Image: Beresford Foreshore, City of Greater Geraldton

Geraldton Jetty Business Case
Options Analysis

Project undertaken for City of Greater Geraldton
November 2024

REMPLAN

Geraldton Jetty Business Case: Options Analysis

This report has been prepared by the team at REMPLAN

&

MP Rogers & Associates

NOVEMBER 2024

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RESOURCES

Economic Impact Modelling has been undertaken using REMPLAN™ software that has been authored by Principal Research Fellow (ret.), Ian Pinge, at La Trobe University Bendigo.

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Executive Summary

Background

The City of Greater Geraldton (Council) resolved to undertake investigations in response to community interest in the development of a jetty at Midalia Beach. The key outcomes being sought by the community group being the provision of accessible overwater recreational and fishing opportunities.

Council investigations have included the development of preliminary jetty options, including concepts, costing and outcomes. Key considerations in the development of the options included:

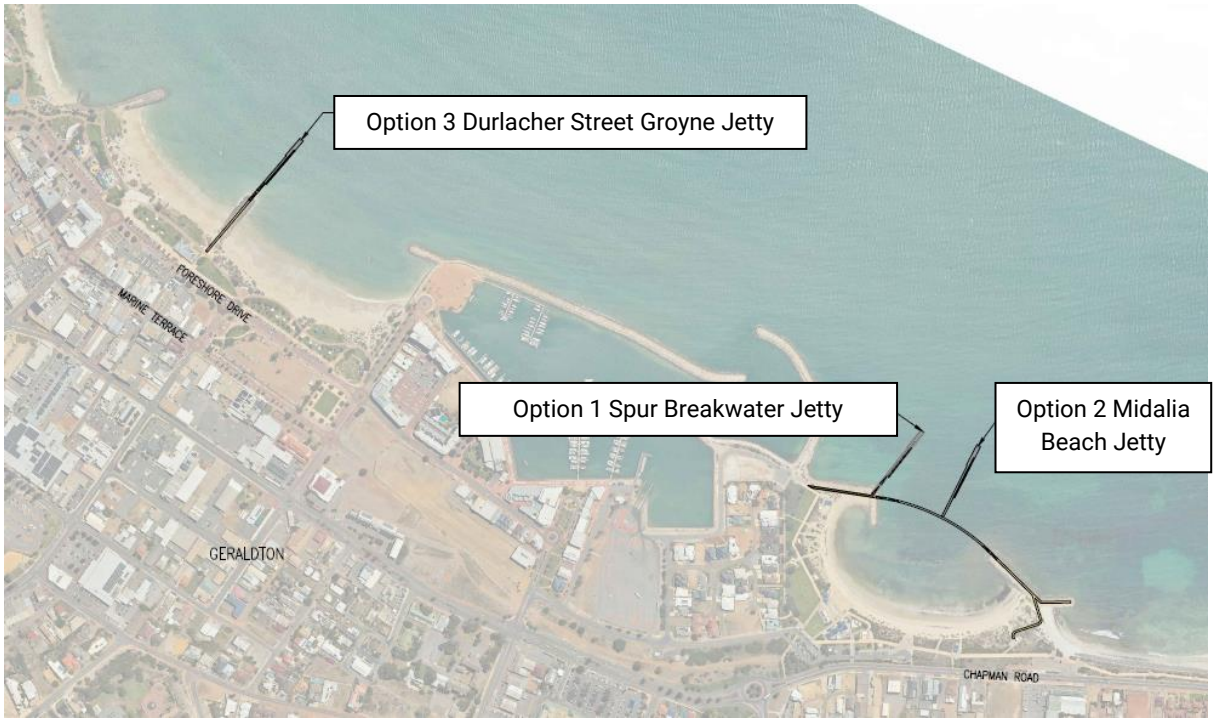
- Public safety in terms of use of the jetty and wave inundation.
- Jetty structure should not interfere with vessel movements.
- Improved over water accessibility for recreational groups, particularly fishing groups.
- Creation of a tourism attraction and boost to overall Geraldton visitor experience.
- Ensuring a balanced approach to infrastructure investment in Greater Geraldton.

Geraldton Jetty Options

Three options for the Geraldton jetty have been developed:

- **Option 1 Spur Breakwater Jetty**: a single 125 metre long jetty off the spur breakwater.
- **Option 2 Midalia Beach Jetty**: reflective of the Jetty Group proposal, total jetty length of 342 metres, consisting of a large structure spanning the width of Midalia Beach (217 metres), connecting the spur breakwater with the rock headland, including an additional offshore extension of the jetty (125 metres).
- **Option 3 Durlacher Street Groyne Jetty**: a 125 metre long jetty off the end of the Durlacher Street Groyne at Town Beach.

Figure ES-1 Jetty Options Locality Plan



Source: MP Rogers & Associates.

All three options involve steel piles and concrete decks, with a main deck height of 4.5 metres above the waterline to withstand wave load. Each option includes a lower landing to improve accessibility and proximity to water.

Jetty construction and maintenance costings are presented below (Table ES-1).

Table ES-1 Jetty Options Development and Maintenance Costs

	Option 1 Spur Breakwater Jetty	Option 2 Midalia Beach Jetty	Option 3 Durlacher Street Groyne Jetty
Preliminary construction cost (incl. contingencies)	$11.9M	$24.1M	$11.9M
Maintenance cost (average annual, preliminary)	$0.2M	$0.3M	$0.2M
End of life demolition costs (preliminary)	$2.5M	$5.0M	$2.5M

Source: MP Rogers & Associates.

Social Impact

Accessibility

Each option includes accessibility features such as ramps for those with mobility impairments. Features include accessible pathways with gentle gradients of 1:20, and ramps down to the lower decks have a compliant slope of 1:14, ensuring easy access for all users.

Recreational Use

Options 1 and 2, located at Midalia Beach, are closer to a larger population of workers and residents within a 15-minute walk, making them more convenient for local users. Option 3, located at Town Beach, has fewer nearby residential areas and is further from a high concentration of workers.

Visual Impact

All jetty options are elevated 4.5 metres above the water. However, Option 3 has a lower elevation relative to the surrounding land, resulting in a reduced visual impact for beachgoers at Town Beach compared to Options 1 and 2 at Midalia Beach, which are more visible from nearby homes.

Overwater Experience

To ensure safety, all jetties must maintain a deck height of 4.5 metres above sea level, equivalent to a one and a half-storey building. This height is necessary but could reduce the recreational experience. To address this, all options include a lower deck at 1.5 metres above sea level, providing better access to the water across the full tidal range.

Economic Impact of Construction Activity

All three options will generate a positive economic impact during construction, with Option 2 delivering the highest overall output due to its higher construction costs. The multiplier effect indicates that, regardless of which option, every jetty construction job will support at least another one and a half jobs elsewhere in local economy due to supply chain and consumption effects.

Return on Investment

The financial appraisal indicates poor return on investment due to the lack of revenue stream associated with capital outlay. This is generally reflective of projects with the primary purpose of delivering a social benefit through shared community assets, and infrastructure.

A preliminary cost-benefit analysis (CBA) was conducted for each option over a 20-year period. The analysis concluded that:

- Option 1 Spur Breakwater Jetty achieves a positive net benefit of $4.8 million, with a cost to benefit ratio of 1.00 : 1.37.
- Option 2 Midalia Beach Jetty, while larger in scale, is the least viable, with a net present value of -$8.6 million and a cost to benefit ratio of 1.00 to 0.66.
- Option 3 Durlacher Street Groyne Jetty provides the highest net benefit, with a net present value of $9.0 million and a cost to benefit ratio of 1.00 : 1.71.

Key Considerations

Based on the assessment of preliminary costs, benefits, and a preliminary risk assessment, Option 3 Durlacher Street Groyne Jetty is the preferred option out of the three developed.

For the purpose of this initial concept level assessment each of the options was developed with a reasonable degree of similarity. From a coastal engineering perspective there is little to differentiate between the three options. Should the project proceed investigations into environmental conditions, regulatory approvals, and detailed design will be necessary and may have bearing on the preferred option.

The preliminary cost of the jetty options ($11 million - $24 million) is significantly higher than recently completed or commenced capital works projects within Greater Geraldton, and there is limited precedent for capital works projects of this size in Geraldton. The total budget for new capital works in Geraldton has ranged between $7 million and $11 million since the 2019-2020 financial year. This project involves significant investment, without funding assistance the project may have implications for other council priorities.

Contents

Shortened Forms

ABS	Australian Bureau of Statistics
CBD	Central Business District
Council	City of Greater Geraldton Council
ERP	Estimated Resident Population
Geraldton LGA	Greater Geraldton Local Government Area
Jetty Group	Jetty for Geraldton group
LGA	Local Government Area
mAHD	Elevation in metres with respect to the Australian Height Datum
MWDC	Mid West Development Commission
km	kilometre

1 Background

1.1 Report purpose

In response to community interest regarding a jetty at Midalia Beach, the City of Greater Geraldton Council (Council) is undertaking investigations into the possible construction of a jetty along the Geraldton foreshore.

This report presents an options analysis for the delivery of a potential jetty in Geraldton. The purpose is to systematically evaluate and compare alternate options to identify the most cost effective and sustainable solution that meets project objectives, stakeholder needs and community priorities.

The analysis presented in this report is based on the preliminary scoping of jetty options. Further analysis, design and costings are required to determine the feasibility of the jetty.

1.2 Project background

Beresford Foreshore Coastal Protection and Enhancement Project

Works to enhance the Beresford Foreshore were undertaken in 2018 along a 1.8 kilometre (km) stretch of foreshore running between Trigg Street and Midalia Beach. The intent of the works was to enhance foreshore protection due to coastal erosion, improve public amenity and connectivity.

The project was delivered at a cost of $23.1 million jointly funded by the State Government Regional Grants Scheme and project managed by the Mid West Development Commission and the Mid West Ports Authority, with Council contributing $1.8 million in funding towards amenities.

Improvements at Midalia Beach included a playground, shade structures, public toilet blocks, BBQ facilities, a café and landscaping (Figure 1-4).

Figure 1-1 Enhancement works at Midalia Beach

Source: City of Greater Geraldton.

Historical Geraldton Jetties

Jetties have played a crucial role in Geraldton's development as a port and coastal settlement. The Esplanade Jetty, built in 1857 at the end of Gregory Street, was the first major jetty in Geraldton. This jetty served as the town's main loading and unloading point for goods until 1893.

Figure 1-2 Promenade Jetty circa 1890

Source: Image reproduced from Information Sheet No. 4, Heritage Services Geraldton Regional Library, Geraldton's Historical Jetties: The Esplanade and Railway Jetties Project Objectives.

In 1892-1893, a new jetty called the Railway Jetty was constructed at the end of Durlacher Street to better accommodate the arrival of larger ships. This jetty was built in response to the increasing shipments of machinery and mining equipment arriving at the port following gold discoveries in the Murchison area. The Railway Jetty was initially 230 metres long and was connected to the rail line to Perth. It was extended multiple times, eventually reaching over a kilometre in length by 1909.

Both jetties served important commercial and recreational purposes for the town. The Esplanade Jetty, after being leased to the Municipality of Geraldton in 1898, became a popular spot for local activities such as swimming, fishing, and band recitals held in a rotunda at its end. However, the use of long jetties for berthing ships began to decline by 1914 due to issues with silt buildup and vulnerability to weather and ocean currents.

Figure 1-3 Railway Jetty circa 1940

Source: Image reproduced from Information Sheet No. 4, Heritage Services Geraldton Regional Library, Geraldton's Historical Jetties: The Esplanade and Railway Jetties Project Objectives.

During World War II, portions of both jetties were destroyed as a precautionary measure against potential invasion attempts. The Esplanade Jetty was ultimately demolished in 1944, while the last section of the Railway Jetty was removed in the 1950s as modern maritime practices reduced the need for jetties in preference for land-backed wharves.

Construction of the first land-backed wharf in Geraldton began in 1928, marking a major shift in port infrastructure. This wharf, completed in 1931, was the first reinforced concrete berth in Western Australia, and saw significant expansion between throughout the 20th century, with additional berths, security enhancements, channel deepening, and more upgrades progressively enabling higher capacity and more diverse exports.[1]

1.3 Jetty for Geraldton proposal

The community group Jetty for Geraldton group (Jetty Group) is a "group of Geraldton residents that would love to see investment in our town, which would include the development of a decent Jetty"[2]. The Jetty Group have approached Council to consider development of a curved jetty at Midalia Beach, connecting across Champion Bay with an additional element protruding out from the coast, providing overwater recreational and fishing opportunities.

The Jetty Group undertook a public survey to gauge preference for location, and the majority of votes supported Midalia Beach as the preferred location. The preliminary concept of the Midalia Beach jetty is illustrated in Figure 1-4.

[1] https://www.midwestports.com.au/our-port/history-of-the-geraldton-port.aspx
[2] Jetty for Geraldton Facebook page (https://www.facebook.com/groups/277486524381752/).

The Jetty Group's proposed structure would link the two rock groins at either end of the beach allowing installation of an anti-shark net and improved swim and snorkelling safety.

Beneficial outcomes of the jetty as proposed by the Jetty Group include:

- Unique design which will support visitation and tourism to Geraldton.
- Community pride.
- Connection between the adjacent boat ramp and jetty.
- Increase in revenue for local businesses due to increased foot traffic along the foreshore.
- Local procurement opportunities during construction and ongoing maintenance.
- Support of Chapman Road revitalisation.
- Support of improved community connection through use of jetty by wide range of users enabled by improved overwater accessibility.

Figure 1-4 Preliminary concept for proposed Midalia Beach jetty

Source: Jetty for Geraldton Facebook page (https://www.facebook.com/groups/277486524381752/).

Council Resolution

In response to the submission by the Jetty Group, Council resolved (December 2023) to undertake investigations and to develop a business case which will consider, as a minimum:

- the best location for a jetty in Geraldton, if any,
- the best jetty configuration and structure, if any,
- the economic impacts of the project on the local community and local infrastructure,
- the capital and maintenance cost implications for Council, and
- the impact on Council's capacity to fund other priority projects.

Case study: Esperance Tanker Jetty

Overview

The Esperance Tanker Jetty, located in Esperance, Western Australia, was originally constructed in 1935. Stretching 512 metres into the bay, it served as a crucial piece of infrastructure for the town's port operations for decades. Opened in March 2021, the 415 metres Esperance Jetty was built for the Esperance community and visitors to enjoy.

Fishing, walking, photography and diving are all accessible. Built primarily from concrete and steel, bent 1 – 10 forms the Esperance Jetty's 'heritage section' and has been designed and built to pay homage the original Esperance Tanker Jetty's design. Elements from the old Tanker Jetty have also been included in the design, like the classic curvature of the jetty, diving platform and shelters.

The Esperance Jetty is at the north end of The Esplanade, situated near the central foreshore area's parklands, art centre, hotels, public toilets, cafes, and car parks. Locals and visitors use the jetty as a site for fishing, walking, photography and diving.

Cost and lifecycle

The Esperance Jetty was fully demolished and replaced, totalling an estimated $7.63m over the first two years of construction as an upfront costs, with an annual operational expenditure of $70,000 ($20,000 for inspections, $50,000 for maintenance and operations). The jetty has an estimated lifespan of 50 years, with a total annualised expense of $772,000. This project was to replace an existing, condemned jetty which needed to be destroyed regardless. The popularity of the existing structure demonstrated high levels of community and tourist recreational use. Council documents suggest that a special levy was imposed on residents to raise revenue for the Esperance Jetty.

