Environmental Statement

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4 Description of the Development

4.1 Introduction

This section of the Environmental Statement (ES) describes the Applicant's proposals for Eastside, including its concept, components, programme, construction, operation, maintenance and sustainable development.

4.2 Project Concept

Eastside is conceived as a high quality residential mixed-use development on the east side of Gibraltar. A rich mix of uses will create a vibrant new residential community supported by cultural, leisure and retail facilities linked by a sequence of landscaped squares and plazas.

A conceptual physical model representing the development is shown in Figure 4.1 and the illustrative masterplan is shown in Figure 4.2. Illustrative cross-sections are shown in Figures 4.3, 4.4 and 4.8.

Figure 4.1 Conceptual Physical Model

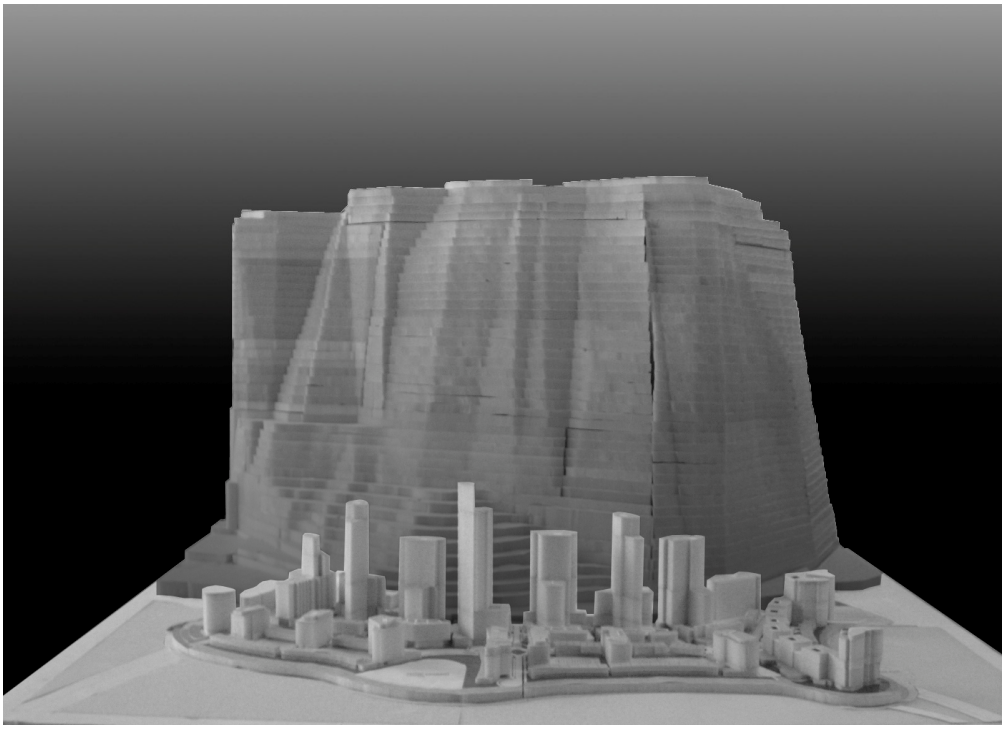


Figure 4.2 Illustrative Masterplan

Figure 4.3 Illustrative Cross-Section (Section 1a), looking south-west and extending from the Rock of Gibraltar in the west to the Mediterranean Sea in the east (for section location see Figure 4.2).

Figure 4.4 Illustrative Cross-Section (Section 1b), looking south and extending from the Rock of Gibraltar in the west to the Mediterranean Sea in the east (for section location see Figure 4.2).

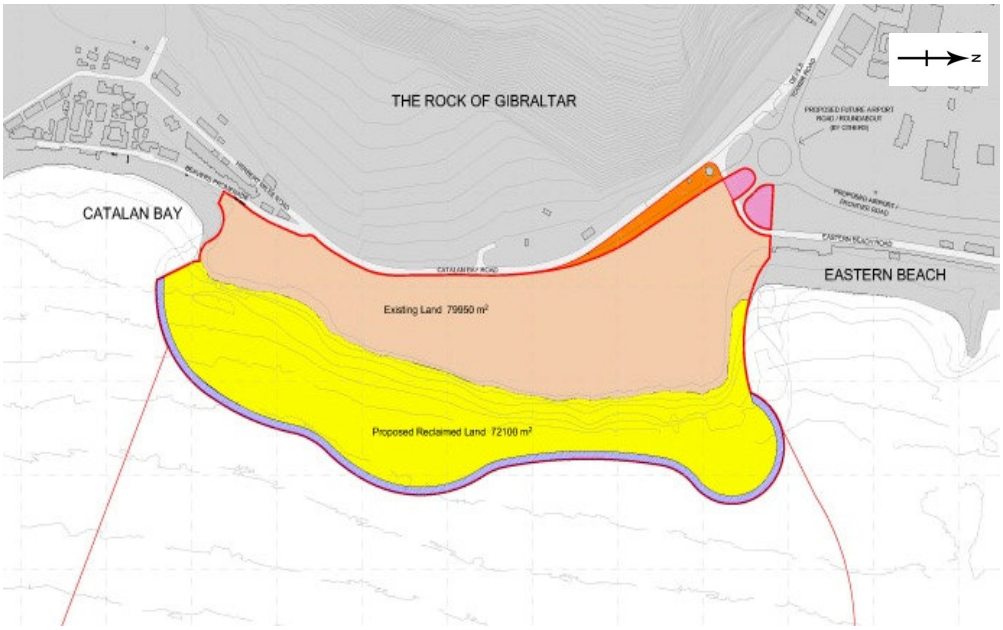
The development will be set with the Rock of Gibraltar as a backdrop, enjoying views across the Mediterranean. It will benefit from a landside gateway five minutes away from the airport. In addition, this development will capitalise on the climate, location and orientation of the buildings to optimise the development's sustainability. An appropriate mix of shops, cafés, restaurants and leisure facilities will meet the needs of the residential community.

The Government of Gibraltar (GoG) has provided guidance to the Applicant on both the broad vision and the specific objectives of the scheme. It was recognised that the site is visually prominent from certain viewpoints but that tight controls on design would ensure that the key objective of producing an innovative, high quality scheme of architectural interest could be met. The intention is for the development to create a focal point for the area that will become a tourist destination in its own right without competing with or undermining local commerce and retail.

The site of the proposed development is currently a tip receiving inert building and demolition rubble (see Figure 4.5). Figure 4.6 shows the existing land reclamation area, created by the disposal of such rubble material and the extent of the proposed additional reclamation, indicated in yellow on the plan. The waste tip material will be recycled and the land will be reinstated for development.

Figure 4.5 Rubble Heaps at the Site

Figure 4.6 Existing Land and Proposed Land Reclamation (indicated in yellow)



4.3 Design Objectives and Scheme Development

4.3.1 Design Objectives

A development of this scale is possible only through close collaboration between GoG and the Applicant throughout the life of the project.

It is the intention of the Applicant that the design of both the buildings and the landscaped spaces will draw on the skills of the very best in their profession. The scheme masterplan has been designed by the architectural practice of Fender Katsalidis (Aust) Pty Ltd., which has a reputation for high quality urban design. While the design of the scheme has undergone progressive reconsideration and refinement, the underlying principles continue to reflect the original objectives for the scheme conceived by GoG.

The rest of this section has been based on information provided by the Applicant.

Fender Katsalidis (Aust) Pty Ltd is an architectural practice based in Melbourne Australia. The practice undertakes projects throughout the world. With extensive experience in urban-scale projects, the work of the practice is informed by appropriate response to the nature of place of each individual site. Each of those responses represents a determination to maximise the opportunities arising from each particular place and, in doing so, embellish the sense of community and appreciation of the natural environment.

Large scale projects completed by the practice include the 92 storey Eureka Tower in Melbourne, one of the tallest residential buildings in the world, Muang Thong Thani, a new city for a population of 250,000, including residential, commercial, industrial, retail, hotel and hospitality facilities that was constructed outside Bangkok in Thailand, and the New Quay development at the Melbourne Docklands, which essentially created a new suburb for Melbourne on its waterfront, and included 1,000 apartments, extensive retail and hospitality uses. Currently the practice is responsible for a large residential development in Shangahai, which consists of eleven apartment towers. It is responsible for the creation of urban design guidelines to inform the master planning of significant elements of Palm Jebel Ali, a large-scale series of islands being created off the Jebel Ali coast of Dubai, and is currently engaged

in the preliminary conceptual design of a landmark series of buildings in Dubai. In addition to those projects, the practice is currently carrying out signature projects in five states within Australia.

The site of Eastside is one of dramatic contrasts: in this location the verticality of the eastern face of the Rock meets the horizontality of the Mediterranean Sea with only a slight intercession of the shelf of land on which the development sits; the southern end of the site is characterised by the rocky cove of Catalan Bay whereas the northern end of the site meets the flatness of the isthmus connecting Gibraltar to Spain. The eastern orientation of the site means that at times it is exposed to the prevailing easterly winds of the Mediterranean and the waves that those winds bring; on the other hand, the distinctive rugged charm of this locale is derived from the meeting of those forces with the toughness of the Rock.

The key objectives driving the scheme are derived from the assessment of the opportunities and possibilities arising from the character of the place. An important driver of the planning was the wish to integrate the development with the important existing Catalan Bay settlement and beach to the south of the site, and also Eastern Beach to the north. In creating those sensitive connections it has been intended to create further shelter for those beaches from the easterly waves. Between those two very important end nodes an important consideration has been to minimise the amount of land reclamation required, so as to reduce disruption to the sea bed and to be able to re-use as much as is feasible the land-fill that has been placed on the site.

Within those broader aspirations, access throughout the scheme has been a key element of the project. Accordingly, a continuous pedestrian pathway along the water's edge is an important component of the design of the development. This pathway flows around the site, and has physical and visual connections to both the Sea and the Rock. Pedestrian linkages have been created from Devil's Tower Road to the water's edge. Those linkages are formed from a variety of conditions: through a series of linked, sheltered courtyards, or along streets. Excellent connection and integration with Catalan Bay in the south, and Eastern Beach in the north have been created. Landscaped open spaces located within the development area and the shops, cafés and other facilities that activate, enliven and enrich those spaces, are linked by the street and pedestrian networks.

The development will have a public face on all four sides and has, accordingly, been designed so that each of those faces is an appropriate response to its different environmental and physical context.

To heighten the amenity of pedestrians, increase the richness of the street experience, and optimise the utility of the site, carparking is generally located within or under buildings.

A key component of the quality of the spaces being created is the landscape. Within the overall site will be a series of larger and smaller spaces and situations that will provide identity. The landscape will integrate with the building design to allow sun, to create shade, to protect and to enhance the quality of those spaces. The landscape strategy is an important element of the integration of the development into its surrounding environment and the proposals are described in more detail in Section 4.4.4.

4.3.2 Scheme Development

The scheme design is an iterative process which has been guided by consultation and the EIA. The physical development of the masterplan has evolved over time and a number of options were considered and assessed before the current design emerged.

The original scheme concept included a marina and a curving breakwater arm. The marina and breakwater arm have not been included in the current application. Provision has been made for both to be included at a later date and proposals for these would be the subject of a separate planning application which is likely to require an EIA.

Through the design process, the massing of the development has been reoriented so that there is a concentration in the centre of the site. That approach allows for a greater sense of responsiveness to, and integration with, the surrounding communities.

The tallest tower was relocated towards the south to minimise any adverse impact on air traffic. The buildings on the west side of the development, adjacent to the Rock, have been redesigned so that they now slope from the high point in the centre of the site to the low point towards the north in order to further minimise the impact on air traffic.

To reduce visual impact, the development has generally reduced in height and increased in density with a greater range of low to mid-rise accommodation across the site and along the water's edge facing Catalan Bay and Eastern Beach. In particular, buildings at the southern end of the site have been reoriented to ensure that they do not overlook Catalan Bay and the beach. An additional factor in determining the shape and form of the reclaimed land area was to ensure that it angled away from, and did not overlap with, Catalan Bay and Eastern Beach. This was to ensure that the existing views from these beaches out to sea were not obstructed by the development. This is set out in more detail in Chapter 14.

