11.2.2 LIMESTONE CLIFF STABILITY ASSESSMENT

LOCATION/ADDRESS	Shire of Augusta Margaret River
APPLICANT/LANDOWNER	Shire of Augusta Margaret River
FILE REFERENCE	ENV/128
REPORT AUTHOR	Jared Drummond, Sustainability Planning Officer
AUTHORISING OFFICER	Dale Putland, Director Sustainable Development

IN BRIEF

- The Shire prepared a Coastal Hazard Risk Management and Adaptation Plan (CHRMAP) in 2016 which identify required responses to coastal hazards, including increased risk from sea level rise. Actions included the need to address risks from an unstable rocky coast.
- In August 2019, the Shire commissioned a Limestone cliff stability assessment to provide detailed responses to mitigate risk to public and assets from rockfall/ground instability risk.
- Subject sites include the coastal areas of Gracetown, Prevelly, and Gnarabup.
- An overview of detailed responses for each site is provided in the report below.
- The report identifies the need to inform community of the risks, and recommends actions for each site.
- The total costs to implement recommendations is approximately $230,000, however measures are included in this report to minimise these costs.

RECOMMENDATION

That Council:

1. Notes the formation of an internal working group to oversee project implementation and cliff stability;
2. Notes that staff will undertake engagement including community briefing sessions and information sharing using various sources, informing the community of the risks present at each site, and an overview of recommended actions, together with engagement with traditional owners;
3. Authorises the CEO to undertake the following rock fall risk mitigation measures which have been budgeted for in the 2019-20 budget as follows:
   a) Remove the overhang at Site ID: GC5 – 75, south of Gracetown stairs.
   b) Install a protection fence in accordance with the Limestone Cliff Stability Assessment 2019 at Site ID: PR6 - 85 at the northern end of Riflebutts Beach, Prevelly..
   c) Install additional signage and extension of the balustrade at Site ID: PR4 – 30; Surfers Point, Prevelly.
   d) Undertake underpinning at Site ID: GN5 – 5 White Elephant Stairs, Gnarabup.
4. Considers an allocation in the 2020/21 and following budgets, and the Long Term Financial Plan to undertake the following work, subject to funding being available:

Works component	Year	Cost
Install underpinning at Site ID: GN5 – 5 White Elephant Stairs, Gnarabup	2020-21	$150,000
Install additional balustrading at Site ID: PR4 – 30; Surfers Point, Prevelly	2020-21	$20,000
Install underpinning (subject to further monitoring of the use of the site) at Site ID: PR4 – 30; Surfers Point, Prevelly	2021-22	$150,000

5. Notes that staff will investigate external funding opportunities for the works and submit grant applications where appropriate.

LOCATION PLAN

See images provided in the body of the report.

TABLED ITEMS
Limestone Stability Assessment – Inspection, Risk Assessment and Remediation Design Report (2019)

BACKGROUND
The CHRMAP was prepared in 2016 to better inform the Shire of the potential impacts from sea level rise and other coastal processes, and how these may affect the Shire over a 100-year timeframe. Specifically the CHRMAP recommended undertaking an assessment of limestone cliffs to better understand the vulnerability of such areas in the context of public safety, and Shire and private assets. On this basis, a study was undertaken in 2017 titled "Limestone Cliff Stability Assessment" with a focus on limestone cliffs identified at Gracetown, Prevelly, Gnarabup Headland and Grunters Beach.

A number of recommendations from the 2017 report have since been implemented. This included installation of coastal safety signage where limestone cliff hazard risks were identified and removal of viewing platforms at Surfer's Point and Southpoint Gracetown where cliff risk hazards were identified as posing unacceptable risks. The report provided options for undertaking mitigation measures at other identified sites but did not provide detailed responses as to how to proceed with the implementation of these options. In August 2019, the Shire commissioned a review of the 2017 limestone assessment. The scope of this study was to provide a more detailed approach as to how to undertake works from 2017 report, and reassess risks in areas where the Shire had completed works.

CONSULTATION AND ADVICE
External Consultation
The areas of the coastline addressed by this report are highly prominent and actions required are significant in the context of the coastal environment. It will be necessary to inform the community of the proposed actions recommended in this council report and share the technical information received. Prior to implementing actions, it is important that a high level of pre works consultation is undertaken with the broader community, explaining the risks present at each site and the necessity for undertaking risk mitigation measures. It is also recommended that stakeholder consultation is undertaken with relevant government agencies. Owing to the location of the works, engagement with traditional custodians will be required before confirming works.

