

16 Recreation and Tourism

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16 Recreation and Tourism

16.1 *Introduction*

This chapter of the Environmental Statement (ES) concerns the effect of the proposed Eastside development on the tourism, recreation and leisure activities taking place on the eastern side of Gibraltar.

The Town Planner's Scoping Opinion (Government of Gibraltar (GoG), 2005 - see Appendix A) identified the following issues relating to recreation and tourism for consideration by the Environmental Impact Assessment (EIA) process:

- Potential impacts on recreational use of the beaches during construction of Eastside; and
- Potential impacts on recreation and tourism arising from Eastside.

This impact assessment draws upon the numerical modelling investigations undertaken to address Coastal Hydrodynamics and Geomorphology (see Chapter 5 and Appendices B, C and D) and Water Quality (see Chapter 6 and Appendices B, C and D).

In addition, where construction and post-construction activities may affect the human aspects of recreation and tourism, the impact assessment draws upon the investigations for Transport Assessment (see Chapter 11 and Appendix H), Air Quality (see Chapter 12), Noise (see Chapter 13) and Landscape and Visual Impacts (see Chapter 14).

16.2 *Assessment Methodology*

16.2.1 *Assessment Methodology – Beach Morphology*
See Section 5.2 concerning geomorphology.

16.2.2 *Assessment Methodology – Beach Cleaning*
The assessment of beach cleansing was carried out on the basis of numerical modelling results generated for flows and waves (see Chapter 5 and Appendix C).

The self-cleaning potential of a beach is determined by the:

- Beach exposure to waves;
- Tidal range;
- Beach sand characteristics; and
- Water quality.

For each of these items criteria were formulated on the basis of which the baseline conditions and impacts could be assessed using numerical modelling.

The reader should refer to Section 8 of Appendix B for more detailed information.

16.2.3 *Assessment Methodology – Bathing Water Quality*
See Section 6.2 concerning bathing water quality.

16.2.4 *Assessment Methodology – Disturbance to Catalan Bay and Eastern Beach*
Where construction and post-construction activities may affect the human aspects of recreation and tourism, the assessment uses the findings of other aspects of the EIA process (see Section 11.2 and Appendix H for Traffic, Section 12.2 for Air Quality, Section 13.2 for Noise and Section 14.2 for Landscape).

16.2.5 *Impact Significance*

In order to classify the significance of predicted impacts, and in an effort to provide a consistent framework for considering and evaluating impacts, the following terminology has been adopted:

- Negligible - the impact is not of concern;
- Minor adverse - the impact is undesirable but of limited concern;
- Moderate adverse - the impact gives rise to some concern but it is likely to be tolerable (depending on its scale and duration);
- Major adverse - the impact gives rise to serious concern; it should be considered as unacceptable unless unavoidable by best practicable means;
- Minor beneficial - the impact is of minor significance but has some environmental benefit;
- Moderate beneficial - the impact provides some gain to the environment; and
- Major beneficial - the impact provides a significant positive gain.

16.3 *Baseline Conditions***16.3.1** *Beaches*

The development site is situated between two of Gibraltar's popular recreational beaches, namely Eastern Beach and Catalan Bay beach.

Eastern Beach (see Figure 16.1) extends north from the existing rubble tip area towards the border with Spain and is a straight sandy beach fronting the eastern end of the airport.

Figure 16.1 Eastern Beach (looking north from the rubble tip)



Catalan Bay beach (see Figure 16.2) extends south from the existing reclamation area and is a slightly crescent-shaped sandy beach fronting properties that look out over the bay.

Sandy Bay beach and Governor's Beach are situated further south.

Figure 16.2 Catalan Bay beach (looking north from the Caleta Hotel)



16.3.2 Tourist and Visitor Facilities

There is limited accommodation for tourists and visitors to this part of Gibraltar. The principal accommodation is the four-star Caleta Hotel, situated at the southern end of Catalan Bay. There is no accommodation at Eastern Beach.

Food and drink is available at a kiosk at Eastern Beach and from two bars / restaurants overlooking the beach at the southern end of Catalan Bay.

Car parking is available along the road backing onto Eastern Beach and on the end of the rubble tip area at the north end of Catalan Bay.

16.3.3 Recreation and Leisure Activities

The main recreation event which takes place on the eastern side of Gibraltar is the speed boat race, an annual event organised by the Gibraltar Motorboat Racing Association (GMRA) under the auspices of the Royal Yacht Association in the UK. In the past, events have run on a monthly basis over the summer months. Boats have been launched from the northern end of Eastern Beach and raced over 52 miles using a triangular course off Gibraltar's east coast.

The existing reclamation area is largely an operational rubble tip and is neither suitable nor used for recreation or leisure in its current state. Recreation and leisure activity in this part of Gibraltar is related to the use of the beaches, but there is no marina or water sports facility.

16.3.4 Planning Policies

During scoping, consultation with the Chief Secretary to the Minister of Tourism identified the need in Gibraltar to provide new tourist attraction products in three different levels/areas:

- Hotel accommodation to cater for the short-break market (which has increased from 3.5 to 4.5 days) - at present, the demand for hotel accommodation is higher than the supply;
- Conference facilities; and

- Marina spaces – currently the spaces available in Gibraltar are filled to capacity; there are not enough spaces for super yachts and those available do not provide a good setting.

16.4 Predicted Impacts

16.4.1 Construction Phase: Impact of Eastside Development Construction Activities on the Recreation and Tourism Environment and Activities

The construction works for Eastside have the potential to affect recreational and tourist experiences at Eastern Beach and Catalan Bay due to changes in the environmental quality of these areas in terms of landscape, air quality, noise and traffic.

Based on the landscape assessment made in Section 14.4, it is clear that near distance views within one kilometre of Eastside will be affected, to various degrees, depending on the viewpoint locations and the nature of the works at a particular point in time. The subjectivity of the affected person is also important in this type of assessment, and it is not always the case that construction activities adversely affect the views from recreational and tourist locations (i.e. some people may find the construction works to be of interest). However, the works will be large in scale and are predicted to have up to a major adverse impact on near distance views and up to a minor adverse impact on middle distance and long distance views.

Based on the air quality assessment made in Section 12.4, it was found that sensitive receptors to air quality impacts would include people visiting Catalan Bay and Eastern Beach and using the beaches within 100 metres of the construction works. In terms of dust, if no dust control measures are in place there is a risk that people within 100 metres would experience a minor adverse impact (i.e. nuisance) during construction.

The likelihood of nuisance beyond 100 metres is negligible due to the distance that dust would be transported. The contribution of emissions from construction vehicles to local air quality (see Tables 12.5 to 12.7) is predicted to increase emissions of oxides of nitrogen and particulates, but without exceeding those standards for human health. Therefore, a negligible impact on recreation and tourism is predicted.