4.4 *Project Components*

The proposals for the scheme (see Figure ES.3) currently comprise the following components:

- An area of reclaimed land which, in addition to the reclaimed land provided by the existing rubble tip, provides the land footprint and wave protection for the development;
- Approximately 2,600 private residential one to four bedroom apartments and town houses covering approximately 380,000m² of gross area (approximately 308,000m² net floor area) over a number of distinct building areas (referred to as development plots) with integrated open spaces and car parking within and beneath the buildings. For the purpose of the assessment, a ratio of 1 parking bay per apartment has been applied;
- A hotel with approximately 300 rooms (approximately 21,000m² gross area);
- An apartment hotel (totalling approximately 10,000m² gross area);
- Retail and commercial/office facilities (approximately 25,000m² and 19,000m² net areas respectively);
- Landscaped open spaces including plazas;
- Private and public car parking; and
- Site infrastructure including roads, services etc.

The following sections describe the project components in more detail.

4.4.1 *Reclaimed Land*

In addition to the existing landfill area, land reclamation is necessary to provide the overall land footprint on which Eastside will be developed. The area of additional land reclamation is shown in yellow on Figure 4.6 above.

The edge of the reclaimed land will be formed by revetment structures. The revetment will be designed to protect the development from wave action and in such a way as to reduce overtopping. To achieve this, the most vulnerable external (seaward) edge sections will be armed with pre-cast concrete armour units (see Section 4.6 below). The internal (landward) edge of the revetment will comprise sloping rock revetment lined with a geotextile in order to contain the reclamation materials (see Section 4.6). The reclamation materials will comprise both recycled building rubble and sands dredged from an offshore borrow area.

4.4.2 *Apartments*

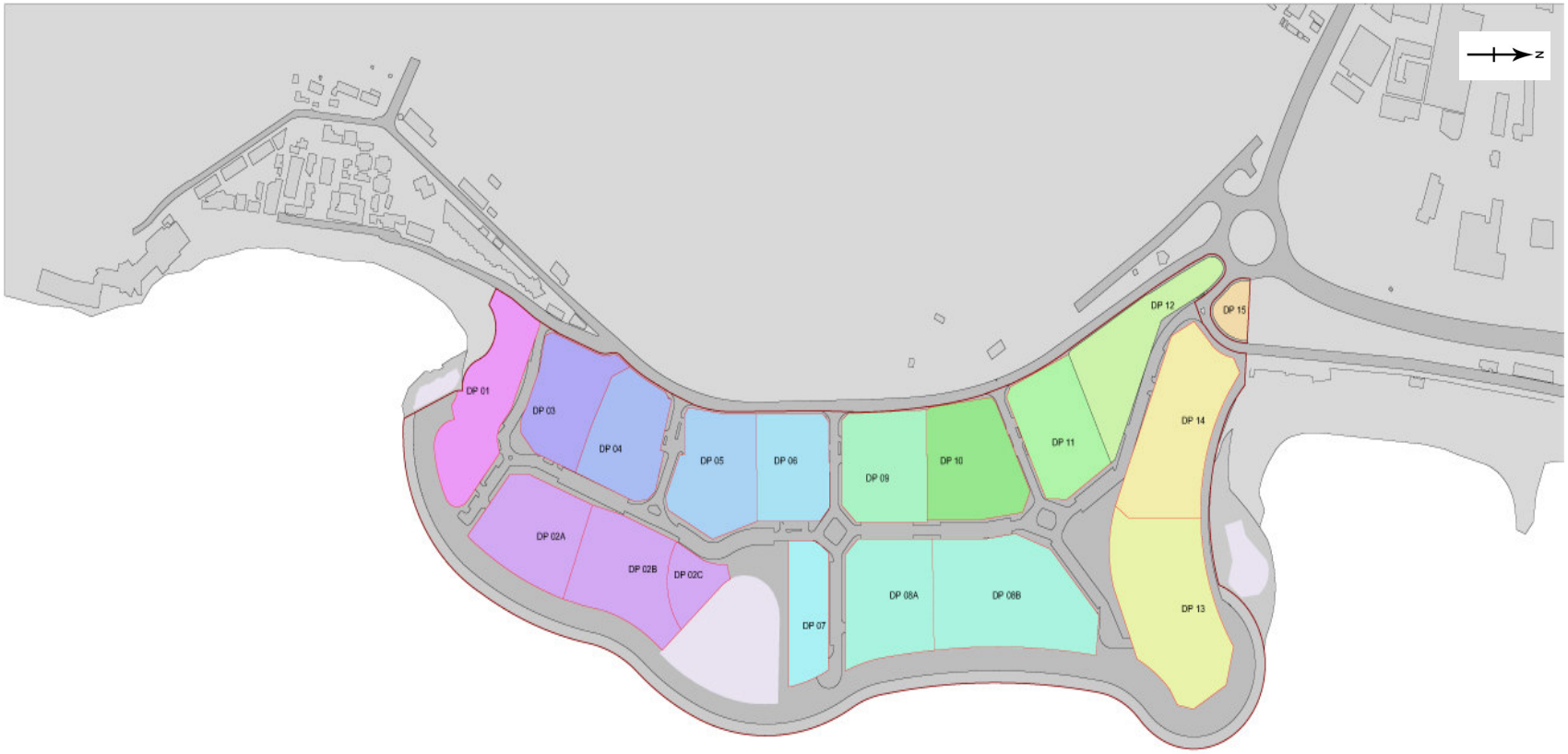
Circa 2,600 apartments and town houses will be contained within various sized buildings up to a maximum net internal area of 308,000 sq.m. These will be modelled with balconies, roof gardens and pools to maximise the use of the natural Mediterranean climate. This rich mix

will ensure that Eastside caters for the needs of all potential residents and visitors and creates the intended landmark destination.

The residential mix within Eastside will provide a wide range of building types, from two storey beach-side villas to mid-rise and high-rise Rock-side apartments. The apartments will typically have between one and four bedrooms.

The intention is for the apartments to be distributed across the site over 14 distinct development plots (01 - 14, as shown on Figure 4.7 overleaf (note – the colours on the plan are given to differentiate between the sites)).

Figure 4.7 Illustrative Development Plot Identification Plan



In summary, the main road in the development runs down the centre of the site from Catalan Bay Road in the north, and swings west to meet that road again in the south.

To the west of that road, between it and Catalan Bay Road, are located the taller buildings in the development, on development plots 03, 04, 05, 06, 09, 10, 11 and 12.

To the east of that road are located generally low-rise to medium-rise buildings, on development plots 02, 07 and 08.

Development plot 01 contains low-rise and medium-rise buildings which respond to the particular nature of Catalan Bay and the height, bulk and outlook of buildings existing in that locale.

Development plots 13 and 14 contain low-rise and medium-rise buildings which respond to the characteristics of the Eastern Beach precinct through appropriate lower height, and the creation of direct pedestrian linkages between Eastern Beach and the development.

Development plot 15 contains a medium-rise commercial building just west of Eastern Beach which, on its northern face, acts as a gateway building into the development.

The broad planning of the site is intended to recognise and respond to the existing landform of the site, and its topographic and visual relationship with the Rock. In doing so, a benefit is to be able to re-use the fill that currently exists on the site. Accordingly, there will be minimal change to the natural contours of the shore and the new site engages naturally with Catalan Bay to the south and Eastern Beach to the north. As a result, the site will be seen as a natural linkage between those two popular existing beaches.

The formation of buildings reinforces that planning by increasing the scale of buildings from the shore line back to the western edge of the site. In that manner, the development responds to and echoes the dramatic landform of the Rock with its coastal fringe. The proposed levels within the site bolster the sense of a natural response by stepping up from the shoreline.

Taller buildings are generally located along the western edge of the site, forming a visual base to the massive bulk of the Rock. Between those buildings and the shoreline, smaller buildings will be constructed. In doing so, opportunities for views over the Mediterranean from all buildings is created, resulting in excellent view amenity across the development and creating vistas from Catalan Bay Road over the sea.

On that basis, the majority of development plots east of the main internal road are developed with buildings stepping up away from the Mediterranean. Near the water's edge are townhouses facing the sea, west of which are taller apartment buildings oriented on an east-west axis, with glancing views to the north and south. That building orientation maximises the space between those buildings and provides visual corridors through that space from the taller buildings west of the main internal road.

The development plots west of the main internal road, and bounding Catalan Bay Road, consist generally of towers over podia. Generally the podium is faced by active uses, and contains internal car parking associated with the building. Those active uses include offices, retail and residential. Above the podium is a residential tower formed to minimise visual intrusion to adjoining buildings, and oriented for optimal view and environmental benefits.

The formation of the lower level environment is intended to create a ground-level environment of shelter, delight, enjoyment, stimulation and recreation. Essential aspects of that approach include clear wayfinding to and through the development, the formation of

landscaped areas and private spaces that are welcoming and create amenity, and the encouragement of pedestrian activity through the site.

A main road through the site links the Eastern Beach precinct in the north with the Catalan Bay precinct in the south. That road distributes traffic to the development plots, and creates access to the landscaped open space at the sea wall sea frontage in the north of the site. To assist in permeability and access, that main road is linked with Catalan Bay Road in three locations evenly distributed throughout the site.

Running across the site, from Catalan Bay Road to the sea, are a series of access routes, creating permeability and vistas through the site. These access routes lead to the creation of special and unique spaces as part of the route through the site. Parts of those paths will be pedestrian only; other parts will be shared with vehicles. The paths open up at times to form small plazas, and the routes will permeate café and restaurant precincts.

A typical, illustrative cross-section through the site is shown on Figure 4.8. This figure illustrates the town houses at the water's edge, and the mid-rise apartments between those.

Along the eastern boundary of the main internal road are two-storey residences facing onto that street; at the base of those is a strip of commercial / retail activity at street level. Between these buildings and the townhouses is located car parking. Located on the western boundary of the main internal road is street-level retail, over which are two storeys of residential apartments. The apartments and retail provide an active face to the car parking podium. That car parking podium is faced on the Catalan Bay Road side by medium-rise buildings generally containing a mix of commercial and retail activities at the lower levels, and residential at the upper levels. Above the car parking podium is the residential tower.

The upper levels of the car park structures both east and west of the main internal road will be designed as landscaped terraces serving the surrounding residential uses.

There are thoroughfares and landscaping between and beyond the buildings, and underground parking beneath the buildings.

Figure 4.8 Illustrative Cross-Section (Section 1c) at northern end of the development, looking south and extending from the Rock of Gibraltar in the west to the Mediterranean Sea in the east (for section location see Figure 4.2).

The design of the buildings is intended to maximise the opportunity for views north towards Spain, east over the Mediterranean, south towards Africa, and glancing views past the Rock to the west. Accordingly, the majority of the buildings are dual aspect. Figure 4.9 shows the location of dual aspect apartment buildings (shown in yellow on the plan). Within those dual aspect buildings there are opportunities for many individual apartments to have dual aspects. Figure 4.10 indicates the location of those apartments. In designing the buildings in this manner, the result will be to maximise opportunities for views over the water areas and the sea, natural ventilation, easterly morning and westerly evening sun.

Figure 4.9 Illustrative Plan showing location of Dual Aspect Buildings

Figure 4.10 Illustrative Plans showing location of Dual Aspect Apartments

The location, height, bulk and interrelationships between buildings have been designed to optimise amenity. An important part of that consideration is the shading effect of the buildings. Figure 4.11 illustrates the shading effect of the buildings during the winter solstice and Figure 4.12 shows the shading effect during the summer solstice. The proposed layout of the high rise buildings has been designed in order to ensure that adjoining lower buildings continue to receive sunlight during the day.

