

Location reference:

Montrose

Management Unit reference:

MU 1/1 to MU 1/4



SUMMARY OF PREFERRED PLAN RECOMMENDATIONS AND JUSTIFICATION

Plan:

This section of coast extends from the undefended cliffs at Milton Ness in the north to the defended mouth of the River South Esk in the south.

An undefended natural beach and dune system, dissected by the River North Esk, extends between Milton Ness and the Montrose Golf Links, here there are few assets at risk including World War II assets and a medieval burial site and the dunes to the north are nationally designated as a SSSI and National Nature Reserve.

Montrose Golf links, a major asset in Montrose fronting the north end of the town, is mainly undefended and dune erosion is particularly severe along this frontage. South of the golf course, the Splash, South Links Holiday Park and GlaxoSmith Kline frontages, are entirely defended. The seawall and rock armour around the Splash (the Faulds) recreation area has formed a promontory where the frontage is currently 40-60m seaward of the natural shoreline position and beach lowering in front of this defence is a continuing problem. The coastal defence scheme protecting the GlaxoSmithKline site however, has acted to encourage accretion in this location.

The long term plan for the frontage north of Montrose Golf Links is to allow natural processes to continue unhindered, where the naturally evolving dune and beach system will continue to provide the natural coastal defence. Along the Montrose Golf Links frontage the plan is to manage erosion of the dunes through a managed realignment policy to maintain the integrity of the dunes as a natural defence while maintaining protection to the majority of the golf course into the long term. Assuming material is suitable and available, there is an opportunity for beneficial use of River South Esk dredged sediment as recharge material along this frontage to help slow erosion. Inevitably this policy will also include the need for relocation of those assets / tees in the 100 year erosion zone further inland.

The medium term plan south of the golf course, along the Splash recreation area and the South Links Holiday Park frontages, is to continue to maintain existing defences to reduce flood and erosion risk into the medium term. Assuming material is suitable and available, there is also an opportunity for short term beneficial use of River South Esk dredgings as recharge material along

the frontage as part of the scheme to help maintain beach levels. Under rising sea levels, coastal squeeze may result in the further loss of beaches in front of the Splash and Holiday Park frontages and therefore, holding defences on their current alignment will become unsustainable in the long term. If present conditions continue, the long term plan here is therefore to remove defences once they reach the end of their serviceable life and allow a more natural shoreline position to form, in line with the golf course dunes to the north.

Assuming the industrial works remain, the long term plan along the GlaxoSmithKline frontage is to continue to provide flood and erosion protection to the site.

Preferred policies to implement Plan:

From present day (short term to 20 years from now):

The short term policy for the north of the frontage is **no active intervention** to continue to allow the cliff, beach and dune system to evolve naturally and provide the coastal defence.

At Montrose Golf Links a **managed realignment** policy combined with monitoring will act to maintain the dune system as the natural coastal defence to Montrose town. Those sections of the golf course at risk of erosion would need to be relocated further inland, following which, the two remaining rock armour strong points would be removed. Localised dune management such as re-profiling of the dunes or use of dune fencing to encourage sand accumulation at the dune toe, may be required to help manage erosion. Recycling of dredged material from the South Esk to the littoral zone could also have a potentially beneficial effect in terms of erosion management along this frontage.

From Splash to the River South Esk, the short term policy is to **hold the line** of the existing defences. This would involve maintenance of current defences and stabilisation / restoration of the upper beach, potentially through the beneficial use of River South Esk dredged material. As long as accretion continues along the GlaxoSmithKline frontage, minimal intervention is expected to be required in this location.

Monitoring should be undertaken along this frontage to inform future policy along the southern frontages.

Medium term (20-50 years)

The medium term policy in the north of Montrose Bay is a continuation of **no active intervention** to allow natural evolution of the beach, dune and cliff systems. Slow erosion of resistant cliffs is expected to continue and with rising sea levels, some beach lowering and frontal dune erosion would be expected to occur over time.

Montrose Links dunes will be allowed to evolve naturally with limited intervention under a **managed realignment** policy. Frontal erosion of the dunes will continue; however erosion is likely to be variable. Localised dune management, along with periodic recharge of dredged material from the South Esk channel may be required to maintain the integrity of the dunes and to help manage erosion.

A **hold the line** policy from Splash to the River South Esk will provide erosion and flood protection to recreational assets and the

GlaxoSmithKline site. Narrowing and lowering of the beach in front of defences at Splash and the South Links Holiday Park is likely with sea level rise. Beach recharge or other stabilisation measures, potentially using dredged material from the River South Esk, may help maintain beach levels and standards of protection along the frontage. Additional measures to address outflanking north of the Splash defence, such as a localised rock revetment may also be required. The GlaxoSmithKline frontage is expected to remain stable, however, if erosion becomes an issue, beach management measures and potential recharge campaigns may be required to maintain standards of protection.

Monitoring should be undertaken along this frontage to inform future policy along the southern frontages.

Longer term (50-100 years)

The long term policy is for a continuation of **no active intervention**, so the cliffs, dunes and beach in the north of Montrose Bay would continue to evolve naturally.

A long term **managed realignment** policy at Montrose Golf Links will include localised dune management and recharge of dredged material from the South Esk channel to maintain the integrity of the dunes as the natural defence and manage erosion. At Splash holding the position of the existing structures will become technically unsustainable on their current alignment. The fronting beach will narrow and steepen as sea levels rise, resulting in increased exposure of the structures to wave action. Therefore, following relocation of recreation assets inland, removal of current defences at Splash and at South Links Holiday Park will address this issue by creating a more natural sustainable shoreline alignment under a ***managed realignment** policy. Studies will be required to investigate the most appropriate alignment and implementation method. The scheme should be designed to complement and tie in with the natural erosion of dunes to the north and the requirement for continued defences to the south. Dune management could help restore the dune system as a natural line of defence, maintain dune integrity and manage erosion.

The GlaxoSmithKline frontage is expected to remain stable with the new supply of sediment from the adjacent northern frontage; however, under a **hold the line** policy, if erosion becomes an issue, beach management measures and potential recharge campaigns may be required to maintain standards of protection.

***Should erosion / accretion patterns change in the future along the Splash frontage, the long term policy may need to be revised.**

Summary of Specific Policies

Management Unit		Preferred Policies		
		Short term	Medium term	Long term
1/1	Montrose Bay (Milton Ness to Montrose Links)	Allow natural coastal evolution to continue through no active intervention .	Allow natural coastal evolution to continue through no active intervention .	Allow natural coastal evolution to continue through no active intervention .
1/2	Montrose Golf Links	Relocation of parts of the golf course landward. Remove the two strong points and undertake dune management and beneficial recharge of dredged material from the South Esk channel as part of a managed realignment policy.	Undertake dune management, and beneficial recharge of dredged material from the South Esk to support the managed realignment policy.	Manage the dunes as a natural defence through dune management and beneficial recharge of dredged material from the South Esk under a managed realignment policy.
1/3 (a)	Splash (The Faulds)	Maintain defences through a hold the line policy. Consider the potential for beneficial use of River South Esk dredged material along the frontage as part of the scheme.	Maintain the existing defences for as long as it is technically and economically possible to do so, through a hold the line policy. Consider the potential for beneficial use of River South Esk dredged material along the frontage as part of the scheme. Relocate assets landward.	Remove current defences and implement measures to create a more sustainable shoreline alignment further inland under a managed realignment policy. Studies should be undertaken to identify the most appropriate alignment and implementation method. The scheme should compliment and tie in with the managed erosion of dunes to the north.
1/3 (b)	South Links Holiday Park	Maintain defences through a hold the line policy. Consider the potential for beneficial use of River South Esk dredged material along the frontage as part of the scheme.	Maintain defences through a hold the line policy. Consider the potential for beneficial use of River South Esk dredged material along the frontage as part of the scheme. Relocate assets landward.	Remove current defences and implement measures to create a more sustainable shoreline alignment further inland under a managed realignment policy. Studies should be undertaken to identify the most appropriate alignment and implementation method. The scheme will need to tie with defences to the south.
1/4	GlaxoSmithKline	Maintain defences	Continue to hold the	Continue to hold the

The above provides the local details in respect of the SMP-wide policy presented in the preceding sections of this Plan document. These details must be read in the context of the wider-scale issues and policy implications, as reported therein.

Management Unit		Preferred Policies		
		Short term	Medium term	Long term
		through a hold the line policy to protect assets at GlaxoSmithKline; this will require little intervention, but will involve monitoring of the beach.	line by maintaining defences to protect assets at GlaxoSmithKline; this should require little intervention, but will involve monitoring of the beach.	line and protect assets at GlaxoSmithKline; this should require little intervention, but if erosion becomes an issue, beach management measures and potential recharge campaigns may be required, combined with beach monitoring.

Location reference:		Montrose						
Management Unit reference:		MU 1/1 to MU 1/4						
IMPLICATIONS OF THE PREFERRED PLAN FOR THIS LOCATION								
Time period	Management Activities	Property and Human Health	Material Assets and Infrastructure	Historic Environment	Flora Fauna and Biodiversity	Geomorphology Geology and Soils	Fisheries and Water	Landscape
2016 - 2036	<p>Removal of strong points and implementation of dune management measures (e.g. dune fencing, re-profiling) and beneficial recharge of dredged material from the South Esk channel at Montrose Golf Links.</p> <p>Maintenance of the existing defences at Splash, South Links Holiday Park and GlaxoSmithKline. Potential beneficial use of dredged material to help stabilise beach levels.</p>	<p>Potential flood risk to isolated properties at Kinnaber alongside the River North Esk channel.</p> <p>Continued flood and erosion protection to Montrose town, Montrose Port, and GlaxoSmithKline.</p> <p>The set-back of some parts of the golf course will be required due to the continued erosion of the dunes. However, most other recreational assets including the Splash area and South Links Holiday Park will continue to be protected. The amenity value of the beach will be maintained, if the upper beach is recharged as part of the scheme.</p>	<p>Continued protection to the Splash car park, minor access roads and water treatment works.</p> <p>Continued protection of harbour infrastructure. Potential for beneficial use of River South Esk dredged material along the frontage as part of the scheme.</p> <p>A 'no development' set back area should be implemented, extending back to the 100 year erosion risk predicted shoreline position in MU 1/1, MU1/2 and MU1/3a and b. The 'no development' set back should also incorporate areas identified at risk of flooding in a 0.5%AEP coastal event in MU1/1 (see map at the end of this Policy Statement).</p> <p>Development should also be restricted behind dune systems to allow for rollback over time.</p> <p>Relocate tees at risk along the golf club frontage.</p>	Erosion in the north of the bay and golf course may impact on the historic World War II assets and may further expose a medieval burial site.	Flora and fauna in intertidal habitats (e.g. sand dunes) are likely to be maintained. However, potential flood risk to freshwater/terrestrial habitats and species at St Cyrus and Kinnaber.	<p>Potential flood risk to small sections of rough grazing land adjacent to the River North Esk channel.</p> <p>The dune and cliff systems to the north and the dune systems in the mid-reach will function near naturally, with dunes rolling backwards where topography allows this. To the south, beach restoration and stabilisation will maintain this inter-tidal feature, without significant coastal "squeeze"</p>	<p>No adverse impacts on fisheries.</p> <p>No detriment to the coastal water body's status.</p>	<p>Allowing natural processes will maintain the landscape character to the north.</p> <p>Maintaining the defences in the south is unlikely to change the character of the landscape but will maintain the unnatural alignment of the coast.</p>
2036 -	Implementation of	Increased flood risk to	Continued protection to	Erosion under no	Flora and fauna in	Increased flood risk to	No adverse impacts on	Allowing natural

Location reference:		Montrose						
Management Unit reference:		MU 1/1 to MU 1/4						
IMPLICATIONS OF THE PREFERRED PLAN FOR THIS LOCATION								
Time period	Management Activities	Property and Human Health	Material Assets and Infrastructure	Historic Environment	Flora Fauna and Biodiversity	Geomorphology Geology and Soils	Fisheries and Water	Landscape
2056	dune management measures (e.g. dune fencing, re-profiling) and beneficial recharge of dredged material from the South Esk channel at Montrose Golf Links. Maintenance of the existing defences at Splash, South Links Holiday Park and GlaxoSmithKline. Potential beneficial use of dredged material to help stabilise beach levels.	isolated properties at Kinnaber. Continued flood and erosion protection to Montrose town, Montrose Port and GlaxoSmithKline. Erosion risk to the golf course will be managed and most other recreational assets including the Splash area and South Links Holiday Park will continue to be protected. The amenity value of the beach will be maintained, if the upper beach is recharged as part of the scheme.	the Splash car park, minor access roads and water treatment works. Continued protection of harbour infrastructure. Potential for beneficial use of River South Esk dredged material along the frontage as part of the scheme. No development areas should be implemented in MU1/1, MU1/2 and MU1/3. Restrict development behind dune systems to allow for rollback over time. Relocate leisure assets along the Faults frontage and Caravan Park	active intervention and managed realignment may impact on the heritage sites.	intertidal habitats (e.g. sand dunes) are likely to be maintained. However, potential flood risk to freshwater/terrestrial habitats and species at St Cyrus and Kinnaber. Potential for a change in birds using the area, as a result of habitat change.	small sections of rough grazing land adjacent to the River North Esk channel. The dune and cliff systems to the north and the dune systems in the mid-reach will function near naturally, with dunes rolling backwards where topography allows this. To the south, beach restoration and stabilisation will maintain this inter-tidal feature, without significant coastal "squeeze".	fisheries unless there are significant changes in water quality. No detriment to the coastal water body's status.	processes will maintain the landscape character to the north. Maintaining the defences in the south is unlikely to change the character of the landscape but will maintain the unnatural alignment of the coast.
2056 - 2116	Implementation of dune management measures (e.g. dune fencing, re-profiling) and beneficial recharge of dredged material from the South Esk channel at Montrose Golf Links. Removal of defences at Splash and at South Links Holiday Park.	Increased frequency of flood risk to isolated properties at Kinnaber. Continued flood and erosion protection to Montrose town, Montrose Port, and GlaxoSmithKline. Erosion risk to the golf course will be managed. Assets at Splash and the South Links Holiday	Trail Road and Splash car park will need to be relocated further inland as part of the managed realignment scheme. Continued protection of harbour infrastructure. Potential for beneficial use of River South Esk dredged material along the frontage as part of the scheme.	Increased risk to heritage sites under no active intervention and managed realignment.	Flora and fauna in intertidal habitats (e.g. sand dunes) are likely to be maintained. However, potential flood risk to freshwater/terrestrial habitats and species at St Cyrus and Kinnaber. Potential for a change in birds using the area, as a result of habitat change.	Increased frequency of flood risk to small sections of rough grazing land adjacent to the River North Esk channel. The dune and cliff systems to the north and the dune and beach systems in the mid-reach and to the south will function	No adverse impacts on fisheries unless there are significant changes in water quality. No significant detriment to the coastal water body's status.	Allowing natural processes with some dune management will maintain the landscape character of the coastline. Maintaining the defences in at GlaxoSmithKline is unlikely to change the character of the landscape.

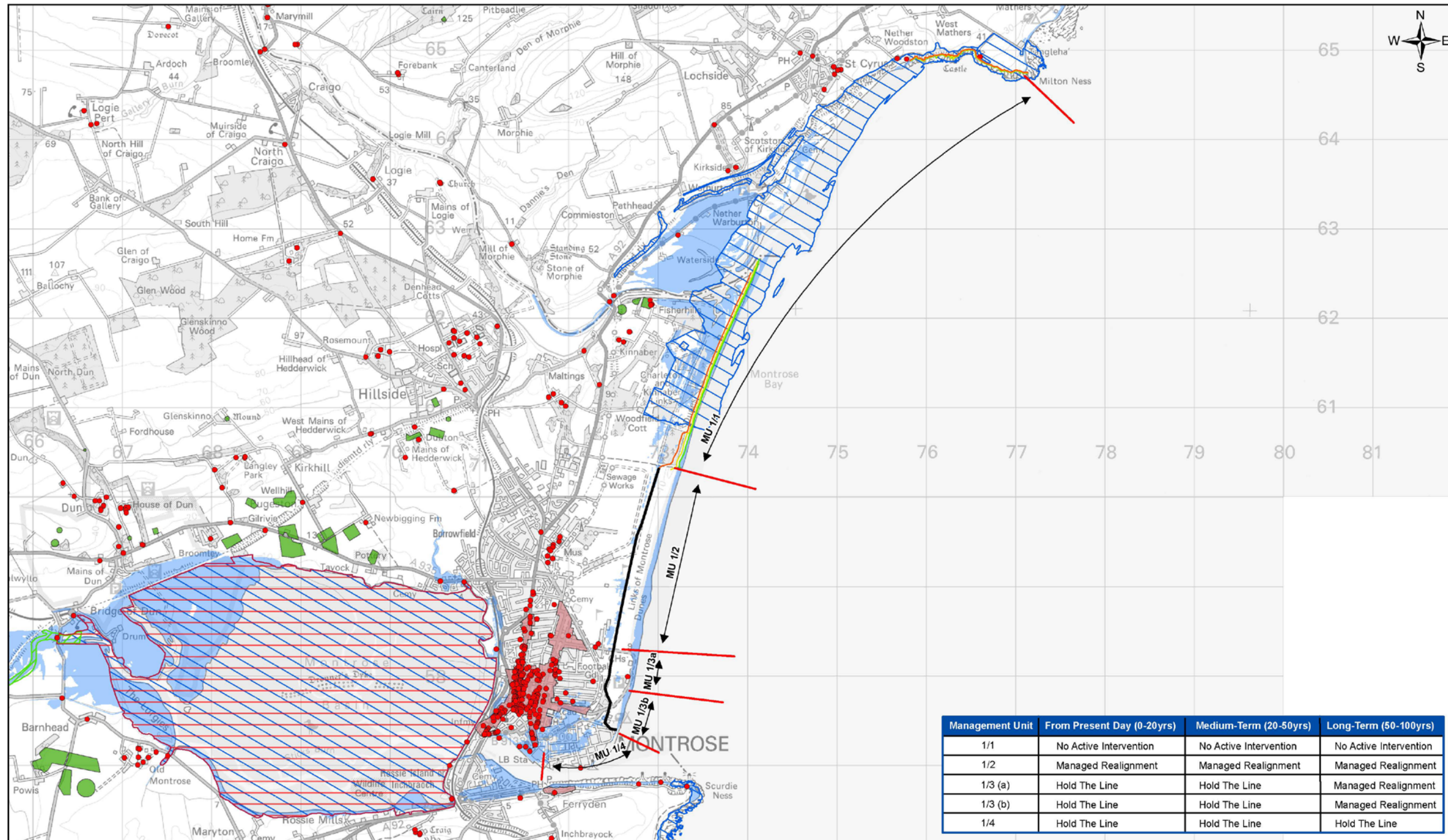
Location reference:	Montrose
Management Unit reference:	MU 1/1 to MU 1/4

IMPLICATIONS OF THE PREFERRED PLAN FOR THIS LOCATION

Time period	Management Activities	Property and Human Health	Material Assets and Infrastructure	Historic Environment	Flora Fauna and Biodiversity	Geomorphology Geology and Soils	Fisheries and Water	Landscape
	<p>Implementation of dune management measures and /or construction of set back defences at Splash and the holiday park.</p> <p>Maintenance of the existing defences at GlaxoSmithKline.</p> <p>Potential beneficial use of dredged material to help stabilise beach levels if required.</p>	<p>Park will need to be relocated in the accommodation space landward to allow for realignment of the defences. The natural shoreline adjustment is likely to release sediment into the system, which will continue to feed the beach and reinstate the dunes. The roll-back of the dunes and dune management may increase the extent of the exposed beach at high tide and there will be an overall retention of the amenity value of the beach.</p>	<p>No development areas should be implemented in MU1/1, MU1/2 and MU1/3.</p> <p>Restrict development behind dune systems to allow for rollback over time.</p>			<p>near naturally, with dunes and beaches rolling backwards where topography allows this. In the extreme south at GlaxoSmithKline beach restoration and stabilisation will maintain this inter-tidal feature.</p>		

Montrose: MU 1/1 to MU 1/4						
ACTION PLAN						
Action	Action Ref.	Action Description	Relevant Importance	Lead Authority and Key Partners	Links to Other Actions	Outcome
1. Management Area studies	1.1	Continue with study to investigate / model sediment movement and sediment budgets within Montrose Bay	Ongoing	Angus Council / Aberdeenshire Council	4.1, 4.2	Informs actions
	1.2	Continue with study to investigate the beneficial use of dredged material as part of beach and dune management schemes	Ongoing	Angus Council / Montrose Port Authority		Informs actions
2. Management Unit studies	2.1	MU 1/2: Develop and adopt dune management adaptation strategy to manage roll back of the dunes, maintaining their value as a natural defence	Short term	Angus Council / Links Management Trust		Sustainable management
	2.2	MU 1/3 (a) and MU 1/3 (b): Develop a long term managed realignment and relocation strategy	Medium term	Angus Council		Sustainable management
3. Potential Schemes	3.1	MU 1/2: To be defined by dune management and adaptation strategy.	Short term	Angus Council		Sustainable management
4. Monitoring	4.1	Extend the existing programme of beach profile monitoring to include Kinnaber and St Cyrus to provide data to allow a much greater understanding of beach sediment movement along Montrose Bay and to inform long term policy. 2 x a year beach profiles are recommended.	Ongoing	Angus Council / Aberdeenshire Council	1.1	Informs actions
	4.2	MU 1/2: Ongoing monitoring and documentation of dune erosion	Ongoing	Angus Council	1.1	Informs actions
	4.3	Defence structural monitoring	Ongoing	Angus Council / GlaxoSmithKline		Informs actions
	4.4	Monitor erosion at the Angus SMR NO765W0097 heritage site and undertake detailed archaeological recording at an early stage (including the recording of any graffiti on the defences) prior to further erosion damaging the site.	Short term	Historic Environment Scotland / Aberdeenshire Council		Sustainable management
	4.5	Monitor erosion at the Angus SMR NO76SW0135, NO75NW0284, NO75NW0385 and NO75NW0159 heritage sites and undertake detailed archaeological recording at an early stage (including the recording of any graffiti on the defences) prior to further erosion and realignment activities damaging the site. Investigate potential for stabilisation of the sites as part of the defensive system. There would also be an opportunity for interpretation of these sites to be presented to the public, as part of the coastal footpath for example.	Short term	Historic Environment Scotland / Aberdeenshire Council		Sustainable management
	4.6	Monitor erosion at the Aberdeenshire SMR NO76SE0012 heritage site and undertake archaeological recording if any further human remains are found.	Short term	Historic Environment Scotland / Aberdeenshire Council		Sustainable management
5. Asset Management	5.1	Maintenance of defences and beach and dune management including	Ongoing	Angus Council		Sustainable management

