

MARCH 2019

# TWO ROCKS BEACH ACCESS FEASIBILITY STUDY

PREPARED FOR CITY OF WANNEROO



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### Acknowledgements

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Emerge has based this Report on information received or obtained, on the basis that such information is accurate and, where it is represented to Emerge as such, complete. The Information contained in this Report has not been subject to an audit.

The views expressed in this Report are not necessarily the views of the City of Wanneroo.



## Summary

This report was commissioned by the City of Wanneroo to investigate the feasibility for an additional beach access location to be accessed from Two Rocks Road south of the Two Rocks Marina between Leeman's Landing and the Spot. This was in response to the City receiving a local resident petition from Acumen Development Solutions requesting the construction of a beach access track and carpark presented at the Council meeting on the 18th September 2018.

In support of the petition Acumen provided a beach access proposal approximately 1km south of the current Leeman's Landing beach access that was based on an existing informal pedestrian access track located within Crown land. A construction estimate was presented based on this proposal seeking support from the City.

The study engaged the review of existing Council reports including coastal planning and management, beach safety, dune and vegetation conservation, traffic considerations, population growth patterns as well as the existing topography and landscape typology. Accompanied by a desktop analysis and on site visual assessment, Emerge is able to provide recommendation to the City to consider appointing an additional beach access point between Leeman's Landing and the Spot off Two Rock's Road. The assessment takes in to consideration future development of the Two Rocks region including the marina, existing beach access and lack of access to identifiable swim beach zones, availability of public carparks in proximity to beach zones and other beach side infrastructure in the vicinity.

In support of this recommendation to the City of Wanneroo, Emerge further investigated the suitability of location, orientation through the landscape and provided concepts and opinion of cost to construct beach access from Two Rocks Road through to the shoreline. The concepts take in to consideration State and Local planning policies, dune conservation, maintaining existing topography, vegetation preservation, traffic movements, road safety, beach safety, coastal processes and aesthetic in the landscape in maintaining a natural coastal aspect.



Fig. 1 Two Rocks Beach Access Study Area



## Background

The City of Wanneroo engaged Emerge Associates to analyse, investigate and assess the feasibility for a new pedestrian beach access and carpark in the coastal suburb of Two Rocks. This is in response to a City Council meeting held on the 18th September 2018 whereby a petition was presented by Acumen Development Solutions where 681 entries noted support for the construction of a beach access track and carpark in Two Rocks to be located between Leeman's Landing and the Spot.

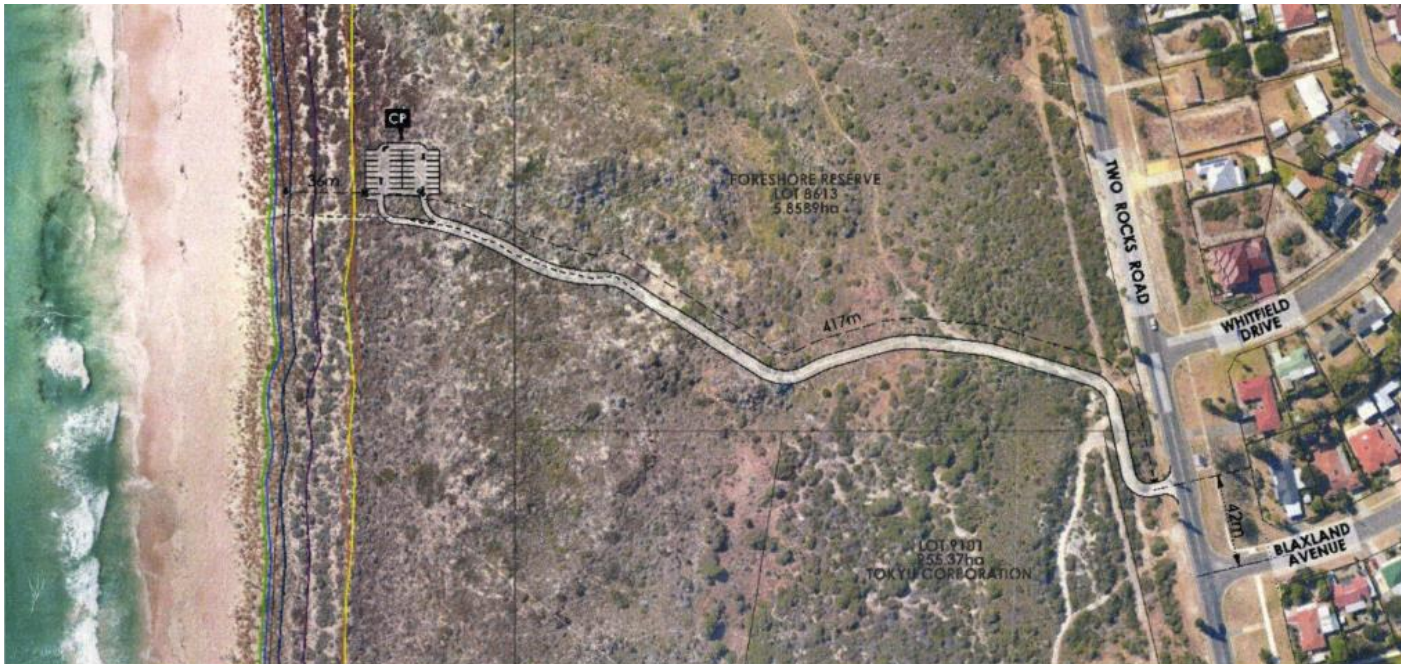


Fig. 2 Acumen proposed beach access and carpark concept showing location and orientation from Two Rocks Road to the beach.

The aims and objectives of this feasibility study is to;

- Review available policies, reports and documented information relevant to the area in question
- Consider population growth to the region and future demand
- Perform desktop data analysis of the site
- Perform on site analysis considering the proposal presented by Acumen and visual assessment
- Ascertain the beach access location noted will present a reasonably safe swimming beach environment
- Address suitability for alternate dog beach location due to current location having issues with sea wrack accumulation and future marina expansion works
- Prepare alternate solutions to currently presented concept if outcome is deemed feasible and alternates more viable
- Prepare an opinion of probable cost for the access road and carpark to provide financial implication

Information and report material reviewed and assessed is based on the following available information;

- Eight (8) existing Approved Structure Plans within the Two Rocks Region
- Three (3) existing Approved Structure Plans within the adjacent Yanchep
- 2018 City of Wanneroo Coastal Hazard Risk Management and Adaptation Plan (CHRMAP)
- 2014 Coastal Aquatic Risk Assessment (CARA) conducted by Surf Life Saving WA (SLSWA)
- State Planning Policy 2.6 – State Coastal Planning Policy
- State Planning Policy 2.8 – Bush Forever
- Local Planning Policy 4.21 – Coastal Assets Policy
- MRA 2015 Two Rocks Coastal Management Study (TRCMS)
- The forecast population projections for Two Rocks
- Coastal Monitoring information from 6 monthly topographic beach surveys
- Local Resident Petition for the Developer's proposed beach access
- Three cost estimates for the beach access and carpark proposal, based on the developer's proposal
- December 2018 Council Report
- Department of Biodiversity Conservation & Attractions (DBCA) database

This document is based on an assessment of the available information, conditions observed during the site visit and the beach access proposal in order to provide findings to the City of Wanneroo in consultation with all identified stakeholders should it be determined to proceed in implementing beach access.



## The Site

Two Rocks is the most northern suburb of the Perth metropolitan area and is part of the City of Wanneroo local authority. The suburb gained its name from two prominent rocks sitting just offshore near Leeman's Landing, south of the marina. The Two Rocks municipal boundary covers approximately 5,200 hectares and is situated within the Yanchep-Two Rocks District Structure Plan area. The focus of the feasibility study is the coastal strip between Leeman's Landing and the Spot known as Two Rocks Beach.

