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**Sheung Shui Slaughter House**

*Executive Summary*

**FINAL REPORT**

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## EXECUTIVE SUMMARY REPORT

### *Introduction*

- 1.1 The Supplementary Environmental Impact Assessment (SEIA) study provides specific information on the individual and cumulative potential environmental impacts resulting from the Sheung Shui Slaughter House (SSSH), and details appropriate accompanying mitigation measures.
- 1.2 This Executive Summary Report highlights the major findings of the SEIA study, concentrating on issues of concern to the community; any residual environmental impacts arising from the proposed slaughterhouse, and requirements (and their basis) for implementation of the project.

### *The Proposed Development*

- 2.1 The slaughterhouse is designed to have a daily slaughtering capacity of 5,000 pigs and 400 cattle per day, and will consist of specific blocks allocated to the various different activities: unloading areas (both rail and lorry); lairages; By-Product Plant (BPP); slaughterhalls; a meat dispatch area; wastewater treatment plant; and an administration block.

### *The Study Area*

- 3.1 The study area lies within the River Indus drainage basin. The proposed site will be located in Sheung Shui adjacent to the existing Shek Wu Hui Sewage Treatment Works. The study site is on low-lying ground, with the KCR to the west, and ponds and agricultural land to the north and east.
- 3.2 Baseline monitoring of the existing environment, including air, noise and water conditions, was undertaken. The cumulative effects of the slaughterhouse's construction and operation were studied in relation to identified Sensitive Receivers (SR) - which included nearby villages. During the construction and operational phases of the slaughter house, the successful implementation of environmental protection measures is recommended to ensure impacts to the SRs are minimised.

### *Environmental Legislation*

- 4.1 Minimisation of the residual environmental impacts within the study area was a major concern of the SEIA study. The environmental guidelines, regulations and licensing conditions relate to the slaughterhouse operations are described. Due consideration was given to air, noise, water quality and solid waste disposal requirements. This legislation is adhered to for all the recommended mitigation measures throughout the report and all

guidelines and recommended limits stipulated by the Environmental Protection Department (EPD).

**Construction Phase**

- 5.1 The most significant impact in terms of air quality are predicted to result from fugitive dust from excavation activities. Noise pollution impacts will be in daylight hours only, and are not expected to be significant. There will be no untreated effluent discharge from the site. Solid wastes will be trucked away from the site, therefore site run-off is expected to be the only potential impact on nearby water quality.
- 5.2 Proposed mitigation measures will ensure the area's air, noise and water quality are not affected by the construction activities. The mitigation measures are summarised in Table 1, shown below. Requirements are detailed in the Environmental Management System (EMS) section of the study, and must be followed by any construction contractor.

Table 1: Summary of Environmental Concerns and Recommended Mitigation Measures for the Construction Phase

Environmental Consideration	Potential Environmental Impact	Recommended Mitigation Measures
<i>Construction Phase</i>		
Air	Fugitive dust  Gaseous emissions	Paving/gravelling and regular watering, covering of excavated material in trucks and piles, cleaning and maintenance of vehicles and equipment.  Few vehicles and no temporary generators.
Noise	Piling, equipment, and machinery noise	Silencers on equipment, no parallel activities, use of portable sound barriers, route planning, no temporary generators.
Water	Contamination of surrounding watercourse	No untreated run-off, re-use for dust suppression, sediment and grease traps, spillage clean-up action plan, impervious ground for chemical use.
Waste	Solid and chemical waste disposal	Separation and recycling, chemical wastes handled and disposed of appropriately.
Visual Impact	Unightly	Decorated hoardings and covered walkways, ordered site, early landscape planting.

