



Architectural Services Department

Environmental Consultancy for

Provision of a Poultry Slaughtering Centre in Sheung Shui

Executive Summary

5 June 2009



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Provision of a Poultry Slaughtering Centre in Sheung Shui
Executive Summary

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1 INTRODUCTION

1.1 Background

- 1.1.1 In order to pursue the goal of segregating live poultry and the population so as to minimise the risk of an outbreak of avian influenza, the Government of the HKSAR (the Government) has proposed to develop a Poultry Slaughtering Centre (PSC) for terrestrial poultry. A site in Sheung Shui has been identified for the development of the PSC, which will comprise two identical “stalls” that provide for reception of poultry, slaughter, packing and collection.
- 1.1.2 The PSC is expected to provide freshly slaughtered chickens and a smaller number of freshly slaughtered “minor” poultry, such as pigeons, chukar, guinea fowl, pheasant, etc. The PSC products will cater for market demand for slaughtered poultry, such as from the restaurant trade, fresh provisions shops, wet markets and supermarkets.
- 1.1.3 The Government intends to provide the infrastructure and buildings comprising the PSC and will tender out each stall to a private Operator who will be responsible for fitting out the buildings and operating their stall. Under this arrangement, an Environmental Permit (EP) will be applied for, prior to commencement of site formation and construction. The two Operators will each be required to meet the operational requirements of the EP.

1.2 The Need for the Project

- 1.2.1 Avian Influenza (such as H5N1, H9N2, etc.) is a type of influenza A, known previously to infect poultry only. In Hong Kong in 1997, 18 human cases of H5N1 strain were documented, six of which were fatal. In the 1997 outbreak in Hong Kong, all live poultry in retail outlets and chicken farms were depopulated. After that incident, Hong Kong suffered a few more outbreaks in retail markets and chicken farms, in 2001, 2002 and 2008, resulting in further culling of poultry.
- 1.2.2 On 2 April 2004, the Administration briefed the Panel on Food Safety and Environmental Hygiene of the Legislative Council that for the protection of public health, the present mode of operation of the live poultry trade would have to be modified – the policy is to separate humans from live poultry and to minimise the contact between the public and live poultry.
- 1.2.3 Immediate improvement measures have been put in place over the past few years. These include vaccination of local and Mainland chickens; improved biosecurity measures in farms; daily thorough cleaning and disinfection at poultry retail outlets and wholesale market; banning of backyard poultry keeping in Hong Kong and overnight poultry keeping at retail premises.
- 1.2.4 Notwithstanding, the presence of live poultry at wholesale poultry market and retail outlets increases the risk of human infection. When the PSC comes into operation, the sale of live poultry in the Cheung Sha Wan Temporary Wholesale Poultry Market and all retail outlets will no longer continue.
- 1.2.5 The need for the PSC is therefore urgent and forms part of Government’s long-term efforts to reduce the risk of human infection of H5N1.

1.3 Project Description

- 1.3.1 The location of the Site and the ground level layout under the initial conceptual design is shown in **Figure 1-1**. The site is bounded by Man Kam To Road to the west, Hung Kiu San Tsuen to the south and vegetated area to the east and north. For hygiene reasons, the transportation route within the site for delivery of live poultry and collection of poultry products has been separated.
- 1.3.2 The PSC will be a single-storey building with part of the supporting mechanical plant on the rooftop, including boiler rooms, odour removal systems and air handling units. Two “stalls” (the main building) will each comprise loading/unloading areas; holding, killing, scalding, evisceration, packing and storage areas; isolation and inspection areas; crate cleaning and storage areas; changing rooms; and an administration office. A shared truck disinfection passageway will be provided, under the initial conceptual design.
- 1.3.3 In addition to the main building, separate ancillary buildings will also be constructed, including a government administration building, wastewater treatment facilities (WTFs) and building services plant.
- 1.3.4 The total PSC site area is about 12,791m². The site will be formed into a series of flat platforms, rising from 13.7mPD at the boundary with Man Kam To Road to a maximum elevation of 22.1mPD. The maximum external elevation will be 10m (32.1mPD), with an exhaust air stack 3m above this (35.1mPD). The main building will cover an area of approximately 5,545m² and together with the ancillary buildings, the total site coverage will be some 7,095m².
- 1.3.5 Under normal circumstances, the estimated daily throughput of the PSC will be about 20,000 chickens, however, to respond to market demands during festive periods (which occur only a few times annually, each lasting for not more than seven days), the daily maximum slaughtering capacity of the PSC will be increased to 30,000 chickens – this is considered to be the “worst case” scenario and was used as the basis for assessment in the EIA Report. Manual slaughtering of minor poultry will also take place, with a maximum slaughtering capacity of 3,000 minor poultry per day, in addition to the chickens.
- 1.3.6 The PSC is anticipated to operate all year around. The slaughtering activities to be carried out within the PSC are shown in **Figure 1-2**.