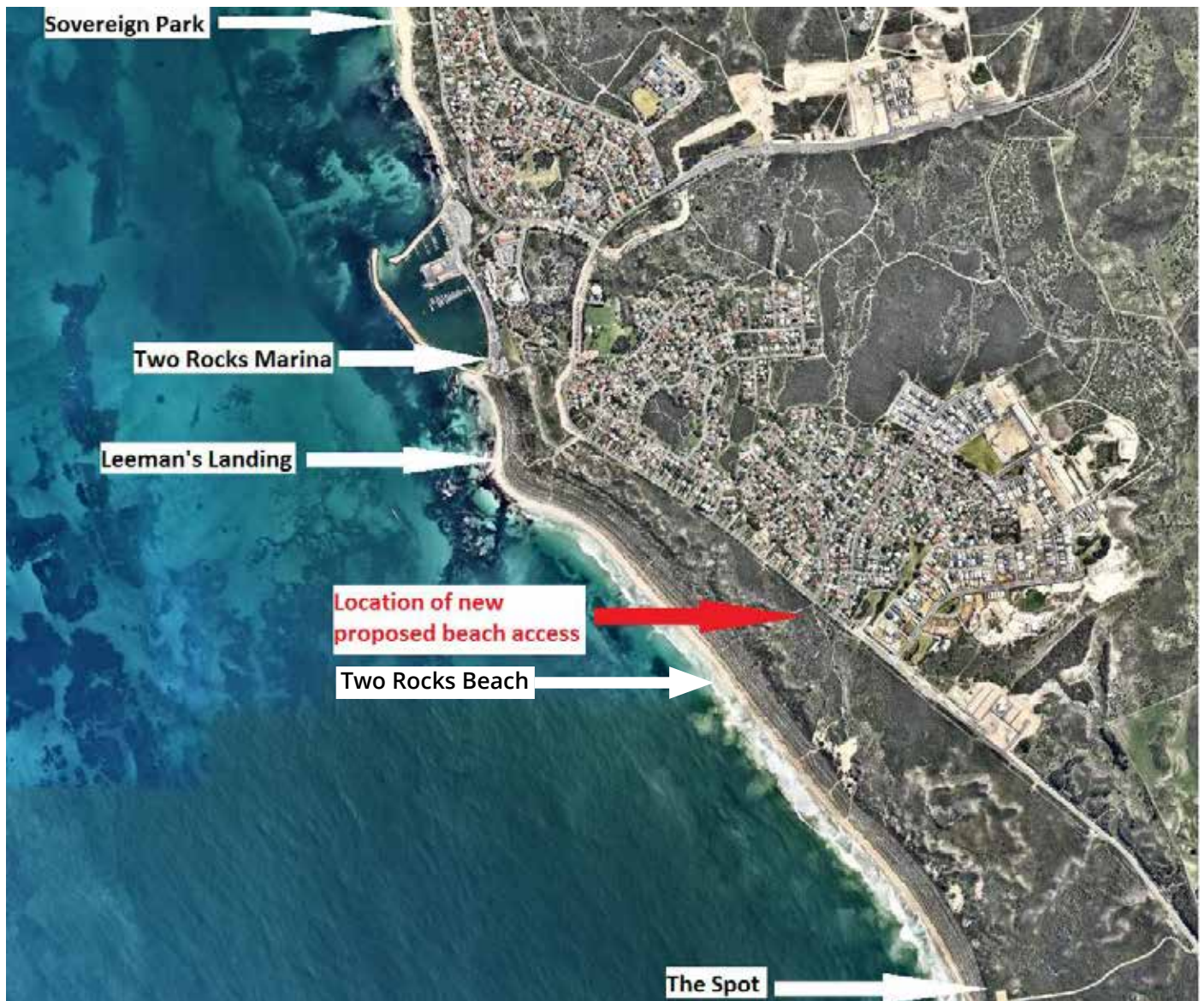


Fig. 3 Two Rocks and site location context (Dec. 2018, City of Wanneroo)

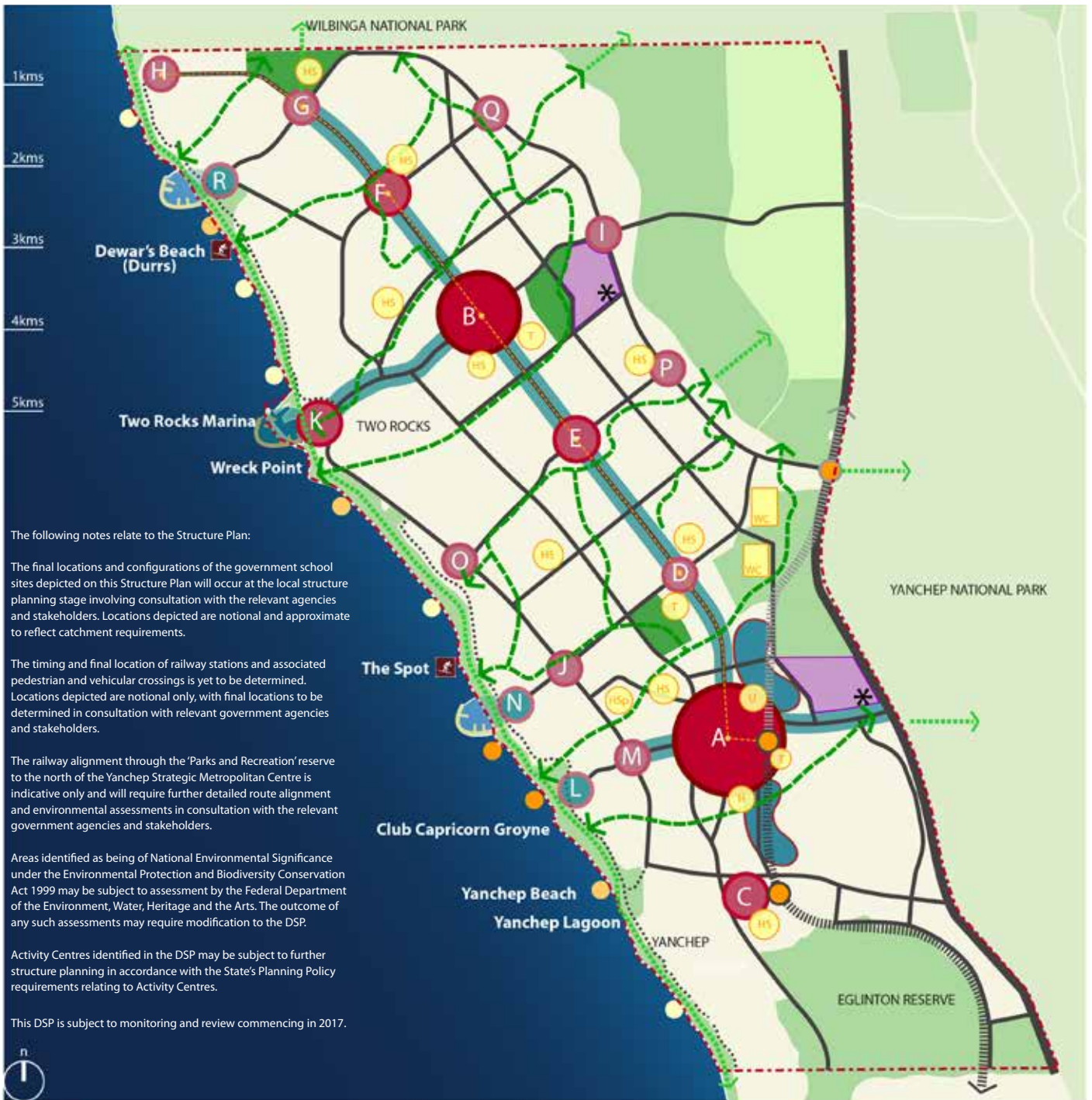
The population of Two Rocks is approximately 3186 people (as of June 2017) and is forecast by 2026 to more than double<sup>1</sup>. Beach visitation rates in the immediate vicinity are currently low with a majority of beach access inaccessible however with ongoing development, population growth and the likelihood of nearby beach visitations reaching capacity, the demand for accessible beach areas for swimming and recreational purposes in the immediate Two Rocks area will ensue.

To support this assumption the current Yanchep - Two Rocks District Structure Plan (DSP)<sup>2</sup> notes the integration of a significant amount of land for potential tourism in selected coastal nodes that will provide diverse marine attractions and beach activities for locals, day trippers and short stay visitors. The development is to create a balance between recreation and environment with an expectation of up to 6,400 people per day expected to use accessible beaches along the Yanchep - Two Rocks coast during peak periods. The following DSP illustration identifies projected land use, potential development nodes and movement networks. It also highlights the study area in question as a key district and local level beach in future development outcomes for the Yanchep - Two Rocks region.

<sup>1</sup> Two Rocks Estimated Residential Population (ERP) and Forecast, .idcommunity Demographic Resources, March 2019

<sup>2</sup> Yanchep - Two Rocks District Structure Plan, Roberts Day / City of Wanneroo, November 2010





The following notes relate to the Structure Plan:

The final locations and configurations of the government school sites depicted on this Structure Plan will occur at the local structure planning stage involving consultation with the relevant agencies and stakeholders. Locations depicted are notional and approximate to reflect catchment requirements.

The timing and final location of railway stations and associated pedestrian and vehicular crossings is yet to be determined. Locations depicted are notional only, with final locations to be determined in consultation with relevant government agencies and stakeholders.

The railway alignment through the 'Parks and Recreation' reserve to the north of the Yanchep Strategic Metropolitan Centre is indicative only and will require further detailed route alignment and environmental assessments in consultation with the relevant government agencies and stakeholders.

Areas identified as being of National Environmental Significance under the Environmental Protection and Biodiversity Conservation Act 1999 may be subject to assessment by the Federal Department of the Environment, Water, Heritage and the Arts. The outcome of any such assessments may require modification to the DSP.

Activity Centres identified in the DSP may be subject to further structure planning in accordance with the State's Planning Policy requirements relating to Activity Centres.

This DSP is subject to monitoring and review commencing in 2017.

