

Appendix C
Environmental Study

**Hong Kong Resort Company
Limited**

**Optimization of Land Use in
Discovery Bay**

Environmental Study (Area 6f)

235928

Final | December 2015

*This report takes into account the particular
instructions and requirements of our client.*

*It is not intended for and should not be relied
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is undertaken to any third party.*

Job number 235928

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Executive Summary

The Hong Kong Resort Company Limited (HKRCL) has been considering the feasibility of implementing additional development areas within the existing boundary of Discovery Bay to provide additional housing supply. A planning statement, titled "Optimisation of Land Use in Discovery Bay" was submitted to Planning Department (PlanD) in July 2013. A round of comments from various government departments was received on December 2013 (ref PlanD's letter Q/L1/L/DBNC/352-17 dated 17 December 2013). Another round of submission was made on August 2014 and the corresponding set of comments was received from various government departments on December 2014 (ref PlanD's letter Q/L1/L/DBNS/352-17(CR) dated 23 December 2014). Subsequently, another round of submission was made in March 2015 and comments were received from various government departments. In order to address those comments, the development proposal has been refined accordingly.

This Environmental Study only refers to Area 6f. The potential development area is included in the latest approved Discovery Bay Outline Zoning Plan as "Other Specified Uses (Staff Quarters)", despite the fact that some of their development parameters are proposed to be amended.

An Environmental Study for Area 6f has been conducted on the latest development proposal to demonstrate land use compatibility. The issues considered in this Environmental Study include noise, air quality, water quality, land contamination and ecology. Those relating to sewerage and drainage, and water supply are separately presented in another report.

Air Quality

All the relevant air emission sources in the vicinity that would have air quality impacts on the proposed developments have been identified and assessed. Key air emission source include the fireworks at Disney Theme Park. A literature review on best available information including Environmental Protection Department (EPD)'s publications, approved Environmental Impact Assessment (EIA) Reports and has been conducted to establish the emission strengths of these air emission sources. These emission strengths are then included in EPD's approved air quality dispersion models to simulate air quality impacts on both existing and planned air sensitive receivers. Results indicate that the predicted air quality impacts would not exceed the relevant Air Quality Objectives. At the same time, the separation distance between the road and the proposed development has fulfilled the requirement stipulated in the Hong Kong Planning and Standard

Guideline. Given that the relatively low traffic volume within Discovery Bay, the proposed land uses would not be subject to insurmountable air quality impacts. In case a small separate sewage treatment work is required, it will be designed to contain any odour that may be generated.

Noise

All the relevant noise sources in the vicinity that would have noise impacts on the proposed developments have been identified and assessed. The noise sources include the traffic along nearby road network and the firework at Disney Theme Park. Where practicable, noise measurements have been conducted to establish the noise caused by these noise sources. These measurement data is then used to assess the noise impacts on planned noise sensitive receivers, taking into account of a number of parameters including but not limited to the separation distance, operational schedule, screening effects etc. Results indicate that the predicted noise impacts would not exceed the relevant noise limits and hence the proposed land uses at Area 6f would not be subject to adverse noise impacts and hence mitigation measures are not required. In case a small separate sewage treatment work is required, sufficient noise attenuation measures shall be implemented to alleviate the noise generated from the operation to ensure compliance with the statutory noise requirements.

Water Quality

During the construction phase, site runoff and sewage can be readily alleviated by implementing good site practice. Sewerage generated during operational phase will be conveyed to a sewerage system. In case a small separate sewage treatment work is required, it will be designed to comply with the relevant standards for effluent discharge for inland waters and inshore waters accordingly.

Other aspects

Site inspection and review of historical photos have revealed that the area within the potential development area have low potential of land contamination. Also, adverse ecological impacts are not anticipated.

1 Introduction

1.1 Background

1.1.1.1 The Hong Kong Resort Company Limited (HKRCL) has been considering the feasibility of implementing additional development areas within the existing boundary of Discovery Bay to provide additional housing supply. A planning statement, titled "Optimization of Land Use in Discovery Bay" was submitted to Planning Department (PlanD) in July 2013. A round of comments from various government departments was received on December 2013 (ref PlanD.'s letter OL1/L/DBNC/352-17 dated 17 December 2013).

1.1.1.2 Another round of submission was made on August 2014 and the corresponding set of comments was received from various government departments on December 2014 (ref PlanD.'s letter OL1/L/DBNS/352-17(CR) dated 23 December 2014). Subsequently, another round of submission was made on March 2015 and comments were received from various government departments.

1.1.1.3 Ove Arup & Partners HK Ltd (Arup) has been appointed by HKRCL to conduct assessments to address those comments relating to environmental aspects including noise, air quality, water quality, land contamination, ecology, sewerage and drainage, and water supply.

1.1.1.4 This report addresses those comments relating to noise, air quality, water quality, land contamination and ecology for Area 6f. Those relating to sewerage and drainage, and water supply are separately presented in another report.

1.2 Key Objectives of this Environmental Study

1.2.1.1 This Environmental Study aims to address the key comments mentioned by various government departments, in support of a rezoning application for Area 6f to demonstrate land use compatibility. This key objectives for this Environmental Report are given below:

- Summarise the relevant regulations and regulations that are applicable;
- Establish the baseline environmental conditions;
- Identify the representative environmental sensitive receivers that may be affected by the proposed development;

- Present the assessment methodologies applicable to various environmental aspects;
- Summarise the key findings for those relevant environmental aspects; and
- Propose mitigation measures where needed.

2 Project Description

2.1 Land uses

2.1.1.1 The current land use for the area include “Other Specified Use (OU) (Staff Quarters)”. Once the proposed development in the area is implemented, they would be changed from the current land uses to the proposed land uses of residential apartment buildings. The following table summarises both the current and proposed land uses for all the potential development area. Figure 2-1 illustrates respective location of Area 6f.

Table 2.1: Current and proposed land uses

Area	Land uses	
	Existing ⁽¹⁾	Proposed
Area 6f	“OU (Staff quarters)”	Residential apartment buildings

[1] – As shown in OZP S/I-DB/4 - Discovery Bay

2.1.1.2 Area 6f is located west of Parkvale Village around Discovery Valley Road and Parkvale Drive. Site observation reveals that the site has partly been previously formed and cleared, and is mainly occupied by grassland. Within Area 6f, it is proposed to have residential buildings, together with the necessary infrastructure and landscaping elements.

2.1.1.3 The total site area for potential development area is about 0.83 ha and would accommodate a total of about 1,190 additional population.

2.1.1.4 The key elements for the development of Area 6f include the site formation work, access road, superstructure for buildings and various utilities. For sewerage system, the sewage generated will be conveyed to a sewerage system, as discussed in the Sewerage Impact Assessment accompanying this planning application. In case a small separate sewage treatment work (~400m³/day) is required within Area 6f, the treated effluent will be discharged in the neighbouring nullah and then discharged into the neighbouring marine water without the need for a marine outfall.

2.1.1.5 For fresh water, it would either be supplied from Siu Ho Wan Water Treatment Work, or supplied from Discovery Bay Reservoir, in which case the previous treatment facilities would be re-commissioned.

2.2 Possible Construction Methodologies

- 2.2.1.1** The construction methodologies are yet to be developed in the subsequent stages. Nevertheless, it is anticipated that the land-based site formation work for Area 6f would adopt an open cut approach.

2.3 Tentative Implementation Programme

- 2.3.1.1** According to the latest design, the tentative time for the occupation of the potential development area would be beyond 2020 and this actual date would be reviewed throughout the design process.

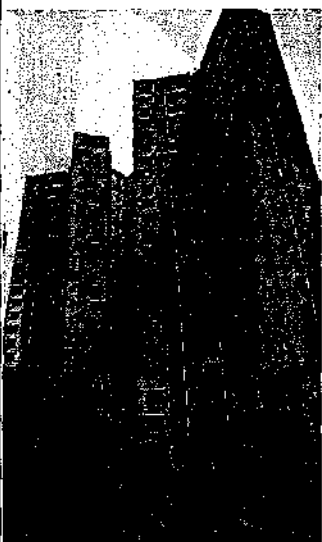

2.4 Concurrent Projects

- 2.4.1.1** A review has been conducted to collate the information on potential concurrent projects that are available from the public domain. These potential concurrent projects are discussed in the following sections to evaluate if there are potential for cumulative impacts during the construction and operation phase of the proposed development in Discovery Bay.
- 2.4.1.2** This is a strategic study initiated by the Government to study the feasibility of implementing artificial islands in the water to the east of Discovery Bay to support the longer term development of Hong Kong. At the time of preparing this report, there are neither development options nor confirmed development programme. Hence, this is not considered as a concurrent project for the purpose of this Environmental Study.
- 2.4.1.3** Residential development is also being considered in Area 10b within Discovery Bay. Given that Area 10b is located at more than 700m away, adverse cumulative impacts are unlikely.

3 Site Inspection

3.1.1.1 Several site visits were carried out in April – June 2014 to identify potential sources of environmental impact and sensitive receivers in the vicinity of the potential development area. Section 2 has briefly described the general context of these and the following table present the images for the potential development area.

Table 3.1: Existing environment conditions

Viewpoint 1: Existing nearby residential buildings	Viewpoint 2: Area 6f occupied by grassland and trees
	

4 Air Quality Assessment

4.1 Air Sensitive Receivers

4.1.1.1 Representative Air Sensitive Receivers (ASRs) ⁽¹⁾ within the potential development area have been identified in Table 4.1 and illustrated in Figure 4-1. Moreover, a number of existing ASRs are also identified. The representative existing ASRs are summarized in Table 4.2 and illustrated in Figure 4-1.

Table 4.1: Representative ASRs for air quality assessment

ASR ID	Description	Land use	Number of Storey	Building Hgt Above Local Ground (approx.) (m)
A6f-01	Planned high rise building	Residential	18	65
A6f-02	Planned high rise building	Residential	18	65

Table 4.2: Representative Existing ASRs

ASR ID	Description	Land use	Approximate Distance from the Site Boundary
A6f-03	Woodland Court	Residential	45m
A6f-04	Crystal Court	Residential	45m

4.1.1.2 The relevant legislations and standards applicable to these ASRs are summarized in Appendix 4.1.

4.2 Air Pollution Sources

4.2.1 Construction Dust

4.2.1.1 During construction phase, construction dust will be generated from the construction activities including site formation, foundation and superstructure works. In consideration of small scale development at Area 6f (i.e. two residential buildings only), construction dust

⁽¹⁾ In accordance to Annex 12 of the TM-EIAO, Air Sensitive Receivers (ASRs) include any domestic premises, hotel, hostel, hospital, clinic, nursery, temporary housing accommodation, school, educational institution, office, factory, shop, shopping centre, place of public worship, library, court of law, sports stadium or performing arts centre. Any other premises or places with which, in terms of duration or number of people affected, have a similar sensitivity to the air pollutant as the aforesaid premises and places would also be considered as a sensitive receiver.

emission from construction works is considered not significant provided that relevant mitigation measures recommended in the Air Pollution Control (Construction Dust) Regulation are implemented to control the dust emissions. Therefore, adverse construction dust impact is considered unlikely.

4.2.2 Vehicular Emission

4.2.2.1 The Hong Kong Planning Standards and Guidelines (HKPSG) has specified the minimum setback distances between ASRs and different categories of roads, including trunk road and primary distributor, district distributor and local distributor. Since all the roads within Discovery Bay are local distributors, a 5m setback requirement is adopted as recommended in the HKPSG.

4.2.2.2 According to the current development layout as shown in Figure 2-1, the separation distance between the Discovery Valley Road and proposed development is about 45m which is larger than 5m. Besides, as advised by the Traffic Impact Assessment accompanying this planning statement, the peak traffic flows of the major local road, Discovery Valley Road, would be only approximately 85 veh/hr with all the developments in place. Hence, it is anticipated that the relatively low traffic volume on Discovery Valley Road together with its separation distance would not induce significant cumulative air quality impact.

4.2.3 Industrial Emission

4.2.3.1 Site surveys conducted in May and June 2014 revealed that there is no existing chimney within 500m assessment area. Hence, no cumulative air quality impact from industrial emission is anticipated.

4.2.4 Marine Vessels Emission

4.2.4.1 No marine vessels activities were identified within the 500m assessment area of Area 6f. Hence, no cumulative air quality impact from marine vessels emission is anticipated.

4.2.5 Fireworks Displays Emission

4.2.5.1 Disneyland Theme Park is located at approximately 3.5 km north east of Discovery Bay. There are fireworks displays every night including

weekdays and weekends. Fireworks launching location is illustrated in Figure 4-2. According to the schedule in Disneyland's website, fireworks displays will be conducted from 8:00 pm for a duration of about 15 minutes. According to the Theme Park EIA, firework displays in the Disneyland Park would emit RSP and heavy metals. However, emission of gaseous pollutants due to combustion of small amount of black powder is not anticipated according to Section 3.5.14 of the approved Theme Park EIA.

4.2.5.2 Hence, for the purpose of this report, assessments on the RSP and heavy metals emissions from fireworks displays are included in the near-field model. The latest Environmental Permits (EPs) (EP-01/059/2000/A, EP-01/059/2000/B and EP-01/059/2000/C) of the Disneyland Park has also been reviewed and site survey has been conducted to verify the assumptions, including types of heavy metals prohibited to be used in fireworks displays and bursting heights of fireworks.

4.2.5.3 Potential odour impact has also been considered in the approved EIA study, and it is predicted that the odour level contributed by the firework displays on Discovery Bay is only 0.05 OU, which is well below the criteria of 5 OU as stipulated in the Annex 4 of the EIAO-TM. Since there is no major odour source within the assessment area, adverse odour impact is not anticipated and quantitative assessment is not required.

4.2.6 Potential Sewage Treatment Work

4.2.6.1 In case a small separate sewage treatment work is required for Area 6f, the operation of the STW may generate some odour. Good design and practices for the STW would be sufficient to contain the dispersion of odour from the STW.

4.3 Operational Phase Air Quality Assessment on Fireworks Displays

4.3.1.1 A review on the Theme Park EIA and the fireworks displays schedule from the operator has been conducted. Site surveys were also conducted to supplement information. Details methodology of the air quality assessment on fireworks displays is summarized in Appendix 4.2.

4.3.1.2 The cumulative RSP and FSP concentrations at each representative ASRs have been assessed. All the predicted pollutant concentrations of representative ASRs would comply with the relevant AQOs. Summary of the maximum predicted concentrations at ASRs among all assessment heights are presented in Table 4.2 and assessment results at all assessment heights are detailed in Appendix 4.3. It is observed that all the air sensitive receivers would comply with the respective AQOs criteria. Hence, no adverse air quality impact is anticipated.

Table 4.2: Cumulative RSP and FSP concentrations at ASRs

ASR ID	Concentration ($\mu\text{g}/\text{m}^3$)			
	RSP		FSP	
	10 ^m highest 24-hour	Annual	10 ^m highest 24-hour	Annual
A6f-01	76	39	57	28
A6f-02	76	39	57	28
AQOs	100	50	75	35

4.3.1.3 In addition, the heavy metals concentrations at all representative ASRs also comply with the respective assessment criteria. The maximum predicted concentrations at ASRs among all assessment heights are presented in Table 4.3 to Table 4.5 below and assessment results at all assessment heights are detailed in Appendix 4.3. All the assessment results would comply with the relevant criteria.

Table 4.3: Maximum 1-hour heavy metals concentrations at ASRs

ASR ID	Max 1-hour Concentration ($\mu\text{g}/\text{m}^3$)					
	Aluminium	Antimony	Barium	Strontium	Copper	Titanium
A6f-01	2.111	0.836	2.015	1.072	0.690	0.261
A6f-02	1.606	0.616	1.487	0.789	0.532	0.192
Criteria	—	—	—	—	100	—

Table 4.4: Maximum 8-hour heavy metals concentrations at ASRs

ASR ID	Max 8-hour Concentration ($\mu\text{g}/\text{m}^3$)					
	Aluminium	Antimony	Barium	Strontium	Copper	Titanium
A6f-01	0.435	0.105	0.265	0.134	0.164	0.033
A6f-02	0.372	0.077	0.199	0.099	0.144	0.024
Criteria	—	—	500	—	—	—

Table 4.5: Annual-average heavy metals concentrations at ASRs

ASR ID	Annual Concentration (µg/m ³)					
	Aluminium	Antimony	Barium	Strontium	Copper	Titanium
A6f-01	0.196	<0.001	0.015	<0.001	0.089	<0.001
A6f-02	0.196	<0.001	0.015	<0.001	0.089	<0.001
Criteria	100	5	5	—	2.4	100

4.4 Recommended Mitigation Measures

- 4.4.1.1 The key air pollutants (i.e. RSP, FSP and heavy metals) at all representative ASRs would comply with AQOs and relevant assessment criteria. No adverse air quality impact is therefore anticipated and hence no mitigation measures are required.
- 4.4.1.2 For any small sewage treatment work that may be required, good design and practices such as the use of negative pressure system and the use of activated carbon filter would be sufficient to ensure that there is no adverse odour impacts on the neighbouring receivers.

4.5 Conclusion

- 4.5.1.1 All the relevant air emission sources, including firework emission at the Disneyland Theme Park that would have air quality impacts on the proposed developments have been identified and assessed.
- 4.5.1.2 The current development layout fulfills the 5m setback requirement in HKPSG between the air sensitive receivers and local road (i.e. local distributors). In consideration of the tight control of vehicles entering the Discovery Bay, comparatively low local traffic volume and separation distance from Discovery Valley Road, adverse cumulative air quality impact on the proposed development is not anticipated.
- 4.5.1.3 Quantitative air quality assessment, taking into account the fireworks displays at Disneyland Theme Park, has been conducted. It is concluded that the predicted cumulative air quality impacts on all air sensitive uses would comply with the AQOs and relevant assessment criteria. Hence, adverse air quality impact on the proposed development is not anticipated.

5 Noise Assessment

5.1 Description of the Environment

5.1.1.1 The entire Discovery Bay has a relatively tranquil environment without any major noise sources that would impose adverse noise impacts on the neighbouring community. All the existing roads within Discovery Bay are local roads on which only licenced vehicles such as golf cars, shuttle buses and services vehicles are allowed to use. As observed on site, all the shuttle buses are Euro IV buses.

5.2 Noise Sensitive Receivers

5.2.1.1 Several site visits were carried out in April 2014 to identify potential sources of environmental impact and sensitive receivers in the vicinity of the site. Photographs taken on site and the neighbouring area are shown in Section 3 to illustrate the existing context. Some general descriptions in terms of the noise environment have been described in Section 5.1.

5.2.1.2 Area 6f (see Figure 5-1) will accommodate 2 towers of residential blocks and a local access road leading from Parkvale Drive, and located near Discovery Valley Drive, and overlooking onto Yi Pak Wan. Relevant legislation that are applicable to noise impact is given in Appendix 5.1.

5.2.1.3 The nearest road is Discovery Valley Road which connects the developments located between the upper and lower part of Discovery Bay. Discovery Valley Road is also a local road and the separation distance between Discovery Valley Road and the nearest residential premises in Area 6f is more than 45m.

5.2.1.4 Representative Noise Sensitive Receivers (NSRs) within the potential development area have been identified in Table 5.1 and illustrated in Figure 5-1.

Table 5.1: Representative NSRs for noise assessment

NSR ID	Description	Land use	Number of Storey	Distance (m)
N6f-01	Planned high rise building	Residential	18	65
N6f-02	Planned high rise building	Residential	18	65

also taken for the 15-minute timeframe during firework display. Based on these measurements, the Corrected Noise Level (CNL) was calculated and compared against the noise criterion as discussed in Appendix 5.1.

5.5.3 Assessment Results

5.5.3.1 The predicted firework display noise levels at the two measurement locations are summarized in Table 5.2. Detailed calculation of firework display noise results is shown in Appendix 5.3.

Table 5.2: Summary of firework display noise assessment results

Noise Level	Noise Impacts, $L_{eq}(15 \text{ min})$, dB(A)	
	F1	F2
Corrected Noise Level	52	53
Noise Criterion	55	
Exceedance	-	-

Note:

[1] Facade correction has been considered in noise calculation.

5.5.3.2 Two firework display noise measurement at F1 and F2 are approximately located at 3.9 km and 2.7 km from Disneyland and are within the noise criterion of $L_{eq}(15 \text{ min})$ 55 dB(A). The proposed layouts of Area 6f will be located further away from Disneyland than the distance between F2 from Disneyland. Hence, the existing firework display at Disneyland is not anticipated to generate adverse noise impacts.

5.6 Recommended Mitigation Measures

5.6.1.1 The noise assessments results have shown that noise impact due to road traffic and fireworks are not anticipated, mitigation measures are therefore not required. In case a small separate sewage treatment work is required, mitigation measures including silencers would be required at the vents/louvres to ensure compliance with the statutory requirements.

5.7 Conclusion

5.7.1.1 A noise impact assessment has been conducted to evaluate the operational impacts based on the current layout.

- 5.7.1.2** Road traffic noise impact has been reviewed. Results indicate that the road traffic noise impact would not be anticipated.
- 5.7.1.3** A preliminary assessment has been conducted for firework display noise impact on site measurement and observation. Results indicate that the firework display noise would not cause adverse impact.

6 Water Quality Assessment

6.1 Description of the Environment

6.1.1 Existing Water Environment

6.1.1.1 The project sites fall within the Southern WCZ and are located at Discovery Valley at east Lantau, downstream of Lo Fu Tau and Discovery Bay Reservoir. Tai Pak Wan, a non-gazetted beach, is within the boundary of Discovery Bay. Besides, a Coastal Protection Area is located at the northern edge of Tai Pak Tsui Peninsula to conserve the natural coastline.

6.1.1.2 Area 6f is located at left bank of Discovery Bay Reservoir Spillway. It is within the catchment leading to the tributaries of the Discovery Bay Reservoir Spillway and the runoff would be discharged to Tsoi Yuen Wan near ferry pier ultimately.

6.1.2 Existing Sewerage System

6.1.2.1 Discovery Bay has been implemented with a sewerage system to collect all the sewage and wastewater generated from daily activities. All the existing sewage and wastewater collected from the sewerage system is diverted to Siu Ho Wan Sewage Treatment Works (SHWSTW) via pumping stations and the outfall is located at north Lantau which is far away from Discovery Bay.

6.1.3 Water Quality Sensitive Receivers

6.1.3.1 A review has been conducted to identify the Water Quality Sensitive Receivers (WSRs) in the vicinity that may be impacted by the potential development area. The following table summarizes these WSRs and they are illustrated in Figure 6-1. Reference is made to the relevant legislations and standards relating to water quality which are summarised in Appendix 6.1.

Table 6.3 Water quality sensitive receivers

Water Sensitive Receivers ⁽¹⁾	Description
WSR01 – Discovery Bay Reservoir	Primary reservoir for flushing, located upstream of the potential development areas
WSR 02 – Discovery Bay	Spillway from Discovery Bay Reservoir and the tributaries,

Water Sensitive Receivers ⁽¹⁾	Description
Reservoir Spillway and Tributaries	chainage runs along Discovery Valley Road and downstream to Tsoi Yuen Wan
WSR03 – Nim Shue Wan Stream	Natural stream downstream from the existing golf course to Nim Shue Wan
WSR04 – Tai Pak Wan	Non-gazetted beach downstream to Discovery Bay Reservoir Spillway
WSR05 – Hai Tai Wan Marina	Marina at Hai Tai Wan next to Discovery Bay Road
WSR 06 – Nim Shue Wan	Nim Shue Wan
WSR07 – Tai Pak Tsui Peninsula Coastal Protection Area (CPA)	Protected natural shoreline at north of Tai Pak Tsui Peninsula

Note:

[1] The nearest water gathering ground is located at 4.8 km away

6.2 Identification and Evaluation of Environmental Impacts during Construction Phase

6.2.1 Pollution Sources

Site Runoff

6.2.1.1 During rainstorm events, construction site runoff would come from all over the works site. These surface runoff might be polluted by:

- Runoff and erosion from site surfaces, earth working areas and stockpiles;
- Wash water from dust suppression sprays and wheel washing facilities; and
- Chemicals spillage such as fuel, oil, solvents and lubricants from maintenance of construction machinery and equipment.

6.2.1.2 Construction runoff may cause physical, biological and chemical effects. The physical effects include potential blockage of drainage channels and increase of suspended solid levels in the Southern WCZ. Runoff containing significant amounts of concrete and cement-derived material may cause primary chemical effects such as increasing turbidity and discoloration, elevation in pH, and accretion of solids. A number of secondary effects may also result in toxic effects to water biota due to elevated pH values, and reduced decay rates of faecal micro-organisms and photosynthetic rate due to the decreased light penetration. All the best practices will be implemented to reduce and minimise the generation of construction run-off.

Sewage from Workforce

- 6.2.1.3** Sewage effluents will arise from the sanitary facilities provided for the on-site construction workforce. According to Table T-2 of Guidelines for Estimating Sewage Flows for Sewage Infrastructure Planning, the unit flow is 0.15 m³/day/employed population. The characteristics of sewage would include high levels of BOD₅, Ammonia and *E. coli* counts. Since sufficient portable chemical toilets and sewage holding tanks will be provided, no adverse water quality impact is anticipated.

6.2.2 Mitigation Measures

- 6.2.2.1** Given the relatively small amount of site formation work for Area 6f, adverse water quality impacts during construction phase is not anticipated. Nevertheless, standard good site practices such as perimeter cut off drains, silt removal facilities, temporary toilet etc. would still be required. A comprehensive list of those good site practices is given in Appendix 6.2.

6.3 Identification and Evaluation of Environmental Impacts during Operational Phase

6.3.1 Potential Impacts

- 6.3.1.1** The current proposal is to have sewage generated from the potential development areas to be pumped to the Siu Ho Wan Sewage Treatment Works (SHWSTW). In this case, there would not be adverse water quality impacts and hence mitigation measures are not required. In case a small separate sewage treatment work is required, the design flow rate would be approximately 400m³/day and the treated effluent will be discharged to the nullah, which will be eventually discharged to the neighbouring marine waters without the need of a marine outfall. Hence, the design of the STW shall ensure that the relevant standards for effluent discharges are complied with, including the following:

- Standards for Effluent Discharged into Group D Inland Waters (Note: the nullah to be discharged to is not for abstraction for potable water supply, irrigation and pond fish culture).
- Standard for Effluent Discharged into Inshore Water of Southern Water Control Zone

- 6.3.1.2** The operation of the STW shall also apply for a discharge licence from the relevant authority before the operation of the STW.

6.4 Conclusion

- 6.4.1.1** The potential issues that may arise during both the construction and operational phases have been identified. Construction phase impacts are not anticipated to be significant, site runoff and sewage can be readily alleviated by implementing good site practice. During operational phase, sewage generated will be conveyed to a sewerage system, as discussed in the Sewerage Impact Assessment accompanying this planning statement. In case a small separate sewage treatment work is required, it will be designed to comply with the relevant standards for effluent discharge for inland waters and inshore waters accordingly.

7 Other Aspects

7.1 Review on Land Contamination Issues

- 7.1.1.1** A desktop review has been conducted by studying the previous aerial photos for the concerned areas for the potential development area. These photos have provided useful information to ascertain any historical land uses that may have potential for land contamination. The relevant legislation and standards relating to land contamination is given in Appendix 7.1 and the related historic aerial photos is given in Appendix 7.2. The following table summarises these findings.

Table 7.1 Summary of historical aerial photographs for Discovery Bay

Year	Description
1973	<ul style="list-style-type: none">• Mainly nature terrain and coastline with a number of villages scattering around.• No signs for industrial developments
1982	<ul style="list-style-type: none">• Some of the residential area near Yi Pak Wan and the reservoir were completed.• Other land based site formation work were in progress
1993	<ul style="list-style-type: none">• Most of the site formation work and reclamation works had been completed.
2012	<ul style="list-style-type: none">• Not much difference to that in 1993 except the scale of the marina was larger than that in the 90's.

