

## Managing Beach Accessways – A Rational Approach

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**ABSTRACT:** Beach access is an important community asset provided to residents and tourists by coastal councils throughout NSW. The Coastal Dune Management Manual has guided the installation, ongoing repair and upgrade to these extensive assets which include fences, stairs, paths, signage and viewing areas along the coast. Councils face many common challenges in managing their coastal assets, which are exposed to the local coastal processes. In many areas, these assets are now approaching the end of their design life.

Shoalhaven City Council manages 40 beach compartments with over 220 beach access points exposed to a wide variety of coastal impacts. As part of an update of Council's Coastal Asset Management Plan, a beach access strategy has been devised that includes a methodology for rationalisation of beach accesses based on environmental, social and economic risks. The methodology includes development of a pro-forma to allow rapid assessment of each asset in the field. A specialised multi-criteria analysis tool has been developed to provide a beach-by-beach rationalisation of accessways that can be adapted for use by any coastal council.

The criteria for rationalising the accessways on a beach-by-beach basis include:

- The number of accessways available per linear distance in each locality
- The location of accessways in relation to key local amenities and accessibility to high-use areas such as carparking or local urban areas
- Safety of accessways based on site assessments
- Environmental impacts of each accessway based on site observations and factors including the positioning of the accessway with respect to local winds, susceptibility to impacts from coastal processes, and the impact that the asset itself has on local coastal processes.

**KEYWORDS:** beach accessways, asset management, coastal processes, risk assessment, multicriteria analysis.

### 1 Introduction

The ongoing management of coastal accessways is a continuing challenge for NSW coastal Councils. These assets, by nature of their location and purpose, are exposed to the full range of coastal hazards including slope instability, coastal erosion, shoreline recession and inundation. Further, the assets are exposed to an increasing threat over time from coastal hazards due to sea level rise, and the fact that these assets in many areas are nearing the end of their design life. These assets are highly valued by local coastal communities as they provide safe access to

the coast and are often the most visibly affected by coastal storm events when they occur. Councils are usually responsible for the planning, design, construction and maintenance of these structures over their full lifecycle. In some Council areas, there are hundreds of coastal assets that need to be managed including stairs, fences, signage, paths and viewing platforms. When these assets are damaged by coastal processes, Council has a duty of care to ensure that these structures remain safe and fit for purpose. This can be challenging when there are many accessways and limited budgets and

resources, and results in Councils doing their best to prioritise maintenance and upgrades based on competing interests and vocal communities.

While the Coastal Dune Management Manual (reference....) provides guidance for installation and repair of these structures, Councils individually need to assess each asset to ensure that the assets remain safe and in a serviceable condition following coastal storms. Councils need to rely on their asset managers to carry out these assessments and there is no standard methodology for this. The management of these accessways imposes a financial and administrative burden on Councils and there is a lack of guidance for asset managers on how to prioritise coastal accessways for upgrades, repairs and replacements.

This paper describes the collaborative development of a risk-based tool by Shoalhaven City Council, DPE and Advisian that can be used by coastal Councils to simplify management of coastal accessways in their local area. The tool involves rapid field inspections of each accessway, documented in a standardised field inspection proforma that captures the condition of the asset, its impact on the surrounding beach environment, the coastal processes impacting on each asset and what community infrastructure is associated with each asset (Appendix 1). Captured on the field register are some initial ideas regarding actions that may be taken to improve the future integrity of the asset. The field inspection register is accompanied by a series of photographs of each asset.

The field inspection proforma can be linked to a Council's GIS-based asset register, with the ability to undertake the field assessments using a GPS-enabled tablet in the field.

The responses from the proforma are then combined with GIS-based desktop techniques to provide a standardised multicriteria assessment which can be used to prioritise accessways in a particular coastal precinct for upgrades, repairs, decommissioning and to assess whether additional accessways are needed (Appendix 2).

The tool was developed for and has been applied along the Shoalhaven coastline [1] as a recommendation of the Shoalhaven Open Coast Coastal Zone Management Plan (CZMP) [3] and has allowed the rapid assessment and prioritisation of over 220 beach accessways within 40 coastal precincts for repairs, replacement or rationalisation.

To date, several accessways have been upgraded or maintained based on applying the framework, with accessways recommended for rationalisation undergoing community consultation through Council's coastal management program under development. An example of a recently upgraded accessway at Collingwood Beach is provided in Figure 1.