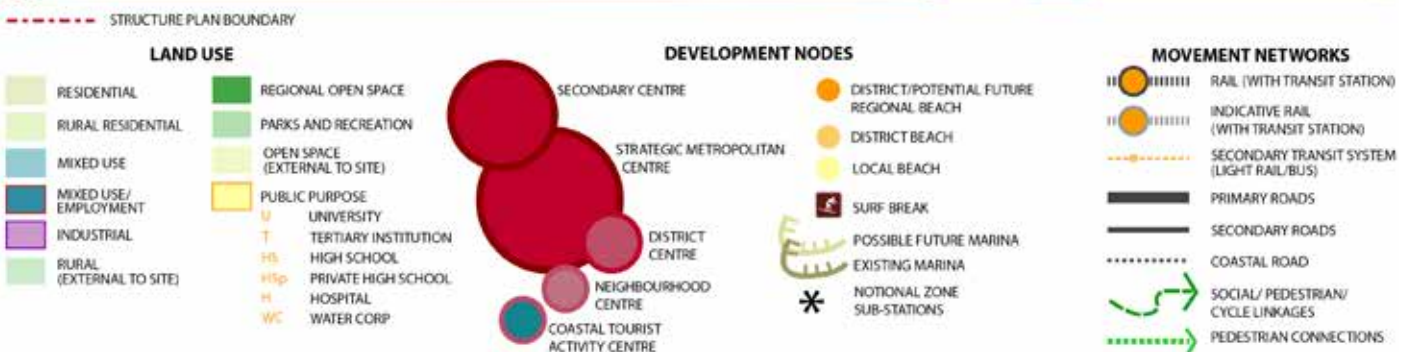


Fig. 4 Yanchep-Two Rocks District Structure Plan - ASP 43 (Nov. 2010, Roberts Day / City of Wanneroo)

## Existing Beach Access

There are currently four (4) designated beach access nodes providing local residents and visitors to Two Rocks the ability to interact with the coastline. These being Sovereign Park Beach, Two Rocks Marina, Leeman's Landing and The Spot as shown in Figure 3. All locations provide differing levels of facility and coastal experience.

### Sovereign Park

Provides beach access north of Two Rocks Marina. Consisting of high dunes with a narrow sandy beach with a steep eroding scarp exposing limestone rocky outcrops. Current assessments note;

- Under significant shoreline regression presenting rocky outcrops (TRCMS<sup>1</sup>)
- Highly vulnerable to coastal hazards by 2050 (CHRMAP<sup>2</sup>)
- Closure of historic 4wd tracks to Dewars has presented pressure to add roadside car parking
- Steep access down to narrow beach not desirable for a wide range of users
- Rocky outcrops and beach rock make the area less desirable for swimming and identified as unsafe (CARA<sup>3</sup>)

### Two Rocks Inner Marina

Provides a lagoon like swimming location however current assessments note;

- Questionable water quality due to boating and commercial activity
- Proximity to marine craft presents high risk to injury
- Less desirable swimming conditions than adjacent beach areas due to potential hazards
- Dangerous if unsupervised swimming or diving

### Leeman's Landing (including Wreck Point)

A moderately wide beach sheltered by reef and designated dog beach exercise area adjacent the existing marina seawall. The identity of Two Rocks is located here and connects with Wreck Point. Current assessments note:

- Good facilities such as toilet, shower, shelter, bbq, seating, small playground & designated car parking
- Fencing to protect vegetation and dunes
- Long track to access the beach
- Open sight lines predominantly south
- Stable low gradient beach that accumulates seasonally seagrass debris (CARA<sup>3</sup>)
- Reef and rocky foreshore tending more towards Wreck Point

### The Spot

A popular reef break surfing location. It consists of a series of limestone rocky outcrops backed by high dunes and limited beach access footprint. Current assessments note:

- Unsealed road with limited visual sight lines at entry/exit from Two Rocks Road and accesses beach through private land
- Designated unsealed car parking area
- Informal steep track to access the beach and surf spot
- Open sight lines to the north

### The Study Site

The 1.5 km stretch between Leeman's Landing and The Spot presents several informal pedestrian and 4wd tracks accessing the beach for recreational purposes such as swimming, dog walking and fishing as shown in Figure 1. Current assessments note:

- Informal pedestrian & vehicle access with some through private land
- Good open sight lines to north and south
- Stable low tide terrace beach classified as least hazardous for swimming (CARA<sup>3</sup>)
- SLSWA recommends formalising two existing informal tracks to access the beach as demand increases (CARA<sup>3</sup>)

Data received from the City of Wanneroo (figure 5) shows volume of people passing through the number of beach access points per coastal suburb within its municipality. The relationship based on population and number of access points is highly variable due to the different levels of infrastructure provided in each area. Alkimos for example has formal roads and car parking facilities with designated trails leading to the beach supportive of high volume activity whilst developed foreshore parks exist in other areas. Two Rocks does not reflect this level of infrastructure to all its current beach access points, two of which would not be suited to general swimming due to access restrictions and hazards. The more intensive nature of newer developments is also orientated further from the coast creating additional pressures on car parking in the adjacent suburbs and warrants the consideration of this beach access as demand grows.

Suburb	Population	No. Beach Access Points	People Per Access Point
Eglinton	1743	0	No access
Alkimos	6531	3	2177
Mindarie	7784	5	1557
Jindalee	2610	3	870
Quinns	9068	11	1824
Two Rocks	3085	4	771
Yanchep	9175	14	655

Fig. 5 Beach Access Points (City of Wanneroo, March 2019)

<sup>1</sup> Two Rocks Coastal Management (TRCM), MP Rogers & Assoc. / City of Wanneroo, March 2015 <sup>2</sup> Coastal Hazard Risk Management and Adoption Plan, Cardno/ City of Wanneroo, August 2018

<sup>3</sup> Coastal Aquatic Risk Assessment, Surf Life Saving WA / City of Wanneroo, December 2014

## Future Growth and Development

There are currently eight (8) approved Structure Plans in the Yanchep - Two Rocks region;

- Two Rocks Town Centre ASP 70
- Two Rocks ASP 69
- Yanchep-Two Rocks District Structure Plan ASP 43
- Portion of Lot 8989 Two Rocks Road ASP 32
- Lot 202 Breakwater Drive, Two Rocks ASP 53
- Lot 201 Breakwater Drive, Two Rocks ASP 35
- Lot 501 Two Rocks Road ASP 48
- East Two Rocks ASP 83
- Yanchep City ASP 68
- Capricorn Coastal Village, Yanchep ASP 44
- Capricorn Coastal Node ASP 75

These structure plans forecast significant development and growth patterns with a reasonable mixture of residential density, primarily R20 and RMD 25-40. The Two Rocks population as of June 2017 was around 3186 people within 1295 dwellings that is forecast by 2026 to more than double at 6,872. This continues with a steady 7.57% average annual growth pattern (.idcommunity<sup>1</sup>). Therefore as development increases with population growth predicted in the next 40 years for the Yanchep - Two Rocks region to reach 155,000<sup>2</sup>, pressures to provide public amenity and access to community open space would ensue. Being coastal this focus would be to provide additional accessible and safe beach access.

The Two Rocks Marina upgrade which will receive a \$6 million revamp to improve ageing infrastructure is also occurring adjacent the study site. This work includes demolition of condemned maritime structures, construction of relocated boat pens, upgrading and maintenance of existing jetties, priority repairs to the existing breakwater, priority maintenance to existing buildings. Expansion of the seawall south of the marina to assist with mitigating sea wrack accumulation is being considered by Department of Transport however has not been identified in the short-term upgrades to the Marina. The long-term solution for marina expansion would need to account for possible movement of the accumulation of sea wrack to Leeman's landing at its southern extent. If the marina was to expand this could have the potential to entirely remove the existing dog beach therefore resulting in community demand for an additional dog beach area to be defined for such use.

## State and Local Policy

For beach access to be considered a review of State and Local planning and environmental policy parameters was undertaken to ensure the identification of appropriate areas for sustainable use of the coast for recreation, tourism and other activities so that development can occur to provide public coastal access through the foreshore reserve. The following were reviewed;

- State Planning Policy SPP 2.6 – State Coastal Planning Policy
- Local Planning Policy LPP 4.21 – Coastal Assets Policy
- State Planning Policy SPP 2.8 – Bush Forever

In brief SPP 2.6 under items 5.8 and Schedule One 7.1 and 7.5 acknowledges the need for the provision of coastal nodes to benefit the broader public. This is best expressed by item 5.8 Public Interest (iii);

*The provision of public access to the coast that is consistent with the values and management objectives of the area including, the interests of security, safety and protection of coastal resources as well as the recreational opportunities, both on and offshore, of that section of coast.*

The LPP 4.21 notes its relationship with SPP 2.6 in complementing the policy and should be considered in conjunction with these documents when considering Coastal Assets. Some noted clear objectives in the policy are to;

1. Maintain a high level of coastal foreshore amenity for current and future residents
2. Provide coastal foreshore and access points at safe swimming beaches
3. Maintain conservation of natural assets and ecological values
4. Provide for a range of coastal foreshore uses that encourage physical activity and connectivity with the natural environment
5. Provide sustainable coastal infrastructure that is designed and located with consideration to sea level rise projections

With the agreed Yanchep - Two Rocks District Structure Plan<sup>2</sup> designating that in the proximity of the study area as a district level beach the LPP 4.21 (Part 2 Policy Procedures, Item 1) should accept further assessment in to the consideration for a proposed beach access off Two Rocks Road between Leeman's Landing and The Spot. To proceed the requirement for preparation of a localised Foreshore Management Plan is acknowledged prior to any development within the foreshore.

