Government of South Australia
Coast Protection Board

INQUIRY REPORT – WITTON BLUFF BASE TRAIL

Coast Protection Board

19 April 2021

1. Introduction

In accord with Section 36 (1) of the *Coast Protection Act 1972*, the Minister for Environment and Water required the Coast Protection Board (Board) to undertake an Inquiry into the Witton Bluff Base Trail project.

The purpose of the Inquiry was to determine if the current proposed project has been developed in an environmentally sustainable manner. The Minister for Environment and Water asked the Board to determine:

- Possible impacts on the coastal environment and, if identified, how these impacts could be minimised.
- Impacts arising from possible increased erosion from the creation and establishment of the walkway footings.
- Any other significant coast-related impacts that have been identified as part of the City of Onkaparinga's previous studies into the project.

In late 2020 the City of Onkaparinga determined that the project does not constitute "development"[1], which means there will be no development application nor statutory referral to the Board for assessment.

The Inquiry has considered the current Witton Bluff Base Trail *Concept Design* proposal released for public consultation in September 2020.

This Inquiry report begins with the outcome (findings and recommendations) and then summarises the project proposal and Council's reported community engagement outcomes. The Inquiry investigations underpin the outcome with information on terrestrial and marine environment, coastal process, hazard risk (e.g. erosion) and visual amenity implications.

The Inquiry was informed by a desktop review of all relevant technical investigations by staff of the Department of Environment and Water, reports (reference material listed under Section 6) and public submissions on the Witton Bluff Base Trail Concept Design; site visits and assessments by staff from the Department for Environment and Water; and a presentation to the Board by relevant Council staff including the Project Leader (Mr Rob Bau) and Council's lead consultant Michael Hitch (BluBuilt Constructions Pty Ltd) on 26 March 2021.The City of Onkaparinga staff were very cooperative, providing requested information and studies promptly.

The Board has also considered the proposed Witton Bluff Base Trail Concept Design in meeting relevant Board policies.

[1] Schedule 3 of the *Development Regulations 2008* outlines activities that are not development, and includes *Recreation Path*s undertaken by a council on coastal land, which includes any ancillary development in connection with the path such as earthworks, boardwalks, support structures etc. (Schedule 3, item 19 (1) and (2)). This exclusion has been transitioned to Schedule 4, item 20 4 (1) and (2) of the *Planning, Development and Infrastructure (General) Regulations 2017*, which applies to the subject land after 19 March 2021.

2. Inquiry Outcome

The Inquiry was a point-in-time analysis based on the current Witton Bluff Base Trail Concept Design released for public consultation in September 2020. The design may change, to an extent, through the detailed design process. The Inquiry therefore did not consider the final design and associated construction and environmental management plans at this point in time.

The Inquiry considered the potential impacts of the proposed Witton Bluff Base Trail on the terrestrial and marine environment, coastal processes, erosion and visual amenity. The Inquiry also considered potential coastal hazard risks on the proposed Witton Bluff Base Trail. Non-environmental matters raised in material reviewed are noted but were not subject to review.

The findings of the Inquiry are summarised as follows:

- The Witton Bluff Base Trail Concept Design and associated studies and reports indicate that the project is unlikely to lead to unacceptable impacts (direct or indirect) on the coastal environment (terrestrial and marine), landform and coastal processes.
- Geotechnical investigations suggest the impact of the walkway footings on the landform is minimal and manageable, due to the strength of the limestone shelf, design siting and construction methodology (WGA Pty Ltd, 2021). The walkway footings are therefore unlikely to significantly influence or exacerbate erosion at the base of the rock platform.
- The proposed current Witton Bluff Base Trail Concept Design generally complies with the Board's coastal access, environmental and hazard policies.
- The final design and pending Construction Environment Management Plan and Environmental Management Plan, are critical to the delivery of the project and in maintaining the Board's confidence that it will be implemented in an environmentally sustainable manner.
- The subsequent phases of the project should minimise impacts on scenic amenity, environment and landform as far as practically possible, during and post construction should the project proceed.

The Board recommends that:

- The Board review and comment on the final design plan/s, draft Construction Environment Management Plan and Environmental Management Plan prior to the commencement of any works. Matters raised in this report should be considered for inclusion in the draft Construction Environment Management Plan. [An Environmental Management Plan may not be required if matters raised are adequately addressed in the Construction Environment Management Plan].
- A qualified geotechnical consultant should supervise construction to minimise potential landform and aesthetic impacts (erosion, cracking, crumbling) resulting from the construction of the walkway footings.
- Council should implement a robust monitoring program to detect any changes to the coastline at Witton Bluff and potential implications for the proposed boardwalk, existing pathway and

associated cliff stability measures. Given the significant public interest and concerns raised over the Witton Bluff Base Trail project, the monitoring plan should be made publically available.

