



COMMUNITY INFORMATION SESSION

Two Rocks Beach Access

Background Information

- Previous Staircase was constructed in 2002 with a 15 year design life
- Recent storms in winter 2016 caused 9m beach erosion and 3m dune erosion at the staircase
- Coastal/Structural Engineering Assessment by M P Rogers
- Beach Safety Assessment by Surf Life Saving



Background Information

- Community Consultation
 - Community Meeting on 21 September 2016
 - Community Feedback obtained on both short and long term access.
- Council Meeting on 11 October 2016
 - Staircase removed
 - Temporary observation point installed
 - M P Rogers Beach Access Options Assessment



Two Rocks Beach Access

Options & Multi Criteria Assessment

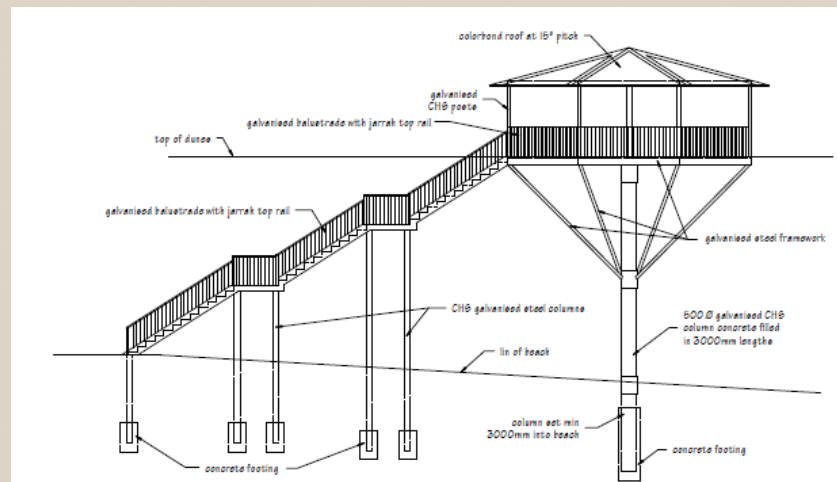
m p rogers & associates p l

Outline

- Presentation will step through
 - Community consultation and feedback
 - Background information
 - Determination of locations for assessment
 - Determination of form of access
 - Design basis for beach access point
 - Multi-criteria assessment

Community Feedback

- Community feedback was sought following community information session
- 11 feedback forms submitted, as well as a proposed design solution
- Commented on short term and long term solutions, locations and form of access and other items



Outcomes of Community Feedback

- Short term access
 - No support received for the option to upgrade the track to the north of the existing development
 - Comments received on the distance to walk and the safety of the swimming beach in that area
 - Several respondents suggested upgrading a track near Tungerra Rd and another at the marina as alternative short term options
 - The short term access options have not been considered further in this assessment



Community Feedback Long Term Solution

- Location
 - Clear preference for access to be reinstated in the existing location (7/11)
 - Several responses (3/11) favoured a location immediately north of the marina
 - One response suggested a midway point
- Form of access
 - Clear preference for stairs to be reinstated (7/11)
 - 2 responses favoured the Octunda design proposal
 - 2 respondents favoured a ramp
- Each of these locations and forms of access will be considered further



Community Feedback

Other comments

- Other comments made in submissions included
 - Coastal erosion needs to be addressed (4/11)
 - A viewing platform was requested in conjunction with the access (3/11)
 - Lighting was requested (1/11)
 - Raising of the walkway and lookout was requested (1/11)
 - Timber was requested as the material (1/11)
 - Developers should pay (1/11)

Agreed Outcomes & Options

Location
Existing Access Point
Mid-way to the Boat Harbour
Northern side of Boat Harbour
Form of Access
Stairs
Rotunda
Ramp
Materials
Timber
Concrete
Aluminium
Fibre Reinforced Plastic

- To be considered in the assessment

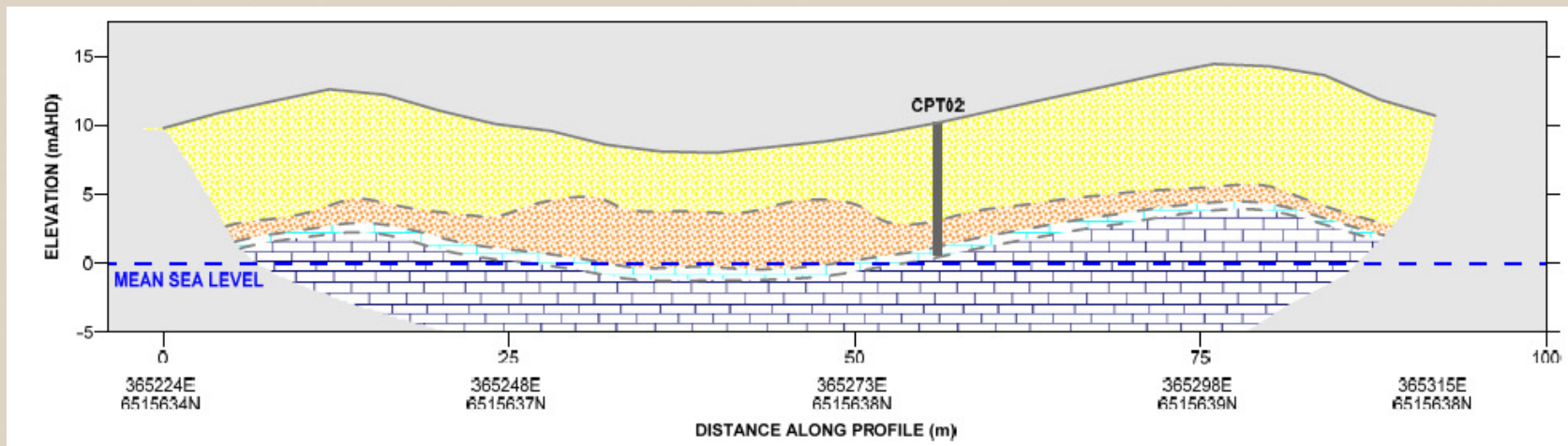
Background – Beach Safety

- SLSWA completed assessment of beach safety
- In summary, whole stretch of coastline is considered unsafe for swimming
- SLSWA rated beaches high risk
- While this is noted, there is a clear community preference for swimming near the location of the existing access point



