4 Defending the East Riding Coastline

Works carried out to protect the coastline within England and Wales are governed by two pieces of legislation, namely, the Coast Protection Act 1949, covering works to prevent erosion and encroachment by the sea, and the Land Drainage Act 1991 used for works to protect the land against flooding by the sea. Under the Coast Protection Act 1949 local maritime councils become coast protection authorities, giving them powers to protect land against erosion by the sea.

Mappleton

Schemes to prevent flooding by the sea are known as sea defence works, these are controlled by the Environment Agency who took over this responsibility from the National Rivers Authority in 1996. Works under the Land Drainage Act 1991 within the East Riding area these are mainly located within the Humber Estuary and control tidal flooding.

The overall control and financing of both coast and sea defence schemes is the responsibility of the central government under the Department of The Environment, Food and Rural Affairs (DEFRA). DEFRA provides financial support to the Coastal Authorities for defences in the form of grant aid, East Riding council would be unable to afford to carry out such works without this assistance. Before DEFRA will consider grant aiding a scheme it has to be satisfied that its own criteria are met and that all the other approvals and consents are in place. The powers given to both the Coast Protection Authorities and the Environment Agency under these acts are permissive powers, which means that there is no duty placed upon them to actually provide the defences although there are provisions within the Act for redress if work is not carried out.

The East Riding of Yorkshire Council's defended frontage currently stands at approximately 9.2 km, and is made up of a variety of construction types ranging from the high masonry seawalls of Bridlington to the more recently constructed rock armour structures of Mappleton and Easington. Other bodies have also defended a further 2km of frontage, however these are usually poorly designed structures built on an ad-hoc basis with a variety of success.

Once completed additional expenditure is required in order to maintain these coastal structures. In exposed locations or where defences are reaching the end of their useful life, this can be quite a substantial annual sum. New designs take this into account and schemes are now designed to function adequately in both the short and long term with minimum ongoing maintenance. Routine maintenance of this kind is the responsibility of and is financed by the various coastal authorities. Ensuring defences are kept in good order helps to prevent more serious failures as damage to coastal structures can rapidly spread if not controlled.

Along the East Riding of Yorkshire's coastline the council runs a comprehensive programme of monthly monitoring together with an annual maintenance contract to ensure all of its structures are functioning correctly and safely. Privately built and maintained structures are also checked with any defect reported to the various bodies as and when necessary. Additional repair works to supplement the main maintenance contract are also often required following rough weather or stormy seas. A record of recent works is given for each frontage on the following diagrams.

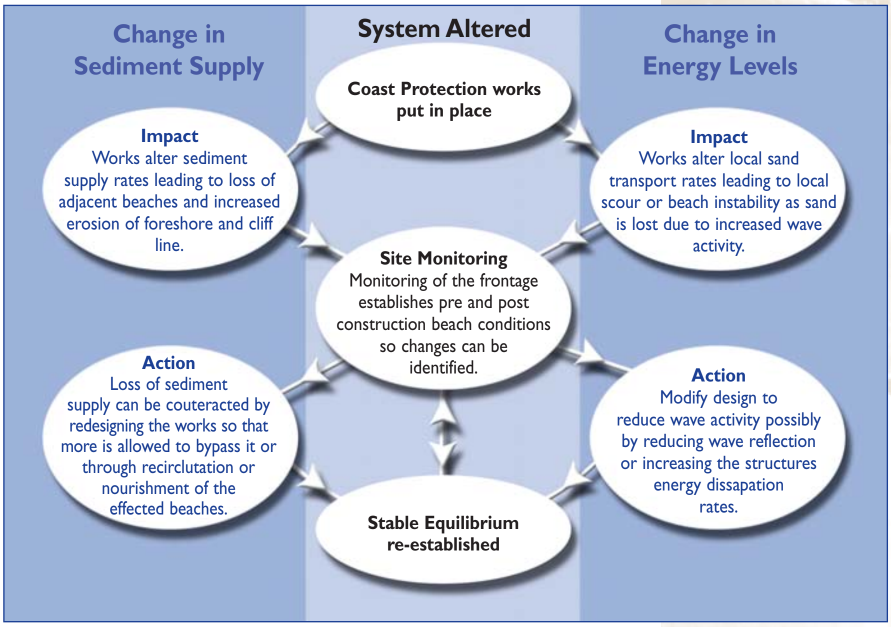
Location	Undefended cliff line	Defended Frontage ERYC	Defended Frontage Private	Frontage Type
Bempton to Bridlington	18.29 km			High chalk cliffs
Bridlington		3.60 km		Masonry and concrete seawalls with groynes
Bridlington to Barmston	5.62 km			Low clay cliffs
Barmston private defences			0.13 km	Rock and concrete armour revetment
Cliffs south to Barmston drain	0.62 km			Low clay cliffs
Barmston drain defences			0.20 km	Rock and concrete armour revetment
Barmston to Ulrome	1.47 km			Clay cliffs
Ulrome north defences (private)			0.35 km	Concrete seawalls
Ulrome cliffs between defences	0.20 km			Clay cliffs
Ulrome south defences (private)			0.09 km	Concrete seawalls
Ulrome to Hornsea	8.26 km			Variable height clay cliffs
Hornsea frontage		1.86 km		Concrete seawalls, groynes and some rock armouring
Hornsea to Mappleton	3.10 km			High clay cliffs
Mappleton frontage		0.45 km		Rock armour revetment with rock groynes
Mappleton to Tunstall	15.32 km			High clay cliffs
Tunstall north defences (private)			0.18 km	Rock and concrete armouring
Tunstall cliffs between defences	0.12 km			Low clay cliffs
Tunstall south defences (E.A.)			0.14 km	Rock armour revetment
Tunstall south to Withernsea	2.81 km			Variable height clay cliffs
Withernsea frontage		2.26 km		Concrete seawalls, timber groynes and rock armouring
Withernsea south to Easington	8.38 km			High clay cliffs
Easington defended frontage		1.03 km		Rock armour revetment
Easington south to Spurn	5.67 km			Variable height clay cliffs
Spurn defences (mainly derelict)			1.06 km	Concrete seawalls, timber groynes and rock armouring
Spurn dunes south to Spurn Point	3.25 km			Low clay cliffs and sand dunes
Totals	**73.11 km**	**9.20 km**	**2.15 km**	
Total length of coastline 85 km				