The proposed beach access is through the portion of bush forever site No. 397, the coastal strip from Wilbinga to Mindarie. This area is owned by the State Government. Guided under Item 5.1.1 (vi) decision making or proposals can be subject to further on-ground site investigation and analysis as a negotiated outcome for approved to use for passive recreational access understanding conservation management objectives. The proposal is not likely to have any adverse impact but any impact would be controlled under SPP 2.8<sup>3</sup> and guided by an approved localised Foreshore Management Plan.

<sup>1</sup> Two Rocks Forecast population, households and dwellings, <https://forecast.id.com.au/wanneroo/Population-households-dwellings?WebID=330>

<sup>2</sup> Yanchep - Two Rocks District Structure Plan, Roberts Day, November 2010

<sup>3</sup> State Planning Policy 2.8: Bushland Policy for the Perth Metropolitan Region, WAPC, June 2010



## Coastal Management, Risks & Adaptation

The Study has considered the available relevant coastal management, risk and adaptation documents and plans including;

- 2014-2018 Coastal Surveys
- Coastal Hazard Risk Management and Adaptation Plan (CHRMAP) reports (Part 1 and Part 2)
- Two Rocks Coastal Management Report (MP Rogers, 2015)
- Local Planning Policy 4.2.1 Coastal Assets Policy Adopted 16 August 2016
- State Planning Policy (SPP2.6)

Appendix 5 outlines the review and findings undertaken by Advisian as summarised below.

The key policy governing coastal planning in WA is the State Planning Policy No. 2.6: State Coastal Planning Policy. The following criteria are applied to assess the required allowances for coastal processes and climate change.

- S1 Severe Storm Erosion - An allowance for the current risk of storm erosion based upon a series of storms, with elevated water levels and an Average Recurrence Interval (ARI) of approximately 100 years in relation to beach erosion.
- S2 Long Term Trends – An allowance for historic shoreline movement trends in order to provide an appropriate allowance for the planning period.
- S3 Climate Change – An allowance of erosion caused by potential sea level rise, with SPP 2.6 adopting a value of 0.9 m for sea level rise in the coming 100 years.<sup>1</sup>

CHRMAP has applied the criteria required in SPP2.6 to assess the allowance for the coastal processes. The allowance includes S1, S2 and S3, plus an additional allowance for uncertainty. MP Rogers (2015) provided a number of areas which were deemed vulnerable over timeframes; up to 2120. For the proposed development site, beach access road and carpark, a 50 years design lifetime would be required.<sup>1</sup>

Figure 1 of Appendix 5 represents the potential proposed car park area and access road to the beach associated with the predicted 2070 Vulnerability, which was derived from the previous coastal process study. Having no access to the digital data of the vulnerability line, Advisian has derived the line coordinates based on the plots shown in the reports. For comparison purposes, the 2120 Vulnerability is also included in the assessment plots.

During the 50 years of the design lifetime, the existing coastline is predicted to be set back approximately 23 m. However, the beach is still in place at that point in time and as the proposed car park infrastructure is above the sea level, it is at a low risk of being washed away. The new dune will relocate accordingly with the future set back of the coastline. The predicted shortest distance between the dune in 2070 and car park infrastructure edge is approximately 19 m. Therefore, the proposed car park infrastructure will not impact on the dune movement.

To mitigate the interruption of natural sediment movement along the foredune in front of the carpark structure it is recommended to have the seaward section of this path unsealed.<sup>1</sup>

## Flora and Vegetation Values

Database searches identified a total of 19 flora and 55 fauna species of conservation value with potential to occur within the wider local area. Based on habitat requirement the following are considered to have potential to occur within the site;

- no threatened flora species
- 13 priority flora species
- 12 threatened fauna species
- 2 priority fauna species
- 7 migratory fauna species

A preliminary inspection of the site was undertaken by Emerge in March 2019 identifying the vegetation to be good to very good condition and no threatened or priority flora detected in the vicinity of the proposed beach access alignments. It is recommended that a spring survey is undertaken to confirm if any priority flora or fauna species are detected within any of the proposed development areas.



Fig. 6 Westringia dampieri



Fig. 7 Atriplex isatidea



Fig. 8 Leucopogon sp.

<sup>1</sup> Two Rocks Beach Access Feasibility Memorandum, Advisian, March 2019

## Proposed Beach Access Site Analysis

Acumen Development Solutions proposal to the City of Wanneroo shows a beach access road through to a car park entering off Two Rocks Road (between Whitfield Drive and Blaxland Avenue) that follows an existing informal pedestrian track (refer Fig. 2). To determine its on ground feasibility post desktop review a site analysis was undertaken assessing;

- Traffic considerations when entering and exiting the site
- Existing vegetation
- Landscape character, value and conservation
- Existing topography
- Proximity to formalised beach access nodes
- Assumed pedestrian movement and distance from existing housing to the beach
- Current impact by informal pedestrian and vehicular access tracks to the beach



Fig. 9 Site Analysis - Movement and Proximity

In assessing the broader site context, Figure 9 highlights proximity and movement patterns for existing residents and visitors to Two Rocks community. It shows beach access on average is a walkable distance ranging from 400m to 1200m with green corridors or neighborhood connectors providing key conduits towards the coastline. All vehicle movement is restricted to Two Rocks Road when seeking beach access with the closest beach side car park at Leeman's Landing. Beach access currently is designated for swimming and dog use however fishing is also popular at Wreck Point and Leeman's Landing.

Public transport is apparent with stops along Two Rocks Road near Findan Street, Gage Street and Blaxland Avenue which are adjacent to the study site and easily provide good drop off and collection points when utilising bus services to access the beach either from Two Rocks town centre or Yanchep. Sign posted on Two Rocks Road near the Whitfield Drive intersection marks access to Unwin Shoals but the track is not well defined.

Not including Leeman's Landing there are three (3) main informal tracks leading through Crown, WAPC owned (2015) and private land to the beach. Two are predominantly narrow foot tracks less than a 1m wide while the third is a vehicle track approximately 2.5m wide leading to a large blowout area with three foot trails then exiting to the beach. The southern most track is through private land owned by the Tokyu Corporation. Though closed off access still seems to be pursued.

The central and north trails provide a fairly direct routes to the beach. Trail adjacent Whitfield Drive (central) provides a steep climb and descent over dunes. The trail adjacent to Gage Street (north) presents ease of access following a lower trajectory through the dunes.





Fig. 10 Site Analysis - Beach Access



There is potential and support in providing an additional beach access leading off Two Rocks Road. Acumen's proposal predominantly follows an existing trail that leads to a stable low tide terrace beach. The CARA report notes this beach type as the least hazardous of the most common intermediate types in Western Australia, preferable for swimming and recreational activities and recommend to activate use.

Figure 10 shows Acumen's proposal road alignment (blue dashed line) along with two alternate road proposals meeting at the same proposed car park and foreshore location by Acumen. The differences in these road alignments take in to account factors regarding vehicle movement, access entry/exit from Two Rocks Road, proximity to existing public transport nodes, pedestrian access, existing topography, dune stabilisation, vegetation preservation, visual blending of proposed with existing landscape character, distance from Two Rocks Road to the foreshore and land ownership these pass through. The following provides comment on each of the proposed road alignments;

#### Developer (Acumen) Proposed Road

- Proposed distance 450m from Two Rocks Road to beach passing through Crown land
- Public bus stop opposite road intersection with Two Rocks Road provides pedestrian drop off however poses traffic risk when exiting access road
- Road intersection at low point of Two Rocks Road presenting traffic risk when exiting
- Road intersection off Two Rocks Road located between and opposite Whitfield Drive and Blaxland Avenue presenting traffic risk due to intersection distance
- Road alignment is through dune peak and gully presenting steep climb and descent through landscape
- Dune would require significant battering of edges, vegetative stabilisation and redirection of stormwater to mitigate any erosive processes where road cuts through dune peak
- Road and infrastructure would be visible to partially blend with existing landscape character

#### Alternate Proposed Road A

- Proposed distance 380m from Two Rocks Road to beach passing through Crown land
- Public bus stops approximately 200m from road intersection with Two Rocks Road
- Road intersection at high point of Two Rocks Road with reasonably clear views - low risk
- Road alignment is through low to medium undulating topography
- Minimal infrastructure and management of stormwater required as compared to developer proposal
- Road and infrastructure would partially blend to blend with existing landscape character

#### Alternate Proposed Road B

- Proposed distance 400m from Two Rocks Road to beach passing through WAPC land ownership
- Public bus stops approximately 150m from road intersection with Two Rocks Road
- Road intersection at high point of Two Rocks Road with reasonably clear views - low risk
- Road alignment is through low to medium undulating topography
- Minimal infrastructure and management of stormwater required as compared to developer proposal
- Road and infrastructure would partially blend to blend with existing landscape character

The Alternate Proposed Road A is preferable for it follows a less undulating and shorter route through the coastal terrain within Crown land. In comparison to Acumen's it also presents less risk in relation to traffic movement, visual impact and affect on existing environmental conditions. In order to ensure effective and safe vehicle movement it is recommended that a traffic and transport engineering review be undertaken and inform a road intersection solution at Two Rocks Road if to proceed.



