2. Project Description

2.1 Introduction

This section provides a description of the proposed Project, which includes details relating to the need for and environmental benefits of the Project, the Project design and the layout, background information on the consideration of alternatives as well as indicative construction methods and tentative programme details.

Project information presented in this version of the EIA is based on the on-going initial schematic design which is considered as the best available information at the time of writing this EIA.

2.2 Project Background and Objectives

2.2.1 Ocean Park Corporation

OPC is a not-for-profit statutory body incorporated in Hong Kong under the Ocean Park Corporation Ordinance enacted in 1987. The Corporation's principal activity is to manage and control Ocean Park as a public recreational and educational park.

Mission of OPC is to provide all guests with memorable experiences that combine entertainment and education, while inspiring life-long learning and conservation advocacy. The Corporation's aim is to maintain a healthy financial status, while striving to deliver the highest standards of safety, animal care, products and guest service.

2.2.2 Project Background

With the opening of the Aqua City and Rainforest in 2011, and the completion of the Thrill Mountain and the Polar Adventure in 2012, OPC's Repositioning project has fulfilled its role as a distinctive milestone in the development history of the Hong Kong's home grown theme park. To establish a long term sustainability of Ocean Park beyond 2012, the next step is to evaluate the strategic expansion of the Ocean Park at the TSW with its mission to enhance the attractiveness of Ocean Park as a world class theme park and to provide a "must see" experience for visitors.

The facilities currently residing in TSW area includes Entrance/Exit Building, Aviary, Bird Paradise Pond, Flamingo Pond, Treasure Palace and the Middle Kingdom Restaurant, Public toilets and 11kv Electrical Sub-station. The TSW entrance has been temporarily closed since January 2011, and since then the main entry to the Ocean Park goes through the new main entrance plaza at Wong Chuk Hang.

The Project plans to have a Water Park together with related retail, dining and associated facilities. There are two planned hotel developments, namely Fisherman's Wharf Hotel and Spa Hotel. However, they are not considered as part of the current Project scheme. Presently there is no programme or any other information available for the hotel developments. A Market and Financial Analysis Report for the Project has been undertaken in May 2011. The analysis recommended the positioning, range of amenities and the optimum size of the Project. TFS for the proposed Project including a conceptual design was completed in June 2012 and project information outline was also prepared in March 2013.

The Project intends to be a standalone destination while enhancing the additional attendance to the Ocean Park. It will also serve as a "second gate" to the successful Ocean Park and draw visitation from both tourists and local resident market.

2.2.3 Project Objectives

The key objectives of the Project are to:

- Create a unique, world-class destination in aquatic leisure and entertainment in the subtropical city of Hong Kong
- Establish a long term sustainability of the Ocean Park and enhance the attraction to tourists as well as local residents
- Provide aquatic leisure with an indoor section housing the Winter Park and an outdoor Summer Park. The two areas will be operated as one gate, with the Summer Park used predominately during the warmer months while the Winter Park can operate all year round
- Incorporate environmental and sustainability measures throughout the entire life cycle of the development stages including planning, design, construction, operation and maintenance

2.3 Project Location and Site History

The TSW development area, i.e. the Project area, is located to the south-western side of Brick Hill facing the Aberdeen Channel. The Project area comprises predominately Park facilities and peripheral woodland, plantation and tall shrubland on hillside. **Figure 2.1** shows the proposed Project boundary.

Since the issuance of the EIA Study Brief (ESB-261/2013) in June 2013, the proposed Project Boundary has been revised as shown in **Figure 2.1** due to design changes. These changes have incorporated environmental friendly designs to minimise potential environmental impacts of the Project. Details of these design changes are discussed in **Section 2.7**. The proposed Project Boundary as shown in **Figure 2.1** demarcates the works limit. No construction works of the Project will be carried out outside this Project Boundary.

The existing TSW site was constructed in early 1990. The attractions at TSW, which had been operated as Middle Kingdom, Aviary, Flamingo Pond and Bird Paradise till January 2011, have been built on reclamation along the coastline.

2.4 Need of the Project

To accommodate the increasing visitor demand as indicated in **Table 2.1**, the Repositioning project has improved the park's facilities and attractions and elevated the park's tourism appeal. However, in achieving the long term sustainability of Ocean Park by enhancing its attractiveness and providing a "must see" experience of visitors, there is a further need to strategically redevelop the Ocean Park at TSW. To be located at the picturesque TSW, the Project will be a significant design statement for Hong Kong, as it will feature a translucent and sweeping roof, along with world class facilities and services. The Project will have state-of-the-art water rides, a variety of attractions, as well as unique and innovative experiences for locals and guests from around the world.

