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Agreement No. CE 10 / 95

Tin Shui Wai Development  
Engineering Investigations for  
Development of Areas 3, 30 & 31 of  
the Development Zone and the Reserve Zone

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**Environmental Impact Assessment Study  
Executive Summary**

0018/C09/10.2

March 1997

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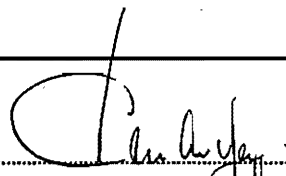
 Binnie Consultants Limited

**Environmental Impact Assessment Study  
Executive Summary**

**0018/C09/10.2**

**March 1997**

Report Authorized For  
Issue By:



For and on Behalf of  
Binnie Consultants Limited

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TIN SHUI WAI DEVELOPMENT ENGINEERING WORKS  
FOR DEVELOPMENT OF AREAS 3, 30 & 31  
OF THE DEVELOPMENT ZONE AND THE RESERVE ZONE

ENVIRONMENTAL IMPACT ASSESSMENT STUDY  
EXECUTIVE SUMMARY

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TIN SHUI WAI DEVELOPMENT ENGINEERING WORKS FOR  
DEVELOPMENT OF AREAS 3, 30 & 31  
OF THE DEVELOPMENT ZONE AND THE RESERVE ZONE

ENVIRONMENTAL IMPACT ASSESSMENT STUDY  
EXECUTIVE SUMMARY

1 PURPOSE

- 1.1 This paper provides a summary of the findings and recommendations of the Environmental Impact Assessment (EIA) for the proposed engineering works for the development of Tin Shui Wai Areas 3, 30 & 31 of the Development Zone (DZ) and the Reserve Zone (RZ).

2 INTRODUCTION

**Background**

- 2.1 The Tin Shui Wai Reserve Zone, the northern part of the Tin Shui Wai Landholding, was identified in 1994 by Government as a target site to meet the future demands for both public and private housing developments in Hong Kong. Together with Areas 3, 30 and 31 of the Development Zone, the further developments in Tin Shui Wai will provide 90 hectares of additional housing areas at Tin Shui Wai for an additional population of about 175,000.
- 2.2 All the major engineering infrastructure in the DZ was substantially completed by the end of 1994. The usage of three areas within the DZ, namely Areas 3, 30 and 31, was undetermined. The remainder of the Tin Shui Wai Landholding to the north of the DZ was reclaimed from fish ponds in 1990/91 and formed to temporary levels.
- 2.3 In September 1994 Planning Department commissioned Shankland Cox Ltd in association with Binnie Consultants Ltd and MVA Asia Ltd for Agreement No. CE 40/94 "Preparation of Layout Plans for Tin Shui Wai Reserve Zone" (hereinafter referred to as "the Planning Report"). The Planning Report was completed and a Preferred Concept Plan, Layout Plans and a Master Plan for the RZ prepared. The findings were presented to Yuen Long District Board in July 1995 and subsequently endorsed by the Committee on Planning and Land Development in August 1995.
- 2.4 To render these proposed developments in Areas 3, 30 and 31 of the DZ and the RZ serviceable, the sites have to be equipped with the necessary engineering infrastructure, complemented by the upgrading of some existing engineering infrastructure in the DZ and the vicinity of Tin Shui Wai.

- 2.5 Binnie Consultants Limited were commissioned by Government under Agreement No. CE 10/95 in November 1995 to undertake the engineering investigations for the development of Areas 3, 30 and 31 of the DZ and the RZ. MVA Asia Limited and Peter Tan & Associates were appointed as specialist sub-consultants. The Study Area is shown on Figure 1.

### Objectives and Scope

- 2.6 The objective of the engineering investigations is to develop in sufficient detail the preliminary design for the provision of a multiplicity of engineering infrastructure, including a feasible implementation programme, to allow the further developments in Tin Shui Wai to proceed.
- 2.7 The investigations comprise, among other tasks or services, the following six inter-related and inter-dependent sub-studies:
- Site Formation;
  - Drainage Impact Assessment;
  - Transport and Traffic;
  - Engineering Infrastructure;
  - Environmental Impact Assessment; and
  - Project Cost and Implementation.
- 2.8 The major infrastructure facilities to be provided under the Project are:
- (a) about 6 km of new roads in the RZ;
  - (b) widening of about 5½ km of existing roads which include:
    - (i) Tin Wah Road which divides the RZ from the DZ;
    - (ii) Tin Ying Road and the northern part of Hung Tin Road which form the main western access;
    - (iii) Tin Tsz Road and the northern part of Long Tin Road which form the main eastern access;
    - (iv) improvements for the junctions along these roads including six new road-bridges;
  - (c) junction improvement works including additional turning lanes and pedestrian facilities;
  - (d) three new bridges across the Western Drainage Channel Extension bordering the RZ, six new cycle and pedestrian foot bridges; six pedestrian subways, about 14 km of footpath and 8 km of cycle track;

- (e) a new sewage pumping station in Area 101 and about 1.5 km of rising mains along the Western Drainage Channel connecting the station to the existing sewage pumping station at Ha Tsuen;
- (f) about 4.5 km of new trunk gravity sewers;
- (g) about 2 km of new main stormwater drainage culverts including the culverting of about 0.5 km of the Eastern Temporary Channel;
- (h) concrete lining to a 0.5 km section of the Western Drainage Channel Extension immediately downstream of the existing inflatable dam;
- (i) landscaping of all road reserves; and
- (j) formation of about 5 km long Light Rail Transit reserve to be developed by Kowloon Canton Railway Corporation.

2.9 The location of the main Project works is shown on Figure 1.

2.10 The first works under the Project are programmed to commence with the site formation of Area 102 in July 1997. From this time onwards the site formation and infrastructure works will occur simultaneously with construction of residential facilities by others. Construction under the Project is programmed for completion in the second half of 2003. Occupation of the new dwellings in Areas 3, 30 and 31 will occur in 1999 with the bulk of the new residents in the RZ arriving from 2000 to 2002.

