7 LANDSCAPE & VISUAL IMPACTS

7.1 INTRODUCTION

During the site selection process that preceded the detailed EIA Study, six alternative sites for the power station were identified and compared. The Lamma Extension option was considered to have the lowest landscape and visual impact, as the proposed development on reclamation would have no effect on coastal morphology and the visual impact of the new structures would be absorbed by the established industrial character of the existing power station.

This Section presents an assessment of the potential landscape and visual impacts of the proposed Lamma Extension development in more detail, and in accordance with the requirements of the Technical Memorandum (TM) arising from the *Environmental Impact Assessment Ordinance (EIAO) (Cap.499)* (EIAO), and recommends mitigation measures for incorporation into the design of the power station to minimise potential impacts.

In this assessment landscape impacts refer to the specific physical impacts that the development would have on the site, whereas visual impacts relate to changes that the development would have on existing views of the landscape.

7.2 LEGISLATION AND STANDARDS

Legislative requirements for the assessment of landscape and visual impacts are contained in the *EIAO*, through the requirement to address such issues as part of an environmental review and assessment process. *Annex 18* of the *TM* provides guidelines for landscape and visual impact assessment and *Annex 10* presents relevant impact assessment criteria.

In addition, *Chapter 10: Landscape and Conservation* of the Hong Kong Planning Standards and Guidelines (HKPSG) outlines relevant criteria that should be considered in project and development planning.

7.3 ASSESSMENT METHODOLOGY

The prediction and assessment of landscape and visual impacts has been undertaken using the methodology described below. This methodology conforms with the requirements of *Annex 18* of the *EIAO TM*, and includes:

- a baseline study, to investigate and establish the landscape and visual character of the power station area in relation to the surrounding topography, vegetation, other landscape features, and landuse;
- a review of the relevant planning and development control framework;
- identification of the visual envelope of the power station;
- identification of the key visual receivers who may be affected by the proposed development;

- synthesis of the above information, leading to an evaluation of potential impacts;

- identification and recommendation of landscaping and visual/architectural design measures, such as massing of structures and colour schemes, to mitigate potential impacts; and

- evaluation of residual impacts following implementation of mitigation measures.

The level of potential visual impact arising from the development is dependent on factors such as the nature of the view, the distance between the viewer and the site, as well as the size of the population (eg residential or recreational) that would see the development.

In this assessment foreground views range from 0 to 2 km, middle ground views range from 2 to 5 km, and background views are over 5 km.

7.4 *BASELINE CONDITIONS*

7.4.1 *Landuse Context*

The site is located over water immediately to the south of the existing Lamma Power Station at the western edge of Lamma Island. The review of planning and development intentions for the surrounding areas is based on the Lamma Island Outline Development Plan (Plan no. D/I-LI/1, 1983).

Surrounding landuses include Village Development Areas at Yung Shue Wan, Sha Po, Ko Long, Tai Yuen Tsuen, Tai Wan San Tsuen, Wang Long, Tai Wan Kau Tsuen, Tai Ling Tsuen, Long Tsai Tsuen, Tai Wan To and Hung Shing Ye, and Agricultural Areas, Open Space Areas and Countryside Conservation Areas, as shown in *Figure 1* of *Annex B7-1*. The adjacent Hung Shing Ye Beach is an officially gazetted beach.

7.4.2 *Landscape and Visual Character*

The northwestern part of Lamma Island is a hilly landscape with lower slopes comprising woods, villages and farm land. The Po Lo Tsui headland runs behind the existing power station and varies in height from 60 to 80 m. This separates the existing power station from the most populated villages around Yung Shue Wan to the north. Across the water to the east of the site lies a rural pastoral setting of villages and the scattered farmlands of Tai Ling Tsuen, Long Tsai Tsuen, Tai Wan To, Tai Wan Kau Tsuen and Hung Shing Ye, which are found beneath hills which vary between 70 and 120 metres in height, and reach 300 metres to the southeast.

The existing power station is located on the northwestern part of Lamma Island, south of Yung Shue Wan. The existing station is largely on reclaimed land approximately 65 ha in area and forms a dominant landscape feature with an established industrial character. There are existing landscape plantings of trees and shrubs on the eastern site boundary to soften the appearance of the power station.

The proposed Lamma Extension development will be established on reclaimed land and will be abutted to the existing power station by a smaller reclamation area. The total area of the new reclamation will be approximately 22 ha. The Extension will be surrounded by existing power station facilities, with the existing ash lagoon to the northeast, the main part of the existing station to the north, and the existing coal transport jetty to the northwest. Therefore, the immediate surrounding of the proposed extension is a large-scale man-made environment with a dominantly industrial character.

