

4 Environmental Appraisal

4.1 Introduction

Four strategic options have been identified as possible solutions to National Trust's future management of Mullion Harbour. Detailed descriptions of these options are provided in Section 3. The objective of this part of the study is to identify the environmental impacts associated with each of these options and to recommend outline mitigation measures where possible.

Impact assessment and mitigation for each of the proposed options is presented for the following environmental features:

- Coastal processes and geology
- Ecology
- Sea flooding/storm damage
- Heritage and archaeology
- Traffic, transport and navigation
- Fisheries
- Noise
- Community and socio-economic issues
- Landscape character and visual amenity

This environmental appraisal is not an Environmental Statement but has been conducted at a high level to identify major impacts relevant to option selection. The process adopted is:

1. Identification of receptors and environmental resources likely to be affected by the implementation of the proposed scheme and their value and sensitivity.
2. Identification of the likely impacts (physical change) as a consequence of the scheme at both the construction and operational phases, relative to the potential impacts of the 'do nothing' option.
3. Assessment of the magnitude of the potential effects on receptors or environmental resources using the criteria presented in Table 4.1. Magnitude was assessed on a four point scale (i.e. negligible, minor, moderate or major and included the scale (i.e. large to small) and nature (i.e. positive or negative) of the effect.

Table 4.1 Criteria for classifying the magnitude & nature of environmental effects

Magnitude	Definition
Major negative	Impact with serious consequences and/or on a large area
Moderate negative	Impact with undesirable consequences
Minor negative	Discernible negative impact and/or on a small area
Negligible	No impact or no discernible impact
Minor positive	Discernible positive impact and/or on a small area
Moderate positive	Impact with favourable consequences
Major positive	Impact provides substantial gains and/or on a large area

4. Evaluation of the significance of the potential effects on receptors and environmental resources based on the value/sensitivity and magnitude of the potential effects using the criteria shown in Table 4.2.

Table 4.2 Assessment of significance of environmental effects and residual effects

Magnitude	Value/Sensitivity			
	Very High	High	Medium	Low
Major negative	Major adverse	Moderate adverse – Major adverse	Moderate adverse	Minor adverse – Moderate adverse
Moderate negative	Moderate adverse – Major adverse	Moderate adverse	Minor adverse – moderate adverse	Minor adverse
Minor negative	Minor adverse – Moderate adverse	Minor adverse – Moderate adverse	Minor adverse	Minor adverse
Negligible	Negligible			
Minor positive	Minor beneficial – Moderate beneficial	Minor beneficial – Moderate beneficial	Minor beneficial	Minor beneficial
Moderate positive	Moderate beneficial – Major beneficial	Moderate beneficial	Minor beneficial – Moderate beneficial	Minor beneficial
Major positive	Major beneficial	Moderate beneficial – Major beneficial	Moderate beneficial	Minor beneficial – Moderate beneficial

Note: the category of ‘negligible’ in terms of the value/sensitivity of the ecological resource has been omitted from the table, as the effects on resources of this value are considered insignificant.

5. Consideration of the duration (temporary or permanent) of the effect.
6. Where potential adverse effects were identified, recommendations of measures to avoid (e.g. change the location of the scheme), mitigate (reduce the impacts on site) or compensate (e.g. replace elsewhere) those effects.
7. Identification of the potential residual impacts of the mitigated scheme.

This general approach was developed using standard impact assessment guidelines for each environmental resource, where available, including Institute of Ecology and Environmental Management (IEEM) (2002) (Flora and Fauna) and Department of Environment, Transport and the Regions (DETR) (2000) (Landscape and Visual Amenity).

4.2 *Offshore breakwater*

Two variants of offshore breakwaters have been considered, in different locations:

- Layout 1 (Figure 3.1) comprising concrete accropodes or imported rock, located opposite the north harbour arm and standing 7.2m above the seabed; and
- Layout 2 (Figure 3.2) comprising concrete accropodes or imported rock, located opposite the south harbour arm and standing 8.2m above the seabed.

Both options have a crest height relative to sea level of 3mOD and a crest width of 7m.

4.2.1 Coastal processes and geology

a) Construction

The main issue of concern relating to the construction of an offshore breakwater is the introduction of foreign rock material into an area of unique geological character. Mullion Cove is situated at a significant boundary of the geology of the Lizard. The cliffs north of the Cove are slate whereas to the south they are composed of schists. The cliffs of the Cove itself are serpentine whilst Mullion Island comprises pillow lava. This would result in a **minor adverse** impact.

This impact cannot be mitigated as local rock is not sufficiently durable not available in large enough units for use in breakwater construction.

Strong tidal currents circulate offshore of Mullion Cove. There is very little sediment in the system and the substrate is thought to be predominantly rocky. There are not likely to be any impacts on coastal processes i.e. resuspension of sediments, during construction of the breakwater. Impacts on coastal process are therefore **negligible**.

b) Operation

Sediment circulation is considered to be limited in the study area. Detailed sediment transport modelling has not been undertaken as part of this study.

Expert opinion indicates that a closed sediment cell transports material in a near circular motion around Mullion Island and the Cove, with little sediment movement downdrift. There are already a number of natural rock outcrops in the Cove which do not appear to significantly influence this sediment transport. Therefore, it is expected that construction of a breakwater within this sediment cell will not have a significant adverse effect on sediment movement in the immediate area, or neighbouring coastal cells.

There is limited cross shore sediment movement along the coast and the usual sediment sink which forms behind a breakwater following its construction is not likely to occur at Mullion Cove.

Impacts on coastal processes from the operation of the offshore breakwater are expected to be **negligible or minor adverse** and this would be confirmed as part of the physical/numerical modelling of the structure undertaken for detailed design.

4.2.2 Ecology

a) Construction

There is no detailed information available on the benthic communities offshore of Mullion Harbour. A submerged reef has been recorded south west of the harbour.

Depending on the importance of these benthic communities, the placement of rocks on the seabed could cause considerable damage. If the species are of high conservation importance, this impact can be considered **moderate-major adverse**. Many mobile species will be able to avoid the area of construction, as disturbance will trigger their migration to alternative habitat. However, static species will be smothered by the breakwater and killed.

Prior to construction work a survey should be undertaken by a suitably qualified marine biologist to establish if there are important flora or fauna in the proposed area of construction. Translocation could be considered to mitigate these impacts. The residual impact may be reduced to **minor adverse**.

There is also a natural submerged reef close to the proposed Layout 2 for the breakwater. Every effort should be taken to protect this reef from damage during construction i.e. misplaced rocks and barge grounding.