2 Strategic Alignment

2.1 Local Government

Local Policy and Priorities	Alignment
Geraldton Community Strategic Plan 2017-2027	Development of the jetty aligns with the strategic goal of promoting informal recreation by enhancing public open spaces, particularly in coastal areas. A jetty would contribute to the promotion of unique tourism experiences, which the Plan emphasises as essential for attracting visitors and investments to Geraldton.
Geraldton Access and Inclusion Plan 2024-2029	A jetty would contribute to improved accessible tourism experiences by enabling access for visitors with disabilities. It also supports the Plan's goal to enhance accessibility in public spaces, particularly along waterfronts, improving access for people of all abilities.
Geraldton Youth Strategy 2024-2029	A jetty development would support the strategic objective of providing accessible spaces where young people can interact and feel a sense of belonging, aligning with the Strategy's focus on fostering vibrant public spaces for youth participation. Additionally, the jetty would promote physical and mental wellbeing by encouraging outdoor and over the water activities like fishing, walking and socialising.
Foreshore Use and Development Policy	The Policy objective of supporting infrastructure development that enhances the public's enjoyment of the foreshore while maintaining environmental sustainability would be realised with the development of the jetty. The jetty would promote recreational and tourism activities, contributing to the foreshore's role as a community asset.
Economic Development and Investment Attraction Policy	The policy emphasises the need for infrastructure that drives economic growth. The jetty would be a strategic infrastructure asset that stimulates economic activity by attracting local and external investment in waterfront businesses and recreation activities in the area.
Geraldton City Centre Master Plan Report	The Master Plan emphasises improving physical and visual connections between the city centre and the foreshore. A public jetty would directly contribute to this goal by encouraging foot traffic from the city centre to the foreshore and increasing interactions with the waterfront.

2.2 Western Australian Government and Regional Organisations

State and Regional Policy and Priorities	Alignment
State Infrastructure Strategy 'Foundations for a Stronger Tomorrow'	Development of the jetty would contribute to increasing the liveability of Geraldton by providing public recreational spaces, aligning with the Strategy's objective of improving community wellbeing. The Strategy highlights there have been historical challenges in prioritising and integrating arts, culture, sports and recreation into government decision-making, which can lead to under investments and constraints in community access.
Western Australia Visitor Economy Strategy 2023	The jetty development aligns with sustainability goals by supporting environmentally sustainable infrastructure that enriches visitor experiences. Development of the jetty directly supports the Strategy's goal of improving attractions by enhancing the range of tourism experiences available in Geraldton, offering new ways to interact with the waterfront.
More People More Active Outdoors – A Framework for Outdoor Recreation in Western Australia 2019	The jetty would promote accessible over water activities like walking, fishing and socialising, as well as water-based activities like kayaking or paddleboarding, aligning with the framework's objective to increase outdoor recreation participation. By facilitating physical activities such as walking and recreational fishing, the jetty would also support the framework's goal of improving physical and mental health through outdoor recreation which reduces healthcare costs in the long run.
Mid West Development Commission (MWDC)	MWDC focuses on enhancing the region's economic diversity, particularly through tourism. Development of a jetty aligns with this by offering new recreational and tourism opportunities, attracting more visitors to Geraldton. Additionally, a primary goal of the MWDC is to maximise job creation and improve infrastructure to support economic and social development. A public jetty project would create short-term construction jobs and long-term opportunities in tourism, which supports the region's growth.
Recfishwest Strategic Plan 22/23	Recfishwest advocates for accessible, sustainable and safe fishing experiences for all Western Australians. Development of a jetty in Geraldton would provide an excellent platform for recreational fishing for the community and visitors which aligns with the third focus area of the Recfishwest 2022/23 Strategic Plan 'investing in enhanced fishing experiences'.

Case study: Busselton Jetty

Overview

The Busselton Jetty, located in Busselton, Western Australia, was originally constructed in 1865. Stretching 1.8 kilometres into Geographe Bay, it is the longest timber-piled jetty in the Southern Hemisphere. Initially built to serve the local timber industry, it has since transitioned into a major tourist attraction and recreational facility.

The Busselton Jetty is situated at the northern end of Queen Street, in the heart of Busselton's foreshore precinct. The area features parklands, a visitor centre, cafes, restaurants, and ample parking. The jetty offers various activities including walking, fishing, and underwater observatory tours. A solar-powered electric train operates along the jetty, providing transportation for visitors.

Cost and lifecycle

The jetty has undergone several major restorations throughout its history. The most recent significant refurbishment occurred between 2009 and 2011, costing approximately $27 million. This included replacing 65% of the jetty's timber piles with concrete-filled steel piles, ensuring greater longevity and reduced maintenance costs. Annual operational costs are managed by the Busselton Jetty Inc., a not-for-profit community organisation. In 2019, their operational expenses were around $3.5 million, offset by income from various jetty-related activities and attractions. The current structure is expected to have a lifespan of at least 50 years, with ongoing maintenance and periodic upgrades planned to ensure its longevity.

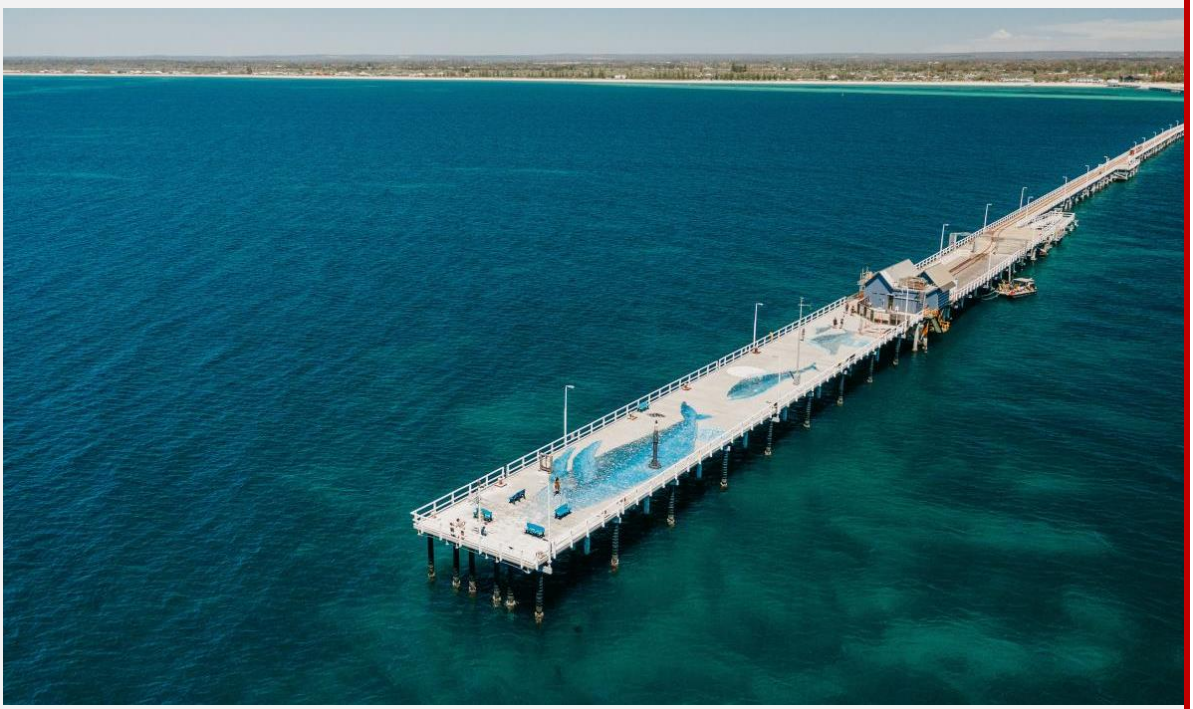


Image reproduced from Explore Parks WA.

3 Capital Works

3.1 Community Capital Works Priorities

Engagement undertaken in November 2020[3] prioritised a range of capital works projects to be included in Councils 10 Year Capital Works Plan. During this consultation, a representative selection of 22 community members were presented with a series of project introductions and information sessions with staff to understand the merit of shortlisted projects before scoring projects against selection criteria. The jury's priority list of capital works presented in Table 3-1 shows community priorities for capital works development in Geraldton. In the jury priority list, 'Beresford Foreshore Jetty' ranks 6th of 18 projects.

Table 3-1 Community Prioritisation of Capital Works Projects

Priority Rank	Capital Works Project	Jury Score (out of 100%)
1	Community Nursery Expansion*	81%
2	Point Moore Lighthouse Tourism Project	79%
3	Maitland Park Bus Interchange and Parking Area - underway	78%
4	Meru Waste Diversion Infrastructure*	78%
5	Renewable Energy Initiatives – next on list	74%
6	**Beresford Foreshore Jetty**	**72%**
7	QPT Upgrades	71%
8	Underwater Snorkelling Dive Trail	71%
9	Maitland Park Botanic Gardens – Stage 1	69%
10	Eadon Clarke Stormwater Harvesting	67%
11	Shared Path Drumming Cove to Sunset Beach	64%
12	Chapman River Mouth Footbridge	63%
13	Foreshore Waterpark Redevelopment	63%
14	Aquarena Splash Playground	62%
15	Mullewa Masonic Hall Refurbishment	61%
16	Shared Path Cape Burney to Tarcoola Beach	59%
17	Drummond Cove Boat Ramp and Erosion Protection	52%
18	Shared Path Greenough Hamlet to Walkaway	51%

Source: City of Greater Geraldton.

When both the jury score and the Council scores were equally weighted, the rankings of the capital works projects vary slightly. Table 3-2 below shows this prioritisation where jury and Council preferences are weighted evenly as well as the status of each of the projects. In the combined priority list, 'Beresford Foreshore Jetty' ranks 9th of 18 projects. It should be noted the Beresford Foreshore Jetty is one of four projects that have not progressed.

[3] The Community Voice 10 Year Capital Works Plan Citizens Jury.

Table 3-2 Community and Council Prioritisation of Capital Works Projects

Priority	Capital Works Project	Jury Score (50%)	City Score (50%)	Adj. Score	Project Status	Estimated cost (where available)
1	Meru Waste Diversion Infrastructure	39%	38%	81%	Complete	> $5m
2	Maitland Park Bus Interchange and Parking Area	39%	37%	79%	Design Project FY24/25	N/A
3	Point Moore Lighthouse Tourism Project	40%	34%	78%	No longer being pursued by Council, potential State project	N/A
4	QPT Upgrades	36%	33%	78%	Ongoing	> $4.1m
5	Renewable Energy Initiatives	37%	30%	74%	Ongoing, Airport Microgrid and Meru Gas Flaring in FY24/25	$5m for Airport Microgrid, $100,000 for Meru Gas Flaring
6	Community Nursery Expansion	41%	25%	72%	Complete	N/A
7	Eadon Clarke Stormwater Harvesting	33%	31%	71%	On Hold	N/A
8	Shared Path Drummond Cove to Sunset Beach	32%	29%	71%	Complete	Part of State's $4.9m Geraldton Cycling Network Expansion Project
9	**Beresford Foreshore Jetty**	**36%**	**25%**	**69%**	**Subject of Options Analysis**	**Approximately $12m -$24m**
10	Shared Path Cape Burney to Tarcoola Beach	29%	30%	67%	MRWA undertaking design FY24/25	Part of State's $4.9m Geraldton Cycling Network Expansion Project
11	Chapman River Mouth Footbridge	31%	27%	64%	No Progress	N/A
12	Underwater Snorkelling Dive Trail	35%	22%	63%	No Progress	N/A
13	Foreshore Waterpark Redevelopment	31%	25%	63%	Potential project in future years	N/A
14	Aquarena Splash Playground	31%	23%	62%	Potential project in future years	N/A
15	Maitland Park Botanic Gardens – Stage 1	35%	18%	61%	Concept design complete	$173,511
16	Shared Path Greenough Hamlet to Walkaway	25%	26%	59%	No progress	N/A
17	Drummond Cove Boat Ramp and Erosion Protection	26%	25%	52%	Dept. of Transport project, concept designs and community consultation in progress	$3.2m of State Government funding
18	Mullewa Masonic Hall Refurbishment	31%	20%	51%	Complete	N/A

Source: City of Greater Geraldton.

3.2 Capital Works Expenditure

Any new capital expenditure needs to be carefully considered and taken in balance with other community priorities to ensure ratepayers are receiving value for their money and that new capital works measurably improve the community's social, economic and environmental conditions.

Council's annual new capital works program generally consists of around $10 million in works for planning, design and construction of new projects or upgrade of existing assets. The past six years included total project works valued between $7.0 million and $11.0 million:

- 2019-20: $7.0 million
- 2020-21: $10.3 million
- 2021-22: $9.5 million
- 2022-23: $9.4 million
- 2023-24: $7.5 million
- 2024-25: $11.0 million

The 2024-25 New Capital Program was developed by refining a list of over 200 project nominations, which were evaluated using Council's 11 endorsed community criteria. The three largest projects which are included in the program and funded by Council's Reserves are:

- Mahomets Caravan Park **Cost: $2.0 million**
- Maitland Park Traffic Improvements (Shared Priority 2) **Cost: $2.3 million**
- Microgrid Project (Shared Priority 5) **Cost: $1.5 million**

A number of new capital projects listed in the 2024-25 Capital Program are directly related to the Community Voice 10 Year Capital Works Plan, including:

- Community Nursery Tree Farm (Shared Priority 6) **Cost: $23,000**
- Meru Waste Disposal Facility Cells (Shared Priority 1) **Cost: $150,000**

Major new capital works (i.e. greater than $500,000) initiated since the 2021 Capital Works Program include:

- Meru Waste Diversion Infrastructure (2021).
- ERP Business Systems Replacement (2021).
- Arthur Road Upgrade (2021).
- Art Gallery/Visitor Centre Precinct Development (2021).
- Chapman Road Cycle Path from Sunset Beach to Drummond Cove (2022) (Shared Priority 8).
- Spalding Precinct Plan (2022).
- Geraldton Airport Microgrid (2022) (Shared Priority 5).
- Broome Street Path (2023).
- Chapman Valley Road/Bosley Street Roundabout Improvements (2023).
- Sunset Beach GSC Groyne Field Stage 2 (2023).

Case study: Rye Pier

Overview

Rye Pier, located in Rye, Victoria, was originally constructed in 1860. Stretching into Port Phillip Bay, it has served as a crucial piece of infrastructure for the town's maritime activities for over 160 years. The pier was rebuilt in 1993-94 and has recently undergone significant reconstruction. The inner 270-metre section of the pier was rebuilt and completed in 2022, with the pier deck widened to 4.2 metres and new handrails and solar lighting installed to improve safety and accessibility.

Rye Pier is situated along the Mornington Peninsula, near the town's central foreshore area. It's a popular destination for sightseeing, fishing, and swimming. The surrounding area likely includes beach amenities, parking facilities, and nearby shops and cafes typical of a seaside town. The pier is used by locals and visitors for recreational activities such as fishing, diving, and casual strolls.

