8. LANDSCAPE AND VISUAL ASSESSMENT

8.1 Introduction

8.1.1 This section summarises the findings of the landscape and visual impact assessment (LVIA) for the proposed Permanent Aviation Fuel Facility (PAFF) at Tuen Mun Area 38.

8.1.2 The purpose of the LVIA is as follows:

a. to undertake detailed baseline review and impact assessment on the preferred location at Tuen Mun Area 38;
b. identify key issues and potentially significant changes to the existing landscape and visual conditions that could result from the PAFF and associated facilities during construction and operation; and
c. recommend mitigation measures in terms of reducing landscape and visual impacts.

8.2 Principal Environmental Legislation and Guidelines

8.2.1 The methodology of the LVIA is based on Annexes 10 and 18 in the Hong Kong SAR Government's Technical Memorandum on the Environmental Impact Assessment Process (EIAO-TM) under the EIA Ordinance (Cap.499, S16), entitled "Criteria for Evaluating Visual and Landscape Impact" and "Guidelines for Landscape and Visual Impact Assessment", respectively and the EIAO Guidance Note No. 8/2002 “Preparation of Landscape and Visual Impact Assessment Under the Environmental Impact Assessment Ordinance.”

8.3 Assessment Methodology

8.3.1 Background

8.3.1.1 The main components of the LVIA are as follows:

a. Description of the proposed project
b. baseline study of landscape and visual resources including a review of planning and development control framework;
c. landscape impact assessment during construction and operation;
d. visual impact assessment during construction and operation;
e. recommendations for landscape and visual mitigation measures for both construction and operation stage; and
f. assessment of residual impact and conclusion on the acceptability of the PAFF.

8.3.2 Baseline Landscape and Visual Resource Study

8.3.2.1 The *baseline study* identified and examined existing landscape and visual resources within the study area of the selected site at Tuen Mun Area 38. Under the study brief, the study area defined for the landscape impact assessment is approximately 500 metres out from the proposed works site boundary. The area for the visual impact assessment is defined by a visual envelope. This is generally the viewshed formed by natural/man-made features such as ridgeline and building blocks.

8.3.2.2 Landscape resources considered include topography, woodland, other vegetation, built forms, settlement patterns, land use, scenic spots and details of local streetscapes. The baseline study describes the landscape resources by identifying broadly homogenous landscape character units (LCUs) of a similar character. The landscape character was rated low, medium or high depending not only on the quality of elements present but also to its sensitivity to change and its importance at a local, district, regional or international level. The mapping of the LCUs referred to Planning Department's Landscape Character Map of Hong Kong and related descriptions on the Landscape Character Types (LCTs) to further assist an understanding of the baseline conditions.

8.3.2.3 Visual resources considered were typical viewpoints located and directed towards the project. A visual envelope has been established which defined the extent of visual influence of the project and, therefore, of the potential visual impacts. Definition of the extent of the viewshed was based on desktop study and site investigation. Sensitive visual receivers (SVRs) identified in this report are "representative" in that individuals or groups that have a similar sensitivity to changes in the visual and landscape environment are grouped together within a single SVR that can represent the whole group. (SVRs) are individuals or groups of who are sensitive to changes in the visual environment. The Hong Kong Planning Standards & Guidelines, Chapter 9 Environment, defines sensitive uses as "land uses which, by virtue of the nature of the activities thereon are susceptible to the influence of residual or physical changes generated by polluting uses".

8.3.3 Review of the Planning and Development Control Framework

8.3.3.1 A review of the planning and development control framework has been undertaken and this information has been mapped and analysed to provide an insight to the future outlook of the area affected and the way the Project would fit into its wider context. The purpose of this planning and development control review is to give further insight into possible future sensitive uses and/or sensitive receivers that might be affected by the proposed project.

8.3.4 Landscape Impact Assessment

8.3.4.1 Impacts on the landscape and visual resources were assessed for both construction and operation stages. The impact assessments allow predictions to be made about the likely levels and significance of landscape and visual impacts. The assessment of LANDSCAPE impacts will result from:

a. the landscape character and its quality;
b. the sensitivity of the landscape in accommodating change;
c. source, nature and magnitude of impacts;
d. the degree of change caused by the impacts to the existing landscape;
e. significance of the change in consideration of the local and regional areas and other developments;
f. cumulative effects with other proposals; and
g. identification of vegetation of significant value which should be conserved.

8.3.4.2 The **sensitivity / quality** for landscape characters/resources are based on:

a. quality of landscape characters/resources,
b. importance and rarity of special landscape elements,
c. ability of the landscape to accommodate change,
d. significance of the change in local and regional context, and
e. maturity of the landscape.

8.3.4.3 The **sensitivity / quality** of the landscape characters/resources will be assessed as follows:

a. *High:* e.g. important components or landscape of particularly distinctive character susceptible to small changes;
b. *Medium:* e.g. a landscape of moderately valued characteristics reasonably tolerant to change;
c. *Low:* e.g. a relatively unimportant landscape, which is able to accommodate extensive change.

8.3.4.4 The **magnitude of change** of landscape characters/resources is based on:

a. compatibility of the project with the surrounding landscape,
b. duration of impacts under construction and operation phases,
c. scale of development, and
d. reversibility of change.

8.3.4.5 The **magnitude** of change in the landscape is as follows:

a. Large – notable change in the landscape characteristics over an extensive area ranging to very intensive change over a more limited area;
b. Intermediate – moderate changes to a local area;
c. Small –changes to components; and
d. Negligible – no perceptible changes.

8.3.4.6 The system for the assessment of landscape impact is summarised in Tables 8.1 and 8.2 below. The significance threshold of landscape impact is derived from the combined analysis of the magnitude of change and the landscape's quality and sensitivity to change. The matrix in Table 8.1 indicates how the significance threshold is derived. Table 8.2 explains the terms used in Table 8.1. This analysis of the significance of threshold of landscape impact will apply in the majority of situations, however in certain cases a deviation may occur e.g. the impact may be so major that a significant impact may occur to a low quality element.

Table 8.1 Significance Threshold of Landscape Impact

		Sensitivity / Quality		
		Low	**Medium**	**High**
Magnitude of Change	**Large**	Moderate Impact	Moderate / Significant Impact	Significant Impact
	Intermediate	Slight /Moderate Impact	Moderate Impact	Moderate / Significant Impact
	Small	Slight Impact	Slight / Moderate Impact	Moderate Impact
	Negligible	Negligible	Negligible	Negligible

Table 8.2 Adverse / Beneficial Impacts of Landscape Impact

Significant:	Moderate:	Slight:	Negligible:
adverse / beneficial impact where the proposed project would cause significant degradation or improvement in existing landscape baseline conditions.	adverse / beneficial impact where the proposed project would cause noticeable degradation or improvement in existing landscape baseline conditions	adverse/beneficial impact where the proposed project would cause a barely noticeable degradation or improvement in existing landscape conditions or where the changes brought about by the project would not be apparent in visual terms	The proposed project does not perceptibly affect the existing landscape baseline conditions

8.3.5 Visual Impact Assessment

8.3.5.1 The assessment of potential VISUAL impacts will result from:

a. the sensitivity of the viewer groups at SVR locations to change and visual intrusion; and
b. the magnitude of change to the visual baseline condition.

8.3.5.2 The **sensitivity of receivers** is based on:

a. value and quality of existing views,
b. availability and amenity alternative views,
c. type and estimated number of receiver population,
d. duration or frequency of view, and
e. degree of visibility.

8.3.5.3 The **sensitivity** of viewer groups at SVR locations will be classified as follows:

- *High:*
  - the nature of the viewer groups expects a high degree of control over their immediate environment, (e.g. people residing in their homes);
  - the viewer groups are in proximity to the project; and
  - the foreground and middle ground cannot visually absorb the Project.
  -
- *Medium:*
  - the nature of the viewer groups expects a high degree of control over their immediate environment, (e.g. people residing in their homes); but
  - the viewer groups are not in proximity to the Project; and
  - the foreground and middle ground can partially absorb views of the Project.
- *Low:*
  - the nature of the viewer groups do not expect a high degree of control over their immediate environment, (e.g. people at their place of employment or temporarily in attendance at the SVR location); and
  - people in transit (e.g. drivers and passengers in vehicles).

8.3.5.4 The **magnitude of change** of the visual resources is based on:

a. compatibility of the project with the surrounding landscape;
b. duration of impacts under construction and operation phases;
c. scale of development;
d. reversibility of change;
e. viewing distance; and
f. potential blockage of view.

8.3.5.5 The **magnitude** of change is classified as follows:

- *Large:*
  - prominent and permanent visual changes in the foreground, middle-ground or background where the project dominates the view;
  - permanent visual changes where the project contrasts conspicuously against the middle ground and/or background; and
  - temporary visual changes where the project dominates the foreground view.
- *Intermediate*:
  - permanent visual changes in the foreground or middle ground where the project is prominent but does not dominate the view;
  - permanent visual changes where the project is discernible against background, but is not conspicuous; and
  - temporary visual changes where the project dominates the middle ground view.
- *Small*:
  - permanent visual changes in the foreground, middle ground or background where the project is present but not noticeable; and
  - temporary visual changes where the project dominates the background view.
- *Negligible*:
  - No visual changes are apparent.

8.3.5.6 The significance threshold of visual impact is rated in a similar fashion to the landscape impact and is illustrated in Tables 8.3 and 8.4 below.

Table 8.3 Significance Threshold of Visual Impact

Magnitude of Change		Sensitivity to Change and Visual Intrusion		
		Low	**Medium**	**High**
	Large	Moderate Impact	Moderate / Significant Impact	Significant Impact
	Intermediate	Slight / Moderate Impact	Moderate Impact	Moderate / Significant Impact
	Small	Slight Impact	Slight / Moderate Impact	Moderate Impact
	Negligible	Negligible	Negligible	Negligible

Table 8.4 Adverse/Beneficial Impacts of Visual Impact

Significant:	Moderate:	Slight:	No impact:
adverse/beneficial impact where the proposed project would cause significant degradation or improvement in existing visual baseline conditions.	adverse/beneficial impact where the proposed project would cause noticeable degradation or improvement in existing visual baseline conditions.	adverse/beneficial impact where the proposed project would cause a barely noticeable degradation or improvement in existing landscape conditions or where the changes brought about by the project would not be apparent in visual terms	The proposed project does not perceptibly affect the existing visual baseline conditions.

8.3.6 Night-time Glare Assessment

8.3.6.1 In accordance with the brief, nighttime glare is considered in the visual impact assessment. The proposed form and finishes of PAFF will be similar to the existing facility at Chek Lap Kok. The designs of this kind of facility are standardised. The existing fuel farm at Chek Lap Kok is taken as an example to investigate the possible nighttime glare brought by this facility to the environment.

8.3.7 Recommendation for Mitigation Measures

8.3.7.1 The identification of the landscape and visual impacts will highlight those sources of conflict requiring design solutions or modifications to reduce impacts and, if possible, absorb the development and associated activities into the surrounding landscape. These mitigation efforts should consider factors including:

a. woodland, tree and shrub planting to new or disturbed slopes, amenity strips, highway reservations and adjacent to any proposed structures;
b. contouring of new slopes to blend with existing topography in a natural manner;
c. landscaped perimeter bund and screen planting;
d. highlighting unacceptable impacts and considering alternative proposals;
e. hard landscape elements including design and appearance of proposed facility;
f. significant landscape elements; and
g. night-time glare solution.

