

Cornwall Beach & Dune Management Plans

Prepared for
Cornwall Council

19 August 2015

ch2m.SM

Ash House
Falcon Road
Sowton
Exeter
Devon
EX2 7LB

Contents

Section	Page
1 Introduction	1
1.1 Background	1
1.2 Project aim, objectives and approach	2
1.3 About this document	5
2 Constantine Bay	6
3 Fistril Beach	10
4 Harvey's Towans.....	13
5 Par Sands.....	16
6 Porthtowan	19
7 Praa Sands.....	22
8 Summerleaze.....	25
9 Widemouth Bay.....	29
References.....	32
Appendix A Sand Dune Management Preliminary Decision Assistance Tool User Guide	33

1 Introduction

1.1 Background

Many of the sand dunes and beaches around Cornwall's coast are currently experiencing net erosion and sediment loss due in part to lack of new sediment input to the shoreline system and rising sea levels. This is a pressing concern as these sand dunes and their associated sandy beaches are one of the most important resources in Cornwall due to:

1. Their role in providing protection against the risk of coastal flooding due to the dynamic nature of beach-dune interactions and their sheer size preventing the sea from impacting upon the hinterland behind the dune systems.
2. Their role in providing important biologically diverse habitats that cannot be easily recreated elsewhere if it were to be lost to coastal erosion or inappropriate development.
3. Their role in providing access to the sea for residents and visitors alike, which is vital to the holiday industry upon which a significant proportion of Cornwall's economy depends.

It is vital therefore that the sand dunes and beaches around Cornwall's coast, that represent some 15% of the total sand dune habitat in Britain, are managed in a holistic, sustainable way over the long-term that balances the needs of each of the three distinct functions of sand dunes and beaches that combined make up the beach-dune system.

The approach to managing the beaches and sand dunes in Cornwall (refer to Figure 1.1) was investigated in between 2006 and 2009 by Halcrow on behalf of the Cornwall and Isles of Scilly Coastal Group, and led to the production of the *Cornwall Sand Dune and Beach Management Strategy* (Halcrow, 2009). The main focus of the strategy is the management of flood and coastal erosion, although the habitat and tourism value of the dunes are also considered. This 2009 project delivered an Inventory of Beaches and Dunes; a Best Practice Management Guide and two pilot Beach and Dune Management Plans (BDMPs) for Harvey's Towans and Fistral Beach. It is this 2009 work that this current project is building upon to develop six new BDMPs and review the two pilot BDMPs (see Section 1.2).

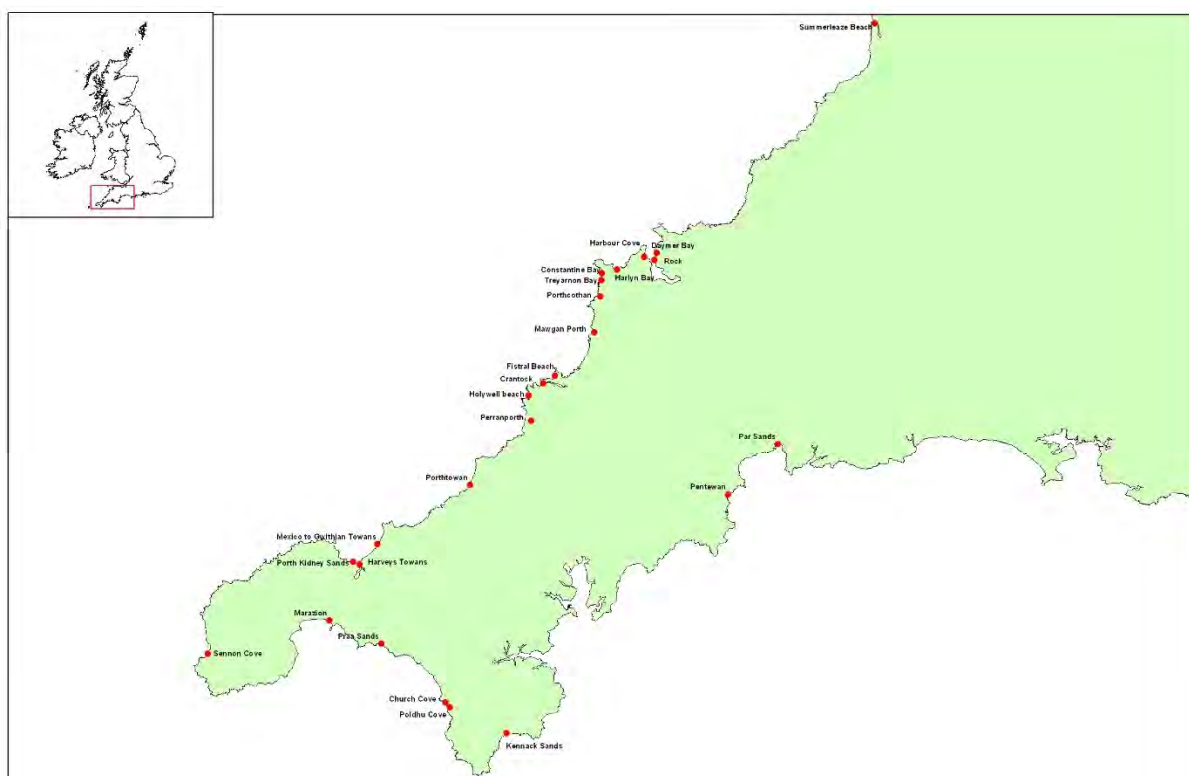


Figure 1.1 Map showing location of all dune locations in Cornwall assessed as part of the Cornwall Sand Dune and Beach Management Strategy (Halcrow, 2009).

1.2 Project aim, objectives and approach

The purpose of the project is to **develop six new long-term strategic BDMPs for Constantine Bay, Par Sands, Praa Sands, Porthtowan, Summerleaze and Widemouth Bay; and review the need (or otherwise) to update the two pilot BDMPs produced in 2009 for Fistral Beach and Harvey's Towns** [NB: following Stage 1 of this project – see below – it was confirmed that the two 2009 pilot BDMPs will be updated through this project]. This will be achieved by:

1. Identifying the best management approach; in terms of monitoring and intervention (when trigger levels are reached) requirements for beach and dune systems at each individual site, based upon the best practice framework developed as part of the *Cornwall Sand Dune and Beach Management Strategy* produced by Halcrow in 2009.
2. Providing a long-term (50 year) approach to each site that is based upon an up-to-date understanding of the beach-dune system and coastal processes at each site, as well as predictions of future coastal evolution.

The locations of these eight sites is shown in Figure 1.2.



Figure 1.2 Map showing location of the eight BDMP locations.

Development of the BDMPs will involve four stages. Local community stakeholders and statutory stakeholders will be engaged to seek local knowledge and guide selection of preferred management options. These stages, and the times when engagement with local community representatives and other statutory consultees is planned, are shown in the flow diagram below (Figure 1.3). This report represents outputs from “Stage 2 – Define Issues and Objectives.”

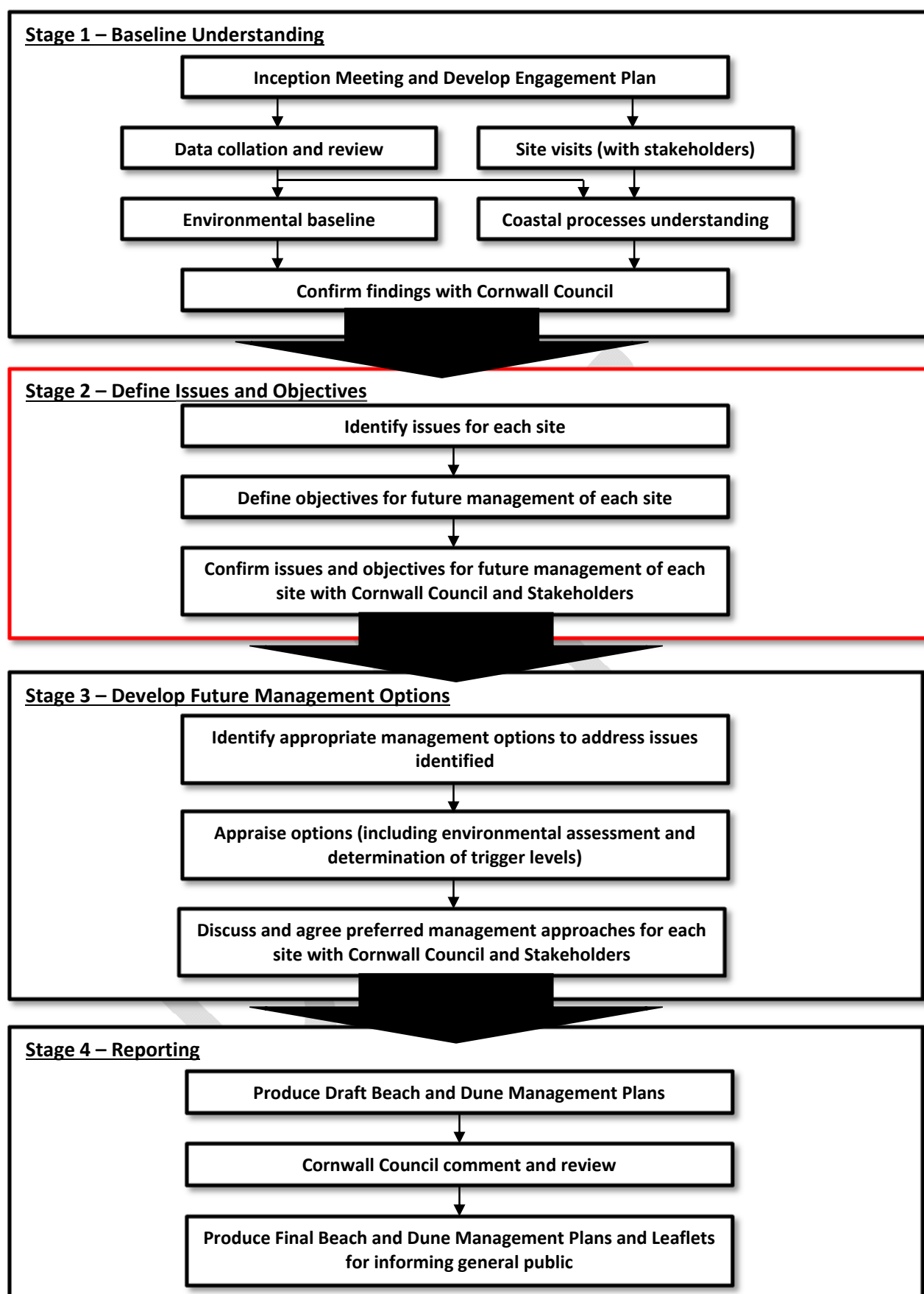


Figure 1.3 Overview of the staged approach to developing BDMPs for the eight locations around Cornwall; current stage highlighted by red box.

1.3 About this document

This report defines the issues that have been identified for each of the eight BDMP locations subject of this project. These issues have been identified from the baseline understanding developed for each location as part of Stage 1 (CH2M HILL, 2015a to 2015h). Where appropriate, current management practices that address (in full or in part) an identified issue are also noted; this will help inform Stage 3 of the project when future management options to address each issue are considered.

It then goes on to:

- a) determine if the issue is within the scope of the BDMP to be developed;
- b) identify the 'issue type' aligned to the Sand Dune Management Techniques Tool 'issue types' defined by Halcrow in 2009 (a copy is provided in Appendix A for reference) to guide efforts in Stage 3 to review and update this tool with latest research and information; and
- c) suggest objectives for future beach and dune management for each location in order to achieve the aims of the project defined in Section 1.2 above. *These suggested objectives are to be confirmed in consultation with stakeholders and Cornwall Council as part of this Stage 2 of the BDMP process. Once confirmed, they will be used in Stage 3 of the BDMP process to assess the appropriateness of different options identified to address each issue.*

2 Constantine Bay

Constantine Bay is located on the north coast of Cornwall, on the western flank of Trevoze Head, to the west of Padstow and Wadebridge (refer to Figure 2.1).