Internal Consultation
Shire Staff from Sustainable Development and Infrastructure Directorate held a councillor briefing session in October 2019 along with the consultant who prepared the report. An overview of limestone stability was presented at each site followed by an outline of proposed recommendations for discussion.

DISCUSSION / OFFICER COMMENTS
The 'Limestone Cliff Stability Report' 2019 (the report) deals with two specific issues. Firstly and most importantly, it provides designs and procedures as to how to implement proposed recommendations. Secondly, the report outlines a procedure for monitoring those risks that do not have a works component, but still require regular monitoring. A risk assessment (based on Landslide Guidelines AGS 2007) was undertaken for all locations, which considers the probability of the risk occurring, the significance of the risk and likelihood of risk affecting an individual or group of people. The discussion below addresses recommendations with a physical works component.

Site ID: GC5 – 75 (Gracetown – cliffs south of stairs)
In 2017, the Shire removed the lookout at GC6 – 15 and this area is now considered to pose an acceptable risk. There are two 5 metre long sections of limestone overhang approximately 10 metres above the beach level (see image below). The site is subject to continuous wind erosion, which continues to further erode the limestone rock. The report notes a facture associated with the overhang, with the report suggesting that the overhang may collapse in the near future, the risk of which may be exacerbated following a storm event.

It is a popular beach, with children occasionally exploring the overhangs and undercuts, particularly during surf events. The very action of scrambling around this area could be a trigger for a rockfall. The slope below the overhang is heavily vegetated and there is a chance of material hanging up on the slope once fallen from the overhang, reducing the risk of debris impacting people exiting the Southpoint carpark stairs as they traverse the beach towards Huzza beach. Nonetheless some material could reach the beach as noted in images in Attachment 1 depicting historic rockfall. The risk assessment for people traversing the beach resulted in relatively small risks. However, due to the large number of people traversing this beach each year to access the popular surf breaks, cumulative individual risks are considered relatively high.

Following an investigation of various options, the report recommends that the hazard is removed using needle drilling and hand barring to remove the rock on predetermined break lines. It is recommended that this action is implemented in 2020. The cost of implementing this action is $25,000. There are funds available in the existing budget to implement this action. It is recommended this action be implemented following detailed project scoping and preliminaries, including community engagement.

Site ID: PR4 - 30 (Surfers Point)
A cliff outcrop/overhang exists mid-way down the cliff face of Surfer's Point directly adjacent to the stairway. To reduce the risk from potential collapse of the overhang, the 2017 report recommended removing the viewing platform and beach midway down the stairway. The viewing platform was removed on this basis (see image below). The scope of works (for this study) required an analysis to be undertaken to determine the resultant risk to public from the overhang and response required (if any). The study also provides advice on the most suitable measure to address risk mitigation, should the Shire wish to re-install the platform in the future.

Removal of the bench and lower viewing platform resulted in the main risk now coming from people sitting on top of the outcrop during surf events or at other times, rather than a risk to people using the stairway. The recommended mitigation response in the report is to underpin the overhang using mass concrete and architectural block work. This not only supports the overhang from collapse but also protects the overhang from future wind erosion. The consultant advised that should this be undertaken it would be safe to re-instate the viewing platform in the future.