A detailed survey of the intertidal ecology of Mullion Harbour (Spalding Associates, 1999) provides detailed information on the habitat in this area. Given the distance of the breakwater from the intertidal area, the construction of the breakwater will not have any direct effects on these communities. However, there is a risk of the accidental release of polluting substances, resulting from the operation of vessels and plant offshore (e.g. oil spills). If polluting substances are transported inshore by wave action there could be potentially significant effects on intertidal ecology. The adoption of best working practice site techniques will avoid this potential impact, rendering it a **negligible** impact.

Cetacean and shark activity has been noted in the area (JNCC, 2003). Given the sensitivity of these species to vibrations, the placement of rock material on the seabed may deter these species from the area. However, this is a temporary impact and very little is known about the magnitude of these effects. These species are also mobile and they utilise a number of other sites, alternative to Mullion Harbour. This impact can therefore be considered **minor adverse**.

Construction of the breakwater is not likely to have any adverse impacts on bird populations in the area. Mullion Island, the prime area for breeding birds, is at a sufficient distance from the proposed locations for the breakwater that disturbance from noise and traffic will not affect these populations.

b) Operation

Breakwaters act as a shelter for shallow subtidal organisms, which may increase in abundance. This is a phenomenon which has been recorded at other sea defence breakwaters, for example at Sea Palling in Norfolk. It is therefore likely that the construction of an offshore breakwater at Mullion Harbour will provide additional habitat for benthic species such as crabs and lobster. An increase in the number of these species at Mullion Cove would have associated beneficial effects on the local food web and additional resources for local fishermen. Some benthic species are sensitive to flow changes and disturbance, these may move away from the breakwater to an area with more suitable environmental conditions.

The intertidal ecology around Mullion Cove is characteristic of an exposed coastline, though the harbour itself is significantly protected by the existing harbour arms. The construction of a breakwater will lead to changes in wave action in Mullion Harbour. However, in view of the existing protection, changes in community structure would be expected to be small.

The breakwater will not have any effects on cetaceans and sharks.

The breakwaters would have a crest height of 3mOD so at MHWS (+2.48mOD) the crest will be visible above the water. This could provide an additional roosting site for seabirds, representing a **moderate positive** impact for these species.

Harbour seals are commonly recorded in the area. Depending on the final specification of the breakwater i.e. size and type of material, the breakwater could act as an additional resting area for seals in the area.

An indirect impact of the breakwater on the ecology of the area is the increased food resource which may result from the increased number of organisms colonising the structure.

4.2.3 Sea flooding/storm damage

a) Construction

The construction activities would not affect the natural phenomena (sea level, swell waves and onshore winds) that have the potential to cause sea flooding/storm damage at the cove

at present, nor would they provide measurable shelter to the cove from these phenomena. Construction impacts on sea flooding/storm damage would be **negligible**.

b) Operation

Both offshore breakwater layouts would provide additional protection to the harbour from swell waves, although not from increased water levels or onshore winds. The offshore breakwaters would thus provide a reduction in the potential for sea flooding/storm damage at the cove. Given the state of the science for predicting this type of wave run-up, spray flooding and damage, it is not possible to quantify the reduction but the effect can be qualitatively identified as **minor beneficial**.

4.2.4 Heritage and archaeology

a) Construction

Given the wave climate in the study area it is unlikely that any unknown archaeological artefacts are located on the seabed in either of the two proposed breakwater locations. If necessary a basic site investigation of the seabed prior to construction of the breakwater could confirm this. Impacts on unknown archaeological artefacts are likely to be **negligible**.

b) Operation

The construction of the offshore breakwater will ensure the Grade II listed harbour breakwaters are maintained and protected from further deterioration. Sustaining the condition of the harbour breakwaters will also ensure the shelter on the north pier, the winch house, the capstan and the fishermen's store do not suffer any detrimental effects from inundation.

4.2.5 Traffic, transport and navigation

a) Construction

Delivery of construction plant and the materials used for the construction of the offshore breakwater are likely to be brought to the site by sea. This will reduce significantly the amount of road traffic that would otherwise be generated. Construction personnel will use the local road network to access Mullion Cove, which consists of a narrow secondary road. As construction will take place outside winter months, the cumulative impact of increased traffic with that of visitors to the Cove represents a **minor adverse** impact on local land transport routes. If possible, construction personnel should be accommodated locally in Mullion Cove during construction; this will reduce the movement of workers to and from the site.

The harbour is used by fishermen and recreational boat users. The movement of construction related marine traffic will cause disruption to normal maritime traffic in the area. Local public and fishermen should be notified of the programme of barge or boat movements in advance of the works and liaison between the contractor and marine users (public and fishermen) should be carried out during the construction. With this mitigation, the construction will have a **minor adverse** effect on navigation.

b) Operation

There are **negligible** operational effects on land traffic and transport, except during maintenance activities when effects will be **minor adverse**, as for construction discussed above.

There are two possible layouts for the offshore breakwater. Layout 1 (Figure 3.1) reduces the navigable route channel into Mullion Harbour but provides protection to both harbour arms. Layout 2 (Figure 3.2) will not obstruct the navigation route but only provides protection to the southern arm of the harbour. The breakwater will pose a potential hazard to maritime traffic in the area, which will be mitigated by warning beacons on each end. Depending on

the final layout, this could affect local harbour users. Local fishermen and recreational boat users will be fully informed of the location and restrictions placed on navigation routes by the preferred breakwater layout. The residual impacts on marine traffic/navigation are **negligible** in the case of Layout 2 and **minor adverse** for Layout 1 (given the additional restriction it places on the existing navigation channel).

4.2.6 Fisheries and diving

a) Construction

During construction, the additional marine traffic in the area may cause disturbance to local fishermen and divers. Fishing is a seasonal activity at Mullion Harbour, carried out between May and October. It is therefore likely that the construction period for the breakwater will overlap with fishing activities in the area. Divers use the harbour and cove when easterly conditions prevail at their normal diving site on the west side of the Lizard Peninsula. Liaising with local fishermen and divers prior to commencement of construction works should be undertaken to establish clear lines of communication. Routes for barge delivery of construction materials should be agreed with the fishing community.

Care should also be taken to avoid damage to static fishing gear during the placement of rocks on the seabed.

b) Operation

The misplacement of rocks on the seabed may represent a hazard to fisheries (depending on type).

The sheltering effect of the breakwater is likely to increase the number of benthic species inhabiting the area. This may lead to an increase in the number of lobster (fished species), representing a **moderate positive** impact for local fisheries.

Protecting the harbour would enable the existing small-scale fishery based in Mullion Cove to continue in its present form. However, in view of the apparently relatively marginal economic status of this fishery, there is no guarantee that fishermen would continue to use it in the long-term.