Coastal Defence Engineering

Coastal engineering began with the development of ports and harbours built to satisfy the needs of trade and the fishing industry. Early coastal defences usually spread out from these industrial centres as coastlines began to be seen as desirable recreation sites. In particular the Victorian migration to the coast saw the construction of numerous seaside resorts each with its own promenade, and wherever possible a pier, each of ever-increasing length. Defences were usually large vertically faced structures, built to withstand wave forces but with little thought given to coastal processes or their long term sustainability. It is only relatively recently with the advent of theoretical modelling techniques that their underlying impact on local processes has begun to be understood. This era of rapid seafront development has now left many authorities with a legacy of coastal engineering difficulties.

Today with our increased knowledge of coastal processes and in particular how defence schemes impact upon an area's natural equilibrium the designer is able to select appropriate solutions for a site that minimise any adverse effects. On sensitive or complex sites designs can be further refined using the results from monitoring surveys and checked using theoretical or physical modelling, reducing further any unknown variables. Often however adverse consequences are inevitable, as coastal defences by their very nature attempt to control or influence natural processes in some way. In such cases this advanced knowledge allows management policies to be set up in advance, monitoring of the frontage then enables appropriate mitigation works to be undertaken as and when necessary.

The coastal processes along the East Riding of Yorkshire coastline are driven by a complex mixture of wave and tidal forces, these forces cause erosion of the underlying clay foreshore and cliffs and the subsequent transport away of liberated sediments. Differences between transport rate forces and the supply of beach sand create imbalances that lead to either deposition of sand or increased erosion as the system attempts to re-establish equilibrium. Any structure that alters elements within this system can therefore lead to an alteration in the others as they adjust to suit the new conditions.