### ***Operational Phase***

#### **Air Impact Assessment**

- 6.1 Odour emissions from the slaughterhouse received intensive study as their generation will be substantial. Modelling was conducted to ensure the worst case scenario was examined and mitigated against. Estimates of odour levels by individual source, the study area contours, and local meteorological conditions were computer modelled.
- 6.2 The modelling enabled the study of options to reduce odours by design and operations management. The resulting recommended technologies include wet scrubbers, ozone systems and neutralising agent systems.
- 6.3 Two options for a BPP, with mitigation measures will have odour impacts within the EPD guidelines. These are: a full scale BPP with 5 stack dispersion and a reduced scale BPP. The client departments decided that only a reduced scale BPP (in the form of a blood coagulation plant to deal with waste blood) will be built. The condemned carcasses and coagulated blood will be sent to the Centralised Incineration Facility (CIF) for incineration and to landfill for disposal respectively.
- 6.4 With the adoption of the above technologies, and operations management, (see Table 2), the odour impacts of the slaughterhouse will be within the EPD guidelines, and will pose no nuisance on the surrounding Sensitive Receivers.

#### **Noise Impact Assessment**

- 7.1 The likely sources of noise arising from the proposed slaughterhouse have been identified, through noise surveys of Kennedy Town Abattoir, and noise modelling techniques. The early hours of operation of the slaughterhouse make potential noise impacts a concern for the surrounding communities, and the Government.
- 7.2 The predicted on-site (including transportation, slaughterhouse operations, unloading activities, and plant machinery) and off-site (trains and lorries) noise impacts have been studied. Mitigation measures have been developed, as shown in Table 2, which will ensure the slaughterhouse operations have noise impacts within the EPD guidelines on the study area.

#### **Wastewater disposal**

- 8.1 Wastewater high in organics and nutrients are synonymous with slaughterhouse operations. Wastewater treatment requirements are identified, and a recommendation made for the optimal treatment process. Options were considered on their removal performances of organic matter and nitrogen.
- 8.2 A Sequencing Batch Reactor is the recommended technology combined with an extensive collection and drainage system, and will ensure that the local water quality is not affected. Only unpolluted stormwater will be discharged into the water course. The treated effluent from the plant will be discharged into the Shek Wu Hui Sewage Treatment Works.

Implications arising from the adoption of the preferred treatment technology, including plant location and cost breakdowns, are detailed in the SEIA.

- 8.3 Water management technologies and procedures will ensure the slaughterhouse's water requirements are minimised. Hot and warm water generation in slaughterhouses contribute significantly to energy consumption, the adoption of solar energy has therefore been proposed.

### **Waste Management, Recycling and Disposal**

- 9.1 Slaughterhouse operations produce significant quantities of solid waste. The impact of solid wastes generated will be addressed by ensuring the minimisation and segregation of wastes, to maximise recycling potential and to ensure that further wastes are efficiently and safely stored and disposed of.
- 9.2 Wastes generated include blood, paunch contents, hair, condemned meat & offal, lairage waste, wastewater solids, sludge, and office waste. A full scale BPP would process all the condemned meat and offal and the coagulated blood into blood and bone meal. A reduced scale BPP would process the coagulated blood only. Blood coagulum, wastewater treatment plant sludge and other solid wastes shall be properly disposed to sanitary landfill, if necessary.
- 9.3 Options for sludge management, and procedures ensuring the reduction of waste contamination, are detailed in the SEIA. Chemicals used and chemical wastes generated will be safely managed. Recommended mitigation measures are summarised in Table 2.

### **Impacts on Land Use**

- 10.1 The surrounding environment should not be affected by the proposed slaughterhouse development, if appropriate mitigation measures are adopted as discussed in the body of the report, see Table 2. The wastewater management option decided upon will have implications for the upgrading and/or expansion of the Shek Wu Hui Sewage Treatment Works. Future land uses must not infringe upon the green belt buffer-zone (which is the zone within which the recommended 5 odour units is exceeded), and full consideration must be given to future developments and their impacts on the SSSH operations.

### **Visual Impacts**

- 11.1 The low-lying site, and the proposed low-level design, mean that the visual impacts of the development will be minor. Planting and landscaping measures will further minimise the slaughterhouse's visual impact, such as site periphery planting and screen planting, summarised in Table 2.