Based on the above discussion, the immediate sea area for the proposed Extension to the south of and surrounded by the existing facilities is considered to have a low landscape and visual quality.

A review of the zoning plans of the area indicates that the future landscape quality is unlikely to be significantly different from the present condition.

7.5 *POTENTIAL SOURCES OF IMPACT*

In order to assess the impact of the proposed Extension on the visual amenity of the surrounding landscape, it is necessary to identify what elements of the Extension would be visible from outside the site, the locations from which those elements could be seen, and who would be able to see the development. Secondly, it is necessary to identify how the development would affect the existing views. The main visually significant elements of the proposed Extension, which would be the sources of impact to be considered for the present assessment, are identified below.

For the construction phase, the main potential impacts derive from:

- reclamation works; and
- building construction works.

Potential sources of impact during the operational phase include:

- two main chimneys approximately 110 m high, and a flare stack of 55 m;
- two main station buildings, which are the largest structures, each 110 by 80 m in plan dimensions, and 32 m high;
- two administration buildings of 19 m in height; and
- two raw water tanks 18 m in diameter and 15 m high, four light oil storage tanks 25 m in diameter and 22 m high, and a switching station of 25 by 100 m and 18 m in height.

Figure 2 of *Annex B7-1* shows an aerial view of the development, and *Figure 3* *Annex B7-1* shows a preliminary layout plan.

The proposed landing points for the submarine transmission cables will be mainly underground structures and only the tops will be visible from the surface with limited localised visual impacts.

7.6 VISUAL ENVELOPE AND SENSITIVE RECEIVERS

7.6.1 *Visual Envelope*

The zone of visual influence (visual envelope) for the development is shown in *Figures 4* to *8* of *Annex B7-1*, based on information from site visits, topographic data and the proposed dimensions of the development, as illustrated in representative cross-sections in *Figures 9* to *13 of Annex B7-1*. For this assessment the visual envelope includes areas that lie within a nominal 8 km radius of the site, outside which visibility is considered poor [1]. It can be observed from the Figures that the visually sensitive receivers within the visual envelope can be identified as two main groups: local receivers on Lamma Island, and distant receivers on Hong Kong Island and Cheung Chau.

In addition to receivers within the visual envelope, three additional receiver groups at Discovery Bay, Mui Wo and Stanley have been added as long distance reference points.

7.6.2 *Visually Sensitive Receivers*

Key visual receiver groups within the zone of visual influence that are sensitive to the proposed Extension are identified as follows :

- Residential receivers, who are typically sensitive to visual impact because of the permanent impact on their daily outlook. Most people within the zones of visibility identified above enjoy views of a landscape which has a high amenity value. This group of people may thus be regarded as having a high level of sensitivity to visual intrusion of this nature.

- Recreational users, who would include walkers using the extensive network of footpaths in countryside and swimmers using gazetted beaches. Such people may be regarded as having a high level of sensitivity to visual intrusion in that they have sought a natural setting for their recreational activities.

Viewers who are considered less sensitive than permanent residents or recreational users include transient viewers such as travellers on sea and land, and occupants of rehabilitation centres, for whom enjoyment of views is not considered a high priority.

Local Receivers - Lamma Island

Figure 6 of Annex B7-1 shows the representative visual receiver groups on Lamma Island. The natural topography of Lamma Island provides a visual barrier over many areas of the island. The development site is visually separated from the villages around Yung Shue Wan by the Po Lo Tsui Headland. However, the site would be visible from the villages of Tai Ling Tsuen, Long Tsai Tsuen, Tai Wan To and Hung Shing Ye along Ha Mei Wan, as well as the beaches of Ta Wan To, Hung Shing Ye and Lo So Shing, with a middle ground view from a distance of 1 to 2 km. Existing views are shown in *Figures 19* to *23 of Annex B7-1*.

[1] Observer's Handbook (4th Edition), Her Majesty's Stationery Office, London, HMSO, 1982.

Distant Receivers

Hong Kong Island

The Extension would be visible from a number of higher locations on Hong Kong Island, including upper storeys of high-rise residential buildings near the coastal areas. Representative visual receiver groups are shown in *Figure 7 of Annex B7-1*. All of them are over 5 km away and would only have a background view of the development from the northeast, largely screened by the hills at Lamma and the existing power station. The existing views from the representative receiver groups are shown in *Figures 24* to *29 of Annex B7-1*.

Cheung Chau & West Lamma Channel

The eastern part of Cheung Chau, approximately 8 km away, would have a background view of the development from the west, as shown in *Figure 8 of Annex B7-1*. In addition, similar views would be available to recreational boat users using the West Lamma Channel. The existing views from the representative receiver groups are shown in *Figures 30* to *31 of Annex B7-1*.