1.4 Key Programme Dates

- 2009 Appointment of the Consultant for the Design
- 2010 Site Available
- 2010 Invite Open Tender for Construction
- 2010 Commence Construction
- 2011 Invite Open Tenders for Operation of the Stalls
- 2012 Completion of Construction

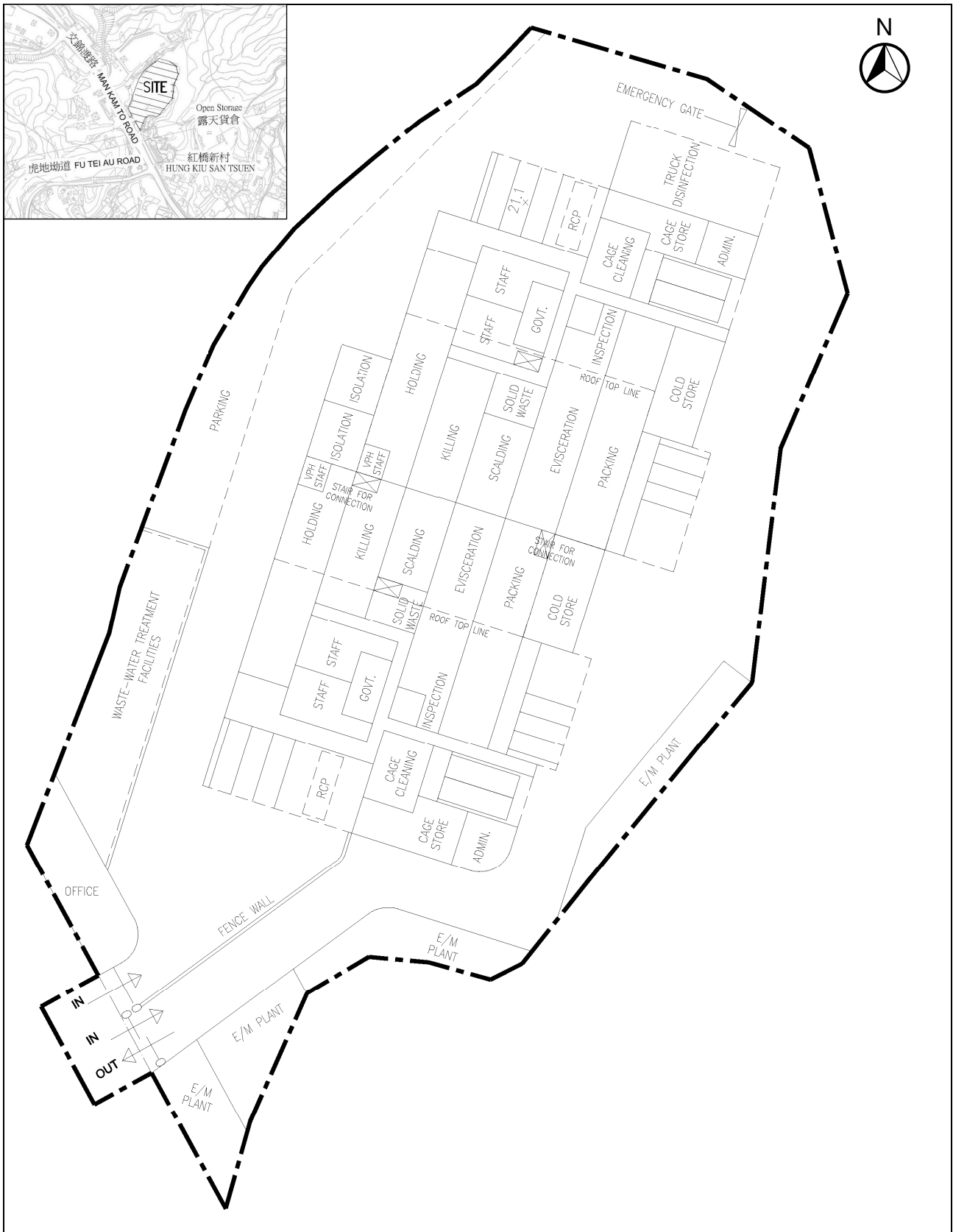


Figure 1-1 Location of the Proposed Site and Ground Level Layout of the PSC

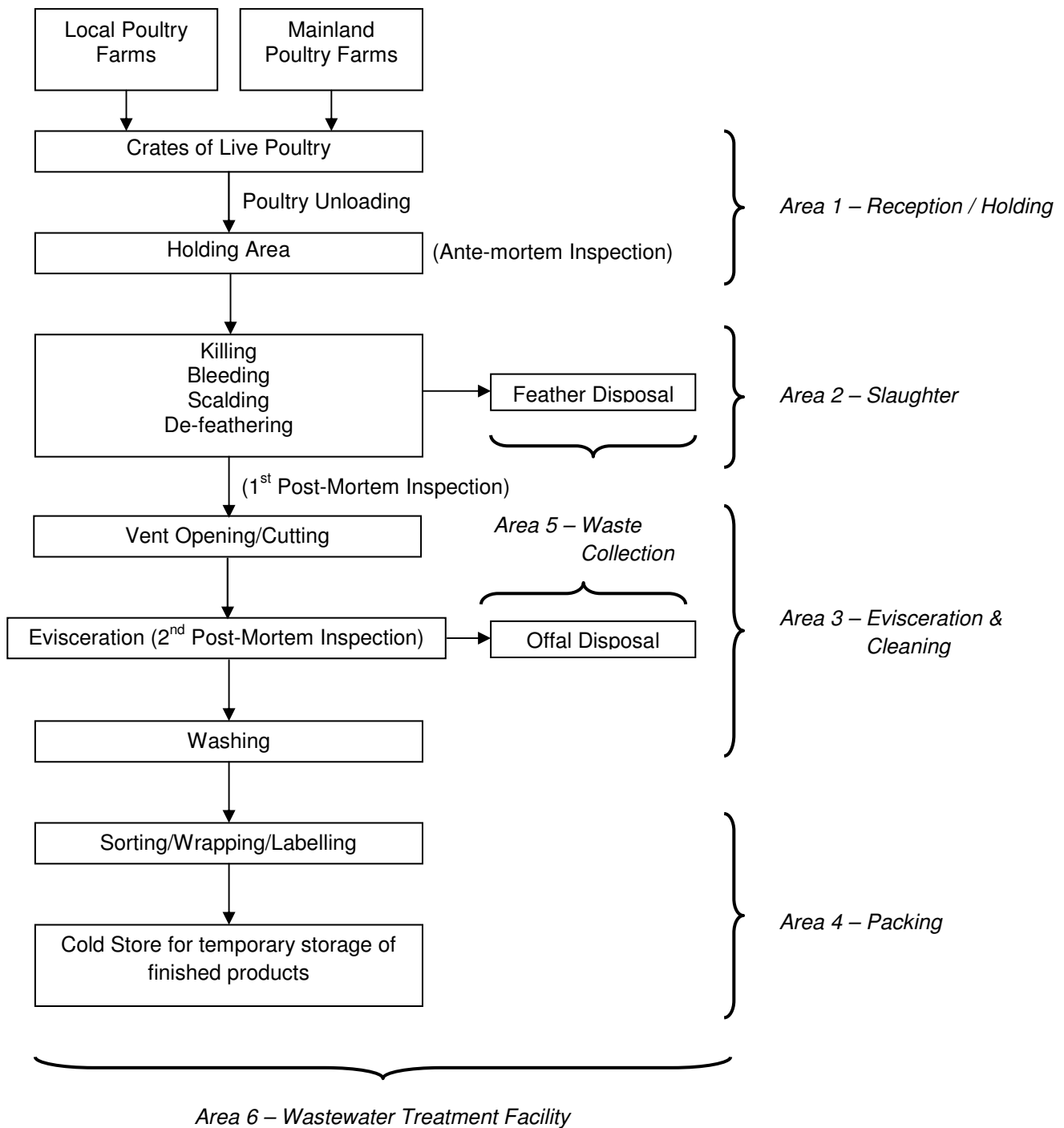


Figure 1-2 Proposed Operation of the PSC

2 SUMMARY OF POTENTIAL IMPACTS AND RECOMMENDATIONS

2.1 Air Quality

Construction Phase

- 2.1.1 Fugitive dust emission is anticipated when the certain construction activities are carried out. These include removal of existing hardstanding; site clearance; foundation works; vehicle movement on unpaved haul roads; material handling, etc.
- 2.1.2 Considering the scale of the Project and the proposed formed site platforms, deep foundation and/or extensive excavation are not anticipated. The number of construction vehicles approaching and leaving the construction site should be minimal. The existing roads will provide direct access