Based on the noise assessment made in Section 13.4, it was found that sensitive receptors to noise impacts would include people visiting Catalan Bay (at 25m and at the Caleta Hotel at 250m) and Eastern Beach (at 250m). In terms of noise, the existing low background noise means that the construction noise will cause up to a major adverse impact on the quality of the environment for recreation and tourism. It should be noted, however, that these impacts will not be experienced continuously throughout the duration of the construction phase.

Based on the traffic assessment made in Section 11.4, it was concluded that it is unlikely that the construction traffic for Eastside would cause any adverse effect to the operation of the critical junctions, and so it is assumed that there would be only a negligible impact on recreational visitors and tourists travelling to and from Catalan Bay and Eastern Beach.

It is likely that beach users will be affected during the construction works as a result of the need for localised sections of the beaches and bathing areas to be fenced off for health and safety reasons. Such works would include the installation of the edging works around the existing rubble tip where it abuts Eastern Beach at the northern end, and Catalan Bay beach at the southern end. Although precise construction methods are not known at present, it is likely that machinery will work on the landward side of the site rather than the beach side whenever possible due to reasons of stability. This will result in less disruption to the beach areas. Due to the localised and temporary nature of the effects, a moderate adverse impact is predicted on beach users during construction.

In summary, recreation and tourism are likely to be affected by significant noise and visual impacts during the construction of Eastside. Whilst the magnitude of these impacts is high, the duration will be variable over the construction period, depending on the proximity of the works to Catalan Bay and Eastern Beach. Overall, there will be up to a major adverse impact on the environmental quality of Catalan Bay and the southern part of Eastern Beach, depending on the location and timing of the works relative to recreation and tourism activities.

16.4.2 *Construction Phase: Impact of Eastside Development Construction Activities on Navigation*

As noted in Section 16.3, speed boat racing takes place off Gibraltar's east coast. There would be concern that marine works could interfere with the safe running of this event (and vice versa), for example, if the racing course were to cross the path of an operational dredger or pass close to land reclamation works. If this were the case, then the potential hazard to navigation could represent a short-term major adverse impact on navigation in terms of collision and/or grounding risks.

16.4.3 *Construction Phase: Impact of Sediment Plumes on Water Quality*

As described in Section 6.4, dredging and associated marine works for Eastside can cause large-scale releases of sediment into the water column, causing increased concentrations of the total suspended solids (TSS). While some waters naturally contain high TSS concentrations, for the EIA process it has been assumed that the coastal waters off eastern Gibraltar have low TSS concentrations of 1mg/l. While the actual conditions will vary considerably as a result of storms, algal blooms, etc., the use of 1mg/l as a background concentration establishes a conservative baseline against which impacts are assessed.

Although an increase in TSS does not necessarily adversely affect water quality, it can affect other water properties such as transparency and turbidity (i.e. reducing visibility through the water), which are included under the EC Bathing Waters Directive.

In terms of impacts on water quality, the proposed dredging and land reclamation works will generally create short-term (i.e. 2 to 7 weeks) increases to TSS concentrations in the coastal waters off eastern Gibraltar. The modelling results indicate the following worst cases:

- TSS concentrations up to 32mg/l could occur at the southern end of Eastern Beach;
- TSS concentrations up to 256mg/l could occur at Catalan Bay beach;
- TSS concentrations between 8mg/l and 16mg/l could occur at Sandy Bay beach;
- TSS concentrations between 8mg/l and 16mg/l could occur at Governor's Beach and other beaches south as far as Europa Point; and
- TSS concentrations between 1mg/l and 8mg/l could occur at the northern end of Eastern Beach and Spanish beaches up to 0.75km from the border.

The modelling results indicate that although large geographical areas can be affected by sediment plumes transported by hydrodynamic and wind conditions, the majority would experience TSS increases below 10mg/l. The highest TSS increases occur around activity such as dredging and land reclamation since it is in the nature of this activity to spill some sediment into the water. Hence, high TSS increases up to 256mg/l at the northern end of Catalan Bay beach could occur during works at the southern end of Eastside.

The increased TSS concentrations will be localised and short-term (2 to 7 weeks), but will reduce water transparency. Given that the suspended sediment will comprise sand, it is likely that water transparency will be less impacted than if affected by finer sediment fractions (e.g. silt).

Transparency is included under the EC Bathing Waters Directive and is measured using a Secchi disc. The reduction in bathing water quality will have a minor adverse impact on

recreation and tourism if it takes place during the bathing season (May to September). If the works take place outside the bathing season (October to April), there will be no impact on bathing water (based on the EC Bathing Waters Directive).

To a certain extent, the worst of this impact will not be experienced by bathers because it is possible that access to the water at certain points adjacent to the beach will be restricted for health and safety reasons during the construction works (rather than for environmental reasons). It should be noted that transparency is also subject to natural variations associated with sediment re-suspension (e.g. during storm conditions).

16.4.4 *Operation Phase: Impact of Eastside Development Operation Activities on the Recreation and Tourism Environment*

The operational situation concerning Eastside has the potential to affect recreation and tourism at Eastern Beach and at Catalan Bay in terms of landscape, air quality, noise and traffic.

Based on the landscape assessment made in Section 14.4, near distance views within one kilometre of Eastside will be affected to various degrees depending on the viewpoint locations and the subjectivity of the people affected. However, overall, Eastside is predicted to have up to a major beneficial impact on near distance views since a modern, lively and busy, high rise development would replace the existing rubble tip, which is predicted to improve the quality of the environment for recreation and tourism. In fact, Eastside is likely to become an important recreational area and tourist attraction for Gibraltar. No mitigation measures are recommended and an overall moderate beneficial residual impact is predicted.

Based on the air quality assessment made in Section 12.4, it was found that the air quality impacts of Eastside are all due to road traffic generated by the development. The assessment showed that no significant air pollution impact is likely to result from Eastside. Accordingly, no mitigation measures are recommended and there will be no residual impact on the quality of the environment for recreation and tourism.

Based on the noise assessment made in Section 13.4, it was found that sensitive receptors to road noise impacts should include all buildings within 300m of the local road network on which traffic flows are expected to change by +25% or -20%. Changes in noise levels between +0.5dB and +4.8dB magnitude can be regarded to cause a negligible to moderate adverse impact. No significant impact is assumed for receptors beyond 300m of the local road network. Low noise road surfaces would help to mitigate road noise but there will be a negligible to moderate adverse impact on the quality of the environment for recreation and tourism, depending on distance (0m to 300m) from the local road network.

Based on the traffic assessment made in Section 11.4, it is noted that although Eastside would attract increased vehicle numbers, the link capacity and junction shows that existing and proposed new access junctions will be able to operate within capacity. An analysis of parking on site has shown that there is currently provision for 85% of total trip demand to the site. The 15% shortfall of parking demand is assumed to be met by the high levels of moped and taxi use in Gibraltar, as well as increased opportunities to access public transport/shuttles and other modal shift. Previous experience with these types of development has shown that traffic is self-restraining and will naturally cap at the maximum parking provision. A negligible impact is predicted in terms of traffic affecting the quality of the environment for recreation and tourism. No mitigation measures are recommended and there is expected to be a negligible residual impact.

