FINAL REPORT

Territory Development Department

Agreement No CE 43/96 Main Drainage Channels and Poldered Village Protection Scheme for San Tin, NWNT : *Environmental Impact Assessment Study*

Executive Summary

7 April 1999

Reference C1618

For and on behalf of
Environmental Resources Management

Approved by: FREEMAN CHEUNG

Signed: [signature]

Position: Deputy Managing Director

Date: 7 April 1999

1. Introduction

San Tin is an area of historical recurrent flooding. The need for the construction of the *Main Drainage Channels and Poldered Village Protection Scheme for San Tin, North West New Territories* (the Project) was established in the *Territorial Land Drainage and Flood Control Strategy Study, Phase 2* (TELADFLOCOSS-2 Study) completed by the Drainage Services Department (DSD) in 1993, to alleviate the recurrent floods in the San Tin basin.

ERM-Hong Kong Limited (ERM), in association with Ecosystems Limited, Shankland Cox Limited and Maunsell Consultants Asia Limited, have been commissioned by the Territory Development Department (TDD) to undertake an Environmental Impact Assessment (EIA) Study for the Project.

The Project comprises:

- *Public Works Programme (PWP) Item No. 35CD covering the village flood protection works for the San Tin villages and Chau Tau Tsuen* - Due to the urgent need to protect the San Tin villages and Chau Tau Tsuen from risk of flooding, the village flood protection works under 35CD commenced in 1996 and will be completed in 1999. The environmental control and monitoring requirements for 35CD, similar to that previously used for the PWP Item No. 71CD work for Sha Po Tsuen, were reviewed and considered to be adequate to achieve established Government environmental standards with no adverse residual impact.

- *Non-itemized Work entitled: Western Main Drainage Channel (MDC) for San Tin* - The ongoing DSD's *Drainage Master Plan Study in Northern New Territories* will include a comprehensive review of the need for further flood control works in San Tin. The need of the Western MDC will be reviewed and should the Western MDC be recommended for implementation in the drainage master plan study, an EIA Study will be required for the proposed work to fulfill the requirements of the EIA Ordinance because the work is a Designated Project under the ordinance.

- *PWP Item No. 73CD consisting of the Eastern MDC for San Tin* - Supported by the San Tin Rural Committee and the Yuen Long Provisional District Board, this MDC work is tentatively scheduled for construction from mid-2001 to end-2003.

This EIA Study focuses on the Eastern MDC works providing a detailed assessment of the potential environmental impacts during construction and operation, and identifying mitigation measures and environmental monitoring requirements for incorporation into the engineering design and construction of the drainage channel. Environmental issues assessed include ecology, water quality, solid waste management, land contamination, noise, air quality, visual and landscape and socio-economic. The information will contribute to decisions on the acceptability of any adverse residual environmental impacts

In accordance with the EIA Ordinance, the proposed drainage work for the Eastern MDC is considered a Designated Project under Schedule 2, Part 1 of the Ordinance due to its close proximity to Conservation Area, and therefore the present EIA Study has been undertaken in accordance with the approach and requirements of the Ordinance. This report provides a summary of the key findings of the EIA Study.

2. Project Description & Land Use Context

Alignment & Design

The TELADFLOCOSS-2 Study identified and recommended the current alignment of the Eastern MDC (see *Figure 1*), which has been committed in the San Tin Outline Zoning Plan (OZP, No. S/YL-ST/1, 1994) and is the basis of the assessment in this report. The construction of the Eastern MDC work will benefit the local residents in the San Tin basin from the present recurrent flooding problems, with reduced threat of flood hazards, economic loss and disruption. The channel alignment, given in the EIA Study Brief is hydraulically constrained and formed the basis of the assessment of this report. The alignment, running parallel and next to the San Sham Road, is farthest possible from the ecologically sensitive Ramsar site and minimises fragmentation of the existing San Tin fish pond areas.

Figure 1 shows general layout and typical cross sections of the Eastern MDC. The main design features of the proposed channel are presented below, with incorporation of design features providing an ecologically and aesthetically friendly solution without compromising hydraulic performance and operation requirements:

- Approximately 2.2km long and 45m wide trapezoidal channel with two embankments at about 4.9 mPD and side slopes of 1 in 2.
- Constructed wetland and associated planting along the eastern side of the channel.
- Inner lining of the channel all grasscreted with perennial vegetation, except the dry weather flow interceptor.
- External slope of the channel will be general fill slope with planting of suitable vegetation.
- One maintenance access road on top of the western channel embankment, approximately 3.5 m wide.