to the site during the construction phase, therefore, vehicle movements on unpaved haul roads are unlikely. Fugitive dust emission arising from vehicle movements within the construction site is therefore minimal.
- 2.1.3 By implementing good site management, dust generation from site clearance, wind erosion and construction activities will be eliminated and no adverse impacts will be caused to the surrounding Air Sensitive Receivers (ASRs) during the construction phase.

Operation Phase

- 2.1.4 During operation of the PSC, the key air pollutants will be nitrogen dioxide from the burning of fuel for process heat (e.g. heating water in scald tanks) and odour generated from live poultry and also from the slaughtering process. The use of a towngas boiler will give minimal rise in concentrations of nitrogen dioxide within the Study Area, and will not cause significant air quality impact at the ASRs. An electric boiler will not result in any nitrogen dioxide emissions.
- 2.1.5 In terms of odour, the following processes have a potential for odour emissions and an odour assessment was carried out for each of these areas:
- **Area 1 – Reception / Holding.** Odour will be emitted from the live poultry and their faeces. A maximum of 25,350 poultry are estimated to be kept in the holding area at any one time.
 - **Area 2 – Slaughtering.** Killing, bleeding, scalding and de-feathering activities will be carried out within the slaughtering area, and odour will be emitted during most of these.
 - **Area 3 – Evisceration.** The main sources will be from offal removal and from removed offal that is collected prior to disposal. Odours include blood, raw meat and offal.
 - **Area 4 – Packing.** Odour will continue be emitted from the eviscerated carcasses, but will be significantly less compared with the odour from Areas 1 to 3.
 - **Area 5 – Waste Collection.** Odour will be emitted from poultry waste such as feathers and offal. There will be no blood recovery/processing, and so no odour emissions from this.
 - **Area 6 – Wastewater Treatment Facilities.** The raw effluent screenings, equalisation tanks, treatment processes and sludge handling and storage will emit odour.