3. Project Proposal

Witton Bluff is a prominent and scenic headland separating the beach side suburbs of Port Noarlunga and Christies Beach. Witton Bluff is a major coastal feature of the metropolitan coastline, easily accessible to locals and tourists.

The existing unsealed path from Christies Beach to Witton Bluff was built in conjunction with the original rock revetment sea wall constructed in the 1970s. The City of Onkaparinga has considered the idea of extending the existing unsealed path south, around Witton Bluff, for many years. The idea was further considered by Council as part of the delivery of the State Government's Coast Park vision of a 70km coastal linear park from North Haven to Sellicks Beach (*Adelaide Metropolitan Coast Park Concept Plan*, 2001). The Witton Bluff Base Trail project now forms part of the City of Onkaparinga's *Coast Park Plan* (2019).

The Witton Bluff Base Trail project involves the construction of a shared use pathway around Witton Bluff, between the foreshore at Christies Beach and Port Noarlunga. The project proposes to seal the existing gravel path from the Christies Beach foreshore to Witton Bluff and continue with a new boardwalk pathway around the base of the cliffs and above the limestone shelf to the Port Noarlunga foreshore.

The proposed Witton Bluff Base Trail Concept Design comprises the following works:

- A new 460 metre elevated boardwalk above the wave-cut shelf at Witton Bluff designed to accommodate both pedestrians and cyclists (Figure 1).
- Upgrade the existing 630 metre unsealed pathway from Christies Beach to Witton Bluff, to a 3-metre-wide shared-use path (Figure 2).
- A coastal path link in the embayment area between the wave-cut shelves, which could consist of:
    - construction of an elevated platform
    - a bridge type structure, or
    - modification of the existing revetment wall.
- New and formalised viewing areas and pedestrian and cyclist access connections to adjoining shared path and cycle networks.
- New landscaping, interpretive signage, trail lighting and furniture.
- Public art to reflect the coastal setting and recognise Kaurna heritage, at the site and surrounds.