In summary, recreation and tourism is likely to be affected by Eastside with significant adverse noise impacts for receptors within 300m. However, some moderate benefits are predicted to the landscape character of the area. Overall, there will be a moderate beneficial

impact on the environmental quality, assuming that Eastside's benefits outweigh its adverse effects.

16.4.5 *Operation Phase: Impact of Eastside Development Operation Activities on Recreation and Tourism Activities*

Eastside could increase recreation and tourism on the eastern side of Gibraltar by providing a range of attractive facilities (see Chapter 4 Description of the Development).

This profile fits with the needs of Gibraltar's tourism industry, as highlighted during consultation, notably more hotel accommodation. Eastside's hotel would increase accommodation availability in Gibraltar. At present, the demand for hotel accommodation is higher than the supply, and this is at a time when the average length of visits to Gibraltar has increased from 2-3 days to 5 days. It has been reported that some of the larger tour operators have reported problems in securing hotel rooms due to persistent high occupancy levels. The new hotel at Eastside will help to offset accommodation short-falls in Gibraltar.

Overall, Eastside is predicted to have a moderate beneficial impact on Gibraltar's recreation and tourism, in terms of visitor accommodation.

16.4.6 *Operation Phase: Impact of Eastside Development Operation Activities on Navigation*

As noted in Section 16.3, speed boat racing takes place off Gibraltar's east coast and this requires launching off Eastern Beach.

The course for powerboat racing is situated off Gibraltar's east coast. It is not known how close it passes to the existing rubble tip, but it is possible that the course may need to be re-routed to safely navigate around Eastside. This would be a minor adverse impact on the powerboat racing, but a necessary measure to maintain safety requirements.

Overall, Eastside is predicted to have an unavoidable minor adverse impact on powerboat racing if the course has to be moved.

16.4.7 *Operation Phase: Impact on Beach Morphology*

As assessed in Section 5.4, without GoG's proposed Catalan Bay beach project in place, it is possible that the construction of Eastside could interrupt the along-shore sediment transport, cross-shore sediment transport, cross-shore profiles and offshore sediment movement characteristics of this stretch of coast, which could impact upon the shape of Catalan Bay's beach and Eastern Beach.

As identified in Section 5.4, the results of the numerical modelling show that - with the Eastside development in place - the main geomorphology changes are expected to be caused partly by re-orientation of the shoreline of Eastern Beach and Catalan Bay. In the first years after construction the re-orientation effect is dominant. Accretion is predicted against the development at Eastern Beach and Catalan Bay, establishing a new equilibrium shoreline orientation within some (approximately 1 or 2) years. Due to this effect the shielded areas between the northern and southern extensions of the development and the coastline are expected to accrete sediment. The maximum computed seaward displacement of the coastline adjacent to Eastside is 60 to 70 metres for Eastern Beach (with respect to the initial coastline) and 20 to 30 meters for Catalan Bay. This sediment in the accreting zone originates from sections of Eastern Beach and Catalan Bay at some distance from the development, inducing an erosion of 15 to 25 metres just south of the central groyne at Eastern Beach and about 5 to 10 meters at the southern end of Catalan Bay. The magnitude of alongshore beach re-orientation after five years is shown in Figure 5.19.

The morphological impact on the second section of Eastern Beach (north of the central groyne) is much smaller and consists of a maximum accretion of at most some meters near the central groyne and a shoreline retreat of similar magnitude near the northern groyne.

No significant shoreline orientation is predicted north of the northern groyne of Eastern Beach or south of Catalan Bay (i.e. at Sandy Bay or the beaches further south).

In terms of beach slopes, the modelling predicted no significant changes of the cross-profiles.

Given the above findings, recreation and tourism could be affected by beach losses or gains associated with changes to beach morphology. Erosion would cause a loss of beach area and is considered an adverse impact on recreation and tourism. Accretion would cause a gain of beach area and is considered to be a beneficial impact on recreation and tourism. However, recreation and tourism are considered to be more sensitive to beach losses than to beach gains. Based on the predicted changes to beach geomorphology, the impacts on recreation and tourism are expected to be as follows:

- Major adverse impact due to beach erosion just south of the central groyne of Eastern Beach and at the southern end of Catalan Bay;
- Moderate adverse impact due to beach erosion just south of the northern groyne of Eastern Beach;
- Moderate beneficial impact due to beach accretion at the southern end of Eastern Beach and the northern end of Catalan Bay, directly south and north of Eastside respectively; and
- No significant impact due to beach erosion or accretion south of Catalan Bay (i.e. at Sandy Bay or beaches to the south) or north of Eastern Beach's northern groyne (e.g. the northern end of Eastern Beach and Spanish beaches).

16.4.8 *Operation Phase: Impact on Beach Cleaning*

There is concern that a change to the hydrodynamic conditions affecting Catalan Bay and Eastern Beach could lead to a reduction in the self-cleaning properties that maintain the beach at its current aesthetic value. However, under the existing conditions, it was found that the hydrodynamics and beach properties are sufficient to promote self-cleaning of the beaches, that is:

- The wave action is sufficiently high;
- The tidal range is in the right range; and
- The beach sand has a sufficiently large grain size.

Wave studies (see Appendix C) showed that the wave action on the southern part of Eastern Beach will be significantly reduced after the construction of Eastside. The effect of the development on wave heights in this area is illustrated in Figure 16.3 for a typical wave condition. As a consequence, the significant wave height (H_s , 12h/y), which is exceeded 12 hours per year, may become lower than 1.0 m in this area. However, it should be noted that the scheme layout was modified after the modelling was carried out and the seaward extension at the north-eastern tip of the development site at the southern end of Eastern Beach, was reduced. It is therefore likely that the reduction in wave action will not be as great as that shown on Figure 6.4.

The impact of Eastside on tidal levels was found to be negligibly small (see Appendix B) and does not change the existing degree of natural beach cleaning.

It is concluded that in general the proposed Eastside development is expected to have no impact on the self-cleaning properties of Eastern Beach and Catalan Bay. However, there could be a minor adverse impact on the self-cleaning properties at the southern end of Eastern Beach where the wave action may become lower than needed for self-cleaning of the beach.

