

# Planning and Engineering Feasibility Study for Development at Anderson Road

## Environmental Impact Assessment Executive Summary


November 1998

**Maunsell**

in association with

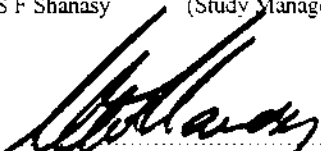
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Reviewed by: Dr Pong Lai (Discipline Manager)

signed:   
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date: 30 Nov 1998

Reviewed by: S F Shanasy (Study Manager)

signed:   
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date: 30 Nov 98

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## 1 INTRODUCTION

### 1.1 Background to the Project

- 1.1.1 Quarry operations at Anderson Road over the last 35 years have resulted in steep rock faces over 200m high extending over a distance of 1.5km. A scheme of quarrying and rehabilitation for the existing Anderson road Quarry area above Anderson Road started in March 1997. The quarry operation in this area will be carried out up to January 2012 and followed by nearly 2 years of establishment works to December 2013. The works within the proposed Anderson road Development area (the site bounded by Anderson Road and the realigned Sau Mau Ping Road) were subjected to further study on the possible implementation approaches.
- 1.1.2 According to the Territorial Development Strategy Review 1996, the housing supply capacity of current approved plans and programmes will not be adequate to meet the estimated housing demand after 2000/01. The proposed development area was identified as one of the potential supplementary housing sites.
- 1.1.3 Civil Engineering Department commissioned the Consultants to undertake a planning and engineering feasibility study for development at Anderson Road. The development site is located in the East Kowloon District. It is bounded by Anderson Road to the north, the realigned Sau Mau Ping Road to the south, Po Lam Road to the east, and Lee On Road and Shun On Road to the west. The Project is proposed to form platforms for housing development and associated uses in an area of about 50 hectares, and to carry out necessary infrastructural upgrading or improvement works to cater for the proposed development. Figure 1.1 and Figure 1.2 show the location of the development site and the Project Layout Plan respectively.
- 1.1.4 The recommended development is based on a plot ratio of 7.5 and provides 867,984 m<sup>2</sup> of residential floor space in 13,302 housing units, representing accommodation for 40,883 persons. The public / private housing mix is about 60:40 in terms of residential units. The target population intake date of the development is March 2009.

### 1.2 Local Development Context

- 1.2.1 There are a number of re-development schemes in the vicinity of the development site which are at various stages of planning and construction. Sau Mau Ping Estate located immediately to the southwest of the development site is currently redeveloped and the final phase will be completed in 2005. As part of the redevelopment programme, the section of Sau Mau Ping Road between Sau Mau Path and Hiu Kwong Street is scheduled to be realigned and widened to 13.5 metres. The target date for this realignment is 1999.
- 1.2.2 There is a proposal for redevelopment of Shun Lee, Shun On and Shun Tin Estates. Nevertheless, it is in a very preliminary stage and there is no definite programme at the present moment. Po Lam Road Platform located to the south of the development site is currently under construction. It is expected that occupation of public housing on Po Lam Road Platform will be in 2001.
- 1.2.3 The Anderson Road Quarry, adjacent to the development site, has a new phased programme of extraction, processing and rehabilitation. The 17-year rehabilitation scheme of Anderson Road Quarry includes 15 years of operation and 2 years of establishment works and is due for completion by December 2013.

### 1.3 Objectives of the Study

1.3.1 The overall objectives of the Study are :

- (a) To assess the suitability of the site for housing development;
- (b) To examine the development potential of the site whilst maintaining compliance with the environmental and planning legislative requirements;
- (c) To advise on the need of modifying development parameters to fully utilise the development potential;
- (d) To examine the implications of, and the future linkage and integration with the quarrying and rehabilitation scheme of Anderson Road Quarry and neighbouring developments;
- (e) To recommend effective and practical mitigation measures to reduce the potential adverse impacts; and
- (f) To explore the opportunities for environmental enhancement and infrastructure development in the surrounding area.

1.3.2 The Executive Summary summarises the findings of the Final Environmental Impact Assessment Report (*Final EIA Report*) on the construction and/or operational phase impacts on the following aspects:

- noise;
- air quality;
- landscape and visual;
- ecology;
- water quality and drainage;
- sewerage;
- solid waste;
- contaminated land; and
- landfill gas.

1.3.3 The EIA presents detailed assessment of various environmental issues of concern for the Preferred Development. Environmental impact mitigation measures, where considered necessary during construction and operational phases of the development, are recommended in the *Final EIA Report*. Details of the proposed environmental monitoring and audit program for the development are provided in a separate Environmental Monitoring and Audit Manual (*EM&A Manual*) issued as part of this study.

## 2 SENSITIVE RECEIVERS

### *Construction Phase*

2.0.1 Existing and future sensitive receivers located in the vicinity of the development site were identified for the construction phase assessment. Representative sensitive receivers are identified and listed

below:

- Cleared site of Shun Lee Tsuen Temporary Housing Area
- Shun Chi Court
- Shun Lee Estate
- Shun On Estate
- Shun Tin Estate
- Sau Mau Ping Estate
- Po Lam Road Platform (future receivers)
- United Christian Hospital

#### *Operational Phase*

- 2.0.2 Sensitive receivers considered in the operational phase assessment were limited to those future receivers on the development site, as there will be no direct impacts from the development site on surrounding receivers once construction is complete. Future sensitive receivers on the development site include residential buildings, schools and recreational open spaces.