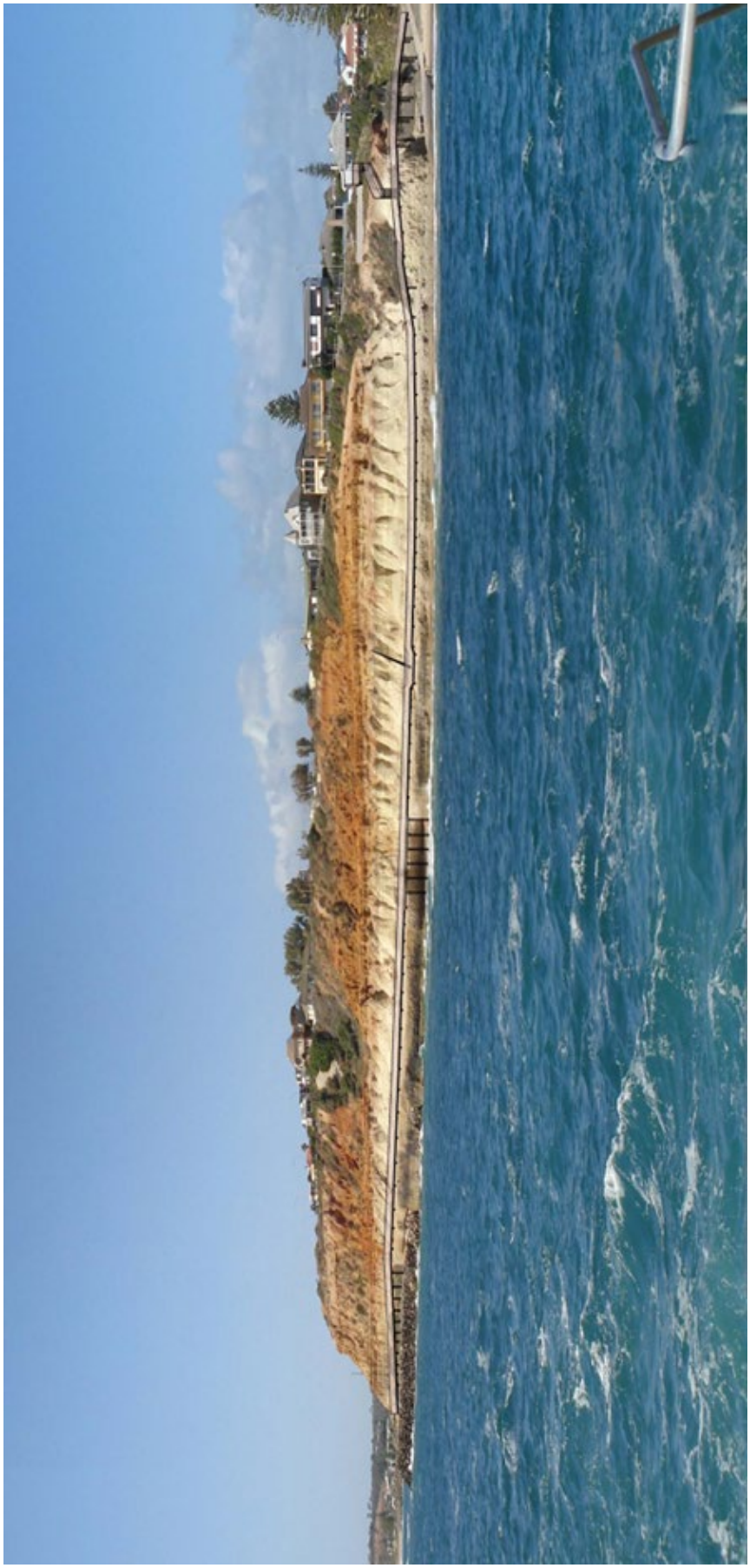

Figure 1 Representation of board walk - Source: City of Onkaparinga – Swanbury Penglase 2008

Figure 2 Witton Bluff Base Trail Concept Design – Upgraded Path (Source: City of Onkaparinga)

The project received funding from the City of Onkaparinga ($2.65M) and State Government ($2.65M under the Open Spaces and Places for People Grants program).

The concept design was released for public consultation in September 2020 and the final design is underway, anticipated to be finalised by mid-2021.

Sea wall repair work to protect the existing pathway and base of the cliff north of Witton Bluff is subject to design and available budget. It is understood that these works are not part of the current Witton Bluff Base Trail design and construct phase.

4. Community Engagement

The City of Onkaparinga summarises its *Community Engagement Feedback Report* as follows:

> "*Community Engagement was undertaken in September 2020 to consult with the community on the desired outcomes of the project, gather information to be considered during the design and construction process and to inform the community and stakeholders of the project.*
>
> *"Thousands of community members were made aware of the project through the Your Say website (1254 visits), letterbox drop (5000 households) and Facebook post (30,449 people reached).*
>
> *"The engagement allowed the community to express their views on the concept design with the majority of people interacting with both the social media posts and Your Say website supporting the concept. The Yoursay survey as part of this engagement had 81 people (64%) support the concept and 45 people (35%) not support the concept. On Facebook, 934 people (99.7%) had positive reactions to the concept."* [2]

Submissions supportive of the Witton Bluff Base Trail project raised potential benefits such as improved accessibility (e.g. for the elderly, people with disabilities, cyclists); link with Coast Park; tourist drawcard/good for business; enjoyment, health and well-being; access to nature; interpretative and educational opportunities; and safety (limit the number of people scrambling over the rock shelf).

Kaurna Elders (Georgina Williams and Buster Turner) do not support the Witton Bluff Base Trail project due to impacts on the Tjilbruke Dreaming Trail. The Port Noarlunga Conservation Society does not support the Witton Bluff Base Trail project due to concerns over cultural matters, visual amenity, environmental concerns and public safety (City of Onkaparinga 2020).

Other submissions that were not supportive raised potential issues such as an increase in visitors (and associated environmental impacts); visual impact; wildlife impact; damage to cliff face and limestone shelf; impacts on the reef; high costs (money better spent elsewhere); maintenance costs; alternative locations should have informed the consultation process; and cultural considerations.

The Board has received two public enquiries concerning the Witton Bluff Base Trail project. One enquiry raised concerns over the approval process; environmental impacts; and erosion hazard risks. The other enquiry raised concerns over impacts on the Tjilbruke Dreaming Trail and marine environment; including potential impacts on Port Jackson sharks breeding directly under the wave cut shelf area.

[2] The full Community Engagement Feedback Report is accessible online at: https://yoursay.onkaparinga.sa.gov.au/witton-buff-base-trail.

5. Inquiry Investigations

Terrestrial Environment

A key policy objective for the Board is to protect coastal biodiversity, which includes terrestrial and marine habitats.

The *Witton Bluff Base Trail – Environmental Feasibility and Design Concept Study* (Connell Wagner 2005) states:

> *"The proposed base trail provides a much improved and more formal access solution along the base of Witton Bluff from a safety and environmental impact point of view. In summary, the potential for significant environmental impacts resulting from construction of a shared trail along the base of the Witton Bluff is considered to be minor. However, further environmental assessment will be required during the detailed design process and a construction environmental management plan (CEMP) will be required to ensure protection of the surrounding marine and cliff environments."*

The above feasibility study did not identify any plant species of national, state or regional conservation significance along the Witton Bluff Base Trail alignment/area (i.e. below the cliff) and the only native species recorded were at the southern end, but are of low diversity.

In contrast, the study recorded a total of 48 flora species along the cliff face, comprising 25 indigenous species and 23 exotic species, which may have been an underestimation due to the season in which the survey was undertaken. No species of national or state conservation significance were observed along the cliff face, but four species of regional conservation significance were recorded [3](Connell Wagner 2005). The proposed Witton Bluff Base Trail Concept Design avoids the cliff face and associated significant native vegetation areas.