### 3 THE ENVIRONMENTAL IMPACT ASSESSMENT (EIA)

3.1 An extensive and detailed EIA has been undertaken based on the requirements of established planning standards and guidelines including *Hong Kong Planning Standards and Guidelines* (HKPSG) and the *Deep Bay Guidelines* (DBG). The task of the EIA has been to consider the potential environmental impacts on both existing and future sensitive receivers including the cumulative effects of the Project with other concurrent development projects in the vicinity. Both the construction and operational impacts have been assessed. Mitigation has been designed for this Project and an Environmental Monitoring and Audit (EM&A) programme formulated to ensure that impacts are kept within relevant environmental legislation and guidelines.

3.2 An integrated, cumulative approach has been taken to the design of the EM&A programme. Monitoring of dust, noise, water quality and ecological parameters will be undertaken. The audit programme has a wide scope including identification of preventive or remediation measures for unanticipated impacts.



## 4 AIR QUALITY

- 4.1 The main adverse impact on air quality arising from construction is the generation of dust from site formation activities. The main potential source of the dust is likely to be from unsealed roads or sealed roads soiled during the passage of construction vehicles. This dust emission can be controlled at source through various mitigation measures including watering of unsealed roads, frequent wheel-washing of vehicles and road-cleaning.
- 4.2 Extensive assessment of the potential dust impacts from a range of scenarios has been undertaken using the Fugitive Dust Model (FDM). The Air Quality Objectives (AQOs) for Hong Kong for Total and Respirable Suspended Particulates were used as assessment criteria. With the aforesaid mitigation measures in place, it is expected that dust levels can be kept at acceptable levels during the Project works at all Air Sensitive Receivers. Furthermore, the dust levels within the Ramsar site will be within the more stringent DBG if compliance with the Air Pollution Control Ordinance [Cap. 311] at all Air Sensitive Receivers is maintained.
- 4.3 Modelling of potential air pollution during the operational phase has been undertaken for Respirable Suspended Particulates, Nitrogen Dioxide and Sulphur Dioxide using the Industrial Source Complex Short Term (ISCST) model and CALINE4. Emissions from 178 chimneys over the wider study area have been assessed. Impact from vehicular emissions has been studied taking into account the configuration of vehicular bridges and road-side noise barriers.
- 4.4 The study concluded that the combined levels of pollutants from vehicular traffic and industrial chimneys predicted by the models are well within the AQOs at the various air sensitive receptors.

## 5 NOISE

- 5.1 Noise levels in Tin Shui Wai will rise as a result of construction activities under the Project and from concurrent works necessary for the further development of Tin Shui Wai. Eleven scenarios have been assessed at the most affected Noise Sensitive Receivers taking into account both cumulative noise from concurrent constraints under the Project, and from other concurrent works in their vicinity.
- 5.2 The EIA has recommended a package of construction noise mitigation measures including scheduling of construction activities, choice of equipment, silenced equipment, plant and equipment minimisation, provision of temporary noise barriers and use of acoustic enclosures to minimise construction noise impact. As there will be concurrent construction contracts, the assessment of potential construction noise impact adopted stringent criteria 3 dB(A) less than those recommended in the Environmental Protection Department's Practice Note for Professional Persons. Contractors under the Project will be required to work to more stringent noise standards if more than one Contractor uses noisy plant in the

vicinity of the same Noise Sensitive Receiver at the same time. The EIA has also recommended compliance noise monitoring to ensure that mitigation measures are fully implemented and that the noise levels will comply with established guidelines.

- 5.3 Given the buffer distances, operational noise impact on noise sensitive receivers from the new sewage pumping station in Area 101 and the LRT system in the RZ is predicted to be well within the noise criteria stipulated in HKPSG.
- 5.4 Noise from vehicular traffic has been assessed using the worst case noise situation for each road over a fifteen year period up to Year 2011. Noise levels at some 160 representative residential blocks and school buildings within the study area were assessed. Some existing and planned noise sensitive receivers will be subject to traffic noise levels exceeding the HKPSG noise criteria. Various forms of direct technical mitigation have been investigated in the EIA study. Direct technical remedies including acoustic barriers and low noise road surfacing material are recommended.
- 5.5 In situations where direct measures are implemented as far as practicable and there are still residual impacts, the impacts have been quantified and mitigation measures such as provision of set-back and self-protective building design have been recommended. No existing residences are eligible for the provision of indirect measures. A number of existing and planned school classrooms have been identified with predicted future noise levels above the HKPSG criterion. Schools affected by the provision of new roads will be protected under the Project. Future school sites have been carefully considered to avoid impact by excessive traffic noise.
- 5.6 The EIA has identified that about 4 km of low noise road surfacing material or friction course will be applied. Over 2 km of noise barriers will be built and over 1 km of roadside planter walls will be modified to form unobtrusive noise protection. The location of noise barriers and road sections with low noise road surfacing material is shown in Figure 2.

## 6 VISUAL IMPACT

- 6.1 The visual appearance of all structures associated with the Project has been assessed for compatibility with existing structures and the future development.
- 6.2 Hydroseeding and/or tall canopy trees with shrub planting have been recommended along the Western Drainage Channel Extension and the amenity reserves. Site formation areas exposed for greater than 6 months will be hydroseeded.
- 6.3 Noise barriers made of plexiglass panels will be designed to reduce bird collision frequency, set in metal frames in colours in harmony with the surroundings.