- 7.1.1.2** Site surveys were conducted between May and June of 2014 to ground truth the findings from desktop review to identify any land uses within the potential development area that may have the potential for contamination in soil and groundwater. Photos taken during the site inspection showing the land uses within each of the area are given in Section 3.

- 7.1.1.3** The area within Area 6f comprises of mainly grassland. There has been no evidence that there had been activities causing contamination issues in the past. Hence, it is considered that the contamination potential for Area 6f is unlikely.

- 7.1.1.4** An initial land contamination appraisal has been conducted to identify any locations within the potential development area that may have the potential for contamination in soil and groundwater. The appraisal mainly includes a review of the desktop information and supplemented with site surveys.

- 7.1.1.5** Based on the findings at this stage, no area with potential land contamination is identified.

7.2 Review on Ecological Issues

- 7.2.1.1** As discussed in Section 1, Area 6f has been included in the approved Discovery Bay OZP as "OU (Staff Quarters)", despite the fact that some of the planning parameters would need to be amended. Site clearance and formation work could be commenced to implement the development parameters in the approved OZP. Site inspection reveals that Area 6f has previously been formed and disturbed, with some vegetation. Adverse ecological impacts are not anticipated.

8 Conclusion

- 8.1.1** An environmental assessment has been conducted to review Area 6f for Discovery Bay. Key aspects that have been assessed include air quality, noise and water quality. Potential issues on land contamination and ecology have also been reviewed. Those relating to sewerage and drainage, and water supply are separately presented in another report.
- 8.1.2** All the relevant noise and air quality emission sources in the vicinity that would have impacts on the proposed developments have been identified and assessed. The strength of these sources have been established by measurement or from best available information and subsequently included in the assessment. Results indicate that the noise and air quality impacts on planned developments would comply with the relevant noise criteria and hence mitigation measures are not required.
- 8.1.2.1** Potential site runoff and sewage from workforce during construction can be alleviated by the implementation of standard good site practices. Sewage generated during operational phase will be conveyed to sewerage treatment system. In case a small separate sewage treatment work is required, it will be designed to comply with the relevant standards for effluent discharge in inland waters and inshore waters accordingly.
- 8.1.2.2** Assessment reveals that the development at Area 6f is unlikely to cause issue on land contamination and ecological issue.

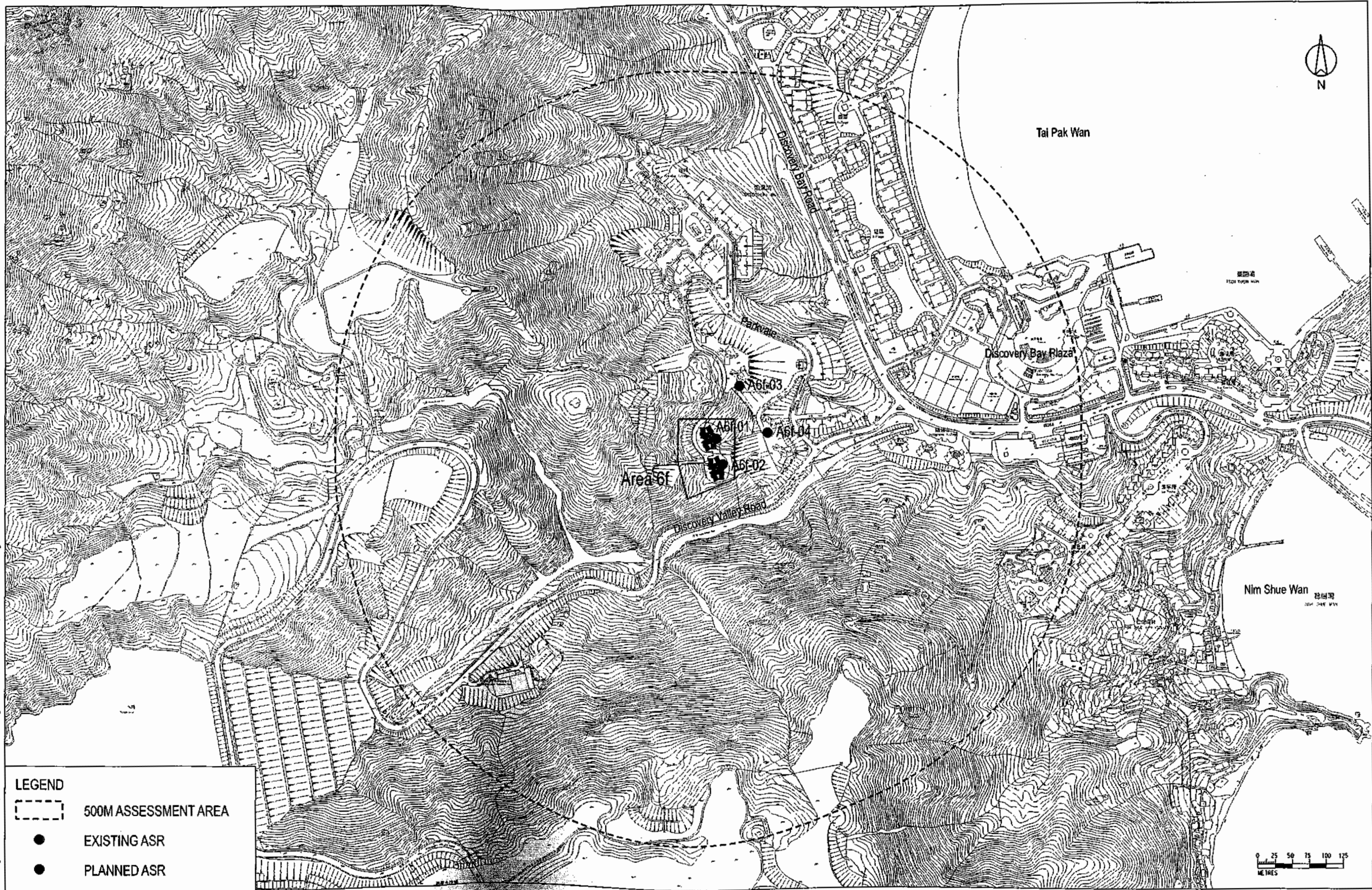
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Figures



Job Title DISCOVERY BAY - OPTIMIZATION OF LAND USE			FIGURE 2-1
Date NOV 14	Scale 1 : 2000	Drawing Title	
POTENTIAL DEVELOPMENT AREA IN DISCOVERY BAY (AREA 6f)			
Drawn GL	Job No. 235928		

ARUP

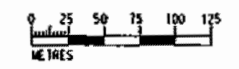


LEGEND

--- 500M ASSESSMENT AREA

● EXISTING ASR

● PLANNED ASR



Job Title: **DISCOVERY BAY - OPTIMIZATION OF LAND USE**

FIGURE 4-1

Date NOV 15	Scale 1:5000	Drawing Title LOCATION OF REPRESENTATIVE ASR
Drawn GL	Job No. 235928	

ARUP

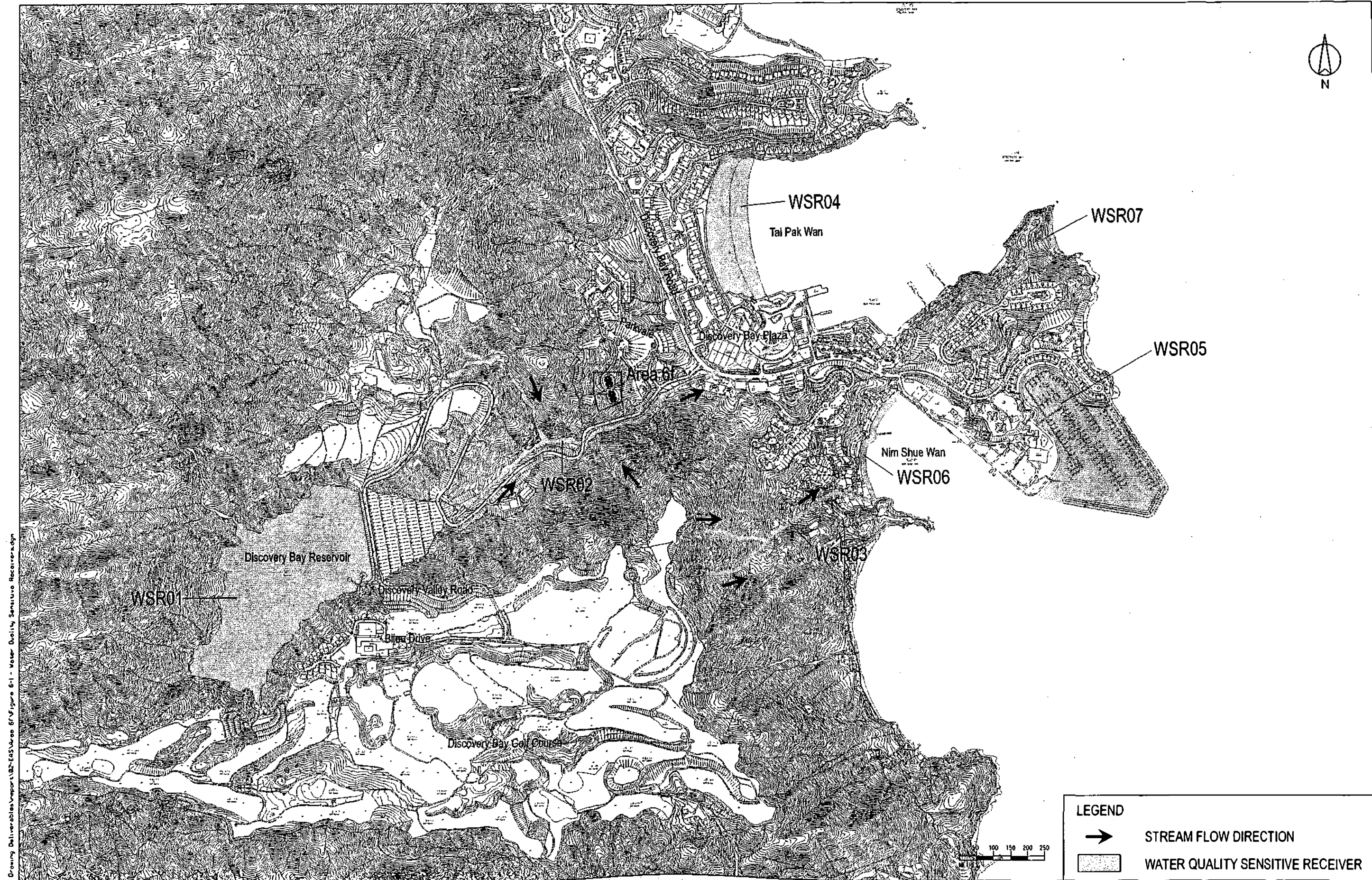
G:\env\project\235928\13 Drawing Deliverables\report\02-04\AS\Area 6f\Figure 4-1 - Location of Representative ASR.dgn



LEGEND
 ● FIREWORKS LAUNCHING LOCATION

Job Title DISCOVERY BAY - OPTIMIZATION OF LAND USE			FIGURE 4-2	
Date NOV 15	Scale AS SHOWN	Drawing Title	ARUP	
Drawn GL	Job No. 235928	Fireworks Launching Location		

G:\env\project\235928\13 Drawing Deliverables\report\82-6\5\Drawn 6\Figure 4-2 - Fireworks Launching Location.dgn



LEGEND	
	STREAM FLOW DIRECTION
	WATER QUALITY SENSITIVE RECEIVER

Job Title			DISCOVERY BAY - OPTIMIZATION OF LAND USE		FIGURE 6-1	
Date	Scale	Drawing Title	Water Quality Sensitive Receivers			ARUP
NOV 15	1:10000					
Drawn	Job No.					
GL	235928					

C:\enviro\project\235928\13 Drawing Deliverables\Report\B2-E65\Mapa 6-1-Water Quality Sensitive Receivers.dgn

Appendix 4.1

Legislation and Standards for Air Quality Impact Assessment

Legislation and Standards for Air Quality Impact Assessment

AQO Pollutants

In accordance with the Air Quality Objectives (AQOs) under Air Pollution Control Ordinance (APCO), the relevant AQOs applicable for this environmental assessment are given in Table A4.1a below.

Table A4.1a: Hong Kong Air Quality Objectives

Pollutant	Limits on Concentration, $\mu\text{g}/\text{m}^3$ ⁽¹⁾				
	(Number of Exceedance per year allowed in brackets)				
	10-min	1-hr	8-hr	24-hr ⁽²⁾	Annual ⁽³⁾
Sulphur Dioxide (SO_2)	500 (3)			125 (3)	
Respirable Suspended Particulates (RSP, or PM_{10}) ⁽⁴⁾				100 (9)	50 (0)
Fine Suspended Particulates (FSP, or $\text{PM}_{2.5}$) ⁽⁴⁾				75 (9)	35 (0)
Carbon Monoxide (CO)		30,000 (0)	10,000 (0)		
Nitrogen Dioxide (NO_2)		200 (18)			40 (0)
Photochemical Oxidants (as ozone, O_3)			160 (9)		
Lead (Pb)					0.5 (0)

Note:

(1) Measured at 293K and 101.325 kPa.

(2) Arithmetic mean.

(3) Respirable suspended particulates (RSP) means suspended particulates in air with a nominal aerodynamic diameter of 10 micrometres or smaller.

(4) Fine suspended particulates (FSP) means suspended particulates in air with a nominal aerodynamic diameter of 2.5 micrometres or smaller.

Non-AQOs Pollutants

According to the approved EIA study "Construction of an International Theme Park in Penny's Bay of North Lantau together with its Essential Associated Infrastructures – Environmental Impact Assessment" (AEIAR-032/2000), hereafter called "Theme Park EIA", a total of six heavy metals, including aluminium, antimony, barium, strontium,

copper and titanium, was identified as the major pollutants emitted during fireworks displays at Disneyland Park.

There are no statutory criteria for these non-AQO pollutants. Hence, international guidelines from World Health Organization (WHO), and toxicity data from Integrated Risk information System (IRIS) of USEPA and from Office of Environmental Health Hazard Assessment (OEHHA) of California Environmental Protection Agency have been reviewed. Besides, the criteria that adopted in the Theme Park EIA have also been compared. The proposed assessment criteria for non-AQO pollutants to be adopted in this assessment are summarized in Table A4.1b below

Table A4.1b: Assessment criteria for non-AQO pollutants

Pollutant	Limit on Concentration, µg/m ³ [1]				
	WHO [1]	USEPA [2]	OEHHA [3]	Theme Park EIA [4]	Adopted for this Study
Acute (1-hour average)					
Aluminium	NA	NA	NA	NA	NA
Antimony	NA	NA	NA	NA	NA
Barium	NA	NA	NA	NA	NA
Strontium	NA	NA	NA	NA	NA
Copper	NA	NA	100	NA	100
Titanium	NA	NA	NA	NA	NA
Chronic (Annual average, or otherwise specified)					
Aluminium	NA	NA	NA	100 [5]	100
Antimony	NA	NA	NA	5 [7]	5
Barium	500 (8 hr average)	NA	NA	5 [7]	500 (8 hr average) 5 (Annual average)
Strontium	NA	NA	NA	NA	NA
Copper	NA	NA	2.4	2.4 [5]	2.4
Titanium	NA	NA	NA	100 [6]	100

Note:

- [1] WHO – World Health Organization
- [2] USEPA – Integrated Risk information System of USEPA
- [3] OEHHA – Office of Environmental Health Hazard Assessment of California Environmental Protection Agency
- [4] Theme Park EIA – Table 3.5n of the approved EIA study “Construction of an International Theme Park in Penny’s Bay of North Lantau together with its Essential Associated Infrastructures – Environmental Impact Assessment” (AEIAR-032/2000)
- [5] NA - Not applicable
- [6] Reference to “Occupational Exposure Limits” published by UK Health & Safety Executive with a safety factor of 100 applied for converting time-weight-average value to long term exposure limit and to allow for variability in human response to chemicals
- [7] Reference to “A Reference Note on Occupational Exposure Limits for Chemical Substances in the Work Environment” published by Hong Kong Labour Department with a safety factor of 100

applied for converting time-weight-average value to long term exposure limit and to allow for variability in human response to chemicals.

[8] Reference to California Air Resources Board (CARB).

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Appendix 4.2

Methodology of Air Quality Assessment on Fireworks Displays

Methodology of Air Quality Assessment on Fireworks Displays

Emission from Fireworks Displays

According to the Theme Park EIA, 42% of the total mass of the fireworks is emitted to the atmosphere and it is assumed that all of these mass will be turned into RSP as worst case scenario (i.e. 2.6kg for low-level shows and 14.7kg for mid-level shows). Details and the calculations are given in Annex A4.2-1.

In the EIA, two mid-level and three low-levels were modelled at the same hour every night as a worst case scenario and the shows were modelled as separate volume sources, 27,000m³ (i.e. 30 x 30 x 30m) and 8,000m³ (i.e. 20 x 20 x 20m) for mid-level and low-level shows, respectively. The same assumptions are also adopted in this Study with the latest fireworks displays schedule obtained from the Disneyland Park's website.

There is no information on the modelling bursting heights of the fireworks in the Theme Park EIA. A site survey has been conducted to estimate the bursting height of the fireworks. It was found that there are mainly two levels of fireworks bursting at height of about 150 mPD and 120 mPD, which are considered within the EPs' conditions that the bursting height limit of the fireworks displays in Disneyland Park is 150 mPD. Therefore, the bursting heights of 150 mPD and 120 mPD for mid-level shows and low-level shows are assumed for modelling purpose, respectively.

There is no conversion factor from RSP to FSP emission from fireworks displays. Therefore, the FSP emission from fireworks is assumed to be the same as the RSP emission for worst case assessment.

Besides, the Theme Park EIA had also considered the impacts due to heavy metals in which their concentrations were estimated by the percentage composition of heavy metal compounds within the mass of the particulate emission. The maximum 1-hour concentration, maximum 8-hour concentration and annual concentration of the heavy metals at ASRs are therefore estimated from RSP concentrations using the conversion factors in this approved EIA as presented in Table A4.2a below.

Table A4.2a: Conversion factors from RSP assessment results to heavy metals concentration

Heavy Metal	Percentage Composition in the pyrotechnics product	Conversion from RSP assessment results (without background) to heavy metal concentration
Aluminium	2.93%	RSP x 0.0293
Antimony	1.28%	RSP x 0.0128

Heavy Metal	Percentage Composition in the pyrotechnics products	Conversion from RSP assessment results (without background) to heavy metals concentration
Barium	3.06%	RSP x 0.0306
Strontium	1.64%	RSP x 0.0164
Copper	0.92%	RSP x 0.0092
Titanium	0.40%	RSP x 0.0040

Note:

[1] The percentage compositions of heavy metals in the pyrotechnics used for fireworks displays in Disneyland Theme Park are referenced to Section 3.5.75 of the approved EIA Study "Construction of an International Theme Park in Penny's Bay of North Lantau together with its Essential Associated Infrastructures – Environmental Impact Assessment" (AEIAR-032/2000)

Dispersion Modelling Approach

The USEPA approved model, Industrial Source Complex - Short Term 3 (ISCST3), has been adopted to model the fireworks displays emission. The modelling parameters are listed in Table A4.2b.

Table A4.2b: Modelling parameters for ISCST3

Parameter	Input
Modelling mode	Rural with terrain effect
Meteorological data	Year 2010 MM5 data extracted from PATH model
Stability Class	Estimation from PCRAMMET model
Mixing Height	Year 2010 MM5 data extracted from PATH model and is capped to 121m as per the real meteorological data recorded by Hong Kong Observatory in Year 2010

For the treatment of calm hours, the approach recommended in the "Guideline on Air Quality on Air Quality Models Version 05 (USEPA)" is adopted.

According to Table 4.1 in the main text, the highest building of the proposed development is 66.5m above ground. Therefore, the impacts on the ASRs are assessed at height of 1.5m, 5m, 10m, 20m, 30m, 40m, 50m, 60m and 70m above local ground.

Cumulative Impact of Criteria Air Pollutants

As mentioned in Section 2.3.1.1, the population intake year of the development will be tentatively beyond Year 2020, the PATH model hourly outputs based on Year 2020 emission inventories is therefore used directly as the future background air quality for AQO pollutants. Far-field emission sources (i.e. all those outside 500m assessment area) including roads, marine, airports, power plants and industries within the Pearl River Delta Economic Zone and Hong Kong were considered in the PATH model. Details of the PATH Model and related emission inventory can be found in EPD's web site.

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It is understood that there is no hourly FSP concentrations available from PATH model. According to EPD's "Guidelines on the Estimation of PM_{2.5} for Air Quality Assessment in Hong Kong", the conservative corrections from RSP concentrations to FSP concentrations are shown in the Table A4.2c.

Table A4.2c: Conversion factors for RSP/FSP

Annual ($\mu\text{g}/\text{m}^3$)	Daily ($\mu\text{g}/\text{m}^3$)
FSP = 0.71 x RSP	FSP = 0.75 x RSP

The cumulative operational air quality is a combination of the emission impacts contributed from the near-field and far field sources (i.e. at local scale and background air quality impact from other concurrent and regional sources) on hourly basis.

In consideration of the number of exceedance allowance of the hourly and daily AQO, the pollutant concentrations after the AQO's allowance limits (e.g. 10th highest 24-hour RSP/ FSP concentrations) are determined at each ASR. The annual predicted concentrations are also assessed and all predicted levels are then compared with the AQOs.

For heavy metals, there is no background concentration available in the PATH model. Therefore, the average of the annual monitoring concentrations of aluminium, barium and copper for the latest 5 available years (i.e. Year 2010 – Year 2014) at Tung Chung Station, the nearest station to the proposed development, are adopted as their corresponding background concentrations (Table A4.2d). For antimony, strontium and titanium, there is no monitoring data and their background concentrations are assumed as 0 $\mu\text{g}/\text{m}^3$.

Table A4.2d: Annual monitoring heavy metal concentration at Tung Chung Station (i.e. Year 2010 – Year 2014)

Year	Annual average concentration ($\mu\text{g}/\text{m}^3$)		
	Aluminium	Barium	Copper
2010	0.196	0.016	0.056
2011	0.226	0.016	0.060
2012	0.171	0.014	0.047
2013	0.208	0.015	0.132
2014	0.179	0.013	0.150
5 years average	0.196	0.015	0.089

Appendix A4.2-1

Calculation of Fireworks Displays Emissions

According to Section 3.5.30 of approved EIA Study “Construction of an International Theme Park in Penny’s Bay of North Lantau together with its Essential Associated Infrastructures – Environmental Impact Assessment” (AEIAR-032/2000) , it is assumed that 2.6 kg and 14.7 kg RSP will be emitted for one low-level show and one mid-level show respectively.
As all the shows are modeled at the same hour as a worst case scenario, the adopted RSP emission rates:

RSP emission rate for low-level show (per show) = 2.6 kg/hr
7.22E-01 g/s

RSP emission rate for mid-level show (per show) = 14.7 kg/hr
4.08E+00 g/s

As there is no FSP emission rate available from the approved EIA study, RSP emission rates are adopted as FSP emission as a worst case scenario. Therefore, the FSP emission rates:

FSP emission rate for low-level show (per show) = 7.22E-01 g/s

FSP emission rate for mid-level show (per show) = 4.08E+00 g/s

Model Input Parameters for Fireworks Works Displays

Source	Source ID	Type	X	Y	Release Height ⁽¹⁾	Lateral Dim. (Sy)	Vertical Dim. (Sz)	Hourly RSP/FSP Emission Rate (g/s) ⁽²⁾	
			(m)	(m)	(m)	(m)	(m)	Hour 21	Other Hours
Low-level show 1	LL01	Volume	822274	819292	120	4.65	4.65	7.22E-01	0.00E+00
Low-level show 2	LL02	Volume	822274	819292	120	4.65	4.65	7.22E-01	0.00E+00
Low-level show 3	LL03	Volume	822274	819292	120	4.65	4.65	7.22E-01	0.00E+00
Mid-level show 1	ML01	Volume	822274	819292	150	6.98	6.98	4.08E+00	0.00E+00
Mid-level show 2	ML02	Volume	822274	819292	150	6.98	6.98	4.08E+00	0.00E+00

Note:

{1} The release heights are observed by site survey.

{2} The fireworks displays shows are started at 20:00 (Hour 21) and last for about 15 minutes based on site survey. Therefore, there is no emisslon during all hours except Hour 21.