Background – Geotechnical Condns

- DoT has completed a series of geotechnical investigations
- MRA has reviewed these and estimated rock locations
- Some rock present in the foreshore but variable
- Considered in the assessment





Background – Coastal Stability

- Based largely on MRA's previous investigations
- Reviewed most recent surveys from City and changes since 2014
- Largely the recent changes are localised around the removed stair location
- Rates of shoreline movement considered in the locations of the stairs

Location Assessment

- Generally determined from the community feedback
- Northern location at existing path
- Southern location at the boat harbour
- Midway location determined based on dune contours, existing tracks and blowout
- Previous short term option discounted





Landing Point of Beach Access

- City confirmed design life minimum of 15 years
- Aiming for 25 years in design – standard marine structure
- Approach of design is:
 - Design to accommodate fluctuation in shoreline position
 - Cater for 5 years of shoreline movement and SLR
 - Cater for single run of SCPP storm
 - At end of 25 year period structure to stand
- Balance required between allowing for shoreline movement and reducing earthworks

Determination of Landing Point





Options for Access Considered

- Stairs
 - Rise and falls in line with AS1657
 - Earthworks reduced as much as possible
 - Piled structure
- Ramp
 - Gradient used is 1:8
 - Does not meet universal access, but consistent with Camira Way ramp and provides balance between earthworks , length of ramp and grade
- Track
 - Not considered in detail
 - Similar issues to ramp, not as trafficable
- Octunda
 - Based on provided design details

Concept Options – Northern Ramp

PROS

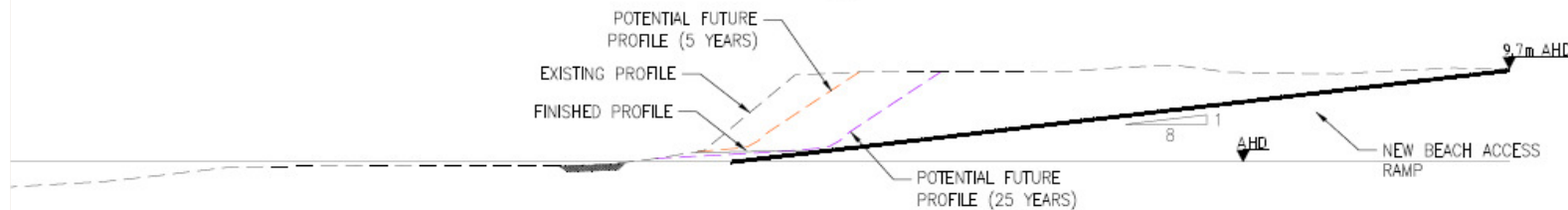
- PREFERRED LOCATION FOR THE COMMUNITY.
- CLOSE TO PREFERRED SWIMMING BEACH.
- SLIGHTLY IMPROVED ACCESS COMPARED TO STAIRS OPTION FOR LESS ABLE BODIED PEOPLE.
- USE OF EXISTING PARKING.

CONS

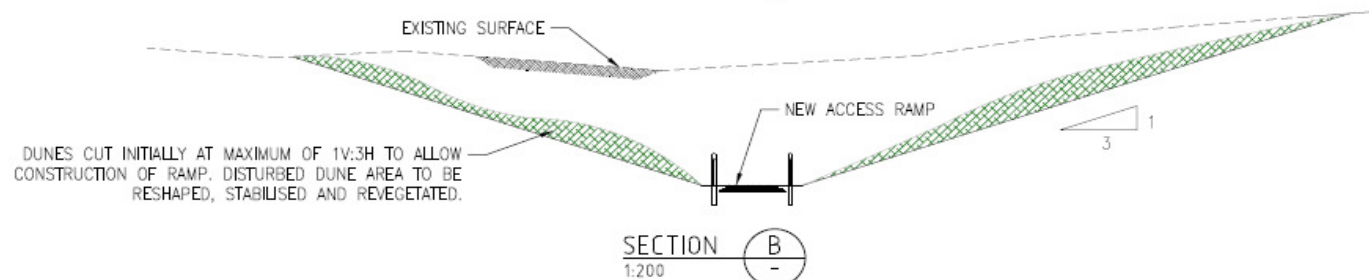
- SIGNIFICANT LEVEL OF EARTHWORK & VEGETATION CLEARING REQUIRED.
- RAMP DOES NOT PROVIDE UNIVERSAL ACCESS.
- DOES NOT MAKE USE OF EXISTING INFRASTRUCTURE.
- TREND OF RECENT EROSION.



RAMP LAYOUT
1:500



SECTION A
1:500



SECTION B
1:200

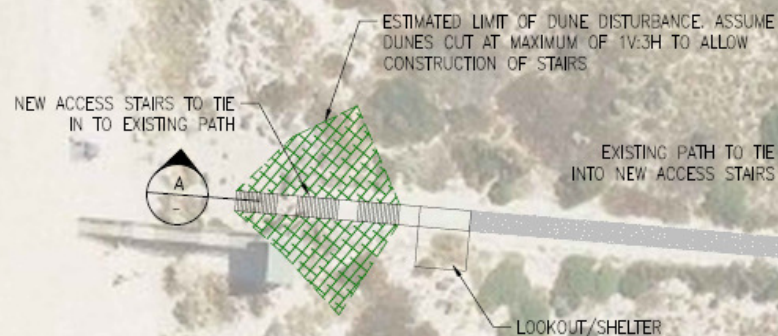
Concept Options – Northern Stairs

PROS

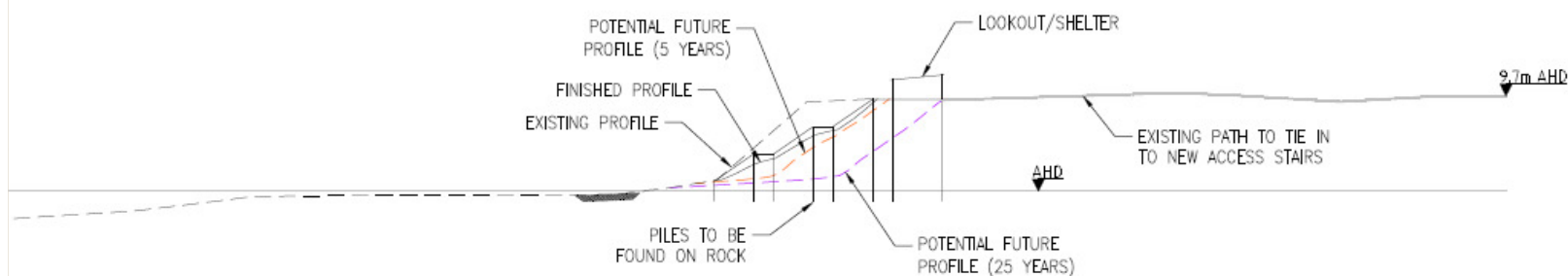
- USE OF EXISTING CONCRETE PATH REDUCES CONSTRUCTION COST.
- CLOSE TO SWIMMING BEACH.
- SIGNIFICANT LOWER LEVEL OF EARTHWORKS & VEGETATION CLEARING REQUIRED.
- PREFERRED LOCATION FOR THE COMMUNITY.
- USE OF EXISTING PARKING.