Table 2 : Summary of Environmental Concerns and Recommended Mitigation Measures for the Operation Phase

Environmental Consideration	Potential Environmental Impact	Recommended Mitigation Measures
<i>Operation Phase</i>		
Air	Emissions	
	On-site Odour	State of the art odour reducing technologies i.e. odour neutralising agent, wet scrubbers, ozone; high stack dispersion; negative pressure in buildings so no leakage; pigs from China cleaned on arrival.
	Off-site Odour	Livestock and trucks washed before transit to Tsuen Wan, containerised waste to landfill.
Noise	Animals and plant activity	Acoustically treated panels and silencers in the lairage.
	Traffic noise	Sound barrier (700m long, 3m high) along Po Wan Road.
	Meat dispatch area, train noise	Sound barriers erected along the north, west and south-east of site boundary.
Water	Contaminated effluent discharge	Specifically designed, fully automatic, underground wastewater treatment plant, reduce and re-use practice, effective internal drainage network
Waste	Solid and chemical waste disposal	Separation and recycling, chemical wastes handled and disposed of appropriately, by-product plant to reduce/recycle, sludge used as soil conditioner on farmland, minimum wastes to landfill.
Impact on Land Use	Incompatibility with other land uses	Present surrounding land use (agriculture and ponds) maintained through "buffer zone", no drainage impact
Visual Impact	Unightly	Landscaping and site periphery planting, additional screen planting, sensitive colour schemes and choice of building materials.

### *Environmental Management System*

- 12.1 The Environmental Management System (EMS) will be the framework of "green" slaughterhouse operations. Developed to be a natural extension of operations management, the EMS will assure environmental compliance, and demonstrate such compliance to the Government, the general public, and others.
- 12.2 The EMS provides the framework for personnel structures and operational controls. Environmental objectives and targets for both the construction and operational phases of

the slaughterhouse aim to ensure the impacts on the surrounding environment are minimal and within the stipulated regulations and guidelines. Mitigation measures and action plans to comply with the environmental objectives are detailed. Environmental monitoring & audit requirements will ensure the environmental performance of the slaughterhouse is maintained, and continually improved.

### ***Conclusions and Recommendations***

- 13.1 During the construction of the proposed slaughterhouse, there are potential environmental nuisances which must be minimised. With the adoption of the mitigation measures identified in the study, the construction phase will only impact on the study area within Government regulations and guidelines.
- 13.2 Slaughterhouse operations without environmental controls will result in significant impacts on the surrounding area. The effective mitigation measures identified in the SEIA study to maintain the area's air, noise and water quality must be adopted. The slaughterhouse, if built with the proposed mitigation technologies and if managed under the proposed EMS, will have minimal impact on its surrounding area and will operate within Government legislation and EPD guidelines.

## 摘要

### 引言

- 1.1 附加環境影響評估 (SEIA) 旨在提供數據關於建議中的上水屠房可能對環境造成的個別及長期的正面和負面影響，並且提供緩解措施。
- 1.2 此摘要主要報告附加環境影響評估的研究結果。尤其集中在社會人士所關注的問題，包括建議中的上水屠房對環境造成的影響和履行此項目的要求及根據。

### 建議中的發展計劃

- 2.1 屠房的設計每日處理量為 5,000 隻豬，400 頭牛，同時會分設地方予不同的工序如：卸收貨區（包括火車和貨車）、蓄養欄、副產品廠、屠宰場、鮮肉發貨區、污水處理廠和辦公室。

### 研究範圍

- 3.1 研究地區位於梧桐河水域範圍內。建議中的屠房位於上水石湖墟污水處理廠側。研究地點是低地帶，西面有九廣鐵路線，東面及北面分別為池塘及農地。
- 3.2 環境本底監察項目包括空氣、噪音和水質經已確定。屠房施工和運作期間所造成的累積影響，包括評估附近鄉村環境敏感的地方。建議當成功地履行環保措施後，環境敏感地方的污染影響應減至最低。



