

Economics Baseline Report

Prepared for

Slapton Line
Partnership

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Introduction

1.1 Background and Study Area

This report has been prepared for the Slapton Line Partnership (SLP) and their partners including South Hams District Council, the Environment Agency and Devon County Council, as part of the Slapton Sands Beach Management Plan (BMP). The BMP study area covers the coastline from Torcross in the south, to Strete Gate in the north; however, for the purpose of the Economics Baseline Report, the study area has been extended to include Blackpool Sands, Beesands and Hallsands, as shown in Figure 1.1.

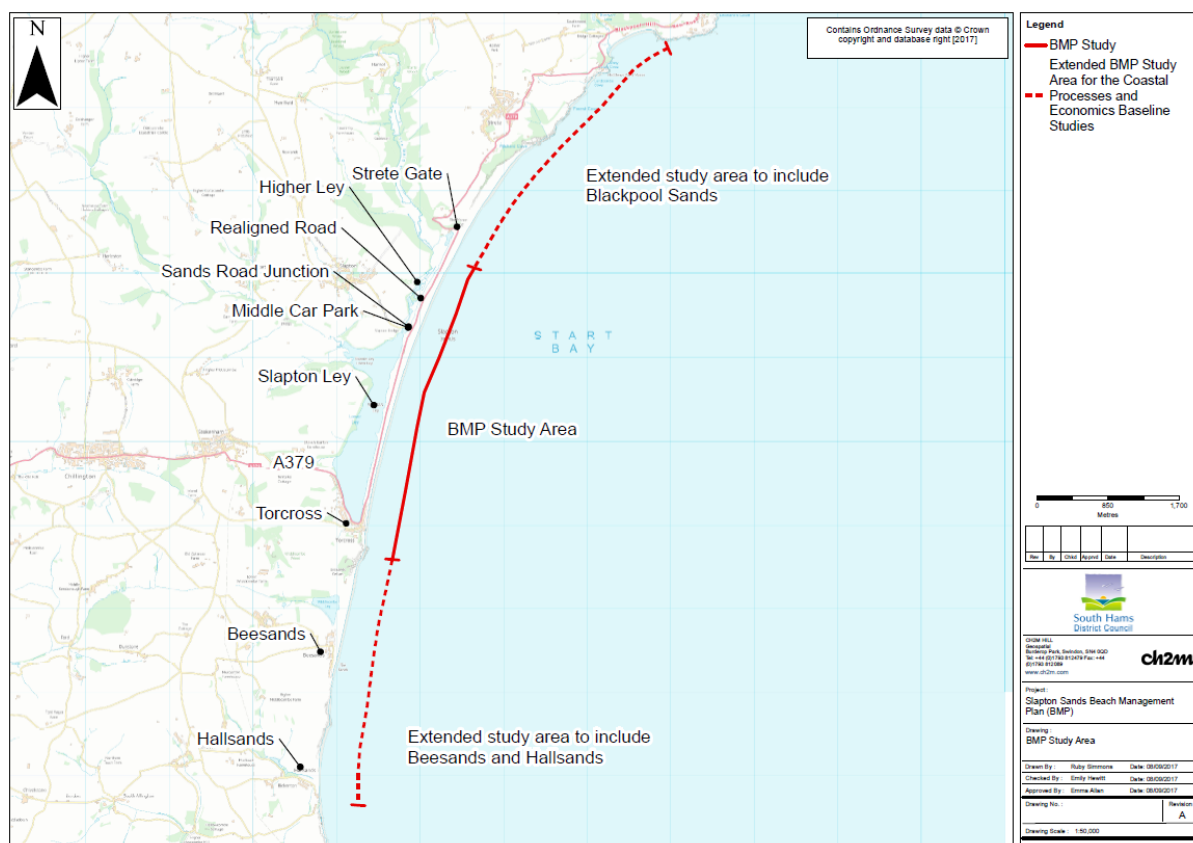


Figure 1.1: Slapton Sands BMP Study Area
Map showing the extent of the BMP study area

1.2 The Basis of this Report

This Economics Baseline Report is a supporting document to the BMP. Studies covering coastal processes, defences and the environment are being undertaken separately and a detailed options appraisal will be completed as part of the BMP process.

This report provides details of the economic basis (i.e. the economic benefits) for both ongoing and future beach management and coastal flood and erosion risk management activities along the Slapton Sands Beach Management Plan (BMP) frontage.

This economic basis for future management of this coastline is developed from a combination of:

- Previous economic assessments used to provide the case for past coastal protection and flood defence schemes along the BMP frontage (Section 2), and

- New assessments of flood and erosion risk undertaken for this project to develop a new BMP (Section 3). The new assessments also consider areas north and south of the main BMP frontage, covering Hallsands, Beesands and Blackpool Sands.

The resulting economic baseline to be used in the economic appraisal of future coastal flood and erosion risk management options as part of developing this BMP is summarised in Section 4. This is the initial stage of the appraisal and potential funding scenarios and value of partnership funding will depend on option appraisal at the next stage. Section 4.3 provides an initial indication of FDGIA that could be available towards works along the BMP frontage only.

2 Economic Appraisal from Previous Studies

There has been a number of previous studies that have produced economic appraisals to demonstrate the value of continued investment in coastal flood and erosion risk management measures along all or parts of the BMP frontage. This section provides a summary of the economic case put forward by those previous studies between 2004 and 2015.

The purpose of this review is to provide understanding of the economic benefits (i.e. potential flood and/or erosion damages if Do Nothing occurs) that were assumed in each study, and what was assumed in defining those benefits.

2.1 Business Survey Report (Tym and Partners, 2005)

This 2005 report provides an overview of results collected from postal questionnaires sent to 426 businesses in the areas of Kingsbridge, Darmouth, Slapton and Chillington in 2005. The aim of the questionnaire was to gain feedback from businesses affected by the previous closure of the A379 in 2000/2001. A total of 109 questionnaires were received back (24% response rate) with 57% of these 109 stating they were directly affected by the closure of road.

Responses indicated that the closure of road caused impacts on business turnover through disruptions to travel to and from work and also reduced access by suppliers and customers including tourists. Respondents estimated they had lost on average approximately £6k each from the recent road closure from flooding but up to £10k of losses per business was estimated in the Slapton/Torcross area.

Other key responses included:

- 90% of businesses said that retention of A379 is important to their business.
- Strong resistance to the alternative inland route, even if improved.
- Tourism average spend per head estimated at between £5 to £50 per head.
- Businesses failed to identify where the visitors came from but some did think they were from outside South Hams.

2.2 Coastal Zone Management Study (Scott Wilson, 2006)

The purpose of the Coastal Zone Management Study (CZMS) was to prepare an assessment of coastal processes at Slapton Sands in order to inform the most appropriate shoreline management approach with particular consideration for the Slapton shingle ridge and A379 link road (Figure 2.1). The study aimed to consider both short term (including recent erosion and flooding issues) and a longer term coastal zone management strategy.

In 2000/2001 loss of 5m width over a 1000m length of the shingle ridge was observed (cutback but not breach) which caused an undermining of over 200m length of road (Figure 2.2). The road was closed during the period and realignment of the worst section (over 200m between Slapton and Strete) was implemented, moving it 20m landwards.

The 'Do Nothing' damages assessment focussed on traffic impacts as a result of flooding and road closure (100-year appraisal period). The assessment identified the A379 as an important transport link with an emergency route being available via A381 and A3122 (but with narrow roads this is suitable for small vehicles only). Damage to a maximum of 10 properties was estimated to occur at a late stage in the strategy appraisal period and only if the barrier breached; and only a maximum of 20 properties at Torcross if the barrier retreated more rapidly. The study considered these property damages overall to be negligible. Socio-economic benefits/costs such as impacts on bus services, emergency services, schools, isolation of communities and tourism impacts, were also excluded.



Figure 2.1: Strategy study area extracted from the CZMS (Scott Wilson, 2006)

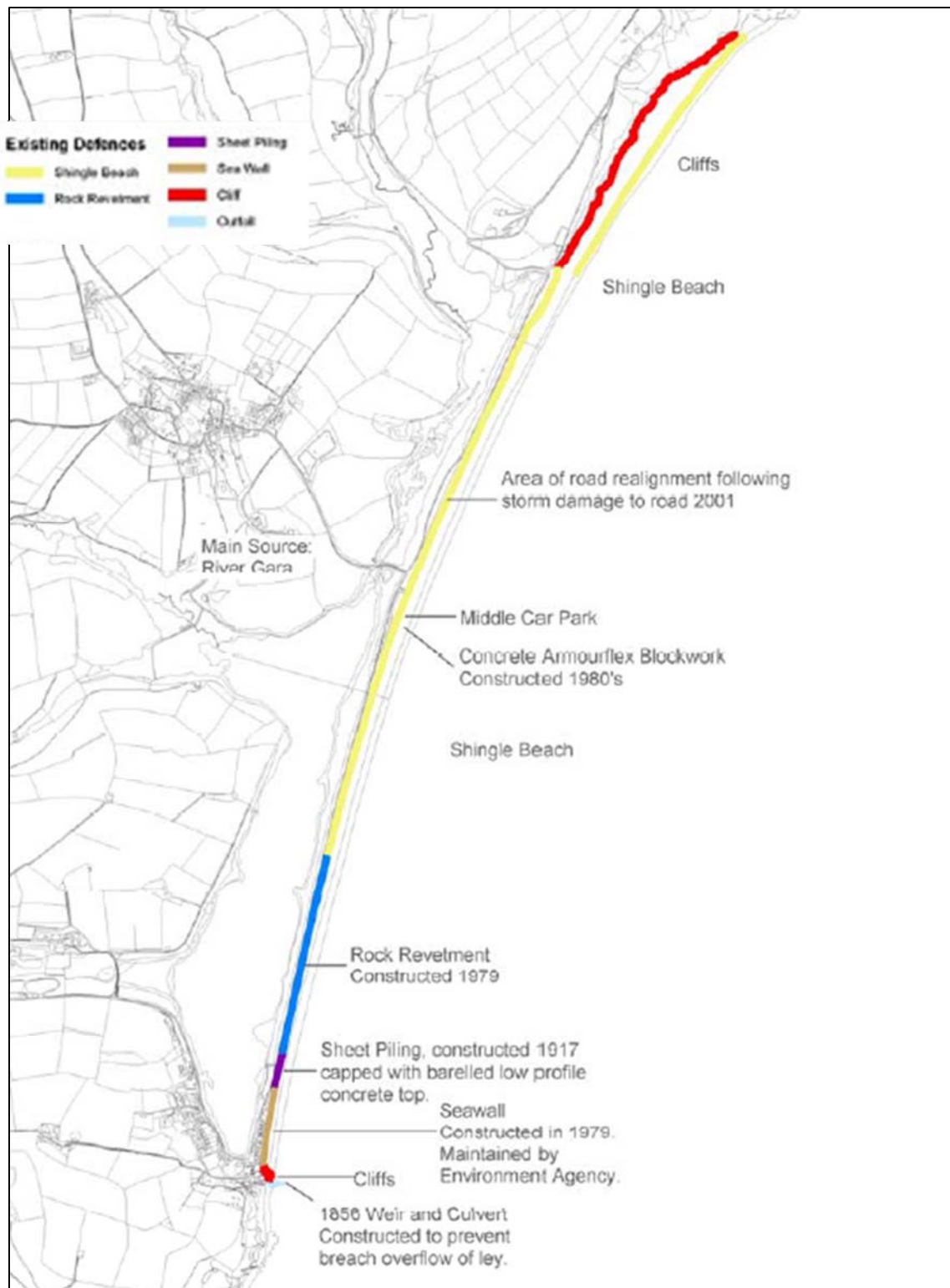


Figure 2.2: Existing defences extracted from the CZMS (Scott Wilson, 2006)

The most vulnerable areas of road between Slapton and Strete were recently realigned (considered likely to be damaged under a 1 in 25 year event- similar to 2000/2001).

The assessment of impacts of road closure undertaken for this study used outline July 2004 traffic data only. Key assumptions included:

- Out of season traffic flows were estimated to be 1,500 vehicles/day and 2,700 for peak daily flows.

- Closure of the road would increase the journey by 6 miles for 70% journeys at cost of £0.40/mile.
- Assumed over 70% of visitors would not travel to the area following road damage event and find alternative areas.

The 'Do Nothing' annual damages were estimated to be £1million/year and over a 100-year strategy period, this was estimated to be £29.9million. The Present Value (PV) 'Do nothing' damages (assuming the existing shingle ridge has a residual life of 15 years) is £23.1million. The PV benefits for keeping the road (but with Do Minimum – proactive maintenance) are estimated at £17.6 million and the PV benefits for keeping the road (but with Do Minimum – reactive maintenance) are estimated at £17.4 million.

The study provides a review of funding (as per the previous Department of Environment, Food and Rural Affairs (DEFRA) guidance and before Partnership Funding was introduced in 2011). It also includes an outline of potential funding sources including Natural Environment Research Council (NERC) and South West of England Regional Development Agency (SWRDA) which was then abolished in 2012. The study notes that DEFRA advised that the road protection would not be funded by Flood and Coastal Erosion Risk Management (FCERM) Grant-in-Aid (GiA) funding and would need to be done by Slapton Line Partnership or others.

Department for Transport (DFT) funding was also explored but seen as unlikely as Slapton is not a major urban area. However, it was estimated that approximately 35% grant aid contribution could be considered for Torcross as the shingle barrier retreats and exposes the village and properties. (NB: since this study was completed emergency works have been carried out at Torcross for which a FCERM-GiA contribution was received – see Section 2.4).

2.3 Slapton Line Economic Valuation (JBA, 2015)

This study provides an overview of the '*current economic contribution of the Slapton Line road (A379)*' to understand the impact of road closure or loss from a major coastal flood. The study considered potential impacts on residents/ local traffic by temporary closure and potential impacts on local visitors due to temporary or permanent loss.

The study assessed settlements of Chillington, Beeson, Kellerton and Torcross assuming that this is the area that is served by the Slapton line travelling to Dartmouth (Primary study area). The wider study area also covers the settlements of Kingsbridge and Dartmouth (Figure 2.3).

2.3.1.1 Local commuting and tourism (baseline)

The study assessed travel to work trips taking into account local employment statistics from 2013 for the Stokenham Ward to provide a present-day baseline against which a range of future scenarios (see below) could be tested.