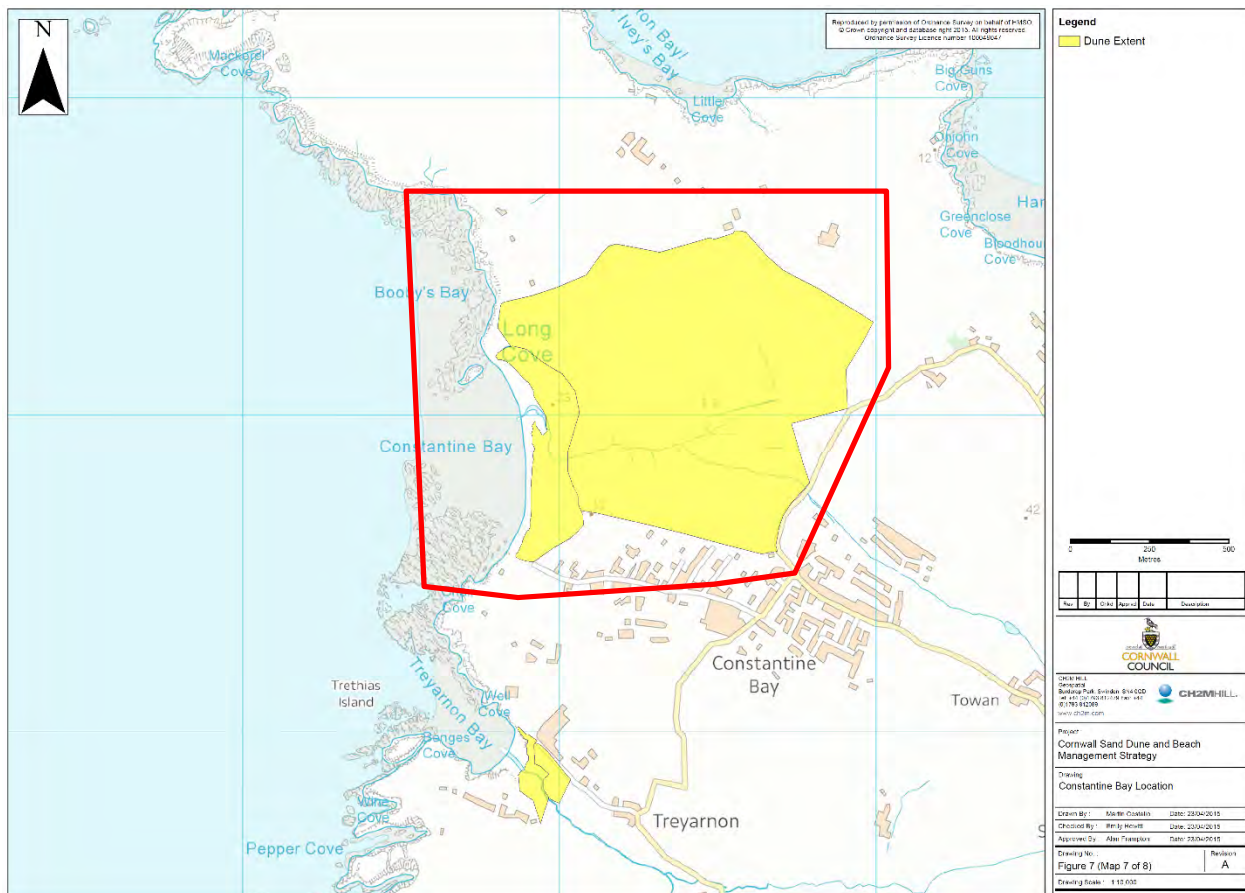


Figure 2.1 Map showing the Constantine Bay BDMP location and extent (red outline).

The following Table 2.1 contains issues for beach and dune management have been identified for Constantine Bay from the baseline understanding work completed as part of Stage 1 of this project (CH2M HILL, 2015a). Based upon the issues identified, and with consideration of the aims of this project defined in Section 1.2, consideration is given to whether or not each issue is within the scope of this project and, where it is within scope, goes on to suggest objectives for future management of the issue.

Table 2.1 Issues and Objectives for Constantine Bay

Issue Description	Assessed relevance to BDMP Aims (in scope?)	Sand Dune Management Techniques Tool Issue Type ID (Halcrow, 2009; see Appendix A)	Suggested BDMP Objective for Issue	Current Management Practice related to issue
<p>1. The beaches and dunes of Constantine Bay are eroding as a result of a combination of natural processes and human impacts.</p> <p>Large storm events, when they occur, can cause reversal (erosion) of dune stabilisation measures that otherwise work successfully in the area to stabilise the dunes and encourage dune re-growth. It can also cause dune cliffing which poses safety issues for those accessing the area (<i>refer also to issue 4 regarding provision of safe access</i>).</p> <p>The beach at the north end of the bay is eroding, whilst the beach at the south end of the bay is stable.</p>	In scope as issue relates directly to managing coastal flood and erosion risk.	STABILISATION; MORPHOLOGICAL MODIFICATION	Work with natural processes to minimise risk in the future, through promotion of ongoing dune restoration using methods that encourage sediment entrapment and dune growth.	Occasional efforts to introduce dune stabilisation measures in the past.
<p>2. Beach levels in front of the hard defences vary regularly over short periods of time. Monitoring as part of the South West Regional Coastal Monitoring Programme does not occur frequently enough to detect these rapid variations. Monitoring has also only been occurring consistently since 2007 so longer-term trends are not necessarily apparent in the available data. Continuation of monitoring is needed. The extent/coverage of monitoring and the frequency with which it occurs could both be increased to ensure it provides sufficient information covering both the beach and sand dunes to inform future management decisions.</p>	In scope as issue relates directly to managing coastal flood and erosion issues as provides information on natural processes.	MONITORING	Ensure existing coastal monitoring is continued, modified as necessary to provide greater coverage and frequency of survey to provide greater levels of data to inform future management decisions.	Monitoring by the South West Coastal Monitoring Programme since 2007.
<p>3. The seawall (constructed in the 1940s) requires regular, ongoing maintenance, including occasional significant repairs following large storms. Given the age of the seawall, it would be expected to reach the end of its serviceable life within the next 50 years and so need replacing (if funding available).</p>	Not in scope as it is a hard defence asset. However, do need to ensure this existing seawall is regularly monitored and maintenance works are carried out by asset owner as required, and that any works that are done are complimentary to the management of the beach and dunes.	N/A	N/A	N/A
<p>4. Access path covered by sand inhibits/hinders access for all visitors. Regular clearing ideally required.</p>	In scope as involves management of sediment that contributes to the beach and dunes.	ACCESS MANAGEMENT; SEDIMENT MODIFICATION	Ensure safe access to site for all visitors along defined paths, and that sediment removed from paths is retained in the beach-dune system.	
<p>5. Erosion of access path and steps by erosion of the fronting dunes (due to natural processes) has required protection of the dune toe using rock armour. This will require maintenance and may need not be sustainable in the present position over the next 50 years.</p>	In scope as direct interaction with dune and beach evolution.	HARD PROTECTION METHODS	Ensure rock armour protecting dune toe is complimentary to efforts to promote working with natural processes in dune stabilisation and growth.	
<p>6. Access by visitors through the dunes using non-defined access routes causes trampling of dune vegetation and erosion of the dunes. This impact is further added to by visitors using barbecues within the dunes. Unauthorised access also increase the risk of injury to visitors by hazard posed from historical dune fencing and WWII barbed wire fencing buried within dunes and periodically exposed, as these issues are not managed along undefined access routes.</p>	In scope as has direct impact on dune erosion processes.	ACCESS MANAGEMENT; PUBLIC AWARENESS	Minimise dune erosion caused by human access.	

Issue Description	Assessed relevance to BDMP Aims (in scope?)	Sand Dune Management Techniques Tool Issue Type ID (Halcrow, 2009; see Appendix A)	Suggested BDMP Objective for Issue	Current Management Practice related to issue
7. Litter of the beach and within the dunes (e.g. discarded used barbecues) is an issue, particularly in the summer months when there is a large increase in the number of visitors to the area. Manual beach cleaning and the number of bins provided at the site is unable to cope with the volumes of litter.	In scope as has direct impact on ecology of the dune system, and so natural dune processes.	ACCESS MANAGEMENT; PUBLIC AWARENESS	Reduce impact of human activity causing pollution of the natural environment.	Manual beach cleaning occurs. Litter bins provided.
8. There is a need to provide seasonal services in the area such as lifeguards (provided by RNLI for a fee) and parking for visitors.	Not in scope as dealt with in other management processes by Cornwall Council.	N/A	N/A	N/A
9. There are a number of approved pitches assigned to licensed vendors to trade at the site. However, unlicensed vendors also appear and trade on unapproved pitches at the site. This erodes the economic value of the approved, licensed pitches.	Not in scope as not relevant to coastal flood and erosion risk management.	N/A	N/A	N/A
10. The backshore area is occupied by a golf course. There is potential for future dune erosion or landwards migration to impact the golf course.	In scope as directly linked to managing risk of coastal flooding and erosion.	ADAPT BACKSHORE MANAGEMENT/USES	Reduce the risk of future coastal erosion to the golf course through coastal adaptation measures.	
11. There is limited funding currently available to undertake beach and dune management activities.	In scope as directly linked to ability to deliver coastal flood and erosion risk management.	<i>NONE PREVIOUSLY DEFINED</i>	Identify potential funding streams to enable economically sustainable beach and dune management to occur.	
12. The Shoreline Management Plan policy is for No Active Intervention to occur. This means that there will be no funding forthcoming for coastal flood and erosion risk management (e.g. dune management) in Constantine Bay from central Government. The policy does, however, permit maintenance of the existing seawall defence if alternative sources of funding are available for this purpose.	In scope as directly linked to managing risk of coastal flooding and erosion.	<i>NONE PREVIOUSLY DEFINED</i>	Ensure future management of the area is in line with SMP policy.	
13. There are potential UK Biodiversity Action Plan Priority Habitats (coastal sand dunes, maritime cliff and slope, maritime heath and grassland, coastal flood and grazing marsh) in the BDMP area, as well as non native invasive species that should be removed if present, though no ecological survey of the area has been completed to verify this.	In scope as ecological health of the dunes is important in working with natural processes to provide coastal flood and erosion risk management with the aid of sand dunes.	<i>NONE PREVIOUSLY DEFINED</i>	Confirm presence and condition of UK BAP priority habitats, and manage appropriately any that is present.	
14. Future beach and dune management needs to consider the environmental impacts on a variety of designated features, including: <ul style="list-style-type: none"> o Trevoze Head to Constantine Bay SSSI. o Falmouth Bay to St Austell pSPA. o Tamar Estuaries Complex SPA. o Isles of Scilly SPA. o Exe Estuary SPA. 	In scope as legal requirements to account for environmental designations.	<i>NONE PREVIOUSLY DEFINED</i>	Ensure the identified environmental features are considered in management decisions for future coastal flood and erosion risk management.	

Issue Description	Assessed relevance to BDMP Aims (in scope?)	Sand Dune Management Techniques Tool Issue Type ID (Halcrow, 2009; see Appendix A)	Suggested BDMP Objective for Issue	Current Management Practice related to issue
<ul style="list-style-type: none">○ Cornwall AONB.○ Historic environment features, including scheduled and non-scheduled monuments.				

DRAFT

3 Fistral Beach

Fistral Beach is located on the north coast of Cornwall, to the west of Newquay (refer to Figure 3.1).