## 7 WATER QUALITY

- 7.1 The Tin Shui Wai drainage basin flows into Inner Deep Bay via the Western Drainage Channel and its extension and, to a lesser extent, the Eastern Drainage Channel and its extension. Inner Deep Bay was designated as a Ramsar site in 1995.
- 7.2 It is therefore essential that any works carried out as part of the Project do not give rise to discharges that will adversely affect the water quality of the two channels and the downstream valuable ecosystem within or near Inner Deep Bay.
- 7.3 Based on the existing and proposed future land-uses and developments and the Project works, the EIA has identified, provided background data on, and assessed any water-body likely to be affected physically, chemically and/or biologically in either the short term or long term.
- 7.4 Current water quality within the main nearby waterbodies is poor. The implementation of the *Livestock Waste Control Scheme* will result in the improvement of water quality, particularly in the Western Drainage Channel, from 1st July 1997 when the first interim discharge standards come into force. The ultimate discharge limits are enforceable after 1st July 1999; by then the discharges to the Western Drainage Channel should dramatically improve compared with the current situation. The current water quality problems associated with the Western Drainage Channel are the result of high levels of pollutants from livestock waste. In the short term, this problem can be minimised with increased maintenance of the existing low-flow interception scheme and frequent removal of sediments from the new low-flow channel constructed at the channel base.
- 7.5 The Western Drainage Channel Extension will be concrete-lined for 500 metres downstream of the existing inflatable dam. The bulk of sediment deposited from tidal movement of water will be deposited in this area or at the channel-mouth. The concrete-lining will facilitate removal of this sediment which is expected to reduce in volume as water quality improves.
- 7.6 The high levels of ammonia present in the water column are likely to remain so for a number of years. Ammonia can be rapidly converted to its toxic form by washings from concrete works during construction. Control of such discharges is crucial to ensure damage to the downstream environment is minimised. These discharges and site run-off are subject to the *Water Pollution Control Ordinance* and are required to meet the designated licensing standards under the ordinance. Emphasis has been placed on the provision of ameliorative measures in the temporary, intermediate and permanent drainage systems.

- 7.7 The study identified that surface runoff arising from site formation and construction activities might also contain high levels of suspended solids or pollutants, such as oil, grease, and wheel-washing wastes and its discharge into the channels would have adverse effects on the water quality. The study recommends mitigation measures including the provision of temporary drainage or bunds around the perimeter of the works area to collect surface runoff and the installation of sediment ponds and oil interceptors to the temporary drainage to remove pollutants before the water enters into the two channels.
- 7.8 The works carried out in the two drainage channels include the extension of the Eastern Culvert, infilling of a section of the channel, the construction of three bridges across the Western Drainage Channel as well as the concrete lining of the 500 m section downstream of the existing inflatable dam. The main impact will be the possible release of contaminated runoff and generation of higher suspended solids levels during excavation. Mitigation measures include carrying out works during dry or low flow seasons, using closed grab machinery with silt curtain or coffer dam, and minimising the amount of contaminated mud requiring removal through engineering design.
- 7.9 Development of the density of Tin Shui Wai inevitably leads to an increase in pollutant loadings from non-point source origins. A holistic approach to mitigation of urban stormwater impacts has been formulated with the aim of ensuring that water bodies near and downstream of Tin Shui Wai are of good quality in the long term. The fresh-water wetland area to be created as mitigation for loss of ecological habitat will be designed to maximise the water pollution control function of wetland, treating waters from the Eastern Drainage Channel. Other measures include the provision of gully-pots and infiltration devices, planters, planter strips and soft landscaping along carriageways and LRT tracks, oil interceptors at bus termini, controlling development of petrol stations and chemical storage in Tin Shui Wai area, maximising the soaking areas by designate more "green" areas within parks, open spaces and housing development.
- 7.10 The study concludes that with these measures in place, the water quality in the two channels will be maintained and the residual impact on the Inner Deep Bay aquatic environment will be minimal.

## 8 WASTE

- 8.1 The site formation design is such that fill material levels are reasonably balanced.
- 8.2 During construction works there will be less than 30,000 m<sup>3</sup> of contaminated muds removed from the two channels under the culverting and concrete-lining works. The EIA recommended to dispose of the contaminated mud at the designated marine dumping ground at East Sha Chau. The disposal will be subject to dumping permits with stringent control.

- 8.3 Measures to recycle and re-use of materials have been recommended for both construction and operational phases in order to minimise waste generation.
- 8.4 The new development will result in an additional 300 tonnes/day of domestic waste and up to 40 tonnes/day of commercial and industrial waste.

## 9 ECOLOGY

- 9.1 A 12-month ecological study commenced in December 1995 as part of the EIA. Quantitative studies have been undertaken for a range of ecological parameters. Some of the results of these studies will form the baseline data for the EM&A programme. The EIA has recommended an integrated two level programme of water quality and ecological monitoring. Water quality impacts and direct ecological impacts will be checked at source. Spatial and temporal cumulative impacts will be checked on a regular programmed basis using a combination of water quality and ecological monitoring including assessment of benthic organisms, mangroves and bird behaviour.
- 9.2 The project area for the proposed development comprises mainly of newly reclaimed land now covered by grasses. Some areas left undeveloped since the works in the early 1990s have become temporary habitats for the feeding and breeding of some species. More valuable habitats are mainly found at the northern periphery of the reclaimed Reserve Zone. These include woodlands, mangroves, intertidal mud flats and other wetlands. The most important one is the mud flat at Inner Deep Bay which was listed as a Ramsar Site in 1995.
- 9.3 The major ecological impacts of the proposed project are the loss of habitats, potential deterioration of water quality and disturbance from human activities. Provided water quality at the two channels is controlled within acceptable levels, the mudflats at Inner Deep Bay would not be adversely affected by the future development of Tin Shui Wai.
- 9.4 To mitigate against such impacts, various measures are proposed in the study. One of the major mitigation measures is the formation of a 18.5 ha "constructed wetland" as replacement habitat for the wetland lost from the project. The "constructed wetland" will also receive storm water runoff collected from the Eastern Culvert and will remove pollutants through sedimentation and wetland mechanisms before the water enters Inner Deep Bay. The study concludes that the mitigation measures to be implemented will safeguard water quality and prevent the mudflats at Inner Deep Bay from being adversely affected. The proposed "constructed wetland" and the adjacent woodland will form a buffer to minimise human disturbance on the Ramsar site. A preliminary layout of the habitat mitigation area with the constructed wetland is shown in Figure 3.

## 10 CONCLUSION

- 10.1 Construction works lead to dust, additional noise and water pollution, loss of habitats and waste generation. An increase in population inevitably leads to increases in noise and exhaust emissions from the additional vehicular traffic, water pollution and waste generation.
- 10.2 Each potential impact has been carefully assessed and mitigation formulated to minimise these impacts. With the recommended mitigation measures in place it is anticipated that the impacts would be controlled within established environmental standard and guidelines.
- 10.3 An environmental monitoring and audit programme has been devised to ensure the recommended mitigation measures do protect all sensitive receivers: schools; residents; sensitive uses; water-bodies; flora and fauna.