Key findings from this baseline assessment were:

- Most travel to work trips are north bound.
- An alternative route is between Kingsbridge and Dartmouth particularly for commercial vehicles.
- Main attraction of A379 is the scenery and sea views which are a tourist attraction.
- Local economy most likely to be impacted by reduced access via Slapton line for tourism and visitor interests.
- Peak traffic counts in summer when tourists (approx. 3000 vehicles each day in July/Aug)
- Only 4-6% of this is travel to work traffic.

Key assumptions in deriving this baseline were:

- Population data taken from ONS 2013 for Stokenham Ward.
- Economy data from 2011 census.
- 80% of day trips from visitors or residents from North of Ley. Other 20% assumed to be in Stokenham and travelling to Dartmouth for the day.
- 75% of day movements are one way journeys and 25% making a return journey.
- Average spend per visitor £32.19/day.
- Visitor spend of £9.28 million per year.
- Visitors of 288,000/year (based on 2014 data).
- £1million of tourism expenditure = £0.443million of Gross Value Added (GVA).
- 1 job = £32,579 of tourism expenditure (converted using 2014 GDP deflator series by HM Treasury).
- Therefore, the value of £4.11million/year to local economy based on 2014 prices (3.5% future discount as per Green Book).

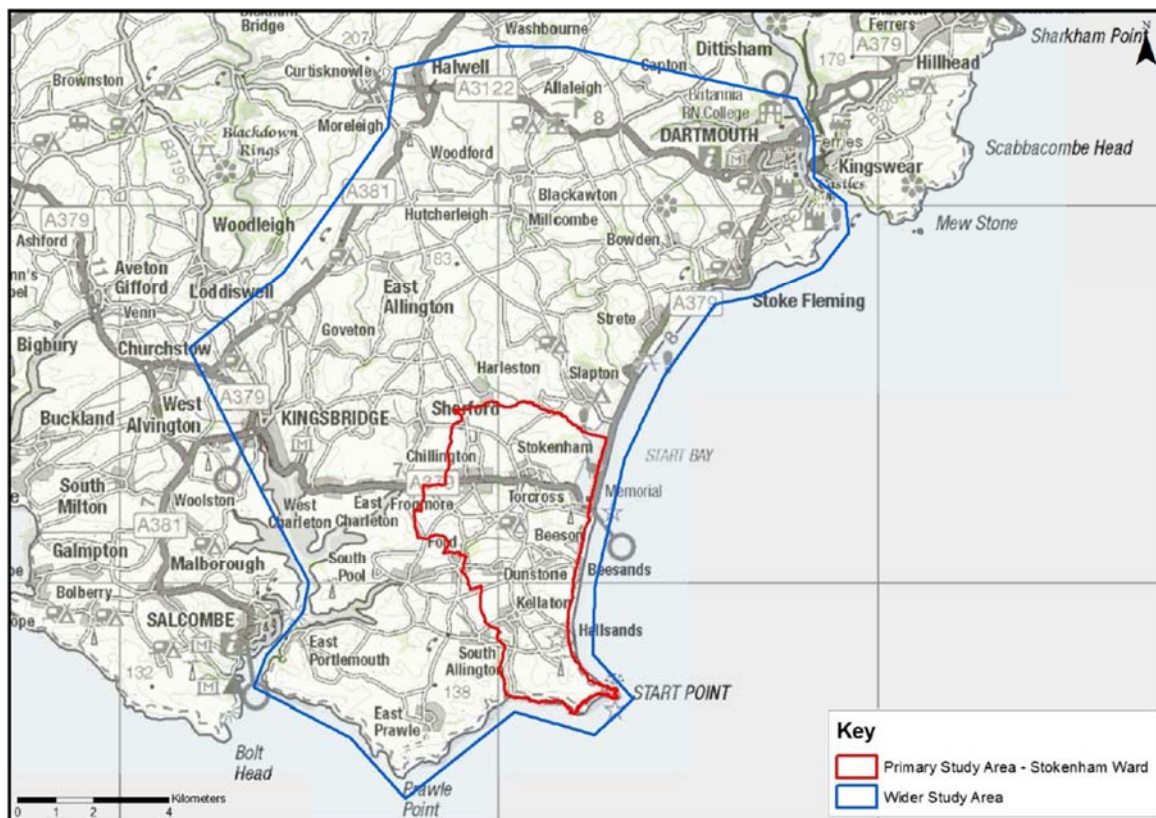


Figure 2.3: Primary assessment area and wider study area considered in JBA (2015) study

2.3.1.2 Future scenarios

The baseline scenario described above was then used to test a range of future scenarios. The scenarios tested were based on the 2006 Scott Wilson method which focussed on local residents and businesses, in addition to visitor impacts:

1. Permanent loss of road- 30% loss of visitor income each year following flood and 60% loss for comparison.

2. Temporary loss of road – 30% loss in visitor income between Mar-Jun in flood year and 60% loss for comparison.

Key assumptions in these future scenario tests were:

- Excludes wave overtopping or wave propagation in event of a breach of the road or storm surge impacts.
- Assessment considered static tide levels and sea level rise for 2015/2065/2115.
- Did not consider Torcross defences. Torcross elevation generally above 4mODN and not at risk of flooding in 1 in 1000 current day or up to 2065¹. Therefore, considered little benefit.
- Sea level rise as a result of climate change will significantly increase the risk of tidal flooding to low-lying properties in Torcross, with most events showing water levels above 4m AOD (estimated lowest property threshold level). The road level of the line is at approximately 5.5m AOD, so would protect the village against tidal flooding in the 2115 scenario. It is predicted that the road will be lost within the next 30 – 50 years, and that it will not be financially viable to retain it beyond this date, however this assessment highlights the potential benefits in retaining some form of bank with a level of at least 4.52m AOD to mitigate tidal flood risk.

2.3.1.3 Future local resident and businesses impacts

The key findings of the future scenario tests on local residents and businesses were:

- Total of £37,800/month disruption to local traffic and £453,000 /year total.
- Over 25 years £0.30million (temporary loss of road every 5 years) to £7.47million (road lost permanently) (discounted at 3.5%).

These findings were based on the same assumptions and approach as used by Scott Wilson in the 2006 study, as follows:

- Average daily local traffic flow is reduced by a factor (6/7ths) to reflect reduced localised traffic on weekends.
- 70% of journeys would be affected by the loss of the road.
- Average increase in local journey length that would occur if the road is closed due to storm damage is 6 miles.
- Average running cost per mile is assumed to be £0.2074, based on estimates for 2014 published by the AA.
- Local traffic data for January (2014) from council and 1663 average daily vehicles.

2.3.1.4 Future visitor impacts

The key findings of the future scenario tests on visitors were:

- Impact on local visitor economy would be £20.3-£40.7million in GVA over 25 years.
- Temporary loss of road = £1.2 to £2.4 million over 25 years.
- Loss of road not impact significantly on damages associated with tidal flooding (e.g. Torcross).

2.3.1.5 Non-quantifiable risks not considered

The following non-quantifiable impacts were not considered in this 2015 study:

1. Public transport links.

¹ However this contrasts to the flood zone data in Section 3.1 which shows the flooding occurs under a current day 1 in 200 year event (Flood Zone 3 and 2).

2. Access to schools.
3. Emergency services.
4. Public and commercial collections and deliveries, e.g. postal deliveries/milk/newspapers.

2.4 Torcross Sea Defences Review of Do nothing situation (Environment Agency, 2016)

In preparing the business case for emergency works to repair the seawall at Torcross, the Environment Agency assessed that 51 (Figure 2.4) properties are at risk of erosion at Torcross under a 'Do Nothing' scenario, where all properties are assumed to be lost in year 1 over 50 years duration of benefits. Although Figure 2.5 shows only 23 properties (i.e. blue dots) to be at risk of erosion; one of the 'blue dots' at risk is a residential complex and within it there are a significant number of individual residential properties. This complex was considered to be at risk by the failure of the defence and the corresponding undermining of the seaward limit of the structure resulting is risk of structural collapse of the building, hence the higher number of 51 (which incorporates the individual properties) being used.

The study recommends a number of additional factors not included within the original damage assessment (Scott Wilson, 2006) that may be included within the 'Do Nothing' option including:

1. Demolition of structurally unsafe properties to maintain an acceptable level of public safety.
2. Associated offsite removal of material that may cause pollution to the marine and terrestrial environments may be required in order to prevent a breach of environmental legislation.
3. Landscaping to return the 'former Torcross' to an acceptable condition given the location of the site within the South Devon AONB would likely be required.
4. All the above activities would require special measures to take due account of UXO risks from former WWII training undertake at this site.
5. Utilities within the road way may be affected resulting in the loss of services for properties that are not directly affected by the coastal erosion. Given the potentially limited economically viable alternative routes for services to supply property, this may result in additional properties becoming inhabitable.
6. At other sites, where residents were asked to leave due to coastal erosion, additional payments ('or buy-outs') were made to residents to account for costs and stress of moving (N.B. it is not government policy to do this and there is no funding stream that would enable this at present, though has been tested at some pilot sites, mainly on the east coast).
7. Loss of the amenity of the promenade and beach for recreational benefit may provide significant benefits. This is worthy of further investigation, however due consideration of what is representative of a 'loss to the nation' is required.
8. Legislation requiring maintenance of the defences to provide protection to the SSSI located with Slapton ley. This may include maintaining the SSSI and requirements of the Water Framework Directive to provide protection to the Ley. As a legal requirement, it is not possible to quantify the impact of this loss.

Such options may warrant further investigation if greater damages are sought to justify intervention works along the Torcross frontage. The study also recommended that any further works should consider the damages attributed to the loss of the A379 road and a strategic approach to damage assessment should be adopted to prevent the risk of double counting of benefits.

The works were implemented in 2016/17 and have now been completed. The properties counted as part of the benefit assessment and for achieving FCERM-GiA cannot be used again for justifying coastal erosion measures for the next 50 years (to prevent double counting); however, they may be considered in justifying coastal flood risk management measures in the next 50 years.

A	B	C	D	E	F	G	H	I	J	
1	Erosion Loss Calculation Sheet with delay options						Sheet Nr.	1 of 1		
2	Client/Authority									
3	Environment Agency									
4	Project name		Option:	Benefits (£)	Delay (yrs)	Prepared (date)		01/01/2016		
5	Torcross Sea Defences - Coastal Erosion Issues		Option 2	12538756	50	Printed		22/01/2016		
6	Project reference		Option 3	10054931	30	Prepared by				
7	Base date for estimates (year 0)		Option 4	7769921	20	Checked by				
8	Scaling factor (e.g. £m, £k, £)		Option 5	12538756	50	Checked date		15/02/2016		
9	Discount rate		3.5%							
0	Ref	Asset	Risk free market value £	Year when the asset is expected to be lost	Prob of loss in year	Expected value of asset losses £				
1		Description				Do-nothing	Option 2	Option 3	Option 4	Option 5
2	0	START BAY INN	250000	0	1	250,000.00	49,315.68	89,069.60	125,641.47	49,315.68
3	1	1 AT THE BEACH	250000	0	1	250,000.00	49,315.68	89,069.60	125,641.47	49,315.68
4	2	1 THE OLD WATCH HOUSE	178000	0	1	178,000.00	35,112.76	63,417.56	89,456.73	35,112.76
5	3	10 AT THE BEACH	250000	0	1	250,000.00	49,315.68	89,069.60	125,641.47	49,315.68
6	4	11 AT THE BEACH	250000	0	1	250,000.00	49,315.68	89,069.60	125,641.47	49,315.68
7	5	12 AT THE BEACH	250000	0	1	250,000.00	49,315.68	89,069.60	125,641.47	49,315.68
8	6	14 AT THE BEACH	250000	0	1	250,000.00	49,315.68	89,069.60	125,641.47	49,315.68
9	7	15 AT THE BEACH	250000	0	1	250,000.00	49,315.68	89,069.60	125,641.47	49,315.68
0	8	16 AT THE BEACH	250000	0	1	250,000.00	49,315.68	89,069.60	125,641.47	49,315.68
1	9	17 AT THE BEACH	250000	0	1	250,000.00	49,315.68	89,069.60	125,641.47	49,315.68
2	10	18 AT THE BEACH	250000	0	1	250,000.00	49,315.68	89,069.60	125,641.47	49,315.68
3	11	19 AT THE BEACH	250000	0	1	250,000.00	49,315.68	89,069.60	125,641.47	49,315.68
4	12	2 AT THE BEACH	250000	0	1	250,000.00	49,315.68	89,069.60	125,641.47	49,315.68
5	13	2 THE OLD WATCH HOUSE	204000	0	1	204,000.00	40,241.59	72,680.80	102,523.44	40,241.59
6	14	3 AT THE BEACH	250000	0	1	250,000.00	49,315.68	89,069.60	125,641.47	49,315.68
7	15	3 THE OLD WATCH HOUSE	180000	0	1	180,000.00	35,507.29	64,130.11	90,461.86	35,507.29
8	16	4 AT THE BEACH	250000	0	1	250,000.00	49,315.68	89,069.60	125,641.47	49,315.68
9	17	4 THE OLD WATCH HOUSE	180000	0	1	180,000.00	35,507.29	64,130.11	90,461.86	35,507.29
0	18	5 AT THE BEACH	250000	0	1	250,000.00	49,315.68	89,069.60	125,641.47	49,315.68
1	19	6 AT THE BEACH	250000	0	1	250,000.00	49,315.68	89,069.60	125,641.47	49,315.68
2	20	7 AT THE BEACH	250000	0	1	250,000.00	49,315.68	89,069.60	125,641.47	49,315.68

Figure 2.4: Extract from FCERM erosion risk assessment spreadsheet for Torcross Emergency Works