Appendix 4.3

Summary of Air Quality Assessment Results

Result Summary of Cumulative RSP Concentration for all ASRs at Various Heights above Ground

Area	ASR	10 th highest 24-hour RSP Concentration (µg/m ³) (AQO = 100 µg/m ³)									Annual RSP Concentration (µg/m ³) (AQO = 50 µg/m ³)								
		1.5m	5m	10m	20m	30m	40m	50m	60m	70m	1.5m	5m	10m	20m	30m	40m	50m	60m	70m
Area 6f	A6f-01	76	76	76	76	76	76	76	76	76	39	39	39	39	39	39	39	39	39
	A6f-02	76	76	76	76	76	76	76	76	76	39	39	39	39	39	39	39	39	39

Note: [1] The Annual RSP background of Area 6f (Grid 17_26) = 39.4 µg/m³

Result Summary of Cumulative FSP Concentration for all ASRs at Various Heights above Ground

Area	ASR	10 th highest 24-hour FSP Concentration (µg/m ³) (AQO = 75 µg/m ³)									Annual FSP Concentration (µg/m ³) (AQO = 35 µg/m ³)								
		1.5m	5m	10m	20m	30m	40m	50m	60m	70m	1.5m	5m	10m	20m	30m	40m	50m	60m	70m
Area 6f	A6f-01	57	57	57	57	57	57	57	57	57	28	28	28	28	28	28	28	28	28
	A6f-02	57	57	57	57	57	57	57	57	57	28	28	28	28	28	28	28	28	28

Note: [1] The Annual FSP background of Area 6f (Grid 17_26) = 28.0 µg/m³

Result Summary of Aluminum Concentration for all ASRs at Various Heights above Ground

Area	ASR	Max 1-hour Aluminum Concentration ($\mu\text{g}/\text{m}^3$) (No Criteria)									Max 8-hour Aluminum Concentration ($\mu\text{g}/\text{m}^3$) (No Criteria)									Annual Aluminum Concentration ($\mu\text{g}/\text{m}^3$) (Criteria = $100 \mu\text{g}/\text{m}^3$)								
		1.5m	5m	10m	20m	30m	40m	50m	60m	70m	1.5m	5m	10m	20m	30m	40m	50m	60m	70m	1.5m	5m	10m	20m	30m	40m	50m	60m	70m
Area 6f	A6f-01	0.576	0.580	0.592	0.637	0.707	0.987	1.350	1.746	2.111	0.244	0.244	0.245	0.251	0.260	0.295	0.340	0.390	0.435	0.196	0.196	0.196	0.196	0.196	0.196	0.196	0.196	0.196
	A6f-02	0.557	0.560	0.571	0.614	0.680	0.778	1.045	1.337	1.606	0.241	0.242	0.243	0.248	0.256	0.269	0.302	0.339	0.372	0.196	0.196	0.196	0.196	0.196	0.196	0.196	0.196	0.196

Result Summary of Antimony Concentration for all ASRs at Various Heights above Ground

Area	ASR	Max 1-hour Antimony Concentration (µg/m³) (No Criteria)										Max 8-hour Antimony Concentration (µg/m³) (No Criteria)										Annual Antimony Concentration (µg/m³) (Criteria = 5 µg/m³)									
		1.5m	5m	10m	20m	30m	40m	50m	60m	70m	1.5m	5m	10m	20m	30m	40m	50m	60m	70m	1.5m	5m	10m	20m	30m	40m	50m	60m	70m			
Area 6f	A6f-01	0.166	0.168	0.173	0.193	0.223	0.346	0.504	0.677	0.836	0.021	0.021	0.022	0.024	0.028	0.043	0.063	0.085	0.105	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001			
	A6f-02	0.158	0.159	0.164	0.183	0.211	0.254	0.371	0.498	0.616	0.020	0.020	0.020	0.023	0.026	0.032	0.046	0.062	0.077	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001			

Result Summary of Barium Concentration for all ASRs at Various Heights above Ground

Area	ASR	Max 1-hour Barium Concentration (µg/m³) (No Criteria)										Max 8-hour Barium Concentration (µg/m³) (Criteria = 500 µg/m³)										Annual Barium Concentration (µg/m³) (Criteria = 5 µg/m³)									
		1.5m	5m	10m	20m	30m	40m	50m	60m	70m	1.5m	5m	10m	20m	30m	40m	50m	60m	70m	1.5m	5m	10m	20m	30m	40m	50m	60m	70m			
Area 6f	A6f-01	0.412	0.416	0.428	0.476	0.548	0.841	1.220	1.634	2.015	0.065	0.065	0.067	0.073	0.082	0.118	0.166	0.217	0.265	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015			
	A6f-02	0.392	0.395	0.407	0.451	0.520	0.623	0.902	1.206	1.487	0.062	0.063	0.064	0.070	0.078	0.091	0.126	0.164	0.199	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015			

Result Summary of Strontium Concentration for all ASRs at Various Heights above Ground

Area	ASR	Max 1-hour Strontium Concentration (µg/m³) (No Criteria)										Max 8-hour Strontium Concentration (µg/m³) (No Criteria)										Annual Strontium Concentration (µg/m³) (No Criteria)									
		1.5m	5m	10m	20m	30m	40m	50m	60m	70m	1.5m	5m	10m	20m	30m	40m	50m	60m	70m	1.5m	5m	10m	20m	30m	40m	50m	60m	70m			
Area 6f	A6f-01	0.213	0.215	0.221	0.247	0.286	0.443	0.646	0.867	1.072	0.027	0.027	0.028	0.031	0.036	0.055	0.081	0.108	0.134	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	
	A6f-02	0.202	0.204	0.210	0.234	0.271	0.326	0.475	0.638	0.789	0.025	0.025	0.026	0.029	0.034	0.041	0.059	0.080	0.099	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	

Result Summary of Copper Concentration for all ASRs at Various Heights above Ground

Result Summary of Copper Concentration for All Areas of Concern (µg/m³)																															
Area	ASR	Max 1-hour Copper Concentration (µg/m³) (Criteria = 100 µg/m³)										Max 8-hour Copper Concentration (µg/m³) (No Criteria)										Annual Copper Concentration (µg/m³) (Criteria = 2.4 µg/m³)									
		1.5m	5m	10m	20m	30m	40m	50m	60m	70m	1.5m	5m	10m	20m	30m	40m	50m	60m	70m	1.5m	5m	10m	20m	30m	40m	50m	60m	70m			
Area 6f	A6f-01	0.208	0.210	0.213	0.227	0.249	0.337	0.451	0.576	0.690	0.104	0.104	0.105	0.106	0.109	0.120	0.134	0.150	0.164	0.089	0.089	0.089	0.089	0.089	0.089	0.089	0.089	0.089			
	A6f-02	0.202	0.203	0.207	0.220	0.241	0.272	0.356	0.447	0.532	0.103	0.103	0.104	0.105	0.108	0.112	0.122	0.134	0.144	0.089	0.089	0.089	0.089	0.089	0.089	0.089	0.089	0.089			

Result Summary of Titanium Concentration for all ASRs at Various Heights above Ground

Result Summary of Titanium Concentration for All Areas at Various Height																												
Area	ASR	Max 1-hour Titanium Concentration (µg/m ³) (No Criteria)										Max 8-hour Titanium Concentration (µg/m ³) (No Criteria)								Annual Titanium Concentration (µg/m ³) (Criteria = 100 µg/m ³)								
		1.5m	5m	10m	20m	30m	40m	50m	60m	70m	1.5m	5m	10m	20m	30m	40m	50m	60m	70m	1.5m	5m	10m	20m	30m	40m	50m	60m	70m
Area 6f	A6f-01	0.052	0.052	0.054	0.060	0.070	0.108	0.157	0.212	0.261	0.006	0.007	0.007	0.008	0.009	0.013	0.020	0.026	0.033	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	A6f-02	0.049	0.050	0.051	0.057	0.066	0.079	0.116	0.156	0.192	0.006	0.006	0.006	0.007	0.008	0.010	0.014	0.019	0.024	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001

Appendix 5.1

Legislation and Standards for Noise Assessment

Legislation and Standards for Noise Assessment

The relevant legislation and associated guidance applicable to present the study for the assessment of noise impacts include:

- TM on Noise from Places other than Domestic Premises, Public Places or Construction Sites (TM-Places); and
- Hong Kong Planning Standard and Guidelines (HKPSG).

Road Traffic Noise

In accordance with the HKPSG, the maximum permissible hourly noise level (L_{10}) at the external facades of domestic premises is 70dB(A). This criterion applies to domestic premises relying on open windows as a primary means for ventilation.

Fixed Noise

The HKPSG stipulates that in order to plan for a better environment, all fixed noise sources should be located and designed so that when assessed in accordance with the TM-Places, the level of the intruding noise at the facade of the nearest sensitive use should be at least 5 dB(A) below the appropriate Acceptable Noise Limit (ANL) as stipulated in TM-Places or, in the case of the background being 5 dB(A) lower than the ANL, should not be higher than the background. The following table presents the ANL for various Area Sensitivity Ratings (ASR).

Table AS.1: ANLs for fixed noise sources

Time Period	ANL (dB(A))		
	ASR A	ASR B	ASR C
Day (0700 to 1900 hours)	60	65	70
Evening (1900 to 2300 hours)	60	65	70
Night (2300 to 0700 hours)	50	55	60

Note:

(1) ASR – Area Sensitivity Rating

However, as discussed in Section 2, the present project is to plan for a residential development which differs from planning a fixed noise source, albeit that some of the existing noise sources would need to be slightly relocated to suit the development plan, and it would not aggravate the ambient noise condition and result in a high future background level. Hence it is proposed to adopt a noise limit of ANL - 5 dB(A).

For Discovery Bay in particular, it comprises of a combination of both high-rise and low-rise residential and commercial developments, and landscaping areas distributing

within the development boundary. Hence, it is considered appropriate to be described as "Low density residential area consisting of low-rise or isolated high-rise developments" as defined in Table 1 of TM-Places. Besides, there are no influencing factors such as industrial areas, major road with daily flow exceeding 30,000 vehicles per day in the vicinity. Hence, it is appropriate to adopt an ASR of "A". As such, the ANL-5 criteria would be 55dB(A) for daytime and evening periods (7:00 to 23:00) and 45dB(A) for night-time period (23:00 to 7:00).

Similar to road traffic noise assessment, all these criteria only apply to NSRs relying on opened windows for ventilation.

Firework Display Noise from Disneyland

The Disneyland Theme Park is located at approximately 3.5km north-east of Area 6f. This theme park is a Designated Project (DP) under the ELAO and an EIA Report was submitted to EPD and approved under the ELAO (ref AEIAR – 0323/2000). Hence, the operation of the theme park is governed by the noise criteria stipulated under TM-Places and TM-ELAO.

Firework events at Disneyland are organized at 8pm every night. According to its approved EIA Report, a noise criterion of $L_{eq(15min)} 55$ dB(A) is recommended for assessing the noise impacts due to fireworks. Hence, this $L_{eq(15min)} 55$ dB(A) is still adopted in this assessment.

Similar to road traffic noise assessment, all these criteria only apply to NSRs relying on opened windows for ventilation.

Construction Noise

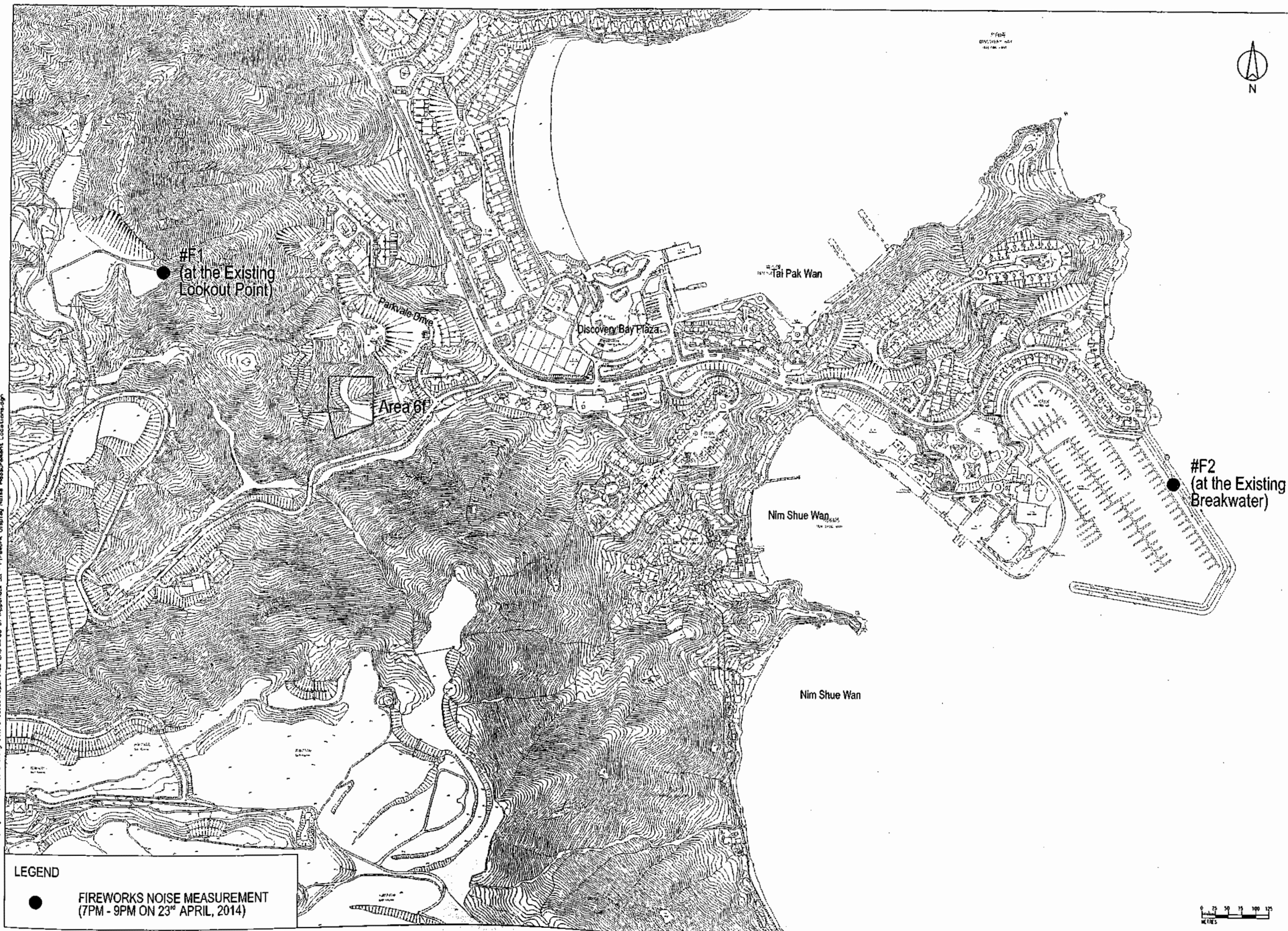
It is considered the development is in a preliminary stage, there is no construction programme or construction plant inventory for this development at this moment. In consideration of small scale development at Area 6f (i.e. two residential buildings only), construction noise impacts at existing sensitive receiver are considered not anticipated. Given that temporary noise barrier, quiet plant, good site practice would be adopted during construction of Area 6f, insurmountable construction noise impacts are not anticipated.

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Appendix 5.2

Firework Display Noise
Measurement Location

\\VHCRT522\acoustic\env\proj\235528\13 Drawing Deliverables\map\102-ENV\Area 6F\Appendix 5.1 - Firework Display Noise Measurement Locations.dgn



Appendix 5.3

Firework Display Noise Result Summary

Project : Discovery Bay EAS
Job No.: 235928
Title: Firework Display Noise Assessment
Subtitle: Firework Display Noise Measurement Results

Noise Level	Location F1	Location F2
Measured Noise Level, Leq (15 min) , dB(A) ^[3]	52	53
Background Noise Level (Before firework display), Leq (15 min) , dB(A) ^[1]	50	50
Background Noise Level (After firework display), Leq (15 min) , dB(A) ^[2]	48	50
Average Background Noise Level, dB(A) ^[3]	49	50
Facade correction ^[4]	3	
Corrected Noise Level, Leq (15 min) , dB(A)	52	53
Noise Criterion ^[5]	55	
Exceedance, dB(A)		

Note:
[1] Background noise level was measured 15 minutes before the firework display.
[2] Background noise level was measured 15 minutes after the firework display.
[3] Logarithmic average of [1] and [2]
[4] Facade correction has been considered in noise calculation.
[5] The firework display noise criteria is referenced to Environmental Impact Assessment - Construction of an International Theme Park in Penny's Bay of North Lantau together with its Essential Associated Infrastructures (AEIAR – 0323/2000) and Hong Kong International Theme Parks Limited - Air Quality and Noise Monitoring During Fireworks Dress Rehearsal: Monitoring Report.

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Appendix 6.1

Legislation and Standards for Water Quality Assessment

Legislation and Standards for Water Quality Assessment

The relevant legislations, standards and guidelines applicable to present study for the assessment of water quality impacts include:

- Water Pollution Control Ordinance (WPCO) CAP 358;
- Technical Memorandum for Effluents Discharged into Drainage and Sewerage Systems Inland and Coastal Waters (TM-DSS);
- Hong Kong Planning Standards and Guidelines (HKPSG); and
- ProPECC PN 1/94 "Construction Site Drainage"

Water Pollution Control Ordinance, CAP 358

The Project is located in the Southern Water Control Zone (WCZ) under the Water Pollution Control Ordinance (WPCO) (CAP 358) and the corresponding WQOs are summarised in below table.

Table A6.1: Water quality objectives for Southern Water Control Zones

Parameters	Objectives	Sub-Zone
Aesthetic Appearance	Waste discharges shall cause no objectionable odours or discolouration of the water.	Whole zone
	Tarry residues, floating wood, articles made of glass, plastic, rubber or of any other substance should be absent.	
	Mineral oil should not be visible on the surface. Surfactants should not give rise to a lasting foam.	
	There should be no recognisable sewage-derived debris.	
	Floating, submerged and semi-submerged objects of a size likely to interfere with the free movement of vessels, or cause damage to vessels, should be absent.	
	Waste discharges shall not cause the water to contain substances which settle to form objectionable deposits.	
Bacteria	<i>Escherichia coli</i> < 610/100 mL, geometric mean in one calendar year.	Secondary Contact, Recreation Subzones and Fish Culture Subzones
	<i>Escherichia coli</i> < 180/100 mL, geometric mean from March to October inclusive in one calendar year. Samples at least 3 times in a calendar month at intervals of between 3 and 14 days.	Bathing Beach Subzones
Dissolved Oxygen	> 4 mg/L at depth-averaged for 90% of the samples > 2 mg/L within 2m of the seabed for 90% of the	Marine waters excepting Fish Culture

Parameters	Objectives	Sub-Zone
	samples	Subzones
	> 5 mg/L at depth averaged for 90% of the samples > 2 mg/L within 2 metres of the seabed for 90% of the sample.	Fish Culture Subzones
	> 4 mg/L	Inland waters of the Zone
pH	In the range of 6.5 – 8.5 Change due to waste discharge < 0.2	Marine waters excepting Bathing Beach Subzones; Mui Wo (A), Mui Wo (B), Mui Wo (C), Mui Wo (E) and Mui Wo (F) Subzones.
	In the range of 6.0 – 9.0 Change due to waste discharge < 0.2	Mui Wo (D) Sub-zone and other inland waters.
	In the range of 6.0 – 9.0 for 90% of samples Change due to waste discharge < 0.5	Bathing Beach Subzones.
Temperature	Change due to waste discharge < 2.0 degC	Whole zone
Salinity	Change due to waste discharges < 10% of ambient levels	Whole zone
Suspended solids	Change due to waste discharge < 30% of ambient levels	Marine waters
	< 20 mg/L, annual median	Mui Wo (A), Mui Wo (B), Mui Wo (C), Mui Wo (E) and Mui Wo (F) Subzones.
	< 25 mg/L, annual median	Mui Wo (D) Subzone and other inland waters.
Unionized Ammonia (ULA)	< 0.021 mg/L, annual arithmetic mean	Whole zone
Nutrient	Shall not cause excessive or nuisance algal growth Total inorganic nitrogen (TIN) < 0.1 mg/L, annual mean of depth averaged	Marine waters
5-Day Biochemical Oxygen Demand (BOD ₅)	< 5 mg/L	Inland waters of the Zone
Chemical Oxygen Demand (COD)	< 30mg/L	Inland waters of the Zone
Dangerous Substances	Waste discharges shall not cause the concentrations of dangerous substances in marine waters to attain such levels as to produce significant toxic effects in humans, fish or any other aquatic organisms, with due regard to biologically cumulative effects in food chains and to toxicant interactions with each other.	Whole zone

Parameters	Objectives	Sub-Zone
	Waste discharges of dangerous substances shall not put a risk to any beneficial uses of the aquatic environment.	Whole zone

Technical Memorandum for Effluents Discharge into Drainage and Sewerage Systems, Inland & Coastal Waters

Apart from the WQOs, Annex 1 of CAP358AK also specifies the limits to control the physical, chemical and microbial parameters for effluent discharges into drainage and sewage system at both inland and coastal waters under the TM-DSS. The discharge limits vary with the effluent flowrates and the sewage from the Project (treated after sewage treatment works) should comply with the standards for effluent discharged into marine water. The effluent discharge standards are presented in tables below.

Table A6.2: Standards for effluents discharged into the marine waters of Southern WCZ (in mg/L, unless otherwise indicated)

Flow rate (m ³ /day)	≤ 10	> 10 and ≤ 200	> 200 and ≤ 400	> 400 and ≤ 600	> 600 and ≤ 800	> 800 and ≤ 1000	> 1000 and ≤ 1500	> 1500 and ≤ 2000	> 2000 and ≤ 3000	> 3000 and ≤ 4000	> 4000 and ≤ 5000	> 5000 and ≤ 6000
pH (pH units)	6-10	6-10	6-10	6-10	6-10	6-10	6-10	6-10	6-10	6-10	6-10	6-10
Temperature (degC)	45	45	45	45	45	45	45	45	45	45	45	45
Colour (Iovibond units) (25mm cell length)	4	1	1	1	1	1	1	1	1	1	1	1
Suspended solids	500	500	500	300	200	200	100	100	50	50	40	30
BOD	500	500	500	300	200	200	100	100	50	50	40	30
COD	1000	1000	1000	700	500	400	300	200	150	100	80	80
Oil & Grease	50	50	50	30	25	20	20	20	20	20	20	20
Iron	20	15	13	10	7	6	4	3	2	1.5	1.2	1
Boron	6	5	4	3.5	2.5	2	1.5	1	0.7	0.5	0.4	0.3
Barium	6	5	4	3.5	2.5	2	1.5	1	0.7	0.5	0.4	0.3
Mercury	0.1	0.1	0.1	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Cadmium	0.1	0.1	0.1	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Other toxic metals individually	2	1.5	1.2	0.8	0.6	0.5	0.32	0.24	0.16	0.12	0.1	0.1
Total toxic metals	4	3	2.4	1.6	1.2	1	0.64	0.48	0.32	0.24	0.2	0.14
Cyanide	1	0.5	0.5	0.5	0.4	0.3	0.2	0.15	0.1	0.08	0.06	0.04
Phenols	0.5	0.5	0.5	0.3	0.25	0.2	0.13	0.1	0.1	0.1	0.1	0.1

Flow rate (m ³ /day)	≤ 10	> 10 and ≤ 100	> 200 and ≤ 400	> 400 and ≤ 600	> 600 and ≤ 800	> 800 and ≤ 1000	> 1000 and ≤ 1500	> 1500 and ≤ 2000	> 2000 and ≤ 3000	> 3000 and ≤ 4000	> 4000 and ≤ 5000	> 5000 and ≤ 6000
Sulphide	5	5	5	5	5	5	2.5	2.5	1.5	1	1	0.5
Total residual chlorine	1	1	1	1	1	1	1	1	1	1	1	1
Total nitrogen	100	100	80	80	80	80	50	50	50	50	50	50
Total phosphorus	10	10	8	8	8	8	5	5	5	5	5	5
Surfactants (total)	30	20	20	20	15	15	15	15	15	15	15	15
<i>E. coli</i> (count/100ml)	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000

Hong Kong Planning Standards and Guidelines

Chapter 9 of the Hong Kong Planning Standards and Guidelines (HKPSG) outlines the environmental requirements that need to be considered in land use planning. The recommended guidelines, standards and guidance cover the selection of suitable locations for the developments and sensitive uses, provision of environmental facilities, and design, layout, phasing and operational controls to minimise adverse environmental impacts. It also lists out environmental factors that influence land use planning and recommends buffer distances for land uses.

ProPECC PN 1/94 "Construction Site Drainage"

The Practice Note for Professional Persons (ProPECC Note PN1/94) on Construction Site Drainage provides guidelines for the handling and disposal of construction discharges. It is applicable to this study for the control of site runoff and wastewater generated during the construction phase. The types of discharges from construction sites outlined in the ProPECC Note PN1/94 include:

- Surface runoff;
- Groundwater;
- Boring and drilling water;
- Wastewater from concrete batching plant;
- Wheel washing water;
- Bentonite slurries;
- Water for testing and sterilization of water retaining structures and water pipes;
- Wastewater from building construction and site facilities; and
- Acid cleaning, etching and pickling wastewater.

Appendix 6.2

Standard Practice for Site Drainage

Standard Practice for Site Drainage

Site Runoff

In accordance with the Practice Note for Professional Persons on Construction Site Drainage, Environmental Protection Department, 1994 (ProPECC PN 1/94), best management practices should be implemented as far as practicable as below:

- At the start of site establishment, perimeter cut-off drains to direct off-site water around the site should be constructed with internal drainage works. Channels (both temporary and permanent drainage pipes and culverts), earth bunds or sand bag barriers should be provided on site to direct stormwater to silt removal facilities.
- The dikes or embankments for flood protection should be implemented around the boundaries of earthwork areas. Temporary ditches should be provided to facilitate the runoff discharge into an appropriate watercourse, through a silt/sediment trap. The silt/sediment traps should be incorporated in the permanent drainage channels to enhance deposition rates.
- The design of efficient silt removal facilities should be based on the guidelines in Appendix A1 of ProPECC PN 1/94. The detailed design of the sand/silt traps should be undertaken by the contractor prior to the commencement of construction.
- The design of temporary on-site drainage should prevent runoff going through site surface, construction machinery and equipment in order to avoid or minimize polluted runoff. Sedimentation tanks with sufficient capacity, constructed from pre-formed individual cells of approximately 6 to 8 m³ capacities, are recommended as a general mitigation measure which can be used for settling surface runoff prior to disposal. The system capacity shall be flexible and able to handle multiple inputs from a variety of sources and suited to applications where the influent is pumped.
- Construction works should be programmed to minimize surface excavation works during the rainy seasons (April to September). All exposed earth areas should be completed and vegetated as soon as possible after earthworks have been completed. If excavation of soil cannot be avoided during the rainy season, or at any time of year when rainstorms are likely, exposed slope surfaces should be covered by tarpaulin or other means.
- All drainage facilities and erosion and sediment control structures should be regularly inspected and maintained to ensure proper and efficient operation at all times and particularly following rainstorms. Deposited silt and grit should be removed regularly and disposed of by spreading evenly over stable, vegetated areas.
- All open stockpiles of construction materials (for example, aggregates, sand and fill material) should be covered with tarpaulin or similar fabric during rainstorms. Measures should be taken to prevent the washing away of construction materials, soil, silt or debris into any drainage system.
- Manholes (including newly constructed ones) should always be adequately covered and temporarily sealed so as to prevent silt, construction materials or

debris being washed into the drainage system and storm runoff being directed into foul sewers.

- Precautions to be taken at any time of year when rainstorms are likely, actions to be taken when a rainstorm is imminent or forecasted, and actions to be taken during or after rainstorms are summarized in Appendix A2 of ProPECC PN 1/94. Particular attention should be paid to the control of silty surface runoff during storm events.
- All vehicles and plant should be cleaned before leaving a construction site to ensure no earth, mud, debris and the like is deposited by them on roads. An adequately designed and sited wheel washing facilities should be provided at every construction site exit where practicable. Wash-water should have sand and silt settled out and removed at least on a weekly basis to ensure the continued efficiency of the process. The section of access road leading to, and exiting from, the wheel-wash bay to the public road should be paved with sufficient backfall toward the wheel-wash bay to prevent vehicle tracking of soil and silty water to public roads and drains.
- Oil interceptors should be provided in the drainage system downstream of any oil/fuel pollution sources. The oil interceptors should be emptied and cleaned regularly to prevent the release of oil and grease into the storm water drainage system after accidental spillage. A bypass should be provided for the oil interceptors to prevent flushing during heavy rain.
- Construction solid waste, debris and rubbish on site should be collected, handled and disposed of properly to avoid water quality impacts.
- All fuel tanks and storage areas should be provided with locks and sited on sealed areas, within bunds of a capacity equal to 110% of the storage capacity of the largest tank to prevent spilled fuel oils from reaching water sensitive receivers nearby.
- Regular environmental audit on the construction site should be carried out in order to prevent any malpractices. Notices should be posted at conspicuous locations to remind the workers not to discharge any sewage or wastewater into the water bodies, marsh and ponds.

By adopting the best management practices, it is anticipated that the impacts of general site operation will be reduced to acceptable levels before discharges. The details of best management practices will be highly dependent to actual site condition and Contractor shall apply for a discharge license under WPCO.

Sewage from Workforce

Mitigation measures to manage the sewage from workforce include the following:

- Portable chemical toilets and sewage holding tanks should be provided for handling the construction sewage generated by the workforce.
- A licensed contractor should be employed to provide appropriate and adequate portable toilets to cater 0.15m³/day/employed population and be responsible for appropriate disposal and maintenance.

- Notices should be posted at conspicuous locations to remind the workers not to discharge any sewage or wastewater into the nearby environment during the construction phase of the Project.
- Regular environmental audit on the construction site should be conducted in order to provide an effective control of any malpractices and achieve continual improvement of environmental performance on site.

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Appendix 7.1

Legislation and Standards for Land Contamination Assessment

Legislation and Standards for Land Contamination Assessment

The relevant legislation, standards and guidelines applicable to the present study for the assessment of land contamination include:

- Annex 19 of the Technical Memorandum on Environmental Impact Assessment Ordinance (TM-EIAO), Guidelines for Assessment of Impact Assessment Process (TM-EIA), Guidelines for Assessment of Impact On Sites of Cultural Heritage and Other Impacts (Section 3: Potential Contaminated Land Issues), Environmental Protection Department (EPD), 1997;
- Guidance Note for Contaminated Land Assessment and Remediation EPD 2007;
- Guidance Manual for Use of Risk-Based Remediation Goals (RBRGs) for Contaminated Land Management, EPD, 2007; and
- Practice Guide for Investigation and Remediation of Contaminated Land, EPD, 2011.