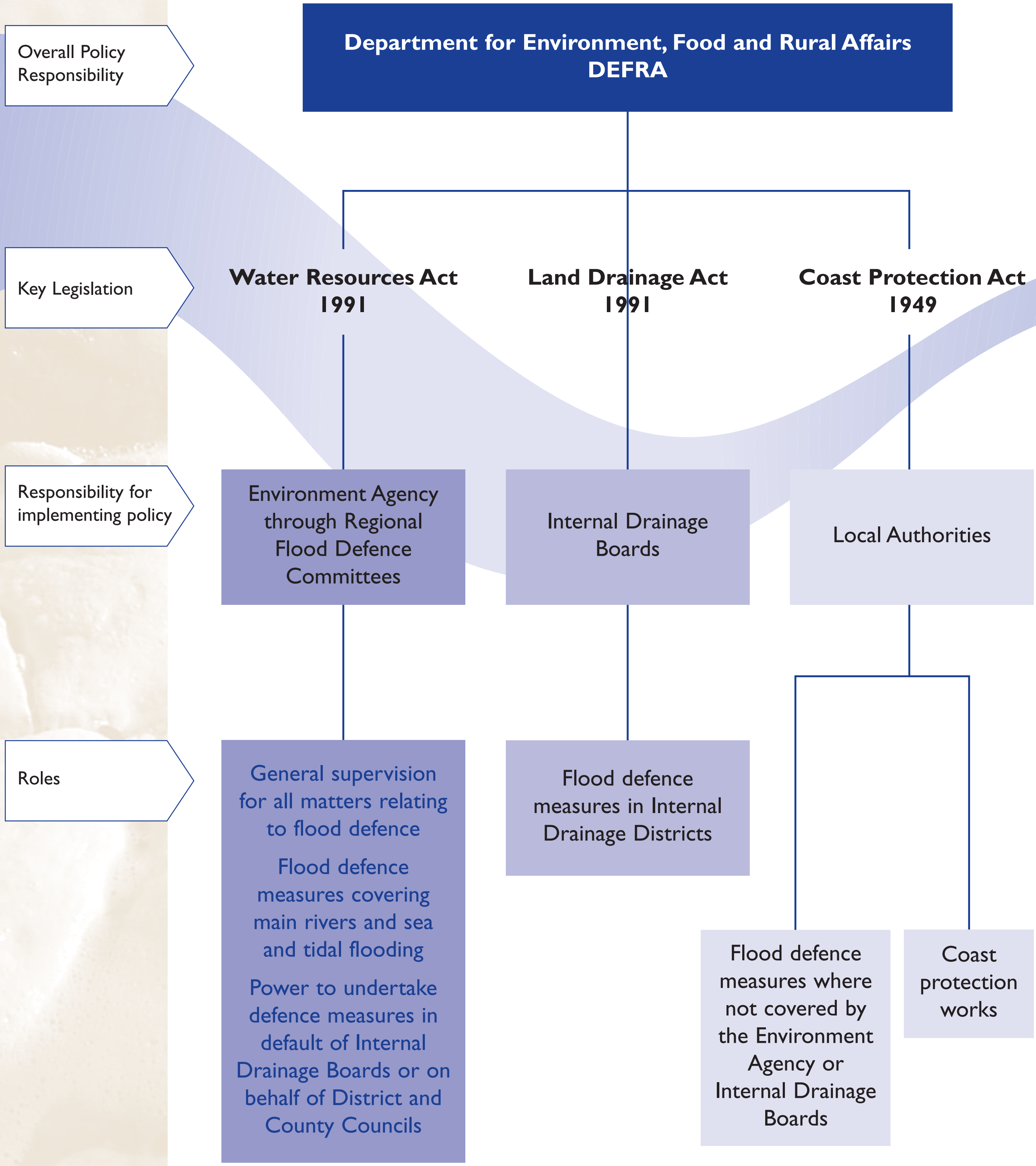
Defence Options

Coastal defence methods can be categorised into backstop defences and beach control structures. Backstop defences provide a hard line of defence to prevent erosion and/or mitigate flooding as a result of tidal inundation or overtopping. Beach control structures provide a mechanism to retain beach material that is derived from natural or imported sources. Common to both forms of man-made defence is the natural protection provided by the foreshore in the form of a sandy beach.

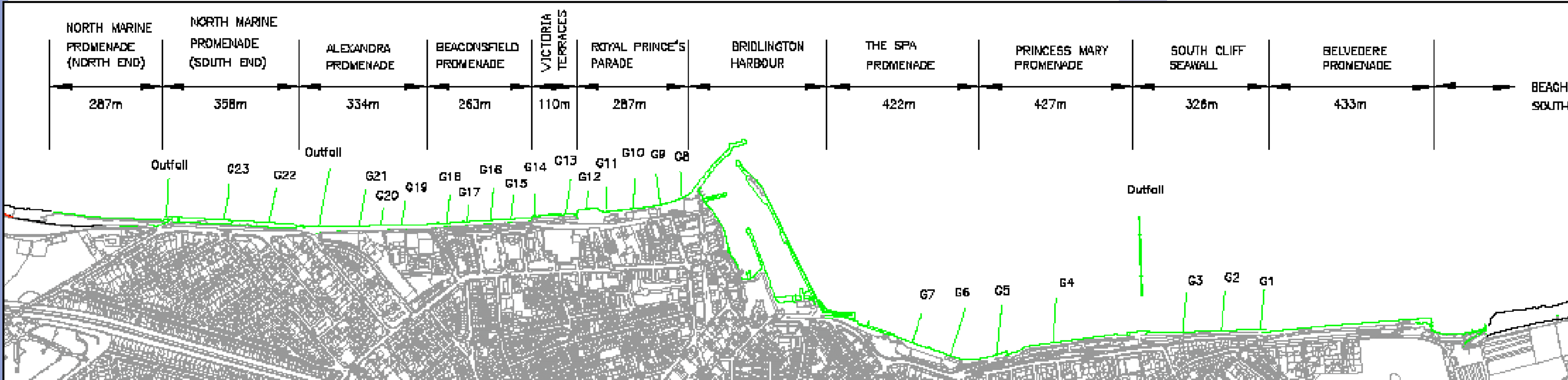
For any design situation there are usually a number of possible solutions each with their own set of advantages and disadvantages. The defences found along each of the East Riding of Yorkshire's defended frontages are however mostly formed from a mix of 19century structures together with more recent upgrades, extensions and alterations. It is comparatively rare for a totally new scheme to be constructed. Some of the more common structure types found along the East Riding of Yorkshire coastline, together with a review of the relative merits are given overleaf.