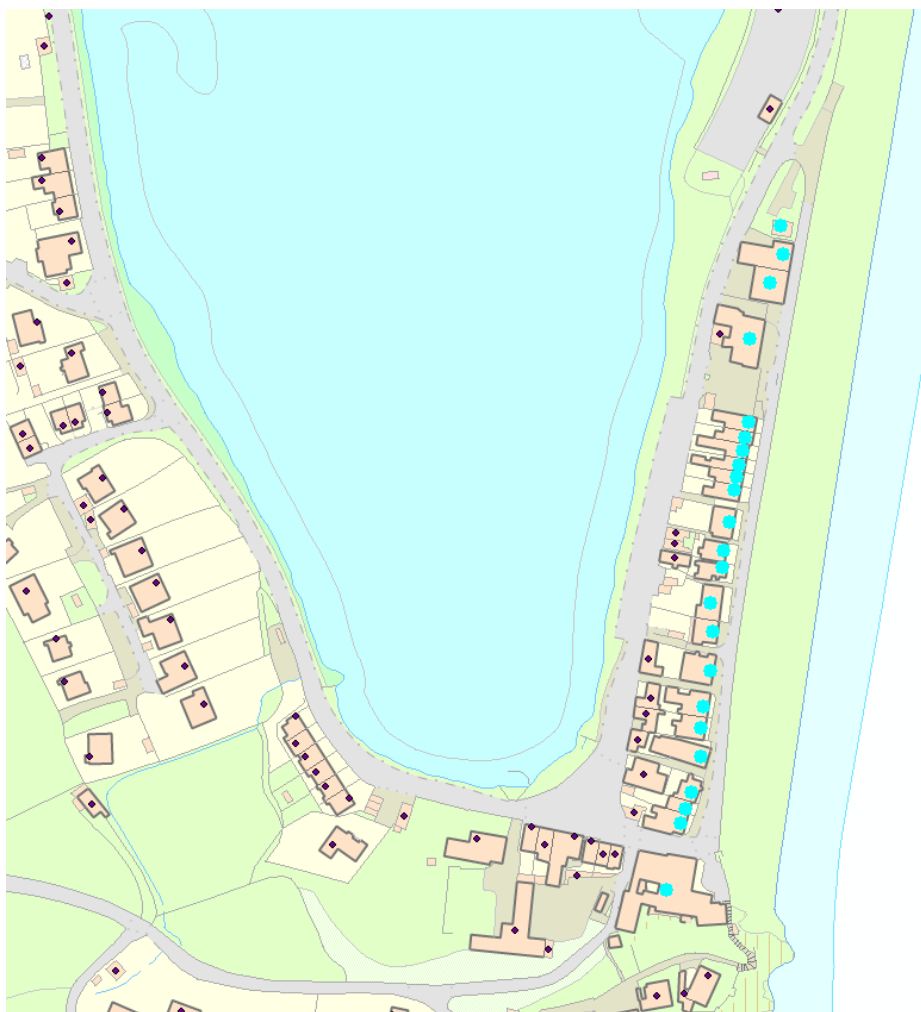


Figure 2.5: Properties at risk of erosion under a Do Nothing scenario at Torcross

3 New Economic Assessments for this BMP

As part of developing the present BMP for Slapton Sands, new assessments of coastal flood and erosion risk damages have been undertaken, making use of the best-available data from recent studies. The following Sections 3.1 and 3.2 describe the approach taken to assessing potential flood and erosion risk damages along the BMP extent respectively, and the assumptions and limitations of both the data and approaches undertaken.

3.1 Flood Risk Damages

The Baseline Scoping Report (CH2M, 2017) outlined that there was some limited data on flood risk for Slapton Sands and the surrounding area. On further investigation, the data provided was limited to areas beyond the study area and mostly fluvial flood risk, e.g. Salcombe.

JBA Ltd are currently undertaking a coastal modelling project utilising the most recent 'State of the Nation' dataset, including flood extent mapping data. Unfortunately, the flood mapping data was not available for consideration at the time of preparing this report. However, this should be considered as part of follow on work, as and when the JBA flood mapping data becomes available in the future.

As a result of lack of data, this assessment has relied on existing Environment Agency flood mapping data and findings from previous studies (as outlined in Section 2) which have been reviewed and updated where possible and/or appropriate.

3.1.1 Residential Flood Damages

3.1.1.1 Available data

This study has used the existing Environment Agency flood zone map data available to undertake a Weighted Annual Averages Damages (WAAD) assessment on residential properties only. The WAAD approach is appropriate where there is little or no understanding of the potential flood depths and return periods. This involves estimating the warning lead time (if any) and also the Standard of Protection (as outlined in the Multi Coloured Manual (MCM, 2014)). A 10% allowance for saline water damage has also been included.

Only Flood Zone 2 and 3 data has been considered in this assessment. Flood Zone definitions are set out in the National Planning Policy Guidance and are defined as the following:

- Flood Zone 3 - land assessed as having a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year.
- Flood Zone 2 - land assessed as having between a 1 in 200 and 1 in 1,000 annual probability of sea flooding (0.5% – 0.1%) in any year.

Also for completeness Flood Zone 1 is land assessed as having a less than 1 in 1,000 annual probability of sea flooding (<0.1%). These flood zones refer to the probability of sea flooding, ignoring the presence of defences. Flood Zone 1 was not considered in this assessment.

The Weighted Annual Average Damages to the average residential property with no flood warning and no flood protection is estimated to be £5,054 as outlined in Table 3.1 below.

Table 3.1: Weighted Annual Average Damages (WAAD) (2017 prices) assuming variable threshold Standards of Protection (SoP) (Source: MCH, 2017)

Existing SOP	No Warning (£)
No protection	5,054
2 years	5,054
5 years	3,071
10 years	1,580
25 years	757
50 years	323
100 years	80
200 years	41

The MCM also provides reduced damage values provided by different Standards of Protection and different flood warnings (to which householders are assumed to move portable contents). However, for the purposes of this high level simple assessment flood warning has not been considered.

3.1.1.2 Residential property damage estimates

Overall there are 78 residential properties at risk of tidal flooding from a current day 1 in 1000 to 1 in 200 year event (flood zone 2) or 1 in 200 to 1 in 100 year event (flood zone 3) between Blackpool Sands in the north to Beesands in the south (Figures A.1-A.4 in Appendix A). The majority of residential property flooding occurs at Beesands (29 properties) and Torcross (48 properties) as represented in Figures A.3 and A.4. The mapping shows one residential property at the northern end of Slapton (Figure A.2) and no properties at risk towards Blackpool Sands (Figure A.1). For the purposes of this assessment the 1 property at Northern Slapton (Figure A.2) has been excluded as it is isolated compared to the properties at Beesands and Torcross; therefore, for the economics assessment presented here, a total of 77 residential properties is assumed to be at risk from flooding. Commercial properties have not been considered here.

The flood extents for both Flood Zones 2 and 3 are the same, except for at Hallsands where the Flood Zone 2 extends slightly further inland. This is due to the fact that for most of the frontage, there is high elevation of land behind the frontage. For the purposes of this flood assessment any properties marked as 'commercial', 'dual use', or undefined as '999' within the National Receptor Database (NRD) data have been excluded from the assessment. In addition, car parks and service related buildings have also been excluded. Emergency services damages have been estimated at 10% of direct property damages (using this value as this is a rural area).

It is important to note that Flood Zones 2 and 3 areas represent the present-day risk of flooding only, i.e. no impacts of sea level rise have been considered. However, given the higher elevation of the land behind the beach frontage there is unlikely to be wide inland flooding as a result of increased water levels from sea level rise – increase in flood depths experienced is more likely; this could be confirmed by undertaking further modelling. The economic assessment presented in this section is considered to only be appropriate for an initial assessment of potential flood benefits, and further assessment informed by further numerical modelling would be required to refine this work as part of developing any future scheme; this may be determined by the options appraisal process to be undertaken as part of developing this new BMP.

This new residential flood damages assessment on 77 properties (based on a very limited present-day assessment of flood risk) indicates approximately £127k of damages per year (undiscounted) (Figures 3.1 and 3.2). This has then been used over a 20-year appraisal period and discounted to calculate the total PV damages for the full area (Tables 3.3 and 4.1). This is likely to be underestimated due to limited input data (return period flood events) and also lack of accounting for future sea level rise. For Beesands (29 properties), the potential flood risk is approximately £48k/year in damages (undiscounted). For Torcross (48 properties) the potential flood risk is

approximately £79k/year in damages (See Appendix C). Both of these values have then been used over a 20-year appraisal period and discounted to calculate the total PV damages for each area only (again see Tables 3.3 and 4.1).

2. Residential Households at Risk of Flooding

Enter the asset description, number of residential households and target flood probability for each existing flood probability of interest. Look-up the Present Value of Benefits (PVB) at Table 1 for each pair of probabilities and chosen scheme life and enter the values to complete your input.

Residential Households								
SoP Before (Existing)				SoP After (Target)		Present Value Benefits		
Return Period (Years)	Probability %	Asset Description	Number of Residential Households	Return Period (Years)	Probability %	Number of Households Benefiting	PVb [see Table1] (£/household)	Total (£)
No protection	100.0			-		-		£ -
2	50.0			-		-		£ -
5	20.0			-		-		£ -
10	10.0			-		-		£ -
25	4.0			-		-		£ -
50	2.0			-		-		£ -
100	1.0	Residential properties	77	10	10.0	77	1,500	£ 115,500
200	0.5	Residential properties	0	1	100.0	-		£ -
Totals			77			77		£ 115,500

Used at section 1.

Figure 3.1: Calculation of flood risk damages/benefits (£PV) for 1 year excluding saline damages for all properties from Blackpool Sands to Beesands (77 properties – excluding isolated property at north of Slapton). With 10% saline damages the value becomes £127k and this value was used to calculate the total PV damages over 20 years appraisal period in Tables 3.3 and 4.1.

Table1: PV Benefits based upon MCH Table 4.4 Weighted Annual Average Damages (WAAD) assuming variable threshold Standards of Protection (SoP) and Green Book Long Term Discount Factors (Annex 6, p100, 2nd table).													
Enter the scheme life to set the discount factor and then look-up the PVb per household based upon the existing and target SoP. To view the WAAD avoided set the scheme life to 0 to set the discount factor to unity.													
Present Value Benefits per Residential Household for Chosen Scheme Life													
Chosen Scheme Life (Years)	Discount Factor	SoP After (Target)										MCH 2014 Table 4.5 WAAD (£/household)	
0	1.000	Return Period (Years)	2	5	10	25	50	100	200	Maximum	Return Period (Years)		
SoP Before (Existing)		Return Period (Years)	Probability %	50.0	20.0	10.0	4.0	2.0	1.0	0.5	0	Scheme Life PV Benefits (No warning) (£/household)	
		No protection	100.0	0	1,983	3,474	4,297	4,731	4,974	5,013	5,054		
		2	50.0		1,983	3,474	4,297	4,731	4,974	5,013	5,054		
		5	20.0			1,491	2,314	2,748	2,991	3,030	3,071		
		10	10.0				823	1,257	1,500	1,539	1,580		
		25	4.0					434	677	716	757		
		50	2.0						243	282	323		
		100	1.0							39	80		
		200	0.5								41		

Figure 3.2: Calculation of flood risk damages/benefits (£PV) for 1 year (year 0) using WAAD approach with the latest MCH 2017 data

3.1.1.3 Limitations of assessment

The estimated residential flood damages prepared as part of this exercise used up-to-date MCM guidance (2014) and used a proportionate approach given the limitations of the available data from previous studies to provide an initial assessment of potential flood damages available to justify future FCERM activities along the frontage. The limitations in the current approach and data and suggested improvements are listed below:

- With lack of modelling data the assessment only considered (current day) Flood Zone 2 and 3 flood extents (no depth data and limited return periods were available).
- Using the present-day damages over a 20-year appraisal period does not include any impacts of sea level rise and so must be considered a low-end estimate of potential damages accounting for sea level rise.

- The current benefits assessment does not include damages to commercial properties or services. Damages to these assets should be separately estimated as the business case proceeds. Valuation data for commercial properties will need to be determined based on rateable value data. Services search data shows no significant infrastructure is at risk of flooding or erosion so it is not worth pursuing in terms of additional benefits.
- There are a number of “999” coded properties within the NRD database. It may be necessary to further explore and recode these properties as appropriate, since they contribute 12% of the damages.
- Car park damages could be considered for some vehicles though assumptions on the likelihood / number of vehicles being present during inclement weather would need to be made.
- Emergency services could be included in future assessments, which can be up to 10.7% for rural areas.
- Finally, it is also crucial to further understand what proportions of the existing benefits (and residential property counts) have already been claimed for construction/capital works on the existing defences. The current exercise did not attempt to quantify the proportion of available benefits for the proposed works which is important for partnership funding. Torcross recently received FCERM-GiA funding towards emergency works and potential for double counting needs to be considered further.

3.1.2 Road Closure/Loss Flood Damages

3.1.2.1 Existing data

In addition to residential properties being flooded, the impact of temporary and permanent closure of the A379 has been considered.

As outlined in Section 2 above, several previous studies have been undertaken to consider the impact of road closure on traffic flows and therefore local and tourist travel. Given lack of available new or more in-depth data, this assessment has relied on the review and updating of previous study outcomes; however some more up to date data was available on traffic flows.

3.1.2.2 Impact on local and tourist traffic

Updating Scott Wilson data

The Scott Wilson study assigned a crude figure of additional miles travelled to all traffic as a result of closure of the road; it did not consider any tourism impacts directly. The existing traffic flow data of the A379 has been considered and re-evaluated (Appendix B). Overall despite lack of data, results suggest there has been an average increase in traffic flows by 42% between 2004 and 2016 and assuming there has been an equal increase in local and tourist traffic, an uplift of 42% has been applied to the original £1million damages of £420,000/year.

There have also been changes in the costs of road disruption and so an additional allowance for inflation has been included using the CPI index (0.5% difference from Aug 2006 and May 2017) of £5,000/year. These values have been added to the estimation of £1million losses from the Scott Wilson (2006) study. Therefore, the updated annual damage as a result of traffic disruption is £1,425,000/year (i.e. this is the damage from complete loss of the road).

Updating JBA data

A more detailed financial impact of road closure on local traffic was undertaken by JBA in 2015 and considered two scenarios:

1. Permanent loss of road.
2. Temporary loss of road (assume flooded for 1 month every 5 years).

Both these scenarios were updated and uplifted using the CPI index (2.1% difference between Dec 14 and July 17), as shown in Table 3.2.