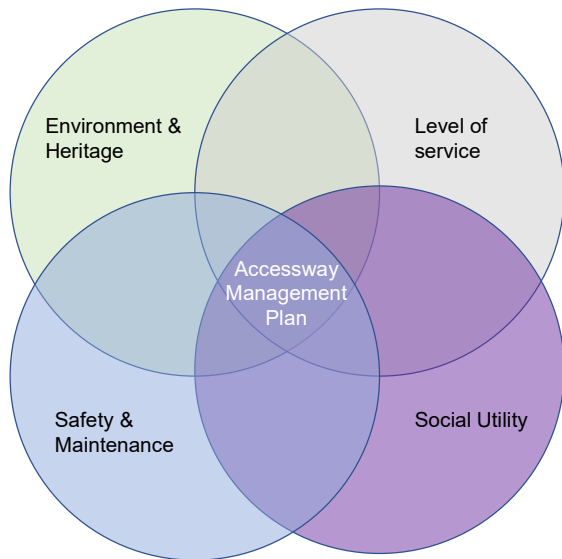


**Figure 1:** Example of recently upgraded beach accessway at Collingwood Beach

## 2 Accessway Management Tool Structure

The Coastal Accessway Management (CAM) approach presented in this paper is based on four key criteria, outlined in Figure 2, deemed important for the ongoing management of coastal accessways:

- **Environment and Heritage** – how the accessway interacts with its surrounding environment, the exposure of the accessway to coastal processes and the impacts of the accessway on the surrounding environment and cultural heritage.
- **Safety & Maintenance** – what is the current condition of the accessway, is it safe to use, fit for purpose and what ongoing maintenance burden does it present?
- **Level of Service** – is there sufficient alternative access available, is there duplication of accessways or more accessways than required in a particular precinct, is the accessway convenient and well located?
- **Social Utility** – does the accessway service emergency management or a major facility?



**Figure 2:** Key criteria for accessway management

## 2.1 Field Inspection Proforma

A field inspection proforma was developed to allow rapid assessment of each accessway in the field, with questions designed to link the accessway to the four main themes shown in Figure 2. The proforma was initially jointly tested and refined in the field by officers from Council, DPE and Advisian to ensure its usability and applicability to a wide range of beach accessways.

The proforma was designed as a single page form for rapid completion in the field. The form has been designed to be able to be completed by a range of personnel, with the tool pitched toward Council asset management staff, who may not have a high level of engineering or asset management experience. The main criteria captured on the form included:

- Asset ID, Name, Type
- Location/GPS Coordinates
- Date/time/Weather conditions
- Asset Description
- Asset Condition Rating
- Asset Utility
- Coastal processes affecting asset
- Impact of asset on surrounding beach
- Notes on recommended actions.

The rationale for selecting these fields is described below.

**Asset ID** ideally should be linked back to the ID in Council's existing GIS asset register.

Field inspections can be accompanied by a map of each locality identifying each accessway by its unique identification number.

**Asset Name** captures the name of the asset based on geographical attributes.

**Asset Type** captures the type of asset – accessway, stairway, concrete ramp etc.

**Asset Location** captures the broader location of each asset.

**GPS Coordinates** allows recording of the asset location by GPS coordinates, which can be recorded by the field technician using a hand-held GPS, or obtained from the metadata attached to digital photographs of each asset.

**Date/Time** allows cross-referencing of site photographs by timestamp, so that individual accessways can be differentiated when the data for each accessway is post-processed. It also allows lookup of metocean conditions, for example if an accessway is experiencing the effects of a coastal storm event, the date/time can be cross-referenced to the recorded metocean conditions (wave height, tide, wind conditions) at the time of the inspection.

**Weather conditions** is a visual assessment of the weather conditions at the time of the inspection, to assess whether coastal processes may be impacting on the asset in real-time.

**Asset Condition** - a condition rating from 1 to 5 is applied in the field to each asset, based on consideration of the asset overall. The proforma includes space for the technician to record the reasons why the rating was chosen for the accessway. Consistent definitions for condition ratings should be agreed by all stakeholders prior to adoption.