8.3.7.2 The above will result in the formation of landscape mitigation proposals which will as far as possible help to alleviate the previously identified landscape and visual impacts.

8.3.8 Residual Landscape and Visual Impacts

8.3.8.1 The final stage of the LVIA study is to assess the significance of the residual impacts of the study assuming landscape mitigation measures are incorporated into the design. In conclusion the landscape and visual impacts were then classified into one of five levels of significance based on criteria in Annex 10 of the EIAO-TM, as summarised below:

a. the impact is **beneficial** if the project will complement the landscape and visual character of its setting, will follow the relevant planning objectives and will improve the overall and visual quality of the study area;
b. the impact is **acceptable** if the assessment indicates that there will be no significant effects on the landscape, no significant visual effects caused by the appearance of the project, or no interference with key views;
c. the impact is **acceptable with mitigation measures** if there will be some adverse effects, but these can be eliminated, reduced or offset to a large extent by specific measures;
d. the impact is **unacceptable** if the adverse effects are considered too excessive and are unable to mitigate practically;
e. The impact is **undetermined** if significant adverse effects are likely, but the extent to which they may occur or may be mitigated cannot be determined from the study. Further detailed study will be required for the specific effects in question

8.4 Project Description

8.4.1 General

8.4.1.1 The site identified in this section for the PAFF is the preferred location determined by a previous comprehensive site and environmental search. This search included the assessment of eight alternative locations and the selection criteria included a landscape and visual factors. A full description of the site of this assessment is given in Appendix A and Section 2 of this EIA Report.

8.4.1.2 The details of the project are described in full in below and in Section 3. An illustration of the PAFF is also shown in Figure 8.1. The major elements can be summarised as:

a. About 6.75 ha. of land to locate the aviation fuel tank farm and associated facilities;
b. a jetty with two berths, able to accommodate 10,000 to 80,000 dwt vessels. It will be located a minimum 200m away from the water frontage with the length approximately 575m;
c. a gross aviation fuel tankage capacity of approx. 264,000,m^3 in the initial phase, increasing in stages to match the anticipated growth in aviation fuel demand to an ultimate gross tankage capacity in the region of 388,000 m^3. Tank sizes will be between 23m to 24.7m in height and 33.5m to 43.5m in diameter with a capacity of between 19,000m^3 to 35,000m^3. For the initial phase, while all 8 tanks are 24.7m high, 6 of them are 43.7m in diameter, the other two are 41.5m and 35m in diameter respectively;
d. tanks will be built in phases, starting with 8 tanks when the facility initially starts operation in 2009. Four additional tank will be required to meet the future demand after 2025. The proposed site will accommodate up to 12 fuel tanks at 2040;
e. pumps and associated facilities;
f. on site operational facilities including an administration office which will be approximately 30 metres by 40 metres and two stories in height; and
g. pipelines to transfer the fuel to the aviation fuel system at the airport. A twin pipeline will connect the facility to the airport pipeline system. The pipelines will be buried at 3m depth and protected by rock armour.

8.4.2 Tank Farm and Onshore Facilities

8.4.2.1 About 6.75 ha of land is required to accommodate the aviation fuel tank farm and associated facilities. The proposed site for the tank farm at Tuen Mun Area 38 has been reclaimed by Government and is zoned for industrial use. The site is situated at Siu Lang Shui just southeast of the Castle Peak Power station and is adjoined on the west by the Shiu Wing Steel Mill and on the south-east by the proposed EcoPark and adjacent to that is land earmarked for industrial use in keeping with the other land uses in the area. Further east is the River Trade Terminal. The allocated plot has a short length of sea frontage of 60m in width which extends inland for about 140m before widening out to a square area of about 217m in length by 278m in width, see Figure 3.2c.

8.4.2.2 The closest residential development is Melody Garden in Tuen Mun, which is at least 3 kilometres from the proposed site. The villages at Lung Kwu Tan are closer at about 2km away but are screened from the site by the Castle Peak topography. However, there is a planned Holiday Camp to the North-East of the site along Lung Man Road at over 500m away.

8.4.2.3 The tank farm will initially house 8 storage tanks, 6 tanks of 43.5m diameter by 24.7m in height, one of 41.5m diameter by 24.7m in height and one of 35m diameter by 24.7m in height. These tank heights refer to the total tank height but it should be noted that part of the tank will be positioned in the ground and as such only 23m will protrude above ground level. The tanks provide a storage capacity of between 35,000m^3 to 22,000m^3. It is intended that the tankage capacity would be increased once the initial capacity of 264,000m^3 has been reached around 2025 to 2040. It is intended that the remaining 4 tanks would be built all together after 2025 to increase the tankage capacity to the ultimate design tankage capacity of PAFF i.e. 388,000m^3. The heights of 3 of the remaining tanks would be 24.7m, with one tank of 23m and their capacities would vary accordingly between 35,000m^3 and 19,000m^3. The 4 remaining tanks will be built according to the latest technology, industrial standards and statutory requirements at that time. The tank farm would be provided with bundwalls and contained drainage. Each tank will be designed with a fixed cone roof. The Tanks are of a standard design and will be finished in a neutral grey non-reflective paint.

8.4.2.4 Other shore based facilities would include office buildings for administrative and security control, leak detection instrumentation, fire fighting and emergency spill equipment, workshops and basic infrastructure including roads, drains, telecommunications, power supply and lighting.

<u>Project Construction and Design</u>

8.4.2.5 The land required for the PAFF tank farm has been minimized by stipulating that large diameter tanks (40metres) should be used. A total of 12 tanks will ultimately be required at the PAFF tank farm. These, together with an administration building, workshop, car park, pumps, filters, bunding and other facilities will occupy a minimum land area of 6 Ha.

8.4.2.6 Initially a site was selected adjacent to Shiu Wing Steelworks of dimensions 150 metres by 400 metres, the waterfront being 150 metres.

8.4.2.7 Subsequently, there was pressure to reduce the water frontage to a minimum, to accommodate other users, on the basis that it was unnecessary to locate aviation fuel tanks directly on the waterfront. It was determined that a minimum water frontage of 60 metres was required for the PAFF for the following reasons:

a. To accommodate the fireboat;
b. To accommodate the work-boats to service the jetty with men, materials and equipment;
c. To allow for access to pipelines and other services from the jetty to the tank farm, and pipelines from the tank farm to the airport;
d. To locate a stormwater drainage outfall and fire water inlet;
e. To house spill response equipment;
f. To provide landscaping; and
g. To allow for delivery of heavy equipment and material by sea, for future phases of tank farm construction.

8.4.2.8 Other constraints in determining the shape of the PAFF tank farm layout are as follows:

a. Access to Shiu Wing Steelworks must be maintained on the north west boundary of the PAFF tank farm from Lung Yiu Street. In addition, a turning circle at the end of the spur road would be required;
b. Adjacent facilities to the south east of the PAFF tank farm would require a set back of the PAFF from the quay wall of 140 metres;
c. Direct access from Lung Mun Road to the PAFF tank farm would not be acceptable;
d. No reprovisioning of the temporary car park or other facilities currently provided in the PAFF tank farm area, are required; and
e. Adequate landscaping for the PAFF tank farm area should be provided.

8.4.2.9 Based on all the above constraints, the tank farm layout was determined, as shown in Figure 3.2c, to require a land take of about 6.75Ha. This comprises an approximately rectangular shape of about 280 metres by 215 metres with an additional irregular shape area towards the sea culminating in a 60 metre water frontage. In this configuration, it should be noted that, because this irregular shape towards the waterfront is of insufficient width to accommodate a tank, with consideration of potential enhancement of existing landscape, it is best used for other facilities such as the administration building, pumps and landscaping. In addition, allowance for further access for emergency vehicles (EVA) is provided along the north west boundary of the PAFF tank farm. Regarding to the standard requirement, a provision of landscaped boundary is also considered along the set back of the PAFF tank farm area.

8.4.2.10 It should be noted that the previous EIA study (April 2002) was undertaken based upon the project layout detailed in Figure 3.2a. However, changes were made to the detailed layout and an application for a variation (Application No. VEP-133/2004) to the then valid Environmental Permit EP-139/2002 was made. A variation to the EP (EP-139/2002/A) was granted by EPD in February 2004. Details of the revised layout approved by the VEP are provided in Figure 3.2b and details of the improvements made to the tank farm layout are detailed in EP Variation Application No. VEP-133/2004 and summarized in Table 3.2. As part of the changes made, and as shown in Figure 3.2b, the whole site has been shifted 10m to the southeast from that proposed in the original

EIA of April 2002, to accommodate Lands Department's commitment of a land extension to Shiu Wing Steel Mill.

8.4.2.11 Aviation fuel storage normally comprises above ground vertical cylindrical tanks of large diameter. Alternative means of storage exists worldwide (e.g. underground storage) and were considered for the PAFF but rejected for the following reasons:

a. For construction, underground tanks would need to allow for greater external forces and possibly floatation and would need complex ventilation system;
b. From the operation perspective, maintenance of the quality of aviation fuel is the prime requirement as fuel required for aircraft must meet stringent standards. Unlike aboveground tanks, for underground tanks there are two prime issues: (i) because PAFF at TMA 38 is on reclaimed land, the tanks will have to be built in the seawater and there is a risk of seawater seeping into the tanks; and (ii) there is a greater potential for bacteriological growth contaminating the fuel;
c. From the environmental perspective, there is also a risk of aviation fuel seeping out of tanks into sea water thus creating environmental pollution;
d. From safety perspective, because of confined space, the means of escape would not be easy as the tanks need to be accessed on a routine basis and the atmosphere would need to be monitored for presence of oxygen, and absence of flammable vapours. This safe atmosphere would need to be maintained by a sophisticated ventilation system. Personnel in the cavern or galleries would be at risk should such systems fail. The means of escape in case of a fire would not be straight forward; and
e. From the regulatory perspective, underground tanks would not comply with the Hong Kong Code of Practice for Oil Storage. The Institute of Petroleum Model Code of Practice Part 2 Section 3.2.15 recommends that buried tanks be avoided.

8.4.3 Berthing Jetty

8.4.3.1 The PAFF requires the construction of a twin berth jetty. This will be sited approximately 200m offshore with no direct access to shore. The two end to end berths would run approximately parallel to the quay wall and fuel tanker berthing would be provided on the sea facing side. The main activity at the jetty will be unloading of the tankers to the storage tanks in the tank farm. Two unloading arms on one berth and three unloading arms at the other berth will be provided to unload the fuel at each berth. Fuel lines and services will run to shore through submarine pipes and cabling protected by rock armour not protruding above the existing seabed, so as to provide marine access to other facilities adjoining the tank farm. Details of the jetty are provided in Figure 3.2c.

8.4.3.2 The sea bed level at the site lies between –17 and –18m PD indicating that water depths can reach 19.5-20.5m during the highest high tides. As the berthing jetty would be built on piles, 100 tubular steel piles of diameter 800mm to 1000mm have already been driven into the seabed from 29 November 2005 to 29 March 2006 (with about 59 days for actual pile driving time) using hydraulic hammers. A key consideration in the design and construction was how to mitigate noise.