### 3 AIR QUALITY

#### *Construction Phase*

- 3.0.1 The major potential air quality impact during the construction phase of the project will result from dust arising from various construction activities including haul road emission, open site erosion, excavation and filling activities, drilling and blasting. Vehicle and plant exhaust emissions from the site are not considered to constitute a significant source of air pollutants. Blasting and crushing of rock may be allowed on the site.
- 3.0.2 Two construction cases were considered for dust impact assessment. The excavated soft-cut materials will be disposed at the South East Kowloon Development site by dump trucks in both cases, whereas the rock-cut materials will be transferred to Anderson Road Quarry for crushing in the first case, and crushed on-site and disposed at the South East Kowloon Development site in the second case. The predicted dust levels at nearby sensitive receivers are generally higher for the second case due to additional dust emissions from trucks travelling to and from the South East Kowloon Development site and from on-site crushing of rock-cut materials.
- 3.0.3 The modelling results showed that with the implementation of practicable mitigation measures, dust levels at sensitive receivers will comply with the 1-hour average total suspended particulates (TSP) guideline and 24-hour average Air Quality Objectives (AQO) in both construction cases. Recommended dust mitigation measures include good site practices, suitable drilling and blasting techniques, and effective dust suppression measures at crushing plant and material handling points.

#### *Operational Phase*

- 3.0.4 For the purpose of air quality impact assessment, the operational phase is divided into 2 stages. Stage 1 starts from the occupation of the development site (estimated to be March 2009) to January 2012 (the end of quarry operation). Stage 2 is from February 2012 onwards. In Stage 1, air quality impacts due to both quarry operations and traffic emissions were considered in the assessment. In Stage 2 of the

operational phase, Anderson Road Quarry is rehabilitated and only traffic emissions impact was assessed.

#### Quarry Dust

- 3.0.5 The major potential dust impacts from the on-going operation of Anderson Road Quarry will result from dust arising from various quarrying activities including haul road emissions, open site erosion, excavation and filling activities, as well as dust emissions from blasting and quarry plants.
- 3.0.6 The highest worst case 1-hour and 24-hour average TSP concentrations were predicted at the back of the quarry with the most intensive quarrying activities and haulage of excavated materials. High TSP concentrations were also predicted around the two plants located adjacent to the development site at the northern and southeastern sides of the development site.
- 3.0.7 The modelling results showed that exceedances of the 1-hour average TSP guideline level of  $500\mu\text{gm}^{-3}$  would not be expected within the development site. Exceedances of the 24-hour average AQO for TSP of  $260\mu\text{gm}^{-3}$  would be expected within part of the development site in close proximity to the plants at the northern and southeastern sides of the development site. Nevertheless, a buffer distance is planned between the plants and the future sensitive receivers on the development site. The modelling results showed that exceedances of the 24-hour average AQO for TSP at the sensitive receivers would not be expected.

#### Traffic Emissions

- 3.0.8 Traffic emission impact on the development site is not considered significant in view of the density of road network in the area and the higher elevation of the development site. The modelling results showed that the predicted worst-case 1-hour average nitrogen dioxide concentrations at the future air quality sensitive receivers within the development site are all well below the 1-hour average AQO for nitrogen dioxide. It is predicted that the 1-hour average nitrogen dioxide concentrations at all the selected receivers at both 1.5m and 5.8m heights would be less than 50% of the 1-hour average nitrogen dioxide AQO.

## 4 NOISE

### *Construction Phase*

- 4.0.1 The construction phase noise impacts are likely to arise from construction traffic and the use of heavy plants during the formation of the platforms. Construction activities will include rock drilling and blasting, material transfer to trucks, transport within or off site for crushing and redistribution of material on the site. Following platform formation, there will be construction of the residential blocks and schools. Impacts from this phase are outside the remit of this study.
- 4.0.2 It is predicted that the unmitigated noise levels would exceed the criteria stipulated in Table 1B in *Annex 5 of the TM on Environmental Impact Assessment Process* for daytime construction work when construction activities occur in close proximity to noise sensitive receivers or when a number of heavy construction activities taking place concurrently. Noise mitigation measures will be required for the construction works to comply with the noise criteria.

- 4.0.3 It is anticipated that the construction noise impacts would be highest during the site formation period of the development when rock drilling and rock breaking would be carried out for rock-cut excavation. Therefore proper noise mitigation measures including the use of quieter equipment; scheduling of work; etc, should be implemented to prevent adverse noise impacts at sensitive receivers. By applying the mitigation measures in areas close to noise sensitive receivers (NSRs), exceedance of the day-time noise criteria would not be expected at the NSRs except at a school on Po Lam Road Platform, which would be provided with air conditioning and good quality glazing for mitigation of traffic noise.
- 4.0.4 An environmental monitoring and audit programme is essential to ensure that compliance of the noise criteria is maintained at sensitive receivers and to ensure the effective implementation of noise mitigation measures.

#### *Operational Phase*

- 4.0.5 Similar to air quality impact assessment, the operational phase is divided into 2 stages. In Stage 1, noise impacts due to both quarry operations and road traffic were considered in the assessment. In Stage 2 of the operational phase, Anderson Road Quarry is rehabilitated and only road traffic noise impact was assessed.

#### Quarry Noise

- 4.0.6 For quarry noise (excluding plant noise from the quarry), the predicted noise levels at the selected receiver locations are all below the Noise Standards for Daytime Construction Activities stipulated in *TM on Environmental Impact Assessment Process*. Adverse noise impacts at the development site from quarry operations other than plant noise from the quarry are therefore not expected.
- 4.0.7 During the course of this study, the noise impacts from the plants within the Anderson Road Quarry at the future noise sensitive receivers on the proposed Anderson Road Development site were examined with possible rearrangement of the building elements on Platform E. In the original layout, it is predicted that some of NSRs closer to the plants will exceed the day-time noise limit of 65 dB(A) as stipulated in Annex 5 of the *TM on Environmental Impact Assessment Process* and marginal exceedances of the day-time Acceptable Noise Levels (ANLs) under the Noise Control Ordinance (NCO) are predicted at one residential block. Additional mitigation measures at the quarry to further reduce the noise level at the future noise sensitive receivers on the Development have been considered. Such measures would be in the form of very large enclosures for four items of plants which have been identified as the dominant noise sources. However, building these enclosures to building regulations for industrial safety would be extremely expensive under the existing quarry rehabilitation contract and not cost-effective for use only during the two years and ten months of the quarry operations to January 2012. In addition, the construction noise arising from construction works for these enclosures, in particular the foundation work which would involve rock breaking and drilling work, would affect the surrounding existing NSRs. Therefore, another mitigation option of refining Platform E of the development was considered. Several alternative layouts of Platform E have then been examined. Of these, the one that meets the minimum requirements for the width of school site as stated in Hong Kong Planning Standards and Guidelines (HKPSG) has been adopted.
- 4.0.8 It is predicted that all the residential flats in the preferred alternative layout will be exposed to noise levels not exceeding 70dB(A). This quarry noise impact is not considered as long term because it will last for 2 years and 10 months which is comparable to the some typical construction periods. Noise