## 環保法例

- 4.1 減低對研究範圍內環境造成影響是本評估研究主要所關注的問題。屠房運作需要從有關環保指引，法例和發牌制度而進行。而對於空氣、噪音、水質和固體廢物棄置的要求亦予以考慮。報告中所建議的緩解措施必須遵從法例和環保署的要求。

## 施工階段

- 5.1 預計由挖掘工程產生的灰塵將對空氣質素造成影響。噪音污染只限於日間，故問題並不大。未經處理的污水不會從工場中排出。固體廢物將會從工場運走。故預計由下雨引致的工場地面水將是影響鄰近水質的主要原因。
- 5.2 建議中的緩解措施可確保施工活動不會對地區的空气、噪音、水質造成影響。表一總結了有關的緩解措施。而需求則詳述於環境管理系統中，施工階段的承建商必須遵從。

表一：施工階段產生的環境問題及建議中的緩解措施摘要：

環境問題	潛在的環境影響	建議中緩解措施
施工階段		
空氣	散出發出的塵埃  氣體散發	鋪路，鋪石子、例行灑水工作、清潔及保養車輛及機件。  減少車輛數目及不設臨時發電機。
噪音	打樁、裝備、機械噪音	機件消聲器、避免同時進行多項活動，使用手提式噪音屏障、路線規劃、不設臨時發電機。
水	污染鄰近水道	避免未經處理的流水溢出；壓制塵埃再用、沉澱物及油脂隔濾器、溢出的水的清潔行動計劃。不滲透地面上方可使用化學物品。
廢料	固體及化學廢料棄置	分隔，再用，適當地處理及棄置化學廢料。
視覺影響不雅觀		作裝飾用的圍欄，建設有蓋行人道、整理工場秩序、多種植樹木。

## 運作階段

### 空氣影響評估

- 6.1 因為屠房有嚴重的氣味，已作出有關這方面的詳盡研究。所有數學模擬是以最差的情況來作評估及以有效的緩解措施解決困難。此評估亦包括了在個別來源的各氣味（臭味）水平的估計、研究範圍的等高氣味線圖和當地天氣數據的數學模擬結果。
- 6.2 數學模擬詳細描述設計上和運作上減低氣味的方法。建議的處理屠房空氣技術包括濕式洗滌器、臭氧系統和中和劑系統。
- 6.3 對副產品廠而言，有兩項選擇，緩解措施都符合環境保護署的規例，將沒有氣味（臭味）的影響，這些包括完整規模的副產品廠（經過 5 座煙囪擴散）和一間縮小規模的副產品廠。顧客部門只要求興建一間縮小規模的副產品廠（以血塊廠處理廢血的形式）腐壞的屍體和血塊將被運往中央焚化設施（CIF）焚毀和堆填區棄置。
- 6.4 實施以上技術和運作管理（見表 2），上水屠房的氣味（臭味）影響都符合環境保護署的規例，亦不對周遭的噪音感應強的地方造成滋擾。

### 噪音影響評估

- 7.1 利用了 在堅尼地城的噪音調查和聲音數學模擬，已知道可能產生噪音的來源。屠房在清晨產生的噪音影響，引起附近居民和政府的廣泛關注。
- 7.2 屠房內（包括交通、屠房運作、卸收貨機械操作）和屠房外（火車和貨車噪音）的噪音影響亦已研究。緩解方法亦已提出，以確保在操作時不會對研究範圍造成嚴重噪音影響。（如表 2 所列）

## 廢水的排放

- 8.1 屠房的運作會產生含有高有機物和營養量的廢水。廢水處理的要求已被評估，同時亦作出了建議關於最佳的處理過程。處理選擇工藝已考慮是否有效去除廢水的有機物和氮。
- 8.2 建議採用連續式生物反應池及廣大的收集及排水系統技術，以確保當地水質不受影響。只有未受污染的雨水才會排入引水道。處理廠排出的經過處理的污水會流入石湖墟污水處理工程。在選取適當的處理技術時相關考慮情況，如處理廠的空間要求、位置和成本效益，都已詳細描述。
- 8.3 有效的用水管理和程序可使屠房用水量減低。屠房中的熱水和暖水的使用耗電量大，故建議使用太陽能。