CONS

- DUNE PROFILE UNDER ACCESS STAIRS SUBJECTED TO CONTINUE LONG TERM RECESSION.
- ACCESS STAIRS MAY BE SIGNIFICANTLY EXPOSED AT THE END OF ITS DESIGN LIFE.
- DOES NOT PROVIDE UNIVERSAL ACCESS.
- TREND OF RECENT EROSION.



STAIR LAYOUT
1:500



SECTION A
1:500

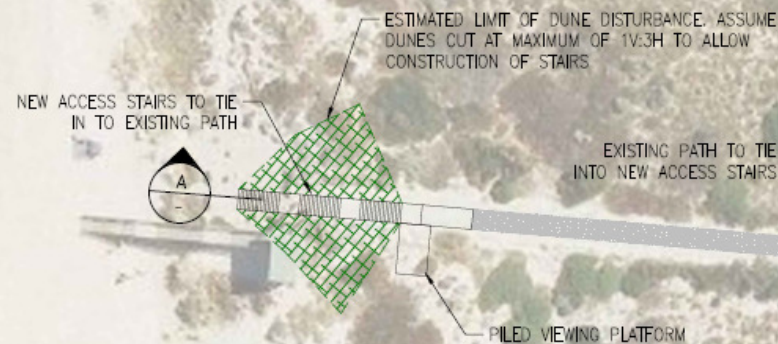
Concept Options – Northern Stairs With Piled Viewing Platform

PROS

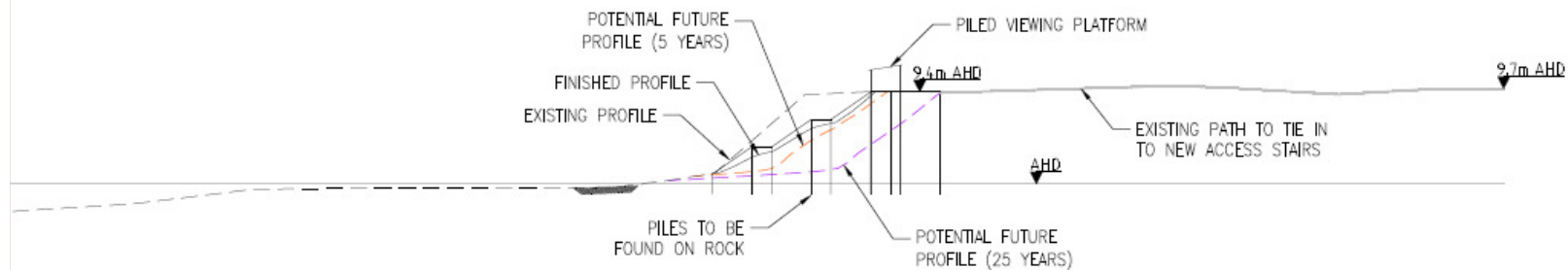
- USE OF EXISTING CONCRETE PATH REDUCES CONSTRUCTION COST.
- CLOSE TO SWIMMING BEACH.
- SIGNIFICANT LOWER LEVEL OF EARTHWORKS & VEGETATION CLEARING REQUIRED.
- PREFERRED LOCATION FOR THE COMMUNITY.
- USE OF EXISTING PARKING.

CONS

- DUNE PROFILE UNDER ACCESS STAIRS SUBJECTED TO CONTINUE LONG TERM RECESSION.
- ACCESS STAIRS MAY BE SIGNIFICANTLY EXPOSED AT THE END OF ITS DESIGN LIFE.
- DOES NOT PROVIDE UNIVERSAL ACCESS.
- TREND OF RECENT EROSION.



STAIR LAYOUT
1:500



SECTION A
1:500

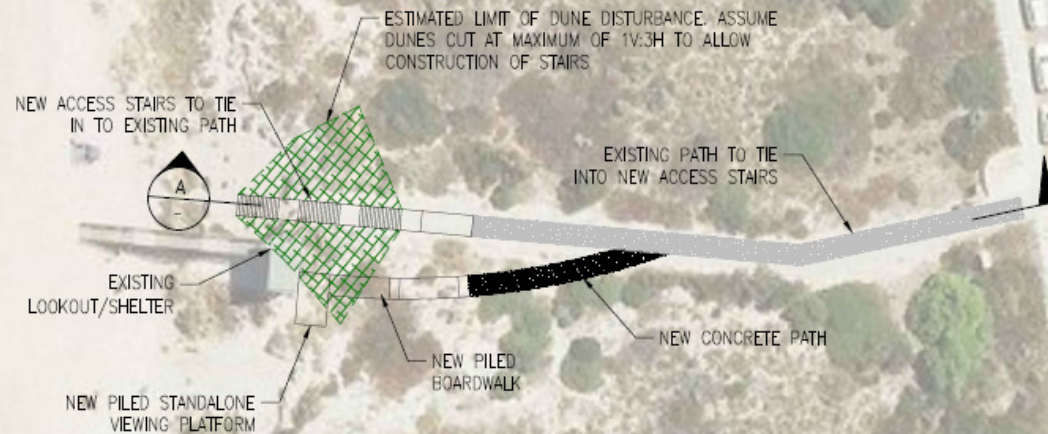
Concept Options – Northern Stairs With Piled Standalone Viewing Platform