Structure Type	Example	Advantages	Disadvantages
SEAWALLS Vertical or near vertical masonry or concrete wall. Can incorporate a wave return profile to improve overtopping performance and a stepped apron toe to reduce scour.	 Hornsea	1 Effective prevention of erosion 2 Effective protection against overtopping 3 Strong enough to resist severe exposure sites 4 Many different types 5 Can incorporate promenade amenity features 6 Generally safe for public use	1 Poor energy absorption and high wave reflection rates 2 Wave reflection and scour can destabilise beach 3 Often requires additional energy absorbing apron 4 Tends to be an expensive option
REVETMENTS Sloping structures of either solid or open construction. Examples being the reinforced concrete structures to the north and south of Withernsea or open rock armour construction of the Easington defences.	 Easington	ROCK ARMOUR 1 Good hydraulic performance and energy dissipation 2 Can be used in exposed sites 3 Construction costs generally cheaper than solid structures 4 Requires little ongoing maintenance 5 Relatively easy and quick to construct 6 Often used in conjunction with seawalls to reduce toe scour	1 Difficult to provide amenity value if used as primary defence 2 Often needs to be massive wide structures 3 Can be visually less appealing 4 Tends to be less safe for public use
	 South Withernsea	SOLID RC CONSTRUCTION 1 Better hydraulic performance than vertical seawalls 2 Can incorporate promenade amenity features 3 Generally safe for public use	1 Disadvantages similar to vertical seawalls 2 Often requires toe scour protection 3 Tend to require more ongoing maintenance than seawalls
SAND DUNES Created and maintained through the deposition of sand, dunes can be artificially or naturally created.	 Spurn Peninsula	1 Provide a valuable store of sand helping to regulate beach levels 2 In maintaining beach levels they aid dissipation of wave energy 3 Provide an important amenity and wildlife value	1 Highly susceptible to erosion
SPLASH WALLS Used as secondary defences to control the effects of overtopping or flooding. Splash walls are usually of reinforced concrete design	 Hornsea Splash Wall	1 Allowing some overtopping greatly reduces the scale of the primary defence with associated cost savings 2 Can incorporate promenade amenity features	1 Requires space and promenade width to provide a floodable area 2 Promenade may require increased cleaning and maintenance cost.

Structure Type	Example	Advantages	Disadvantages
FLOOD BANKS Flood banks tend to be of simple soil/clay or gabion construction	 Kilnsea Flood Bank	1 Used in sheltered locations the control of flooding through the use of a flood bank can relieve the need for a primary defence 2 Set back from the main defence line they provide a cheap solution to control flooding	1 Can only be used as a primary defence at sheltered locations 2 Often requires additional toe protection
BEACHES Beaches are effective in harmlessly dissipating wave energy and constitute an excellent form of natural defence.	 Withernsea	1 A healthy beach provides effective control of erosion and overtopping 2 Beaches provide a valuable amenity feature 3 Provision of a beach reduces the exposure of the main backstop defence 4 Generally safe for public use	1 A constant source of sand is required 2 To be effective beach levels need to be maintained, this may require costly beach control and/or regular nourishment 3 Maintenance of a beach using natural supplies can starve down-drift areas 4 As a defence beaches are highly sensitive to draw-down during storms
GROYNES Groynes help to build and maintain beach levels by intercepting the long-shore movement of sand.	 Hornsea	1 Can be effective in beach building 2 Provision of a beach provides a valuable amenity feature 3 Can be constructed relatively easily from a wide range of materials 4 Maintenance of a beach reduces the exposure of the main backstop defence 5 Can be relatively quick to construct	1 Can produce local scour and increased down-drift erosion 2 Require sand supplies of either natural long-shore drift or artificial nourishment 3 Less effective in controlling cross shore sand movements 4 When constructed of materials other than rock they can have a high maintenance cost 5 Rock groynes tend to be less safe for public use
OFFSHORE STRUCTURES Forcing waves to break offshore reduces wave activity in their lee. A reduction in wave energy at the shoreline encourages the deposition of sand and reduces erosion potential.	 South Withernsea	1 Promotes the natural build up of beach levels 2 Maintenance of a beach reduces the exposure of the main backstop defence 3 Require little ongoing maintenance	1 Offshore constructions tend to be more massive and therefore more costly 2 Can create a navigation hazard and cause public safety issues 3 Can produce increased down-drift erosion 4 Difficult to construct in deep water



