vegetation) where these areas can be demonstrated to provide a high level of public amenity, are appropriately located, and are usable for informal recreation.

Public Open Space (POS): In terms of this Policy, POS encompasses a broader definition and considers 'public open space' as all recreation and conservation reserves within the City; including

parklands, play areas, playing fields, bushland, foreshore, and other similar spaces people use for recreation, sport, and social interaction.

This definition of POS is taken from the *Classification Framework for Public Open Space 2012 (DLSGC).*

Foreshore Reserve: Refers to land adjacent to a stream, river, lake or coast, or directly influencing a body of water that is managed to protect the body of water and coastal environment.

Parks and Gardens (Parks): Land considered recreational space that provides for informal activity to encourage a variety of recreational opportunities for a diverse demographic of residents. These spaces include all public parks, gardens, playgrounds, and skate parks/pump tracks.

Sporting grounds: Includes all sporting grounds and playing fields that allow structured sporting activities and include the required infrastructure for those activities.

Street landscaping: Street landscaping is defined as the managed space that falls within the road reserve but does not include transport assets such as footpaths and roadways. This includes verge, median and roundabout landscaping.

Building reserves: Land adjacent to and surrounding City of Albany owned or managed buildings and facilities.

APPENDIX 1: PARK LIST

PARK CATEGORY	PARK NAME	LOCATION	LOS	AREA m²
Regional Parks	Emu Point	Emu Point	1S	210636
	Centennial Precinct	Centennial Precinct	1S	41984
	York St Precinct	York St Precinct	1S	42261
	Middleton Beach	Middleton Beach	1S	449609
District Parks	Eyre Park	Middleton Beach	1	50247
	Foundation Park	Albany	1	14748
	Lakeside Park	McKail	1	45857
	Lange Park	Bayonet Head	1	15805
	Lower King Boat Ramp	Lower King	1	5813
	Lower King Picnic	Lower King	1	9700
Neighbourhood Parks	Becker Park	Bayonet Head	1	23941
	Bovell Square	Emu Point	2	8491
	Callistemon Park	Yakamia	1	10820
	Clifton Street Park	Lockyer	2	20770
	Clydesdale Road Reserve	McKail	2	9885
	Cull Park	Mira Mar	1	11003
	Dunn Street Park	Orana	2	11608
	Engleheart park	McKail	2	8365
	Grenfell Park	Bayonet Head	2	13524
	Hare Street Skate Park	Mt Clarence	2	12491
	Havoc Road Park	Milpara	2	45355
	Hull Park	Collingwood Heights	1	7500
	Kalgan Heights Park	Lower King	2	14452
	Lake Weerlara Park	Lockyer	1	34927
	Lancaster Rd Drainage Basin	McKail	1	15644
	Lawley Park	Albany	1	31804
	McGonnell Park	Bayonet Head	1	9599
	McNeal Park	McKail	2	7569
	Mills Park	Little Grove	1	5472
	Mokare Park	Spencer Park	1	23545
	Oyster Heights	Bayonet Head	2	26299
	Roome Park	McKail	2	13663
	Sherwood Park	McKail	2	9355
	The Ridge	Lockyer	2	4782
	Woodrise Park	Spencer Park	2	8796
Local Parks	Lancaster Rd Park	McKail	2	1978
	Anchorage Estate Park	Bayonet Head	1	12719
	Baltic Ridge Park	Yakamia	1	14071
	Boronia Park	Collingwood Heights	2	7985
	Breaksea Park	Collingwood Heights	2	3477
	Clint Terrace	Spencer Park	2	2660
	Coorinda Park	Albany	2	5992
	Drome Rd Drainage	McKail	2	1714
	Drummond Street Park	Lockyer	2	4741
	Ecology Park	Spencer Park	1	28883
	Gill Park	Little Grove	2	1560
	Gladville Park	McKail	2	6552
	Herbert Park	Mira Mar	2	1915
	Houghton Park	Bayonet Head	1	3437
	Hunter Street Park	Emu Point	2	244
	Kendell Crt Reserve	Warrenup	2	15410
	Keyser Park	Mira Mar	2	3218
	Kitcher Pde Park	McKail	2	3447
	Kooyong Drainage Reserve	Warrenup	2	53248
	McGonnell St Drainage Basin	McKail	2	3467
	McKail Street Park	McKail	2	3037
	Meadow Lake Vista	Lower King	2	34734
	Merlin Park	Collingwood Heights	2	3372
	Milpara Park	Milpara	1	5326
	Moon Parade Park	McKail	1	6544
	Mueller St Park	Lockyer	2	999
	Pines Estate Park	McKail	2	15854
	Pioneer Park	Centennial Park	2	1557
	Pluto Park	McKail	2	4112
	Scorpio Park	McKail	2	4359
	Stall Street Park	Gledhow	2	1116
	Wansborough Street Park	Spencer Park	2	6724
	Warrenup Ridge Hinterland	Warrenup	2	40576
	Wooderson Park	Spencer Park	2	1165
	Worra Park	Yakamia	2	8066
TOTAL PARKS / ha	**70**			160 ha