Figure 16.3: Wave Heights without the Eastside Development

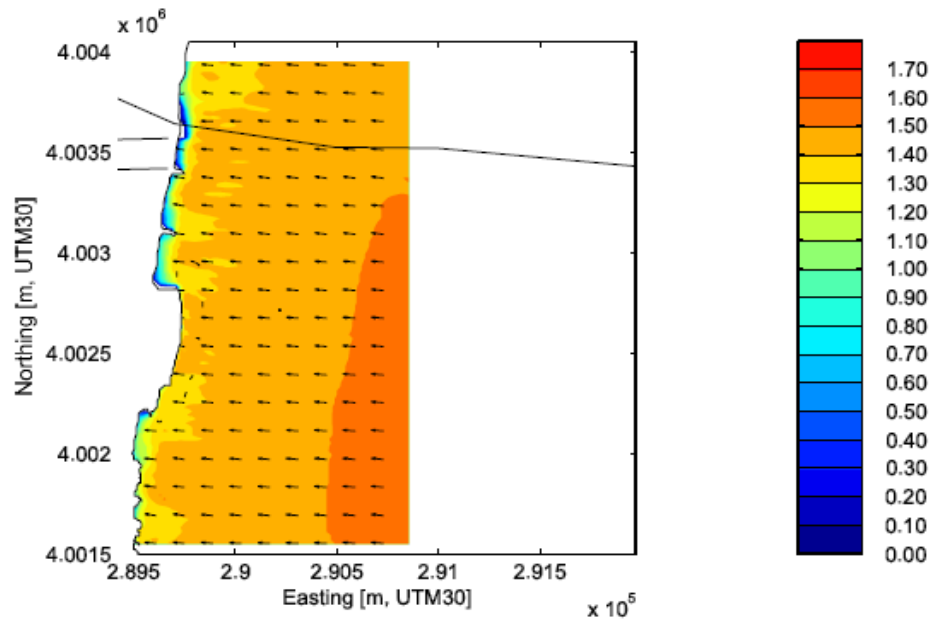
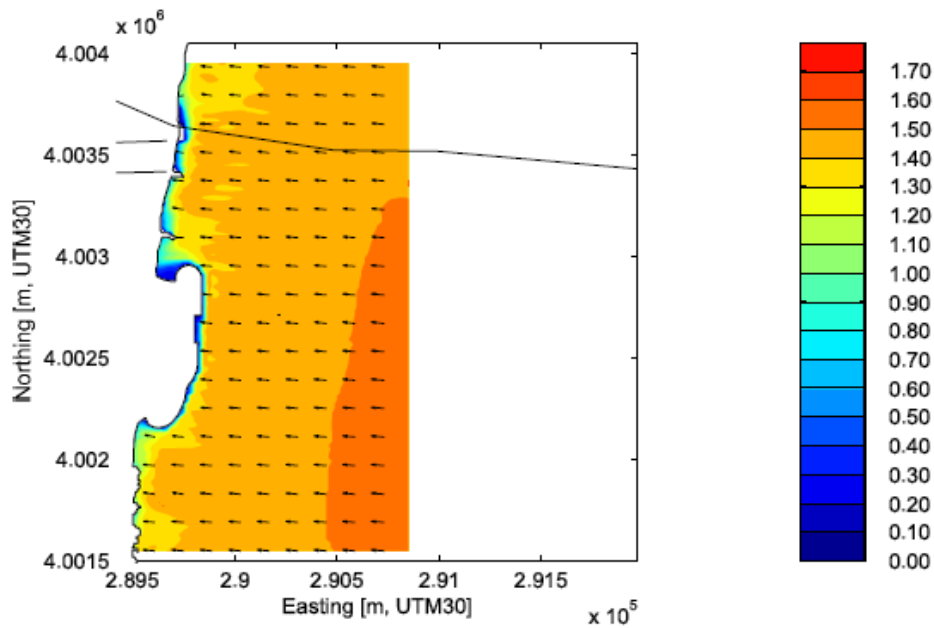


Figure 16.4: Wave Heights with the Eastside Development



16.4.9 Operation Phase: Impact on Bathing Water Quality

As described in Section 6.4, the construction of Eastside could cause a change to the current flows along the coast which could affect the flushing capacity of the bathing waters and potentially impact upon water quality with respect to the standards required under the European Commission (EC) Bathing Water Directive. Reduced water quality would have an indirect impact on recreation and tourism in terms of the quality of the environment in which recreational and tourist activities take place.

As identified in Section 6.4, the results of numerical modelling based on hydrodynamics and wave conditions indicate that currents and wave heights would be reduced at the southern

end of Eastern Beach and the northern end of Catalan Bay where the beaches abut the boundaries of Eastside. As a result, the flushing capacity of the water in these areas would be reduced.

Based on interpretation of the numerical modelling (see Appendix B), it is concluded that the self-cleansing capacity of Catalan Beach will be minimally affected by the Eastside development. The refreshment rates in the bathing area are expected to be slightly reduced compared to the present situation. However, it is not anticipated that algae growth and accumulation will occur, which could reduce the transparency of the water. The refreshment of the bathing waters is also expected to be large enough to prevent the development of visual films of sun bathing oils and accumulation of litter and debris. No increased risk of violation of the EC Bathing Waters' Directive's guideline standards for safe bathing water quality with respect to coliform bacteria is expected at Catalan Bay.

Based on interpretation of the numerical modelling (see Appendix B), it is concluded that the self-cleansing capacity of the southern end of Eastern Beach is expected to be affected by the Eastside development due to reduced flushing capacity / water exchange. It is expected that there will be an increased risk (over existing conditions) to water transparency, as well as an increased risk for the development of visual films of sun bathing oils and the accumulation of litter and debris. Also, it is expected that there will be an increased risk (over existing conditions) to the EC Bathing Waters' Directive's guideline standards for safe bathing water quality with respect to coliform bacteria.

However, revisions to the layout have reduced the northwards extension of the Eastside development to the extent that the southern end of Eastern Beach is more exposed to the open sea (compared to the previous layout) (see Supplementary Note to Appendix B).

Therefore, after construction, Eastside could have a minor adverse impact on bathing water quality and therefore on recreation and tourism. Despite the sensitivity of the impact with regard to the EC Bathing Water Directive, the significance of this impact is considered to be minor because:

- The area impact would be very localised to one small location (i.e. southern end of Eastern Beach) and therefore the impact is not representative of the whole bathing water area;
- The impact cannot be confirmed since there is a risk that bathing water quality will be affected by changes to the flushing capacity and this alone does not necessarily mean that water quality standards will be breached because other factors also affect this risk (e.g. source of pollutants, number and behaviour of beach users);
- The revisions to the layout may reduce the risk of this impact occurring; and
- The EC Bathing Water Directive's guideline values (but not mandatory values) for water quality are already exceeded under the existing conditions, including the existing flushing capacity of the waters.

It is estimated that there will be only a small risk that the transparency of the water will be reduced significantly due to the development of algae in the beach waters. Similarly, there will be only a small risk of the formation of visual films of sun-bathing oils and the accumulation of litter and debris. A minor adverse impact is predicted on water quality and therefore on recreation and tourism for the same reasons as given above.