A subsequent *Flora and Fauna Assessment* (T and M Ecologists, 2020) indicated that:

- There are sections of remnant vegetation along the proposed trail route, which is generally in poor to moderate condition.
- No species of State or National conservation significance were observed during field survey, and the potential impact area is unlikely to provide significant habitat for any flora or fauna of State or National conservation significance.
- Referral under the *Environment Protection and Biodiversity Conservation Act 1999* is unlikely to be required.

[3] The *Witton Bluff Base Trail – Environmental Feasibility and Design Concept Study* (Connell Wagner 2005) identified four species of regional conservation significance including *Alyxia buxifolia* Sea Box**;** *Samolus repens* Creeping Brookweed; *Scaevola crassifolia* Cushion Fanflower *Zygophyllum; and billardierei* Coast Twinleaf.

Notwithstanding the above observations, the Board notes that some vegetation clearance will occur, particularly at the southern end of the proposed trail where the trail will connect to the existing path. It is understood that this area consists of several large native shrubs, likely to be nitre bush (*Nitraria billardierei*).

The proposed project falls within the area in which the *Native Vegetation Act 1991* applies. The City of Onkaparinga will require approval to clear native vegetation on the site under *Regulation 12(36) – Recreation Track* of the *Native Vegetation Act 1991*. This Regulation allows for clearance of vegetation to establish or maintain a track for public recreational use (the City of Onkaparinga will need to engage an accredited consultant and provide a Significant Environmental Benefit).

Whilst there are some rated fauna species, such as the Peregrine Falcon (*Falco peregrinus*) that may occasionally fly over the site, or the Sooty Oystercatcher (*Haematopus fuliginosus*) which may roost or feed on the rocky banks, the Flora and Fauna assessment concluded that it is unlikely that any of the areas of native vegetation assessed provide significant habitat for species of State or National conservation significance. The potential impact areas are considered unlikely to provide habitat for any mammal, reptile or amphibian species of conservation significance (T and M Ecologists, 2020).

An appropriate and agreed Construction Environment Management Plan and Environmental Management Plan can help avoid or minimise potential land-based environmental impacts during and post construction. For example, the Site Analysis Plan (Attachment 4) suggests that there is potential for revegetation at the base of northern headland area, which could enhance biodiversity and minimise scenic amenity impacts.

Any landscaping associated with this project should consist of revegetation using appropriate, local native coastal species, to improve coastal biodiversity, minimise the spread of exotic plants on the coast, and for effective stabilisation of the landform where appropriate.

Provided the construction phase is appropriately managed, the Board does not expect that the Witton Bluff Base Trail project will result in unacceptable impacts on the terrestrial coastal environment.

The final design plan, draft Construction Environment Management Plan and any draft Environmental Management Plan should be provided to the Board for review, prior to the commencement of any works.

Marine Environment

The Witton Bluff Base Trail project site abuts a rich marine environment and is one of South Australia's most popular scuba diving and snorkeling locations. A significant barrier reef system made of limestone supports invertebrate animal and fish life including large schools of reef fish, spotted wobbegongs, blue groper, blue devil fish and dolphins. Leafy sea dragons have also been recorded here and Port Jackson Sharks congregate annually to breed (usually in November) at Port Noarlunga and nearby reefs, including the reefs seaward of the wave cut platform on which the raised boardwalk is proposed (DEW, 2020).

The reef profiles adjacent Witton Bluff includes medium low profile reef (brown), patchy low profile reef (dark brown hash) and continuous medium profile reef (dark brown) – Figure 3. State-wide benthic mapping indicates that macro algae is present throughout this area.

Figure 3 - Reef Profiles (DEW State Benthic Mapping) and Aerial Photograph depicting general alignment of boardwalk

The proposed Witton Bluff Base Trail is directly adjacent and partially within the Encounter Marine Park established under the *Marine Parks Act 2007*[4]. The Marine Park system overlays the historic Noarlunga Reef Aquatic Reserve protected under the *Fisheries Management Act 2007* (SA)[5].

The northern extent of the Witton Bluff Base Trail (existing pathway) abuts *Habitat Protection Zone 1* within the Encounter Marine Park. The middle section (proposed raised boardwalk) abuts and is partially within (where the boardwalk traverses the small embayment area between the two limestone platforms) *Sanctuary Zone 2.* The southern section (proposed raised boardwalk) abuts *Habitat Protection Zone 2* (Figure 4). For reference, the Noarlunga Jetty is within *Habitat Protection Zone 2* (bulk of jetty) and *Sanctuary Zone 2* (end of jetty).

The *Marine Parks Act 2007* defines Habitat Protection Zones as areas established to provide protection for habitats and biodiversity within a Marine Park, while allowing activities and uses that do not harm habitats or the functioning of ecosystems. Sanctuary Zones are designed to protect important habitats, marine species, breeding grounds or important refuge areas - these are important conservation areas where fishing, all other extractive activities and structures are not allowed without a permit.