constraint is identified for the northern corner of Platform E with predicted plant noise level exceeding 70 dB(A) at the worst affected elevation of about 204mPD. It is recommended that noise sensitive uses should not be planned within the corner. In order to comply with the day-time NCO noise limit of 70 dB(A), noise sensitive uses, if any, planned within the corner should not exceed the elevation of 190mPD until quarry operation ceases in January 2012.

### Traffic Noise

- 4.0.9 Traffic noise was predicted using the methodology provided in the UK, Department of Transport Calculation of Road Traffic Noise (CRTN), 1988, and is based on the traffic data for year 2011 (AM peak hour) provided by the traffic consultant and reviewed by the Transport Department and the Planning Department. Roads considered in the traffic noise model include Sau Mau Ping Road, Shun On Road, Lee On Road, Po Lam Road, Anderson Road, the proposed main access roads to the development site and the local roads within the site.
- 4.0.10 With the given scenario, the modelling results showed that the compliance rate of the road traffic noise criteria would be 93% and 95% for the northern private housing site and the southern public housing site respectively. It is expected that the noise exposure could be reduced by proper detailed design of the development.
- 4.0.11 In order to reduce the road traffic noise impacts at the planned school within the development site, 3 m high boundary walls are proposed. The location and extent of the proposed 3 m high solid boundary walls are shown in Figure 4.1.
- 4.0.12 It is recommended that those residential flats and school classrooms with residual noise impacts should be mitigated with indirect technical remedies such as window glazing with air conditioning.

## 5 LANDSCAPE AND VISUAL

### *Landscape Impacts*

- 5.0.1 The Project's impacts on landscape resources will be relatively low throughout its life. Impacts on vegetation will be moderate during construction, but with mitigation, residual impacts will be low/negligible. Impacts on the stream courses which cross the Site will be the most significant of impacts on landscape resources and residual impacts will be moderate.
- 5.0.2 The *Tai Sheung Tok Landscape Character Area (LCA)* is a fairly degraded urban fringe landscape, which has lost much of its sensitivity to further development. Impacts on the **landscape character** of Tai Sheung Tok will result largely from the scale of the development and impacts on this local landscape at all stages of the Project's life will be moderate/low.
- 5.0.3 The *Kowloon Coast LCA* is characterised to a large extent by the relationship between the intensely developed coastal plain and the relatively undeveloped, natural hillsides behind them. The Site lies at the edge of the urban area, on the ridge of hills which line the coast, and is therefore in a key location as regards this relationship between natural and the man-made landscape elements. The proposed Project is not characteristic of the topographical distribution of development in Kowloon nor the relationship between the texture and pattern of natural hillsides and that of the urban areas. Impacts on the character of the landscape will be limited by the scale of the change to the landscape, which is



fairly small. However, impacts on the landscape character of Kowloon will be moderate at all stages in the life of the development.

- 5.0.4 Perhaps the key feature of the landscape of the *Hong Kong LCA* is the interaction, alluded to above, between low-lying urban areas, mountainous uplands, and the sea. It is the relative relationship of these three elements which in large part, determines the character of the sub-regional landscape. In particular, the proximate relationship between the low-lying and intensely developed urban areas and the natural hillsides behind them is typical of this wider landscape. These hills and ridges also serve to contain development in bays or pockets and prevent a coalescing of the urban fabric. This characteristic pattern is readily discernible by viewing any plan of the SAR. The proposed development, located on one of these coastal ridges, is not characteristic of the predominant pattern of development and will change, albeit to a small degree, this traditional set of landscape relationships. The Project is however, small in relation to the area of the SAR and this will limit its impacts. These impacts on the character of the wider sub-regional landscape will therefore be significant at all stages of the Project. However because of the scale of the wider Hong Kong landscape, impacts will be low.
- 5.0.5 In this regard, it should however be noted that if a number of Projects of this type were proposed, they would be liable to have a much more significant impact on the fabric and character of the Hong Kong landscape over the longer term.

#### *Visual Impacts*

- 5.0.6 The Site's prominent, elevated location at the mouth of Victoria Harbour means that its visual envelope is considerably larger than would be the case were it within the lower lying urban area.
- 5.0.7 A very large number of visual receivers will be affected daily by the Project (millions of people each day). However, effects of distance, poor visibility and mitigation measures will mean that for the vast majority of these receivers, visual impacts will be low or negligible. The Project will however, introduce a large number of new urban features into close and middle distance views of the landscape. These features will in a limited way, breach the ridgeline that forms a backdrop to the Harbour.
- 5.0.8 The most significant of these impacts will be upon a small number of residents of Sau Mau Ping and Shun Tin Estates, who will experience high residual visual impacts. In addition, a small number of residents in Tseung Kwan O and Tsui Lam will also experience high or moderate visual impacts throughout the life of the Project, as the new towers of the development will appear in views of the otherwise natural Tai Sheung Tok ridge.
- 5.0.9 A larger number of residents will experience moderate residual impacts in Quarry Bay, Wong Tai Sin, Sai Wan Ho, Hung Hom and Hang Hau. However, west of Wanchai and in the northwestern parts of the Kowloon Peninsula, residual impacts will be negligible or low.
- 5.0.10 Impacts on key views will result from the new urban features in these views and in particular, from the changing relationship between urban fabric and natural ridge line to the rear. High impacts will be evident during construction and operation in views from Sau Mau Ping, Shun Tin, Lam Tin, and Tsui Lam. The only high residual impact will be on the key view from Tsui Lam.