PROS

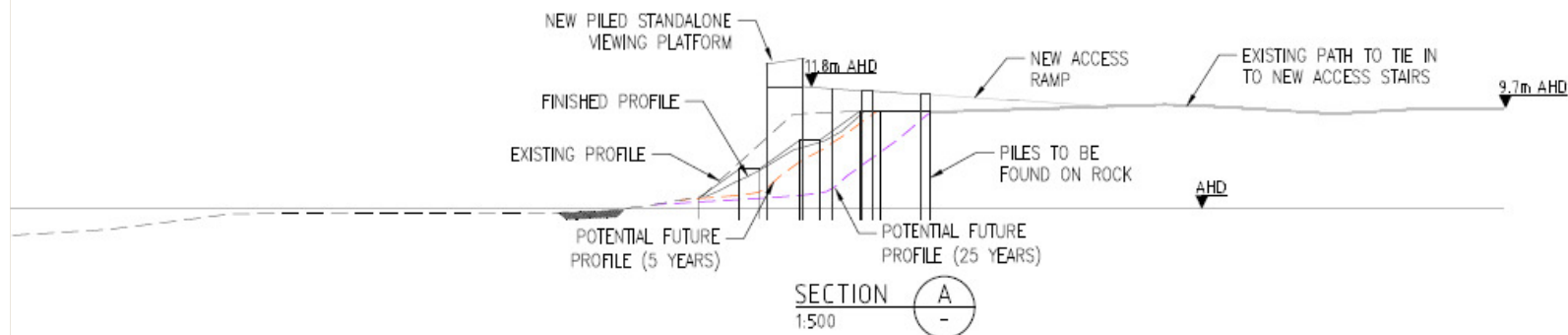
- USE OF EXISTING CONCRETE PATH REDUCES CONSTRUCTION COST.
- CLOSE TO SWIMMING BEACH.
- SIGNIFICANT LOWER LEVEL OF EARTHWORKS & VEGETATION CLEARING REQUIRED.
- PREFERRED LOCATION FOR THE COMMUNITY.
- USE OF EXISTING PARKING.
- NEW STANDALONE VIEWING PLATFORM AS PER COMMUNITY PREFERENCE.
- PROVIDES UNIVERSAL ACCESS TO THE VIEWING PLATFORM

CONS

- DUNE PROFILE UNDER ACCESS STAIRS SUBJECTED TO CONTINUE LONG TERM RECESSION.
- ACCESS STAIRS MAY BE SIGNIFICANTLY EXPOSED AT THE END OF ITS DESIGN LIFE.
- DOES NOT PROVIDE UNIVERSAL ACCESS.
- TREND OF RECENT EROSION.
- HIGHER COST FOR A STANDALONE VIEWING PLATFORM



STAIR LAYOUT
1:500



Concept Options – Northern Octunda

PROS

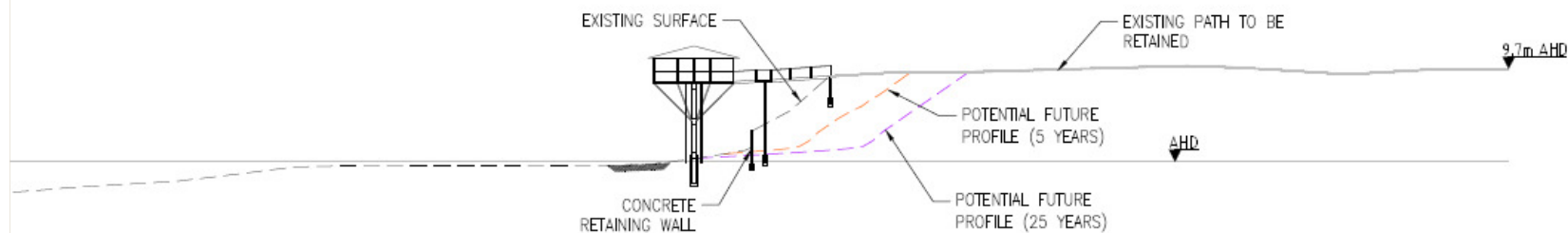
- USE OF EXISTING CONCRETE PATH REDUCES CONSTRUCTION COST.
- PREFERRED LOCATION FOR THE COMMUNITY.
- USE OF EXISTING PARKING.

CONS

- ACCESS PATH LEADING TO THE OCTUNDA MAY BE UNDERCUT DUE TO CONTINUE DUNE EROSION.
- ACCESS POINT IN THE WATER.
- ACCESS STRUCTURE IS EXPOSED TO WAVE ACTION.
- DOES NOT PROVIDE UNIVERSAL ACCESS.
- TREND OF RECENT EROSION.



OCTUNDA LAYOUT
1:500



SECTION A
1:500

Concept Options – Modified Octunda

PROS

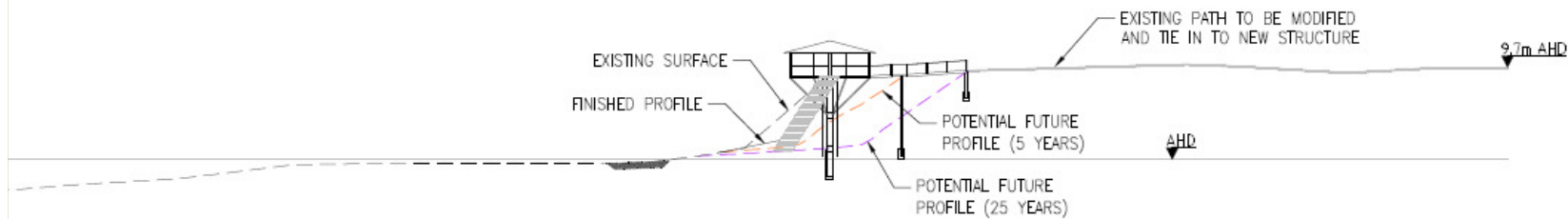
- USE OF EXISTING CONCRETE PATH REDUCES CONSTRUCTION COST.
- PREFERRED LOCATION FOR THE COMMUNITY.
- USE OF EXISTING PARKING.

CONS

- SIGNIFICANT CLEARING OF THE FRONT DUNES
- DOES NOT PROVIDE UNIVERSAL ACCESS.
- TREND OF RECENT EROSION.