- 2.1.6 An effective way to control odour nuisance problems is to reduce the amount of odorous gaseous emissions. There are several common odour control techniques including scrubbers, biofilters, activated carbon filters, ionisers, etc.
- 2.1.7 Dry or wet scrubbers and biofilters are widely used for removing industrial odours, whereas ionizers may also remove 90% ammonia and volatile organic compounds (VOCs) which are considered to be major odour contributors in poultry odour.
- 2.1.8 Therefore, it is recommended that an odour removal system comprising scrubbers and/or ionizers and/or biofilters should be installed with a minimum combined odour removal efficiency of 95%. This is an efficiency level readily available in commercial equipment, with devices used singly or in series.
- 2.1.9 Negative pressure will be maintained in Areas 1 to 6 by mechanical ventilation, and air-conditioning will be provided for Areas 1 to 4. Air from these areas will be treated by odour removal systems before being ducted to exhausts located on the roofs of the buildings.
- 2.1.10 By implementing a suitable odour removal system and adopting good operation practices, odour arising from the PSC will be controlled and the residual odour levels outside the PSC will not cause significant air quality impacts on nearby ASRs.

2.2 Noise

Construction Phase

- 2.2.1 Potential construction noise impacts to the nearby noise sensitive receivers (NSRs) will arise from the operation of the powered mechanical equipment (PME), such as backhoes, concrete mixers, bulldozers, etc.).
- 2.2.2 Good site practice was recommended to minimise the noise levels during construction as far as possible. Furthermore, quiet PMEs was recommended to further reduce noise. Construction of a 5m high temporary noise barrier at the south-eastern Site was also recommended, in particular during site formation/foundation works when construction noise levels were predicted to exceed the daytime noise standard.
- 2.2.3 With the implementation of these mitigation measures any potential construction noise generated during the construction phase of the Project is mitigated to an acceptable level.

Operation Phase

- 2.2.4 During the operation phase of the Project, industrial noise will arise within the Site from general exhaust fans, the odour removal system, air-cooling chillers and vehicle movements. Off-site, road traffic noise will be generated from vehicles coming to and going from the PSC.
- 2.2.5 In terms of fixed plant outside the PSC building, partial or complete enclosures with silencers at condenser fan outlets and silencers/louvers at air inlets of the enclosures for the air-cooled chillers on the roof of the PSC building are recommended. Installation of acoustic louvers is also recommended for the exhaust fans of the odour removal system.
- 2.2.6 In terms of vehicle movements within the Site, the perimeter walls already included in the conceptual design provide sufficient noise mitigation for the NSRs in Hung Kiu San Tsuen.

- 2.2.7 Potential road traffic noise impact due to the traffic generated by the PSC were assessed. Road traffic noise levels along Man Kam To Road and Jockey Club Road (from Man Kam To Road to Po Shek Wu Road) were predicted based on scenarios of with and without the PSC.
- 2.2.8 Although the predicted overall traffic noise levels (i.e. the existing background traffic plus the traffic related to the PSC) at some of the identified assessment points exceeds noise criteria, the traffic noise contribution due only to the PSC is not significant. As such, off-site traffic noise impact is considered to be acceptable, in terms of the noise contribution by PSC traffic.

2.3 Water Quality

Construction Phase

- 2.3.1 Potential impacts include construction runoff and drainage, general construction activities and sewage from workers. Mitigation measures were recommended to control construction runoff, and to minimise the chance of introducing silt and pollutants into the local storm water drainage system. Overall, no unacceptable water quality impacts were anticipated.

Operation Phase

- 2.3.2 A thorough assessment of all likely wastewater sources was carried out, comprising sewage (from workers and visitors) and wastewater from poultry slaughtering. The total process wastewater flow of $\sim 465\text{m}^3$ per day is equivalent to around 14l/bird slaughtered.
- 2.3.3 In the process wastewater, only total nitrogen and total phosphorus concentrations met the relevant discharge standard for discharge to sewer. Therefore the process wastewater will require treatment in an on-site Wastewater Treatment Facility (WTF) prior to discharge into a foul sewer leading to Shek Wu Hui Sewage Treatment Works (SWHSTW).
- 2.3.4 There will be no discharge of sewage or wastewater to any local water systems and, overall, no significant residual impact related to water quality is anticipated, provided that the WTF is properly implemented.

