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1. INTRODUCTION

1.1 Project Title

1.1.1 The project pertaining to this project profile is the Deep Bay Link.

1.2 Purpose and Nature of the Project

1.2.1 Given the forecast growth in cross boundary traffic, the existing boundary crossing between HKSAR and Shenzhen will be over capacity. The Hong Kong and Mainland Cross Boundary Major Infrastructure Co-ordinating Committee has been looking into the provision of additional cross boundary links. A possible link is the Shenzhen Western Corridor (SWC) to connect the Mainland and the northwestern part of the New Territories.

1.2.2 To cater for the traffic from the new crossing to and from Hong Kong, broad alignment corridors for the connecting roads in Hong Kong have been developed for study under the Feasibility Study for Additional Cross-border Links. Whilst a decision has yet to be made on the implementation of the new road crossing, it has been agreed that a point just north of Ngau Hom Shek can be adopted as a possible landing and connecting point to the new crossing for the purpose of further studies to develop connecting road links in Hong Kong.

1.2.3 It is envisaged that the Deep Bay Link (DBL) will connect Ngau Hom Shek and initially the Yuen Long Highway, and ultimately Route 10. We propose to carry out an EIA to ascertain the environmental impact of the project before taking a decision on its implementation.

1.2.4 The scope of the proposed project includes:

- a dual-3 lane expressway about 5.4 km in length linking Ngau Hom Shek to an interchange with the Yuen Long Highway and the proposed Route 10 at Lam Tei;
- an interchange with the Yuen Long Highway and the proposed Route 10 at Lam Tei;
- cross boundary control facilities;
- a northbound and a southbound vehicle holding area; and
- associated civil, structural, geotechnical, landscape, drainage works, street lighting, traffic aids, emergency telephones, closed circuit television cameras and E&M works.

1.3 Project Proponent

1.3.1 The project proponent will be the Highways Department, Major Works Project Management Office.

1.4 Location and Scale of the Project and History of the Site

1.4.1 The proposed study area of the project is shown on Figure No 1.

1.4.2 The site area has traditionally been rural and agricultural in nature consisting largely of cultivated land and fishponds between the predominantly village type residential areas. More recently, especially in the area around Ha Tsuen, fish ponds have been filled in and the land used for urban fringe activities such as container open storage sites and vehicle repair areas.

1.5 Number and Types of Designated Projects Covered by the Project Profile

The construction and operation of the DBL and associated cross boundary facilities and vehicle holding areas is the only project covered by this Project Profile. The project is an expressway and is thus a designated project under Category A.1 of Schedule 2 of the Environmental Impact Assessment Ordinance. The road would also be considered a designated project under Category Q.1.

1.6 Contact Details



Legend :
----- Study Limit (approx)

Route 10-North Lantau to Yuen Long Highway (R10-NLYLH)

Yuen Long Highway (YLH)

Lam Tei

West Rail

Hung Shui Kiu

Deep Bay Link

Mouchel
Figure No. 1

2. OUTLINE OF PLANNING AND IMPLEMENTATION PROGRAMME

2.1 Project Planning and Implementation

2.1.1 The intention is to commence the EIA and the investigation into engineering feasibility in mid 1999 as part of the planning process for the project.

2.2 Project Timetable

Subject to policy approval for the project to proceed, the tentative programme is to commence construction of the project in 2002 for completion in 2004.

2.3 Interface with Other Projects

2.3.1 The current proposal is that DBL would connect Ngau Hom Shek with Yuen Long Highway (to be widened to dual 3-lane in 2004) initially, and ultimately with Route 10 upon its completion in 2007.

3. POSSIBLE IMPACT ON THE ENVIRONMENT

3.1 Project Processes, Emissions and Discharges

3.1.1 The project comprises a road, cross boundary control facility and vehicle holding areas and as such discharges and emissions during the construction phase of the project will be confined to vehicle emissions, potential fugitive dust, emissions from the concrete batching plants and discharges of site run-off, wastewater and sewage from construction workers' facilities. Operational discharges will comprise vehicle emissions and sewage from the operation of the road, the cross boundary control facility and the vehicle holding areas.