Cost and lifecycle

The recent reconstruction of Rye Pier's inner section was funded under the $24 million Building Works economic stimulus investment. In 2020, a $500,000 upgrade to the Rye Pier Low Landing was completed, providing an all-abilities access ramp and improved berthing facilities.

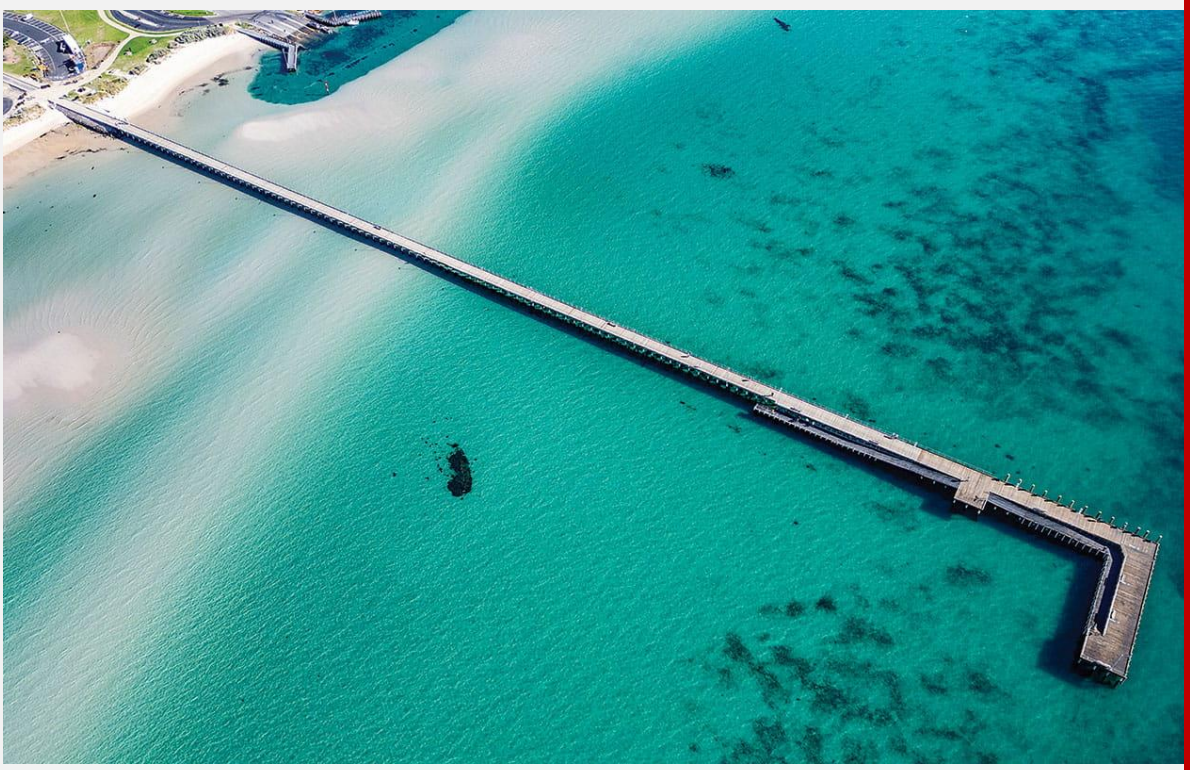


Image reproduced from Parks Victoria.

4 Options Identification

4.1 Overview

The primary driver for the investigation into jetty options is to provide a 360-degree, accessible over water experience for residents and visitors. Key considerations in the development of jetty options and concepts have included:

- Avoidance of ocean view obstruction from the foreshore.
- To ensure public safety in terms of use of jetty and wave inundation.
- Jetty structure not to interfere with vessel movements.
- Improved over water accessibility for recreational groups, particularly fishing recreational groups.
- Creation of tourism attraction and boost to overall Geraldton visitor experience.
- Ensuring a balanced approach to infrastructure investment in Greater Geraldton.

Determination of jetty options have been undertaken at a high level due to the preliminary nature of the investigation. Should the investigations proceed beyond an options analysis detailed design and costings will be undertaken.

The design of each jetty option considered the following:

- A jetty length of 125 metres best reflects typical jetty lengths within Western Australia and value for money (i.e. a longer jetty is likely to be cost prohibitive).
- Construction techniques and materials most likely to deliver best whole of life costs and structural design life.
- Jetty load allowance for pedestrian use and maintenance vehicles.
- Structure to withstand horizontal wave load (i.e. impact of wave on the structure).
- Structure to vertical wave uplift load (i.e. impact of wave to structure's underside).

Wave uplift loads (i.e. the upward force exerted by waves) have the potential to cause significant damage to jetty structures. The primary method for managing wave uplift load is to construct the jetty deck level at a height which avoids wave crests during a design event.

All three jetty designs incorporate steel piles and concrete deck and a jetty height of 4.5 mAHD[4] . Given the height of the jetty deck would reduce the recreational functionality of the jetty, the options include a lower level landing (constructed from permeable grated decking to limit uplift loads) to extend down to an elevation of 1.5 mAHD. It is envisaged the lower level landing would provide a reasonable level of access to the water during the full tidal range.

An example of a similar jetty structure to the proposed options is presented in Figure 4-1.

[4] mAHD is the abbreviation for elevation in metres with respect to the Australian Height Datum which in turns refers to a mean water level.

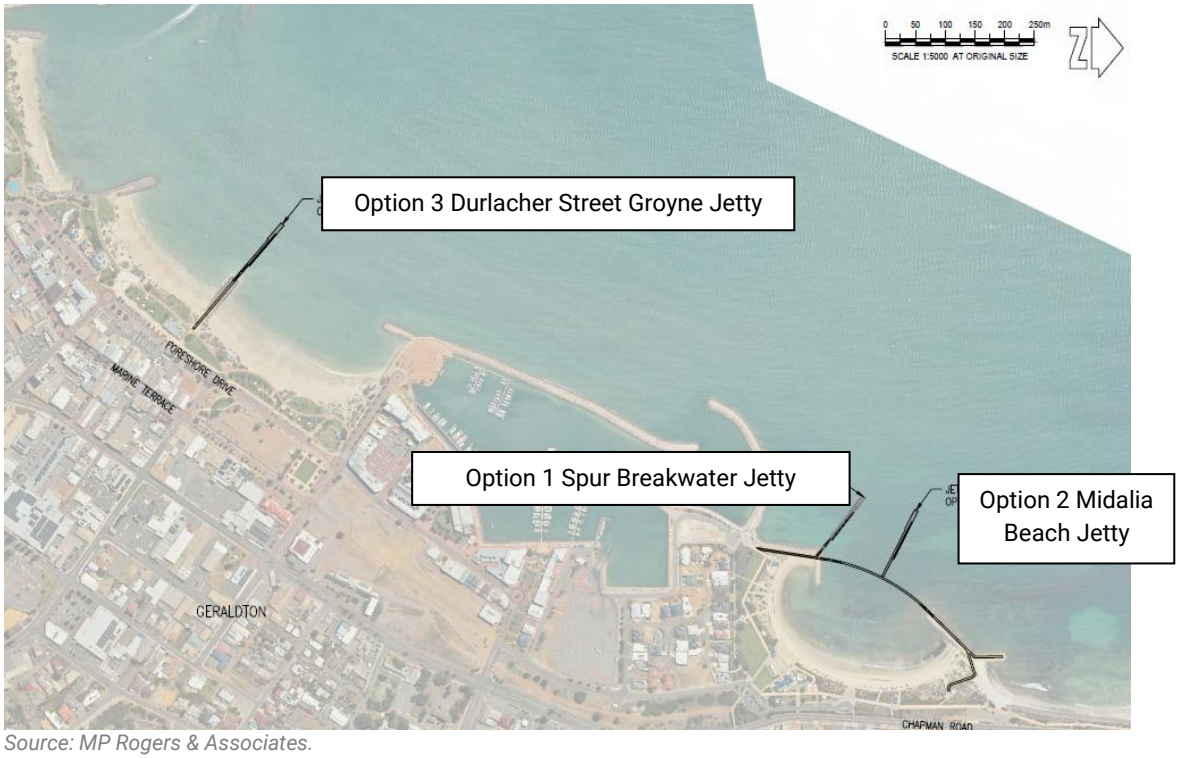
Figure 4-1 Jetty of similar structure to proposed options

Source: MP Rogers & Associates.

Based on the above design requirements, three options have been developed (Figure 4-2):

- Option 1 Spur Breakwater Jetty: a single 125 metre long jetty off the spur breakwater
- Option 2 Midalia Beach Jetty: reflective of the Jetty Group proposal, total jetty length of 342 metres, consisting of a large structure spanning the width of Midalia Beach (217 metres), connecting the spur breakwater with the rock headland, including an additional offshore extension of the jetty (125 metres).
- Option 3 Durlacher Street Groyne Jetty: a 125 metre long jetty off the end of the Durlacher Street Groyne at Town Beach.

Figure 4-2 Jetty Options Locality Plan



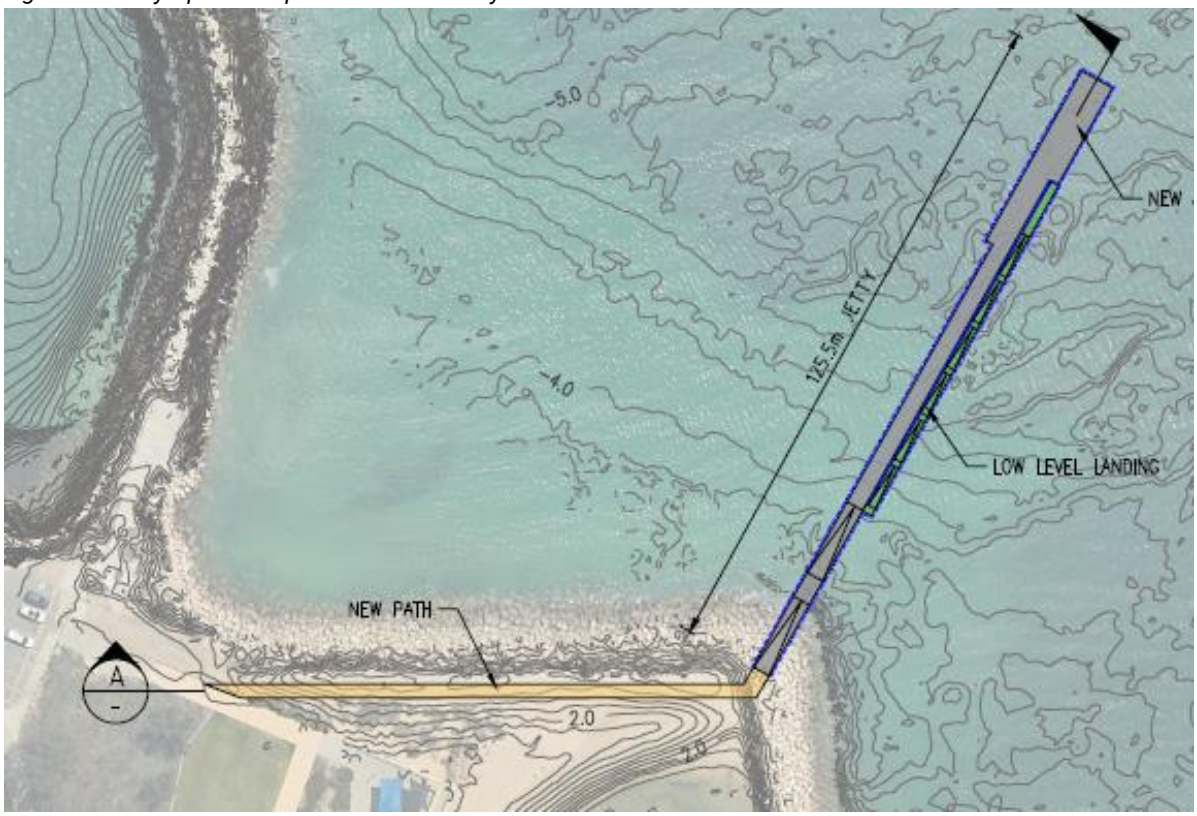
Source: MP Rogers & Associates.

4.2 Option 1 Spur Breakwater Jetty

At an estimated cost of $11.9 million, Spur Breakwater Jetty (Option 1) would involve the construction of a 125 metre long jetty out from the spur breakwater. As the elevation of the spur breakwater is approximately 3 mAHD, the jetty deck level would increase over the inner sections of the jetty to reach the final level of 4.5 mAHD. It is envisaged that an upgrade of the path along the spur breakwater would be required to better facilitate access to the jetty.

An overview is presented in Figure 4-3, more detail is contained in Appendix A.

Figure 4-3 Jetty Option 1: Spur Breakwater Jetty



At the end of the useful life of the jetty there would be a requirement for demolition. An estimate of the demolition costs (in current day terms) has been prepared. The demolition costs would include full deconstruction of the structure as well as removal or cutoff of the piles beneath the seabed. The costs for disposal of all materials would also be included. The estimated demolition cost is $2.5 million (including management fees and 30% contingency).

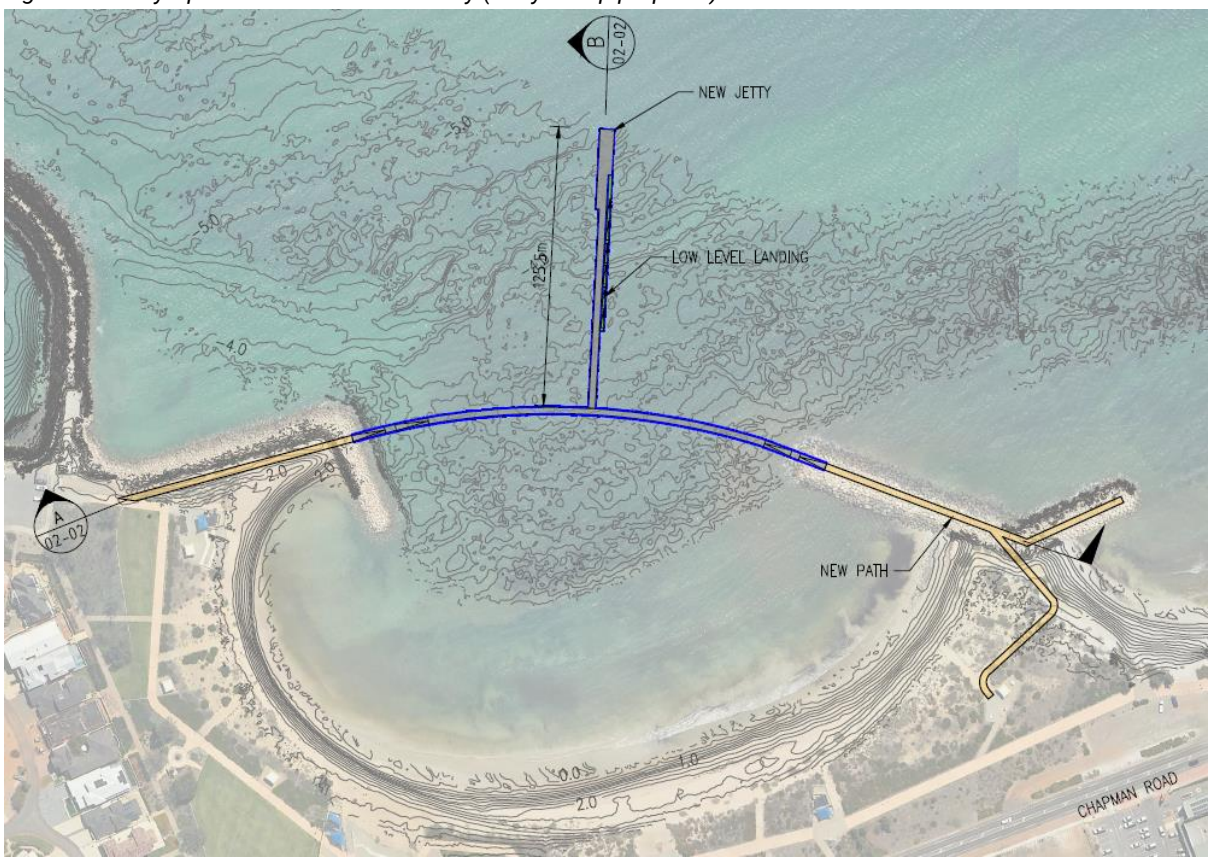
4.3 Option 2 Midalia Beach Jetty

Midalia Beach Jetty (Option 2) is estimated to cost $24.1 million and directly addresses the Jetty Group proposal for a 217 metre long structure spanning the width of Midalia Beach connecting the spur breakwater and the rock headland as well as a 125 metre long jetty extending offshore from the centre of the walkway.