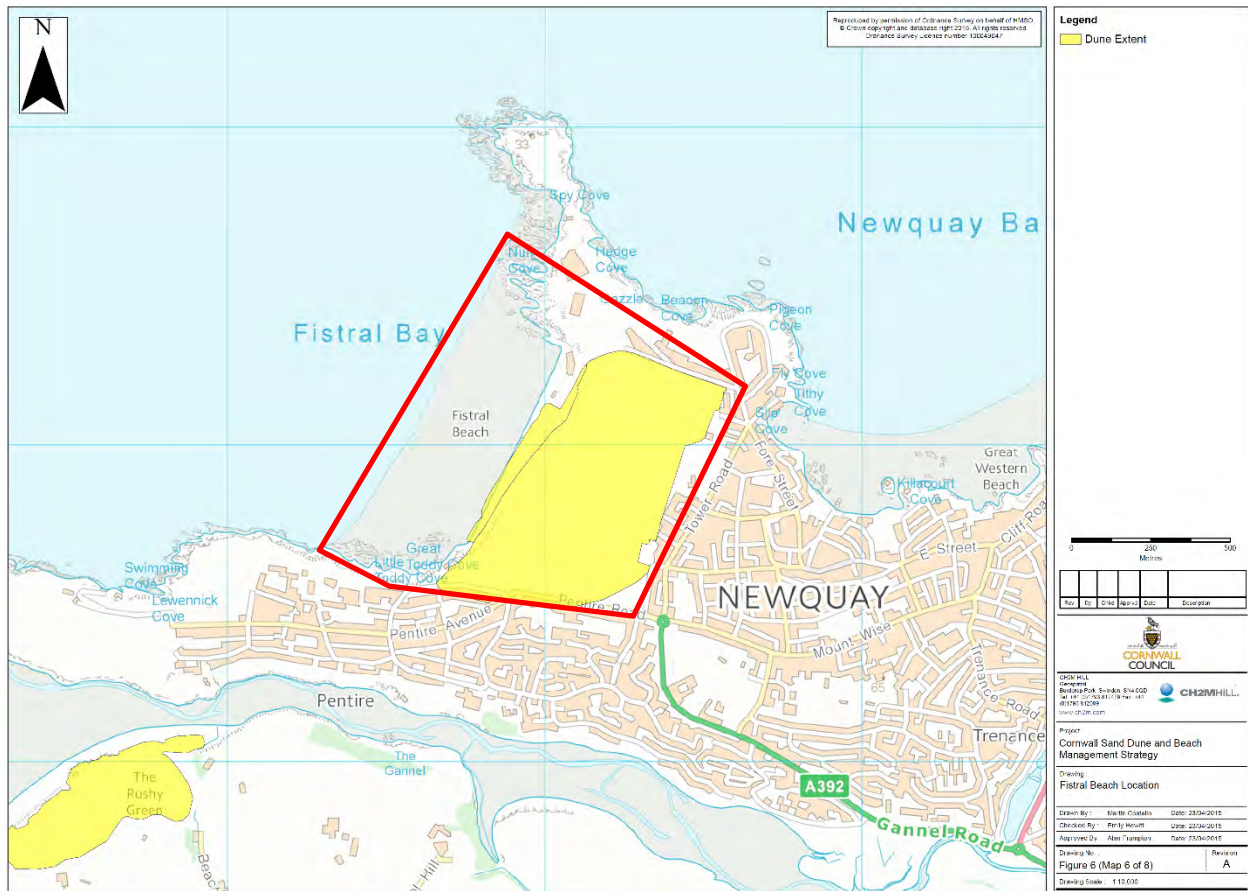


Figure 3.1 Map showing the Fistral BDMP location and extent (red outline).

The following Table 3.1 contains issues for beach and dune management have been identified for Fistral Beach from the baseline understanding work completed as part of Stage 1 of this project (CH2M HILL, 2015b). Based upon the issues identified, and with consideration of the aims of this project defined in Section 1.2, consideration is given to whether or not each issue is within the scope of this project and, where it is within scope, goes on to suggest objectives for future management of the issue.

Table 3.1 Issues and Objectives for Fistral Beach

Issue Description	Assessed relevance to BDMP Aims (in scope?)	Sand Dune Management Techniques Tool Issue Type ID (Halcrow, 2009; see Appendix A)	Suggested BDMP Objective for Issue	Current Management Practice related to issue
<p>1. The dunes and backshore along Fistral Beach are currently eroding.</p> <p>At points along the beach, (e.g. the northern end of the beach; RNLI lifeguard station), there has been significant erosion of the backshore dunes and cliffs due to storms in 2014, resulting in collapse and failure of the footings of both gabion basket defences and commercial buildings in this area; a combination of rock armour/sand bags has been placed at different parts to stabilise the situation.</p> <p>The backshore dune area atop the cliff is occupied for much of the length by a golf course. There is potential for future erosion of the dunes and cliffs to impact the golf course.</p>	In scope as issue relates directly to managing coastal flood and erosion risk.	ADAPT BACKSHORE MANAGEMENT/USES	Reduce the risk of future coastal erosion to buildings and the golf course through coastal adaptation measures and directing future development away from areas at risk of coastal change.	
<p>2. Fencing of various types (including timber, metal and barbed-wire [placed during World War 2] placed at the points along the beach/dunes (largely to help stabilise and promote dune growth) is or has become buried by sand. At different points in time, some of the fencing is at least partially re-exposed for periods of time at different points along the beach/dunes. This is linked to the dynamism of the beach levels, and causes temporary health and safety issues when exposure does occur.</p> <p>Dune fencing measures can, at times, also be subject to accidental damage, vandalism (e.g. burning) or theft, again posing potential risks to the public and the stability of the dunes.</p> <p>In addition, large storm events, when they occur, can cause significant erosion of the dunes including washing away dune stabilisation measures and cliffing of the dune face, both of which pose safety issues for visitor access.</p>	In scope as issue relates directly to managing coastal flood and erosion risk.	STABILISATION; MORPHOLOGICAL MODIFICATION	Promote ongoing dune restoration using methods that encourage sediment entrapment and dune growth, being mindful of potential future health and safety issues posed by covering and later re-exposure/dune cliffing to ensure safe access to site for all visitors along defined paths.	Various dune fencing has occurred in the past.
<p>3. Local businesses are unable to get insurance due to history of erosion.</p>	Not in scope. Insurance is a matter for businesses and insurance providers.	N/A	N/A	N/A
<p>4. Beach and dune levels along the frontage vary regularly over short periods of time. Monitoring as part of the South West Regional Coastal Monitoring Programme does not occur frequently enough to detect these rapid variations. Monitoring has also only been occurring consistently since 2007 so longer-term trends are not necessarily apparent in the available data. Continuation of monitoring is needed. The extent/coverage of monitoring and the frequency with which it occurs could both be increased to ensure it provides sufficient information covering both the beach and sand dunes to inform future management decisions.</p>	In scope as issue relates directly to managing coastal flood and erosion issues as provides information on natural processes.	MONITORING	Ensure existing coastal monitoring is continued, modified as necessary to provide greater coverage and frequency of survey to provide greater levels of data to inform future management decisions.	Monitoring by the South West Coastal Monitoring Programme since 2007.
<p>5. Access by visitors through the dunes using non-defined access routes (i.e. access not along one of the three defined routes) causes trampling of dune</p>	In scope as has direct impact on dune erosion processes.	ACCESS MANAGEMENT; PUBLIC AWARENESS	Minimise dune erosion caused by human access.	

Issue Description	Assessed relevance to BDMP Aims (in scope?)	Sand Dune Management Techniques Tool Issue Type ID (Halcrow, 2009; see Appendix A)	Suggested BDMP Objective for Issue	Current Management Practice related to issue
vegetation and erosion of the dunes. This impact is further added to by visitors using barbecues within the dunes and using the dune area as an unauthorised viewing area for surf events.				
6. There is limited funding currently available to undertake beach and dune management activities.	In scope as directly linked to ability to deliver coastal flood and erosion risk management.	<i>NONE PREVIOUSLY DEFINED</i>	Identify potential funding streams to enable economically sustainable beach and dune management to occur.	
7. The Shoreline Management Plan policy is for Managed Realignment to occur in the medium to long-term. This is to accommodate natural variability along Fistral Beach and enhance the natural dune system as a UK BAP Priority Habitat. It also allows for planning and implementation of coastal adaptation measures to reduce the risks to assets in the area.	In scope as directly linked to managing risk of coastal flooding and erosion.	<i>NONE PREVIOUSLY DEFINED</i>	Ensure future management of the area is in line with SMP policy.	
8. UK Biodiversity Action Plan Priority Habitats (coastal sand dunes, maritime cliff and slope) generally in unfavourable condition. This includes need for removal of non-native invasive species within the dune vegetation.	In scope as ecological health of the dunes is important in working with natural processes to provide coastal flood and erosion risk management with the aid of sand dunes.	<i>NONE PREVIOUSLY DEFINED</i>	Improve condition of UK BAP priority habitats.	
9. Future beach and dune management needs to consider the environmental impacts on a variety of designated features, including: <ul style="list-style-type: none"> o Falmouth Bay to St Austell pSPA. o Isles of Scilly SPA. o Historic environment features, including scheduled and non-scheduled monuments. 	In scope as legal requirements to account for environmental designations.	<i>NONE PREVIOUSLY DEFINED</i>	Ensure the identified environmental features are considered in management decisions for future coastal flood and erosion risk management.	

[illegible]

The following Table 4.1 contains issues for beach and dune management have been identified for Harvey's Towans from the baseline understanding work completed as part of Stage 1 of this project (CH2M HILL, 2015c). Based upon the issues identified, and with consideration of the aims of this project defined in Section 1.2, consideration is given to whether or not each issue is within the scope of this project and, where it is within scope, goes on to suggest objectives for future management of the issue.

Table 4.1 Issues and Objectives for Harvey's Towans

Issue Description	Assessed relevance to BDMP Aims (in scope?)	Sand Dune Management Techniques Tool Issue Type ID (Halcrow, 2009; see Appendix A)	Suggested BDMP Objective for Issue	Current Management Practice related to issue
<p>1. There is a history of erosion problems along Harvey's Towans, although the beaches and dunes of Harvey's Towans were until winter 2013/14 largely stable or accreting in recent times according to monitoring data. This indicates the natural variability in the system.</p> <p>Large storm events, when they occur, can cause significant erosion of the dunes, including destroying dune stabilisation measures that otherwise work successfully in the area to stabilise the dunes and encourage dune re-growth. Storms can also cause dune cliffing which poses a safety issue for visitor access</p>	In scope as issue relates directly to managing coastal flood and erosion risk.	STABILISATION; MORPHOLOGICAL MODIFICATION	Work with natural processes to minimise risk in the future through promotion of ongoing dune restoration using methods that encourage sediment entrapment and dune growth.	ING provide some dune restoration measures as compensation for works previously.
<p>2. Beach and dune levels along the frontage vary regularly over short periods of time. Monitoring as part of the South West Regional Coastal Monitoring Programme does not occur frequently enough to detect these rapid variations. Monitoring has also only been occurring consistently since 2007 so longer-term trends are not necessarily apparent in the available data. Continuation of monitoring is needed. The extent/coverage of monitoring and the frequency with which it occurs could both be increased to ensure it provides sufficient information covering both the beach and sand dunes to inform future management decisions.</p>	In scope as issue relates directly to managing coastal flood and erosion risk.	MONITORING	Ensure existing coastal monitoring is continued, modified as necessary to provide greater coverage and frequency of survey to provide greater levels of data to inform future management decisions.	Monitoring by the South West Coastal Monitoring Programme since 2007.
<p>3. Access by visitors through the dunes using non-defined access routes (instead of defined routes) causes trampling of dune vegetation and erosion of the dunes. Erosion is also occurring at the south-west corner of the dunes in the vicinity of the car park due to human impacts (i.e. trampling).</p>	In scope as has direct impact on dune erosion processes.	ACCESS MANAGEMENT; PUBLIC AWARENESS	Minimise dune erosion caused by human access.	
<p>4. Litter of the beach and within the dunes (e.g. discarded used barbecues) is an issue, particularly in the summer months when there is a large increase in the number of visitors to the area.</p>	In scope as has direct impact on ecology of the dune system, and so natural dune processes.	ACCESS MANAGEMENT; PUBLIC AWARENESS	Reduce impact of human activity causing pollution of the natural environment.	Occasional volunteer manual beach cleaning is unable to cope with the volumes of litter.
<p>5. Beneath part of the beach runs the power-cable connecting the Wave Hub (offshore of Hayle) to the national grid (via a sub-station located landwards of the car park and residential properties. On occasion this is exposed due to the dynamic nature of the system. The cable is marked by signage.</p>	In scope as issue is directly related to beach and dune levels, the future management of which needs to work in combination with this cable being present.	NONE PREVIOUSLY DEFINED	Ensure future management of the beach and dunes does not adversely impact the Wave Hub cable.	
<p>6. The backshore area is occupied by holiday facilities, car park and residential properties. Coastal erosion has previously caused loss of some properties in the area, and this risk will continue in the future.</p>	In scope as issue relates directly to managing coastal flood and erosion risk.	ADAPT BACKSHORE MANAGEMENT/USES	Reduce the risk of future coastal erosion to the assets behind the dunes through coastal adaptation measures, including directing future development away from areas at risk of coastal change.	