**END OF TEXT**

# 天水圍發展區第3, 30, 31區 及預留區發展工程 環境影響評估 行政摘要

## 1. 目的

- 1.1 本行政摘要對發展天水圍第3, 30, 31區及預留區工程所進行之環境影響評估結果和建議作出簡略撮要。

## 2. 簡介

### 背景

- 2.1 天水圍預留區位處天水圍新市鎮北部，預留區於1994年被政府認定為目標發展用地，以滿足香港未來公共及私營房屋的需求。連同目前發展區內第3, 30及31區，天水圍的進一步發展提供90公頃房屋用地，以容納175,000人口。
- 2.2 發展區內之主要基礎建設已於1994年尾竣工，區內的其中三幅土地（分別為第3, 30, 31區），其時用途尚未確定。而位於天水圍北部的預留區，則已於1990至1991年間經已從魚塘堆填至臨時水平，以待進一步發展。
- 2.3 規劃署於1994年9月委任以森蘭郭斯有限公司為首，連同賓尼工程顧問有限公司和 MVA 亞洲顧問公司，履行顧問合約編號 CE 40/94 號，去訂定天水圍預留區的發展藍圖。此研究工作已經完竣，並制定優先發展概念藍圖，同時亦制定了佈置放樣和園景設計圖紙。研究結果更於1995年7月提交元朗區議會及其後於1995年8月被政府的規劃及土地發展委員會（CPLD）接納。

2.4 為使發展區內的第3，30，31區及預留區能作為建議中的發展，該等用地須具備必要的基礎建設，同時亦有必要將天水圍發展區，以至鄰近的現有基礎建設加以改進。

2.5 賓尼工程顧問有限公司於 1995年 11月受聘於政府，履行顧問合約編號 CE 10/95，對有關天水圍發展區第3，30，31區及預留區作工程研究。MVA 亞洲顧問公司和 Peter Tan & Associates Ltd 更被聘為專門課題的副顧問。總體的研究範圍如圖一所示。

#### 研究目的和範圍

2.6 該項顧問研究的目的是，在於能為天水圍的進一步發展，以致所需的多元化基礎建設提供一個詳盡的方案設計，其間更包括一個完善可行的執行時間程序表。

2.7 除其他工作及服務外，該顧問研究更包括以下六個相互關連和依賴的個別研究：

- 地盆平整；
- 排水影響評估；
- 運輸及交通；
- 基礎建設；
- 環境影響評估；
- 項目成本及執行程序。

2.8 是項發展計劃所提供的主要基礎建設詳列如下：

(a) 在預留區內興建六公里長的新道路；

(b) 擴闊約五點五公里現有道路，需擴闊的路面包括：

- (i) 分隔發展區和預留區的天華路；
  - (ii) 組成西部主要通道的天影路及洪天路北段；
  - (iii) 組成東部主要通道的天慈路及朗天路北段；
  - (iv) 改善上述道路的交匯處設施，當中包括興建六條行車天橋；
- (c) 在發展區內改善現有路口，增建行車線和行人設施；
- (d) 在預留區興建三條行車橋橫過西排水道伸延段，六條單車／行人天橋，六條行人隧道，總長約十四公里之行人路和總長約八公里之單車徑；
- (e) 在101區興建污水抽水站，並沿西排水道鋪設約一千五百米之加壓管道連接廈村污水抽水站；
- (f) 鋪設總長約四點五公里之自流式主要污水渠；
- (g) 鋪設約二公里之主要雨水收集渠和五百米連接東臨時排水道之涵箱；
- (h) 在西排水道伸延段，現充氣壩之下游用混凝土鋪砌一段長約五百米之河道；
- (i) 綠化所有道路及預留地；及
- (j) 平整五公里長之輕便鐵路專用範圍，以便九廣鐵路公司進行發展。

2.9 是項工程之主要項目如圖一所示。

2.10 整個發展計劃的首項工程為平整第102區，預計於一九九七年七月動工。動工後，其餘地盆平整、基礎建設及樓宇建築將會同時展開。整體建築工程預計於二零零三年下半年完成，居民可於一九九九年遷入第3、30及31區，而大部份預留區的人口將於二零零零年至二零零二年遷入。



### 3. 環境影響評估

- 3.1 為配合是項發展計劃，一個廣泛而詳盡的環境影響評估經已完成，是項評估按現有之標準和指引進行。該等指引包括〈香港規劃標準和指引〉及〈后海灣指引〉。該研究主要為探討發展計劃及其累積影響對目前及將來居民的潛在環境影響。此評估並考慮到施工期間和完成後之影響，同時制定有關是項發展計劃的影響消減措施和環境監察及審核手冊以確保各類影響能符合有關的環境管制條例和指引。各相關的政府部門已對進行影響消減措施作出承諾，並制定執执行程序。
- 3.2 環境監察及審核手冊之制定採用綜合及累積方針 — 接受監察之項目包括塵埃量、噪音水平、水質及生態參數；廣泛的審核程序包括確認非預期影響，其防範及補救措施。

### 4. 空氣質素

- 4.1 在施工期間，塵埃將會是破壞空氣質素的主因。預計塵埃的主要來源為工程車輛駛經未經鋪砌的路面或沾泥道路。在塵埃來源應用適當之緩減措施，將可有效地控制塵埃的排放。該等緩減措施包括，在未經鋪砌的路面灑水、清洗車輛輪胎及道路。
- 4.2 報告書採用逃逸性煙塵散播模擬方法（FDM）對一系列不同程度的塵埃影響作出廣泛評估，是項評估是以空氣質素指標中的總懸浮粒子及可吸入懸浮粒子濃度為準則。當前述之緩減措施能有效執行，全部對空氣質素敏感的地方所面對的塵埃量將會被抑制在可接受水平內和符合空氣污染條例之要求。而拉姆薩爾濕地的塵埃量亦將低於〈后海灣指引〉的嚴緊限制。
- 4.3 對於在運作階段的潛在空氣污染，報告書亦利用工業排放模型（ISCST）及CALINE4 對可吸入懸浮粒子、二氧化氮和二氧化硫的散播作出模擬。評估內容包括在廣泛研究範圍內的一百七十八個煙囪排放及車輛廢氣的影響。車輛廢氣之評估已考慮到未來道路和橋樑之安排。