8.4.3.3 A particular consideration for this project is the need to protect marine mammals from disturbance during the piling. Similar issues were raised when the temporary AFRF

was constructed near Sha Chau in 1995. At that time the Airport Authority were advised by a panel of international cetacean experts that percussively driven piles would be preferred over in-situ bored piles, as was the original intention at that time, based upon the decreased time required for this technique, although it would be important to strive to mitigate noise. (ERM 1996). A similar approach was adopted in the piling of the PAFF but a range of mitigation measures were applied before and during these piling works in accordance with the previous Environmental Permit EP-139/2002/A.

8.4.3.4 Two defensive fender piles have already been installed on the on shore side of the jetty to prevent any possible collision from small craft straying into the prohibited area. Coupling points on the ship would be provided with slop trays to catch occasional minor spills of unloaded fuels during coupling and de-coupling and the vessels will deal with the spills.

8.4.4 Pipeline

8.4.4.1 A short buried submarine twin pipeline will connect the reception jetty to the onshore tank farm, together with the utilities required for the jetty. The fuel from the jetty to the tank farm will be transferred at a rate of 3,500m^3 per hour. It is proposed that the fuel would then be delivered to the airport site by means of further buried twin subsea pipelines which would connect to the existing facility at Sha Chau. The total length of the pipelines would be about 4.8km including a 400m stretch within the Lung Kwu Chau and Sha Chau Marine Park in the approach to the existing AFRF pipeline.

8.4.4.2 The twin pipelines would each have an outside diameter of 500mm. The pipelines will be operated at a pressure of 30 barg (gauge pressure) and have a pumping rate of 30,000m^3 per day or 1,500m^3 per hour based upon 20 hours per day of pumping. It is assumed that these would be continuously welded, encased in concrete and lowered into a trench of 3m depth to protect against 6 to 22 tonne anchors. Future dredging activities are planned along the pipeline route for a coal berth for CLP in Urmston Road and, therefore, in this section of the alignment, the pipeline depth will be increased to about 6.5m below seabed. In both cases, the trench would then be backfilled with graded stones and rock armour to protect the pipelines. Schematic illustrations of the proposed pipelines and utilities from the jetty to shore and from the tank farm to the connection with the AFRF at Sha Chau are provided in cross sections (A) and (B) respectively in Figure 3.3.

8.4.4.3 The pipeline from the PAFF to the existing AFRF would be connected by being brought up one of the existing dolphin piles and flanged together with the existing pipeline using a new valve arrangement incorporated in-between.

8.4.4.4 The trench is assumed to be formed by a combination of trailer suction hopper dredger for the deeper areas in Urmston Road and by grab dredging for the remaining length. Sand for the pipeline backfill would be placed by bottom dumping from barges.

8.4.4.5 A possible alternative to dredging a trench for the pipelines would be horizontal directional drilling, tunnel and ploughing. These techniques have been discussed in Section 2 of this report and dismissed on engineering, programming, environmental and cost constraints.

8.4.5 Tanker Visit Frequency

8.4.5.1 The fuel reception jetty will provide two berths to allow flexibility to accommodate a full range of vessels within the size range 10,000 to 80,000dwt. Fuel would typically be received at a frequency of three times per week rising to a forecasted average of 3.6 occasions per week at the 2040 planning horizon.

8.5 Baseline Study of Landscape and Visual Resources

8.5.1 Background

8.5.1.1 Tuen Mun Area 38 is new reclaimed land zoned for industry, facing south towards Urmston Road (Harbour) with the Castle Peak as its backdrop. To the west, it is adjacent to Shiu Wing Steelworks and the Castle Peak Power Station. To the east, there is the CED reclamation site which is zoned as a resource recovery facility referred hereafter as an "Eco-Park", The landscape character in the vicinity varies between from woodland, industrial/utility, transport corridor, pier and waterfrontage, as shown in Figures 8.3.1 and 8.3.2 and the landscape resources shown in Figure 8.4. The site is open to view from the sea with a water frontage of approximately 60m in length. It is enclosed by future industrial development on the Special Industrial Area (S.I.A.), refer to Section 8.5 on S.I.A. definition. Visual resources are mainly in the local context and the sea traffic along Urmston Road (Harbour).

8.5.2 Baseline Landscape Resources

8.5.2.1 In accordance with the study brief, landscape character units (LCUs) and landscape elements have been identified within 500m from the site boundary. The LCUs have been selected depending on the presence and combination of landscape pattern, mass and scale of buildings and structures, topography, and existing vegetation. Reference was made to the Landscape Character Map of Hong Kong. For each LCU assessment has been made of its quality and sensitivity to change. The landscape elements (including trees, coastline, sea, existing roads etc) have been quantified. The methodology refers to Section 1.3. The results of the landscape baseline study are described in Table 8.5a, Table 8.5b and shown on Figures 8.3.1and 8.3.2.

8.5.2.2 The combination of the Landscape Character Units are discussed below and shown in Table 8.5a.

a. *Woodland, grassland and shrubland (LCU1)* –Existing green areas comprising woodland (of predominantly native tree species), grassland and shrubland, including major ridgelines in southwest New Territories – Castle Peak. This LCU encompasses south facing wooded slopes that provide a green backdrop to the proposed project. The topography is fairly steep, rising to Castle Peak to the north. Parts of the woodland resource Castle Peak Bay have been disturbed by formation works required for road and/or industrial uses. Despite this disturbance, LCU1 remains an important landscape resource in the local context of Castle Peak as well as Hong Kong as a whole. Because of this distinct character, LCU1 has a high landscape quality and a high sensitivity to change.

b. *Transport Corridor (LCU2)* – Existing linear structures for vehicles, Lung Mun Road. Lung Mun Road is the key local access from Tuen Mun Town Centre to Lung Kwu Tan via Tuen Mun Area 38. It is a linear engineering structure, which can always adapt to change and has a low sensitivity. Common species of roadside trees are found along the corridor. LCU2 has a medium landscape quality.

c. *Industrial/ Utility (LCU3)* – LCU3 comprises the industrial development at Castle Peak Bay including existing factories, laundry workshop, cargo terminal, steel mill and power station. This LCU has an industrial character comprising large scale infrastructure elements such as chimneys, industrial buildings and sheds and loading and unloading machinery. Much of this area comprises reclaimed land. This LCU also includes small areas of roadside amenity planting along the local road and at the entrances to industrial sites. Most of this planting is immature comprising largely whips and shrubs but with some trees (common species). It should be noted that as some construction works have already been undertaken as described in Section 1 of this report, all the road side trees to be affected by the PAFF have already been felled or transplanted. The future outlook is described under the Draft Tuen Mun OZP No. S/TM/22. Under this draft planning document the area is zoned for 'OU' (Special Industries Area) and is reserved for land-extensive and capital investment industry as well as for other special industries. Under the draft OZP further reclamation is proposed. This includes the formation of new land (currently in progress by CEDD) to the south east of the proposed site. LCU3 is assessed as having a low landscape quality and that is can accommodate change. The proposed PAFF is located within LCU3

   According to the Landscape Character Map of Hong Kong, the proposed PAFF is mapped as a LCU of "Industrial Urban Landscape" within a LCT of "Urban Landscape". The explanatory statement accompanying the Landscape Character Map states that industrial urban landscapes are "generally found on low-lying areas of reclaimed land and often along the coasts of urban areas, these are landscapes defined by their almost exclusively industrial land uses. They typically include areas of industrial buildings, often in very dense arrangements. Any occasional open areas are used for vehicle parking or open storage. Streets are mainly residual spaces, with little or no vegetation. On the peripheries, there may be areas of vacant land. These landscapes also include industrial estates: extensive areas of comprehensively developed low-rise buildings with wider roads, which are often tree lined, usually found at the edges of new towns, such as Yuen Long or Tai Po. Their unifying characteristics are their large utilitarian buildings, their limited coherence of spaces, features and materials, and absence of significant vegetation cover". The characteristics of LCU Industrial Urban Landscape/LCT Urban Landscape as identified in the Landscape Character Map were found to be in accordance with LCU3 as mapped by the LVIA and therefore LCU3 is assumed to incorporate the findings of the Landscape Character Map.

d. *Pier (LCU4)* – This LCU is characterised by berthing points for the power plant, cement works and steel mill as well as other engineered infrastructure. These aretypical landscape elements found along the Tuen Mun Area 38 waterfront. LCU4 has a low landscape quality and a low sensitivity to change.

e. *Waterfront (LCU5)* – LCU5 comprises a manmade straight edge along Area 38 with berthing points for sea vessels and harbour interface with the site. The harbour edge is formed by a typical seawall. This runs along the reclaimed area of Castle Peak Bay. Although marine habitat adjacent to the site has been disturbed by the on-going reclamation activities at Castle Peak Bay, Urmston Road (Harbour) is still recognized as a regionally significant marine habitat. The overall landscape quality and sensitivity to change of LCU5 remains high.

Table 8.5a Landscape Character Units (LCUs)

LCU	Name	Description	Quality/Sensitivity to Change
LCU 1	Woodland, grassland and shrubland	Existing green areas comprise the predominantly wooded (of native tree species) backdrop of Castle Peak and related hills.	◆ High/High
LCU 2	Transport Corridor	Existing linear structures for vehicles, Lung Mun Road.	◆ Medium/Low
LCU 3	Industrial/ Utility (incorporating LCU Industrial Urban Landscape of the Landscape Character Map of Hong Kong)	Industrial/ Utility facilities next to the sites, including power station, steel mill, river trade terminal (container terminal), pumping station and container storage and repair, warehouses, future EcoPark, C&D Recycling Facility on CEDD reclamation site etc.	◆ Low/Low
LCU 4	Pier	Built element for power plant, cement works, steel mill.	◆ Low/Low
LCU 5	Water frontage	Reclamation edge, manmade seawall.	◆ High/High

8.5.2.3 Within the 500m study, the proposed PAFF falls within Industrial/Utility (LCU3) where the local industrial landscape character comprises a unique pattern of existing uses and planned uses (refer to Section 8.5) at Tuen Mun Area 38. The landscape elements (refer to Table 8.5b) are changing due to reclamation and other construction activities and the overall quality of LCU3 will remain industrial in the future. The proposed PAFF is located on reclaimed Government land without anything on it except a temporary car park with a local access and an EVA. A total of 292 trees and whips were found at the site and in the adjacent roadside areas (23 were subsequently found missing). As part of the construction works undertaken in 2005 prior to the quashing of the original Environmental Permit, a total of 209 trees have been transplanted, 29 felled and 31 retained. As such there are no further trees or whips to be disturbed by the future works.