Discovery Bay, Mui Wo and Stanley

Existing views from these long distant visual reference points are shown in *Figures 32* to *38 of Annex B7-1*.

7.7 ASSESSMENT OF IMPACTS

7.7.1 *Landscape Impacts*

The power station extension site is a man made island located south of the existing power station. (*see Figure 1 of Annex B7-1*) The construction of the development on the reclaimed land will have no direct impact on the existing land form and coastal morphology of Lamma Island as there will be no need for excavation or any changes to the existing topography that will lead to loss of any vegetation. However, an area of water will be lost in forming the reclamation.

The loss of water area (approximately 22 ha) adjacent to the existing power station is considered to have a low landscape impact, given the low landscape value of the immediate area and the context of the surrounding expanse of water in the West Lamma Channel.

7.7.2 *Visual Impacts*

As discussed in *Section 7.6*, views from the more populated areas around Yung Shue Wan on relatively low flat land and from villages such as Ko Long, Wang Long, Tai Wan San Tsuen and Tai Yuen Village are obstructed by the Po Lo Tsui headland (80 m high).

Views of the proposed development from the small villages of Tai Wan Kau Tsuen, Tai Ling Tsuen, Long Tsai Tsuen, Tai Wan To and Hung Shing Ye, and the recreation areas of Tai Wan To Beach and Hung Shing Ye to the northeast, are partially concealed by the existing power station, with the two larger chimneys being the main visible features. There is, however, an unobstructed view of the proposed Lamma Extension from the Hung Shing Ye Beach to the southeast.

All of the partial views from the above receivers are not considered significant since the existing power station is already much closer to the receivers, much larger in apparent scale and therefore more visually intrusive. The additional visual elements arising from the proposed Extension will be visually absorbed by the existing structures, and therefore the visual impacts on local receivers are considered to be low (see photomontages in *Figures 19 to 22 of Annex B7-1*).

It is from Lo So Shing Beach that the proposed development can be seen as a separate entity. From this location, there is a significant visual impact as the development visually extends the impact of the existing Power Station over the skyline on the existing middle ground view. (see Photomontages in *Figure 23* of *Annex B7-1*)

7.7.3 *Distant Receivers*

Hong Kong Island

The hills on Lamma Island and the existing power station largely obstruct the views of the proposed development from Hong Kong Island, and only the top of the two main chimneys will be visible over the existing main power station building which reaches a height over 80 metres, as illustrated in the photo-montages in *Figures 24 to 29 of Annex B7-1*. The visible elements of the Extension are considered to be effectively absorbed by the existing industrial character and therefore the visual impacts are considered to be low.

Cheung Chau & West Lamma Channel

This island is located about 8 km from the site. Although part of the island has residential settlements on a hill up to 100 m PD, the visual effects of the development over such a distance are not considered significant, as illustrated in *Figure 30 of Annex B7-1*. In addition, the development will be partially screened by the existing power station and will only be seen as background against the hills of Lamma Island. The proposed Extension will not alter the existing skyline.

The overall impacts on boat users of West Lamma Channel are similar to those for Cheung Chau (see *Figure 31* of *Annex B7-1*), although viewed from a closer distance and on irregular basis.

Discovery Bay, Mui Wo (Silvermine Bay) & Stanley

These locations are all at long distances from the site and the views are completely or mostly screened by other islands, as well as the Lamma Island hills, as illustrated in *Figures 32* to *38 of Annex B7-1*. Views from most of the residential units in Discovery Bay are blocked by the topography of Discovery Bay itself, Peng Chau and Sunshine Island. For most of these units only the top of the existing power station chimneys will be visible. Only one development would have an unobstructed view of the Lamma Extension between Peng Chau and Sunshine Island and, given the long intervening distance, the impact is not considered significant. No views of the Extension are expected from either Mui Wo or Stanley.

7.8 MITIGATION MEASURES

The following mitigation measures are recommended to minimise the potential visual impacts of the development. These measures primarily relate to site layout and massing of buildings and structures, colour schemes, and landscaping.

Site Layout & Massing of Buildings and Structures

The proposed Extension is located on a man-made reclamation which is flat and rectangular in shape. Sitting on this flat platform, the Extension itself has also a regular layout with very large scale buildings and structures. The whole development which stands as an island separate from the existing power station is, therefore, in contrast with the natural setting across the water. It would be recommended that a more natural land-form is introduced to break up the regular and flat appearance of the site.

This may be achieved by using rubble mound seawall along the south and west edges of the reclamation to provide a more natural look to the island and by introducing planting of varying heights along the seawall.

The main body of the Extension is formed by two very large scale main station buildings, two main chimneys and related facilities and structures. The rest of the site is occupied by the administrative buildings which are located in close proximity and inter-linked to the main station buildings with pedestrian bridges.

