

## 5 Option Costs and Funding

### 5.1 Option costs

#### 5.1.1 Offshore breakwater

Key quantity parameters for the breakwater layout options are collated in Table 5.1 together with rock quantities derived from these. The structure cross section is as shown in Figure 3.3 and it is assumed to be symmetric over the trunk length. Allowing for voids, the average density of the rock armour and first layer is estimated at 1.8 tonnes per m<sup>3</sup>, for the core material the average density is estimated at 2.1 tonnes per m<sup>3</sup>.

**Table 5.1 Summary of relevant quantities**

Indicative design data/quantities	Layout 1	Layout 2
Rock armour (trunk) W <sub>50</sub>	15 tonnes	12 tonnes
Rock armour (roundhead/toe)	22 tonnes	17 tonnes
Side slope	1 : 3	1 : 3
Crest height	7.2 m	8.2 m
Breakwater crest length	50 m	50 m
Breakwater crest width	7.0 m	7.0 m
Rock density	2650 kg/m <sup>3</sup>	2650 kg/m <sup>3</sup>
Rock quantity (Rock Armour) <sup>1</sup>	24,000 tonnes	29,000 tonnes
Rock quantity (First Layer) <sup>3</sup>	1,500 tonnes	2,100 tonnes
Rock quantity (Core) <sup>3</sup>	5,700 tonnes	10,400 tonnes
Rock quantity (Toe) <sup>3</sup>	900 tonnes	800 tonnes
No of navigation beacons	2	2

Table 5.2 summarises the rates used in the cost estimate, which are all exclusive of VAT.

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<sup>1</sup> Volume calculations given in more detail can be found at Appendix G

**Table 5.2 Summary of the indicative rates (excl VAT)**

Rate	Layout 1	Layout 2
Rock supply	£30 / tonne	£30 / tonne
Rock placement	£ 15 / tonne	£ 15 / tonne
Core supply	£ 25 / tonne	£25 / tonne
Core placement	£ 8 / tonne	£ 8 / tonne
Navigation beacons supply & installation	£25,000	£25,000

Using the data given in Tables 5.1 and 5.2, the capital cost estimate (excluding VAT) is summarised in Table 5.3. The basic costs have been assessed with an addition of 15% for Contractor's preliminary and general costs (to include site establishment, reinstatement, plant mobilisation and demobilisation, insurances etc). To this total 15% has been added for design, approvals, documentation, tendering and site supervision and a further 30% for contingencies. Costs for the eventual removal of the breakwaters at some point in the future beyond the 100 year assessment period are indicatively assumed to be 50% of the construction cost.

**Table 5.3 Summary of the indicative capital construction costs (excl VAT) for an offshore breakwater seaward of Mullion Harbour**

Item	Layout 1	Layout 2
Rock supply	£1,320,000	£1,596,000
Rock placement	£660,000	£799,000
Core supply	£396,000	£434,000
Core placement	£77,000	£138,000
Navigation beacons supply & installation	£83, 000	£83, 000
Total cost of construction of the breakwater, rounded to nearest £100k	£2,400,000	£3,000,000
Future costs (beyond 100 year assessment timeframe) for removal and demolition of harbour structures	£1,200,000	£1,500,000

The likely monitoring and maintenance costs, excluding VAT, are estimated in Table 5.4 below.

**Table 5.4 Summary of the potential monitoring and maintenance costs (excl VAT) for an offshore breakwater seaward of Mullion Harbour**

Item	Layout 1	Layout 2
Proactive maintenance works (undertaken annually for first 2 years then undertaken 5-yearly)	£5,000 pa	£5,000 pa
Navigation beacon replacement (every 25 years)	£25,000	£25,000
Monitoring/inspection (undertaken annually for first 2 years then undertaken 5-yearly)	£2,000 pa	£2,000 pa
<b>Total cost of maintenance of the breakwater over 100 year lifetime, rounded to nearest £10k (cash value, not discounted)</b>	<b>£780,000</b>	<b>£780,000</b>