Table 2.1: Ocean Park Attendance (2008-2013) from Annual Report

Year	Ocean Park Attendance
2008-2009	over 4.8 million
2009-2010	about 5.1 million
2010-2011	nearly 5.9 million
2011-2012	about 7.1 million
2012-2013	over 7.7 million

Though the Project is a stand-alone development, it also serves to provide benefit and to draw additional attendance to the Park, which would complement the existing theme park by facilitating a longer length-of-stay for visitors.

The state-of-the-art indoor/outdoor Water Park shall have an instantaneous capacity of approximately 7,000 visitors and an estimated highest daily attendance of approximately 10,500 visitors. The all-season Water Park together with its retail, dining and entertainment areas will allow year round visits to the Ocean Park. The design will focus on the experience of visitors to ensure that there is a multitude of activities and fun for all ages. This provision of a mix of amenities and attractions will help encourage repeated attendance throughout the year. As a multi-gate offering (i.e. theme park and water park), OPC will encourage longer lengths of stay amongst visitors both in the Ocean Park and in Hong Kong, thereby elevating the destination market presence locally and throughout the region.

As the only local Water Park, this Project will cater to the needs and demands for such services from the local market, as well as offer the depth of tourism infrastructure that continues to make Hong Kong a desired destination. Countless memories and precious moments of the Hong Kong community were previously intertwined with Ocean Park's original Water World for years. The Project will provide a return of a place that the people of Hong Kong have missed, and a chance to create future lasting and fond memories.

In addition, the Project is expected to enrich the overall tourism appeal of Hong Kong and diversify tourist attraction. Given that visits to the Ocean Park are expected to be a full-day experience, it is estimated that the length of stay for non-local visitors will be extended by 0.75 day with the addition of the Water Park. The Project is projected to contribute significantly to the local economy and drastically stimulate industry growth – it is estimated to create 2,900 jobs, as well as generate HK$842 million in tourism growth, for the local economy. Furthermore, the proposed Project will be a new recreation destination for locals.

2.5 Scope of the Project

The Project will redevelop the existing theme park areas at TSW into a Water Park to enhance the attractiveness of Ocean Park into a world-class theme park and provide a must-see destination to the visitor. Artistic impressions of the preferred scheme for the Project are shown in **Figure 2.2** and **Figure 2.3**. The Project area, of approximately 6.63 ha, is expected to comprise of a series of platforms matching with the natural topography of TSW and will not involve any marine works. The Project can be largely categorised into the following parts:

- **An Indoor Zone –** water park with a wave pool, lazy river, play structure, water slides, surf-rider, various pools, food and beverage (F&B) facilities, electrical and mechanical (E&M) utilities, back of house and car-parking (refer to **Figure 2.4** for artistic impression of the indoor water park)

- **An Outdoor Zone –** water park with a wave pool, lazy river, water slides, ride platforms, various pools; 'sea turtle' exhibit; and some small-scale F&B facilities (refer to **Figure 2.5** for artistic impression of the outdoor water park)

- **General Approach Area –** coach and taxi drop-off point and Emergency Vehicular Access Road (EVA)

- **Sewerage Facilities –** sewage sump pit and twin above-ground rising mains of 150mm diameter each

The opening hours of the Water Park will be from 9 a.m. to 11 p.m. daily. The proposed Project layout plan of the preferred scheme is shown in **Figure 2.6**, which includes the various levels and major facilities as summarised in **Table 2.2**. Details of the level plan and vertical alignment can be found in **Figure 2.7**.

Table 2.2: Levels and Corresponding Major Facilities for the Project

Level	Major Facilities
Basement	• Parking • Mechanical and Electrical Plant (MEP)
Level 1	• Entrance and Ticketing Office • 'Sea Turtle' exhibit • Flamingo Pond • Interactive Water Element • Lobby • Changing rooms • F&B • Retail stores
Level 2	• Outdoor wave pool • Lazy rivers (indoor and outdoor) • Plunge pools for slides • Indoor surf rider • Slides
Level 3	• Indoor wave pool • Indoor play structure • Outdoor infinity pools • Outdoor spa pools • Outdoor activity pool
Platform Level	• Platforms of water slides • Mat racer platform • Water slides

2.6 Consideration of "Without Project" Alternative

The "without project" scenario considers the implications of the development works not occurring at the Project area. The Project has been conceived and designed to meet the needs as described in **Section 2.4**. If the Project were not to proceed, the need for the Project would not be met and the increasing visitor demand could not be entertained, hence missing the golden opportunity to provide an unique Water Park facility as a fresh local recreation, which would in turn compromise the opportunities to strengthen the

tourism industry and local employment rate in Hong Kong. As a result, the opportunity costs arising from the "without project" scenario could not be under-estimated.