Figure 4.11 Shading by Buildings during Winter Solstice

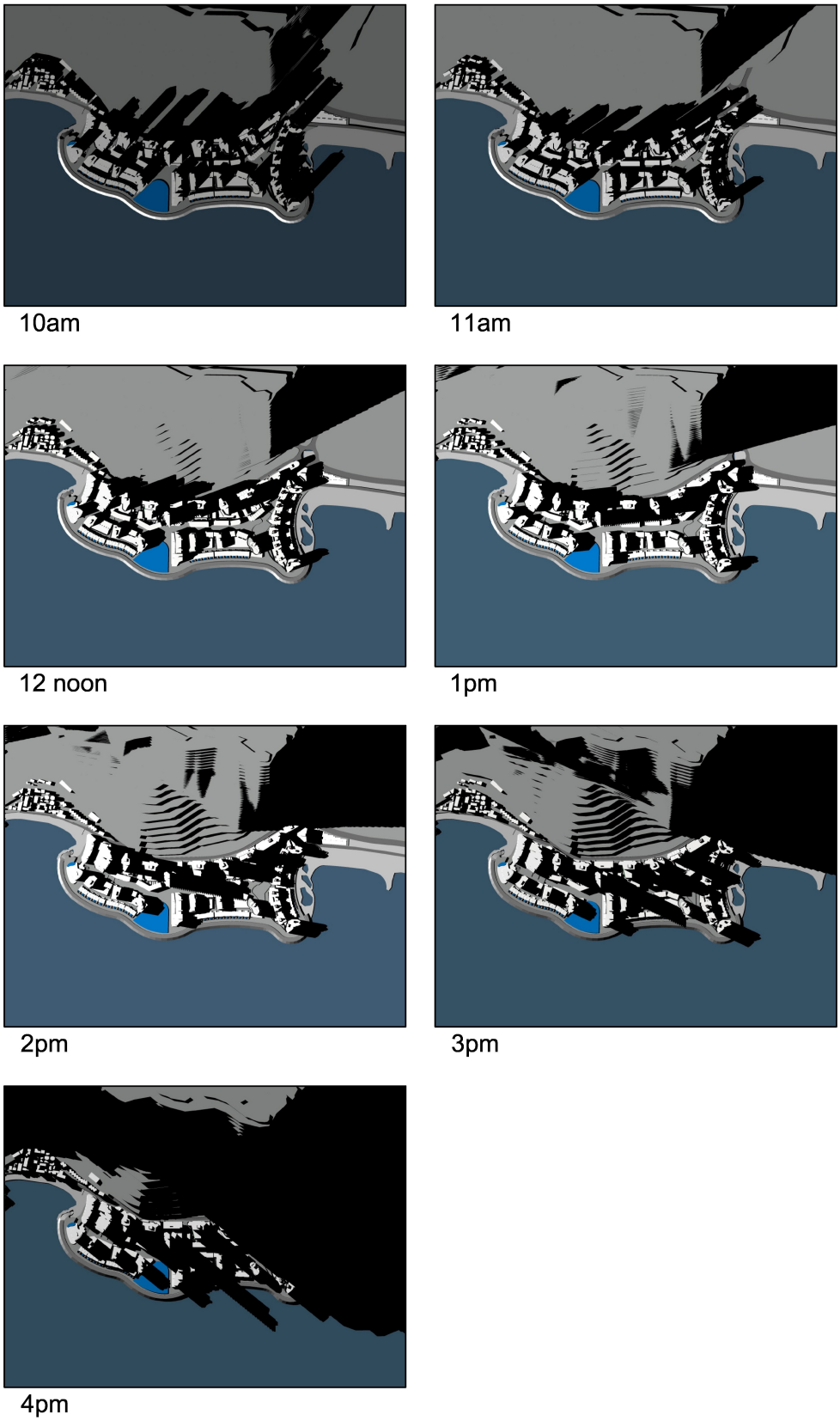
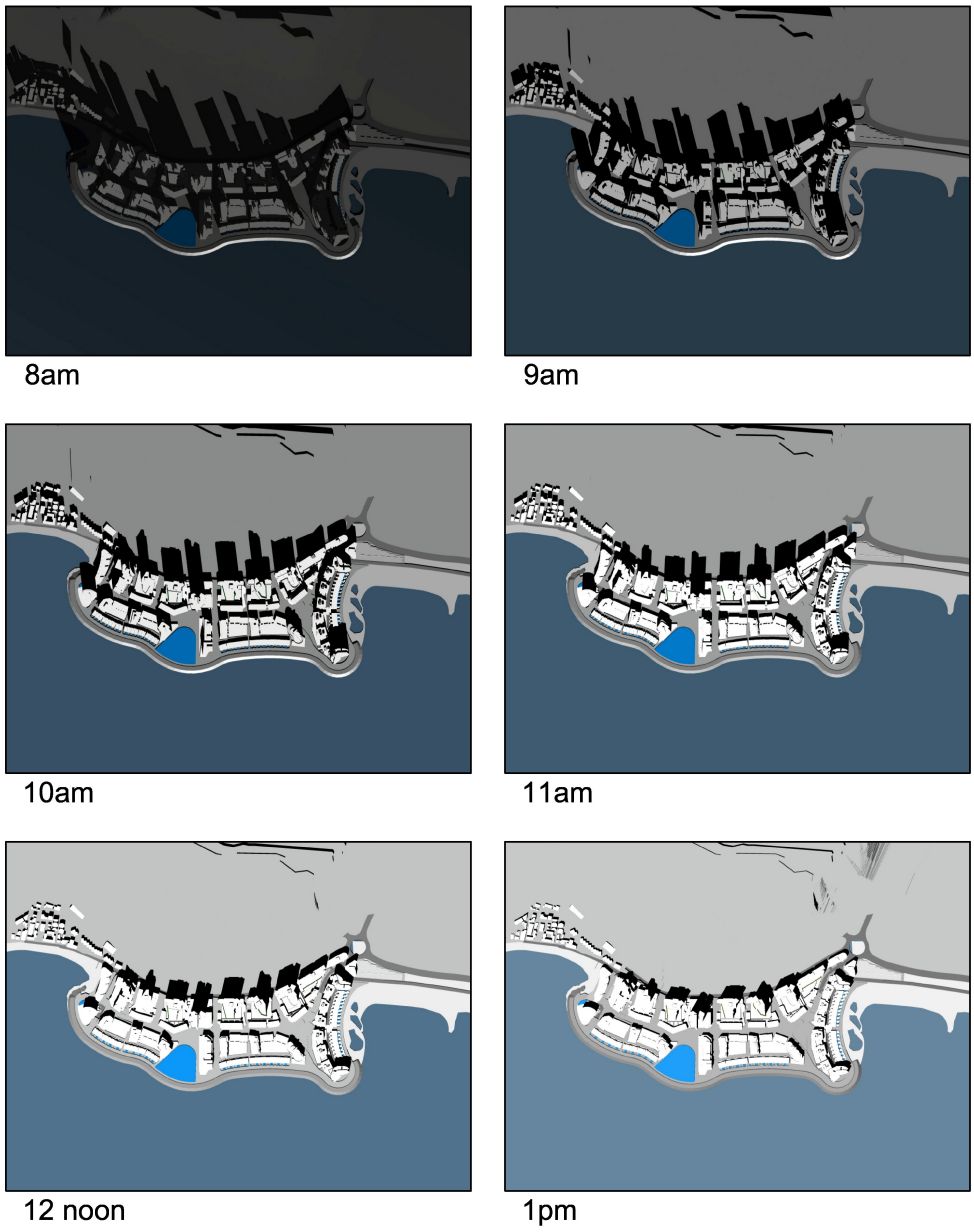


Figure 4.12 Shading by Buildings during Summer Solstice



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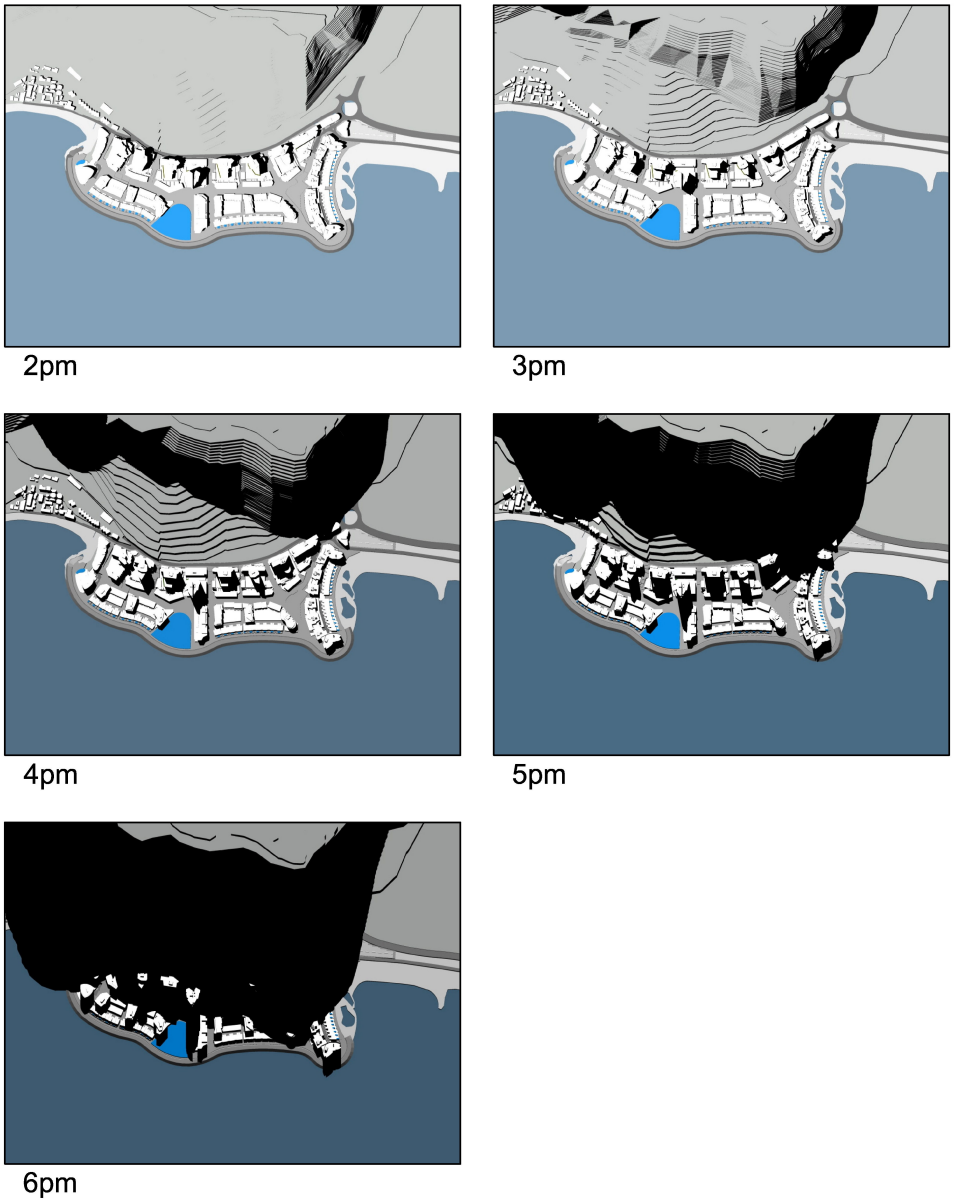


4.4.3 *Hotel, Retail and Commercial Facilities*

The hotel location is shown within development plot 03 (see Figure 4.7). The intention is to provide high quality accommodation in a building eleven storeys high with a gross floor area of approximately 21,000m². The hotel will provide up to 300 rooms and will offer associated facilities such as restaurants, conference rooms, pool and gymnasium. In the podium is located public car parking.

Over the hotel will be an apartment building containing approximately 45 apartments.

In this location the hotel forms an active adjunct to the plaza formed north of the buildings facing Catalan Bay, and is part of phase one of the development.