## 廢物管理、循環再造和棄置

- 9.1 屠房運作時，會產生大量固體廢物。固體廢物的處理，在於確保減少和分隔所產生的廢物及盡量將廢物循環再用，並確保廢物有效地及安全地儲存和棄置。
- 9.2 屠房產生的廢物包括血塊、肚腹廢物、毛髮、壞肉和內臟、蓄養欄廢物、廢水污物、污泥和辦公室垃圾。完整規模的副產品廠可處理壞肉及內臟。縮小規模的副產品廠只可處理血塊。如有需要的話，較大的血塊、廢水處理廠的污泥和其他固體廢物可運到堆填區。
- 9.3 評估亦包括對污泥和化學物的管理和程序，用以確保減除污染。化學品及屠房產生的化學廢料亦會得到安全的管理。圖表 2 總結了建議的緩解措施。

## 土地運用的影響

- 10.1 如選用此報告所討論的適當舒緩措施，建議中的屠房的發展應該不會影響現時的環境。見圖表 2。

廢水管理的選擇或會令石湖墟污水處理廠考慮增加設施和擴建，將來的土地運用不能違反綠帶緩衝區，（在這區內，建議可超過 5 個氣味單位），同時日後附近環境的發展對屠房的影響亦要作全面的考慮。

## 視覺影響

- 11.1 建議中的屠房位於較低地勢，並且是低層設計，故引起的視覺影響並不大，可以配合不同計劃和園林設計的改善，把視覺影響減至最低，例如在工場周圍種植樹木及種植樹叢，這都總結在圖表 2。

## 環境管理系統

- 12.1 環境管理系統令到屠房運作是對環境友善，是一個自然溶入的管理計劃，這系統將會確保上水屠房遵從自己的環保政策，並且讓政府和大眾知道它是對環境負責。
- 12.2 環境管理系統提供人事和運作管理的架構。施工和運作階段的環保指標可確保屠房不會對周圍環境造成嚴重的影響。達至環境指標的緩解措施和行動計劃已詳細列出。環境監測和審核的需求可確保屠房的環保成就可維持並不斷改進。

圖表 2：運作階段的環境考慮及建議緩解措施的總結

環境考慮	環境影響之可能性	建議的緩解措施
運作階段		
排放空氣	工場內的氣味  工場外的氣味	採用減低氣味的先進科技，即是氣味中和劑，濕式洗滌器，臭氧，建築物內的負氣壓；清洗由中國運入的豬隻。  運送牲畜到荃灣前，必須將牠們及貨車清洗。以密封容器儲存廢料到堆田區。
噪音	動物及工廠的活動  交通噪音  肉類發放市場、火車噪音	在棚內安置處理屏障及靜聲器。  沿着寶運路及建築聲音阻隔屏（七百米長及三米高）。  在工場外的北面，西面及東南面架起聲音阻隔屏。
水	污水排放	特別設計，全自動地下廢水處理廠。減少用水及再用水。有效的內置排污系統。
廢物	固體及化學廢物處理	分開及循環再造，適當地處理及處置化學廢物，減少或循環再造副產品廠的廢物，淤泥用作有機耕種，減少堆田的廢物。
土地使用	與其他土地使用的不協調	以“緩衝區”保持現在的周圍土地使用（農場及池塘），沒有排污影響。
影响視覺影响	質差的視覺環境	土地及工場周圍種植樹木，和樹叢，適當顏色協調及建築物的使用。

## 總編及建議

- 13.1 建議中的屠房在施工階段間對環境造成的滋擾必須減至最低。如配合本評估報告建議的緩解措施，施工階段只會對研究範圍造成符合政府規則的影響。
- 13.2 屠房運作如缺乏適當的環境管制，將對周圍環境造成嚴重的影響。本評估已確定有效的防污和緩解措施以維持空氣質素、噪音量和水質。再配合適當的環境管理系統下運作，其對周圍環境將不會造成嚴重影響及符合政府訂法例和環保署的規定。