For discussion
On 30 March 2009

Legislative Council
Panel on Environmental Affairs

233DS – Sludge Treatment Facilities

PURPOSE

This paper seeks Members' support for the Administration's proposal to upgrade **233DS** – Sludge Treatment Facilities to Category A at an estimated cost of $5,160 million in money-of-the-day (MOD) prices, prior to submission to the Public Works Subcommittee (PWSC) for consideration with a view to seeking Finance Committee (FC)'s funding proposal.

PROPOSAL AND JUSTIFICATION

2. Since the cessation of marine disposal of sludge in 1996, all dewatered sewage sludge (sludge) generated by sewage treatment works (STW) are disposed of at the three strategic landfills. However, despite the application of dewatering prior to its disposal, sludge still retains approximately 70% by weight of water. In order to avoid causing operational and slope stability problems at the landfills, the sludge is mixed with municipal solid waste (MSW) and/or construction waste in a ratio of about one to ten (sludge : waste) before their co-disposal at the landfills.

3. While the commissioning of Stage 1 of the Harbour Area Treatment Scheme (HATS) in 2001 has helped to improve the general water quality of Hong Kong, it also produced a large quantity of sludge. It is essential to have at the same time dedicated and appropriate treatment and disposal means to handle the sludge generated on a daily basis. The planned progressive expansion of HATS together with the expansion and upgrading of other existing regional STW (including Pillar Point STW and San Wai STW), would result in further increase in the amount of sludge requiring disposal from the current quantity of about 800 tonnes per day to some 1,500 tonnes per day by 2014 and subsequently over 2,000 tonnes per day in 2020.

4. The current practice of sludge disposal at landfill is not sustainable from both environmental and technical perspectives. Landfilling of sludge would generate

environmental impacts such as leachate and greenhouse gas which require further mitigation measures to deal with. Furthermore, apart from the occupation of precious landfill space, the significant increasing quantity of sludge will undermine the assimilative capacity[1] of our landfills to handle sludge safely and could lead to slope failure at the landfills, thereby causing severe disruption to the safety and waste disposal operations at the landfills. With the current quantity of 800 tonnes per day of sludge, the ratio of sludge : waste is already just meeting the one to ten[2] ratio. When Stage 2A of HATS is commissioned in 2014, the sludge : waste ratio of one to ten will not be met.

5. In view of the anticipated significant increase in the quantity of sludge requiring disposal, the Environmental Protection Department (EPD) completed the "Sludge Treatment and Disposal Strategy Study" in 1999. The Study recommended that all dewatered sludge in Hong Kong be incinerated in a centralized treatment facility. This recommendation was endorsed by the Advisory Council on the Environment (ACE) in January 2000.

6. We then conducted a comprehensive site search with a view to identifying the most suitable site for the proposed Sludge Treatment Facilities (STF). Nine potential sites were short-listed for detailed assessment based on various essential selection criteria including environmental implications (noise, air quality, water quality, ecology, visual and landscape), engineering feasibility (ease of construction, geotechnical conditions, water and power supply, wastewater treatment), transportation, town planning and financial considerations. In 2003, the eastern end of the ash lagoon at Tsang Tsui near Nim Wan, Tuen Mun, was identified as the most technically viable location for the STF. The site is remote from residential areas, with no planned developments, and is accessible by both road and sea. Most importantly, the development of STF at the site would have no unacceptable impacts on air quality, water quality, marine ecology and fisheries, terrestrial ecology as well as landscape and visual aspects. A location plan showing the location of the STF is at **Enclosure 1**.

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[1] Assimilative capacity refers to the capacity of landfill for safe disposal of sludge. Sludge is a very soft material. To avoid adversely affecting the stability of landfill, sludge needs to be mixed with solid waste at a sludge-to-waste ratio of not exceeding one to ten. The quantity of sludge that can be disposed of safely at landfill is therefore limited by the quantity of solid waste available to meet the mixing ratio.

[2] In 2008, total quantity of sludge and other types of wet/soft waste which required co-disposal (including waterworks sludge, livestock waste and dredged waste etc) was 1,220 tonnes per day. To avoid affecting the stability of landfills, these wastes need to be mixed with MSW and construction waste in a ratio of one to ten. In the same year, the available quantity of MSW and construction waste was 12,072 tonnes per day.