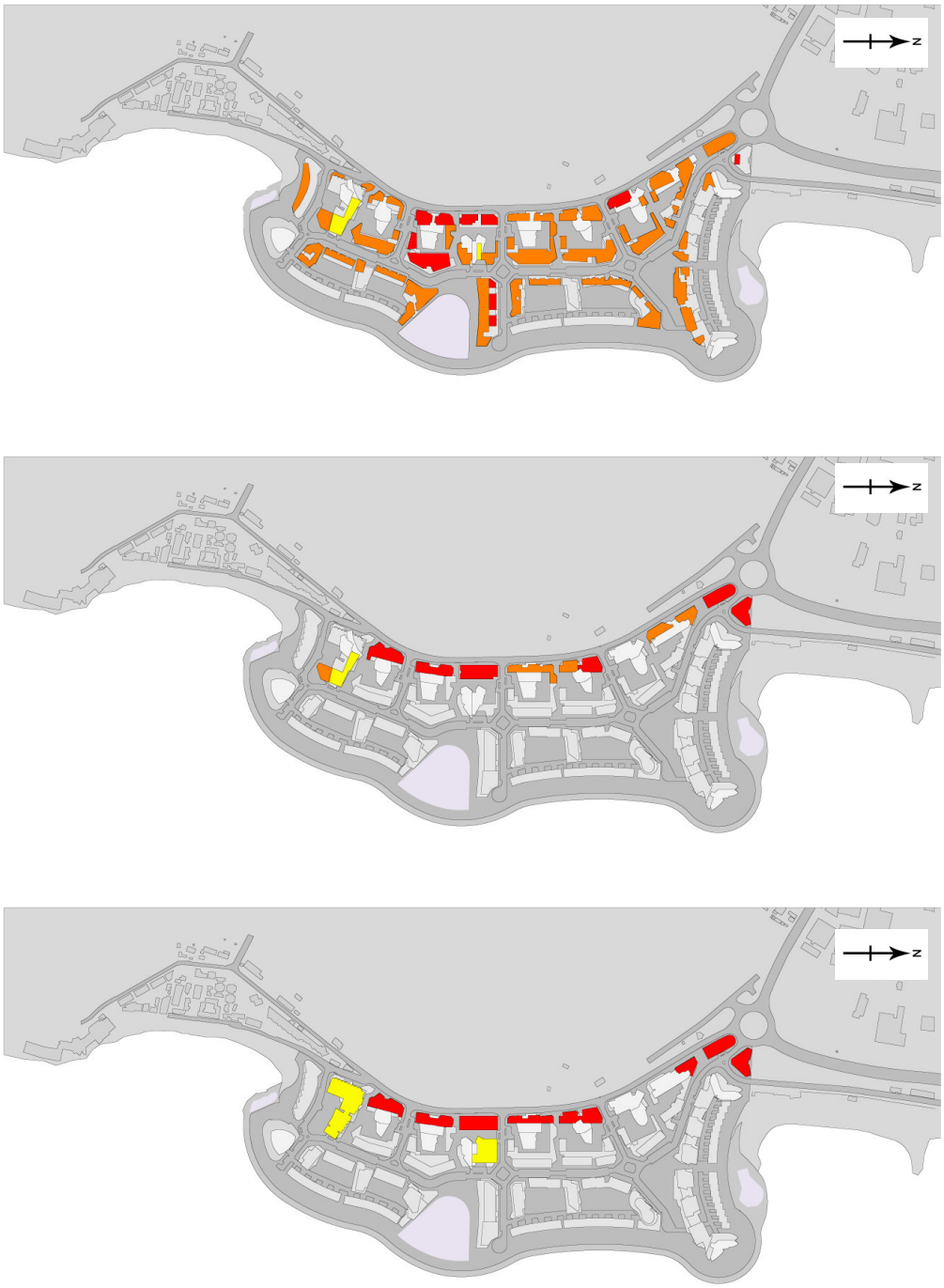
In addition to the hotel is one apartment hotel located in development plot 06 with a gross area of 10,000 m².

In development plot 06, the apartment hotel forms part of a complex incorporating residential, retail and commercial facilities. It is located adjacent to the swimming lagoon, one of the primary public open spaces within the development.

Retail facilities will be distributed throughout the site, and will generally be established along ground floor levels. Some further retail will be located on level one in some development plots fronting Catalan Bay Road. The locations of retail uses are described on Figure 4.13. The frontages of the retail outlets will typically face public open spaces and the principal thoroughfares within the site so as to provide good visibility, and activation and enhancement of the street and pedestrian environments. The net area of retail facilities is likely to be in the region of 25,000m^2.

Commercial facilities will be established generally along Catalan Bay Road, and in development plot 15. The locations of commercial uses are indicated on Figure 4.13. Generally, the commercial uses will be located on ground, first and second floor levels, with the exception of plots 06 and 15. The total net area of commercial facilities is approximately 19,000m^2.

Figure 4.13 Illustrative Plan of Hotel (in yellow), Retail Zone (in orange) and Commercial Zone (in red) at Ground Floor Level (Top), First Floor Level (Middle) and Second Floor Level (Bottom).



4.4.4 *Landscaped Open Spaces*

The objective of the proposed landscaped open spaces within Eastside is to provide a new, vibrant destination on the eastern side of Gibraltar. These spaces will form the heart of the new development and reflect the Mediterranean environment in which Gibraltar is situated, as well as its heritage and history. The development's design and layout will provide a unique and interesting environment that is accessible to visitors, residents and users of the adjacent beaches and retail facilities.

The development incorporates four main landscaped open spaces and several other more contained public spaces.

The first major landscaped open space is located near the northern end of the site and is a focal point upon entry to the development. This landscaped open space links the major road through the site to the sea frontage, and creates a major outdoor passive and active recreation zone adjacent to a retail strip. This space also links through to the Eastern Beach precinct.

This space can act as a venue for the holding of cultural events, performances and ceremonies.

Near that landscaped park and adjacent to the Eastern Beach frontage are the sea water rock pools. These pools, incorporating a lap pool, will be surrounded by terracing, and will encourage active recreation in this locale. Another major space is located near the geographic centre of the development, and represents the heart of the development. The qualities of this space will be derived from three primary influences: the buildings bounding the space, the major landscape plaza located within the space, and the sea water swimming lagoon which bounds the space to the east.

The bounding buildings create focal points surrounding the space, and contain retail and hospitality functions at the ground level associated with outdoor dining spaces. Radiating from the road intersection within this space, the urban park creates a diagonal emphasis towards pathways leading along the sea wall to the south of the site.

The swimming lagoon creates a recreational focus to this space and a sense of connection to the Mediterranean by infiltrating water into the site.

At the south of the site, and overlooking Catalan Bay, is a landscaped plaza activated and enlivened by retail uses, and overlooked by apartments. That space provides a connection with, and continuity to, the Catalan Bay environment, and an infiltration of the qualities of that place into the development.

Linking all of those spaces will be the waterfront. The waterfront will be welcoming for pedestrians for its full length, activated by retail at times, the swimming lagoon in the centre of the site, and at other times passing by residential uses.

The landscaped open spaces are intended to act as clear foci within the site. Other open spaces are intended, by contrast, to assist in creating a distinct sense of place in different parts of the site. That sense of place will be derived from the particular opportunities afforded by topography, road alignments, building uses, shelter from wind and solar access. Those spaces include the plaza created at the entry to the hotel and just behind the apartment buildings being created on development plot 01, at the Catalan Bay end of the site. Views to the east across the Mediterranean and south to Catalan Bay will be available from this plaza, which will be the first point of arrival when entering the development from Catalan Bay Road at the southern end.

Semi-private landscaped gardens will be located between apartment buildings, and will link between Catalan Bay Road and the main development road.

Figure 4.14 illustrates the locations of the landscaped open space. The yellow colour indicates the primary open space zones of the waterfront, the swimming lagoon, the public park south of the Eastern Beach buildings, and the retail plaza facing Catalan Bay. The olive colour indicates open space bonding the buildings, and infiltrating between the main internal road and Catalan Bay Road to the west, and the waterfront to the east.

Figure 4.14 Landscaped Open Spaces

4.4.5 *Car Parking*

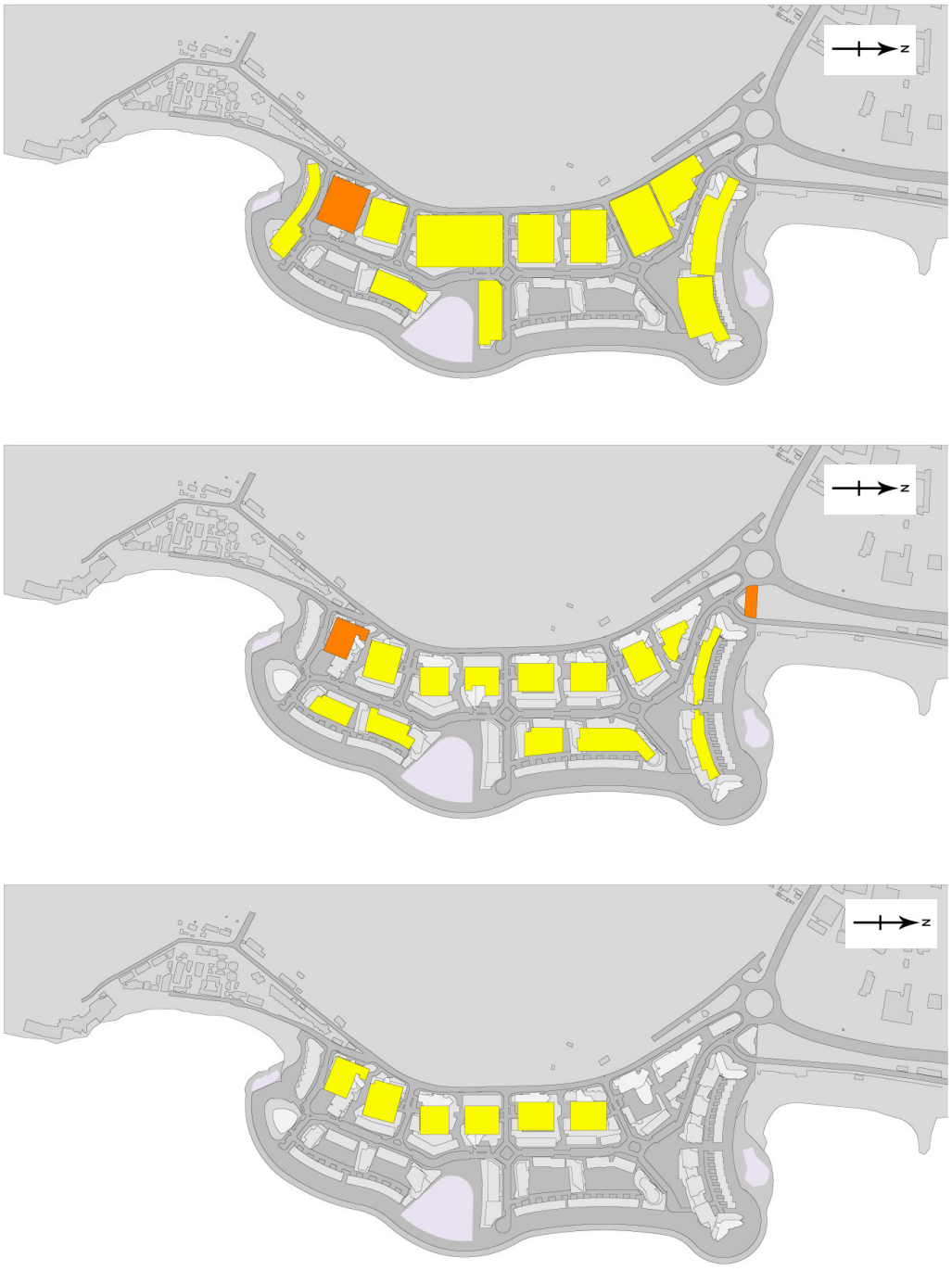
Eastside will provide car parking for commercial and retail premises, private parking for residents, parking for the hotel staff and guests, and parking for the public. Figure 4.15 (overleaf) indicates the location of public car parking in orange, and car parking associated with the residential, commercial, retail and hotel uses in yellow.

There are likely to be around 2,665 parking bays available for residents. This figure assumes that Eastside will provide just over one parking bay per apartment for residents. On-street parking for retail, commercial and visitors will also be provided.

Up to 500 public car parking spaces will be made available - 250 at the southern and 250 at the northern end of the site. Whilst the 250 spaces at the southern end of the site are within the application site boundary, those at the northern end are outwith the boundary and it is understood that these will be provided by GoG.

