Hong Kong Government
Drainage Services Department
香港政府渠務署

Agreement No 合約編號 CE 51/93

Rural Drainage Rehabilitation Scheme

Environmental Impact Assessment

鄉郊排水系統修復計劃

環境影響評估

Executive Summary

行政摘要

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Mouchel Asia Limited

Rural Drainage Rehabilitation Scheme
Final Environmental Impact Assessment

- Executive Summary -

INTRODUCTION

This Executive Summary presents the main findings and recommendations of the Environmental Impact Assessment for the proposed Rural Drainage Rehabilitation Scheme (RDRS).

BACKGROUND

The need for the RDRS and other drainage improvement schemes was identified in the Territorial Land Drainage and Flood Control Strategy Study - Phase II (TELADFLOCOSS II). This study proposed improvements to the existing natural stream-courses in the northern New Territories, to minimize flooding, restore flow capacities and facilitate maintenance.

The objective of the EIA was to provide information on the nature and extent of environmental impacts arising from the construction and operation of the proposed RDRS. This information contributed to decisions on:

- the overall acceptability of any adverse environmental impacts that are likely to arise from the RDRS;
- the conditions and requirements for the detailed design stage, construction and operation of the project; and
- the acceptability of any residual impacts after the proposed mitigation measures are implemented.

THE PROPOSED PROJECT

The RDRS comprises nine streams in the North West and North East New Territories (NWNT and NENT, respectively). The location of the streams is shown on *Figures 1* and *2*.

The RDRS streams lie in a landscape comprising primarily flat agricultural land interspersed with small towns and rural villages, the largest of which is Yuen Long. Drainage improvement will be achieved by engineering works to widen, straighten and/or deepen natural river beds, constructing structures such as silt traps and weirs within the new channels, then lining the channels (with materials including concrete and natural linings).

As much of the land in the NWNT catchment is subjected to flooding during periods of peak flow, the RDRS in the NWNT comprises six streams, as indicated in *Figure 1:* Mo Fan Heung Stream, Wing Kei Tsuen Stream, Sha Po Tsuen Stream, Nam Hang Drainage Channel, Small Traders New Village Stream, and Wai Tsai and Mai Po Channel.

The RDRS in the NENT comprises three rivers and their tributaries; the Rivers Indus (with tributaries the Rivers Jhelum and Chenab), Beas (with tributaries the Kwu Tung streams and Ngau Tei channel) and Ganges. These drain into the Inner Deep Bay via the Shenzhen River.

STUDY FINDINGS AND RECOMMENDATIONS

The EIA conducted assessments of impacts from the RDRS upon water quality, ecology, landscape, waste management, noise and air quality. The findings of the assessments are summarized below.

Construction Impacts

Water Quality

Baseline conditions in the Rivers Beas, Indus and Ganges, as indicated by EPD's water quality data, indicate poor water quality in all reaches except the upper reaches of the River Ganges. Organic and nutrient loads and Biological Oxygen Demand (BOD_5) values are high, Dissolved Oxygen (DO) values are low and faecal bacteria counts are high as a result of livestock and domestic sewage inputs. Baseline water quality data is not available for the NWNT owing to their small size and ephemeral nature. EPD data on organic loads, and observations made during this study, suggest that many of the streams are subject to organic loads.

Impacts during the construction phase works upon water quality and downstream sensitive receivers were predicted to arise from disturbances to natural stream processes, resuspension of contaminated sediments and associated nutrient and pollutant release, construction runoff and drainage, construction debris and rubbish, liquid spillage and sewage effluents. All streams in the RDRS ultimately discharge into Deep Bay, which is an area of ecological importance and is considered to be sensitive to changes in water quality. Although current baseline water quality conditions are poor, the study pointed out that further deterioration in water quality should not be permitted to occur as a result of the construction or operation of the RDRS, so as to avoid impacts to Deep Bay.

Mitigation measures have been proposed which will control impacts to water quality. Land-based grab dredgers and excavators are currently envisaged for RDRS works and tightly sealed closed grabs are recommended when handling seriously contaminated (Class C) material. During construction, means of sediment containment including specific structures, diversion channels and silt curtains are recommended and whenever possible, works should be undertaken during periods of low flow (dry season) to minimise downstream impacts.

Ecology

The EIA assessed potential impacts to ecological resources arising from the RDRS works using the River Corridor Survey technique, which provided extensive baseline data and identified 18 sites (Figure 4.4e to 4.4l of the Final EIA Report) which merited further study, including specialist surveys for plants, birds, aquatic invertebrates, bats and dragonflies.

For Mo Fan Heung, Wing Kei Tsuen and Nam Hang, in the NWNT and the Beas tributaries in the NENT, the existing habitats along the project sections have been assessed as being of low ecological interest and impacts are predicted to be minimal. The proposed works on the Sha Po Tsuen stream and the Small Traders New Village stream in the NWNT and on the Indus, Chenab and Beas rivers in the NENT will impact areas of moderate ecological interest. Mitigation measures including the following were proposed:

- impact avoidance, such as incorporating changes in the design such that identified areas of ecological value are avoided, or consideration of alternative means of flood control ;

- compensation measures for habitat loss;
- enhancement features, such as provision of aquatic planting bays, replanting areas and retention of isolated meanders; and
- general site practises, such as provision of fencing around works areas, dust control and timing of works to avoid the bird breeding season.

Providing these mitigation measures are adopted, the RDRS is not predicted to cause unacceptable residual impacts to ecological resources.

Three of the schemes impact areas of high ecological interest, ie the Wai Tsai / Mai Po Channel, the River Ganges, and the River Jhelum.