[4] In accordance with Section 14 (3) of the *Coast Protection Act 1972*, the Board must, if taking any action (in this case an Inquiry) within or in relation to a specially protected area (including a Marine Park) take into account, and seek to further, the objects and objectives of the relevant Act (i.e. *Marine Parks Act 2007*).

[5] Aquatic reserves were established to protect the habitat, ecosystems and communities of the rich variety of underwater organisms found in the marine and estuarine waters of South Australia. Aquatic reserves are considered to be IUCN Category II protected areas.

Figure 4 - Marine Park Zoning including Sanctuary Zones and Habitat Protection Zones abutting the project area (red line)

Potential indirect impacts from the Witton Bluff Base Trail project on the marine environment could include but are not necessarily limited to:

- Increased marine turbidity due to sediment run-off during upgrades to the existing unsealed pathway from Christies Beach and during construction (piling) of the raised boardwalk on the rock shelf.
- Noxious weed or contamination sources introduced into the coastal environment.
- Pile driving to support the raised boardwalk may produce some level of underwater sound. The *Design Criteria Report for the Boardwalk* (Water Technology, 2020) recommends the elevated boardwalk structure across the small sandy embayment be supported by footings founded on weathered limestone beneath the beach sand. The final design and construction methodology should determine the potential for underwater sound transmission and whether this would impact on the physiological and or behavioural effects on nearby fish, benthic invertebrates, and marine mammals. Noting that the Port Jackson Shark congregates nearby annually to breed.

An appropriate and agreed Construction Environment Management Plan and Environmental Management Plan can help avoid or minimise potential marine impacts, including those listed above. Such a plan could include:

- The implementation of a monitoring regime, to complement strict construction measures, can ensure remedial actions are undertaken immediately should potential environmental harm become apparent (e.g. sediment runoff).
- Construction only during calm weather, low tides and low current flows may also minimise potential turbidity impacts.
- Marine piling activities undertaken outside November could minimise any potential disturbance to the Port Jackson Shark breeding season (unless further investigations determine that there is no potential for underwater sound transmission issues).
- Machinery washed down and free of sediment and contamination prior to arriving on-site minimises weed and contamination sources.

Potential issues that have been raised by members of the public that may impact the environment are associated with increased public access in an environmentally sensitive area. The impacts are variable, difficult to quantify, but may include, for example, the collection of intertidal reef species or increased litter. Interpretive signage integrated into the design of the Witton Bluff Base Trail could help educate the public on these matters, which are not unique to Witton Bluff.

The Council should consider working with the National Parks and Wildlife Service (Marine Park rangers) on cooperative opportunities for interpretive signage.

Defined public access via the Witton Bluff Base Trail boardwalk should help limit informal access and associated environmental impacts along the rock shelf and cliff areas (e.g. trampling vegetation).

Given the rich and sensitive marine environment abutting the Witton Bluff Base Trail project site, the final design plan, draft Construction Environment Management Plan and draft Environmental Management Plan should be provided to the Board for review, prior to the commencement of any works, should the project proceed.

Provided the Witton Bluff Base Trail construction phase is appropriately managed, it is unlikely that the proposed works will cause significant, unacceptable impacts (direct or indirect) on the marine environment within both the Habitat Protection Zone and Sanctuary Zone.

As the project sits immediately adjacent to, and partially within, a Marine Park Sanctuary Zone (where structures are otherwise prohibited), a marine parks permit will be required.

Coastal Processes and Hazard Risks

The proposed Witton Bluff Base Trail boardwalk alignment (subject to final design) traverses a limestone rock shelf, which is subject to erosion at its toe/base. This is caused by metocean conditions such as waves, tides & storm surge events. The wave-cut limestone platform is a remnant of a previous cliff which now serves to cause larger waves to break some distance from the cliff face.

The *Witton Bluff Base Trail Environmental Feasibility and Design Concept Study* (Connell Wagner Report 2005) states:

> *"Geotechnical issues were assessed for several possible path alignments. The geotechnical study concluded that trail alignments along the sloping cliff face or immediately adjacent to the cliff crest are not feasible options from a geotechnical perspective. The most viable option based on geotechnical and other considerations is an elevated boardwalk constructed of either timber or pre-cast concrete along the limestone wave cut platform at the base of the cliff. However, adequate set-backs from the edges of the limestone platform are recommended due to the risks associated with potential geotechnical instability of both the seaward edge of the platform and the cliff above the landward edge of the platform".*

The offshore reef protects the limestone rock shelf from south-westerly, wind-generated waves, to an extent. However, waves generated across the long open water fetches to the north-west across the Gulf can be significant. Nonetheless, historic erosion of the wave cut limestone platform has been relatively slow.