**Notes on Asset Utility** records whether, in the opinion of the field officer, the accessway is conveniently located, appears to be well used, whether there are alternative accessways nearby, and what ancillary facilities are associated with each accessway. This field captures attributes such as whether the accessway is suitable for all-ability access and whether the facilities associated with the accessway are appropriate.

**Notes on coastal processes affecting asset**, i.e. whether the accessway is impacted by coastal processes at that location that limit its utility or use, or impact future maintenance and present-day condition.

**Notes on impact of coastal asset on surrounding beach** captures whether the

accessway itself is having an adverse impact on the surrounding environment or Aboriginal heritage objects. For example, accessways that are poorly sited or designed allow wave runup to penetrate beyond the frontal dune, allow weeds to spread, or allow wind-blown sand to drift landward behind the accessway. The accessway may also be a site for concentration of stormwater flows, or an area where erosion can have a disproportionate impact on the dune immediately surrounding the accessway. An accessway may also be impacting on sensitive Aboriginal sites including middens, with any accessway remediation needing to factor in the assessment and approval pathway and associated costs and timeframes.

**Notes on recommended actions** to improve or rationalise asset captures initial recommendations for each accessway based on the experience of the field officer and visual assessment. These include specific actions such as fixing fencing, revegetation, modifying alignment, regrading etc. but also include space for specific suggestions to improve or rationalise the accessway.

**Photo IDs** – this field aids cross-referencing between photos in the field and accessway IDs when post-processing the inspection data.

**Other comments/sketches** – This field allows specific recommendations for each accessway to be illustrated by field sketches, as well as comments on any other aspects considered by the field officer to be relevant to the assessment of the accessway – e.g. presence of nearby informal accessways, presence of weeds, notes on observed usage, condition of adjacent vegetation etc.

## 2.2 Multicriteria Assessment

The information from the proforma is then used to populate a spreadsheet multicriteria tool, which then assigns scores for each accessway based on the criteria shown in Figure 3.

The scores against each of the fields in the spreadsheet tool are assigned against set criteria, based on the technician's responses in the fieldwork proforma. The scores are assigned against the following criteria in the tool:

**condition rating from the field inspection** – accessways in good condition were assigned a higher score than those in poor condition, reflecting safety of the accessway and capital expenditure required to upgrade the access.

**distance along the beach to the nearest accessway** – this criterion captures whether there are multiple accessways servicing a single area – if distance between adjacent accessways is longer, the accessway is assigned a higher score.

**the walking distance on the landward side between accessways** – this captures the utility and convenience of the accessway, as well as assessing whether there are multiple accessways servicing a single area, with accessways spaced further apart receiving a higher score.

**duplicate access servicing the same area** – if there is only a single accessway servicing a single area, the accessway is assigned a score against this criterion.

**accessway services Surf Life Saving Club (SLSC)** – accessways that service SLSC's are assigned a score against this criterion.

**accessway used for or suitable for emergency access (e.g. flood control)** – if the accessway is used for emergency access, or could be used for vehicle access for essential beach servicing, it is assigned a score against this criterion.

**Estimated ongoing maintenance required** – the required level of maintenance at each accessway was assessed as low, medium or high (depending on the complexity of the structural elements of the access, or the level of capital expenditure required to upgrade it) and assigned a score, with lower maintenance accesses receiving a higher score.

**Impact of accessway on the surrounding environment and heritage** – this was assessed as high, medium or low, and assigned a score, with accessways having a high impact on the surrounding environment assigned a lower score.

**Services major development or facility** – if the accessway services a major facility (e.g. caravan park), it was assigned a higher score.

**Estimated number of lots serviced by accessway** – this was estimated based on walking distance from each accessway from the surrounding urban areas closest to each access. This criterion is best assessed by desktop analysis through GIS. Accessways that service a large number of lots received a high score, with those only servicing a small number of lots receiving a lower score.