As a general principle, it is recommended that (i) the design of the main station buildings is approached as a collection of buildings rather than a large mega-structure under one roof to break up the mass and (ii) the relatively high structures are located away from the edges of the site towards the centre and a varying roof-line is achieved so that there is an overall form to the island rather than a uniform height everywhere.

Reducing the large mass of the station buildings is achieved by separating the two main station into six smaller units each. The same design approach is also used for the administrative buildings a well as the switching station. The administrative buildings are mainly two to four storey and as office buildings, they have much more flexibility in their design in terms of proportions and scale and it should therefore be easier to implement the recommendations.

As the main station units are grouped into two, each block over 110 m. long, separated by a 20 m wide road, the option of increasing the height of the central units could also be considered to create a more varying skyline.

The feasibility of placing the smaller scale administrative buildings with the sub-divided main station units to the eastern part of the site facing Lamma coastline and the more industrial appearance of many large structures such as chimneys and tanks to the western part was investigated but found not feasible due to functional arrangement constraints of the site layout. Visual screening, using landscape planting is recommended as the next important mitigation measure to reduce the visual impact to the Lo So Shing beach users.

Colour Scheme

An industrial development would be identified not only by its large size but also by its uniform metallic and concrete finishes and colours. In such developments, some of the structures offer flexibility in their finishes while others are limited by economic, functional and engineering factors. In the context of this study, colour is introduced into the site as an important element to reduce the "industrial" appearance of the proposed Extension.

The proposed Extension comprises a variety of concrete and steel structures, plant, chimneys, ducts and tanks, all of which contribute to the character of the development. In this Extension the most flexibility is offered by the reinforced concrete structures such as the administrative buildings, main station buildings and switching station. These are buildings which can be rendered, painted and maintained much more easily than other plants and structures.

It has been recommended that this opportunity is utilised and different colours are applied on the rendering of these buildings to create a more lively, but unintrusive appearance, breaking the monotony of an industrial appearance. *Figure 14 of Annex B7-1* illustrates the effects of applying different colour schemes, in comparison to a standard treatment of such developments. It is recommended that earth colour are preferred to the bare metal and concrete colours and its tones. In addition, the brighter tone of colours would bring "life" into the development, complement the landscaping mitigation (see below), and together would create an environment in harmony not only with the existing power station but also with the surrounding setting of Lamma Island. A colour scheme proposal will be finalised at the detailed design stage.

The provision of alternative colour scheme to the chimneys, such as dark tones of green at lower levels and lighter tones of grey/blue at higher levels has been considered. It was concluded that grey would blend in well with the surroundings and is compatible with the existing chimneys. Since concrete is naturally grey, it was decided that the chimney should best be left with fairfaced concrete finish. This would also alleviate the need for painting and represents a lasting solution with low maintenance requirement.

Landscaping

The Extension requires mitigation measures mainly for views across the bay to the east and southeast as the views from south and southwest are limited only to occasional boats visiting the area.

Mitigation through appropriate landscape planting will provide visual screening and soften the industrial appearance of the development. A strong line of trees from a range of relatively quick growing and tolerant to salt-laden winds species should be planted. Typical species would include *Acacia confusa, Cerbera manghas, Eucalyptus robusta, Hibiscus tiliaceus,* which are evergreen, tall, bushy, medium (5-12m) to tall (over 12m) trees. Appropriate climber species should also be planted to soften the hard boundary wall appearance.

Tree planting within the site has also been maximised and incorporated into design along major roads, taking into account the constraints of considerable underground service routes of the power station. The tree-lined roads will provide view corridors from the east as well as emphasizing the distance between the main station buildings, to reduce the apparent mass of the

development. *Figures 16 of Annex B7-1* shows the proposed Master Landscape Plan for the power plant extension. *Figures 17 & 18 of Annex B7-1* illustrate the perspective view of peripheral planting for visual screening of the power station.

7.9 EVALUATION OF RESIDUAL IMPACTS

With the implementation of the above mitigation measures, the potential visual impacts of the proposed Extension will be minimised and the overall residual impact is not considered significant. *Figures 19 to 38 of Annex B7-1* show the photomontages of the views from representative visual receiver groups, before and after the proposed Extension.

7.10 SUMMARY AND CONCLUSIONS

The selection of the Extension option during the new power station selection studies has minimised potential impacts by establishing the new power units next to the existing power station with an established industrial character.

The potential landscape and visual impacts have been assessed in more detail in this EIA Study and specific mitigation measures have been proposed to minimise identified impacts, including massing of buildings and structures, appropriate colour schemes and landscaping.

It is concluded that, with the incorporation of the recommended measures into the design of the Extension, the overall residual impacts are not considered significant.