In addition to the channel, there will be one inflatable dam, one air blower house and pumping station, for the purpose of preventing backflow of sediment rich waters from Shenzhen River during high tide, as well as removing water to Shenzhen River during low flow condition.

Construction

The main construction activities will include excavation and filling, followed by grasscreting of channel linings and the access road construction. The plant used for the construction of the channel will be common types used for land based civil engineering works in Hong Kong, for example, dump trucks, excavators, loaders, etc. The major plant used will be the earth moving plant for the construction of the earth embankment.

Operation

Maintenance is required for the channel, mainly involving the desilting of the channel to keep the channel under a free flow condition. Maintenance excavation of Eastern MDC will be carried out by a land-based excavator on an ad hoc basis, in dry condition during low tide or when the inflatable dam constructed at downstream of the channel is inflated to exclude the effect of tide.

Land Use Context

The land use of the San Tin area is designated under the statutory San Tin OZP and the Eastern MDC alignment has been reserved in the OZP as the Drainage Reserve. Residential developments are concentrated in the San Tin village areas (V zone) and the R(D) area to the west of San Tin villages. The northern San Tin area is predominantly fish ponds and is designated as Conservation Area within which developments are strictly controlled to provide additional protection to the Mai Po Nature Reserve.

Field visits observe that the container lorry parking and container yards scatter alongside the New Territories Circular Road in the southern part of the San Tin area. Some of these parking and storage areas actually impinge on the residential areas.

Other proposed projects in the vicinity of the San Tin area mainly include Expansion of Kiosks and Other Facilities at Lok Ma Chau Boundary Crossing, and KCRC East Rail - Sheung Shui to Lok Ma Chau Spur Line. The on-going *Shenzhen River Regulation Project* (SRRP), Stage 2 at Lok Ma Chau would be completed in 2000, before commencement of the Eastern MDC.

3. Ecology

Construction Phase

Loss of wetland habitats of ecological value, particularly to waterbirds and their prey, was identified as the impact of primary concern. Impacts of habitat loss have been addressed through a package of mitigation measures that includes impact avoidance and reduction, wetland restoration and wetland creation, as shown in *Figure* 2. Construction phase impacts to aquatic ecology in local watercourses, the Shenzhen River and Inner Deep Bay could occur due to water quality degradation during channel excavation; these impacts would be addressed by controls on excavation methods, timing and spoil disposal. The potential impact of disturbance to sensitive wildlife during construction works would be addressed by appropriate site and noise control. Overall, the mitigation measures proposed would limit predicted impacts to acceptable levels.

Operation Phase

Channel maintenance (excavation and vegetation cutting) could affect ecology in the wet grasscrete area within the channel. These impacts can be mitigated by keeping the frequency of maintenance works to the lowest level commensurate with maintaining flood capacity. Other operation impacts related to disturbance from human and vehicle traffic along the channel embankment road would be limited. Overall, the mitigation measures proposed would limit impacts to acceptable levels.

4. Water Quality

Construction Phase

The key issue in terms of water quality will be related to the excavation for the Eastern MDC channel along the existing stream course. This activity, if

uncontrolled, is likely to lead to the release of suspended solids and pollutants from the disturbed existing stream sediments and reduction of dissolved oxygen within the local water bodies, affecting potential water sensitive receivers downstream. However, the impact is expected to be small as the excavation will be conducted mostly along filled fishponds and earth bunds.

A range of mitigation measures and working method controls has been recommended, such as use of sediment traps and excavation at the existing stream course in the dry season, to ensure that potential to water quality impact is minimised to within acceptable levels.

Operation Phase

The proposed Eastern MDC Project will introduce drainage improvements at San Tin, and will improve water quality through enhanced transportation of pollutants and increased flow rate of the water column. The installation of the inflatable dam at the proposed Eastern MDC will also eliminate the potential impact of pollutants from Shenzhen River due to the tidal intrusion. Potential impact from ad hoc maintenance excavation is expected to be limited and will be controlled by appropriate measures.