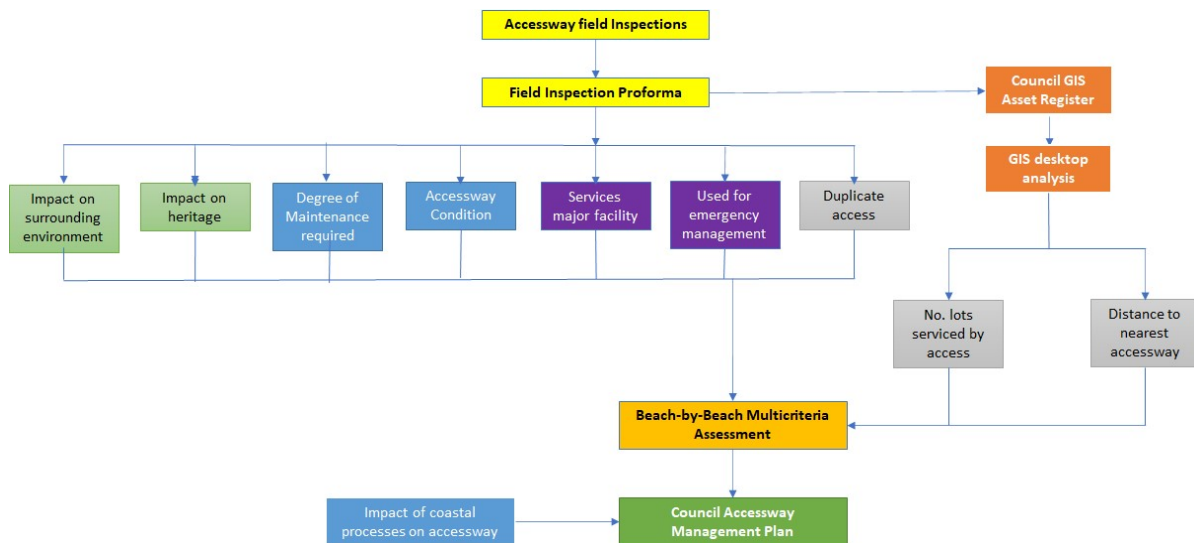


Figure 3: Structure of CAM tool

### 2.3 Beach-by-beach Assessment

The results of the multicriteria analysis were organised by beach, so that the scores for each accessway could be compared directly within each beach compartment. The added benefits of this approach included:

- the ability to rank each accessway within each locality to prioritise them for upgrade, repair or closure
- the ability to compare the average accessway ratings at each beach, which allows Councils to better allocate resources to locations most in need.

### 3 Common Accessway Failure Mechanisms and Management Measures

The CAM tool was applied at over 220 beach accessways in 40 localities along the Shoalhaven coastline. During the fieldwork undertaken for this application, it was determined that the failure mechanisms at the beach accessways fall into a small number of categories. It is postulated that these failure mechanisms are common to beach accessways along the entire NSW coastline.

It was also determined that generic management actions can be applied to most of these failure mechanisms. The proposed categories for the failure mechanisms and suggested management measures are described below.

**Erosion at the base of the accessways** – this is exacerbated where there are steep slopes and stormwater overflows onto the accessways (see example in Figure 4). A proposed solution for this type of erosion is to extend timber steps to the base of the track, where these are used on upper portions. Re-orienting the seaward ends of the accessways away from the prevailing wind direction may also help prevent the problem from recurring, particularly for those accessways that face south at their seaward end.



Figure 4: Example of erosion at accessway base

**Stormwater erosion** – stormwater flows can cause surface damage to access tracks. This can be controlled by providing landscaping at the top of the slope to prevent stormwater flowing directly onto the track.

**Slope stability** – steep cliffs and bluffs present a challenge for provision of access. Where timber or concrete staircases are used, these should be founded on the underlying bedrock where possible. Lightweight Fibre-Reinforced Polymer (FRP) structures, which are resistant

to corrosion and generally have good UV resistance, may be appropriate in some areas, otherwise standard timber staircase design can be used if the footings are founded onto bedrock.

**General Maintenance/ vegetation encroachment** - tracks that are not highly used can fall into disrepair, with overgrowing vegetation and decayed structural elements. There are also areas with multiple accessways servicing the same location. Depending on the outcome of the multicriteria assessment these accessways could be closed with the dune rehabilitated or repaired.

**Damage to dune vegetation (by vandalism or natural causes)** and spread of weeds is a significant problem in urban beach areas – continued education programs and revegetation is recommended for these areas.

**Lowering of the base of the accessways relative to the surrounding dune** (see example in Figure 5) – these can be treated by topping up with sand to restore the accessway elevation relative to the dune, and placement of timber sleepers to maintain the accessway level.



**Figure 5:** Example of lowering of accessway level relative to dune

**Difficult/remote access** - At more remote locations, there is a lack of vehicle access to some areas and a lack of signage. Some areas may warrant local improvements (e.g. controlling drainage from adjacent carparks by resurfacing, paving or regrading, providing better vehicle access roads, etc.)