4.2.7 Noise

a) Construction

Construction related activities both onshore (construction personnel) and offshore (placement of rocks on the seabed) could result in considerable disturbance to local residents and visitors. The sheltering effect of the cove may also amplify noise impacts.

To maximise the use of every tide, construction of the breakwater will potentially need to occur at night. To allow construction to take place in safe weather conditions, work is likely to be done in summer. This will have a **major adverse** impact on local residents and staying visitors at hotels and guesthouses in Mullion Cove during peak visitor months.

To minimise complaints from local residences and business owners, the public should be fully informed of the timing of these works through notices and letters.

b) Operation

No significant impact.

4.2.8 Water quality

a) Construction

Given the lack of fine sediments in the study area, it is unlikely that the resuspension of sediments during construction will occur and hence there should be no effects on turbidity.

There is potential for a pollution incident associated with offshore construction works. Possible effects will be from spillages of vehicle/machine fuels, oil, or other construction materials. Given the importance of Mullion Cove and surrounding coves to recreational users and bathers this would be classed as a major adverse impact. It is important that mitigation measures are employed to prevent any pollution events from occurring. Adherence to good working practice will reduce the likelihood of pollution incidents from construction related activities.

b) Operation

No significant impact.

4.2.9 Community and socio-economic issues

a) Construction

The construction of an offshore breakwater is likely to cause significant disruption to the community at Mullion Cove. These disturbances are due to noise, visual amenity, and access. If work is carried out at night, appropriate floodlighting will need to be used offshore for health and safety reasons. This will have a detrimental impact on local residents and visitors staying at nearby hotels and guesthouse which face onto the cove. Directing temporary lighting away from residential properties will reduce these effects, the residual impact from this source will be minor adverse.

The local economy is likely to incur both **positive** and **negative** impacts from the construction of an offshore breakwater. Construction personnel will require accommodation and subsistence during the works, local guesthouses and hotels should be used where possible. On the other hand, some visitors may avoid staying at the cove because of the disruption.

b) Operation

The impact of breakwaters will be **major positive**, because the harbour structures, as a tourist asset, will be afforded greater protection from storm damage and sea flooding of the harbour's edge assets will be reduced (refer previous section), and because tourist use and tourist (visitor) spend is expected to continue at present levels.

4.2.10 Landscape character and visual assessment

Landscape and visual impacts can be divided into two categories:

- changes in the fabric of, character and quality of the landscape, (landscape character);
- changes in the appearance of the landscape and the effects of those changes on people (visual effect).

Photomontages 1 and 2 (Appendix H) show the breakwater options viewed from the South West Coastal Footpath adjacent to Mullion Cove Hotel at a mean low water neap tide. Photomontages 3 and 4 (Appendix H) show the two options viewed from the crest at the top of the harbour adjacent to Porthmellin Café at a mean low water neap tide.

Landscape Character

a) Construction

During construction works a temporary but noticeable deterioration will occur to the landscape character of the area. The movement and operation of heavy construction material onshore and offshore of Mullion Harbour will significantly alter the normally serene landscape character of the area. This represents a temporary, **moderate adverse** impact.

b) Operation

The scheme will also result in long term changes to the landscape character of Mullion Cove, which is covered by the Cornwall AONB.

At present the cove has a rugged and predominantly natural landscape character. The harbour arms are a man made feature of the landscape but their cultural context makes them integral to the landscape character. They are made from serpentine, a locally sourced rock which blends in with the surrounding landscape. The effect of the breakwater on landscape character will depend on the type of construction material selected:

(i) Concrete accropodes

The size, angular shape and colour of an accropode breakwater will make it a highly artificial and incongruous addition to the landscape. The impact will depend on the state of tide. At MHWS, 0.75m of the top of the breakwater will be exposed above still water level (reducing to 0.25m in 100 years as a result of sea level rise), which may be regarded as a **moderate adverse** visual impact. At MLWS, more than a 5m height of the breakwater will be exposed (reducing to just less than 5m in 100 years), which may be regarded as a **major adverse** impact on landscape character.

(ii) Rock

The type of rock expected to be used in the breakwaters is dark grey in colour and visually quite different from local stone, though not as visually intrusive as concrete accropodes. Moreover, the regular placing of rocks in a breakwater will create an obviously artificial structure. At MHWS, 0.75m of the top of the breakwater will be exposed above still water level (reducing to 0.25m in 100 years as a result of sea level rise), which may be regarded as a **minor adverse** visual impact. At MLWS, more than a 5m height of the breakwater will be exposed (reducing to just less than 5m in 100 years), which may be regarded as a **moderate adverse** impact on landscape character.

Visual Effect

c) Construction

The presence of construction plant, heavy goods vehicles, personnel and stored materials during construction of an offshore breakwater will have a significant visual effect on the normally serene appearance of Mullion Harbour.

A number of properties (residential and commercial) overlook the harbour and the works will temporarily affect the existing view from these receptors.

Offshore construction works will be visible from the following locations:

- South West Coastal Footpath (north and south of the harbour)
- Both harbour arms
- Boat users
- Mullion Cove Hotel
- Residential properties on north harbour arm

Construction related plant and vehicles should be contained to as small an area as possible, to minimise the visual impact during construction. Following these mitigation measures there would be a temporary but **minor adverse** visual impact during construction.

d) Operation

The layout of the offshore breakwater will determine the extent of the visual effect. The receptors for each layout are described separately.

If layout 1 is chosen as the preferred option the visual amenity of the following receptors will be adversely affected:

- South West Coastal Footpath (north and south of the harbour)
- Both harbour arms
- Boat users
- Recreational users of Mullion Cove
- Slipway

If layout 2 is chosen as the preferred option the visual amenity of the following receptors will be adversely affected:

- South West Coastal Footpath (north and south of the harbour)
- Both harbour arms
- Boat users
- Residential properties and holiday lets on the north side of the harbour
- Recreational users of Mullion Cove
- Slipway

The construction of an artificial breakwater in a generally unspoilt landscape will have a significant adverse visual impact. However, the type of material chosen for the construction of the breakwater will influence the magnitude of this impact. If a rock is chosen, the effects of weathering will give the breakwater a more natural appearance which will reduce the magnitude of the visual impact (Photomontages 2 and 4, Appendix H) for an illustration of this). The use of concrete accropodes would have a greater adverse effect on the visual amenity of the area (Photomontages 1 and 3, Appendix H).

The most significant visual effect will be on viewpoints from the South West Coastal Path. From the cliffs north and south of the harbour the view down on Mullion Cove is one of rugged beauty combined with the cultural perspective provided by Mullion Harbour. The construction of a breakwater at location 1 or 2 would significantly alter this view. The number of people impacted by this change in visual amenity is significantly increased by the presence of the South West Coast Path; this increases the magnitude of the effect leading to a **major adverse** impact on visual amenity.

