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**Agreement No. CE 80/2001(DS)
Drainage Improvement in
Tsuen Wan and Kwai Chung –
Tsuen Wan Drainage Tunnel
Environmental Impact Assessment
- Executive Summary**

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List of Contents Page

Chapters

E.	EXECUTIVE SUMMARY	1
E.1	Background	1
E.2	Scale of the Project	1
E.3	Intake/Outfall Locations and Tunnel Alignment	2
E.4	Construction Methods	2
E.5	Air Quality	3
E.6	Noise	3
E.7	Water Quality	3
E.8	Waste	3
E.9	Ecology	3
E.10	Cultural Heritage	4
E.11	Hazard to Life	4
E.12	Fisheries Impacts	4
E.13	Environmental Monitoring and Audit	4
E.14	Overarching Conclusions	5

Figures

Figure 1	Proposed Drainage Tunnel General Layout
Figure 2	Proposed Intake I-1 Layout Plan
Figure 3	Proposed Intake I-2 Layout Plan
Figure 4	Proposed Intake I-3 Layout Plan
Figure 5	Proposed Outfall O-1 Layout Plan

E. EXECUTIVE SUMMARY

E.1 Background

The Drainage Services Department (DSD) completed the “Stormwater Drainage Master Plan (DMP) Study in Tsuen Wan, Kwai Chung and Tsing Yi” in July 1999. In that Study it was identified that the drainage systems in Tsing Yi could meet the current flood protection standard in general, but not the drainage systems in Tsuen Wan and Kwai Chung. A series of drainage improvement works including the “Drainage Improvement in Tsuen Wan and Kwai Chung – Tsuen Wan Drainage Tunnel” (The Project) and the “Drainage Improvement in Tsuen Wan and Kwai Chung – Urban Drainage Improvement Works” were proposed, and subsequently DSD commissioned a Preliminary Project Feasibility Study (PPFS) for “Drainage Improvement in Tsuen Wan and Kwai Chung – Package A, Tsuen Wan Drainage Tunnel” which was completed in April 2000.

The PPFS concluded that the construction of a tunnel of an internal diameter of 6.5m and length 5.35km should be implemented to alleviate the flooding risk in Tsuen Wan and Kwai Chung. At the end of October 2002, Mott Connell Limited (MCL) was commissioned by the Drainage Services Department under Agreement No. CE 80/2001 (DS) to carry out the investigation and preliminary design for the “Drainage Improvement in Tsuen Wan and Kwai Chung – Tsuen Wan Drainage Tunnel” (The Project).

The primary objective of the Project is to develop an optimum preliminary design of the proposed tunnel and associated drainage structures based on the recommendations of the Preliminary Project Feasibility Study Report (PPFS), the Stormwater Drainage Master Plan Study in Tsuen Wan, Kwai Chung and Tsing Yi (DMP) and the results of the various investigations to be carried out under this Assignment. This Environmental Impact Assessment (EIA) is a key submission of the project and has been prepared in conjunction with other design teams including the drainage, geotechnical and landscape teams.

E.2 Scale of the Project

The proposed drainage improvement works comprise a tunnel and associated intakes and outfall structures (shown in **Figures 1-5**).

The scope of construction works for the tunnel development comprises:

- 5.13km drainage tunnel system between Kwai Chung and Yau Kom Tau (reduced from 5.35km during preliminary design);
- provision of three Intake locations:
 - i. Intake I-1: Kwai Chung, adjacent to the junction of Wo Yip Hop Road and Shing Mun Road;
 - ii Intake I-2: At Lo Wai, adjacent to Lo Wai Road;
 - iii Intake I-3: At Tso Kung Tam, about 350m off Route Twist.
- provision of Outfall O-1: Yau Kom Tau, underneath the existing Castle Peak Road; and
- provision of associated environmental mitigation measures.