The "without project" scenario therefore fails to meet the objectives of OPC to establish long-term sustainability of Ocean Park, to enhance the additional attendance to the Ocean Park and to cope with the possible overcrowding problem. Notwithstanding the environmental issue arise (but they are expected to be surmountable as detailed in this EIA study), consequential negative impacts are likely that the attraction of the Park would be significantly diminished.

2.7 Consideration of Alternative Development Options

At the TFS stage, an original Project scheme was developed (as presented in the Project Profile No. PP-486/2013). This original Project scheme is shown in **Appendix 2.1a** for reference. It was arranged in the original layout that: (1) a stand-alone structure located south-west of the site which incorporates a definitive indoor water park facility under a singular large span roof, and (2) a separate outdoor water park component linked at the north-east corner via a lazy river. The building form was adopted to achieve the maximum utilisation of space for major activities/function. A large 'clam shell-like' building structure thus resulted as the iconic feature in the original scheme.

The design concept for the Project has been improved to better blend with the natural environment. The overall design goal is to create a dynamic, striking Water Park deeply rooted into the natural surroundings and local site topography. Unlike traditional water parks, the preferred scheme aims to integrate the indoor, outdoor, entrance plaza, visitor's journey, rides, architecture and structure in a holistic response to the design brief. This scheme now takes good advantage of the existing slope conditions by locating ride platforms on or near the slopes to minimise the amount of structural support required. The building forms are an extension of the existing slope topography integrating the Water Park rides and spaces blurring the edges between indoor and outdoor zones as well as maximising views towards the bay. Cascading pools integrated with the natural surroundings thus result as an iconic feature in the preferred scheme, are shown in **Figure 2.2** and **Appendix 2.1b**.

Avoidance of environmental impact has been taken into account during consideration of alternatives for layout and design. Ecological concern is recognised for the Project, key ecological habitat has been scoped out at the initial stage of the development and due consideration was given for conservation of key ecological resource during the option development stage.

The preferred development option has many benefits from ecological perspective over other alternative options. For instance, in relation to habitat disturbance, the original design places the slides on both northern and southern side of the Project area affecting the natural habitat in both areas. It spreads the impact on natural habitat at different locations and affects the flora species of conservation concern *Artocorpus hypargyrues* and *Platycodon grandiflorus* on the southern side of the Project area. On the contrary, the preferred layout design limits the impact on natural habitat to the northern side only and will enhance the habitat at the southern side of the Project area for ardeid community. The difference between the two different schemes is presented in **Figure 2.8** whilst details of the ecological impact assessment are presented in **Chapter 10** Ecology Chapter.

Other than habitat loss, impact on the wild birds using the Project area is of ecological concern. It has been recognised that the roosting place of ardeid was mainly concentrated at the Flamingo Pond, therefore

preservation of the Flamingo Pond had been considered. However, as the Flamingo Pond is located on the flat area at the centre of the Project Site, keeping the pond in the original location will unavoidably move other building structures aside or uphill to hillside slope, which is not preferable from environmental and engineering perspective. Also, keeping the Flamingo Pond at the centre of the Project area (refer to **Figure 2.8**) will unlikely attract wildlife because of the high level of human activities nearby. Therefore, a more balanced approach adopted in the preferred layout is to relocate the Flamingo Pond to the southern side of the Project area, which is "isolated" from the main structure and park activities at the central and northern part of the Project area, as illustrated in **Figure 2.8**. This setting, together with enhanced vegetation near the pond, is considered to have higher potential to attract wild bird.

Overall speaking, the preferred layout option has taken into account the main ecological concerns arising from the Project and has been incorporated with appropriate design features which make it ecologically more preferable when compared to the original design. Such design features are summarised in **Table 2.3**.