2.4 Sewerage and Sewage Treatment Implications

- 2.4.1 There is no local gravity sewerage system in the vicinity of the Site, however, there is a single 250mm diameter rising main running along Man Kam To Road, all the way to SWHSTW.
- 2.4.2 Discharging sewage and effluent from the WTF into this rising main was considered, but was rejected on technical grounds. Instead, it has been proposed to construct dedicated twin rising mains from the Site to SWHSTW. No impacts to the operation of SWHSTW were identified as a result of accepting effluent from the PSC.
- 2.4.3 A number of alignments for this dedicated rising main were considered and the preferred option is along Fu Tei Au Road, following the existing rising main. This alignment goes through less populated areas with less traffic flow, and so would have less impact than the other alignments.
- 2.4.4 A concept design of a suitable WTF, based on Dissolved Air Flotation (DAF) technology, has been prepared to demonstrate that the required level of treatment can be achieved using commercially available plant and equipment.

2.5 Waste Management Implications

Construction Phase

- 2.5.1 Some earthworks will be required to form the platforms on which the buildings will be constructed, although this will not be extensive. The assumed construction period is 17 months. During this time, it was estimated that ~18,956 tonnes of waste will be generated, comprising 18,931 tonnes of C&D Material (public fill); 850kg of chemical waste from on-site servicing of the Works Contractor's plant and equipment; and 24 tonnes of general refuse from the workforce will be generated.
- 2.5.2 This waste will require disposal at public filling facilities (public fill), treatment (chemical waste) or landfill disposal (MSW). There is sufficient capacity at the Tuen Mun Area 38 Fill Bank to accommodate the public fill. There is sufficient capacity within facilities in Hong Kong for the treatment of chemical wastes, and the disposal of 24 tonnes of general refuse at NENT Landfill will not significantly affect the total disposal capacity of this facility.
- 2.5.3 Overall, therefore, the waste management impacts resulting from the construction phase of the PSC are not considered to be significant.

Operation Phase

- 2.5.4 During operation, it has been estimated that the PSC will generate some 17,720kg of waste per day, comprising 9,818kg of special waste from poultry slaughtering; 1.64kg of chemical waste from plant maintenance; 7,700kg of special waste (sewage sludge) from the WTF; and 200kg of general refuse.
- 2.5.5 The daily landfill disposal of these quantities of special waste and general refuse from the PSC represents 0.78% of the daily waste intake at NENT Landfill, which averaged 2,250 tonnes/day in 2007. There is also sufficient capacity within facilities in Hong Kong for the treatment of 1.64kg/day of chemical wastes.
- 2.5.6 Overall, therefore, the waste management impacts resulting from the operation phase of the PSC are not considered to be significant.

2.6 Land Contamination

- 2.6.1 Based on the historical information and the lack of evidence to indicate any significant source of contamination has ever been present at the Site, it was concluded that the Site was not likely to be contaminated to a level likely to pose a significant risk to current or future users, waters or other receptors.
- 2.6.2 The proposed fuel tanks for the operation of the PSC (e.g. for back-up diesel generators) should be located above ground, with a bund beneath, to prevent undetected leakage (which would be a potential problem with underground tanks).