Fig. 11 Alternate Proposed Road A - lower trajectory through foreshore reserve in comparison to the Developer's



## Alternate Proposals

With community support and valid argument supporting the overall beach access proposal there is however risk associated with Acumen's proposed road trajectory. A further desktop and on site analysis reviewing the topography was able to put forward two alternate road trajectories. These are resultant of investigating and considering the following;

- Traffic movement
- Trajectory through landscape
- Land ownership
- Environmental impact and preservation
- Distance
- Safety
- Cost

Both the Alternate Proposed Access A (Fig. 13), and Access B (Fig. 14) maintain Acumen's proposed car park location and connection to the beach (refer Fig. 7). This is sited approximately 800m from Leeman's landing and 1700m from the Spot. The location is in reference to the SLSWA recommendation to formalise the access to Unwin Shoals off Two Rocks Road where signage is currently in place.

The proposed car park is sited well back from the foreshore in an elevated position above the 50yr sea level (2070 vulnerability) and gives provision for two access paths to the beach. Northern most path is for dog owners to access the beach. This is to give separation from the general public to reduce risk resultant of dog behavioural issues. The dog exercise area would then extend northwards from the car park linking with the existing dog beach at Leeman's Landing to provide an extensive dog beach exercise area, circa 1km. The remaining wider path would be for general public beach access and emergency/service use. It is recommended this should have removable bollards to allow emergency services and general maintenance access to the beach. The dog free section of beach would extent from the car park south towards the Spot providing almost 1.7km of usable beach.

### Development Opportunities

- Provide safer access to beach with designated path, road and car parking
- To control and limit access to the beach ensures preservation measures to the coastline
- To repair and revegetate damaged dune areas through community coastal care groups
- Provide less risk to harm by snakes during seasonal periods through designated access
- Increase accessible beach use for all recreational purposes
- To significantly increase dog beach exercise area south of Leeman's Landing well clear of potential sea wrack issues limiting current use
- Provide and promote greater opportunity for a healthier community lifestyle
- Proximity to public transport nodes encourages reduction in pollution and road congestion by using the bus
- Provision of bicycle racks to encourage cycling to the beach
- To encourage all ability access to the beach
- Provide broader beach activities and tourism opportunities for the Two Rocks community
- To increase passive surveillance and monitoring of beach safety
- To utilise the POS on Two Rocks Road for potential overflow parking and greater use of its amenity
- To take advantage of elevated levels in landscape for scenic view opportunities

### Development Constraints

- Budget
- WAPC and privately owned land access may limit or deny implementation
- Subject to SPP 2.6 and SPP 2.8 outcomes to proceed to development approval
- Extent of conservation fencing is localised and may require greater scope through approvals negotiation and therefore having effect on budget
- Community and stakeholder feedback on opinions of visual impact
- There is no guide on number of car parking bays and is subject to negotiated approval in allocation



Fig. 12 Views towards beach from possible observation point



- FOOTPATH CROSSOVER TO EXISTING
- ENTRY AND EXIT FROM TWO ROCKS ROAD
- TWO WAY ASPHALT ROAD WITH LOWER TRAJECTORY THROUGH LANDSCAPE (400M)
- CONSERVATION FENCING TO PERIMETER OF ROAD & FOOTPATH
- 1.5M FOOTPATH FOR PEDESTRIAN ACCESS
- SOLAR LIGHTING ROAD AND CAR PARK
- BICYCLE RACKS
- 40 STANDARD CAR BAY AND 4 ACROD BAY CAR PARK
- ACCESS TRACK FOR DOG OWNERS TO BEACH
- ACCESS TRACK TO SWIM BEACH EMERGENCY AND SERVICE VEHICLE ACCESS
- 2120 (100yr) VULNERABILITY
- 2070 (50yr) VULNERABILITY

**NOTE:**

- DIRECTIONAL, WATER SAFETY, GENERAL INFORMATION AND EMERGENCY SERVICES SIGNAGE TO BE IN PLACE
- RUBBISH BINS AND DOG WASTE DISPOSAL BAG FACILITIES TO BE SUPPLIED
- CONCEPT ONLY: SUBJECT TO FINAL SITE SURVEY AND DETAIL DESIGN

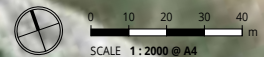


Fig. 13 Alternate Proposed Beach Access A - 380m



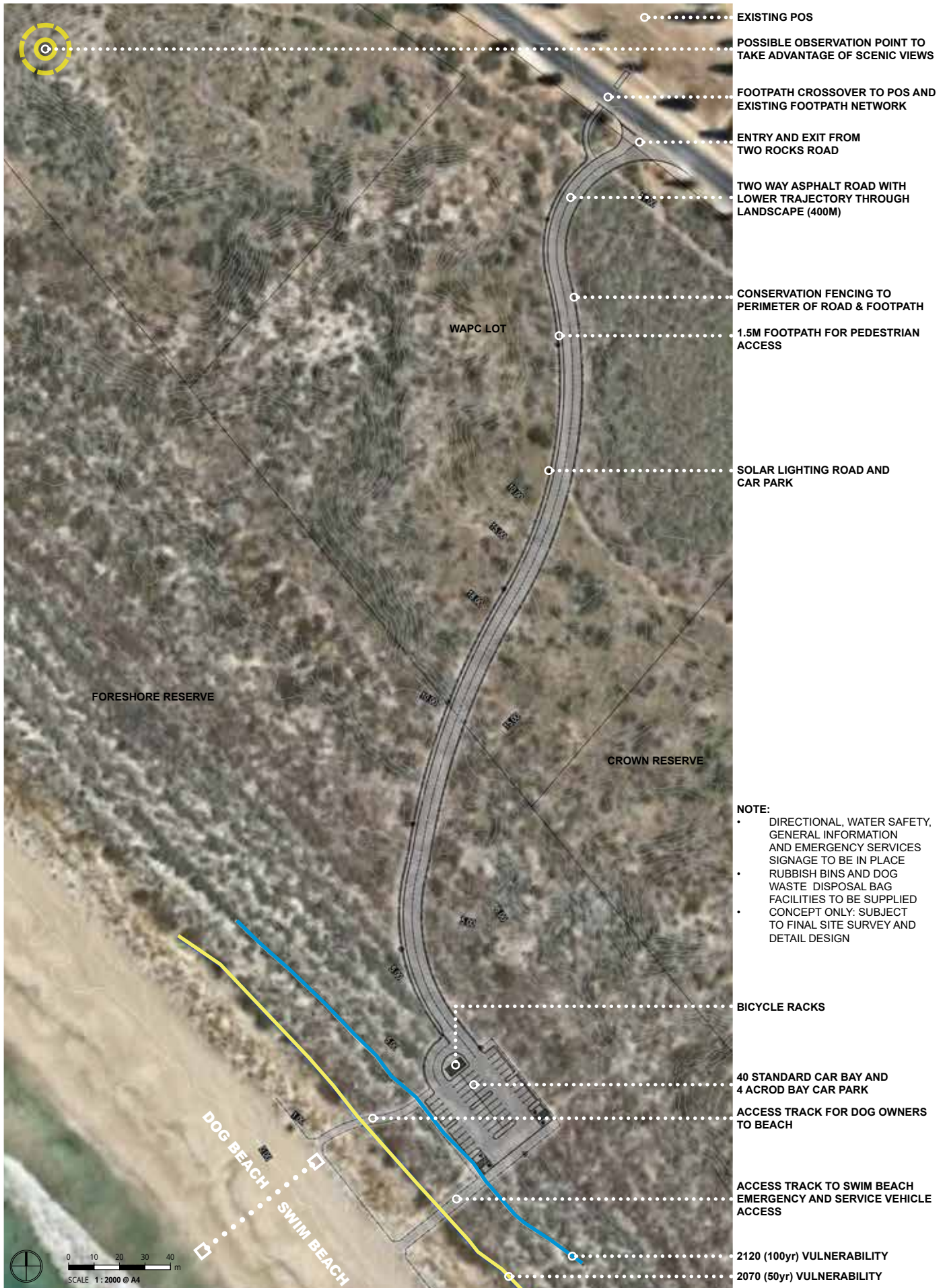


Fig. 14 Alternate Proposed Beach Access B - 400m

## Financial Implication

Accompanying the developer's beach access proposal was an opinion of probable cost to construct. Based on the construction estimates presented to the City of Wanneroo, the City's review against the design presented a higher opinion of cost based on City specifications and requirements of State and Local Planning Policy as follows;

- Acumen Estimate One \$233,597.84 +GST
- Acumen Estimate Two \$253,712.50 +GST
- City of Wanneroo \$515,691.79 +GST

These estimates are based on fairly conservative outcomes with differing scope and rates. Each would be subject to final detail design if to present any reasonable accuracy in construction costs associated. Emerge undertook a review of the Acumen proposal with reference to additional allowances made the City of Wanneroo costing to produce the below figure as detailed in Appendix 1.

- Emerge review based on Acumen proposal only (Appendix 1) \$465,984.18 +GST

The reviewed cost was based on comparative rates however includes items which were outlined in the City of Wanneroo costing as being required to meet the City's standards as listed below.