In October 2002, DSD appointed Mott Connell Limited (MCL) to carry out the investigation, preliminary design and Environmental Impact Assessment (EIA) for the Project. This report presents the findings of the EIA which was carried out as an integral part of the Project and makes reference to other related documents and reports which were also prepared under the auspices of this Project.

E.3 Intake/Outfall Locations and Tunnel Alignment

Throughout the development of the project various alignments and intake/outfall locations have been considered. Final options selection report for intake/outfall locations and tunnel alignment was completed in June 2003. This detailed environmental impact assessment has been examined the impacts associated with the preferred scheme from the Options Selection Report. The conclusions of the individual assessments, which have been carried out in accordance with the Study Brief, are given in the following paragraphs.

E.4 Construction Methods

Tunnel and Underground Structures

The main tunnel will be constructed using a Tunnel Boring Machine (TBM). The direction of drive of the TBM excavation will be from outfall O-1 to Intake I-1. Other than the main tunnel, there are other ancillary underground structures including man access vertical shaft and storm water drop shaft which need to be constructed.

Intake I-1

Most of the works at Intake I-1 including the construction of maintenance works area and spiral access ramp will be undertaken on sloping area which mainly involve slope cutting works, installation of soil nails, construction of retaining walls, site formation and excavation, and pilings.

Intake I-2

The construction activities in Intake I-2 will mainly involve the channel modification works, construction of retaining wall on the western side of the channel, vortex chamber and its associated on-line approach channel, the drop shaft and underground de-aeration chamber, the man access shaft and connecting tunnel.

Intake I-3

Intake I-3 mainly involves the construction of the vortex chamber and its associated on-line approach channel, drop shaft, aeration chamber and audit tunnel, access road and slope works.

Outfall O-1

The works at Outfall O-1 will include the construction of tunnel portal, cascade, box culvert underneath the improved Castle Peak Road, spiral access ramp and laying of rip-rap protection layer on the seabed by the outfall.

E.5 Air Quality

The construction of the Project may lead to dust generation. It is predicted that various construction activities associated with the earthworks, material handling and tunnel construction would cause temporary minor impacts. “Best practice measures” are recommended to suppress dust emissions from construction activities through good site practice.

E.6 Noise

The construction of the Project may lead to noise generation if noise mitigation measures are not undertaken. It is predicted that various construction activities associated with the earthworks, excavation and construction may cause temporary impacts without mitigation. “Best practice measures”, quiet plant and mobile noise barriers are recommended to suppress noise emissions from construction activities where noise exceedance is anticipated.

E.7 Water Quality

With appropriate mitigation and precautions measures in place during construction there should be relatively minor impacts associated with this project during or following construction. In the operational phase, the impacts from stormwater discharge are anticipated to be negligible.

E.8 Waste

The potential environmental impacts with the handling and disposal of waste arising from the construction the Tsuen Wan Drainage Tunnel have been assessed. Operational impacts on the proposed route are not expected to be a key concern and no detailed assessment will be required. Key issues include the need for effective waste management planning during the construction phase. The assessment has concluded that the potential environmental impacts associated with the handling, storage, treatment and disposal of waste arising for the construction of the Tsuen Wan Drainage Tunnel meet the requirements of the Technical Memorandum on Environmental Impact Assessment Process.

E.9 Ecology

The ecological resources recorded within the Study Area included woodland, plantation, grassland, village-orchard, stream channel, intertidal habitat (artificial/disturbed seashore) and disturbed/urbanized, as well as the associated wildlife. Of these habitats, woodland and stream habitat (Sam Dip Tam Stream and Tso Kung Tam Stream) have moderate ecological value. The remaining habitats are of low to moderate ecological value. With the exception of low to moderate impact to the middle course of Sam Dip Tam Stream (location of Intake I-2) and Tso Kung Tam Stream (location of Intake I-3), the direct ecological impact due to the construction and operation of the drainage channel is expected to be low. No rare or protected species near the works areas are affected by the proposed works. The loss of stream sections of natural bottom and bank and hydrological disruption to the natural stream habitats downstream to the intake structures, particularly Intakes I-2 and I-3, have been minimised and properly mitigated. No adverse residual impact is expected after the implementation of the recommended mitigation measures. Since the affected sections of Sam Dip Tam Stream and Tso Kung Tam Stream (location of Intakes I-2 and I-3) are partially disturbed (with relatively