Works on the Wai Tsai/ Mai Po Channel involve six Grade A fish ponds, however as these are expected to be reinstated, no long term residual impacts are anticipated. Opportunities to maintain the ecological value of this stream are encouraged, wherever possible.

The River Ganges has been identified as being important to wildlife, particularly birds and bats. The river is an integral part of the ecosystem and despite the mitigation measures proposed, residual impacts have been predicted, including a loss of aquatic and riparian habitats and subsequent loss of species from the area.

Works on the River Jhelum involve widening and realignment of the lower reaches to form a trapezoidal channel. The River and its catchment have been assessed as being of local and regional importance for wildlife. As with the River Ganges, the Jhelum is also an integral part of the ecosystem and despite the mitigation measures proposed, residual impacts have been predicted, including the loss of aquatic and riparian habitats which support an increasingly rare, diverse, assemblage of species. Alternative measures of flood control (to the proposed design) are recommended for consideration, however should unacceptable residual impacts arise, withdrawal of the River from the Scheme is recommended. It is anticipated that residual impacts following design updates will be assessed during later design phases of the project.

Visual and Landscape Issues

The EIA noted that although there are no areas that have been officially designated as being of high landscape quality in close proximity to the RDRS works, the existing landscape character of areas in which the RDRS lies is high. Such areas include the Ganges River, the upper reaches of the Beas River, the upper reaches of the Sha Po Tsuen Stream, and the lower reaches of the Indus. The landscapes of the Indus, parts of the Rivers Jhelum and Chenab, and northern reaches of the River Beas are to some extent already degraded by urban development and its related infrastructure, and the process of urbanisation is likely to continue in the future.

Impacts upon existing vegetation adjacent to the channels in the NWNT would be low due to the scarcity of vegetation along the existing channels. Landscape impacts on the Rivers and its tributaries in the NENT would be high, as the existing riverside vegetation often represents the only notable vegetation in the surrounding landscape.

Other landscape impacts are the loss of existing fish ponds in the NWNT and the removal of local shrines, graves and village wells in the NENT and NWNT.

Visual impacts will arise from the construction of the RDRS, as works associated with the excavation, dredging and lining of the channel, building of bridges, access roads and other related structures, will be highly visually intrusive. However many residences and workplaces with possible views to the works are low-rise buildings on flat, low lying land and there is little development on the rising land surrounding the river floodplains. The visual impacts consequently will be less notable from many properties which are not directly adjacent to the construction works and haulage roads. In addition, the opening up of visually intrusive views previously screened during the construction of the works due to the removal of vegetation (especially river-side vegetation) and buildings, will be a source of negative visual impact on a number of visual receivers in the NENT.

Once built, the channel, bridges and related structures will generate high visual impacts on residents of recognised villages, unrecognised properties as well as other users in close proximity to the river and access roads in the NENT. Where the river channel flows through areas with few or no roads, the presence of new access roads would have a notably negative impact on a potentially large number of receivers.

In the NWNT, there are few visual sensitive receivers with views of the channels, except at the Small Traders Stream and Sha Po Tsuen. Moreover, the small-scale nature of the RDRS proposals would result in a considerably lower level of visual impact compared to the proposals in the NENT.

There is little space available for extensive landscape and visual mitigation in the NENT. Visual impacts could be reduced by screen planting where viewers are in close proximity to the channels but landscape character impacts would remain high due to the large scale nature of the proposals. Screen planting and minor channel re-alignments together with a sensitive approach to the channel design would reduce the majority of the landscape and visual impacts in the NWNT.

Waste Management

An assessment of the potential environmental impacts and the disposal options for dredged or excavated waste materials, construction waste, chemical wastes, and solid refuse generated by the RDRS works was conducted.

The Study indicated that the only disposal method for dredged / excavated materials for which there are established criteria is marine disposal, and these criteria are based on the concentrations of seven trace metals in the material, for which there are three classes of contamination. For other dredged /excavated material disposal methods, criteria do not exist, or are not clearly defined in guidance documents, whilst the criteria available for marine disposal of waste are not necessarily applicable to other disposal options.

As the most appropriate disposal method for waste material depends upon the physical, chemical, and production characteristics of the waste itself, the results of a preliminary sediment survey in the NENT, which outlined baseline material quality, were reviewed. Sediment of all classes is present in the River Indus, while the Ganges has predominantly contaminated sediment and the Beas sediments are relatively uncontaminated. Organic compounds (PCB and PAH) were measured but levels recorded were too low for detection in all samples.

Relevant previous studies of the Main Drainage Channels (MDC) project were reviewed, and show that waste materials to be generated by dredging and excavation are generally expected to be of small particle size, and have relatively low water content. Of the volume to be produced over the construction and operational maintenance phases of the RDRS, a proportion is expected to be either moderately or seriously contaminated (Class B and C) with metals. It was noted that other potentially harmful contaminants (eg organics) were not examined in these sediment tests, and thus not used as a determining factor in the storage, transportation, and disposal scenarios.

Based on the single set of contamination criteria available (ie for seven metals), an evaluation of the impacts during the construction phase, and the resulting storage, transportation, and disposal options was carried out. While the final storage, transportation and disposal options for dredged and excavated materials will be determined based on a number of factors, including input from the regulatory agencies, it was recommended that, of the dredged and excavated material:

- Class A material be reused onsite as far as possible, or transferred to landfills for use as cover (with less than 70% water by weight), subject to control of EPD.

- Class A material comprising inert material (rock, rubble, concrete, etc) be disposed in public dumps, subject to control by the Port Works Division, Civil Engineering Department.

- The fate of Class B and C material be decided following the results of the *Territory Land Drainage and Flood Control Strategy Study - Phase III Sedimentation Study* (TEL3) due to be completed in 1997. According to existing information, the recommendation of marine disposal in the East Sha Chau Contaminated Mud Pits is made until such a time as recommendations from TEL3 are available, when this decision should be reviewed.