Table 3.2: Damages from permanent and temporary loss of the A379 road (local traffic disruption)

Scenario	2014 damages (JBA,2015)	Updated 2017 damages
Permanent loss of road scenario	£453,207/year	£462,724/year
Temporary loss of road (assume every 5 years)	£37,767/month the road is closed.	£38,560 /month

The permanent loss of the road scenario price from 2014 (JBA study) and 2017 (this study) is half of the original loss value of £1million (2006 CZMS) but even more so if accounting for the £425,000 increase (as above). This is likely to do with the 2014 study undertaking a more detailed assessment of the potential benefits compared to the 2006 study. As a result, the updated JBA study value of £462,724/year will be utilised for this study (for the erosion assessment in Section 4). The value of £38,560/month will be utilised for the flood assessment here.

3.1.2.3 Impact on tourist revenue

Updating JBA data

The JBA study also estimated tourism numbers using the additional tourism related traffic and spend per tourist to account for potential loss of tourist revenue:

- **Permanent loss:** The road is worth approximately £4,110,000/year to the local economy based on 2014 prices (JBA 2015). Using a 2.1% CPI index uplift (as described above) to account for changes since then, this rises to £4,196,310/year. If the road was lost permanently, this would cause damages of £4,196,310/year (utilised in the erosion risk assessment in Section 4).
- **Temporary loss:** the 2013 South Hams tourism data suggests that the day visitor spend for 2013 for the whole of South Hams is approximately £32.19 per day visit. This is the same figure utilised in the 2015 JBA assessment. The total number of day visits in the whole of South Hams is estimated to be 4,151,000 per year – in the JBA report it assumes that approximately 144,000 of these day trips are to Torcross. By car this is approximately 3% of the total. If the road was temporarily closed for one month (12,000 day trips lost due to flooding) this would be estimated as approx. £386,280 of damages. All damages related to the loss of tourism are assumed to be related to Torcross and Slapton Sands only.

3.1.2.4 Limitations of assessment

As with many appraisals, tourism damages can be highly subjective and it is questionable if these are damages to the nation. As this provides the majority of damages for any scheme along this frontage, this could be a key delivery risk.

3.1.3 Summary

Table 3.3 summarises the new flood risk damages/benefits calculated for the study area over 20 years.

Table 3.3: Summary of flood damages/benefits for Blackpool Sands to Beesands

	Hallsands	Beesands	Torcross/Slapton sands	Blackpool Sands	Total (£PV)
Property damages (£PV)	0	£706k (29 properties)	£1,162k (48 properties)	0	£1,868k (77 properties only)
Tourism damages (£PV)	0	0	£1,216k	0	£1,216k
Local road damages (£PV)	0	0	£121k	0	£121k
Total (£PV)	0	£706k	£2,499k	0	£3,205k

3.2 Erosion Risk Damages

In order to make an assessment of potential erosion risk damages along the frontage, the erosion risk bands developed as part of the National Coastal Erosion Risk Management (NCERM) dataset and supported by the coastal processes baseline assessment prepared as part of this current project (University of Plymouth Enterprise Ltd, 2017) have been used. This provides an ‘intermediate’ estimate of erosion risk bands for year 20, year 50 and year 100 assuming a No Active Intervention (NAI) scenario. It also provides an ‘upper’ and ‘lower’ estimate of erosion risk for year 20 (the duration of benefits for this project).

These erosion risk bands are used along with NRD data to identify properties at risk of erosion over the next 20, 50 and 100 years. In total, only up to 6 assets in the NRD data are determined to be at risk of erosion over 100 years; none of these are believed to be residential properties (see Table 3.4 below) and only 1 asset lost within 20 years.

Table 3.4: Assets at risk of erosion over next 20,50 and 100 years from Blackpool to Beesands

MCM Code >>	1 - Residences	2 - Retail	8 -Industry	9 - Miscellaneous	999 -	TOTAL NRD assets
Lower estimate (20 years)	0			1		1
Intermediate estimate (20 years)				1		1
Upper estimate (20 years)				1		1
Intermediate estimate (50 years)				2		3
Intermediate estimate (100 years)		1	1	2	2	6

Figures A.5 to A.8 in Appendix A show the NRD assets at risk under the ‘intermediate’ estimate NAI erosion risk bands respectively for 20, 50 and 100 years respectively. The maps also include the risk of erosion of the A379 using erosion mapping provided by Plymouth University for this study; this considered the medium emissions scenario for 20, 50 and 100-year time periods along Slapton Sands and Torcross.

The flood damages assessment (above) only considered residential properties and the erosion risk damages assessment shows only non-residential assets are at risk in this study area because there are no residential properties at risk.

3.2.1.1 Impact on local and tourist traffic

In addition to erosion losses to non-residential assets, erosion will impact on the A379 coast road. The 2015 Slapton economic assessment (JBA) assumed that the economic impact on the road would amount to £462k per year (including CPI index uplift) from the year of loss. If that figure is applied over a 20-year appraisal period, then this could equate to an additional PV damage value ranging from £6,807k to £2,895k, as summarised in Table 3.5.

In reality the upper end is not likely to be achieved as the road is not at imminent risk from erosion, and taking into account the Plymouth erosion risk mapping (which suggests complete loss of the road is unlikely within the short term) for this assessment purposes a value of £2,895k would seem appropriate to assume at this point.

Table 3.5: Erosion damages to traffic (permanent road closure costs)

PVd assuming road loss in year 0 (incurs 20 years of costs)	PVd assuming road loss in year 5 (incurs 15 years of costs)	PVd assuming road loss in year 10 (incurs 10 years of costs)
£6,807k	£4,683k	£2,895k

3.2.1.2 Impact on tourism revenue

As outlined above in the flood damages assessment (Section 3.1), if the road was lost permanently this would cause damages of £4,196k/year due to loss of tourism revenue. This damage is assumed to be focussed on the Torcross/Slapton Sands frontage rather than at Hallsands, Beesands or Blackpool Sands and assuming the road is permanently lost in year 10.

3.3 Summary

Table 3.6 summarises the new erosion risk damages/benefits calculated for the study area.

Table 3.6: Summary of erosion damages/benefits for Blackpool to Beesands

	Hallsands	Beesands	Torcross/Slapton Sands	Blackpool Sands	Total (£PV)
Residential property damages (£PV)	0	0	0	0	0
Road closure tourism damages (£PV)	0	0	£26,318k	0	£26,318k
Road closure local damages (£PV)	0	0	£2,895k	0	£2,895k
Total (£PV)	0	0	£29,213k	0	£29,213k

4 Conclusions

4.1 Do Nothing damages for Use in BMP Appraisal

Based on the review of previous studies and new analysis undertaken as part of this BMP project presented in Sections 2 and 3, it can be concluded that the minimum Present Value damages for the BMP frontage to be used in appraising future FCERM options along for this section of coast can be summarised as follows in Table 4.1.

Table 4.1: Summary of flood and erosion damages/benefits for Blackpool Sands to Beesands

		Hallsands	Beesands	Torcross/Slapton Sands	Blackpool Sands	Total (£PV)
Flood damages	Residential property damages (£PV)	0	£706k (29 properties)	£1,162k (48 properties)	0	£1,868k (77 properties only)
	Road closure tourism damages (£PV)	0	0	£1,216k	0	£1,216k
	Road closure local damages (£PV)	0	0	£121k	0	£121k
	Total (£PV)	0	£706k	£2,499k	0	£3,205k
Erosion damages	Residential property damages (£PV)	0	0	0	0	0
	Road closure tourism damages (£PV)	0	0	£26,318k	0	£26,318k
	Road closure local damages (£PV)	0	0	£2,895k	0	£2,895k
	Total (£PV)	0	0	£29,213k	0	£29,213k
	Total	0	£706k	£31,712k	0	£32,418k

Given the limitations of available data (particularly for flood damage assessment) as described in Section 3, and with comparison to previous study estimates of damages for parts of the BMP frontage (refer to Section 2), this PV damages total of £32,418k is considered to be a minimum level of benefits that would justify FCERM activities in the near future. Further assessment outlined in Section 4.1.1 could potentially increase the PV damages totals over a 100-year appraisal period, however, given the limited residential properties at risk of flooding and erosion over this period the eligibility of a scheme for FCERM-GiA funding would most likely be limited (see Section 4.2). As the tourism damages are subjective and provide the majority of damages for any scheme along this frontage, this could be a key delivery risk.

4.2 Recommendations for Further Assessment

4.2.1 Flood risk damages

The current exercise reported in Section 3.1 gave a first estimate of the AADs from tidal events using the WAAD approach. The estimates were based on EA flood maps. Estimates could be improved (and increased) by first undertaking further modelling of a wider range of return periods down to 1:1 and up to 1:500 as a minimum for both present day and for climate change scenarios to year 100, and using the new modelling outputs to refine the economic damages presented in this report by:

- Incorporation of property-specific surveys (if available), or bespoke assessments, would decrease uncertainty in final AADs estimates. Commission of property surveys (if not readily available) would incur in additional costs and consultations.
- Clearly identifying the return period for the onset of flood damages, since this could further increase the do-minimum damages. This will require further modelling work to be completed as described above.
- Refining the MCM codes assigned to assets and ensuring all assets at risk are included in the NRD. For example, the MCM code for residential properties used in this assessment was “1”, regardless of the type of property and this could be further refined into two or more digits. Additionally, recoding “999” properties and investigating further the non-residential rental yield would also be of value.

Finally, it is also crucial to understand what proportions of the existing benefits (and residential property counts) have already been claimed for construction/capital works on the existing defences. The current exercise did not attempt to quantify the proportion of available benefits for the proposed works. This is important for partnership funding and requires further investigation.

4.2.2 Amenity damages / gains

Whilst there was consideration of loss of tourism revenue as part of the 2015 JBA study, tourism and recreation is likely to be a significant value and could be assessed further if more damages (benefits) to justify a business case are required in the future.

In order to undertake assessment of amenity damages and potential gains, more data on the number of types of visitors and their purpose of visit is required as a minimum; this could be compared with values contained in the MCM from previous studies around the coast of the UK.

4.2.3 Erosion risk damages

The assessment of erosion risk damages reported in Section 3.2 considers there to be no residential risk to properties over the next 100 years along this frontage. This assumes that the existing defences (including those at Beesands and the recent emergency works at Torcross) are maintained for the full 100-year appraisal period. Erosion benefits have already been utilised to justify these works and therefore to avoid double counting this assumption is important. Further work could consider the value of non-residential assets at risk, but this is unlikely to be a significant number given that only 6 assets are lost in 100 years.

4.2.4 Car park damages

Car park damages could be considered for some vehicles although a judgement call on the likelihood / number of vehicles being present during inclement weather should be considered further.

4.2.5 Emergency services damages

Emergency services could be considered and could be up to 10.7% for rural areas. This may increase the damages.

4.2.6 Property damage

Property damage is known to have occurred as a result of beach material being deposited onto the Torcross frontage. This has historically caused damage to windows, doors, property exteriors from material mobilised by waves and the wind. There is no known data or guidance available to understand how these impacts might be valued and therefore a recommendation is to consider this further in the future.

4.2.7 Risk to life or evacuation

Risk to life is also considered an issue along this frontage. Properties are frequently evaluated by the Environment Agency to mitigate this risk and a cost for risk to life or evacuation should be considered. This is recommended to be considered further in the future as and when better flood mapping data becomes available, which includes flood depth and flow velocities.

4.3 Initial Indication of FDGiA

Using the data presented in this baseline, and with some uncertainty regarding the number of properties at flood risk used in the Outcome Measure 2 (OM2), it is possible to provide an initial estimate of the amount of FCERM-GiA that may be available to deliver coastal risk management activities over the next 20 years for Torcross and Beesands respectively (Figure 4.1 and Figure 4.2).

In this case, in order to obtain a 100% PF score for Torcross/Slapton Sands against **£31,712k of benefits** and 48 properties being at risk of flooding under a 1:100 year event (moderate risk) being moved to low risk, then approximately **£1,778k of FCERM-GiA could be available** before third-party contributions are needed to deliver solutions. This will be refined as part of options appraisal, when opportunities for obtaining third-party contributions in relation to different options may be identified.

FCRM Partnership Funding Calculator for Flood and Coastal Erosion Risk Management Grant in Aid (FCRM GiA)
Version 8 January 2014

Project Name: _____
Unique Project Number: _____

Key
Input cells
Calculated cells

All figures are in £'s
Figures in Blue to be entered onto Medium Term Plan

SUMMARY: prospect of FCRM GiA funding

Raw Partnership Funding Score	100%	(1)	Scheme Benefit to Cost Ratio:	17.84	to 1
External Contribution or saving required to achieve an Adjusted Score of 100%	0	(2)	Effective return to taxpayer:	18.90	to 1
Adjusted Partnership Funding Score (PF)	100%	(3)	Effective return on contributions:	n/a	to 1
PV FCRM GiA towards the up-front costs of this scheme (PV Cost for Approval)	1,677,599	(4)			

Cell (2) shows the minimum amount of contributions and/or reductions in scheme cost that are required to raise the Adjusted PF Score to at least 100%. Further increases on this will improve this scheme's chances of an FCRM GiA allocation in the desired year. Planned savings and contributions should be entered into cells (9,10,12) and cells (14-17). See NOTE below.