#### *Impacts on Special Interests and Designations*

- 5.0.11 The design of the development maintains the strategic view corridor to the peak of Tai Sheung Tok

and also specifically addresses its impact on the Tai Sheung Tok ridge. For these reasons, the Project substantially conforms to Metroplan policy on *Visually Prominent New Development Zone/Redevelopment Zones*.

- 5.0.12 Metroplan policy on *Citywide Landmark/Reference Points* suggests that buildings should be used to define and give identity to the peak of Tai Sheung Tok. In this regard, the development entirely conforms to Metroplan policy.
- 5.0.13 The Project does not accord with Metroplan policy on *Principal Ridgelines* in so far as at the northern and southern ends of the proposed development, where the ridge is much lower, it is breached by buildings (in views from east and west). However, it is evident that any practicable residential development on this Site will almost certainly not meet the requirements of Metroplan policy in this regard. It should also be noted that ongoing development next to the Site (named the 'Po Lam Road Platform') will also breach the ridgeline. A sensible and pragmatic approach to this issue is suggested in the Central and East Kowloon Development Statement, where it is proposed that development on this site should aim to achieve a harmonious composition with the ridge, rather than adhere strictly to a policy of maintaining a 20% clearance below the ridgeline itself.
- 5.0.14 Metroplan policy classifies the Site as *Degraded Landscape to be Reinstated*. Although it is difficult to understand in what sense the Site might really be considered "degraded" or should be "reinstated", the proposals will certainly have the effect of obscuring the scar of Anderson Road Quarry and in this sense conforms to Metroplan policy. In addition, the layout of the development conforms almost exactly to the conceptual layout suggested in Metroplan.
- 5.0.15 Areas of natural hillside north and south of the development have been designated as *Conservation Area* under the Draft Tseng Lan Shue OZP. Designation of these areas is on the basis of their "significant landscape value". The development is likely to impact significantly on the landscape setting of these natural areas, by introducing large scale human features into the landscape.

#### Residual Impacts

Residual impacts, that is, those impacts remaining after the implementation of mitigation measures, will generally be low or moderate. Residual impacts on landscape resources will be most significant on water courses (moderate). Residual impacts on the landscape character of Tai Sheung Tok will be moderate/low whilst residual impacts on the landscape character of Kowloon will be moderate.

Residual impacts on key views will be most significant in views from Tsui Lam where they will be high. Impacts on views from Shun Tin, Lam Tin, Quarry Bay, North Point, Sau Mau Ping, Hung Hom and Tseung Kwan O will be moderate.

The most affected by visual impacts will include residential receivers in Sau Mau Ping, Shun On Estate and Shun Tin Estate who will experience high impacts. Recreational receivers in these areas will experience high/moderate visual impacts. For all other types of receivers in other locations, visual impacts will be low or moderate.

#### Recommendations

- 5.0.16 Should the Project be taken forward to detailed design stage, further consideration should be given to the following:

- Detailed layout and composition of buildings;
- Planting and vegetation restoration on soil slopes. This should include restoration of grassland, scrub and woodland on slopes around the development platforms and access road. Restoration should be undertaken using predominantly native species. Soil slopes may include slopes which are currently rock-covered;
- Screen planting along the access roads, to limit impacts of elevated structures and rock slopes;
- Colouring of and limited planting on, shotcrete slopes;
- Creation of landscape buffers and planting in and around the development itself to screen partially close views of the site;
- Colour rendering of towers to minimise visual impacts;
- Screen planting in front of retaining walls as well as granite cladding to those walls to reduce glare and visual impact;
- Careful design of road elevated structure and abutments, to limit visual impacts;
- Colour rendering of roadside features to limit visual impacts;
- Conservation of CDG or CDV recovered from the site for re-use, in the landscape restoration;
- Preservation (by transplanting if necessary) of any trees identified as being of particular landscape value;
- Detailed planting design for slopes, streets and public open spaces;
- Detailed mitigation measures and screen planting proposals for access roads;
- Careful integration into landscape of slope drainage features.

## 6 ECOLOGY

- 6.0.1 Major habitats found within the proposed development site included woodland, grassland, agriculture, disturbed area and streams. The proposed development would cause a permanent and irreversible loss of all terrestrial and aquatic habitats within the site. These would include approximately 15 ha woodland, 14 ha grassland, 1 ha agriculture land, and 300 m stream course.
- 6.0.2 The woodland habitats found in the site are young, disturbed, fragmented, with a very open canopy, and of low or moderate diversity. Plant species recorded are common and widespread. However, the woodland sites consist of numerous tree and shrubs species providing extensive food sources for avifauna. These woodland patches serve as a refuge for avifauna in the urban environment. The sites also have moderate to high potential values to develop into mature woodland given time and continued protection from disturbance. Permanent loss of the woodland is considered to be of moderate impact.
- 6.0.3 In view of the limited size, commonness and fragmented nature of the grassland and agriculture habitats, permanent loss of the habitats are considered to be of minor ecological significance. The existing and potential ecological values of the main stream habitat are severely affected by the quarry operation, which is programmed to continue for the next 15 years. The potential ecological impacts due to permanent loss of the stream channels are considered minor.
- 6.0.4 Permanent loss of the woodland habitat would constitute a moderate impact and will require mitigation. Revegetation using native tree and shrub species on soft cut slopes will mitigate the loss of woodland and impact to avifauna. Maximum available area on soft cut slopes (about 13.4 ha) would be less than the total area of woodland loss (16 ha). However, due to the nature of the woodland to be lost, compensatory planting with a ratio less than 1:1 in this case is considered to be sufficient.