- Community consultation
- Tree surgery for Two Rocks Road pine trees
- Geotechnical Report
- Foreshore Management Plan
- Revised CARA Report
- Increased bulk earthwork requirements
- Increased need for scour protection
- Conservation fencing rate and linear length allowances adjusted to cover full extent of access
- Added vegetative restorative and dune stabilisation works rather than hydromulch only
- Informative and directional signage added
- Solar pole top lighting and electrical
- 1.5m wide pedestrian footpath access
- Semi moutable kerb to carpark
- Removable bollards for beach access

Estimates for the alternate beach access proposals A and B (refer Appendices 2 & 3) aim to provide an opinion of cost in reflecting the requirements of State and Local Planning as advised by the City of Wanneroo, recommendations from SLSWA, improving lighting to the road, footpath and car park to AS 1158, footpath to separate vehicle and pedestrian access, waste collection (bins & disposal bag/dispenser), signage, emergency/services access to the beach and post construction revegetation/stabilisation works.

- Alternate Proposed Beach Access A \$410,853.69 +GST
- Alternate Proposed Beach Access B \$439,670.21 +GST

Though subject to final detail design in consultation with the City and Developer, the figures above provide a reasonable estimate assumption in construction including preliminary reporting as required plus or minus 10%.

Ongoing monthly maintenance for the built infrastructure would require street sweeping, road surface inspection, traffic management, rubbish collection, dog waste bag replacement and inspection of conservation fencing and lighting. Refer Appendix 4. Some costs could be consolidated and reduced with existing scheduled works.

- Ongoing Monthly Maintenance \$1,510.00 +GST

## Further Consultation

Prior to proceeding with additional site specific surveys or design development it is recommended that Community consultation be undertaken to engage local community groups, residents and stakeholders in the decision making process and to provide feedback on the current proposals. Consultation with key stakeholders and potential users is key to ensuring successful engagement with the proposal and ongoing utilisation of the facility.

Through advice received from relevant government bodies during this study it is evident that additional research and site investigations are required to assist with determining the suitability of the site to accommodate potential development. These include;



- Investigation and clearance of any potential unexploded ordnance or fragments within the substantial occurrence area
- SLSWA CARA report specific to the area
- Spring Flora Survey
- Geotechnical investigations
- Foreshore Management Plan

The provision of these documents, along with further detail design will form the basis of the application for statutory approval of these works should the project proceed.

## Conclusion

The 681 signed petition received by the City of Wanneroo addressed support for beach access off Two Rocks Road between Leeman's Landing and the Spot. The location currently proposed by Acumen near the intersections of Whitfield Drive and Blaxland Avenue. A break down of the entries revealed 63% were local with the remainder visitors to Two Rocks. In relationship to the current Two Rocks community this represents almost 20%. With several structure plans in place and approved for Two Rocks, forecasted growth will be significant to the area and demand for safe beach access will be need to be addressed. The SLSWA CARA documents existing beach usage and potential beach access as demand grows. The CARA suggests that this beach type is preferable for swimming and currently recommends to formalise two existing informal tracks with fencing and made safe for access as a measure to provide supply due to imminent demand. With the limited supply of formalised safe beach access in the immediate area for the growing population it is apparent that this a suitable location.

Procedurally State and local planning requires the beach to be safe, of high amenity value and considerate to the conservation of natural assets and ecological values. Sustainable coastal infrastructure that is designed and located with consideration to sea level rise projections is possible within the study area with a localised Foreshore Management Plan is to be undertaken prior to any development within the foreshore. During a 50 years design lifetime the existing coastline is predicted to be still in place at that point in time with the current design locations at low risk in being affected or have any significant impact on dune movement.

Two (2) possible options have been provided for beach access which account for factors regarding vehicle movement, access entry/exit from Two Rocks Road, proximity to existing public transport nodes, pedestrian access, existing topography, dune stabilisation, vegetation preservation, visual blending of proposed with existing landscape character. The proposals provide safer access to the beach with designated path, road and car parking and offer additional key ecological and lifestyle opportunities such as;

- Control and limit access to the beach ensures preservation measures to the coastline
- Repair damaged dune areas through community coastal care groups
- Increase accessible beach use for all recreational purposes
- Significantly increase dog beach exercise area south of Leeman's Landing well clear of potential sea wrack issues limiting current use
- Provide and promote greater opportunity for a healthier community lifestyle
- To encourage all ability access to the beach
- Provide broader beach activities and tourism opportunities for the Two Rocks community

Based on the available information in is evident that there is sufficient current and projected demand to warrant the provision of formalised safe beach access within the study area. It is recommended that a number for additional investigations and consultation be undertaken following this report. A Multi-criteria Analysis (refer Appendix 6) has been completed to assist with the recommendations.

### Recommendations

- Community Consultation
- Investigation and clearance of any potential unexploded ordnance or fragments within the substantial occurrence area
- SLSWA CARA report specific to the area
- Spring Flora Survey
- Geotechnical investigations
- Foreshore Management Plan
- Foreshore Restoration Works Plan
- Negotiate with Developer revision of findings, recommendation and cost implications

These would inform the progression of detailed design for the works to enable submission for statutory approvals. It is estimated that the timeframe for this process to proceed to confirmation of intent to construct is approximately 3 months. Due to the requirement of a spring flora survey, the progression of the Foreshore Management Plan and steps towards suitable approval applications would not be possible until October or November 2019. Part of this recommendation supporting beach access would be to engage discussions with the Developer (CVJV) to renegotiate the preferred location and route as documented in this report, final design, timeframes and financial implications associated.

# Appendices

## Appendix 1: Opinion of Probable Cost for Acumen Proposed Beach Access



Project: **Two Rocks Beach Access**  
 Client: City of Wanneroo  
 Task: Preliminary Cost Estimate  
 Plan Ref: COW-07  
 Prepared by: MH  
 Date: 12-Apr-19  
 Revision: D

Total Area (m2)	\$/m2	TOTAL
5800	\$ 80.34	\$465,984.18

### Acumen Proposed Beach Access

\* Note: Rates excl. GST

	ITEM	UNIT	QTY	\$ RATE	COST	
<b>1</b>	<b>PRELIMINARIES</b>			\$389,386.45	2.00%	\$ 7,787.73
1.01	Foreshore Management Plan	item	1	\$ 8,500.00		\$ 8,500.00
1.02	Foreshore Restoration Works Plan	item	1	\$ 4,500.00		\$ 4,500.00
1.03	Geotechnical Report	PS	1	\$ 6,500.00		\$ 6,500.00
1.04	SLSWA CARA Report	item	1	\$ 1,600.00		\$ 1,600.00
1.05	Civil Consultation	item	1	\$ 15,000.00		\$ 15,000.00
1.06	Landscape Consultation	item	1	\$ 12,000.00		\$ 12,000.00
1.07	Community Consultation	item	1	\$ 9,960.00		\$ 9,960.00
<b>2</b>	<b>TREE SURGERY (Two Rocks Road)</b>					\$ 1,000.00
<b>3</b>	<b>SITE WORKS AND SET OUT</b>					
3.01	Removal of Demolition waste and disposal offsite	PS	1	\$ 5,000.00		\$ 5,000.00
3.02	Dust supression	item	1	\$ 3,500.00		\$ 3,500.00
3.03	Service utilities location and identification	item	1	\$ 500.00		\$ 500.00
3.04	Site works and set out	sqm	6,000	\$ 0.20		\$ 1,200.00
3.05	Dewatering	item		\$ -		\$ -
3.06	Weed/Undergrowth eradication/ top soil stripping	sqm	6,000	\$ 0.50		\$ 3,000.00
<b>4</b>	<b>EARTHWORKS, GRADING AND SUB SOIL</b>					
4.01	Bulk Earthworks	sqm	5,800	\$ 2.00		\$ 11,600.00
4.02	Final trim (+/- 100mm)	sqm	5,800	\$ 0.85		\$ 4,930.00
4.03	Stabilisation of earthworks	sqm	2,100	\$ 2.50		\$ 5,250.00
<b>5</b>	<b>ROADWORKS</b>					
5.01	Crushed limestone sub base course (200mm)	sqm	4,440	\$ 8.50		\$ 37,740.00
5.02	Asphalt (40mm)	sqm	4,440	\$ 18.50		\$ 82,140.00
5.03	Line marking	item	1	\$ 1,800.00		\$ 1,800.00
5.04	Road compaction testing	item	1	\$ 2,000.00		\$ 2,000.00
5.05	Drainage swale (2m wide)	lin/m	600	\$ 8.50		\$ 5,100.00
5.06	Scour protection to swales	sqm	150	\$ 54.00		\$ 8,100.00
<b>6</b>	<b>PAVING, EDGES AND FENCING</b>					
6.01	Concrete footpath broom finish natural grey	sqm	933	\$ 42.00		\$ 39,186.00
6.02	Conservation fencing 1.2M high	lin.n	1,360	\$ 62.00		\$ 84,320.00
6.03	Kerb semi mountable	lin/m	267	\$ 23.85		\$ 6,367.95
<b>7</b>	<b>SITE FURNITURE</b>					
7.01	Pole top lights (Solar)	item	8	\$ 6,500.00		\$ 52,000.00
7.02	Removable bollard - service vehicle access to beach	ea	2	\$ 450.00		\$ 900.00
<b>8</b>	<b>SOFT LANDSCAPE WORKS</b>					
7.01	140mm planting @ 4sqm	ea	1,400	\$ 5.25		\$ 7,350.00
7.02	Tube stock planting	ea	3,600	\$ 2.15		\$ 7,740.00
7.03	Mulch only (imported - supply and install)	sqm	1,250	\$ 6.85		\$ 8,562.50
<b>9</b>	<b>MISCELLANEOUS</b>					
9.01	Graffiti Coating	item	0	\$ -		\$ -
9.02	Structural Eng. Certification	item	2	\$ 750.00		\$ 1,500.00
9.03	Electrical Certification	item	1	\$ 1,000.00		\$ 1,000.00
9.04	Informative signage	item	8	\$ 750.00		\$ 6,000.00
9.05	Bike Rack	item	1	\$ 2,600.00		\$ 2,600.00
<b>10</b>	<b>MAINTENANCE</b>					
10.01	Consolidation	per week	13	\$ 750.00		\$ 9,750.00