3.2 Construction and Operational Environmental Impacts

3.2.1 It is anticipated that surrounding sensitive receivers could be affected by noise, air quality, ecological, water quality, visual, waste, contaminated land, fisheries, hazards and cultural heritage impacts during the construction and operational stages.

Noise

3.2.2 Construction noise will be associated with construction activities and equipment, together with construction traffic travelling to and from the site. The key construction activities which could create noise impacts for the adjacent sensitive receivers will be earthworks during the site clearance for the road, the boundary control facilities and the vehicle holding areas, the formation of embankments and pile driving for columns for the section of the road on structure and the foundations of the control facility buildings.

3.2.3 Noise sources in the operational stage will be associated with the traffic using the link road and the operation of the boundary control facility and the vehicle holding areas. A large volume of traffic is predicted to use the DBL and a large proportion of the traffic is expected to be heavy goods vehicles.

Air Quality

3.2.4 Air pollution during construction will be primarily due to the generation of dust during earthworks and excavation activities. Sensitive receivers adjacent to the boundary control facilities and the vehicle holding areas, such as San Sang Tsuen and Tin Sam, may be affected. The prevailing wind direction in this area is north-easterly towards the sensitive receivers, although a large section of the alignment is shielded by the Castle Peaks Hills.

3.2.5 Air pollution sources during the operational stage will be associated with emissions from the traffic using the link road, passing through the cross boundary control facility, and in the vehicle holding areas where large numbers of vehicles may be concentrated. Based upon preliminary modelling overall pollutant concentrations are anticipated to be within the Air Quality Objectives. However, there is the potential for localised hot spots. In addition, odour from the adjacent San Wai sewerage treatment works may affect the users of the boundary crossing facilities.

Ecology

- 3.2.6 Noise and disturbance during construction could affect wildlife distribution and activity near the project but only in the short-term. Also, construction of the project may affect several hectares of shrubland and scattered agricultural/fish pond habitats near Ha Tsuen, Yick Yuen, Sun Fung Wai, Nai Wai and Tsoi Yuen Tsuen although these areas are not of high ecological value due to the fragmented and isolated nature of the ponds.
- 3.2.7 Noise and disturbance from traffic could cause impacts to wildlife. In addition, air pollution from vehicles could affect vegetation growth along the road alignment and in the vicinity of the boundary crossing facility and the vehicle holding area.

Water Quality

- 3.2.8 Short term impacts to the water quality of the local streams and Deep Bay may occur during construction from the following sources:
- run off of soils from exposed surfaces and landing point construction;
 - run off of contaminants from equipment;
 - disturbances to streams during construction of culverts;
 - wastewater from construction works; and
 - sewage disposal from construction workers' facilities.
- 3.2.9 There could be spills during operation of the project, potentially containing oil and other contaminants. This could affect water quality in local watercourses, with implications for stream flora and fauna. However, the operation of the project is not expected to generate significant volumes of discharge and runoff should not be contaminated under normal operating conditions.

Visual

- 3.2.10 The key source of visual impact during the construction phase will be visual scarring of the landscape due to earthworks and ground formation. In addition, there may be loss of visual amenity due to removal of landscape features, in particular, existing areas of woodland and fishponds. There may also be a general visual impact from the construction activities, construction traffic and potentially dust emissions if not adequately controlled.
- 3.2.11 Operational impacts may arise from the visual appearance of the new road and its users from the surrounding areas and in particular the appearance of the cross boundary facilities and vehicle holding areas, caused by the introduction of engineering structures and traffic into mainly naturalistic and passive views of the Castle Peak Hills and burial grounds. The night-time visual impact created by street lighting and illumination of the boundary crossing facility and vehicle holding areas could be significant in this relatively undeveloped region.

Waste

3.2.12 Activities during the construction phase may result in the generation of a variety of wastes which can be divided into distinct categories based on their nature and the options for their disposal. These include:

- excavated and inert material suitable for reclamation and fill;
- general construction waste;
- demolition waste;
- chemical waste; and
- general refuse.

3.2.13 A key issue will be excavated material in light of the large extent of earthworks required for the project. It is expected that a large portion of the excavated materials will be balanced as fill material on site to create the embankments. The storage and stockpiling of excavated material could, however, lead to the generation of dust and may be visually intrusive if good waste management practices are not carried out.