4.4 按模擬預測，由交通運輸及工廠煙囪所排放的污染物將遠低於現行〈空氣污染管制條例〉所列的空氣質素指標。

## 5. 噪音

5.1 天水圍區內的噪音水平將因進一步發展的建築活動而增加。為評估較容易受噪音滋擾居民的影響，本報告已按發展計劃及鄰近工程，在十一種不同境況下所產生的累積噪音作出評估。

5.2 報告書亦建議一系列噪音消減措施，以減低建築期所產生的噪音滋擾。建議中的措施包括工序和機械的安排、工具的選擇、選用低噪音工具、機械和減少機械工序、提供臨時隔音屏障和護罩等。考慮到同期的建築合約，故對建築噪音之評估已採用較環保署〈專業人仕通告〉中所提議的標準低3分貝之評估準則。報告書並建議在同一噪音敏感使用者鄰近若有多於一個承辦商使用嘈吵器材時，則須遵守更嚴緊的噪音指標。此外，報告書亦建議進行噪音監察以確保所提出的噪音消減措施能有效執行以符合規定指引。

5.3 按建議中的緩沖距離，101區的新污水抽水站和預留區內的輕便鐵路於運作時所產生的噪音估計將會遠低於〈香港規劃標準和指引〉中的規定。

5.4 交通噪音評估已考慮到直至2011年的未來十五年內每條道路的最高噪音水平。研究已對160個在研究範圍內並具有代表性之住宅和學校進行評估。結果指出一些現有和計劃中的噪音敏感者將受到高於〈香港規劃標準和指引〉的噪音影響。本報告書已列出可行的直接噪音消減方案。建議方案包括安裝噪音屏障和鋪砌低噪音路面。

5.5 報告書建議盡量採用直接噪音消滅措施。但在某些地方直接消滅措施未能湊效，其所受影響已作出評估，並建議了適當的補救措施，例如自我保護之建築設計和增加與道路之距離。研究結果指出，沒有現居民具接受間接噪音消滅措施的資格，而區內一些現有及計劃中的學校將會受到高於〈香港規劃標準和指引〉所容許的噪音影響。那些因新建道路而受交通噪音滋擾的學校將會獲得本計劃提供適當的保護；而計劃中的學校亦已被審慎考慮以避免過量的嘈音問題。

5.6 報告書建議在四公里的道路鋪砌低噪音物料，興建約二千米透明隔音屏障，和修建一千米路傍花槽以組成美觀的隔聲保護。隔音屏障之位置和低噪音路面將如圖二所示。

## 6. 視覺影響

6.1 報告書已對本計劃所建議的建築結構進行了視覺評估及擬定適當的緩解措施。

6.2 報告書建議在西排水道伸延段和休憩用地種植高冠層樹木，配以灌木及／或噴草，並在空置期多於半年的地盆進行噴草美化工作。

6.3 隔音屏障將採用纖維玻璃附以條紋以減低雀鳥碰撞機會，屏障的金屬支架則會髹上和環境配合的色彩。

## 7. 水質

7.1 天水圍地區之排水系統主要經由西排水道及其伸延段（小部份則經由東排水道）流入內后海灣。

7.2 所有建築項目必須確保對東、西排水道及其下游水質和內后海灣的生態系統不會構成不良影響。

- 7.3 根據目前及建議之土地用途和發展計劃，環境評估報告已收集和提供背景資料和數據，並對所有水體的長期和短期的物理、化學及生物特性進行了評估。
- 7.4 當〈禽畜廢物管制計劃〉的臨時排放標準於一九九七年七月一日生效後，西排水道的水質將得到改善。該管制計劃的最終排放標準將於一九九九年七月一日全面生效。屆時，排放至西排水道之水質將會得到顯著的改善。目前西排水道的水質問題，主要是由於大量累積的禽畜廢物。短期內，加強維修旱季低水流系統和經常清理河底的新低水流管道可將滋擾減低。
- 7.5 西排水道伸延段在現有充氣壩下游約500米長之一段河道將會用混凝土鋪砌，以方便清理河道沉積物。因大部份沉積物將會在這段河道積聚。而下游水質將會為微生物所淨化。
- 7.6 目前河水內含高氮量現象可能會持續數年。在施工期間，由於混凝土的沖洗物容易把氮轉化為毒素，故控制該等沖洗物的排放量對於減低對河流下游環境構成的損害有著關鍵性的作用。根據〈水污染管制條例〉規定，所有建築地盆必須申領污水排放牌照，而排放水質須符合指定牌照之標準。本報告特別著重在臨時性及中、長期排水系統所設置的水質改善措施。
- 7.7 研究結果確定地面徑流之主要來源如地盆平整工程及建築工序可能帶來高量度之懸浮固體和污染物如汽油、油脂及清洗輪軸之廢物和排放至水道之排放物皆水質構成影響。本研究建議之緩解措施包括臨時水道和工地四周之圍堰以收集徑流。亦建議在東、西排水道之主要排放口安裝沉澱池，和油脂堵截裝置。
- 7.8 在東、西排水道所進行的工程包括擴建東部涵箱，填平部份現有河道，興建三條橋樑橫跨西排水道，並同時在充氣壩下游將一段長約500米之河道鋪砌混凝土。而主要之影響將是污染物之排放和挖掘時所產生之懸浮固體。緩解措施包括盡可能在旱季進行工程，採用密封式挖掘機械和沙泥保護網和圍堰，及籍工程設計減少挖掘受污染淤泥。

7.9 發展如天水圍般密度的地區，將無可避免地增加非源點污染物。為確保天水圍鄰近的水域及下游水域能長遠保持良好水質，本報告已擬定整體性市區雨水污染緩解措施。例如位於保護區內的人工淡水濕地，在設計時已盡量提高其污水淨化功能以淨化東排水道之排放。其餘之緩解措施如路面排水井，滲透裝置，植樹帶，路傍和輕鐵傍之綠化地帶，巴士總站之截油裝置，對天水圍範圍內之油站和化學品之貯藏加以控制，增加在公園和屋邨內之綠化範圍以增加滲水面積。