Montrose: MU 1/1 to MU 1/4						
ACTION PLAN						
		management of public access.				
6. Communication	6.1	Consult key stakeholders and general public during dune management and adaptation strategy development.	Short term	Angus Council		Stakeholder engagement
	6.2	Monitoring and management of action plan by Angus Council to confirm SMP policies are put into practice.	Ongoing	Angus Council		Action management
	6.3	Dialogue with Montrose Port Authority regarding the beneficial use of dredged material from the South Esk Channel as part of beach management schemes	Short term	Angus Council		Sustainable management
7. Adaptation / resilience	7.1	Develop and adopt dune management adaptation strategy to manage roll back of the dunes.	Short term	Angus Council	2.1, 2.3	Sustainable management
	7.2	Investigate relocation of assets (Faulds assets and caravan park assets) in MU 1/3 (a) and (b) over time to prepare for the long term managed realignment policy	Medium term	Angus Council	2.2	Sustainable management
8. Emergency Response / Flood Warning	8.1	Development, monitoring and review of emergency response plans to prepare for over design standard events	Short term	Angus Council		Emergency management
	8.2	Continue to improve flood warning service and raise awareness of flood risk.	Ongoing	Angus Council		Emergency management
9. Habitat creation / Environmental Mitigation	9.1	Seek opportunities for habitat enhancements as part of flood/erosion risk management works e.g. consider sand fencing where and as appropriate	Short term	Angus Council		Sustainable management



Project:
Angus Shoreline Management Plan 2
 Drawing:
Management Unit: 1 Montrose
 Drawn By: MPC 31/10/2016
 Checked By: SB 31/10/2016
 Approved By: JY 31/10/2016



Legend

- Management Units (MU)
- Indicative no Development Zone
- Erosion Risk - Predicted Shoreline Position*
 - 20 Year
 - 50 Year
 - 100 Year
- Listed Building
- Conservation Areas
- Scheduled Monuments
- Special Protection Area and RAMSAR
- Special Areas of Conservation
- Sites of Special Scientific Interest
- Flood Risk - Year 100
 - 0.5% AEP event (coastal)

*Limited long term erosion rates available for this section of coast. Therefore rates for similar types of cliffs and exposure have been applied.



Location reference:

Montrose Basin

Management Unit reference:

MU 2/1 to MU 2/8



SUMMARY OF PREFERRED PLAN RECOMMENDATIONS AND JUSTIFICATION

Plan:

Montrose Basin is an enclosed estuarine basin which almost empties at low water, exposing extensive mud flats which are internationally designated as a SPA and Ramsar site. Montrose Basin also forms part of a Scottish Wildlife Trust Nature Reserve and Local Nature Reserve, important for the diverse habitats and species. The north, west and south coastlines are largely undeveloped, backed by agricultural land, with only a small section of residential property, a caravan park and cemetery at Tayock in the north eastern corner. The eastern coastline is largely reclaimed and developed. Defences provide flood and erosion protection to residential and commercial assets, infrastructure (railway and road) and landfill at Montrose.

The River South Esk drains through the basin and out to sea south of Montrose, adjacent to the village of Ferryden and the northern edge of the Scurdie Ness headland. Defences extend both to the north and south of the river channel, providing protection to Montrose Port as well as residential areas and access routes at Ferryden to the south. East of Ferryden the frontage is characterised by the undefended Scurdie Ness cliffs which is designated as a SSSI at the eastern tip.

The long term plan is to continue to protect assets and infrastructure at flood or erosion risk at Montrose, Montrose Port, Rossie Island and Tayock, including allowing private maintenance of defences at Ferryden and Sleepyhillock Cemetery. Elsewhere, along the northern and southern flanks of the Basin, and along the undeveloped cliffs toward Scurdie Ness the plan is to maintain a naturally evolving system to preserve habitats and maintain designations.

The long term plan for the west of the Basin is to maintain designated freshwater assets while also providing opportunity for habitat creation in non-designated areas, under a managed realignment policy. The construction of new set back defences will manage flood risk to the wider area while providing accommodation space for longer term habitat creation. New habitat formed may offset losses of habitat as a result of coastal squeeze elsewhere in Montrose Basin.

Preferred policies to implement Plan:

From present day (short term to 20 years from now):

The short term policy for the built up areas (Montrose Port, Ferryden, Rossie Island) along the River South Esk channel and for the east (Montrose) and north east (Tayock) Montrose Basin shorelines is to **hold the line** of the existing defences. This would involve maintenance and upgrade of current defences. Defences along the Sleepyhillock Cemetery frontage currently reduce erosion risk to the cemetery. It is understood that these defences are privately owned and maintained and that this policy would involve only limited intervention and private maintenance of defences. There would not be economic justification to use public funding to hold the line in this location. Defences to the west, in front of designated freshwater assets will be maintained.

The short term policy for the non-designated western frontages is **managed realignment** to provide accommodation space for habitat creation. Flood risk would be managed by maintaining existing defences to an appropriate standard in the immediate term, while undertaking studies to investigate Managed Realignment opportunities for habitat creation. A set back defence would be constructed and the current embankments allowed to fail (or perhaps breached), reverting to a more natural environment and creating new intertidal areas.

The undefended coasts to the north and south of Montrose Basin and towards Scurdie Ness will continue to evolve naturally under a policy of **no active intervention**.

Medium term (20-50 years)

The medium term policy for Montrose, Montrose Port, Ferryden, Rossie Island and Tayock is a continuation of **hold the line** to protect assets and infrastructure. Where defences are privately owned (Sleepyhillock Cemetery and Ferryden) private maintenance would be permitted in consultation with Angus Council for planning purposes. Elsewhere this would involve maintenance and upgrade of defences. Defences to the west, in front of designated freshwater assets will be maintained.

Under a continued policy of **managed realignment** along the non-designated frontage, new habitats will be created in new intertidal areas along the western Montrose Basin shoreline. This could result in further changes to river flow patterns and sediment movement. New habitat formed may offset losses of habitat as a result of coastal squeeze elsewhere in the Basin.

Along the southern bank of Montrose Basin and towards Scurdie Ness the shoreline would be allowed to evolve naturally under **no active intervention** and little change would be expected during this period; however there is potential for occasional erosion in the Basin by wave action during high tidal conditions. It is not expected that sea level rise will significantly affect the rate of recession of the

undefended cliffs between Ferryden and Scurdie Ness due to their resistant nature. However, sea level rise may start to submerge the fringing rock platform and shingle fringing beach.

Longer term (50-100 years)

Along with Montrose Port and Ferryden, the north eastern and eastern Montrose Bay shoreline will continue to be fixed under a **hold the line** policy in order to manage flood and erosion risk to the railway, Port and other assets. The defences are likely to require improvements during this period in order to maintain standards of flood defence as sea level rise accelerates. Increased overtopping of defences and potential flooding of properties is also likely with sea level rise. Under a hold the line policy, there is potential for erosion and coastal squeeze of the intertidal area against defences due to channel movements and, over time, sea level rise. Defences to the west, in front of designated freshwater assets will be maintained.

Long term **managed realignment** along the non-designated frontage in the west of Montrose Basin would involve maintenance of set back defences in order to continue managing flood and erosion risk to the hinterland. The habitat created through flooding may narrow as sea level rises and the set-back line is held.

The southern Montrose Basin bank and the Scurdie Ness shoreline would be allowed to evolve naturally under a continued **no active intervention** policy. There is increased potential for localised episodic erosion of the coastal edge by wave action during high tidal conditions. The resistant nature of the Scurdie Ness cliffs will remain the dominant control on their erosion and therefore recession rates are not expected to be significantly affected by accelerated sea level rise.

Summary of Specific Policies

Management Unit		Preferred Policies		
		Short term	Medium term	Long term
2/1 (a)	Montrose Port (north bank – Glaxo to A92 bridge)	Maintain and upgrade defences through a hold the line policy.	Maintain and upgrade defences through a hold the line policy.	Maintain and upgrade defences through a hold the line policy.
2/1 (b)	Montrose Port (south bank – A92 bridge to Ferryden)	Maintain and upgrade defences through a hold the line policy.	Maintain and upgrade defences through a hold the line policy.	Maintain and upgrade defences through a hold the line policy.
2/2 (a)	Montrose West (A92 Bridge to the end of the railway defences)	Maintain and upgrade defences through a hold the line policy.	Maintain and upgrade defences through a hold the line policy.	Maintain and upgrade defences through a hold the line policy.
2/2 (b)	Montrose West (Railway defences to Tayock River)	Maintain and upgrade defences through a hold the line policy.	Maintain and upgrade defences through a hold the line policy.	Maintain and upgrade defences through a hold the line policy.

The above provides the local details in respect of the SMP-wide policy presented in the preceding sections of this Plan document. These details must be read in the context of the wider-scale issues and policy implications, as reported therein.

Angus Shoreline Management Plan 2

Management Unit		Preferred Policies		
		Short term	Medium term	Long term
				line policy.
2/3 (a)	Tayock (Tayock village)	Maintain and upgrade defences through a hold the line policy.	Maintain and upgrade defences through a hold the line policy.	Maintain and upgrade defences through a hold the line policy.
2/3 (b)	Tayock (Sleepyhillock Cemetery)	Permit appropriate maintenance of localised private defences through hold the line . The responsibility of maintaining these private defences would lie with the landowner and not Angus Council as they are on private land.	Permit appropriate maintenance of localised private defences through hold the line . The responsibility of maintaining these private defences would lie with the landowner and not Angus Council as they are on private land.	Permit appropriate maintenance of localised private defences through hold the line . The responsibility of maintaining these private defences would lie with the landowner and not Angus Council as they are on private land.
2/4a	West Montrose Basin (west of Tayock)	Maintain existing defences through a hold the line policy.	Maintain existing defences through a hold the line policy.	Maintain existing defences through a hold the line policy.
2/4b	West Montrose Basin (Bridge of Dun)	Construct a new set back defence through managed realignment and then maintain these new defences to ensure that the risk of flooding is managed.	Maintain set back defences under a managed realignment policy to ensure that the risk of flooding is managed.	Maintain set back defences under a managed realignment policy to ensure that the risk of flooding is managed.
2/4c	West Montrose Basin (Old Montrose)	Maintain existing defences through a hold the line policy.	Maintain existing defences through a hold the line policy.	Maintain existing defences through a hold the line policy.
2/5	Old Montrose to Railway Bridge	Allow natural coastal evolution to continue through no active intervention .	Allow natural coastal evolution to continue through no active intervention .	Allow natural coastal evolution to continue through no active intervention .
2/6	Rossie Island to A92	Permit appropriate maintenance of localised private defences through limited intervention under a hold the line policy. The responsibility of maintaining these private defences would lie with the associated landowner and not Angus Council	Permit appropriate maintenance of localised private defences through limited intervention under a hold the line policy. The responsibility of maintaining these private defences would lie with the associated landowner and not Angus Council	Permit appropriate maintenance of localised private defences through limited intervention under a hold the line policy. The responsibility of maintaining these private defences would lie with the associated landowner and not Angus Council
2/7	Ferryden	Permit appropriate	Permit appropriate	Permit appropriate

The above provides the local details in respect of the SMP-wide policy presented in the preceding sections of this Plan document. These details must be read in the context of the wider-scale issues and policy implications, as reported therein.

Angus Shoreline Management Plan 2

Management Unit		Preferred Policies		
		Short term	Medium term	Long term
		maintenance of localised private defences through hold the line . The responsibility of maintaining these private defences would lie with the landowner and not Angus Council as they are on private land.	maintenance of localised private defences through hold the line . The responsibility of maintaining these private defences would lie with the landowner and not Angus Council as they are on private land.	maintenance of localised private defences through hold the line . The responsibility of maintaining these private defences would lie with the landowner and not Angus Council as they are on private land.
2/8	Ferryden to Scurdie Ness	Allow natural coastal evolution to continue through no active intervention .	Allow natural coastal evolution to continue through no active intervention .	Allow natural coastal evolution to continue through no active intervention .

Location reference:		Montrose Basin						
Management Unit reference:		MU 2/1 to MU 2/8						
IMPLICATIONS OF THE PREFERRED PLAN FOR THIS LOCATION								
Time period	Management Activities	Property and Human Health	Material Assets and Infrastructure	Historic Environment	Flora Fauna and Biodiversity	Geomorphology Geology and Soils	Fisheries and Water	Landscape
2016 - 2036	<p>Maintenance of the existing defences at Montrose Town, Rossie Island, Tayock and in the west. Private maintenance (appropriate measures, controlled through planning process) of local defences at Ferryden and Sleepyhillock Cemetery.</p> <p>Construct set back defences along non-designated frontage, in the west of Montrose Basin and allow existing defences to fail. Maintain these new defences to ensure that the risk of flooding is managed.</p>	<p>Continued flood protection to Montrose Town, Ferryden, Rossie Island and Tayock.</p> <p>Minimal impact on recreational activities.</p> <p>Continued erosion protection to the cemetery.</p> <p>Continued flood protection to landfill.</p>	<p>Continued flood protection to Montrose Port, the East Coast Railway, outfalls, Esk Road and the A92.</p> <p>A 'no development' set back area should be implemented, extending back to the 100 year erosion risk predicted shoreline position in MU 2/5 and MU2/8. The 'no development' set back should also incorporate areas identified at risk of flooding in a 0.5%AEP coastal event in MU2/4b (see map at the end of this Policy Statement).</p>	Continued flood protection to heritage features, crop mark sites and Montrose Conservation Areas.	<p>Potential for coastal squeeze of intertidal habitat along the northern, western and eastern part of the basin, with associated impacts on designated birds e.g. loss of bird roosting, nesting and feeding areas and impacts on wildfowl, waders and invertebrates.</p> <p>Continued flood protection of designated freshwater habitats in the west.</p> <p>Potential for intertidal habitat creation along the non-designated frontage in the west of the basin.</p>	<p>Natural coastal processes are key to maintain the integrity of the Scurdie Ness geological site through the exposure of geological features.</p> <p>Flooding of some agricultural land in a realigned area to the west of the Basin with associated loss of productivity.</p> <p>Protection of agricultural land elsewhere.</p>	<p>No adverse impacts on fisheries.</p> <p>Maintaining the defence line along the northern, western and eastern shores of Montrose Basin will result in gradual loss of mudflats over the majority of the water body's undeveloped perimeter, with potential deleterious effects on water body status for example by impacting benthic invertebrates. Natural evolution will continue along the southern shore and where managed realignment takes place in the west.</p>	<p>Maintaining the defences in the eastern, northern and western part of the basin may change the character of the landscape through the gradual loss of mudflats. Allowing natural processes elsewhere is likely to be beneficial to the existing landscape character, though there is likely to be a visible change in land use with the managed realignment site, in the western part of the basin, as reclaimed land is allowed to flood and set-back embankments are constructed.</p>
2036 - 2056	<p>Maintenance and upgrade of the existing defences at Montrose Town, Rossie Island and Tayock. Private maintenance (appropriate measures, controlled through planning process) of</p>	<p>Continued flood protection to Montrose Town, Ferryden, Rossie Island and Tayock.</p> <p>Minimal impacts on most recreational activities, although there will be an increasing flood risk to</p>	<p>Continued flood protection to Montrose Port, the East Coast Railway and outfalls.</p> <p>Continued flood protection to Esk Road and the majority of the A92. Potential flood risk to a short length of the</p>	Continued flood protection to heritage features, crop mark sites and Montrose Conservation Areas.	<p>Potential for coastal squeeze of intertidal habitat along the northern, western and eastern part of the basin, with associated impacts on designated birds e.g. loss of bird roosting, nesting and</p>	<p>Natural coastal processes are key to maintaining the integrity of the Scurdie Ness geological site through the exposure of geological features.</p> <p>Flooding of some agricultural land in a</p>	<p>No adverse impacts on fisheries unless there are significant changes in water quality.</p> <p>Maintaining the defence line along the northern, western and eastern shores of Montrose Basin will</p>	<p>As more substantial defences are required in the eastern part of the basin, the upgrading of defences has the potential to change the character of the landscape and</p>

Location reference:		Montrose Basin						
Management Unit reference:		MU 2/1 to MU 2/8						
IMPLICATIONS OF THE PREFERRED PLAN FOR THIS LOCATION								
Time period	Management Activities	Property and Human Health	Material Assets and Infrastructure	Historic Environment	Flora Fauna and Biodiversity	Geomorphology Geology and Soils	Fisheries and Water	Landscape
	local defences at Ferryden and Sleepyhillock Cemetery. Maintenance of defences in the west of Montrose Basin and set back defences.	some coastal walks and the wildlife visitor centre. Continued erosion protection to the cemetery. Continued flood protection to landfill.	A92 on the southern side of Montrose Basin. No development areas should be implemented in MU2/5, MU2/8 and MU2/4b.		feeding areas and impacts on wildfowl, waders and invertebrates. Continued flood protection of designated freshwater habitats in the west. Potential for intertidal habitat creation in the managed realignment area.	realigned area to the west of the Basin with associated loss of productivity. Protection of agricultural land elsewhere.	result in gradual loss of mudflats over the majority of the water body's undeveloped perimeter, with potential deleterious effects on water body status for example by impacting benthic invertebrates. Natural evolution will continue along the southern shore and where managed realignment takes place in the west.	defence works would need to be designed in a sympathetic manner to the local environment. Allowing natural processes elsewhere is likely to be beneficial to the existing landscape character.
2056 - 2116	Maintenance and upgrade of the existing defences at Montrose Town, Rossie Island and Tayock. Private maintenance (appropriate measures, controlled through planning process) of local defences at Ferryden and Sleepyhillock Cemetery. Maintenance of defences in the west of Montrose Basin and set back defences.	Continued flood protection to Montrose Town, Ferryden, Rossie Island and Tayock. Minimal impacts on most recreational activities, although there will be an increasing flood risk to some coastal walks and the wildlife visitor centre. Continued erosion protection to the cemetery. Continued flood protection to landfill.	Continued flood protection to Montrose Port, the East Coast Railway and outfalls. Continued flood protection to Esk Road and the majority of the A92. Potential flood risk to a short length of the A92 on the southern side of Montrose Basin. No development areas should be implemented in MU2/5, MU2/8 and MU2/4b.	Continued flood protection to heritage features, crop mark sites and Montrose Conservation Areas.	Potential for coastal squeeze of intertidal habitat along the northern, western and eastern part of the basin, with associated impacts on designated birds e.g. loss of bird roosting, nesting and feeding areas and impacts on wildfowl, waders and invertebrates. Potential for intertidal habitat creation in the managed realignment area.	Natural coastal processes are key to maintaining the integrity of the geological site at Scurdie Ness through the exposure of geological features. There may be potential however, for increased erosion of exposures with sea level rise and increased storminess. Flooding of some agricultural land in a realigned area to the west of the Basin with associated loss of productivity.	No adverse impacts on fisheries unless there are significant changes in water quality. Maintaining the defence line along the northern, western and eastern shores of Montrose Basin will result in gradual loss of mudflats over the majority of the water body's undeveloped perimeter, with potential deleterious effects on water body status for example by impacting benthic invertebrates. Natural	As more substantial defences are required in the eastern part of the basin, the upgrading of defences has the potential to change the character of the landscape and defence works would need to be designed in a sympathetic manner to the local environment. Allowing natural processes elsewhere is likely to be beneficial to the existing landscape