16.5 Mitigation Measures

16.5.1 Construction Phase: Impact of Eastside Development Construction Activities on the Recreation and Tourism Environment and Activities

The following measures are recommended to address impacts on recreation and tourism associated with construction activities:

- Screening is recommended as a mitigation measure for landscape (see Section 14.5);
- Best practicable means are recommended to minimise dust nuisance (see Section 12.5);
- The mitigation measures identified in Section 13.5 are recommended to address noise;
- No mitigation measures are recommended for traffic; and
- No mitigation measures are recommended for the localised fencing off of sections of the beach for bathing and other leisure activities, due to health and safety reasons.

16.5.2 *Construction Phase: Impact of Eastside Development Construction Activities on Navigation*

It is recommended that the appointed contractor for the marine works liaises with the Gibraltar Port Authority (GPA) and the GMRA to identify whether there is a potential navigation risk. A risk assessment should be conducted and, if a significant risk is identified, measures should be agreed and implemented that reduce this risk to as low as reasonably practicable. Measures may include Notices to Mariners, moving the racing course, temporarily stopping marine works in open water such as dredging, appropriately marking hazards, etc.

16.5.3 *Construction Phase: Impact of Sediment Plumes on Water Quality*

To mitigate the impact of sediment plumes causing increased TSS concentrations in bathing waters, it is recommended that:

- Either construction works under scenarios sc1a and sc1b (i.e. 2 weeks of dredging and works for the trenches and sea defences) and scenarios sc2a or sc2b (i.e. 7 weeks of dredging and land reclamation) be undertaken outside the bathing season (May to September); however, dredging during certain periods of the winter months may be impractical due to adverse sea conditions; or
- Construction works under scenarios sc1a and sc1b and scenarios sc2a or sc2b are undertaken during the bathing season but restricted to times when prevailing currents and/or winds limit the transport of sediment plumes towards the bathing waters.

16.5.4 *Operation Phase: Impact of Eastside Development Operation Activities on the Recreation and Tourism Environment*

No mitigation measures are recommended for landscape, air quality, noise or traffic to offset impacts on recreation and tourism.

16.5.5 *Operation Phase: Impact of Eastside Development Operation Activities on Recreation and Tourism Activities*

Since a beneficial impact is predicted, no mitigation measures are recommended.

16.5.6 *Operation Phase: Impact of Eastside Development Operation Activities on Navigation*

It is recommended that the Eastside's operational company liaises with the GPA and the GMRA to assist identification of potential navigation risks, prior to events taking place. The race course may have to be moved.

16.5.7 *Operation Phase: Impact on Beach Morphology*

The following mitigation measures assume that GoG is not implementing a beach project at Catalan Bay and/or Eastern Beach – although such a project has been discussed in recent years.

The impacts of Eastside can be mitigated by means of regular nourishment of the eroding spots indicated in Figure 5.21. To minimise offshore sand loss, it would be preferable to carry out relatively small-scale nourishment operations.

However, from an operational point of view and in order to avoid local rapid shoreline retreat rates, due to re-orientation of the shorelines in the first years after construction of Eastside, an alternative approach would be to create the equilibrium shape of the beach in one initial sand nourishment operation immediately after construction of the planned development, as illustrated in Figure 5.21. In this way the predicted erosion further along the beaches (due to the alongshore re-distribution of sand) can be prevented. The total required volume of sand for this initial nourishment is about 30,000 to 60,000 m³ north of the planned development (Eastern Beach) and 20,000 to 30,000 m³ south of the planned development (Catalan Bay).

If beach maintenance (i.e. nourishment) works are required to mitigate an impact associated with beach morphology, then the mitigation itself could potentially affect recreation and tourism unless certain considerations are given to the nourishment activity. Therefore, the following recommendations are made:

- Preferably, the beaches should have their maximum width prior to the main tourist season (spring and summer), and therefore the preferred time for beach maintenance would be some time before the spring season so that the maximum recreation and tourism benefit is gained from the placed sand and the beaches will remain for a longer period of time due to the relatively mild wave conditions during spring and summer;
- For recreational purposes, the nourished beach's cross-shore profile should preferably not be steeper than 1:10 above the water line to avoid steep steps; and
- Between the waterline and -1.5mOD, the nourished beach's cross-shore profile should preferably not be steeper than 1:30 to create an area of 40m to 50m wide in which bathers can have contact with the seabed and to avoid steep slopes with waves breaking close to the shore and potentially inducing local, strong currents (i.e. avoid the combination of breaking waves causing uncontrolled swimming and a strong seaward increase of water depth).

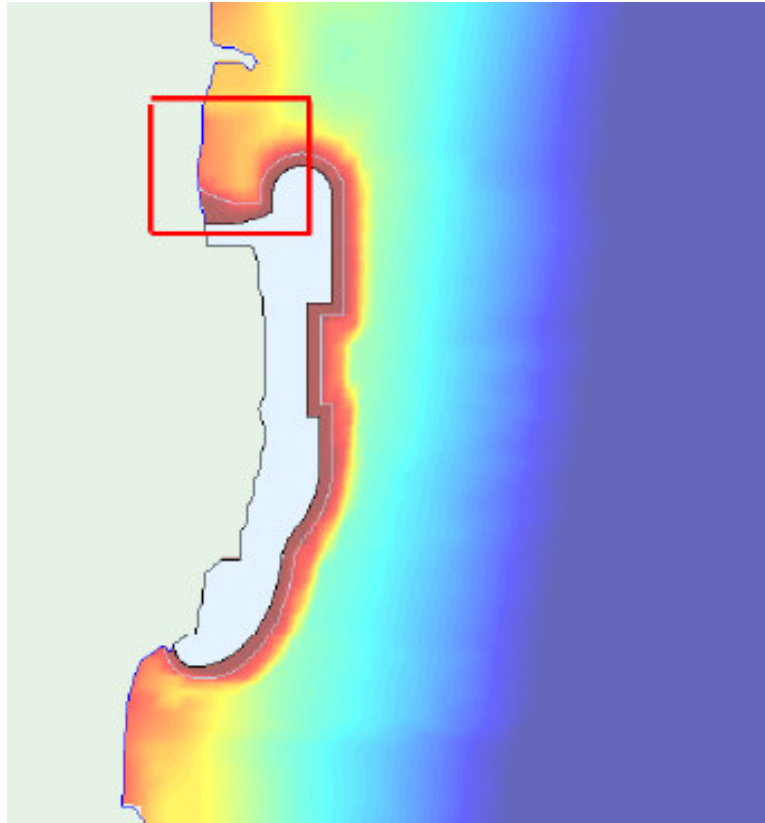
On the basis of the above it is recommended that the sand should preferably not just be dumped on the beach, but if possible some sand should be placed below mean sea level in order to speed up the process of coastal profile development towards the above quoted slopes.

The volume of re-nourishment sand may also depend on the expected sand loss during the more severe seasons (i.e. autumn and winter). Therefore, it is recommended that a monitoring plan should be set-up in which criteria should be defined for beach maintenance / re-nourishment.