**Table 5.5 Summary of the potential monitoring and maintenance costs (excl VAT) for the existing Mullion Harbour structures with an offshore breakwater (100 year lifetime)**

Item	Rate	Number	Total
Initial repair works as Section 3.2		Sum	£133,000
Yearly maintenance	£3,350	99	£332,000
5 yearly maintenance	£25,000	19	£475,000
10 yearly maintenance	£67,000	9	£603,000
25 yearly maintenance	£25,000	3	£75,000
Works within 25 years	£167,000	1	£167,000
Works within 50 years	£292,000	1	£292,000
Works within 100 years	£125,000	1	£125,000
<i>Sub-total, rounded to nearest £10k</i>			<i>£2,200,000</i>
Annual inspections	£2,000	80	£160,000
5 yearly inspections	£5,000	19	£95,000
<b>Total cost of maintenance of the existing harbour structures with an offshore breakwater over 100 year lifetime, rounded to nearest £10k. (cash value, not discounted)</b>			<b>£2,460,000</b>
<b>Future costs (beyond 100 year assessment timeframe) for removal and demolition of harbour structures</b>			<b>£1,270,000</b>

The likely costs, excluding VAT, of maintaining the existing harbour structures with the offshore breakwater in position are based on the details in Sections 3.2 and 3.3 and are summarised in Table 5.5 above. The costs have been based on a 100 year lifespan i.e. to 2105, but ignoring any cost increase in that time period. The costs have been based on contract costs for previous repairs, index linked to present day costs using the Association of Consulting Engineers Output Price Index for the date of the repairs and the present day (second quarter of 2005). The basic costs have been assessed with an addition of 15% for Contractor's preliminary and general costs (to include site establishment, reinstatement, plant mobilisation and demobilisation, insurances etc). To this total 15% has been added for design, approvals, documentation, tendering and site supervision and a further 30% for contingencies. Note that future costs for this option, at some time beyond the 100-year assessment timeframe, would include demolition and removal of the harbour structures.

The total costs of this option exclusive of VAT are summarised in Table 5.6 below.

**Table 5.6 Summary of total costs (excl VAT) for the offshore breakwater including maintenance costs to the offshore breakwater and the existing Mullion Harbour structures (100 year lifetime)**

Item	Layout 1	Layout 2
Total cost of construction of the breakwater, rounded to nearest £100k	£2,400,000	£3,000,000
Total cost of maintenance of the offshore breakwater over 100 year lifetime, rounded to nearest £10k (cash value, not discounted)	£780,000	£780,000
Total cost of maintenance of the existing harbour structures with an offshore breakwater over 100 year lifetime, rounded to nearest £10k (cash value, not discounted)	£2,460,000	£2,460,000
<b>Total costs for the offshore breakwater, including maintenance costs to the offshore breakwater and the existing Mullion Harbour structures, over 100 year lifetime</b>	<b>£5,640,000</b>	<b>£6,240,000</b>
<b>Future costs (beyond 100 year assessment timeframe) for removal and demolition of harbour structures</b>	<b>£2,420,000</b>	<b>£2,770,000</b>

#### 5.1.2 Maintain and repair

The likely costs, excluding VAT, of maintaining the existing harbour structures are based on the details in Section 3.3 and are summarised in Table 5.7 below. The costs have been based on a 100 year lifespan i.e. to 2105, but ignoring cost increase in that time period. The costs have been based on contract costs for previous repairs, index linked to present day costs using the Association of Consulting Engineers Output Price Index for the date of the repairs and the present day (second quarter of 2005). The basic costs have been assessed with an addition of 15% for Contractor's preliminary and general costs (to include site establishment, reinstatement, plant mobilisation and demobilisation, insurances etc). To this total 15% has been added for design, approvals, documentation, tendering and site supervision and a further 30% for contingencies. Note that future costs for this option, at some time beyond the 100-year assessment timeframe, would include demolition and removal of the harbour structures.

