

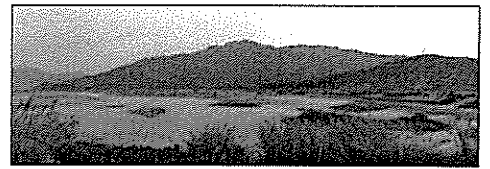
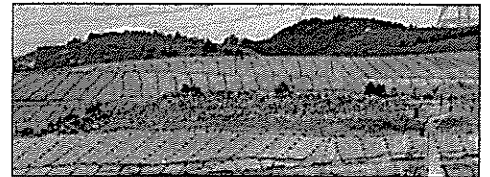


環境保護署
Environmental Protection Department

廢物設施組
Waste Facilities Group

**Agreement No. CE 43/2006 (EP)
West New Territories (WENT)
Landfill Extensions –
Feasibility Study**

**Final EIA Executive Summary
(Rpt Ref. 060-01)**



June 2009

ARUP

Environmental Protection
Department

**Agreement No. CE
43/2006 (EP) West New
Territories (WENT)
Landfill Extensions –
Feasibility Study**

Final Environmental
Impact Assessment
Report
Executive Summary

Rpt Ref. 060-01

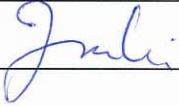

Environmental Protection
Department

**Agreement No. CE
43/2006 (EP) West New
Territories (WENT)
Landfill Extensions –
Feasibility Study**

Final Environmental
Impact Assessment
Report
Executive Summary

June 2009

This report takes into account the particular instructions and requirements of our client. It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party

Job title	Agreement No. CE 43/2006 (EP) West New Territories (WENT) Landfill Extensions – Feasibility Study	Job number	24929		
Document title	Final Environmental Impact Assessment Report Executive Summary	File reference			
Document ref	24929-REP-060-01				
Revision	Date	Filename	24929-REP-060-00		
1 st issue	06/05/09	Description	Draft Environmental Impact Assessment Report Executive Summary		
		Prepared by	Checked by	Approved by	
		Name	Various	Franki Chiu	Alex Kong
		Signature			
2 nd Issue	05/06/09	Filename	24929-REP-060-01		
		Description	Final Environmental Impact Assessment Report Executive Summary		
		Prepared by	Checked by	Approved by	
		Name	Various	Franki Chiu	Alex Kong
		Signature			
		Filename			
		Description			
		Prepared by	Checked by	Approved by	
		Name			
		Signature			
		Filename			
		Description			
		Prepared by	Checked by	Approved by	
		Name			
		Signature			

Issue Document Verification with Document



Contents

	Page
1 INTRODUCTION	1
1.1 Project Background	1
1.2 EIA Study Objective	1
1.3 General Description of Project	2
1.4 Project Programme and Sequence of Works	2
2 CONSIDERATION OF ALTERNATIVES	3
2.1 Alternative Extension Layout	3
2.2 Selection of Preferred Option	3
2.3 Alternative Construction Methods	5
3 SUMMARY OF KEY FINDINGS IN EIA STUDY	6
3.1 Air Quality	6
3.2 Noise	7
3.3 Water Quality	7
3.4 Waste Management	8
3.5 Landfill Gas	8
3.6 Landscape and Visual	8
3.7 Cultural Heritage	10
3.8 Ecology	10
3.9 Pulverized Fuel Ash	10
3.10 Environmental Monitoring and Audit (EM&A)	11
4 OVERALL CONCLUSION	12