16.5.8 *Operation Phase: Impact on Beach Cleaning*

Cleaning measures (e.g. litter and debris removal) may be needed to mitigate the reduction of the natural self-cleaning beach conditions occurring at the southern end of Eastern Beach where the proposed Eastside development will cause a decrease of wave action (see Figure 16.5).

Figure 16.5: Mitigation Area for Beach Cleaning



16.5.9

Operation Phase: Impact on Bathing Water Quality

Overall, no mitigation measures are recommended concerning the impact on bathing water quality - and recreation and tourism - with respect to coliform bacteria. This is because:

- The existing water quality is such that it regularly exceeds the guideline standards under the EC Bathing Water Directive, which suggests that there is an existing pollution problem (not associated with Eastside) that needs to be addressed to prevent future failures; and
- The available data cannot confirm whether additional mitigating measures (e.g. improving the flushing in the sheltered area at the southern end of Eastern Beach) are needed.

Nevertheless, it is recommended that the water quality at the southern end of Eastern Beach is monitored for bacteriological parameters with respect to standards under EC Bathing Waters Directive. Should monitoring confirm that water quality is adversely affected by reduced flushing capacity / water exchange, then small-scale measures to increase flushing capacity / water exchange should be devised. Such measures could include cascades where water flows over the rocks (forming the edge works for Eastside) from the sheltered area to the sea.

Mitigation measures are recommended concerning the impact on bathing water quality with respect to water transparency and oily films. It is recommended that beach maintenance be undertaken to regularly remove litter and debris from the southern end of Eastern Beach.

16.6 Residual Impacts

16.6.1 Construction Phase: Impact of Eastside Development Construction Activities on the Recreation and Tourism Environment

Even with the recommended mitigation measures in place, there will remain a moderate to major adverse residual impact on the recreation and tourism environment. For example, even with mitigation measures in place (e.g. screening), a moderate adverse residual impact is predicted on the quality of the environment for recreation and tourism and even with noise mitigation in place, noise will be reduced but the resulting increase over the existing background levels is predicted to remain as a major adverse residual impact, particularly at Catalan Bay and at the Caleta Hotel.

It should be noted, however, that these residual impacts will not be experienced continuously throughout the duration of the construction phase.

16.6.2 Construction Phase: Impact of Eastside Development Construction Activities on Navigation

With mitigation measures in place and appropriately implemented, the risk should be as low as reasonably practicable and there should be a negligible residual impact on navigation during powerboat racing.

16.6.3 Construction Phase: Impact of Sediment Plumes on Water Quality

With the mitigation measures in place, there should be a negligible impact on recreation and tourism relating to TSS affecting water quality at the beaches.

16.6.4 Operation Phase: Impact of Eastside Development Operation Activities on the Recreation and Tourism Environment

There is expected to be a moderate beneficial residual impact on the quality of the environment for recreation and tourism.

16.6.5 Operation Phase: Impact of Eastside Development Operation Activities on Recreation and Tourism Activities

There is expected to be a moderate beneficial residual impact on Gibraltar's recreational and tourist facilities.

16.6.6 Operation Phase: Impact of Eastside Development Operation Activities on Navigation

If the power boat race course has to be moved, there would remain a minor adverse residual impact on navigation since this impact would be unavoidable.

16.6.7 Operation Phase: Impact on Beach Morphology

With mitigation in place, there is expected to be a negligible residual impact on beach morphology.

16.6.8 Operation Phase: Impact on Beach Cleaning

With cleaning measures in place at the southern end of Eastern Beach, there would be a negligible residual impact on recreation and tourism.

16.6.9 Operation Phase: Impact on Bathing Water Quality

There would be a residual minor adverse impact on bathing water quality. However, if flushing is required, this mitigation measure should be planned so that it reduces the matter to a negligible residual impact.

16.7 Cumulative Effects

16.7.1 Construction Phase: Cumulative Effect of Activities on the Recreation and Tourism Environment

The cumulative effect of Eastside in combination with other plans or projects (see Section 4.10) has been assessed for quality of the recreation and tourism environment as described in Section 16.4.

The distance and magnitude of the Both Worlds project is such that a negligible cumulative effect is anticipated over the impact of the Eastside development alone. At the Eastside development, cumulative effects will be similar to those of the Eastside development alone (e.g. for traffic and noise). Also, in terms of landscape, the two developments are not visible from one another (due to topography).

16.7.2 Construction Phase: Cumulative Effects of Activities on Navigation

The cumulative effect of Eastside in combination with other plans or projects (see Section 4.10) has been assessed for recreation and tourism as described in Section 16.4. The findings for cumulative effects relate to the additional marine works at the Both Worlds project.

Assuming that the construction for this project is to include dredging (for land reclamation) and rock placement, then the potential cumulative effects are the same as described for Eastside alone. Hence, there would be concern that marine works could interfere with the safe running of powerboat racing events (and vice versa), with the potential hazard to navigation representing a short-term major adverse cumulative effect on navigation in terms of collision and/or grounding risks.

It is recommended that the appointed contractors for the marine works for Eastside and the Both Worlds projects liaise with the GPA and the GMRA to identify whether there is a potential navigation risk. Risk assessments should be conducted and, if a significant risk is identified, measures should be agreed and implemented that reduce this risk to as low as reasonably practicable.

Measures may include Notices to Mariners, moving the racing course, temporarily stopping marine works in open water such as dredging, appropriately marking hazards, etc. With measures in place and appropriately implemented, the risk should be as low as reasonably practicable and there should be a negligible residual cumulative effect on navigation during powerboat racing.

16.7.3 Construction Phase: Cumulative Effect of Sediment Plumes on Water Quality

The cumulative effect of constructing Eastside in combination with other plans or projects (see Section 4.10) has been assessed for water quality as described in Section 16.4. The findings for cumulative effects relate to the additional marine works for the Catalan Bay project and the Both Worlds project.

The Both Worlds project is not expected to involve dredging and reclamation that coincides with the dredging and reclamation for Eastside, and therefore no cumulative effect is predicted as a result of sediment plumes.

Accordingly, no mitigation measures are recommended and therefore there will be no residual cumulative effect.

16.7.4 Operation Phase: Cumulative Effect of Activities on the Recreation and Tourism Environment

The cumulative effect of Eastside in combination with other plans or projects (see Section 4.10) has been assessed for the quality of the recreation and tourism environment as described in Section 16.4.

As for the construction phase, the distance and magnitude of the Both Worlds project is such that a negligible cumulative effect is anticipated over the impact of the Eastside development alone. At the Eastside development, cumulative effects will be similar to those

of the Eastside development alone (e.g. for traffic, noise). Also, in terms of landscape, the two developments are not visible from one another (due to topography).

- 16.7.5 *Operation Phase: Cumulative Effect of Eastside of Activities on Recreation and Tourism Activities*
The cumulative effect of Eastside in combination with other plans or projects (see Section 4.10) has been assessed for recreation and tourism facilities as described in Section 16.4.