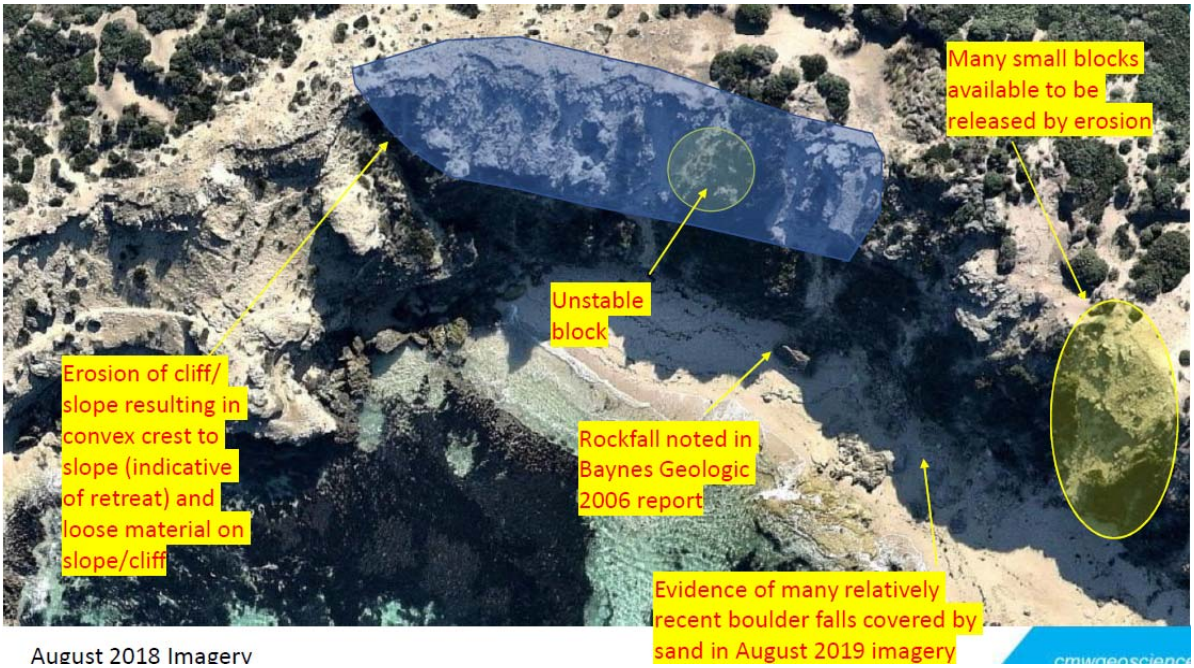
The report assumes that up to 20 people use this area during events up to two times each year, resulting in a significant risk to large numbers of the public. Numbers of this proportion were reported in the past, associated with surfing events. During the Surf Pro in May, one person was spotted using the concrete plinth below the overhang (where the viewing platform was previously located) as a camera location. One person was also recorded sitting atop of the overhang. The very low number of people recorded at this site reduces the risk of people being impacted from rockfall collapse. This area is highlighted as an exclusion zone for any events at Surfer's Point, with relevant development approvals prohibiting public from accessing this area. This may have contributed to reduced numbers recorded at this site. However, a significant risk remains to people who may use the area when crowd control is not present.

Further risk mitigation works have commenced, with the first stage including installation of additional cliff safety signage, followed by extension of the balustrading. These works are intended to provide added protection to public and substantiate the exclusion zone. It should be noted that if the underpinning works do not proceed the risk of cliff collapse remains, which could result in retreat of the cliff face due to collapse and subsequent erosion.

In response to the above, it is recommended that the Shire manage this risk through preventive means (i.e. development approval conditions, signage, extended balustrading, inspections, monitoring during surf events etc.) rather than underpinning as recommended in the report. Underpinning may be required in the future if increased visitation is recorded at this site, but will be subject to ongoing monitoring. If required, underpinning could be implemented as part of future budget considerations.

Site ID: PR6 - 85 (Cliffs at Riflebutts Beach)
The limestone report from 2017 referred to imminent rockfall risk in the next 1 – 10 years for this stretch of beach (see image below) and recommended closing the beach by way of signage. A large sign has been installed warning 'imminent rockfall beyond this point' but people continue to use this area. As part of the scope of works for the current study, the consultant was required to:

- Determine and detail a suitable method for removal of the identified hazard;
- Undertake and/or oversee removal of the hazard (provide indicative sub-contractor costings, if required).
- Identify a permanent exclusion zone at the base of the cliffs to discourage people from entering 'at risk' areas and recommend a method for excluding people from the area i.e. fencing or otherwise.



A risk scenario was developed based on the risk of rockfall occurring and the anticipated use of the site by sunbathers and walkers/ dog walkers accessing the hazard zone area. The calculated risk exceeds the tolerable thresholds set out in the AGS 2007 Guidelines (which recommends risk mitigation measures are undertaken to minimise the anticipated risk to public). The report investigated a number of risk mitigation options and included exploring installation of a fence at the base of the cliffs as referred to in the scope of works. This option was discounted due to practicality, primarily due to the significant distance the fence would need to be setback from the cliff base, resulting in it being affected by coastal processes. The report recommends installing a substantial fence (consisting of 4 X 125mm diameter steel posts 1.5 – 2m in height and high tensile wire strands) with *do not pass this point* signage across the full width of the beach, starting at the toe of the cliff and extending into the surf zone.