Issue Description	Assessed relevance to BDMP Aims (in scope?)	Sand Dune Management Techniques Tool Issue Type ID (Halcrow, 2009; see Appendix A)	Suggested BDMP Objective for Issue	Current Management Practice related to issue
7. The BDMP area is owned by Hayle Harbour and only partly managed by Cornwall Council. There is a need to work in partnership to achieve sustainable management of coastal flood and erosion risk in the area.	In scope as issue relates directly to managing coastal flood and erosion risk.	<i>NONE PREVIOUSLY DEFINED</i>	Ensure future management is undertaken in a co-ordinated, integrated and sustainable way by working with all landowners and interested parties.	Towans Partnership exists and may be a suitable forum for taking forward future integrated, sustainable management of the beach and dunes.
8. There is limited funding currently available to undertake beach and dune management activities.	In scope as directly linked to ability to deliver coastal flood and erosion risk management.	<i>NONE PREVIOUSLY DEFINED</i>	Identify potential funding streams to enable economically sustainable beach and dune management to occur.	
9. The Shoreline Management Plan policy is for Managed Realignment to occur in the medium to long-term. This is to accommodate natural variability along Fistral Beach and enhance the natural dune system as a UK BAP Priority Habitat. By virtue of this policy being adopted, it necessitates the need for planning and implementation of coastal adaptation measures to reduce the risks to assets in the area.	In scope as directly linked to managing risk of coastal flooding and erosion.	<i>NONE PREVIOUSLY DEFINED</i>	Ensure future management of the area is in line with SMP policy.	
10. UK Biodiversity Action Plan Priority Habitats (coastal sand dunes, maritime cliff and slope, littoral and infra-littoral sediment) generally in unfavourable condition. This includes need for removal of non-native invasive species within the dune vegetation.	In scope as ecological health of the dunes is important in working with natural processes to provide coastal flood and erosion risk management with the aid of sand dunes.	<i>NONE PREVIOUSLY DEFINED</i>	Improve condition of UK BAP priority habitats.	
11. Future beach and dune management needs to consider the environmental impacts on a variety of designated features, including: <ul style="list-style-type: none"> ○ Hayle Estuary and Carrack Gladden SSSI. ○ Gwithian to Mexico Towans SSSI. ○ Loggans Moor SSSI. ○ Falmouth Bay to St Austell pSPA. ○ Tamar Estuaries Complex SPA. ○ Isles of Scilly SPA. ○ Exe Estuary SPA. ○ Cornwall and West Devon Mining Landscape UNESCO World Heritage Site. ○ Historic environment features, including scheduled and non-scheduled monuments. 	In scope as legal requirements to account for environmental designations.	<i>NONE PREVIOUSLY DEFINED</i>	Ensure the identified environmental features are considered in management decisions for future coastal flood and erosion risk management.	

5 Par Sands

Par Sands is located on the south coast of Cornwall, approximately 4km to the east of St Austell. The beach is set-back within St Austell Bay, enclosed by the docks and china clay works in the west and the steep cliffs of Kilmarth in the east (refer to Figure 5.1).

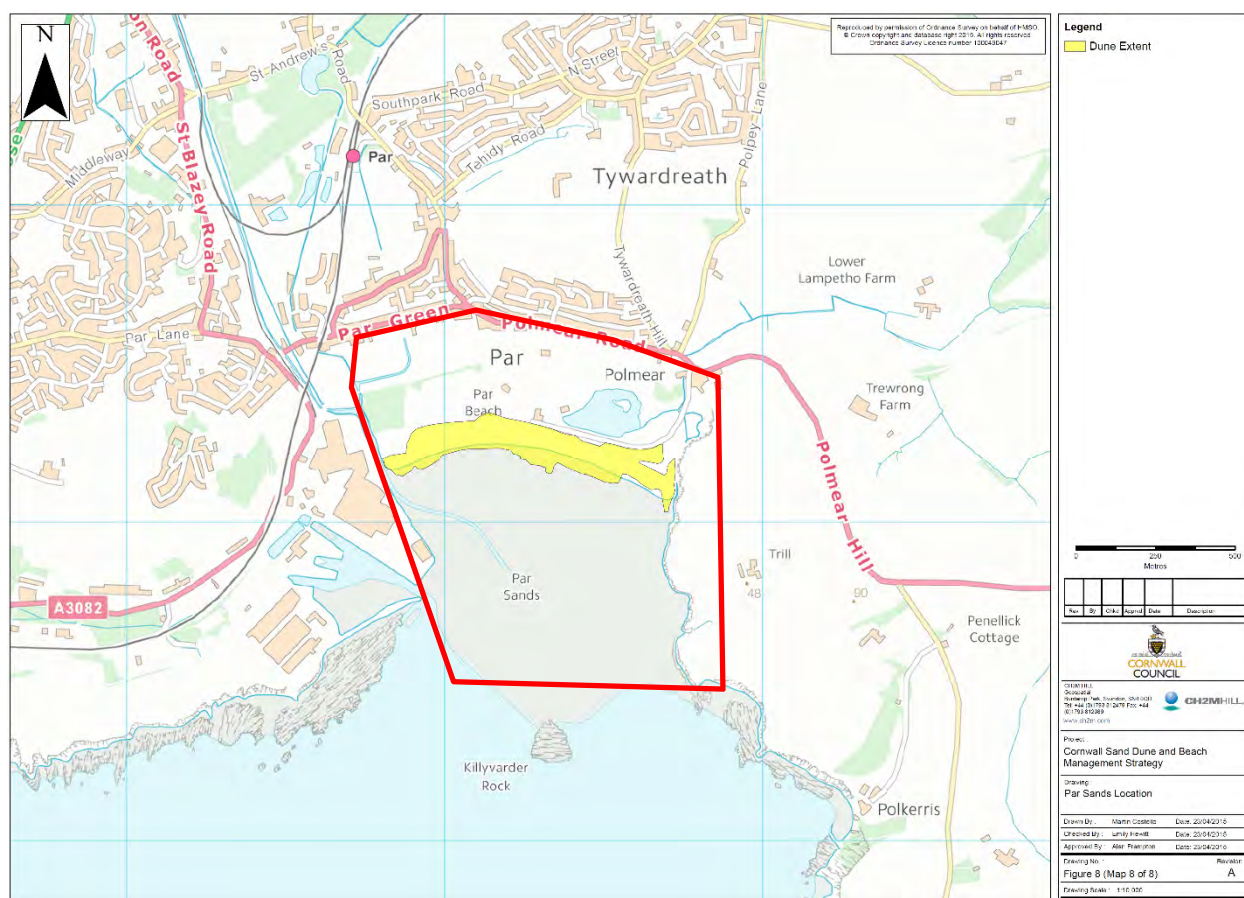


Figure 5.1 Map showing the Par Sands BDMP location and extent (red outline).

The following Table 5.1 contains issues for beach and dune management have been identified for Par Sands from the baseline understanding work completed as part of Stage 1 of this project (CH2M HILL, 2015d). Based upon the issues identified, and with consideration of the aims of this project defined in Section 1.2, consideration is given to whether or not each issue is within the scope of this project and, where it is within scope, goes on to suggest objectives for future management of the issue.

Table 5.1 Issues and Objectives for Par Sands

Issue Description	Assessed relevance to BDMP Aims (in scope?)	Sand Dune Management Techniques Tool Issue Type ID (Halcrow, 2009; see Appendix A)	Suggested BDMP Objective for Issue	Current Management Practice related to issue
1. Low-lying land behind Par Sands beach and dunes is vulnerable to flooding should the dunes be breached. This includes the holiday park located on the low-lying land behind the dunes hinders the ability for natural dune rollback to occur. This is likely to become an ever more constraining factor as sea level rise in the future.	In scope as directly linked to managing risk of coastal flooding and erosion.	ADAPT BACKSHORE MANAGEMENT/USES	Reduce the risk of future coastal erosion and flooding to the low-lying land behind the dunes through coastal adaptation and resilience measures, including directing future development away from areas at risk of coastal change.	
2. The dunes along the bank of the Par River are eroding and require stabilisation.	In scope as issue directly relates to managing dunes.	STABILISATION; MORPHOLOGICAL MODIFICATION	Promote dune restoration using methods that encourage sediment entrapment and dune growth.	
3. The Polmear Stream channel banks are stabilised by rock armour. This requires ongoing monitoring and maintenance to continue to manage flood risk along the stream.	Not in scope. Issue is dealt with by other management processes.	N/A	N/A	N/A
4. The mouth of the Polmear Stream requires occasional clearance of sand to reduce flood risk to development upstream.	In scope as involves management of sediment that contributes to the beach and dunes.	SEDIMENT MODIFICATION	Ensure sediment removed from the Polmear Stream is retained within the Par Sands beach-dune system.	
5. Beach levels vary regularly over short periods of time. Monitoring as part of the South West Regional Coastal Monitoring Programme does not occur frequently enough to detect these rapid variations. Monitoring has also only been occurring consistently since 2007 so longer-term trends are not necessarily apparent in the available data. Continuation of monitoring is needed. The extent/coverage of monitoring and the frequency with which it occurs could both be increased to ensure it provides sufficient information covering both the beach and sand dunes to inform future management decisions.	In scope as issue relates directly to managing coastal flood and erosion issues as provides information on natural processes.	MONITORING	Ensure existing coastal monitoring is continued, modified as necessary to provide greater coverage and frequency of survey to provide greater levels of data to inform future management decisions.	Monitoring by the South West Coastal Monitoring Programme since 2007.
6. Access by visitors through the dunes using non-defined access routes causes trampling of dune vegetation and erosion of the dunes. Pressure for more formalised access which could create a liability in a shifting dune system.	In scope as has direct impact on dune erosion processes.	ACCESS MANAGEMENT; PUBLIC AWARENESS	Minimise dune erosion caused by human access.	
7. Litter of the beach and within the dunes is an issue. Manual beach cleaning and a number of bins are provided at the site to address this issue though bin locations/numbers could be reviewed.	In scope as has direct impact on ecology of the dune system, and so natural dune processes.	ACCESS MANAGEMENT; PUBLIC AWARENESS	Reduce impact of human activity causing pollution of the natural environment.	Manual beach cleaning occurs. Litter bins are provided.
8. Within the eastern part of the dunes is a historic landfill site. Should the dunes erode in the future then this will cause an environmental issue.	In scope as has direct impact on ecology of the dune system, and so natural dune processes.	NONE PREVIOUSLY DEFINED	Ensure historic landfill within the dunes is not exposed to erosion risk.	
9. The Shoreline Management Plan policy is for No Active Intervention to occur in the short term (as the dunes are considered to be in a stable condition requiring no management for the purpose of flood risk management. However, the policy is to transition to one of Managed Realignment in the medium to long term,	In scope as directly linked to managing risk of coastal flooding and erosion.	NONE PREVIOUSLY DEFINED	Ensure future management of the area is in line with SMP policy and identify potential funding streams to enable economically sustainable beach and dune management to occur.	Friends of Par Beach group exists and may be a suitable forum to take forward future integrated, sustainable management of the beach and dunes.