Construction wastes will be reused or recycled to the extent feasible, and then disposed at an appropriate landfill or dump, depending on the nature of the material. Chemical wastes will be disposed at the CWTC at Tsing Yi. Solid refuse will be landfilled.

Noise

As the RDRS lies in a predominantly rural area, Noise Sensitive Receivers (NSRs) in the Study area are mostly small villages. Castle Peak Road is the major source of noise at present, however in the future there will be an influence from the development of the Western Corridor Railway and Route 3 Highway. Where villages are at a distance of greater than 1 km from Castle Peak Road the noise environment is dominated by noise associated with village and agricultural settlements.

Construction noise is expected from construction of access roads and embankments, pond draining operations, river bed excavation and dredging, construction of the concrete drainage channels and piling operations associated with bridge construction. Three levels of mitigation were suggested to minimise the construction impacts to NSRs. The first level is the use of quiet machinery and the second level is the use of permanent or movable noise barriers. The combination of these is expected to provide as much as 20 dB (A) reduction in noise at the affected NSR. If further noise reduction is required, the third level, that of on-site mitigation measures should be considered. These include the use of noise enclosures, reduction in simultaneous operation of noisy plant, siting of mobile plant as far away from NSRs as possible and switching off noisy equipment when not in use. These are expected to provide further noise reduction in construction phases.

As the plant to be employed during construction of the RDRS are unknown at the current project stage, a noise specification to be met for each stream in the RDRS was provided in the form of allowable site sound power levels for construction activities. These specify the sound power which will maintain an acceptable construction noise level during the non-restricted hours.

For any piling activities associated with bridge construction, non-percussive piling methods are strongly recommended. Concurrent construction activities should be avoided if possible.

Air Quality

The study indicated that there should be no insurmountable air quality issues as a result of RDRS works. Three potential situations which would require mitigation were identified, namely construction dust from haul roads within 80 metres of nearby Air Sensitive Receivers (ASRs), construction plant emissions from numerous pieces of heavy diesel construction plant at distances within 10 metres of nearby ASRs, and odour emissions from decomposing organic materials in excavated sediments.

Potentially unacceptable impacts associated with these situations can be overcome by employing appropriate mitigation measures. For construction dust, this includes the following:

- paving haul roads within 20 m of ASRs;
- handling dusty materials properly and securing dredged material in trucks (such as through the use of dust covers, sideboards and tailguards);
- defining a speed limit of 10 kph;
- mandatory wheel-washing for access trucks and other vehicles before using public roads, watering access roads and dusty sections of construction sites frequently; and
- transporting excavated material off-site promptly.

For construction plant emissions, suggested mitigation measures include the following:

- use only well-maintained equipment;
- reducing the numbers of heavy diesel construction plant within 10 metres of ASRs; and
- ensuring that vehicles are turned off, rather than left idling, when not in use.

For odour emissions, it was recommended that odorous stockpiled material be removed immediately.

Operation Impacts

Water Quality

Operation phase works comprise maintenance dredging, which uses similar methods as the construction phase, and thus results in similar impacts. Mitigation measures have been suggested to control these impacts, including the use of sediment traps in the new channels, dry weather flow channels, step weirs to enhance aeration, and regular maintenance dredging.

It is expected that improved flushing, reduced natural erosion and the removal of accumulated sediments will result in water quality improvements in the RDRS rivers and streams. Implementation of practical, cost effective mitigation measures for construction and operation phase impacts are expected to reduce adverse effects to acceptable levels and therefore no unacceptable residual impacts to water quality or water sensitive receivers are anticipated.

Ecology

Operation phase works will involve maintenance dredging of the new channels and silt traps. Recommendations for mitigation of the construction phase of the RDRS will therefore be incorporated into the detailed design, as far as is possible within the constraints of the project. Since, at this stage, future baseline ecological conditions are not known, operation phase impacts to ecological resources may not yet be predicted. It is anticipated that these will be assessed in later design stages of the project.

Visual and Landscape

Maintenance operations would affect sensitive receivers with views adjacent to the dredging equipment, access roads and any proposed spoil disposal areas. Due to the periodic and localised nature of these operations they would generally have a relatively low visual impact. However, sensitive receivers with views to any spoil disposal sites may experience potentially more significant, and long-term, negative impacts.

Waste Management

Operation phase works will comprise maintenance dredging to remove accumulated silt from silt traps and the new river channels. Impacts associated with these works will arise from the removal of these sediments and from any accumulated solid waste and refuse within the river channels, and are thus similar to those associated with construction works.

Dredging methods for the removal of sediment during the operational phase were reviewed from the Territory Land Drainage and Flood Control Strategy Studies Phase I (TEL 1) and Phase II (TEL 2), although, it should be noted that the appropriateness of the recommended methods are being reviewed in the ongoing TEL 3 study. Suggested mitigation measures for wastes arising during the construction phase also apply to the operation phase, and providing they are employed, impacts arising from the operation phase are not expected to occur. It was noted that recommendations from the TEL3 study, when available, should be taken into account during the operation phase.

Noise

Operation of the project is likely to involve regular maintenance dredging every four or five years. Operation works are not anticipated to cause adverse noise impacts.

Air

The operation works will comprise maintenance dredging or excavation of the channels and removal of dredged or excavated material. Since quantities of dredged material are relatively small, odour impacts are expected to be minimal providing the mitigation measures noted for construction phase works are applied.

FURTHER RECOMMENDATIONS

Timing of Work

In order to minimise impacts to sensitive receivers, particularly water quality and ecological resources, recommendations were made regarding the timing of construction work. Impacts to water quality will be reduced if construction work during the wet season (May to September) is avoided. Also, breeding birds will be disturbed by construction work between March and May, and thus this period should be avoided if possible.