Implementation of the fence will clearly signal to the public that the area beyond the fence is prohibited. Despite the anticipated effectiveness of the fence and improved safety standards, there are also a number of concerns, which are expressed below:

- Unsightly visual impact upon the coastal landscape resulting in negative community/visitor outcomes;
- Unknown level of maintenance and on-going costs resulting from potential corrosion protection, durability over the long term and during large storm events, seaweed removal, changes in sand levels and other coastal processes; and
- Potential hazard from people being swept along the ocean into the fence wires/poles or running into these.

The cost of this option is estimated at $25,000. This can be implemented using available funds in the 2019-20 budget. Prior to implementing works, there are a number of preliminary stages (consultation, design, procurement) that first must be undertaken.

An alternative option could be to install several additional signs in a line across the beach perpendicular to the cliff face (before the hazard area starts) warning people of the risks ahead. An educational sign, explaining the nature of the limestone risk ahead, and the importance of not entering this area could also be developed alongside the safety signage. Following installation of the signs, the subject area could be monitored over the summer period through an agreed approach to determine whether the exclusion zone is still being frequented. A risk rating could then be developed using the revised numbers recorded over the reporting period. The risk may be deemed low if members of the public have avoided this area. If following installation of signage visitation numbers to this area are still high, then a reasonable approach would be to install the proposed fence. At the briefing session it was advised that this could be a viable option should council wish to pursue it. As discussed in the report, existing signage has been ignored in the past, however a series of signs across the beach (inclusive of educational

signage) may assist in reducing people from entering the area. Some concerns with additional signage include:

- Unsightly visual impacts;
- Potential to be ignored or misunderstood;
- Accuracy of recording visitation numbers via a pedestrian counting system is not considered feaasible; and
- Maintenance etc, particularly of those signs located close to the wave zone.

Regardless of the option decided for this site, it will be important to undertake well considered consultation with local community groups, government agencies (Marine Parks, DBCA), and Traditional Owners prior to implementation of works.

Site ID: GN5 - 5 (Stairs leading to upper car park from White Elephant)
Stairs leading down to the White Elephant Café from the upper car park area at Gnarabup are built directly on top of an overhang (see image below). The hazard at this location is largely associated with collapse of the overhang while recreational users are using the stairs. In response to the scope of works, the consultant has installed monitoring equipment and prepared detailed designs to underpin the overhang using concrete, similar to the approach presented for Surfers Point.

Underpinning will significantly reduce the risk of incident should the overhang collapse. The proposed underpinning seeks to improve the safety of the public in the long term, but may also provide a good foundation to replace stairs at the end of their life cycle (approximately 10 years from now). The proposed underpinning is likely to be screened by vegetation from most parts of the beach. It will however, still be visible from the shoreline, jetty and from the ocean. To minimise visual impacts, it is recommended that rockwork similar to the surrounding area (with a rough surface) be applied to the exterior of the concrete (similar to the approach for Surfer's Point). At the briefing session, a query was raised as to whether the stairway could be relocated to another section of the cliff. The consultant has further considered this option and advised it is considered problematic to realign the stairway. This is mainly due to the existing rock fall hazards identified within the realignment area, the cost of removing rock fall hazards, and the cost of assessing the realignment. There would also be costs associated with removing the existing stairs, and undertaking erosion control in newly exposed areas. The estimated cost of implementing underpinning is $100,000; however, with architectural rockwork it may cost up to $150,000.

Overview of actions/costs
A summary of proposed actions and associated costs at each site is proposed in the table below.

Location	Proposed Action	Anticipated Cost ($$)
Gracetown – Cliffs south of stairs	Physical removal	$25,000

Surfers Point	Additional signs and balustrade extension	$30,000
Riflebutts Beach	Fence	$25,000
Gnarabup (White Elephant stairs)	Underpinning	$150,000
TOTAL		**$230,000**

STATUTORY ENVIRONMENT / LEGAL IMPLICATIONS
Nil

STRATEGIC PLAN / POLICY IMPLICATIONS
Community Strategic Plan 2036 (CSP)
Corporate Business Plan 2019-2023
Key result area 1: Valuing, protecting and enhancing the natural environment
Community Outcome 4: Continued unique and iconic and iconic coastal landscapes
Strategic Response: Manage responsibly coastal areas under the Shire's control
Service level strategy/plan: Implement the Limestone Cliff Stability Assessment and Landcare Management plans for coastal areas

PLANNING FRAMEWORK
These preventative works are exempt from the need to obtain planning consent. The relevant standards for assessment are based on Landslide Risk Management Guidelines AGS 2007.