Issue Description	Assessed relevance to BDMP Aims (in scope?)	Sand Dune Management Techniques Tool Issue Type ID (Halcrow, 2009; see Appendix A)	Suggested BDMP Objective for Issue	Current Management Practice related to issue
reflecting the likely impacts of sea level rise to result in pressure on the dunes to rollback landwards onto the backing low-lying land. This policy means that there will be potential for some funding to be forthcoming for coastal flood and erosion risk management (e.g. dune management) from central Government. However, it is likely that partnership funding will be needed to fulfil all of the required funding for such activities.				
<p>10. UK Biodiversity Action Plan Priority Habitats (coastal sand dunes, reed beds, mudflats and sandflats) generally in unfavourable condition.</p> <p>This includes need to remove non-native invasive species within the dune vegetation.</p>	In scope as ecological health of the dunes is important in working with natural processes to provide coastal flood and erosion risk management with the aid of sand dunes.	<i>NONE PREVIOUSLY DEFINED</i>	Improve condition of UK BAP priority habitats.	
<p>11. Future beach and dune management needs to consider the environmental impacts on a variety of designated features, including:</p> <ul style="list-style-type: none"> ○ Par Beach and St Andrews Road LNR. ○ Falmouth Bay to St Austell pSPA. ○ Marazion Marsh SPA. ○ Marazion Marsh SSSI. ○ Isles of Scilly SPA. ○ Severn Estuary SPA. ○ Severn Estuary SSSI. ○ Cornwall AONB. ○ Historic environment features, including scheduled monuments. 	In scope as legal requirements to account for environmental designations.	<i>NONE PREVIOUSLY DEFINED</i>	Ensure the identified environmental features are considered in management decisions for future coastal flood and erosion risk management.	

The following Table 6.1 contains issues for beach and dune management have been identified Porthtowan from the baseline understanding work completed as part of Stage 1 of this project (CH2M HILL, 2015e). Based upon the issues identified, and with consideration of the aims of this project defined in Section 1.2, consideration is given to whether or not each issue is within the scope of this project and, where it is within scope, goes on to suggest objectives for future management of the issue.

Table 6.1 Issues and Objectives for Porthtowan

Issue Description	Assessed relevance to BDMP Aims (in scope?)	Sand Dune Management Techniques Tool Issue Type ID (Halcrow, 2009; see Appendix A)	Suggested BDMP Objective for Issue	Current Management Practice related to issue
1. The beaches and dunes of Porthtowan are eroding, lowering and flattening as a result of a combination of natural processes (large storm events) and human impacts. Management of the coastal flood and erosion risks associated with this need to balance dune stabilisation measures with visual impact. It also needs to recognise the potential for dune stabilisation measures to be impacted by storms and/or human impact (e.g. stolen/vandalism etc).	In scope as directly linked to managing risk of coastal flooding and erosion.	STABILISATION; MORPHOLOGICAL MODIFICATION	Work with natural processes to minimise risk in the future through promotion of ongoing dune restoration using methods that encourage sediment entrapment and dune growth with minimal visual impact and low potential for damage by vandalism.	Various dune stabilisation measures implemented in the past.
2. Landwards dune migration potential limited due to rising valley sides, means increased pressure and erosion potential in future as sea levels rise. Dune erosion is already impacting the coastal path. The backshore area is occupied by development that could be at risk from coastal erosion in the future.	In scope as directly linked to managing risk of coastal flooding and erosion.	ADAPT BACKSHORE MANAGEMENT/USES	Reduce the risk of future coastal erosion to the developed area behind the dunes through coastal adaptation measures, including directing future development away from areas at risk of coastal change.	
3. Access by visitors through the dunes using non-defined access routes causes trampling of dune vegetation and erosion of the dunes.	In scope as has direct impact on dune erosion processes.	ACCESS MANAGEMENT; PUBLIC AWARENESS	Minimise dune erosion caused by human access.	
4. Beach levels vary regularly over short periods of time. Monitoring as part of the South West Regional Coastal Monitoring Programme does not occur frequently enough to detect these rapid variations. Monitoring has also only been occurring consistently since 2007 so longer-term trends are not necessarily apparent in the available data. Continuation of monitoring is needed. The extent/coverage of monitoring and the frequency with which it occurs could both be increased to ensure it provides sufficient information covering both the beach and sand dunes to inform future management decisions. Monitoring of sediment composition would also be useful.	In scope as issue relates directly to managing coastal flood and erosion issues as provides information on natural processes.	MONITORING	Ensure existing coastal monitoring is continued, modified as necessary to provide greater coverage and frequency of survey to provide greater levels of data to inform future management decisions.	Monitoring by the South West Coastal Monitoring Programme since 2007.
5. Wind-blown sand onto roads and car parks behind the dunes requires regular clearance by Cornwall Council/private landowners. Sand removed from site due to pollution risks thus reducing overall volume of sediment in the coastal system.	In scope as involves management of sediment that contributes to the beach and dunes.	SEDIMENT MODIFICATION	Seek to minimise loss of sediment from the beach/dune system via clearing of river channel and clearance of sand blown onto road and parking areas.	Sand removal from car park.
6. Access paths covered by sand inhibits/hinders access for all visitors. Regular clearing required.	In scope as involves management of sediment that contributes to the beach and dunes.	ACCESS MANAGEMENT; SEDIMENT MODIFICATION	Ensure safe access to site for all visitors along defined paths and that sediment cleared is retained within beach-dune system.	
7. The river channel requires periodic clearing of sand to manage flood risk upstream.	In scope as involves management of sediment that contributes to the beach and dunes.	SEDIMENT MODIFICATION	Ensure sediment removed from the river channel is retained within the beach-dune system.	Periodic clearing of sediment from river channel.
8. The Shoreline Management Plan policy is for Managed Realignment to occur to allow natural dune evolution of the UK BAP priority habitat. This means that there will be potential for some funding to be	In scope as directly linked to managing risk of coastal flooding and erosion.	NONE PREVIOUSLY DEFINED	Ensure future management of the area is in line with SMP policy and identify potential funding streams to	Porthtowan Beach Association group exists and may be a suitable forum to take forward future integrated, sustainable management of the beach and dunes.

Issue Description	Assessed relevance to BDMP Aims (in scope?)	Sand Dune Management Techniques Tool Issue Type ID (Halcrow, 2009; see Appendix A)	Suggested BDMP Objective for Issue	Current Management Practice related to issue
forthcoming for coastal flood and erosion risk management (e.g. dune management) from central Government. However, it is likely that partnership funding will be needed to fulfil all of the required funding for such activities.			enable economically sustainable beach and dune management to occur.	
<p>9. UK Biodiversity Action Plan Priority Habitats (coastal sand dunes, maritime cliff and slope, maritime heath) generally in unfavourable condition.</p> <p>This includes need for removal of non-native invasive species within the dune vegetation.</p>	In scope as ecological health of the dunes is important in working with natural processes to provide coastal flood and erosion risk management with the aid of sand dunes.	<i>NONE PREVIOUSLY DEFINED</i>	Improve condition of UK BAP priority habitats.	
<p>10. Future beach and dune management needs to consider the environmental impacts on a variety of designated features, including:</p> <ul style="list-style-type: none"> Godrevy to St Agnes SAC. Godrevy to St Agnes SSSI. Carrick Heaths SSSI. Falmouth Bay to St Austell pSPA. Tamar Estuaries Complex SPA. Isles of Scilly SPA. Cornwall and West Devon Mining Landscape UNESCO World Heritage Site. Cornwall AONB. Historic environment features, including scheduled and non-scheduled monuments. 	In scope as legal requirements to account for environmental designations.	<i>NONE PREVIOUSLY DEFINED</i>	Ensure the identified environmental features are considered in management decisions for future coastal flood and erosion risk management.	

7 Praa Sands

Praa Sands is located on the south coast of Cornwall, bounded by Hoe Point in the west and Rinsey Head in the east (refer to Figure 7.1).

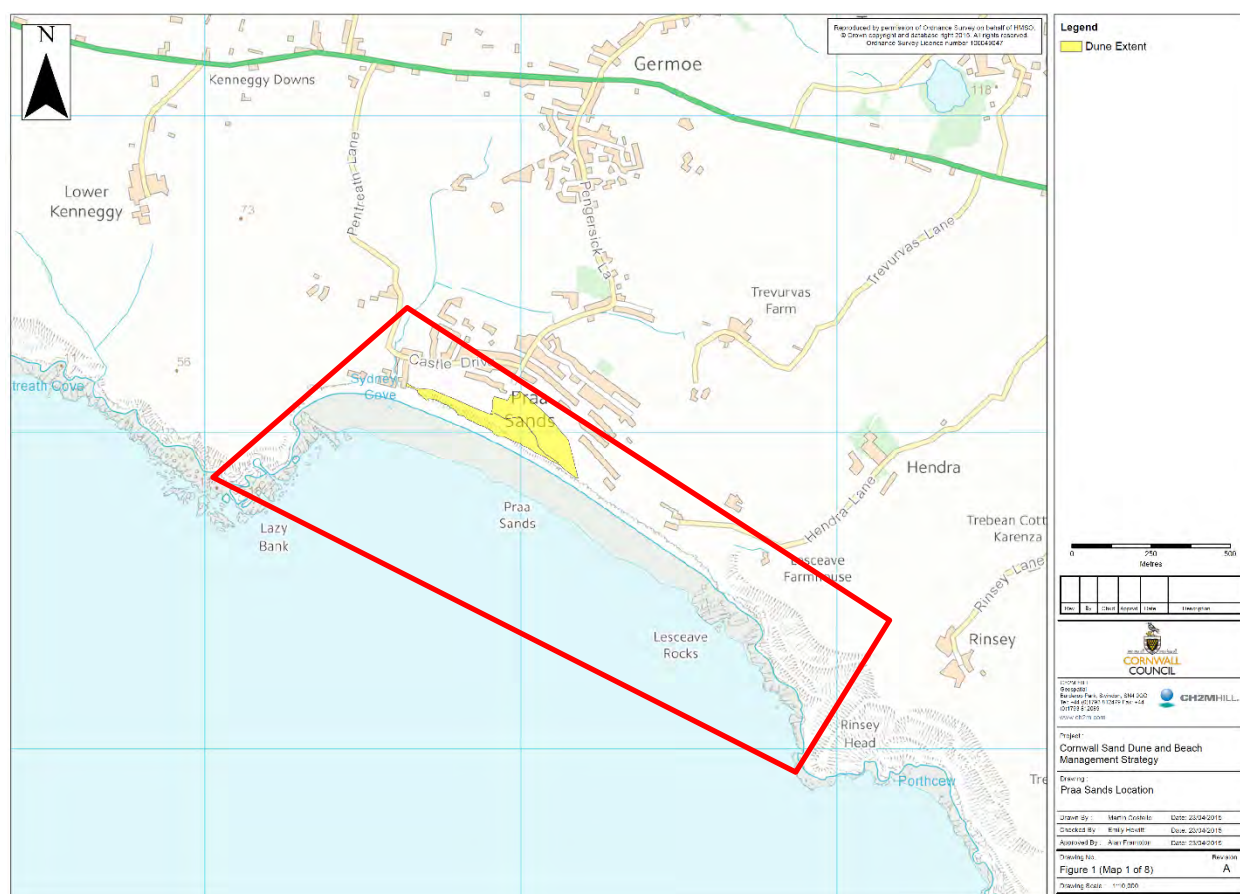


Figure 7.1 Map showing the Praa Sands BDMP location and extent (red outline).

The following Table 7.1 contains issues for beach and dune management have been identified for Praa Sands from the baseline understanding work completed as part of Stage 1 of this project (CH2M HILL, 2015f). Based upon the issues identified, and with consideration of the aims of this project defined in Section 1.2, consideration is given to whether or not each issue is within the scope of this project and, where it is within scope, goes on to suggest objectives for future management of the issue.