To accommodate these sensitive time frames, recommendations are made which should be taken into account, as far as practicable, when designing and implementing the construction programme. These are described in detail below.

Channel excavation, earth moving and other large scale construction activities should be undertaken as far as possible between the months of October and February. Small scale construction works may be undertaken outside this period, with appropriate mitigation measures employed to reduce the impacts at sensitive receivers to a minimum.

Where major construction works must be undertaken in the sensitive period, the following restrictions should apply:

- areas identified by this study as being of high or medium ecological value should be avoided during the period March to May, to minimise impacts to ecological resources; and

- the mitigation measures provided in *Sections 3* and *4* (eg containment structures, fencing) should be implemented as far as possible to reduce the risk of disturbance to water quality and ecology.

Monitoring and Audit

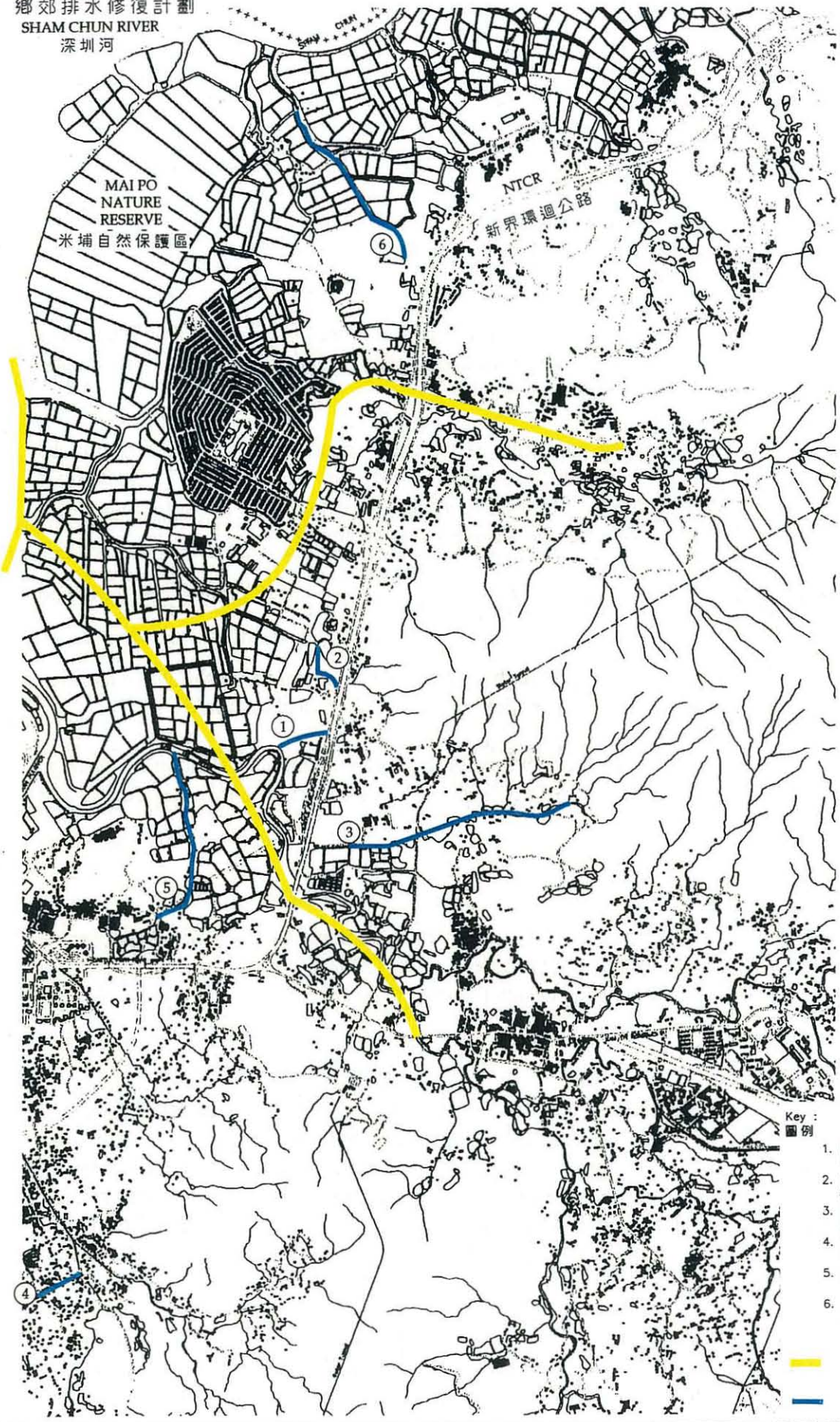
It is recommended that the application and success of the recommended mitigation measures be checked through an Environmental Monitoring and Audit (EM&A) programme. This will be defined and reported during the detailed design phase of the RDRS.

OVERALL CONCLUSION

This EIA study has assessed the impacts upon water quality, ecology, visual and landscape features, noise and air quality, also those associated with the management of waste material, that will arise from the construction and operation of the RDRS, based upon the preliminary design of the NENT streams and the current plans for the NWNT streams. The EIA has determined that no unacceptable residual impacts, ie, impacts after mitigation, will result from the construction or operation of the RDRS, given that, for those discrete sections for which unacceptable ecological impacts have been predicted, alternative measures (to the proposed design) of flood control which avoid disturbance to the river and associated habitat are recommended for consideration. Should residual impacts from alternative designs be predicted to be unacceptable, then it is recommended that two rivers, the Rivers Ganges and Jhelum, be withdrawn from the RDRS.

Mitigation measures have been proposed to minimise the environmental impacts, and it is anticipated that these will be incorporated into the detailed design for the RDRS.