7.10 總括研究結果指出按適當之措施，東、西排水道之水質將可保持而其對后海灣水質之殘餘影響將可減至最少。

## 8. 廢物

8.1 土地平整工程設計已把填料需求控制至自給自足之水平。

8.2 工程廢物包括受到污染的淤泥，在疏浚東、西排水道及涵道鋪砌工序中將掘出少於30,000立米之受污染淤泥。研究建議將淤泥運往東沙洲之海上廢物棄置場。整項棄置工序將受到嚴格之管制。

8.3 本報告建議在施工及運作期間採用循環及再用物料以減少廢物產生。

8.4 新發展項目入伙後將增加區內產生的固體廢物數量：住宅圾垃每日三百噸，工商廢物每日四十噸。

## 9. 生態

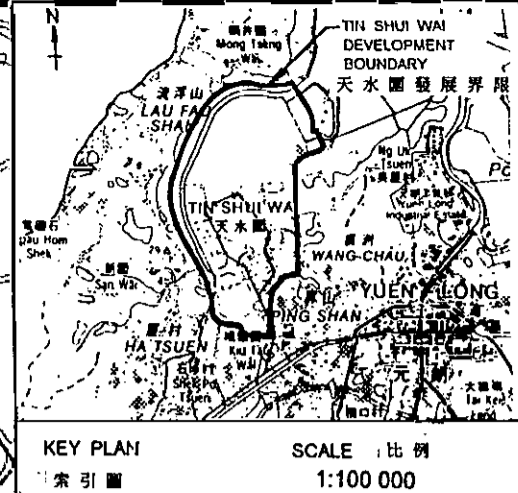
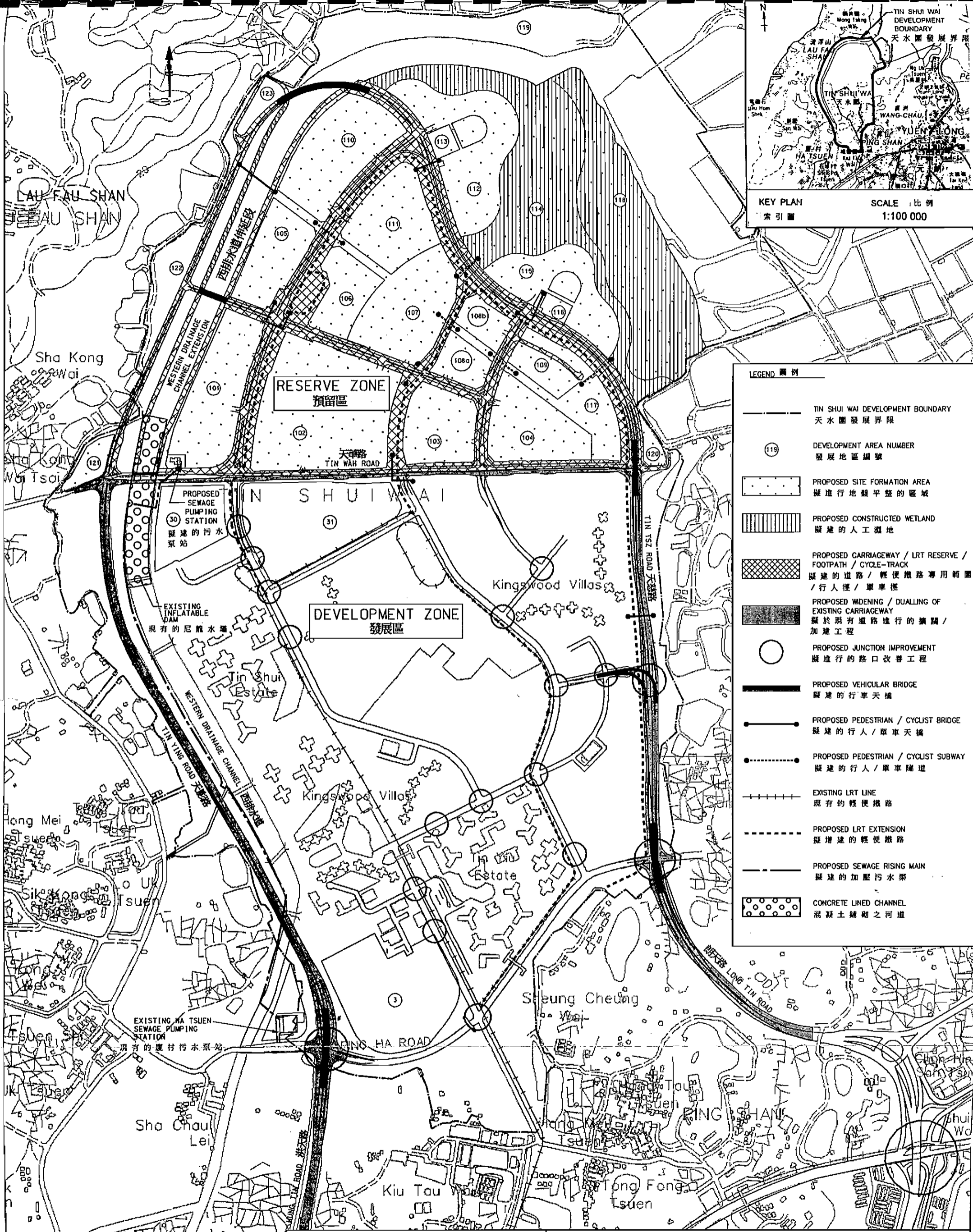
9.1 在本研究之內的一項為期一年的生態研究已於1995年12月展開。該研究收集了一系列的生態參數，而部份的數據將用作環境監察及審核程序的基線數據。報告書建議進行一項雙重的綜合水質及生態環境監察：在污染物產生之源頭，將會對水質和生態環境進行監察；至於地域性和時間性的累積影響，將會採取一個有系統的水質和生態監察制度，包括對水底棲生物，紅樹林和水鳥習慣的評估。