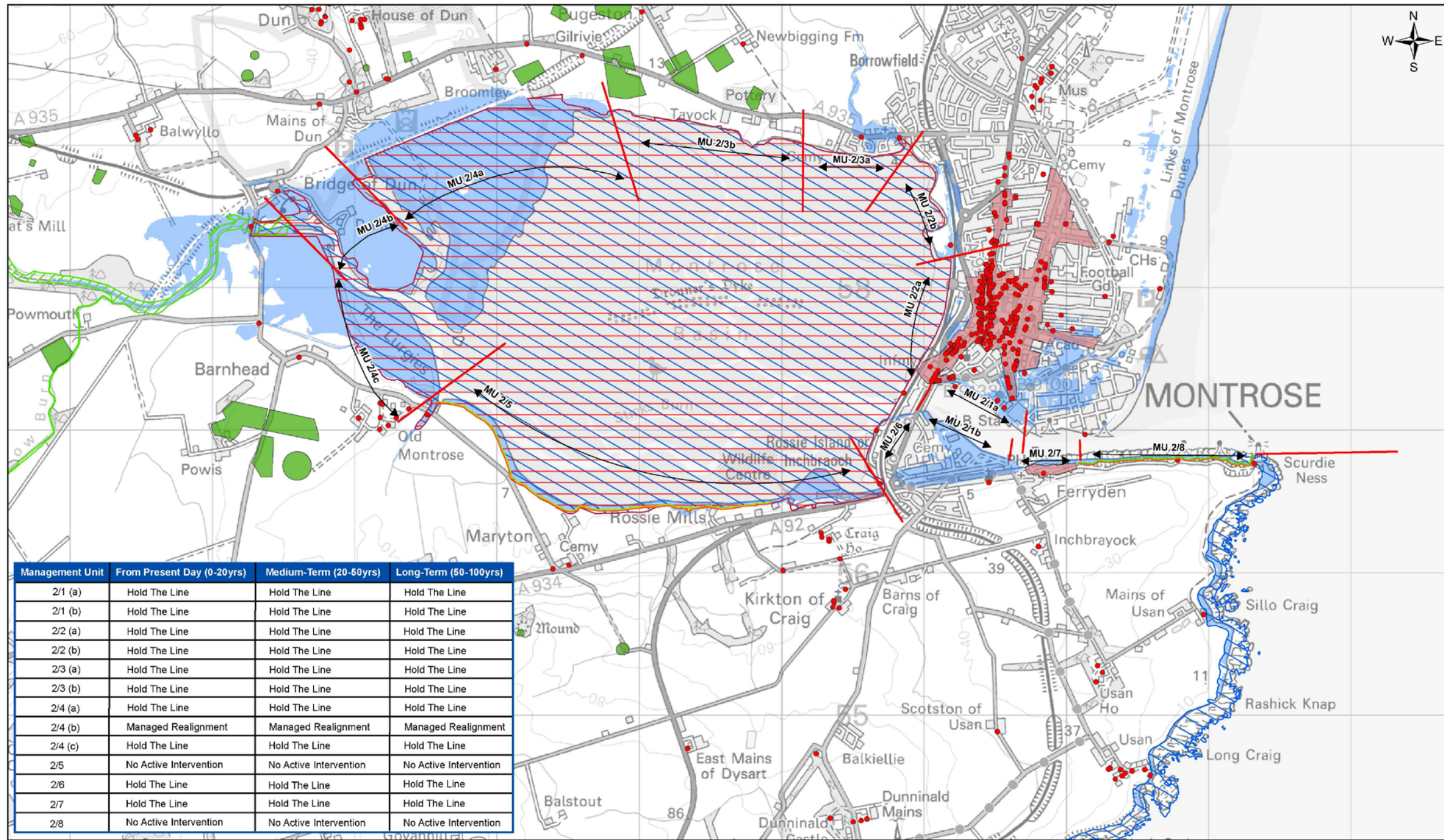
Location reference:	Montrose Basin
Management Unit reference:	MU 2/1 to MU 2/8

IMPLICATIONS OF THE PREFERRED PLAN FOR THIS LOCATION

Time period	Management Activities	Property and Human Health	Material Assets and Infrastructure	Historic Environment	Flora Fauna and Biodiversity	Geomorphology Geology and Soils	Fisheries and Water	Landscape
						Protection of agricultural land elsewhere.	evolution will continue along the southern shore and where managed realignment takes place in the west.	character.

Montrose Basin: MU 2/1 to MU 2/8						
ACTION PLAN						
Action	Action Ref.	Action Description	Relevant Importance	Lead Authority and Key Partners	Links to Other Actions	Outcome
1. Management Area studies	1.1					
2. Management Unit studies	2.1	Undertake strategy to seek opportunities to build secondary defences in MU 2/4b to achieve a more sustainable defence alignment and facilitate habitat creation through a managed realignment adaptation strategy. Further assessment of the combined effects of managed realignment at Montrose Basin and the TayAYplan's SDP, proposed SDP and Angus LDP will be undertaken at project level when the design/nature of this option has been confirmed and when more details of the development sites in the SDP/LDP are available. Further consideration will be given to the functionality and value of the terrestrial habitat, the likely change in habitat type (dependent on the likely frequency of flooding, water levels etc), and ability to support to feeding, nesting and roosting overwintering, feeding, nesting or roosting qualifying birds at scheme level	Short term	Angus Council, local landowners, Scottish National Trust		Sustainable management
	2.2	Detailed numerical modelling to predict and understand how the managed retreat policy may alter tidal currents within the basin and at the entrance and the potential impacts of these changes	Short term	Angus Council		Sustainable management
3. Potential Schemes	3.1	MU 2/4b - To be defined by managed realignment adaptation strategy. Any scheme will require a detailed HRA in consultation with SNH, which will more precisely prescribe the potential effects of the project and project level mitigation measures, when specific details of the scale and nature of the works is known.	Short term	Angus Council/SNH	2.1, 4.2	Sustainable management
4. Monitoring	4.1	Undertake erosion / accretion monitoring within Montrose Basin to inform future SMP reviews.	Ongoing	Angus Council		Informs actions
	4.2	Strategic environmental monitoring of designated conservation sites to provide baseline data for future Habitat Regulations Assessments.	Ongoing	Scottish Natural Heritage	9.1	Informs actions
	4.3	Undertake routine coastal defence monitoring	Ongoing	Angus Council Riparian owners		Informs actions
	4.4	Measurement of tidal currents, principally along the South Esk Channel from Glaxo Corner up to the south-western corner of the basin.	Short term			Informs actions
5. Asset Management	5.1	Maintenance of defences including management of public access.	Ongoing	Angus Council, Riparian owners		Sustainable management

Montrose Basin: MU 2/1 to MU 2/8						
ACTION PLAN						
6. Communication	6.1	Consult key stakeholders and general public during managed realignment adaptation strategy development.	Short term	Angus Council	2.1	Stakeholder engagement
	6.2	Consultation with private defence owners for future defence planning purposes	Short term	Angus Council		Stakeholder engagement
	6.3	Monitoring and management of action plan by Angus Council to confirm SMP policies are put into practice.	Ongoing	Angus Council		Action management
7. Adaptation / resilience	7.1	Investigations for recommended managed realignment	Short term		2.1	Sustainable management
8. Emergency Response / Flood Warning	8.1	Development, monitoring and review of emergency response plans to prepare for over design standard events.	Short term	Angus Council / Emergency services		Emergency management
	8.2	Continue to improve flood warning service and raise awareness of flood risk.	Ongoing	Angus Council / SEPA		Emergency management
9. Habitat creation / Environmental Mitigation	9.1	<p>Monitor progress with habitat creation in Managed Realignment areas.</p> <p>Timing of any breaches in the existing defences (if required) to avoid salmon runs/migratory season (i.e. October to May).</p> <p>Suitable/sensitive habitat used by overwintering birds and qualifying species will be identified at the detailed design stage of the works and avoided.</p> <p>Timing the works to avoid periods of key bird usage in the identified locations.</p> <p>Routing of construction traffic to avoid the loss of sensitive habitats used by the qualifying species.</p>	Short / medium term	Angus Council / Scottish Natural Heritage	4.2	<p>Informs actions</p> <p>Sustainable management</p>



Project:
Angus Shoreline Management Plan 2

Drawing:
Management Unit: 2
Montrose Basin

Drawn By: MPC 31/10/2016
Checked By: SB 31/10/2016
Approved By: JY 31/10/2016

Drawing Scale: 1:25,000
Plot Scale: 1:25,000 A3

Legend

- Management Units (MU)
- Erosion Risk - Predicted Shoreline Position*
 - 20 Year
 - 50 Year
 - 100 Year
- Flood Risk - Year 100
 - 0.5% AEP event (coastal)
- Listed Building
- Conservation Areas
- Scheduled Monuments
- Special Protection Area and RAMSAR
- Special Areas of Conservation
- Sites of Special Scientific Interest

*Limited long term erosion rates available for this section of coast. Therefore rates for similar types of cliffs and exposure have been applied.

Location Plan:

Location reference:

Scurdie Ness to Rickle Craig

Management Unit reference:

MU 3/1



SUMMARY OF PREFERRED PLAN RECOMMENDATIONS AND JUSTIFICATION

Plan:

The undefended coastline is dominated by a rocky coast and fronting rock platform. There are minimal assets at risk of erosion over the lifetime of the plan along this undeveloped coastline, the exceptions being the East Coast Main Rail Line which passes close to the edge of the cliffs near to Rickle Craig, the listed Lime Kilns at Boddin Point which are being actively eroded and two heritage sites at Fishtown of Usan.

The cliffs are designated as a SSSI and GCR site for their geologically important volcanic lava exposures and any introduction of defences would have a detrimental impact on these exposures and also on the natural landscape of this undefended coastline.

The long term plan is to allow natural processes to continue without any intervention along this coastline. Limited data is available on cliff recession rates along this frontage; however, the historic low rates of erosion and periodic localised rock falls are expected to continue. Monitoring would reduce this uncertainty and would therefore be recommended, particularly where the railway line may be at potential risk. The sustainability of the railway in its present location should be reviewed by Network Rail.

Preferred policies to implement Plan:

From present day (short term to 20 years from now):

The short term policy for this entire frontage is **no active intervention**, with low rates of cliff erosion expected, predominantly through cliff falls, as at present.

Medium term(20-50 years)

The medium term policy for the cliffed frontage between Scurdie Ness and Rickle Craig is to continue is to continue with **no active intervention**.

Longer term(50-100 years)	<p>The long term policy is for a continuation of no active intervention, so the cliffs would continue to evolve naturally.</p> <p>The resistant nature of the cliffs will remain the dominant control on their erosion and therefore recession rates are not expected to be significantly affected by accelerated sea level rise.</p>
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Summary of Specific Policies

Management Unit		Preferred Policies		
		Short term	Medium term	Long term
3/1	Scurdie Ness to Rickle Craig	Allow natural coastal evolution to continue through no active intervention .	Allow natural coastal evolution to continue through no active intervention .	Allow natural coastal evolution to continue through no active intervention .

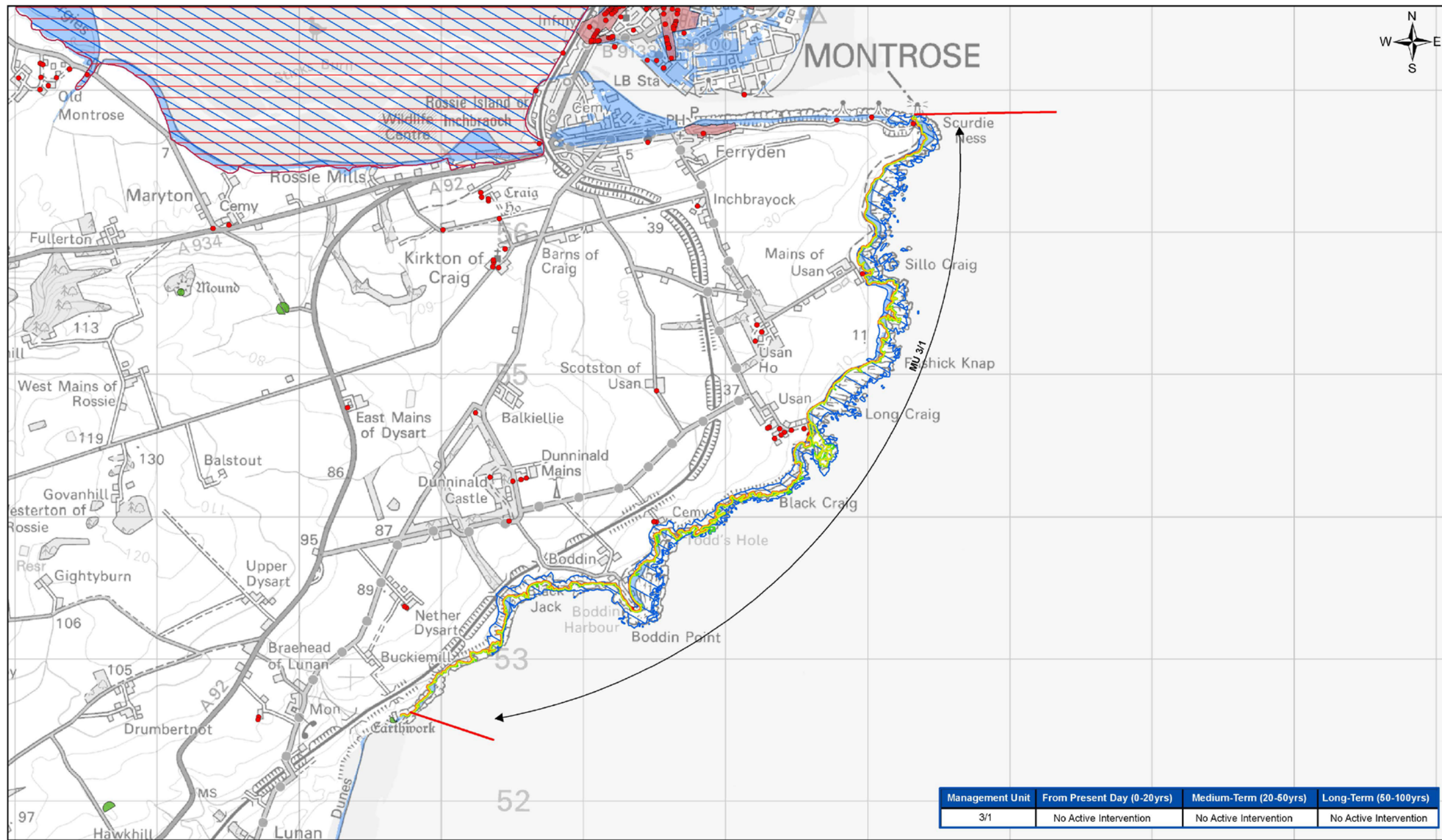
Location reference:		Scurdie Ness to Rickle Craig						
Management Unit reference:		MU 3/1						
IMPLICATIONS OF THE PREFERRED PLAN FOR THIS LOCATION								
Time period	Management Activities	Property and Human Health	Material Assets and Infrastructure	Historic Environment	Flora Fauna and Biodiversity	Geomorphology Geology and Soils	Fisheries and Water	Landscape
2016 - 2036	No active management. Low rates of cliff erosion will continue along this section, with periodic localised rock falls. Monitor extent of cliff erosion/falls and manage access as appropriate.	Potential impact on access routes.	Minimal erosion risk to the railway, farms or to access routes but potential risk of cliff falls. Risk to the railway would be monitored. No adverse impacts on small harbour activities. A 'no development' set back area should be implemented, extending back to the 100 year erosion risk predicted shoreline position.	Minimal erosion predicted to Scurdie Ness West beacon, Montrose Leading Lights or Scurdie Ness Lighthouse, however, there may be potential impact on these structures from cliff falls. Continued erosion risk to Lime Kilns, loss of parts of historic asset and impact on two heritage sites at Fishtown of Usan. No adverse impacts on other Grade B and C listed buildings and Sites of Local Importance.	Natural processes are allowed to continue, which is likely to be beneficial to the nationally designated site. Potential for loss of existing saltmarsh due to ongoing erosion under storm conditions but this will not be a result of SMP policy.	Integrity of local GCR conservation interest features maintained. Minimal loss of agricultural land to erosion.	Natural processes of coastal water body (and any other water body) will not be constrained.	Allowing natural processes to continue will maintain the landscape character.
2036 - 2056	No active management. Low rates of cliff erosion will continue along this section, with periodic localised rock falls. Monitor extent of cliff erosion/falls and manage access as appropriate.	Potential impact on access routes.	Minimal erosion risk to the railway, farms or to access routes but potential risk of cliff falls. Risk to the railway would be monitored. No adverse impacts on small harbour activities. A 'no development' set back area should be implemented, extending back to the 100 year erosion risk predicted shoreline position	Minimal erosion predicted to Scurdie Ness West beacon, Montrose Leading Lights or Scurdie Ness Lighthouse, however, there may be potential impact on these structures from cliff falls. Increased erosion risk to Lime Kilns and loss of parts of historic asset. Impact on the two heritage sites at Fishtown of Usan. No adverse impacts on other Grade B and C listed buildings and Sites of Local Importance.	Natural processes are allowed to continue, which is likely to be beneficial to the nationally designated site. Potential for loss of existing saltmarsh due to ongoing erosion under storm conditions but this will not be a result of SMP policy.	Integrity of local GCR conservation interest features maintained. Minimal loss of agricultural land to erosion.	Natural processes of coastal water body (and any other water body) will not be constrained.	Allowing natural processes to continue will maintain the landscape character.

Location reference:		Scurdie Ness to Rickle Craig						
Management Unit reference:		MU 3/1						
IMPLICATIONS OF THE PREFERRED PLAN FOR THIS LOCATION								
Time period	Management Activities	Property and Human Health	Material Assets and Infrastructure	Historic Environment	Flora Fauna and Biodiversity	Geomorphology Geology and Soils	Fisheries and Water	Landscape
2056 - 2116	<p>No active management.</p> <p>Low rates of cliff erosion will continue along this section, with periodic localised rock falls.</p> <p>Monitor extent of cliff erosion/falls and manage access as appropriate.</p>	<p>Potential impact on access routes.</p>	<p>Minimal erosion risk to the railway, farms or to access routes but potential risk of cliff falls. Risk to the railway would be monitored.</p> <p>No adverse impacts on small harbour activities.</p> <p>A 'no development' set back area should be implemented, extending back to the 100 year erosion risk predicted shoreline position</p>	<p>Minimal erosion predicted to Scurdie Ness West beacon, Montrose Leading Lights or Scurdie Ness Lighthouse, however, there may be potential impact on these structures from cliff falls.</p> <p>Potential loss of lime kilns and impact on the sites at Fishtown of Usan.</p> <p>No adverse impacts on other Grade B and C listed buildings and Sites of Local Importance.</p>	<p>Natural processes are allowed to continue, which is likely to be beneficial to the nationally designated site. Potential for loss of existing saltmarsh due to ongoing erosion under storm conditions but this will not be a result of SMP policy.</p>	<p>Integrity of local GCR conservation interest features maintained.</p> <p>Minimal loss of agricultural land to erosion.</p>	<p>Natural processes of coastal water body (and any other water body) will not be constrained.</p>	<p>Allowing natural processes to continue will maintain the landscape character overall. As sea levels rise, the rock platform may become submerged and pocket beaches may narrow, resulting in a change in landscape character.</p>

Scurdie Ness to Rickle Craig: MU 3/1

ACTION PLAN

Action	Action Ref.	Action Description	Relevant Importance	Lead Authority and Key Partners	Links to Other Actions	Outcome
1. Management Area studies	1.1					
2. Management Unit studies	2.1					
3. Potential Schemes	3.1					
4. Monitoring	4.1	Environmental monitoring of designated sites to provide baseline data for future studies or Habitat Regulations Assessments	Short term	Scottish Natural Heritage		Informs actions
	4.2	Monitor and record erosion of Boddin Lime Kilns at Boddin Point and compare against the 2010 digital record by Scottish Coastal Archaeology and the Problem of Erosion (SCAPE) and Queen's University, Belfast (www.scapetrust.org/pdf/Boddin/BoddinReport.pdf), and the two sites at Fishtown of Usan.	Ongoing	Historic Environment Scotland		Informs actions
	4.3	Monitor cliff erosion to provide data to allow a much greater understanding of cliff behaviour	Short term	Angus Council		Informs actions
	4.4	Contact should be maintained with Network Rail to monitor the short section of track at potential risk at Rickle Craig.	Ongoing	Angus Council / Network Rail		Informs actions
5. Asset Management	5.1	n/a				
6. Communication	6.1	Monitoring and management of action plan by Angus Council to confirm SMP policies are put into practice.	Ongoing	Angus Council		Action Management
7. Adaptation / resilience	7.1	Develop an adaptation plan to relocate the railway line in the future if risk increases.	Medium / long term	Network Rail		Action Management
8. Emergency Response / Flood Warning	8.1	Development, monitoring and review of emergency response plans to prepare for extreme events	Short term	Angus Council / Emergency services		Emergency Management
9. Habitat creation / Environmental Mitigation	9.1					



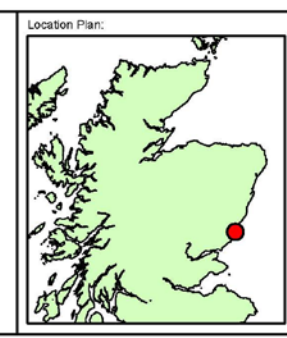
Project :
Angus Shoreline Management Plan 2
 Drawing :
Management Unit: 3 Scurdie Ness to Rickle Craig
 Drawn By : MPC 31/10/2016
 Checked By : SB 31/10/2016
 Approved By : JY 31/10/2016



Legend

- Management Units (MU)
- Erosion Risk - Predicted Shoreline Position*
 - 20 Year
 - 50 Year
 - 100 Year
- Flood Risk - Year 100
 - 0.5% AEP event (coastal)
- Listed Building
- Conservation Areas
- Scheduled Monuments
- Special Protection Area and RAMSAR
- Special Areas of Conservation
- Sites of Special Scientific Interest

*Limited long term erosion rates available for this section of coast. Therefore rates for similar types of cliffs and exposure have been applied.