Table 7.1 Issues and Objectives for Praa Sands

Issue Description	Assessed relevance to BDMP Aims (in scope?)	Sand Dune Management Techniques Tool Issue Type ID (Halcrow, 2009; see Appendix A)	Suggested BDMP Objective for Issue	Current Management Practice related to issue
1. The undefended dunes of Praa Sands are eroding as a result of a combination of natural processes (storm events) and human impacts (e.g. trampling).	In scope as directly linked to managing risk of coastal flooding and erosion.	STABILISATION; MORPHOLOGICAL MODIFICATION	Promote ongoing dune restoration using methods that encourage sediment entrapment and dune growth.	
2. Access by visitors through the dunes and over the dune face using non-defined access routes causes trampling of dune vegetation and erosion of the dunes.	In scope as has direct impact on dune erosion processes.	ACCESS MANAGEMENT; PUBLIC AWARENESS	Minimise dune erosion caused by human access.	
3. Erosion of the undefended dunes and cliffs poses risk to cliff top assets including properties, infrastructure and the coastal path.	In scope as directly linked to managing risk of coastal flooding and erosion.	ADAPT BACKSHORE MANAGEMENT/USES	Reduce the risk of future coastal erosion to backshore property and infrastructure through coastal adaptation and resilience measures including directing future development away from areas at risk of coastal change.	
4. When low beach levels occur, this poses access difficulties with sizeable drops onto the beach from the bottom of defined access paths/steps. At the western slipway, low beach levels exposes rock armour that has been placed in this area (to reduce coastal erosion risk) also hinders access onto the beach. This rock armour is also subject to movement during storm events.	In scope as directly linked to managing beach and dunes levels.	ACCESS MANAGEMENT; PUBLIC AWARENESS	Ensure safe access to site for all visitors along defined paths. Ensure existing rock armour is regularly monitored and maintenance works are carried out as required, addressing stability and access issues in the process.	Maintenance of slipway and rock armour.
5. Private defences are proposed (subject to planning consent) along part of the eastern end of Praa Sands to reduce coastal erosion risk. The impacts of defences on adjacent coastal areas including the sand dunes will need to be addressed, along with potential risk of outflanking by future erosion of undefended areas adjacent any defences (should they be permitted).	Not in scope. This is a private proposal being brought forward separately. However, that proposal will need to demonstrate in the planning application that any scheme that may be implemented is complimentary to the management of the beach and dunes and does not adversely impact these features,	N/A	N/A	N/A
6. Highway drainage issues can cause saturation of cliffs and so increased risk of cliff failures if drainage gulleys are not kept clear.	Not in scope as this is a land drainage issue relating to the cliffs not the beach and dunes, and so is to be dealt with by others.	N/A	N/A	N/A
7. Beach levels vary regularly over short periods of time. Monitoring as part of the South West Regional Coastal Monitoring Programme does not occur frequently enough to detect these rapid variations. Monitoring has also only been occurring consistently since 2007 so longer-term trends are not necessarily apparent in the available data. Continuation of monitoring is needed. The extent/coverage of monitoring and the frequency with which it occurs could both be increased to ensure it provides sufficient information covering both the beach and sand dunes to inform future management decisions.	In scope as issue relates directly to managing coastal flood and erosion issues as provides information on natural processes.	MONITORING	Ensure existing coastal monitoring is continued, modified as necessary to provide greater coverage and frequency of survey to provide greater levels of data to inform future management decisions.	Monitoring by the South West Coastal Monitoring Programme since 2007.
8. The Shoreline Management Plan policy is for Managed Realignment to occur in the short to medium term, transitioning to No Active Intervention in the long term. This aims to manage the rate of coastal erosion of the dunes and cliffs and manage risk to assets by adaptation. This policy means that there will be potential	In scope as directly linked to managing risk of coastal flooding and erosion.	<i>NONE PREVIOUSLY DEFINED</i>	Ensure future management of the area is in line with SMP policy and identify potential funding streams to enable economically sustainable beach and dune management to occur.	

Issue Description	Assessed relevance to BDMP Aims (in scope?)	Sand Dune Management Techniques Tool Issue Type ID (Halcrow, 2009; see Appendix A)	Suggested BDMP Objective for Issue	Current Management Practice related to issue
for some funding to be forthcoming for coastal flood and erosion risk management (e.g. dune management) from central Government. However, it is likely that partnership funding will be needed to fulfil all of the required funding for such activities.				
<p>9. UK Biodiversity Action Plan Priority Habitats (coastal sand dunes, maritime cliff and slope) generally in unfavourable condition.</p> <p>This includes need for removal of non-native invasive species within the dune vegetation.</p>	In scope as ecological health of the dunes is important in working with natural processes to provide coastal flood and erosion risk management with the aid of sand dunes.	NONE PREVIOUSLY DEFINED	Improve condition of UK BAP priority habitats.	
<p>10. Future beach and dune management needs to consider the environmental impacts on a variety of designated features, including:</p> <ul style="list-style-type: none"> o Folly Rocks Cove SSSI. o Porthkew SSSI. o Falmouth Bay to St Austell pSPA. o Tamar Estuaries Complex SPA. o Isles of Scilly SPA. o Cornwall and West Devon Mining Landscape UNESCO World Heritage Site. o Cornwall AONB. o Historic environment features, including scheduled and non-scheduled monuments. 	In scope as legal requirements to account for environmental designations.	NONE PREVIOUSLY DEFINED	Ensure the identified environmental features are considered in management decisions for future coastal flood and erosion risk management.	

8 Summerleaze

Summerleaze Beach is located on the north coast of Cornwall, close to Bude town (refer to Figure 8.1).

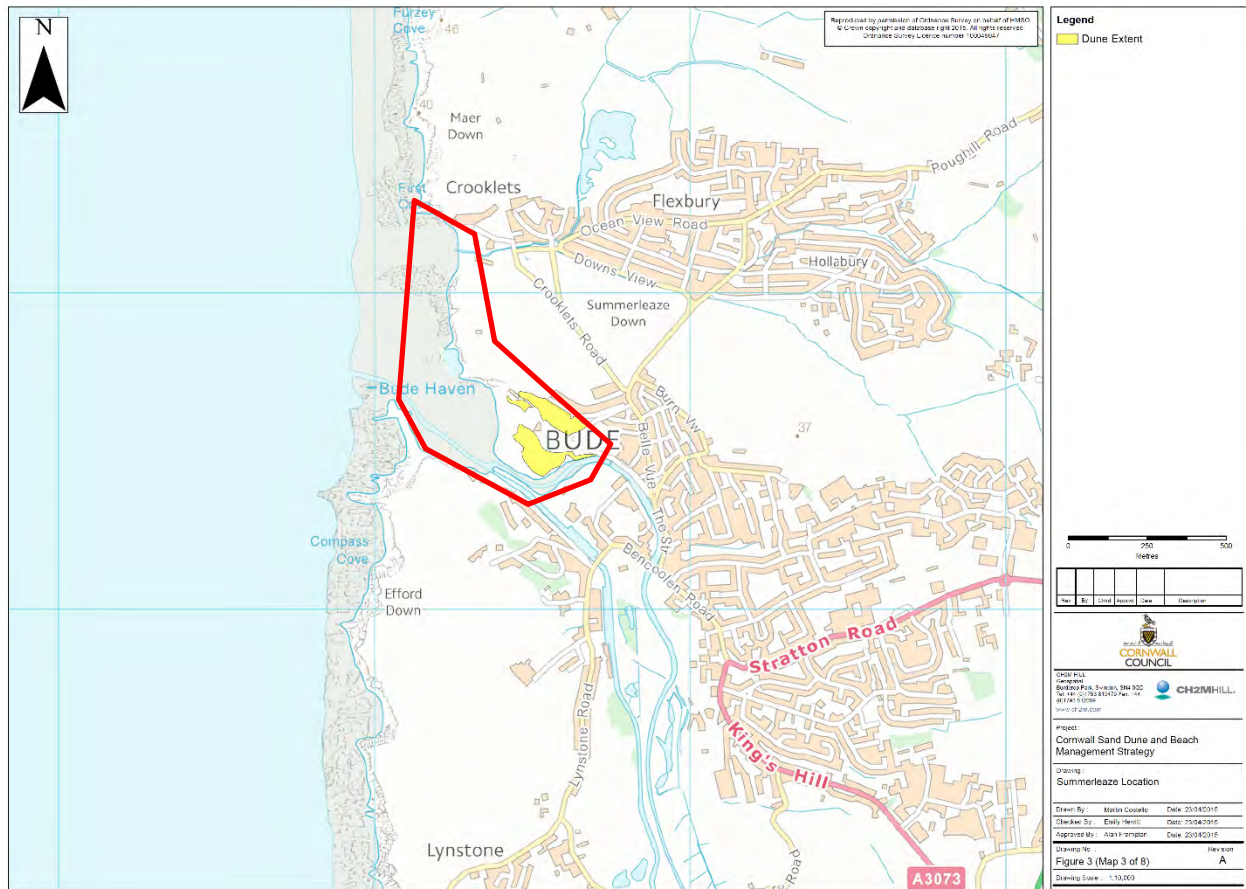


Figure 8.1 Map showing the Summerleaze BDMP location and extent (red outline).

The following Table 8.1 contains issues for beach and dune management have been identified for Summerleaze from the baseline understanding work completed as part of Stage 1 of this project (CH2M HILL, 2015g). Based upon the issues identified, and with consideration of the aims of this project defined in Section 1.2, consideration is given to whether or not each issue is within the scope of this project and, where it is within scope, goes on to suggest objectives for future management of the issue.

Table 8.1 Issues and Objectives for Summerleaze

Issue Description	Assessed relevance to BDMP Aims (in scope?)	Sand Dune Management Techniques Tool Issue Type ID (Halcrow, 2009; see Appendix A)	Suggested BDMP Objective for Issue	Current Management Practice related to issue
<p>1. The dunes of Summerleaze are accreting and migrating landwards, though this is posing issues for access to RNLI buildings and beach huts that provide source of income.</p> <p>Accumulation of sand against seawall located either side of the access path also poses risk of overloading of seawall leading to eventual failure. This requires ongoing monitoring and possible work to reduce risk of failure.</p> <p>It is possible that the rate of dune vegetation growth is unable to keep pace with rate of sand accumulation in dunes.</p>	In scope as directly linked to managing risk of coastal flooding and erosion.	STABILISATION; MORPHOLOGICAL MODIFICATION; HARD PROTECTION METHODS	<p>Seek to minimise impact of sand accumulation and dune rollback on buildings and beach huts by working with natural processes through promotion of ongoing dune management methods that encourage sediment entrapment and dune growth.</p> <p>Ensure existing seawall along access path is regularly monitored and maintenance works are carried out as required.</p>	
<p>2. Large storm events, when they occur, can cause erosion of the dunes which can pose risks to assets behind the dunes.</p>	In scope as directly linked to managing risk of coastal flooding and erosion.	ADAPT BACKSHORE MANAGEMENT/USES	Reduce the risk of future coastal erosion/dune rollback to development and infrastructure behind the dunes through coastal adaptation measures including directing future development away from areas at risk of coastal change.	
<p>3. Beach levels vary regularly over short periods of time. Monitoring as part of the South West Regional Coastal Monitoring Programme does not occur frequently enough to detect these rapid variations. Monitoring has also only been occurring consistently since 2007 so longer-term trends are not necessarily apparent in the available data. Continuation of monitoring is needed. The extent/coverage of monitoring and the frequency with which it occurs could both be increased to ensure it provides sufficient information covering both the beach and sand dunes to inform future management decisions.</p>	In scope as issue relates directly to managing coastal flood and erosion issues as provides information on natural processes.	MONITORING	Ensure existing coastal monitoring is continued, modified as necessary to provide greater coverage and frequency of survey to provide greater levels of data to inform future management decisions.	Monitoring by the South West Coastal Monitoring Programme since 2007.
<p>4. Wind-blown sand onto roads and car parks behind the dunes requires regular clearance by Cornwall Council. Sand removed from site due to pollution risks thus reducing overall volume of sediment in the coastal system.</p>	In scope as involves management of sediment that contributes to the beach and dunes.	SEDIMENT MODIFICATION	Seek to minimise loss of sediment from the beach/dune system via clearance of sand blown onto road and parking areas.	Sand removal from car park.
<p>5. Access path covered by sand inhibits/hinders access for all visitors, whilst wooden access steps require regular replacement.</p>	In scope as involves management of sediment that contributes to the beach and dunes.	ACCESS MANAGEMENT; SEDIMENT MODIFICATION	Ensure safe access to site for all visitors along defined paths and that sediment cleared is retained within beach-dune system.	
<p>6. Access by visitors through the dunes using non-defined access routes causes trampling of dune vegetation. This in turn can increase risk of dune erosion during storms.</p>	In scope as has direct impact on dune erosion processes.	ACCESS MANAGEMENT; PUBLIC AWARENESS	Minimise dune erosion caused by human access.	
<p>7. Litter of the beach and within the dunes is an issue. Manual beach cleaning by Cornwall Council and occasional voluntary beach cleaning events unable to cope with volume of litter.</p>	In scope as has direct impact on ecology of the dune system, and so natural dune processes.	ACCESS MANAGEMENT; PUBLIC AWARENESS	Reduce impact of human activity causing pollution of the natural environment.	Manual beach cleaning occurs occasionally.