**Creek bank erosion** – along the Shoalhaven coast this was observed at most of the estuary entrances, affecting the structural integrity of foreshore accesses in these areas. These have been assessed on a case-by-case basis by Advisian [1].

#### 4 Case Study – Shoalhaven Beach Accessways

The methodology described in this paper was developed for and applied to the beach

accessways of the Shoalhaven as a collaboration between Shoalhaven City Council, DPE and Advisian.

As part of the beach-by-beach assessment, the number of accessways per kilometre length of beach was assessed for each beach, to help ascertain whether any accessways could be considered for rationalisation in each area. Where accessways were identified as unsafe, had low scores according to the multicriteria analysis, or where an area is serviced by an excessive number of accessways, it was recommended that the lowest scoring accessways in these areas be considered for rationalisation.

Key issues identified at beach accessways in the Shoalhaven are illustrated in Table 1.

**Table 1:** Locations and key accessway management issues [1]

Area	Key Issues
<b>Shoalhaven Heads</b>	Wind-blown dune stability Beach erosion
<b>Culburra</b>	Multiple accessways servicing same area No all-ability access to beach Erosion at base of access
<b>Warrain</b>	Informal access Erosion at base of access
<b>Currarong</b>	Multiple accessways servicing same area No all-ability access to beach Beach erosion
<b>Callala Bay</b>	Erosion at base Dinghy access and storage Lowering of accessways relative to dune
<b>Callala Beach/Myola</b>	Dune vegetation damage Multiple accessways servicing same area Lowering of accessways relative to dune Creek bank erosion (Myola)
<b>Huskisson (Shark Net and Huskisson Beach)</b>	Erosion at base Multiple accessways servicing same area Creek bank erosion (Moona Moona Creek)
<b>Collingwood Beach</b>	Dune vegetation damage Lowering of accessways relative to dune Stormwater erosion
<b>Orion and Barfleur Beaches</b>	Stormwater drainage Slope stability
<b>Nelson and</b>	Slope stability

<b>Area</b>	<b>Key Issues</b>
<b>Blenheim Beaches</b>	Erosion at base Stormwater erosion
<b>Hyams Beach</b>	Erosion at base
<b>Sussex Inlet</b>	Wind-blown dune stability
<b>Curmirrah and Berrara</b>	Stormwater erosion Slope stability
<b>Bendalong</b>	Track safety due to lack of maintenance/bushfire impact Erosion at base Stormwater erosion
<b>Manyana</b>	Stormwater erosion
<b>Cunjurong Point</b>	Slope stability Stormwater erosion
<b>Lake Conjola</b>	Informal access along foreshore
<b>Narrawallee</b>	Creek bank erosion Slope stability
<b>Mollymook</b>	Multiple accessways servicing same area Stormwater erosion Beach erosion
<b>Collers Beach</b>	Stormwater erosion Slope stability
<b>Ulladulla Harbour</b>	Track maintenance Slope stability Stormwater erosion
<b>Rennies Beach and Racecourse Beach</b>	Slope stability Stormwater erosion
<b>Burrill Beach (the Spit)</b>	Remote access Beach erosion
<b>Burrill Lake (Dolphin Point)</b>	Slope stability Creek bank erosion
<b>Wairo Beach</b>	Remote access Lack of maintenance
<b>Lake Tabourie</b>	Creek bank erosion
<b>Bawley Point</b>	Erosion at base Multiple accessways servicing same area (Gannet Beach) Lack of maintenance Weeds
<b>Kioloa</b>	Remote access Erosion at base

The application of the tool to the Shoalhaven coastal accessways resulted in accessways in some areas being recommended for closure or upgrade. The outcome of the project included:

- a suite of recommendations for Council's coastal accessway assets
- a register that can be used by Council as a tool to repeat the assessment in the future, and
- a framework to assess other key Council-owned coastal assets.

## 5. Example application of Method

An example of the application of the method at Shoalhaven Heads is presented below. Each accessway in the area was inspected on foot, with an example of the field proforma used shown in Figure 6.