Table 2.3: Summary of Layout and Design of Scheme Options Considered

Aspect	Original Scheme	Preferred scheme	Environmental Benefits / Dis-benefits
Footprint on hillside	Outdoor swimming pools sitting on the hillside; cut/excavation into the slope at the valley requiring clearance of natural habitat at both northern and southern side of the Project Site.	Swimming pools to be built on platforms supported by stilts; Make good use of the already developed areas (refer to Level 1 Plan presented in **Appendix 2.1b**); Establishing series of platform and applied to the relatively gentle slopes on the east, north-east and south-east which require clearance of natural habitat at northern side.	The need of large-scale slope works and subsequent loss of woodland/ shrubland in the periphery; the natural landscape and ecological environment are preserved as far as possible. The preferred scheme limits the clearance of natural habitat to the northern side of the Project area only and preserves the southern side as an enhancement area for wild bird use. Potential visual impacts are minimised in the preferred scheme.
Main Building Structure	Stand-alone structure located south-west of the site which incorporates a definitive indoor water park facility under a singular large span roof.	"Terrace" concept with cascading pools, which streamlines the artificial structure to match with hillside landscape	Visual impact of the indoor zone enclosure in the original design is more prominent and substantial. Lack of green and natural landscape to be integrated into the indoor and outdoor structures in the original scheme and hence low compatibility with the surroundings. The enclosure adopts extensive glazing which pose higher risk of bird collision. Preferred scheme reduces visual impact of the park with the hillscape and increased compatibility with the surroundings; minimised use of glazing which reduces bird collision risk and is a more bird friendly design
Flamingo Pond	Flamingo pond is located at the centre of the Water Park (near the entrance) next to the Indoor Zone building structure.	Flamingo pond is located at southern part of the site with separation from the main building structure.	<u>Compatibility with natural environment and favourable for wildlife</u> Original scheme – area around the Flamingo Pond can only provide very limited planting; its location (near the entrance) receives high degree of anthropogenic disturbance and highly

Aspect	Original Scheme	Preferred scheme	Environmental Benefits / Dis-benefits
			glazed building structure. The whole setting is not favourable for matching with natural environment and for wildlife use. Preferred scheme – large area of plants and vegetation available behind the pond; relatively undisturbed by anthropogenic activities by the Project. The setting is more compatible to natural environment and favourable for wildlife

2.7.1 Integration of Environmentally Friendly Features with the Design

With the selection of a more “natural” design scheme, a number of environmental friendly features have been incorporated into the current design. These include:

- Blending of the building structure with nature environment and preserving the natural landscape and topography with a series of cascading platforms positioned within the Brick Hill valley. The building forms an extension of the existing slope topography integrating the Water Park rides; spaces blurring the edges between indoor/ outdoor zones while maximising views towards the bay;
- The orientation of building has been positioned where building faces predominantly south-west to receive maximum daylight;
- Taking advantage of the existing slope conditions by locating ride platforms on or near the slope to minimise the amount of support structure required;
- Landscaping would permeate into the indoor and outdoor spaces, and the surrounding landscape emerging into the existing valley to minimise visual impact;
- Providing green roof and skylights to minimise reflection from roofing materials and blending into the existing hillscape. Reduced use of large glazing or transparent screening to minimise the risk of bird collision;
- Indoor area to be categorised into different thermal zones according to functional requirement to minimise the energy consumption;
- Adopting natural ventilation for the indoor Water Park area during summer with minimal mechanical ventilation to achieve both the thermal comfort and energy saving;
- Adopting heat exchangers for retrieving waste heat from the Air Conditioning System for pre-heating of hot water for general ablution and pool heating;
- Alternation to existing seawall and marine works have been avoided hence no impact on surrounding marine life;

- Adopting Building Information Modeling (BIM) facilitates a more efficient design and construction coordination and to avoid unforeseen clashes which subsequently generate abortive work and construction waste.

2.7.2 Further Environmentally Friendly Design Features

In addition to the above environmentally friendly features that have already been integrated with the design, the following extra design features will also be considered in the detailed design, construction and operation phases to further enhance the environmental performance of the Project:

- Selection of environmental friendly and sustainable building materials;
- Introducing rainwater harvesting system for recycling storm water on irrigation or cleaning purpose;
- Using renewable energy systems and energy efficient device, such as solar landscape lighting, lighting control management system, low energy consumption signs, low flow shower heads, dual flushing cisterns and co-generation/ tri-generation;
- For selection of mechanically efficient systems, the following measures for high energy efficiency will be used in HVAC system: evaporative cooling tower & gas absorption chiller, variable outside air quantity and economizer free cooling off system;
- Consideration of pre-bored rock socket steel H-piles for foundation which could generate less noise and vibration as well as impose least disruption to the terrain;
- Earth retaining structures and temporary cut slopes, and excavation lateral support system for pile caps to generate smaller volumes of excavated materials and balance the cut and fill volume in order to reduce any surplus earth material disposal and minimise waste management implications;
- Using electric vehicles for guest shuttle service and staff transportation subject to the development of available technology.