The placement of navigation beacons on the breakwater would also adversely affect the view of the harbour and seascape, particularly at night as there is currently no artificial lighting in the harbour or offshore.

4.3 *Maintain and repair*

Photographs 5 and 6 show the harbour with the harbour arms maintained at mean low water neap tide.

4.3.1 Coastal processes and geology

The repair and maintenance of Mullion Harbour will not have any impact on coastal processes or geology in the study area beyond those associated with the existing presence of the harbour, which has been *in situ* for over a century.

4.3.2 Ecology

a) Construction

If construction vehicles need to use the intertidal area to undertake repair works to the harbour arms, there could be significant disturbance and damage to the flora and fauna of this area. Every effort should be taken to minimise the movement of heavy machinery in the intertidal area.

The accidental release of polluting substances, resulting from the maintenance and repair works e.g. fuel leaks, release of construction materials, would have an adverse effect on intertidal ecology. The movement of polluting substances through the water column will also affect flora and fauna outside of the immediate construction site. This impact will be mitigated through the adoption of best working practice site techniques and can be considered **negligible**.

b) Operation

Depending on the scale of subsequent repair and maintenance works, effects on ecology will vary. Small scale maintenance works will have little or no effect on ecology, where as any large scale actions involving the movement of heavy plant in the intertidal area is likely to have a significant local impact on ecology.

4.3.3 Sea flooding/storm damage

a) Construction

The construction activities would not affect the natural phenomena (sea level, swell waves and onshore winds) that have the potential to cause sea flooding and storm damage at the cove at present, nor would they provide measurable shelter to the cove from these phenomena. Construction impacts on sea flooding/storm damage would be **negligible**.

b) Operation

The existing harbour structures would continue to provide protection to the harbour from swell waves, as at present. The operational impacts on sea flooding/storm damage are therefore **minor beneficial**.

4.3.4 Heritage and archaeology

a) Construction

The harbour arms are Grade II Listed. Listed building consent may be required if the repair works change the character of these structures. Every precaution should be taken to ensure the harbour arms are reinstated to their former status. Construction vehicles and personnel should also avoid damaging other listed buildings in the vicinity of the area. General construction activities which generate noise and vibrations can pose a threat to such structures.

Given the general lack of sediment in Mullion Harbour, there are not likely to be any impacts on unknown archaeological impacts from construction works in this area. However, in the event of any artefacts being discovered, a suitably qualified archaeologist will be notified and the finds will be recorded.

b) Operation

The continued maintenance and repair of Mullion Harbour will have a beneficial impact on the heritage of the area. This option will ensure the harbour arms are protected from inundation and they are maintained in a favourable condition.

4.3.5 Traffic, transport and navigation

a) Construction

Mullion Harbour is a small area with limited access. The movement of construction vehicles and personnel to the site may cause considerable disturbances to local traffic around the cove. Given the danger of working in adverse weather conditions, any repair and maintenance works will have to be carried out in spring/early summer or autumn. This will not coincide with the busiest holiday season but may cause traffic congestion during holiday weekends. This temporary but moderate adverse impact can be reduced by accommodating construction personnel at Mullion Cove thus negating the need for them to travel on local transport routes everyday. Keeping construction plant at a suitable compound in Mullion Cove will also reduce the volume of heavy vehicles on local roads. The impact on land traffic and transport is therefore considered to be **minor adverse**.

The movement of construction vehicles and vessels around the harbour may restrict access to and from the harbour for marine traffic. This would have a temporary moderate adverse impact on marine traffic/navigation, avoiding the peak summer season for fishermen and recreational boat users. By informing the public and fishermen of the programme of works and liaising with them during the construction, this can be reduced to a **minor adverse** impact.

b) Operation

During maintenance activities (refer to Section 3.3 for a description), impacts on land traffic and transport and on navigation will be **minor adverse** as for the construction period. When maintenance is not being undertaken, impacts will be **negligible**.

4.3.6 Fisheries and diving

a) Construction

If access is restricted to the harbour during repair works, there may be a temporary disruption to fishermen and divers. Depending on the nature of the repairs fishermen may also have to remove their boats from the harbour and store them up the slipway. The timing of repair works would coincide with part of the fishing season at Mullion Harbour. Disruption to fishing activities would therefore have a **moderate adverse** impact on this industry, given the small window of time they operate in. Mitigation in the form of liaising with local fishermen/divers on the timing and nature of these repair works would help to reduce this impact.

b) Operation

Repair and maintenance of the harbour arms represents a positive management option for fisheries and diving. Fishermen would be able to keep their current fleet at the harbour without the need to reduce the size of their boats or bring them up the slipway. The maintenance activities would have a temporary **minor to moderate adverse** impact, varying with the scope of the maintenance activities (e.g. repointing of harbour breakwater – minor adverse, re-piling of breakwater toe – moderate adverse). Restrictions placed on the navigation channel by an offshore breakwater at Layout 1 will also be avoided. However, in view of the apparently relatively marginal economic status of this fishery, there is no guarantee that fishermen would continue to use it in the long-term.

4.3.7 Noise

a) Construction

Repair works to the harbour are likely to generate considerable noise impacts in the area. This will have a major, albeit temporary, adverse impact on local residents and visitors to the area. The sheltering effect of the cove will amplify these noise impacts. Works will be undertaken

outside the winter months but, where possible the peak holiday season (July-August) will be avoided to mitigate disturbance to holidaymakers and visitors.

To avoid complaints from local residents and business owners the public should be kept fully informed of the programme of works through notices and letters. Non-tidal works should also be programmed as far as possible between the hours of 0700 and 1800 Mondays to Fridays and between 0700 and 1200 on Saturdays. These restrictions will not be appropriate for construction activities that require tidal working, however. The construction activities are similar to those undertaken previously in the Harbour, which have been mitigated by liaising with the local community and programming of the works, with a **moderate adverse** impact.

b) Operation

The magnitude of noise impacts on residents and visitors is dependent on the nature and scale of the maintenance works to be undertaken. Small operations such as grouting and pointing will have **negligible** noise impacts where as re-piling the toe at the end of the Western Breakwater would have **major adverse** effects.

4.3.8 Community and socio-economic issues

a) Construction

The movement of construction personnel and vehicles around the harbour during repair of the harbour arms will cause disturbance to local residents and visitors. Access to the harbour arms may also be temporarily restricted.

Repair and maintenance of the harbour would have to be undertaken outside the winter months but would be programmed, as far as possible, to avoid the summer peak holiday season in the Lizard peninsula. Depending on the scale of the repair works, any need to gain access to the harbour from the beach at Mullion Cove would require temporary closure of the beach for health and safety reasons. Noise and disruption would also affect the local community.