Rural Drainage Rehabilitation
鄉郊排水修復計劃



NWNT
新界西北

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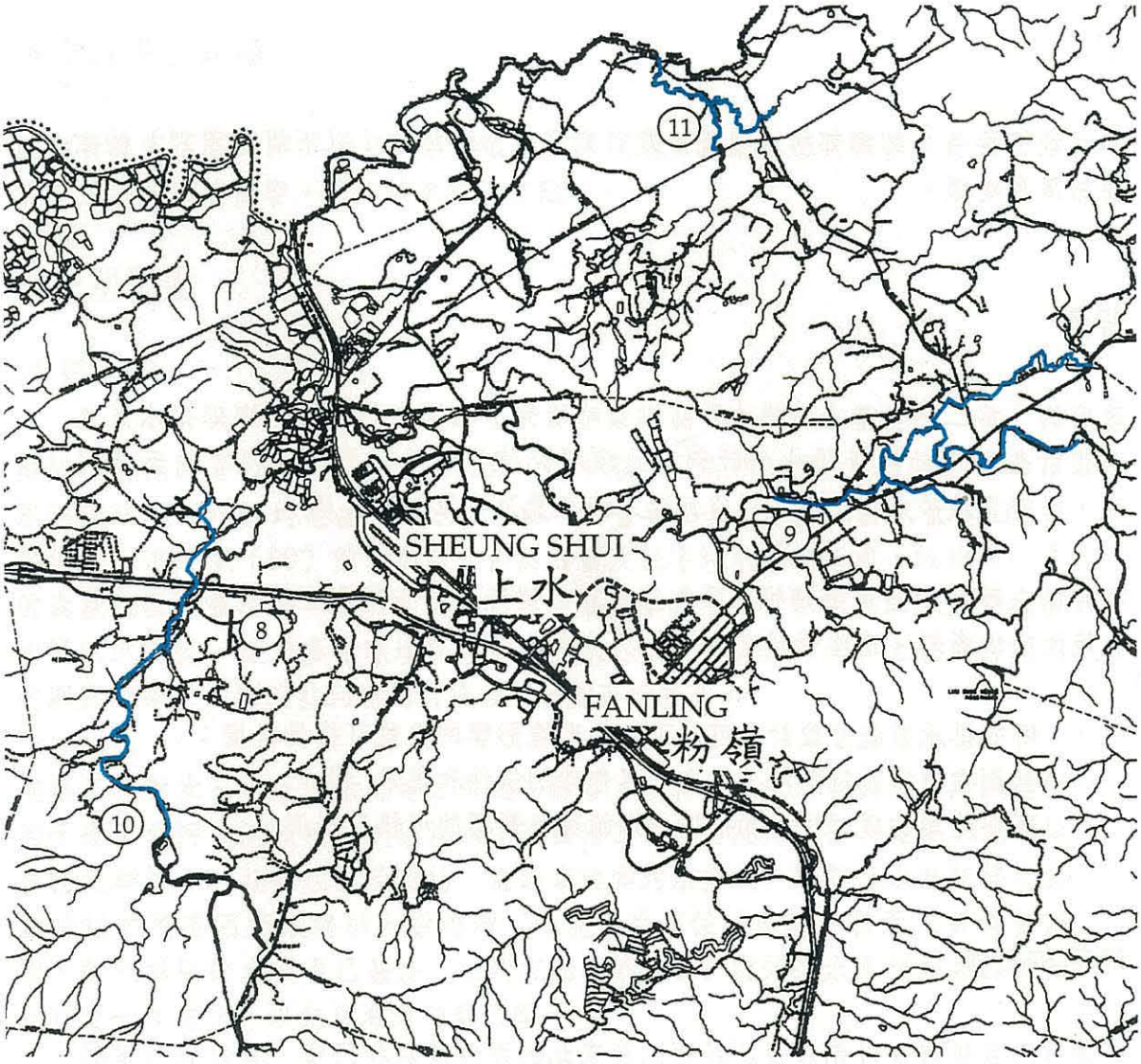
Figure
1



KEY

(8)	NGAU TEI	牛地
(9)	INDUS RIVER	梧桐河
(10)	BEAS RIVER	雙魚河
(11)	GANGES RIVER	平原河

NENT
新界東北

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萬碩

Figure
2

鄉郊排水系統修復計劃
最終環境影響評估
行政摘要

引言

本行政摘要將介紹鄉郊排水系統修復計劃環境影響評估（以下簡稱環評）的主要結果和建議。

背景

政府的「第二期全港土地排水及防洪策略研究」確認有需要施行鄉郊排水系統修復計劃和其他改善排水的計劃。此項研究建議改善新界北部現有的天然河道，以盡量減少水淹威脅、恢復河道水流容量及令維修更容易。

環評的主要目的是就鄉郊排水系統修復計劃建造及運作所產生環境影響的性質和範圍提供資料。這些資料有助作出以下決定：

- 鄉郊排水系統修復計劃可能引起的環境影響的整體可接受程度；
- 計劃在詳細設計階段、建造和運作時的條件和要求；及
- 環評建議的緩解措施實行後，殘餘環境影響的可接受程度。

建議的計劃

鄉郊排水系統修復計劃涉及新界西北及東北的九條溪流和河道，其位置可參閱圖一及圖二。

鄉郊排水系統修復計劃中的河道所在地方，主要是平坦的耕地，間有小鎮和鄉村，而元朗就是其中最大的鄉鎮。排水系統將透過擴闊修直天然河道、挖深河床、在新河道建造截沙器和溢流堰等工程加以改善，改善後的河道最後會使用水泥或天然材料鋪砌。