1. Scheme details

Risk Management Authority type of asset maintainer	EA	(5)	Yes	(6)
Duration of Benefits (years)	20	(7)	Is evidence available that a Strategic Approach has been taken, and that double counting of benefits has been avoided?	
PV Whole-Life Benefits:	31,712,000	(8)	All costs and benefits must be on a Present Value (PV) Whole-Life basis over the Duration of Benefits period. Where Contributions are identified these should also be on a Present Value basis.	
PV Costs		(9)		
PV Appraisal Costs	1,677,599	(10)		
PV design & Construction Costs	1,677,599	(11)		
Sub Total - PV Cost for Approval (appraisal, design, construction)	1,677,599	(11)		
PV Post-Construction Costs	100,000	(12)	<i>The total value of any necessary contributions will depend on whether maintenance (ongoing costs) is funded through revenue FCRM GiA, or by other means.</i> NOTE: This scheme is to be maintained by the EA (ref cell 5). Any contributions needed (ref cell 2) are to help fund both up-front costs (cell 11) and future ongoing costs (cell 12) and should be entered into cells (14-17).	
PV Whole-Life Costs:	1,777,599	(13)		
PV Contributions secured to date		(14)		
PV Local Levy secured to date		(15)		
PV Public Contributions secured to date		(16)		
PV Private Contributions secured to date		(17)		
PV Funding from other Environment Agency functional sources secured to date		(18)		
PV Total Contributions secured to date	0	(18)		

2. Qualifying benefits under Outcome Measure 2: households better protected against flood risk

Number of households in:

	Before			After			Change due to scheme		
	Moderate risk	Significant risk	Very significant risk	Moderate risk	Significant risk	Very significant risk	Moderate risk	Significant risk	Very significant risk
20% most deprived areas	48						0	0	0
21-40% most deprived areas							0	0	0
60% least deprived areas							-48	0	0

Annual damages avoided (£), compared with a household at low risk

	Per year	Over lifetime of scheme	Qual. benefits (discounted)
20% most deprived areas	£ -	£ -	OM2 (20%) £ -
21-40% most deprived areas	£ -	£ -	OM2 (21-40%) £ -
60% least deprived areas	-£ 7,200	-£ 144,000	OM2 (60%) £ 109,529

Figure 4.1: Initial Partnership Funding Calculator for Torcross and Slapton BMP extent (48 properties only)

In order to obtain a 100% PF score for Beesands against £706k of benefits and 29 properties being at risk of flooding under a 1:100-year event (moderate risk) being moved to low risk, then approximately £49k of FCRM-GiA could be available before third-party contributions are needed to deliver solution (Figure 4.2).

FCRM Partnership Funding Calculator for Flood and Coastal Erosion Risk Management Grant in Aid (FCRM GiA)
Version 8 January 2014

Project Name
Unique Project Number

Key
Input cells
Calculated cells

All figures are in £'s
Figures in Blue to be entered onto Medium Term Plan

SUMMARY: prospect of FCRM GiA funding

Raw Partnership Funding Score: 100% (1)

External Contribution or saving required to achieve an Adjusted Score of 100%: 0 (2)

Adjusted Partnership Funding Score (PF): 100% (3)

PV FCRM GiA towards the up-front costs of this scheme (PV Cost for Approval): 38,780 (4)

Scheme Benefit to Cost Ratio: 14.47 to 1
Effective return to taxpayer: 18.21 to 1
Effective return on contributions: n/a to 1

Cell (2) shows the minimum amount of contributions and/or reductions in scheme cost that are required to raise the Adjusted PF Score to at least 100%. Further increases on this will improve this scheme's chances of an FCRM GiA allocation in the desired year. Planned savings and contributions should be entered into cells (9,10,12) and cells (14-17). See NOTE below.

1. Scheme details

Risk Management Authority type of asset maintainer: EA (5)

Duration of Benefits (years): 20 (7)

PV Whole-Life Benefits: 706,000 (8)

PV Costs

PV Appraisal Costs: (9)

PV design & Construction Costs: 38,780 (10)

Sub Total - PV Cost for Approval (appraisal, design, construction): 38,780 (11)

PV Post-Construction Costs: 10,000 (12)

PV Whole-Life Costs: 48,780 (13)

PV Contributions secured to date

PV Local Levy secured to date: (14)

PV Public Contributions secured to date: (15)

PV Private Contributions secured to date: (16)

PV Funding from other Environment Agency functional sources secured to date: (17)

PV Total Contributions secured to date: 0 (18)

2. Qualifying benefits under Outcome Measure 2: households better protected against flood risk

Number of households in:

	Before			After			Change due to scheme		
	Moderate risk	Significant risk	Very significant risk	Moderate risk	Significant risk	Very significant risk	Moderate risk	Significant risk	Very significant risk
20% most deprived areas	29						0	0	0
21-40% most deprived areas							0	0	0
60% least deprived areas							-29	0	0

Annual damages avoided (£), compared with a household at low risk: 150 600 1,350

Change in household damages, in:

	Per year		Over lifetime of scheme		Qual. benefits (discounted)	
	£		£		OM2 (20%)	£
20% most deprived areas	-		-		OM2 (21-40%)	-
21-40% most deprived areas	-		-		OM2 (60%)	66,174
60% least deprived areas	-£	4,350	-£	87,000		

NOTE: This scheme is to be maintained by the EA (ref cell 5). Any contributions needed (ref cell 2) are to help fund both up-front costs (cell 11) and future ongoing costs (cell 12) and should be entered into cells (14-17).
The total value of any necessary contributions will depend on whether maintenance (ongoing costs) is funded through revenue FCRM GiA, or by other means.

All costs and benefits must be on a Present Value (PV) Whole-Life basis over the Duration of Benefits period. Where Contributions are identified these should also be on a Present Value basis.

Figure 4.2: Initial Partnership Funding Calculator for Beesands BMP extent (29 properties only)

4.4 Potential Funding Sources

From the review of previous studies and new analysis undertaken for this BMP, it is apparent that there are a variety of beneficiaries from FCRM activities along the BMP frontage of Torcross/Slapton continuing in to the future. These potential beneficiaries and likelihood of each being able/willing to contribute to future FCRM activities is summarised in Table 4-2.

SECTION 4

Table 4.2: Initial thoughts on potential beneficiaries

Organisation / Group	Why would the benefit / want to contribute?	Potential scale of funds available (£)	Likelihood of gaining contribution	Comments / Notes
Environment Agency	Maintainer of assets at Torcross.	Hundreds of thousands to low millions of pounds.	High	Funding would be via FCRM Grant in Aid. Possible access to natural flood risk management funding, though only small amounts.
South Hams District Council	Maintainer of assets along the Slapton line (car parks) which generates revenue locally. Derives revenue from property and businesses at risk of flooding and erosion.	Tens of thousands to hundreds of thousands of pounds (possibly more if use loans/bonds etc).	High	Funding would most likely be via FCRM Grant in Aid or RFCC Local Levy. May also be available via Community Infrastructure Levy, Council reserves or some form of capital loan (would need to discuss with Council finance director). Also, possible LEP / CCF bids if meet criteria for economic re-generation.
Devon County Council (Highways)	Operator of A379 road and wider local road network.	Tens of thousands to hundreds of thousands of pounds.	High whilst road remains viable; Low once road becomes unviable and diversion needed.	DCC already contributes to road maintenance / realignment but only so long as the carriageway remains (even in part). If it is fully breached then DCC advise no legal requirement to restore connection DCC to confirm . DCC advise that capital scheme funding unlikely, and any funding will have to come from capital maintenance with supporting business case – if can identify reduction in revenue spent on current unplanned intervention levels with a degree of confidence and improve the life of the asset, will greatly improve any business case. What about future tolling? Variable toll rates for residents/businesses/ visitors? DCC operate or transfer to private/CIC? DCC to provide previous advice given when this tolling option was raised in the past.
Devon County Council (LLFA)	Responsible for surface water drainage.	Zero	Very Low	LLFA advise that it is very unlikely to be forthcoming as no surface water risks in this area.
South West Water	If they have infrastructure at risk.	Tens of thousands to hundreds of thousands of pounds.	Very Low	Services search shows only infrastructure that services individual properties is at risk of flooding or erosion. No significant infrastructure appears to be at risk. As such, it is very unlikely that any contribution to secure infrastructure assets in current location likely at lower cost than relocating would be forthcoming.
Gas network operator	If they have infrastructure at risk.	Tens of thousands to hundreds of thousands of pounds.	Very Low	Services search shows only infrastructure that services individual properties is at risk of flooding or erosion. No significant infrastructure appears to be at risk. As such, it is very unlikely that any contribution to secure infrastructure assets in current location likely at lower cost than relocating would be forthcoming.
Electricity network operator	If they have infrastructure at risk.	Tens of thousands to hundreds of thousands of pounds.	Very Low	Services search shows only infrastructure that services individual properties is at risk of flooding or erosion. No significant infrastructure appears to be at risk. As such, it is very unlikely that any contribution to secure infrastructure assets in current location likely at lower cost than relocating would be forthcoming.
Local Businesses	Continued protection of frontage helps to support local economy.	Hundreds to thousands of pounds (if any)	Low	Local businesses already pay business rates and likely to be resistant to paying further charges.
Local Residents	Continued protection of frontage helps to support local communities.	Hundreds to thousands of pounds (if any)	Low	Local residents already pay council tax which include precepts for RFCC and so likely to be resistant to paying further charges.
South West Coast Path	Supports alignment of current path, thought protection of the path cannot be used as justification for FCERM activities	Zero to hundreds of pounds.	Low	SWCP may contribute to enhancements / education along Path but not significant amount towards any intervention works.
Natural England	Supports natural environmental features of designation in NNR	Zero to hundreds of pounds.	Low	NE may contribute to environmental enhancements / education along English Coast Path but not significant amount towards any intervention works.

Organisation / Group	Why would the benefit / want to contribute?	Potential scale of funds available (£)	Likelihood of gaining contribution	Comments / Notes
Historic England	War Memorials fund to protect historic environment features along Slapton Sands and wider setting.	Tens to thousands of pounds (Grants are available up to 75% of eligible costs, capped at £30,000)	Low	Other grants may also be available subject to achieving key criteria to organisations and local authorities for historic environment assets they own. Funds limited so not all projects will achieve grants.
Big Lottery Fund	Funds projects that meet specific, defined criteria.	Thousands to hundreds of thousands of pounds (based on previous funds awarded elsewhere; scale of funds depends on funding scheme applied to).	Low	Funding is for projects that meet specific, defined, funding criteria, generally aimed at community and charitable groups. Would need to demonstrate any project meets these criteria to access funds; e.g. Is there potential for delivering aspects of the defined funding criteria as part of overall environmental enhancements to be delivered by FCERM?.
Heritage Lottery Fund	Funds projects that meet specific, defined criteria.	Thousands to millions of pounds (based on previous funds awarded elsewhere; scale of funds depends on which grant scheme applied to).	Low	Funding is for projects that improve health, education, the environment, UK heritage. Would need to demonstrate any project meets these criteria to access funds; e.g. Is there potential for delivering aspects of the defined funding criteria as part of overall environmental enhancements to be delivered by FCERM?.
Other	American Veterans / Historical Group(s) may be an option to seek donations from due to significance of site to US military history.	Uncertain	Low	This would need to be explored further with relevant groups to determine if it was even viable to raise this subject; assumption is Low likelihood aligned to that for “war memorials fund” identified above.

5 References

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MCM, 2013. Flood and Coastal Erosion Risk Management: A Manual for Economic Appraisal'. Available at: <https://www.mcm-online.co.uk/manual/>

Scott Wilson, 2006. Slapton Coastal Zone Management Study

Tym and Partners, 2005. Business survey report

University of Plymouth Enterprise Ltd, 2017. Slapton Sands Beach Management Plan: Coastal Processes Baseline. Document code/version:1609_v2

Appendix A Flood and Erosion Risk Mapping



Figure A.1. Flood extents and properties at risk of flooding under Flood risk 2 and 3 zones (Blackpool to Slapton Sands) including National Receptor Database (NRD) property information

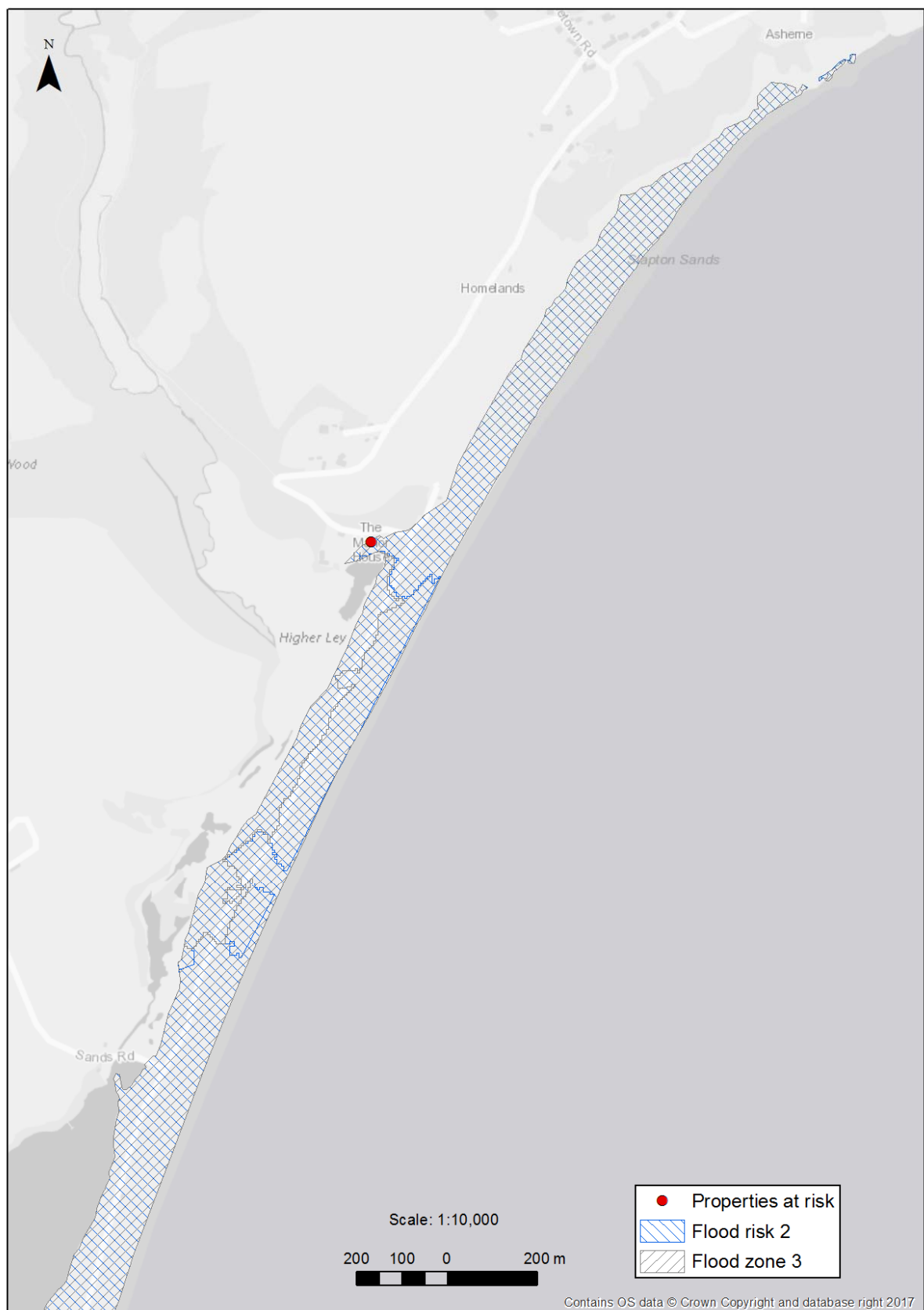


Figure A.2. Flood extents and properties at risk of flooding under Flood risk 2 and 3 zones (Slapton Sands to the Ley) including National Receptor Database (NRD) property information