The data from the field proforma was populated into Council's GIS asset register and used to populate the multicriteria analysis tool, with an entry provided for each accessway and scores assigned to each of the criteria, as described in Section 2.2. An example of the multicriteria assessment and beach-by-beach assessment is provided in Figure 7. The scoring criteria that was applied against each of the categories in the assessment is also demonstrated in Figure 7.

The multicriteria assessment allowed each accessway to be scored against the criteria and ranked to prioritise them for upgrade, repair or closure as indicated in Figure 7. The linkage of the multicriteria assessment to Council's GIS Asset register allowed mapping of accessway condition and proposed management actions to be carried out, with an example shown in Figure 8.

**AJvisian** Shoalhaven Asset Management Strategy - Field Inspection Form

Asset ID.	14110/1263			
Asset Name	Shoalhaven Heads (Golf course)			
Asset Type	Sand path			
Asset Location				
GPS Coordinates				
Date/Time	3/3 11:50am			
Weather Conditions (tide, swell, wind etc.)	Fine, low/moderate swell			
Inspector	CAA			
Asset Description (board and chain, stairway, gravel path, etc.)	<input type="checkbox"/>	Board and Chain Accessway	<input type="checkbox"/>	Gravel Path
	<input type="checkbox"/>	Stairway	<input type="checkbox"/>	Concrete Path
	<input checked="" type="checkbox"/>	Sand pathway	<input type="checkbox"/>	Other
	<input type="checkbox"/>	Timber boardwalk		
Notes on Asset Condition (notes on its condition, dimensions, estimated age, comment on safety, remaining useful life). Refer to lookup criteria below for condition rating.	<p>4 Overall Condition (1 = Poor → 5 = Excellent)</p> <p>Good condition, some vegetation overhanging but not impeding access</p>			
Notes on asset utility (is it conveniently located, does it appear to be well used, are there alternative accessways nearby, ancillary facilities associated with accessway)	<p>Need to walk through Golf course to get to accessway</p>			

Notes on coastal processes affecting asset	<input type="checkbox"/> erosion <input type="checkbox"/> sand drift <input type="checkbox"/> stormwater <input type="checkbox"/> wind <input type="checkbox"/> wave action <input type="checkbox"/> other	Dune on either side has been eroded but accessway unaffected
Notes on impact of asset on surrounding beach (e.g. sand drift onto adjacent carpark, exacerbated erosion, impact on adjacent vegetation)		No impact of accessway on beach processes.
Notes on recommended actions to improve or rationalise asset (e.g. dogleg, fencing, resurfacing, signage, prune vegetation impeding access, etc.)	<input type="checkbox"/> revegetation <input type="checkbox"/> fix fencing <input type="checkbox"/> regrading <input type="checkbox"/> modify alignment <input type="checkbox"/> other	Maintain vegetation central spread of weeds from golf course.
Photo IDs		Track only requires minimal maintenance. Signage in good condition but not conveniently located as need to walk thru golf course.
Other Comments/sketches (e.g. presence of nearby informal accessways, presence of weeds, notes on observed usage, condition of adjacent vegetation etc.)		