3.2.14 Sources of operational waste will be associated with the operations and activities at the boundary crossing facility vehicle holding areas and will largely take the form of general refuse associated with office, rest and catering activities. However, some chemical waste from maintenance and garage facilities may also be relevant.

Cultural Heritage

3.2.15 No designated archaeological sites are directly affected by the proposed scheme, although there is a planned archeological site at Ngau Hom Shek.

Hazardous Goods

3.2.16 As part of the operation of the cross boundary facility, the Customs and Excise Department will operate a hazardous goods store which is intended to contain impounded contraband and prohibited hazardous materials including explosives for a short period of time until suitable arrangement for disposal can be made.

4. MAJOR ELEMENTS OF THE SURROUNDING ENVIRONMENT

4.1 Sensitive Receivers

4.1.1 Existing noise and air sensitive receivers during both the construction and operation stages include a number of village communities to the east of the Study Area. The villages areas will include:

- Ngau Hom Shek;
- Kau Lee Uk Tsuen;
- San Sang Tsuen;
- Tin Sam;
- Yick Tuen Tsuen;
- Tsing Chun Wai;
- Sun Fung Wai;
- Nai Wai;
- Tsoi Yuen Tsuen;
- Lam Tei;
- Tuen Mun San Tsuen; and
- Fuk Hang Tsuen.

4.1.2 Any planned sensitive receivers identified during the Study will be considered.

4.1.3 In respect of ecological sensitive receivers, the upland portion to the west of the study area is mostly eroded and fire-affected and of limited conservation interest, as are the lowland areas comprising abandoned fish ponds, abandoned fields, villages and open storage area. However, there are some freshwater agricultural wetlands at Ngau Hom Shek, together with coastal mudflat dominated by mangrove plantation and there is a conservation area west of Ha Tsuen. In addition, a small egret is located at Ngau Hom Shek which may be sensitive during the construction and operation phases. Local wildlife may be sensitive to noise and light disturbance during both phases of the project.

4.1.4 A number of small streams drain the slopes of Castle Peak to the flat plain below and ultimately to Deep Bay's mud flats. The lower reaches of the streams that flow into Deep Bay via the village developments and the CPA along the Deep Bay shore may be affected by pollution from neighbouring pig farms and village activities.

4.1.5 Visual sensitive receivers relating to the project include the residential buildings of the surrounding village areas, non-residential buildings including Ling To Monastery and Miu Fat Buddhist Monastery and members of the public using the surrounding roads and trails and footpaths in the Tai Lam Country Park.

4.1.6 Sensitive receivers of cultural and heritage importance will include the planned archaeological site near Ngau Hom Shek.

4.2 Existing Environmental Elements

4.2.1 The area through which the project is proposed to be constructed is varied. The area in the vicinity of Ngau Hom Shek is generally sparsely populated and consists of cultivated

land and fishponds and as such background noise and air levels are low, typical of the rural area. Further inland, the area of Ha Tsuen is characterised by container storage sites and container traffic associated with these form the major source of air and noise pollution in this area. Further south near Hung Shui Kiu, a mixed land use pattern is present which consists of recognised village housing and open storage sites around the Castle Peak Road, which forms a major transport corridor in the area. The Castle Peak Road and Yuen Long Highway form the key noise and air sources in this section of the route.

- 4.2.2 The San Wai sewerage treatment works is located in the Ha Tsuen area and represents a potential source of odour.

5. ENVIRONMENTAL PROTECTION MEASURES TO BE INCORPORATED INTO THE DESIGN

5.1 Measures to Minimise Environmental Impacts

5.1.1 Based upon the potential impacts as a result of the construction and operation of the project, it is anticipated that mitigation measures will be required. Measures to minimise environmental effects are detailed below.