APPENDIX 2: PARK INSPECTION FORMS

PARK INSPECTION FORM

PARK NAME:

DR NUMBER:

DATE:

INSPECTED BY:

			CONDITION RATING (Tick appropriate box)			
TYPE	**ACTIVITY**	***LOS 1S REGIONAL*** *Maintenance Standard*	**GOOD** Standard met	**AVERAGE** Some issues with standard being met	**POOR** Standard not met, requires immediate attention	**COMMENT**
Turf/grassland	Mowing	*40mm*				
	Turf Up keep	*Biannually*				
	Fertilising lawn areas	*2 x month*				
Gardens/feature areas	Fertilize	*Quarterly*				
	Planting	*Seasonal*				
	Mulch / gravels	*Biannually*				
	Pruning	*Biannually*				
	Weed management	*As required*				
Beach areas	Sand management	*As required*				
	Seagrass management	*As required*				
	Boardwalks / paths sweeping	*2 x week*				
Irrigation	Turf irrigated	*25-40mm / week*				
	Irrigation system maintenance	*3 weekly*				
General/ whole park	Aboricultural	*Quarterly*				
	Insect and disease control	*As required*				
	Rubbish Management	*3 x week*				
	BBQs	*3 x week*				
	Playground equipment / furniture	*Fortnightly*				
	Kerbing / edging	*Fortnightly*				
	Path / hardstand	*Fortnightly*				

PARK INSPECTION FORM

PARK NAME:

DR NUMBER:

DATE:

INSPECTED BY:

			CONDITION RATING (Tick appropriate box)			
TYPE	**ACTIVITY**	***LOS 1 DISTRICT*** *Maintenance Standard*	**GOOD** Standard met	**AVERAGE** Some issues with standard being met	**POOR** Standard not met, requires immediate attention	**COMMENT**
Turf/grassland	Mowing	*60mm*				
	Turf Up keep	*Annually*				
	Fertilising lawn areas	*Annually*				
Gardens/feature areas	Fertilize	*Biannually*				
	Planting	*Seasonal*				
	Mulch / gravels	*Biannually*				
	Pruning	*Biannually*				
	Weed management	*As required*				
Irrigation	Turf irrigated	*10-15mm / week*				
	Irrigation system maintenance	*Monthly*				
General/ whole park	Aboricultural	*Quarterly*				
	Insect and disease control	*As required*				
	Rubbish Management	*3 x week*				
	BBQs	*Weekly*				
	Playground equipment / furniture	*Monthly*				
	Kerbing / edging	*Monthly*				
	Path / hardstand	*Monthly*				

PARK INSPECTION FORM

PARK NAME:

DR NUMBER:

DATE:

INSPECTED BY:

			CONDITION RATING (Tick appropriate box)			
TYPE	**ACTIVITY**	***LOS 1 NEIGHBOUR-HOOD*** *Maintenance Standard*	**GOOD** Standard met	**AVERAGE** Some issues with standard being met	**POOR** Standard not met, requires immediate attention	**COMMENT**
Turf/grassland	Mowing	*100mm*				
	Turf Up keep	*As required*				
	Fertilising lawn areas	*N/A*				
Gardens/feature areas	Fertilize	*As required*				
	Planting	*Seasonal*				
	Mulch / gravels	*Annually*				
	Pruning	*As required*				
	Weed management	*As required*				
Irrigation	Turf irrigated	*8-10mm / week*				
	Irrigation system maintenance	*Monthly*				
General/ whole park	Aboricultural	*2 yearly*				
	Insect and disease control	*As required*				
	Rubbish Management	*Weekly*				
	BBQs	*Fortnightly*				
	Playground equipment / furniture	*Monthly*				
	Kerbing / edging	*As required*				
	Path / hardstand	*As required*				

PARK INSPECTION FORM

PARK NAME:

DR NUMBER:

DATE:

INSPECTED BY:

			CONDITION RATING (Tick appropriate box)			
TYPE	**ACTIVITY**	***LOS 2 NEIGHBOUR-HOOD*** *Maintenance Standard*	**GOOD** Standard met	**AVERAGE** Some issues with standard being met	**POOR** Standard not met, requires immediate attention	**COMMENT**
Turf/grassland	Mowing	*150mm*				
	Turf Up keep	*As required*				
	Fertilising lawn areas	*N/A*				
Gardens/feature areas	Fertilize	*As required*				
	Planting	*Seasonal*				
	Mulch / gravels	*Annually*				
	Pruning	*As required*				
	Weed management	*As required*				
Irrigation	Turf irrigated	*5-8mm / week*				
	Irrigation system maintenance	*Monthly*				
General/ whole park	Aboricultural	*2 yearly*				
	Insect and disease control	*As required*				
	Rubbish Management	*Weekly*				
	BBQs	*N/A*				
	Playground equipment / furniture	*Monthly*				
	Kerbing / edging	*As required*				
	Path / hardstand	*As required*				

PARK INSPECTION FORM

PARK NAME:

DR NUMBER:

DATE:

INSPECTED BY:

			CONDITION RATING (Tick appropriate box)			
TYPE	**ACTIVITY**	***LOS 1 LOCAL*** *Maintenance Standard*	**GOOD** Standard met	**AVERAGE** Some issues with standard being met	**POOR** Standard not met, requires immediate attention	**COMMENT**
Turf/grassland	Mowing	*200mm*				
	Turf Up keep	*As required*				
Gardens/feature areas	Fertilize	*As required*				
	Planting	*Seasonal*				
	Mulch / gravels	*Annually*				
	Pruning	*As required*				
	Weed management	*As required*				
General/ whole park	Aboricultural	*5 yearly*				
	Insect and disease control	*As required*				
	Rubbish Management	*Weekly*				
	BBQs*	*N/A*				
	Playground equipment / furniture	*Monthly*				
	Kerbing / edging	*As required*				
	Path / hardstand	*As required*				

* Moon Park only

PARK INSPECTION FORM

PARK NAME:

DR NUMBER:

DATE:

INSPECTED BY:

			CONDITION RATING (Tick appropriate box)			
TYPE	**ACTIVITY**	***LOS 2 LOCAL*** *Maintenance Standard*	**GOOD** Standard met	**AVERAGE** Some issues with standard being met	**POOR** Standard not met, requires immediate attention	**COMMENT**
Turf/grassland	Mowing	*250mm*				
	Turf Up keep	*N/A*				
Gardens/feature areas	Fertilize	*As required*				
	Planting	*Seasonal*				
	Mulch / gravels	*Annually*				
	Pruning	*As required*				
	Weed management	*As required*				
General/ whole park	Aboricultural	*5 yearly*				
	Insect and disease control	*As required*				
	Rubbish Management	*Weekly*				
	Playground equipment / furniture	*Monthly*				
	Kerbing / edging	*As required*				
	Path / hardstand	*As required*				