COASTAL DEFENCE: ORGANISATION
Adapted from MAFF 1993



Location: Bridlington — Construction Sequence for Main Defence Structures

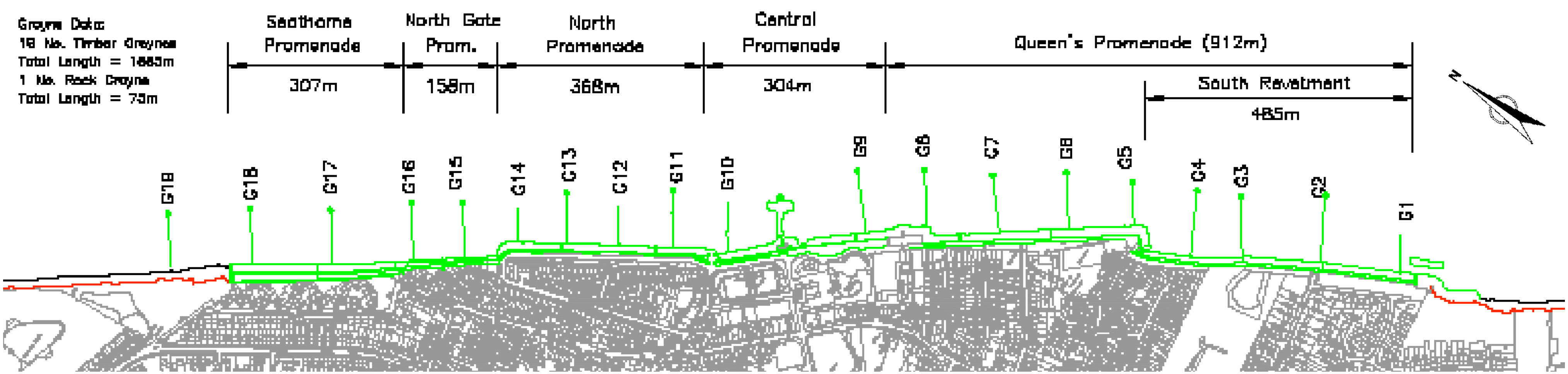
Early History: Bridlington began in the 12th century as a small settlement inland of a river outlet to the north sea. Initially it grew as a fishing and trade centre, seeing steady expansion in the 17th and 18th centuries with the development of the quay and harbour. Initially these structures were of timber framework construction with rock filled cores, and enclosed an area spanning between the current north pier and chicken run jetties. It wasn't until the middle of the 19th century that growth really took off with the reconstruction of the harbour and following the completion of a rail link. With the influx of holidaymakers drawn to its sandy beaches and bathing waters Bridlington quickly become more of a seaside resort than a commercial centre.

Date	Description of Works	Frontage (m) New	Frontage (m) Total	Defence Type
Prior to 1816	The timber framework piers that formed the early harbour area were the first major seafront developments at Bridlington. Requiring constant repair and maintenance records suggest they were never satisfactory.			Timber framework with rock filled cores
1816 to 1843	Construction of new 156m long masonry pier to replace the old north pier			Massive masonry seawall
1843 to 1848	Construction of new 456m long masonry pier to south of the old south pier which more than doubled the size of the harbour area.	410		Massive masonry seawall
1860	At about the same time as the harbour development discrete lengths of frontage were also being defended on an ad hoc basis immediately north and south of the harbour. The first recorded defended frontage was a rock filled timber seawall to the north of the North Pier, further north towards Trinity Cut several other brick walls were also thought to have been constructed.			Mainly timber framework construction
	To the south at about this time a concrete seawall was constructed to defend the Spa area. Approx. 35m of this original wall still remains opposite the current Spa slipway.	35	445	Concrete seawall
1866	Extension of north pier by 48m to improve wave climate within harbour.			Massive masonry seawall
1866 to 1868	The first proper defence to be built at Bridlington was Royal Prince's Parade. This massive masonry structure complete with 5 timber groynes replaced earlier makeshift defences.	220	665	Masonry seawall & timber groynes
1879 to 1881	Alexandra Promenade seawall was the next to be built, again replacing earlier failing timber defences.	334	999	Reinforced Concrete
1888	Beaconsfield Seawall and Trinity iron bridge constructed.	268	1,267	Massive masonry seawall
1896	Spa seawall reconstructed and extended south, the old concrete seawall being demolished and retained as toe armouring.	409	1,676	Massive masonry seawall
1896 to 1899	Maintenance and upgrade of earlier timber structures continues, plus a new timber seawall is built to the north of Alexandra Promenade.			Timber breastwork
1899 to 1905	Timber groyne field constructed along foreshore to north of North Pier, replacing earlier groynes.			Timber groynes
1902	Belvedere Promenade seawall and 9 timber groynes added to area south of South Pier.	439	2,115	Masonry seawall & groynes
1906	Extension of Royal Prince's Parade by 69m and reconstruction of Victoria Terraces replacing the earlier timber and rubble structure.	183	2,298	Massive masonry seawalls
1925 to 1928	Defences extended further south with the construction of Princess Mary Promenade	320	2,618	Concrete seawall
1929 to 1931	Timber structures alone North Marine Promenade replaced by a new concrete seawall.	357	2,975	Concrete seawall
1962 & 1964	Two stage construction of low-level walkway to north of North Marine Promenade.	289	3,264	Sloping concrete seawall
1971	Princess Mary Promenade extended south upgrading existing ad hoc concrete defences. Area now known as South Cliff.	343	3,607	Concrete seawall

Repair and Upgrade History for Main Defence Structures

The Bridlington frontage has a long and complicated maintenance history due to its early-unregulated development. As each of these makeshift defences is replaced by more substantial structures the maintenance requirements have steadily fallen. Few maintenance records now exist, however observation and site investigation work has shown that most of the old masonry seawalls apart from the piers and Royal Princess Parade have been strengthened and underpinned at some point in the past. Currently the Bridlington frontage remains in relatively good order, the only problems lie with the North Pier and Royal Prince's Parade area masonry seawalls as steady lowering of the foreshore is now threatening the stability of their unsupported foundations, works to upgrade them are planned for the near future.