Under Annex 19 of the TM-EIAO, a number of potentially contaminating historical land uses should be considered, including oil installations, gas works, metal workshops, car repair and dismantling workshops, which have the potential to cause or have caused land contamination.

In accordance with EPD's *Guidance Note for Contamination Land Assessment and Remediation*, a contamination assessment evaluation should:

- provide a clear and detailed account of the present land-use and the relevant past land history, in relation to possible land contamination;
- identify areas of potential contamination and associated impacts, risks or hazards; and
- submit a plan to evaluate the actual contamination conditions for soil and/or groundwater, if required.

The *Guidance Manual for Use of Risk-Based Remediation Goals (RBRGs) for Contaminated Land Management* introduces the risk based approach in land contamination assessment and present instructions for comparison of soil and groundwater data to the Risk-Based Remediation Goals (RBRGs) for 54 chemicals of concern commonly found in Hong Kong. The RBRGs were derived to suit Hong Kong conditions by following the international practice of adopting a risk-based methodology for contaminated land assessment and remediation and were designed to protect the health of people who could potentially be exposed to land impacted by chemicals under

four broad post restoration land use categories. The RBRGs also serve as the remediation targets if remediation is necessary.

The EPD's *Practice Guide for Investigation and Remediation of Contaminated Land* includes a summary of the general steps of a contamination assessment study, which include site appraisal, site investigation and remediation.

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Appendix 7.2

Historical Aerial Photos for Area 6f

YEAR 1973



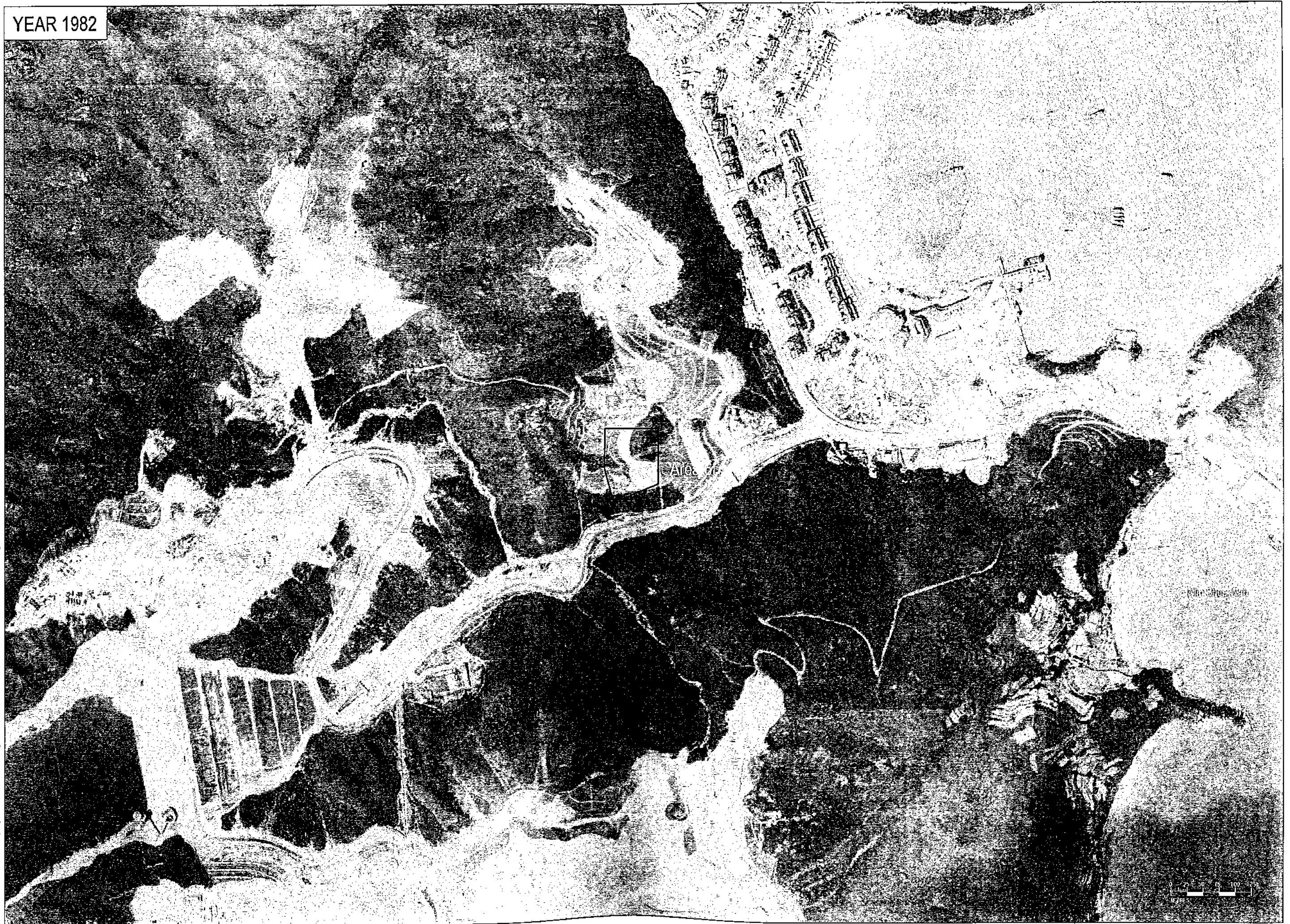
Tai Pak Wan

Area 6f

Nim Shue Wan

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YEAR 1982

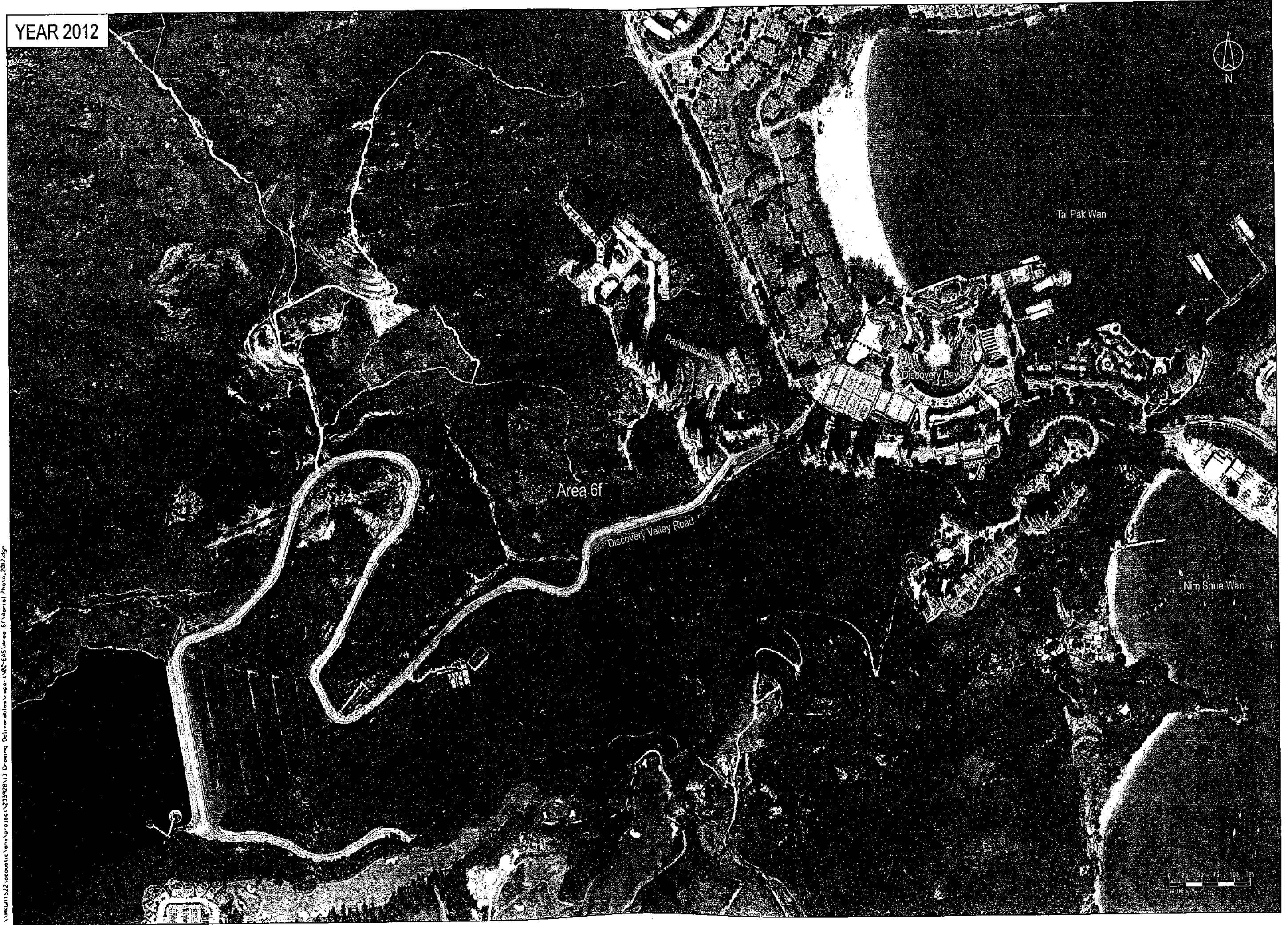


YEAR 1993

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YEAR 2012



Appendix D
Landscape Design Proposal

VOLUME 1

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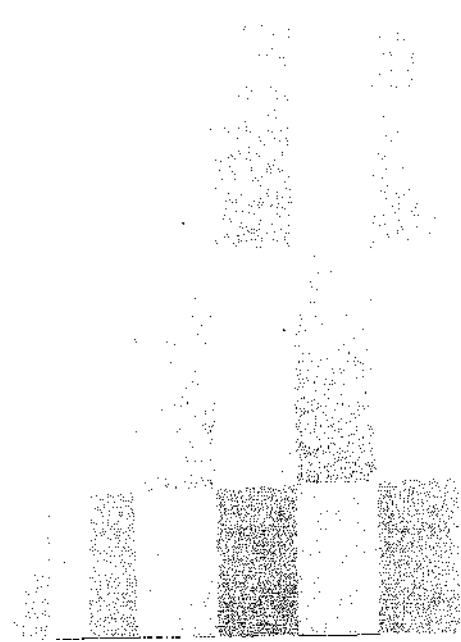
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VOLUME 2

EXISTING TREE PHOTOGRAPHS



A.1 INTRODUCTION

- A.1.1 This report contains a landscape proposal including a Tree Preservation Scheme and Compensatory Planting Proposal for a Section 12A Application for the Residential Development at Discovery Bay Area 6f (hereafter referred to as the "Application Site"). This report outlines the landscape design proposals for the Proposed Development at the Application Site.
- A.1.2 This landscape design proposal is submitted to demonstrate the effect of the building design of the Proposed Development on the Application Site and how landscape and visual impacts will be mitigated through an appropriate landscape design. It includes an assessment of existing trees and potential impacts on them and a landscape layout with proposed compensatory and amenity planting to integrate the proposed development into the existing landscape context.

A.2 EXISTING SITE CONDITIONS

- A.2.1 **Context/ General Neighbourhood** - The Proposed Application Site is located to the west of Parkvale Village and is bounded by Parkvale Drive to the east and north of Discovery Valley Road. The existing residential tower blocks of Woodbury, Woodgreen and Woodland Courts lie to the north and Crystal and Coral Courts lie to the east. The site is on the lower slopes of hills that rise to the uplands of Lo Fu Tau to the west and north. Parkvale Village has a suburban residential character and marks the westerly edge of the residential development at the lower part of Discovery Bay. The hills to the west are robust and the lower hills to the east has been with partially modified by the construction of building platforms, slope work, access roads and hiking trails and have a rugged semi-natural character with dense vegetation
- A.2.2 **The Site** - The Application Site is broadly rectangular in shape and covers an area of approximately 8,300 m² with the existing levels ranging from +44 mPD to +70 mPD. The northern part of the site consists of a rock-cut bench with natural slope profiles to the east and artificial slopes to the west. The southern part of the site consists of a flat construction platform with natural vegetated slopes to the west and steep tree clad artificial slopes to the east.

A.3 PROPOSED DEVELOPMENT FORM

- A.3.1 **Building Layout** - The Proposed Development consists of two residential blocks with a building height of not more than 18 storeys.
- A.3.2 **Circulation** - Access to the Application Site will be via an extension of Parkvale Drive located to the east of the Proposed Development via the northern part of the site (which currently serves Woodbury, Woodgreen and Woodland Courts).

A. 4 TREE PRESERVATION SCHEME

A. 4.1 Tree Survey Findings

General - 1no. individual tree and 4no. tree groups have been surveyed within the Application Site boundary. The most frequently occurring species are *Litsea glutinosa*, *Lophostemon confertus*, *Mallotus paniculatus*, *Pinus elliotii* and *Cinnamomum camphora*. The tree species are predominantly native with some exotic pioneer species suited to slope conditions. It is likely that part of all of the slopes were originally planted to enhance slope stability and general amenity during the construction of the existing building phases. The vegetation is unmanaged and forms a dense cover to the existing and man-made slopes although the man-made slopes at the back of the site are relatively bare.

No protected species listed under Forestry Regulations (Cap. 96 Forestry and Countryside Ordinance sub. leg.) were found within the Site. No "Old and Valuable Trees" or "Champion Tree" as defined in

"Registration of Old and Valuable Trees" (ETWB TC(W) No. 29/2004) and in the book "Champion Trees in Urban Hong Kong" respectively, were found.

The condition of the trees is mostly fair and most are of medium amenity value. The Tree Survey plan and Tree Assessment Schedule are provided in Annex A1 and Tree Photographs are provided in Volume 2. A breakdown of tree numbers is provided in Table A1 below.

Table A.1 – Summary of Tree Numbers

Trees	Total
Individual Trees	
• T61	1
Tree Groups	
• TG10	82
• TG11	50
• TG12	63
• TG13	29
TOTAL	225

A. 4.2 Proposed Treatment of Existing Trees

Individual Trees – Tree No. T61 conflicts with the proposed access road. This tree is mature and of fair form and health and medium amenity value. It has a low anticipated survival rate after transplanting and therefore it is proposed be felled.

Tree Groups – There are 4no. tree groups within the Application Site. TG11 and TG 13 lie on the western site slopes and are anticipated to be unaffected. TG10 and TG12 lie on the eastern side of the site and will be directly affected by the proposed development footprint. Trees in these groups are mature and of fair form and health; with medium amenity value. The site is characterised by rock outcrops and soil on the site is thin making the forming of rootballs for transplanting difficult. The affected trees are therefore proposed to be felled. The unaffected trees are proposed to be retained in order to preserve the existing green slope character of the site.

A summary of proposed treatment of existing trees is shown in Table A2 below:-

Table A.2 – Summary of Treatment of Existing Trees

Tree Groups	Trees to be Retained	Trees to be Felled	Trees to be Transplanted	Total
Individual Trees				
• T61	0	1 (Girth: 1.40m)	0	1
Tree groups				
• TG10	16 (20%)	66 (80%) (Girth: 24.70m)	0	82
• TG11	50 (100%)	0	0	50
• TG12	12 (20%)	51 (80%) (Girth: 20.30m)	0	63
• TG13	29 (100%)	0	0	29
TOTAL	107	118 (Girth = 46.40m)	0	225

A.4.3 Compensatory Planting Proposal

Compensatory trees will consist of heavy-standard trees with a minimum size of 100mm DBH. Total aggregate girth of the 118 existing trees to be felled within this Application Site is 46.40m. To compensate the number of trees felled by equivalent aggregate girth with heavy standard planting would require 148no. trees. However, there is insufficient space to provide such a large amount of planting on the site for the following reasons:

- (i) The flat area of the site is largely taken up with building footprint, access road and pedestrian circulation space to optimise use of the existing land area and to minimise the landform modification. The areas available for planting are relatively small and it is estimated that a minimum of 50 no. compensatory trees could be planted.
- (ii) The rest of the site is on sloping areas which is not suitable for the planting of heavy standards trees. In order to reinstate the existing slope planting that is disturbed by site formation works, it is proposed to provide tree whip planting. The exact area and number of whips is subject to the detailed design but it is anticipated that a minimum area of 350sq.m of tree whip planting on slopes will be provided.

The tree species to be planted are outlined in the Landscape Design section later in this report.

A.5 LANDSCAPE DESIGN

A.5.1 The Landscape Design has been developed to:

- (i) Create landscape spaces appropriate to the specific site conditions of the Proposed Development serving the future residents;
- (ii) To ensure the landscape character is consistent with the overall design language and aesthetic of the architectural elements;
- (iii) To ensure the Proposed Development is sensitively integrated into the surrounding areas via naturalistic interface treatments;
- (iv) To minimise the visual impact of the Proposed Development through sensitive landscape treatment;
- (v) To create suitable outdoor spaces for passive recreational activities; and
- (vi) To promote the use of indigenous plant species throughout the landscape where possible to promote ecological diversity and sustainability; and
- (vii) To introduce exotic ornamental species to feature areas as appropriate to enhance amenity.

A.5.2 General Concept Design

A.5.2.1 Proposed Residential Development - The general concept is to:

- (i) Preserve as much existing vegetation on surrounding slopes as possible and plant disturbed or new slopes created due to site formation works with native or naturalised species in order to integrate the site with the surroundings;
- (ii) Provide landscaped passive amenity spaces for the future residents around the base of the towers;
- (iii) Create a welcoming entrance to the development from the extended Parkvale Drive.
- (iv) The planting scheme for the entry areas will create an attractive landscape for the development while also blending it in with the surrounding area. Evergreen shrubs and tree species will be planted along the driveway leading up to the main entrance of the residential blocks. The main entry will be defined by feature paving and a row of ornamental trees and flowering shrubs, which then leads to an open plaza and a grand cascade water feature. Pedestrian walkways will be added to connect all the buildings along Parkvale Drive and within the Proposed Development. Two pocket gardens between the residential towers with ornamental planting and small plazas will provide areas for passive activities. The overall design of the residential landscape is to maximize greenery while providing designed spaces to facilitate different activities.

A.5.3 Major Landscape Elements [Refer to Landscape Master Plan shown In Annex B.1]

A.5.3.1 Landscape at Main Access – The vehicle access of the development will be an extension of the existing Parkvale Drive serving the residential towers to the north. Indigenous trees and ornamental shrub planting along the main entrance from Parkvale Drive will enhance the appearance of the slope to the west of the driveway. The access road will lead to a central entry court between the two towers. This will have feature paving, ornamental trees and flowering shrub planting.

A.5.3.2 Recreational Facilities and Central Communal Garden – Landscaped amenity spaces are sited on the eastern side of the development away from the access road and where they can take advantage of open views to the east across Discovery Bay and Tai Pak Bay. A deck will be constructed over the slope to create additional terraced space which will incorporate passive and active recreational facilities. The change in level will be used to create a central cascading water feature and a lower plaza. Pocket gardens and seating areas will be provided of a scale which will create intimate settings for informal relaxation. Children's play areas will provide for active recreation. Ornamental shrub planting beds will be provided to create interest and variety throughout the year. Fragrant flowering trees and shrubs will be planted to create a relaxing and attractive atmosphere for residents.

A.5.3.3 Pedestrian Environment - A pedestrian circulation loop will provide access from the southern end of the access road around the eastern edge of the landscaped deck back to the access road in the north. There will also be a footpath link into the hiking trails to the west. Tree and shrub planting will be implemented along the walkways to enhance the interior circulation spaces. The planting will provide colour and texture to soften the edges of the paving as well as adjacent building walls. In addition, lighting will be selected designed to provide safe access and amenity for the residents and will reinforce a consistent design character throughout. Fragrant flowering trees and shrubs will be planted around the pocket gardens to create a relaxing and attractive atmosphere for residents.

A.5.3.4 Peripheral Planting and Boundary Treatment

The western slopes will be largely untouched by the development. Any vegetation impacted to the slopes due to the construction of the access road will be reinstated and ornamental planting at the toe of the slope will enhance the entrance experience. The vegetation on the slopes surrounding the deck on the eastern side of the development will be retained and reinstated if disturbed to maintain the existing vegetated character.

A.5.4 Landscape Softworks Design

A.5.4.1 Planting Strategy - Planting shall compliment the adjacent natural vegetation and will help ameliorate the local micro-climate, help to control pollution, reduce noise, improve energy efficiency by establishing shade in summer and provide wildlife habitats. Species selection will relate to the particular landscape character in each area. Peripheral amenity landscape will feature areas of naturalistic buffer planting, utilizing mainly native species. Amenity planting within landscaped spaces around the tower and on the deck along the east side will be more formal in style and include exotic species chosen for flower and foliage colour, seasonal variation and form.

A.5.4.2 Proposed Planting Schedule – A palette of plant materials is indicated in Table A.3 and A4:

Table A.3 Proposed Ornamental Planting Palette

ABB	Scientific Name	Chinese Common Name	Proposed Size	Spacing (mm)
TREES				
CAM.JAP.	<i>Camelia japonica</i>	山茶花	Heavy Standard	3000

APPENDIX D
LANDSCAPE DESIGN PROPOSAL (REV.0)

ABB	Scientific Name	Chinese Common Name	Proposed Size	Spacing (mm)
CIN.BUR.	<i>Cinnamomum burmannii</i> *	陰香	Heavy Standard	4000
ELA.API.	<i>Elaeocarpus chinensis</i> *	中華杜英	Heavy Standard	4500
ELA.HAI.	<i>Elaeocarpus hainanensis</i>	水石榕	Heavy Standard	4500
FIC.BEN.	<i>Ficus benjamina</i>	垂榕	Heavy Standard	4000
JUN.CHI.	<i>Juniperus chinensis</i>	龍柏	Heavy Standard	3000
OSM.FRA.	<i>Osmanthus fragrans</i>	桂花	Heavy Standard	3000
PLU.RUB.	<i>Plumeria rubra</i>	雞蛋花	Heavy Standard	4000
POD.MAC.	<i>Podocarpus macrophyllus</i> *	羅漢松	Heavy Standard	3000
SYZ.HAN.	<i>Syzygium hancei</i> *	韓氏蒲桃	Heavy Standard	4500
SHRUB				
AGA.ODO.	<i>Aglaiia odorata</i>	米仔蘭	--	
BOU.SPE.	<i>Bougainvillea spectabilis</i>	賀春紅	--	
CAL.ZEB.	<i>Calathea zebrine</i>	斑葉竹芋	--	
COD.VAR.	<i>Codiaeum variegatum</i>	灑金榕	--	
CYC.REV.	<i>Cycas revoluta</i>	鳳尾松	--	
DUR.REP.	<i>Duranta repens</i>	金蓮翹		
GAR.JAS.	<i>Gardenia jasminoides</i> *	梔子	--	
GOR.AXI.	<i>Gordonia axillaris</i> *	大頭茶		
HIB.ROS.	<i>Hibiscus rosa – sinensis</i> (Yellow)	黃花大紅花	--	
IXO.CHI.	<i>Ixora chinensis</i> *	龍船花	--	
LAG.IND.	<i>Lagerstroemia indica</i>	紫薇	--	
LIG.SIN.	<i>Ligustrum sinense</i> *	山指甲	--	
PIT.TOB.	<i>Pittosporum tobira</i>	海桐花	--	
RHO.SIM.	<i>Rhododendron simsii</i> *	紅杜鵑	--	
STR.REG.	<i>Strelitzia reginae</i>	天堂鳥蕉	--	
OSM. FRA	<i>Osmanthus fragrans</i>	桂花 台灣赤楠	--	
GROUND COVER				
CAT.ROS.	<i>Catharanthus roseus</i>	長春海棠	--	
CHL.COM.	<i>Chlorophytum comosum</i>	吊蘭	--	
LIR.SPI.	<i>Liriope spicata</i> *	花葉蒲草	--	
PHY.MYR.	<i>Phyllanthus mytifolius</i>	葉下珠	--	
ZEP.CAN.	<i>Zephyranthes candida</i>	玉簪	--	

* Native species

Table A.4 Proposed Tree Whip Planting on Slopes

ABB	Scientific Name	Chinese Common Name	Proposed Size (mm)	Spacing (mm)
BAU. BLA.	<i>Bauhinia x blakeana</i>	洋紫荆	1000	4000-5000
CIN. CAM.	<i>Cinnamomum camphora</i>	樟	1000	4000-5000
LIT. GLU.	<i>Litsea glutinosa</i>	潺槁樹	1000	4000-5000
SAP. SEB.	<i>Sapium sebiferum</i>	烏柏	1000	4000-5000
SCH. HEP.	<i>Schefflera heptaphylla</i>	鵝掌柴	1000	4000-5000

A.5.5 **Soil Depth and Irrigation** – All planting areas at grade and on slab shall have the following minimum soil depth provision (excluding the drainage layers):

Tree/ Palm Tree	1200mm
Shrubs	600mm
Groundcover	300 – 600mm
Turf	300mm

All amenity planting areas will be irrigated manually by hose from water points.

A.5.6 **Barrier Free Access** – All landscape areas will be designed and detailed according to the current version of BD's Design Manual – Barrier Free Access.

A.5.7 **Landscape Area Provision**

Communal Open Space - The total Application Site area is about 8,300m² with a designed population of 1,190. With a total open space area provided within the development of at least 1,200 m², the minimum standard of 10 ha per 100,000 persons as stipulated in Chapter 4 of the Hong Kong Planning Standards and Guidelines, has been more than achieved.

Greenery Provision – The greenery area provision for the proposed development is summarised in Table A.5 as follows:-

Table A.5 Greenery Area Provision

Description	Area (approx. m ²)
Application Site Area	8,300
Greening Requirement (20% of Site Area)*	1,660
Site Greenery Coverage	Min. 3,500

*According to PNAP (APP-152).

A minimum of 3,500 m² greenery area will be provided within the development. The percentage of green area provided within the development exceeds the 20% requirement of PNAP (APP-152).