Car parking will be distributed on the basement, ground and first floors throughout the development.

Figure 4.15 Car Parking Areas at Basement Level (top), Ground Level (middle) and First Floor Level (bottom)



4.4.6 Landscape Strategy

The Landscape Masterplan (Figure 4.16 – overleaf) supports the integrated approach to urban planning and architectural design, providing unity and continuity that will contribute significantly to the overall success of Eastside.

The unique location of this development, at the foot of the Rock and with the Mediterranean on the other three sides, requires an appropriate landscape strategy to suit this setting.

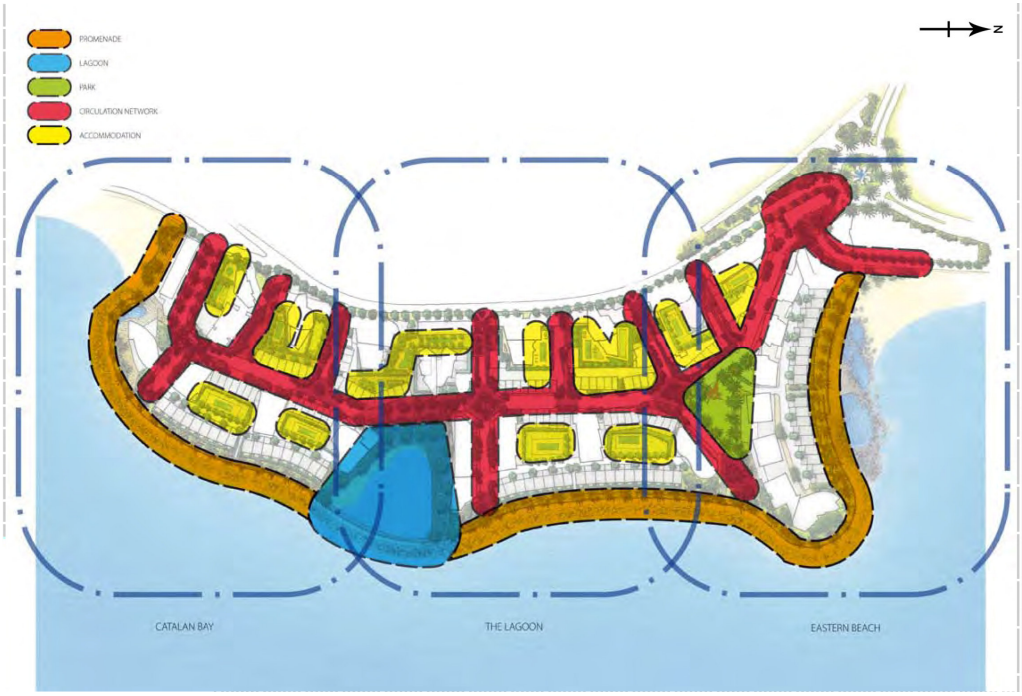
Whilst the overall character of the landscape treatment will be consistent, the intent is to create five precincts that will be treated in a manner that produces individual identities for each precinct. The identity will be formed by quality hard and soft landscape components, especially at node locations within the site.

Within the precincts will be a series of situations and spaces that will provide identity to the development. For example, nodal punctuations such as key roundabouts and squares create opportunities for structured landscapes, reinforcing the spatial qualities of those public spaces. Lineal features such as the foreshore promenade suggest an approach which reinforces the sense of connectivity. Open spaces and alcoves formed by the voids between buildings will allow lush protected gardens to prosper. Incidental spaces along roadways, paths and in open spaces create an opportunity for groupings, or copses, of trees for strength and protection from the wind. These tree groups will, however, be designed with selected species and in such a way as to avoid attracting roosting birds, in accordance with he proposed Bird Management Plan (see Section 4.4.7). Interwoven throughout the development are a number of smaller links and nodes that form a network of permeable open spaces that embellish and enrich the urban fabric.

Figure 4.16 Landscape Masterplan

The five precincts, formed by their spatial characteristics and uses, are illustrated in Figure 4.17 and described below.

Figure 4.17 Landscape Precincts



Precinct 1: Promenade.

The three metre wide promenade with a further eight metre wide safety zone on the sea side forms the interface with the Mediterranean and the land reclamation. Given the exposure of this precinct to the harsh climatic and sea influences on the planting and hard landscape, materials are designed in an elegant manner to be robust and hardy. The promenade flows around the site allowing visual and physical connection to the sea side and inland.

Precinct 2: Central Spine and Circulation Network

This precinct, in a hierarchical expression, ties the site together (along with the promenade). It commences at the northern entry, and flows to the south-east. Whilst the central spine road is the main movement thread to this precinct, it is manifested in a series of short offset runs. The treatment of the streetscape is by way of irregular massing of plantings with a series of plazas and squares to create a village atmosphere. Running off the central spine are alternative road and pedestrian ways that allow east-west permeability throughout the site. The pedestrian walks feature a series of plazas, water features and steps designed to provide maximum meeting and interaction possibilities.

Precinct 3: Accommodation

A series of townhouses and apartments are clustered off the central spine precinct. Within each cluster of accommodation there are areas of private parkland, with central areas being on structures above car parking. This includes private pools, gardens, lawns and paved areas, and communal facilities.

Precinct 4: Lagoon

This centrally located landscaped space features a large, irregularly shaped pool, approximately 85 metres by 85 metres in size, with beaches, café, boardwalks, plaza and

Town Square connecting to the cafés and restaurants to the west. The design of this space forms the heart of the development, and ties into the promenade and central spine precincts.

Precinct 5: Central Park

This park is strategically located at the northern entry to the site, and is surrounded by cafés and residential uses. The park directly connects to the promenade and central spine. The central park forms the symbolic "green" heart of the development, and allows for passive uses or acts as a meeting space for special ceremonial occasions or public events.

Site Wide Landscape Treatments

Within each of these Precincts are a series of soft and hard landscape treatments. Underlying these treatments is the aim of ensuring environmental sustainability. For the soft landscape the plantings will be informal and influenced by the harsh environmental conditions of strong, salt laden winds and compacted soil conditions.

The hard landscape treatments will build from their context and respond to the intended future uses. The treatments will provide an overall theme for the landscaped spaces and private realm whilst exhibiting a Precinct specific character. Urban Art will be encouraged throughout the development and will build upon the history and location of the area. The intention is to work with the local community to develop an Art Strategy that will allow for the provision of appropriate artwork.

Furniture such as bollards, seats, bins, and lighting will form an overall site wide theme that is unique to this development.

A series of water features will be strategically located throughout the precincts (particularly Precinct 1 Promenade, Precinct 2 Central Spine, Precinct 4 Lagoon and Precinct 5 Central Park).

Planting Palette

Given the climatic and site conditions and to ensure sustainability, a site-specific planting palette will be derived. In formulating the palette it is important to select vegetation that not only fulfils the objectives already stated but to ensure that plants do not attract or create a roosting habitat for birds that could impact on the operations of the airport to the immediate north. The final planting palette should be agreed with the Bird Management Unit responsible for the Bird Strike Risk Assessment (see Appendix J).

Four categories of planting could be selected.

Nodal Trees: proposed species include Canary Island and Washingtonia Palms. These palms will provide a dramatic signature to the development whilst being able to withstand the harsh coast environment. The palms will run along the Promenade, be at strategic locations in the Central Spine and at key roundabouts as well as in the Parklands and at the Lagoon Precinct.

Specimen trees will include fig trees *(Ficus carica* and *F. macrophylla)* at key intersections, and angopheras *(Angophera spp)* and eucalypts *(Eucalyptus spp)*, planted individually, or in copses. These plants will occur throughout the development in locations such as along the east / west pedestrian spines, on and around the podiums and buildings within the Accommodation Precinct and scattered elsewhere throughout the development. The focal Dragons Blood tree *(Dracaena draco)* will be complemented in planting beds by other structural shrub species.

Mediterranean Groves will consist of plants such as rata *(Metrosideros spp)*, oak *(Quercus spp)*, celtis *(Celtis spp)* and olive *(Olea spp)* and will occur in groves along the Central Spine roadway.

Shrubs will include hardy plants such as the colourful oleander *(Oleander spp)* and Bird of Paradise plant *(Strelitzia spp)*, supported by the more structural cycad *(Cycad spp)*, aloe *(Aloe*

spp), agave *(Agave spp)* and yucca *(Yucca spp)*. The plantings will occur throughout the whole development to provide colour, privacy and amenity. Shrubs will be supplemented by climbers such as bougainvillea *(Bougainvillea spp)* to provide stunning vertical colour and to provide cover to shade structures and built form.

Due the exposed nature of the site, these planting categories will be supported by hardy vegetation, indigenous to Gibraltar including: bay tree *(Laurus nobilis)*, dwarf fan palm *(Chamerops humilis)*, Bush Germander *(Teucrium fruticans)* Rock Rose *(Cistus albidus)*, ephedra *(Ephedra fragilis)* and Esparto grass *(Stipa tenacissima)*.

The areas associated with the traffic roundabout and main entrance road, leading to a landscaped square, will be treated as a 'gateway' to the project.

Lighting will be an important component of the landscape strategy and design. An innovative lighting design will enhance the appearance of soft and hard landscape in general and highlight specific features such as building facades, ornamental pools and fountains, paved areas, planting and public art.

4.4.7 *Bird Management Design*

The Town Planner's Scoping Opinion (Appendix A) referred to the proximity of the site to the airport as an important consideration, particularly in relation to the potential increases in bird strike hazards. The site is in close proximity to the 27 runway at RAF Gibraltar, and it is very important that the development does not result in increased bird strike risk for the airport.

A Bird Strike Risk Assessment was therefore undertaken to assess the main bird management issues during the construction and operational phases of the scheme (see to Appendix J '*Bird Strike Risk Assessment*). The results of this assessment have been used to make recommendations to design out structures and resources that are attractive to birds wherever possible, and will inform a proposed Bird Management Plan (BMP) which will be produced and agreed before any work starts on site.

Proposals to be implemented to reduce the risk of increased bird strike to a minimum during the design, construction and operational phases are highlighted below.

Design Considerations

The potential for attractants to hazardous species of birds will be considered at the detailed design stage and will be designed out to minimise the risk of increased bird strike. Measures will include:

- Designing out, wherever possible, structures and elements that are attractive to priority group species, including flat roofs, protruding roof structures, covered ledges, recesses etc.
- Selecting amenity planting so that it avoids attractive roosting or breeding opportunities;
- Not creating open, freshwater habitats that attract bird species;
- Profiling the footprint of the development to minimise the possibility of rainwater pooling;
- Designing rainwater runoff management and irrigation systems to ensure there is no exploitable freshwater capable of attracting hazardous bird species; and
- Specifying bins with self-closing lids.

Construction Phase Considerations

During the remediation phase, the BMP will ensure that no hazardous birds are allowed to gather on site. Control will be by means such as a bird distress call player to discourage pre-roosting and roosting birds. Active control of birds will be carried out in the full knowledge of the Bird Control Unit (BCU) at RAF Gibraltar, and any control will be reported to the BCU prior to commencement.

During building construction phase the BMP will be maintained. The construction site will be actively managed at all times in order to reduce to a minimum any potential attractants to hazardous birds. Measures will include:

- Proofing roof structures and ledges to deny perching opportunities to hazardous bird species;
- Implementing measures to reduce exploitable resources by feral pigeons, including minimising covered platforms, fitting bins with self-closing lids and ensuring waste is removed regularly; and
- Minimising fresh water, food waste and shelter that could attract unwanted bird species.

Operation Phase Considerations

The successful implementation of design aspects during detailed design and the construction phase will effectively dissuade usage by hazardous bird species, and will ensure that the BMP is less onerous in ensuring that bird strike risk is effectively controlled at a satisfactory level during the operational phase. The BMP will be operated in full consultation with the BCU at RAF Gibraltar.

4.4.8 *Utilities and Services:*

The new on site services and utility infrastructure will be connected to the public / government services infrastructure along the site boundary. The Government will upgrade the off site services in a manner sufficient to accommodate the requirements of the new proposed scheme.