The elevation of the walkway jetty would need to increase at both shore connections to achieve the required jetty deck level. An upgrade to the path would be required at the southern end, along the spur breakwater, to facilitate access whilst at the north an additional path would be required to connect the jetty to the existing path network.

An overview is presented in Figure 4-4, more detail is contained in Appendix A.

Figure 4-4 Jetty Option 2: Midalia Beach Jetty (Jetty Group proposal)



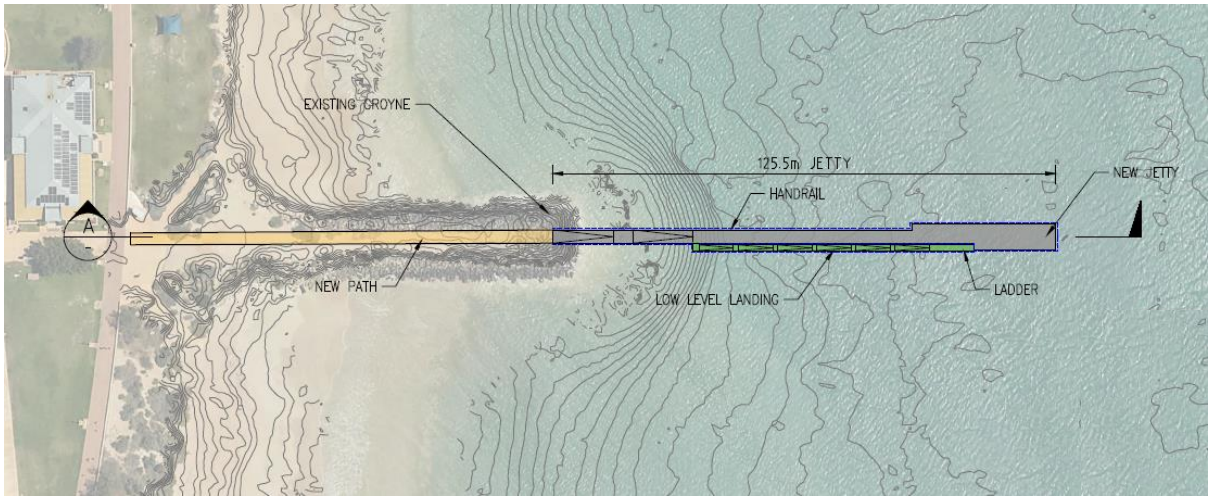
An assessment of the demolition cost for this jetty at the end of its service life has been made. The estimated demolition cost, in current day terms, is $5.0 million (including management fees and 30% contingency).

4.4 Option 3 Durlacher Street Groyne Jetty

The cost to develop the Durlacher Street Groyne Jetty (Option 3) is estimated at $11.9 million and would involve the construction of a 125 metre long jetty out from the end of the Durlacher Street Groyne. Similar to the other options, the Durlacher Street Groyne has an elevation of approximately 3 mAHD, therefore the jetty deck level would need to increase over the inner sections of the jetty to reach the final level of 4.5 mAHD. It is envisaged that an upgrade of the path along the Durlacher Street Groyne would also be required to better facilitate access to the jetty.

An overview is presented in Figure 4-5, more detail is contained in Appendix A.

Figure 4-5 Jetty Option 3: Durlacher Street Groyne Jetty



An assessment of the demolition cost for the jetty at the end of its service life has been made. The estimated demolition cost is $2.5 million (including management fees and 30% contingency).

4.5 Options Summary

A preliminary estimation of development and maintenance costs for each jetty option have been determined and are presented in Table 4-1. Maintenance costs in Table 4-1 are the estimated total over a 10-year period, reflecting the likelihood of larger maintenance activities every 10 years.

The magnitude of costs associated with Option 2 Midalia Beach Jetty is reflective of the complexity of the construction and structure length (boardwalk and spur) compared to the other options.

Table 4-1 Jetty Options development and maintenance costs

	Option 1 Spur Breakwater Jetty	Option 2 Midalia Beach Jetty	Option 3 Durlacher Street Groyne Jetty
Construction cost, including contingencies (preliminary)	$11,880,730	$24,132,970	$11,888,738
Construction timeline	24 months	28 months	24 months
Maintenance cost (10-year total)	$1,537,730	$3,111,780	$1,537,730
Design life	50 years	50 years	50 years
End of life demolition costs (preliminary)	$2,500,000	$5,000,000	$2,500,000

Source: MP Rogers & Associates.

5 Options Evaluation Components

5.1 Social Impact

Accessibility

Each of the three jetty options include a length of elevated pathway and jetty decking which has a gradient of 1:20 this is considered almost flat and highly accessible.

The ramp down to lower jetty deck on all three options is a 1:14 slope which is considered as accessible and at a compliant gradient.

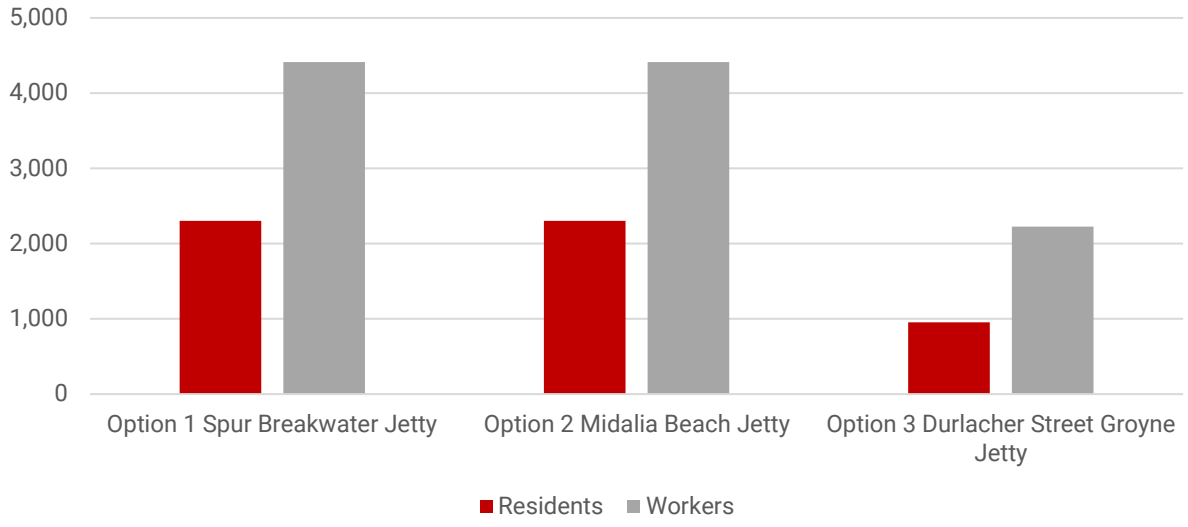
Recreational Use

Recreational use, like many recreational activities, is contingent on the potential for casual use. Figure 5-1 indicates estimated numbers of workers and residents who live within a 15-minute walk of the jetty options.

The Spur Breakwater Jetty (Option 1) and Midalia Beach Jetty (Option 2) are located at Midalia Beach which is close to a concentration of workers and closer to residential developments. The 15-minute walkable catchment captures a portion of Beresford and Wonthella.

Durlacher Street Groyne Jetty (Option 3) is located in Town Beach and is further from high concentration of workers and residential suburbs. The 15-minute walkable catchment captures a portion of the suburbs of Geraldton and Beachlands.

Figure 5-1 Potential jetty local users within a 15-minute walkable catchment



Source: REMPLAN Community.

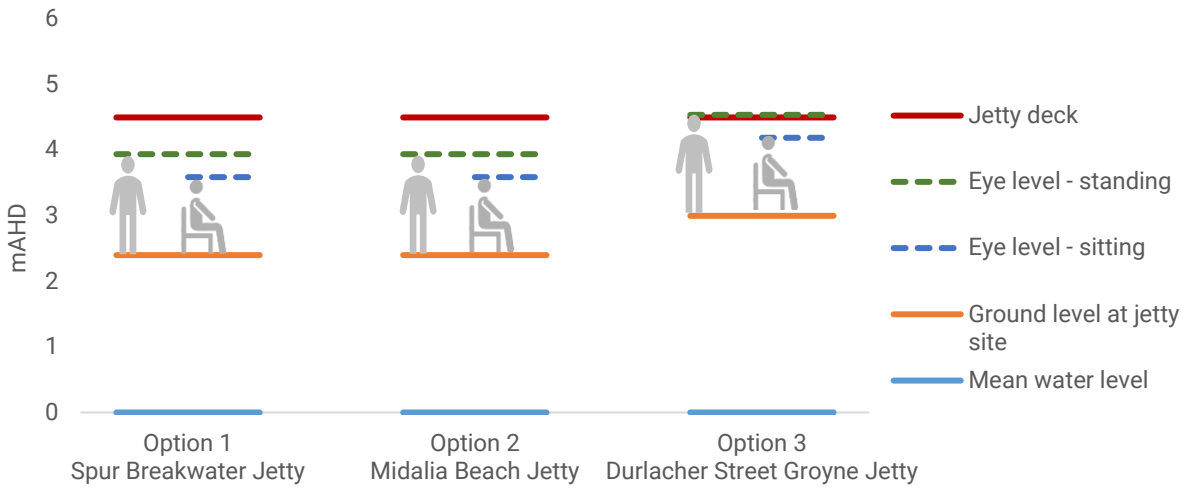
Visual Impact

All three jetty options are the same height above the water line (4.5 mAHD), however the jetty deck elevation in relation to the ground level at jetty site varies. The elevation of the land leading up to the jetty path for Options 1 and 2 is 2.4 mAHD (i.e. 2.4 metres above the mean water level) for Option 3 (Durlacher Street Groyne Jetty) land level is 3 mAHD.

This implies Option 3 will have less of a visual impact for persons standing on Town Beach looking out to sea, compared to the impact of Options 1 or 2 on persons standing on Midalia Beach.

This implies persons standing on Town Beach will potentially have a less obstructed due to Option 3, compared to those standing on Midalia Beach should Option 1 or 2 be developed. The reason being Option 3 at Town Beach has a lower jetty deck level in relation to the ground level. The is represented in Figure 5-2, it should be noted that this does not take into account the potential for additional visual impact resulting from guard rails and shade structures.

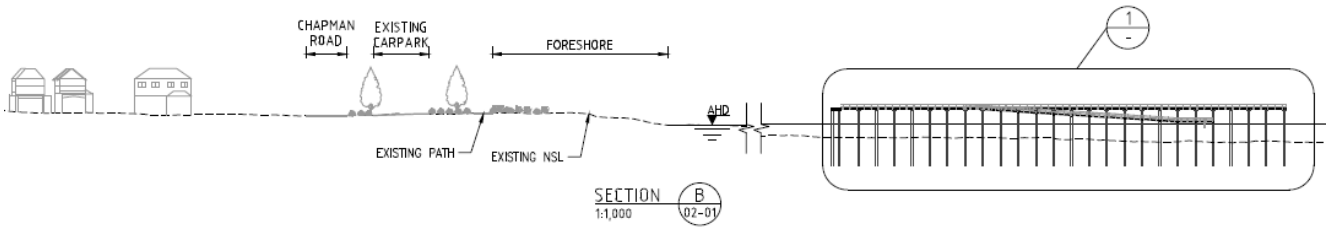
Figure 5-2 Potential visual impact from beach



Source: REMPLAN.

Historically jetties have played a crucial role in the establishment of Geraldton. If a jetty is designed to reflect local history, character and complement the existing landscape, it could have a positive visual impact for local residents. However, since Options 1 and 2 at Midalia Beach will be visible from nearby homes (Figure 5-3), further engagement with local residents will be needed to secure community support and achieve beneficial outcomes.

Figure 5-3 Cross sectional view of Option 2 Midalia Beach Jetty



Source: MP Rogers & Associates.

Over Water Experience

An example of a similar jetty to the options being proposed is presented in Figure 5-4, noting the deck level for the proposed options is another 1 metre higher than the jetty shown in this example.

Figure 5-4 Jetty of similar structure to proposed options

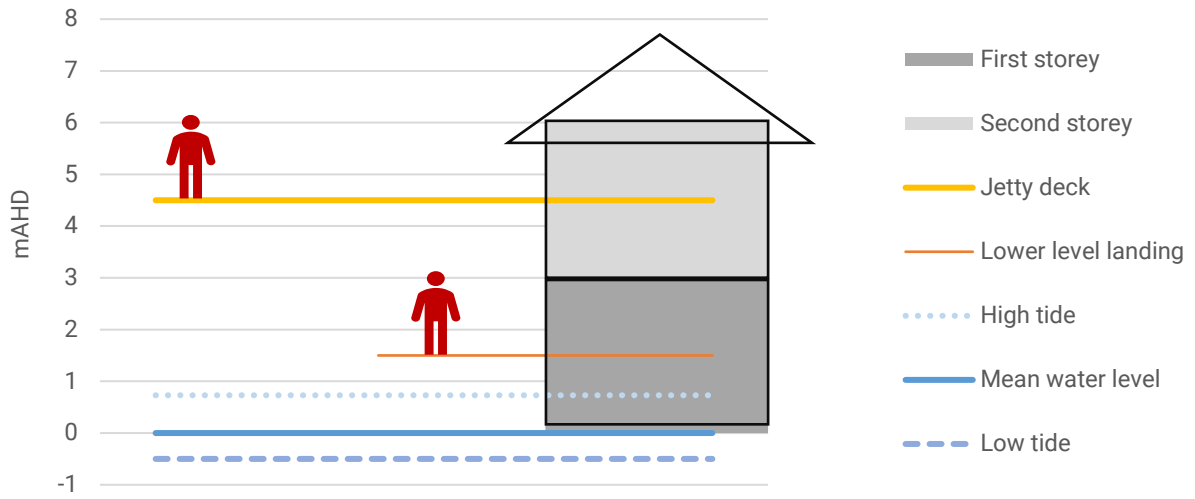
Source: MP Rogers & Associates.