Should this mitigation measure be implemented, there will not be significant residual impacts from the project.

## 7 WATER QUALITY AND DRAINAGE

7.0.1 The construction work of the project will be land based, thus no direct impact on marine water in Victoria Harbour is anticipated. During construction phase, the major water quality impact will be related to runoff which could carry out high suspended solids. With the implementation of standard mitigation measures as recommended in EPD's ProPECC Note PN1/94 *Construction Site Drainage*, the actual residual impacts should in general be low.

7.0.2 During the operational phase, water quality in terms of quantity and quality will be affected due to the altered landuses. The major concern of water quality impact during operation is a substantial increase in surface runoff due to the increased impervious areas. Nevertheless, under the current design, about 50% of the development site area including the slopes will be planted with the remaining areas being effectively paved. Non-point source pollution will be controlled and maintained by the individual land users which include Housing Department, Education Department, Urban Services Department and private developers. Sand traps designed to Drainage Services Department and EPD's requirements are recommended for each land lot. This will reduce the runoff impacts from the development to an acceptable level. Proposed modifications of the existing drainage system including the installation of drainage storage tanks are expected to maintain the existing drainage situation in the area.

## 8 SEWERAGE

8.0.1 Sewage impact will occur during the construction and operational phase. During the construction phase, sewage will be generated from the workforce. However, this impact can be mitigated. During the operational phase, sewage will be generated from the proposed population. Thus, the installation of a new sewerage collection system will be required. The additional sewage flows will also impose constraints on the existing downstream sewerage system and the Kwun Tong Sewage Treatment Plant (KTSTP). Thus, upgrading the existing sewerage system and the KTSTP will also be required to accommodate the population growth from the proposed Anderson Road Development as well as other committed developments in the sewerage catchment area.

## 9 SOLID WASTE

9.0.1 During the construction phase, various types of wastes will be generated including soft and rock spoil derived from site clearance and slope cutting, waste derived from construction materials and processes, general refuse from workforce, and waste generated from plant and equipment maintenance. It is anticipated that substantial construction waste, including soft and rock spoil as well as removed vegetation, will be generated due to site clearance and slope cutting activities. It was estimated that a total bulk volume of 4.0 Mm<sup>3</sup> of rock spoil and 5.1 Mm<sup>3</sup> of soft spoil would be generated. Of the soft spoil, 0.4 Mm<sup>3</sup> will be re-used on site as fill material. Thus, in total 8.7 Mm<sup>3</sup> of excavated spoil will require to be disposed of off-site. With the implementation of the proposed construction traffic improvement scheme, two options of off-site disposal are considered feasible. It is proposed that either both the surplus soft and rock spoils transferred to the South East Kowloon Development site for

reclamation or the rock spoil transferred to the Anderson Road Quarry site for quarry products.

- 9.0.2 The study also identifies that approximately 57 tonnes per day of domestic waste would be generated from residents after the completion of the development. The waste should be delivered and handled at a refuse transfer station in the Kowloon area prior to its containerisation and disposed of at a landfill.

## 10 CONTAMINATED LAND

- 10.0.1 A review of site history and site condition concludes that land contamination should not be a major issue in the overall study. There have not been any large-scale industrial activities inside the site and over 75% of the site area is vegetated hills and slopes. There are only some localised small sites with suspected contamination requiring further quantitative intrusive contamination assessment. A detailed contaminated land study including the preparation of a Contamination Assessment Report (CAR) and/or a Remediation Action Plan (RAP) should be carried out during the land resumption stage or the detailed design stage.

## 11 LANDFILL GAS

- 11.0.1 The proposed development site is outside the respective Consultation Zones of the Jordan Valley landfill as well as the Ma Yau Tong (West & Central) landfills. In addition, no man made or geological features which could act as preferential pathway for any landfill gas migration from these landfills have been identified. Therefore, a Qualitative Risk Assessment is not required in accordance with the guidance note issued by EPD (ProPECC Note 3/96 Landfill Gas Hazard Assessment for Developments Adjacent to Landfills). Further site investigation is however recommended for the detailed design stage to measure landfill gas around the perimeter of the site, to re-confirm that there is no preferential pathway for landfill gas migration and to assess the potential for landfill gas hazards on the future development. In the unlikely event that landfill gas hazard is identified, the proponent should be required to propose and implement mitigation measures to address the hazard issue.

## 12 PROPOSED IMPROVEMENT AT THE JUNCTION OF SOUTHERN ACCESS ROAD / PO LAM ROAD

- 12.0.1 The improvement works at the junction of Southern Access Road / Po Lam Road proposed in the *Final Traffic Impact Assessment Report* is considered a major improvement to an existing District Distributor Road and is considered as a Schedule 2 Designated Project. An environmental review of the proposed junction improvement works is presented in the *Final EIA Report*.
- 12.0.2 As part of the proposed improvement works, a section of Po Lam Road near the junction will be widened. The proposed widening of Po Lam Road will require the reconstruction of the noise barriers to be installed in 2001 as part of the Po Lam Road Development. About 268m of the 365m long, 7m high cantilevered noise barrier will be affected by the proposed widening.
- 12.0.3 Reconstruction of the unaltered cantilevered noise barrier is proposed along the footpath of the widened Po Lam Road. With the implementation of this noise mitigation measure, traffic noise impacts at the Po Lam Road Development due to the proposed improvement at Southern Access Road

/ Po Lam Road junction will be maintained at acceptable levels for most of the noise sensitive receivers. Noise sensitive receivers with residual traffic noise impacts from the widened Po Lam Road will be protected by indirect noise mitigation measures to be provided as part of the Po Lam Road Development.