2.8 Consideration of Alternative Construction Methods and Work Sequences

In the course of planning the Project, OPC has confirmed that no reclamation, no hydraulic/marine work, no dredging and no seawall construction will be carried out under this Project.

The major construction activities involved in the Project are foundation works, site formation, slope stabilisation works, main building and superstructure construction and sewerage facilities. Comparison of alternative options for these construction activities are presented in **Table 2.4**:

Table 2.4: Summary of Alternative Construction Methods and Environmental Benefits / Dis-benefits

Construction Activity	Technical Requirements	Constraints	Environmental Benefit / Dis-benefit
Foundation Works Options			
Large diameter bored pile	Comparatively larger working spaces are required due to	May be susceptible to bulging or necking during pile	More Construction and Demolition (C&D) material will

Construction Activity	Technical Requirements	Constraints	Environmental Benefit / Dis-benefit
	larger piling plants. This pile type has the largest structural capacities to cater for lateral and vertical loads and less numbers of piles are required	concreting in unstable ground to the larger pile size	be generated comparing with driven H-piles
Pre-bored rock socket steel H-piles	Working spaces required are smaller and flexible to suit the design of the structures, relatively easy to overcome underground obstructions	May be susceptible to bulging or necking during pile concreting in unstable ground. Possible collapse of the annulus space (over-cut) between the side wall and temporary casing before pile concreting would reduce the skin friction. The design loading is smaller comparing with bored piles.	Generates less noise and vibration; Reduces disruption to the sloped and forested terrain; Less excavation and so reduces material disposal
Driven steel H-piles	Lower loading capacity leading to greater number of piles required. Smaller working space and flexible to suit the design of the structures	Higher ground borne vibration and movement induced from the driving operation, may cause damage to adjacent piles, structures and utilities installations. Pre-boring may be required to overcome underground obstructions and require longer construction period	Generates the greatest noise and vibration which may impact nearby noise sensitive receivers (NSRs)
Site Formation and Slope Stabilisation Options			
Earth retaining structures and temporary cut slopes	Requires working space for provision of temporary cut slopes and also slope stabilisation	Trees above slopes	Relatively small volumes of excavation are required in comparison with shallower angled permanent cuts, but thicker building walls (more concrete) are required as they are earth retaining structures.
Permanent cut slopes	Requires stabilisation of permanent cut slopes	Trees above slopes	Relatively large excavation volumes than for steeper temporary cuts for earth retaining structures. Thinner building walls (less concrete) required as not earth retaining.
Placement of fill in areas where proposed building structure is above existing ground level.	Compaction of fill	Suitable fill material required	Thicker building walls (more concrete) as walls earth retaining. May utilise cut material as fill.
Excavation lateral support system for pile caps	Excavations for pile caps may require temporary support where there is insufficient space for open cut. Options include sheet piling or temporary soil nails.	Construction duration will be increased due to the construction of ELS system	Excavation extent (and potential ground water ingress where occurs) is minimised by the use of temporary support methods such as sheet piles and soil nails.
Utilities, roadworks and landscaping	Conventional methods	No specific constraints	No difference
Disposal by trucks	None	Construction trucks may only leave the site through Sham	Potential increase in dust and road traffic noise impact to

Construction Activity	Technical Requirements	Constraints	Environmental Benefit / Dis-benefit
		Wan Road	adjacent air sensitive receivers (ASRs) / NSRs
Disposal by barges	Designated barging point required	Sloping seawall along coastline. Time required for approval of barging point by relevant government departments.	Potential water quality impacts from barge loading operations
Superstructure Options			
Conventional in-situ reinforced concrete construction	Simple construction method suitable for complicated structural form of structures, extensively adopted by local contractors	No specific constraints	More C&D waste will be generated compared to precast concrete. Noise generation due to concreting works
Precast concrete	Suitable for structures with standardised structures	Uneconomical if only a small number of units is required. Connection details may have to be specially designed and therefore expensive. Transportation of long units may be difficult	Less C&D waste will be generated. Construction of concrete panels is carried out off-site and potential environmental impact could be minimised
Steelwork	Fast construction and suitable for long span structures	The construction cost is generally more expensive than concrete, in particular for fire resistance and corrosion	Steel members are fabricated off-site and connected on-site, minimising potential environmental impacts