Location reference:

Lunan Bay

Management Unit reference:

MU 4/1 to MU 4/2



SUMMARY OF PREFERRED PLAN RECOMMENDATIONS AND JUSTIFICATION

Plan:

Lunan Bay is a mostly undeveloped large sandy bay contained between high resistant cliffs to the north and south. The extensive dune and beach system which dominates the bay is intersected by the Lunan Water outlet. Red Castle Scheduled Monument and midden are located beside the Lunan Water and there are a number of World war II defences, a medieval settlement and possible fort found within the dune system. Although the undefended dunes and beach are mostly stable in this enclosed bay, recreation and visitor activities have destabilised parts of the dunes in the north, where dune blowouts are evident.

The holiday home community of Corbie Knowe in the southern end of the bay is at risk of erosion and consequently, ad hoc private defences have been constructed to protect the small number of assets. These defences are at present, in varying states of disrepair, and, having contributed to lowering of the beach in this location, will become increasingly unsustainable over time.

The long term plan for Lunan Bay is to reinstate a completely naturally evolving system in the Bay as a whole, with the dunes providing the natural coastal defence. Once defences fail at Corbie Knowe they would not be replaced, to allow the system to revert back to a natural state. Consequently, Corbie Knowe assets would need to be removed or relocated further inland in the short term.

Measures to limit pressures on the dunes should be investigated and implemented to allow natural processes to continue alongside recreational activities within the dune system.

Preferred policies to implement Plan:

From present day (short term to 20 years from now):

The short term policy for the entire frontage is **no active intervention** to allow the beach and dune system to evolve naturally and provide the coastal defence.

Private maintenance of existing defences at Corbie Knowe would be permitted until the end of their serviceable life to allow time to relocate assets away from the risk area, on the understanding that no new defences would be constructed following failure.

Medium term (20-50 years)	The medium term policy for Lunan Bay is a continuation of no active intervention to allow natural evolution of the beach and dune systems.
Longer term (50-100 years)	The long term policy is for a continuation of no active intervention , so the dunes and beach in Lunan Bay would continue to evolve naturally.

Summary of Specific Policies

Management Unit		Preferred Policies		
		Short term	Medium term	Long term
4/1	Lunan Bay	Allow natural coastal evolution to continue through no active intervention .	Allow natural coastal evolution to continue through no active intervention .	Allow natural coastal evolution to continue through no active intervention .
4/2	Corbie Knowe	Once defences reach the end of their useful life, remove failed defences and allow the cliff and dune system to evolve and retreat naturally, through no active intervention .	Allow natural coastal evolution to continue through no active intervention .	Allow natural coastal evolution to continue through no active intervention .

Location reference:		Lunan Bay						
Management Unit reference:		MU 4/1 to MU 4/2						
IMPLICATIONS OF THE PREFERRED PLAN FOR THIS LOCATION								
Time period	Management Activities	Property and Human Health	Material Assets and Infrastructure	Historic Environment	Flora Fauna and Biodiversity	Geomorphology Geology and Soils	Fisheries and Water	Landscape
2016 - 2036	Private maintenance of existing formal defences at Corbie Knowe until the end of their serviceable life. Maintenance of these ad-hoc defences should not include the use of rubble or other waste materials. Remove defences once failed.	No adverse impact to properties set back from the flood risk area at Lunan. Erosion risk to holiday homes at Corbie Knowe as defences fail. Relocation of some homes will be required before defences fail. The Bay and dunes are likely to remain stable, therefore, minimal impact on recreational activities.	No adverse impacts on the minor access road and car park at Lunan. A 'no development' set back area should be implemented, extending back to the 100 year erosion risk predicted shoreline position. The 'no development' set back should also incorporate areas identified at risk of flooding in a 0.5%AEP (see map at the end of this Policy Statement). Development should also be restricted behind the dune systems to allow for rollback over time.	Heritage properties are mostly on higher ground. Continued erosion of anti-tank blocks at Lunan Water and the midden site beneath Red Castle. Potential for erosion impacting on the medieval settlement site and fort.	Maintains the integrity of conservation interest features.	The beach / dune system will continue to provide a natural form of defence to the backing agricultural land. Continuation of natural processes, and a return to a more natural system at Corbie Knowe once defences fail, will enhance the beach and dune system as a natural defence.	No adverse impacts on fisheries. Natural processes of coastal water body (and any other water body) will not be constrained.	Allowing natural processes will maintain / enhance the landscape character.
2036 - 2056	No active management.	No adverse impact to properties set back from the flood risk area at Lunan. Relocate holiday homes at risk and potential loss at Corbie Knowe. The Bay and dunes are likely to remain stable, therefore, minimal impact on recreational activities.	No adverse impacts on the minor access road and car park at Lunan. No development areas should be implemented. Restrict development behind dune systems to allow for rollback over time.	Heritage properties are mostly on higher ground. Continued erosion / loss of anti-tank blocks at Lunan Water and the midden site beneath Red Castle. Increased potential for erosion impacting on the medieval settlement site and fort.	Maintains the integrity of conservation interest features.	The beach / dune system will continue to provide a natural form of defence to the backing agricultural land. Continuation of natural processes; beach and dune system will continue as a natural defence. However, increasing erosion of the frontal edge of the dunes as sea levels rise.	No adverse impacts on fisheries. Natural processes of coastal water body (and any other water body) will not be constrained.	Allowing natural processes will maintain / enhance the landscape character.
2056 -	No active management.	No adverse impact to	No adverse impacts on	Heritage properties are	Maintains the integrity	The beach / dune	No adverse impacts	Allowing natural

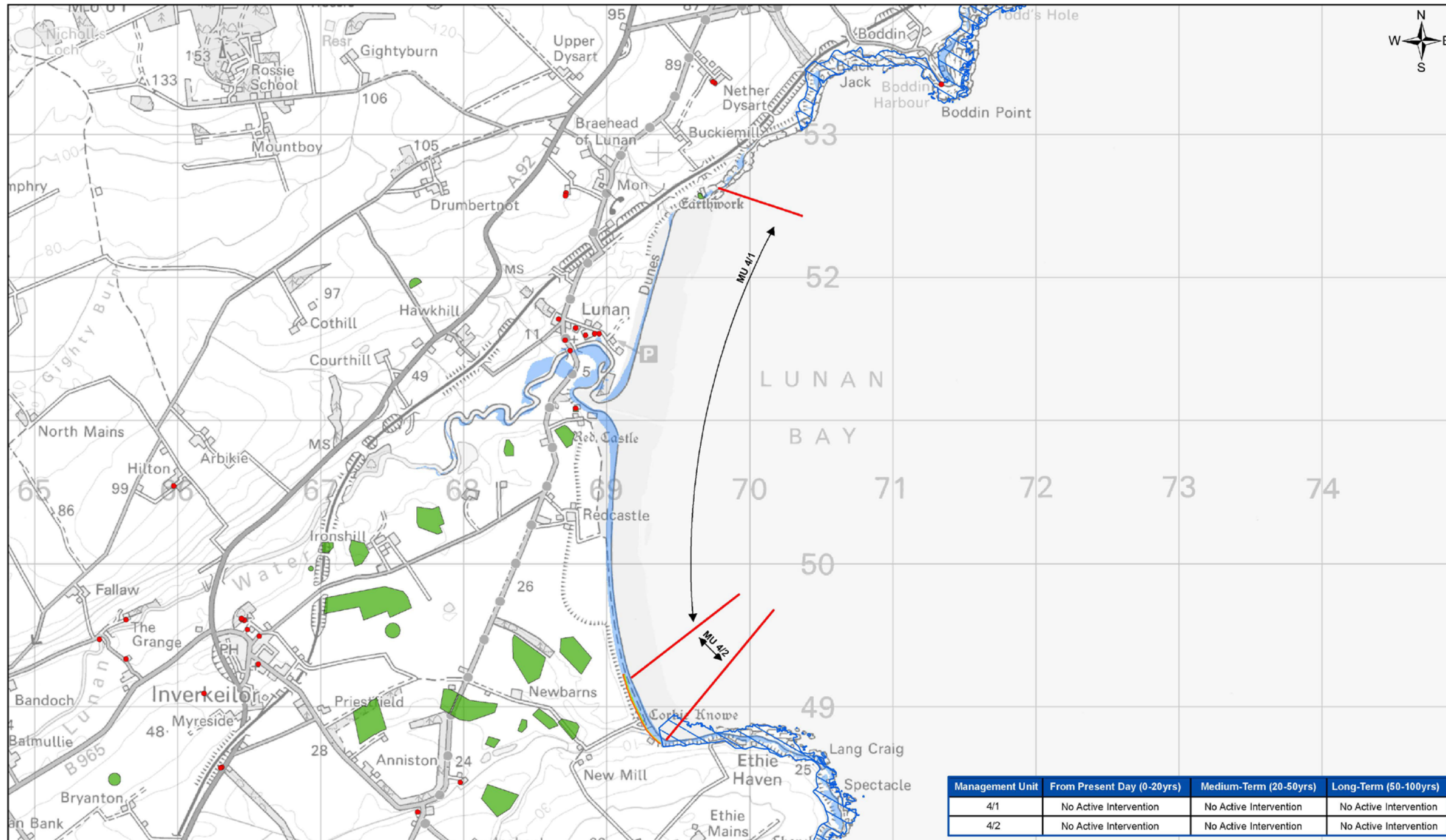
Location reference:		Lunan Bay						
Management Unit reference:		MU 4/1 to MU 4/2						
IMPLICATIONS OF THE PREFERRED PLAN FOR THIS LOCATION								
Time period	Management Activities	Property and Human Health	Material Assets and Infrastructure	Historic Environment	Flora Fauna and Biodiversity	Geomorphology Geology and Soils	Fisheries and Water	Landscape
2116		<p>properties set back from the flood risk area at Lunan.</p> <p>Relocate holiday homes at Corbie Knowe at risk of erosion.</p> <p>The Bay and dunes are likely to remain stable, minimal impact on recreational activities. However, if dunes erode and deteriorate due to human activities and wave erosion, there may be an impact on recreational activities.</p>	<p>the minor access road and car park at Lunan.</p> <p>No development areas should be implemented.</p> <p>Restrict development behind dune systems to allow for rollback over time.</p>	<p>mostly on higher ground.</p> <p>Continued erosion / loss of anti-tank blocks the midden site, medieval settlement and fort.</p>	<p>of conservation interest features.</p>	<p>system should continue to provide a natural form of defence to the backing agricultural land; however, increased erosion risk to agricultural land if dunes erode.</p> <p>Continuation of natural processes; increasing erosion of the frontal edge of the dunes as sea levels rise.</p>	<p>on fisheries.</p> <p>Natural processes of coastal water body (and any other water body) will not be constrained.</p>	<p>processes will maintain / enhance the landscape character.</p>

Lunan Bay: MU 4/1 to MU 4/2						
ACTION PLAN						
Action	Action Ref.	Action Description	Relevant Importance	Lead Authority and Key Partners	Links to Other Actions	Outcome
1. Management Area studies	1.1					
2. Management Unit studies	2.1	MU 4/1: Develop a dune management plan to address anthropogenic and natural pressures on the dunes to maintain their function as a natural defence	Short term	Angus Council / Scottish Natural Heritage	5.1, 7.1	Sustainable management
	2.2	MU 4/2: Develop with asset owners an adaptation strategy for properties at Corbie Knowe. Strategy to include short term measures to manage risks including emergency access and flood warnings and development of a policy to facilitate relocation out of risk area.	Short term	Angus Council	6.1, 7.2, 8.1, 8.2	Sustainable management
3. Potential Schemes	3.1					
4. Monitoring	4.1	Set up a programme of beach profile monitoring to monitor any changes in the beach / dune system along the whole Lunan Bay frontage.	Short term	Angus Council		Informs actions
	4.2	Monitor the heritage sites (Angus SMR NO65SE0062, NO64NE0093, NO64NE0029 and NO64NE0004). If works are required then the asset would need to be subject to archaeological recording or may have potential to become part of a stabilisation structure, preserving the remains in situ. Where erosion would impact on a site, detailed archaeological recording would be required at an early stage (including the recording of any graffiti on the defences) prior to further erosion damaging the site.	Short term	Historic Environment Scotland / Aberdeenshire Council		Sustainable management
5. Asset Management	5.1	Maintenance of beach and dune management including management of public access.	Ongoing	Angus Council	2.1	Sustainable management
6. Communication	6.1	Early dialogue with Corbie Knowe asset owners to develop a relocation strategy.	Short term	Angus Council	2.2, 7.2, 8.1, 8.2	Stakeholder engagement
	6.2	Monitoring and management of action plan by Angus Council to confirm SMP policies are put into practice.	Ongoing	Angus Council		Action management
7. Adaptation / resilience	7.1	Reduce access pressures on the dunes to the north of the Lunan Water by undertaking management activities to reduce the impact of pedestrian pressures and natural wind erosion processes on the dunes.	Short term	Angus Council	2.1, 5.1	Sustainable management
	7.2	Develop a relocation strategy for assets (holiday homes) at Corbie Knowe (MU 4/2) in conjunction with asset owners.	Short term	Angus Council	2.2, 6.1, 8.1, 8.2	Sustainable management
8. Emergency Response / Flood Warning	8.1	Development, monitoring and review of emergency response plans to prepare for extreme events	Short term	Angus Council / Emergency services	2.2, 6.1, 7.2, 8.2	Emergency management
	8.2	Continue to improve flood warning service and raise awareness of flood risk.	Ongoing	Angus Council / SEPA	2.2, 6.1, 7.2, 8.1	Emergency management
9. Habitat creation /	9.1	Seek opportunities for habitat enhancements	Ongoing	Angus Council / Scottish		Sustainable management

Lunan Bay: MU 4/1 to MU 4/2

ACTION PLAN

Environmental Mitigation				Natural Heritage		
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Management Unit	From Present Day (0-20yrs)	Medium-Term (20-50yrs)	Long-Term (50-100yrs)
4/1	No Active Intervention	No Active Intervention	No Active Intervention
4/2	No Active Intervention	No Active Intervention	No Active Intervention

Project:
Angus Shoreline Management Plan 2

Drawing:
Management Unit: 4
Lunan Bay

Drawn By: MPC 31/10/2016
Checked By: SB 31/10/2016
Approved By: JY 31/10/2016

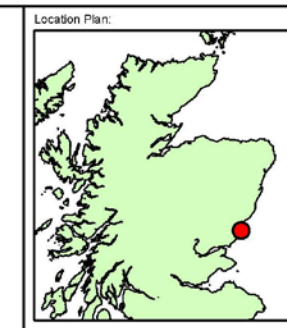
Drawing Scale: 1:25,000
Plot Scale: 1:25,000 @ A3



Legend

- Management Units (MU)
- Erosion Risk - Predicted Shoreline Position*
 - 20 Year
 - 50 Year
 - 100 Year
- Flood Risk - Year 100
 - 0.5% AEP event (coastal)
- Listed Building
- Conservation Areas
- Scheduled Monuments
- Special Protection Area and RAMSAR
- Special Areas of Conservation
- Sites of Special Scientific Interest

*Limited long term erosion rates available for this section of coast. Therefore rates for similar types of cliffs and exposure have been applied.



Location reference:

Lang Craig to Whiting Ness

Management Unit reference:

MU 5/1



SUMMARY OF PREFERRED PLAN RECOMMENDATIONS AND JUSTIFICATION

Plan:

There are currently no defences along this cliffed frontage and no assets are at risk of erosion over the lifetime of the plan. There is, however, an abandoned harbour at Auchmithie which is in a state of disrepair.

The cliffs are designated as SSSI for their geology and any introduction of defences would have a detrimental impact on these exposures and also on the natural landscape of this undefended coastline. The cliffs at Seaton, at the south of the management unit, also form part of the Scottish Wildlife Trust Nature Reserve.

Localised maintenance/ relocation of the footpath which extends along the cliff top would need to be considered should sections of the path become at risk from isolated cliff falls; however, these landslips are primarily caused by drainage and fluvial processes rather than coastal processes.

The long term plan is to allow natural processes to continue without any intervention along this coastline. Limited data is available on cliff recession rates along this frontage; however, the historic low rates of erosion and periodic localised rock falls are expected to continue. Monitoring would reduce this uncertainty and would therefore be recommended, particularly where the coastal path may be at potential risk.

Preferred policies to implement Plan:

From present day (short term to 20 years from now):

The short term policy for this entire frontage is **no active intervention**, with low rates of cliff erosion expected, predominantly through cliff falls, as at present.

Medium term (20-50 years)

The medium term policy for the cliffed frontage between Lang Craig and Whiting Ness is to continue with **no active intervention**.

Long term (50-100 years)	<p>The long term policy is for a continuation of no active intervention, so the cliffs would continue to evolve naturally.</p> <p>The resistant nature of the cliffs will remain the dominant control on their erosion and therefore recession rates are not expected to be significantly affected by accelerated sea level rise.</p>
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Summary of Specific Policies

Management Unit		Preferred Policies		
		Short term	Medium term	Long term
5/1	Lang Craig to Whiting Ness	Allow the cliffs to evolve and retreat naturally through no active intervention .	Allow the cliffs to evolve and retreat naturally through no active intervention .	Allow the cliffs to evolve and retreat naturally through no active intervention .

Location reference:	Lang Craig to Whiting Ness
Management Unit:	MU 5/1

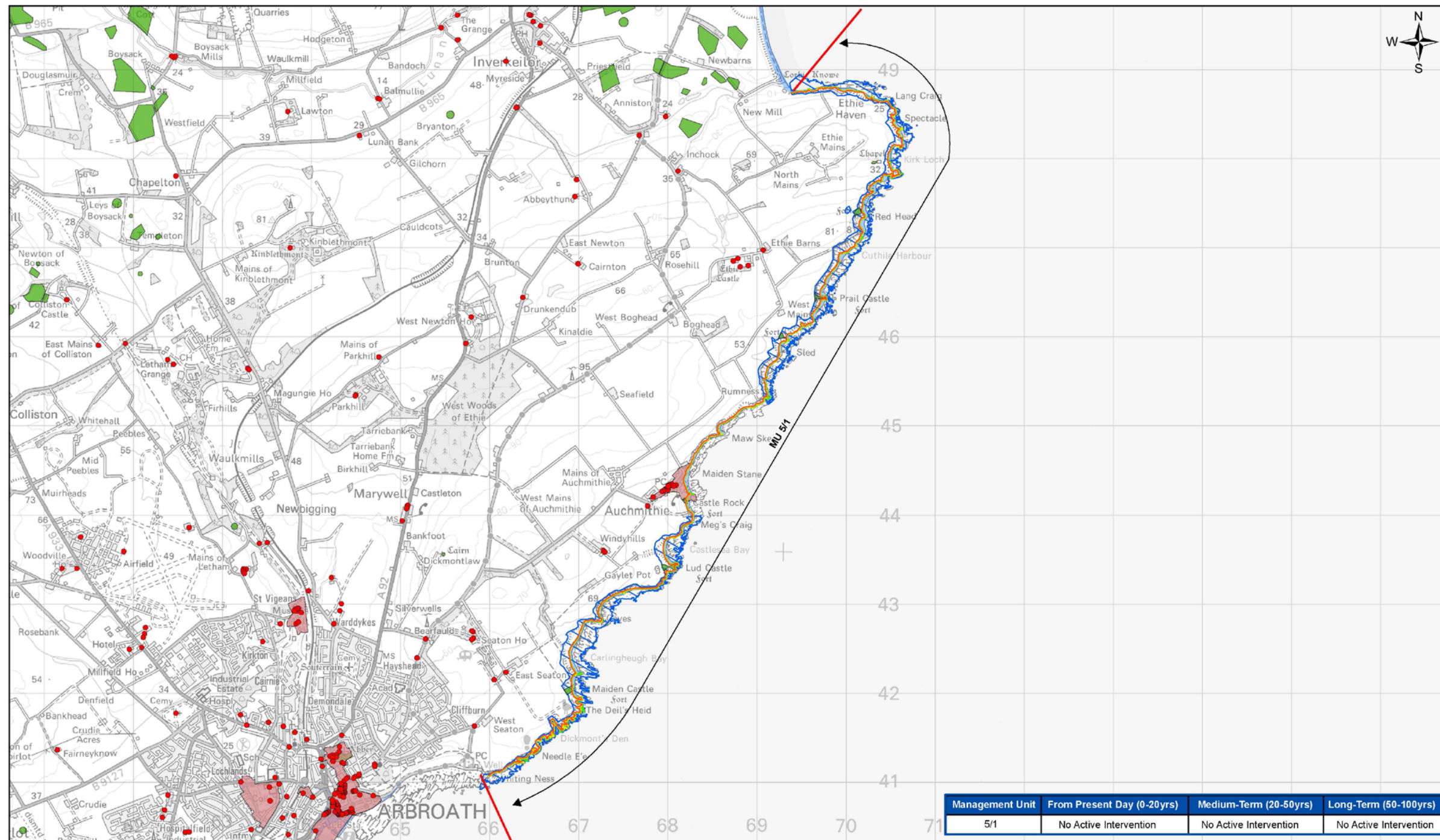
IMPLICATIONS OF THE PREFERRED PLAN FOR THIS LOCATION

Time period	Management Activities	Property and Human Health	Material Assets and Infrastructure	Historic Environment	Flora Fauna and Biodiversity	Geomorphology Geology and Soils	Fisheries and Water	Landscape
2016 - 2036	Manage health and safety risk of landslips/cliff falls Low rates of cliff erosion will continue along this section, with periodic localised rock falls.	Potential erosion risk to cliff top paths as a result of periodic rock falls, therefore relocate further inland as required.	Potential erosion risk to access roads to Auchmithie and Ethie Haven, as a result of periodic rock falls. A 'no development' set back area should be implemented, extending back to the 100 year erosion risk predicted shoreline position.	Potential erosion risk to historic assets near the cliff edge, as a result of rock falls. No adverse impacts on the Auchmithie Conservation Area.	The integrity of national and local conservation interest features will be maintained.	Minimal loss of agricultural land to erosion.	The natural processes of coastal water bodies (or any other water body) will not be constrained.	Allowing natural processes to continue will maintain landscape character.
2036 - 2056	Manage health and safety risk of landslips/cliff falls Low rates of cliff erosion will continue along this section, with periodic localised rock falls.	Potential erosion risk to cliff top paths as a result of periodic rock falls, therefore relocate further inland as required.	Potential erosion risk to access roads to Auchmithie and Ethie Haven, as a result of periodic rock falls. No development areas should be implemented	Potential erosion risk to historic assets near the cliff edge, as a result of rock falls. No adverse impacts on the Auchmithie Conservation Area.	The integrity of national and local conservation interest features will be maintained.	Minimal loss of agricultural land to erosion.	The natural processes of coastal water bodies (or any other water body) will not be constrained.	Allowing natural processes to continue will maintain landscape character.
2056 - 2116	Manage health and safety risk of landslips/cliff falls Low rates of cliff erosion will continue along this section, with periodic localised rock falls.	Potential erosion risk to cliff top paths as a result of periodic rock falls, therefore relocate further inland as required. Potential narrowing of the shingle beach at Auchmithie as sea levels rise.	Potential erosion risk to access roads to Auchmithie and Ethie Haven, as a result of periodic rock falls. No development areas should be implemented	Potential erosion risk to historic assets near the cliff edge, as a result of rock falls. No adverse impacts on the Auchmithie Conservation Area.	The integrity of national and local conservation interest features will be maintained.	Minimal loss of agricultural land to erosion.	The natural processes of coastal water bodies (or any other water body) will not be constrained.	Allowing natural processes to continue will maintain landscape character.