Issue Description	Assessed relevance to BDMP Aims (in scope?)	Sand Dune Management Techniques Tool Issue Type ID (Halcrow, 2009; see Appendix A)	Suggested BDMP Objective for Issue	Current Management Practice related to issue
8. The River Neet is channelized with gabions (along river bank) and rock armour (along dune toe) to control its position. These structures require ongoing monitoring and maintenance to ensure that they continue to fulfil their intended function.	In scope as directly relates to management of dunes.	HARD PROTECTION METHODS	Ensure rock armour protecting dune toe is complimentary to efforts to promote working with natural processes in dune stabilisation and growth.	Maintenance of channel control structures.
9. The Bude Haven harbour breakwater requires ongoing monitoring and maintenance funded by the harbour master.	Not in scope as dealt with by the harbour master.	N/A	N/A	N/A
10. There is limited funding currently available to undertake beach and dune management activities.	In scope as directly linked to ability to deliver coastal flood and erosion risk management.	<i>NONE PREVIOUSLY DEFINED</i>	Identify potential funding streams to enable economically sustainable beach and dune management to occur.	
11. The Shoreline Management Plan policy is for Managed Realignment to occur in the short to medium term, transitioning to No Active Intervention in the long term. This aims to manage the support natural dune evolution and rollback whilst managing risks to assets in the backshore by relocating infrastructure and development away from risk areas. This policy means that there will be potential for some funding to be forthcoming for coastal flood and erosion risk management (e.g. dune management) from central Government. However, it is likely that partnership funding will be needed to fulfil all of the required funding for such activities.	In scope as directly linked to managing risk of coastal flooding and erosion.	<i>NONE PREVIOUSLY DEFINED</i>	Ensure future management of the area is in line with SMP policy.	
12. UK Biodiversity Action Plan Priority Habitats (coastal sand dunes, maritime cliff and slope, coastal saltmarsh, littoral rock reef) generally in unfavourable condition. This includes need for removal of on-native invasive species within the dune vegetation.	In scope as ecological health of the dunes is important in working with natural processes to provide coastal flood and erosion risk management with the aid of sand dunes.	<i>NONE PREVIOUSLY DEFINED</i>	Improve condition of UK BAP priority habitats.	
13. Future beach and dune management needs to consider the environmental impacts on a variety of designated features, including: <ul style="list-style-type: none">o Bude Marshes LNR.o Bude Coast Cliffs SSSI.o Tintagel-Marsland- Clovelly Coast SAC.o Hartland Point to Tintagel recommended MCZ.o Falmouth Bay to St Austell pSPA.o Tamar Estuaries Complex SPA.o Isles of Scilly SPA.o Exe Estuary SPA.o Severn Estuary SPA.o Severn Estuary SSSI.	In scope as legal requirements to account for environmental designations.	<i>NONE PREVIOUSLY DEFINED</i>	Ensure the identified environmental features are considered in management decisions for future coastal flood and erosion risk management.	

Issue Description	Assessed relevance to BDMP Aims (in scope?)	Sand Dune Management Techniques Tool Issue Type ID (Halcrow, 2009; see Appendix A)	Suggested BDMP Objective for Issue	Current Management Practice related to issue
<ul style="list-style-type: none">○ Historic environment features, including scheduled and non-scheduled monuments.				

DRAFT

9 Widemouth Bay

Widemouth Bay is located on the north coast of Cornwall, approximately 4km south of Bude (refer to Figure 9.1).

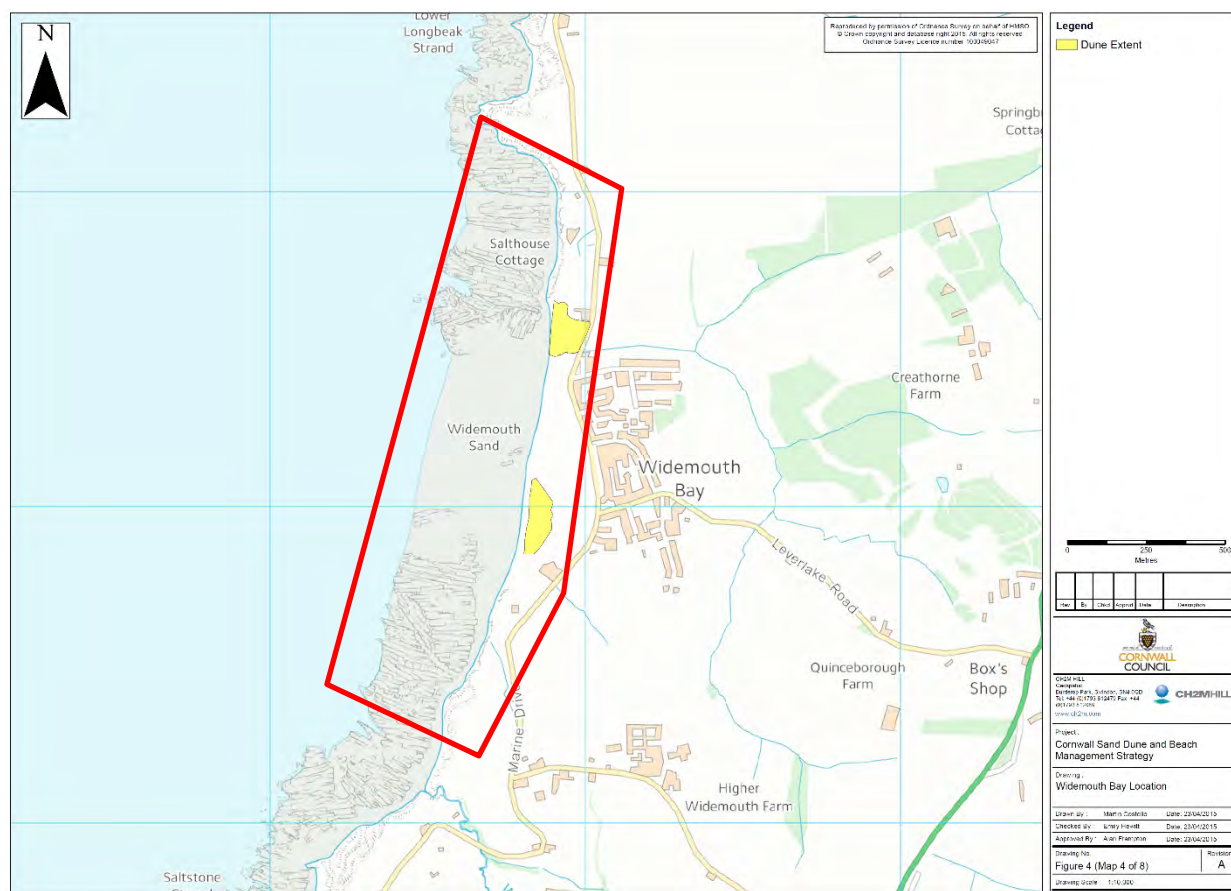


Figure 9.1 Map showing the Widemouth Bay BDMP location and extent (red outline).

The following Table 9.1 contains issues for beach and dune management have been identified for Widemouth Bay from the baseline understanding work completed as part of Stage 1 of this project (CH2M HILL, 2015h). Based upon the issues identified, and with consideration of the aims of this project defined in Section 1.2, consideration is given to whether or not each issue is within the scope of this project and, where it is within scope, goes on to suggest objectives for future management of the issue.

Table 9.1 Issues and Objectives for Widemouth Bay

Issue Description	Assessed relevance to BDMP Aims (in scope?)	Sand Dune Management Techniques Tool Issue Type ID (Halcrow, 2009; see Appendix A)	Suggested BDMP Objective for Issue	Current Management Practice related to issue
1. The front face of the dunes is eroding, posing access difficulties where resulted in steep cliffing of the dune face. In places, rock armour has been placed at the dune toe, though this is unlikely to be sustainable over 50 years. Storm events can cause reversal (erosion) of dune stabilisation measures that otherwise work with some success in the area to stabilise the dunes and encourage dune re-growth.	In scope as directly linked to managing risk of coastal flooding and erosion.	STABILISATION; MORPHOLOGICAL MODIFICATION	Work with natural processes to minimise risk in the future, through promotion of ongoing dune restoration using methods that encourage sediment entrapment and dune growth.	Maintenance of rock armour.
2. Cliff and dune erosion at the north end of the bay are eroding, posing risk to highway infrastructure and the coastal path (NB: access route via bridge destroyed by 2014 storms).	In scope as directly linked to managing risk of coastal flooding and erosion.	ADAPT BACKSHORE MANAGEMENT/USES	Reduce the risk of future coastal erosion to development and infrastructure through coastal adaptation measures including directing future development away from areas at risk of coastal change.	
3. Beach and dune levels vary regularly over short periods of time. Monitoring as part of the South West Regional Coastal Monitoring Programme does not occur frequently enough to detect these rapid variations. Monitoring has also only been occurring consistently since 2007 so longer-term trends are not necessarily apparent in the available data. Continuation of monitoring is needed. The extent/coverage of monitoring and the frequency with which it occurs could both be increased to ensure it provides sufficient information covering both the beach and sand dunes to inform future management decisions.	In scope as issue relates directly to managing coastal flood and erosion issues as provides information on natural processes.	MONITORING	Ensure existing coastal monitoring is continued, modified as necessary to provide greater coverage and frequency of survey to provide greater levels of data to inform future management decisions.	Monitoring by the South West Coastal Monitoring Programme since 2007.
4. Wind-blown sand onto roads and car parks behind the dunes requires regular clearance by Cornwall Council. Sand removed from site due to pollution risks thus reducing overall volume of sediment in the coastal system.	In scope as involves management of sediment that contributes to the beach and dunes.	SEDIMENT MODIFICATION	Seek to minimise loss of sediment from the beach/dune system via clearance of sand blown onto road and parking areas.	Sand removal from car park.
5. Beneath the beach car park, and extending seawards beneath the beach/dunes, is a trans-Atlantic sub-sea communications cable. The cable is marked by signage.	In scope as issue is directly related to beach and dune levels, the future management of which needs to work in combination with this cable being present.	<i>NONE PREVIOUSLY DEFINED</i>	Ensure future management of the beach and dunes does not adversely impact the sub-sea communications cable.	Cable maintained by communications company.
6. Access paths covered by sand and/or eroded inhibits/hinders safe access for all visitors.	In scope as involves management of sediment that contributes to the beach and dunes.	ACCESS MANAGEMENT; SEDIMENT MODIFICATION	Ensure safe access to site for all visitors along defined paths and that sediment cleared is retained within beach-dune system.	
7. Access by visitors through the dunes/over the dune face using non-defined access routes causes trampling of dune vegetation and erosion of the dunes.	In scope as has direct impact on dune erosion processes.	ACCESS MANAGEMENT; PUBLIC AWARENESS	Minimise dune erosion caused by human access.	
8. There is a need to provide seasonal services in the area such as lifeguards (provided by RNLI for a fee), litter clearance and parking for visitors.	Not in scope as dealt with in other management processes by Cornwall Council.	N/A	N/A	N/A

Issue Description	Assessed relevance to BDMP Aims (in scope?)	Sand Dune Management Techniques Tool Issue Type ID (Halcrow, 2009; see Appendix A)	Suggested BDMP Objective for Issue	Current Management Practice related to issue
9. Litter of the beach and within the dunes is an issue, particularly in the summer months when there is a large increase in the number of visitors to the area. Manual beach cleaning is unable to cope with the volumes of litter.	In scope as has direct impact on ecology of the dune system, and so natural dune processes.	ACCESS MANAGEMENT; PUBLIC AWARENESS	Reduce impact of human activity causing pollution of the natural environment.	Manual beach cleaning.
10. The Shoreline Management Plan policy is for Managed Realignment to occur in the short to medium term, transitioning to No Active Intervention in the long term. This aims to manage the support natural dune evolution and rollback whilst managing risks to assets in the backshore by relocating infrastructure and development away from risk areas. This policy means that there will be potential for some funding to be forthcoming for coastal flood and erosion risk management (e.g. dune management) from central Government. However, it is likely that partnership funding will be needed to fulfil all of the required funding for such activities.	In scope as directly linked to managing risk of coastal flooding and erosion.	<i>NONE PREVIOUSLY DEFINED</i>	Ensure future management of the area is in line with SMP policy and identify potential funding streams to enable economically sustainable beach and dune management to occur.	
11. There are potential UK Biodiversity Action Plan Priority Habitats (coastal sand dunes, maritime cliff and slope, old sessile oak woods, European dry heath) in the BDMP area, as well as non native invasive species that should be removed if present, though no ecological survey of the area has been completed to verify this.	In scope as ecological health of the dunes is important in working with natural processes to provide coastal flood and erosion risk management with the aid of sand dunes.	<i>NONE PREVIOUSLY DEFINED</i>	Confirm presence and condition of UK BAP priority habitats, and manage appropriately any that is present.	
12. Future beach and dune management needs to consider the environmental impacts on a variety of designated features, including: <ul style="list-style-type: none"> ○ Boscastle to Widemouth SSSI. ○ Tintagel-Marsland-Clovelly Coast SAC. ○ Hartland Point to Tintagel recommended MCZ. ○ Falmouth Bay to St Austell pSPA. ○ Isles of Scilly SPA. ○ Cornwall AONB. ○ Historic environment features, including scheduled and non-scheduled monuments. 	In scope as legal requirements to account for environmental designations.	<i>NONE PREVIOUSLY DEFINED</i>	Ensure the identified environmental features are considered in management decisions for future coastal flood and erosion risk management.	