In the consideration of alternatives in sequences of works, concurrent construction sequence involves construction activities occurring at the same time. The environmental benefit of this would be the reduction of overall construction period and hence the duration of impact. The magnitude of the overall environmental impact could hence be larger but still within acceptable level as detailed in this EIA report. On the other hand, phased construction sequence involves construction activities being carried out one after another. This would reduce the magnitude of the overall impacts but prolong the construction period.

2.9 Selection of Preferred Scenario

Redevelopment of the existing theme park areas at TSW into a Water Park in-situ is preferred after consideration of the need of Project and the “without project” scenario (as presented in **Section 2.4** and **Section 2.6** respectively). It would not require further land acquisition and construction of the associated water and electrical, gas supply, and telecommunication resulting in a much lesser costs and would have less environmental impact on the already developed site. Re-provision in-situ would also have the added benefit of no additional requirements of exploiting other brownfield or greenfield sites which would otherwise have other beneficial societal uses, to serve the same purpose.

2.9.1 Development Options

As described in **Section 2.7**, the design concept for blending with the natural environment and optimisation of development option in environmental perspective has been adopted. The preferred scheme (shown in **Figure 2.6**) is thus the recommended option for the Project as it has minimised, and avoided whenever possible, environmental impacts in its layout and design of structures. The following summarises the key

environmental considerations that have been incorporated into the preferred scheme to improve the environmental performance of the Project.

2.9.1.1 Key Environmental Benefits

Given that the overall theme of the Project is to combine nature with water elements of the development, the Project has given great consideration in maximum utilisation of existing landscape features, including the topography and geographic location of the site. Key environmental benefits that will be generated from the Project include the following:

- Development of a Water Park with various landscape and amenity planting which enhance the environmental setting. Landscape and visual enhancement will be achieved via provision of new aesthetic structures that complement the surroundings.

- Greening and landscape elements will be incorporated at the roofs and platform structures to maximise the planting and landscape area.

2.9.1.2 Key Environmental Impacts Avoided or Minimised

As described in **Section 2.7**, a number of environmental impacts have been avoided or minimised in the preferred scheme. These include the following:

- The preferred scheme makes good use of the already developed areas and establishes a series of platforms so that large-scale slope excavation for outdoor park and subsequent loss of natural environment is avoided; also vegetation clearance/tree felling and visual impacts are minimised.

- Minimising footprint on the existing hillside slopes by reducing the amount of structural support required so that ecological impact on natural habitats especially woodland and streams are minimised.

- Adoption of “terrace” concept to avoid substantial visual impact and minimise incompatibility with the surrounding environment; also to minimise the use of glazing and the potential collision impact on birds.

- Reprovision of the Flamingo Pond at the southern side of the Project Area which is compatible with natural environment and more suitable for wildlife use.

- Avoidance of works encroaching onto marine habitat and potential impact on the marine environment and the associated fauna, noticeably hard coral communities.

- Reuse of spent cooling water for on-site flushing can completely eliminate the need to discharge high temperature and chlorine containing water into the marine environment, and hence minimising impact to the coral communities in the nearby marine environment.

- Implementing site practices as outlined in ProPECC Note PN 1/94 to control and minimise site runoff and drainage during construction period.

- Install and maintain roadside gullies and silt traps for removal of pollutants from stormwater during operation.

- Reuse of inert C&D materials as far as practicable to minimise off-site delivery of surplus inert C&D materials and the associated environmental impacts.

2.9.2 Construction Method and Work Sequence

As described in **Section 2.8**, a number of alternative construction methods and sequence of works has been reviewed and compared prior to recommending the preferred option. Consideration of environmental impacts during construction stage has been one of the main factors affecting the choice of construction method and construction sequence. The recommended option has aimed to provide the optimum balance between environmental concerns and non-environmental considerations. A summary of the recommended options for construction methods is presented in **Table 2.5**.