On the other hand, the general public are often attracted to construction sites. Visitors may be attracted to Mullion Cove to see the repair works being undertaken. The local economy is likely to incur some beneficial impacts from the repair and maintenance of the harbour arms. During the repair works construction personnel will require accommodation and subsistence. Local guesthouses and hotels should be used for this purpose.

The overall impact of construction on the community is considered to be **minor negative**.

b) Operation

There are not likely to be any adverse effects associated with maintenance of the harbour arms on the local community. However, this is somewhat dependent on the scale and frequency of the repair works. Certain sections of the harbour may require closure in the future to allow maintenance works be undertaken, this would cause continued disruption to recreational users.

There are significant beneficial impacts for human beings associated with the maintenance and repair of the harbour arm structures. This option represents a lower magnitude of disruption to the area than the construction of a breakwater. The intrinsic character of the area will also be left unchanged.

If the National Trust can source a suitably qualified local team to undertake maintenance works to the harbour, this will generate employment for the area and have a positive impact on the local economy.

Maintenance of the harbour arms will continue to provide a degree of reduction to sea flood /storm damage risk, a **minor benefit** to the community. In addition, tourist use and tourist (visitor) spend is expected to continue at present levels.

4.3.9 Landscape character and visual amenity

a) Construction

The presence of construction vehicles and plant in Mullion Harbour will temporarily alter the landscape character of the area. The landscape is typified by its sense of history and unchanging character and the absence of modern industry or commercial ventures. The movement of heavy machinery around the harbour will have a temporary, **major adverse** effect on this landscape character.

The presence of construction vehicles in the vicinity of the harbour will also have an adverse effect on visual amenity. The area is highly valued for its serene landscape. Disruption of this view by heavy machinery and construction workers will result in a temporary, **major adverse** impact on visual amenity. A large number of visual receptors will be affected by this impact, these include:

- South West Coastal Footpath (north and south of the harbour)
- Both harbour arms
- Boat users
- Residential properties and holiday lets on the north harbour arm
- Recreational users of Mullion Cove
- Slipway

b) Operation

Some components of the proposed works, particularly bagwork to the seaward face of the harbour arms, will have a long-term negative impact on the appearance of the structures and therefore on the landscape. However, the impact of this on visual amenity will be limited as it will only be seen by boat-users and distantly from the coastal footpath.

Following the initial large scale repair works, the continued maintenance programme itself will have only minor effects on the landscape character and visual amenity of the area.

4.4 *Managed retreat*

This option entails the managed “retreat” or progressive loss of both harbour arms, resulting in a return of the Cove to its natural form. Photomontages 7 and 8 (Appendix H) show the ultimate result, without the harbour arms, at mean low water neap tide. The managed retreat would occur over a period of time, with loss of the seaward part of the southern breakwater likely to occur first, from storm damage. Damaged parts of the harbour arms would be removed and made safe as they deteriorated.

4.4.1 Coastal processes and geology

a) Construction

The removal of damaged harbour arms as they deteriorate would not have any effect on geology or coastal processes in the study area.

b) Operation

The exposure of the beach at the harbour would lead to a loss of sediment from this area and reduction in beach area. However, this loss would occur slowly (managed retreat is expected to take place over decades) and over a similar timeframe, sandy pocket beaches around Cornwall, as a whole would begin to be lost due to sea level rise. The Cove would return to its ‘natural’ pre-1895 state in terms of coastal processes and geology. From a purist geomorphological viewpoint this could be seen as **moderate beneficial**. In terms of a change from the existing

regime, however, this can be considered a **minor adverse** impact because of the loss of sediment and reduction in beach area.

4.4.2 Ecology

a) Construction

Decommissioning the harbour arms will involve removing material and transporting it off site. If work is carried out from the intertidal area, there may be disturbances to intertidal ecology. However, as the removal of material will be a progressive process, occurring at intervals over a period of years, this will mitigate the impact.

The accidental release of polluting substances from construction vehicles or the release of dust would have an adverse effect on intertidal ecology. If these polluting substances enter the water column flora and fauna in adjoining areas will also be affected. This impact will be mitigated through the adoption of best working practice site techniques, and can be considered **negligible**.

b) Operation

Ultimately, the exposure of the cove to wave action could lead to a loss of sediment from the cove. This would make the intertidal habitat more exposed than it currently is, resulting in a change of character of intertidal communities, returning to a state similar to that before the harbour was built, which is considered neutral (**negligible**).

A managed retreat option is unlikely to have any impacts on any other ecological features of Mullion Cove or the offshore area.

4.4.3 Sea flooding/storm damage

a) Construction

The decommissioning activities would not affect the natural phenomena (sea level, swell waves and onshore winds) that have the potential to cause sea flooding and storm damage at the cove at present, nor would they provide measurable shelter to the cove from these phenomena. Construction impacts on sea flooding/storm damage would be **negligible**.

b) Operation

Managed retreat would increase the exposure of the properties at the harbour's edge to wave run-up and windblown spray. As the harbour breakwaters deteriorate and are removed, there would be an increase in wave run-up on the slipway for a typical 1 in 1 year storm event from a level of 6.1 mOD (for the existing harbour) to 7.0 mOD (without the harbour structures).

While this wave run-up in isolation may not induce sea flooding/storm damage, when considering the additional processes occurring simultaneously with wave run-up (e.g. surge, wind induced spray), it is likely that there may be some localised standing water during and following a severe storm (greater than a 1 in 50 year event). This level of storm combined with future sea level rise could also conceivably cause minor damage to the properties (e.g. window breakage, water driven inside doors, windows) due to windblown spray. It is noted that because of the complexity of these combined processes, the precise increase in risk of sea flooding/storm damage is not quantifiable with current theory but there would be a moderate increased risk of sea flooding/storm damage. The properties most likely to be affected would be those below the level of the 10.5m OD contour (e.g. properties on the North wall of the harbour and the Harbour Master's cottage). Sandbagging, boarding up windows and maintaining site drainage would assist in addressing the increased risk of sea flooding/storm damage due to the managed retreat element, which is considered to be **moderate adverse**.

4.4.4 Heritage and archaeology

a) Construction

The harbour arms are designated as Grade II listed structures. Progressive removal of both of these listed structures as they deteriorate, would result in a **moderate adverse** impact to the heritage of the area.

b) Operation

The loss of the harbour structures is a moderate adverse impact, taking into consideration English Heritage's preference for the structures to remain and English Heritage's view that, as well as being listed in their own right, the harbour walls form part of the interest and history of the coastline. Under a managed retreat option, there will also be an increased risk of sea flooding/storm damage to other listed structures (all Grade II) at Mullion Harbour. However, significant damage or loss is not expected to occur provided the measures noted above in section 4.4.3 are undertaken, so this would be a **minor/moderate adverse** impact.