**Table 5.7 Summary of the potential monitoring and maintenance costs (excl VAT) for the existing Mullion Harbour structures (100 year lifetime)**

Item	Rate	Number	Total
Initial repair works as Section 3.2		Sum	£133,000
Yearly maintenance	£3,350	99	£332,000
5 yearly maintenance	£42,000	19	£798,000
10 yearly maintenance	£83,000	9	£747,000
25 yearly maintenance	£33,000	3	£99,000
Works within 25 years	£167,000	1	£167,000
Works within 50 years	£292,000	1	£292,000
Works within 100 years	£125,000	1	£125,000
<i>Sub-total, rounded to nearest £10k</i>			<i>£2,690,000</i>
Yearly inspections	£2,000	80	£160,000
5 yearly inspections	£5,000	19	£95,000
<b>Total cost of maintenance of the existing harbour structures over 100 year lifetime, rounded to £10k. (cash value, not discounted)</b>			<b>£2,950,000</b>
<b>Future costs (beyond 100 year assessment timeframe) for removal and demolition of harbour structures</b>			<b>£1,270,000</b>

### 5.1.3 Managed retreat

**The likely costs of the managed retreat option** are based on the details in Section 3.4. The costs have been based on current unit costs provided by a demolition contractor experienced in this type of work, but ignoring any cost increase in the time period of the works.

Tests on the concrete hearing have shown that the concrete has been partially broken down as a result of attack by sulphates. Whilst crushed concrete can often be used as fill under structures and roads, the levels of contamination within the concrete make it very unlikely that a practical use could be found for the aggregate. As it would appear unlikely that the aggregate could be sold costs have been allowed for disposal to landfill.

Landfill sites are currently filling up and closing and the number of available sites is decreasing. Current rates for disposal of the concrete hearing have been obtained from three sites, including one at Penryn. The cost is almost certain to increase with time and legislation, (which is likely to increase the landfill tax costs) and the rate of increase is almost certain to exceed the rate of inflation. Transport costs will increase if a local landfill site is not available. The cost of landfill tax used in this report is £2/t as provided by the landfill sites.

The granite and Elvan stone facing has an economic value, although the actual amount is difficult to determine as it is demand led. The National Trust may wish to use it as a resource to be used as required on their properties. A credit rate has been determined, but it must be remembered that this figure could fluctuate greatly depending on what demands there are for stone of this type at the time it becomes available. For clarity the credit figure has been shown separately.

The total weight of the harbour structures is approximately 19,000 tonnes. The rates for the managed retreat option are shown in Table 5.8 below.

**Table 5.8 Rates (excl VAT) used for the Managed Retreat option**

Item	Rate
Demolition of structures	£21/tonne
Disposal of concrete hearting to landfill (including landfill tax of £2t) <i>(likely to increase with time at a greater rate than inflation)</i>	£34/tonne
Credit for sale of stone – <i>demand led and subject to wide variation</i>	(£48/tonne)

Two alternatives, 1 and 2, have been considered as described in Section 3.4: Alternative 1 for no maintenance work other than for health and safety reasons and Alternative 2 for early grouting of the north west corner to extend the life of the structures. The two alternatives are costed, exclusive of VAT, separately in Tables 5.9 and 5.10. The basic costs have been assessed with an addition of 15% for Contractor's preliminary and general costs (to include site establishment, reinstatement, plant mobilisation and demobilisation, insurances etc). To this total 15% has been added for design, approvals, documentation, tendering and site supervision and a further 30% for contingencies.