Date	Description of Works	Cost £
1989	Underpinning works put in along the north end of the Spa seawall, foundation problems caused by a general lowering of the foreshore and by the presence of a ground water spring that runs under the Spa area.	115,000
1994	Original concrete seawall along Alexandra Promenade encased in reinforced concrete and promenade surface replaced with coloured block-work.	527,000
1990's	General seawall maintenance works. Seawall repairs following storm damage to Royal Prince's Parade, Victoria Terraces and The Spa slipway.	84,100 65,400
2000 to 2003	General seawall maintenance repairs	20,000



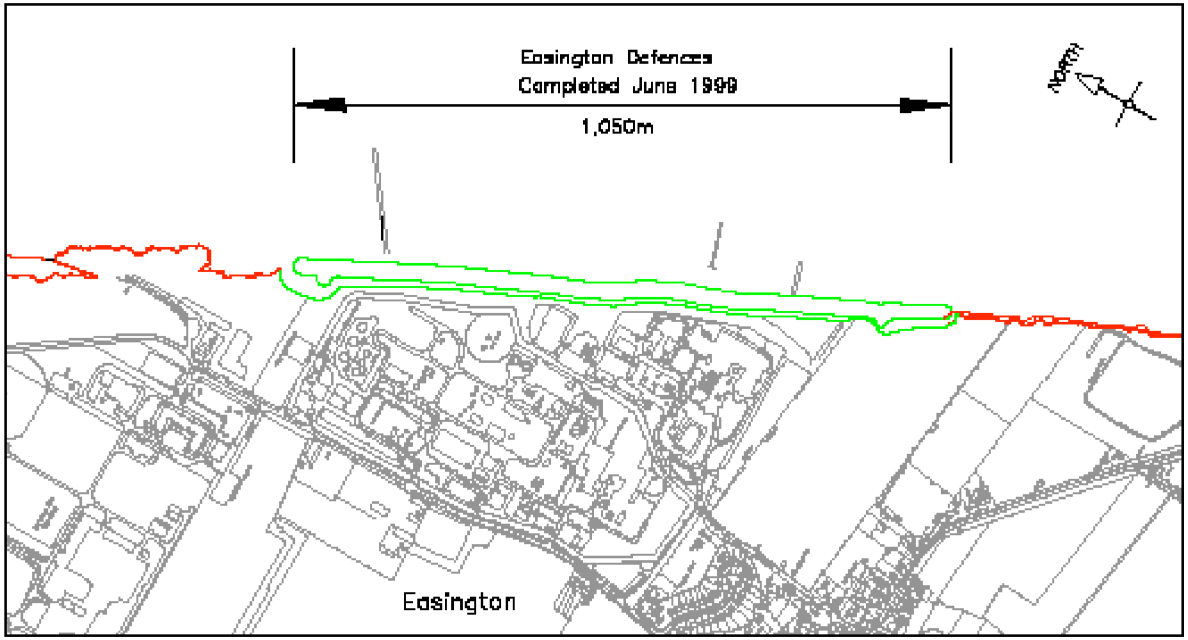
Location: Withernsea **Construction Sequence for Main Defence Structures**

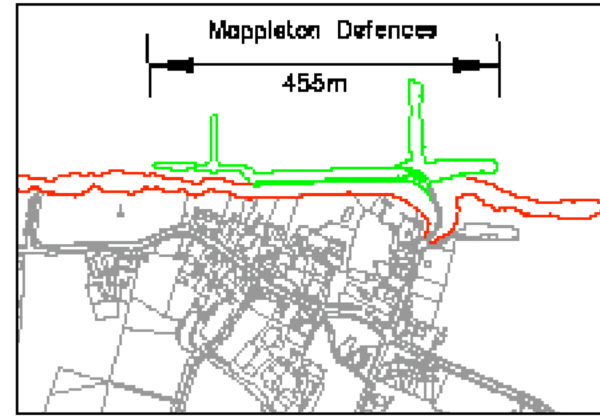
Date	Description of Works	Frontage New	Frontage Total	Defence Type
Early History	By the early 19th century Withernsea had become a well-established coastal village. At that time defences will have been minimal and probably of timber breastwork construction.			Timber breastworks
1875	The late 19th century saw the start of the main defence construction. This began with the construction of a pleasure pier together with two castellated towers, plus the erection of 5 timber groynes. North promenade seawall followed shortly after.	364m		Timber groynes & massive concrete seawall
1910	Extension of the early defences was competed with the construction of Central Promenade seawall on either side of Pier Towers. This date also saw the final removal of the ill-fated pier following repeated ship collisions.	314m	678m	Extension of massive concrete seawalls
1912	To control erosion to the north, North Prom. was extended using a split-level seawall construction. Today this area is referred to as North Gate Prom. Following completion of these defences work began on extending Central Prom. southwards to Cheverton Avenue, this work also included the provision of timber groynes.	161m 107m	839m 946m	R C & massive concrete seawalls & timber groynes
1920	Central Promenade extended further south reaching SouthCliff Road, this area is now known as Queen's Promenade.	270m	1,216m	RC seawall.
1945	Groyne field refurbished and extended to whole frontage.		1,216m	Timber groynes
1958	Construction of Seathorne Promenade which marks the northern limit of the current frontage.	305m	1,521m	RC revetment.
1968	Construction of South Revetment which marks the southern limit of the current hard frontage.	486m	2,007m	RC revetment.
1981	South Revetment defences extended south to control outflanking through placement of rock armour.	29m	2,036m	Rock armour
1992 to 94	Additional rock used to strengthen and extend existing South Revetment armouring.	-	2,036m	Rock armour
1995	South Revetment armouring strengthened once again and supplemented with the provision of an offshore rock breakwater.	25m	2,061m	Rock armour
1998	Emergency re-profiling works extended South Revetment armouring south by 60 metres to control outflanking, this now marks the limit of the southerly defended frontage.	60m	2,121m	Rock armour