4.4.9 *Utilities and Services: Power Supply*

The intention is to provide a high voltage supply which will be fed from the Eastside Distribution Centre. The electrical supply will be provided via high voltage ring circuits to various sub-stations situated in buildings within the development. Low voltage power will be distributed across the site from the sub-stations for residential and commercial buildings, street lighting, signage, and ancillary public power supplies.

4.4.10 *Utilities and Services: Internal Road Network*

Five access points to the Eastside site are envisaged (see Figure 4.18 – public roads are shown in red, the central main street in orange, secondary linking roads in yellow and car park access roads in pale yellow). All access points will be available for use by residents and visitors to the development.

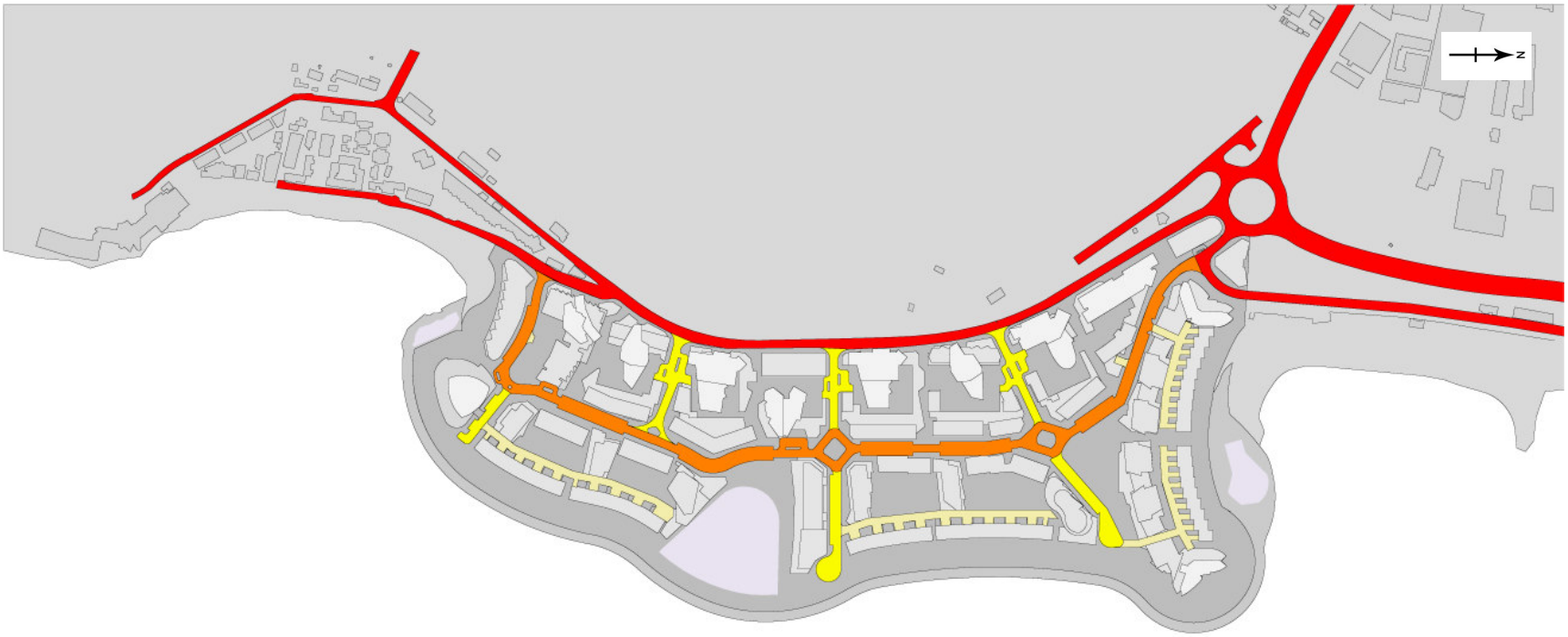
The externally located northern roundabout junction will perform the function of the primary access and gateway to the site. It will be the first access point for visitors approaching the site from the north and will provide access to the landscaped open spaces, retail and commercial outlets, and public car parking at the northern end of the site.

The southern junction, off Catalan Bay Road, will perform the function of the secondary access since it allows access to landscaped open spaces, retail and commercial outlets, and public car parking at the southern end of the site.

The three access points between development plots 04 and 05, 06 and 09 and between development plots 10 and 11 will be used mainly by residents living in these areas of the Eastside site.

All turning areas will be designed to cater for the following vehicles: fire engines, fire tenders, 12m hydraulic inspection platform, 9m refuse collection vehicles, 9.35m removal van, 10.5m bus, 15m luxury coach and 10m FTA HG rigid lorry.

Figure 4.18 Illustrative Internal Road Network



4.4.11 *Utilities and Services: Lighting*

The entire Eastside site will be illuminated in accordance with British Standard 5489, parts 1-9 and CIE 150-2003. Road lighting will be to an adoptable standard.

All luminaries will be individually fitted with photocells and will have a zero upward light component. The marina areas will have feature, decorative and accent lighting.

4.4.12 *Utilities and Services: Water Supply*

Water supplies for Eastside will be based on an underground ring distribution system taken from the main utility supply mains. The system will provide water for the entire Eastside development including all the apartment blocks, hotel, retail and commercial facilities, and all water using appliances such as washdown points, supplies to mechanical plant and equipment.

There will be two separate main water supplies systems: a potable water supply providing water for domestic, drinking and secondary non-potable systems, and a sea water supply which will be used for toilet flushing of WC's and urinals and for fire hydrants and sprinklers.

4.4.13 *Utilities and Services: Foul Water Drainage*

The foul water drainage system will be routed via gravity to connect to the main foul water system routed within the main access roads, from where the effluent will be pumped to the GOG main foul water pumping station. Standby diesel powered generators will be provided for each pumping station to back up the primary supplies.

4.4.14 *Utilities and Services: Surface / Storm Water Drainage*

Surface water and storm water will be routed by gravity to flow to discharge into the sea via petrol/oil interceptors positioned as necessary for pollution control.

4.5 Development Programme

This section of the ES describes the possible development programme for Eastside.

At this stage, accurate projections of timescale cannot be made. The information provides an example of the likely timescales associated with the development based on previous experience of similar projects.

The intention is to develop the scheme continuously in stages, from the south to the north of the site. In summary, recycling of the rubble mound and marine reclamation works will create the basic land platform in the southern part of the site to allow property development behind. Afterwards, additional recycling, grading and marine works will create the basic infrastructure in the northern part of the site to allow property development behind.

It is anticipated that construction will progress as a number of distinct construction sites, as identified in Figure 4.7.

An indicative construction programme for the development of Eastside has been produced (see Table 4.1 overleaf). It is based on estimated construction durations (in months) and quarterly start and finish dates (i.e. Q1 = January to March, Q2 = April to June, Q3 = July to September, and Q4 = October to December).

Since the actual programme cannot be accurately predicted at the time of preparing this ES, the programme has been devised to inform the EIA process only and should not be considered to provide fixed dates for the development.

Table 4.1 Indicative Construction Programme

Construction Element	Approx. Duration	Approx. Start Date	Approx. Finish Date
Marine Works	24 months	Q1 2008	Q1 2010
Land reclamation	24 months	Q1 2008	Q1 2010
Mound Recycling	16 months	Q1 2008	Q2 2009
Site infrastructure	16 months	Q1 2009	Q2 2010
Development Plot 1	21 months	Q1 2009	Q1 2011
DP 2A	20 months	Q2 2009	Q1 2011
DP 2B	20 months	Q3 2009	Q2 2011
DP 2C	19 months	Q4 2009	Q3 2011
DP 3	26 months	Q1 2010	Q2 2012
DP 4	31 months	Q2 2010	Q1 2013
DP 5	32 months	Q1 2011	Q1 2014
DP 6	35 months	Q2 2012	Q3 2015
DP 7	20 months	Q3 2012	Q2 2014
DP 8A	24 months	Q1 2013	Q1 2015
DP 8B	20 months	Q2 2013	Q1 2015
DP 9	32 months	Q1 2014	Q4 2016
DP 10	31 months	Q1 2015	Q4 2017
DP 11	32 months	Q4 2015	Q4 2018
DP 12	22 months	Q1 2016	Q1 2018
DP 13	26 months	Q3 2016	Q1 2019
DP 14	26 months	Q3 2017	Q4 2019
DP 15	25 months	Q2 2018	Q3 2020

4.6 Construction

This section of the ES describes the marine revetment and terrestrial construction activities for Eastside.

The information provides an example of the likely design, methods, materials, equipment, etc associated with the development based on previous experience of similar projects. The information should not be taken to represent definitive and fixed construction activities.

4.6.1 *Marine Works – Revetment Works*

Initial marine works will comprise construction of a revetment around the land reclamation area to provide edge protection against wave attack. The sea defences' design criteria will encompass both stability criteria and functional/operational requirements.

The design for an extreme return period event (1:100 year storm) will consider combinations of waves and water levels, including storm surge and sea level rise due to climate change over the design life of the structure. This will form the basis for the initial assessment of the structure's stability and any damage levels.

Additional functional criteria, will define lower acceptable limits for lesser return period events, such as maximum overtopping of seawater, to allow for safe access for pedestrians or vehicles to different areas within the development There will be operational constraints associated with these criteria (e.g. access to exposed areas may need to be closed during storm conditions greater than a 1:1 year storm).

The marine works will be designed to recognised and proven current codes, standards or regulations appropriate to the part of the Works, including seismic analysis and design in accordance with Eurocode 8.

At the time of writing this ES, precise construction methods cannot be confirmed, and these will be developed and agreed once the scheme has been designed in more detail. Experience of similar projects has been applied in order to inform the assessment. The key stages of the likely edge protection works are described in the following paragraphs.

Firstly, there would be dredging to create a trench for the marine structures if the upper layer of the seabed's substrate is not suitable as a foundation. This is necessary in order to comply with safety requirements related to earthquake imposed loads. To satisfy these requirements the loose surface sands will be dredged and subsequently replaced with crushed rock. Dredging will require a trailing suction hopper dredger (TSHD) and / or a backhoe dredger.

Secondly, quarry run rock will be placed to create the core of the revetment. There is likely to be a transition level between -3mOD and -4mOD below which rock will be placed and shaped with marine equipment (i.e. a backhoe dredger and side stone dumping vessel (SSDV; see Figure 4.19) and above which rock will be placed and shaped with land-based equipment (e.g. hydraulic excavators and wheel loaders - see Figure 4.19).

Thirdly, the revetment core will be covered by a selection of rock grades to provide filter layers, under layers and armour layers. As for the revetment core, there will be a transition level below which materials will be placed and shaped with marine equipment and above which rock will be placed and shaped with land-based equipment.

Fourthly, a backhoe dredger will be used to place rock of 1-3 tonnes at the toe of the revetment and to finalise the shape, slopes and levels of the revetment.

Fifthly, pre-cast concrete armour units will be placed around the revetment subject to significant wave attack. Where possible the concrete armour units will be placed with a crawler crane working on top of the revetment. A flat top pontoon will supply the concrete armour units. The crane on top of the revetment will take the concrete elements one by one from the flat top pontoon and place them directly into the final position on the revetment.