**Table 5.9 Summary of costs (excl VAT) for Alternative 1 for the Managed Retreat option (no grouting)**

Item	Cost Alternative 1
Minor works currently required (slipway repointing)	£3,350
Maintenance work required for health and safety reasons whilst structures still used	£58,000
Southern Breakwater removed to the knuckle 10–15 years (Fig 3.8)	£133,000
Western Breakwater parapet, lamp house and a further 6m of Southern Breakwater removed 10-15 years (Fig 3.9)	£117,000
Western Breakwater, 20m of Northern Quay and remaining 23m of Southern Breakwater removed 10-20 years (Fig 3.10)	£1,183,000
Additional 12m of Northern Quay removed 10-20 years (Fig 3.11)	£42,000
Remaining 13m of Northern Quay and Bridges removed 20-35 years (Fig 3.12)	£100,000
<i>Sub- total, rounded to nearest £10k</i>	<i>£1,640,000</i>
Inspections prior to removal of the structures	£28,000
<b>Total of Managed retreat Alternative 1, rounded to nearest £10k based on a period of 20 to 35 years</b>	<b>£1,670,000</b>
<b>Possible credit for sale of facing stone</b>	<b>(£180,000)</b>
<b>Total cost <i>if stone facing is sold</i></b>	<b>£1,490,000</b>

**Table 5.10 Summary of costs (excl VAT) for Alternative 2 for the Managed Retreat option (with the Northern Quay grouted)**

Item	Cost Alternative 2
Grouting to north west corner	£58,000
Minor works currently required (slipway repointing)	£3,350
Maintenance work required for health and safety reasons whilst structures still used	£58,000
Southern Breakwater removed to the knuckle 10–15 years (Fig 3.13)	£133,000
Western Breakwater parapet, lamp house and a further 6m of Southern Breakwater removed 10-15 years (Fig 3.14)	£117,000
Western Breakwater removed to the knuckle and further 6m of Southern Breakwater removed 15-20 years (Fig 3.15)	£308,000
Remaining 40m of Western Breakwater and remaining 17m of Southern Breakwater removed 25-50 years (Fig 3.16)	£817,000
Bridges removed 40-50 years (Fig 3.17)	£25,000
45m of Northern Quay removed 50-75years (Fig 3.18)	£175,000
<i>Sub- total rounded to nearest £10k</i>	<i>£1,690,000</i>
Inspections prior to removal of the structures (rounded to the nearest £5k)	£65,000
<b>Total of Alternative 2 Managed retreat based on a period of 50 to 75 years including grouting to the north west corner</b>	<b>£1,755,000</b>
<b>Possible credit for sale of facing stone</b>	<b>(£180,000)</b>
<b>Total cost <i>if stone facing is sold</i></b>	<b>£1,575,000</b>

#### 5.1.4 Maintain and repair until failure

The likely costs, excluding VAT, of maintaining the existing harbour structures until a decision is made to managed retreat are based on the details in Sections 3.5 and are summarised in Table 5.11 below. The costs have been based on a 100 year lifespan i.e. to 2105, but ignoring and cost increase in that time period. The costs have been based on contract costs for previous repairs, index linked to present day costs using the Association of Consulting Engineers Output Price Index for the date of the repairs and the present day (second quarter of 2005). The rates for the managed retreat part of this option are as Table 5.8. The basic costs have been assessed with an addition of 15% for Contractor's preliminary and general costs (to include site establishment, reinstatement, plant mobilisation and demobilisation, insurances etc). To this total 15% has been added for design, approvals, documentation, tendering and site supervision and a further 30% for contingencies.

**Table 5.11 Summary of the potential monitoring and maintenance costs (excl VAT) for the existing Mullion Harbour structures to 49 years and then managed retreat (100 year lifetime)**

Item	Rate	Number	Total
Initial repair works as Section 3.2		Sum	£133,000
Yearly maintenance	£3,350	49	£164,000
5 yearly maintenance	£42,000	9	£378,000
10 yearly maintenance	£83,000	4	£332,000
25 yearly maintenance	£33,000	1	£33,000
Repair works within 25 years	£167,000	1	£167,000
Repair works within 50 years (bridge repair)	£17,000	1	£17,000
Maintenance after 50 years required for health and safety reasons whilst structures still used	£25,000	Sum	£25,000
Southern and Western Breakwaters removed to the knuckle 50 - 60 years	£384,000	Sum	£384,000
Additional lengths of Southern and Western Breakwaters removed 60 -70 years	£317,000	Sum	£317,000
Remainder of Southern and Western Breakwaters removed, bridges removed 70-75 years	£684,000	Sum	£684,000
Northern Quay removed 75 - 100 years	£167,000	Sum	£167,000
<i>Sub-total rounded to nearest £10k</i>			£2,800,000
Yearly inspections 1 - 49 years	£2,000	40	£80,000
Yearly inspections 50 - 100 years	£1,000	37	£37,000
5 yearly inspections	£5,000	9	£45,000
<b>Total cost of maintenance of the existing harbour structures over 100 year lifetime, rounded to £10k. (cash value, not discounted)</b>			<b>£2,960,000</b>
<b>Possible credit for sale of stone</b>			<b>(£180,000)</b>
<b>Total cost of maintenance of the existing harbour structures over 100 year lifetime, rounded to £10k. (cash value, not discounted) <i>if stone facing is sold</i></b>			<b>£2,780,000</b>