Figure

Figure 1.1 Location Plan

1 Introduction

1.1 Project Background

- 1.1.1** Currently, around 5 million tonnes of waste are disposed of each year at the three strategic landfills in Hong Kong, including the West New Territories (WENT) Landfill, the South East New Territories (SENT) Landfill and the North East New Territories (NENT) Landfill.
- 1.1.2** In order to maintain the continuity of landfill capacity for disposal of wastes, the Director of Environmental Protection commissioned a study CE45/99 on “Extension of Existing Landfills and Identification of Potential New Waste Disposal Sites” in 2000. The study (CE45/99) was completed in early 2003 and proposed a Strategic Plan for the development of landfill extensions and new sites for the disposal of solid wastes in the next 50 years.
- 1.1.3** The WENT Landfill Extension is an integral part in the Strategic Plan in maintaining the continuity of landfill capacity in the WEST New Territories. The project is to develop the WENT Landfill Extension (about 200 hectares with capacity of 81Mm³) next to the existing WENT Landfill at Nim Wan.
- 1.1.4** The eastern part of the site is located in Tsang Kok Valley which is a hilly terrain site sparsely vegetated with grass and limited patched of shrubs. The easterly ridge forms a boundary with the existing landfill. The northern part is the CLP Tsang Tsui Ash Lagoons and the former BBC Relay Station. The southern area is bounded by the natural topography, with ridgelines rising southwards from the coastline to meet the major east-west trending ridgeline at about +290mPD. The southern part of the site will also encroach onto the Tsing Shan Firing Range. The location plan of the WENT Landfill Extension site is shown on **Figure 1.1**.

1.2 EIA Study Objective

- 1.2.1** The purpose of this EIA Study is to provide information on the nature and extent of environmental impacts arising from the construction, operation, restoration and aftercare stages of the WENT Landfill Extension and to contribute to decisions on the overall acceptability of the Project, after the implementation of environmental mitigation measures.
- 1.2.2** This Project is a designated project under Schedule 2, G.1, of the Environmental Impact Assessment Ordinance (EIAO): “A landfill for waste as defined in the Waste Disposal Ordinance (Cap. 354)”. An application (No. ESB-117/2004) for an Environmental Impact Assessment Study Brief (EIA SB) under section 5(1)(a) of the EIAO was submitted by the Applicant (ie the Waste Facilities Group of EPD) on 28 Apr 2004 with a project profile (No. PP-214/2004).
- 1.2.3** Pursuant to section 5(7)(a) of the EIAO, the Director of Environmental Protection issued an EIA SB (ref: EIA Study Brief No: ESB-117/2004 dated 10 Jun 2004) to the Project Proponent to carry out an EIA Study.

1.3 General Description of Project

1.3.1 **Figure 1.1** shows the location of the Project site. The development of the WENT Landfill Extension will involve the following works:

- site formation and preparation;
- installation of liner system;
- installation of leachate collection, treatment and disposal facilities;
- relocation of existing landfill infrastructures including leachate treatment plant;
- utilities provisions;
- Nim Wan road diversion;
- design and operation of landfill;
- restoration and aftercare in subsequent stages;
- measures to mitigate environmental impacts as well as environmental monitoring and auditing to be implemented.

1.4 Project Programme and Sequence of Works

1.4.1 The WENT Landfill Extension will be developed under six phases to allow progressive use of the overall landfill area. Each phase will have similar waste capacity and require about 2 to 3 years for the site formation works to meet the need of waste delivery. Nevertheless, each phase will be constructed, operated and restored at a rate dependent on the actual delivery of waste and sufficient areas should be maintained to stockpile the excavated materials for subsequent fill process to avoid disposal of surplus excavated materials by vehicles resulting in additional environmental impacts on other sensitive receivers en-route. Simultaneous construction, operation and capping activities will occur in different parts of the site.

1.4.2 The WENT Landfill Extension's development-phasing and landfilling-sequence is designed to keep Clan Grave to be resumed in the latest phases. This allows ample time for the negotiation process for clearance/removal of this grave. On the other hand, as the ash lagoons have been leased to CLP until 2047 and are currently occupied by CLP for storage of coal ash, for prudence sake, the implementation of WENT Landfill Extension could be planned in such a way that the west lagoon (the one nearest to CLP's Black Point Power Station) is given more time for land acquisition. To this, the site formation works will commence at the eastern perimeter.