Figure A – Tree Assessment

Figure A.1 Tree Schedule

*Figure A.2 Tree Group and Individual Tree
Survey Plan (PT30/6F/P/TS01.dwg)*

*Figure A.3 Tree Treatment Plan
(PT30/6F/P/TS02.dwg)*

Tree Assessment Schedule at

Address: Discovery Bay Area 6F
 Lot: N/A
 Prepared by: Pura Wong
 Field Survey was conducted/updated on: Nov-14
 To be read in conjunction with drawing nos: PT30/6F/PT501
 In D O: N/A
 on: Dec-14
 Rev: 0

S12A Discovery Bay Optimisation Of Land Use - Refinement Of Area 6F

Units: Unrelated

Existing Tree Assessment Schedule (Individual Tree)

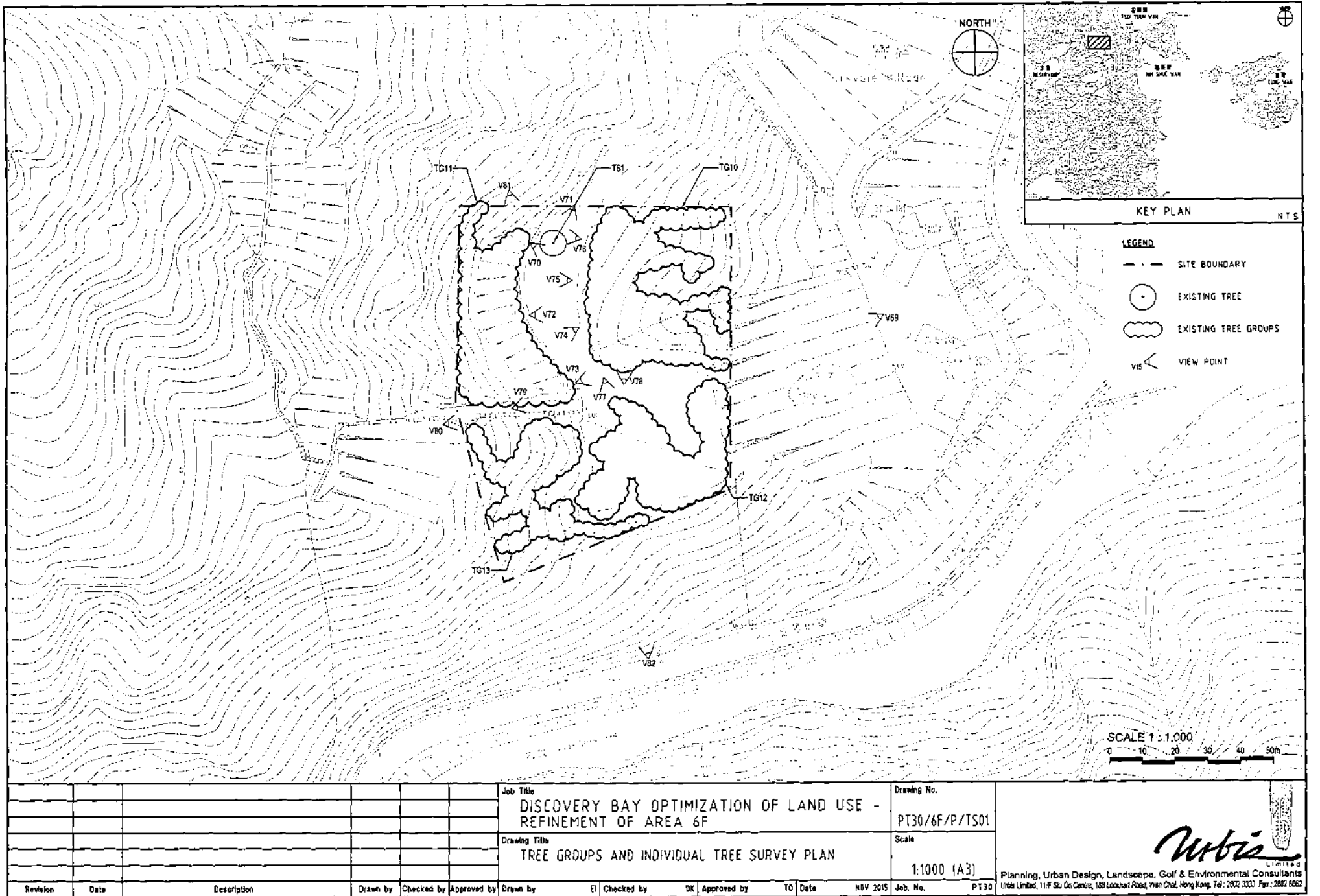
Rev: 0

Tree ID Number	Tree Species	DBH (cm)	Distance to Road (m)	Tree Size		Form (Canopy Shape)	Health Condition (Visual Appraisal)	Aesthetic Value (Subjective)	Anticipated Survival Rate After Transplantation (Estimated)	Proposed Treatment to Initial Approval Application (Retain/Transplant/del)	Justification for Proposed Tree Retention	Remarks
				Trunk Diameter (cm)	Canopy Crown Spread (m)							
T61	<i>Quercus aquilifolia</i>			450	8	Fair	Fair	Med	Low	Fed	Conflict with proposed access road	

Existing Tree Assessment Schedule (Tree Group)

Rev: 0

Tree Group Number	Tree Species	DBH (cm)	Distance to Road (m)	Approx. Group Total	Approx. Number	Approx. Percentage	Tree Size			Form (Canopy Shape)	Health Condition (Visual Appraisal)	Aesthetic Value (Subjective)	Anticipated Survival Rate	Proposed Treatment to Initial Approval Application (Retain/Transplant/del)	Justification for Proposed Tree Retention	Remarks
							Overall Height (m)	Trunk Diameter (cm)	Average Crown Spread (m)							
TG10	<i>Andropogon furcatus</i>	10	4.3%	5-6	100-150	4-5	Fair	Fair	Med	Low	80% Fell 20% Retain	Conflict with proposed development				
	<i>Ulmus glaberrimus</i>	10	12.3%	4-5	95-120	4-5	Fair	Fair	Med	Low						
	<i>Leguminosae trifoliate</i>	10	12.3%	8-10	150-200	6-8	Fair	Fair	Med	Low						
	<i>Amorpha fruticosa</i>	8	5.8%	3-4	100-150	7-9	Fair	Fair	Med	Low						
	<i>Malvaceae paniculata</i>	15	18.3%	7-8	95-120	3-5	Fair	Fair	Med	Low						
	<i>Pinus edulis</i>	15	18.3%	4-6	95-120	3-5	Fair	Fair	Med	Low						
	<i>Schizanthus hirsutus</i>	10	11.3%	6-8	95-120	2-3	Fair	Fair	Med	Low						
	<i>Conium maculatum</i>	10	12.3%	3-4	95-100	1-1.5	Fair	Fair	Med	Low						
TG11	<i>Chrysanthemum coronarium</i>	10	20%	8-9	150-200	6-8	Fair	Fair	Med	Low	Retain					
	<i>Leptodermis confertifolia</i>	12	24%	8-10	150-250	6-8	Fair	Fair	Med	Low						
	<i>Amorpha fruticosa</i>	3	6%	3-4	100-150	7-9	Fair	Fair	Med	Low						
	<i>Pinus edulis</i>	15	12%	4-6	95-120	3-5	Fair	Fair	Med	Low						
	<i>Pinus succubus</i>	5	10%	4-5	100-120	3-5	Fair	Fair	Med	Low						
	<i>Schizanthus hirsutus</i>	4	8%	6-8	95-120	2-3	Fair	Fair	Med	Low						
	<i>Leptodermis confertifolia</i>	15	21.8%	6-10	150-250	6-8	Fair	Fair	Med	Low						
	<i>Pinus edulis</i>	15	23.8%	4-6	95-120	3-5	Fair	Fair	Med	Low						
TG12	<i>Pinus succubus</i>	8	12.3%	4-5	100-120	3-5	Fair	Fair	Med	Low	80% Fell 20% Retain	Conflict with proposed development				
	<i>Schizanthus hirsutus</i>	15	23.8%	6-8	95-120	2-3	Fair	Fair	Med	Low						
	<i>Conium maculatum</i>	10	15.9%	3-4	95-100	1-1.5	Fair	Fair	Med	Low						
	<i>Malvaceae paniculata</i>	10	34.3%	7-8	95-120	3-5	Fair	Fair	Med	Low						
	<i>Pinus edulis</i>	10	34.3%	4-6	95-120	3-5	Fair	Fair	Med	Low						
	<i>Schizanthus hirsutus</i>	5	17.2%	4-6	95-120	2-3	Fair	Fair	Med	Low						
	<i>Conium maculatum</i>	4	13.8%	3-4	95-100	1-1.5	Fair	Fair	Med	Low						
	<i>Pinus edulis</i>	10	34.3%	4-6	95-120	3-5	Fair	Fair	Med	Low						



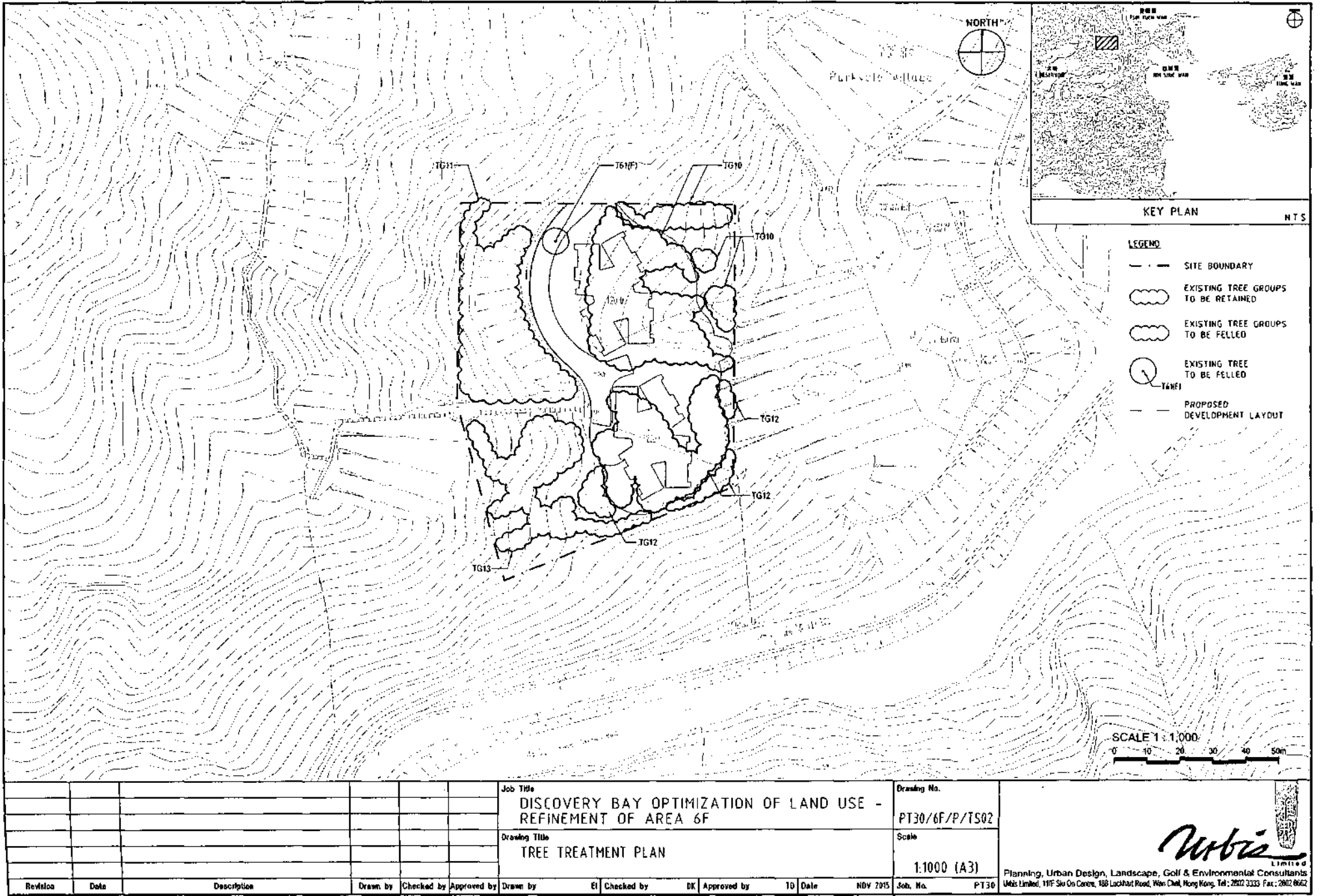


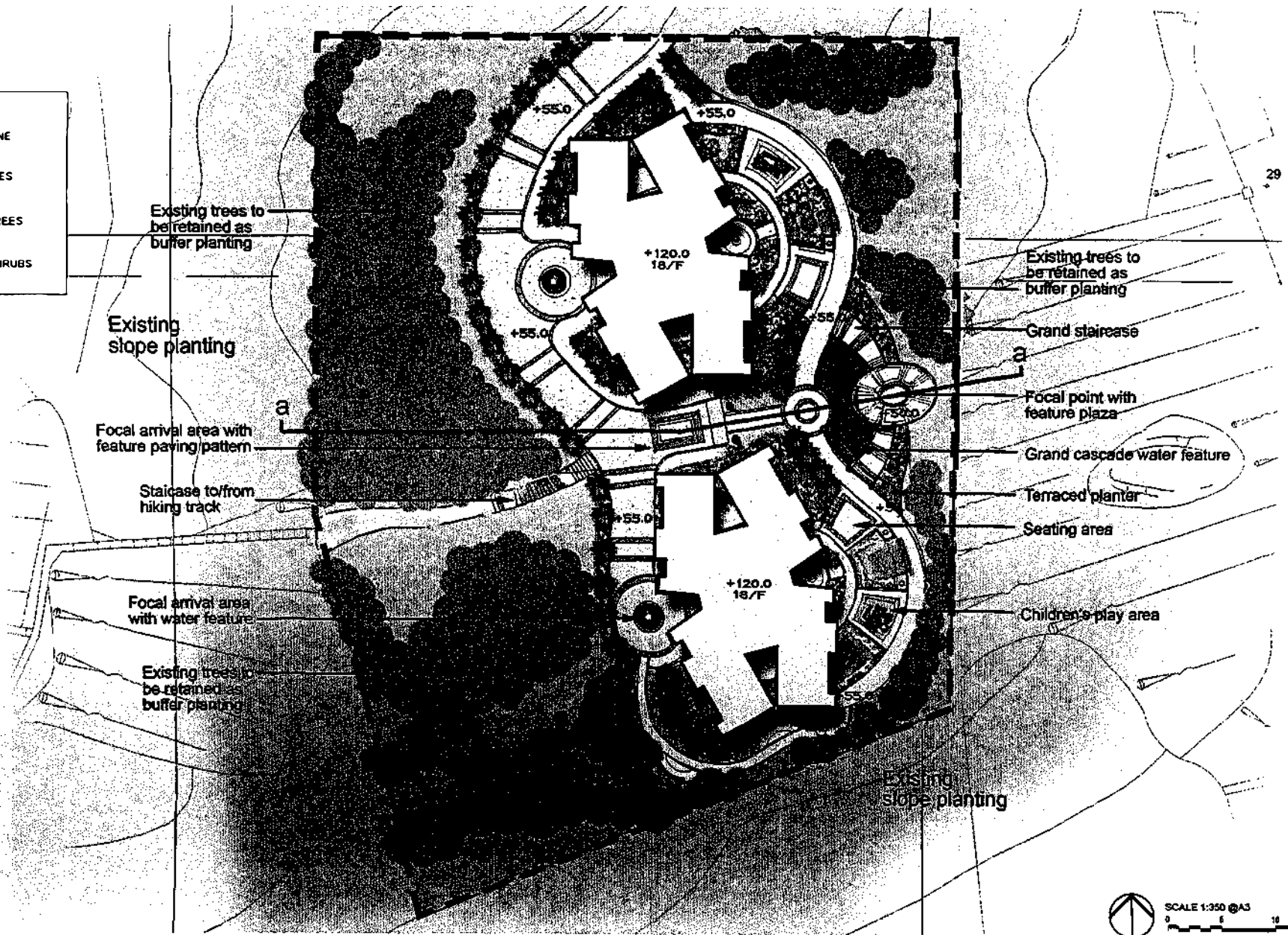
Figure B – Landscape Design

Figure B.1 Landscape Master Plan

Figure B.2 Landscape Section A-A

LEGEND

- BOUNDARY LINE
- EXISTING TREES
- PROPOSED TREES
- PROPOSED SHRUBS

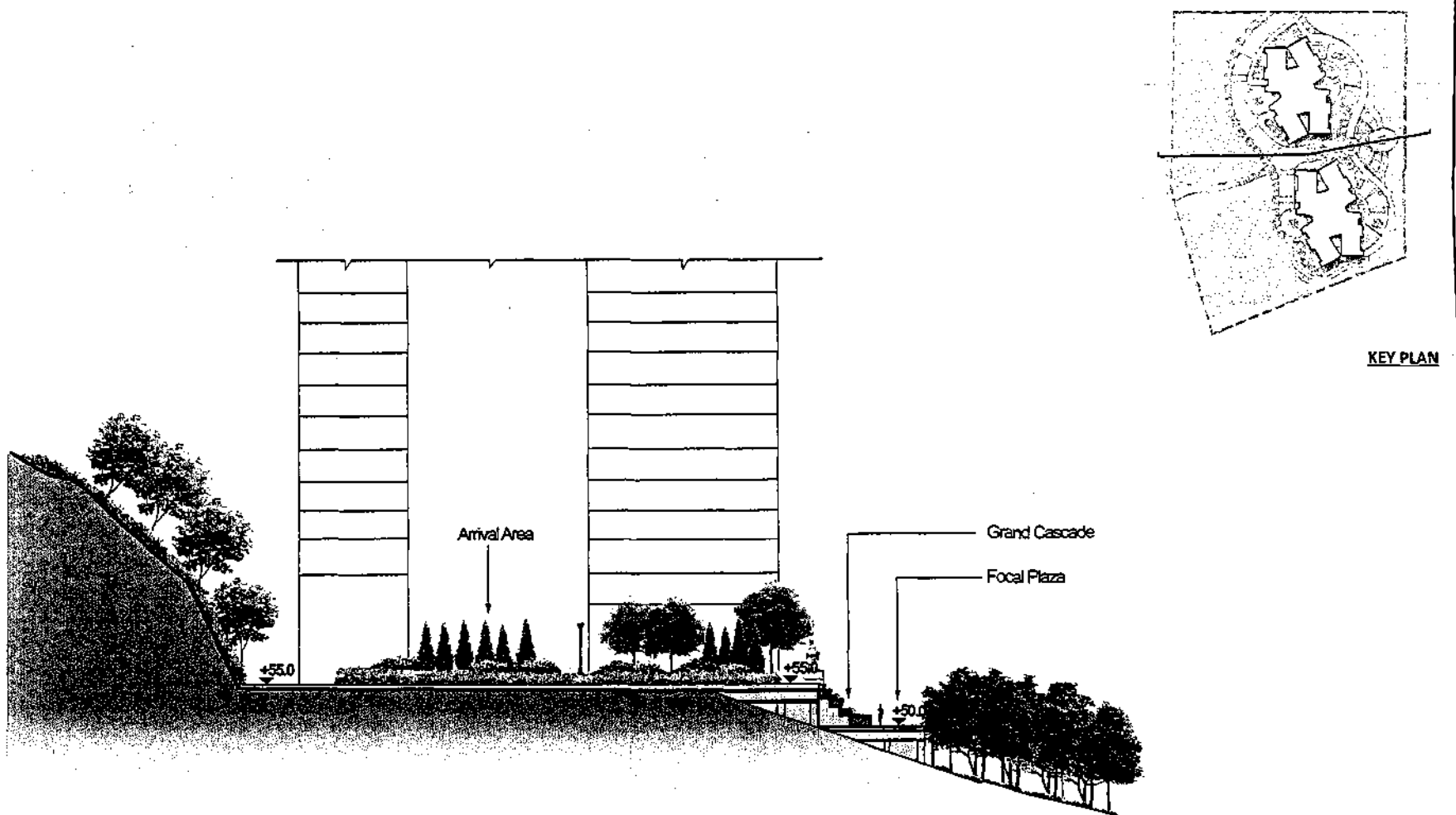


TITLE: **LANDSCAPE MASTER PLAN**

PROJECT: **DISCOVERY BAY OPTIMIZATION OF LAND USE - AREA 6F**

DEC 2015

FIGURE: **B.1**



TITLE: **SECTION A-A**

PROJECT: **DISCOVERY BAY OPTIMIZATION OF LAND USE - AREA 6F**

DEC 2015

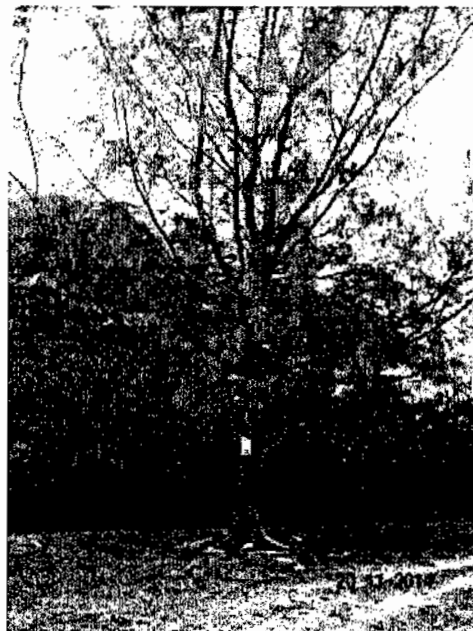
FIGURE: **B.2**

VOLUME 2

Existing Tree Photographs



T61 | Fell



T61 | Fell



View V69



View V71 | TG10



View V73 | TG10 and TG12

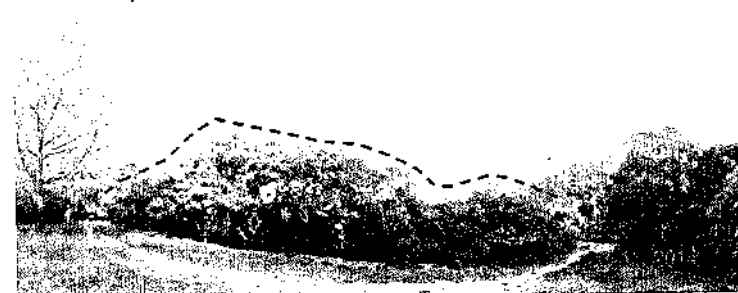


View V75 | TG11

DISCOVERY BAY OPTIMIZATION OF LAND USE – REFINEMENT OF AREA 6F



View V70 | TG10



View V72 | TG10



View V74 | TG11



View V76 | TG11

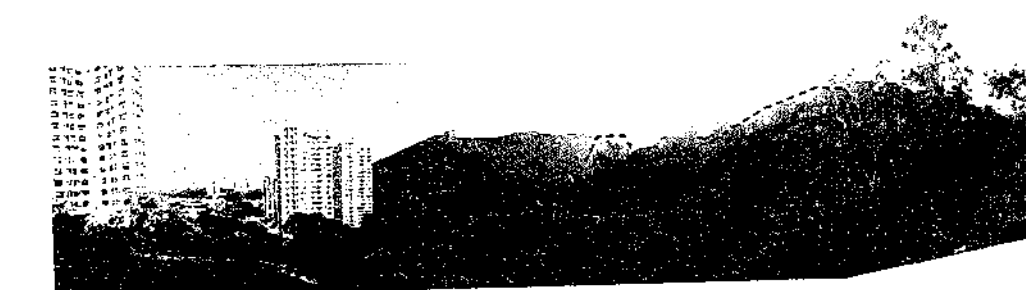
TREE SURVEY PHOTOGRAPHS (TREE GROUP)



View V77 | TG12 and TG13



View V79 | TG11 and TG13



View V81 | TG11



View V78 | TG10



View V80 | TG11 and TG13



View V82

TREE SURVEY PHOTOGRAPHS (TREE GROUP)

DISCOVERY BAY OPTIMIZATION OF LAND USE – REFINEMENT OF AREA 6F

Appendix E
Visual Impact Assessment

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1 INTRODUCTION

This Visual Impact Assessment (VIA) report has been prepared to support the Section 12A Application for Optimisation of Land Use in Discovery Bay in Support of the Residential Development at Discovery Area 6f (hereafter referred to as the "Application Site"). The Town Planning Board Guidelines TPB PG-No.41 – Guidelines on Submissions of Visual Impact Assessment for Planning Applications to the Town Planning Board have been used as a basis for the preparation of this report. In addition, reference has been made to the criteria for evaluation of visual impacts as laid out in Annex 10 of the Environmental Impact Assessment Ordinance (EIAO) Technical Memorandum.

This VIA has been prepared to identify the visual impact of the Proposed Development on:

- The visual amenity of the landscape around the Proposed Development;
- Persons in public places around the Proposed Development known as 'Visually Sensitive Receivers' (VSRs).

The report provides a description of the visual assessment methodology, a description of the scope of the Proposed Development and the key visual concerns, identifies baseline visual conditions, a summary of potential visual impacts and an assessment of those visual impacts. Additionally, visual mitigation measures are proposed and residual visual impacts are identified and assessed.

2 METHODOLOGY FOR THE APPRAISAL OF VISUAL IMPACT

2.1 Introduction

Appraisal of visual impacts is not an objective science but is based upon a structured and reasoned evaluation of predicted impacts, informed by professional judgement and experience. The methodology adopted for this VIA consists of:

1. Identification of Baseline Conditions (Assessment Area/ Zone of Visual Influence (ZVI)), Visual Elements and Resources and Viewing Points / Public VSRs);
2. Identification of Potential Sources of Impact;
3. Appraisal of Significance of Visual Impacts;
4. Mitigation Measures;
5. Conclusion/Evaluation of Overall Visual Impact.

These stages are described in more detail below.

2.2 Identification of Baseline Visual Conditions

During the identification of baseline visual conditions, the following elements are defined:

- Existing Site Conditions and ZVI of the proposed Project;
- Visual Elements and Resources; and
- Viewing Points / Public VSR's.

The identification of these conditions is the product of both desk-top research and field survey.

Zone of Visual Influence

In order to identify clearly the visual impacts of a Proposed Development, it is necessary to establish the existing baseline visual conditions of the surrounding environment. For these purposes, the project Study Area is defined with reference to the project's **Zone of Visual Influence (ZVI)**. The ZVI is that area surrounding the Proposed Development from which any part of it can be clearly seen. Definition of the ZVI takes account of significant landforms and building groups. The ZVI forms the assessment area for the purposes of VIA.

Visual Elements and Resources

Visual Elements and Resources are the component features of a landscape or townscape which shape its appearance and visual character to those who see it. Key visual elements and resources may include major physical structures, visual attractors (e.g. water bodies, natural coastline, ridgeline, mountain backdrop, woodland, streams, etc.) and/or visual eyesores or detractors (e.g. pylons, sewage treatment plants, refuse collection points, ventilation shaft buildings, quarries, etc.) that currently exist or are known to be planned within the assessment area.

Different visual elements and resources may enhance, degrade or neutralize the overall visual impact of the Proposed Development being assessed. Victoria Harbour and its ridgelines for example are recognized as particularly Important Visual Elements in the Hong Kong context.

Different aspects of visual elements and resources give the landscape its visual character, including their scale (e.g. buildings, topographic features, etc), variety of visual texture, pattern, form and colour. These features affect the visual character of a landscape and the type of development that can be accommodated within it without significantly changing this visual character.

Where committed future major development falls within the Assessment Area, its visual elements and resources are also considered, as far they are known.

Viewing Points / Public Visually Sensitive Receivers (VSR's)

Viewing Points - TPB PG-No.41 notes: "In the highly developed context of Hong Kong, it is not practical to protect private views without stifling development opportunity and balancing other relevant considerations. In the interest of the public, it is far more important to protect public views, particularly those easily accessible and popular to the public or tourists. VIA should primarily assess the impact on sensitive public viewers from the most affected viewing points. The viewing points could be kinetic or static. They include key pedestrian nodes, popular areas used by the public or tourists for outdoor activities, recreation, rest, sitting-out, leisure, walking, sight-seeing, and prominent travel routes where travellers' visual attention may be caught by the Proposed Development."

TPB PG-No.41 continues: "Local viewpoints should be determined with reference to the setting of the project and views of local significance".

Public VSR's - Those people who will experience views of the Application Site from publicly accessible viewpoints are known as public VSR's. They are identified through the definition of the Proposed Development's ZVI (i.e. the area within which views of the Proposed Development are perceived). For the purposes of this visual assessment, residential VSRs are considered to be private VSRs and therefore are not included.

Future Visual Receivers have been considered in the assessment, these being those who, whilst not able to see the Proposed Development from a given location at present, will be able to see it in the future as a result of development that is committed by Government.

Public VSRs are categorised on the basis of their character and their sensitivity to visual changes in the environment varies accordingly. The VSR categories are as follows:

- **Travellers** : Those people who would view the Proposed Development from vehicles or on foot; and
- **Recreational** : Those people who would view the Proposed Development whilst engaging in recreational activities.

The sensitivity of receivers to visual impacts is influenced by:

- 1) The activity in which they are engaged;
- 2) The duration and distance over which the Proposed Development would remain visible; and
- 3) The public perception of value attached to the views being assessed.