Lang Craig to Whiting Ness: MU 5/1

ACTION PLAN

Action	Action Ref.	Action Description	Relevant Importance	Lead Authority and Key Partners	Links to Other Actions	Outcome
1. Management Area studies	1.1					
2. Management Unit studies	2.1					
3. Potential Schemes	3.1					
4. Monitoring	4.1	Environmental monitoring of designated sites to provide baseline data for future studies or Habitat Regulations Assessments	Short term	Scottish Natural Heritage		Informs actions
	4.2	Monitor cliff erosion to provide data to allow a much greater understanding of cliff behaviour	Short term	Angus Council		Informs actions
	4.3	Monitor risk to cliff paths	Short term	Angus Council	6.2, 7.1	Informs actions
5. Asset Management	5.1					
6. Communication	6.1	Monitoring and management of action plan by Angus Council to confirm SMP policies are put into practice.	Ongoing	Angus Council		Action Management
	6.2	Communication with land owners to investigate path relocation opportunities	Short term	Angus Council	4.3, 7.1	Stakeholder engagement
7. Adaptation / resilience	7.1	Investigate relocation of paths where at risk	Short term	Angus Council	4.3, 6.2	Sustainable Management
8. Emergency Response / Flood Warning	8.1	Development, monitoring and review of emergency response plans to prepare for extreme events	Short term	Angus Council / Emergency services		Emergency Management
9. Habitat creation / Environmental Mitigation	9.1					



Project :
Angus Shoreline Management Plan 2
 Drawing :
Management Unit: 5 Lang Craig to Whiting Ness

Drawn By : MPC 31/10/2016
 Checked By : SB 31/10/2016
 Approved By : JY 31/10/2016

Drawing Scale : 1:40,000
 Plot Scale : 1:40,000 @ A3

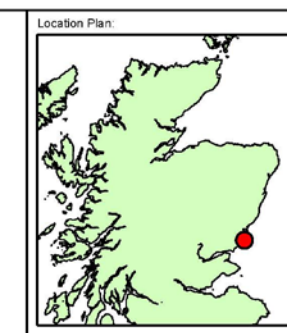


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Legend

- Management Units (MU)
- Erosion Risk - Predicted Shoreline Position*
 - 20 Year
 - 50 Year
 - 100 Year
- Flood Risk - Year 100
 - 0.5% AEP event (coastal)
- Listed Building
- Conservation Areas
- Scheduled Monuments
- Special Protection Area and RAMSAR
- Special Areas of Conservation
- Sites of Special Scientific Interest

*Limited long term erosion rates available for this section of coast. Therefore rates for similar types of cliffs and exposure have been applied.



Location reference:

Arbroath to West Haven

Management Unit reference:

MU 6/1 (a) to 6/4 (c)



SUMMARY OF PREFERRED PLAN RECOMMENDATIONS AND JUSTIFICATION

Plan:

This section of coast extends from Arbroath in the north to West Haven in the south and is characterised by two distinct areas.

The coastal town of Arbroath, its harbour and recreation areas are located to the north of the frontage. Hard coastal defences extend along the entire Arbroath frontage, providing flood and erosion protection to assets and infrastructure at Arbroath, Arbroath Harbour, Seagate and to recreational assets at Victoria Park, Inchcape Park and Gayfield Park. Due to the reflective nature of the defences at Inchcape Park, beach lowering in front of this defence is an increasing problem. A number of heritage assets have been found along the Victoria Park and Inchcape frontages, including skeletons, human remains and medieval stonework.

The southern part of this section, extending from Arbroath to West Haven, is largely undeveloped and is characterised by a relatively stable, mostly undefended dune and beach system. A wide sand beach, backed by a cobble storm beach at the dune toe gives way to a fronting rock platform south of Corse Hill, broken only over a short section at East Haven. The dune systems at Elliot Links are nationally designated as a SSSI for important flora and fauna and habitats. An area of World War II defences survive along this section. The East Coast Main Rail Line runs along the coast here, passing very close to the coastal edge at Hatton, just north of East Haven. Here a short stretch of defence has been constructed to protect the railway line. The only other defence along the southern section is a short stretch of rock revetment at Dowrie, constructed to protect an area of contaminated land.

The village of East Haven is located towards the south of the frontage, within a small bay formed where there is a gap in the rock platform. A wide beach area has formed, backed by stable dunes. A number of properties, accessed by a road under the railway, are located directly landward of a small area of dunes nationally designated as a SSSI.

The long term plan for the Arbroath frontage is to continue to protect assets and infrastructure at flood or erosion risk, and allow private maintenance of defences at Seagate to continue (as

appropriate). Natural evolution and unconstrained coastal processes are key to the conservation of the designated sites at West Links. At East Haven the long term plan is to allow the continuation of limited intervention by the local community to conserve and enhance the dunes as a natural defence through a managed realignment policy. Between Arbroath and West Haven the long term plan is to allow natural evolution of the coast along the majority of the frontage, where the dunes form the natural coastal defence.

A localised hold the line policy is necessary between West Links and East Haven to allow the continued maintenance and improvement (if required) of defences at Hatton and Dowrie. Providing short lengths of protection to the railway and to contaminated land at these two locations is not expected to have a significant effect on coastal processes along the frontage. Risk to the railway should also be monitored and the sustainability of the railway in its present location should be reviewed by Network Rail.

A small number of residential properties along the East Haven coastal frontage may be at increased flood risk as sea levels rise over time or if a breach occurs. Property adaptation and resilience measures should be investigated / implemented to help residents address any future risk. In addition, flood warning and emergency procedures should be implemented for those properties located seaward of the railway.

Preferred policies to implement Plan:

From present day (short term to 20 years from now):

The short term policy between Arbroath and East Haven is **hold the line** to continue to manage flood and erosion risk to the town, recreation areas, harbour, infrastructure and contaminated land. At Arbroath this would involve maintaining and upgrading existing defences, when required, to an appropriate standard. Where defences are privately owned (Seagate) private maintenance would be permitted in consultation with Angus Council for planning purposes. Between Arbroath and East Haven a localised hold the line policy is assumed to involve monitoring of risk and maintenance of existing defences at Dowrie, and monitoring, upgrading and maintenance of defences at Hatton in front of the railway, to maintain standards of protection to the assets.

South of the frontage between Hatton and West Haven a **no active intervention** policy will allow the continuation of natural processes to allow the beach and dune system to provide the coastal defence.

At East Haven, the short term policy for **managed realignment** will enable the continuation of adaptation and dune management by the local community to maintain and enhance the dune system as an effective defence.

Medium term (20-50 years)

The medium term policy at Arbroath and between Arbroath and East Haven is a continuation of **hold the line** through maintaining and upgrading defences if required. The defences at Inchcape and Victoria Park will continue to fix the shoreline position, resulting in potential for loss of the intertidal area as sea levels rise. This will put increasing pressure on defences and therefore capital works may be required to maintain / increase the standard of protection in these locations. Localised hold the line at Hatton and Dowrie may require upgrade of defences in addition to maintenance activities.

This is not expected to have a significant adverse effect on coastal processes, due to the short lengths of defences involved.

Natural evolution of the beach and dune systems will continue through a **no active intervention** policy between Hatton and West Haven.

A **managed realignment** policy at East Haven will continue through adaptation and dune management by the local community to enhance and maintain the natural dune defence line. Coastal monitoring would continue and adaptation and resilience measures encouraged for the small number of private property at flood risk. Relocation of the car park may need to be investigated if at risk.

Longer term (50-100 years)

The long term policy of **hold the line** will continue to provide protection to assets at Arbroath and local infrastructure between Arbroath and East Haven. Defences are likely to require improvements during this period in order to maintain standards of flood defence and address overtopping issues as sea level rise accelerates.

A long term **no active intervention** policy, between Hatton and West Haven will allow continuation of natural processes. The rock platform fronting the beach may become submerged as sea levels rise and therefore the natural protection afforded to the shore will diminish over time and potentially result in increased retreat of the shoreline over this period; however, erosion rates are still expected to be relatively low.

The long term policy of **managed realignment** at East Haven would allow the local community to maintain the natural defence line through adaptation and dune management. Coastal flood and erosion risk would be monitored at East Haven and it may be likely that local adaptation and resilience measures would need to be put in place to address increased any future risk.

Summary of Specific Policies

Management Unit		Preferred Policies		
		Short term	Medium term	Long term
6/1 (a)	Victoria Park	Maintain and upgrade defences through a hold the line policy.	Maintain and upgrade defences through a hold the line policy.	Maintain and upgrade defences through a hold the line policy.
6/1 (b)	Seagate	Permit maintenance (as appropriate, managed via the planning process) of localised private defences through hold the line . The	Permit maintenance (as appropriate, managed via the planning process) of localised private defences through hold the line . The responsibility of	Permit maintenance (as appropriate, managed via the planning process) of localised private defences through hold the line . The

The above provides the local details in respect of the SMP-wide policy presented in the preceding sections of this Plan document. These details must be read in the context of the wider-scale issues and policy implications, as reported therein.

Management Unit		Preferred Policies		
		Short term	Medium term	Long term
		responsibility of maintaining these private defences would lie with the landowner and not Angus Council as they are on private land.	maintaining these private defences would lie with the landowner and not Angus Council as they are on private land.	responsibility of maintaining these private defences would lie with the landowner and not Angus Council as they are on private land.
6/2	Arbroath Harbour	Maintain and upgrade defences through a hold the line policy.	Maintain and upgrade defences through a hold the line policy.	Maintain and upgrade defences through a hold the line policy.
6/3	Inchcape Park to Westway Road	Maintain and upgrade defences through a hold the line policy.	Maintain and upgrade defences through a hold the line policy.	Maintain and upgrade defences through a hold the line policy.
6/4 (a)	West Links to East Haven	Maintenance of railway defences at Hatton and defences protecting contaminated land through a localised hold the line policy. The remaining parts of the coastal frontage would not require intervention under this policy, therefore letting natural processes continue.	Maintenance of railway defences at Hatton and defences protecting contaminated land through a localised hold the line policy. The remaining parts of the coastal frontage would not require intervention under this policy, therefore letting natural processes continue.	Maintenance of railway defences at Hatton and defences protecting contaminated land through a localised hold the line policy. The remaining parts of the coastal frontage would not require intervention under this policy, therefore letting natural processes continue.
6/4 (b)	East Haven	Allow the local community to continue to undertake dune management and adaptation through managed realignment .	Allow the local community to undertake dune management and adaptation measures through managed realignment . Adaptation and resilience measures should be encouraged where assets are at risk.	Allow the local community to continue to undertake dune management and adaptation through managed realignment . Adaptation and resilience measures should be encouraged where assets are at risk.
6/4 (c)	East Haven to West Haven	Allow natural coastal evolution to continue through no active intervention .	Allow natural coastal evolution to continue through no active intervention .	Allow natural coastal evolution to continue through no active intervention .

The above provides the local details in respect of the SMP-wide policy presented in the preceding sections of this Plan document. These details must be read in the context of the wider-scale issues and policy implications, as reported therein.

Location reference:		Arbroath to West Haven						
Management Unit reference:		MU 6/1 (a) to MU 6/4 (c)						
IMPLICATIONS OF THE PREFERRED PLAN FOR THIS LOCATION								
Time period	Management Activities	Property and Human Health	Material Assets and Infrastructure	Historic Environment	Flora Fauna and Biodiversity	Geomorphology, Geology and Soils	Fisheries and Water	Landscape
2016 - 2036	<p>Maintenance of the existing defences at Arbroath, Dowrie and Hatton.</p> <p>Private maintenance (as appropriate, managed via the planning process) of local defences at Seagate.</p> <p>Continued dune management and adaptation measures undertaken by the local community. Encourage local resilience measures at East Haven.</p>	<p>Continued flood and erosion protection to Arbroath (including Seagate).</p> <p>Minimal risk of flooding to shoreline properties at East Haven.</p> <p>Some lowering of the beach in front of the defences at Inchcape.</p> <p>No impacts on the designated bathing and recreational beach at West Links.</p> <p>Continued flood and erosion protection to recreational assets such as Victoria Park and Arbroath FC. However, potential flood or erosion risk to the coastal walk between East Haven and West Haven. No risk to Arbroath Golf Course.</p> <p>Continued protection of contaminated land at Dowrie.</p>	<p>Continued protection of the harbour area, access roads and existing commercial assets.</p> <p>No adverse impacts to the A92 and minor access roads.</p> <p>Continued protection to the East Coast Main Line Railway, however also investigate potential to relocate if risk increases.</p> <p>A 'no development' set back area should be implemented, extending back to the 100 year erosion risk predicted shoreline position in MU 6/4a, b and c, The 'no development' set back should also incorporate areas identified at risk of flooding in a 0.5%AEP coastal event (see map at the end of this Policy Statement).</p>	<p>Continued flood protection of historic assets in Arbroath and Arbroath Town Conservation Area.</p> <p>Potential for any renewal or upgrade of defences to impact on potential buried heritage assets.</p> <p>World War II defences along the frontage may be subject to erosion.</p>	<p>Localised holding the line at Elliot has the potential to constrain the natural evolution of the sand dunes along two short stretches, therefore no significant effect expected on the SSSI. No change to the existing freshwater habitats and species.</p> <p>A continuation of natural processes at East Haven is likely to be beneficial to the national conservation site as dunes (which may support Greater Yellow Rattle) being allowed to evolve and roll-back naturally.</p>	<p>The rock platform and beach will continue to provide protection to the Class 1 agricultural land on the raised beach. Localised areas of flooding of Class 4 land directly behind the shore in areas of no active intervention.</p> <p>Where defences remain, beaches may narrow in front of defences, reducing their function as a natural defence. West of Arbroath, the beach at the dune toe will continue to provide natural protection to this stable frontage.</p> <p>A continuation of natural processes will mean no adverse effects on the stable dune system. However, some localised defence maintenance will constrain the natural roll-back of the dune system in two short locations.</p> <p>The fringing rock platforms will continue</p>	<p>Protection of harbour infrastructure, therefore there is unlikely to be any strategic impacts on fishing activity.</p> <p>Natural processes of coastal water body (or any other water body) unlikely to be constrained to any significant extent, but depends on rate of sea level rise.</p>	<p>Allowing natural processes will maintain / enhance the landscape character to the south. In the north, where defences will continue to be maintained, there will be no change to the urban landscape.</p>

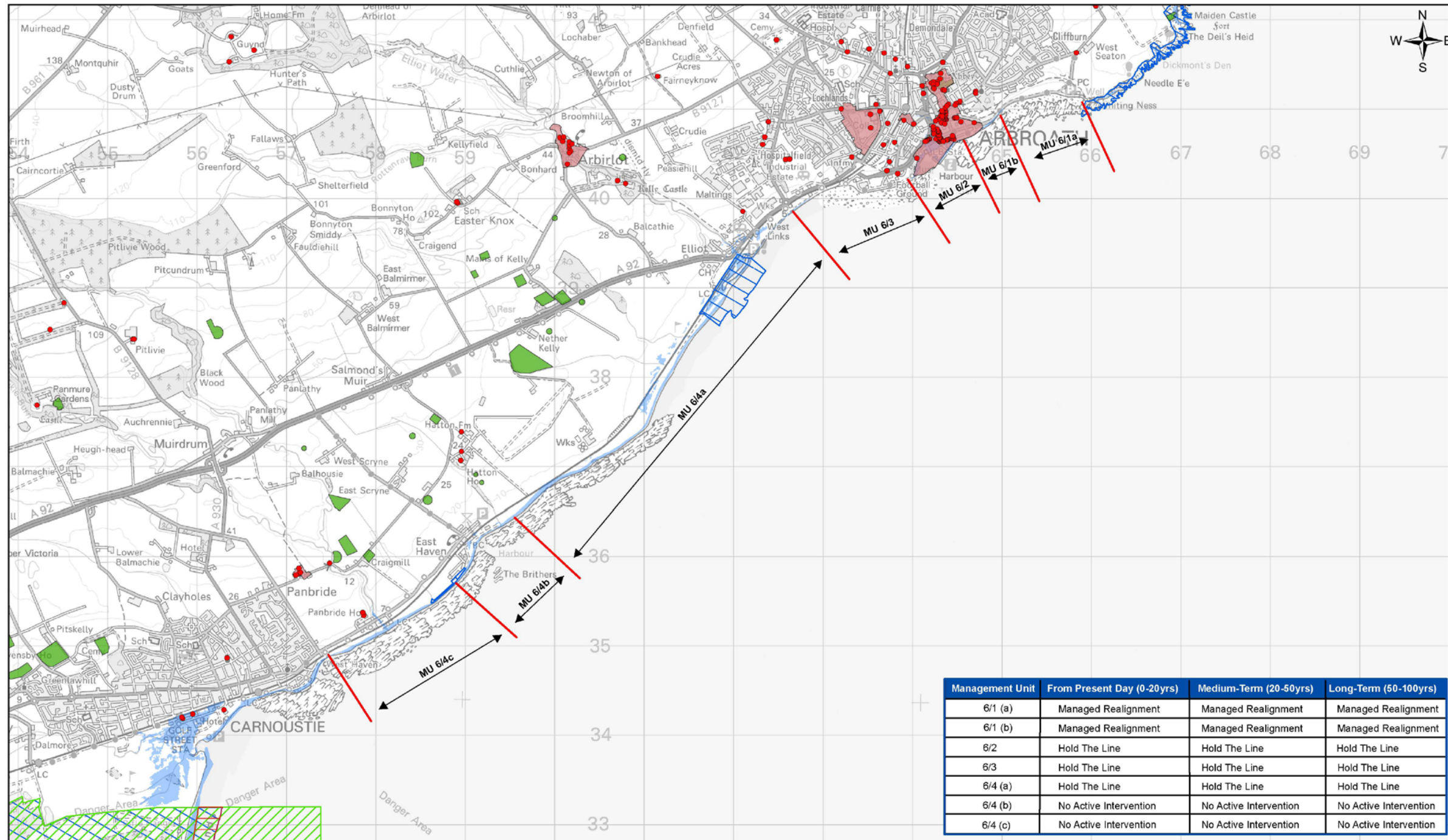
Location reference:		Arbroath to West Haven						
Management Unit reference:		MU 6/1 (a) to MU 6/4 (c)						
IMPLICATIONS OF THE PREFERRED PLAN FOR THIS LOCATION								
Time period	Management Activities	Property and Human Health	Material Assets and Infrastructure	Historic Environment	Flora Fauna and Biodiversity	Geomorphology, Geology and Soils	Fisheries and Water	Landscape
						to provide protection to the shore.		
2036 - 2056	<p>Maintenance and upgrade of the existing defences at Arbroath, Dowrie and Hatton.</p> <p>Private maintenance (as appropriate, managed via the planning process) of local defences at Seagate.</p> <p>Continued dune management and adaptation measures undertaken by the local community. Monitor risk at East Haven and investigate the need for adaptation measures, such as relocating the car park. Encourage local resilience measures at East Haven.</p>	<p>Continued flood and erosion protection to Arbroath (including Seagate).</p> <p>Minimal risk of flooding to shoreline properties at East Haven.</p> <p>Lowering of the beach at Inchcape will continue. No impacts on the designated bathing and recreational beach at West Links.</p> <p>Continued flood and erosion protection to recreational assets such as Victoria Park and Arbroath FC. No risk to Arbroath Golf Course.</p> <p>Continued protection of contaminated land at Dowrie.</p>	<p>Continued protection of the harbour area, access roads and existing commercial assets.</p> <p>No adverse impacts to the A92 and minor access roads.</p> <p>Continued protection to the East Coast Main Line Railway, however also investigate potential to relocate if risk increases.</p> <p>No development areas should be implemented.</p>	<p>Continued flood protection of historic assets in Arbroath and Arbroath Town Conservation Area.</p> <p>Potential for future renewal or upgrade of defences to impact on potential buried heritage assets.</p> <p>Potential for World War II defences along the frontage to be subject to erosion.</p>	<p>Localised holding the line at Elliot has the potential to constrain the natural evolution of the sand dunes along two short stretches, therefore no significant effect expected on the SSSI. No change to the existing freshwater habitats and species.</p> <p>A continuation of natural processes at East Haven is likely to be beneficial to the national conservation site as dunes (which may support Greater Yellow Rattle) are allowed to evolve and roll-back naturally.</p>	<p>The rock platform and beach will continue to provide protection to the Class 1 agricultural land on the raised beach. Localised areas of flooding of Class 4 land directly behind the shore in areas of no active intervention.</p> <p>Where defences remain, beaches may narrow in front of defences, reducing their function as a natural defence. West of Arbroath, the beach at the dune toe will continue to provide natural protection to this stable frontage.</p> <p>A continuation of natural processes will mean no adverse effects on the stable dune system. However, some localised defence maintenance will constrain the natural roll-back of the dune system in two short locations.</p>	<p>No adverse impacts to fisheries unless there are significant changes in water quality.</p> <p>As sea levels rise with climate change, some loss of intertidal habitats along the frontage from Victoria Park to the harbour and from the harbour to Westway Road may result in deleterious effects on ecological status along a notable proportion (c.15%) of the coastal water body's shoreline. Further south, natural processes will be unconstrained.</p>	<p>Allowing natural processes will maintain / enhance the landscape character to the south. In the north, where defences will continue to be maintained, there will be no change to the urban landscape.</p>