Table 8.5b Landscape Resources

Type	Description	Total area within the LVIA Study Area
Secondary Woodland	Existing secondary woodland associated with rocky area on the Castle Peak, north to the Proposed PAFF. Typical species are *Acacia confuse, Celtis sinensis, Cratoxylum cochinchinensis, Elaeocarpus hainanensis, Ficus virens, Ficus mircocarpa, Ficus superba, Ficus variegate, Litsea glutinosa, Machilius chekiangensis, Macaranga tanarius, Mallotus paniculata.* No Old and Valuable or Champion Trees found.	Approx. 14ha.
Trees on the site and by the road side	Planting along roads. (Of the original 292 existing trees identified adjacent and within the site area, 23 were found missing, 31 were retained, 209 were already transplanted and 29 felled by works undertaken in 2005 (see Section 1). No further disturbance to the remaining trees will occur during future works.)	Approx. 6ha (1000 nos. of trees/whips)
Cut Slope	Existing cut slope along Lung Mun Road and also near the container storage areas.	Approx. 4.7ha.
Sea		Approx. 230ha.
Transport Corridor (i.e. existing roads and footpaths)	Existing linear structures for vehicles, Lung Mun Road.	Approx. 19ha
Industrial Built-up area	Reclaimed land at Tuen Mun Area 38 along Castle Peak Bay. Built elements are power plant, cement works, steel mill, future EcoPark.	Approx. 42ha.
Manmade Coastline	Existing manmade seawall along Tuen Mun Area 38.	Approx. 2700m length

8.5.3 Baseline Visual Resources

8.5.3.1 In accordance with the study methodology in Section 8.3, the Sensitive Visual Receivers (SVRs) within the visual envelope were identified and grouped into types, as shown in Figures 8.5.1 to 8.5.4. In summary, the SVRs can be classified into five representative groupings (i.e. some groups will have more than one SVR) according to the location of the proposed PAFF as defined in Table 8.6. The visual resources closely relate to the landscape character units (LCUs). These units vary from the water frontage to the industrial/utility facilities.

8.5.3.2 To assist in determining Sensitive Visual Receivers (SVRs), a visual envelope has been determined as illustrated on Figure 8.5.1 and key views from and toward the proposed PAFF are described as below.

8.5.3.3 Key views from the proposed PAFF are:

a. partially obstructed view to the east towards the River Trade Terminal across CEDD reclamation site planned for use as an EcoPark and C&D recycling facility adjacent;
b. oblique and obstructed view to Shiu Wing Steel Mill and Castle Peak Power Station;
c. north with open view to the green backdrop of the Castle Peak;
d. south with open view to the sea (Urmston Road); and
e. south distant view to Chek Lap Kok Airport.

8.5.3.4 Key views toward the proposed PAFF are summarised in Figure 8.6 and listed below:

a. oblique and open views north across the site from the sea (Urmston Road);
b. open and partial views from Lung Mun Road immediately adjacent to the site;
c. partial obstructed view from structures in the adjacent industrial development and by future screen planting to be implemented as part of the future EcoPark (as described in the EIA for this development) which is immediately adjacent to the site;
d. distant views from north Chek Lap Kok Airport and North Lantau Express; and
e. elevated views from a future Holiday Camp at Siu Lang Shui.

8.5.3.5 Details of the SVRs are provided below and summarised in Table 8.6:

a. *SVR1* are the passengers and staff on vessels travelling along the Urmston Road Channel. They have oblique and open views north to the proposed PAFF and other industrial development at Castle Peak Bay from the sea. Their views are transient in nature and distant from the proposed PAFF. Their sensitivity to change is low.

b. *SVR2* are predominantly the drivers and passengers of vehicles using the Lung Mun Road. They largely have partially obstructed views across Area 38 which are blocked by the huge machinery at the River Trade Terminal and the Castle Peak Power Station. Although they are proximate to the proposed PAFF, these receivers are in transit and relatively small in number. Pedestrians along Lung Mun Road are relatively infrequent. Their sensitivity to change is low.

c. *SVR3* are the workers working at Tuen Mun Area 38 during working hours only. Views from the industrial buildings are limited and always blocked by the huge machinery at the River Trade Terminal and the Castle Peak Power Station. Their sensitivity to change is low.

d. *SVR4* are the passengers using the North Lantau Express and visitors and staff using the north side of Chek Lap Kok Airport. They have very distant views, at a minimum 6000m across the Urmston Road Channel to the proposed PAFF. Residents at Tung Chung in the higher towers are over 8000m distant. Their views are dominated by the foreground of Chek Lap Kok Airport and the PAFF will be a very small distant element within the general context of the Tuen Mun industrial area. Due to the local climatic conditions resulting in a high incidence of sea mist, the proposed PAFF will only be visible intermittently through out the year. Local climatic conditions mean that, in general, during spring and summer, Castle Peak

Bay cannot be seen clearly from the SVR4 location. Their sensitivity to change is medium.

e. *SVR5* are the future users of the proposed Holiday Camp at Siu Lang Shu. The future users would overlook the proposed PAFF from the north-east from a distance of approximately 730 metres. The PAFF would be a conspicuous view when seen from this location. The most noticeable objects would be the fuel tanks which would dominate the middle-ground of the view, framed by existing vegetation in the foreground and the sea in the background. The sensitivity to change would be medium as the camp would not be permanently occupied and the main users would use the facility for a brief period only.

8.5.3.6 Principal viewpoints (Vpt.) are selected from each SVRs to illustrate their sensitivity and the extent of change with the proposed PAFF (see Figure 8.5.1).

Table 8.6 Sensitive Visual Receivers

SVR	Name	Nature of Viewer Group	Distance to Proposed PAFF	Frequency and duration of view towards proposed PAFF and source of impact type of view	Value and Quality of Existing View towards PAFF	Availability and amenity of alternative views	Sensitivity to change and visual intrusion
SVR 1	Sea traffic along Urmston Road *Vpt. 1Urmston Road near River Trade Terminal* Quantity of SVRs: *small*	Passengers and Workers on vessels using Urmston Road Channel	200m-5000m 2141m	Oblique and open views north across the site from the sea Low frequency transition view during daytime	Immediate foreground of sea and distant background views of attractive vegetated hillsides. Middleground view dominated by steel mill, industrial in appearance, not considered attractive or interesting	Wide range of alternative views available which are high in amenity value.	◆ Low
SVR 2	Traffic from Lung Mun Road *Vpt. 2 Elevated view from Lung Mun Road* Quantity of SVRs: *small*	Passengers + pedestrians	50m-2000m 50m	Partial view towards south Area38 blocked by River Trade Terminal. Low frequency transition view during day & night	Immediate foreground of sea and distant background views of attractive vegetated hillsides. Middleground view dominated by steel mill, industrial in appearance, not considered attractive or interesting	Wide range of alternative views available which are high in amenity value.	◆ Low

SVR	Name	Nature of Viewer Group	Distance to Proposed PAFF	Frequency and duration of view towards proposed PAFF and source of impact type of view	Value and Quality of Existing View towards PAFF	Availability and amenity of alternative views	Sensitivity to change and visual intrusion
SVR 3	Industrial/ Utility facilities *Vpt. 3.1 From River Trade Terminal* *Vpt. 3.2From Proposed Eco-Park (Resource Recovery Park)* Quantity of SVRs: *small*	Workers at River Trade Terminal Tuen Mun Area 38, EcoPark, C&D Recycling facility	250m-4000m 1800m 250m	Partial and obstructed views toward the site blocked by ancillary machinery and structures at the River Trade Terminal and Castle Peak Power Station Low frequency view during working hours	Immediate foreground of sea and distant background views of attractive vegetated hillsides. Middleground view dominated by steel mill, industrial in appearance, not considered attractive or interesting	Wide range of alternative views available which are high in amenity value.	◆ Low
SVR 4	North Lantau development including Tung Chung *Vpt. 4.1 Chek Lap Kok Airport* *Vpt. 4.2 North Lantau Highway/Airport Railway/MTR Tung Chung Line* *Vpt 4.3 Tung Chung Residents* Quantity of SVRs: *large*	Staff + Visitors + Passengers and Local Residents of Tung Chung	Over 6000m Residents of Tung Chung are over 8000m distant from PAFF	Very Distant and transient view towards the site Medium frequency view during daytime	Foreground to distant background dominated by water views, amenity considered to be very high,	Wide range of alternative views available also high in amenity	◆ Medium

SVR	Name	Nature of Viewer Group	Distance to Proposed PAFF	Frequency and duration of view towards proposed PAFF and source of impact type of view	Value and Quality of Existing View towards PAFF	Availability and amenity of alternative views	Sensitivity to change and visual intrusion
SVR5	Siu Lang Shui Holiday Camp *Vpt 5 Future users* Quantity of SVRs - *Small*	Staff and users of proposed Holiday camp	730m	Open and unobstructed views	High amenity value	Wide range of alternative views available high in amenity value	◆ Medium

8.5.3.7 In addition, views from residents at Tuen Mun Town and Lung Kwu Tan have also been considered. Although they are about 2km away or more from the site and screened by natural topography, photographs have been taken from the view point options (Vpt. A1 – A3) in Table 8.7 to demonstrate that they are out of the visual envelope of the proposed PAFF, as shown in Figure 8.5.3.

Table 8.7 Viewpoint Options from the Nearest Residents

Vpt. Options	Name	Nature of Viewer Group	Distance to Proposed PAFF	Type of view
Vpt. A1	Lung Kwu Tan	Residents + Visitors	over 1700m	Obstructed Views toward the site, blocked by Tap Shek Kok and Castle Peak Power Station.
Vpt. A2	Melody Garden near Butterfly Beach	Residents + Visitors	over 3600m	Obstructed/ Elevated Views toward the site, blocked by natural topography.
Vpt. A3	Tuen Mun Ferry Pier Residential Blocks Miami Beach Tower	Residents	over 4000m	Obstructed/ Elevated Views toward the site, blocked by natural topography and River Trade Terminal.

8.5.3.8 The lookout point in the Marine Park at Sha Chau is a dolphin survey point used only by AFCD. It is not accessible by the public and, hence, not considered as a SVR.

8.6 Review of Planning and Development Control Framework

8.6.1 The planning and development control framework is shown in Figure 8.4. The broad statutory planning framework and intention for the proposed site is currently covered by the Draft Tuen Mun Outline Zoning Plan (OZP) No. S/TM/22 exhibited on 27.10.2006. According to the Draft Tuen Mun OZP No. S/TM/22, the Site is zoned for 'OU' (Special Industries Area). This area is reserved for land-extensive and capital investment industry as well as for other special industries. This may include uses such as the proposed PAFF. Under Column 2 of the Statutory Notes, a 'Utility Installation not Ancillary to the Specified Use' may be permitted with or without conditions on application to the TOWN PLANNING BOARD (OZP and Statutory Notes at the front of this Statement refer).

8.6.2 The area in which the Site is located (i.e. Planning Area 38) will be dominated by industrial and OU uses (OZP at the front of this Statement refers). These include existing and proposed uses such as the Castle Peak Power Station, Green Island Cement Plant, Shiu Wing Steel Mill, 'Special Industries Area', a River Trade Terminal, piers, Container Storage and Repair Depot, Breakwater, and Sewerage Treatment Plant. These are all non-sensitive uses. The proposed PAFF would, therefore be compatible with adjacent developments.

8.6.3 The **non-statutory** Planning Context is indicated in the Tuen Mun New Town Areas 38 & 47 Layout Plan which was adopted on 2 June 1992 (Figure 3.1), the sites along Lung Mun Road (including the Site) are zoned for Industrial (Types B and C) uses. The proposed PAFF site falls within a site reserved for a Centralised Incineration Facility (Site B), a

Chemical Waste Bulking/ Treatment Plant (Site C) and two other sites reserved for industrial uses (Sites D and E). With the proposed PAFF, the incinerator and waste treatment plant sites are likely to be relocated elsewhere within the Tuen Mun Area 38 (e.g. Sites F to Q).