Noise

5.1.2 Mitigation for construction noise will be required and temporary noise barriers are likely to be required along the construction site boundary such that construction equipment and noise will be screened. In addition, other measures will include:

- implementation of the following standard noise pollution control clauses including:
 - good site practice to limit noise emissions at source;
 - avoidance of simultaneous noisy activities;
 - selection of quiet plant and working methods; and
 - reduction in the number of plant operating in critical areas close to NSRs;
- carrying out construction activities and limiting construction traffic to and from the site to during daytime hours (07:00-19:00) where works may affect sensitive receivers;
- installation of silencers at the exhaust pipes and acoustic enclosures for the engines of the dump trucks and lorries to reduce noise levels; and
- installation of mufflers for any concrete pumps and generators to reduce noise levels.

5.1.3 Noise sources in the operational stage will be associated with the traffic using the DBL and the operation of the boundary control facility and the vehicle holding areas. Operational impacts in excess of the HKPSG guidelines of 70 dB(A) are predicted at adjacent existing sensitive receivers. Mitigation measures in the form of cantilevered noise barriers or semi-enclosures are likely to be required.

Air Quality

5.1.4 Mitigation measures which may be required to abate construction dust impacts to within the 1-hour TSP limit of 500 $\mu\text{g}/\text{m}^3$ will include the following:

- establish concrete batching plant(s) in accordance with EPD requirements;
- watering of unpaved areas twice daily;
- watering in areas where breaking of oversize rock/concrete;
- use of water spray during the handling of fill material and the site and at active cuts, excavation and fill sites where dust is likely to be created;
- ensuring that the level of dropping heights for excavated materials is controlled to

- a minimum height to minimise fugitive dust from unloading;
 - inspection of vehicles to ensure that materials are not loaded to a level higher than the side and tail board, and dampening or covering materials before transport;
 - covering or watering stockpiled material in dry or windy conditions;
 - implementation of wheel washing facilities at access roads to the site; and
 - controlling speed of on-site vehicles below 15 km/hr.
- 5.1.5 In respect of operational air pollution, the incorporation of noise semi-enclosures on the alignment could result in higher concentrations at the 'portals' and ventilation measures may be required. There may need to be mitigation measures for vehicle emissions on the road, in the vehicle holding areas and at the boundary crossing facility. Any odour impacts from the adjacent San Wai sewerage treatment works will be best controlled at source via a scrubber system.

Ecology

- 5.1.6 Avoidance of any identified sensitive sites through route refinement will be the preferred mitigation measure. However, in some cases compensatory habitat recreation on or near the site would be a feasible option. In respect of operational impacts, the permanent noise barriers likely to be required along the road to protect the residential areas adjacent to the alignment would also mitigate ecological disturbance impacts. The relatively sheltered topography in this area would also provide some mitigation for the local wildlife.

Water Quality

- 5.1.7 Mitigation measures to ensure that construction impacts on water quality are kept to a minimum will include the following:
- schedule surface excavation work as far as possible for the dry season. Areas of excavation should be minimised and exposed surfaces stabilised appropriately by covering with aggregate, hydroseeding, etc.;
 - undertake construction of culverts during the dry season where possible;
 - surround the boundaries of the earthworks by temporary flood protection and drainage works;
 - use local temporary grading of the ground surface during construction to direct site runoff towards regularly cleaned and maintained silt traps and oil/grease separators to minimise the risk of contamination of surface water courses. The silt and oil/grease traps should be appropriately designed for the local drainage and ground conditions;
 - store oil and other potentially contaminating material in designated hard standing bunded areas in order to prevent discharges due to accidental spillages or breaching of tanks;
 - use of layers of sawdust or equivalent material laid underneath or around any construction plant or equipment that leaks oil. The polluted clean up materials should be replaced with fresh material on a regular basis and any polluted materials should be disposed of in an acceptable manner; and
 - all polluted water should be treated to relevant standards in compliance with the *Technical Memorandum on Effluents Discharged into Drainage and Sewerage*

Systems, Inland and Coastal Waters prior to discharge to the public foul sewerage system.

- 5.1.8 Operational hard surface runoff, potentially containing oil and other contaminants can be controlled through the use of sediment traps and oil interceptors installed along the route to reduce the pollution to stormwater systems.

Visual

- 5.1.9 Mitigation of construction phase visual impacts should include control and minimisation of the site work area together with abatement of dust generation and good site organisation. Landscape contracts should be phased to be implemented as soon as possible after sections of the route are completed. Visual screening of the works area from the views of sensitive receivers may also be required.