## 13 CONCLUSIONS AND RECOMMENDATIONS

### 13.1 Construction Phase Impacts

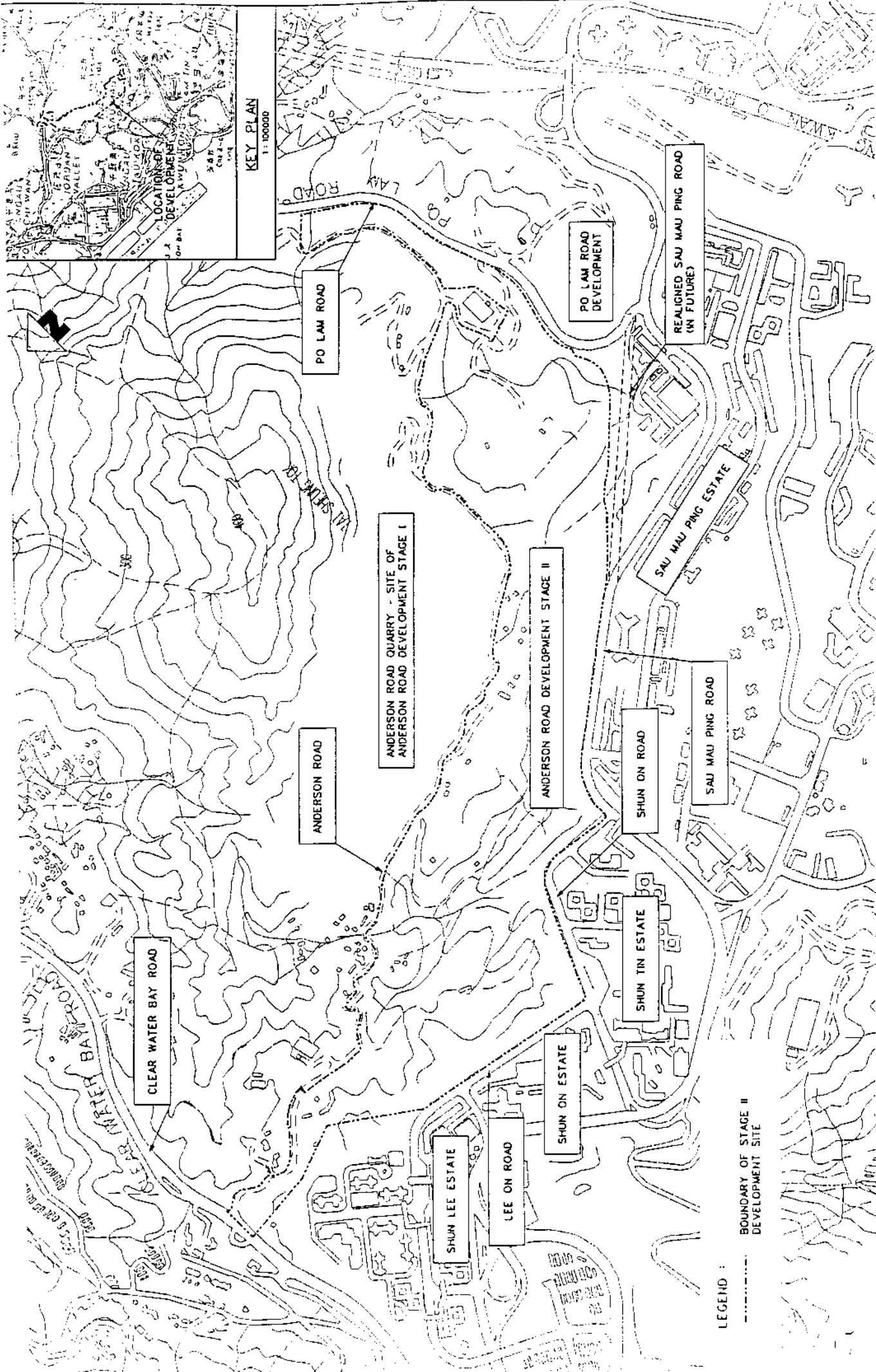
- 13.1.1 During construction, mitigation measures will be required to reduce noise and dust levels. Statutory and recommended dust and noise limits are expected to be achievable with the adoption of strict controls. Water quality impacts during construction are expected to be readily mitigatable. An environmental monitoring and audit programme is essential to ensure compliance of the environmental guidelines and to ensure the effective implementation of the recommended environmental mitigation measures.
- 13.1.2 Construction activities will result in the generation of substantial amount of waste, including soft and rock spoil as well as removed vegetation due to site clearance and slope cutting activities. It was estimated that a total bulk volume of 4.0 Mm<sup>3</sup> of rock spoil and 5.1 Mm<sup>3</sup> of soft spoil would be generated. Other than a limited amount of excavated spoil which can be re-used on site as fill material, the rest will be required to be disposed off-site. It is proposed that the surplus soft and rock spoils would be either used for the South East Kowloon Development project or the rock spoil be processed at the Anderson Road Quarry site for quarry products.
- 13.1.3 Ecologically, major habitats found within the proposed development site included woodland, grassland, agriculture, disturbed area and streams. The proposed development would cause a permanent and irreversible loss of all terrestrial and aquatic habitats within the study area. These would include approximately 15 ha woodland, 14 ha grassland, 1 ha agriculture land, and 300m stream course. Permanent loss of woodland habitat would constitute a moderate impact and will require mitigation. Should the recommended mitigation measures including revegetation using native tree and shrub species on soft cut-slopes be implemented to reduce the impact to woodland and avifauna, significant residual impacts are not expected.
- 13.1.4 The Project's impacts on landscape resources will be relatively low throughout its life. Impacts on vegetation will be moderate during construction, but with mitigation, residual impacts will be low/negligible. Impacts on the stream courses which cross the site will be the most significant of impacts on landscape resources and residual impacts will be moderate.
- 13.1.5 Impacts on landscape character will be evident at the Tai Sheung Tok, Kowloon Coast and the Hong Kong Landscape Character Areas (LCAs). Impacts will however be limited by the scale of the development and the change to the landscape. Impacts on the landscape character at the above three LCAs will be moderate to low at all stages in the life of the development.
- 13.1.6 In terms of visual impacts, a very large number of visual receivers will be affected daily by the Project (millions of people each day). However, effects of distance, poor visibility and mitigation measures will mean that for the vast majority of these receivers, visual impacts will be low or negligible. The Project will however, introduce a large number of new urban features into close and middle distance views of the landscape. These features will in a limited way, breach the ridgeline that forms a

backdrop to the Harbour.