7. The proposed STF will have a designed capacity of 2,000 tonnes per day and it will provide treatment for sludge generated from HATS (i.e. Stonecutters Island STW) and ten other regional STWs, including the Pillar Point STW, San Wai STW, Sham Tseng STW, Siu Ho Wan STW, Sai Kung STW, Shatin STW, Shek Wu Hui STW, Stanley STW, Tai Po STW and Yuen Long STW by means of high temperature incineration technology to substantially reduce the volume of sludge by 90%[3]. The much reduced volume of incineration ash produced would be disposed of at landfills. The recommendation of adopting high temperature incineration was also unanimously supported by an Independent Advisory Panel. This Panel was formed in 2005 and comprised four renowned academic members from the University of Hong Kong, Hong Kong University of Science and Technology and Hong Kong Baptist University to provide independent views on the technology options.

8. The STF is an essential and integral part of the HATS programme. It would not be technically possible or environmentally sustainable for HATS Stage 2A to proceed alone without a dedicated and sustainable outlet for the handling of the sludge arising from the Scheme. At the meeting of the Panel on Environmental Affairs on 15 December 2008, the Paper CB(1) 363/08-09(05) for 341DS – Harbour Area Treatment Scheme, Stage 2A – Construction of the Sewage Conveyance System and Upgrading of Stonecutters Island Sewage Treatment Works and Preliminary Treatment Works was discussed. During the discussion, Members had expressed concerns about the treatment and disposal of the sludge generated by HATS Stage 2A and urged the Administration to expedite the implementation of the STF project.

9. The scope of **233DS** comprises –

(a) design and construction of a sludge treatment facility of capacity of 2,000 tonnes per day;

(b) provision of ancillary facilities;

(c) provision of environmental educational and associated facilities; and

(d) environmental monitoring during the construction stage

A conceptual layout plan showing the proposed works is at **Enclosure 2**.

10. We plan to commence the design and construction work in early 2010 for commissioning in end 2012. We plan to implement the project in two phases, phase

[3] The remaining 10% dry and inert ash can be disposed of at landfills without causing the abovementioned landfill stability problem.

1 with a capacity of 1,600 tonnes per day will be commissioned in end 2012 while phase 2 to the full capacity of 2,000 tonnes per day will be commissioned in 2016.

FINANCIAL IMPLICATIONS

11. We estimate the capital cost of the proposed works to be about $5,160 million in MOD prices.

12. We estimate that the annual recurrent expenditure arising from the operation of the completed STF is about $145 million upon full commissioning.

13. We estimate that the design and construction of the proposed works will create about 613 jobs (557 labourers and another 56 professional/technical staff) providing a total employment of 18,718 man-months. In addition, we estimate that the operation of the STF will create 60 permanent jobs (26 labourers and another 34 professional/technical staff).

PUBLIC CONSULTATION

14. We have adopted a continuous public involvement process with the Tuen Mun District Council and other local representatives throughout the Environmental Impact Assessment (EIA) Study of the STF project. We consulted the Environment, Hygiene and District Development Committee and the Working Group on Development and Planning of Tuen Mun District of the TMDC, as well as all five Tuen Mun Area Committees from 2007 to 2008. In addition, we have organized roving exhibitions in the Tuen Mun district and arranged outreach programmes for schools in Tuen Mun to introduce the STF project to the local community.

15. We consulted the TMDC on 6 January 2009 on the findings of the EIA Study and the latest development of the STF project. The TMDC objected to the siting of too many perceivingly unwelcomed public facilities in Tuen Mun and requested a joint meeting with the relevant Directors of Bureau to discuss the overall planning and development of Tuen Mun. In response to the TMDC's request, the Environment Bureau has taken the lead to set up a working group with representatives from relevant bureaux and departments as well as TMDC. The Administration is fully committed to forging a close working partnership with the TMDC to map out strategies and measures to promote the development of Tuen Mun. We reported our proposal to the TMDC on 3 March 2009. While members welcomed the proposed

partnership arrangement, they demanded that the discussion outcome should be made available before the LegCo approves any funding proposal. However, we would like to reiterate that the STF is an essential and integral part of the HATS programme and it is neither technically nor environmentally acceptable for HATS Stage 2A to proceed without a dedicated and sustainable outlet for the sludge arising from the Scheme. We will continue to work with the TMDC and the relevant bureaux and departments on measures to promote the development of Tuen Mun. The first working group meeting will be held on 27 March 2009.