Repair and Upgrade History for Main Defence Structures

Following their construction coastal structures soon require maintenance and upgrading, inappropriate initial construction can increase this workload and leave many coastal authorities with an extensive programme of costly works. For the East Riding this maintenance commitment is complicated further by the continued erosion of the clay foreshore and adjacent coastlines.

Date	Description of Works	Cost £
Prior to 1970's	No maintenance records exist for this time however works are likely to minimal groyne repairs as the original seawalls remained intact and the newly constructed north and south revetments would still be relatively maintenance free.	
1970's	Underpinning to North, Central and North Gate Promenade seawalls General groyne repairs	1,800,000 352,000
1980's	General seawall repairs Major upgrading and repair of groyne field Outflanking rock protection to South Revetment	200,000 1,413,500 93,620
1990's	General seawall repairs- note mainly South and Seathorne revetments which began to fail in the mid 90's General groyne repairs Upgrading Original Seawalls: 1/ Pier Towers to North Gate Prom: Replace upper seawall with RC re-curved seawall, plus rock armour protection to toe. 2/ Pier Towers to South Cliff Rd: Replace upper seawall with RC re-curved seawall, plus rock armour protection to its toe and to breakwater and outflanking protection to south of South Revetment. 3/ North Gate Promenade: Replace upper seawall with a new RC seawall and encase upper seawalls with RC. Extend and re-profile existing rock armour outflanking protection to south of South Revetment	265,000 307,000 2,890,000 3,101,500 325,000 271,700
2000 to 2003	General seawall repairs- note mainly South and Seathorne revetments. General groyne repairs	130,000 58,800

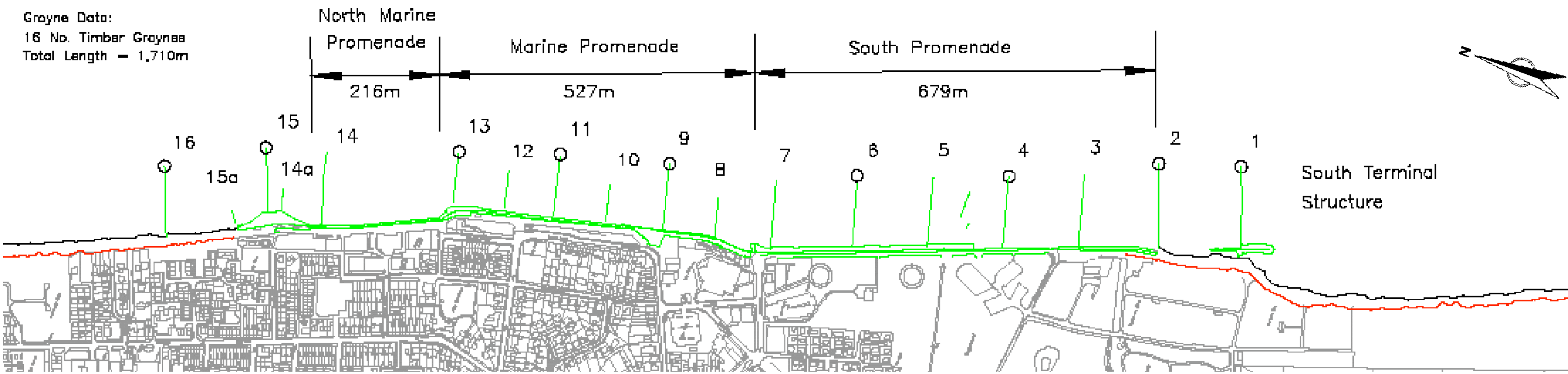




Location:	Other Frontages
	Funding for coast protection works is only given when it can be shown that the cost of providing the defence works is less than the cost of the property being saved. Due to the high cost of carrying out such works which can be as much as £6,000 to £10,000 per metre, it is often difficult to gain approval for defence works at sites outside of the currently developed frontages. A further complication placed upon this analysis is that the full cost of saving a property is only gained at a time when the property is about to be lost. Before then economically it is better to invest the money and receive interest on it. This means that the further a property is from the cliff edge the less financial benefit is gained from the defending it, so when totalling up the costs benefit savings are steadily reduced as properties move inland. This reduction can make totalling up a viable benefit cost difficult for the sporadically populated villages and outlying built up areas, and explains why defence works are only put in at the last moment.