- 13.1.7 The design of the development substantially conforms to Metroplan policies on *Visually Prominent New Development Zone/Redevelopment Zones* and *Citywide Landmark/Reference Points*. The development does not accord with Metroplan policy on *Principal Ridgelines* in so far as at the northern and southern ends of the proposed development, where the ridge is much lower, it is breached by buildings (in views from east and west). A sensible and pragmatic approach to this issue is suggested in the Central and East Kowloon Development Statement, where it is proposed that development on this site should aim to achieve a harmonious composition with the ridge, rather than adhere strictly to a policy of maintaining a 20% clearance below the ridgeline itself.

## 13.2 Operational Phase Impacts

- 13.2.1 Exceedances of the AQOs at the development site from road traffic emissions are not anticipated. Exceedances of the dust guideline level are not expected during the early occupation of the development site with the on-going operation of the nearby Anderson Road Quarry.
- 13.2.2 Prior to the cease of operation of Anderson Road Quarry in early 2012, it is predicted that most of the noise sensitive receivers closer to the plants of the quarry would be affected. In view of the fact that at-source mitigation measures are not cost-effective and would not be pursued, the building elements on Platform E have been rearranged to minimise the quarry noise impact at the noise sensitive receivers. In the revised layout, it is predicted that during the initial 3 year period all the residential flats will not be exposed to noise levels exceeding the day-time noise limit of 70 dB(A) as stipulated in the Noise Control Ordinance. It is considered that the residual noise impact from the quarry plants would not constitute long term, serious adverse implications for the proposed development and Annex 5 of the TM on Environmental Impact Assessment Process is complied with.
- 13.2.3 Feasible combinations of noise mitigation measures are proposed to reduce the road traffic noise impacts at the future noise sensitive receivers planned within the development site. The overall compliance rate of the HKPSG road traffic noise criteria for the development site would reach 95% with the implementation of the proposed direct noise mitigation measures. Those residential flats and school classrooms with residual noise impacts should be mitigated with indirect technical remedies such as window glazing with air conditioning.
- 13.2.4 During the operational phase of the development, mitigation measures including the installation of sand traps by individual land users are recommended to mitigate the non-point source pollution due to surface runoff from increased impervious areas. Modifications of the existing drainage and sewerage systems will be required to accommodate the increased drainage and sewage demands generated from the proposed population.



KEY PLAN  
1:100000

CLEAR WATER BAY ROAD

ANDERSON ROAD

ANDERSON ROAD QUARRY - SITE OF  
ANDERSON ROAD DEVELOPMENT STAGE I

ANDERSON ROAD DEVELOPMENT STAGE II

SHUN LEE ESTATE

LEE ON ROAD

SHUN ON ESTATE

SHUN TIN ESTATE

SHUN ON ROAD

SAU MAU PING ROAD

SAU MAU PING ESTATE

PO LAM ROAD  
DEVELOPMENT

REALIGNED SAU MAU PING ROAD  
(IN FUTURE)