Regardless of the option selected, all jetty decks must 4.5 metres above the mean water line to ensure user safety. A height of 4.5 metres is the equivalent of a one and a half storeys, assuming a 3 metres per level. To put this in perspective Figure 5-5 is a simplified graphic of the jetty deck over the mean water level in relation to a two-storey building. The outcome is unavoidable due to safety and engineering requirements and should be considered in relation to the aspirational outcome wanting to be achieved by the Jetty Group and other community members, being an over water experience which provides accessibility and improved connection between recreational users and the ocean.

To address the reduced functionality of the relatively high jetty deck, all three options include a lower deck at 1.5 mAHD. This will provide a reasonable level of water access during the full range of tidal movements. It should be noted the tidal range in Geraldton is relatively small compared to other regions between 0.5 metres to 1.0 metres.

- Low tide can be around 0.2 to 0.5 metres below AHD.
- High tide typically reaches around 0.6 to 0.8 metre above AHD.

Figure 5-5 Jetty deck height above water in relation to a two-storey building



Source: REMPLAN.

5.2 Economic Impact

Construction activity boost to local economy

Adopting the estimated development costs and projected timelines for each of the jetty options the potential economic impacts associated with jetty development has been estimated. Jetty development activity will primarily be serviced by the civil engineering and professional services sectors. For the purpose of economic modelling it has been assumed all development expenditure will be captured within the Greater Geraldton LGA, i.e. local engineering and professional services businesses will have the capacity to deliver the project.

Activity associated jetty development will increase the local demand for goods and services as local businesses service the demand of the construction activity. In addition those local businesses will also increase their requirement for locally sourced goods and services. The supply chain effects include multiple rounds of flow-on effects.

The boost to employment, direct (i.e. construction jobs on site) and indirect (supply chain related) will result in the payment of additional wages and salaries. A portion of these wages will be captured locally (i.e. boost to local spending in Geraldton) through a consumption effect.

Table 5-1 summarise the projected direct and indirect effects associated with development of each of the jetty options. During the construction phase:

- Option 1 Spur Breakwater Jetty will generate $19.5 million in output (inclusive of $11.9 million construction cost) and support 19 jobs (when construction activity peaks in year 2).
- Option 2 Midalia Beach Jetty will generate $39.6 million in output (inclusive of $24.1 million construction cost) and support 30 jobs (when construction activity peaks in year 2).
- Option 3 Durlacher Street Groyne Jetty will generate $19.5 million in output (inclusive of $11.9 million construction cost) and support 19 jobs (when construction activity peaks in year 2).

Table 5-1 Summary of the economic impact of jetty construction on Greater Geraldton LGA

	Direct effect	Indirect effects[a]	Total effect	Type 2 Multiplier effect
Option 1 Spur Breakwater Jetty				
Output ($M)	$10.8	$8.7	$19.5	1.806
Employment (Jobs) - Peak Year 2	7	12	19	2.714
Value-added ($M)	$4.3	$3.9	$8.2	1.924
Option 2 Midalia Beach Jetty				
Output ($M)	$21.9	$17.7	$39.6	1.806
Employment (Jobs) - Peak Year 2	11	19	30	2.727
Value-added ($M)	$8.7	$8.0	$16.7	1.924
Option 3 Durlacher Street Groyne Jetty				
Output ($M)	$10.8	$8.7	$19.5	1.806
Employment (Jobs) - Peak Year 2	7	12	19	2.714
Value-added ($M)	$4.3	$3.9	$8.2	1.942

Note: a) flow-on supply chain & consumption effects.
Source: REMPLAN.

In summary:

- Midalia Beach Jetty (Option 2) delivers a higher value of indirect economic effects, primarily related to the high development cost.
- All three development options generate the same multipliers effects, i.e. the total economic effect in relation to the direct project expenditure.
    - The Type 2 Output Multiplier for all three options is 1.806, that is for every $1.00 spent on jetty development, regardless of which option, another $0.81 is captured in the local economy.
    - The Type 2 Employment Multiplier for all three options is 2.714 or 2.727, that is for every one job directly associated with jetty development, regardless of which option, at least another one and a half jobs are supported elsewhere in local economy.

Value of Jetty for Recreational Fishers

A jetty in Geraldton will provide additional and accessible recreational fishing activities for local residents. The economic value a jetty may provide recreational fishers has been estimated through the adoption of a range of assumptions regarding proportion of residents who fish recreationally, the frequency and the value to the participant of a low-cost recreational activity (Appendix C).

The annual value of jetty use by local recreational fishers has been estimate at $1,565,000 per annum for all three of the jetty options.

Value of Jetty Experience for Tourists

An estimate of the economic value for all tourists experiencing one of the proposed jetty options over a year has been determined (Table 5-2), based on various assumptions such as the proximity of each jetty to visitor accommodation, the time tourists spend on the jetty, and the value of that time. Assumptions and methodology are detailed in Appendix D.

Table 5-2 Value of Jetty Experience

	Option 1 Spur Breakwater Jetty	Option 2 Midalia Beach Jetty	Option 3 Durlacher Street Groyne Jetty
Annual economic value for tourists	$301,000	$387,000	$753,000

Cost Benefit Analysis

A preliminary cost benefit analysis (CBA) has been undertaken to determine the societal benefit for every dollar of cost associated with development and maintenance of each of the jetty options over a 20-year period.

The CBA considered costs associated with development and maintenance, and the beneficial value of use of the jetty to local resident recreational fishers and tourists. Further CBA detail is provided in Appendix D.

The preliminary CBA determined a net benefit and a positive ratio of benefits to costs is achieved with Options 2 and 3.

- Option 2 Midalia Beach Jetty: Over a 20-year analysis period a $4.8 million net benefit achieved, and for every $1.00 of cost a benefit of $1.37 is delivered.
- Option 3 Durlacher Street Groyne Jetty: Over a 20-year analysis period a $9.0 million net benefit is achieved, and for every $1.00 of cost a benefit of $1.71 is delivered.

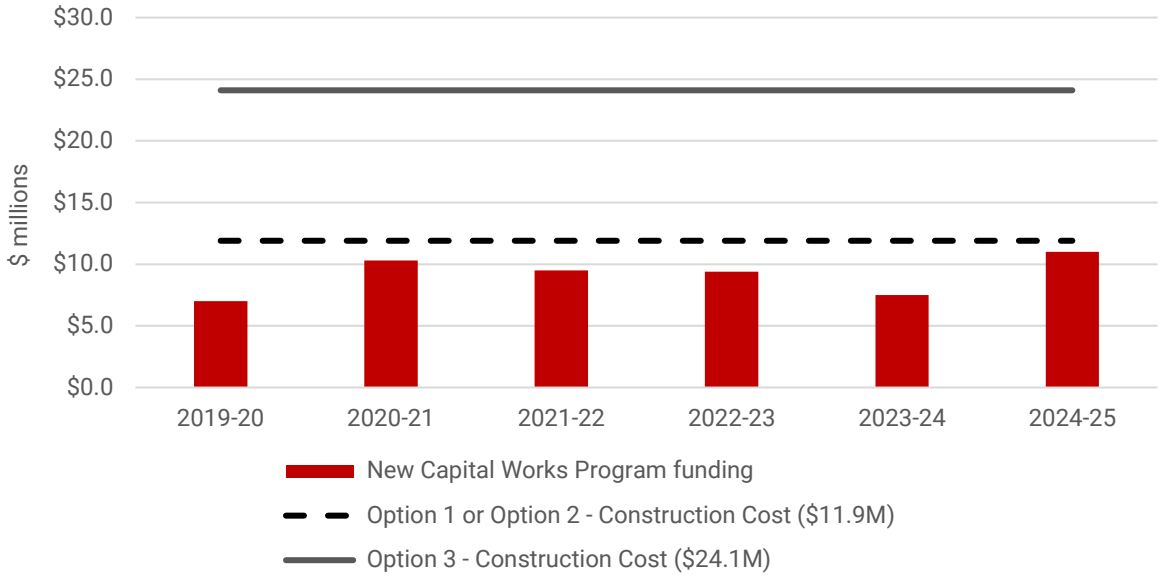
Table 5-3 Cost Benefit Analysis Summary (at a 7 per cent discount rate)

	Option 1 Spur Breakwater Jetty	Option 2 Midalia Beach Jetty	Option 3 Durlacher Street Groyne Jetty
Project Net Present Value ($M)	$4.8M	-$8.6M	$9.0M
Cost Benefit Ratio	1.00 : 1.37	1.00 : 0.66	1.00 : 1.71

5.3 Financial Impact

Each jetty option will have significant financial implications for Council budgeting, this is particularly evident when considering the cost to develop the jetty options in relation to the annual value of Council's new capital program Figure 5-6.

Figure 5-6 Jetty Options development costs in relation to Council New Capital Works funding

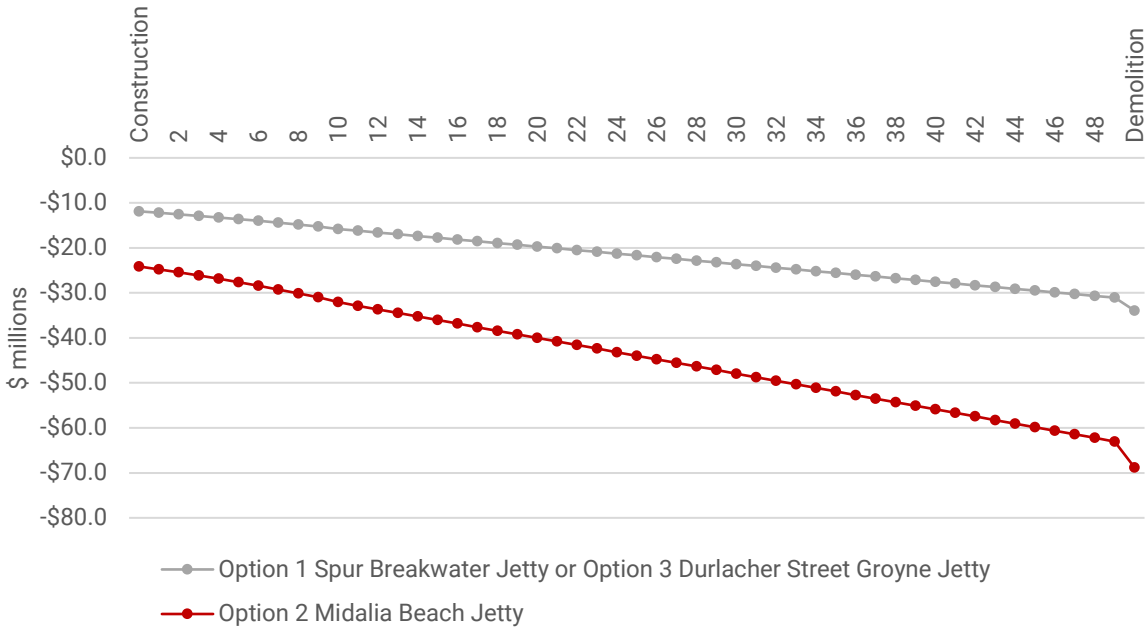


A preliminary financial appraisal was developed for each Option based on projection of asset life and estimates of costs (no income is derived under the options considered). The appraisal considered:

- capital cost to develop,
- maintenance and renewal,
- asset depreciation, and
- end of life demolition.

The cumulative financial outcome (Figure 5-7) does not take into consideration the potential for future funding assistance, or jetty governance.

Figure 5-7 Cumulative Financial Outcome – Life of Asset



5.4 Risks Analysis

Table 5-4 outlines considerations that will require further investigation and detail should the jetty options proceed to business case development.

Table 5-4 Preliminary Risk Analysis

Preliminary Risk Identification and Consequence	Preliminary Probability	Preliminary Response
Project Risks		
Design and Structural Integrity • Risk of design flaws leading to structural failure. • Environmental conditions (e.g., tides, waves, currents) impacting the durability. • Inadequate materials used during construction.	**LOW**	Option 2 includes connection to two coastal structures therefore this Option 2 may be more vulnerable to movement of those structures impacting accessibility. The design, construction and approvals processes will be undertaken in a way to mitigate and minimise any risks.
Construction and Engineering • Delays in project completion due to weather or material shortages. • Safety risks for construction workers.	**LOW**	
Regulatory Compliance • Non-compliance with local council or maritime regulations. • Delays in obtaining permits and approvals.	**LOW**	
Environmental Risks		
Erosion and Water Quality • Jetty altering natural water flows, causing erosion. • Impact on local marine ecosystems and water quality.	**MED**	This initial options analysis has not included investigation into potential geotechnical and environmental risks. It is envisages more detailed investigation will be undertaken during the detailed design phase.
Wildlife Disruption • Interference with habitats of aquatic or bird species. • Increased risk of pollution from human activities.	**LOW**	Design, approvals and construction processes will be undertaken in a way to minimise risks. Potential for Option 2 to interfere with wave energy, however this may have beneficial impact for swimmers. Risk of sediment flow disruption is higher with Option 2 however, there is unlikely to be significant change.
Sediment Flow Disruption • Concentration of jetty piles may disrupt sediment transport patterns.	**LOW**	
Safety Risks		
Public Safety • Risk of accidents or injuries due to improper usage or lack of safety features. • Insufficient signage, lighting, or barriers leading to unsafe conditions.	**LOW**	Option 2 mild sheltering impact due to jetty piles, unknown at this stage if reduction in wave energy would be positive (due to calmer water for swimming).

Weather-related Hazards • Storms, flooding, or high winds causing structural damage or dangerous conditions.	**LOW**	Design elements will be included to mitigate and minimise any risks. Maintenance program will be developed and delivered to minimise any risks.
Operational and Maintenance Risks		
Maintenance Requirements • Regular maintenance needed to prevent wear and tear. • Unexpected costs for repairs due to environmental damage.	**LOW**	The construction processes will be undertaken in a way to mitigate and minimise any risks. A maintenance and asset renewal program will be developed and implemented to mitigate any risk. Public safety measures and crime deterrents will be incorporated into the design to minimise risk.
Vandalism or Theft • Potential damage from vandalism or unauthorised access. • Theft of jetty-related equipment or materials.	**MED**	
Community and Social Risks		
Community Opposition • Resistance from local residents or stakeholders due to environmental or safety concerns. • Resistance from local residents due to parking traffic and parking implications • Resistance from local residents due to visual impact.	**MED**	Project has community support as evidenced by engagement in 2020 which ranked the 'Beresford Foreshore Jetty' as 6th of 18 projects. Parking at Midalia Beach currently services beach users and may have limited capacity to services jetty users.
Overcrowding and Usage Issues • Overuse leading to degradation of the jetty or nearby recreational areas. • Conflicts between different user groups (e.g., recreational fishers, swimmers, boaters).	**MED**	
Financial and Economic Risks		
Cost Overruns • Unforeseen costs during construction, leading to budget issues.	**MED**	Detailed design and costings will be undertaken to ensure risk is minimised and contingency allowed for, however, there remains a high likelihood of continued cost escalation. Project has been identified as a community priority and will integrate into the wider foreshore development ensuring accessibility in turn ensuring community and tourists use, however, the magnitude of costs will require a high rate of usage to enable economic return. Project development will require external funding due to the magnitude of cost.
Economic Viability • Lower than expected community usage, affecting economic returns on investment.	**MED**	
Council Capital Works Program • Project cost will have long-lasting implications on Council's financial allocations for new and renewal of capital works programs.	**HIGH**	

6 Options Evaluation

In order to determine a preferred option a simplistic ranking approach was adopted. Each option was ranked (a ranking of 1 being the highest/most beneficial, 3 being the poorest/least beneficial) against key outcomes, with equal weighting across all outcomes.