在峰流期間，新界西北河流集水區域內的大部分土地都可能受洪氾，新界西北的鄉郊排水修復計劃就如圖一所示包括了以下六條河道：模範鄉溪、榮基村溪、沙埔村溪、南坑排水道、小商新村溪及圍仔／米埔排水道。

新界東北的鄉郊排水系統修復計劃包括三條河流及其支流，即梧桐河（包括其支流丹山河及軍地河）、雙魚河（包括其支流古洞河）及平原河。上述河流均由經深圳河流入后海灣。

研究結果及建議

環評研究評估了鄉郊排水修復計劃在水質、生態、景觀、廢物管理、噪音和空氣質素各方面的影響。評估結果在下文簡述。

建築期影響

水質

根據環境保護署公布的水質數據顯示，除平原河上游外，雙魚河、梧桐河和平原河流域現時水質均甚差。河水中有機物、營養物含量和生化需氧量（BOD_5）數值高，溶解氧（DO）數值則低。由於禽畜及住宅污水排放入河，故此河水中的糞便細菌含量亦高。新界西北的河道由於較小及不常有水流，所以並無現有水質狀況數據。環評參考環境保護署的河水有機物含量數據，加上在環評期間的觀察結果，推斷這些河流的有機物含量亦可能甚高。

建築工程對水質及下游敏感地方引起的影響，預料主要會來自對天然河流過程的干擾、受污染沉積物再次懸浮水中而釋出的營養物及污染物、建築工地的地表徑流和排水、建築垃圾及雜物、溢漏事故和污水排放。鄉郊排水系統修復計劃函括的所有河流最終引入后海灣，此處為生態保護重點，易受水質轉變影響。雖然該區的水質現已甚差，但研究指出不應容許鄉郊排水系統修復計劃使水質進一步惡化，以免后海灣受到影響。

研究建議採取緩解措施控制水質。現時預料鄉郊排水系統修復計劃的工程會使用陸上的抓斗式疏浚機和挖泥機，而處理嚴重受污染（丙級）物料時則建議使用密封的抓斗。在工程進行期間，研究建議盡可能使用減少泥沙進入水流的方法，包括特殊的設施，供暫時改變河流方向的水道和隔沙網等。工程也應在河水流量低（旱季）時進行，以盡量減低對下游的影響。

生態

環評研究採用了「河流走廊測量法」，對鄉郊排水系統修復計劃可能引起的生態影響作出了評估，提供了大量有關現有生態狀況的數據，並確認了十八處

（參閱最終環境影響評估報告：圖 4.4e 至 4.41）需進一步研究的地點。這些研究包括了對植物、雀鳥、水生無脊椎動物、蝙蝠及蜻蜓的專門測量。

在新界西北的模範鄉、榮基村和南坑，與新界東北雙魚河支流，沿著工程河段的現有生境的生態價值較低，預料只會有極為輕微的影響。至於在新界西北的沙埔村溪和小商新村溪，和在新界東北的梧桐河、軍地河及雙魚河進行的工程，則會影響一些具有中等生態價值的地點。研究建議的緩解措施包括以下各點：

- 避免產生影響，例如改變工程設計以迴避具生態價值的地點，或考慮採用其他防洪方法；
- 補償生態環境的流失；
- 生態環境改善措施，例如提供水生植物種植點和其他重新種植原有植物的地點，和保留已被截斷的河道彎位；及
- 一般工地管理措施，例如在工地四周豎立圍板，控制塵埃及避免在鳥類繁殖季節進行工程。

若上述緩解措施得以實行，預料鄉郊排水修復計劃對生態資源並不會引致不能接受的殘留影響。

計劃中有三部分，即圍仔／米埔排水道、平原河和丹山河，會影響具高度生態價值的地點。

在圍仔／米埔進行的工程預料會涉及六個甲等魚塘，但是由於這些魚塘在工程過後將會修復，所以研究預期並無長遠的殘留影響。研究並鼓勵盡可能把握保障此段河道生態的機會。

研究認定平原河對野生動物甚為重要，尤其是鳥類及蝙蝠。由於此河為生態系統不可分割的一部分，所以儘管有緩解措施，預料仍有殘留的影響。這些影響包括了該區水中及河岸生境的流失，及其引致的物種流失。

丹山河的工程涉及擴闊及修直下游，使其成為一梯形切面的河道。丹山河及其集水區域被評定對本地及鄰近地區的野生生物甚為重要，雖有緩解措施，仍會有殘留的影響，其中包括了水中和河岸生境的流失。上述一類生境的價值在於其哺育繁多物種的能力，而這類豐富的物種組合也愈見罕有。研究建議應考慮其他方法以達致同等的防洪效果。不過，若這些方法仍會引起不能接受的殘留影響，研究則建議應撤銷在丹山河的工程。預料其他防洪設計的殘留影響將在設計較後期時加以評估。

視覺及景觀

環評指出，在鄉郊排水系統修復計劃的工地附近雖然並無正式列為高景觀質素的地方，但是計劃所涉及地區的現有景觀具其獨有特質。這些地區包括平原河、雙魚河上游、沙埔村溪上游、及梧桐河下游。梧桐河其他部分、丹山河及軍地河部分流域、及雙魚河北面流域的景觀，或多或少已受都市發展及有關的基本建設破壞，而都市化進程在未來相信仍會持續。

由於新界西北河道一帶的植被已非常稀少，故此對這些河道旁現有植被的影響將甚低。至於新界東北方面，由於現有河旁植被往往是附近景觀中唯一可見植被，故此計劃對新界東北的河流及其支流附近景觀的影響將甚高。