Figure 6: Example of field proforma used

Criteria for Accessway Rationalisation													
Shoalhaven Heads	Asset No.	Score 1-5		Score 1-5		Score 1-5		Score 1-5		Score 1-5		Score 1-5	
		141110	140118	140121	140127	140133	140136	664	140142/140139				
Condition rating from field assessment	4	4	1	1	2	2	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Distance along beach to nearest accessway (m)	318	3	35	0	35	0	190	2	190	2	82	1	89
Walking distance to nearest walkway at landward end (m)	752	4	37	0	37	0	290	3	290	3	11	0	90
Duplicate walkway servicing same area (Y/N)	N	5	Y	0	Y	0	N	5	N	5	N	5	N
Accessway services SLSC (Y/N)	Y	5	N	0	Y	5	N	0	N	0	N	0	N
Accessway used for or suitable for emergency access (e.g. flood control) (Y/N)	N	0	N	0	Y	5	N	0	N	0	Y	5	N
Estimated ongoing maintenance required (low, medium, high)	Low	5	Medium	3	High	0	Medium	3	Medium	3	Low	5	Low
Impact of accessway on surrounding beach environment (low, medium, high)	High	0	Medium	3	Medium	3	Medium	3	Low	5	Low	5	Low
Impact of accessway on surrounding heritage items (low, medium, high)	Low	5	Low	5	Low	5	Low	5	Low	5	Low	5	Low
Services major development or facility (e.g. caravan park) (Y/N)	Y	5	N	0	Y	5	Y	5	Y	5	N	0	N
Estimated no. lots serviced by accessway	756	5	0	0	453	5	1	1	1	1	312	5	1
Accessway used to access off-leash dog walking area (Y/N)	N	0	N	0	N	0	N	0	N	0	Y	5	N
<b>Accessway Score</b>	41	12		30		30.5		32.5		34.5		30.5	26.5
<b>Accessway ranking</b>	1	8		6		4		3		2		4	7
<b>Recommendation - Retain, remove or repair</b>	Retain	Remove		Repair		Retain		Retain		Retain		Retain	Retain
<b>Comments</b>	<p>Access currently closed due to erosion, unsafe. Rehabilitation would damage the dune, other alternative access available nearby. Could be turned into a viewing platform set back from escarpment.</p> <p>Main access for surf club and day visitors</p> <p>Retain as only access to river foreshore, currently used for birdwatching</p>												
<b>Overall Beach Assessment</b>													
Beach length serviced by accessways (km)	2.5												
No. accessways (existing)	8												
No. accessways per km length of beach (existing)	3.20												
No. accessways recommended to be retained	7												
No. accessways per km length of beach (proposed)	2.80												
<b>Scoring Criteria</b>													
Condition rating from field assessment	1 (1), 2 (2), 3 (3), 4 (4), 5 (5)												
Distance along beach to nearest accessway	>1km (5), 500m - 1km (4), 200m - 500m (3), 100m - 200m (2), 50m - 100m (1), <50m (0)												
Walking distance to nearest walkway at landward end	>1km (5), 500m - 1km (4), 200m - 500m (3), 100m - 200m (2), 50m - 100m (1), <50m (0)												
Duplicate walkway servicing same area	Yes (0), No (5)												
Accessway services SLSC (Y/N)	Yes (5), No (0)												
Accessway used for or suitable for emergency access (e.g. flood control) (Y/N)	Yes (5), No (0)												
Estimated ongoing maintenance required (low, medium, high)	low (5), medium (3), high (0)												
Impact of accessway on surrounding beach environment (low, medium, high)	low (5), medium (3), high (0)												
Impact of accessway on surrounding heritage items (low, medium, high)	low (5), medium (3), high (0)												
Services major development or facility (e.g. caravan park) (Y/N)	Yes (5), No (0)												
Estimated no. lots serviced by accessway (within 2km walking distance)	>100 (5), 50-100 (4), 25-50 (3), 10-25 (2), 1-10 (1), 0 (0)												
Accessway used to access off-leash dog walking area (Y/N)	Yes (5), No (0)												