Location reference:		Arbroath to West Haven						
Management Unit reference:		MU 6/1 (a) to MU 6/4 (c)						
IMPLICATIONS OF THE PREFERRED PLAN FOR THIS LOCATION								
Time period	Management Activities	Property and Human Health	Material Assets and Infrastructure	Historic Environment	Flora Fauna and Biodiversity	Geomorphology, Geology and Soils	Fisheries and Water	Landscape
						The fringing rock platforms will continue to provide protection to the shore, however, with sea levels rise the influence of the platform may reduce as it becomes submerged		
2056 - 2116	<p>Maintenance and upgrade of the existing defences at Arbroath, Dowrie and Hatton.</p> <p>Private maintenance (as appropriate, managed via the planning process) of local defences at Seagate.</p> <p>Continued dune management and adaptation measures undertaken by the local community. Monitor risk at East Haven and implement adaptation of assets where appropriate to address increased future risk. Encourage local resilience measures at East Haven.</p>	<p>Continued flood and erosion protection to Arbroath (including Seagate).</p> <p>Potential for increased risk of flooding to low-lying properties at East Haven with sea levels rise.</p> <p>Further narrowing and potential loss of the beach at Inchcape is likely due to coastal squeeze. No impacts on the designated bathing and recreational beach at West Links.</p> <p>Continued flood and erosion protection to recreational assets such as Victoria Park and Arbroath FC. No risk to Arbroath Golf Course.</p> <p>Continued protection of</p>	<p>Continued protection of the harbour area, access roads and existing commercial assets.</p> <p>No adverse impacts to the A92 and minor access roads.</p> <p>Continued protection to the East Coast Main Line Railway, however also investigate potential to relocate if risk increases.</p> <p>No development areas should be implemented.</p>	<p>Continued flood protection of historic assets in Arbroath and Arbroath Town Conservation Area.</p> <p>Potential for future renewal or upgrade of defences to impact on potential buried heritage assets.</p> <p>Potential erosion of World War II defences along the frontage.</p>	<p>Localised holding the line at Elliot has the potential to constrain the natural evolution of the sand dunes along two short stretches, therefore no significant effect expected on the SSSI. No change to the existing freshwater habitats and species.</p> <p>A continuation of natural processes at East Haven is likely to be beneficial to the national conservation site as dunes (which may support Greater Yellow Rattle) are allowed to evolve and roll-back naturally.</p>	<p>The rock platform and beach will continue to provide protection to the Class 1 agricultural land on the raised beach. Localised areas of flooding of Class 4 land directly behind the shore in areas of no active intervention.</p> <p>Where defences remain, beaches may narrow in front of defences, reducing their function as a natural defence. West of Arbroath, the beach at the dune toe will continue to provide natural protection to this stable frontage.</p> <p>A continuation of natural processes will mean no adverse effects on the stable</p>	<p>No adverse impacts to fisheries unless there are significant changes in water quality.</p> <p>As sea levels rise with climate change, some loss of intertidal habitats along the frontage from Victoria Park to the harbour and from the harbour to Westway Road may result in deleterious effects on ecological status along a notable proportion (c.15%) of the coastal water body's shoreline. Further south, natural processes will be unconstrained.</p>	<p>Allowing natural processes will maintain / enhance the landscape character to the south, however, potential changes in landscape character at East Haven if erosion becomes an issue in the long term.</p>

Location reference:		Arbroath to West Haven						
Management Unit reference:		MU 6/1 (a) to MU 6/4 (c)						
IMPLICATIONS OF THE PREFERRED PLAN FOR THIS LOCATION								
Time period	Management Activities	Property and Human Health	Material Assets and Infrastructure	Historic Environment	Flora Fauna and Biodiversity	Geomorphology, Geology and Soils	Fisheries and Water	Landscape
		contaminated land at Dowrie.				<p>dune system. However, some localised defence maintenance will constrain the natural roll-back of the dune system in two short locations. Dune erosion may increase as sea levels rise.</p> <p>Permanent submergence of fringing rock platforms is possible as sea levels rise, reducing their natural defence function.</p>		

Arbroath to West Haven: MU 6/1(a) to MU 6/4 (c)						
ACTION PLAN						
Action	Action Ref.	Action Description	Relevant Importance	Lead Authority and Key Partners	Links to Other Actions	Outcome
1. Management Area studies	1.1					
2. Management Unit studies	2.1	MU 6/4(b): Develop an adaptation strategy for East Haven.	Medium term	Angus Council / East Haven Residents Association / East Haven Together	5.2, 6.1, 7.1, 8.1, 8.2	Sustainable Management
3. Potential Schemes	3.1					
4. Monitoring	4.1	Beach profile monitoring	Short term	Angus Council		Informs actions
	4.2	Structural monitoring of defences	Ongoing	Angus Council / Network Rail		Informs actions
	4.3	Monitor risk to contaminated land	Ongoing	Angus Council		Informs actions
	4.4	Monitor risk to railway	Ongoing	Angus Council / Network Rail		Informs actions
	4.5	Monitor heritage assets (Angus SMR NO64SW0216 and NO64SW0050) in light of any renewal or upgrade of defences.	Ongoing	Historic Environment Scotland / Aberdeenshire Council		Sustainable management
	4.6	Monitor erosion of World War II assets (Angus SMR NO63NW0019) and undertake detailed archaeological recording at an early stage (including the recording of any graffiti on the defences) prior to further erosion damaging the site.	Short term	Historic Environment Scotland / Aberdeenshire Council		Sustainable management
5. Asset Management	5.1	Maintenance of defences and beach and dune management including management of public access.	Ongoing	Angus Council		Sustainable management
	5.2	Dune management and adaptation measures.	Ongoing	East Haven Together / East Haven community	2.1	Sustainable management
6. Communication	6.1	Consult key stakeholders and general public during adaptation strategy development.	Medium term	Angus Council	2.1, 7.1, 8.1, 8.2	Stakeholder engagement
	6.2	Monitoring and management of action plan by Angus Council to confirm SMP policies are put into practice.	Ongoing	Angus Council		Action management
7. Adaptation / resilience	7.1	Property adaptation and resilience measures should be investigated to help residents at East Haven address any future flood risk.	Medium term	Angus Council / East Haven Residents Association	2.1, 5.2, 6.1, 8.1, 8.2	Sustainable management
	7.2	Investigate potential for relocation of the railway if risk increases in the	Ongoing	Network rail		Action Management

		future.				
8. Emergency Response / Flood Warning	8.1	Development, monitoring and review of emergency response plans to prepare for over design standard / extreme events	Short term	Angus Council / Emergency services	2.1, 6.1, 7.1, 8.2	Emergency management
	8.2	Continue to improve flood warning service (potential for linkages with Carnoustie flood forecasting scheme and any future flood warning proposals) and raise awareness of flood risk.	Ongoing	Angus Council / SEPA	2.1, 6.1, 7.1, 8.1	Emergency management
9. Habitat creation / Environmental Mitigation	9.1	Seek opportunities for habitat enhancements as part of flood/erosion risk management works	Short term	Angus Council / Scottish Natural Heritage / East Haven Together	5.2	Sustainable management



Management Unit	From Present Day (0-20yrs)	Medium-Term (20-50yrs)	Long-Term (50-100yrs)
6/1 (a)	Managed Realignment	Managed Realignment	Managed Realignment
6/1 (b)	Managed Realignment	Managed Realignment	Managed Realignment
6/2	Hold The Line	Hold The Line	Hold The Line
6/3	Hold The Line	Hold The Line	Hold The Line
6/4 (a)	Hold The Line	Hold The Line	Hold The Line
6/4 (b)	No Active Intervention	No Active Intervention	No Active Intervention
6/4 (c)	No Active Intervention	No Active Intervention	No Active Intervention

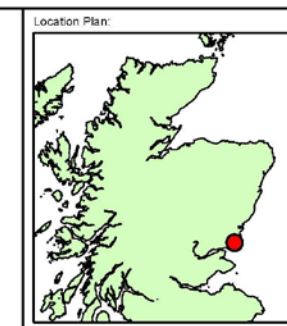
Project :
Angus Shoreline Management Plan 2
 Drawing :
Management Unit: 6 Arbroath to West Haven
 Drawn By : MPC 31/10/2016
 Checked By : SB 31/10/2016
 Approved By : JY 31/10/2016




Legend

- Management Units (MU)
- Erosion Risk - Predicted Shoreline Position*
 - 20 Year
 - 50 Year
 - 100 Year
- Flood Risk - Year 100
 - 0.5% AEP event (coastal)
- Listed Building
- Conservation Areas
- Scheduled Monuments
- Special Protection Area and RAMSAR
- Special Areas of Conservation
- Sites of Special Scientific Interest

*Limited long term erosion rates available for this section of coast. Therefore rates for similar types of cliffs and exposure have been applied.



<p>Location reference:</p> <p>Management Unit reference:</p>	<p>Carnoustie</p> <p>MU 7/1 to 7/2</p> 
<p>SUMMARY OF PREFERRED PLAN RECOMMENDATIONS AND JUSTIFICATION</p>	
<p>Plan:</p> <p>The Carnoustie frontage extends from West Haven in the east to Barry Burn in the west. Between West Haven and Carnoustie Station the hinterland consists of a largely developed residential area, fronted by a low narrow dune ridge, narrow beach and fronting rock platform broken only over a short section at West Haven. The East Coast Main Rail Line runs along this section of coast, and a pumping station and buried wastewater main are also located close to the shore. The shoreline is relatively stable along this section where the rock platform provides natural protection to the shoreline and consequently defences are now buried in some locations.</p> <p>Between Carnoustie Station and Barry Burn the hinterland is predominantly used for recreation. Carnoustie is an important tourism centre, famous for its golf course. Here defences provide flood protection to a recreation area, leisure centre, Carnoustie Golf Course and Hotel. A wide sloping sand beach fronts the defences; however beach levels can vary, with no exposed beach at high tide along the majority of frontage.</p> <p>The long term plan for Carnoustie is to continue to protect assets and infrastructure at flood or erosion risk. Where the coastline is stable and defences are currently buried minimal intervention is expected to be required.</p>	
<p>Preferred policies to implement Plan:</p>	
<p>From present day (short term to 20 years from now):</p>	<p>The short term policy for the Carnoustie frontage is to hold the line of the existing defences to provide protection to Carnoustie town, infrastructure and recreational assets. Between West Haven and Carnoustie Station this would involve limited intervention as long as the frontage is accreting and defences are buried. Between Carnoustie Station and Barry Burn the hold the line policy would involve maintenance of the existing defences.</p> <p>Continued monitoring of the dynamic coastline is recommended to inform future management.</p>

Medium term (20-50 years)

The medium term policy for the whole frontage is a continuation of **hold the line**. Assuming present conditions continue, the dunes between West Haven and Carnoustie Station are predicted to remain relatively stable. However, if frontal erosion of the dunes becomes an issue, dune management measures, such as planting or dune fencing could be implemented to help slow the erosion, or additional defences (e.g. rock revetment) may be required.

The inter-tidal beach will continue to narrow and lower seaward of the rock revetment to the west between Carnoustie Station and the Barry Burn due to reflection from the defence and as sea levels rise. More substantial defences may be required to address increasing overtopping issues over time.

Continued monitoring of the dynamic coastline is recommended to inform future management.

Longer term (50-100 years)

The long term policy at Carnoustie is to **hold the line**. Between West Haven and Carnoustie Station, the rock platform fronting the beach may become submerged as sea levels rise. The natural protection afforded by the rock platform to the beach will therefore diminish over time. Although the dune system is assumed to remain fairly resilient if current conditions continue, there is potential for increased frontal erosion as sea levels rise. Consequently, more substantial works in the form of an extension of the rock revetment to the west may be required along this frontage to protect properties at risk.

Between Carnoustie Station and the Barry Burn, the intertidal beach will continue to narrow and lower seaward of the defence structures as sea levels rise. As the sea level rises, wave action will move higher onto the beach resulting in erosion of the beach and an increased risk of overtopping of defences. More substantial defences may be required to address overtopping issues over this epoch.

Continued monitoring of the dynamic coastline is recommended to inform future management.

Summary of Specific Policies

Management Unit		Preferred Policies		
		Short term	Medium term	Long term
7/1	West Haven to Carnoustie Station	Limited intervention and maintenance of defences through a hold the line policy.	Limited intervention and maintenance of defences through a hold the line policy.	Limited intervention and maintenance of defences through a hold the line policy.
7/2	Carnoustie Station to Barry Burn	Maintain and upgrade defences through a hold the line policy.	Maintain and upgrade defences through a hold the line policy.	Maintain and upgrade defences through a hold the line policy.

The above provides the local details in respect of the SMP-wide policy presented in the preceding sections of this Plan document. These details must be read in the context of the wider-scale issues and policy implications, as reported therein.

Location reference:		Carnoustie						
Management Unit reference:		MU 7/1 to MU 7/2						
IMPLICATIONS OF THE PREFERRED PLAN FOR THIS LOCATION								
Time period	Management Activities	Property and Human Health	Material Assets and Infrastructure	Historic Environment	Flora Fauna and Biodiversity	Geomorphology Geology and Soils	Fisheries and Water	Landscape
2016 - 2036	West Haven to Carnoustie - Limited intervention / maintenance of defences. Carnoustie Station to the Barry Burn - Maintenance of existing defences.	Continued flood protection to Carnoustie and West Haven. Continued flood and erosion protection to recreational assets to maintain tourism and amenity areas, including the Championship Golf Course. The fronting beach may narrow and lower due to the reflective nature of the defences and coastal squeeze against the defences over time with loss of amenity value. Continued defence maintenance will maintain the water quality of the designated bathing beach.	Continued flood and erosion protection of main east coast railway in Carnoustie. Continued protection of pumping station and associated assets from erosion.	No heritage features present.	No direct impacts on the SPA, SAC or SSSI sites. However the continued maintenance of defences to the north of the designated site will constrain natural processes and has the potential to affect sediment supply to the SSSI, SPA and SAC dune habitats to the south. Continued coastal squeeze of intertidal habitat adjacent to the designated site has the potential to impact on SPA birds using the area and SAC / SSSI interest features. However, assuming the current sediment regime continues, this is not anticipated to affect the condition of the site as it is not currently affecting the site.	The fronting beach may narrow and lower due to the reflective nature of the defences and coastal squeeze against the defences over time. The dune system will remain stable and intertidal rock platform will continue to provide natural protection to this stable frontage.	Natural processes of coastal water body (or any other water body) unlikely to be constrained to any significant extent, but depends on rate of sea level rise.	Defences will maintain the existing landscape character of land in the hinterland. The narrowing of the beach may affect the local landscape character but no adverse strategic landscape impacts would be experienced.
2036 - 2056	West Haven to Carnoustie - Limited intervention along the frontage. If dune erosion becomes an issue implement dune	Continued flood protection to Carnoustie and West Haven. Continued flood and erosion protection to	Continued flood and erosion protection of main east coast railway in Carnoustie. Continued protection of pumping station and	No heritage features present.	No direct impacts on the SPA, SAC or SSSI sites. However the continued maintenance of defences to the north	The dunes will remain relatively stable. The intertidal beach will continue to narrow and lower seaward of the remaining	As sea levels rise with climate change, some loss of intertidal habitats is likely along the frontage. The frontage is small	Any substantial works on the defence will have significant impacts on the landscape character of the frontage. The

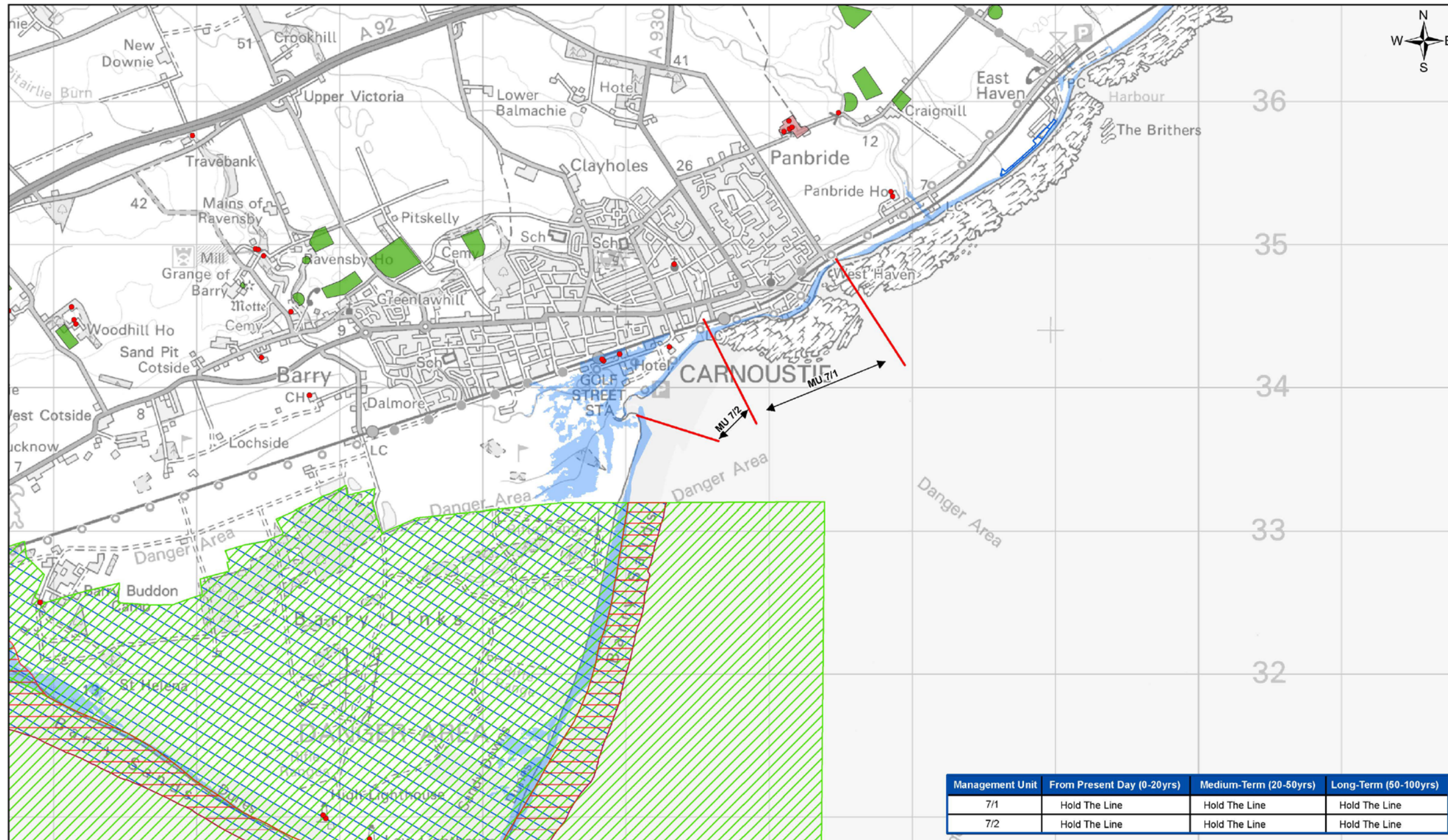
Location reference:		Carnoustie						
Management Unit reference:		MU 7/1 to MU 7/2						
IMPLICATIONS OF THE PREFERRED PLAN FOR THIS LOCATION								
	<p>management measures, such as planting or dune fencing or construct additional defences (e.g. rock revetment).</p> <p>Carnoustie Station to the Barry Burn – Maintenance and upgrading of defences.</p>	<p>recreational assets to maintain tourism and amenity areas, including the Championship Golf Courses.</p> <p>The intertidal beach will continue to narrow and lower seaward of the remaining structures as sea levels rise, with associated loss of amenity value of the beach.</p>	<p>associated assets from erosion.</p>		<p>of the designated site will constrain natural processes and has the potential to affect sediment supply to the SSSI, SPA and SAC dune habitats to the south. Continued coastal squeeze of intertidal habitat adjacent to the designated site has the potential to impact on SPA birds using the area and SAC / SSSI interest features. However, assuming the current sediment regime continues, this is not anticipated to affect the condition of the site as it is not currently affecting the site.</p>	<p>structures as sea levels rise.</p>	<p>compared to the full coastline of the water body, and also is likely to be a non-critical reach in terms of ecological quality, i.e. any effect will be limited spatially/geographically and will not affect a particularly important feature in the water body, hence we can conclude no risk of deterioration.</p> <p>WFD objectives are unlikely to be compromised.</p>	<p>narrowing of the beach may affect the local landscape character but no adverse strategic landscape impacts would be experienced.</p>
2056 - 2116	<p>West Haven to Carnoustie – Maintenance, upgrading of defences.</p> <p>Carnoustie Station to the Barry Burn – Maintenance, upgrading of defences.</p>	<p>Continued flood protection to Carnoustie and West Haven.</p> <p>Continued flood and erosion protection to maintain tourism and amenity areas, including the Championship Golf Courses.</p> <p>The intertidal beach will continue to narrow and lower seaward of the</p>	<p>Continued flood and erosion protection of main east coast railway in Carnoustie.</p> <p>Continued protection of pumping station and associated assets from erosion.</p>	<p>No heritage features present.</p>	<p>No direct impacts on the SPA, SAC or SSSI sites. However the continued maintenance of defences to the north of the designated site will constrain natural processes and has the potential to affect sediment supply to the SSSI, SPA and SAC dune habitats to the south. Continued coastal squeeze of intertidal habitat adjacent to the</p>	<p>The dunes will remain relatively stable. The intertidal beach will continue to narrow and lower seaward of the remaining structures as sea levels rise.</p>	<p>As sea levels rise with climate change, some loss of intertidal habitats is likely along the frontage. The frontage is small compared to the full coastline of the water body, and also is likely to be a non-critical reach in terms of ecological quality, i.e. any effect will be limited spatially/geographically and will not affect a</p>	<p>Any substantial works on the defence will have significant impacts on the landscape character of the frontage. The narrowing of the beach may affect the local landscape character but no adverse strategic landscape impacts would be experienced.</p>