8.6.4 **Other non-statutory guidance** from Government on the need for PAFF has been recognised by the HKSAR Government. In March 2001, the facility received support from the Chief Secretary, Sir Donald Tsang and Government bureaux. There has been ongoing liaison with the Advisory Council on the Environment (ACE), Green Groups, the Country and Marine Parks Board (CMPB), and the Tuen Mun District Council. Most departments and organisations have given in-principle support to Tuen Mun Area 38 as the preferred site for the PAFF. There has been, in conjunction with Government, ongoing consultation with the Tuen Mun District Council (who are the only objectors to the proposed project). The local community has voiced concerns over risk and visual matters. The Airport Authority has given a commitment that adverse landscape and visual impacts would be fully mitigated and with a resultant negligible residual impact.

8.6.5 **The future planning outlook** and interface with sensitive uses and sensitive visual receivers indicates that Tuen Mun Area 38 will remain designated as a 'Special Industries Area'. There are a number of potential uses for the area. These include Environmental Protection Department's 20 ha Eco-Park (Resource Recycling Park) located southeast of the proposed PAFF. Processing plants for batteries, electrical and electronic appliances, glass, metal, organic waste, waste oil, paper, plastics and foam, textile waste, toner cartridge, tyre, wood, etc. may also be included within the Park. The PAFF would be likely to interface with these future uses. However since all the proposed uses are non-sensitive uses, the interface can be ameliorated by buffer planting, sensitive site layout and orientation. These possible future uses have a low sensitivity and given the overall industrial context it is predicted that PAFF would result in a negligible change and impact on such uses.

8.6.6 In accordance with the broad statutory planning framework mentioned above, the planning of Tuen Mun Area 38 is particularly for industries, which require large pieces of land and high capital investment. Since the proposed PAFF development complies with this planning intention, no potential conflicts are found with respect to landscape and visual impacts with the existing planning and development control framework.

8.7 Landscape and Visual Impact Assessment during Construction

8.7.1 Background

8.7.1.1 The proposed site is on reclaimed land. Potential construction impacts will be building materials delivery, dredging for the pipeline, piling and construction activities of the jetty, formation of the access road and associated facilities. Construction of the 12 proposed fuel tanks would be in phases over about a 30 year period. Phase 1 will comprise construction of the first 8 cylindrical fuel tanks, the administration block, proposed jetty and landscaped perimeter bunds. In order to meet the future demand of the aviation fuel storage, future expansion is required and fuel tanks will be required until 2040.

8.7.2 Prediction and Evaluation of Landscape Impacts during Construction (without Mitigation Measures)

8.7.2.1 A landscape impact is a physical change to an existing landscape resource. By mapping the extent and location of these changes, any loss or alteration can be assessed and, where possible, re-provisioned or compensated by landscape mitigation measures incorporated into a Project.

Disturbance to Existing Vegetation

8.7.2.2 Construction activities will comprise site formation and building of fuel tanks and administration blocks. Site formation includes clearance of the whole site. Earthworks will be undertaken to form a low bund around the tanks comprising a concrete containment bundwall, access road and security fencing. The fuel tanks will be located inside these bunded areas. Other sources of construction impacts will result from storage of construction materials and the movement of machinery. As detailed in Section 1, some construction works have been undertaken under the previous Environmental Permit EP-139/2002/A. These activities have included some site clearance. As such, 209 trees have already been transplanted and these transplanted trees, the remaining 31 trees retained and other vegetation within LCU3 will not be further disturbed by future works. The high landscape quality of the natural setting of Castle Peak (LCU1) behind the proposed PAFF will remain unaffected.

Disturbance of the Existing Waterfront

8.7.2.3 The construction activity of the proposed jetty, (which is 200m away from the waterfront) and dredging for the seabed pipelines will result in some disturbance to LCU5. Approximately 60m of existing manmade waterfront and approximately 1.5 hectares of sea area will be affected. The proposed jetty massing is low, long and narrow. Connecting pipes are laid under the sea. The jetty proposal will therefore result in a slight/moderate change to the existing condition. Compared to disturbance resulting form the CEDD reclamation that has been undertaken next to the proposed PAFF, the jetty construction impact will be comparatively small. Corresponding landscape mitigation measures are discussed in Section 8.10.

Disturbance of the Industrial/Utility Areas

8.7.2.4 The site for the proposed PAFF comprises about 6.75 hectares of reclaimed land in LCU 3. It is currently fenced and used as a material storage and car parking area. Compared to the neighbouring industrial facilities, such as River Trade Terminal, Castle Peak Power Station, EcoPark and C&D recycling facility, as well as the construction activities at the Castle Peak Bay, the construction impacts of the proposed PAFF will be relatively small. None of the ferry piers of LCU 4 will be affected.

8.7.2.5 During construction, LCU3 and LCU5 will have “slight adverse” impacts. These result from the site formation and the construction of the initial phase of the tank farm (8 tanks). The magnitude of change to LCU3 and LCU5 is assessed as small when considered in relation to the industrial context of the neighbouring heavy industry. The landscape character of LCU1, LCU2 and LCU4 will remain unchanged, as summarised in Tables 8.9a, Tables 8.9b and 8.10.

Table 8.9a Summary of Disturbance to Landscape Character Units (without Mitigation Measures)

Description	Disturbances
LCU 1 Woodland, grassland and shrubland	Nil
LCU 2 Transport Corridor	Nil
LCU 3 Industrial/Utility (incorporating LCU Industrial Urban Landscape of the Landscape Character Map of Hong Kong)	About 6.75 ha. of land zoned for Industrial Uses
LCU 4 Pier	Nil
LCU5 Waterfront	Approx. 60m length of disturbed waterfront.

Table 8.9b Summary of Disturbance to Landscape Elements (without Mitigation Measures)

Type of Landscape Element	Total area within the Study Area of the PAFF	Area in Interaction with the PAFF
Secondary Woodland	Approx. 14ha.	Nil
Cut Slope	Approx. 5ha.	Nil
Sea	Approx. 230ha.	Approx. 1.5ha. sea area
Transport Corridor (i.e. existing roads and footpaths)	Approx. 19ha	375m long existing access road.
Industrial Built-up area	Approx. 42ha.	Approx. 6.75ha. reclaimed land
Manmade Coastline	Approx. 2700m length	60m length
Roadside vegetation	Approx 6ha	0.25ha

8.7.3 Prediction and Evaluation of Visual Impacts during Construction (without Mitigation Measures)

8.7.3.1 In general, the main source of the unmitigated visual impact on all SVRs is the tanks. The massing and scale of these structures would make them noticeable and distinctive objects in the foreground when viewed from within two to three kilometres (see Figures 8.8.1 and 8.8.4). The ancillary structures such as offices, workshops and jetty are not considered to be significant sources of visual impact. Beyond three kilometres, the attenuating effects of distance, the surrounding industrial setting and the availability of alternative views would make the tanks less distinctive although they would remain noticeable if the viewer was looking directly at them (see Figure 8.8.8). Table 8.11a describes how the magnitude of visual change was assessed for each of these conditions, while Table 8.11b summarises the resulting visual impacts.

8.7.3.2 The visual impacts arising assuming no mitigation measures will be:

a. the interruption and obstruction of views northwards by built elements and the dredging activities from the vessels using the Urmston Road (Harbour) will result in “slight adverse” visual impacts for SVR1;

b. the conspicuous interruption and obstruction of views southwards towards the Harbour from the vehicles using Lung Mun Road, will result in "slight/moderate" visual impacts for SVR2 (see Figure 8.8.4);
c. the conspicuous interruption and obstruction of views along the waterfront from the adjacent properties will result in "slight/moderate" visual impacts for SVR3 (see Figure 8.8.1);
d. the change of visual quality northwards from the distant North Lantau Island would be small owing to the distance and will result in "slight/moderate adverse" visual impacts for SVR4; and
e. the proposed Holiday Camp at SVR5. As the PAFF is more advanced in terms of project planning, it is assumed that the initial phase of the PAFF would be constructed before the Holiday Camp is operational. Therefore, no visual impacts are predicted for SVR5 during construction phase of the PAFF. Figure 8.8.8 illustrates the appearance of the tanks from this location in any case

8.7.3.3 The visual envelope shown on Figure 8.5.1 illustrates the possible inter-visibility of views toward the proposed project. Although the visual envelope extends south to Lantau (including Tung Chung and Chep Lap Kok Airport), north toward Castle Peak, east along the sea channel to Tai Lam Chung and Yam O and west to Sha Chau Island many of these views are over very long distances (over 8km). At these distances the proposed project it is predicted that the proposed project will result in an imperceptible magnitude of change and negligible adverse impact. Importantly, for potentially local sensitive residents at Lung Kwu Tan to the north west and adjacent Butterfly Beach to the east it is assessed that local topography will obstruct views to the proposed project. These local residents will therefore not be adversely impacted by the proposed project.

8.8 Landscape and Visual Impact Assessment during Operation (without Mitigation Measures)

8.8.1 Background

8.8.1.1 The PAFF is a static storage facility. Few operational activities will be involved in the day to day running of the facility. The initial operational phase of the PAFF will not result in any further perceptible changes to the existing landscape and visual character. Although permanent built elements intrude into the local landscape context, the overall quality of the industrial context will remain unchanged. It is anticipated that new tanks will be built in one additional phase between 2025 and 2040 until the development comprises a total of 12. The development will be completed by 2040. This construction programme is related to the future expansion and demand at the Airport. Cumulative landscape and visual impacts will result from the construction of the additional fuel tanks.

8.8.2 Prediction and Evaluation of Landscape Impacts during Operation (without Mitigation Measures)

8.8.2.1 During operation from 2009 to 2025 it is predicted that the magnitude of change from the baseline condition will be negligible. With the gradual and periodic construction of new fuel tanks after 2025, a "slight adverse" landscape impact to LCU3 is predicted as shown in Table 8.10. No change is predicted to the other LCUs.