Based on this preliminary assessment and adopting equal weighting for reach of the outcomes, the Durlacher Street Groyne Jetty (Option 3) is the preferred option.

Outcomes	Option 1 Spur Breakwater Jetty		Option 2 Midalia Beach Jetty		Option 3 Durlacher Street Groyne Jetty	
Return on investment (cost to benefit ratio)	2		3		1	
Capital outlay	1		2		1	
Ongoing maintenance and renewal costs	1		2		1	
Whole of life financial outcome	1		2		1	
Economic stimulus through construction phase	2		1		2	
Support of recreational fishing	1		1		1	
Accessibility	1		1		1	
Existing adequate parking	2		2		1	
Visual impact from land	2		2		1	
Over water experience (length of deck)	2		1		2	
Largest resident catchment within a 15-minute walk	1		1		2	
Supports tourism activity	2		2		1	
Sum (equal weighting)	*18*	-	*20*	-	*15*	-
Overall Rank	**2**		**3**		**1**	

7 Considerations

- **Jetty construction**
  - For the purposes of this initial concept level assessment each of these options has been developed with a reasonable degree of similarity. From a coastal engineering perspective there is little to differentiate between the three options.
  - The preliminary nature of concept design and options analysis is reflected in the initial design costs and contingencies applied for each of the options, however at this point in time it is not possible to differentiate between the options with regard to these items.

- **Project Delivery**
  - The approvals process for such a project is significant and complicated, with an automatic referral to the EPA.

- **Capital expenditure comparison**
  - The preliminary cost of the jetty options ($11 million - $24 million) is significantly higher than recently completed or commenced capital works projects within Greater Geraldton, and there is limited precedent for capital works projects of this size in Geraldton. The total budget for new capital works in Geraldton has ranged between $7 million and $11 million since the 2019-2020 financial year.
  - This project involves significant investment, without funding assistance the project may have implications for other council priorities.

- **Governance**
  - Ownership, management and long-term maintenance costs and responsibilities need to be considered.

- **Economic uplift**
  - While the jetty will provide recreational benefits for locals and visitors, it will be important to consider if the economic uplift will be of a scale to justify a project of this cost and scale. As Midalia Beach is not located in the central business district of Geraldton, it may not generate as much economic uplift as developments nearer to retail and hospitality businesses.

- **Environmental and geotechnical impacts**
  - Critical information has not been obtained for the sites for this initial investigation, such as information on geotechnical conditions as well as any specific environmental sensitivities.
  - The potential environmental impacts of the jetty need to be explored, particularly in regard to sand retention. This is especially important considering the significant environmental works undertaken for the Beresford Foreshore Landscape Masterplan.
  - Bathymetric surveying and the impact on significant seagrass areas must be considered.

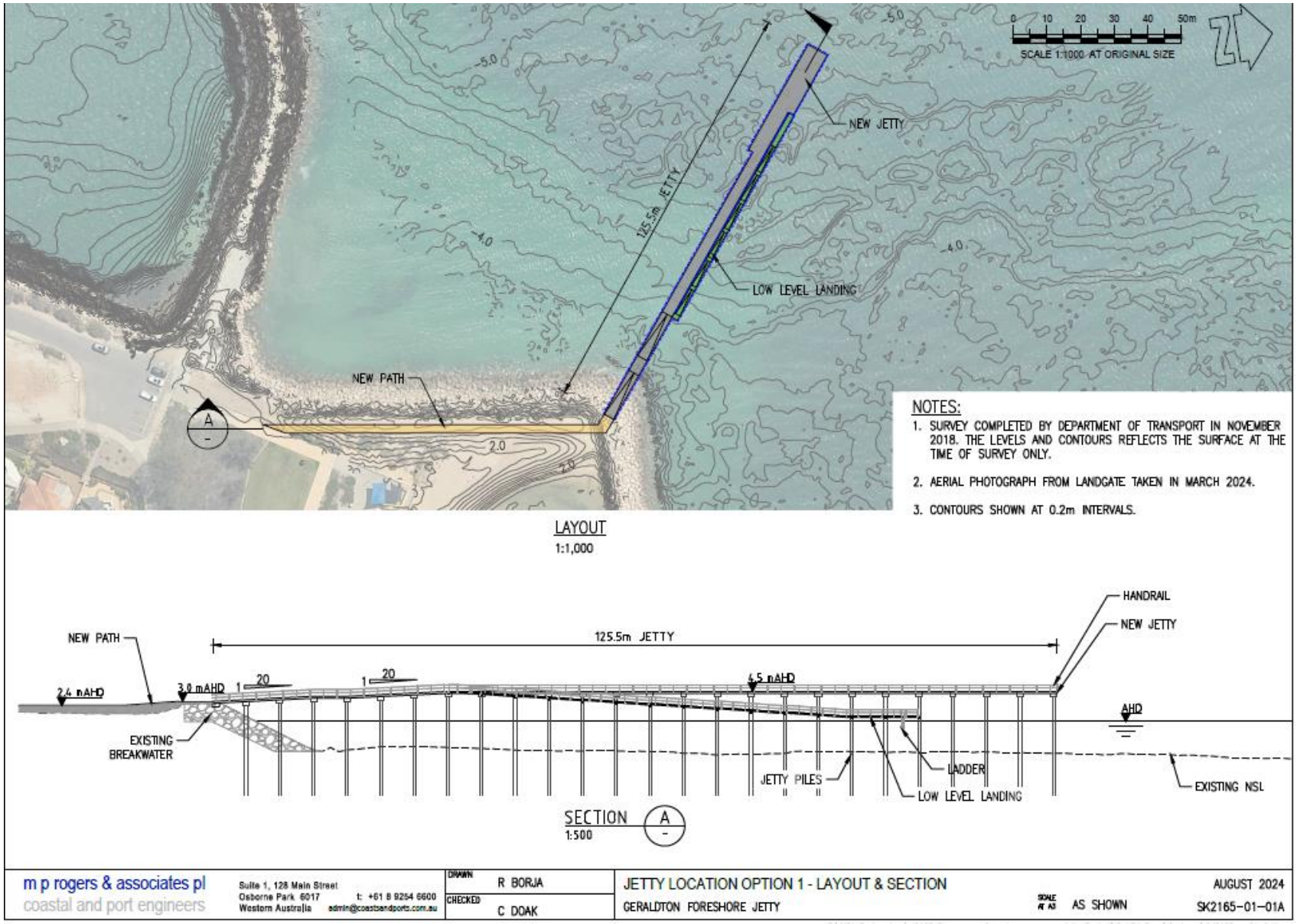
Appendix A. Jetty Options – Opinion of Probable Costs, Layout and Sections

A.i. Jetty Option 1: Spur Breakwater Jetty

Table A-1 OPC for Capital Construction of Jetty Option 1

Item	Activity	Subtotal	Total for Item
1	**Preliminaries**		**$1,584,960**
1.1	Preliminaries, including mobilisation/demobilisation, insurances, survey, site management, environmental compliance, etc.	$1,584,960	
2	**Jetty Construction**		**$6,096,000**
2.1	Construction 125m long concrete jetty with steel piles and FRP lower level landing.	$6,096,000	
3	**Path Connection**		**$33,800**
3.1	Construction of path along Durlacher Street groyne to facilitate access to the jetty	$33,800	
	Subtotal 1	*$7,714,760*	*$7,714,760*
	Management & Design Fees (incl. Geotech)	$771,476	$771,476
	Contingencies	$2,314,428	$2,314,428
	Subtotal 2	*$10,800,664*	*$10,800,664*
	Goods and Services Tax	$1,080,066	$1,080,066
	Total Estimated Cost	**$11,880,730**	**$11,880,730**

Source: MP Rogers & Associates.

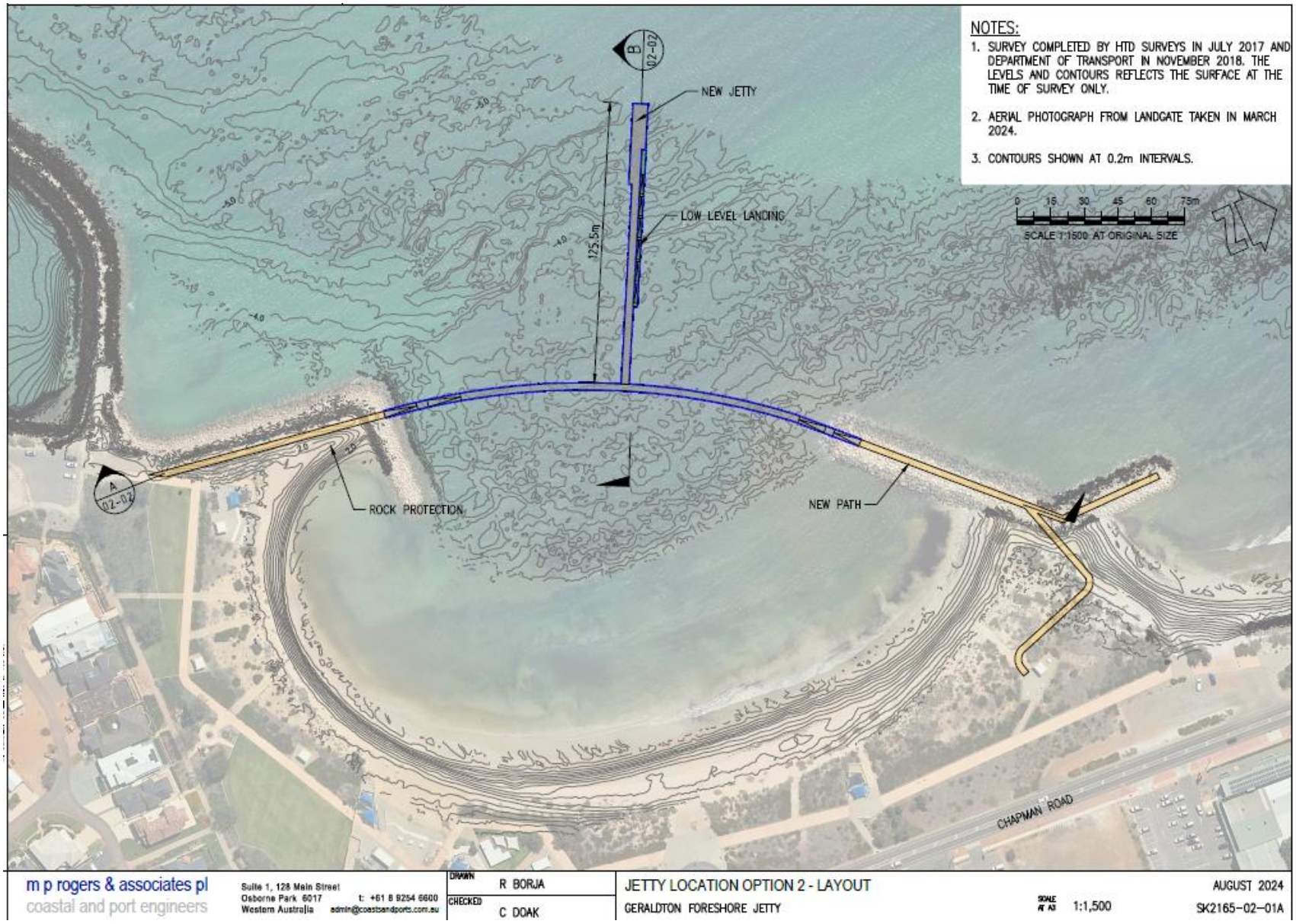

0 10 20 30 40 50m
SCALE 1:1000 AT ORIGINAL SIZE
NEW JETTY
125.5m JETTY
LOW LEVEL LANDING
NEW PATH
-5.0
-4.0
2.0
NOTES:
1. SURVEY COMPLETED BY DEPARTMENT OF TRANSPORT IN NOVEMBER 2018. THE LEVELS AND CONTOURS REFLECTS THE SURFACE AT THE TIME OF SURVEY ONLY.
2. AERIAL PHOTOGRAPH FROM LANDGATE TAKEN IN MARCH 2024.
3. CONTOURS SHOWN AT 0.2m INTERVALS.
LAYOUT
1:1,000
HANDRAIL
NEW JETTY
NEW PATH
125.5m JETTY
2.4 mAHD
3.0 mAHD
4.5 mAHD
1 20
AHD
EXISTING BREAKWATER
JETTY PILES
LADDER
LOW LEVEL LANDING
EXISTING NSL
SECTION A-A
1:500
m p rogers & associates pl
coastal and port engineers
Suite 1, 128 Main Street
Osborne Park 6017
Western Australia
t: +61 8 9254 6600
admin@coastandports.com.au
DRAWN R BORJA
CHECKED C DOAK
JETTY LOCATION OPTION 1 - LAYOUT & SECTION
GERALDTON FORESHORE JETTY
SCALE AT A3 AS SHOWN
AUGUST 2024
SK2165-01-01A

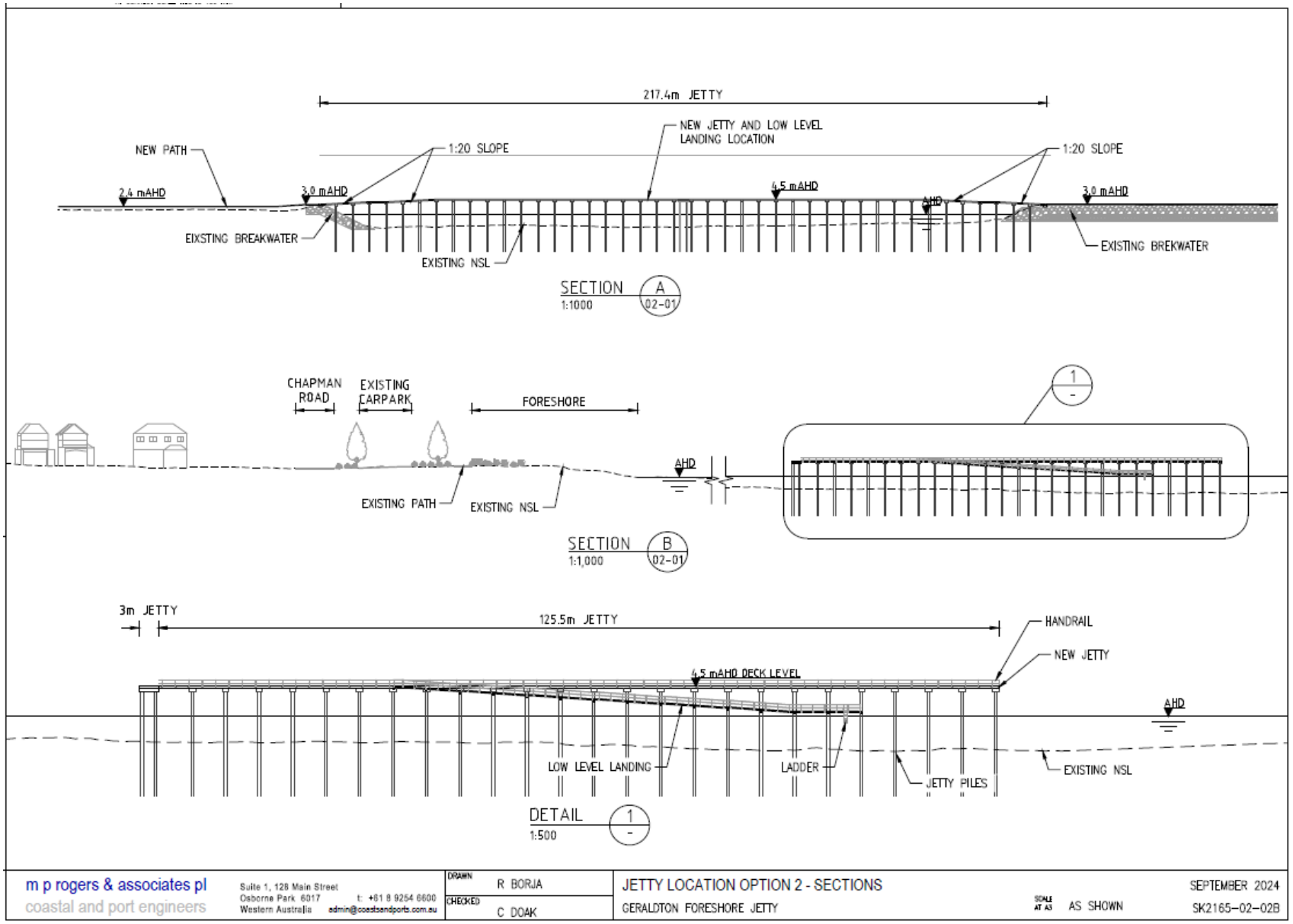
A.ii. Jetty Option 2: Midalia Beach Jetty