其他景觀影響包括新界西北現有魚塘的流失，與及遷移新界東北及西北的神龕、墓地及鄉村水井等。

由於挖土、疏浚及鋪砌河床、建造橋樑、通道及其他有關結構的工程對視覺侵擾程度高，故此預料鄉郊排水系統修復計劃將引起視覺影響。不過，許多視界可能觸及工地的住宅及工作場所，都是建於平坦低地上的低矮樓房，而在河流流域附近高地上的發展亦少。基於以上原因，對於許多並非位於工地或工地運輸道路旁的物業而言，視覺影響會稍低。在新界東北的工程將導致植被（尤其是河岸的植被）流失和建築物被拆卸，使一些原來視界不及工地的地點將受視覺滋擾。

新界東北鄉村及其他物業的居民，及在河道或通往河道道路附近的人士，都會受建成的河道、橋樑及有關結構產生的視覺滋擾影響。河道流經的一些地點，如原先並無或只有少數道路，因計劃而加建的新通道將令大量地點受影響。

在新界西北方面，除小商新村和沙埔村外，和河道有視線接觸的地點較少。再者，新界西北的工程規模較少，引起的視覺滋擾程度因而亦較新界東北方面為低。

新界東北可供大規模緩解工程的景觀及視覺影響的空間甚少。在河道旁的地點，視覺滋擾可透過裝設屏障而減低。但由於工程規模大，所以對景觀特質的影響仍會頗高。在新界西北，大部分景觀和視覺影響都可以透過裝設屏障、稍為修改河道走向，及較佳的河道設計而減輕。

廢物管理

環評就鄉郊排水系統修復計劃中挖泥或疏浚河道產生的廢料、建築廢物、化學廢物及固體廢物可能引起的環境影響和處置方法作出了評估。

研究顯示現時唯一已有既定準則，供處置疏浚或挖泥廢料的方法，就是傾卸入海，而這些準則是根據七種微量金屬的濃度而訂定，將物料污染程度分成三級。對其他處置疏浚或挖泥廢料的方法，現時要不是未有準則，就是準則在指引文件中並無明確界定，而適用於海上傾卸廢物的準則亦未必適用於其他處置廢料的方法。

至於採用何種處置方法最為適合，是取決於廢物本身的物理、化學和產生特質。基於上述理由，環評研究了取自新界東北一項沉積物初步分析的數據。三種污染級別的沉積物在梧桐河都有發現。平原河的沉積物大多已受污染，而雙魚河的沉積物則大多未受污染。在這次研究中，亦有分析沉積物的有機化合物（即多氯聯苯和多環芳烴），但所有樣本中的含量都低於可測量的水平。

環評亦參考了為「主要排水道工程」進行的相關研究。該等研究顯示疏浚及挖泥所產生廢物一般顆粒較小和含水量較低。鄉效排水系統修復計劃建造及運作維修而產生的廢料中，有部分預料為受金屬中度或嚴重污染（乙級及丙級）物料。在上述為「主要排水道工程」進行的沉積物測試中，並未有對其他可能有害的污染物（如有機化合物）作出分析，所以其他有害污染物的含量並無用作衡量儲存、運送及處置受污染沉積物的準則。

環評只根據了一套現有的沉積物污染評審準則（亦即是七種金屬），對建築期間的影響，及其後的廢料儲存、運送和處理方法作出了評估。雖然最終的廢料儲存、運送和處理方案需根據一系列的條件而訂定，其中亦要包羅管制機構的意見，但是環評仍作出了下列建議：

- 在環境保護署的管制下，甲級物料應盡量在原地再用，或轉送往堆填區作覆蓋物料（只適用於總重含水少於百分之七十的物料）。
- 在土木工程署港口工程科的管制，只含惰性物料（包括石塊、石碎和水泥等）的甲級物料應送往公眾傾卸場棄置。
- 乙級及丙級物料的處置方法則有待一九九七年完成的「第三期全港土地排水及防洪策略研究」中的「沉積研究」結果公布後才可定奪。不過，環評根據現有的資料，建議此等廢料應暫時送往沙洲以東的污泥傾卸坑卸入海中，直至第三期防洪策略研究的建議公布後再作覆核。

建築廢物應盡可能循環再用，餘下的可根據其特性送往適當的堆填區或傾卸場棄置。化學廢物應送往青衣的化學廢物處理中心。一般固體垃圾應送往堆填區。

噪音

由於鄉郊排水系統修復計劃進行地點多為鄉郊地區，可能受噪音影響的地點亦大多為小村落。現時的噪音來源主要是青山公路，將來則會有西部鐵路和三號幹線公路發展帶來的影響。若村落和青山公路之間距離超過一公里，噪音就主要只會來自村落及農舍。

預料建築噪音會來自建造通道和河堤、抽乾魚塘、挖深河床、鋪建水泥河道及打樁建橋。環評建議了三種級別的措施，以盡量減低建築噪音對附近村落影響。第一級為使用較寧靜的機械。第二級為裝設永久或可移動的噪音屏障。若同時採用上述兩級措施，可將受影響地點承受的噪音水平減低二十分貝。如果仍需減低噪音，則應施行第三級，亦即工地上的緩解措施。這些措施包括使用隔音罩、減少同時開動嘈吵機器、將流動的機器放置於離受影響地點較遠之處、及關掉嘈吵但並非使用中的設備。這些措施可進一步減低建築噪音。

由於現時未知鄉郊排水系統修復計劃將使用何種建築機械，故此環評就以可容許的建築工地噪聲功率水平的形式，提供了此項計劃每條河道工程中應遵守的噪音標準。這套準則指定了在非受管制時段內將可維持一可接受噪音水平的聲功率。