MODIFIED OCTUNDA LAYOUT
1:500



SECTION A
1:500

Concept Options – Midway Ramp

PROS

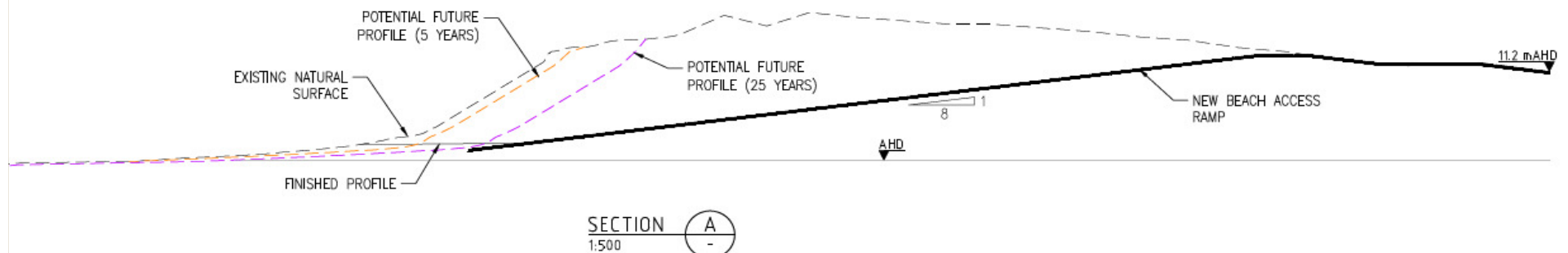
- SLIGHTLY IMPROVED BEACH ACCESS COMPARED TO STAIRS OPTION.
- REDUCED LEVEL OF EROSION.
- BALANCED WALKING DISTANCE TO BEACH ACCESS POINT.

CONS

- LIMITED COMMUNITY SUPPORT.
- SIGNIFICANT LEVEL OF EARTHWORK & VEGETATION CLEARING REQUIRED.
- RAMP DOES NOT PROVIDE UNIVERSAL ACCESS.
- SIGNIFICANT CONSTRUCTION COST.
- LIMITED PARKING.



RAMP LAYOUT
1:500



Concept Options – Midway Stairs

PROS

- LOW LEVEL OF EARTHWORKS & VEGETATION CLEARING.
- REDUCED LEVEL OF EROSION.
- BALANCED WALKING DISTANCE TO BEACH ACCESS POINT.

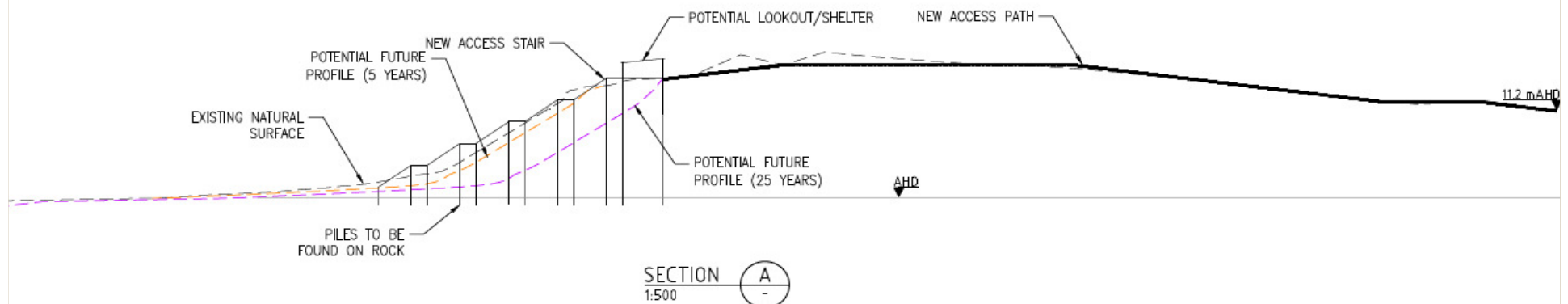
CONS

- LIMITED COMMUNITY SUPPORT.
- LONGER WALKING DISTANCE.
- NEW ACCESS PATH LEADING TO STAIRS REQUIRED.
- ACCESS STAIRS SUBJECTED TO CONTINUE LONG TERM RECESSION.
- ACCESS STAIRS MAY BE SIGNIFICANTLY EXPOSED AT THE END OF ITS DESIGN LIFE.
- DOES NOT PROVIDE UNIVERSAL ACCESS.
- LIMITED PARKING.



STAIR LAYOUT

1:500



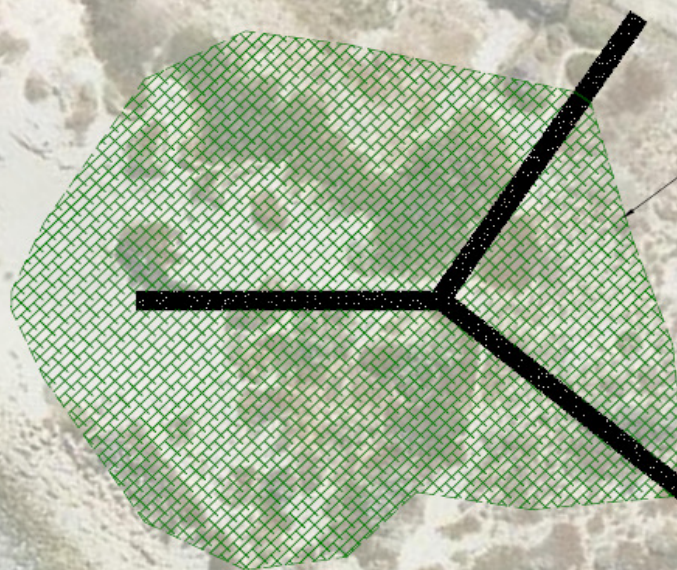
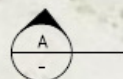
Concept Options – Southern Ramp

PROS

- USE OF EXISTING CAR PARK AT THE TWO ROCKS BOAT HARBOUR.
- SLIGHTLY IMPROVED BEACH ACCESS COMPARED TO STAIRS OPTION.