Receivers are categorised as being of High, Moderate or Low sensitivity to visual impacts:

- a) For those who view the Proposed Development whilst engaging in outdoor leisure pursuits, visual sensitivity varies depending on the type of recreational activity. Those taking a stroll in a park or hiking for example, would be classified as a High sensitivity group as their focus is on the surrounding visual amenity, compared to say football players who would have a Low sensitivity rating as their focus is within their field of play.
- b) For those people who view the Proposed Development from public thoroughfares, the degree of visual intrusion experienced depends on the speed of travel and whether views are continuous or only occasional. Generally, the slower the speed of travel and the more continuous the viewing experience, then the greater the degree of sensitivity. Generally, those travelling by car or by train are classified as a Medium sensitivity group.

2.3 Identification of Source of Visual Impacts

The key sources of visual impact of the Proposed Development are identified. These will generally include the completed buildings, associated structures and infrastructure works, such as highways, pumping stations, and electricity substations etc, used to service the Proposed Development. For the purposes of this VIA, sources of impact during the construction and operational stages of the Proposed Development are considered. It should be noted that Sources of Impact may be Positive or Negative.

2.4 Mitigation Proposals

Mitigation proposals to reduce the significance of visual impacts from the various sources are proposed. Mitigation measures can be part of the basic project design (e.g. sensitive siting of buildings, on site or preservation of existing trees) or can be added to the basic project design (e.g. new tree planting to screen a development and chromatic treatment of building facades). The mitigation proposals identified in this report are broad in their nature and subject to the design of the project.

2.5 Appraisal of Significance of Visual Impact

Under TPB PG-No.41, the significance of visual impacts to **Public VSRs** at **Key Public Viewing Points** shall be assessed. The 'significance' of a visual impact is defined as a function of the *sensitivity* of a Receiver and the *magnitude of change* to the visual character experienced by that Receiver. The criteria used to determine the magnitude of change of visual character to a view are:

- a) scale of change to character of views;
- b) proximity of Proposed Development; and
- c) length of time for which the view is experienced.

Impacts assessed are based upon the completed project. Impacts are also assessed on the assumption that mitigation measures are in place (and in the case of planting, that it is fully mature).

Impact significance is rated qualitatively as *Substantial*, *Moderate*, *Slight* or *Negligible*. *Negligible* impacts are deemed to make no significant difference to the character of views, even though the Application Site and development may be physically visible. Impacts are negative unless expressly stated as positive. **Table 1** below shows the matrix used to assess visual impacts (as provided in Annex 10 of the EIAO Technical Memorandum).

Table 1 - Matrix for Appraisal of Significance of Visual Impact

		SENSITIVITY OF VISUALLY SENSITIVE RECEIVER (VSR)		
		Low	Medium	High
MAGNITUDE OF CHANGE	Large	Moderate	Moderate/ Substantial	Substantial
	Intermediate	Slight/Moderate	Moderate	Moderate/Substantial
	Small	Insubstantial/Slight	Slight / Moderate	Moderate
	Negligible	Insubstantial	Insubstantial	Insubstantial

Note: All impacts are deemed to be negative unless expressly stated to be positive.

2.6 Conclusions – Evaluation of Overall Visual Impact

The report concludes with a summary discussion of the key visual impacts. The Conclusion provides a brief analysis of results and highlights key issues relating to visual impact. Finally, a single summary assessment of the impacts is made based on the following thresholds stated in TPB PG-No.41:

- **Enhanced** – if the Proposed Development in overall terms will improve the visual quality and complement the visual character of its setting from most of the identified key public viewing points;
- **Partly enhanced/partly adverse** – if the Proposed Development will exhibit enhanced visual effects to some of the identified key public viewing points and at the same time, with or without mitigation measures, exhibit adverse visual effects to some other key public viewing points;
- **Negligible** – if the Proposed Development will, with or without mitigation measures, in overall terms have insignificant visual effects to most of the identified key public viewing points, or the visual effects would be screened or filtered by other distracting visual elements in the assessment area;
- **Slightly adverse** – if the Proposed Development will, with or without mitigation measures, result in overall terms some negative visual effects to most of the identified key public viewing points;
- **Moderately adverse** – if the Proposed Development will, with or without mitigation measures, result in overall terms negative visual effects to most of the key identified key public viewing points; and
- **Significantly adverse** – if the Proposed Development will in overall terms cause serious and detrimental visual effects to most of the identified key public viewing points even with mitigation measures.

3 IDENTIFICATION OF BASELINE VISUAL CONDITIONS

3.1 Visual Context of Application Site

The Proposed Development Site in the residential resort development of Discovery Bay on Lantau is 8,300 sq.m and lies on a small platform of land at an elevation of approximately 50mPD on the steep slopes facing Tai Pak Bay. Densely vegetated man-made and natural slopes rise to the west behind the site. A vegetated valley lies to the south with Discovery Valley Road at its base. Three residential towers of Parkvale Village lie to the north at a slightly higher level than the site and the twin towers of Crystal and Coral Court lie to the east at a level of approximately 20mPD. The major visual elements of the locality are as follows:

Visual Attractors

- **Sea**
The site has a very scenic outlook from its hillside location overlooking Tai Pak Bay to the east. The bay waters connect to the broader sea expanse between Lantau and Hong Kong Island with the varied marine traffic provided added visual interest.
- **Topography**
To the east, Tai Pak Bay with associated beach is enclosed by the low rocky headlands occupied by Headland Village and Peninsula Village with panoramic views beyond to the remaining portions of Lantau island (including the Disneyland Theme Park), Tsing Yi, inhabited and uninhabited outlying islands including Peng Chau, the New Territories and the Hong Kong Island Skyline. A high, undeveloped ridge of Lantau hills defines the northern skyline and steep vegetated slopes lie to the south.
- **Woodland and Amenity Planting**
The natural and man-made slopes to the north, west and south of the proposed development site are densely vegetated with semi-natural woodland. The surrounding residential areas are heavily landscaped and provide an attractive green outlook.
- **Rural Fringe/Village Residential Character**
Discovery Bay is an attractive self-contained residential resort style development consisting of a series of villages of varying architectural styles mixing low, medium and high-rise blocks. The residential

development generally adopts a very low density with a high proportion of landscaped open space. . The commercial centre closest to the development site also adopts a low-rise profile with attractive waterfront recreational space. This development style provides a high level of visual amenity and the backdrop to the development site.

Visual Detractors

- **High Rise Development**

The three existing high-rise residential towers of Parkvale Village and Crystal and Coral Court will visually obstruct views to the north and east respectively from the proposed development.

3.2 Description of Development Proposal

The development proposal is for a medium rise residential development of 2 blocks of 18 storeys. The overall development would include an access road, communal open spaces and landscaped area with water features. A full development schedule is provided in Table 2 below:

Table 2 - Development Schedule

DEVELOPMENT SCHEDULE	
Application Site Area (m²) (about)	8,300 m ²
Proposed Domestic Plot Ratio	not more than 2.60
No. of Blocks	2 nos
No. of Storeys	18 nos
No. of Units	476 nos

3.3 Zone of Visual Influence (ZVI)

The study area for the visual impact assessment is determined primarily by the potential extent of visibility of the Proposed Development. The primary zone of visual Influence (ZVI) is that area from which any part of the Proposed Development can be seen. This 'Visual Envelope' or 'ZVI' has been determined by means of site investigations together with line-of-sight studies using survey maps. Potential sources of visual impact that would be generated by the project have been identified by desk-top studies and by discussions with the project proponent (refer to Figure B.1).

3.4 Committed Development

Committed developments identified within the ZVI include:

- Up-market residential units along the eastern edge of the Golf Course. The site formation for this residential development is complete and the construction of the housing is now underway.
- Housing development in lots along Peng Chau waterfront. Site formation works are currently underway.
- New hotel construction at Disneyland Theme Park. Construction is currently underway.

As the developments above are private residential/hotel developments rather than public facilities providing new public viewpoints, they are not assessed further in this study although their future presence is taken into account in the assessment of visual compatibility of the Proposed Development within the surrounding landscape context.

3.5 Potential Public Visually Sensitive Receivers (VSRs)

As per the requirements of TPB PG-NO.41, the selected VSRs are those members of the public who are most affected by the Proposed Development.

- **VSR REC1 (VP1)** : Residents and Visitors in Discovery Bay Plaza (Figure B.2); this VSR Group is large and will have views of the proposed new development to the west and is therefore considered one of the key public VSRs.

- **VSR T1 (VP2)** : Drivers and Passengers along Discovery Bay Road (**Figure B.2**): this VSR Group will have views of the Proposed Development site and also represents a large public VSR group.
- **VSR REC2 (VP3)** : Residents and visitors using the open space around Parkvale Village (**Figure B.3**): this VSR Group will have views of the proposed residential towers to the south.
- **VSR REC3 (VP4)** : Residents and visitors using the park at Midvale Village (**Figure B.3**): this VSR Group will have views of the proposed residential towers to the south.
- **VSR REC4 (VP5)** : Hikers at Lo Fu Tau Pergola/lookout (**Figure B.4**): this VSR Group will have elevated views of the proposed residential towers to the south west and are considered one of the key public VSRs.
- **VSR REC5 (VP6)** : Hikers at Lau Fa Tung Hiking Trail (**Figure B.4**): this VSR Group will have distant elevated views of the proposed development to the south east.
- **VSR REC6 (VP7)** : Hikers at Reservoir Dam (**Figure B.4**): this VSR Group will have distant views of the proposed development to the east and are considered one of the key VSRs.
- **VSR REC7 (VP8)** : Hikers on hiking trail on south of Discovery Valley (**Figure B.4**): this VSR Group will have views across Discovery Valley to the proposed development in the north and is considered one of the key VSRs.
- **VSR REC8 (VP9)** : Residents and visitors using park at La Serene (**Figure B.5**): this VSR Group will have views of the proposed development to the north west.
- **VSR T2 (VP10)** : Passengers on ferries and leisure crafts in Tai Pak Bay (**Figure B.5**): this VSR Group will have views of the proposed development from the south west and are considered one of the key VSRs.
- **VSR REC9 (VP11)** : Visitors to the promenade at Disneyland (**Figure B.5**): this VSR Group will have distant views of the proposed development to the south west.

4 POTENTIAL SOURCE OF VISUAL IMPACTS

This section describes the sources of visual impact resulting from the Proposed Development during construction and during operation.

4.1 Construction Phase

Potential sources of visual impacts during the construction phase will include:

- Loss of existing trees on the development site;
- Earth moving and site formation operations;
- Construction of 2 residential towers of 18-storeys including associated construction equipment and plant such as scaffolding, cranes and hoardings; and
- Temporary construction traffic within and on roads around the Application Site.

4.2 Operational Phase

Potential sources of visual impacts during the operation phase include:

- Permanent built form of 2 residential towers of 18 storeys and associated ground level landscape; and
- Increased traffic serving new development.

5 PROPOSED MITIGATION MEASURES

Visual mitigation measures seek to minimise potential impacts by helping to integrate the new development into the landscape pattern of the surrounding area. Basic visual mitigation features within the proposed design include a maximum height of 120mPD and a small development footprint that will limit the physical extent of the impact. Sensitive design of the towers including measures to articulate their facades and appropriate choice of materials and colour scheme can reduce the visual impact by blending the elevation with the colours and tones of the surrounding landscape. Tree and shrub planting at ground level will help integrate the edges of the development site with the surrounding landscape. Visual mitigation measures are illustrated on Figure B.6.

5.1 Construction Stage Visual Mitigation Measures

- Retention of existing trees and vegetation;
- Screen hoardings; and
- Advance screen tree planting.

5.2 Operational Stage Visual Mitigation Measures

The Proposed Development will integrate the following visual impact mitigation measures into the architectural and landscape designs:

- Spacing of towers to enhance the degree of visual permeability to avoid a 'wall' effect;
- Sensitive architectural and chromatic treatments to buildings and engineered structures sympathetic to the landscape context;
- Tree and shrub planting along the Proposed Development boundaries to integrate the Application Site with the adjacent semi-natural landscape and provide a degree of screening; and
- Tree and shrub planting within the proposed development site in accordance with the Landscape Master Plan to enhance the general visual amenity.

6 APPRAISAL OF VISUAL IMPACTS

6.1 Effect of Visual Change on Visual Composition

The Proposed Development will be situated on a slope behind the existing high-rise towers of Crystal and Coral Court and its height will be lower than the mountain ridgelines behind. The proposed towers will be similar in scale and style to the existing residential towers of Parkvale Village and the development will be perceived as an addition to an existing building group. From many view points to the east, the proposed towers will be wholly or partially screened by the existing towers and will be viewed against the backdrop of the hills behind. Viewpoints to the west will be from elevated positions over the towers and they will therefore be viewed in association with the existing buildings of Parkvale Village and against the backdrop of the rest of the residential landscape of Discovery Bay. It is therefore considered that the overall magnitude of change to the existing visual context will be relatively minor.

6.2 Impact on Visually Sensitive Receivers

The visual impacts of the Proposed Development on the Key Public VSRs are summarised in Table 3 and are described briefly below. The locations of the Viewing Points are shown on Figure B.1. Photomontage views from the selected key public viewpoints are presented on Figures B.7 to B.11. Photomontage viewpoints were selected to illustrate a representative range of views from different viewing angles and distances.

Travelling Visually Sensitive Receivers

VSR T1 (VP2): Drivers and Passengers along Discovery Bay Road (Figure B.2)

Drivers and passengers (as well as pedestrians) along Discovery Bay Road currently experience views up Discovery Valley Road with the towers of Parkvale Village on the skyline. Following construction, the new towers will be generally screened by Crystal and Coral Court and only parts of them may be visible behind. The magnitude of change is therefore assessed as *Small*. The VSRs are considered to have a *Low* sensitivity as their

purpose is travel; their view is not static and will be experienced for a very short period. The resulting visual impact significance following mitigation will be *Slight*.

VSR T2 (VP10): Passengers on ferries and leisure craft in Tai Pak Bay (Figure B.5)

Passengers on ferries and leisure craft currently experience distant views of the towers of Parkvale Village from a low viewpoint which means they are seen against the backdrop of the hills behind. Following construction, the new towers will be generally screened by Crystal and Coral Court and only parts of them may be visible behind. The magnitude of change is therefore assessed as *Negligible*. The VSRs are considered to have a *Medium* sensitivity as their purpose is travel; their view is not static and will be experienced for a very short period. The resulting visual impact significance following mitigation will be *Insubstantial*.

Recreational Visually Sensitive Receivers

VSR REC1 (VP1): Residents and Visitors in Discovery Bay Plaza (Figure B.2)

Residents and Visitors in Discovery Bay Plaza currently have views of the hills to the west and the towers of Parkvale Village in the foreground. Following construction, portions of the two new towers will be visible behind Crystal and Coral Court. The sensitivity of this VSR group is assessed as *Medium* as although it is assumed that their main focus of attention is within the Plaza, the surrounding views of the hills is a contributing factor to the amenity of the plaza. Views of the towers will be of short duration and from some distance and partly obstructed by existing buildings and the magnitude of perceived visual change is assessed as *Small*. The resulting visual impact significance would therefore be *Slight* following mitigation. A photomontage from this viewpoint illustrating the potential visual impact of the proposed development is provided in **Figure B.7**.

VSR REC2 (VP3): Residents and visitors using the open space around Parkvale Village (Figure B.3)

Residents and visitors using the open space around Parkvale Village currently experience open views in the direction of the Proposed Development with vegetated hills in the background. Following construction, these views will be partially obstructed by the new towers. This VSR group is considered to have a *Medium* sensitivity as the duration of view is short. The magnitude of visual change is assessed as *Large* as the Proposed Development will be viewed from close distances and partially obstruct existing views of the hills. However, as similar tower blocks define the existing character of Parkvale Village, the resulting visual impact significance is assessed as *Moderate* following mitigation.

VSR REC3 (VP4): Residents and visitors using the park at Midvale Village (Figure B.3)

Residents and visitors using the park at Midvale Village currently experience views of vegetated hills and the tower blocks of Parkvale Village. Following construction, the view will remain essentially the same as the new development will be similar to the existing tower blocks of Parkvale Village. The sensitivity of this VSR group is assessed as *Medium* as their primary focus is the park but they are also aware of the surrounding views and visual amenity. The magnitude of change is assessed as *Small* as the Proposed Development will be visually compatible with the existing tower blocks. The resulting visual impact significance is assessed as *Slight* following mitigation.

VSR REC4 (VP5): Hikers at Lo Fu Tau Pergola/lookout (Figure B.4)

Hikers at the Lo Fu Tau Pergola/lookout currently experience elevated panoramic views over Discovery Bay residential area and Tai Pak Bay and the sea and island landscape beyond. The towers of Parkvale Village lie to the south west at a lower level. Following construction, the tops of the new towers will be visible as an extension of the existing tower group. This VSR group is large in number as the lookout is a popular destination and is considered to have a *High* sensitivity as it comprises people who are there specifically to experience the view. The magnitude of visual change is assessed as *Small* due to the distance from the viewing point, and the fact that the towers are seen as an extension to the existing tower group and because they will form a small element in an open panoramic view. The resulting visual impact significance would be *Moderate* following mitigation. A photomontage from this viewpoint illustrating the potential visual impact of the proposed development is provided in **Figure B.8**.

VSR REC5 (VP6): Hikers at Lau Fa Tung Hiking Trail (Figure B.4)

Hikers on the Lau Fa Tung hiking trail currently experience elevated panoramic views over Discovery Bay residential area and Tai Pak Bay and the sea and island landscape beyond. The towers of Parkvale Village lie to the south west at a lower level to the south west and form a relatively minor element in the landscape composition as a whole. Following construction, the new towers will be visible as an extension of the existing tower group. This VSR group is few in number and is considered to have a *High* sensitivity as it comprises people who are there specifically to experience the view. The magnitude of visual change is assessed as *Negligible* due to the far distance from the viewing point and the fact that the towers are a minor addition to the existing tower group. The resulting visual impact significance would be *Insubstantial* following mitigation.

VSR REC6 (VP7): Hikers at Reservoir Dam (Figure B.4)

Hikers at the Reservoir Dam currently experience views north east down Discovery Valley with the towers of Parkvale Village and Hillgrove Village silhouetted against Tai Pak Bay at the base of the valley. Following construction, the new towers will slightly increase the visual obstruction of Tai Pak Bay but the character of the view will remain. This VSR group is large in number as it is a popular destination for hikers and is considered to have a *High* sensitivity as it comprises people who are there specifically to experience the view. The magnitude of visual change is assessed as *Small* due to the far distance from the viewing point and the fact that the towers are a minor addition to the existing tower group and will not significantly detract from the existing view. The resulting visual impact significance is assessed as *Moderate* following mitigation. A photomontage from this viewpoint illustrating the potential visual impact of the proposed development is provided in Figure B.9.

VSR REC7 (VP8): Hikers on hiking trail on south of Discovery Valley (Figure B.4)

This VSR Group will have clear views across Discovery Valley to the proposed development in the north and is considered one of the key VSRs. Following construction, the new towers will obstruct some of the existing towers of Parkvale Village but the overall visual mass of the tower group will only be slightly increased. This VSR group is small in number as the path is less frequented than the Reservoir Dam and is assessed as having a *High* sensitivity as it comprises people who are there specifically to experience the view. The magnitude of visual change is assessed as *Small* due to far distance from the viewing point and the fact that the towers are a minor addition to the existing tower group and will not significantly detract from the existing view. The resulting visual impact significance is assessed as *Moderate* following mitigation. A photomontage from this viewpoint illustrating the potential visual impact of the proposed development is provided in Figure B.10.

VSR REC8 (VP9): Residents and visitors using park at La Serene (Figure B.5)

This VSR Group currently have views of the Parkvale Village towers to the north-west silhouetted against the hills of the Lau Ta Fung range behind. Following construction, the new towers will expand the Parkvale Village tower group but will still be below the ridgeline. This VSR Group is few in number and has a *Medium* sensitivity as their primary focus is within the park. The magnitude of visual change is assessed as *Small* due to the distance from the viewing point and the fact that the towers are a minor addition to the existing tower group and will not significantly detract from the existing view. The resulting visual impact significance is assessed as *Slight* following mitigation.

VSR REC9 (VP11): Visitors to the promenade at Disneyland (Figure B.5)

This VSR Group currently have distant views towards Discovery Bay to the southwest. The existing Parkvale Village towers lie well below the ridgeline of the hill backdrop and are relatively inconspicuous within the overall expansive panoramic view. Following construction, the new towers will provide a barely noticeable addition to the Parkvale Village tower group. This VSR Group is large in number and has a *Medium* sensitivity as their primary focus is the park and sea views. The magnitude of visual change is assessed as *Negligible* due to the distance from the viewing point and the fact that the towers will form a barely perceptible addition to the existing tower group and that the towers will form a minor element in an expansive, panoramic view. The resulting visual impact significance is assessed as *Insubstantial* following mitigation. A photomontage from this viewpoint illustrating the potential visual impact of the proposed development is provided in Figure B.11.

Table 3 Summary of Visual Impact Assessment

Key Visually Sensitive Receivers (VSRs)	Degree of Visibility of Source(s) of Visual Impact (Full, Partial, Glimpse)	Approx. Distance Between VSR & Nearest Source(s) of Impact	Magnitude of Change (Large, Intermediate, Small, Negligible)	Receptor Sensitivity & Number (Low, Medium, High) (Very Few, Few, Many, Very Many)	Impact Significance during Operation Phase following Mitigation (Substantial, Moderate, Slight, Insubstantial, Enhanced)
VSR T1: Drivers and Passengers along Discovery Bay Road	Partial	300m	Small	Low/Many	Slight
VSR T2: Passengers on ferries and leisure craft in Tai Pak Bay	Partial	1500m	Negligible	Medium/Many	Insubstantial
VSR REC1: Residents and Visitors in Discovery Bay Plaza	Partial	520m	Small	Medium/Many	Slight
VSR REC2: Residents and visitors using the open space around Parkvale Village	Partial	50m	Large	Medium/Few	Moderate
VSR REC3: Residents and visitors using the park at Midvale Village	Partial	130m	Small	Medium/Few	Slight
VSR REC4: Hikers at Lo Fu Tau Pergola/lookout	Partial	530m	Small	High/Many	Moderate
VSR REC5: Hikers at Lau Fa Tung Hiking Trail	Partial	1100m	Negligible	High/Few	Insubstantial
VSR REC6: Hikers at Reservoir Dam	Partial	400m	Small	High/Many	Moderate
VSR REC7: Hikers on hiking trail on south of Discovery Valley	Partial	1250m	Small	High/Few	Moderate

Key Visually Sensitive Receivers (VSRs)	Degree of Visibility of Source(s) of Visual Impact (Full, Partial, Glimpse)	Approx. Distance Between VSR & Nearest Source(s) of Impact	Magnitude of Change (Large, Intermediate, Small, Negligible)	Receptor Sensitivity & Number (Low, Medium, High) (Very Few, Few, Many, Very Many)	Impact Significance during Operation Phase following Mitigation (Substantial, Moderate, Slight, Insubstantial, Enhanced)
VSR REC8: Residents and visitors using park at La Serene: VP(6f)9 – Figure 9	Partial	600m	Small	Medium/Few	Slight
VSR REC9: Visitors to the promenade at Disneyland	Partial	4500m	Negligible	Medium/Many	Insubstantial

Types of Key Visually Sensitive Receivers (VSRs): T - Transport Related VSRs; REC- Recreational VSRs
Note: All impacts are negative unless otherwise stated.

CONCLUSION

Appraisal of Visual Composition

It is considered that the residential character of the Proposed Development is compatible with the surrounding residential character of the neighbourhood and the general visual composition. The size and massing of the proposed residential towers is similar to the existing residential towers of Parkvale Village and their siting between and behind two existing groups of towers minimises the visual intrusion into the existing landscape composition. The height of the proposed towers is lower than the existing hill ranges behind and does not break the ridgeline.

Appraisal of Visual Obstruction

The degree of visual obstruction created by the proposed towers is generally low due to the fact that the towers are located behind and adjacent to existing towers. From many viewpoints, the proposed towers will be partially screened by the existing towers. The gap between the proposed towers provides a degree of visual permeability reducing a solid wall effect.

Effect on Public Viewers

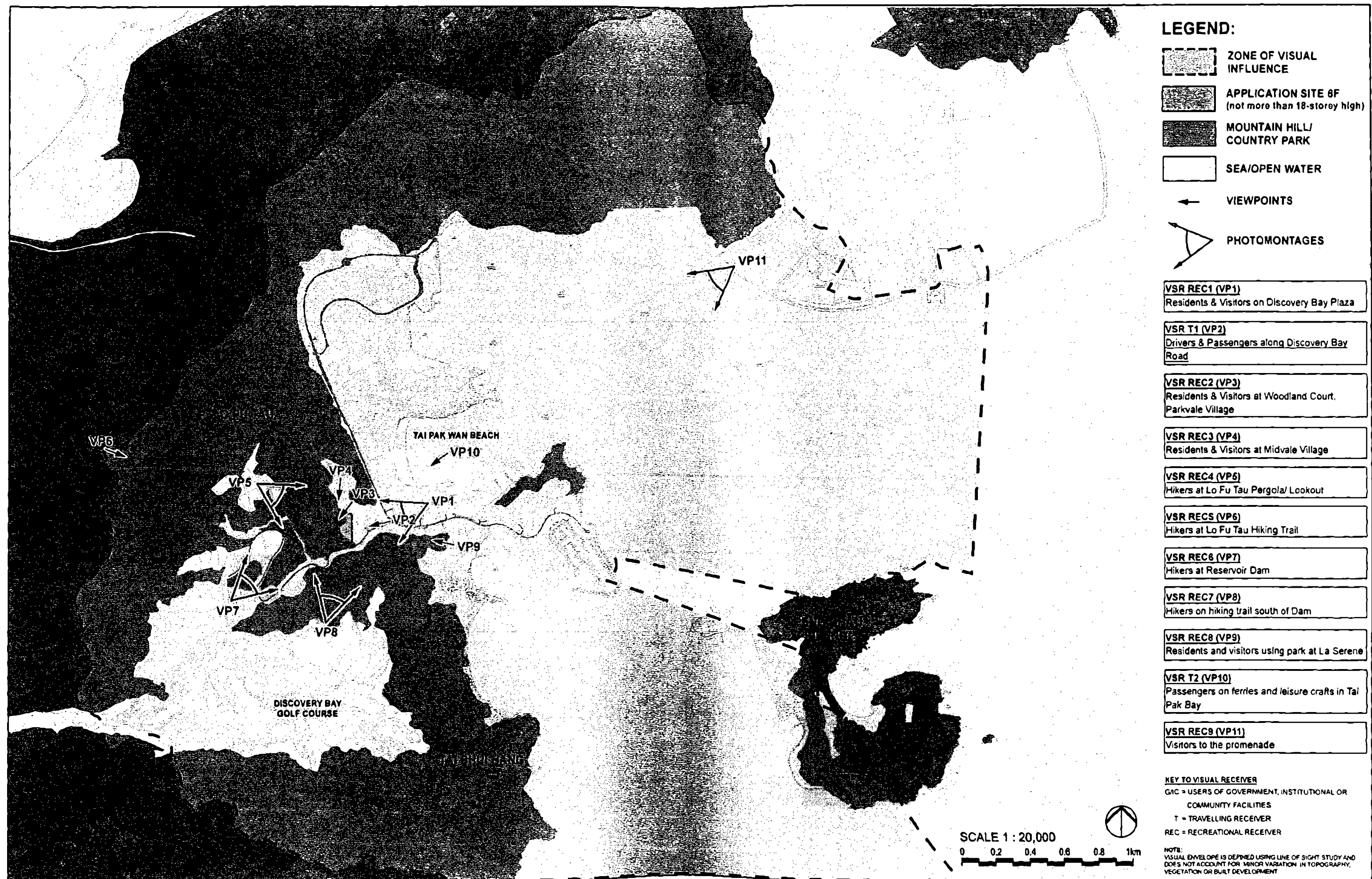
Four of the eleven public VSR groups identified are assessed as experiencing *Moderate* visual impact following construction and implementation of visual mitigation measures. Residents using the open space around the existing Parkvale Village will experience the greatest visual impacts due to their close proximity. However, these impacts are to some extent offset by the fact that the Proposed Development is highly compatible with the existing village character. Hikers at lookouts and trails with relatively direct views to the site will also experience *Moderate* visual impacts. Four VSR Groups would experience *Slight* visual impacts and the remaining four VSR groups would experience *Insubstantial* visual impacts. Overall, the Proposed Development is relatively minor in scale compared to the existing residential development and will be perceived as a relatively insignificant extension of the existing Parkvale Village by the surrounding VSRs.

