INTRODUCTION

The purpose of this report is to present the findings of Drainage and Sewerage Impact Assessment that has been carried out on the drainage and sewerage systems including the facilities in place or planned for the proposed Kwu Tung North (KTN) and Fanling North (FLN) New Development Areas (NDAs) in the North East New Territories (NENT).

DRAINAGE IMPACT ASSESSMENT

Design Criteria

The flood protection design and the analysis of the flood levels used in the assessment followed the Stormwater Drainage Manual of Drainage Services Department (DSD). The proposed drainage systems serving the NDAs will generally be designed for 1-in-200-year events for trunk drainage system and 1-in-50-year events for branch drainage system. For those areas within NDAs which are under the influence of tidal backwater, e.g. along Shenzhen River and the rivers in the NDAs, the considered flood water level will take into account the combined tidal and fluvial flood probability.

Existing Conditions of the NDAs

For KTN NDA, the majority of the runoff from development is currently discharged to Sheung Yue River with small catchment on the west draining to Chau Tau Channel and on the north draining to Ma Tso Lung stream.

For FLN NDA, there is a series of urban catchments within Fanling and Sheung Shui, the runoff of which is being discharged to Ng Tung River.

Potential Drainage Impact

Additional stormwater runoff will be generated from the introduction of impermeable surfaces from the proposed development. A comprehensive drainage system has been proposed to replace the existing drainage channels and ditches inside the NDAs. The drainage system will be designed to convey the design flows not only from development site but also from upstream area to provide the design flood protection.

There will be an increase in surface runoff due to increase in paved areas. The drainage impacts associated with the proposed NDAs development have been assessed in the "Review of Drainage Master Plans in Yuen Long and North Districts" undertaken by DSD and the respective drainage improvement works at the surrounding areas of the NDAs were recommended. Within the NDAs, several existing drainage systems are found to have inadequate capacities and they will be upgraded or replaced by the proposed NDA drainage systems to match their land uses.

Conclusions and Recommendations

A drainage impact assessment has been carried out for the revised RODPs for the two NDAs. A comprehensive review of the existing and planned drainage networks in the vicinity of the two NDAs together with their performance has been carried out. Close coordination with the "Review of Drainage Master Plans in Yuen Long and North Districts"

Drainage and Sewerage Impact Assessments Executive Summary

has been maintained to identify the potential drainage impacts due to the NDAs Development.

To mitigate the drainage impacts, necessary drainage improvement works outside the NDAs have been recommended under the "Review of Drainage Master Plans in Yuen Long and North District" undertaken by DSD. Within the NDA areas, drainage mitigation measures have been proposed. These local drainage mitigation measures include: providing designated NDA drainage systems, necessary site formation works, improvement of existing drainage systems, drainage diversions, etc. The preliminary design of these local drainage mitigation measures will be carried out in the next stage upon reaching in-principle agreement on the revised RODPs for the two NDAs.

Based on this Stage 3 drainage impact assessment, it can be concluded that the proposed NDAs Development are feasible from drainage point of view.

SEWERAGE IMPACT ASSESSMENT

Design Criteria

The criteria are based on Environmental Protection Department's Report No. EPD/TP 1/05 Guidelines for Estimating Sewage Flows (GESF). The main relevant criteria are listed below:

Unit Flow Factors – the factor for different land uses shall be in accordance with EPD's GESF.

Catchment Inflow Factors – they are not applicable in estimating the total flows from the new development areas as stated in EPD's GESF.

Peaking Factors – under *normal condition*, peaking factors (excluding stormwater allowance) are applicable for planning sewerage facilities receiving flow from new upstream sewerage systems. Under *unclear service conditions*, peaking factors (including stormwater allowance) shall be used. For *design purpose*, peaking factors (including stormwater allowance) will be used because the proposed sewerage system will also receive sewage flows from the existing villages.

Unit Load Factors – the global unit load factors are used to estimate the sewage loading from the proposed developments in accordance with EPD's GESF.

Existing Conditions of the NDAs

For KTN NDA, the Western Trunk Sewer (WTS) along the Fanling Highway from Yin Kong to the junction with Po Shek Wu Road was completed under the North District Sewerage Stage 1 Phase 1. The construction of village sewerage connecting to the WTS was also scheduled to be carried out as part of the North District Sewerage Stage 1 Phase 1. The village sewerage works to Hang Tau, Ho Sheung Heung, Tsung Yuen and Kam Tsin is included in 4345DS – North District Sewerage Stage 2 Part 2A.

For FLN NDA, most of the area is currently unsewered as it is undeveloped and mainly located on the flood plain of River Indus.

Executive Summary

Potential Sewerage Impact

Based on the latest estimate, the proposed KTN and FLN NDAs will generate an additional Average Dry Weather Flow (ADWF) of about 33,722m³/day and 17,785m³/day respectively. The current treatment capacity of SWHSTW is 93,000m³/day which does not take into consideration the sewage flows from the NDAs Development and therefore the capacity of SWHSTW needs to be expanded. Also, taking account of the projected natural population growth in the vicinity, SWHSTW is proposed to be expanded to a capacity of 190,000/day ADWF. Apart from this, effluent standards of SWHSTW needs to be further tightened to meet the requirement of 'no net increase in pollution loading to Deep Bay'.

Treated Sewage Effluent (TSE) reuse scheme has been recommended. The TSE from SHWSTW will be supplied to the two NDAs and the North District for landscape irrigation, toilet flushing and make-up cooling water for proposed district cooling system (DCS). The total projected demand of TSE reuse for KTN and FLN NDAs are 56,500m³/day. The water quality of the TSE will meet the stringent health standards. The implementation of TSE reuse scheme requires further liaison with WSD, EPD and DSD.

Conclusions and Recommendations

Based upon preliminary sewerage impact assessment, it can be concluded that the proposed NDAs Development is sustainable from sewerage collection, treatment, reuse and disposal perspectives. Expansion/upgrading of the SWHSTW to handle 190,000m³/day ADWF is necessary to cater for sewage flows from the KTN and FLN NDAs and also for additional flows due to base growth in the sewage catchment area. In addition, TSE reuse is recommended for landscape irrigation, toilet flushing and DCS cooling water in the NDAs which will be generated by the tertiary treatment of SWHSTW.