Location reference:		Carnoustie					
Management Unit reference:		MU 7/1 to MU 7/2					
IMPLICATIONS OF THE PREFERRED PLAN FOR THIS LOCATION							
		remaining structures as sea levels rise, with associated loss of amenity value of the beach.			designated site has the potential to impact on SPA birds using the area and SAC / SSSI interest features. However, assuming the current sediment regime continues, this is not anticipated to affect the condition of the site as it is not currently affecting the site.		particularly important feature in the water body, hence we can conclude no risk of deterioration. WFD objectives are unlikely to be compromised

Carnoustie: MU 7/1 to MU 7/2

ACTION PLAN

Action	Action Ref.	Action Description	Relevant Importance	Lead Authority and Key Partners	Links to Other Actions	Outcome
1. Management Area studies	1.1	Coastal processes study to investigate links between changes in tidal flows and wave conditions and movement of the Tay Estuary channel and Gaa Sands, and patterns of erosion and accretion along the eastern flank of Buddon Ness and within Carnoustie Bay.	Short term	Angus Council / Scottish Natural Heritage	MU 8	Informs actions
2. Management Unit studies	2.1					
3. Potential Schemes	3.1					
4. Monitoring	4.1	Beach profile monitoring	Ongoing	Angus Council		Informs actions
	4.2	Defence structure monitoring	Ongoing	Angus Council		Informs actions
	4.3	Ongoing monitoring of erosion / accretion and consideration of changes in potential indirect impacts on designated sites.	Ongoing	Scottish Natural Heritage		Informs actions
5. Asset Management	5.1	Maintenance of defences and beach management including management of public access.	Ongoing	Angus Council		Sustainable management
6. Communication	6.1	Monitoring and management of action plan by Angus Council to confirm SMP policies are put into practice.	Ongoing	Angus Council		Action management
7. Adaptation / resilience	7.1					
8. Emergency Response / Flood Warning	8.1	Development, monitoring and review of emergency response plans to prepare for over design standard events	Short term	Angus Council / Emergency services		Emergency management
	8.2	Continue to improve flood warning service (linked to Carnoustie Flood Forecasting scheme proposals) and raise awareness of flood risk.	Ongoing	Angus Council / SEPA		Emergency management
9. Habitat creation / Environmental Mitigation	9.1					



Management Unit	From Present Day (0-20yrs)	Medium-Term (20-50yrs)	Long-Term (50-100yrs)
7/1	Hold The Line	Hold The Line	Hold The Line
7/2	Hold The Line	Hold The Line	Hold The Line

Project :
Angus Shoreline Management Plan 2
 Drawing :
Management Unit: 7 Carnoustie

Drawn By : MPC 31/10/2016
 Checked By : SB 31/10/2016
 Approved By : JY 31/10/2016

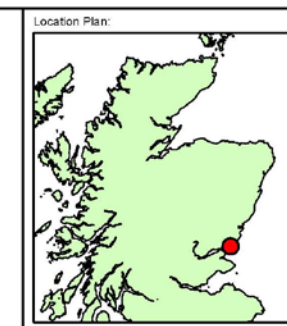
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 Plot Scale : 1:25,000 @A3



Legend

- Management Units (MU)
- Erosion Risk - Predicted Shoreline Position*
 - 20 Year
 - 50 Year
 - 100 Year
- Flood Risk - Year 100
 - 0.5% AEP event (coastal)
- Listed Building
- Conservation Areas
- Scheduled Monuments
- Special Protection Area and RAMSAR
- Special Areas of Conservation
- Sites of Special Scientific Interest

*Limited long term erosion rates available for this section of coast. Therefore rates for similar types of cliffs and exposure have been applied.



Location reference: Management Unit reference:	Buddon Ness MU 8/1 to 8/2
	

SUMMARY OF PREFERRED PLAN RECOMMENDATIONS AND JUSTIFICATION

Plan:

The Buddon Ness frontage extends from Barry Burn, Carnoustie in the east to Monifieth in the west. Buddon Ness represents an extensive, dynamic dune system, the majority of which is allowed to function and evolve naturally. Buddon Ness falls within the boundaries of MoD land and therefore there is very little development on the Ness, with the exception of Carnoustie Golf Course in the north east, two historic lighthouses, various World War II defences and built assets associated with MoD activities. The majority of the Buddon Ness dune system is internationally designated as a SAC and nationally designated as a SSSI, while the intertidal areas are internationally designated as SPA and Ramsar. The eastern half of the Ness is also designated as a GCR site.

A rock armour revetment, built in 1990, extends along the eastern side of the Ness at Barry Sands East to protect Carnoustie Golf Course and the MoD firing range located in this area. The intertidal beach is wide in this location; however, beach levels have fallen, with no exposed beach at high tide. Construction of defences has effectively restricted landward movement of the shoreline and natural sediment exchange between the dunes and beach.

On the assumption that the MoD will continue to use Buddon Ness into the long term, the plan for Buddon Ness is to continue to protect MoD and golf course assets from flood and erosion risk at Barry Sands East, while allowing natural processes to continue unhindered along the southern and western frontages, where the naturally evolving dune and beach system will continue to provide the natural coastal defence.

If in the future, the MoD reduce their activities or leave the Barry Buddon site, opportunities to remove defences and restore the natural coastline and process should be investigated.

Preferred policies to implement Plan:

From present day (short term to 20 years from now):	The short term plan is to hold the line along the Barry Sands East frontage through maintenance of defences providing protection to the MoD firing range. The defence will continue to fix the shoreline and current problems of seabed lowering in front of this defence are likely to continue. Overtopping of the defence and the resulting
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scour of the backing dunes may undermine the revetment over time.

The short term plan for the Buddon Ness shoreline is to allow the remaining dune system to evolve and retreat naturally, through a policy of **no active intervention**.

Medium term (20-50 years)

The medium term plan is to continue to **hold the line** at Barry Sands East. This would involve maintenance of the defence, such as including defence crest protection to reduce erosion caused by overtopping.

The medium term policy for the remaining Buddon Ness frontages is a continuation of **no active intervention** to allow natural evolution of the beach and dune systems.

Longer term (50-100 years)

Assuming the MoD still has a presence on Buddon Ness, the long term policy will be to continue to **hold the line** to provide protection to the firing range and other MoD assets. Increased overtopping with sea level rise and continued outflanking and erosion of the dunes to the south of the defence may become an issue.

The long term policy is for a continuation of **no active intervention**, so the dunes and beach to the south and west of Buddon Ness would continue to evolve naturally.

Summary of Specific Policies

Management Unit		Preferred Policies		
		Short term	Medium term	Long term
8/1	Barry Sands East	<p>Permit maintenance of the private defence through hold the line (managed through the planning process). The responsibility of maintaining these private defences would lie with the landowner (MoD) and not Angus Council as they are on private land.</p> <p>If the MoD withdraws from the site, opportunities to remove defences and restore the natural coastline and process should be investigated.</p>	<p>Permit maintenance of the private defence through hold the line (managed through the planning process). The responsibility of maintaining these private defences would lie with the landowner (MoD) and not Angus Council as they are on private land.</p> <p>If the MoD withdraws from the site, opportunities to remove defences and restore the natural coastline and process should be investigated.</p>	<p>Permit maintenance of the private defence through hold the line (managed through the planning process). The responsibility of maintaining these private defences would lie with the landowner (MoD) and not Angus Council as they are on private land.</p> <p>If the MoD withdraws from the site, opportunities to remove defences and restore the natural</p>

The above provides the local details in respect of the SMP-wide policy presented in the preceding sections of this Plan document. These details must be read in the context of the wider-scale issues and policy implications, as reported therein.

Angus Shoreline Management Plan 2

Management Unit		Preferred Policies		
		Short term	Medium term	Long term
				coastline and process should be investigated.
8/2	Barry Buddon and Barry Sands West	Allow natural coastal evolution to continue through no active intervention .	Allow natural coastal evolution to continue through no active intervention .	Allow natural coastal evolution to continue through no active intervention .

The above provides the local details in respect of the SMP-wide policy presented in the preceding sections of this Plan document. These details must be read in the context of the wider-scale issues and policy implications, as reported therein.

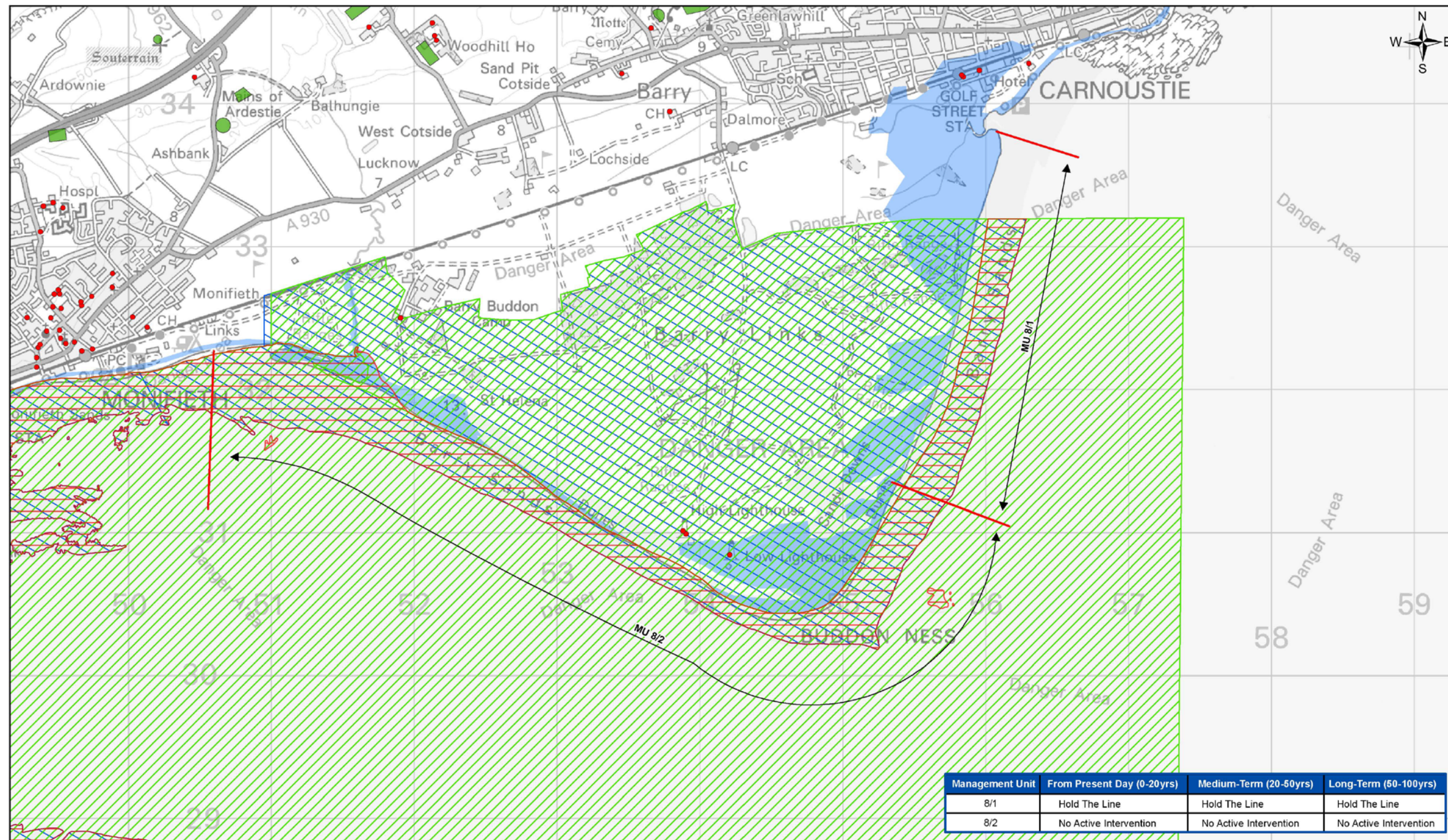
Location reference:		Buddon Ness						
Management Unit reference:		MU 8/1 to MU 8/2						
IMPLICATIONS OF THE PREFERRED PLAN FOR THIS LOCATION								
Time period	Management Activities	Property and Human Health	Material Assets and Infrastructure	Historic Environment	Flora Fauna and Biodiversity	Geomorphology Geology and Soils	Fisheries and Water	Landscape
2016 - 2036	Private maintenance of Barry Sands East defences, as appropriate and consented through the planning process.	Flood and erosion risk to informal coastal walks on Buddon Ness.	No adverse impacts on the MoD training camp, exclusion area and rifle ranges and access tracks to training facilities. Potential flood risk to some minor roads. Restrict development behind the dune system to allow rollback over time.	Potential flood risk to Low Lighthouse No adverse impacts on the historic links. Potential for erosion of World War II heritage assets.	NAI along much of the boundary of this site will allow natural processes to operate and is likely to be beneficial to the SAC, SPA and Ramsar sites and to the dune habitats and qualifying interest species of the SSSI. However the continued maintenance of defences in the north-eastern part of the designated site will constrain natural processes and will result in coastal squeeze of the intertidal habitat supporting designated bird species.	Holding the line at Barry Links East will prevent the natural roll-back of the dune habitats and is likely to be detrimental to the GCR. Further south, the dune habitats will be allowed to migrate landward naturally in response to sea level rise although there may be some erosion of the dune face and breaching of the dunes from storm surges. Where defences are maintained at Barry Sands East, beaches may narrow in front of defences, reducing their function of a natural defence. Beaches and dune system at Buddon Ness will continue to provide natural protection to this stable frontage.	Natural processes of transitional water body will continue along Barry Sands West frontage. Natural processes of coastal water body along Barry Sands East frontage will not be constrained to any significant extent, but depends on rate of sea level rise.	Allowing natural processes will maintain / enhance the landscape character at Buddon Ness. Holding the line at Barry Sands East will result in the continued narrowing of the beach and loss of the dunes with potential changes in landscape character. At Barry Sands East, the natural interaction between the beach and dune habitats will be prevented.
2036 - 2056	Private maintenance of Barry Sands East defences, as appropriate and	Flood and erosion risk to informal coastal walks on Buddon Ness.	No adverse impacts on the MoD training camp, exclusion area and rifle ranges and access tracks	Increased flood risk to Low Lighthouse. No adverse impacts on the historic links.	NAI along much of the boundary of this site will allow natural processes to operate	Holding the line at Barry Links East will prevent the natural roll-back of the dune	Whilst natural processes will continue in the transitional water	Allowing natural processes will maintain / enhance the landscape

Location reference:		Buddon Ness						
Management Unit reference:		MU 8/1 to MU 8/2						
IMPLICATIONS OF THE PREFERRED PLAN FOR THIS LOCATION								
	consented through the planning process.		to training facilities. Potential flood risk to some minor roads increases with sea level rise. Restrict development behind the dune system to allow rollback over time.	Potential for increased erosion of World War II heritage assets.	and is likely to be beneficial to the SAC, SPA and Ramsar sites and to the dune habitats and qualifying interest species of the SSSI. However the continued maintenance of defences in the north-eastern part of the designated site will constrain natural processes and will result in coastal squeeze of the intertidal habitat supporting designated bird species.	habitats and is likely to be detrimental to the GCR. Further south, the dune habitats will be allowed to migrate landward naturally in response to sea level rise although there may be some erosion of the dune face and breaching of the dunes from storm surges. Where defences are maintained at Barry Sands East, beaches may narrow in front of defences, reducing their function as a natural defence. Beaches and dune system at Buddon Ness will continue to provide natural protection to this stable frontage.	body at Barry Sands West, as sea levels rise with climate change, some loss of intertidal habitats is likely along the coastal water body frontage at Barry Sands East. The frontage represents >10% of the water body's coastline and the loss of habitats may impact on ecological quality.	character at Buddon Ness. Holding the line at Barry Sands East will result in the continued narrowing of the beach and loss of the dunes with potential changes in landscape character. At Barry Sands East, the natural interaction between the beach and dune habitats will be prevented.
2056 - 2116	Private maintenance of Barry Sands East defences, as appropriate and consented through the planning process.	Flood and erosion risk to informal coastal walks on Buddon Ness.	No adverse impacts on the MoD training camp, exclusion area and rifle ranges and access tracks to training facilities. Potential flood risk to some minor roads will continue to increase with increased sea level rise. Restrict development behind the dune system	Increased frequency of flood risk to Low Lighthouse No adverse impacts on the historic links. Erosion of World War II heritage assets.	NAI along much of the boundary of this site will allow natural processes to operate and is likely to be beneficial to the SAC, SPA and Ramsar sites and to the dune habitats and qualifying interest species of the SSSI. However the continued	Holding the line at Barry Links East will prevent the natural roll-back of the dune habitats and is likely to be detrimental to the GCR. Further south, the dune habitats will be allowed to migrate landward naturally in response to sea level	Whilst natural processes will continue in the transitional water body at Barry Sands West, as sea levels rise with climate change, some loss of intertidal habitats is likely along the coastal water body frontage at Barry Sands East. The	Allowing natural processes will maintain / enhance the landscape character at Buddon Ness. Holding the line at Barry Sands East will result in the continued narrowing of the beach and loss of the dunes with potential changes in

Location reference:		Buddon Ness						
Management Unit reference:		MU 8/1 to MU 8/2						
IMPLICATIONS OF THE PREFERRED PLAN FOR THIS LOCATION								
			to allow rollback over time.		maintenance of defences in the north-eastern part of the designated site will constrain natural processes and will result in coastal squeeze of the intertidal habitat supporting designated bird species.	rise although there may be some erosion of the dune face and breaching of the dunes from storm surges. Where defences are maintained at Barry Sands East, beaches may narrow in front of defences, reducing their function as a natural defence. Beaches and dune system at Buddon Ness will continue to provide natural protection to this stable frontage.	frontage represents >10% of the water body's coastline and the loss of habitats may impact on ecological quality.	landscape character. At Barry Sands East, the natural interaction between the beach and dune habitats will be prevented.