Table A-2 OPC for Capital Construction of Jetty Option 2

Item	Activity	Subtotal	Total for Item
1	**Preliminaries**		**$3,207,360**
1.1	Preliminaries, including mobilisation/demobilisation, insurances, survey, site management, environmental compliance, etc.	$3,207,360	
2	**Jetty Construction**		**$12,336,000**
2.1	Construction 125m long concrete jetty with steel piles and FRP lower level landing.	$12,336,000	
3	**Path Connection**		**$127,400**
3.1	Construction of path along the spur breakwater and rock headland to facilitate access to the jetty	$127,400	
	Subtotal 1	*$15,670,760*	*$15,670,760*
	Management & Design Fees (incl. Geotech)	$1,567,076	$1,567,076
	Contingencies	$4,701,228	$4,701,228
	Subtotal 2	*$21,939,064*	*$21,939,064*
	Goods and Services Tax	$2,193,906	$2,193,906
	Total Estimated Cost	**$24,132,970**	**$24,132,970**

Source: MP Rogers & Associates.


NOTES:
1. SURVEY COMPLETED BY HTD SURVEYS IN JULY 2017 AND DEPARTMENT OF TRANSPORT IN NOVEMBER 2018. THE LEVELS AND CONTOURS REFLECTS THE SURFACE AT THE TIME OF SURVEY ONLY.
2. AERIAL PHOTOGRAPH FROM LANDGATE TAKEN IN MARCH 2024.
3. CONTOURS SHOWN AT 0.2m INTERVALS.
NEW JETTY
LOW LEVEL LANDING
125.5m
ROCK PROTECTION
NEW PATH
CHAPMAN ROAD
0 15 30 45 60 75m
SCALE 1:1500 AT ORIGINAL SIZE
m p rogers & associates pl
coastal and port engineers
Suite 1, 128 Main Street
Osborne Park 6017
Western Australia
t: +61 8 9254 6600
admin@coastsandports.com.au
DRAWN R BORJA
CHECKED C DOAK
JETTY LOCATION OPTION 2 - LAYOUT
GERALDTON FORESHORE JETTY
SCALE AT A3 1:1,500
AUGUST 2024
SK2165-02-01A

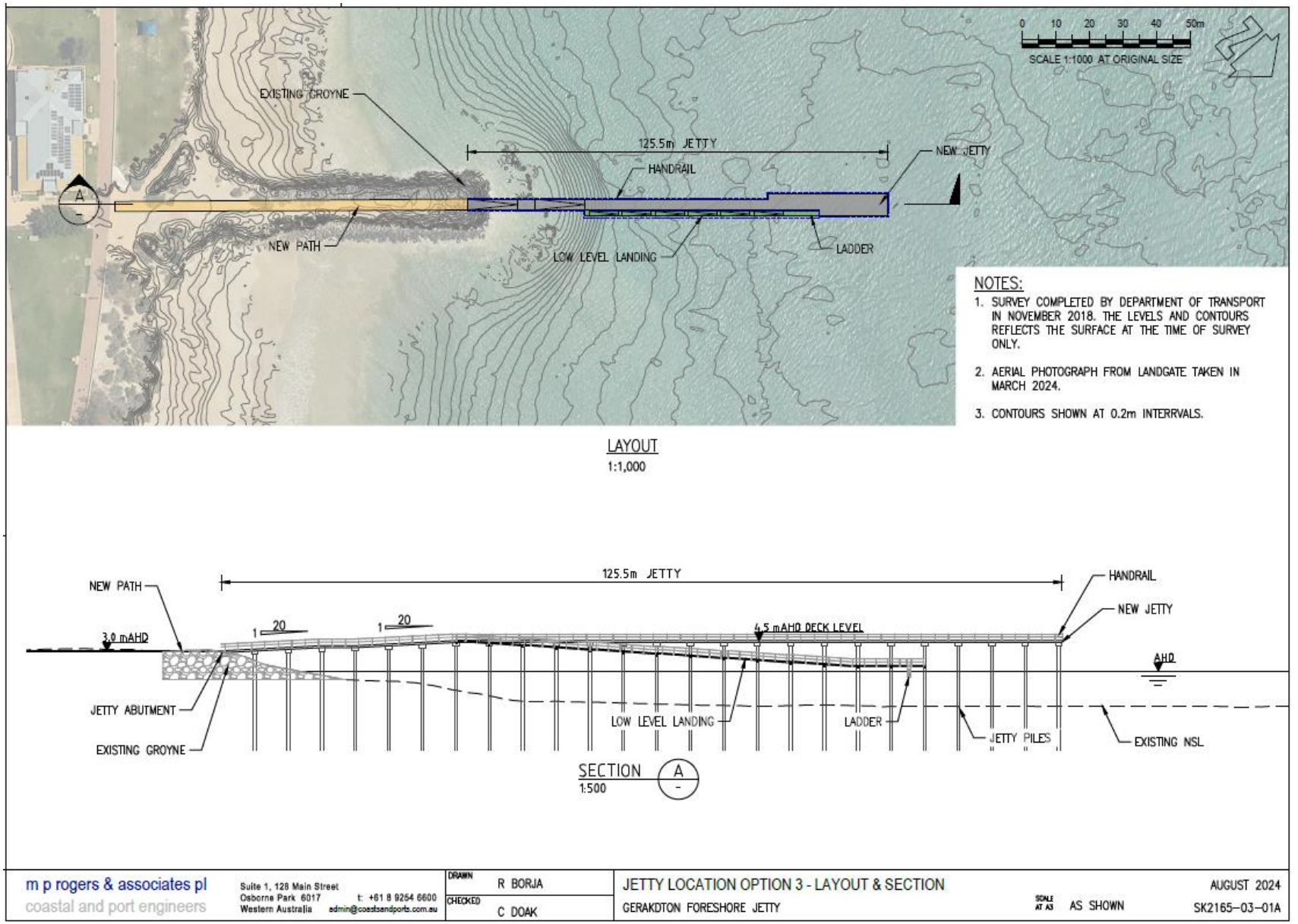

217.4m JETTY
NEW PATH
1:20 SLOPE
NEW JETTY AND LOW LEVEL LANDING LOCATION
1:20 SLOPE
2.4 mAHD
3.0 mAHD
4.5 mAHD
AHD
3.0 mAHD
EIXSTING BREAKWATER
EXISTING NSL
EXISTING BREKWATER
SECTION A
1:1000
02-01
CHAPMAN ROAD
EXISTING CARPARK
FORESHORE
AHD
EXISTING PATH
EXISTING NSL
SECTION B
1:1,000
02-01
3m JETTY
125.5m JETTY
HANDRAIL
NEW JETTY
4.5 mAHD DECK LEVEL
AHD
LOW LEVEL LANDING
LADDER
JETTY PILES
EXISTING NSL
DETAIL 1
1:500
m p rogers & associates pl
coastal and port engineers
Suite 1, 128 Main Street
Osborne Park 6017
Western Australia
t: +61 8 9254 6600
admin@coastsandports.com.au
DRAWN R BORJA
CHECKED C DOAK
JETTY LOCATION OPTION 2 - SECTIONS
GERALDTON FORESHORE JETTY
SCALE AT A3 AS SHOWN
SEPTEMBER 2024
SK2165-02-02B

A.iii. Jetty Option 3: Durlacher Street Groyne Jetty

Table A-3 OPC for Capital Construction of Jetty Option 3

Item	Activity	Subtotal	Total for Item
1	**Preliminaries**		**$1,584,960**
1.1	Preliminaries, including mobilisation/demobilisation, insurances, survey, site management, environmental compliance, etc.	$1,584,960	
2	**Jetty Construction**		**$6,096,000**
2.1	Construction 125m long concrete jetty with steel piles and FRP lower level landing.	$6,096,000	
3	**Path Connection**		**$39,000**
3.1	Construction of path along Durlacher Street groyne to facilitate access to the jetty	$39,000	
	Subtotal 1	*$7,719,960*	*$7,719,960*
	Management & Design Fees (incl. Geotech)	$771,996	$771,996
	Contingencies	$2,315,988	$2,315,988
	Subtotal 2	*$10,807,944*	*$10,807,944*
	Goods and Services Tax	$1,080,794	$1,080,794
	Total Estimated Cost	**$11,888,738**	**$11,888,738**

Source: MP Rogers & Associates.


0 10 20 30 40 50m
SCALE 1:1000 AT ORIGINAL SIZE
EXISTING GROYNE
125.5m JETTY
HANDRAIL
NEW JETTY
A
NEW PATH
LOW LEVEL LANDING
LADDER
NOTES:
1. SURVEY COMPLETED BY DEPARTMENT OF TRANSPORT IN NOVEMBER 2018. THE LEVELS AND CONTOURS REFLECTS THE SURFACE AT THE TIME OF SURVEY ONLY.
2. AERIAL PHOTOGRAPH FROM LANDGATE TAKEN IN MARCH 2024.
3. CONTOURS SHOWN AT 0.2m INTERRVALS.
LAYOUT
1:1,000
NEW PATH
125.5m JETTY
HANDRAIL
NEW JETTY
3.0 mAHD
1 20
1 20
4.5 mAHD DECK LEVEL
AHD
JETTY ABUTMENT
EXISTING GROYNE
LOW LEVEL LANDING
LADDER
JETTY PILES
EXISTING NSL
SECTION A
1:500
m p rogers & associates pl
coastal and port engineers
Suite 1, 128 Main Street
Osborne Park 6017
Western Australia
t: +61 8 9254 6600
admin@coastsandports.com.au
DRAWN R BORJA
CHECKED C DOAK
JETTY LOCATION OPTION 3 - LAYOUT & SECTION
GERAKDTON FORESHORE JETTY
SCALE AT A3 AS SHOWN
AUGUST 2024
SK2165–03–01A

Appendix B. Construction Phase Economic Impact Analysis

B.i. Methodology

REMPLAN have estimated direct, and indirect economic effects associated with construction of each jetty option for the Greater Geraldton LGA. Economic impact analysis has been undertaken using *REMPLAN – regional economic modelling and analysis system* and applies regional economic data incorporating information sourced from the Australian Bureau of Statistics (ABS) 2021 Census, ABS National Input / Output Tables (2020/2021), and ABS Gross State Product (2023).

B.ii. Assumptions

Table B-1 Construction Phase Expenditure Assumptions

	Option 1 Spur Breakwater Jetty		Option 2 Midalia Beach Jetty			Option 3 Durlacher Street Groyne Jetty	
	Year 1	Year 2	Year 1	Year 2	Year 3	Year 1	Year 2
Component expenditure by year (% of cost component)							
Preliminaries	100%	0%	75%	25%	0%	100%	0%
Jetty Construction	25%	75%	25%	50%	25%	25%	75%
Path Connection	0%	100%	0%	0%	100%	0%	100%
Management & Design Fees (incl. Geotech)	50%	50%	33%	33%	33%	50%	50%
Component expenditure by year ($ millions)							
Preliminaries	$1.585	$0.000	$2.406	$0.802	$0.000	$1.585	$0.000
Jetty Construction	$2.099	$6.298	$4.247	$8.495	$4.247	$2.099	$6.298
Path Connection	$0.000	$0.047	$0.000	$0.000	$0.175	$0.000	$0.054
Management & Design Fees (incl. Geotech)	$0.386	$0.386	$0.522	$0.522	$0.522	$0.386	$0.386
Annual total	$4.070	$6.731	$7.175	$9.819	$4.945	$4.070	$6.738
Total (excl. GST)		$10.801			$21.939		$10.808
Construction expenditure, impact by industry ($ millions)							
Heavy & Civil Engineering Construction	$3.278	$6.731	$5.972	$9.418	$4.945	$3.278	$6.738
Professional, Scientific & Technical Services	$0.792	$0.000	$1.203	$0.401	$0.000	$0.792	$0.000

B.iii. Economic Impact Summary

Economic impacts are reported in terms of Output, Value-added and Jobs:

- Output data represents the gross revenue generated by businesses/organisations in each of the industry sectors in a defined region. Gross revenue is also referred to as total sales or total income.

- Employment data represents the number of people employed by businesses / organisations in each of the industry sectors in a defined region. Employment data presented in this report is based on location of work, i.e., no inference is made as to where workers reside.
- Wages and Salaries data represents the total amount paid by businesses and organisations to local employees in the form of wages and salaries.
- Value-added data represents the marginal economic value that is added by each industry sector in a defined region. Value-added by industry sector is the major element in the calculation of Gross Regional Product and Gross State Product.

The impact results are described in terms of direct and indirect effects. The direct effect is the change in employment or output directly due to economic activity. The indirect effects are the flow-on supply chain and consumption effects resulting from the direct change. A supply chain effect is an increase in output (or jobs or value-added) generated by servicing industry sectors in response to the direct change in output and demand. As output increases, so too does employment and wages and salaries paid to local employees. Part of this additional income to households is used for consumption in the local economy which leads to further increases in demand and output, known as the consumption effect.