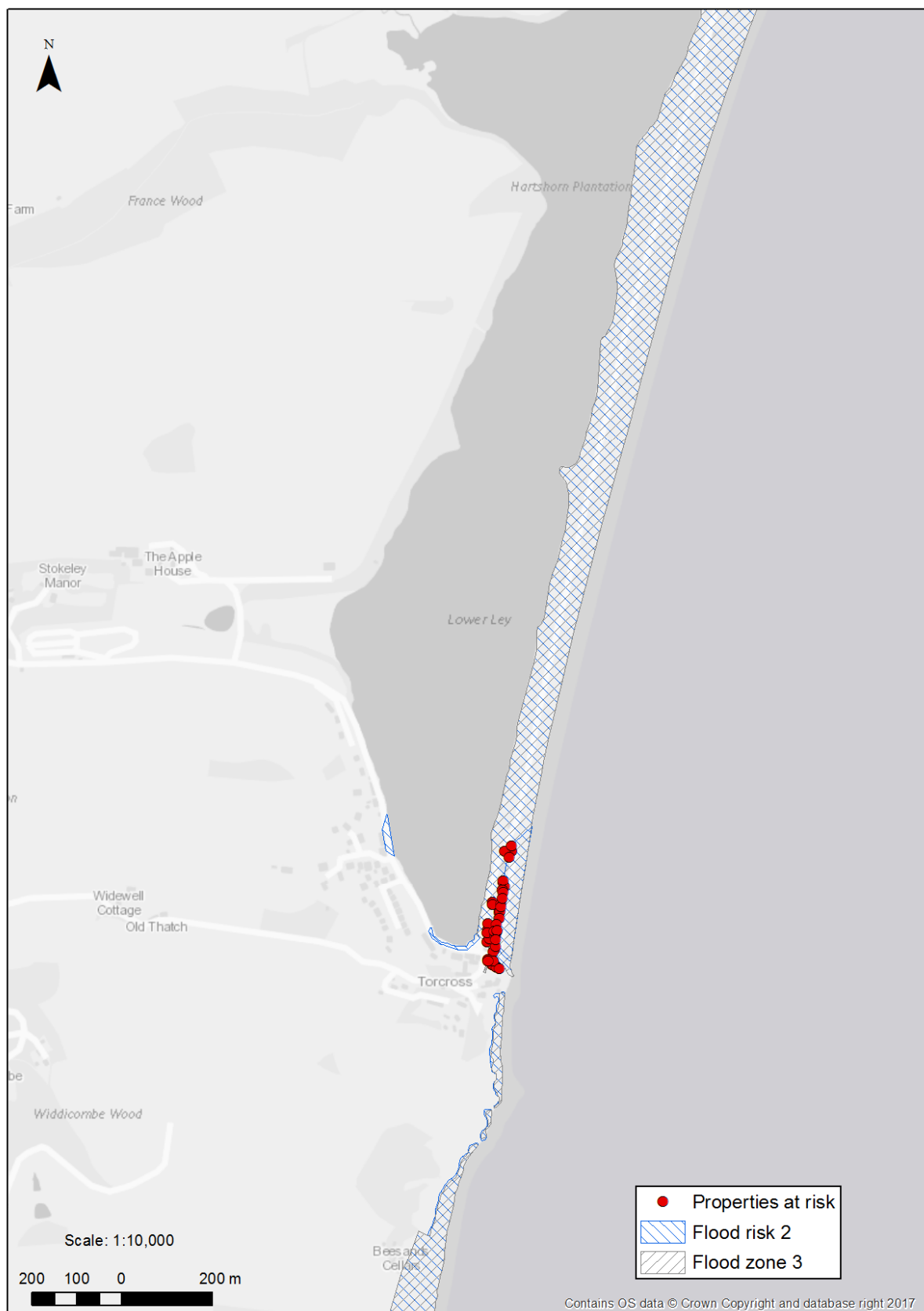


Figure A.3. Flood extents and properties at risk of flooding under Flood risk 2 and 3 zones (The Ley to Torcross) including National Receptor Database (NRD) property information

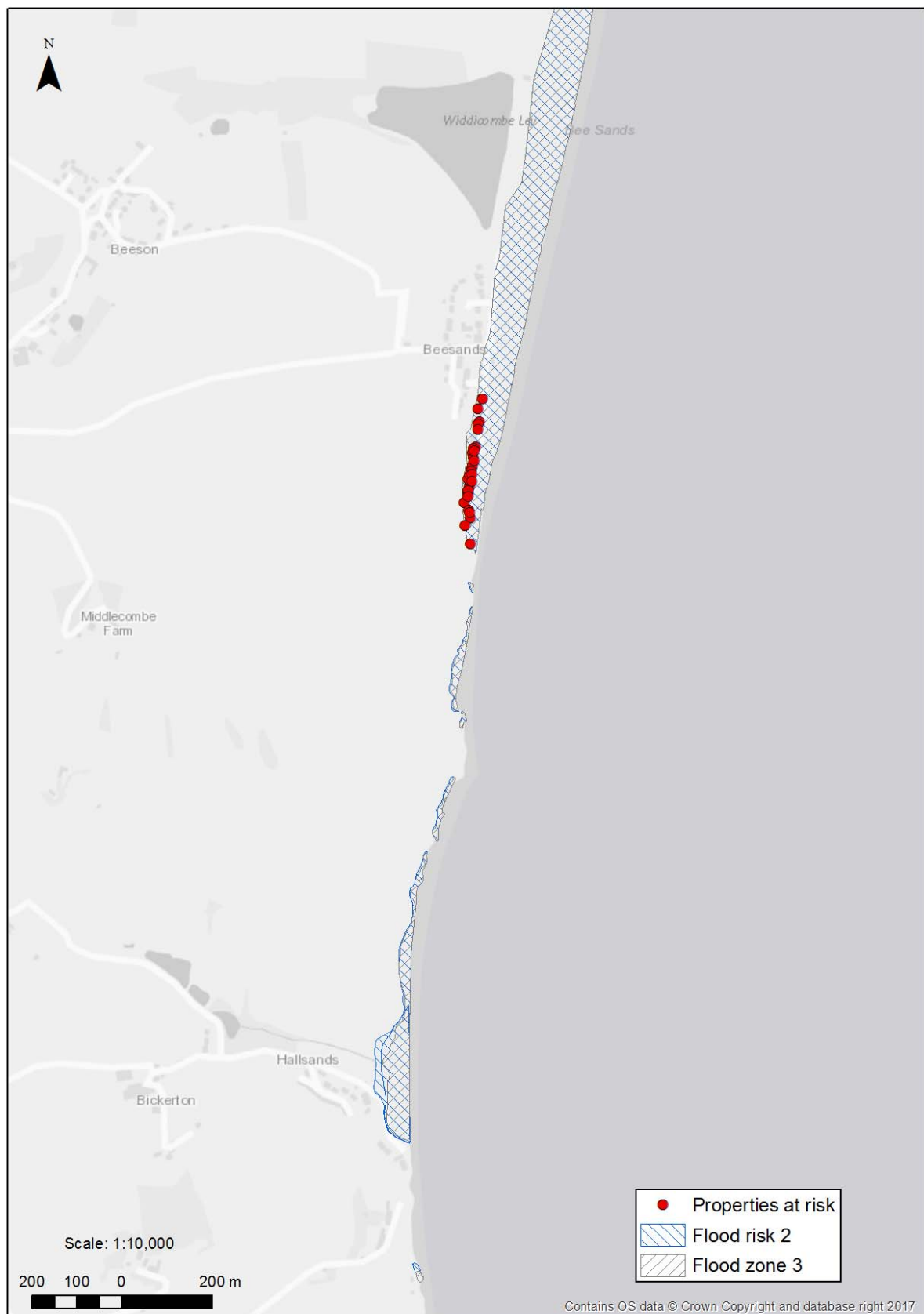


Figure A.4. Flood extents and properties at risk of flooding under Flood risk 2 and 3 zones (Beasands to Hallsands) including National Receptor Database (NRD) property information

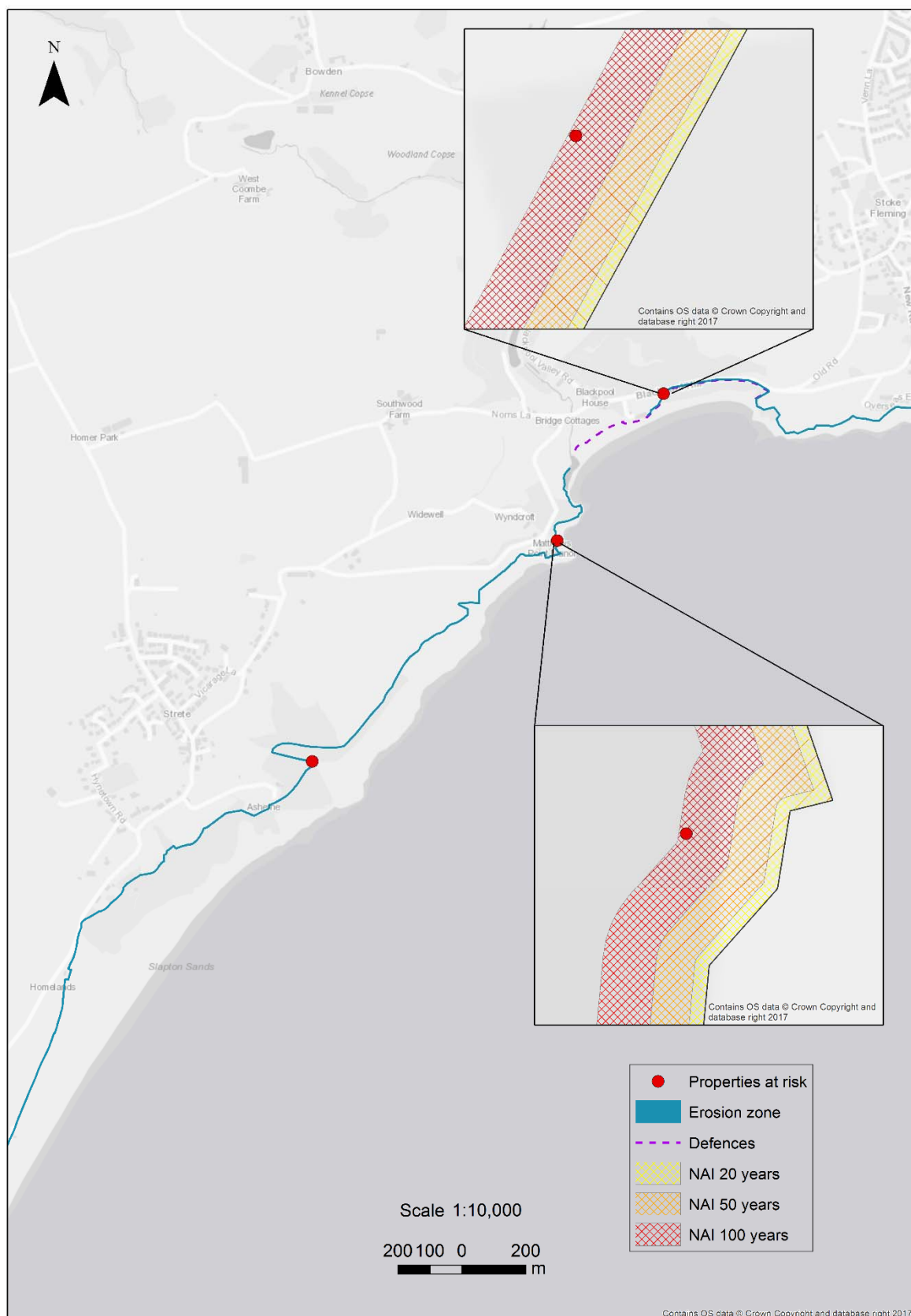


Figure A.5. 'Intermediate' estimates of NAI erosion risk bands and assets at risk in each risk band from year 0-20, 20-50 and 50 to 100 and non-residential assets at risk of erosion (Blackpool to Slapton Sands) including National Receptor Database (NRD) property information