2.7 Human Health Risk

- 2.7.1 Implications to human health were examined by identifying the likely pathogens arising from operations within the PSC and the likely pathways that could lead to infection. The two main pathways were via direct or indirect contact (i.e. through handling of infected poultry or their immediate contaminated environment during the slaughtering process) and via droplet from infected poultry (i.e. inhalation of bioaerosols).
- 2.7.2 Having said that, however, in terms of potential risk there are three observations to be made:
- Firstly, health checks, sample testing and ante-mortem inspection on poultry will be carried out. It is therefore unlikely that infected poultry will ever be delivered to the PSC.
 - Secondly, in the unlikely event that infected poultry are detected at the PSC, the Operators will activate an “emergency response plan”, which will include the measure to immediately stop all slaughtering activities at the PSC. As such, the risk to workers at the PSC will be immediately reduced as the two main routes of transmission will have been eliminated. The implementation of the plan will not give rise to additional environmental impact to nearby sensitive receivers
 - Thirdly, despite evidence indicating that close contact with dead or sick poultry are the principal source of human infection with the H5N1 virus, there have been very few cases detected in presumed high-risk groups, such as commercial poultry workers.
- 2.7.3 A hierarchy of control has been developed to identify necessary mitigation measures and operational practice to be employed at the PSC that will minimise the effects on human health:
- Level 1 – Location and physical separation of the PSC from the general public
 - Level 2 – Design and layout of the PSC to reduce the risk to the local community
 - Level 3 – Operational procedures to reduce the risk to workers and the local community
 - Level 4 – Personal protection for workers

2.8 Landscape and Visual Impact

- 2.8.1 The site boundary has been configured to minimize the number of trees affected. Only eight trees within the site boundary will be removed to ensure that no vegetation will remain within the Site. One will be transplanted and seven will be felled. Compensation planting of a further eleven trees will be carried out to compensate for those felled. Shrubs along the outside of the boundary wall will also be reinstated if needed.
- 2.8.2 The largest impact on landscape resources will occur during the construction phase, when large areas of land will be used for site formation works. Landscape resources within the 500m Study Area comprise scrubland and grassland; woodland; villages and roads; and river. The mitigated adverse impacts during construction range from “negligible” to “moderate”, and during operation range from “negligible” to “slight”. Overall, the impact on the landscape character is considered to be acceptable and the landscape character will benefit from the PSC by receiving a new building with a better aesthetic outlook than the former car park.
- 2.8.3 Although planting is not possible within the Site, the visually-pleasing architectural design of the PSC will provide a better visual impact to visual receivers within the area than the former

carpark. For the residents of Hung Kiu San Tsuen, who will be the most likely affected by the PSC, the hoarding, and eventually the external façade of the boundary wall shall be well-designed to lessen the impact.

- 2.8.4 The mitigated adverse impacts to Visual Sensitive Receivers (VSRs) during construction and operation range from “slight” to “moderate”. Visual impacts are considered to be acceptable.
- 2.8.5 Overall, the landscape and visual impact of the PSC to the environment is generally acceptable upon proper implementation of mitigation measures. Although mitigation measures for the loss of trees within the Site as a landscape resource cannot be achieved, these trees will be compensated for at greater than 1:1 ratio.

3 ENVIRONMENTAL MONITORING AND AUDIT

- 3.1.1 An Environmental Monitoring and Audit (EM&A) programme for the construction and operation phases has been recommended. The EM&A requirements cover monitoring for construction dust and noise, and operational odour.
- 3.1.2 Weekly construction audits were also recommended to ensure that appropriate mitigation is being implemented effectively and in accordance with recommendations in the EIA. Full details are provided in a separate EM&A Manual.

4 CONCLUSIONS

- 4.1.1 The EIA Study has assessed the potential environmental impacts associated with the PSC, including air quality, noise, water quality, waste management, land contamination, human health risk and landscape and visual. Where appropriate, the EIA Study has recommended mitigation measures to reduce the impacts to ensure full compliance with the relevant environmental legislations and standards.
- 4.1.2 The EIA Study has predicted that the environmental impacts arising from the PSC are considered either minimal or can be mitigated to an acceptable level. Implementation of the EM&A programme as recommended will ensure that the mitigation measures are implemented properly and effectively.
- 4.1.3 In conclusion, there will be no unacceptable environmental impacts arising from the construction and operation of the PSC.