Figure 7: Example of Multicriteria and Beach by Beach Assessment



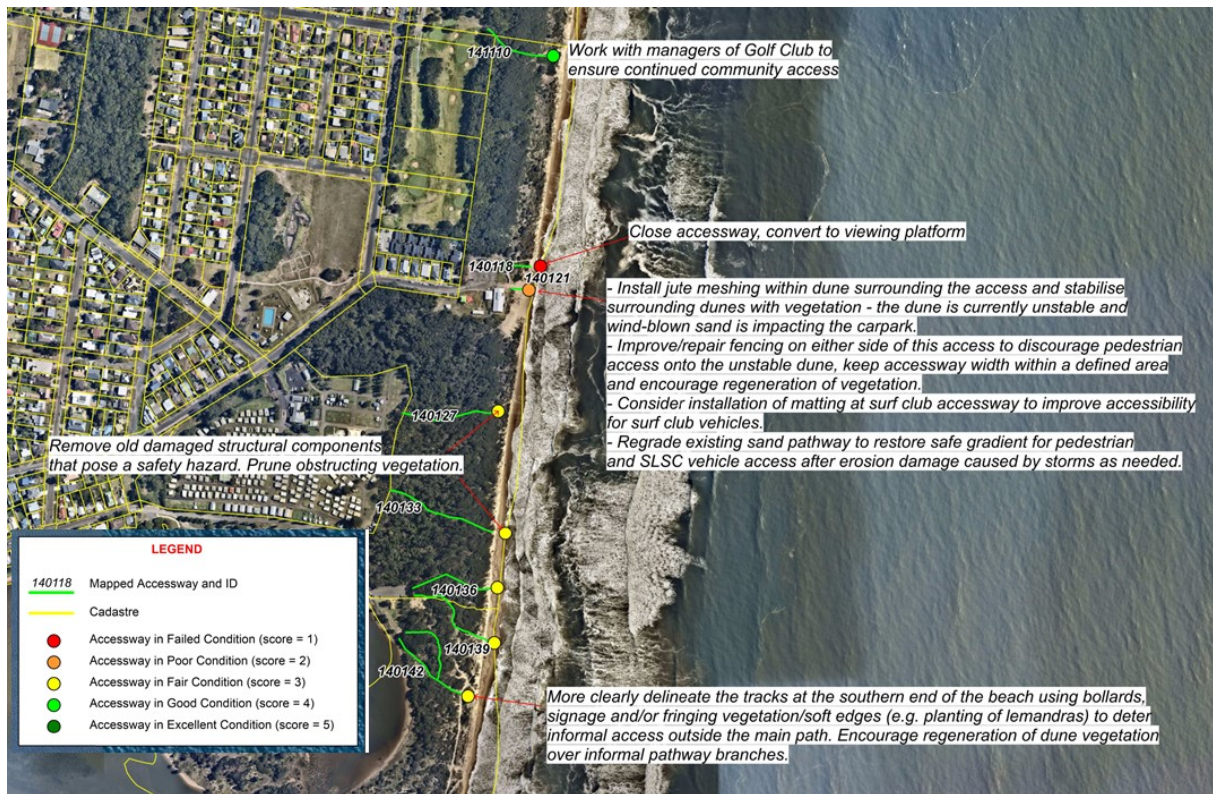


Figure 8 – Example Coastal Accessway Condition and Management Action Mapping

## 6 Future Directions

There is benefit for Councils and other land managers in creating a statewide consistent approach to assessing beach accessways. Where there is a need to rationalise beach accessways, for example due to multiple accessway infrastructure reaching the end of design life combined with limited budgets and an overservice of accessways, this can be unpopular with local communities.

Having the ability to follow a statewide framework to rationalise accessways enables Councils to demonstrate to their communities they are following a robust, defensible and consistent approach to other Councils across the state, while needing to operate within funding constraints.

Potential exists to streamline the usability and functionality of the tool, which would enable other Councils to more easily and consistently apply the approach. As an example, automating the process into a decision support tool, similar to the decision support tool (DST) developed for bank erosion in NSW estuaries through the Marine Estate Strategy [2]. This DST provides a recommendation for management actions for particular sections of foreshore, based on a number of factors

including the severity and causes of erosion, and whether there is infrastructure or environmental values at risk. The DST is being used throughout NSW to undertake bank erosion assessments in support of several Coastal Management Plans (CMP) – for example, the Shoalhaven River CMP and St Georges Basin/ Sussex Inlet, Swan Lake, and Berrara Creek CMP.

The experience from the bank erosion Decision Support Tool can be applied to develop the CAM tool presented in this paper further as follows:

- link the field proforma directly with the multicriteria assessment spreadsheet to minimise double handling of data and automate the coastal accessway assessment scores
- develop the multicriteria spreadsheet further so that generic management actions are suggested based on the responses from the field proforma develop technical documentation (eg as part of the online coastal management toolkit) for the CAM tool to enable application by other coastal Councils throughout NSW, potentially as part of their Coastal Management Programs.

## 7 Conclusions

This paper has presented a methodology and framework that Councils can use to manage their coastal accessway assets in a defensible and consistent manner, which by their very nature are the most exposed public infrastructure to coastal hazards requiring ongoing maintenance.

The framework allows for rapid assessment of accessways in the field, against criteria including safety, utility, future maintenance and environmental impact. A beach-by-beach assessment is an integral part of the framework, which allows accessways to be ranked within localities. It also allows the level of service between different precincts within a local government area to be compared so that infrastructure upgrade spending can be prioritised.

The framework was applied to the beaches of the Shoalhaven local government area, which manages more than 220 accessways within 40 beach compartments. It was found that many of the accessways were affected by common issues for which generic management options can be applied.

As the methodology has widespread applicability, further use and development of the approach to maximise efficiency of data capture, processing and assessment to inform management actions would be beneficial.

## Acknowledgements

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## References

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