Table 2.5: Summary of Recommended Option of Construction Methods

Construction Activity	Recommended Option for Construction Method
Foundation Works	Pre-bored rock socket steel H-piles is considered to be preferable as it generates less noise and vibration and impose the least disruption to the terrain.
Site Formation and Slope Stabilisation	Earth retaining structures, temporary cut slopes, and excavation lateral support system for pile caps to generate smaller volumes of excavated materials and minimise waste management implications Disposal by trucks instead of barges to avoid impact to marine environment
Utilities, roadworks and landscaping	Conventional methods
Disposal	Disposal by trucks instead of barges to avoid impact to marine environment
Superstructure	Owing to the given constraints, conventional cast in-situ reinforced concrete construction and particularly the flatslab system is preferred to precast concrete. Steelwork would be adopted for long span roof structures.

For the site formation works, minimisation approach is adopted. As part of the architectural approach, the clearance between the rear of the structure and the cut slope is required to be small. It is therefore proposed to adopt a clearance of only the minimum required for maintenance access and surface drainage provisions which will minimise slope cutting.

For slope works, the slopes formed will be designed to Hong Kong standards using common rock and soil stabilisation methods. Slope angles will be optimised, so as to reduce the extent of cutting into the hillside and minimise the extent of soil nailing. Soil nails will be used to stabilise soil cuts. Soil nails cuts are planned to be at 55° generally, in order to be landscaped to give a green appearance. Where cuts are in competent bedrock, rock cuts may be made up to 85°. Stabilisation works, such as rock dowels, scaling or loose rock, wire mesh and dentition will be required and will be confirmed on site during excavation.

As a result, the construction boundary is entirely driven by the anticipated extent of the building and associated structures and associated construction space; the level of the building relative to the profile of existing slopes; and the anticipated extent of slope-works (and associated works area).

Regarding works sequence, in considering the environmental benefits and dis-benefits of the two construction sequences, a balance approach is preferred to be adopted to minimise the environmental impacts, maximise the benefits and to meet the target commissioning date. The balance approach will be a combination of concurrent and phased construction sequences at different stages of construction.

2.10 Works Programme and Implementation

The design of the Project has been commenced in the second quarter of year 2013. The earliest advance site work is expected to be physically commenced by the third quarter of year 2014. The tentative programme for operation of the Project will be in 2017. Given the scale of the Project, construction will be implemented according to the general description as shown in **Table 2.6**.

Table 2.6: Summary of Construction Programme

Item	Description	Timeframe
1	EVA, slope stabilisation & site formation works	Q3 2014-Q2 2015
2	Foundation	Q4 2014-Q2 2015
3	Main building construction	Q2 2015-Q4 2016
4	Superstructure	Q2-Q4 2015
5	Roof steel erection	Q4 2015-Q1 2016
6	Glass curtain wall installation	Q1-Q3 2016
7	Water rides installation	Q1-Q2 2016
8	Interior fitting out	Q2 2016-Q1 2017

The tentative construction programme is provided in **Appendix 2.2.** This programme is subject to further changes during the course of the scheme designs. Construction will proceed in the general order of slope stabilisation; site formation; foundation, main building construction; superstructure; roof steel erection; glass curtain wall installation; water rides installation; and interior fitting out.

2.11 Consultation

Consultation / communication with individual Southern District Council (SDC) members has been carried out during the preparation stage of the Project. The SDC members consulted had no objection to the Project. A presentation to the SDC on the key EIA findings has been scheduled on 31st March 2014, during which details of the Project will be shared and discussed with SDC members, with a view to soliciting their support on the Project.

2.12 Concurrent Projects

There is no confirmed project in the vicinity of the Project site. Planned projects in the vicinity of the Project area include two hotel developments of the Ocean Park (i.e. Spa Hotel and Fisherman's Wharf Hotel) in TSW. These two hotel developments are in a preliminary planning stage and yet to be confirmed, and no information is currently available for the construction timetable. Therefore, these two hotel developments are not considered as concurrent projects when considering cumulative construction impacts. As both this Project and the two hotels are under OPC's control, in case the confirmed construction programme of the hotel developments become available, the construction programmes would be scheduled to minimise the possible cumulative construction impact. Nevertheless, the two hotels have been considered as potential sensitive receivers in the operation phase air quality, noise and visual impact assessment (refer to **Chapters 3**, **5** and **12**) and the potential sewage flows generated from the two hotels have also been taken into account in the sewerage and sewage impact assessment (refer to **Chapter 7**) for the Project.