An analysis of aerial photography from 1949-2017 (Integrated Coasts Pty Ltd 2020), suggests that overall, the base of the ledge appears to be in similar position to 1949, apart from a concaved area of recession between the two limestone platforms – this area eroded approximately 2.5 metres since 1949 and this was addressed in 2013 with the placement of rock protection (Figure 5 and 6).

Figure 5 Witton Bluff - General Profile. Source: Integrated Coasts Pty Ltd 2020

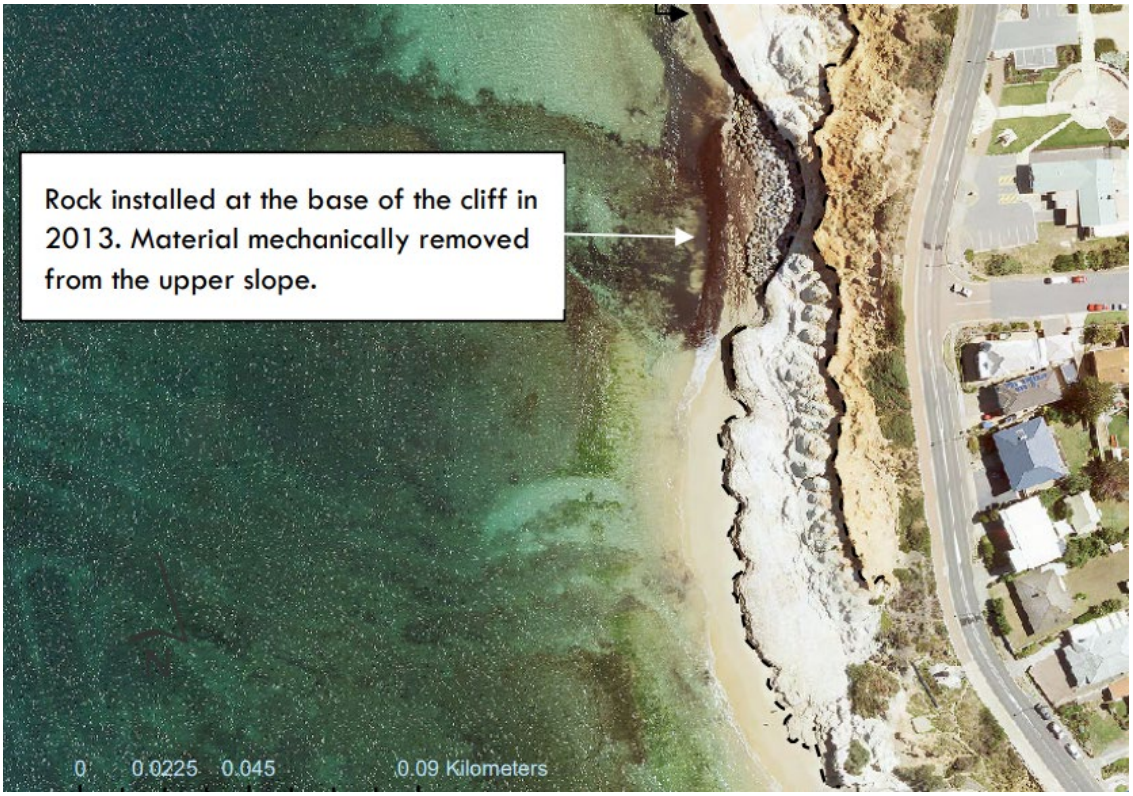

Figure 6 Except for the concaved area of recession between the limestone platforms, the seaward alignment of the rock shelf is similar to its position in 1949 (Source: Integrated Coasts Pty Ltd 2020)

While historically the limestone shelf appears relatively stable and resistant to wave forces, the combination of storm surge events and elevated ocean water levels (projected sea level rise) may exacerbate erosion in the long term.

> *"Increases in sea level will bring higher and more routine impact at the base of the bluff. In the north, the sea walling will become increasingly inadequate post 2050 and overtopping would undermine the cliffs behind. In the south, the limestone ledge and cliffs are likely to erode at a faster rate, and seas will overtop the ledge more frequently and increasingly interact with the softer cliffs behind. These cliffs are likely to be undermined and potentially fail in the latter part of this century" (Integrated Coasts Pty Ltd 2020)*

The proposed Witton Bluff Base Trail boardwalk is understood to have a design of life of approximately 50 years (Water Technology Pty Ltd, 2020).

Irrespective of the proposed boardwalk alignment, the base of the limestone rock shelf may at some point require protection, to prevent retreat and potential undermining of the cliff face (softer materials) – threatening the Esplanade. It is important that the proposed boardwalk alignment and design does not compromise future erosion protection options at the base or upper reaches of the cliff. The Witton Bluff Base Trail project team has advised the Board that this will be considered during the design phase.