4.4.5 Traffic, transport and navigation

a) Construction

The movement of construction vehicles and personnel to the site may cause disturbance to local road traffic around Mullion Cove.

Material will also need to be removed from the site as the harbour deteriorates. The transport of the removed material by road will cause some disruption to the narrow road network which connects Mullion Cove with the main transport routes of the Lizard Peninsula. It is likely that material would be removed during favourable working conditions outside the winter months but where possible, the work would be programmed to avoid the peak holiday season. This will have a **moderate adverse** impact on traffic in the area. This impact could be mitigated by storage of block work (which should be salvaged for re-use elsewhere) locally and removal by road during the off-peak (winter) season.

Removal of the arms as they deteriorate is also likely to cause temporary closure of the harbour to fishermen and recreational boat users. By informing the public and fishermen of the programme of works, this can be considered a **minor adverse** impact.

The removal activities may restrict access around the harbour for marine traffic. This would have a temporary moderate adverse impact on marine traffic/navigation, avoiding the peak summer season for fishermen and recreational boat users. By informing the public and fishermen of the programme of works and liaising with them during the construction, this can be reduced to a **minor adverse** impact.

b) Operation

Following the managed retreat of the harbour arms, there will be no effects on land transport and traffic.

Launching of boats from the harbour will be restricted further than at present by wave conditions, and navigation to and from Mullion Cove will suffer an adverse impact, increasing with time as the harbour deteriorates to, ultimately, a **major adverse** impact once the harbour arms are completely lost.

4.4.6 Fisheries and diving

a) Construction

The managed retreat of the harbour arms will cause considerable disruption to fisheries and, potentially, any diving groups launching from the harbour during a period of removal works.

The progressive removal of both harbour arms will require fishermen and divers to remove their boats from the harbour during work periods. Fishermen will also need to find alternative storage locations for their nets and pots. The impact can be mitigated by advising the fishermen and divers in advance of planned works and liaising with them during the works and is considered a **minor adverse** impact.

b) Operation

Launching at Mullion Cove will become a more weather dependent activity. Fishermen predict that they would have to pull their boats further up the slipway every day which would entail replacing their present boats with smaller ones. This would further affect the weather conditions in which fishing could be undertaken and the range of fishing boats. Together this would represent a **moderate adverse** impact on fisheries and diving. In view of the apparently relatively marginal economic status of the fishery based in Mullion Cove, there is no guarantee that fishermen would continue to use it in the long-term. It is possible that the removal of the harbour would hasten its decline.

Diving is much less likely to be affected by loss of the harbour arms. The harbour is only used for diving when wave conditions at Mullion are mild (and the preferred site on the west side of the Lizard Peninsula is not usable) and would be suitable for launching with or without the harbour arms.

4.4.7 Noise

a) Construction

Managed retreat of the harbour arms will result in significant noise impacts during removal of deteriorated sections of the harbour arms. This is likely to be done outside the peak summer tourist season (July-August). To avoid complaints from local residents and business owners the public should be kept fully informed through notices and letters. Non-tidal works should also be programmed as far as possible to between the hours of 0700 and 1800 Mondays to Fridays and between 0700 and 1200 on Saturdays. These restrictions will not be appropriate for construction activities that require tidal working, however. This would be a **moderate adverse** impact.

b) Operation

No significant operational noise effects are anticipated.

4.4.8 Community and socio-economic issues

a) Construction

The movement of construction vehicles and personnel to and from this small area during removal of deteriorated sections of the harbour arms will cause considerable local disruption.

Tourists and recreational users will be denied access to the site during works for health & safety reasons. Works will be programmed to take place outside the peak summer months which will mitigate the impact to **moderate adverse**.

b) Operation

Managed retreat of Mullion Harbour would have a **moderate adverse** effect on the community, given attention to undertaking a range of mitigation measures. The harbour is a significant part of Mullion Cove and local people place a high value on its place in the community. The harbour gives Mullion Cove part of its sense of place. The focus of activities presently occurring around the existing harbour would need to change with the managed retreat of the harbour (e.g. annual regatta would continue with vantage points from cliffs rather than harbour breakwaters; sandy-beach activities would be replaced by rocky shore activities). As noted above, there would be an increased risk of sea flooding/storm damage due to managed retreat but losses of properties are not predicted

It is likely that loss of the harbour arms will be met with considerable public opposition. However, it was clear from the February 2005 stakeholder meeting (refer to Section 7) that the acceptability of this option is potentially increased by managing the retreat process rather than allowing unmanaged retreat.

A socio-economic study of Mullion Harbour (Halcrow, 2005, refer Appendix A) revealed that many business people felt Mullion Harbour is an important tourist attraction to the local area. However, Kynance Cove was also highly rated amongst locals as an important attraction of the Lizard Peninsula. Given the success of Kynance Cove as a tourist attraction, Mullion Village is not expected to suffer significant losses from tourism if managed retreat is adopted as a future management option for the area. Furthermore, the Cove would continue to have significant attraction as a place to visit, as a picturesque rocky embayment with offshore islands, cliffs, caves a rocky foreshore and existing carpark and café amenities. Some of the activities engaged in by visitors (e.g. promenading on the harbour arms) would necessarily need to change from those at present, however. Overall, tourist use and tourist (visitor) spend would not be expected to alter significantly from present levels.

By fully informing and engaging the public in any decision to allow the harbour arms at Mullion Harbour to deteriorate and be removed, the reasons behind the need for managed retreat can be more fully understood, making this option a more acceptable to the local community. This could be achieved through a public exhibition and the production of leaflets outlining the need for managed retreat and the likely impacts this option will have on Mullion Harbour.

4.4.9 Landscape character and visual amenity

a) Construction

The presence of construction vehicles and plant at Mullion Harbour will significantly alter the landscape character of the area. The landscape is typified by the quiet, historic character of the area and an absence of modern day technology and equipment. The activity associated with progressive removal of the harbour arms will have a temporary **major adverse** effect on this landscape character.

b) Operation

Landscape Character

If managed retreat is chosen as the preferred option the landscape character of Mullion Cove will be significantly altered. Photomontages 7 and 8 (Appendix H) show the effect on removing the harbour arms; the impact of partial removal would be intermediate between this and the present situation shown in Photographs 5 and 6.

Loss of the harbour arms would dramatically alter the landscape character. Some of the cultural aspect of 'landscape character' will be lost. This may include the fishing industry and its associated equipment such as boats, nets and pots, which creates a significant part of the present character of the cove. However, a more natural cove would be restored (Photomontage 7, Appendix H). Arguably, this represents an enhancement to the existing landscape and hence a **major beneficial** impact.