References

- CH2M HILL (2015a). *Stage 1 Report: Constantine Bay*. Report produced as part of the Cornwall Beach & Dune Management Plans project for Cornwall Council, June 2015.
- CH2M HILL (2015b). *Stage 1 Report: Fistral Beach*. Report produced as part of the Cornwall Beach & Dune Management Plans project for Cornwall Council, June 2015.
- CH2M HILL (2015c). *Stage 1 Report: Harvey's Towans*. Report produced as part of the Cornwall Beach & Dune Management Plans project for Cornwall Council, June 2015.
- CH2M HILL (2015d). *Stage 1 Report: Par Sands*. Report produced as part of the Cornwall Beach & Dune Management Plans project for Cornwall Council, June 2015.
- CH2M HILL (2015e). *Stage 1 Report: Porthtowan*. Report produced as part of the Cornwall Beach & Dune Management Plans project for Cornwall Council, June 2015.
- CH2M HILL (2015f). *Stage 1 Report: Praa Sands*. Report produced as part of the Cornwall Beach & Dune Management Plans project for Cornwall Council, June 2015.
- CH2M HILL (2015g). *Stage 1 Report: Summerleaze*. Report produced as part of the Cornwall Beach & Dune Management Plans project for Cornwall Council, June 2015.
- CH2M HILL (2015h). *Stage 1 Report: Widemouth Bay*. Report produced as part of the Cornwall Beach & Dune Management Plans project for Cornwall Council, June 2015.
- Halcrow (2009). *Cornwall Sand Dune and Beach Management Strategy*. Report produced by Halcrow Group Limited for the Cornwall and Isles of Scilly Coastal Advisory Group, September 2009.

Appendix A Sand Dune Management Preliminary Decision Assistance Tool User Guide

DRAFT

Cornwall and Isles of Scilly Coastal Advisory Group Cornwall Sand Dune and Beach Management Strategy

Sand Dune Management Preliminary Decision
Assistance Tool
User Guide

September 2009



Sand Dune Management Preliminary Decision Assistance Tool

Introduction

The Dune Management Preliminary Decision Assistance Tool has been developed as part of the Cornwall Sand Dune and Beach Management Strategy project. The aim of this tool is help the dune manager identify potential management techniques that could help resolve problems identified in the dune system.

This Tool will aid the decision making by providing a starting point for further work, however, more detailed scientific investigation is likely to be required to develop, design and implement the appropriate dune management technique.

Using the Tool

To use the Dune Management Preliminary Decision Assistance Tool follow the steps at the top of the screen. Further information on the dune management techniques are provided in the Management Techniques Report (Halcrow, 2009).

A number of attributes can be chosen within each field, this will shorten the list of techniques that could be used until a single, or smaller range of appropriate techniques is identified. Not filtering an attribute will allow all cases to be considered.

The range of attributes is outlined below:

Issues addressed allows the user to define one of a wide range of various issues that can affect a dune site:

- Beach Erosion – notable lowering of the beach levels in front of the dunes; this may occur for a number of reasons, including lack of sediment input to the system, or a storm event.
- Blow-out – areas of bare sand developed within the body of the dune system; while blow-outs are a natural occurrence, their frequency is greatly exacerbated by human activities that erode vegetation cover such excessive recreational use, driving vehicles over dunes, the removal of sand for building materials or agricultural use.
- Breaching – when seawater overtops the dunes, a channel may form; this usually happens during storm events or extreme high water conditions. Breaching may not always have a negative impact on a dune system – it is a natural process which, in unmanaged dunes, can occur occasionally and may not be detrimental to the health of the dune system.
- Frontal Dune Erosion – loss of material from the front face of the dune system; this may occur for a number of reasons including wave action during storm events, high tide levels or strong winds. This can be a temporary or long term trend.
- Hinterland Tidal Flooding – usually as a result of breaching or outflanking. As with breaching, this may not always be considered a negative event, for example it may be necessary to maintain important salt-water environments behind the dunes.
- High Visitor Numbers – the effect of large visitor numbers on the dunes; commonly results in trampling, blow-outs, vegetation loss and dune erosion.

Where on the dune denotes the location of the problem within the beach-dune system. The possible options are:

- Beach- below mean high water

- Toe – at the seaward beach/dune interface
- Middle – within the main body of the dunes
- Back - on the backslope of or behind the active dunes

Visual impact refers to the effect the techniques will have on the aesthetics of the dune system. The options are:

- None – no change to the visual landscape
- Low – a small change to the visual landscape but limited impact on the amenity value.
- Medium – potential to impact on the visual landscape. Design needs to consider impact upon amenity value.
- High – significant change to the visual landscape. High risk of impacts on amenity value of beach.

Cost (Basedate 2008) categorised as:

- Low – £0 to £5k per 100m run
- Medium - £5k to £50k per 100m run
- High - £50k + per 100m run

Future maintenance refers to the frequency of maintenance required in the future, in order to sustain the technique:

- None – no maintenance will be required
- Low – maintenance will most likely not be required within a 10 year period
- Medium – the technique will probably need some maintenance every 1 to 10 years
- High – this technique will most likely require maintenance at least once a year

Life expectancy is the predicted life expectancy for each technique. This should be considered as a broad estimate; actual life will vary greatly due to differing environmental conditions:

- Short – 0 to 5 years
- Medium – 5 to 20 years
- Long– 20 + years

Category relates to the type of technique employed:

- Access Management - controlling beach user access to protect vulnerable areas of the dunes;
- Adapt Backshore Management/ Uses – adapting management and land use behind the dunes and allowing natural processes to continue;
- Hard Protection Methods – construction of hard defences to manage erosion and/or flood risk;
- Monitoring – regular surveys of the beach and dunes to assess short and long term trends;
- Morphological Modification – managing the form and structure of the dunes;
- Public Awareness – informing and educating the public;
- Removal of Defences – removal of management currently in place which is causing detrimental impacts on the beach and dune system;
- Sediment Modification – managing the sediment available and/or location of sediment in the beach and dune system;
- Stabilisation – stabilising unstable dune surfaces to reduce erosion and sand blow.

Technique A description of each technique, along with a summary of when it should be applied, and associated benefits and problems can be found in Table I of the Sand Dune Management Techniques (Draft) report. A brief summary of each technique is provided here:

Adapt Backshore Management/Uses

- Adapt Backshore Management/ Uses - allow natural dune processes to continue but manage the backshore by moving/ replacing assets at risk and controlling future developments.

Access Management

- Zoning – planning of the site to reduce or spread the impact of visitors. Encourage people to less sensitive zones and discourage people from sensitive areas.
- Boardwalks – construction of wooden walkways through the dunes to reduce trampling and manage access.
- Control Fencing – construction of fencing to prevent visitor access to vulnerable areas and contain traffic along designated access routes

Public Awareness

- Signs and Display Boards, Guided Walks, Public Talks, Interpretive Leaflets – Education of beach users to explain the importance of the dunes, why they require protection, the management in place and how the beach user can contribute.

Stabilisation

- Planting – Planting of dunes with species that help stabilise the dune surface to protect bare sand from erosion.
- Thatching – Covering of exposed sand areas with cuttings to reduce trampling and protect vegetation. Usually in combination with stabilisation planting.
- Mulching/ Matting/ Sand Binders – Methods to protect bare sand from wind erosion and reduce rain impact and splash erosion. Usually in combination with stabilisation planting.

Hard Protection Methods

- Sand Bag Structures – Sand bags of various size used to construct reefs, groynes, headlands or revetments. Short-term fixed defence.
- Gabion Revetments – Construction of revetment from wire mesh-filled baskets filled with cobbles or rock. Provides short term protection by absorbing wave energy along the dune face.
- Artificial Headland – Construction of rock structures along the dune toe to protect vulnerable eroding areas.
- Artificial Reefs – Construction of shore parallel rock mound structures part way down the beach face. Structure dissipates wave energy protecting from erosion and encouraging deposition.
- Near shore Breakwater - Shore parallel segmented structures along the upper beach at approximately high water. Reduces wave energy reaching the beach and dunes without affecting beach dune interaction.
- Timber Groynes – Cross shore structures made of timber which reduces longshore transport. Can be used to retain material in combination with beach nourishment.

- Rock Groynes - Cross shore structures made of rock that reduce longshore transport. Can be used to retain material in combination with beach nourishment.
- Rock Revetments – Rock used to armour the dune face. Dissipates storm waves and prevents further recession.
- Timber revetments – timber structures that can range from impermeable breastwork to temporary permeable upper beach wave barriers. Forms partial barrier to wave action when forming a permeable barrier along the upper beach or a wave protection wall when forming an impermeable vertical breastwork along the dune face.
- Clay Embankments – construction of clay defences to prevent hinterland flooding. Can be located behind the dune system to form a secondary defence.
- Impermeable Revetments and Sea Walls – construction of a fixed line of defence across the front of the dune system.

Morphological Modification

- Dune Fencing - Fencing designed to trap sand and encourage dune building. Can increase dune height and width, improving flood and coastal defence properties of the dunes.
- Planting – Planting of dunes with sand trapping species to encourage dune building. Can increase dune height and width, improving flood and coastal defence properties of the dunes.
- Bulldozing/Contouring – Bulldozing of existing sand to create new sand mounds or to infill blow outs. Reprofilng of existing dunes to a more stable aerodynamic shape.
- Beach Drainage – Burial of perforated land drain pipes below the upper beach which are connected to a pump and discharge. This lowers the water table in the swash zone, enhancing the porosity and wave absorption capacity of the beach and encouraging sand deposition.

Sediment Modification

- Beach recycling and reprofiling – Mechanically move sand from areas of accretion to an area of erosion e.g. accreting dune ridge to a blow out. Reprofile dune through movement of material from an accreting dune crest to an eroding dune toe.
- Beach Nourishment – Importation of sand or gravel to cover beach losses resulting from erosion. Can be used to raise beach levels or can be added to the dune system.

Cease Existing Management

- Remove Defence Structures – hard defence structures along the dune front are of limited benefit in locations with a negative sediment budget and high wave energy. Such structures require significant maintenance and it may be economically and environmentally beneficial to remove them.
- Cease Mechanical Litter Cleaning – Mechanical beach cleaning can remove natural material which would normally encourage embryo dune growth. These methods can prevent embryo dunes developing and destroy young embryo dunes which have started to form.

Monitoring

- Monitoring - Regular surveys of the beach and dunes to assess short and long term trends. Can include topographic surveys, LiDAR surveys and visual surveys. May be part of a regional monitoring programme.

References

Halcrow (2009) Cornwall Sand Dune and Beach Management Strategy. Sand Dune Management Techniques Report.