5. Waste management

Construction Phase

Excavation and disposal of river and fish pond sediment will be the key sources of impact during the construction phase. The total amount of excavated materials from the San Tin Eastern MDC works will be about 115,000 m^3, of which less than 10,000 m^3 could be classified as seriously contaminated sediment in accordance with Environmental Protection Department's (EPD) guidelines. It is recommended that a sediment quality investigation should be carried out prior to the commencement of the construction works to confirm quantity of the contaminated sediment, and presented in a Sediment Quality Report to EPD and Fill Management Committee. Special excavation and disposal procedures as recommended in the report will be required to minimise potential environmental impacts. Together with other mitigation measures such as proper handling and disposal of construction and chemical waste, and recycling of construction and demolition materials on site, it is anticipated that the potential environmental impacts associated with the handling, storage, transport and disposal of wastes arising from the work will meet the established guidelines.

Operation Phase

It is expected that impacts from the ad hoc maintenance excavation will be similar to the excavation during the construction phase but on a smaller scale. Hence, mitigation measures for the handling and disposal of solid waste generated from the operation phase will be similar to that recommended for the construction phase.

6. Land Contamination

The main environmental impacts related to contaminated land arise from those lands which have been used for vehicle maintenance, trailer storage and scrap metal works, and are located in areas which are to be excavated during the upcoming programme. The detailed design is not presently available. However,

as the existing channel will only be widened and the proposed channel will mainly be excavated through fish ponds and rural wetlands, volumes of potentially contaminated soils are not expected to be significant, and thus land contamination impacts are not considered to represent a major concern. It is recommended that a Contamination Assessment Plan be prepared prior to construction to identify the extent of any potential land contamination. Mitigation, including handling and disposal of excavated soils from any contaminated areas, should be performed following specific protocols to minimise potential impacts.

7. Noise

Construction Phase

The main noisy activities during the construction of the Eastern MDC are expected to include excavation, pond drainage operation, embankment formation, access road construction, river bed and pumping station construction. The assessment concludes that the construction can be carried out without exceeding the daytime noise criterion with respect to established criteria. Good construction practices such as use of quiet plant and working methods are recommended to minimise any potential impact.

Operation Phase

Operation noise emissions from the Eastern MDC pumping station can comply with the Hong Kong Planning Standards and Guidelines criteria through appropriate design of the pumping station. It is expected that potential impact from the infrequent maintenance excavation will be small.

8. Air Quality

Construction Phase

This assessment indicated that the dust criteria will be complied at all the air sensitive receivers during construction of the Eastern MDC . Mitigation measures as good construction practice should follow the *Air Quality (Construction Dust) Regulation* to ensure the dust level is within the criteria. As the sensitive receivers are located more than 80 m away from the channel, potential odour nuisance is not expected. Mitigation measures and EM&A requirements have been recommended to minimise potential nuisance from the work.

Operation Phase

There will be no pollutant sources during the operation phase, but it is expected that the impacts from infrequent ad hoc maintenance excavation will be similar to the excavation during the construction phase but to a smaller scale. Mitigation measures recommended for the construction phase will generally apply to maintenance excavation.

9. Landscape and Visual

The landscape and visual assessment has identified that the main impact from the Eastern MDC occurs through the use of elevated embankment along the channel sides leading to visual impact particular to residents in close proximity of the channel. Specific design and landscaping mitigation measures have been recommended to minimise impact, such as appropriate screen planting, grasscrete lining (vegetation cover) of channel and sensitive design of pumping station to relate to other building structures in the surrounding. *Figure 3* illustrates the future appearance of the channel.

10. Socio-economic

Developments such as road network construction and expansion of rural communities have increased the incidence of flooding in the San Tin Basin, even from minor rainstorms. The San Tin area is most susceptible to flooding where all the major villages in the basin lie. In addition to flood hazards and disruption to local residents, serious flooding in previous years also led to loss of cultured fish.

The construction of the San Tin Eastern MDC is to alleviate the recurrent floods in the San Tin basin and will reduce the threat of disastrous floods and minimises economic loss and disruption to everyday life. The drainage improvement scheme will inevitably involve the alternation of fish ponds into channels, leading to a small direct economic loss due to the decrease in production from culture fishery.