Visual Impact

Visual receptors include:

- Commercial and residential properties at Mullion Harbour
- Boat users
- Coastal Path
- Sight seers at Mullion Cove

Loss of the harbour arms of the harbour is a significant impact but would not necessarily represent a worse result visually than the present.

It should also be noted that this visual effect of the proposed changes will be limited to those who have seen the present harbour. If managed retreat of the harbour arm were undertaken, the new view at Mullion Cove would not be regarded as deterioration by those who have not seen Mullion Harbour as it currently exists.

The visual impact of managed retreat would be **major**, but whether it is regarded as beneficial or adverse is a matter of personal judgement.

4.5 *Maintain and repair until failure*

This option presents a hybrid of the “Maintain and Repair” and “Managed Retreat” solutions described above. In essence, it would provide a level of maintenance and minor repair until the harbour sustains a level of structural damage that exceeds an “acceptable threshold”. Following this critical exceedance, a managed “retreat” policy would be implemented, involving the staged removal and making safe of sections of both harbour arms, as they deteriorate. This option would attempt to extend the present day layout of the harbour for as long as reasonably possible, while acknowledging that the long-term policy would be a progressive decommissioning of the harbour.

4.5.1 Coastal processes and geology

a) Construction

Existing coastal processes in the local area would not be effected by maintenance or removal/making safe of damaged sections.

b) Operation

Whilst the operation of the harbour in its present day condition (i.e. during the maintenance/repair period) would not influence the existing coastal processes, following the collapse and removal of sections of the harbour arms, there may be some alteration to the localised sediment transport conditions and wave climate. As previously described in section 4.4.1b, the exposure of the beach at the harbour would lead to a loss of localised sediment and reduction in beach area. The Cove would return to its ‘natural’ pre-1895 state in terms of coastal processes and geology. In terms of a change from the existing regime, however, this can be considered a **negligible** impact.

4.5.2 Ecology

a) Construction

Maintenance, repair and decommissioning may each require the use of heavy plant to some extent. If the movement of plant is carried out within the intertidal area, there may be disturbances to intertidal ecology. Therefore every effort should be made to minimise the movement of plant during construction work.

The accidental release of polluting substances from construction vehicles or the release of dust would have an adverse effect on intertidal ecology. If these polluting substances enter the water column, flora and fauna in adjoining areas will also be affected. This impact will be mitigated through the adoption of best working practice site techniques, and can be considered **negligible**.

b) Operation

There would be little impact on the local ecology whilst the harbour is being maintained to its present standard. However in the long term, as the harbour is decommissioned, there would be a gradual loss of sediment from the cove as it becomes more exposed to the incoming

wave climate. This increased exposure would lead to the intertidal habitat, returning to a state similar to that before the harbour was built, which is considered neutral (**negligible**).

4.5.3 Sea flooding/storm damage

a) Construction

The maintenance and decommissioning activities would not affect the natural phenomena (sea level, swell waves and onshore winds) that have the potential to cause sea flooding/storm damage at the cove at present, nor would they provide measurable shelter to the cove from these phenomena. Construction impacts on sea flooding/storm damage would be **negligible**.

b) Operation

Whilst the harbour is maintained and repaired to its present standard, the harbour would continue to provide shelter to the incoming wave climate, leading to **minor beneficial** operational impacts. However once structural damage exceeds the “acceptable threshold” and a managed retreat policy is followed, the harbour area would be subjected to increased exposure to the incoming wave climate. As described in the “Managed Retreat” option, (see section 4.4.3b), this increased level of exposure would naturally lead to a gradual increase in the risk of sea flooding/storm damage as the structure disintegrates and is progressively removed. However, this option provides a period of adjustment to allow affected property owners to implement exit strategies from their properties, should they wish to do so. The impact can also be mitigated by implementing the measures described in section 4.4.3. The operational impact is therefore considered to be **minor adverse**.

4.5.4 Heritage and archaeology

a) Construction

The harbour arms are designated as Grade II listed structures, consent may be required to perform any alterations to the existing structure. Whilst the harbour arms are being maintained care should be taken to ensure that the structure is restored to its current condition. Given the general lack of sediment in Mullion Harbour, there are not likely to be any impacts on unknown archaeological impacts from construction works in this area. However, in the event of any artefacts being discovered, a suitably qualified archaeologist will be notified and the finds will be recorded.

The long-term, progressive removal of both of these listed structures as they deteriorate, would result in a **moderate adverse** impact to the heritage of the area.

b) Operation

Whilst the harbour arms are maintained, the structures will continue to limit sea flooding and storm damage to the quay and other listed structures around the harbour area.

Once the structure sustains a level of damage that exceeds the “acceptable threshold” and a progressive removal of the harbour takes place, the loss of the harbour structures themselves structures is a moderate adverse impact, taking into consideration English Heritage’s preference for the structures to remain and English Heritage’s view that, as well as being listed in their own right, the harbour walls form part of the interest and history of the coastline. Under a managed retreat option, there will also be an increased risk of sea flooding/storm damage to other listed structures (all Grade II) at Mullion Harbour. However, significant damage or loss is not expected to occur provided the measures noted above in section 4.4.3 are undertaken, so this would be a **minor/moderate adverse** impact.

4.5.5 Traffic, transport and navigation

a) Construction

The movement of construction vehicles and personnel to the site may cause disturbance to local road traffic around Mullion Cove. The largest disruption is likely to be caused during the decommissioning phase of the option as material will need to be removed from the site as the harbour deteriorates. The transport of the removed material by road will cause some disruption to the narrow road network which connects Mullion Cove with the main transport routes of the Lizard Peninsula.

It is likely that any construction work would be carried out during favourable working conditions outside the winter months to avoid working in adverse weather conditions. Where possible, work would be programmed to avoid the peak holiday season. This will have a **moderate adverse** impact on traffic in the area. This impact could be mitigated by storage of construction materials on site, reuse of debris when making safe and the managed removal of any unwanted debris in stages.

Removal of the arms as they deteriorate is also likely to cause temporary closure of the harbour to fishermen and recreational boat users. By informing the public and fishermen of the programme of works, this can be considered a **minor adverse** impact.

b) Operation

Following any maintenance work or removal of sections of the harbour arms, there will be no effects on land transport and traffic.

During the progressive removal of the harbour, launching of boats from the harbour will be restricted further than at present by wave conditions, and navigation to and from Mullion Cove will suffer an adverse impact, increasing with time as the harbour deteriorates to, ultimately, a **major adverse** impact once the harbour arms are completely lost.