## 5.1.5 Summary of lifetime costs

**Table 5.12 Summary of lifetime costs (excl VAT)**

	Option					
	A-1 (Offshore breakwater, layout 1)	A-2 (Offshore breakwater, layout 2)	B (Maintain and repair)	C-1 (Managed retreat)	C-2 (Managed retreat)	D (Maintain and repair until failure)
Capital	£2,400,000	£3,000,000	0	0	0	0
Maintenance/ monitoring *	£3,240,000	£3,240,000	£2,950,000	£1,490,000	£1,575,000	<b>£2,780,000</b>
<b>Total *</b>	<b>£5,640,000</b>	<b>£6,240,000</b>	<b>£2,950,000</b>	<b>£1,490,000</b>	<b>£1,575,000</b>	<b>£2,780,000</b>
<b>Future costs #</b>	<b>£2,420,000</b>	<b>£2,770,000</b>	<b>£1,270,000</b>	-	-	-

\* undiscounted, for 100 year lifetime

# Future costs (beyond 100 year assessment timeframe) for removal and demolition of harbour structures

## 5.2 External funding

Several grant funding sources have been identified for consideration. A comprehensive guide is not possible as the availability of grant funding programmes is subject to continual change. Some are time limited and others, whilst on-going, are subject to changing priorities and budgets. In addition, new grant funding streams may become available after the production of this report. It is therefore essential that any project is considered individually against these and other possible sources of funding, before the true appropriateness of any funding source can be established. To do this it is recommended that the current status, priorities, and eligibility criteria of these and any other grant funding schemes available at the time of project's development are reviewed. If deemed appropriate, projects should then be discussed with the potential funding bodies to verify their interest and confirm the best way forward.

It is because of these issues that possible sources of grant funding cannot be identified with any degree of certainty for each of the 4 future options for Mullion Harbour. Instead we have outlined sources of grant funding that may be worth further investigation to consider their appropriateness for any eventual project proposals. The proposals would then need to be developed with input from the grant funding agencies and other partners involved to ascertain their true viability for funding.

Possible grant funding options include:

- Heritage Lottery Fund – Heritage Grants
- Heritage Lottery Fund – YourHeritage Grants
- Objective One Programme for Cornwall & Isles of Scilly
- South West Regional Development Agency
- Market and Coastal Towns Initiative

- DEFRA Flood & Coastal Defence Grants – England
- EU Fisheries Grant Scheme (Financial Instrument for Fisheries Guidance – FIFG)
- Interreg III B
- Crown Estate's Marine Stewardship Fund
- Other trusts and foundations.

Further details are included in Appendix I.

### **5.3 *Harbour-generated funding***

The harbour presently generates a small amount of funding from:

- Diving fees (approximately £500 for 2004 but over £4,000 in 2003).
- Boat launching fees, membership subscriptions etc (£600 in 2003).
- Filming fees (extremely variable but of the order of £1000 if the location is used in a given year).
- Carpark revenue (not NT) (estimated at £6,000 per year).
- Honesty Box income (£700 - £800 per year).
- National Trust membership recruitment at the harbour (approximately £3,000 gross income in 2003, but need to account for staff costs).

This funding would be expected to continue in future under the offshore breakwater and maintain and repair options and might increase if additional emphasis was placed on membership recruitment.