8.8.3 Prediction and Evaluation of Visual Impacts during Operation (without Mitigation Measures)

8.8.3.1 The visual impacts in comparison to the baseline condition arising from the initial operation phase of PAFF and its gradual and periodic expansion to 2040 are discussed below. Table 8.11a describes how the magnitude of visual change was assessed for each of these conditions, while Table 8.11b summarises the resulting visual impacts.

a. visual impacts to SVR1 resulting from an increase in vessel traffic using the Urmston Road will be small. The PAFF vessel traffic will constitute less than 1% (0.2%) of the existing traffic volume at initial phase (see Table 3.3). Visual impacts to SVR1 resulting from the presence of the fuel tanks are predicted to be also "slight", owing to the small level magnitude of change to the VSR and the low sensitivity of the VSR, but adverse as they will block views of the hills behind;
b. In the initial phases, the new tanks will constitute "intermediate" changes within the views looking from SVR2 to SVR3. Although in general the project is compatible with the existing surrounding industrial landscape (e.g. the River Trade Terminal and the Shiu Wing steel mill) and will be compatible with the future EcoPark resource recycling centre when it is constructed, the new tanks will constitute an "intermediate" magnitude of change when viewed from these locations. This will result in "slight/moderate" visual impact;
c. When viewed from SVR4, the magnitude of change will be small, however this SVR is sensitive to change (owing to the presence of residents) and therefore the visual impact will be "slight/moderate adverse";
d. In the expansion phases from 2025 to 2040 the new tanks will generally be placed and obscured by those constructed in the initial phase. As a result the cumulative magnitude of change for SVR1 and SVR4 that could result from the maximum utilisation of PAFF, is predicted to be no worse than the initial phase;
e. for SVR2 the cumulative impact from expansion of PAFF to 2040 (through interruption/obstruction in views from the south) is predicted to result in a "moderate" visual impact as Lun Mun Road is very close to the development;
f. for SVR3 the cumulative impact from expansion of PAFF to 2040 (through interruption/obstruction in views from the adjacent properties) will result in "moderate" visual impacts as the four new tanks will be relatively obvious new elements in the scenery;
g. cumulative adverse visual impacts will result from the permanent intrusion up 12 fuel tanks at 2040; and
h. It is assumed that the initial phase of the PAFF would be constructed before the Holiday Camp at SVR5 is operational, as the PAFF implementation programme is running well in advance. After the Holiday Camp is implemented, the PAFF initial phase development would be an existing element within the view and appear as a conspicuous element. Owing to its industrial appearance, it is unlikely to contribute to an attractive outlook when viewed from the future camp. If the Holiday Camp were operational before the PAFF initial phase development and the fuel tanks were introduced into the existing view, the visual impact could be considered as "significant adverse". However, where the development is pre-existing to the SVR, it is concluded that that visual impact must be less and therefore no visual impact is predicted during the operation of the PAFF initial phase. During the PAFF expansion phase, the change in the middle-ground view would be conspicuous as additional fuel tanks are constructed. Under these

circumstances the visual change is likely to be intermediate. The choice of "intermediate" rather than "high" visual change is based on the judgement that large fuel tanks would already be a conspicuous part of the middle ground. Under these circumstances, visual impact is predicted to be "moderate adverse" during the expansion phase of operation (2025 to2040).

8.9 Night-time Glare Assessment

8.9.1 In order to meet safety and security requirements permanent 24 hours lighting of the proposed PAFF is necessary. As the lighting requirements for these types of facilities are standard, they will be very similar to those used on the existing Chek Lap Kok Facility. Night-time glare is potentially a significant visual impact. Studies of the night-time glare from the existing Chek Lap Kok fuel tank farm give an estimate of the potential glare from the proposed PAFF. Figure 8.6.2 indicates the night-time lighting of existing Chek Lap Kok fuel tank farm. As shown, lighting is required along staircases and railings only. The intensity, luminance and lighting levels of the fuel tank farm are low. Lighting is generally focussed and shielded to reduce glare and illuminate required areas only. Compared to road lighting the levels are low.

8.9.2 The impact of night-time lighting of the proposed PAFF will be reduced due to its remote location away from residents and sensitive receivers. The impact will be further mitigated by its absorption into the overall and existing night-time glare of the neighbouring industry, including the River Trade Terminal (24 hours container delivery operation) and the Castle Peak Power Station. Night-time glare from these facilities will be more conspicuous than that for the proposed PAFF. A slight cumulative impact from night glare is anticipated as the tank farm expands over the period from 2025 to 2040. However, it is predicted that the magnitude of change will be small resulting in "slight/negligible adverse" impact.

Table 8.10a Summary of Landscape Impacts on LCUs (without Landscape Mitigation Measures)

LCU Name	Disturbed Area	Quality/ Sensitivity to Change	Construction Phase		Operation Phase Initial Phase		Operation Phase 2025 - 2040	
			Magnitude of Change and Source of Landscape Impact	Significance Threshold of Landscape Impact	Magnitude of Change during Operation Phase	Significance Threshold of Landscape Impact	Magnitude of Change during Operation Phase	Significance Threshold of Landscape Impact
LCU 1 Woodland, grassland and shrubland	Nil	High	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
LCU 2 Transport Corridor	Nil	Low	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
LCU 3 Industrial/ Utility (incorporating LCU Industrial Urban Landscape of the Landscape Character Map of Hong Kong)	Approx. 6.75 ha.	Low	Small (site formation + construction of fuel tanks & administration blocks + delivery construction materials + temporary hoarding)	Slight Adverse	Negligible	Negligible	Small (fuel tank farm extension of 4 tanks)	Slight Adverse
LCU 4 Pier	Nil	Low	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
LCU 5 Water frontage	Approx. 60m long for administration blocks approx. 1.5ha. sea area for the proposed jetty	High	Small construction of jetty + delivery construction materials + dredging seabed + temporary hoarding	Moderate Adverse	Negligible	Negligible	Negligible	Negligible

Table 8.10b Summary of Landscape Impacts on Landscape Elements (without Landscape Mitigation Measures)

Type of Landscape Element	Disturbed Area	Quality/ Sensitivity to Change	Construction Phase		Operation Phase Initial Phase		Operation Phase 2025 - 2040	
			Magnitude of Change and Source of Landscape Impact	Significance Threshold of Landscape Impact	Magnitude of Change during Operation Phase	Significance Threshold of Landscape Impact	Magnitude of Change during Operation Phase	Significance Threshold of Landscape Impact
Secondary Woodland	Nil	High	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
Cut Slope	Nil	Low	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
Sea	Approx. 1.5ha. sea area reclaimed	High	Small	Moderate	Negligible	Negligible	Negligible	Negligible
Transport Corridor (i.e. existing roads and footpaths)	375m long existing access road.	Low	Small	Slight	Negligible	Negligible	Negligible	Negligible
Industrial Built-up area	Approx. 6.75ha. previously reclaimed land	Low	Small	Slight	Negligible	Negligible	Negligible	Negligible
Manmade Coastline	60m length	Low	Small	Slight	Negligible	Negligible	Negligible	Negligible
Roadside vegetation	0.25ha	Low	Small	Slight	Negligible	Negligible	Negligible	Negligible

Table 8.11a Assessment of Visual Magnitude of Change (without Landscape Mitigation Measures)

SVR1			
Items	**Construction Phase**	**Operation Phase (Initial Phase)**	**Operation Phase (2025-2040)**
a. compatibility of the project with the surrounding landscape	Compatible	Compatible	Compatible
b. duration of impacts under construction and operation phases	Temporary	Approximately 40 years	Approximately 40 years
c. scale of development (when viewed from this SVR)	Distinctive but not out of scale	Distinctive but not out of scale	Distinctive but not out of scale
d. reversibility of change	Reversible	Reversible	Reversible
e. viewing distance	2km	2km	2km
f. potential blockage of view	Low	Low	Low
Magnitude of Visual Change SVR1	**Small**	**Small**	**Small**

SVR2			
Items	**Construction Phase**	**Operation Phase (Initial Phase)**	**Operation Phase (2025-2040)**
a. compatibility of the project with the surrounding landscape	Compatible	Compatible	Compatible
b. duration of impacts under construction and operation phases	Temporary	Approximately 40 years	Approximately 40 years
c. scale of development (when viewed from this SVR)	Large and Distinctive	Large and Distinctive	Large and Distinctive
d. reversibility of change	Reversible	Reversible	Reversible
e. viewing distance	50m	50m	Next to SVR
f. potential blockage of view	High	High	High
Magnitude of Visual Change SVR2	**Intermediate**	**Intermediate**	**Large**

Table 8.11a (continued) Assessment of Visual Magnitude of Change (without Landscape Mitigation Measures)

SVR3			
Items	**Construction Phase**	**Operation Phase (Initial Phase)**	**Operation Phase (2025-2040)**
a. compatibility of the project with the surrounding landscape	Compatible	Compatible	Compatible
b. duration of impacts under construction and operation phases	Temporary	Approximately 40 years	Approximately 40 years
c. scale of development (when viewed from this SVR)	Distinctive	Distinctive	Distinctive
d. reversibility of change	Reversible	Reversible	Reversible
e. viewing distance	250m	250m	250m
f. potential blockage of view	High	High	High
Magnitude of Visual Change SVR3	**Intermediate**	**Intermediate**	**Large**

SVR4			
Items	**Construction Phase**	**Operation Phase (Initial Phase)**	**Operation Phase (2025-2040)**
a. compatibility of the project with the surrounding landscape	Compatible	Compatible	Compatible
b. duration of impacts under construction and operation phases	Temporary	Approximately 40 years	Approximately 40 years
c. scale of development (when viewed from this SVR)	Noticeable but not out of scale	Noticeable but not out of scale	Noticeable but not out of scale
d. reversibility of change	Reversible	Reversible	Reversible
e. viewing distance	6km	6km	6km
f. potential blockage of view	Low	Low	Low
Magnitude of Visual Change SVR4	**Small**	**Small**	**Small**

Table 8.11a (continued) Assessment of Visual Magnitude of Change (without Landscape Mitigation Measures)

SVR5			
Items	**Construction Phase**	**Operation Phase (Initial Phase)**	**Operation Phase (2025-2040)**
a. compatibility of the project with the surrounding landscape	SVR not existing	SVR not existing	Compatible
b. duration of impacts under construction and operation phases			Approximately 40 years
c. scale of development (when viewed from this SVR)			Conspicuous in middleground
d. reversibility of change			Reversible
e. viewing distance			730m
f. potential blockage of view			Low
Magnitude of Visual Change SVR5	**Not Applicable**	**Not Applicable**	**Intermediate**

Table 8.11b Assessment of Visual Impacts (without Landscape Mitigation Measures)

SVR	Name	Sensitivity to Change and Visual Intrusion	Construction Phase		Operation Phase Initial Phase		Operation Phase 2025 – 2040*	
			Magnitude of Visual Change	Significance Threshold of Visual Impact	Magnitude of Visual Change	Significance Threshold of Visual Impact	Magnitude of Visual Change	Significance Threshold of Visual Impact
SVR 1	Sea traffic along Urmston Road *Vpt. 1 Urmston Road near River Trade Terminal* Quantity of SVRs: *small*	Low	Small	Slight Adverse	Small	Slight Adverse	Small	Slight Adverse
SVR 2	Traffic from Lung Mun Road *Vpt. 2 Elevated view from Lung Mun Road* Quantity of SVRs: *small*	Low	Intermediate	Slight/Moderate	Intermediate	Slight/Moderate	Large	Moderate
SVR 3	Industrial/ Utility facilities *Vpt. 3.1 From River Trade Terminal* *Vpt. 3.2EcoPark (Resource Recovery Park)* Quantity of SVRs: *small*	Low	Intermediate	Slight/Moderate	Intermediate	Slight/Moderate	Large	Moderate
SVR 4	North Lantau Development including Tung Chung Quantity of SVRs: *large*	Medium	Small	Slight/Moderate Adverse	Small	Slight/Moderate Adverse	Small	Slight/Moderate Adverse
SVR 5	Siu Lang Shui Holiday Camp *Vpt 5 Future users* Quantity of SVRs - *small*	Medium	Not Applicable	None	Not Applicable	None	Intermediate	Moderate Adverse

* Operation Phase 2025-2040 has been compared to the baseline case

8.10 Recommended Landscape and Visual Mitigation Measures

8.10.1 Background

8.10.1.1 The assessment in the previous section predicts that the majority of visual impacts both during construction and initial operation at 2009 and expansion from 2025 to 2040 will be "slight adverse". The impact on the landscape character is predicted as negligible primarily because of the existing industrial landscape character into which the proposed PAFF will be located, as well as its remote and enclosed location. Minor adverse impacts include: a "slight adverse" landscape impact to the "Industrial/Utility" LCU 3 during construction and operation phase 2025 to2040, and a "moderate adverse" landscape impact to the "Water Frontage" LCU5 during construction. Impacts on the visual resources and SVRs are also predicted to be slight, primarily due to the remote and enclosed location of the proposed PAFF. A "slight adverse" visual impact is, however, predicted to viewer groups at SVR2 and SVR3 at Year 2040, when the tank farm is at capacity.