CONS

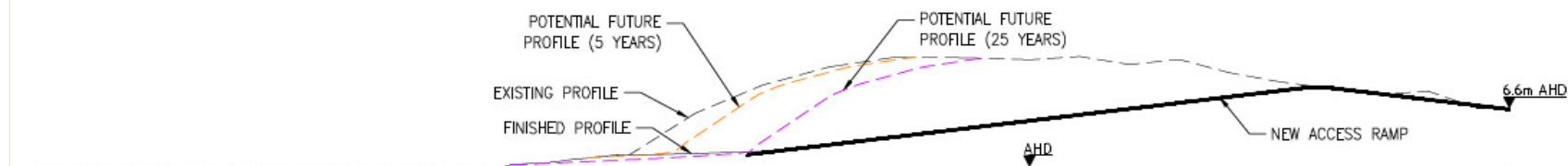
- LESS COMMUNITY SUPPORT.
- LONG WALK TO PREFERRED SWIMMING BEACH.
- HIGH LEVEL OF EARTHWORKS & VEGETATION CLEARING REQUIRED.
- DOES NOT PROVIDE UNIVERSAL ACCESS.
- UNSAFE LOCATION FOR SWIMMING.



ESTIMATED LIMIT OF DUNE DISTURBANCE, ASSUME DUNES CUT AT MAXIMUM OF 1V:3H TO ALLOW CONSTRUCTION OF STAIRS

NEW ACCESS RAMP

RAMP LAYOUT
1:500



SECTION
1:500



Concept Options – Southern Stairs

PROS

- USE OF EXISTING CAR PARK AT THE TWO ROCKS BOAT HARBOUR.
- LOWER LEVEL OF EARTHWORKS & VEGETATION CLEARING REQUIRED.

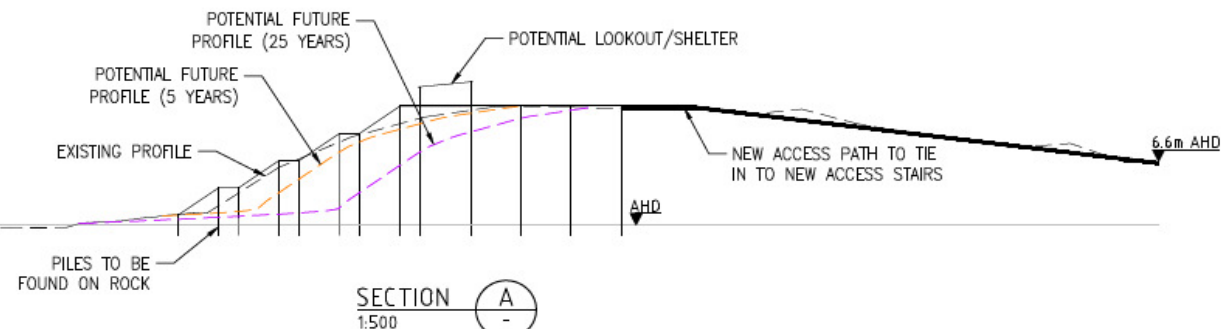
CONS

- LIMITED COMMUNITY SUPPORT.
- LONG WALK TO PREFERRED SWIMMING BEACH.
- DUNE PROFILE UNDER ACCESS STAIRS SUBJECTED TO CONTINUE LONG TERM RECESSION.
- ACCESS STAIRS MAY BE SIGNIFICANTLY EXPOSED AT THE END OF ITS DESIGN LIFE.
- DOES NOT PROVIDE UNIVERSAL ACCESS.
- NOT PERPENDICULAR TO THE BEACH.
- UNSAFE LOCATION FOR SWIMMING.



STAIR LAYOUT

1:500



Materials

Material	Pros	Cons
Timber	<ul style="list-style-type: none">• Simple to remove• Less susceptible to corrosion• Easy to work with• Aesthetically appealing (opinion)	<ul style="list-style-type: none">• Marine grade timber may be hard to source• Susceptible to degradation (such as cracks, shrink & swell) and weathering• Higher maintenance cost than other materials• Not fire resistant
FRP	<ul style="list-style-type: none">• Minimal long term maintenance if the correct type of FRP used (e.g. UV protected for outdoor)• No corrosion issue in coastal environment• Simple to remove• Long design life can be achieved	<ul style="list-style-type: none">• Customized section available but expensive• Anti-crush insert required for bolt through hollow sections• Some fire retardancy, but still loses strength in high temperatures
Aluminium	<ul style="list-style-type: none">• Less susceptible to corrosion compared to steel• Easy to install	<ul style="list-style-type: none">• Potential for galvanic or crevice corrosion of fasteners if not designed properly• Potential issue with pitting that reduces the aesthetic of the structure• Appropriate maintenance required in coastal environment• Slight better fire resistant than timber but loses most of its strength in high temperature
Concrete	<ul style="list-style-type: none">• More earthwork required to achieve a suitable subgrade/subbase• Long design life can be achieved with the right concrete mix	<ul style="list-style-type: none">• Relatively difficult to remove• Relatively harder to construct compared to other options

Multi Criteria Analysis - Basis

- Considers a range of criteria
- Scores based on the presented table

Criteria	Stop & Reassess (1)	Slow (3)	Go (5)
Feasibility & Practicality	Option is impractical and has implications on infrastructure and amenities beyond planning timeframe	Option is viable given it is adequately assessed / designed	Option is considered feasible / practical and requires minimal further investigations
Environmental Impact	Will significantly impact negatively on environment	Minor or no negative impact on the environment	Will benefit environment.
Social Impact / Community Values	Unlikely to be acceptable to community and socially unpalatable. Loss of beach amenity Not supported	Would be palatable to some not to others, briefing by Councillors and community education required Some support	Is very politically palatable, acceptable to community. Beach amenity maintained. Minimal education required Supported by community
Beach Access & Swimming Safety	Option does not ensure safety in beach access or swimming in the short and long term	Option only ensure safety in beach access or swimming in the short term.	Option ensure safety in beach access or swimming in both the short and long term.
Design, Capital & Ongoing Costs	Very expensive (>\$400,000)	Moderately expensive (\$200,000 to \$400,000)	Lower cost (<\$200,000)
Long Term Effectiveness	Option does not provide a long term solution, but may be effective over short term	Option is only a short term solution but has other benefits or option requires further resources / changes to be effective in long term	Option provides a long term solution
Response to Climate Change	Option provides no consideration for and is vulnerable to the effects of climate change	Option is adaptable to climate change but at considerable cost / effort	Option is designed to allow for predicted impacts of climate change
Reversible / Adaptable in the Future	Option is irreversible, option limits alternative options in the future	Option is reversible or adaptable but at considerable cost / effort	Option can easily be adapted for future circumstances or should impacts not occur, option would not negatively impact future generations