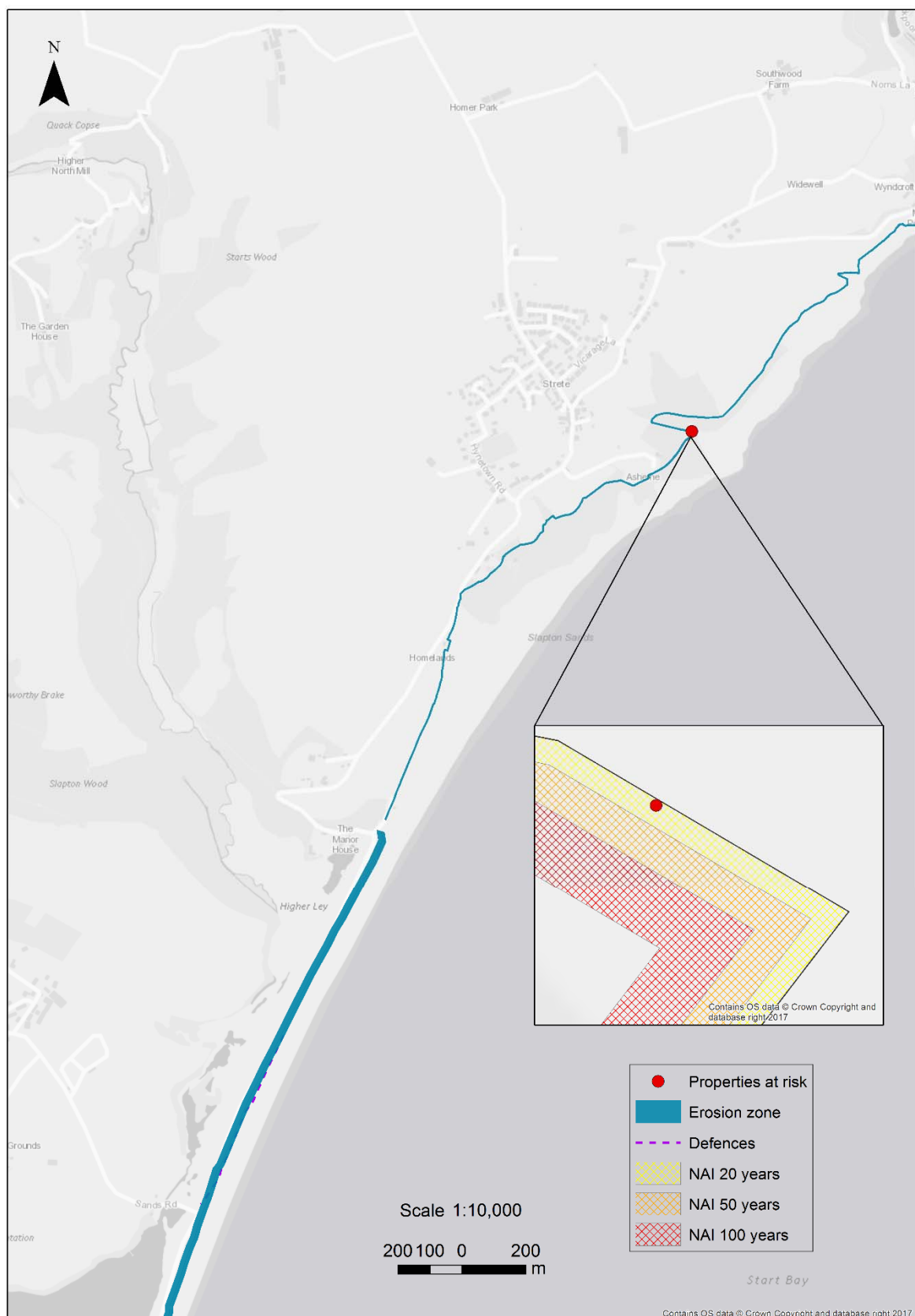


Figure A.6. Intermediate estimates of NAI erosion risk bands and assets at risk in each risk band from year 0-20, 20-50 and 50 to 100 and non-residential assets at risk of erosion (Blackpool to Slapton Sands) including National Receptor Database (NRD) property information

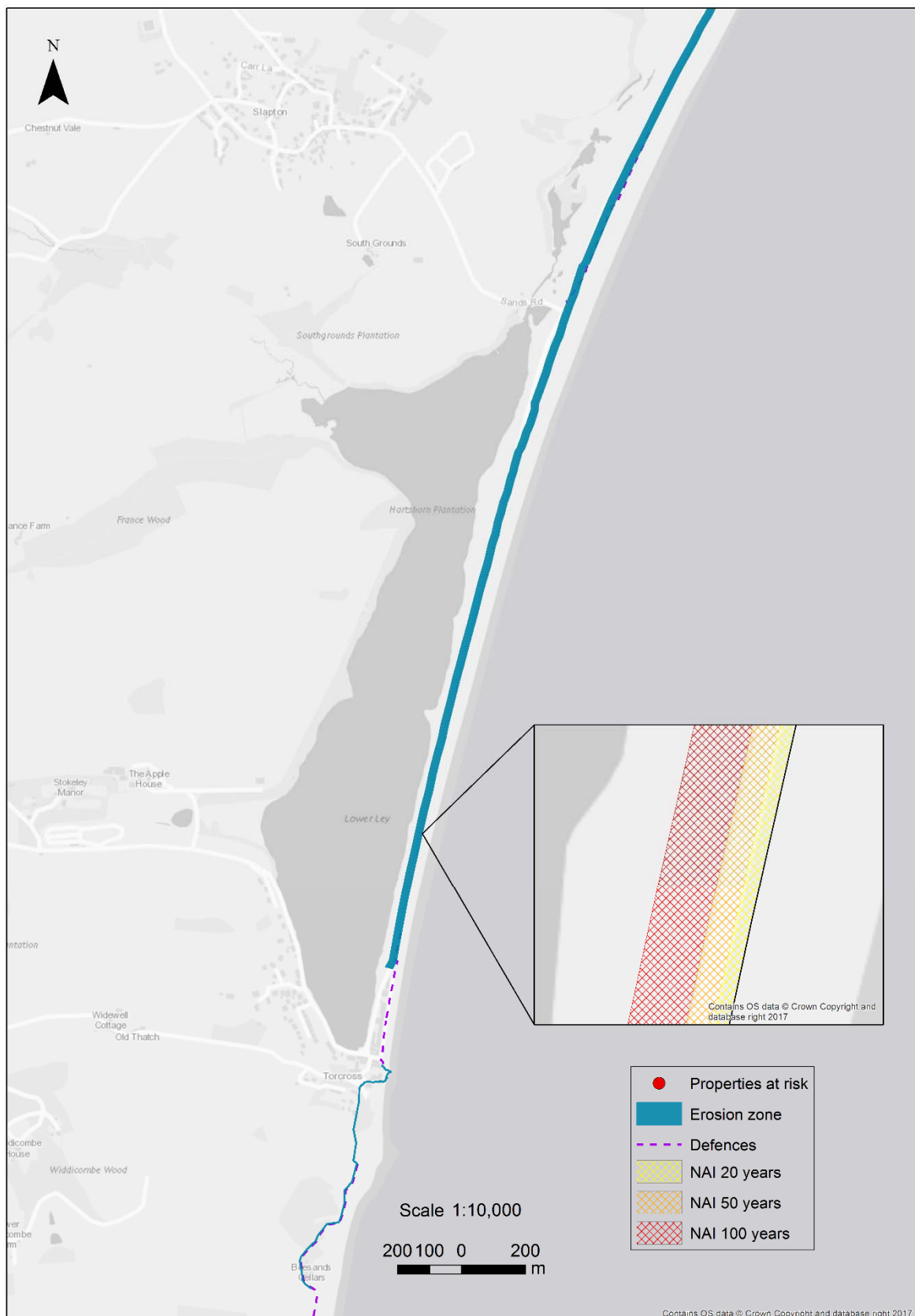


Figure A.7. Intermediate' estimates of NAI erosion risk bands and assets at risk in each risk band from year 0-20, 20-50 and 50 to 100 and non-residential assets at risk of erosion (Slapton Sands to the Ley) including National Receptor Database (NRD) property information

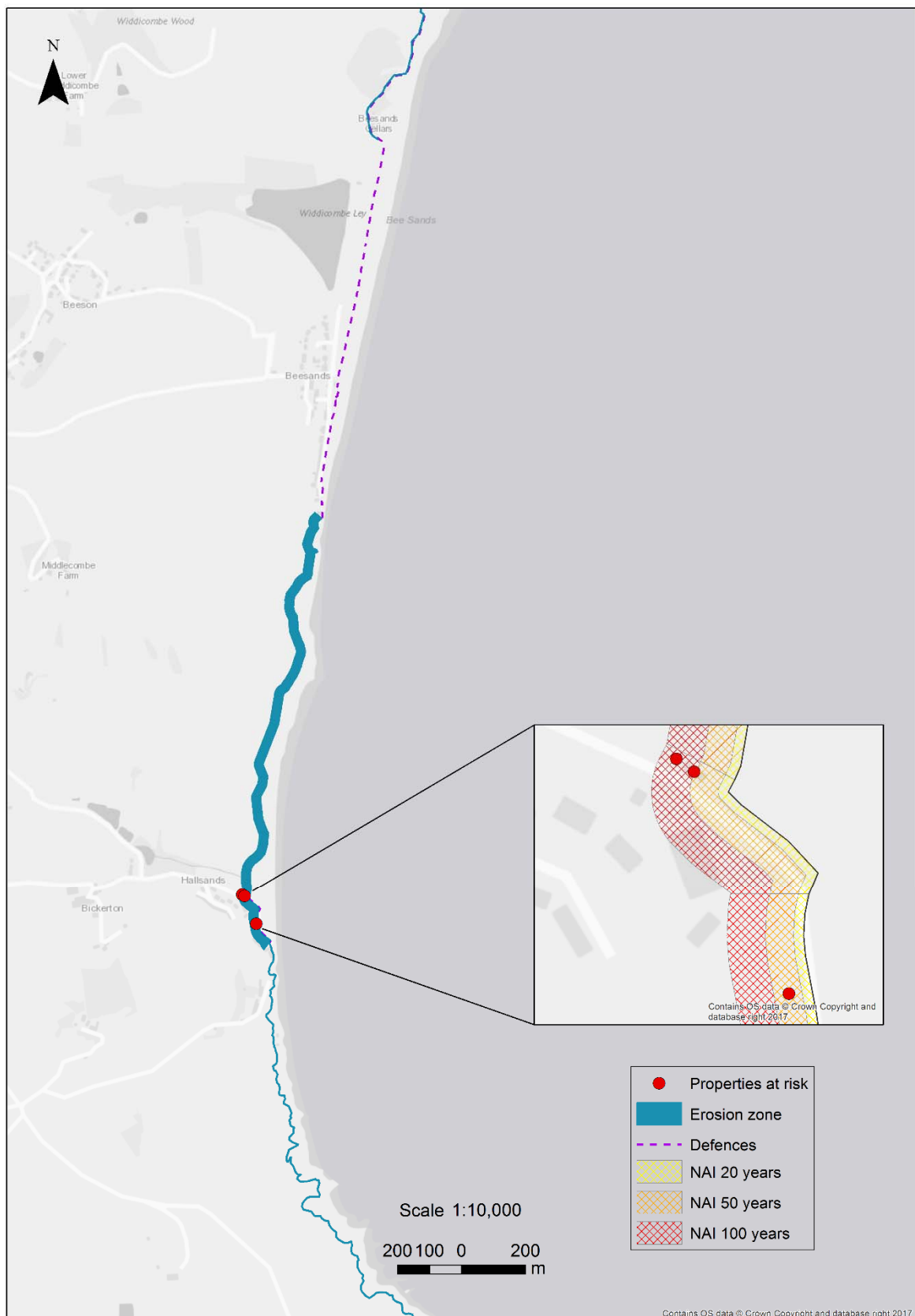


Figure A.8. Intermediate' estimates of NAI erosion risk bands and assets at risk in each risk band from year 0-20, 20-50 and 50 to 100 and non-residential assets at risk of erosion (Slapton Sands to the Ley) including National Receptor Database (NRD) property information

Appendix B Traffic Flow Data

Table B.1 Comparison of traffic flow data

	2004 (Scott Wilson data)	2010	2014	2015	2016	2017	% change 2004 to 16	% change (2014-16)	% change (2014-17)
Jan	1500		1663	1713	1740	1762	16	4	6
Feb	1500		1831	1881	1737	1995	16	-5	8
Mar	1500		2352	1989	2153	2273	44	-9	-3
Apr	1500		2517	2493	2307	2740	54	-9	8
May	1500		2718	2517	2524		68	-8	
Jun	1500	2710	3060	2768	2718		81	-13	
July	2700		3315	3048	3080		14	-8	
Aug	2700	3495	2723	3249	3380		25	19	
Sept	1500		2149	2762	2765		84	22	
Oct	1500		1799	2210	2318		55	22	
Nov	1500		1708	1773	1867		24	9	
Dec	1500		2322	1779	1825		22	-27	
Year average	1700		2322	2351	2371	2159	42	0	5

Appendix C Flood Damages Spreadsheets

2. Residential Households at Risk of Flooding

Enter the asset description, number of residential households and target flood probability for each existing flood probability of interest. Look-up the Present Value of Benefits (Pvb) at Table 1 for each pair of probabilities and chosen scheme life and enter the values to complete your input.

Residential Households								
SoP Before (Existing)				SoP After (Target)		Present Value Benefits		
Return Period (Years)	Probability %	Asset Description	Number of Residential Households	Return Period (Years)	Probability %	Number of Households Benefiting	PVb [see Table1] (£/household)	Total (£)
No protection	100.0			-		-		£ -
2	50.0			-		-		£ -
5	20.0			-		-		£ -
10	10.0			-		-		£ -
25	4.0			-		-		£ -
50	2.0			-		-		£ -
100	1.0	Residential properties	29	10	10.0	29	1,500	£ 43,500
200	0.5	Residential properties	0	1	100.0	-		£ -
Totals			29			29		£ 43,500

Used at section 1.

Figure C.1 Weight Average Annual Damages (WAAD) sheet for Beesands (29 properties in Year 0) without saline damages. With saline damages the value becomes £48k/year.

2. Residential Households at Risk of Flooding

Enter the asset description, number of residential households and target flood probability for each existing flood probability of interest. Look-up the Present Value of Benefits (Pvb) at Table 1 for each pair of probabilities and chosen scheme life and enter the values to complete your input.

Residential Households								
SoP Before (Existing)				SoP After (Target)		Present Value Benefits		
Return Period (Years)	Probability %	Asset Description	Number of Residential Households	Return Period (Years)	Probability %	Number of Households Benefiting	PVb [see Table1] (£/household)	Total (£)
No protection	100.0			-		-		£ -
2	50.0			-		-		£ -
5	20.0			-		-		£ -
10	10.0			-		-		£ -
25	4.0			-		-		£ -
50	2.0			-		-		£ -
100	1.0	Residential properties	48	10	10.0	48	1,500	£ 72,000
200	0.5	Residential properties	0	1	100.0	-		£ -
Totals			48			48		£ 72,000

Used at section 1.

Figure C.2 Weight Average Annual Damages (WAAD) sheet for Torcross and Slapton (48 properties in Year 0) without saline damages. With saline damages the value becomes £79k/year.