- 5.1.10 Operational mitigation measures will be required to reduce the visual impact of the road corridor. These will include the following:

- loss of visual amenity through cutting into natural slopes as well as removal of local woodland/trees should be minimised by refining the alignment;
- landscaping of the road corridors should make reference to the local vegetation pattern and local species. Advance screen planting should be considered inclusive of off site locations to maximise effect;
- the detail design of road structures should relate to the local area. In this respect standard details associated with urban areas are visually unsatisfactory in rural locations;
- the design of slope cuttings must be undertaken carefully and should avoid planar finishes and linear drainage patterns that are out of character with the surrounding natural landscape. Planting should be incorporated into the design process rather than applied afterwards as far as possible; and
- special consideration should be provided to the design of the buildings and structures of the crossing facility so as to create visual interest.

Waste

- 5.1.11 Adequate management of the storage, handling and disposal of construction waste will be required to prevent adverse impacts and mitigation measures could include:

- all vehicles entering or leaving the site carrying solid waste should have their loads covered;
- all vehicles travelling to and from the site should be routed, as far as possible, to avoid sensitive receivers in the area;
- all vehicles leaving the site should pass through a wheel wash at the site exit. The wheel wash should be cleaned regularly to removed sediment. Mud or similar material deposited on public roads near the site should be removed immediately;

- solid materials, litter or wastes should not be disposed of in any surface waters, but should be removed to a designated disposal site;
- all combustibles to go landfill, and not burned on site.

5.1.12 It is recommended that a materials/waste management plan is established prior to commencement of excavation and construction work to outline the methods that can be incorporated into the project for waste minimisation, reuse, handling, storage, transport and disposal of expected waste materials.

5.1.13 Suitable waste management facilities and systems will need to be set up during the operation of the cross boundary facility and the vehicle holding area to control operational waste impacts and this may include:

- all refuse material should be collected and stored in containers supplied for that purpose and housed in a facility to protect the waste from the elements; and
- solid materials, litter or wastes should be removed to a designated disposal site as soon as possible.

Cultural Heritage

5.1.14 Mitigation for cultural heritage impacts in the first instance should include avoidance of the area of importance and minimisation of direct impacts. In direct impacts on adjacent cultural heritage features can be reduced by the use of hard and soft landscaping and screening techniques.

Hazardous Materials

5.1.15 Any hazardous materials seized by the Customs and Excise Department during their operations at the cross boundary facilities will be properly handled and controlled in accordance with the relevant legislation. The storage facility will be of a high standard capable of withstanding explosions and will be secure.

Environmental Monitoring and Audit

5.1.16 A key component of the mitigation will be the implementation of environmental monitoring and audit during construction of the project, and possible during operation for mitigation such a compensatory habitat creation. An Environmental Management Plan will be prepared for the project which will include an Environmental Monitoring and Audit Manual.

5.2 Severity and Duration of Environmental Effects

5.2.1 Construction impacts will be temporary and the key impacts in terms of potential noise and dust impacts from earthworks and piling activities and the associated disturbance implications for wildlife will be confined to the first half of the construction period only and can be minimised by the implementation of suitable mitigation measures.

5.2.2 Despite the presence of container storage areas and some key distributor roads in the study areas which increase ambient levels, the operational noise levels are likely to be

significant at adjacent sensitive receivers. Mitigation in the form of permanent noise structures will be required to minimise impacts to acceptable levels.

- 5.2.3 Visual impacts will be permanent and long-term design and landscaping solutions will be required to minimise the effects and integrate the project into the existing environment and planned development.
- 5.2.4 Water quality and waste impacts during both the construction and operational stages can be adequately controlled and impacts are not anticipated to be severe.
- 5.2.5 Potential loss of the mangrove at Ngau Hom Shek will be a key issue in light of the paucity of this type of habitat in Hong Kong.

5.3 Further Implications

- 5.3.1 As the project is still at the preliminary stage, no public consultation has yet been undertaken.

6. USE OF PREVIOUSLY APPROVED EIA REPORTS

- 6.1.1 No previously approved EIA reports have been referred to during the preparation of this Project Profile.