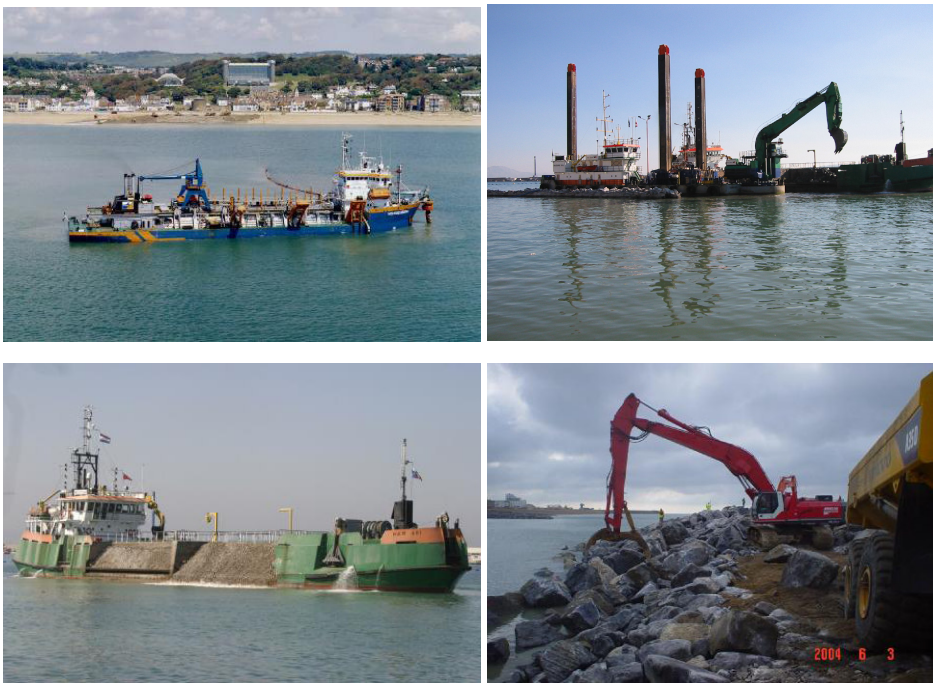
In cases where placement with a crawler crane from the top of the revetment is not possible, the concrete armour units will be placed with a backhoe dredger.

The concrete armour units may comprise the following types:

- Accropodes of 6.3m³ (approx. 15 ton per unit);
- Cubes of 1.5 x 2.0 x 2.5m (approx. 18 ton per unit); and
- Cubes of 2.05 x 2.05 x 2.05m (approx. 21 ton per unit).

Finally, the inside edge of the revetment will be lined by a geotextile using long-reach excavators. Sections of geotextile will be weighed down by rocks and will overlap. At this point in the construction process, the revetment will be complete and ready to receive the fill material for land reclamation.

Figure 4.19 Marine Works Construction Equipment (clockwise from top left: TSHD, Backhoe Dredger, Hydraulic Excavator and SSDV)



4.6.2 *Marine Works – Land Reclamation Works*

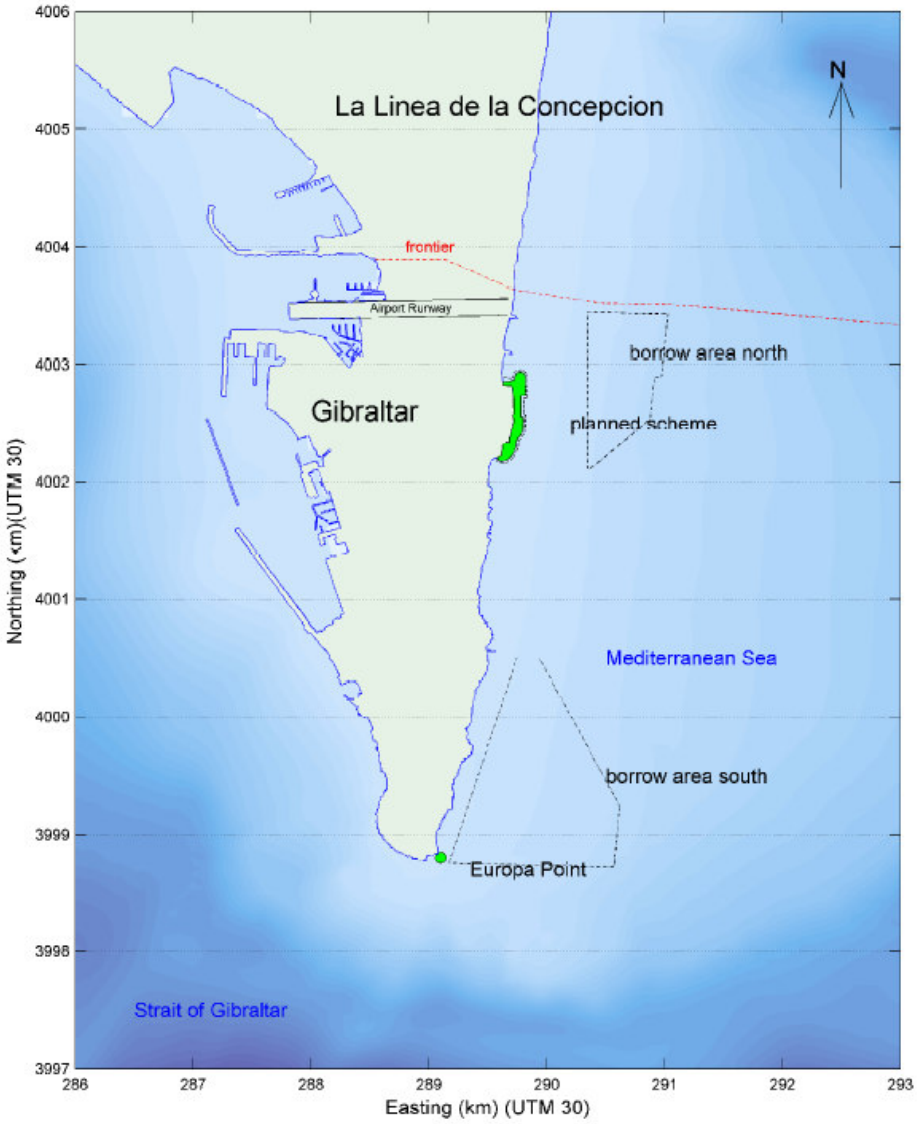
Land reclamation will require approximately 600,000m³ of fill material which would be dredged by a TSHD from one of two potential offshore borrow areas.

At the time of writing this ES, precise construction methods cannot be confirmed, and these will be developed and agreed once the scheme has been designed in more detail. Experience of similar projects has been applied in order to inform the assessment. The key stages of the likely land reclamation works are described in the following paragraphs.

Firstly, sand will be dredged from one of the two potential offshore borrow areas shown on Figure 4.20. The TSHD will sail to the relevant part of the borrow area to commence dredging. To start dredging, the draghead at the end of the suction pipe is lowered onto the seabed with a system of winches and gantries. A mix of sand and water will be sucked through the TSHD's draghead and the suction pipe and pumped into the hopper. Gravity causes the majority of the sand to settle in the hopper while the surplus of water flows out of the hopper through the overflow / underflow. During dredging the trail speed of the TSHD normally varies between 1 and 3 knots. Dredging will be stopped once the draught of the

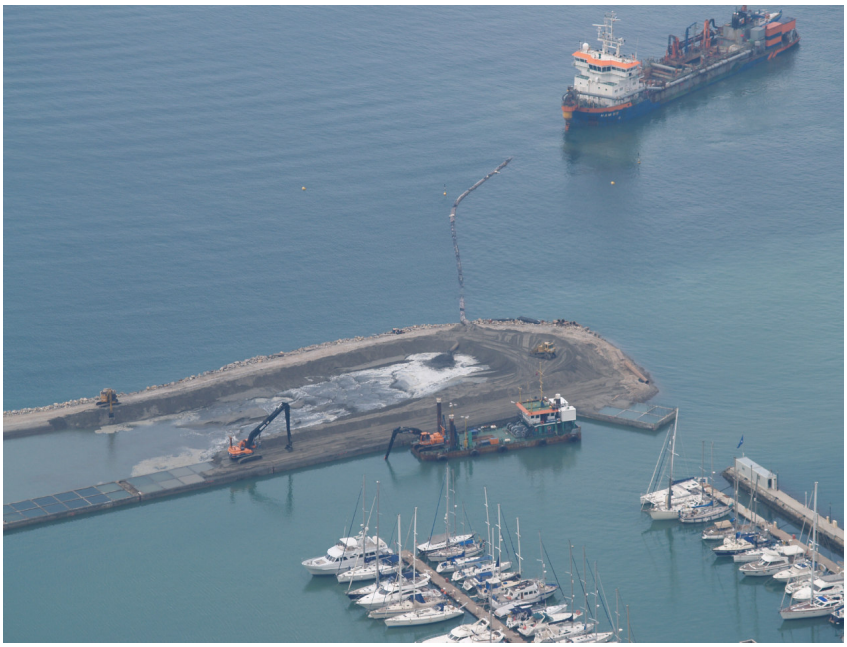
vessel reaches the optimum load-mark. The suction pipe is then hoisted on deck and the TSHD will sail to the reclamation area at Eastside.

Figure 4.20 Potential Borrow Areas for Fill Material



Secondly, sand will be pumped into the reclamation area. Depending on the TSHD to be deployed on this project, part of the reclamation area may be reclaimed by means of bottom dumping, whereby sand will be placed directly into the reclamation area. Alternatively, the reclamation will take place – particularly at shallower locations – by either pumping the sand through a pipeline system into the reclamation or by rainbowing it directly into the reclamation area. Figure 4.21 shows a TSHD reclaiming land at the Island Project at Queensway Quay marina on the west side of Gibraltar.

Figure 4.21 TSHD Filling a Reclamation Area



Finally, after initial placement, the sand will be compacted in order to achieve satisfactory fill compaction throughout its depth. Compaction is required to increase the strength parameters (i.e. angle of internal friction) of the fill material so as to increase its bearing capacity, to minimise possible differential settlements and liquefaction potential. Compaction will take place through a combination of high energy impact compaction with rotating cam-shaped, pentagonal steel drums and/or eccentric rollers and vibro-compaction (also known as vibro-floatation).

4.6.3 *Southern Land Construction*

The start of the construction process will require recycling of the land at the existing rubble tip to prepare the southern part of the site for subsequent construction works.

As part of the land recycling process, rubble tip materials will be inspected and separated into waste material (e.g. cables, plastics, metal objects, and contaminated materials) and material for reuse (e.g. inert rubble). Inspection of waste materials may include an on site laboratory to analyse the contents of materials for contaminants.

All waste materials, including those that are found to be contaminated, will be considered as unsuitable for reuse and will be loaded into trucks or barges and taken to an appropriate waste disposal facility.

It is anticipated that in excess of 80% of the excess materials will be fit for reuse as construction material. It may be necessary to process the materials before reuse.

Reuse material will be:

- General fill material;
- Rock/core in marine structures; and
- Foundation of vertical quay wall.

4.6.4 *Northern Land Construction*

Should all recycling not be carried out at the start of the project during the southern land remediation, the next stage of the construction works would be the recycling of the land at

the existing rubble tip to prepare the northern part of the site for subsequent construction works.

Initially, there would be demolition of buildings and structures within the Eastside development site. In other respects, the key stages of the land recycling works would be similar to the southern land remediation works.

4.6.5 Southern Building Works

The following paragraphs describe the expected construction methods for the buildings, some of which incorporate retail units and car parks, and relate to construction activities in the southern part of the site. It is anticipated that the hotel will be constructed using the same basic methodology.

At the time of writing, the construction sequence is expected to include the following key construction stages:

- Firstly, establishing the building construction platform through ground levelling and excavation works and the formation of the building foundations and basement structures which is likely to require piling;
- Secondly, construction and erection of the building frame and structure; and
- Thirdly, construction of the roof, external facades and internal finishes of the buildings, as well as the adjacent hard and soft landscaping.

Once the land remediation and marine works have prepared the development plots, there would be a rolling programme of building construction. At peak construction activity, the construction programme could require four buildings being constructed in the ground (i.e. foundations), four buildings having structure in progress, and four buildings in the finishing stages.

In addition to the buildings, there would be the finishing touches to the northern part of the site including works for the final surfacing of internal road layout, the provision of lighting, signposts and street furniture, and landscaping.

4.6.6 Northern Building Works

The key stages of the construction works will be similar to the description given for the southern building works.

The construction sequence is likely to include the following key construction stages:

- Firstly, establishing the building construction platform through ground levelling and excavation works and the formation of the building foundations and basement structures;
- Secondly, construction and erection of the building frame and structure; and
- Thirdly, construction of the roof, external facades and internal finishes of the buildings, as well as the adjacent hard and soft landscaping.

4.6.7 Utilities Works

It is anticipated that the installation of new on site utilities (see Sections 4.4.8 – 4.4.14) will take place early on in the overall development programme to provide services such as water supply, sewerage, power, telecommunications etc. to the development. The new services will be linked with Gibraltar's existing infrastructure.