- 9.2 發展工程主要位於新近堆填魚塘而來的土地，該地區現已為草類覆蓋。有些區域從90年代早期已成為野生動物的臨時繁殖和棲息地。在天水圍預留區北部更可發現有價值的生物棲息地，包括林地、紅樹林、潮間泥灘及其它濕地，其中最重要的是內后海灣的泥灘更已於1995年被標定為拉姆薩爾濕地。
- 9.3 新發展對生態環境所帶來的主要影響將是生物棲息地的損失，潛在水質下降及人類活動的干擾。如果東、西水道之水質能夠被控制在可接受水平內，則內后海灣的泥灘將不會受未來天水圍發展的不良影響。
- 9.4 為消滅工程所帶來的影響，本報告已建議多項措施。而最主要之措施為建議一個面積達18.5公頃之人工濕地以彌補因工程而損失之生物棲息地。而該人工濕地亦同時接收從東部涵箱所排放之雨水並籍著沉澱和濕地工能予以淨化，然後才排放至后海灣。研究結果指出該緩解措施將有效地保障水質和防止后海灣之紅樹林受到影響。該人工濕地和附近林地亦為拉姆薩爾濕地提供緩沖區，圖三展示所建議之人工濕地之初步設計。

## 10. 總結

- 10.1 發展計劃建設工程將引起塵埃、噪音、水質污染、生態損失及廢料等問題。人口增長亦將無可避免地導致噪音、交通廢氣、水質污染及垃圾等的增加。
- 10.2 本報告按相關的條例和準則，詳細地評估了每項可能性影響，並制定了緩解措施，若該等措施能適當執行，將可把影響有效地控制至可接受的水平。
- 10.3 為了確保所有建議的環保措施和環境敏感者諸如學校、居民、水體及動植物等不受影響，本報告已制定了一套完整的環境監測及審核計劃。

全文完



**LEGEND 圖例**

	TIN SHUI WAI DEVELOPMENT BOUNDARY 天水圍發展界限
	DEVELOPMENT AREA NUMBER 發展地區編號
	PROPOSED SITE FORMATION AREA 擬進行地盤平整的區域
	PROPOSED CONSTRUCTED WETLAND 擬建的人工濕地
	PROPOSED CARRIAGEWAY / LRT RESERVE / FOOTPATH / CYCLE-TRACK 擬建的道路 / 輕便鐵路專用範圍 / 行人徑 / 單車徑
	PROPOSED WIDENING / DUALLING OF EXISTING CARRIAGEWAY 擬於現有道路進行的擴闊 / 加建工程
	PROPOSED JUNCTION IMPROVEMENT 擬進行的路口改善工程
	PROPOSED VEHICULAR BRIDGE 擬建的行車天橋
	PROPOSED PEDESTRIAN / CYCLIST BRIDGE 擬建的行人 / 單車天橋
	PROPOSED PEDESTRIAN / CYCLIST SUBWAY 擬建的行人 / 單車隧道
	EXISTING LRT LINE 現有的輕便鐵路
	PROPOSED LRT EXTENSION 擬增建的輕便鐵路
	PROPOSED SEWAGE RISING MAIN 擬建的加壓污水渠
	CONCRETE LINED CHANNEL 混凝土鋪砌之河道

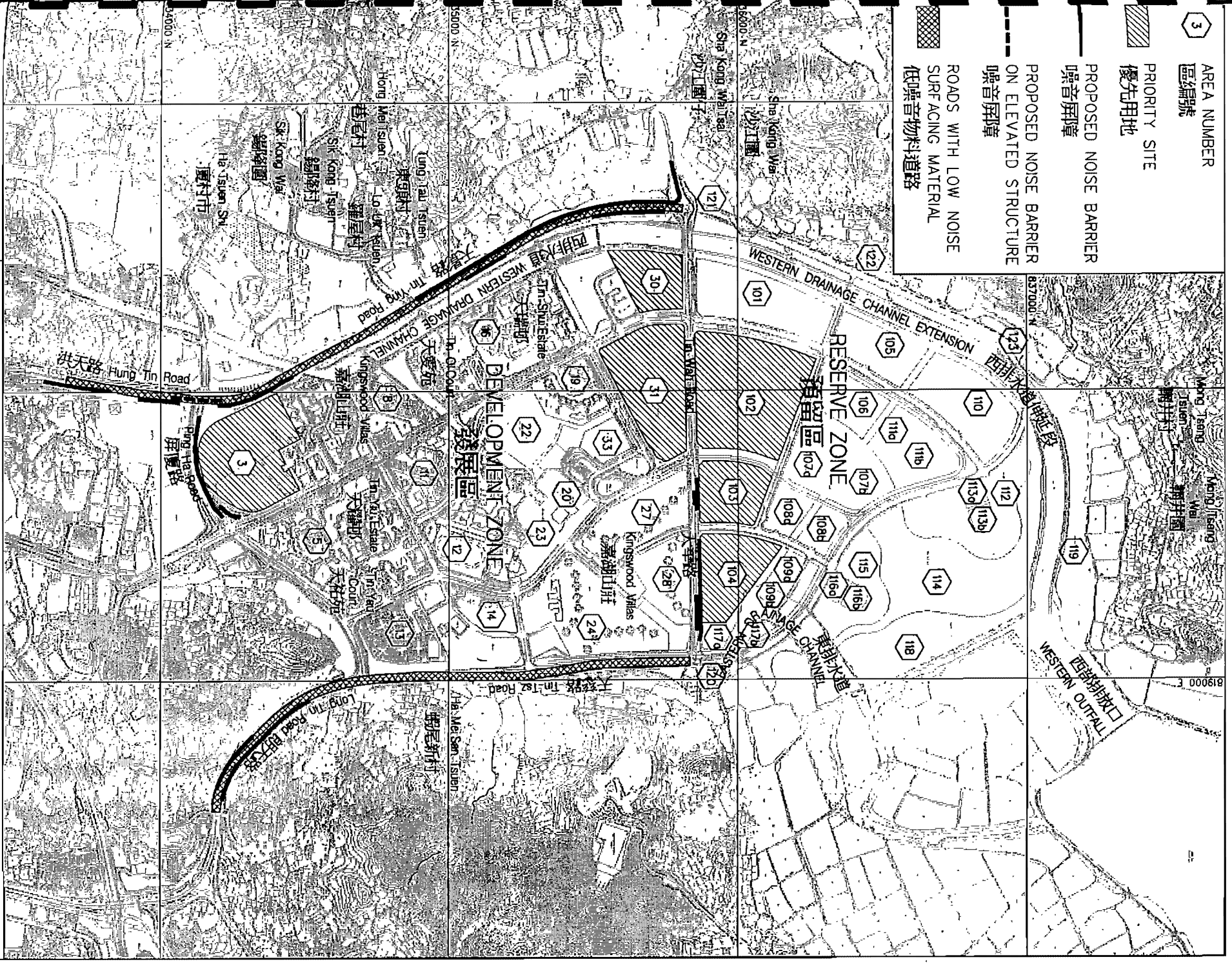
TIN SHUI WAI DEVELOPMENT  
AGREEMENT NO. CE 10/95  
ENGINEERING INVESTIGATIONS FOR  
DEVELOPMENT OF AREAS 3, 30 & 31  
OF THE DEVELOPMENT ZONE  
AND THE RESERVE ZONE