Effect on Visual Resources

The Proposed Development lies on the edge of the Discovery Bay residential area and close to existing residential towers of similar character. Of the positive visual resources identified in Section 3.1 above, the semi-natural wooded slopes of the site locality will be slightly affected by the construction of the tower blocks. The rural fringe residential character will be maintained although it will represent an increase in the density of Parkvale Village. However, the existing character is currently of very low density development with generous green and open space surrounding the village. This fundamental character will not be significantly affected.

Evaluation of Overall Visual Impact

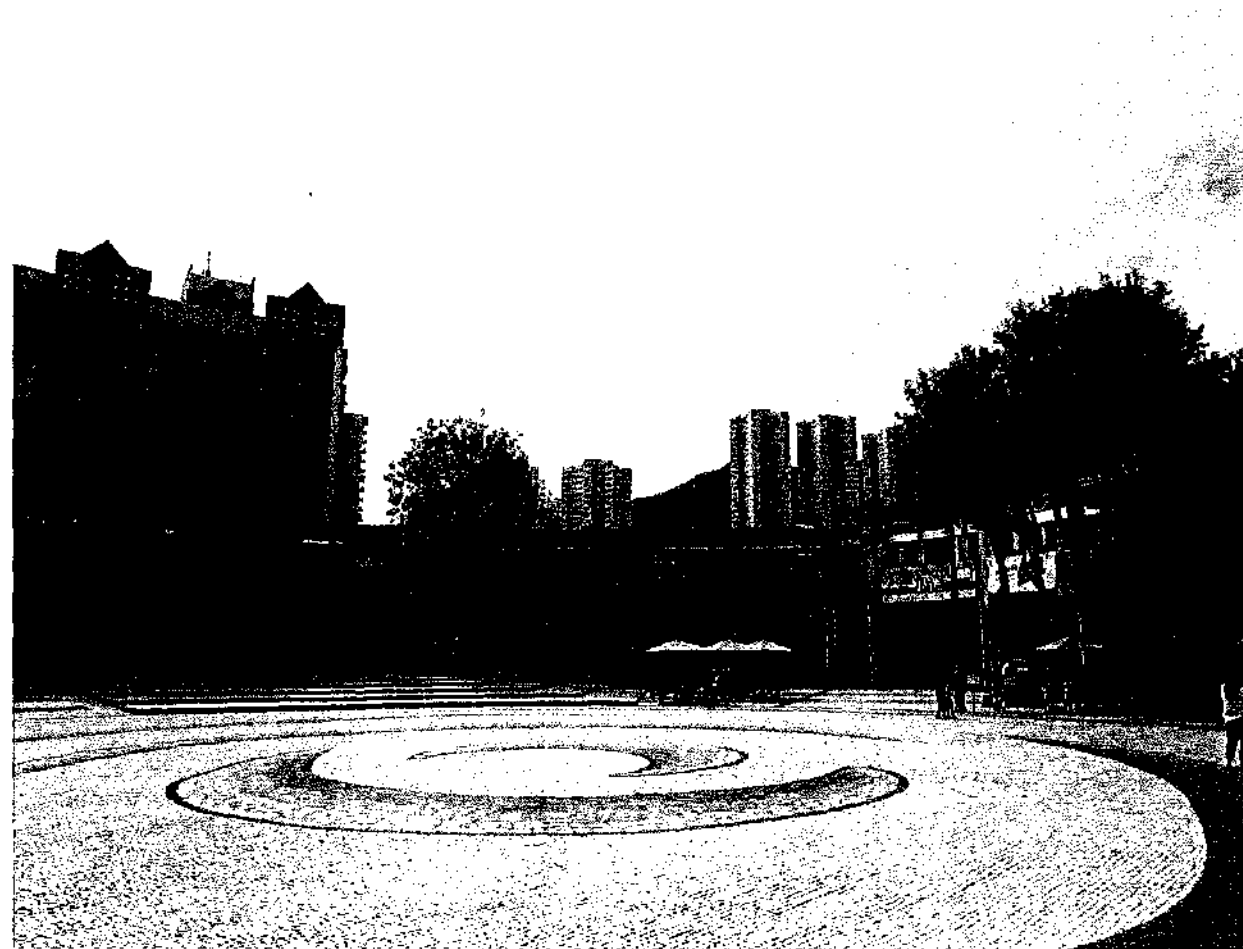
It is considered that the overall visual impact of the Proposed Development would be **Slightly Adverse** in terms of the criteria of TPB PG-No. 41, that is, it will, with or without mitigation measures, result in overall terms some negative visual effects to most of the identified key public viewing points. Generally, due to the low density of development and the varied topography of Discovery Bay, views tend to be open and expansive and the proposed development will be perceived as a relatively minor element within the broader landscape context.



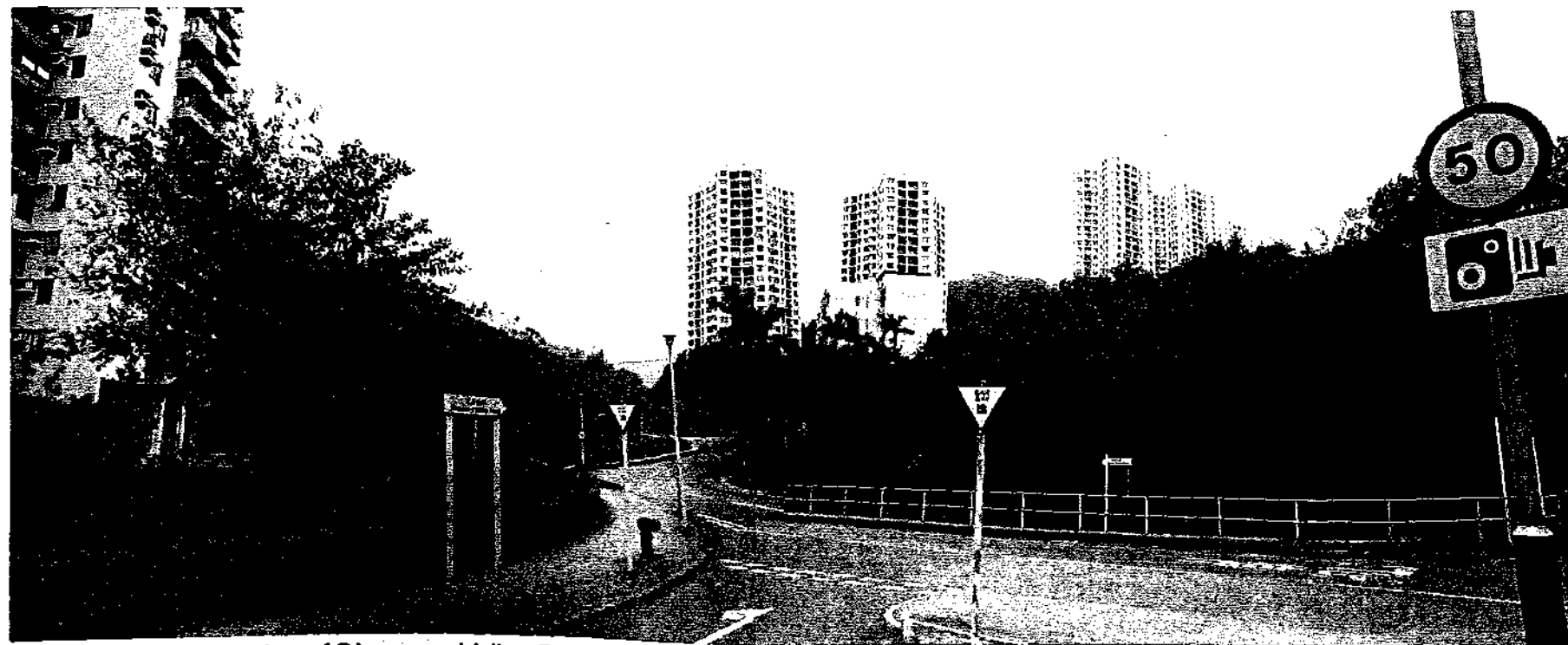
TITLE: BASELINE VISUAL ENVELOPE (ZVI), VSRs & VIEWPOINTS

PROJECT: DISCOVERY BAY OPTIMIZATION OF LAND USE - REFINEMENT OF AREAS 6F

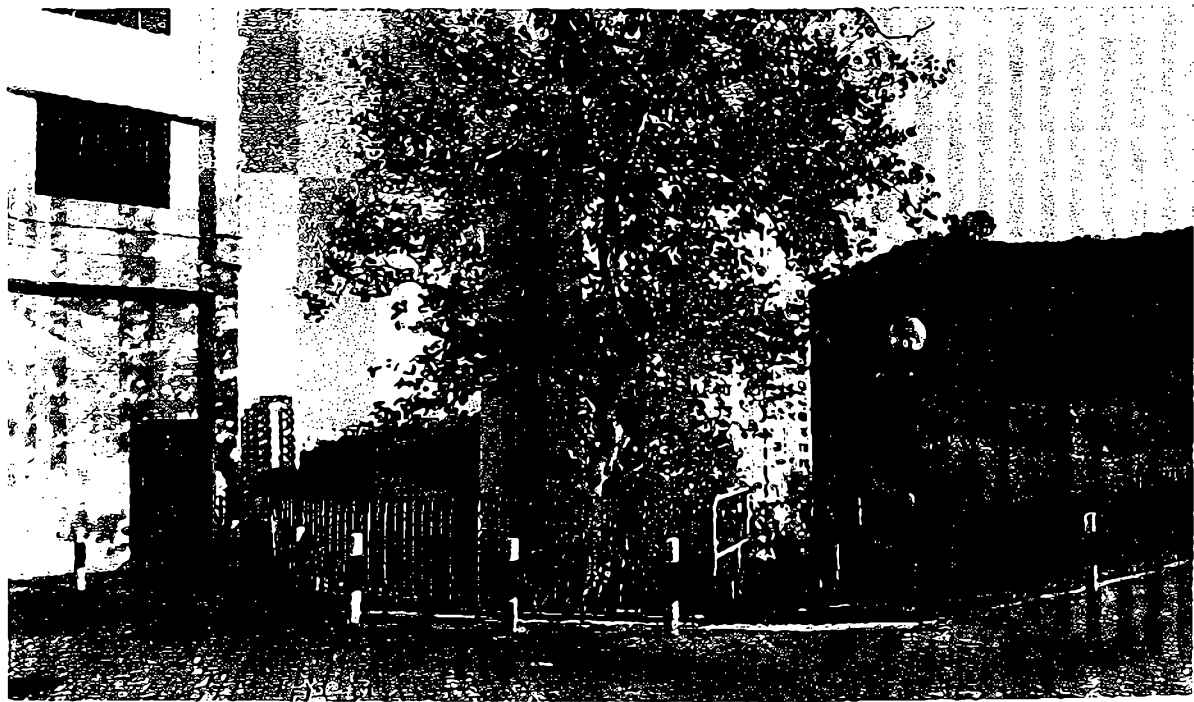
FIGURE: B.1
DEC 2015



VP1: View from Discovery Bay Plaza (REC1)



VP2: View from Junction of Discovery Valley Road/Discovery Bay Road (T1)



VP3: View from Woodland Court, Parkvale Village (REC2)



VP4: View from Midvale Village (REC3)



TITLE :

VIEWPOINTS VP3 (REC2), VP4 (REC3)

PROJECT :

OPTIMISATION OF LAND USE IN DISCOVERY BAY, SITE 6(f)



DEC 2015

FIGURE :

B.3



VP5: View from Lo Fu Tau Pergola/Lookout (REC4)



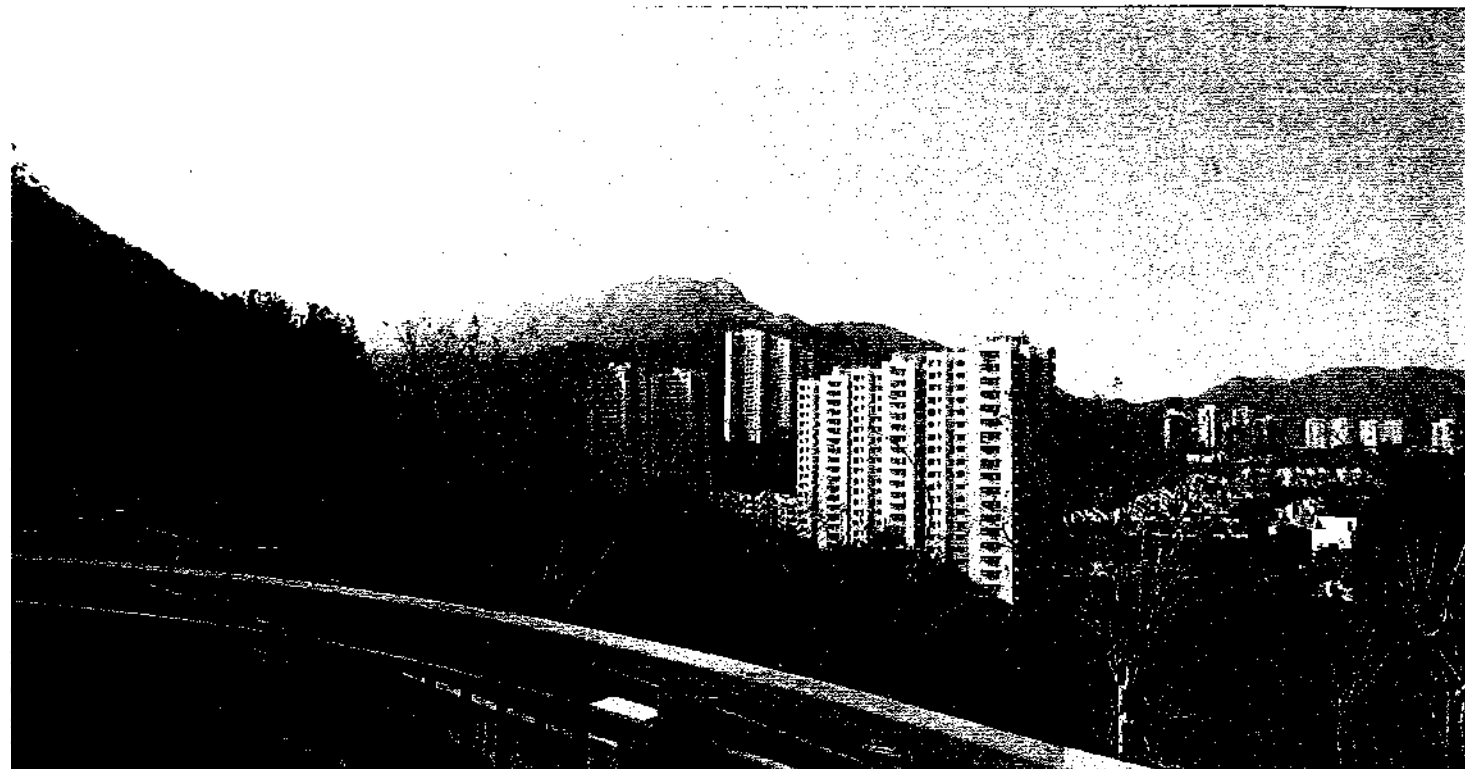
VP7: View from Reservoir Dam (REC6)



VP6: View from Lau Fa Tung Summit/ Hiking Trail (REC5)



VP8: View from Hiking Trail South of Dam (REC7)



VP #9: View from Park at La Serene (REC8)



VP10: View from Tai Pak Bay (T2)



VP11: View from Disneyland Promenade (REC9)

LEGEND

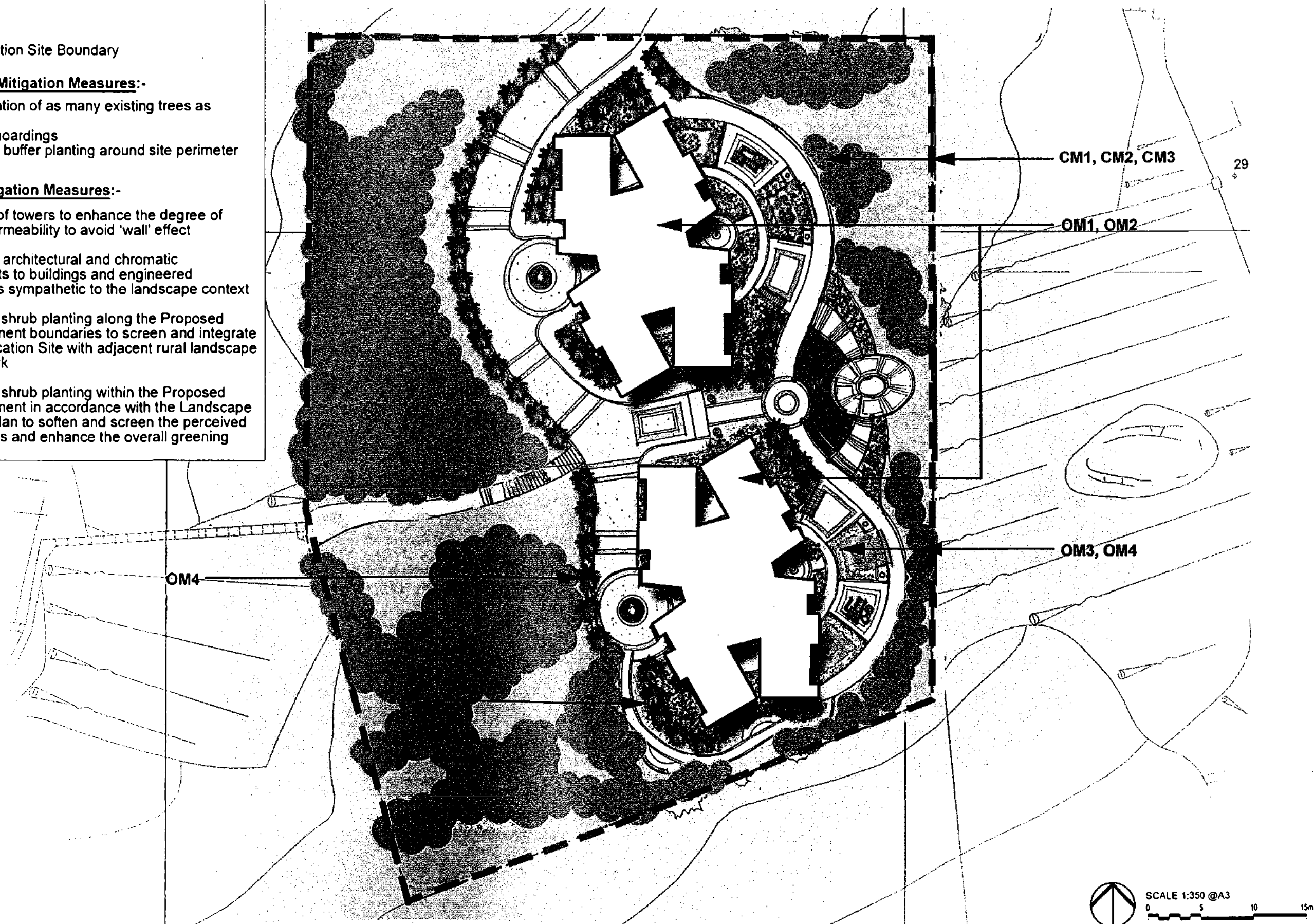
--- Application Site Boundary

Construction Mitigation Measures:-

- CM1 : Preservation of as many existing trees as possible
- CM2 : Screen hoardings
- CM3 : Advance buffer planting around site perimeter

Operation Mitigation Measures:-

- OM1 : Spacing of towers to enhance the degree of visual permeability to avoid 'wall' effect
- OM2 : Sensitive architectural and chromatic treatments to buildings and engineered structures sympathetic to the landscape context
- OM3 : Tree and shrub planting along the Proposed Development boundaries to screen and integrate the Application Site with adjacent rural landscape framework
- OM4 : Tree and shrub planting within the Proposed Development in accordance with the Landscape Master Plan to soften and screen the perceived built forms and enhance the overall greening



TITLE :

VISUAL MITIGATION MEASURES

PROJECT :

DISCOVERY BAY OPTIMIZATION OF LAND USE - REFINEMENT OF AREAS 6F

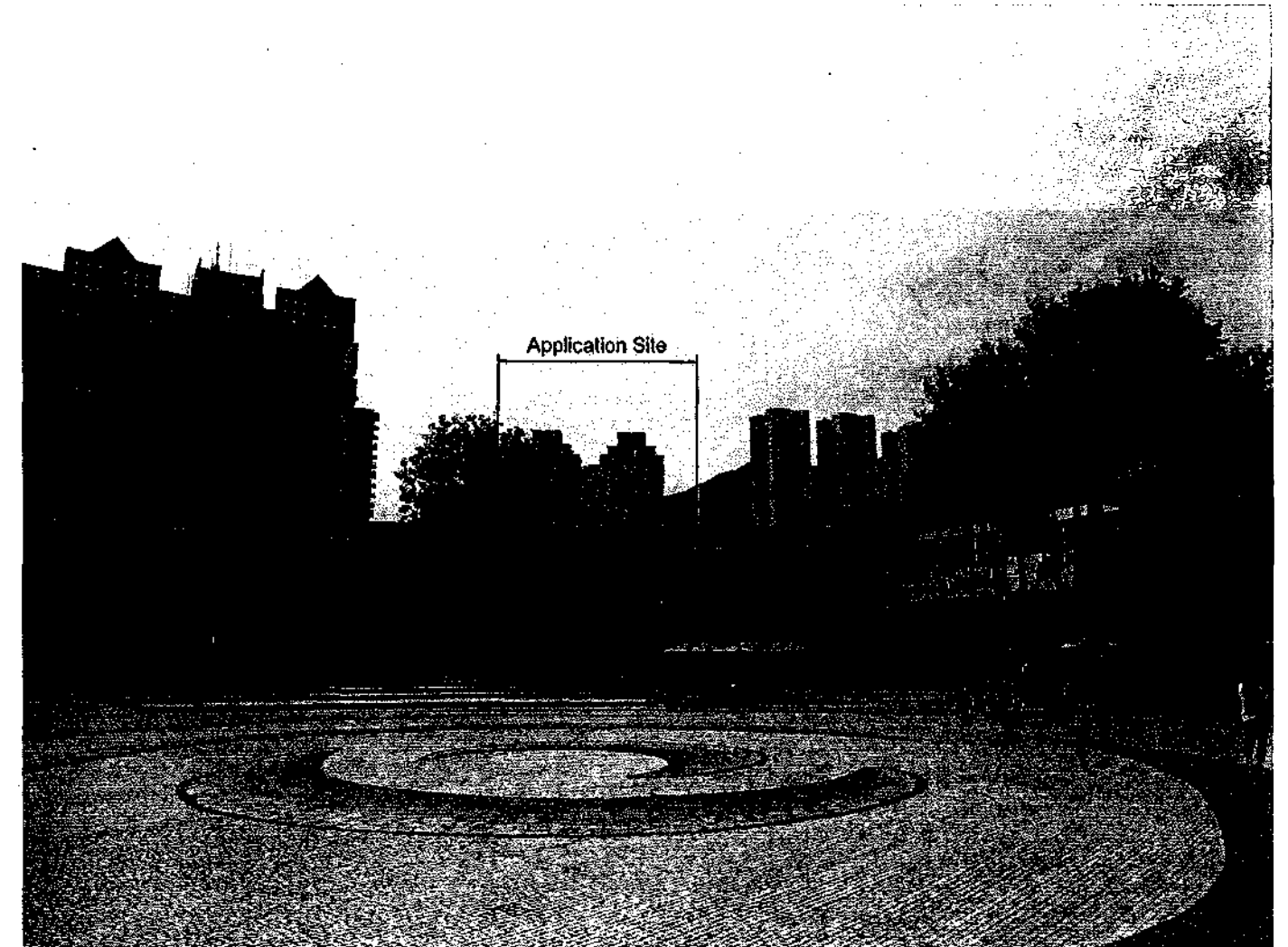
FIGURE :

B.6

DEC 2015



VP1: View South-West towards Application Site from Discovery Bay Plaza (Existing Condition)



VP1: View South-West towards Application Site from Discovery Bay Plaza with Proposed Development