4.5.6 Fisheries and diving

a) Construction

Any maintenance or decommissioning work on the harbour arms will cause considerable disruption to fisheries and, potentially, any diving groups launching from the harbour during a period of removal works. Any construction will require fishermen and divers to remove their boats from the harbour during work periods. These impacts can be mitigated by advising the fishermen and divers in advance of planned works and liaising with them during the works.

In particular, it is important to establish clear communication channels during the transition between the maintenance and decommissioning of the harbour as fishermen will need to find alternative storage locations for their nets and pots. This level of disruption is considered a **minor adverse** impact.

b) Operation

Whilst the harbour is being maintained to its present standard, there would only be minor disruption to fishing and diving whilst unsafe sections of the harbour await repair subject to good weather conditions.

Once the harbour is progressively decommissioned, launching at Mullion Cove will become a weather dependent activity. As described previously, fishing would become more dependent on the weather conditions, which may have a negative impact on the long-term future of the fishing industry at Mullion. This would represent a **moderate adverse** impact on fisheries and diving.

Diving is much less likely to be affected by loss of the harbour arms. The harbour is only used for diving when wave conditions at Mullion are mild (and the preferred site on the west

side of the Lizard Peninsula is not usable) and would be suitable for launching with or without the harbour arms.

4.5.7 Noise

a) Construction

During any maintenance or managed retreat it is likely that there would be significant noise impacts from construction works. This is likely to be done outside the peak summer tourist season (July-August). To avoid complaints from local residents and business owners the public should be kept fully informed through notices and letters. Non-tidal works should also be programmed as far as possible to between the hours of 0700 and 1800 Mondays to Fridays and between 0700 and 1200 on Saturdays. These restrictions will not be appropriate for construction activities that require tidal working, however. This would be a **moderate adverse** impact.

b) Operation

No significant effects.

4.5.8 Community and socio-economic issues

a) Construction

The movement of construction personnel and vehicles around the harbour during repair or removal of the harbour arms will cause disturbance to local residents and visitors. Any works would have to be undertaken outside the winter months but would be programmed, as far as possible, to avoid the summer peak holiday season in the Lizard peninsula. Depending on the scale of the repair or decommissioning works, any need to gain access to the harbour from the beach at Mullion Cove would require temporary closure of the beach for health and safety reasons. Noise and disruption would also affect the local community.

There may be some short-term benefits to the local economy from the provision of guesthouses, hotels and subsistence to the construction staff. Whilst the harbour is being repaired and maintained, the overall impact on the community is considered to be **minor negative**. Clear communication with the local residents and tourists would help mitigate this impact. Local residents and tourists should be given advance warning of construction work, together with timings and some description of its intended outcome.

b) Operation

Whilst the harbour is being maintained, there would only be minor adverse effects on the local community in the event of continued disruption to recreational users. As maintenance and repair works do not alter the existing character of the area and continue to provide a degree of reduction to sea flood risk, there would be a **minor benefit** to the community.

Following structural damage that exceeds the “acceptable threshold” and a staged decommissioning of the harbour takes place, there would be a progressively increasing risk of sea flooding/storm damage due to the harbour area becoming more exposed to the incoming wave climate.

In the long-term, a managed retreat of Mullion Harbour would have a **moderate adverse** effect on the community, given attention to undertaking a range of mitigation measures. As described in section 4.4.8b, the harbour is a significant part of Mullion Cove and local people place a high value on its value as a tourist attraction and indeed its place in the community. Therefore the loss of the harbour arms would be met with considerable public opposition.

However, the negative impacts of the long term managed retreat option may be mitigated, by a fully informing and engaging the public in a well defined strategy to extend the lifetime of the structure via maintenance and repair whilst reasonably possible (i.e. until structural damage exceeds an acceptable threshold). With a clear definition of the “acceptable threshold” within a

well publicised overall strategy plan, a long-term decommissioning of the harbour would become more understood and accepted by the local community. Furthermore, by delaying the onset of the staged removal by maintaining and repairing the structure, the long term loss of the harbour to the local community may be more expected and accepted when this eventually occurs.

4.5.9 Landscape character and visual amenity

a) Construction

The presence of construction vehicles and plant in Mullion Harbour will temporarily alter the landscape character of the area. The landscape is typified by its sense of history and unchanging character and the absence of modern industry or commercial ventures. The movement of heavy machinery around the harbour will have a temporary, **major adverse** effect on this landscape character.

b) Operation

Following the initial large scale repair works, the continued maintenance programme itself will have only minor effects on the landscape character and visual amenity of the area.

As a staged removal of the harbour takes place, the loss of the harbour arms would dramatically alter the landscape character, as described in section 4.4.9b. Inherently, some of the cultural aspect of 'landscape character' will be lost. It should also be noted that this visual effect of the proposed changes will be limited to those who have seen the present harbour. If the long-term removal of the harbour was taken forward, the new view at Mullion Cove would not be regarded as deterioration by those who have not seen Mullion Harbour as it currently exists.

The visual impact of managed retreat would be **major**, but whether it is regarded as beneficial or adverse is a matter of personal judgement.

4.6 *Conclusions*

Mullion Harbour is seen as a significant cultural and historic asset by a significant proportion of local people and many visitors. The harbour arms themselves are Grade II listed structures.

The most significant impacts identified of the options considered relate to:

- Long-term changes in landscape, visual amenity and cultural heritage.
- Long-term changes in the level of flood risk to properties immediately fronting the north side of the harbour.
- Short-term disruption during construction.

Breakwaters would represent a negative landscape and visual impact, the magnitude of which depends on the material used and the state of tide when they are viewed. Noise disruption from construction would be significant, particularly with night-time tidal working, though traffic and other land-based impacts would be less significant.

Retaining and maintaining the harbour arms preserves the status quo, to which the local environment and community have become habituated since the construction of the harbour over a century ago. Environmental impacts can be mitigated to minor levels, for the most part.

Removal of the harbour arms as they deteriorate would entail loss of the listed structures (a negative heritage impact) and a major change in the character of the cove. However, this would arguably be an enhancement to the landscape. There would be a negative impact on fishing and some leisure uses of the harbour. Removal of the harbour may hasten the decline

of the small fishing industry based in the Cove. There would be an increased risk of sea flooding/storm damage to properties fronting the harbour but losses of properties are not predicted. Land-based disruption during demolition activities would be significant but short-term.

If the harbour arms did not exist, there would be no economic or environmental case for building them. It seems unlikely that consent would be obtained for such structures on an otherwise largely undeveloped, wild coastline. Viewed in this context, the introduction of further, visually intrusive structures in the form of breakwaters to prolong the life of the harbour arms would not appear to be justified. The other options (maintain and repair, managed retreat, maintain and repair until failure) are viable options from an environmental perspective.