8.10.1.2 The key source landscape impacts arise from construction activities, such as building material delivery, construction of jetty, fuel tanks and associated facilities. The key source of the visual impact is the permanent intrusion of the jetty and fuel tanks in views from all SVRs.

8.10.1.3 In order to mitigate these impacts a comprehensive range of landscape mitigation measures (LMMs) and landscape framework have been developed in-conjunction with the site planning and phasing of the site. The landscape framework includes the following enhancement and mitigation measures to be implemented in the construction phase:

a. managed construction programming (LMM1);

b. landscaped perimeter bund and buffer planting (LMM2);

c. advanced transplantation of existing trees (LMM2);

d. selection of fast growing and native tree and shrub mixes (LMM2); and

e. recessive colours and recessive night-time lighting to tanks and associated buildings (LMM3 and LMM4).

8.10.1.4 All of the above landscape mitigation measures have been confirmed with the project proponent for incorporation into the proposed PAFF. The mitigation measures are summarised in the following paragraphs and outlined in Tables 8.12 and 8.13, Figures 8.7.1 and 8.7.2 and in the Environmental Mitigation Implementation Schedules in Appendix B. No off-site mitigation measures have been proposed. Table 8.14 gives a full description of the Landscape Mitigation Measures and their proposed programming, funding, implementation, management and maintenance.

8.10.2 Landscape Mitigation Measure 1 (LMM1) –Managed Construction Programming and Soil Conservation

8.10.2.1 Soil conservation is consideration in the management of the construction process. Existing soil resources on site such as at the existing amenity areas will be conserved in stockpiles with a maximum height of 2m, and re-used in the formation of the proposed landscaped perimeter bund (see LMM2) as far as possible. In addition soil required in formation of the temporary bund will also be conserved and stored for use on and/or off site. Work on the bunds using material from the site has already commenced under the previous Environmental Permit EP-1/39/2002/A prior to the suspension of works following the Judgement of the Court of Final Appeal of July 2006.

8.10.2.2 The construction programme for the PAFF should be reduced to the shortest possible period. Additionally, the extent and periphery of the works areas should be managed so that they are as small as possible and do not appear cluttered, untidy and unattractive, particularly to road traffic along Lung Mun Road. Temporary hoarding barriers should be of a recessive visual appearance in both colour and form. Measures should be implemented during construction to store materials in areas with the least obstruction to residents, pedestrians and traffic and cover all material stockpiles (2m high maximum) with impermeable material and sandbagging diversions around exposed soil. Construction of fuel tank expansion should be in a group of 4 to minimise the construction impacts over the period from 2025 to 2040.

8.10.3 Landscape Mitigation Measure 2 (LMM2) – Advanced Transplantation and Boundary Planting Buffer/Perimeter Landscape Bund

8.10.3.1 In accordance with the recommendation of the previous EIA Report (April 2002) which stated that the transplantation of the existing road side and site trees and vegetation should be undertaken as early as possible in the construction period, as noted above, the transplantation of 209 trees and whips was undertaken at the very start of the original construction period in 2005 prior to the quashing of the Environmental Permit and the subsequent suspension of works. A raised landscaped perimeter bund comprising containment bund-wall, access road and planting buffer is proposed around the tank farm. The planting buffer will be planted on the higher parts of the bund. This measure will help soften and screen the built elements and mitigate the landscape and visual impacts (refer to Figures 8.7.1 & 8.7.2). Planting will be undertaken to form a perimeter landscaped bund around the site at phase 2009. This will allow the maximum time for establishment period and higher success rate for the survival and the early establishment of new screen and compensatory planting. The planting buffer will comprise a mix of native species and species that have a tall habit and are fast growing. This will include rows of Causuarina (*Causuarina equisetifolia*) trees that will form a tall and evergreen buffer. The Causuarina trees are anticipated to form an effective and mature screen by 2040. The following boundary planting mix is proposed:

a. **Dominant Species:** *Causuarina equisetifolia* (Planted as whips and heavy standards/mature specimens where required) will be used to provide the screen effect and will therefore form the dominant species.

b. **Edge Species:** Native and dense mix of planting is proposed along the edge (and within) of the dominant species. This will provide a more mixed edge effect and break-up the overall visual dominance of the Causuarina. The following species are proposed:

Trees Low maintenance, salt and wind tolerant tree planting of heavy-standard and seedling sized trees	**Shrubsand Small Tree Mix** Low maintenance, salt and wind tolerant densely planted large shrubs	**Hydro_seeding Shrub and Groundcover mix** Low maintenance, salt and wind tolerant grass and shrub planting
Tristania conferta	Nerium indicum	Thevetia peruviana
Cassia suranttensis	Thevetia peruviana	Nerium indicum
Cassia siamea	Bauhinia tormentosa	
Bombax malabaricum	Bauhinia galpinii	Ligustrum sinense
Casuarina equetisetifolia	Bauhinia acumentata	
Sapium discolour	Hibiscus rosa-sinensis	Mekastoma candidum
Schefflera octophylla	Murraya paniculata	Clerodendron fragrans
Ficus microcarpa	Rhododendron pulchrum	Cynodon dactylon (Bermuda grrass)
Malaleuca leucadendron		Paspalum notadum
Schima superba		Lolium perenne
Schefflera aboricola		

8.10.3.2 A planting scheme will be implemented as shown on Figures 8.7.4 and 8.7.5. It will comprise planting on the proposed planting buffer at Day 1 of the construction period, site boundary and along Lung Mun Road. Compensatory planting should be at a minimum 1 to 2 basis, comprising a matrix of semi-standard and transplants at a proposed rate of 4-6m centres. A 24-month maintenance (including defects liability) period will also be needed to ensure the transplantation of the trees already undertaken and plant establishment for compensatory tree planting is successful, (refer to Figures 8.7.1-8.7.5).

8.10.4 Landscape Mitigation Measure 3 (LMM3) – Compact Site Planning and Sensitive Design

8.10.4.1 Apart from functional issues a primary role of the architectural and landscape design is to reduce adverse visual and landscape impacts to an acceptable level if possible. The key design considerations:

a. **Site planning:** a layout which is compact as possible: This will primarily be driven from the refinement of the engineering requirements. Limiting and concentrating the zones of activity will help reduce visual impact;

b. **Visual Screens:** landform, landscaped perimeter bunds, screen planting, walls, and fences will be used to hide activities from view. The design of the structures themselves will have a visual impact and must be designed to reduce this as far as possible; and

c. **Coherent Design of Structures and Materials:** producing a family of structures and treatments will help co-ordinate appearance and lessen visual impact from different activities.

8.10.4.2 The tanks and jetty will be standardised components. Due to the high safety and risk standards that these built elements have to meet there is little opportunity to amend their design. For these built elements it is recommended that there are finished in a non-reflective neutral grey colour with a low chromatic intensity to reduce the potential contrast between the structures and their background.

8.10.4.3 The design of the administration office and the associated elements should incorporate materials, details and textures so as to be as visually recessive and in a style that fits with the surrounding industrial setting. The following is recommended:

a. **Massing and Form:** The building massing will appear less if the roofs have a thin edge and if walls are set back, and are dark either in colour or by being in shadow;

b. **Colour:** to assist the proposed built forms to recess and blend into their surroundings the use of light colours and tones of grey, green and blue are recommended. The colours surrounding the PAFF site are influenced by the reflectance of light and colour of the sea. Colours within the immediate vicinity are muted, generally light hues and tones of grey, green and blue;

c. **Roofs:** For the roof a fired rated, durable (up to 25 years), insulated, self cleansing, rigid curved metal cladding system is proposed (either steel or aluminium). There are several standard products locally available which would be suitable. A non-reflectant (matt and/or textured) finish would be required; and

d. **External Walls:** For the external walls it is proposed that the Office accommodation be finished in an aluminum panel to match and signify the important role of this component. General walls to be finished in ceramic tile (self cleaning/dust-proof) and/or durable textured external spray paint (Cost effective).

8.10.4.4 The phasing of PAFF will have a significant impact on its cumulative landscape and visual impact. The following phasing is recommended:

a. **Advanced Planting, and Permanent Landscaped Perimeter Bunds:** to be commenced on Day 1 of construction.

8.10.5 Landscape Mitigation Measure 4 (LMM4) – Minimise the Night-time Glare

8.10.5.1 Compared to the existing fuel tank farm at Chek Lap Kok, the possible night-time glare from the proposed PAFF is not significant to the Tuen Mun Area 38, see Figure 8.5b, as night time glare is also found in the neighbourhood, such as from the River Trade Terminal and the Castle Peak Power Station. However, the following lighting measures should be considered:

a. minimum amount of lighting, only applied for safety at the key access points and staircases;
b. limited lighting intensity; and
c. directional down lighting is suggested to minimise light spill to the surrounding areas.

8.11 Residual Impacts and Acceptability of the Proposed PAFF

8.11.1 Analysis of Impacts

8.11.1.1 The significance of the landscape and visual impacts assuming mitigation measures included in the proposed PAFF was examined in accordance with Section 8.3. The proposed PAFF is compatible with the existing zoned special industries area. Proposed mitigation measures will help to reduce slight to negligible adverse impacts during construction and operation.

8.11.2 Residual Landscape Impacts

8.11.2.1 A summary of residual landscape impacts is shown in Table 8.12. In general, the incorporation of mitigation measures into the proposed PAFF will be effective in reducing "slight adverse" construction impacts in Industrial/Utility LCU3 to negligible, "moderate adverse" construction impacts at Waterfront LCU5 to "slight adverse" impact. Early implementation of the planting buffer (LMM2) will help to reduce the operational impact at LCU3 to "slight" impact. These reductions can be achieved by the mitigation measures recommended in Section 8.9 above.

8.11.3 Residual Visual Impacts

8.11.3.1 A summary of residual visual impacts is shown in Table 8.13. In general, the landscape mitigation measures are predicted to reduce the levels of visual impact of the proposed development when viewed from all SVR locations.

8.11.3.2 Unmitigated visual impact from SVR5 is predicted to be "moderate adverse" during the construction stage of the expansion phase of operation (2025 to 2040) mainly owing to the appearance of an additional four tanks and associated construction activity. After completion of the tanks, the visually recessive design (LMM3) would result in the new structures being rapidly absorbed visually into the mass and scale of the existing tanks, particularly as the bulk of the new tanks would be concealed by the initial phase tanks. Under these circumstances, the residual visual impact is forecast to be "slight/moderate adverse".