Mappleton	Construction Sequence for Main Defence Structures			
Date	Description of Works	Frontage	Frontage Cost £	Defence Type
Early History	The village of Mappleton lay undefended until 1991which saw the construction of the current defences. Unlike other coastal towns such as Hornsea that developed in tandem with their defended frontages the small village of Mappleton grew up on high ground some distance inland of the coastline, thus it was never able to prepare itself for the impact of cliff erosion. Concern over the retreating cliffs was ever present however, with the first recorded erosion measurement being taken as early as 1786. At that time the village church was578m from the cliff, by 1990 this distance had reduced to 223m. By the late eighties cliff erosion looked set to claim the village and the main coast road so a justifiable case could be made for their protection.			
1991	Coast protection works put in to defend a 450m length of cliff line opposite the village using 61,500Mg of rock armour to build two groynes and a sloping revetment.	450m	2,000,000	Rock Armour Revetment with Groynes

Easington	Construction Sequence for Main Defence Structures			
Date	Description of Works	Frontage	Frontage Cost £	Defence Type
Early History	The village of Easington lies on low ground bounded by the coast on one side and the River Humber on the other, unlike Mappleton its fortunes have always been linked to access to the sea. As the village is still some 400m from the coast it would have been difficult to justify the cost of defending it at present. However at Easington the cost benefit could easily be achieved as the gas terminals situated on the cliff top to the north were at one point less than 30m from the cliff edge. When first built it had been assumed that gas supplies would have run out before cliff erosion threatened the facility, however gas supplies remain strong and the site now supplies about 25% of the nation's gas. With so much costly infrastructure at risk gaining economic approval was a formality, more difficult to obtain was the planning approval which for a site bounded on both sides by SSSI's took over five years. Interestingly one condition placed upon this planning consent is that the need for the scheme should be reviewed in 25 years time and allowance be made for its removal if the gas terminals are no longer required.			
1999	Coast protection works put in using 133,000 Mg of rock to build a 1km long revetment at the base of the regraded cliffs opposite the gas terminal site.	1,000m	6,600,000	Rock Armour Revetment



Location: Hornsea	**Construction Sequence for Main Defence Structures**			
Date	**Description of Works**	**Frontage (m) New**	**Total**	**Defence Type**
Early History	By the early 19th century Hornsea had become a well-established coastal village. At that time defences will have been minimal and probably of timber breastwork construction.			Timber breastworks
1906	The turn of the last century saw the start of the main defence construction at Hornsea. This began with the construction of a North Promenade split level seawall	422m		Reinforced concrete seawall
1910 to 1930	At some time between these dates the seawall between Sands Lane and New Road was constructed to defend the low lying land behind	447m	869m	Reinforced concrete seawall
1930	Defences extended south with construction of south Promenade seawall between Sands Lane and Hornsea Burton Road.	545m	1,414m	Massive concrete seawall
1954	South Promenade defences extended south with the construction of a RC revetment.	130m	1,544m	RC seawall.
	Hornsea's defended frontage has been extended further north and south beyond the hard defences with the construction of additional timber groynes. (See note below)	313m	1,857m	
1906 to 1954	It is likely that the original timber groyne field was put in along with each successive seawall construction, however no written records can be found to support this. Since their construction all but groynes numbered 14a and 15a have been replaced, these remaining groynes are however now redundant.			

Repair and Upgrade History for Main Defence Structures

Following their construction coastal structures soon require maintenance and upgrading, inappropriate initial construction can increase this workload and leave many coastal authorities with an extensive programme of costly works. For the East Riding this maintenance commitment is complicated further by the continued erosion of the clay foreshore and adjacent coastlines.

Date	**Description of Works**	**Cost £**
Prior to 1970's	No maintenance records exist for this time however works are likely to have been minimal as the groyne frontage had fallen into disrepair and the massive seawall were relatively intact.	
1970's	General seawall maintenance plus underpinning to Central Promenade seawall opposite New Road	302,700
	By the early 1970's Hornsea's groyne field required major refurbishment, a total of 8 groynes were totally rebuilt and 4 others were repaired, also to control outflanking the south terminal structure was added.	1,718,400
1980's	During the mid 80's work began on upgrading the original seawalls:-	
	Central Promenade seawall: North end opposite the Marine Hotel the upper walls were encased in textured reinforced concrete and a wave return profile was added to the main seawall.	1,087,500
	Towards its south end protection was improved through construction of a new inner floodwall.	420,000
	South Promenade seawall has been sinking since its construction as it is underlain by post glacial peat layers, to raise its level it was encased in reinforced concrete and also given extra protection through placement of a rock armour revetment.	700,000
	Upgrading of groyne field continues with the rebuilding of a further 8 plus strengthening works to south terminal structure.	950,000
1990's	By the 90's most of Hornsea's groyne frontage had been replaced and required little further maintenance, the seawalls apart from north Promenade were also in relatively good order, few maintenance records exist so estimates have therefore been made based upon recent works.	
	General seawall repairs.	20,000
	General groyne repairs.	60,000
2000 to 2003	Central Promenade seawall between Sands Lane and New Road was too low to prevent overtopping during storms its level was therefore raised to provide increased flood protection.	620,000
	General seawall repairs.	43,000
	General groyne repairs.	29,200