2 CONSIDERATION OF ALTERNATIVES

2.1 Alternative Extension Layout

2.1.1 In working out the most desirable layout for WENT Landfill Extension, a number of layout options were formulated, evaluated and then compared, based on various evaluation criteria and an evaluation framework agreed with relevant stakeholders in advance.

2.1.2 The key issues and constraints identified during the course of study were taken into account in formulation of landfill extension layout options. A total of 5 broad options were thoroughly evaluated and discussed at a Value Management Workshop, attended by relevant stakeholders. Key features of the various options are recapitulated in **Table 2.1**.

Table 2.1 Key features of various options

Option	Total area (ha)	Maximum fill level (mPD)	Actual waste capacity (Mm ³)
Option 1	160	+290	71
Option 2	171	+290	74
Option 3	188	+290	79
Option 4	188	+290	81
Option 5	150	+250	39

2.2 Selection of Preferred Option

2.2.1 These options in Section 2.1 were evaluated / assessed in accordance with the following factors and main criteria:

- Waste management needs of at least 71Mm³ target void space for the WENT Landfill Extension;
- Engineering considerations including site formation complexity, constructability, drainage impact and maintenance;
- Environmental issues such as noise, air quality, ecology, landscape and visual, waste management, cultural heritage, water quality, etc.;
- Community aspects such as afteruse flexibility, unit cost of disposal, land resumption and graves clearance.

The details of the evaluation criteria are summarised in **Table 2.2**.

Table 2.2 Main criteria considered in the selection of preferred option

Criteria	Option 1	Option 2	Option 3	Option 4	Option 5
(A) Waste Management Considerations					
Waste capacity	71Mm ³	74Mm ³	79Mm ³	81Mm ³	39Mm ³
Cost-effectiveness	Target capacity is 71Mm ³ is met, no extra cost for reclamation-based landfill	Around \$HK0.69b is saved (3Mm ³ reclamation-based landfill can be saved)	Around \$HK1.84b is saved (8Mm ³ reclamation-based landfill can be saved)	Around HK\$2.30b is saved (10Mm ³ reclamation-based landfill can be saved)	Around extra \$HK7.36b is needed for reclamation-based landfill (32Mm ³ reclamation-based landfill is required)
Waste-to-energy potential	Proportion to waste capacity	Proportion to waste capacity	Proportion to waste capacity	More waste to energy potential	Less waste to energy potential
(B) Engineering					
Flexibility of site formation	Export fill ~ 3.1 Mm ³	Import fill ~ 1.5 Mm ³	Export fill ~ 0.7 Mm ³	Balance cut and fill	Export fill ~ 1.2 Mm ³
Construction Practicability	580 m retaining wall required	300m retaining wall required			
Drainage Impact to Downstream	Without decking over of Tsang Kok Stream outfall	Decking over of Tsang Kok Stream outfall is required			
Operation and Maintenance	Maintenance of longer retaining wall	Similar operation and maintenance amongst the four options			
(C) Environmental Issues					
Air Quality	Air quality impact can be mitigated				
Noise	Noise impact can be mitigated				
Water Quality Impact	Impact to Tsang Kok Stream	Impact to both Tsang Kok Stream and its outfall			
Landscape & Visual	Restored landfill high is +290mPD				Restored landfill high is +250mPD
Archaeological and Heritage Impact	Encroachment to TTAS and removal of Clan Grave and Hung-Sing Temple required				No impact to TTAS, Clan Grave and the Hung-Sing Temple
Ecology Impacts	Encroachment to woodland, middle ash lagoon and Tsang Kok Stream	Encroachment to woodland, middle ash lagoon, Tsang Kok Stream and Tsang Kok Stream outfall			Encroachment to less extent of woodland, middle ash lagoon, Tsang Kok Stream and Tsang Kok Stream outfall
(D) Community Aspects					
Flexibility for afteruse	Separate site less afteruse flexibility			Combine to single development more flexibility for afteruse	
Unit Cost per Disposal	HK\$89/m ³	HK\$36/m ³	HK\$40/m ³	HK\$40/m ³	HK\$110/m ³
Need for Land Resumption	Some private lands need to be resumed				Less private lands need to be resumed
Need for Graves Clearance	Nine graves including one Clan Grave need to be cleared				The Clan Grave is excluded from the extension

Among the five options, Option 4 was evaluated as the most preferred option as it acquires highest rank in most of the aspects.