A geotechnical report for the proposed boardwalk (WGA Pty Ltd, 2020) recommends that the detailed design consider:

"Across the sandy embayment, it is recommended that the elevated boardwalk structure be supported by footings founded on weathered limestone beneath the beach sand. At each end of the sandy embayment footings may be founded directly on the surface of the limestone shelf. Large spread footings founded on the limestone are not expected to be practical in the embayment due to the presence of shallow groundwater and sandy soils, which would require relatively flat batters to be adopted for footing excavations…. Small-diameter piles driven to practical refusal in the limestone are recommended."

The Design Criteria Report for the Boardwalk indicates that scouring may develop around the piles, but that with adequate control measures the severity of the risk to the structure is expected to be "minor". The Report recommended control measures including implementation of a quality assurance procedure and that expected scour depth and anticipated erosion be determined during the design phase with allowance to be included in the design (Water Technology Pty Ltd, 2020).

The Design Criteria Report for the Boardwalk also identified that structural failure due to geotechnical instability is a potential risk, but that with adequate control measures the severity of the risk is expected to be "minor". The recommended control measures included implementation of a quality assurance procedure and that a qualified geotechnical consultant prepare the design and supervise construction (Water Technology Pty Ltd, 2020).

Witton Bluff is classified as a "Geological Monument" by the Geological Society of South Australia. While the geological formation is not subject to statutory protection, it is important to minimise physical disturbance as far as practically possible given its geological value.

The design phase and construction methodology should consider the potential impacts of piling on the limestone rock platform such as risk of crumbling or cracking. Council have advised the Board that they have engaged a qualified geotechnical consultant (WGA Pty Ltd) to inform the final design phase and supervise construction (in accordance with the above-mentioned control measure). This is likely to not only minimise the potential for structural failure, but also minimise potential landform impacts (increased erosion, cracking, crumbling) resulting from the construction of the walkway footings.

The following comments by WGA Pty Ltd (13 April 2021) address the potential for the footings to exacerbate erosion of the shelf:

- *Construction methodology/equipment has been selected to minimise impact on the Shelf.*
- *The strength of the rock is such that the construction is expected to cause minimal fracturing/cracking of rock.*
- *If any fracturing/cracking does occur, damaged/loose areas will be chased/removed and replaced with structural grade concrete, which is harder than the existing material.*
- *Any rock removed and replaced concrete should improve the long-term durability of the Shelf in these areas.*

- *The proposed level of the boardwalk is such that the majority of the footings will rarely be inundated by storm tides.*

Based on the above investigations and information, it appears unlikely that the Witton Bluff Base Trail will significantly influence or exacerbate erosion at the base of the rock platform. The design phase should provide further evidence of this.

The upper levels of the cliff comprises softer material that may be subject to slumping, stormwater runoff and wind erosion influences. The proposed alignment of the Witton Bluff Base Trail boardwalk concept is seaward of the cliff face (the bluff), avoiding physical disturbance of the softer cliff sections.

It is noted that the proposed development footprint (boardwalk) and potential disturbance to the geological landform is relatively 'light' in comparison to historic bulk earthworks and reforming of the cliff face along the northern section of the Witton Bluff Base Trail area (existing path).

The fragile upper reaches of the cliff will require ongoing management, regardless of the Witton Bluff Base Trail project, and should be prioritised given the anticipated increase in foot traffic seaward of the cliff face. The final Witton Bluff Base Trail design needs should avoid disturbance to the rock layer which acts as a key support for the cliff top above (GHD, 2015) and that any asset monitoring plan ensures public access along the boardwalk remains safe.

The Board's flood hazard risk standard requires that structures to be sited over tidal water (such as public jetties) should have a minimum floor/decking level of at least 1.25 metres above the "standard sea-flood risk level"[6]. This equates to a minimum decking level of 4.95m Australian Height Datum (AHD) for the proposed boardwalk, which allows for 1 metre of sea level rise and 0.25m freeboard.

The proposed boardwalk minimum deck level is 5.5m AHD, which satisfies the Board's flood hazard risk standard.

The Design Criteria Report for the Boardwalk (Water Technology, 2020) suggests the boardwalk deck is located outside of the wave zone and therefore not impacted by 'wave slam'. However, the headstocks will be impacted and therefore wave loading will need to be determined in detail during the detailed design phase.

The final design plan and construction methodology should be provided to the Board for further review of potential coastal hazard and landform impacts.

Seawall repair work to protect the existing pathway (Figure 7) and base of the cliff north of Witton Bluff is not part the current design and construct phase. Council's 'monitor and respond' approach is reasonable. Any future seawall repair design and construction methodology should be undertaken in consultation with the Board.

[6] The "standard sea-flood risk level" means the 1% Annual Exceedance Probability (AEP) sea flood level (tide, stormwater and associated wave effects combined) plus an allowance to accommodate 100 years of land subsidence.