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ENGINEERS AND SCIENTISTS

FIGURE 1  
LOCATION OF THE INFRASTRUCTURE  
圖一  
基礎建設的位置



- 3 AREA NUMBER  
區編號
- PRIORITY SITE  
優先用地
- PROPOSED NOISE BARRIER  
噪音屏障
- PROPOSED NOISE BARRIER  
ON ELEVATED STRUCTURE  
噪音屏障
- ROADS WITH LOW NOISE  
SURFACING MATERIAL  
低噪音物料道路

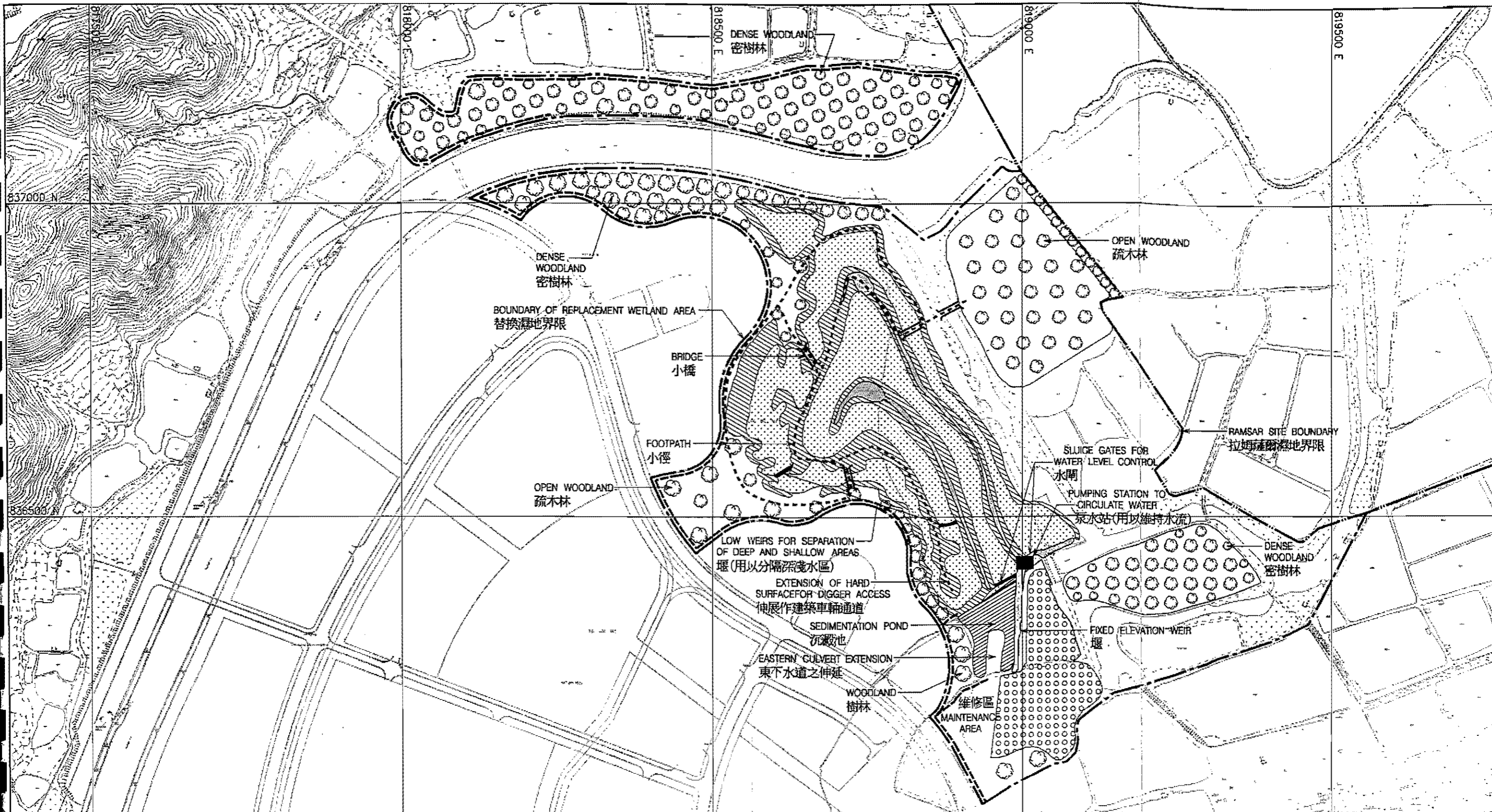












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FIGURE 2  
LOCATION OF PERMANENT NOISE BARRIERS AND  
LOW NOISE ROAD SURFACING MATERIAL

圖二  
噪音屏障及低噪音物料道路



- |   |  |   |  |
|---|--|---|--|
|  | BANK<br>河堤                               |  | WOODLAND<br>樹林                                 |
|  | WETLAND/CHANNEL<br>濕地/河道                 |  | FOOTPATH<br>小徑                                 |
|  | HARD SURFACE FOR DIGGER ACCESS<br>建築車輛通道 |  | RAMSAR SITE BOUNDARY<br>拉姆薩爾濕地界限               |
|  | DEEP WATER AREA<br>深水區                   |  | BOUNDARY OF REPLACEMENT WETLAND AREA<br>替換濕地界限 |
|  | SEDIMENTATION POND<br>沉澱池                |  | FENCE<br>圍欄                                    |

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FIGURE: 3  
 HABITAT MITIGATION AREA WITH CONSTRUCTED WETLAND.  
 圖三  
 擬建人工濕地的位置