16. A summary of the public consultation activities is at **Enclosure 3**.

ENVIRONMENTAL IMPLICATIONS

17. **233DS** is a designated project under the EIA Ordinance and an environmental permit is required for its construction and operation. The EIA report was approved under the EIA Ordinance on 19 February 2009. The project would comply with the established standards stipulated under the EIA Ordinance.

18. For short term impacts during construction, we will control noise, dust and site run-off to levels within established standards and guidelines, through the implementation of mitigation measures such as the use of quiet construction plant to reduce noise generation, water-spraying to reduce dust emission and proper pre-treatment of site run-off. We will also carry out close site inspections to ensure that these recommended mitigation measures and good site practices are properly implemented.

19. We have considered the foundation design and use of precast concrete units in the planning and design stages to reduce the generation of construction waste where possible. In addition, we will require the contractor to reuse inert construction waste (e.g. excavated soil and demolished concrete) on site or in other suitable construction sites as far as possible, in order to minimize the disposal of inert construction waste to public fill reception facilities[4]. We will encourage the contractor to maximize the use of recycled or recyclable inert construction waste, as well as the use of non-timber formwork to further minimize the generation of construction waste.

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[4] Public fill reception facilities are specified in Schedule 4 of the Waste Disposal (Charges for Disposal of Construction Waste) Regulation. Disposal of inert construction waste in public fill reception facilities requires a licence issued by the Director of Civil Engineering and Development.

20. We will also require the contractor to submit for approval a plan setting out the waste management measures, which will include appropriate mitigation means to avoid, reduce, reuse and recycle inert construction waste. We will ensure that the day-to-day operations on site comply with the approved plan. We will require the contractor to separate the inert portion from non-inert construction waste on site for disposal at appropriate facilities. We will control the disposal of inert construction waste and non-inert construction waste to public fill reception facilities and landfills respectively through a trip-ticket system.

21. We estimate that the project will generate in total about 125,600 tonnes of construction waste. Of these, we will reuse about 91,600 tonnes (73%) of inert construction waste on site. In addition, we will dispose of 34,000 tonnes (27%) of non-inert construction waste at landfills. The total cost for accommodating construction waste at landfill sites is estimated to be $4.25 million for this project (based on a unit cost of $125/tonne[5] of waste disposed of at landfills).

22. The STF will incorporate various green design concepts to make the STF an environmentally friendly facility. Apart from employing the most advanced incineration technology which ensures compliance with very stringent environmental control standards[6] and 90% volume reduction of waste, renewable energy from the incineration process would also be recovered for daily operation and other gainful use as appropriate. Furthermore, the STF will be equipped with a desalination plant to provide fresh water supply and a high level wastewater treatment plant to recycle the wastewater for on-site cleaning and irrigation.

23. We will include a requirement in the design-build-operate contract provisions that the architectural design should be creative and attractive to make the STF an eco-friendly and eye-pleasing infrastructure. In this regard, we will proactively engage the TMDC with a view to incorporating its advice where possible and appropriate in the design and development of the facility