As described in Section 16.4, Eastside alone is predicted to have a moderate beneficial impact on Gibraltar's recreation and tourism. The Both Worlds project is predicted to have no significant impact on recreation and tourism facilities since it is a residential development. No mitigation measures are recommended and there is expected to be a moderate beneficial residual cumulative effect on Gibraltar's recreational and tourist facilities.

- 16.7.6 *Operation Phase: Cumulative Effect of Activities on Navigation*
The cumulative effect of Eastside in combination with other plans or projects (see Section 4.10) has been assessed for navigation as described in Section 16.4. The findings for cumulative effects relate to the operation of the Both Worlds project.

As noted in Section 16.3, speed boat racing takes place off Gibraltar's east coast and this requires launching off Eastern Beach. The course for powerboat racing is situated off Gibraltar's east coast. It is not known how close it passes the existing rubble tip or Sandy Bay (i.e. site of the Both Worlds project), but it is possible that the course may need to be re-routed to safely navigate around Eastside's reclamation and – to a lesser extent - Both World's reclamation. This would be a minor adverse impact on the powerboat racing, but a necessary measure to maintain safety requirements.

Overall, an unavoidable minor adverse cumulative effect on powerboat racing is predicted if the course has to be moved. It is recommended that Eastside's operational company and the developer of the Both Worlds project liaise with the GPA and the GMRA to assist identification of potential navigation risks, prior to events taking place. If the course has to be moved, there would remain a minor adverse residual cumulative effect on navigation since this impact would be unavoidable.

- 16.7.7 *Cumulative Effect on Beach Morphology*
The cumulative effect of Eastside in combination with other plans or projects (see Section 4.10) has been assessed for beach geomorphology by using the same approach as described in Section 5.7.

For the Both Worlds project (see Section 4.10), the seaward extension is very small and does not create a noticeable wave shielding effect on Sandy Bay beach or any other beach. It also does not form a noticeable interruption of current and sediment transport patterns. Predictions made for the planned development at Eastside are not affected by the Both Worlds project and so any cumulative effect on beach morphology over the impact caused by Eastside alone is expected to be negligible.

Accordingly, no mitigation measures are recommended and therefore the residual cumulative effect will be negligible too.

- 16.7.8 *Cumulative Effect on Beach Cleaning*
The cumulative effect of Eastside in combination with other plans or projects (see Section 4.10) has been assessed for beach cleaning by using the same approach as described in Section 16.4.

On the basis of the numerical modelling and analysis (see Appendix B), no cumulative effect is expected over the impact caused by Eastside alone because of the very limited size of the Both Worlds project.

Accordingly, no mitigation measures are recommended and therefore there will be no residual cumulative effect.

16.7.9 *Cumulative Effect on Bathing Water Quality*

The cumulative effect of Eastside in combination with other plans or projects (see Section 4.10) has been assessed for bathing waters by using the same approach as described in Section 16.4.

Given the findings for Eastside alone (see Section 6.4) and because of the very limited size of the Both Worlds project, no cumulative effects on bathing water quality are predicted as a result of combined pollutant sources (e.g. swimmers and sewage discharges).

Accordingly, no mitigation measures are recommended and therefore there will be no residual cumulative effect.

16.8 *Transboundary Effects*

16.8.1 *Construction Phase: Transboundary Effect of Activities on the Recreation and Tourism Environment*

The transboundary effect of Eastside has been assessed for the quality of the recreation and tourism environment as described in Section 16.4. The construction works for Eastside have the potential to affect recreational and tourist experiences at the Spanish beaches at La Linea and further north, due to changes in the environmental quality of these areas in terms of landscape, air quality, noise and traffic.

Based on the landscape assessment made in Section 14.4, middle distance views between one and three kilometres to the north of Eastside will be affected at the southern end of La Linea, but the construction works are predicted to have a negligible transboundary effect on views. There will be a negligible transboundary effect on long distance views from north of La Linea.

In summary, the air quality assessment made in Section 12.4 found that pollutant increases will not have a significant effect on the environment of Spain. The noise assessment found that noise is unlikely to be perceptible across the border in Spain. Traffic was not assessed for Spanish roads, and is assumed not to be significant in terms of its impact on recreation and tourism at Spanish beaches, since only a negligible impact was found on recreational visitors and tourists in Gibraltar.

Distance to La Linea and other beaches in Spain reduces the significance of potential impacts of recreation and tourism. With the recommended mitigation measures in place, there would remain a negligible residual transboundary effect on the recreation and tourism environment at La Linea and beaches to the north.

16.8.2 *Construction Phase: Transboundary Effect of Activities on Navigation*

The construction activities for Eastside will not extend into Spanish waters and therefore there will be no transboundary effect on navigation.

16.8.3 *Construction Phase: Transboundary Effect of Sediment Plumes on Water Quality*

The transboundary effect of constructing Eastside has been assessed for water quality as described in Section 16.4 and uses the information provided on sediment plumes in Section 6.4.

As identified in Section 6.4, the proposed dredging and other marine works will generally create short-term (i.e. 2 to 7 weeks) increases to TSS concentrations in the coastal waters off Spain. The modelling results indicate that maximum TSS concentrations from 64mg/l to 128mg/l can be reached due to sediment plumes dispersing from dredging activity within the northern borrow area. Increases of this magnitude are to be expected around activities

involving large dredging equipment such as a TSHD - since it is in the nature of this dredging activity to spill some sediment into the water – but not at Spanish beaches.

At the Spanish shoreline, the maximum TSS concentrations are expected to be between 8mg/l and 16 mg/l for sc2a (see Figure 6.4) and to be less than 8mg/l for all other impact scenarios.

In summary, a negligible transboundary effect is predicted on the water quality and associated recreation and tourism at Spanish beaches since all impact scenarios create maximum increases in TSS concentrations that are generally less than 8mg/l.

Although a negligible transboundary effect is predicted, the following mitigation measures should be considered and implemented in a practicable and cost-effective manner as part of the contract awarded for the marine works for Eastside.

To reduce sediment suspension from the TSHD (CIRIA, 2000):

- Optimise trailing velocity, suction head and pump discharge with respect to one another to reduce sediment losses around the draghead;
- Try to reduce water intake by the suction head to increase sediment density and reduce need for overflowing;
- Apply return flow method if the TSHD has this facility to increase sediment density and reduce overflowing; and
- Avoid unnecessary overflowing through operational method.

To reduce sediment plumes from the northern borrow area:

- Undertake dredging in the southern borrow area to avoid the dispersion of a significant sediment plume into Spanish waters; and/or
- Undertake dredging from the northern borrow area as far south as possible to reduce the dispersion of a significant sediment plume into Spanish waters.

Even with the suggested measures for the TSHD in place, it is unlikely that the residual transboundary effects will be reduced significantly since modern dredging equipment tends to work very efficiently, for example, in terms of the accuracy of the draghead, increasing the density of the sediment pumped into the hopper and avoiding unnecessary overflowing.