Project name Slapton Sands Beach Management Plan				Option: Do-nothing				
Project reference Base date for estimates (year 0) 00/01/2017								
Scaling factor (e.g. £m, £k, £) £k								
Initial discount rate 3.5%				3.0%		2.5%		
< 0 10 30 99				PV breach/failure Ave Annual Damage (overtopping)		£k 0.00/yr		
Breach pb 0.100 1.000 1.000 1.000				PV Total Damage		£k 1,162 (calculated below)		
Year	Discount factor	Prob of a breach/failure	Prob that breach/failure: occurs in year	has not occurred	PV damage due to: breach or failure	over-topping	Other damages 1-Damages properties 2-Damages road 3-Damages Tourism	PV total damage
0	1.000	0.100	0.100	0.900	0.00	0.00	79.00	79.00
1	0.966	0.190	0.171	0.729	0.00	0.00	76.33	76.33
2	0.934	0.280	0.204	0.525	0.00	0.00	73.75	73.75
3	0.902	0.370	0.194	0.331	0.00	0.00	71.25	71.25
4	0.871	0.460	0.152	0.179	0.00	0.00	68.84	68.84
5	0.842	0.550	0.098	0.080	0.00	0.00	66.52	66.52
6	0.814	0.640	0.051	0.029	0.00	0.00	64.27	64.27
7	0.786	0.730	0.021	0.008	0.00	0.00	62.09	62.09
8	0.759	0.820	0.006	0.001	0.00	0.00	59.99	59.99
9	0.734	0.910	0.001	0.000	0.00	0.00	57.96	57.96
10	0.709	1.000	0.000	0.000	0.00	0.00	56.00	56.00
11	0.685	1.000	0.000	0.000	0.00	0.00	54.11	54.11
12	0.662	1.000	0.000	0.000	0.00	0.00	52.28	52.28
13	0.639	1.000	0.000	0.000	0.00	0.00	50.51	50.51
14	0.618	1.000	0.000	0.000	0.00	0.00	48.80	48.80
15	0.597	1.000	0.000	0.000	0.00	0.00	47.15	47.15
16	0.577	1.000	0.000	0.000	0.00	0.00	45.56	45.56
17	0.557	1.000	0.000	0.000	0.00	0.00	44.02	44.02
18	0.538	1.000	0.000	0.000	0.00	0.00	42.53	42.53
19	0.520	1.000	0.000	0.000	0.00	0.00	41.09	41.09
20	0.503	1.000	0.000	0.000	0.00	0.00		0.00

Figure C.3 Do nothing flood damages for Torcross (48 properties only)

Damage Cost Calculation Sheet - Do Nothing (Linear)								Sheet Nr.
Client/Authority South Hams District Authority				Option: Do-nothing				
Project name Slapton Sands Beach Management Plan								
Project reference Base date for estimates (year 0) 00/01/2017								
Scaling factor (e.g. £m, £k, £) £k								
Initial discount rate 3.5% 3.0% 2.5%								
< 0 10 30 99				PV breach/failure £k				
Year 0 10 30 99				Ave Annual Damage (overtopping) £k 0.00 /yr				
Breach pb 0.100 1.000 1.000 1.000				PV Total Damage £k 706 (calculated below)				
Year	Discount factor	Prob of a breach/failure	Prob that breach/failure: occurs in year	has not occurred	PV damage due to: breach or failure	over-topping	Other damages 1-Damages properties 2-Damages road 3-Damages Tourism	PV total damage
0	1.000	0.100	0.100	0.900	0.00	0.00	48.00	48.00
1	0.966	0.190	0.171	0.729	0.00	0.00	46.38	46.38
2	0.934	0.280	0.204	0.525	0.00	0.00	44.81	44.81
3	0.902	0.370	0.194	0.331	0.00	0.00	43.29	43.29
4	0.871	0.460	0.152	0.179	0.00	0.00	41.83	41.83
5	0.842	0.550	0.098	0.080	0.00	0.00	40.41	40.41
6	0.814	0.640	0.051	0.029	0.00	0.00	39.05	39.05
7	0.786	0.730	0.021	0.008	0.00	0.00	37.73	37.73
8	0.759	0.820	0.006	0.001	0.00	0.00	36.45	36.45
9	0.734	0.910	0.001	0.000	0.00	0.00	35.22	35.22
10	0.709	1.000	0.000	0.000	0.00	0.00	34.03	34.03
11	0.685	1.000	0.000	0.000	0.00	0.00	32.88	32.88
12	0.662	1.000	0.000	0.000	0.00	0.00	31.77	31.77
13	0.639	1.000	0.000	0.000	0.00	0.00	30.69	30.69
14	0.618	1.000	0.000	0.000	0.00	0.00	29.65	29.65
15	0.597	1.000	0.000	0.000	0.00	0.00	28.65	28.65
16	0.577	1.000	0.000	0.000	0.00	0.00	27.68	27.68
17	0.557	1.000	0.000	0.000	0.00	0.00	26.75	26.75
18	0.538	1.000	0.000	0.000	0.00	0.00	25.84	25.84
19	0.520	1.000	0.000	0.000	0.00	0.00	24.97	24.97
20	0.503	1.000	0.000	0.000	0.00	0.00		0.00

Figure C.4 Do nothing flood damages for Beesands (29 properties only)

Appendix D Erosion Damages Spreadsheets

Damage Cost Calculation Sheet - Do Nothing (Linear)										Sheet Nr.	
Client/Authority											
South Hams District Authority											
Project name											
Slapton Sands Beach Management Plan											
Project reference											
Base date for estimates (year 0)											
00/01/2017											
Scaling factor (e.g. £m, £k, £)											
£k											
Initial discount rate											
3.5% > 3.0% 2.5%											
PV breach/failure											
£k											
Year											
0 10 30 99											
Ave Annual Damage											
(overtopping)											
£k											
0.00 /yr											
Breach pb											
0.100 1.000 1.000 1.000											
PV Total Damage											
£k											
68,529 (calculated below)											
Prepared (date)											
06/09/2017											
Printed											
06/09/2017											
Prepared by											
S Hampshire											
Checked by											
A Frampton											
Checked date											
06/09/2017											
Year	Discount factor	Prob of a breach/failure	Prob that breach/failure: occurs in year	has not occurred	PV damage due to: breach or failure	over-topping	Damages 1- properties	Damages 2- road	Damages 3- Tourism	PV total damage	
0	1.000	0.100	0.100	0.900	0.00	0.00	0.00	462.72	4196.00	4658.72	
1	0.966	0.190	0.171	0.729	0.00	0.00	0.00	447.08	4054.11	4501.18	
2	0.934	0.280	0.204	0.525	0.00	0.00	0.00	431.96	3917.01	4348.97	
3	0.902	0.370	0.194	0.331	0.00	0.00	0.00	417.35	3784.55	4201.90	
4	0.871	0.460	0.152	0.179	0.00	0.00	0.00	403.24	3656.57	4059.81	
5	0.842	0.550	0.098	0.080	0.00	0.00	0.00	389.60	3532.92	3922.52	
6	0.814	0.640	0.051	0.029	0.00	0.00	0.00	376.43	3413.45	3789.87	
7	0.786	0.730	0.021	0.008	0.00	0.00	0.00	363.70	3298.02	3661.71	
8	0.759	0.820	0.006	0.001	0.00	0.00	0.00	351.40	3186.49	3537.89	
9	0.734	0.910	0.001	0.000	0.00	0.00	0.00	339.51	3078.74	3418.25	
10	0.709	1.000	0.000	0.000	0.00	0.00	0.00	328.03	2974.62	3302.66	
11	0.685	1.000	0.000	0.000	0.00	0.00	0.00	316.94	2874.03	3190.97	
12	0.662	1.000	0.000	0.000	0.00	0.00	0.00	306.22	2776.84	3083.07	
13	0.639	1.000	0.000	0.000	0.00	0.00	0.00	295.87	2682.94	2978.81	
14	0.618	1.000	0.000	0.000	0.00	0.00	0.00	285.86	2592.21	2878.07	
15	0.597	1.000	0.000	0.000	0.00	0.00	0.00	276.20	2504.55	2780.75	
16	0.577	1.000	0.000	0.000	0.00	0.00	0.00	266.86	2419.86	2686.71	
17	0.557	1.000	0.000	0.000	0.00	0.00	0.00	257.83	2338.03	2595.86	
18	0.538	1.000	0.000	0.000	0.00	0.00	0.00	249.11	2258.96	2508.08	
19	0.520	1.000	0.000	0.000	0.00	0.00	0.00	240.69	2182.57	2423.26	
20	0.503	1.000	0.000	0.000	0.00	0.00	0.00			0.00	

Figure D.1 Do nothing erosion damages (Torcross and Slapton road loss and tourism impact) in year 0

Damage Cost Calculation Sheet - Do Nothing (Linear)										Sheet Nr.			
Client/Authority													
South Hams District Authority													
Project name						Option:							
Slapton Sands Beach Management Plan						Do-nothing							
Project reference						-							
Base date for estimates (year 0)		00/01/2017											
Scaling factor (e.g. £m, £k, £)		£k											
Initial discount rate		3.5%		3.0%		2.5%		Prepared (date)				05/09/2017	
<		>		PV breach/failure		£k		Printed				05/09/2017	
Year		0	10	30	99	Ave Annual Damage		Prepared by				S Hampshire	
Breach pb		0.100	1.000	1.000	1.000	(overtopping)		Checked by				A. Frampton	
						PV Total Damage		£k		46,979 (calculated below)		Checked date	06/09/2017
Year	Discount factor	Prob of a breach/failure	Prob that breach/failure: occurs in year has not occurred		PV damage due to: breach or failure over-topping		Other damages Damages 1- properties Damages 2- road Damages 3- Tourism			PV total damage			
0	1.000	0.100	0.100	0.900	0.00	0.00	0.00	38.56	342.5	381.06			
1	0.966	0.190	0.171	0.729	0.00	0.00	0.00			0.00			
2	0.934	0.280	0.204	0.525	0.00	0.00	0.00			0.00			
3	0.902	0.370	0.194	0.331	0.00	0.00	0.00			0.00			
4	0.871	0.460	0.152	0.179	0.00	0.00	0.00			0.00			
5	0.842	0.550	0.098	0.080	0.00	0.00	0.00	389.60	3519.45	3909.05			
6	0.814	0.640	0.051	0.029	0.00	0.00	0.00	376.43	3400.43	3776.86			
7	0.786	0.730	0.021	0.008	0.00	0.00	0.00	363.70	3285.44	3649.14			
8	0.759	0.820	0.006	0.001	0.00	0.00	0.00	351.40	3174.34	3525.74			
9	0.734	0.910	0.001	0.000	0.00	0.00	0.00	339.51	3067.00	3406.51			
10	0.709	1.000	0.000	0.000	0.00	0.00	0.00	328.03	2963.28	3291.31			
11	0.685	1.000	0.000	0.000	0.00	0.00	0.00	316.94	2863.07	3180.01			
12	0.662	1.000	0.000	0.000	0.00	0.00	0.00	306.22	2766.25	3072.48			
13	0.639	1.000	0.000	0.000	0.00	0.00	0.00	295.87	2672.71	2968.58			
14	0.618	1.000	0.000	0.000	0.00	0.00	0.00	285.86	2582.33	2868.19			
15	0.597	1.000	0.000	0.000	0.00	0.00	0.00	276.20	2495.00	2771.20			
16	0.577	1.000	0.000	0.000	0.00	0.00	0.00	266.86	2410.63	2677.49			
17	0.557	1.000	0.000	0.000	0.00	0.00	0.00	257.83	2329.11	2586.94			
18	0.538	1.000	0.000	0.000	0.00	0.00	0.00	249.11	2250.35	2499.46			
19	0.520	1.000	0.000	0.000	0.00	0.00	0.00	240.69	2174.25	2414.94			
20	0.503	1.000	0.000	0.000	0.00	0.00	0.00			0.00			

Damage Cost Calculation Sheet - Do Nothing (Linear)										Sheet Nr.	
Client/Authority											
South Hams District Authority											
Project name											
Slapton Sands Beach Management Plan											
Project reference											
Base date for estimates (year 0)											
00/01/2017											
Scaling factor (e.g. £m, £k, £)											
£k											
Initial discount rate											
3.5%											
3.0%											
2.5%											
<											
>											
PV breach/failure											
£k											
Year											
0											
10											
30											
99											
Breach pb											
0.100											
1.000											
1.000											
1.000											
Ave Annual Damage											
(overtopping)											
£k											
0.00											
/yr											
PV Total Damage											
£k											
29,213											
(calculated below)											
Year	Discount factor	Prob of a breach/failure	Prob that breach/failure: occurs in year	has not occurred	PV damage due to: breach or failure	over-topping	Other damages 1- Damages 1- properties	2- Damages 2- road	3- Damages 3- Tourism	PV total damage	
0	1.000	0.100	0.100	0.900	0.00	0.00		38.56	386.28	424.84	
1	0.966	0.190	0.171	0.729	0.00	0.00				0.00	
2	0.934	0.280	0.204	0.525	0.00	0.00				0.00	
3	0.902	0.370	0.194	0.331	0.00	0.00				0.00	
4	0.871	0.460	0.152	0.179	0.00	0.00				0.00	
5	0.842	0.550	0.098	0.080	0.00	0.00		32.47	325.24	357.70	
6	0.814	0.640	0.051	0.029	0.00	0.00				0.00	
7	0.786	0.730	0.021	0.008	0.00	0.00				0.00	
8	0.759	0.820	0.006	0.001	0.00	0.00				0.00	
9	0.734	0.910	0.001	0.000	0.00	0.00				0.00	
10	0.709	1.000	0.000	0.000	0.00	0.00		328.03	2974.84	3302.88	
11	0.685	1.000	0.000	0.000	0.00	0.00		316.94	2874.24	3191.19	
12	0.662	1.000	0.000	0.000	0.00	0.00		306.22	2777.05	3083.27	
13	0.639	1.000	0.000	0.000	0.00	0.00		295.87	2683.14	2979.01	
14	0.618	1.000	0.000	0.000	0.00	0.00		285.86	2592.40	2878.27	
15	0.597	1.000	0.000	0.000	0.00	0.00		276.20	2504.74	2780.93	
16	0.577	1.000	0.000	0.000	0.00	0.00		266.86	2420.04	2686.89	
17	0.557	1.000	0.000	0.000	0.00	0.00		257.83	2338.20	2596.03	
18	0.538	1.000	0.000	0.000	0.00	0.00		249.11	2259.13	2508.24	
19	0.520	1.000	0.000	0.000	0.00	0.00		240.69	2182.73	2423.42	
20	0.503	1.000	0.000	0.000	0.00	0.00				0.00	

Figure D.3 Do nothing erosion damages (Torcross and Slapton road loss and tourism impact) in Year 10