There is an overall socio-economic gain from the Eastern MDC scheme, which has been supported in previous public consultations with the Yuen Long Provisional District Board and San Tin Rural Committee. Appropriate land resumption procedures and reprovision of local access will be undertaken.

11. Environmental Monitoring & Audit

An Environmental Monitoring and Audit (EM&A) programme has been recommended based on the findings and recommendations of this EIA, setting out details of the monitoring and audit requirements and procedures for the drainage improvement works, to ensure efficacy of mitigation measures and compliance with established environmental guidelines and standards.

12. Conclusion

The EIA Study has presented a detailed assessment of the potential environmental impacts associated with the construction and operation phases of the proposed San Tin Eastern MDC improvement works, based on the preliminary engineering information available. Environmental mitigation measures and monitoring and audit requirements have been recommended, which will form the basis of the Environmental Permit under the EIA Ordinance. The findings of the report indicate that with the implementation of the mitigation measures, checked by the monitoring and audit programme, the proposed San Tin Eastern MDC works will fulfill the requirements EIA Ordinance and comply with the established environmental guidelines and standards, and no significant residual environmental impacts are expected.

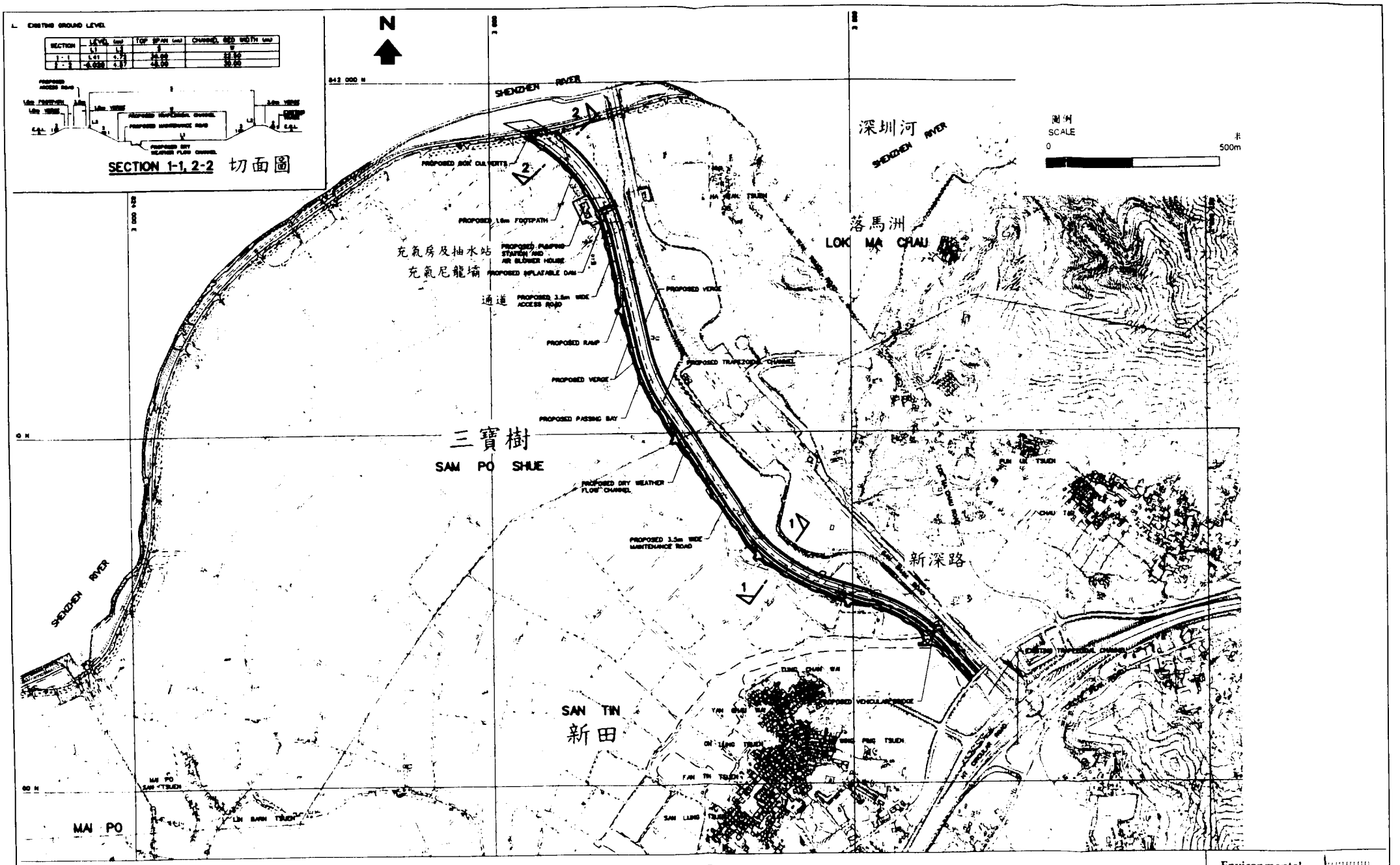


FIGURE 1
圖 1

PRELIMINARY LAYOUT OF EASTERN MDC
東部防洪主渠的初步設計

Environmental Resources Management
ERM

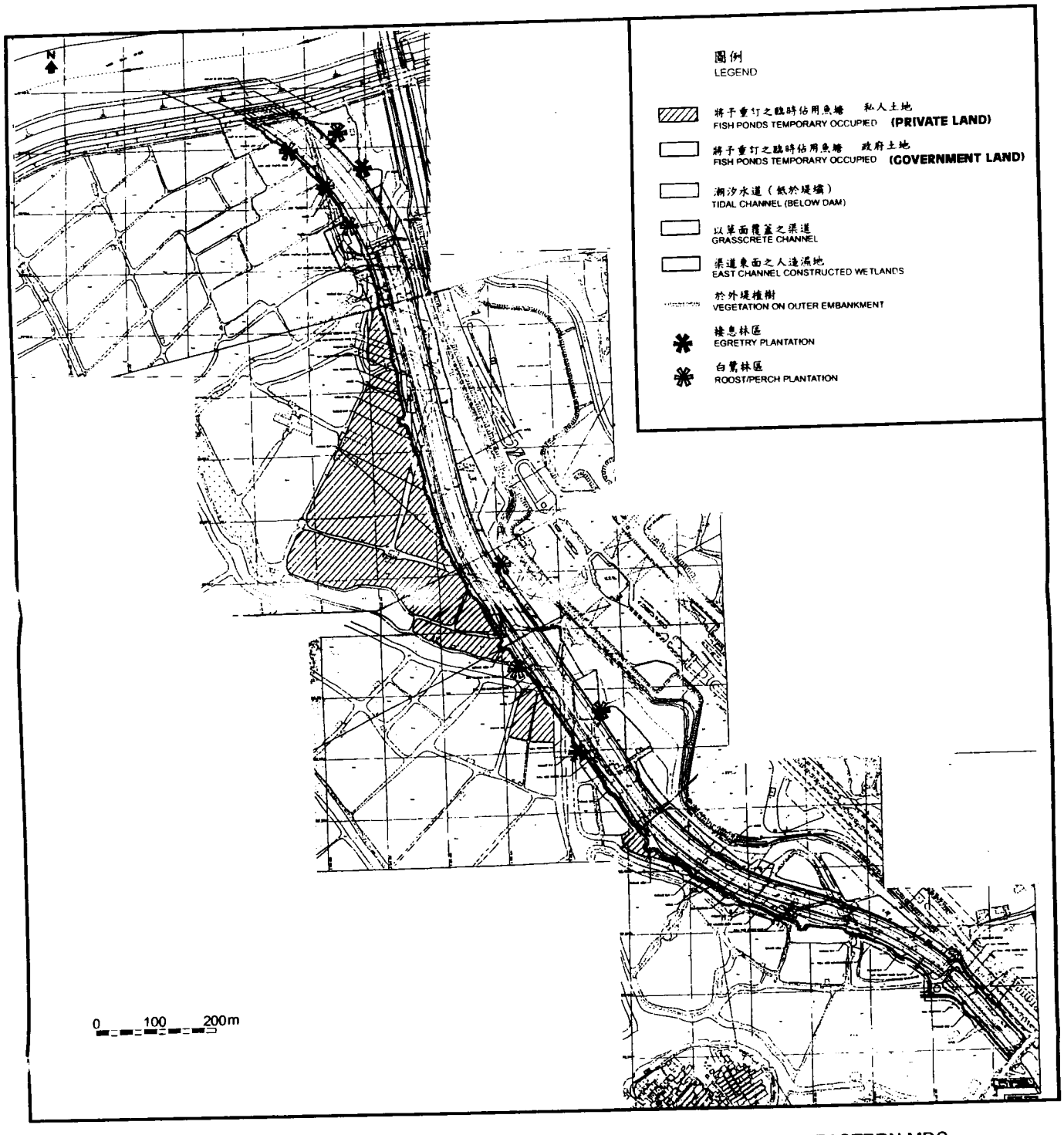
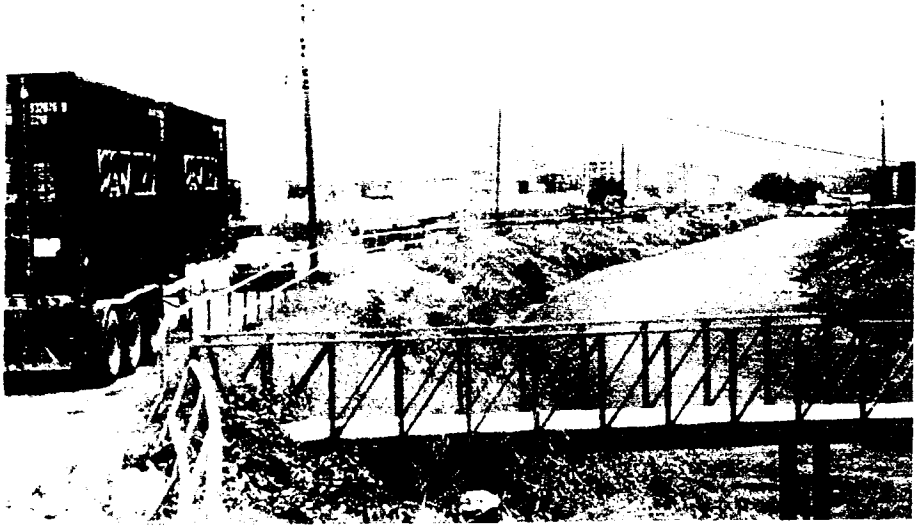