2.3 Alternative Construction Methods

2.3.1 Different construction methods including using hydraulic breakers and blasting method for excavation were studied, giving careful consideration on environmental impacts including noise, ecology, cultural heritage, etc.

2.3.2 During the construction stage, mobilisation & preparation / establishment will be carried out by the future Design-build-operate (DBO) Contractor. A balance between cut-and-fill quantities will be adopted to optimise the reuse of excavated materials, i.e. to minimise import or export of materials. The process involves temporarily stockpiling of excavated materials on site for use as daily cover during the operation phase and final capping during the restoration phase. No surplus construction materials / waste is anticipated to be delivered to public fill bank. Daily cover will be provided to reduce potential impact on air quality during the operation phase of the Project.

3 SUMMARY OF KEY FINDINGS IN EIA STUDY

3.1 Air Quality

- 3.1.1** The potential air quality impacts during construction, operation, restoration and aftercare phases of the WENT Landfill Extension Project have been assessed.
- 3.1.2** Construction Phase - Construction dust modelling results show that the 1-hr and 24-hr average TSP concentrations at all the air sensitive receivers (ASRs) would comply with the legislative requirements. The cumulative annual TSP concentration would however, due to the high background level, exceed the respective criterion. Further analysis suggests that the contribution from the WENT Extension Project would nevertheless be insignificant, especially for the neighbouring village houses. For other areas that are provided with air-conditioning, it is anticipated that typical dust filters would be able to reduce the dust level by 50% and hence would be sufficient to ensure acceptable air quality.
- 3.1.3** Operation Phase - Dispersion modelling results show that gaseous emissions from ammonia stripping plant, LFG power generator and flaring system of the WENT Landfill Extension will have no adverse impact on the ASRs throughout the operation period of the WENT Landfill Extension, except that the cumulative annual RSP concentration would, due to the high background level, exceed the respective criterion. However, further analysis revealed that the annual RSP contribution from the Project (WENT Landfill Extension), existing WENT Landfill and marine emissions is less than 1% of the annual AQO. Adverse air quality impact arisen from the Project is therefore not anticipated. Subject to the subsequent EPD's requirement on chimney installation, regular stack monitoring of air pollutants, including NO_x, SO₂, RSP, NMOCs, vinyl chloride, and benzene shall be carried out at a quarterly interval (i.e. once every 3 months), and the operating conditions, including exhaust gas temperature and velocity shall be monitored continuously in order to demonstrate compliance during the operations.
- 3.1.4** By adopting the best practice using effective active extraction system, plastic sheet cover at inactive tipping phases plus periodic EM&A monitoring, the surface gas emission can be significantly reduced. With the provision of these measures, no adverse health risk impact is anticipated.
- 3.1.5** Regular emission monitoring of these facilities is recommended to ensure their proper functioning.
- 3.1.6** Odour assessment results show that some operational constraints on the locations of tipping faces (ie only one tipping face within certain distance from some sensitive receivers (1100m from West Ha Pak Nai, 1200m from office of Black Point Power Station & 1200m from Lung Kwu Sheung Tan)) are required to ensure compliance of the odour limits for the receivers. For the office at the Sludge Treatment Facilities (STF), some odour removal facilities would be installed to reduce the odour level accordingly. Other odour control measures (eg application of daily cover) would be implemented to minimise the odour impact.
- 3.1.7** Ventilated cover with emissions extracted to suitable odour removal filters for odour removal has been proposed for leachate treatment plant. Updated treatment method such as Sequencing Batch Reactor has been proposed. Ferric nitrate or sodium hypochlorite shall be added to oxidise the odourous chemical in the leachate. The pH value of leachate can be controlled to a suitable value such that the generation of any odourous H₂S and ammonia can be optimised.
- 3.1.8** The locations of discharge points and discharge heights should be in accordance with the assumptions adopted in the EIA Report. If the future locations / heights of the stacks deviate from the assumptions adopted in the EIA Study, reassessment of the air quality impact should be conducted.