Table B-2 Construction Phase Economic Impact Summary, Greater Geraldton LGA

	Direct Effect	Supply-Chain Effect	Consumption Effect	Total Effect	Type 2 Multiplier
Option 1 Spur Breakwater Jetty - Year 1 to Year 2					
Output ($M)	$10.801	$5.570	$3.132	$19.503	1.806
Employment (Jobs) Peak Gain - Year 2	7	7	5	19	2.714
Wages and Salaries ($M)	$2.352	$1.221	$0.705	$4.278	1.819
Value-added ($M)	$4.264	$2.105	$1.834	$8.203	1.924
Option 2 Midalia Beach Jetty - Year 1 to Year 3					
Output ($M)	$21.939	$11.316	$6.362	$39.617	1.806
Employment (Jobs) Peak Gain - Year 2	11	11	8	30	2.727
Wages and Salaries ($M)	$4.776	$2.481	$1.432	$8.689	1.819
Value-added ($M)	$8.660	$4.276	$3.725	$16.661	1.924
Option 3 Durlacher Street Groyne Jetty - Year 1 to Year 2					
Output ($M)	$10.808	$5.574	$3.134	$19.517	1.806
Employment (Jobs) Peak Gain - Year 2	7	7	5	19	2.714
Wages and Salaries ($M)	$2.353	$1.222	$0.705	$4.281	1.819
Value-added ($M)	$4.267	$2.107	$1.835	$8.208	1.924

Appendix C. Value of Jetty to Recreational Fishers

In order reflect the value of jetty use by local adults who fish from the jetty for recreation the following assumptions have been adopted.

- Estimated resident population = 41,917[5].
- 76.0% of residents are aged 18 or over[6].
- 25.8% of adults fish recreationally, and of those:
  - 48.0% fish 2 days per year,
  - 35.0% fish 7 days per year, and
  - 16.0% fish 10 days per year[7].
- 93.9% of recreational fishers fish in salt water[7].
- An assumed 25.0% of recreational fishers are likely to fish from the Geraldton foreshore.

Table C-1 Recreational fisher value of jetty use assumptions

Metric	Value
Residents	
Share of adults aged 18+	76.0%
Greater Geraldton resident population	41,914 persons
Greater Geraldton resident adults	31,846 adults
Fishers	
% of adults who are recreational fishers	25.8%
Adults who are recreational fishers	82,16 fishers
Adult recreational fishers in salt water	7,715 fishers
Foreshore recreational fishers	1,929 fishers
Frequency of recreational fishing (adults)	
2 days per year	926 fishers
7 days per year	675 fishers
10 days per year	309 fishers
Total annual days spent recreational fishing (adults x days per year)	
At a rate of 2 days per year	1,852 days
At a rate of 7 days per year	4,726 days
At a rate of 10 days per year	3,086 days
Total	9,663 days

A 2010 estimated value of $116 per adult per recreation day spent undertaking a low-cost recreational activity has been adopted[8] and inflated accordingly to $162 (2023 prices).

Assuming no difference in the frequency of recreational fishing between the three jetty options. An annual value of $1,565,440 has been determined as the economic value of adult use of a jetty for recreational fishing purposes.

[5] ABS, Regional Population.
[6] ABS, 2021 Census of Population and Housing.
[7] Moore, A, Schirmer, J, Magnusson, A, Keller, K, Hinten, G, Galeano, D, Woodhams, J, Wright, D, Maloney, L, FRDC, ABARES, UC, 2023, National Social and Economic Survey of Recreational Fishers 2018-2021, February. CC BY 3.0.
[8] Rolfe, J., & Dyack, B. (2010). Testing for convergent validity between travel cost and contingent valuation estimates of recreation values in the Coorong, Australia. The Australian Journal of Agricultural and Resource Economics, 54, 583-599. https://doi.org/10.1111/j.1467-8489.2010.00513.x

Appendix D. Tourist Value of Jetty Experience

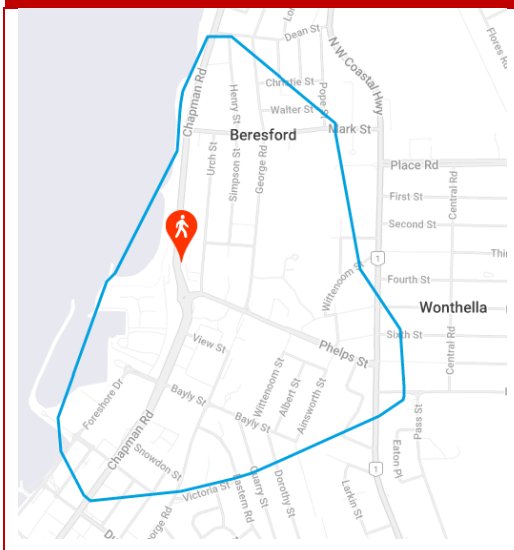
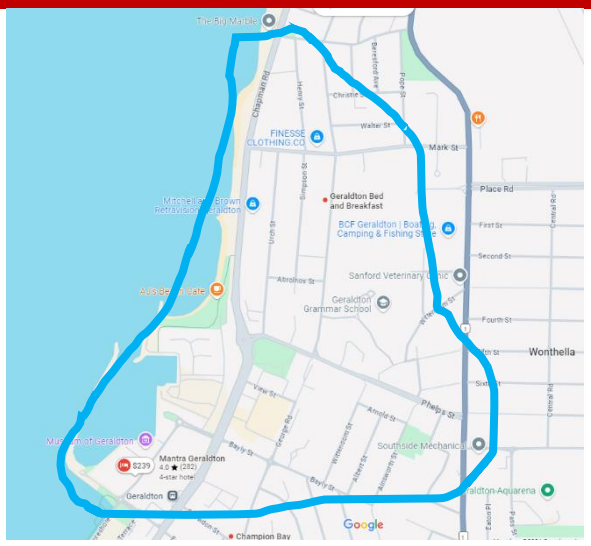
In order capture the value of experiencing the jetty for a visitor on vacation the following assumptions have been adopted.

- Tourist are likely to use the jetty if they are staying/visiting within a 10-minute walking radius of the jetty.
- Tourists walk at an average pace of 1.2 metres per second[9].
- Of those tourists staying or visiting Geraldton CBD or the Beresford foreshore area:
  - 50% of international and domestic day trip visitors will visit the jetty,
  - 80% of domestic overnight visitors will visit the jetty.
- Each visit to a jetty includes:
  - a return walk to the jetty site,
  - a return walk to the end of the jetty,
  - 10 minutes viewing time for Option 1 and Option 2, or
  - 19 minutes viewing time for Option 3 (reflective of the length of jetty in relation to Option 1 and Option 2).
- Total time spent by a tourist to experience the jetty:
  - Option 1 and Option 2: 35 minutes.
  - Option 3: 45 minutes.

Figure D-1 and Figure D-2 illustrate the 10-minute walkable catchment around each of the proposed jetty sites. Based on this radius the number of commercial accommodation providers have been identified.

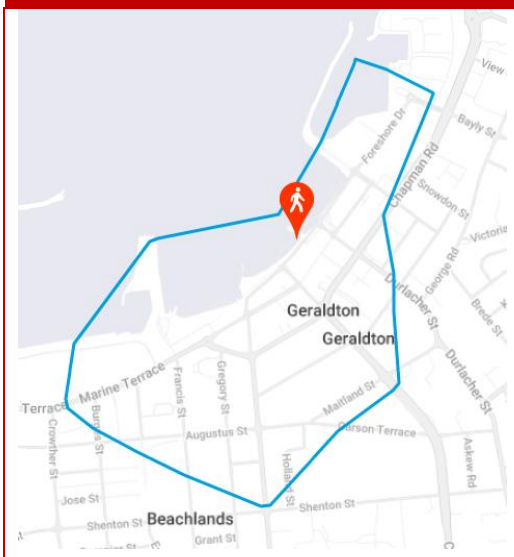
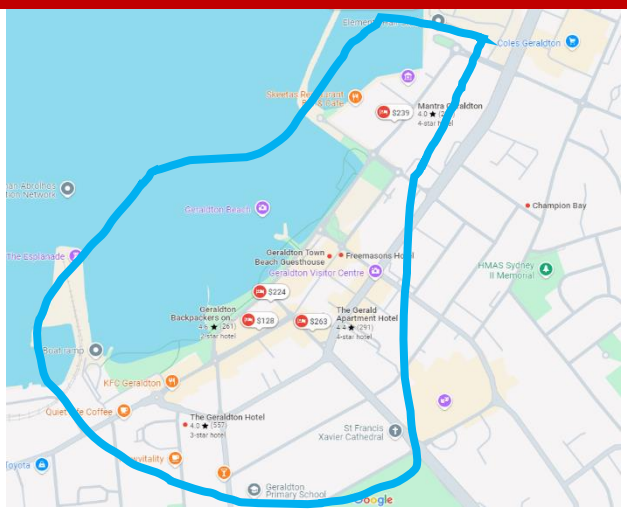
- Across the two catchment areas there are a total of six accommodation providers
  - Option 1 and Option 2 are within 10-minute walk of two commercial accommodation providers, and
  - Option 3 is within 10-minute walk of five commercial accommodation providers.

Figure D-1 Commercial accommodation and attractions within a 10 minute walk of Option 1 and Option 2

10 minutes walkable catchment	Accommodation / attractions within walkable catchment
	

[9] In Australia, the average walking speed used for determining pedestrian walk times is typically 1.2 metres per second (Australasian Transport Research Forum 2018 Proceedings 30 October – 1 November, Darwin, Australia)

Figure D-2 Commercial accommodation and attractions within a 10 minute walk of Option 3

10 minutes walkable catchment	Accommodation / attractions within walkable catchment
	

The latest Tourism Research Australia profile for Greater Geraldton LGA estimates that out of a total 571,000 visitors, 240,000 visitors come to Geraldton for a vacation[10].

The number of visitors on holiday, and the proportion staying in commercial accommodation or, in the case of day trip visitors, visiting a location in the CBD or the foreshore has formed the basis of determining value of the jetty experience for tourists. Table D-1 details further assumptions and the process adopted to determine the jetty experience value.

Table D-1 Tourist value of jetty experience assumptions

	International	Domestic Overnight	Domestic Day Trip	Total
Annual visitors on vacation				
Tourism Research Australia estimate	34,000	102,000	104,000	571,000
Tourists staying/visiting the CBD or Beresford Foreshore				
Share of total tourists staying/visiting CBD or Beresford Foreshore (assumed)	100%	80%	50%	-
Tourists	34,000	82,000	52,000	240,000
Tourists within 10-minute walk of proposed jetty sites				
Option 1 Spur Breakwater Jetty	11,333	27,200	17,333	139,667
Option 2 Midalia Beach Jetty	11,333	27,200	17,333	55,867
Option 3 Durlacher Street Groyne Jetty	28,333	68,000	43,333	55,867
Value of a tourist's time				
Spend per trip (Tourism Research Australia)	$491.00	$554.00	$187.00	-
Spend per day	$98.00	$185.00	$187.00	-
Value of tourist minute (spend per minute)	$0.14	$0.26	$0.26	-
Tourists that will use the jetty				

[10] Tourism Research Australia, Tourism in Local Government Areas 2019; Greater Geraldton (C).

Assumed proportion of tourists within 10-minute walking catchment	50%	80%	50%	-
Option 1 Spur Breakwater Jetty	5,667	21,760	8,667	90,233
Option 2 Midalia Beach Jetty	5,667	21,760	8,667	36,093
Option 3	14,167	54,400	21,667	36,093
Value of time spent visiting jetty, per tourist				
Option 1 (35 minutes)	$4.77	$8.98	$9.09	-
Options 2 (45 minutes)	$6.14	$11.54	$11.69	-
Option 3 (35 minutes)	$4.77	$8.98	$9.09	-
Value of total tourist's use of jetty, annual total				
Option 1 Spur Breakwater Jetty	$27,050	$195,336	$78,782	$301,169
Option 2 Midalia Beach Jetty	$34,779	$251,147	$101,292	$387,218
Option 3 Durlacher Street Groyne Jetty	$67,626	$488,341	$196,956	$752,923

Based on the above approach, the annual economic value of a tourist's experience of each of the jetty options is estimated to be:

- Option 1 Spur Breakwater Jetty: $301,169.
- Option 2 Midalia Beach Jetty: $387,218.
- Option 3 Durlacher Street Groyne Jetty: $752,923.

Appendix E. Preliminary Cost Benefit Analysis

A cost benefit analysis (CBA) has been prepared for the three jetty options, these CBAs are considered preliminary and are reflectively of the early stages of the jetty investigations and limited information available at this stage.

The CBA has been conducted over a 20-year period with NPV of costs and benefits presented at the various discount rates. A 7 per cent real discount rate has been applied, with rates of 4 per cent and 10 per cent applied for sensitivity testing. Applying a discount rate enables comparison of costs and benefits over a number of years, expressing all years in today's dollar value.

The cost assessment has been limited to:

- Direct costs associated with development.
- Maintenance and asset renewal costs.

The benefits assessment includes:

- Value of the jetties to recreational fishers (see Appendix C).
- Value of visiting the jetties for tourists on holiday (see Appendix D).

A Cost Benefit Ratio (CBR) demonstrates the relationship between the relative costs and benefits of a project. Various discount rates have been applied to the costs and benefits over the life of the project to determine the NPV, i.e., converting the future values into present values. Under the CBA framework, the ratios of costs to benefits in NPV terms is presented (NPV being the current value of projected cash flows).

NPV and CBR are both presented in order to guide the investment decisions. Generally, a project with a higher CBR would be preferred. However, CBR tends to be biased towards projects with lower initial capital costs, so a CBR is best considered in conjunction with the NPV of net benefits in making project decisions.

The key decision-making criteria with a CBA are:

- If a project has a positive NPV the project should be accepted as the present value of the stream of economic benefits exceeds the present value of the stream of economic costs.
- If a project has a CBR of greater than 1.0, the project is expected to deliver a positive net present value.

Under a 7 per cent discount rate, the ratio of costs to benefits associated with the marginal change brought by each of the jetty options is:

- Option 1 Spur Breakwater Jetty: 1.00 : 1.37
- Option 2 Midalia Beach Jetty: 1.00 : 0.66
- Option 3 Durlacher Street Groyne Jetty: 1.00 : 1.71

The net benefit (i.e., NPV) over the 20-year analysis period for each of the jetty option, at a 7 per cent discount rate, is:

- Option 1 Spur Breakwater Jetty: + $4,755,873
- Option 2 Midalia Beach Jetty: - $8,607,988
- Option 3 Durlacher Street Groyne Jetty: + $9,015,321

Table E-1 Cost Benefit Analysis Summary

	Real Discount Rate % p.a.		
	4%	7%	10%
Option 1 Spur Breakwater Jetty			
Project Costs - Net Present Value	$13,419,037	$12,772,150	$12,271,649
Project Benefits - Net Present Value	$22,721,116	$17,548,023	$13,917,120
Project Net Present Value	**$9,302,079**	**$4,775,873**	**$1,645,471**
Cost Benefit Ratio	**1 : 1.69**	**1 : 1.37**	**1 : 1.13**
Option 2 Midalia Beach Jetty			
Project Costs - Net Present Value	$26,712,451	$25,259,426	$24,118,116
Project Benefits - Net Present Value	$21,963,189	$16,651,438	$12,944,915
Project Net Present Value	**-$4,749,262**	**-$8,607,988**	**-$11,173,201**
Cost Benefit Ratio	**1 : 0.82**	**1 : 0.66**	**1 : 0.54**
Option 3 Durlacher Street Groyne Jetty			
Project Costs - Net Present Value	$13,426,744	$12,779,646	$12,278,945
Project Benefits - Net Present Value	$28,220,044	$21,794,967	$17,285,318
Project Net Present Value	**$14,793,300**	**$9,015,321**	**$5,006,374**
Cost Benefit Ratio	**1 : 2.10**	**1 : 1.71**	**1 : 1.41**