less aquatic faunal diversity) due to the residential sewage and the intake structures have been appropriately designed to minimise habitat loss, the impacts due to the land take for the surface structures and hydrological disruption are considered acceptable. Adverse ecological impacts on the proposed Ecological Park are also unlikely.

E.10 Cultural Heritage

A literature review supplemented by an archaeological investigation identified no sites of archaeological significance in the Study Area. No mitigation measures for archaeological resources are considered necessary.

One Grade III building (Po Kwong Yuen Monastery at Lo Wai) and 86 historical buildings and structures were identified within the Study Area during the built heritage survey. Most of the identified sites except a few sites at Lo Wai, Sam Dip Tam and Yau Kom Tau settlement areas are located over 70 m from the Preferred Option of the drainage tunnel alignment and the associated Intakes/Outfall construction activities.

Potential vibration impact on a number of historical buildings and structures at Lo Wai, Sam Dip Tam and Yau Kom Tau has been identified and appropriate mitigation measures have been recommended including the adoption of construction methods that minimises generation of excessive vibration, a pre-construction survey to establish the existing condition of the potentially affected buildings and vibration monitoring as part of the Environmental Monitoring and Audit programme.

E.11 Hazard to Life

According to the EIA Study Brief, evaluation of Hazard to Life as the criteria specified is considered not necessary since no overnight storage of explosives is anticipated for this project. In addition, with the stringent control and monitoring procedures in place, adverse impact on populated area or on Potential Hazardous Installations nearby due to the blasting operation is unlikely.

E.12 Fisheries Impacts

Reviews of existing information on commercial fisheries resources and fishing operations located within the Study Area have been undertaken. Information from a study on fishing operations in Hong Kong and the AFCD Port Surveys indicate that fisheries production values in the vicinity of the Study Area vary but are medium to low.

The construction and operation of the Project will not give rise to impacts to fisheries, as there is no predicted adverse impact to water quality or habitat loss.

No special mitigation measures are required for fisheries resources, mitigation measures recommended to reduce impacts to water quality are also expected to mitigate any impacts to fisheries resources. The availability of literature on the fisheries resources of the Study Area comes mainly from the AFCD.

E.13 Environmental Monitoring and Audit

Environmental monitoring and audit procedures have been identified for the specific

confirmation of the mitigation and protection measures proposed with emphasis being placed on air quality, noise, vibration, water quality and ecology. Routine monitoring is also recommended for confirming the mitigation measures are being implemented correctly and as effectively as predicted.

E.14 Overarching Conclusions

The EIA has been completed in accordance with the requirements of the EPD Study Brief No. ESB-069/2001. A tunnel alignment between Tsuen Wan and Kwai Chung has been proposed which has least impact on the environment while avoidance or minimisation of environmental aspects underpinning the entire process of options selection. In keeping with the basic tenets of the DSD's Environmental Policy and the principle of avoidance or minimisation, the Drainage Tunnel has been designed to minimise environmental and ecological impacts and minimise waste generation.

The EIA has surmised that provided the recommended mitigation measures are implemented, there will be no significant impacts of the construction or operation of the Tsuen Wan drainage tunnel on the alignment between Tsuen Wan and Kwai Chung or at the intake/outfall locations. Assuming the mitigation proposed within this EIA the drainage tunnel can be constructed and operated within acceptable standards.

Early discussions have been held with relevant Government Departments to consider the views and opinions on the intake/outfall locations and the alignment. The feedback has been used in the assessment of the Project and has allowed design principles to be developed and avoidance of conflicts where possible.