Buddon Ness: MU 8/1 to MU 8/2						
ACTION PLAN						
Action	Action Ref.	Action Description	Relevant Importance	Lead Authority and Key Partners	Links to Other Actions	Outcome
1. Management Area studies	1.1	Coastal processes study to investigate links between changes in tidal flows and wave conditions and movement of the Tay Estuary channel and Gaa Sands, and patterns of erosion and accretion along the eastern flank of Buddon Ness and within Carnoustie Bay.	Short term	Angus Council / Scottish Natural Heritage	MU 7	Informs actions
2. Management Unit studies	2.1					
3. Potential Schemes	3.1	Any scheme will require a detailed HRA in consultation with SNH, which will prescribe project level mitigation measures including dune habitat monitoring (if required) when specific details of the scale and nature of the works are known.	Ongoing	Angus Council/SNH	4.3	Legislative requirement
4. Monitoring	4.1	Beach profile monitoring Strategic level monitoring will also be undertaken to better understand any geomorphological changes along the coastline, which will include review and appropriate intervention if required, when agreed trigger levels are reached/early warning system.	Ongoing	Angus Council		Informs actions, scheme level Appropriate Assessment
	4.2	Defence structural monitoring	Ongoing	Angus Council / MoD		Informs actions
	4.3	A monitoring programme for the dune habitat is will be agreed with SNH in advance of scheme implementation to inform any scheme level HRA. To include review and appropriate intervention if required, when agreed trigger levels are reached/early warning system.	Ongoing	SNH	9.1	Informs actions
	4.4	Monitor the impact of erosion on World War II assets (Angus SMR NO53SE0059) undertake detailed archaeological recording at an early stage (including the recording of any graffiti on the defences) prior to further erosion damaging the site.	Short term	Historic Environment Scotland / Aberdeenshire Council		Sustainable management
5. Asset Management	5.1	Maintenance of defences and beach and dune management including management of public access. Maintenance works will be designed appropriately to reduce any damage to dune habitats and avoid significant effects on the SAC. The works area should be minimised and traffic routed to avoid sensitive dune habitats.	Ongoing	Angus Council		Sustainable management
6. Communication	6.1	Monitoring and management of action plan by Angus Council to confirm SMP policies are put into practice.	Ongoing	Angus Council		Action management
	6.2	Dialogue with the MoD in relation to their long term plans and defence management	Short term	Angus Council / MoD / Scottish Natural Heritage		Stakeholder engagement
7. Adaptation / resilience	7.1					

Buddon Ness: MU 8/1 to MU 8/2						
ACTION PLAN						
Action	Action Ref.	Action Description	Relevant Importance	Lead Authority and Key Partners	Links to Other Actions	Outcome
8. Emergency Response / Flood Warning	8.1					
9. Habitat creation / Environmental Mitigation	9.1	<p>Any works will be timed to avoid the seal breeding season (i.e. avoiding works between June to August).</p> <p>Works during the winter will be avoided in areas known to be used by overwintering birds (i.e. between 1 October and 31 March). The distribution and population of wintering birds will be identified at project level.</p> <p>Known nesting areas of Little terns will be identified at the project level and avoided.</p>	Short / medium term	Angus Council/SNH	4.3	<p>Informs actions</p> <p>Sustainable management</p>



Management Unit	From Present Day (0-20yrs)	Medium-Term (20-50yrs)	Long-Term (50-100yrs)
8/1	Hold The Line	Hold The Line	Hold The Line
8/2	No Active Intervention	No Active Intervention	No Active Intervention

Project :
Angus Shoreline Management Plan 2
 Drawing :
Management Unit: 8 Buddon Ness

Drawn By : MPC 31/10/2016
 Checked By : SB 31/10/2016
 Approved By : JY 31/10/2016

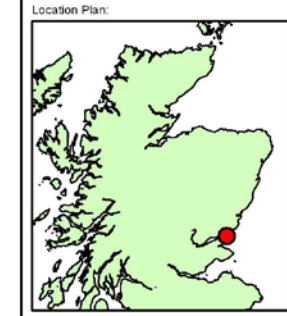
Drawing Scale : 1:25,000
 Plot Scale : 1:25,000 @ A3



Legend

- Management Units (MU)
- Erosion Risk - Predicted Shoreline Position*
 - 20 Year
 - 50 Year
 - 100 Year
- Flood Risk - Year 100
 - 0.5% AEP event (coastal)
- Listed Building
- Conservation Areas
- Scheduled Monuments
- Special Protection Area and RAMSAR
- Special Areas of Conservation
- Sites of Special Scientific Interest

*Limited long term erosion rates available for this section of coast. Therefore rates for similar types of cliffs and exposure have been applied.



Location reference:

Monifieth to Broughty Ferry

Management Unit reference:

MU 9/1 to 9/5



SUMMARY OF PREFERRED PLAN RECOMMENDATIONS AND JUSTIFICATION

Plan:

This section of coast extends from Monifieth in the east, past Barnhill, to Broughty Ferry Castle in the west. It is intersected by the Dighty Burn at Milton Mill, which marks the boundary between Angus Council and Dundee City Council.

The East Coast Main Rail Line runs along the majority of the frontage, along with the buried wastewater main. Almost the entire frontage is defended and erosion and accretion has historically fluctuated along the frontage, where patterns of erosion and accretion are linked to movement of the Tay channel and associated sand banks. Under present conditions, the frontage is accreting in the east and west, and eroding in between. The intertidal areas along the whole frontage are internationally designated as SPA, Ramsar and SAC sites and nationally designated as a SSSI.

Most of the land along the eastern Monifieth frontage has been reclaimed and is now almost entirely used for recreation, including two caravan parks, a recreation area and football playing field. Defences also provide protection to a historic landfill site along this frontage. The western Monifieth shoreline is characterised by a dune ridge backed by the railway line. In this location the rock platform is now exposed on the beach and timber breastwork has been constructed in an attempt to protect the backing dunes. At the mouth of the Dighty Burn a rock revetment protects the railway and wastewater main and there is very little beach in this location.

Broughty Ferry is a key tourist and commercial centre. Assets at Barnhill are located landward of the railway line, on high land, however a number of assets along the Broughty Ferry coastal frontage are at flood risk. A links area fronts the railway along this frontage, which increases in width and the sand beach becomes wider to the west, with a healthy sand beach and line of frontal dunes towards Broughty Ferry Castle. Defences along the esplanade at Barnhill provide protection to an area of contaminated land, and a new rock revetment has been constructed near the Glass Pavilion Café to address erosion issues.

The long term plan along the whole frontage is to continue to provide protection to the assets, infrastructure and recreation areas at Monifieth, Barnhill and Broughty Ferry. Where the coastline is stable and / or accreting, minimal intervention is expected to be required.

Preferred policies to implement Plan:

From present day (short term to 20 years from now):

The short term policy for the Monifieth and Broughty Ferry frontages is to **hold the line**. This would involve limited intervention where the frontage is accreting or stable and / or where defences are buried. Elsewhere the hold the line policy would involve maintenance of the existing defences and upgrading where required. Implementation methods need to adapt to the changing erosion and accretion patterns which fluctuate over short periods of time along the frontage. Beach retaining measures could be implemented, such as the use of rock fish tail groynes combined with beach recharge campaigns to help improve / maintain beach levels.

Continued monitoring of the dynamic coastline is recommended to inform future management.

Medium term (20-50 years)

The medium term plan is to continue to **hold the line** to provide protection to the assets and infrastructure at Monifieth and Broughty Ferry. In the central area, the trend of beach lowering is likely to continue with sea level rise, due to coastal squeeze against defences. If long term erosion is evident and there is a requirement to retain a beach at this location, beach retaining structures and dune management measures may be required. Groynes will need to be replaced or recharge undertaken to help maintain beach levels.

If dune erosion becomes an issue at Broughty Ferry, dune management measures would help maintain the integrity and function of the dunes as a natural flood defence.

Elsewhere, the hold the line policy would involve limited intervention where the frontage is accreting or stable and / or where defences are buried.

Continued monitoring of the dynamic coastline is recommended to inform future management.

Longer term (50-100 years)

The long term plan is to continue to **hold the line** along the whole frontage to manage flood and erosion risk to Monifieth and Broughty Ferry. This would involve a mix of limited intervention, maintenance, upgrading of defences and dune management at different locations along the frontage.

Continued monitoring of the dynamic coastline is recommended to inform future management.

Summary of Specific Policies

Management Unit		Preferred Policies		
		Short term	Medium term	Long term
9/1	MoD Boundary to west Tayview Caravan Park	Limited intervention and maintenance of defences through a hold the line policy.	Limited intervention and maintenance of defences through a hold the line policy.	Limited intervention and maintenance of defences through a hold the line policy.
9/2	Monifieth West	Maintain and upgrade defences through a hold the line policy.	Maintain and upgrade defences through a hold the line policy.	Maintain and upgrade defences through a hold the line policy.
9/3	Barnhill to the Esplanade	Maintain and upgrade defences through a hold the line policy.	Maintain and upgrade defences through a hold the line policy.	Maintain and upgrade defences through a hold the line policy.
9/4	Broughty Ferry East	Limited intervention and maintenance of defences through a hold the line policy.	Limited intervention and maintenance of defences through a hold the line policy.	Limited intervention and maintenance of defences through a hold the line policy.
9/5	Broughty Ferry	Maintain and upgrade defences through a hold the line policy.	Maintain and upgrade defences through a hold the line policy.	Maintain and upgrade defences through a hold the line policy.

The above provides the local details in respect of the SMP-wide policy presented in the preceding sections of this Plan document. These details must be read in the context of the wider-scale issues and policy implications, as reported therein.

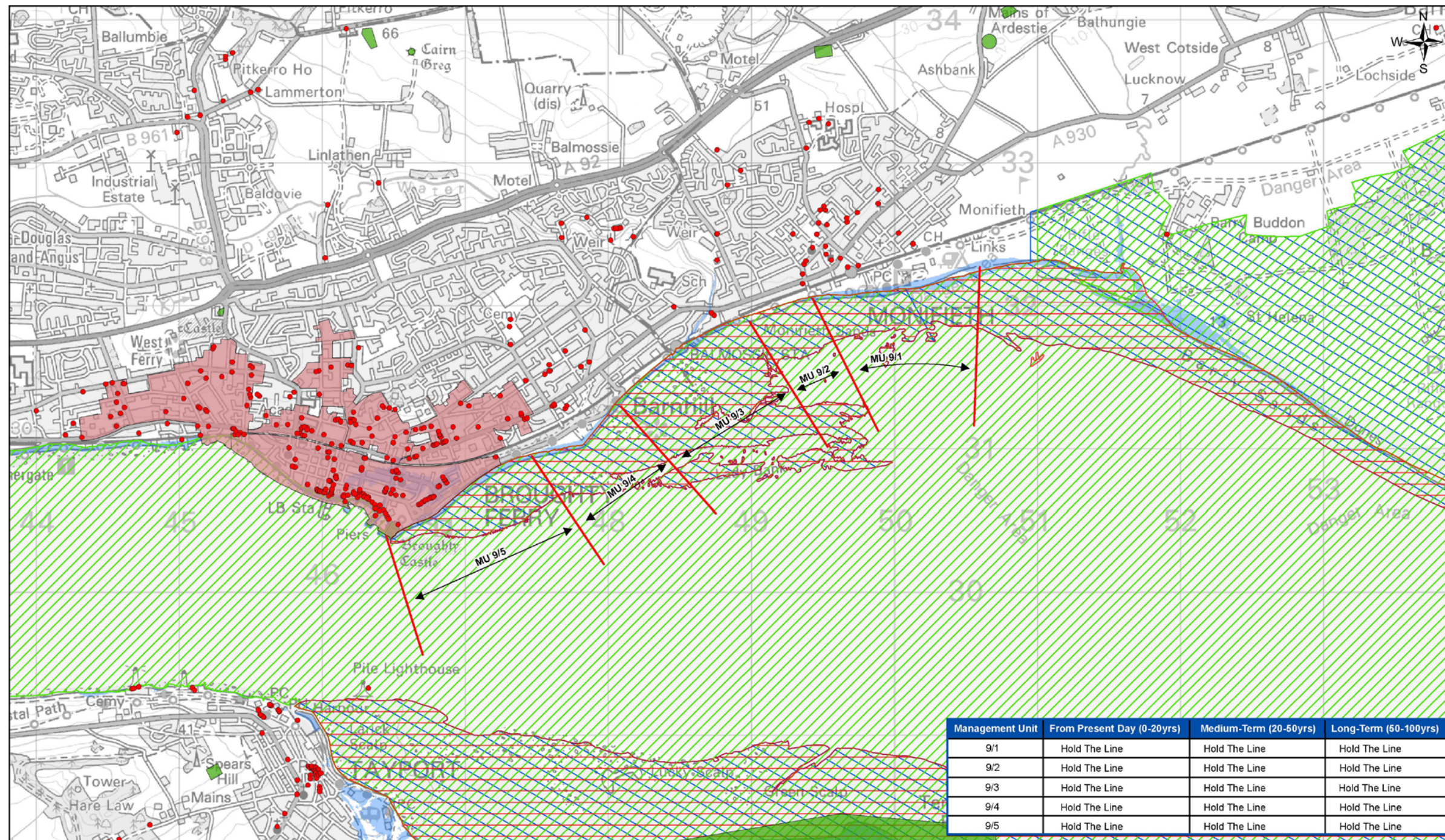
Location reference:		Monifieth to Broughty Ferry						
Management Unit reference:		MU 9/1 to MU 9/5						
IMPLICATIONS OF THE PREFERRED PLAN FOR THIS LOCATION								
Time period	Management Activities	Property and Human Health	Material Assets and Infrastructure	Historic Environment	Flora Fauna and Biodiversity	Geomorphology Geology and Soils	Fisheries and Water	Landscape
2016 - 2036	Limited intervention, maintenance and defence upgrading.	Continued flood and erosion protection to Monifieth and Broughty Ferry towns, Monifieth Seafront recreational assets, caravan parks and historic landfill sites. The coastal footpath may be subject to erosion or flooding in some locations. There are opportunities to improve recreational access , features and aesthetics of existing defence in this management unit. Beaches will narrow in front of defences, reducing the amenity value of the beach, however, accretion in front of some defences at Monifieth playing fields and at Broughty Ferry is expected to continue.	Continued flood and erosion protection to service infrastructure, the Main East Coast Railway and minor roads.	Continued flood and erosion protection of architectural and historic assets in the Broughty Ferry Conservation Area and Broughty Ferry Castle.	The continued maintenance of defences will constrain natural migration landward of the dune habitats and will result in coastal squeeze of the intertidal habitat supporting designated bird species, due to rising sea levels.	Beaches may narrow in front of defences, reducing their function as a natural defence; however, accretion in front of defences at Monifieth playing fields and at Broughty Ferry is expected to continue.	Natural processes of transitional water body will not be constrained to any significant extent, but depends on rate of sea level rise.	Defence maintenance will maintain the existing landscape character of the frontage
2036 - 2056	Limited intervention, dune management, maintenance and defence upgrading.	Continued flood and erosion protection to Monifieth and Broughty Ferry towns, Monifieth Seafront recreational assets, caravan parks,	Continued flood and erosion protection to service infrastructure, the East Coast Main Rail Line and minor roads.	Continued flood and erosion protection of architectural and historic assets in the Broughty Ferry Conservation Area and	The continued maintenance of defences will constrain natural migration landward of the dune habitats and will result	Beaches may narrow in front of defences, reducing their function of a natural defence, however, accretion in front of defences at	As sea levels rise with climate change, some loss of intertidal beach habitats is likely along approximately half of the transitional water	Over time, the defences will result in the narrowing of the beach, which may change the local landscape character.

Location reference:		Monifieth to Broughty Ferry						
Management Unit reference:		MU 9/1 to MU 9/5						
IMPLICATIONS OF THE PREFERRED PLAN FOR THIS LOCATION								
Time period	Management Activities	Property and Human Health	Material Assets and Infrastructure	Historic Environment	Flora Fauna and Biodiversity	Geomorphology Geology and Soils	Fisheries and Water	Landscape
		<p>historic landfill sites and Broughty Ferry Castle.</p> <p>The coastal footpath may need to be relocated landward in some locations between Monifieth and Broughty Ferry. There are opportunities to improve recreational access, features and aesthetics of existing defence in this management unit.</p> <p>Beaches will narrow in front of defences, reducing their amenity value, accretion in front of some defences at Monifieth playing fields and at Broughty Ferry is expected to continue.</p>		Broughty Ferry Castle.	in coastal squeeze of the intertidal habitat supporting designated bird species, due to rising sea levels.	Monifieth playing fields and at Broughty Ferry is expected to continue.	body frontage (whilst accretion is expected to continue along the other half). This “squeezed” frontage represents approximately 5% of the water body’s coastline, and although other reaches will have significantly higher ecological value to the water body as a whole, there may be some impact on ecological quality.	
2056 - 2116	Limited intervention, dune management, maintenance and defence upgrading.	<p>Continued flood and erosion protection to Monifieth and Broughty Ferry towns, Monifieth Seafront recreational assets, caravan parks, historic landfill sites and Broughty Ferry Castle.</p> <p>The coastal footpath may need to be relocated landward in some locations</p>	Continued flood and erosion protection to service infrastructure, the Main East Coast Railway and minor roads.	Continued flood and erosion protection of architectural and historic assets in the Broughty Ferry Conservation Area and Broughty Ferry Castle.	The continued maintenance of defences will constrain natural migration landward of the dune habitats and will result in coastal squeeze of the intertidal habitat supporting designated bird species, due to rising sea levels.	Defences will continue to restrict movement, beaches will narrow and dune erosion will increase.	As sea levels rise with climate change, some loss of intertidal beach habitats is likely along approximately half of the transitional water body frontage (whilst accretion is expected to continue along the other half). This “squeezed” frontage represents approximately 5% of	Over time, the defences will result in the narrowing of the beach, which may change the local landscape character.

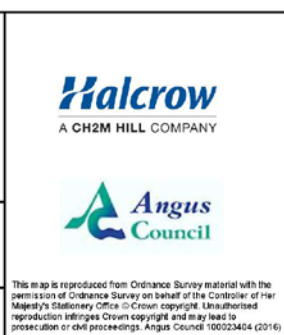
Location reference:		Monifieth to Broughty Ferry						
Management Unit reference:		MU 9/1 to MU 9/5						
IMPLICATIONS OF THE PREFERRED PLAN FOR THIS LOCATION								
Time period	Management Activities	Property and Human Health	Material Assets and Infrastructure	Historic Environment	Flora Fauna and Biodiversity	Geomorphology Geology and Soils	Fisheries and Water	Landscape
		<p>between Monifieth and Broughty Ferry. There are opportunities to improve recreational access, features and aesthetics of existing defences in this management unit.</p> <p>Continued maintenance and upgrading of the existing defences will restrict movement, beaches will narrow and dune erosion will increase, reducing amenity value. Potential loss of beach access points.</p>					<p>the water body's coastline, and although other reaches will have significantly higher ecological value to the water body as a whole, there may be some impact on ecological quality.</p>	

Monifieth to Broughty Ferry: MU 9/1 to MU 9/5						
ACTION PLAN						
Action	Action Ref.	Action Description	Relevant Importance	Lead Authority and Key Partners	Links to Other Actions	Outcome
1. Management Area studies	1.1	Coastal processes study to investigate links between changes in tidal flows and wave conditions and movement of the Tay Estuary channel and Gaa Sands, and patterns of erosion and accretion along the eastern flank of Buddon Ness and within Carnoustie Bay.	Short-term	Dundee City Council		Sustainable management
2. Management Unit studies	2.1	Dundee Coastal Study	Underway	Dundee City Council		
3. Potential Schemes	3.1	Schemes arising from Dundee Coastal Study At scheme level a more detailed HRA will be undertaken in consultation with SNH, which will more precisely prescribe the potential effects of the project and project level mitigation measures, when specific details of the scale and nature of the maintenance and upgrading works are known. Schemes should avoid direct encroachment of the intertidal mudflats, sandflats and sandbanks.	Short-term	Dundee City Council/SNH	4.3	Sustainable management
4. Monitoring	4.1	Beach profile monitoring	Ongoing	Dundee City Council / Angus Council		Informs actions
	4.2	Defence structure monitoring	Ongoing	Dundee City Council / Angus Council		Informs actions
	4.3	Strategic environmental monitoring of designated conservation sites to provide baseline data for future Habitat Regulations Assessments.	Ongoing	Scottish Natural Heritage	9.1	Informs actions
5. Asset Management	5.1	Maintenance of defences and beach and dune management including management of public access.	Ongoing	Dundee City Council / Angus Council		Sustainable management
6. Communication	6.1	Monitoring and management of action plan by Angus Council to confirm SMP policies are put into practice.	Ongoing	Dundee City Council / Angus Council		Action management
7. Adaptation / resilience	7.1					
8. Emergency Response / Flood Warning	8.1	Development, monitoring and review of emergency response plans to prepare for over design standard events	Short term	Dundee City Council / Angus Council / Emergency services		Emergency management
	8.2	Continue to improve flood warning service and raise awareness of flood risk.	Ongoing	Dundee City Council / Angus Council / SEPA		Emergency management
9. Habitat creation / Environmental Mitigation	9.1	Seek opportunities for habitat enhancements as part of flood/erosion risk management works	Short term	Dundee City Council / Angus Council / Scottish Natural Heritage	4.3	Sustainable management

		<p>Works will be timed to avoid the seal breeding season (i.e. avoiding works between June to August)</p> <p>Little tern nesting areas and suitable/sensitive habitat used by overwintering birds will be identified and avoided (i.e. between 1 October and 31 March).</p> <p>Routing of construction traffic to avoid the loss of sensitive habitats used by the qualifying species</p>				
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Project :
 Angus Shoreline Management Plan 2
 Drawing :
 Management Unit: 9
 Monifieth to Broughty Ferry
 Drawn By : MPC 31/10/2016
 Checked By : SB 31/10/2016
 Approved By : JY 31/10/2016



Legend

- Management Units (MU)
- Erosion Risk - Predicted Shoreline Position*
 - 20 Year
 - 50 Year
 - 100 Year
- Flood Risk - Year 100
 - 0.5% AEP event (coastal)
- Listed Building
- Conservation Areas
- Scheduled Monuments
- Special Protection Area and RAMSAR
- Special Areas of Conservation
- Sites of Special Scientific Interest

*Limited long term erosion rates available for this section of coast. Therefore rates for similar types of cliffs and exposure have been applied.