Figure 7 Existing pathway and cliff protection works. Source: Integrated Coasts Pty Ltd (2020)

Should the project proceed to construction, it is expected that formal ongoing monitoring of Witton Bluff will be embedded in Council's coastal asset monitoring program. Monitoring should consider changes to the coastline and potential implications for the proposed boardwalk, existing pathway and associated cliff stability measures. The draft Coastal Scoping Study (Integrated Coasts Pty Ltd 2020) recommends various monitoring options for Witton Bluff such as:

- Comparison of newly captured aerial photography.
- Analyse newly captured Coast Protection Board profile data.
- Recapturing the 3D digital model and make digital comparisons (especially useful for cliff and slope assessment).
- Photographing the coast after storm events using drone technology and making a desktop assessment of any changes or impacts to the coast.
- Utilise a 'citizen science' approach for the capture of photography in storm events from designated monitoring positions.
- Annual site inspection of areas where undermining or gullying are occurring (if applicable).

Given the significant public interest and concerns raised over the Witton Bluff Base Trail project, a final monitoring plan should be made publically available.

Board policy seeks to minimise the exposure of new development to risk of damage from coastal hazards. The Board considers that the Witton Bluff Base Trail Concept Design is not subject to unacceptable coastal hazard risk and complies with the Board's coastal hazard risk policies.

Visual Amenity

The Board seeks to protect coastal environments of high scenic value and in doing so ensures that development does not detract from the aesthetic appearance of the coast. The positioning of the boardwalk will to an extent, impact on landscape value afforded the prominent bluff and lower rock shelf area.

Community feedback on the project suggests scenic amenity is valued by members of the public. Some members of the public consider that the project will provide additional vantage points to appreciate the Bluff and surrounding coastal landscape. Others consider that the project will compromise the natural scenic value afforded the Bluff.

Notwithstanding that the natural landform is directly adjacent a built up urban environment (with houses above the cliff visible from the jetty) the design of the boardwalk should be cognisant of the scenic amenity impacts from adjacent coastline, nearshore waters and from the Port Noarlunga jetty.

The main alignment of the boardwalk provides through access and is generally parallel with the rock shelf and sediment layers in the cliff face. The Site Analysis Plan (Attachment 4) depicts design elements to reduce the visual mass and minimise scenic amenity impacts. For example, limiting the amount of columns; eliminating columns within natural depressions along the rock shelf areas; and considering the cliff colour and angle of incline when selecting materials.

Figure 8 shows the southern end of the proposed boardwalk linking to an existing path at Port Noarlunga Beach. It also shows additional steps and boardwalk linked to a new viewing platform at the top of the cliff. It is questionable whether this additional section is required, which does not appear critical to the essential design objective (to advance Coast Park vision – uninterrupted access along the coast). This additional section may be imposing and exacerbate scenic amenity impacts given the substantial amount of existing and proposed infrastructure at the southern end of the bluff.

Council has recently confirmed that the additional steps and boardwalk (up and down the cliff face) have been removed from the design. A recent 3D model (Figure 9) depicts the boardwalk alignment, with the additional section removed.

Given the potential scenic amenity impacts, the final design plan should be provided to the Board for review to determine if the design minimises as far as is practical, impacts on coastal landform and scenic amenity.

Figure 8 Photomontage - Source: City of Onkaparinga, Swanbury Penglase (2008) _

Figure 9 Proposed Boardwalk 3D Model (19 March 2020) – southern staircase removed. Source: City of Onkaparinga

Sustainable Access

The City of Onkaparinga considers that a shared use path (two way) is impractical along the crest of the cliff, which is relatively narrow, steep and subject to erosion (Figure 9). The Board is not in a position to determine the merits or otherwise of coastal access potential behind the cliff, which includes broader traffic management and road infrastructure considerations.

- limited room (<7.5m wide from property to cliff in parts) – no options considered feasible
- options previously considered included path on eastern side and one-way Esplanade
- eastern side not supported due to vehicle conflicts
- one-way Esplanade not supported by community
- very steep gradient impacts accessibility for older people and people with disabilities

Figure 9 Alternative Esplanade Options/Constraints. Source: City of Onkaparinga

The lower rock shelf alignment is intended to provide long-term access as part of the broader Coast Park vision for Greater Adelaide and will link in with existing coastal paths. The path is expected to enable more inclusive access. The steep topography along the Esplanade is understood to currently constrain inclusive access.

The current concept design is considered to generally comply with Coast Protection Board Policy 6.1 (Sustainable Access): *"The Board will encourage and support: (a) environmentally sustainable access to the coast. [In doing so the Board will take into consideration the ability of the particular landform to cater for uses without undue adverse environmental effects; preference to public use over private use; preference will be given to those uses which by their nature, need to be located close to the coast; and public safety.]"*

The Board needs to review subsequent design plan/s, draft Construction Environment Management Plan and any Environmental Management Plan to determine if the project remains consistent with the above-mentioned Board Policy.

6. Reference Material

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