4.6.8 Construction Traffic Estimation

For the purposes of the EIA process, it has been assumed that the bulk of the construction materials and plant required for the land reclamation works will be imported by sea.

It has also been assumed that the bulk of the construction materials and plant required for constructing the buildings and associated infrastructure will be imported by road. Based on the rolling programme of buildings construction, Table 4.2 summarises the numbers of road

traffic deliveries to site that have been identified based on previous experience of similar construction projects.

Table 4.2 Peak Road Traffic Estimation

Building Construction Stage	Number of Buildings	Vehicles per Building per Day	Total Vehicles per Day	Total Vehicles per Month
Starting	4	20	80	1760
Structure	4	30	120	2640
Finishing	4	15	60	1320
Total	12	65	260	5720

Based on the descriptions of the construction works, Table 4.2 presents an estimation of the peak road traffic generated by construction of Eastside in terms of vehicle type and journeys to and from the development site. It is acknowledged that some degree of uncertainty exists concerning the actual vehicle type and journeys that will take place; however, the estimations provide the best predictions of the future based on experience of similar developments.

It should also be noted that due to the large extent of the site, a number of vehicles will be site-based and will be used to move materials across the site and compound area. The above figures are therefore considered to represent a worst case scenario of construction trips on the local highway.

4.7 Operation

4.7.1 Operation Phase Management

To provide for the future maintenance of the site and structures post occupation, two separate management plans will be set up - one to manage the development/estate as a whole, i.e. all areas shared by the residents of and visitors to the development, and one to ensure the correct management of the buildings and their internal mechanisms.

The Estate Management Plan, to which all of the occupants of the development would contribute, will ensure the correct and proper maintenance of the common areas used by all of the occupants of the development. This will include roads and footpaths, the promenade and all hard and soft landscaping (planting), the common swimming pools such as the lagoon and rock pool and all on site services and utilities serving the individual buildings.

An Estate Management Team would be responsible for ensuring the proper use of these common areas and for the security of the development, drawing up a set of rules/code of conduct for use of the public realm. These would include use of the landscaped open spaces, the promenade during inclement weather and the roads, to ensure a safe environment. Whilst public access will be encouraged to nominated areas within the development, the Estate Management Team would retain the right to restrict public access at its discretion.

The Building Management Plan would be tailored to suit each building on site and each development plot, be they low rise town houses or high rise apartment buildings. The Building Management Plan would cover the maintenance of the building and its related facilities only and would hence be contributed to by the occupants of the building. Undercover parking, waste management, window cleaning, common pool and landscaped podiums and the cleaning and maintenance of the building interior and its equipment, such as lifts etc. would fall under this regime, as would building security and access.

All buildings would be managed in such a way as to only allow access to occupants and expected visitors.

4.7.2 Operation Phase: Maintenance of Revetment Structures

No long term maintenance is envisaged over the design life of the revetment structures. Good practice, however, dictates that a visual inspection is carried out after any major storm or impact by any vessels, to ensure that there has been no movement of the Accropodes and rocks forming the revetment structure.

The crest wave wall should also be visually inspected at regular intervals, as should all surface water drainage outlets located on the promenade, discharging any sea water/spray back to the seaward side of the wave wall.

If there has been any significant movement of the Accropodes or rocks forming the revetment structure, these should be relocated to their original position if deemed necessary.

4.8 Sustainable Development

Eastside provides an opportunity to introduce sustainable construction principles and design standards in terms of construction materials, building orientation, insulation, energy conservation through solar gain, natural ventilation, waste water recovery, etc.

Sustainable development is something that both the Applicant and the architect are particularly committed to. It has played a critical role throughout the early design stages of this project and will continue during the subsequent detailed design stages for the buildings.

To date, sustainable development principles have been integrated into the construction and design of Eastside in the ways described in the following paragraphs.

4.8.1 Selection and Transport of Construction Materials

Sustainable construction is related to consumption of non-renewable resources for construction materials and consumption of fossil fuels for transport energy. Energy consumption is often considered as embodied energy and can be related directly to construction materials. Embodied energy provides a measure of the energy consumed during the entire lifecycle of a construction material, including the energy required during pre-construction (e.g. raw material extraction and processing and transport), construction (e.g. installation and maintenance) and post-construction (e.g. reuse or recycling and disposal).

The embodied energy incurred during pre-construction of a construction material's lifecycle, typically takes the form of fossil fuel consumption. Energy is consumed during the extraction of minerals and other raw materials and during processing to produce materials such as rock, sand, concrete, steel, bricks, cement, glass, etc.

Eastside will require large quantities of rock, sand and concrete to construct the reclamation areas and breakwaters. Rock and sand generally require little or no processing before they can be used in construction. For example, quarry run rock will undergo no processing to remove small pieces of rock if no particular rock size is specified, while sand will be dredged and pumped directly into the reclamation areas. Less processing means that the embodied energy of sand and rock is generally low compared to the concrete that will be required to construct the reclamation areas and breakwaters.

However, it is not sufficient to simply compare the embodied energy of construction materials in order to decide which is the most sustainable. For example, after extraction and processing, the embodied energy of concrete will be higher than the embodied energy of rock. However, smaller quantities of concrete may be sufficient to perform in the same way as higher quantities of rock for Eastside's defences because concrete armour units can be piled at steeper slope angles (requiring less volume) than rock.

The embodied energy of the principal construction materials for Eastside's reclamation areas and seawalls (particularly sand and rock) comprises low amounts of energy during extraction

and processing, and negligible amounts post-construction (Masters, 2001). Therefore, energy consumption is dominated by transport of large quantities of construction materials, which increases rapidly with weight and distance travelled. The transport of construction materials between each of the lifecycle stages consumes energy through fuel consumption. Since energy consumption during the post-construction lifecycle of construction materials used in coastal structures is negligible the sustainable performance of constructing Eastside's reclamation areas and seawalls can be improved by reducing the energy consumed by transporting materials.

Transport contributes to global environmental issues such as climate change and fossil fuel depletion, and local environmental issues such as transport pollution and congestion. The importance of transport relates to the distance travelled, weight of materials, and the transport method.

To minimise transport distances, locally sourced materials will be used for Eastside.

Although fill material for the revetment and land reclamation can be sourced from the marine waters in Gibraltar's territorial waters, many other raw materials for construction (e.g. rock, concrete components, steel, glass, internal fittings, etc) will have to be imported. Given this situation, local sources of construction materials may include Spain and Morocco.

Transport energy intensities are the same for all construction materials but different for transport methods: 0.00039GJ/t.km km for transport by ship, 0.00094 GJ/t.km km for transport by rail, and 0.00102 GJ/t.km km for transport by road (based on a 25+ tonnes rigid truck) (derived from Masters, 2001). Transport by ship is the least energy intensive and the most sustainable transport method for large volumes of construction materials. It consumes around 40% of the energy consumed by road transport. For Eastside, it is proposed that all key construction materials for reclamation areas and breakwaters (i.e. sand, rock and concrete) will be transported to site by ship.

Trucks can be the most energy intensive transport method. Larger truck sizes (e.g. 25 tonnes) consume less energy than small truck sizes (e.g. 5 tonnes) if sufficient construction materials to fill larger trucks are being transported. For Eastside, it is likely that a large proportion of the construction materials for the buildings will be transported to site by road. If this is the case, the appointed contractor will be encouraged to utilise larger trucks to reduce transport energy consumption.

4.8.2 *Reuse and Recycling of Waste Materials for Construction*

Where practicable and practical, waste materials will be reused and/or recycled. For example, it is anticipated that approximately 80% of the building and demolition rubble material resulting from the recycling and levelling of the existing area of reclamation can be reused in the works. Accordingly, it is proposed that suitable excess rubble will be re-used to fill the reclamation areas and seawalls. This approach has the potential to reduce the use of non-renewable marine aggregate resources and offset unnecessary waste disposal.

4.8.3 *Landscaping*

Where feasible and realistic, plants and hard materials will be sourced locally and /or provided from sustainable sources.

4.8.4 *Design*

The essential focus within the building design is on creating buildings that have better performance with less impact on the environment. That is done by undertaking sustainable design which aims to reduce the demand for energy, water and resources in the design and operation of the building and then, having done that, to assess the feasibility of substituting alternative sources of power to supply sustainable energy.

Much of that design is detailed, and occurs after planning approval has been granted. Relevant, however, for the conceptual design phase of a project are locational and

orientation considerations, and the manner of response of the building facades to those influences.

The Eastside development has therefore benefited from careful consideration of those influences. Buildings are predominantly oriented along an east-west axis, which means that the majority of apartments face south, towards the sun. As indicated in Figures 4.9 and 4.10, a significant proportion of apartments have dual aspect, which provides through ventilation and dual orientation.

The location of the buildings seeks to maximise distance between them, and step the building alignment, so as to optimise daylight and sunlight access, and availability of breezes.

The dual aspect nature of many of the buildings also means that they can be naturally ventilated, reducing the need for mechanical systems.

Potable water is a precious commodity in Gibraltar and its preservation is of particular importance. Sea water will be used where possible in a number of ways, such as the flushing of toilets, and with fire sprinkler systems to avoid wastage of potable water, while at the same time, rainwater will be collected from roofs etc. and where practicable, re-used for the watering of landscaped areas.

With regard to carbon emissions, the specifications for some design aspects of Eastside could include a requirement for the construction contractor to identify design solutions that contribute to reduced carbon emissions and energy use, at least in terms of capital cost, maintenance cost, design life, payback period and energy savings.

4.9 The Alternatives

The Regulations require that an ES should provide *"an outline of the main alternatives studied by the developer and an indication of the main reasons for his choice, taking into account the environmental effects."* The term '*main alternatives*' and the level of detail required in reporting them are not defined in either the Regulations or in other guidance documents.

For the purpose of this report, a main alternative has been interpreted as being a viable solution to the problem being considered, i.e. it must be economically and technically feasible. It must therefore:

- Fulfil the requirements of the project's original specification;
- Be operationally feasible; and
- Be capable of being constructed using practicable techniques.

A main alternative, if adopted instead of the preferred solution, would also change any significant effects identified for the preferred solution or would introduce its own significant effects.

4.9.1 Assessment of Alternatives

No alternative sites have been considered during the EIA process since, as explained in Chapter 1, the Eastside area was originally identified by GoG as the site for a major new land reclamation project and high quality development (GoG Department of Trade and Industry's 'The Gibraltar Development Plan 1991') and the Applicant's proposals relate specifically to this initiative.

The way in which this scheme developed and the alternative layout options that were considered as part of the design process is set out in Section 4.3.2.

4.10 Other Plans or Projects

This section describes the other plans or projects that are relevant to the EIA process for the purposes of assessing cumulative effects. At the time of scoping the EIA, only two plans or projects could be confirmed, namely:

- Beaches and coast protection works at Catalan Bay; and
- Both Worlds Development at Sandy Bay.

These schemes have been considered in the cumulative impacts assessment, as described in Section 2.4 of Chapter 2 'The EIA Process'.

No consideration is given to potential changes to border arrangements and/or the operation of Gibraltar airport as a result of the recently updated Airport Agreement 2006 between Gibraltarian, Spanish and British authorities because no details were available to Halcrow at the time of writing of this ES.

4.10.1 Beaches and Coast Protection Works

This project is proposed by GoG and comprises a scheme to improve the existing beach at Catalan Bay. The basic elements of GoG's proposals include beach widening by nourishment and beach protection by a submerged breakwater structure.

At the time of preparing the ES, a confirmed design and programme for the beach improvement work was not available and therefore cumulative impacts associated with this project could not be assessed.

4.10.2 Both Worlds Development, Sandy Bay

The Both Worlds Development is proposed by ABCO Ltd to take place at the southern end of Sandy Bay between the shoreline and Sir Herbert Miles Road. The development compromises some land reclamation and coast protection works to facilitate the construction of 65 two-, three- and four-bedroomed apartments, a swimming pool and 170 car parking spaces. The timescale for this project is not known at present but for the purpose of the EIA it is assumed that it is likely to take place prior to 2010.