8.11.4 Acceptability of Development

8.11.4.1 Using the criteria as set out in Section 8.3, the significance of these residual visual impacts are evaluated as being acceptable with mitigation measures in accordance with Annex 10 of the TM EIAO, owing to the following factors:

a. the proposed PAFF incorporates landscape and visual mitigation measures, which will reduce overall adverse levels of visual impact to an acceptable level. Views from the nearest residents at Miami Beach Towers and Melody Garden are obstructed by the River Trade Terminal, as shown in Figure 8.5.3, and thus, the adverse visual impacts brought by the proposed PAFF will be limited to its industrial neighbourhood denoted by SVR3 and SVR5 where the number of sensitive receivers are small and relatively insensitive. The planting buffer and temporary landscape works for the reserved area will enhance the local visual quality.

b. night-time glare is considered to be acceptable within the visual envelope. The change to the baseline condition will be negligible; and

c. potential landscape impacts are restricted to a local level only, which is of low landscape quality and of a low sensitivity to change. Careful phasing programme and site planning could avoid loss of roadside trees and maximise the planting buffer along the Lung Mun Road. Within the immediate landscape context of adjacent industrial uses the proposed PAFF is predicted to be acceptable with landscape and visual mitigation measures implemented.

8.12 Conclusion and Summary of Findings

8.12.1 The major findings and residual and cumulative landscape and visual impacts predicted by the LVIA are as follows:

a. The majority of the baseline condition of the study area comprises existing industrial uses and is considered to be of low quality and sensitivity to change. A part of the study area also comprises the sea lanes of Urmiston Road and the wooded slopes (as part of Castle Peak) that is of regional importance. These areas will not be affected by the proposed project.
b. No areas designated with a landscape zoning such as country park, open space or green belt would be affected by the Project and therefore the Project is compatible with the Government's statutory planning framework in terms of landscape conservation.
c. The Project overall would result in the loss of approximately, 0.25ha of roadside vegetation and affects 1.5ha of open sea under the jetty. Compensatory planting will comprise 0.6ha of screen planting on the perimeter bund and roadside planting resulting in a net a gain of 0.35ha of vegetation. (This excludes the trees that have been transplanted and the bunding formed during the construction period and that will be maintained at Day 1 of operation).
d. The introduction of the proposed project into the study area will result in mainly "slight adverse" to negligible landscape impacts assuming mitigation measures are incorporated into the scheme.

e. The introduction of the proposed project into the study area will result in mainly "slight/moderate" and "slight" visual impacts assuming mitigation measures are incorporated into the scheme.
f. Views toward the proposed project are generally over medium to long distances (up to 8km). At these distances the proposed project is predicted to result in an imperceptible magnitude of change and negligible adverse impact.
g. For potentially local sensitive residents at Lung Kwu Tan to the north west and adjacent Butterfly Beach to the east it is assessed that local topography will obstruct views to the proposed project. These local residents will therefore not be adversely impacted by the proposed project.
h. Future users at a proposed Holiday Camp at Siu Lang Shui will receive on "slight/moderate" levels of visual impact on views overlooking the proposed site during the expansion stage of the development (2025 to 2040), as the new tanks will be substantially blocked by existing tanks in front.
i. The PAFF will be viewed in conjunction with the future EcoPark resource recycling centre, the existing steel mill, the River Trade Terminal and other industrial uses in the local district. The visual characteristics of the PAFF are industrial in appearance and therefore compatible with these future and existing uses. The cumulative visual impact on views from SVRs of all these elements viewed within the same panorama is not predicted to reach a level whereby it would exceed the visual impact level of the PAFF when assessed separately as summarised in Table 8.13.

8.12.2 The Landscape and Visual Impact Assessment highlights that no significant impacts will occur during both construction and operation phases. The disturbance to existing trees will be compensated during construction of the initial phase. The disturbed waterfront is man-made with a low sensitivity to change, landscape mitigation measures will minimise adverse impacts. It is predicted that the proposed PAFF will have limited adverse landscape and visual impacts on the baseline conditions (through introduction of additional landscape areas). In conclusion, the landscape and visual impacts are considered ***acceptable with mitigation measures***.

8.13 Environmental Monitoring and Audit

8.13.1 It is recommended that implementation and operational maintenance of all proposed Landscape and Visual Mitigation Measures is included within the EM&A. The design stage EM&A will consist of auditing the detailed landscape designs. Construction and operational stage EM&A will comprise audit of the compensatory planting/transplantation and planting establishment in the form of site inspection. Further details of the specific EM&A requirements are detailed in Section 15 of this report and in the EM&A Manual.

Table 8.12a Summary of Residual Landscape Impacts on LCUs (with Landscape Mitigation Measures)

LCU Name	Without Recommended Mitigation Measures			Recommended Mitigation Measures	With Recommended Mitigation Measures		
	Significance Threshold of Landscape Impact during Construction	Significance Threshold of Landscape Impact during Operation			Significance Threshold of Landscape Impact during Construction	Significance Threshold of Landscape Impact during Operation Phase Initial Phase (Day 1)	Significance Threshold of Landscape Impact During Operation Phase (Year 2040)
		Phase 2009	Phase to 2040				
LCU 1 Woodland, grassland and scrubland	Negligible	Negligible	Negligible	Nil	Negligible	Negligible	Negligible
LCU 2 Transport Corridor	Negligible	Negligible	Negligible	Nil	Negligible	Negligible	Negligible
LCU 3 Industrial/ Utility (incorporating LCU Industrial Urban Landscape of the Landscape Character Map of Hong Kong)	Slight Adverse	Negligible	Slight Adverse	LMM1, LMM2, LMM3, LMM4	Negligible	Slight Adverse	Negligible
LCU 4 Pier	Negligible	Negligible	Negligible	Nil	Negligible	Negligible	Negligible
LCU 5 Water frontage	Moderate Adverse	Negligible	Negligible	LMM2, LMM3, LMM4	Slight Adverse	Negligible	Negligible

Table 8.12b Summary of Residual Landscape Impacts on Landscape Elements (with Landscape Mitigation Measures)

Landscape Element	Without Recommended Mitigation Measures			Recommended Mitigation Measures	With Recommended Mitigation Measures		
	Significance Threshold of Landscape Impact during Construction	Significance Threshold of Landscape Impact during Operation			Significance Threshold of Landscape Impact during Construction	Significance Threshold of Landscape Impact during Operation Phase Initial Phase (Day 1)	Significance Threshold of Landscape Impact During Operation Phase (Year 2040)
		Phase 2009	Phase to 2040				
Secondary Woodland	Negligible	Negligible	Negligible	Nil	Negligible	Negligible	Negligible
Cut Slope	Negligible	Negligible	Negligible	Nil	Negligible	Negligible	Negligible
Sea	Moderate	Moderate	Moderate	LMM2, LMM3, LMM4	Slight	Slight	Slight
Transport Corridor (i.e. existing roads and footpaths)	Slight	Slight	Slight	LMM1, LMM2, LMM3, LMM4	Slight/Negligible	Slight/Negligible	Slight/Negligible
Industrial Built-up area	Slight	Slight	Slight	LMM1, LMM2, LMM3, LMM4	Slight/Negligible	Slight/Negligible	Slight/Negligible
Manmade Coastline	Slight	Slight	Slight	LMM1, LMM2, LMM3, LMM4	Slight/Negligible	Slight/Negligible	Slight/Negligible
Roadside vegetation	Slight	Slight	Slight	LMM1, LMM2, LMM3, LMM4	Slight/Negligible	Slight/Negligible	Slight/Negligible

Table 8.13 Summary of Residual Visual Impacts (with Landscape Mitigation Measures)

SVR Number	Without Recommendation Mitigation Measures			Recommended Mitigation Measures	With Recommendation Mitigation Measures		
	Significance Threshold of Visual Impact during Construction	Significance Threshold of Visual Impact during Operation			Significance Threshold of Visual Impact during Construction	Significance Threshold of Visual Impact during Operation	
		Initial Phase	Future Phase 2025-2040			Initial Phase DAY 1	Future Phase 2025 – 2040 YEAR 2040
SVR 1 Sea traffic along Urmston Road	Slight Adverse	Slight Adverse	Slight Adverse	LMM1, LMM2, LMM3, LMM4	Slight	Slight	Slight
SVR 2 Traffic from LungMun Road	Slight/Moderate	Slight/Moderate	Moderate	LMM1, LMM2, LMM3, LMM4	Slight	Slight	Slight/Moderate
SVR 3 Industrial/ Utility facilities	Slight/ Moderate	Slight/Moderate	Moderate	LMM1, LMM2, LMM3, LMM4	Slight	Slight	Slight/Moderate
SVR 4 North Lantau Development including Ting Chung	Slight/Moderate Adverse	Slight/Moderate Adverse	Slight/Moderate Adverse	LMM1, LMM2, LMM3, LMM4	Slight	Slight	Slight
SVR 5 Proposed Holiday Camp	None	None	Moderate	LMM3, LMM4	Moderate Adverse (Expansion phase construction stage only)	N/A	Slight/Moderate

Table 8.14 Summary Landscape Mitigation Measures Programming, Funding, Implementation, Management and Maintenance Agents

LMM Reference	Description of Landscape Mitigation Measures	Programming	Programme Stages			Funding and Implementation Agent	Management and Maintenance Agency
			D	C	O		
LMM1	The construction programme for the PAFF should be reduced to the shortest possible period and should be executed in phases with future phases of tanks built in a set of 4.	PAFF site / throughout construction period	Y	Y		Project Proponent	Project Proponent
LMM1	The extent and periphery of the works areas should be managed so that they are as small as possible and do not appear cluttered, untidy and unattractive, particularly to road traffic along Lung Mun Road.	PAFF site / throughout construction period		Y	Y	Project Proponent	Project Proponent
LMM1	Temporary hoarding barriers should be of a recessive visual appearance in both colour and form.	PAFF site / throughout construction period	Y	Y		Project Proponent	Project Proponent
LMM1	Materials should be stored in areas with the least obstruction to residents, pedestrians and traffic	PAFF site / throughout construction period		Y	Y	Project Proponent	Project Proponent
LMM1	All material stockpiles (2m high maximum) should be covered with an impermeable material and sandbagging diversions should be placed around exposed soil	PAFF site / throughout construction period		Y	Y	Project Proponent	Project Proponent
LMM1	Conservation of existing and imported soil resources. Existing soil resources on site will be conserved in stockpiles with a maximum height of 2m(see LMM2).	PAFF site / throughout construction period of fuel tank expansion.			Y	Project Proponent	Project Proponent

LMM Reference	Description of Landscape Mitigation Measures	Programming	Programme Stages			Funding and Implementation Agent	Management and Maintenance Agency
			D	C	O		
LMM2	A landscaped perimeter bund comprising containment bund-wall, access road and planting buffer shall be built and maintained around the tank farm.	PAFF site/ On Commencement of Construction	Y	Y	Y	Project Proponent	Project Proponent
LMM3	The design of the PAFF should incorporate materials, details and textures that are visually recessive.	PAFF site /design	Y	Y	Y	Project Proponent	Project Proponent
LMM3	Colours should be of low chromatic intensity to reduce the potential contrast between the structures and their background	PAFF site /design	Y	Y	Y	Project Proponent	Project Proponent
LMM4	Minimum amount of lighting for the tanks shall be used, only applied for safety at the key access points and staircases	Tanks/Operational phase	Y	Y	Y	Project Proponent	Project Proponent
LMM4	Limited lighting intensity on the site	PAFF site /Operational phase	Y	Y	Y	Project Proponent	Project Proponent
LMM4	Directional down lighting is suggested to minimise light spill to the surrounding area.	PAFF site /Operational phase	Y	Y	Y	Project Proponent	Project Proponent