However, with the suggested measures relating to dredging at the borrow areas, the residual transboundary effect associated with sediment plumes from dredging at the northern borrow area should remain as a negligible residual transboundary effect.

16.8.4 *Operation Phase: Transboundary Effect of Activities on the Recreation and Tourism Environment*

The transboundary effect of Eastside has been assessed for the quality of the recreation and tourism environment, as described in Section 16.4. The operational situation concerning Eastside has the potential to affect recreation and tourism at Spanish beaches at La Linea in terms of landscape, air quality, noise and traffic.

Based on the landscape assessment made in Section 14.4, middle distance views between one and three kilometres to the north of Eastside will be affected because Eastside will be visible from Playa de la Atunara and the seafront on the southern edge of La Linea. Eastside is predicted to have a minor beneficial transboundary effect on middle distance views since a modern, lively and busy, high rise development would replace the existing rubble tip, which is predicted to improve the quality of the environment for recreation and tourism. There will be a negligible transboundary effect on long distance views from north of La Linea.

In addition, the air quality assessment found that pollutant increases will not have a significant effect on the environment of Spain. The noise assessment found that noise is unlikely to be perceptible across the border in Spain. Traffic was not assessed for Spanish roads, and is assumed not to be significant in terms of its impact on recreation and tourism at Spanish beaches, since only a negligible impact was found on recreational visitors and tourists in Gibraltar.

In summary, recreation and tourism is likely to be affected by a minor beneficial transboundary effect only, due to views of the development from Playa de la Atunara and the seafront on the southern edge of La Linea. No mitigation measures are recommended and there will be a minor beneficial residual transboundary effect.

16.8.5 *Operation Phase: Transboundary Effect of Eastside of Activities on Recreation and Tourism Activities*
Eastside will not extend into Spanish territory and therefore there will be no transboundary effect on recreation and tourism facilities.

16.8.6 *Operation Phase: Transboundary Effect of Activities on Navigation*
Eastside will not extend into Spanish waters and therefore there will be no transboundary effect on navigation.

16.8.7 *Operation Phase: Transboundary Effect on Beach Morphology*
The transboundary effect of Eastside on neighbouring territory (i.e. Spain) has been assessed for beach morphology by using the same approach as described in Section 16.4. As assessed in Section 5.8, it is possible that the construction of Eastside could interrupt the along-shore sediment transport, cross-shore sediment transport, cross-shore profiles and offshore sediment movement characteristics of this stretch of coast, which could impact upon the shape of the beaches at La Linea and further north.

As described in Section 5.8, with Eastside in place, no significant impact is predicted north of Eastern Beach's northern groyne. Accordingly, no transboundary effect is predicted for Spain's coast, no mitigation measures are necessary and no residual transboundary effect is predicted.

Although no transboundary effects are predicted, modelling suggests that it is possible that small changes in shoreline trends could be masked by inaccuracies in the shorelines derived from the satellite pictures. Therefore, although there is no evidence to support the supposition, it is possible that a very small northwards transport (some thousands of m³/yr at most) could be occurring, but is not detected on the basis of the shoreline analysis. Even if such a northerly transport were to exist, the impact of Eastside to the beaches north of Eastern beach's northern groyne would be minimal.

Given the findings of Section 5.4 concerning the impact of the Eastside development to the north of the northern groyne at Eastern Beach, it would be prudent to monitor Eastern Beach just south of the border after construction of Eastside and decide on placement of a sand buffer if year-to-year erosion is observed (which would indicate the existence of a small net northward transport).

If a buffer were to be placed, the behaviour of the buffer should be monitored and some renourishment (on average some thousands of m³/year at most) should be anticipated.

16.8.8 *Operation Phase: Transboundary Effect on Beach Cleaning*
The transboundary effect of Eastside on neighbouring territory (i.e. Spain) has been assessed for beach cleaning by using the same approach as described in Section 16.4.

Given that it was concluded that in general Eastside is expected to only have affect the self-cleaning properties at the southern end of Eastern Beach, no significant transboundary effect is expected on the beach cleaning characteristics of Spanish beaches. This assessment is

based on the predictions that the hydrodynamic conditions that promote self-cleaning beaches (i.e. tidal range and wave action) are not expected to change significantly.

No mitigation measures are recommended and no residual transboundary effect will remain.

16.8.9 *Operation Phase: Transboundary Effect on Bathing Water Quality*

The transboundary effect of Eastside has been assessed for bathing waters at Spanish beaches by using the same approach as described in Section 16.4. This approach assumes that reduced water quality would have an indirect transboundary effect on recreation and tourism along Spanish beaches in terms of the quality of the environment in which recreational and tourist activities take place.

As identified in Sections 6.4 and 16.4, the results of numerical modelling based on hydrodynamics and wave conditions indicate that currents and wave heights would be reduced only at the southern end of Eastern Beach and the northern end of Catalan Bay causing the flushing capacity of the water in these areas to be reduced. Accordingly, no significant impact is predicted on bathing water quality in Spanish waters and at Spanish beaches. Therefore, no significant transboundary effect is predicted.

No mitigation measures are recommended and there would be no residual transboundary effect.

16.9 *Uncertainty*

Since the findings used in this chapter are principally derived from other chapters within the ES, uncertainty relates to uncertainties concerning Coastal Hydrodynamics and Geomorphology (see Chapter 5), Water Quality (see Chapter 6), Transport Assessment (see Chapter 11 and Appendix H), Air Quality (see Chapter 12), Noise (see Chapter 13) and Landscape and Visual Impacts (see Chapter 14).

16.10 *Summary*

This chapter has assessed the potential impacts, cumulative effects and transboundary effects of Eastside on recreation and tourism. A number of potential impacts were identified and assessed.

It was found that construction of Eastside could have significant adverse effects on the environment in terms of its quality for recreation and tourism due to views and noise. Mitigation measures are required to reduce the impact. After construction, Eastside would provide improved views (due to the removal of the existing rubble tip) and limited changes to air quality, noise and traffic. Overall, it would be of benefit to recreation and tourism.

Eastside is predicted to alter hydrodynamic and sediment transport processes to the extent that significant beach accretion and erosion will affect the current beach morphology at Eastern Beach and Catalan Bay. Beach nourishment measures have been recommended as mitigation. Spanish beaches should not be affected.

Construction and operation could also adversely affect water quality due to increased TSS concentrations affecting water transparency and due to reduced water flushing in the corners between Eastside and the adjacent beaches. Again, mitigation measures are recommended to reduce these effects. The self cleaning properties of the beaches are not expected to be affected significantly, except at the southern end of Eastern Beach where flushing improvements may be required to mitigate this impact.

Construction and operation activities could also require changes to the power boat racing course to avoid and/or reduce navigation risks (e.g. collisions with dredgers).