LEGEND :  
- - - - - BOUNDARY OF STAGE II  
DEVELOPMENT SITE

DATE	BY	CHKD BY	APP'D BY

PLANNING AND ENGINEERING FEASIBILITY STUDY  
FOR DEVELOPMENT AT ANDERSON ROAD

NO.	DATE	REVISION

NO.	DATE	REVISION

**Mausell**  
in association with  
UTGS

SITE LOCATION PLAN

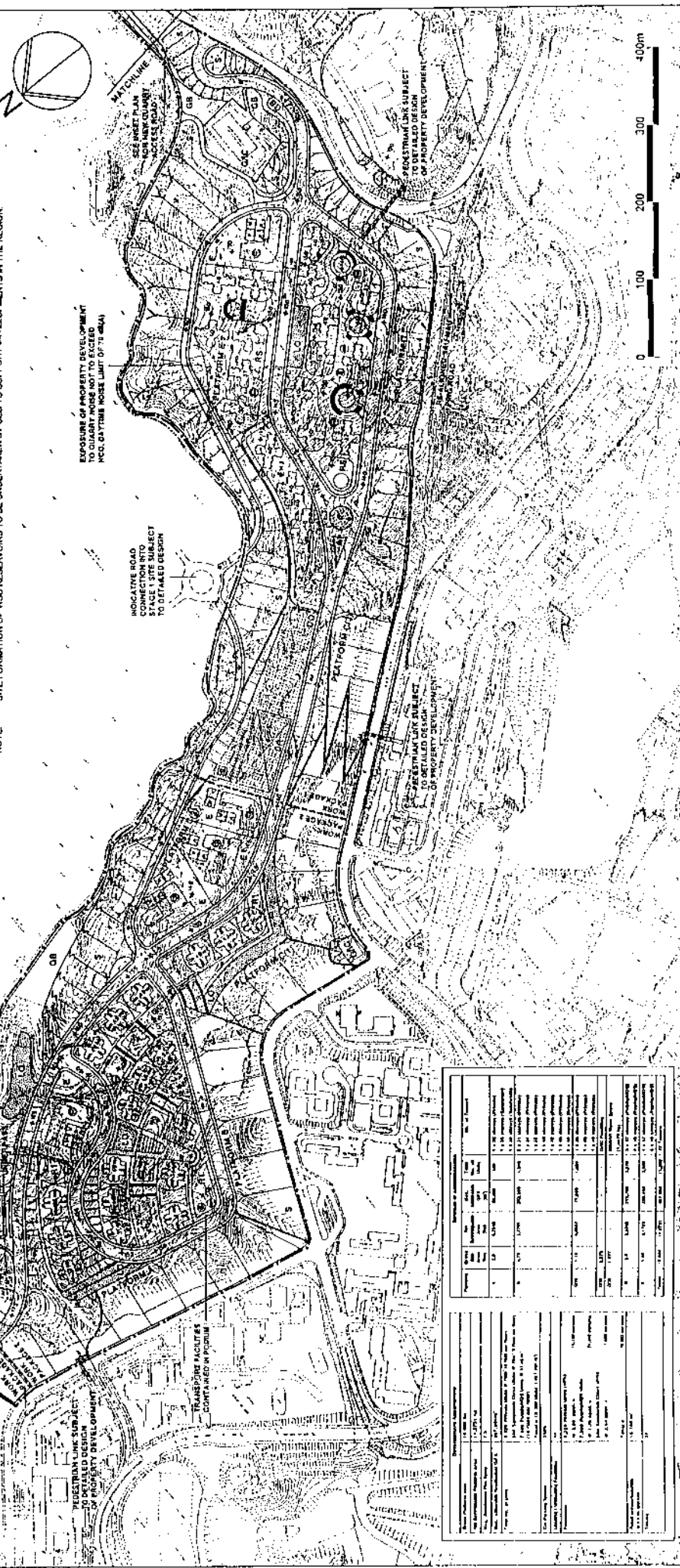
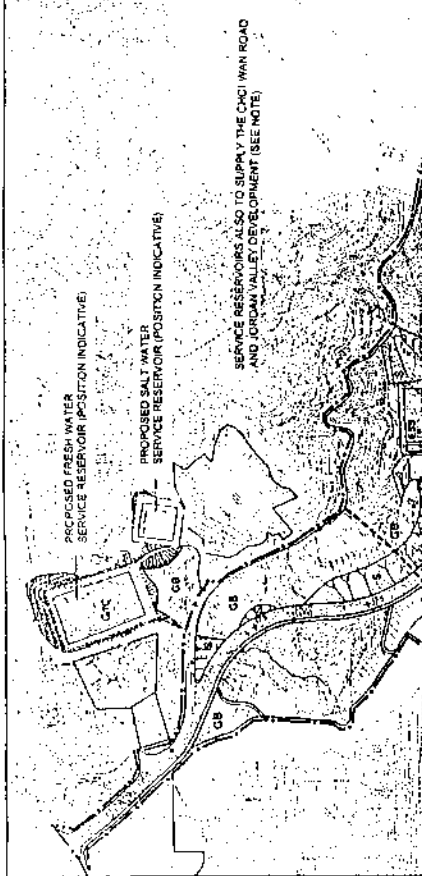
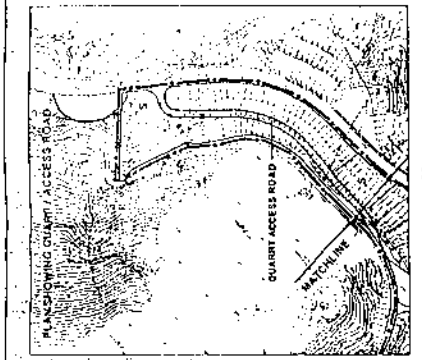
Figure 1.1

DVA DOKKING DEPARTMENT, HONG KONG



LEGEND	
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2	1:500 Scale (1:500)
3	1:250 Scale (1:250)
4	1:100 Scale (1:100)
5	1:50 Scale (1:50)
6	1:25 Scale (1:25)
7	1:10 Scale (1:10)
8	1:5 Scale (1:5)
9	1:2 Scale (1:2)
10	1:1 Scale (1:1)
11	1:0.5 Scale (1:0.5)
12	1:0.25 Scale (1:0.25)
13	1:0.1 Scale (1:0.1)
14	1:0.05 Scale (1:0.05)
15	1:0.025 Scale (1:0.025)
16	1:0.01 Scale (1:0.01)
17	1:0.005 Scale (1:0.005)
18	1:0.0025 Scale (1:0.0025)
19	1:0.001 Scale (1:0.001)
20	1:0.0005 Scale (1:0.0005)
21	1:0.00025 Scale (1:0.00025)
22	1:0.0001 Scale (1:0.0001)
23	1:0.00005 Scale (1:0.00005)
24	1:0.000025 Scale (1:0.000025)
25	1:0.00001 Scale (1:0.00001)

SECTION OF ROAD / QUARTY ACCESS ROAD	
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2	1:500 Scale (1:500)
3	1:250 Scale (1:250)
4	1:100 Scale (1:100)
5	1:50 Scale (1:50)
6	1:25 Scale (1:25)
7	1:10 Scale (1:10)
8	1:5 Scale (1:5)
9	1:2 Scale (1:2)
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12	1:0.25 Scale (1:0.25)
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23	1:0.00005 Scale (1:0.00005)
24	1:0.000025 Scale (1:0.000025)
25	1:0.00001 Scale (1:0.00001)



PROJECT INFORMATION	
PROJECT NAME	PLANNING AND ENGINEERING STUDY FOR DEVELOPMENT AT WESTERN ROAD
CLIENT	ONE ENGINEERING DEPARTMENT, HONG KONG
DATE	10/11/05
SCALE	1:1000
DESIGNER	MAUNSELL
CHECKED BY	
DATE	

PROJECT LAYOUT PLAN	
NO.	
DATE	
BY	
CHECKED BY	
DATE	

REVISIONS	
NO.	DESCRIPTION
1	ISSUED FOR TENDERS
2	ISSUED FOR CONTRACT
3	ISSUED FOR CONSTRUCTION
4	ISSUED FOR AS-BUILT

**Maunsell**  
in association with  
Urban  
CECS