Total \$465,984.18



## Appendix 2: Opinion of Probable Cost for Beach Access A



Project: **Two Rocks Beach Access**  
 Client: City of Wanneroo  
 Task: Preliminary Cost Estimate  
 Plan Ref: COW-07  
 Prepared by: MH  
 Date: 26-Mar-19  
 Revision: **B**

Total Area (m2)	\$/m2	TOTAL
4600	\$ 89.32	\$410,853.69

### BEACH ACCESS A

\* Note: Rates excl. GST

	ITEM	UNIT	QTY	\$ RATE	COST
<b>1</b>	<b>PRELIMINARIES</b>				
			\$335,336.95	2.00%	\$ 6,706.74
1.01	Foreshore Management Plan	item	1	\$ 8,500.00	\$ 8,500.00
1.02	Foreshore Restoration Works Plan	item	1	\$ 4,500.00	\$ 4,500.00
1.03	Geotechnical Report	PS	1	\$ 6,500.00	\$ 6,500.00
1.04	SLSWA CARA Report	item	1	\$ 1,600.00	\$ 1,600.00
1.05	Civil Consultation	item	1	\$ 15,000.00	\$ 15,000.00
1.06	Landscape Consultation	item	1	\$ 12,000.00	\$ 12,000.00
1.07	Community Consultation	item	1	\$ 9,960.00	\$ 9,960.00
<b>2</b>	<b>TREE SURGERY (Two Rocks Road)</b>				\$ 1,000.00
<b>3</b>	<b>SITE WORKS AND SET OUT</b>				
3.01	Removal of Demolition waste and disposal offsite	PS	1	\$ 5,000.00	\$ 5,000.00
3.02	Dust supression	item	1	\$ 3,250.00	\$ 3,250.00
3.03	Service utilities location and identification	item	1	\$ 500.00	\$ 500.00
3.04	Site works and set out	sqm	4,600	\$ 0.20	\$ 920.00
3.05	Dewatering	item		\$ -	\$ -
3.06	Weed/Undergrowth eradication/ top soil stripping	sqm	4,600	\$ 0.50	\$ 2,300.00
<b>4</b>	<b>EARTHWORKS, GRADING AND SUB SOIL</b>				
4.01	Bulk Earthworks	sqm	4,600	\$ 2.00	\$ 9,200.00
4.02	Final trim (+/- 100mm)	sqm	4,600	\$ 0.85	\$ 3,910.00
4.03	Stabilisation of earthworks	sqm	2,150	\$ 2.50	\$ 5,375.00
<b>5</b>	<b>ROADWORKS</b>				
5.01	Crushed limestone sub base course (200mm)	sqm	3,230	\$ 8.50	\$ 27,455.00
5.02	Asphalt (40mm)	sqm	3230	\$ 18.50	\$ 59,755.00
5.03	Line marking	item	1	\$ 2,150.00	\$ 2,150.00
5.04	Road compaction testing	item	1	\$ 2,000.00	\$ 2,000.00
5.05	Drainage swale (2m wide)	lin/m	350	\$ 8.50	\$ 2,975.00
5.06	Scour protection to swales	sqm	125	\$ 54.00	\$ 6,750.00
<b>6</b>	<b>STRUCTURES</b>				
6.02	Bicycle rack	item	4	\$ 650.00	\$ 2,600.00
<b>7</b>	<b>PAVING, EDGES AND FENCING</b>				
7.01	Concrete footpath broom finish natural grey	sqm	933	\$ 42.00	\$ 39,186.00
7.02	Conservation fencing 1.2M high	lin.n	1,179	\$ 62.00	\$ 73,098.00
7.03	Kerb semi mountable	lin/m	267	\$ 23.85	\$ 6,367.95
<b>8</b>	<b>SITE FURNITURE</b>				
8.01	Pole top lights (Solar)	item	8	\$ 6,500.00	\$ 52,000.00
8.02	Removable bollard - service vehicle access to beach	ea	2	\$ 450.00	\$ 900.00
<b>9</b>	<b>SOFT LANDSCAPE WORKS</b>				
9.01	140mm planting @ 4sqm	ea	1,200	\$ 5.25	\$ 6,300.00
9.02	Tube stock planting	ea	3,400	\$ 2.15	\$ 7,310.00
9.03	Mulch only (imported - supply and install)	sqm	1,100	\$ 6.85	\$ 7,535.00
<b>10</b>	<b>MISCELLANEOUS</b>				
10.01	Graffiti Coating	item	0	\$ -	\$ -
10.02	Structural Eng. Certification	item	2	\$ 750.00	\$ 1,500.00
10.03	Electrical Certification	item	1	\$ 1,000.00	\$ 1,000.00
10.04	Informative signage	item	8	\$ 750.00	\$ 6,000.00
<b>12</b>	<b>MAINTENANCE</b>				
12.01	Consolidation	per week	13	\$ 750.00	\$ 9,750.00
<b>Total</b>					<b>\$410,853.69</b>

## Appendix 3: Opinion of Probable Cost for Beach Access B



Project: **Two Rocks Beach Access**  
 Client: City of Wanneroo  
 Task: Preliminary Cost Estimate  
 Plan Ref: COW-07  
 Prepared by: MH  
 Date: 20-Mar-19  
 Revision: A

Total Area (m2)	\$/m2	TOTAL
4850	\$ 90.65	\$439,670.21

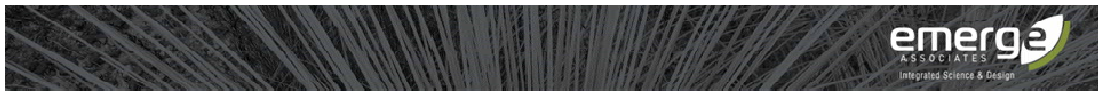
### BEACH ACCESS B

\* Note: Rates excl. GST

	ITEM	UNIT	QTY	\$ RATE	COST
<b>1</b>	<b>PRELIMINARIES</b>				
			\$363,862.95	2.00%	\$ 7,277.26
1.01	Foreshore Management Plan	item	1	\$ 8,500.00	\$ 8,500.00
1.02	Foreshore Restoration Works Plan	item	1	\$ 4,500.00	\$ 4,500.00
1.03	Geotechnical Report	PS	1	\$ 6,500.00	\$ 6,500.00
1.04	SLSWA CARA Report	item	1	\$ 1,320.00	\$ 1,320.00
1.05	Civil Consultation	item	1	\$ 15,000.00	\$ 15,000.00
1.06	Landscape Consultation	item	1	\$ 12,000.00	\$ 12,000.00
1.07	Community Consultation	item	1	\$ 9,960.00	\$ 9,960.00
<b>2</b>	<b>TREE SURGERY (Two Rocks Road)</b>				\$ 1,000.00
<b>3</b>	<b>SITE WORKS AND SET OUT</b>				
3.01	Removal of Demolition waste and disposal offsite	PS	1	\$ 5,000.00	\$ 5,000.00
3.02	Dust supression	item	1	\$ 3,250.00	\$ 3,250.00
3.03	Service utilities location and identification	item	1	\$ 500.00	\$ 500.00
3.04	Site works and set out	sqm	4,850	\$ 0.20	\$ 970.00
3.05	Dewatering	item		\$ -	\$ -
3.06	Weed/Undergrowth eradication/ top soil stripping	sqm	4,850	\$ 0.50	\$ 2,425.00
<b>4</b>	<b>EARTHWORKS, GRADING AND SUB SOIL</b>				
4.01	Bulk Earthworks	sqm	4,850	\$ 2.00	\$ 9,700.00
4.02	Final trim (+/- 100mm)	sqm	4,850	\$ 0.85	\$ 4,122.50
4.03	Stabilisation of earthworks	sqm	2,150	\$ 2.50	\$ 5,375.00
<b>5</b>	<b>ROADWORKS</b>				
5.01	Crushed limestone sub base course (200mm)	sqm	3,750	\$ 8.50	\$ 31,875.00
5.02	Asphalt (40mm)	sqm	3750	\$ 18.50	\$ 69,375.00
5.03	Line marking	item	1	\$ 2,150.00	\$ 2,150.00
5.04	Road compaction testing	item	1	\$ 2,000.00	\$ 2,000.00
5.05	Drainage swale (2m wide)	lin/m	350	\$ 8.50	\$ 2,975.00
5.06	Scour protection to swales	sqm	125	\$ 54.00	\$ 6,750.00
<b>6</b>	<b>STRUCTURES</b>				
6.02	Bicycle rack	item	4	\$ 650.00	\$ 2,600.00
<b>7</b>	<b>PAVING, EDGES AND FENCING</b>				
7.01	Concrete footpath broom finish natural grey	sqm	995	\$ 42.00	\$ 41,790.00
7.02	Conservation fencing 1.2M high	lin.n	1,240	\$ 62.00	\$ 76,880.00
7.03	Kerb semi mountable	lin/m	267	\$ 23.85	\$ 6,367.95
<b>8</b>	<b>SITE FURNITURE</b>				
8.01	Pole top lights (Solar)	item	9	\$ 6,500.00	\$ 58,500.00
8.02	Removable bollard - service vehicle access to beach	ea	2	\$ 450.00	\$ 900.00
<b>9</b>	<b>SOFT LANDSCAPE WORKS</b>				
9.01	140mm planting @ 4sqm	ea	1,250	\$ 5.25	\$ 6,562.50
9.02	Tube stock planting	ea	3,450	\$ 2.15	\$ 7,417.50
9.03	Mulch only (imported - supply and install)	sqm	1,150	\$ 6.85	\$ 7,877.50
<b>10</b>	<b>MISCELLANEOUS</b>				
10.01	Graffiti Coating	item	0	\$ -	\$ -
10.02	Structural Eng. Certification	item	2	\$ 750.00	\$ 1,500.00
10.03	Electrical Certification	item	1	\$ 1,000.00	\$ 1,000.00
10.04	Informative signage	item	8	\$ 750.00	\$ 6,000.00
<b>12</b>	<b>MAINTENANCE</b>				
12.01	Consolidation	per week	13	\$ 750.00	\$ 9,750.00
<b>Total</b>					<b>\$439,670.21</b>