FINANCIAL IMPLICATIONS
Implications
$60,000 in PAP15 (*Huzzas Stairs remedial works)* is available in the 2019-20 budget. This was allocated on the basis that the Shire would need to carry out works to the stairs as an outcome of the limestone assessment report. As works are no longer required for this area, that money could potentially be used to implement other recommendations of the report. There is also $6,000 left in LCA55, which was allocated towards preparation of the Limestone Cliff Stability Report which could be used towards preliminary consultation. There is also $10,000 available for coastal warning signs under MR31. These funds are sufficient to undertake the following works in the 2019/20 financial year:

- Removal of overhang Site ID: GC5 - 75 - south of Gracetown stairs.
- Installation of a protection fence at Site ID: PR6 - 85 at Riflebutts Beach, Prevelly.
- Installation of coastal warning signs at PR4 – 30; Surfers Point, Prevelly.

The proposed works may meet the criteria for grant funding provided by Department of Transport Coastal Adaptation Protection grants however eligibility is uncertain as is the success of any application, therefore works should be fully budgeted for and if grants are successful, this be realised as budget savings.

Long Term Financial Plan
The full scope of costs for these works is provided below, and are based on implementing all works identified in the report.

Works component	**Year**	**Cost**
Remove the overhang at Site ID: GC5 - 75 - south of Gracetown stairs.	2019-20 (existing budget)	$25,000
Install beach exclusion fence at Site ID: PR6 - 85 - Riflebutts Beach, Prevelly	2019-20 (existing budget)	$25,000
Install additional coastal safety signage at Site ID: PR4 – 30;	2019-20 (existing budget)	$10,000
Install underpinning at Site ID: GN5 – 5 White Elephant Stairs, Gnarabup	2020-21	$150,000
Install additional balustrading at Site ID: PR4 – 30; Surfers Point, Prevelly	2020-21	$20,000

Install underpinning (subject to monitoring of the site) at Site ID: PR4 – 30; Surfers Point, Prevelly	2021-22	$150,000
Total		**$380,000**

Whole of Lifecycle considerations
Ongoing monitoring and replacement of fence, if installed.

Conclusion
There is a clear risk in the coastal area that requires positive action. There are several alternatives that may be explored to limit the extent of prosecution works. In addition, additional consultation, engagement and detailed project definition is required prior to implementation. It is recommended these risks are addressed by, in order:

- Formation of internal project group.
- Engagement and project definition.
- Budgeting and implementation of works.

SUSTAINABILITY IMPLICATIONS
Environmental
The environmental impacts are not considered significant. Some minor disturbance of vegetation is anticipated at White Elephant and Gracetown, which may require rehabilitation with suitable species.

Social
The report identifies substantial risk to public from rockfall should no mitigation measures be implemented. The proposed risk mitigation measures seeks to improve the safety to the public and visitors.

Economic
Although the initial costs are substantial for the proposed risk mitigation works, the on-going costs for actions such at White Elephant stairs will aid in the protection of the asset, which if it were to collapse without underpinning then the cost of replacement and relocating the stairs would be even greater.

ADVOCACY
Nil

ALTERNATE OPTIONS
As an alternative approach to installing additional signage across Riflebutts Beach, Council may wish to replace part 2 b), c) and d) of the recommendation with the following:

2. Undertake the following rock fall risk mitigation measures as follows:
   b) Install additional signage warning public *'imminent rockfall ahead - do not go beyond this point'* at Site ID: PR6 - 85 Riflebutts Beach, Prevelly.

Reason: This is an alternative approach to the recommendation in the limestone report, it may have less visual impacts in comparison to the proposed fence.

   c) Install underpinning at Site ID: PR4 – 30; Surfers Point, Prevelly.

Reason: The report recommends installation of underpinning. This recommendation is based on the assumption that up to 20 people could rest atop of the overhang (which exceeds numbers currently recorded at this site.)

   d) Investigate an alternative alignment for installation of a new stairway at Site ID: GN5 – (White Elephant Stairs, Gnarabup) and only undertake underpinning if an alternative alignment is not considered feasible.

Reason: This is an alternative approach to the recommendation in the limestone report.

VOTING REQUIREMENTS
Simple Majority