Multi Criteria Analysis - Summary

Access Option	Feasibility & Practicality	Environmental Impacts	Social Impacts / Community Values	Beach Access & Swimming Safety	Design, Capital & Ongoing Costs	Long Term Effectiveness	Response to Climate Change	Reversible / Adaptable in the Future
Northern Location - Ramp	<ul style="list-style-type: none"> Substantial dune clearing and earthworks required for construction Significant level of dune clearing reduces buffer against continue future erosion 	<ul style="list-style-type: none"> Significant level of dune clearing and earthworks required 	<ul style="list-style-type: none"> Community preferred location Provides assisted access for disabled people Use of existing parking 	<ul style="list-style-type: none"> Provides safe beach access at the end of design life Community preferred swimming location 	<ul style="list-style-type: none"> Additional cost of demolition of the existing access path Total capital costs in the order of \$300,000 Moderate level of maintenance cost (e.g. clean sand build up on path) 	<ul style="list-style-type: none"> Functional at the end of design life after continued erosion, but would require maintenance to provide continued beach access 	<ul style="list-style-type: none"> Option accounts for the effects of climate change or sea level rise 	<ul style="list-style-type: none"> Reversible through reasonable level of capital expenditure Adaptable, but at considerable cost / effort Slightly less adaptable than stairs
Northern Location – Stairs Option 1	<ul style="list-style-type: none"> Majority of the existing beach access path can be used to tie in to the new stairs Accounts for long term erosion and shoreline recession over the design life At the end of the design life, access infrastructure will require mitigation to provide continue access 	<ul style="list-style-type: none"> Low level of dune clearing and earthworks required 	<ul style="list-style-type: none"> Community preferred location Community preferred form of access Use of existing parking 	<ul style="list-style-type: none"> Provides safe beach access at the end of design life Community preferred swimming location 	<ul style="list-style-type: none"> Allow the use of part of the existing access path Total capital costs in the order of \$210,000 Low maintenance cost 	<ul style="list-style-type: none"> Functional at the end of design life after continued erosion, but would require maintenance to provide continued beach access 	<ul style="list-style-type: none"> Structure will be designed for expected increases in sea level rise and future shoreline recession 	<ul style="list-style-type: none"> Reversible through reasonable level of capital expenditure Adaptable, but at considerable cost / effort
Northern Location - Stairs Option 2 (Piled Viewing Platform)	<ul style="list-style-type: none"> Majority of the existing beach access path can be used to tie in to the new stairs Accounts for long term erosion and shoreline recession over the design life At the end of the design life, access infrastructure will require mitigation to provide continue access 	<ul style="list-style-type: none"> Low level of dune clearing and earthworks required 	<ul style="list-style-type: none"> Community preferred location Community preferred form of access Use of existing parking 	<ul style="list-style-type: none"> Provides safe beach access at the end of design life Community preferred swimming location 	<ul style="list-style-type: none"> Allow the use of part of the existing access path Total capital costs in the order of \$250,000 Low maintenance cost 	<ul style="list-style-type: none"> Functional at the end of design life after continued erosion, but would require maintenance to provide continued beach access 	<ul style="list-style-type: none"> Structure will be designed for expected increases in sea level rise and future shoreline recession 	<ul style="list-style-type: none"> Reversible through reasonable level of capital expenditure Adaptable, but at considerable cost / effort
Northern Location – Stairs Option 3 (Piled Standalone Viewing Platform)	<ul style="list-style-type: none"> Majority of the existing beach access path can be used to tie in to the new stairs Accounts for long term erosion and shoreline recession over the design life At the end of the design life, access infrastructure will require mitigation to provide continue access 	<ul style="list-style-type: none"> Low level of dune clearing and earthworks required 	<ul style="list-style-type: none"> Community preferred viewing option, with comparable viewing to previous structure. Community preferred location Community preferred form of access Use of existing parking 	<ul style="list-style-type: none"> Provides safe beach access at the end of design life Community preferred swimming location 	<ul style="list-style-type: none"> Allow the use of part of the existing access path Total capital costs in the order of \$450,000 Low maintenance cost 	<ul style="list-style-type: none"> Functional at the end of design life after continued erosion, but would require maintenance to provide continued beach access 	<ul style="list-style-type: none"> Structure will be designed for expected increases in sea level rise and future shoreline recession 	<ul style="list-style-type: none"> Reversible through reasonable level of capital expenditure Adaptable, but at considerable cost / effort
Northern Location - Octunda	<ul style="list-style-type: none"> Allow the use of the existing access path Some minor armouring of the toe of the dune via precast concrete panel, unlikely to be sufficient for coastal protection Structure subjected to wave loading due to its exposure 	<ul style="list-style-type: none"> Dune clearing not required 	<ul style="list-style-type: none"> Community preferred location Some community support for this form of access Use of existing parking Aesthetically appealing structure 	<ul style="list-style-type: none"> Beach access point in the water. Unsafe beach access even at the current state Community preferred swimming location 	<ul style="list-style-type: none"> Total capital costs in the order of \$600,000 Significant maintenance cost required to maintain access. 	<ul style="list-style-type: none"> Ineffective in the long term as beach access point in the water 	<ul style="list-style-type: none"> Inadequate consideration for future beach recession and storm erosion Beach access path leading to the Octunda may be undercut in 5 years due to future shoreline recession 	<ul style="list-style-type: none"> Reversible through high level of capital expenditure Adaptable, but at considerable cost / effort