建橋時如需打樁，環評建議應使用非撞擊式的打樁方法，也應盡量避免同時進行不同的打樁工程。

空氣質素

研究顯示鄉郊排水系統修復計劃的工程應不會引起不能克服的空氣質素問題。研究認定了三種需要緩解的可能情況，即距離易受影響地點八十米以內的工地運輸道路引起的塵埃、距離易受影響地點十米以內的柴油推動重型建築機械排放的廢氣、及挖出沉積物內有機物質腐化時產生的氣味。

上述情況或會產生不能接受的影響，但這些影響都應可以適當的緩解措施一一克服。對建築塵埃可採取下列措施：

- 鋪砌好易受影響地點二十米內的工地運輸道路；
- 妥善處理易生塵埃的物料及穩固裝運經貨車運送的挖泥廢料（如為貨斗加上覆蓋、關好側板及尾板）；
- 將車速限制為每小時十公里；
- 規定貨車及其他車輛離開工地進入公用道路前必需清洗車輪，也應為進出工地的通道和工地塵埃多的部分時常灑水；及
- 盡速將挖出泥土等物料運離工地。

對建築機械的廢氣排放，建議的緩解措施如下：

- 只使用保養良好的設備；
- 盡量減少易受影響地點十米內的重型柴油機械數目；及
- 車輛用完後，應關掉引擎，不應讓引擎空轉。

對於氣味方面，環評建議應將有惡臭發出的物料立即移走。

運作期影響

水質

運作期的工程主要有保養河道的疏浚工程，所用的疏浚方法與建築期的相似，產生的影響因此亦相似。為控制這些影響，環評建議了緩解措施，包括在新河道使用截沙器、旱季水道、可為加強曝氣效果的梯級式溢流堰、及定期的維修疏浚工程。

預料水流沖刷加強、天然河道侵蝕減輕及累積的淤泥挖走後，鄉郊排水修復計劃中的河流水質可見改善。實施切實可行及合符成本效益的緩解措施後，運作期的不良影響將可減至可接受的水平，故此預料對水質或對易受水質改變影響地點，並無不可接受的殘留影響。

生態

運作期的工程包括保養河道的疏浚工程及清理截沙器等。建築期的緩解措施在可能範圍內已納入本計劃的詳細工程設計內。由於現時未知未來的生態本底狀況將會如何，故此運作期內對生態的影響仍未可料。預期上述影響將會在計劃的詳細設計階段內加以評估。

視覺及景觀

保養工程會令視界可達疏浚器材、進出通道及處理廢料地點的地方受到影響。由於這些工程都較短暫及規模較小，所以由此引起的視覺影響會較低。但是，視界可達處理廢料地點的地方卻可能承受較明顯和長遠的負面影響。

廢物管理

運作期間需進行維修疏浚工程清理堆積於截沙器及河床的泥沙。這些工程引起的影響將來自清理出的沉積物及其他堆積在河床的固體廢物和垃圾，影響亦和建築期的時候相似。

環評研究就運作期疏浚清理淤泥的方法，參考了「全港土地排水及防洪策略研究」第一、二期。不過，建議採用的辦法是否合用，仍然有待防洪策略第三期研究檢討。建議在建築期採用的緩解措施亦可用於運作期，只要切實執行這些措施，預料在運作期中並不會有影響產生。至於防洪策略第三期研究建議公布後，亦應在運作期內加以考慮。

噪音

計劃運作時每四至五年須進行疏浚工程。此等工程預料不會產生不良的噪音影響。

空氣質素

運作期間會進行疏浚工程、挖除河道淤泥及清除挖出的廢料。由於挖出的廢料量預期甚低，故此在實施建築期的緩解措施後，氣味的影響將極少。

進一步建議

工程的時間安排

為盡量減低對鄰近地方的影響，尤其是水質和生態資源方面的影響，環評就建築工程在時間上的安排提出了建議。假如能避免在雨季（五月至九月）進行工程，對水質的影響將可減低。此外，由於在三月至五月間進行的工程也會滋擾正在繁殖的雀鳥，所以亦應盡可能避免在此時段安排工程。

為避免在上述各敏感時段進行工程，環評的建議應盡可能在設計及實施工程計劃時加以考慮。這些建議在下文詳述。

挖掘河道、搬運泥土及其他大型建築活動應盡量安排在十月至二月間進行。小規模的建築工程可在此時段外進行，但應有適當的緩解措施以盡量減低對鄰近地點的影響。

若需在敏感的時段內進行大型的建築工程，需遵守以下限制：

- 為盡量減低對生態資源的影響，應避免在三月至五月間於環評研究已認定具有高度或中度生態價值的地點進行工程；及
- 在本摘要「研究結果及建議」一節中提出的緩解措施（如圍堵設施、圍欄），應盡可能實施，以減低對水質及生態的滋擾。

監測及審核

環評建議的緩解措施是否得以施行和成功，應有一「環境監測及審核計劃」查察。此項計劃會於鄉郊排水系統修復計劃的詳細設計階段訂定和作出報告。

總結

環評研究根據鄉郊排水系統修復計劃中，對新界東北河道工程的初步設計和對新界西北河道的現有計劃，就建築和運作期間可能產生的各種環境影響，包括水質、生態、視覺及景觀、噪音、空氣質素和廢物管理等各方面，都一一作出了評估。環評發現鄉郊排水修復計劃在建造或運作時都不會有不能接受的殘留影響（即經緩解後仍留有的影響）。所有預料會有不能接受的生態影響的河流段落，應考慮採用其他可達致同等防洪效果的方法，以避免滋擾河流及其有關生境。只有在此前題下，上述的結論才能成立。假若其他防洪方法亦會引起殘留影響，環評就建議應由鄉郊排水系統修復計劃中撤除平原河及丹山河的工程。

環評建議採取緩解措施，以盡量減低工程對環境的影響。預期這些措施將會納入鄉郊排水修復計劃的詳細設計中。

萬碩

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