TITLE : **PHOTOMONTAGE - VP1 (VSR REC1) FROM DISCOVERY BAY PLAZA**

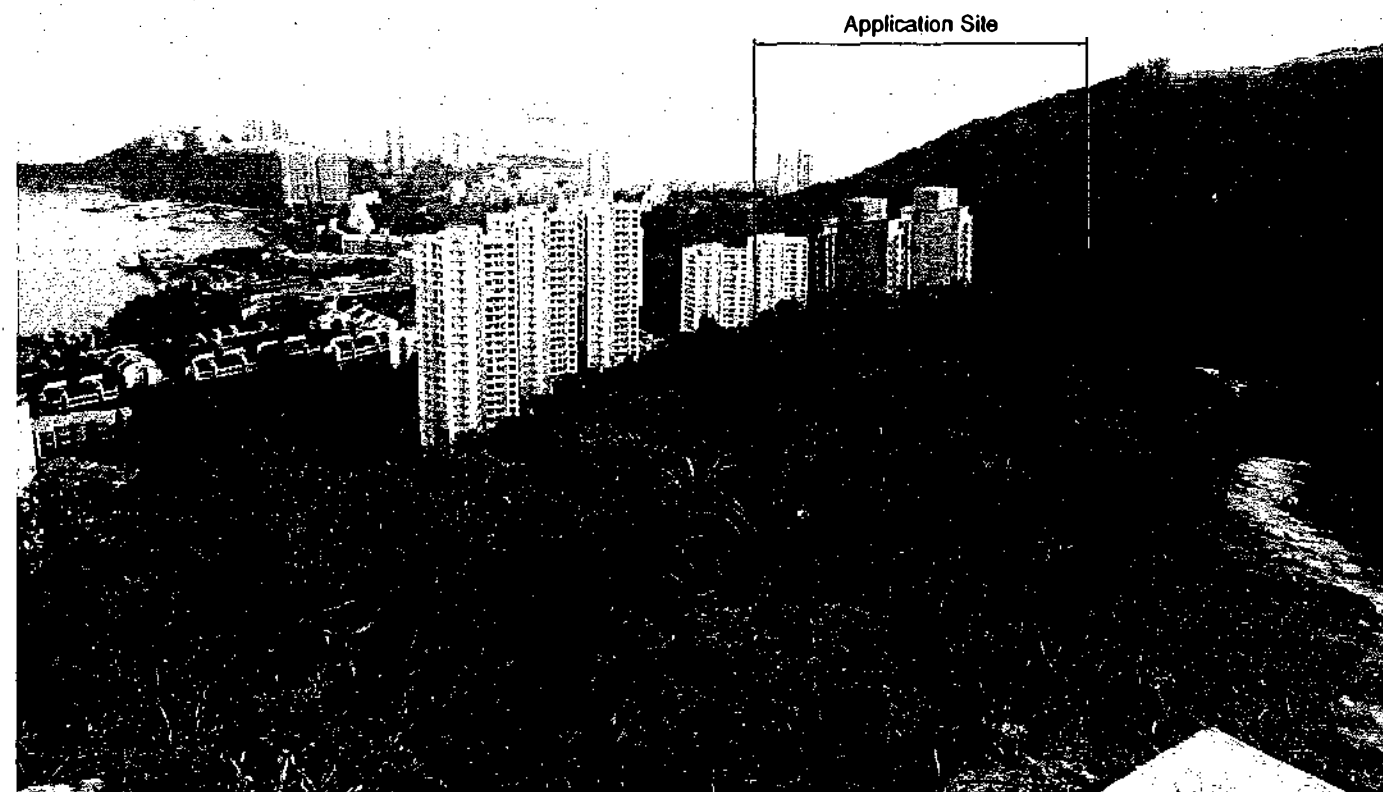
PROJECT : DISCOVERY BAY OPTIMIZATION OF LAND USE - REFINEMENT OF AREA 6F

DEC 2015

ANNEX : **B.7**



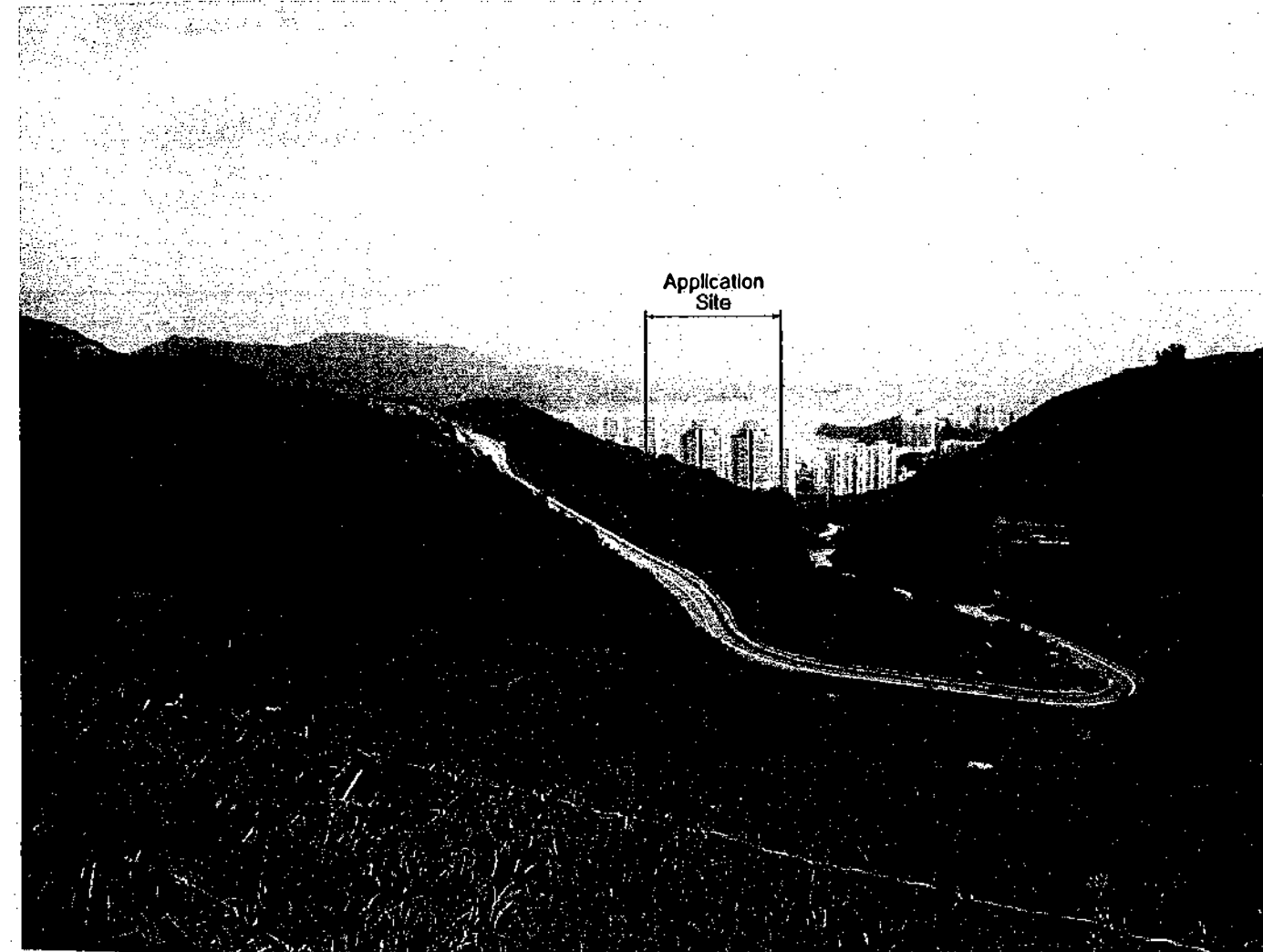
VP5: View South-East towards Application Site from Lo Fu Tau Pergola/Lookout (Existing Condition)



VP5: View South-East towards Application Site from Lo Fu Tau Pergola/Lookout with Proposed Development



VP7: View North-East towards Application Site from the Reservoir Dam (Existing Condition)



VP7: View North-East towards Application Site from the Reservoir Dam with Proposed Development



TITLE: **PHOTOMONTAGE - VP7 (VSR REC6) FROM RESERVOIR DAM**

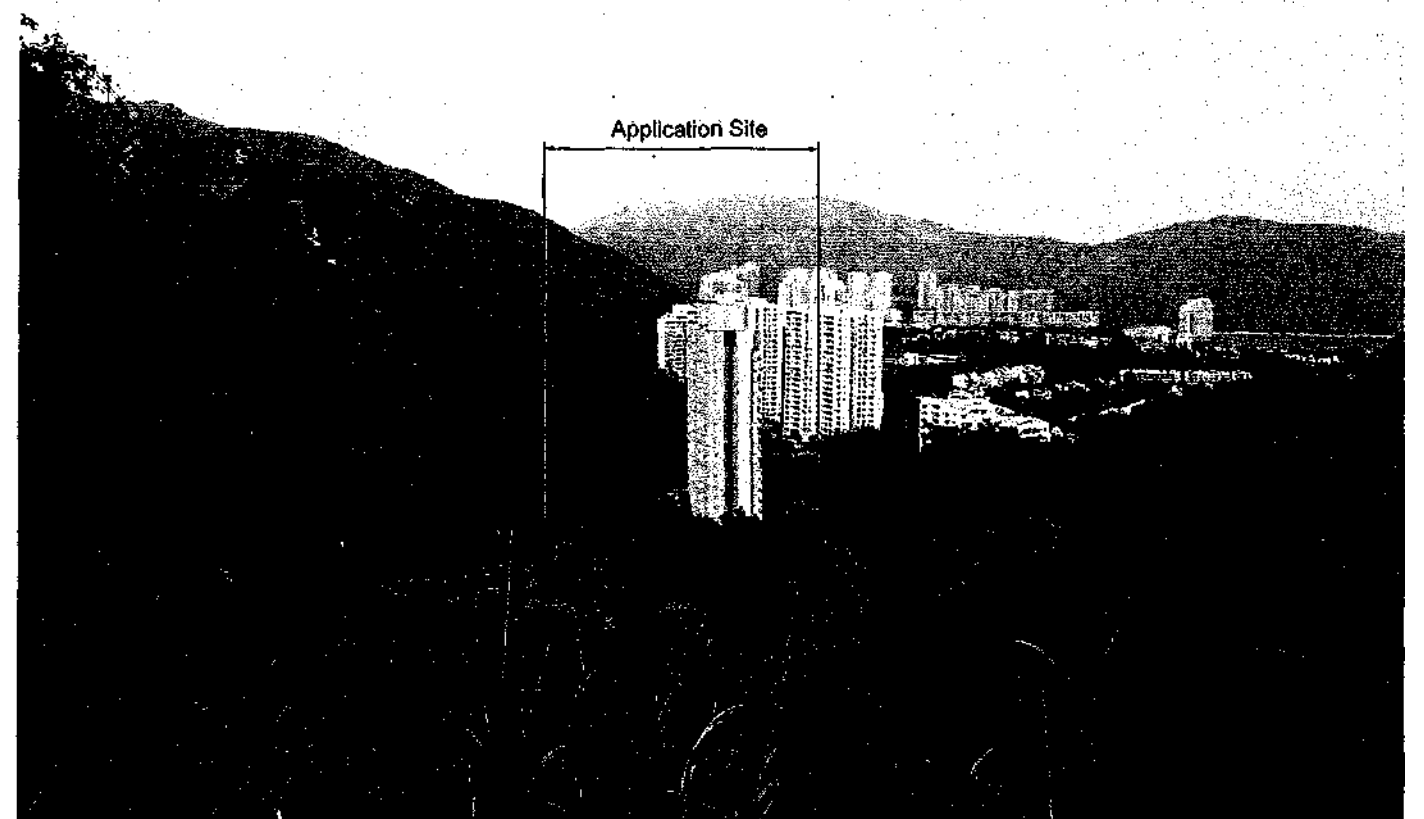
PROJECT: DISCOVERY BAY OPTIMIZATION OF LAND USE - REFINEMENT OF AREA 6F

DEC 2015

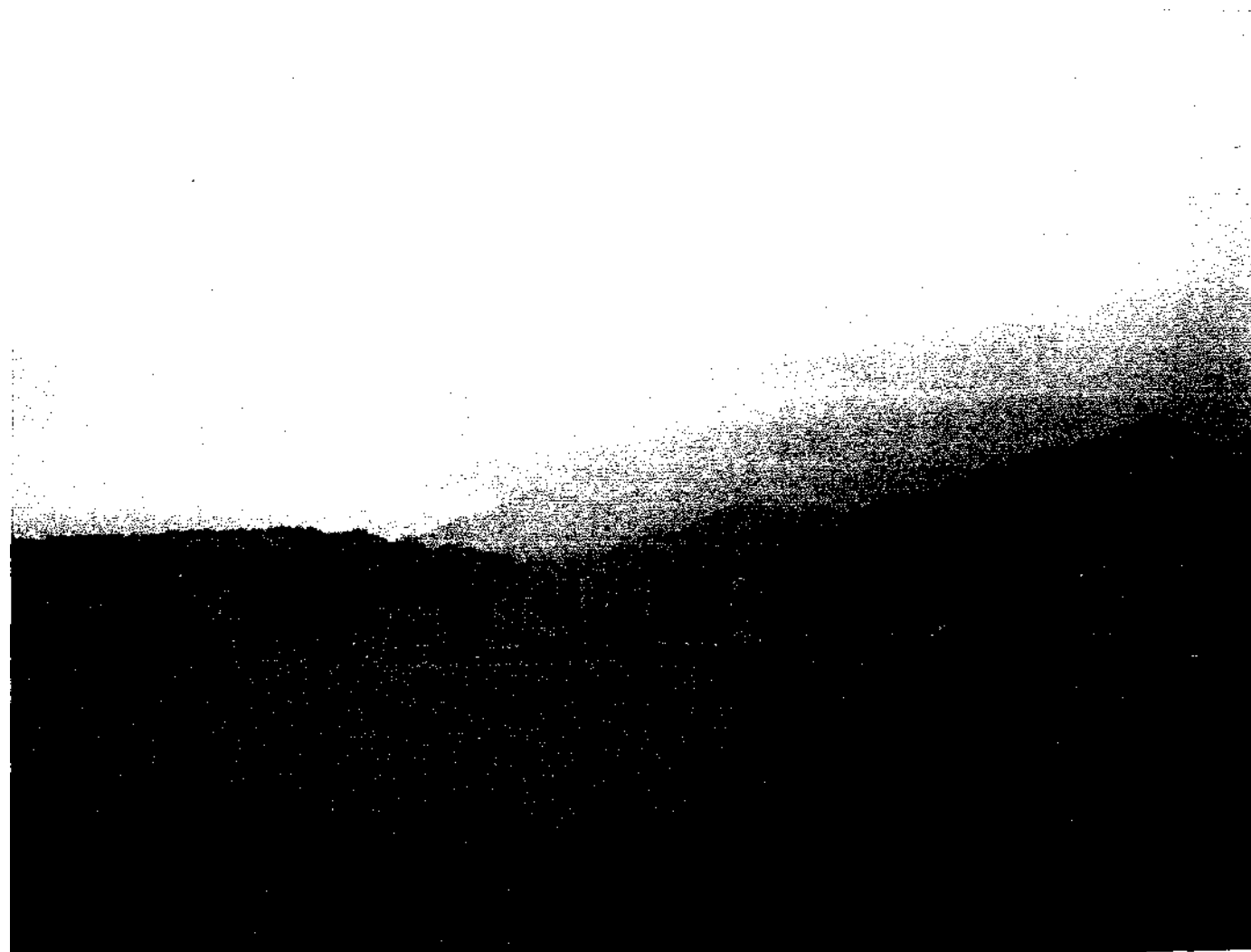
ANNEX : **B.9**



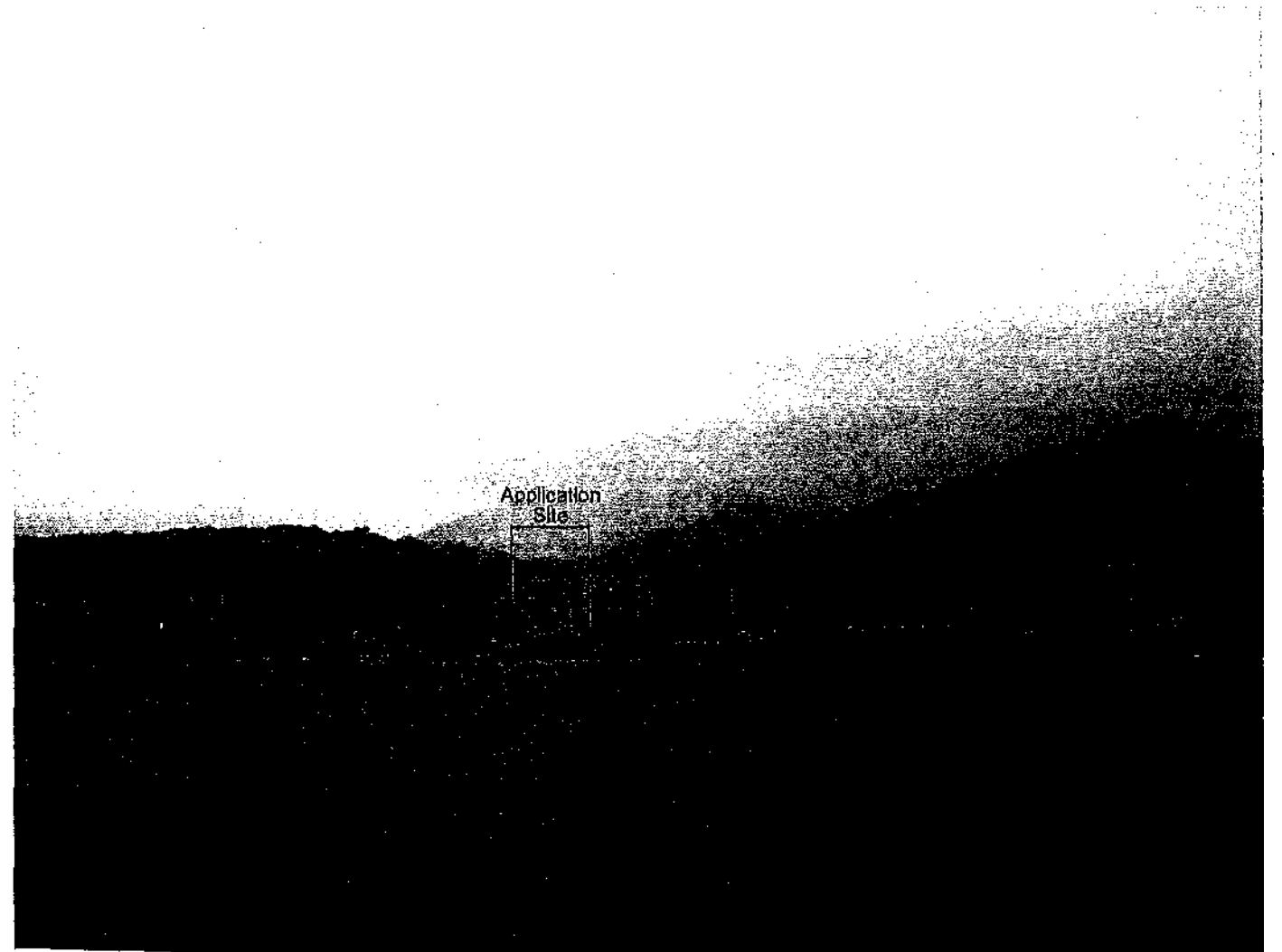
VP8: View North towards Application Site from Hiking Trail South of the Dam (Existing Condition)



VP8: View North towards Application Site from Hiking Trail South of the Dam with Proposed Development

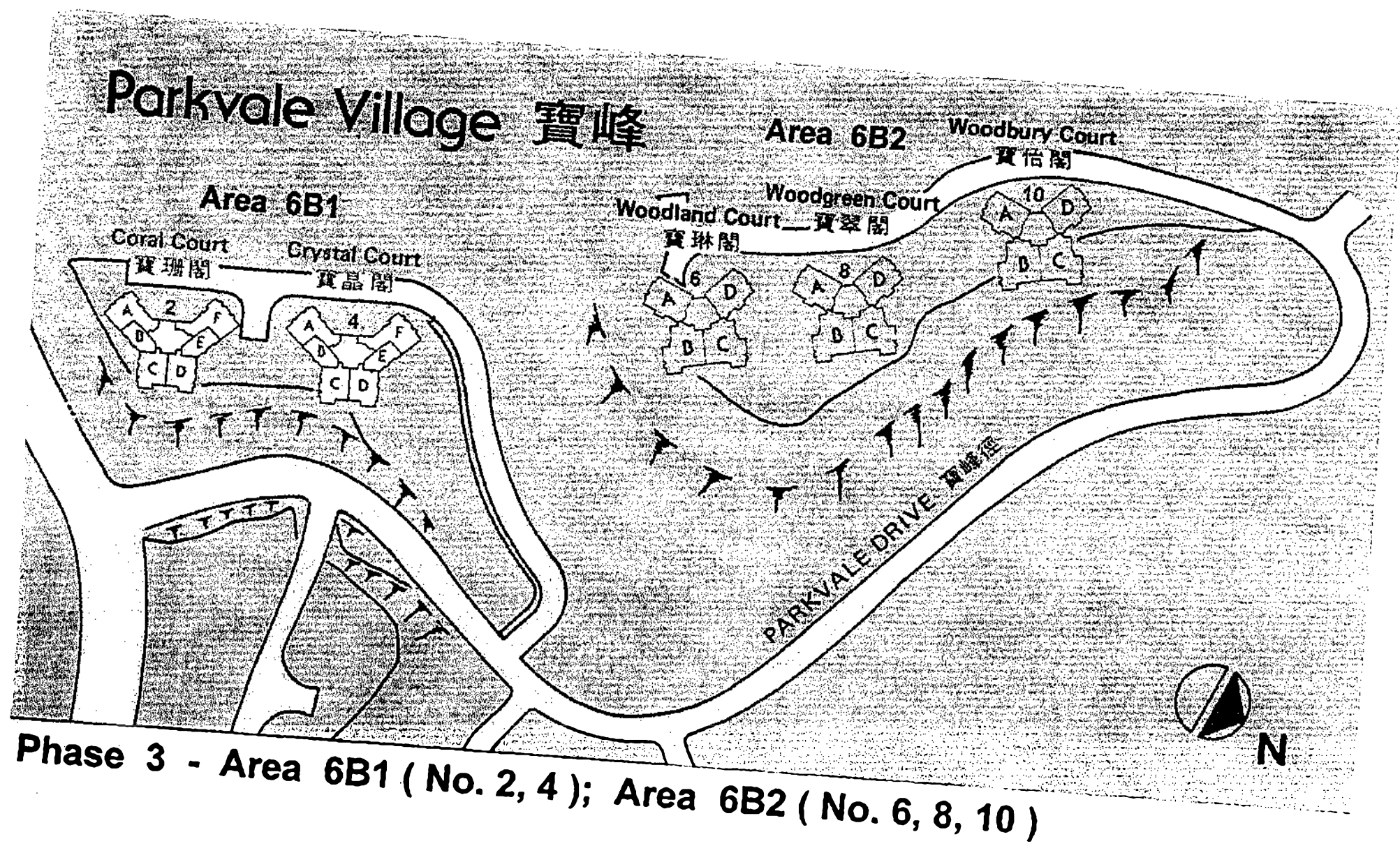


VP11: View South-West towards Application Site from the Disneyland Promenade (Existing Condition)

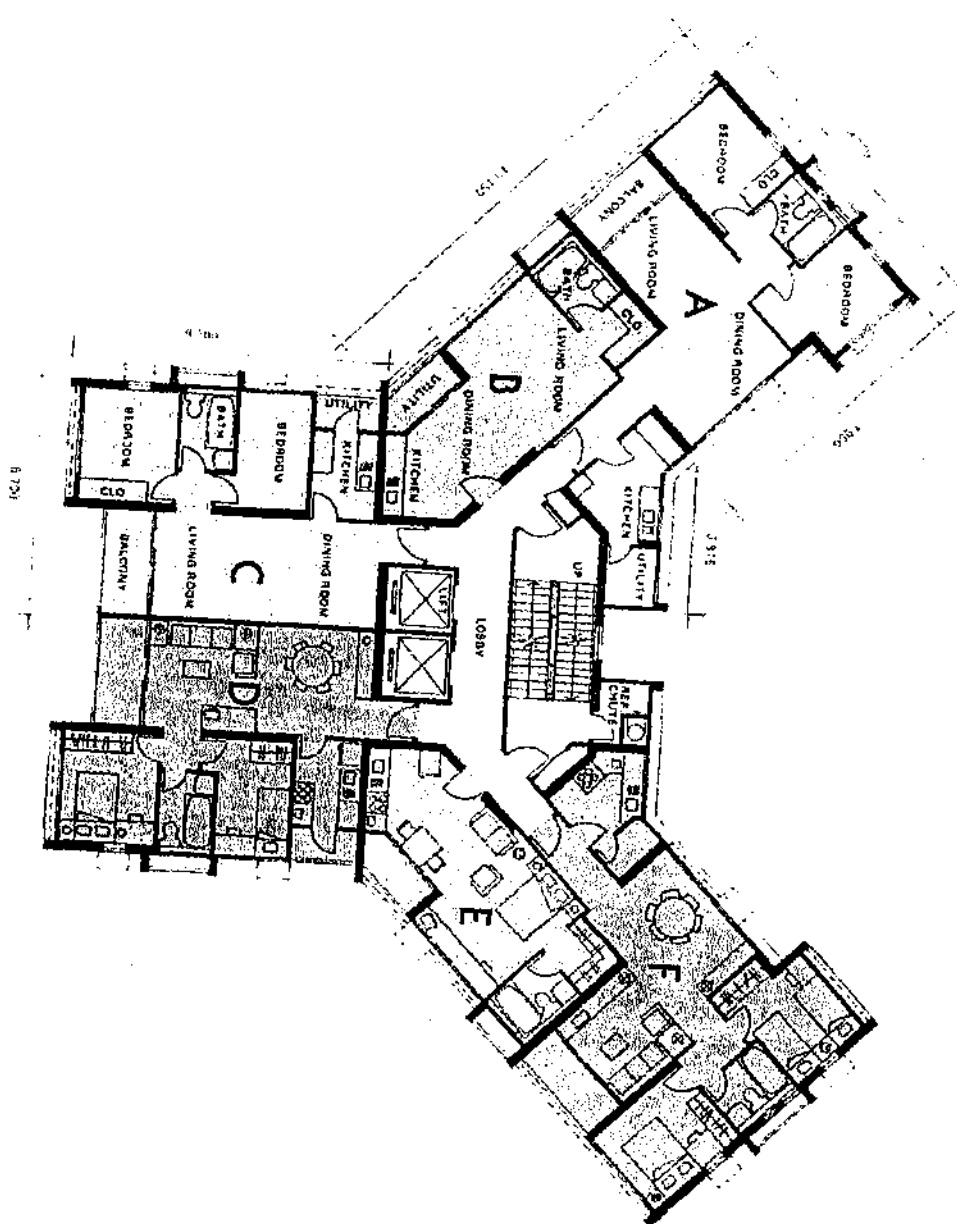


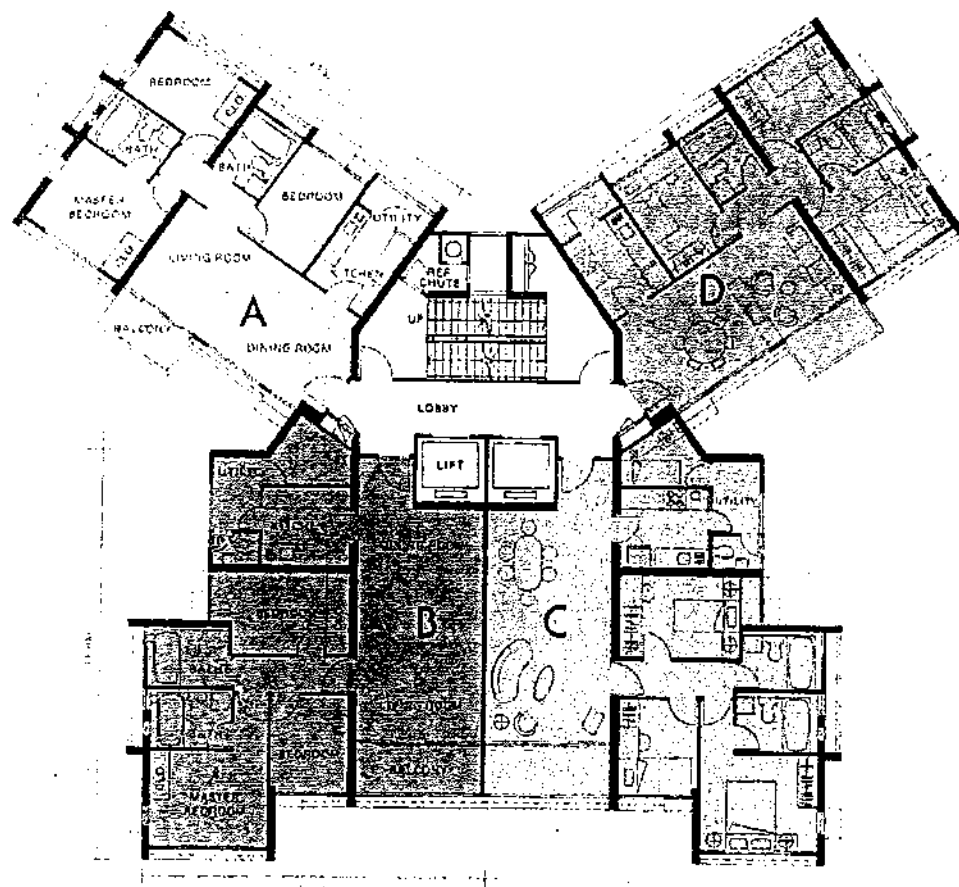
VP11: View South-West towards Application Site from the Disneyland Promenade with Proposed Development

Appendix F
Floor Plans of Parkvale Village Units



1/F - 2/F TYPICAL FLOOR PLAN





1/F - 21/F TYPICAL FLOOR PLAN