## Appendix 4: Opinion of Probable Cost for Maintenance



Project: **Two Rocks Beach Access**  
 Client: City of Wanneroo  
 Task: Preliminary Cost Estimate  
 Plan Ref: COW-07  
 Prepared by: PT  
 Date: 29-Mar-19  
 Revision: **A (DRAFT)**

### Monthly Maintenance

Total Area (m2)	\$/m2	TOTAL
5800	\$ 0.27	\$1,510.00

\* Note: Rates excl. GST

	ITEM	UNIT	QTY	\$ RATE	COST
1	PRELIMINARIES				\$
3	SITE WORKS				
3.01	Traffic Management	item	1	\$ 250.00	\$ 250.00
3.02	Pathways & Road sweep and clean	item	1	\$ 500.00	\$ 500.00
3.03	Litter Collection and disposal (one visit per week)	item	4	\$ 120.00	\$ 480.00
3.04	Inspection of Conservation Fencing	item	1	\$ 60.00	\$ 60.00
3.05	Inspection of Street Light Fittings	item	1	\$ 120.00	\$ 120.00
3.06	Replacement of Dog Waste Bags	item	2	\$ 50.00	\$ 100.00
<b>Total</b>					<b>\$1,510.00</b>

# Memorandum

<b>To:</b>	Peter Trend, Michael Harris	<b>Date:</b>	22 March 2019
<b>CC:</b>	Martijn Klabbers	<b>From:</b>	Junsheng Jiang
<b>Doc No:</b>		<b>File Loc:</b>	
<b>Subject:</b>	Review	<b>Project:</b>	Two Rocks Beach Access FS

## 1 BASIS OF REVIEW

### 1.1 Background

This memorandum covers the review of relevant coastal study reports for the Two Rocks southern beach area, focussed on potential coastline set back that may impact on the key structural elements of the proposed development, being:

- Car park infrastructure adjacent to the southern beach of the Two Rocks; and
- Access track linking the car park and the foredune of the beach.

### 1.2 Scope of Review

The following data and documents have been provided for this review:

Reference	Received Items	Comments / use in this study
/1/	2014 to 2017 surveys	Beach profile surveys do not cover the development area
/2/	2018 survey	Beach profile surveys do not cover the development area
/3/	Coastal Hazard Risk Management and Adaptation Plan (CHRMAP) reports (Part 1 and Part 2)	Report predicted the 2070 coastline, used for Car Park Infrastructure assessment
/4/	Two Rocks Coastal Management Report (MP Rogers, 2015)	Report provides metocean data and coastal processes results for Two Rocks
/5/	Local Planning Policy 4.2.1 Coastal Assets Policy Adopted 16 August 2016	Criteria adopted for CHRMAP Assessment



## Appendix 5: Coastal Management, Risks and Adaption. (cont.)

/6/	State Planning Policy (SPP2.6)	Criteria adopted for CHRMAP Assessment
/7/	Proposed Concept Design for Car Park Option A and B	Apply Option A layout for the assessment

The scope of this review is to assess the:

1. Determine the long-term stability of this beach and to ensure that any proposed infrastructure is not going to be undermined or washed away. Assume a minimum 50 years design lifetime would be required.
2. Determine the finished level at which the infrastructure would still be above sea level in 50 years time.
3. Describe any impact that the car park infrastructure could have on the dune movement.
4. Confirm that the aggregation of sea wrack against the Two Rocks is caused by the Marina Headwall and unlikely to change in the near future.
5. Describe the impacts of cutting an access track through the foredune.

It should be noted that this review is of a high-level nature and does not include a comprehensive assessment and study. Furthermore, the review is based on the information provided and verification or validation of values and results summarised in the reports is outside the scope of this review.

## 2 REVIEW SUMMARY

### 2.1 Criteria Adopted for CHRMAP Assessment

The key policy governing coastal planning in WA is the State Planning Policy No. 2.6: State Coastal Planning Policy (/6/). The following criteria are applied to assess the required allowances for coastal processes and climate change.

- S1 Severe Storm Erosion - An allowance for the current risk of storm erosion based upon a series of storms, with elevated water levels and an Average Recurrence Interval (ARI) of approximately 100 years in relation to beach erosion.
- S2 Long Term Trends – An allowance for historic shoreline movement trends in order to provide an appropriate allowance for the planning period.
- S3 Climate Change – An allowance of erosion caused by potential sea level rise, with SPP 2.6 adopting a value of 0.9 m for sea level rise in the coming 100 years.

### 2.2 Estimated Allowance for Coastal Processes

CHRMAP (/3/) has applied the criteria required in SPP2.6 to assess the allowance for the coastal processes. The allowance includes S1, S2 and S3, plus an additional allowance for uncertainty. MP Rogers (2015, /4/) provided a number of areas which were deemed vulnerable over timeframes; up to 2120. For the proposed development site, beach access road and carpark, a 50 years design lifetime would be required.

As such, Advisian has undertaken the risk assessment to select the 2070 Vulnerability. For comparison purposes, the 2120 Vulnerability is also included in the assessment plots.

## 2.3 Review Results

Figure 1 presents the proposed car park area and access road to the beach associated with the predicted 2070 Vulnerability, which was derived from the previous coastal process study (MP Rogers, 2015, /4/). Having no access to the digital data of the vulnerability line, Advisian has derived the line coordinates based on the plots shown in the reports.



**Figure 1 Proposed Car Park Infrastructure associated with predicted 2070 Vulnerability derived from MP Rogers (2015, /4/)**

### 2.3.1 Determine the long-term stability of this beach and to ensure that any proposed infrastructure is not going to be undermined or washed away. Assume a minimum 50 years design lifetime would be required

During the 50 years of the design lifetime, the existing coastline is predicted to be set back approximately 23 m. However, the beach is still in place at that point in time and as the proposed car park infrastructure is above the sea level, it is at a low risk of being washed away.

### 2.3.2 Determine the finished level at which the infrastructure would still be above sea level in 50 years time

See previous Section 2.3.1.



### **2.3.3 Describe any impact that the car park infrastructure could have on the dune movement**

The new dune will relocate accordingly with the future set back of the coastline. The predicated shortest distance between the dune in 2070 and car park infrastructure edge is approximately 19 m. Therefore, the proposed car park infrastructure will no impact on the dune movement.

### **2.3.4 Confirm that the aggregation of sea wrack against the Two Rocks is caused by the Marina Headwall and unlikely to change in the near future**

There are potential developments proposed by DoT on the existing Two Rocks Marina. As per Advisian's understanding, these developments will consider improving the capacity of the sea wrack bypassing around the Marina Headwall. Advisian suggests the City to confirm with DoT.

### **2.3.5 Describe the impacts of cutting an access track through the foredune**

The proposed access road will be cut through the foredune. If this path is sealed, then it will function as a headland in time, interrupting the natural sediment movements along this section, which can affect sedimentation and erosion. Therefore, it is recommended to have the seaward section of this path unsealed.

Appendix 6: Multi-criteria Analysis

Criteria	Options		
	Proposed Location A	Proposed Location B	Developer's Proposed Location
Feasibility and Practically	4	3	1
Environmental Impact	3	3	1
Social Impacts / Community Values	5	5	5
Public Safety	5	5	3
Capital Costs	3	1	2
Long Term Effectiveness	5	5	4
Maintenance Items / Cost	4	4	4
Response to Climate Change, Reversible / Adaptable	4	4	3
<b>Total Score (out of 40)</b>	<b>33</b>	<b>30</b>	<b>23</b>
<b>Conclusion</b>	<b>Recommend</b>	<b>Consider</b>	<b>Not recommended</b>