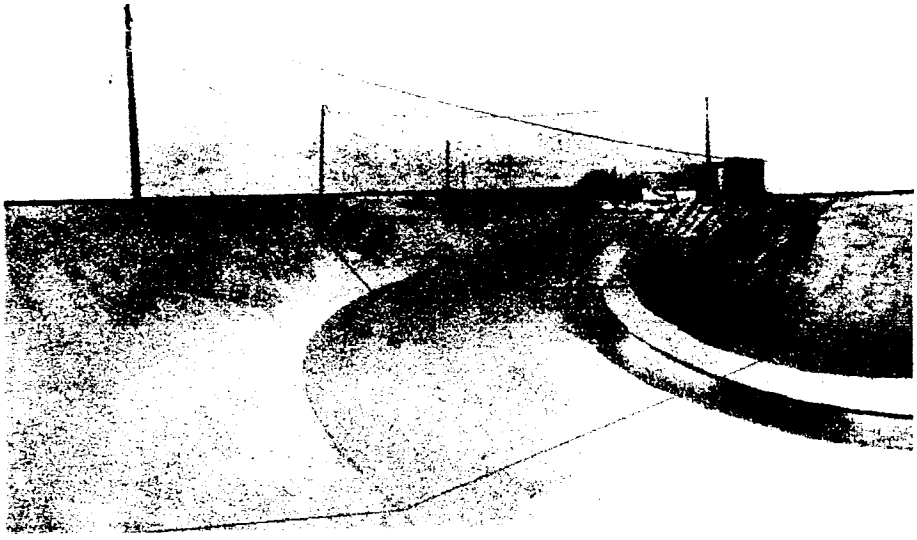
FIGURE 2 - LOCATION OF ECOLOGICAL MITIGATION SITES IN AND AROUND THE EASTERN MDC

圖2 位於東部防洪主渠之內及附近的生態緩解地點位置圖



Existing View

現時情況



Photomontage of Proposed EMDC without Mitigation

綠化前之東部防洪主渠照片拼圖

Photomontage of Proposed EMDC with Mitigation

綠化後之東部防洪主渠照片拼圖

Figure 3 **Photomontage of Eastern MDC**

圖 3 **東部防洪主渠照片拼圖**

Environmental Resources Management

ERM