Multi Criteria Analysis - Summary

Access Option	Feasibility & Practicality	Environmental Impacts	Social Impacts / Community Values	Beach Access & Swimming Safety	Design, Capital & Ongoing Costs	Long Term Effectiveness	Response to Climate Change	Reversible / Adaptable in the Future
Northern Location – Modified Octunda Option	<ul style="list-style-type: none"> Allow the use of the existing access path Some minor armouring of the toe of the dune via precast concrete panel, unlikely to be sufficient for coastal protection 	<ul style="list-style-type: none"> Significant level of dune clearing and earthworks required 	<ul style="list-style-type: none"> Community preferred location Some community support for this form of access Use of existing parking Aesthetically appealing structure 	<ul style="list-style-type: none"> Community preferred swimming location 	<ul style="list-style-type: none"> Total capital costs in the order of \$600,000 Low maintenance cost 	<ul style="list-style-type: none"> Functional at the end of design life after continued erosion, but would require maintenance to provide continued beach access 	<ul style="list-style-type: none"> Inadequate consideration for future beach recession and storm erosion Beach access path leading to the Octunda may be undercut in 5 years due to future shoreline recession 	<ul style="list-style-type: none"> Reversible through high level of capital expenditure Adaptable, but at considerable cost / effort
Midway Location - Ramp	<ul style="list-style-type: none"> Substantial dune clearing and earthworks required for construction Significant level of dune clearing reduces buffer against continue future erosion 	<ul style="list-style-type: none"> Significant level of dune clearing and earthworks required 	<ul style="list-style-type: none"> Low level of community support at this location Provides assisted access for disabled people Long walking distance to the beach Limited parking 	<ul style="list-style-type: none"> Provides safe beach access at the end of design life Unsafe swimming location 	<ul style="list-style-type: none"> Total capital costs in the order of \$800,000 Moderate level of maintenance cost (e.g. clean sand build up on path) 	<ul style="list-style-type: none"> Functional at the end of design life after continued erosion, but would require maintenance to provide continued beach access 	<ul style="list-style-type: none"> Option accounts for the effects of climate change or sea level rise 	<ul style="list-style-type: none"> Only reversible through high capital expenditure Adaptable, but at considerable cost / effort Slightly less adaptable than stairs
Midway Location - Stairs	<ul style="list-style-type: none"> Require a new access path leading to the new stairs to be constructed Longer stairs required to accommodate the dune profile 	<ul style="list-style-type: none"> Low level of dune clearing and earthworks required 	<ul style="list-style-type: none"> Low level of community support at this location Long walking distance to the beach Limited parking 	<ul style="list-style-type: none"> Provides safe beach access at the end of design life Unsafe swimming location 	<ul style="list-style-type: none"> Additional cost for provision of new access path to tie into the new stairs Total capital costs in the order of \$350,000 Low maintenance cost 	<ul style="list-style-type: none"> Functional at the end of design life after continued erosion, but would require maintenance to provide continued beach access 	<ul style="list-style-type: none"> Structure will be designed for expected increases in sea level rise and future shoreline recession 	<ul style="list-style-type: none"> Reversible through reasonable level of capital expenditure Adaptable, but at considerable cost / effort
Southern Location - Ramp	<ul style="list-style-type: none"> Use of the existing carpark north of the Two Rocks boat harbour Substantial dune clearing and earthworks required for construction 	<ul style="list-style-type: none"> Significant level of dune clearing and earthworks required 	<ul style="list-style-type: none"> Low level of community support at this location Long walk distance to the swimming beach Use of existing parking at Boat Harbour 	<ul style="list-style-type: none"> Provides safe beach access at the end of design life Not suitable location for swimming 	<ul style="list-style-type: none"> Total capital costs in the order of \$400,000 Moderate level of maintenance cost (e.g. clean sand build up on path) 	<ul style="list-style-type: none"> Functional at the end of design life after continued erosion, but would require maintenance to provide continued beach access 	<ul style="list-style-type: none"> Option accounts for the effects of climate change or sea level rise 	<ul style="list-style-type: none"> Reversible through reasonable level of capital expenditure Adaptable, but at considerable cost / effort Slightly less adaptable than stairs
Southern Location - Stairs	<ul style="list-style-type: none"> Use of the existing carpark north of the Two Rocks boat harbour Longer stairs required to ensure continue access in the long term 	<ul style="list-style-type: none"> Low level of dune clearing and earthworks required 	<ul style="list-style-type: none"> Low level of community support at this location Long walking distance to the swimming beach Use of existing parking at Boat Harbour 	<ul style="list-style-type: none"> Provides safe beach access at the end of design life Not suitable location for swimming 	<ul style="list-style-type: none"> Additional cost for provision of new access path to the new stairs Total capital costs in the order of \$380,000 Low maintenance cost 	<ul style="list-style-type: none"> Functional at the end of design life after continued erosion, but would require maintenance to provide continued beach access 	<ul style="list-style-type: none"> Structure will be designed for expected increases in sea level rise and future shoreline recession 	<ul style="list-style-type: none"> Reversible through reasonable level of capital expenditure Adaptable, but at considerable cost / effort

Multi Criteria Analysis - Results

	Options									
Criteria	Northern Location - Ramp	Northern Location - Stairs - Option 1	Northern Location - Stairs - Option 2 (Piled Viewing Platform)	Northern Location - Stairs - Option 3 (Piled Standalone Viewing Platform)	Northern Location - Octunda	Northern Location - Modified Octunda	Midway Location - Ramp	Midway Location - Stairs	Southern Location - Ramp	Southern Location - Stairs
Feasibility & Practicality	3	3	3	3	1	3	3	3	3	3
Environmental Impact	1	3	3	3	3	1	1	3	1	3
Social Impacts / Community Values	3	3	4	5	3	4	3	3	3	3
Safety	5	5	5	5	1	5	5	5	4	4
Capital & Ongoing Costs	3	3	3	1	1	1	1	3	3	3
Long Term Effectiveness	5	5	5	5	1	5	5	5	5	5
Response to Climate Change	5	5	5	5	1	5	5	5	5	5
Reversible / Adaptable in the Future	3	4	4	4	3	3	3	4	3	4
Total Score (out of 24)	28	31	32	31	14	27	26	31	27	30
Conclusion	Not recommend	Consider	Recommend	Consider	Not recommend	Not recommend	Not recommend	Consider	Not recommend	Not recommend



Recommendations

- Replacement stairs in the existing location are recommended
- Largely preferred over other options due to costs, reduced environmental impacts and community responses
- Piled lookout structure recommended off stairs
- Will achieve views of coast, similar to previous structure at time of construction
- Recommended Northern Stairs with Piled Viewing Platform

A photograph of a beach with waves crashing onto the sand. The top of the image shows the ocean with white foam from the waves. The bottom two-thirds of the image is a solid, light beige color representing the sand.

QUESTION AND ANSWER SESSION



Next Steps

- Council Meeting on 7 March 2017
- Approvals
 - Clearing Permit
 - Development Application
 - Aboriginal Heritage
- Tender for design and construction
- Construction in Spring 2017