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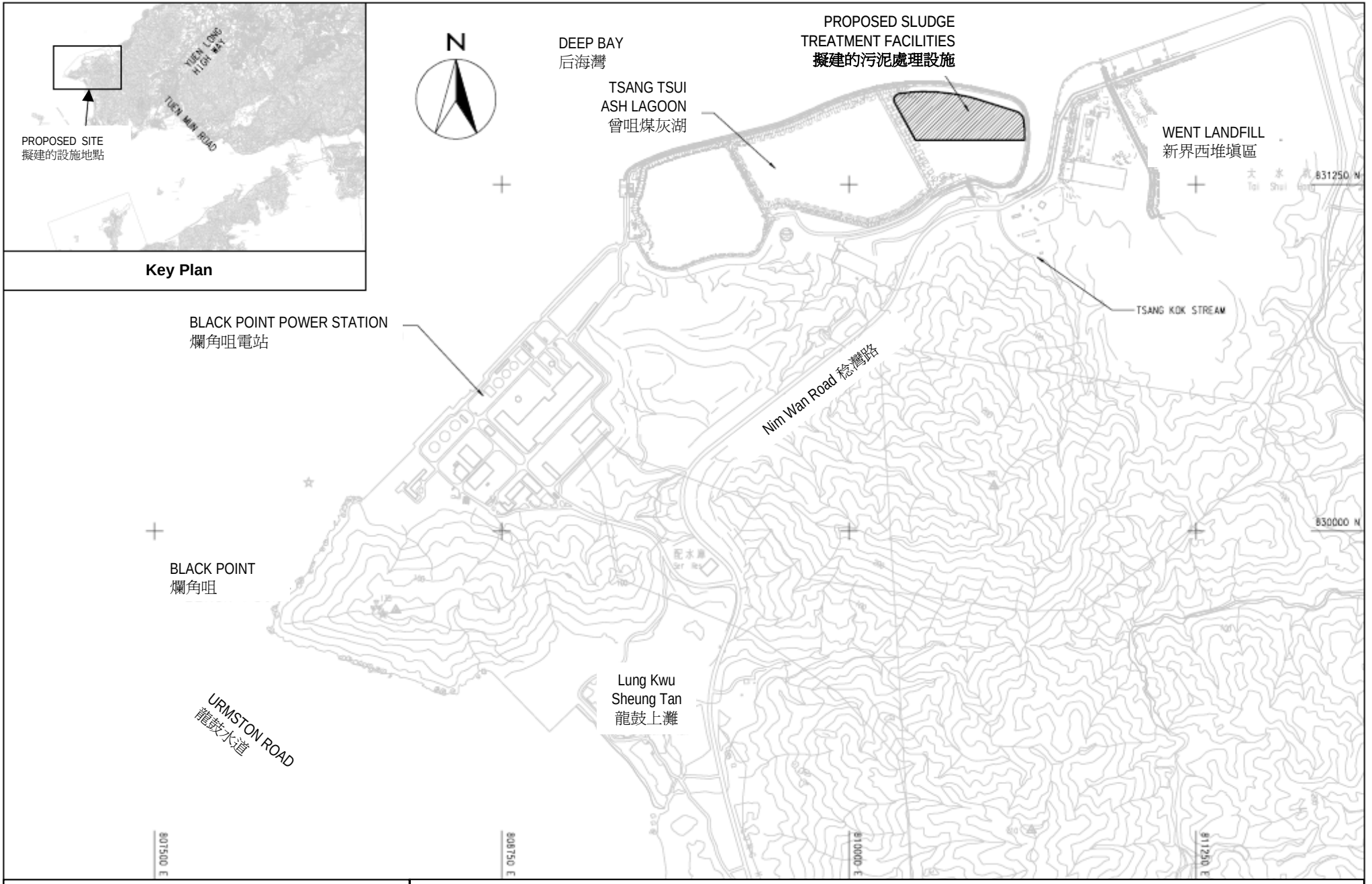
[5] This estimate has taken into account the cost for developing, operation and restoring the landfills after they are filled and the aftercare required. It does not include the land opportunity cost for existing landfill sites (which is estimated at $90/$m^3$), nor the cost to provide new landfills, (which are likely to be more expensive) when the existing ones are filled.

[6] The STF will meet the most stringent target emission standards which are equivalent to the European Union standards.

ADVICE SOUGHT

24. Members are invited to support the Administration's proposal to upgrade **233DS** to Category A at an estimated cost of $5,160 million in MOD prices for consideration by the PWSC in April 2009 with a view to seeking funding approval by the FC in May 2009.

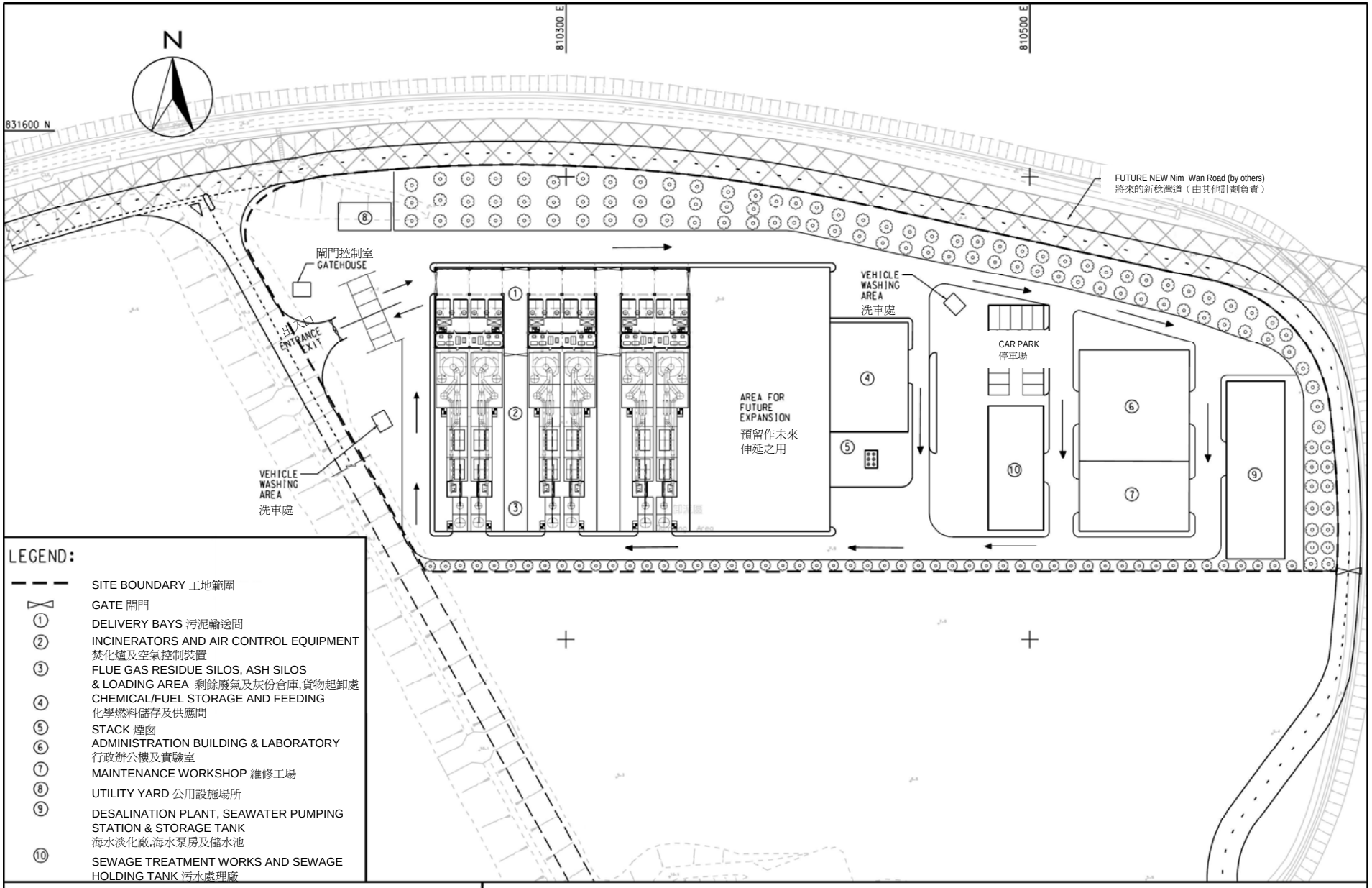
Environmental Protection Department
March 2009



Environmental Protection Department
環境保護署

Proposed Sludge Treatment Facilities Location Plan
擬建的污泥處理設施位置圖

Enclosure 2 附件二



Environmental Protection Department
環境保護署

General Layout Of Proposed Sludge Treatment Facilities
擬建的污泥處理設施平面布置圖

Enclosure 3

Sludge Treatment Facilities

Event summary of public consultation

Dates	Milestones
17 Aug 07	Attended Tuen Mun District Council (TMDC), Environment, Hygiene and District Development Committee (EHDDC) Special Meeting
29 Feb 08	Attended Tuen Mun North West Area Committee Meeting
Mar 2008 onward	Outreach programme for Tuen Mun school students and residents
21 Apr 08	Consulted professional institutions
22, 29 Apr 08	Briefing to TMDC during their visits to WENT Landfill
May – Nov 08	Roving exhibition at 17 shopping malls in Tuen Mun
26 May 08	Consulted TMDC (Working Group on Development and Planning of Tuen Mun District)
17 Jun 08	Consulted academic institutions
8 Jul 08	Consulted green groups
21 Jul 08	Attended Tuen Mun North East Area Committee Meeting
7 Aug 08	Attended Tuen Mun South East Area Committee Meeting
7 Aug 08	Attended Tuen Mun South West Area Committee Meeting
8 Aug 08	Attended Tuen Mun North West Area Committee Meeting
20 Aug 08	Attended Tuen Mun Tai Hing & San King Area Committee Meeting
20 Sep 08	The STF Website (www.hkstf.hk) launched
17 Dec 08 – 15 Jan 09	EIA Report available for public inspection
29 Dec 08 – 26 Feb 09	EIA Report – Advisory Council on the Environment (ACE) consultation period
6 Jan 09	Attended TMDC Meeting to present the EIA Study findings
3 Mar 09	Attended TMDC Meeting to present the proposal of setting up a working group for Tuen Mun overall planning issue