3.1.9 The scale of construction activities during the restoration and aftercare phases of the WENT Landfill Extension will be small when compared with the construction phase. Construction dust is therefore not anticipated to be an issue. The impact of stack gas emissions from treatment facilities will be much reduced during these phases given the gradual reduction in leachate and LFG generation rates over time.

3.1.10 Odour in restored landfill will not be a concern.

3.2 Noise

3.2.1 Potential noise sources and representative noise sensitive receivers (NSRs) for the construction and operation phases have been identified. Noise prediction has been conducted to assess the impact with reference to established methodologies.

3.2.2 The assessment has been conducted based on daytime noise criteria specified in the TM-EIAO. The construction noise impacts associated with the construction activities on the Project site would not exceed the criteria and adverse construction noise impact is not anticipated.

3.2.3 Road traffic noise assessment results indicate that the WENT Landfill Extension would not significantly increase the traffic noise impacts on the residential premises along Lung Kwu Tan Road and hence mitigation measures are not required.

3.2.4 A 3.5m high noise bund (about 150m long) along the existing eastern seawall of the existing WENT Landfill would be required to comply with the noise criteria during daytime, evening and night-time periods.

3.3 Water Quality

3.3.1 The potential water quality impacts of the Project have been assessed.

3.3.2 With proper implementation of construction site runoff control measures, adverse water quality impact during construction phase is not expected.

3.3.3 Sewage will be generated by workforce on-site during the construction period. Temporary sanitary toilets will be provided for on-site construction workforce. No sewage will be allowed to discharge directly into the surrounding water body without treatment. It is anticipated that sewage generation during the construction phase of the Project would not cause water quality impact after undertaking all required measures.

3.3.4 Given that the WENT Landfill Extension will only be in operation after the closure of the existing WENT Landfill, no cumulative water quality impact due to the operation of the two landfills will occur. Nonetheless, cumulative impact will occur when restoration in existing WENT Landfill and operation in the WENT Landfill Extension take place concurrently.

3.3.5 With the implementation of surface water and groundwater management control measures, adverse water quality impact on surface water and groundwater during operation phase is not expected.

3.3.6 Leachate generated from the landfill will be treated at the leachate treatment works and discharged via the existing submarine outfall at Urmston Road via the realigned Nim Wan Road. Given that the discharge limit of the treated leachate will be maintained and would only constitute ~1% of outfall capacity, the impact of leachate on the environment will be minimal.

3.3.7 Under normal installation condition, the rate of leachate seepage is potentially 0.26 litres per hectare per day, which is considered to be insignificant. With the implementation of the measures proposed in the Contingency Plan on Accidental Leakage of Leachate (including active pumping of leachate from leachate and

groundwater collection layers to the leachate treatment plant), impact on the groundwater quality is insignificant.

- 3.3.8** Nevertheless, monthly monitoring of the surface and groundwater discharges will form part of the EM&A programme. If groundwater or surface water is contaminated, further monitoring will be undertaken to locate the source of contamination, and remediation measures will then be carried out.
- 3.3.9** Sewage will be generated by workforce on site during operation phase. Adverse impact is not anticipated as both portable toilets and permanent toilets at the site office will be provided to collect all the sewage generated.
- 3.3.10** During the restoration and aftercare phases of the WENT Landfill Extension, leachate will continue to be generated but the amount is expected to be sufficiently reduced. The established leachate control measures and treatment will continue to operate throughout the restoration and aftercare periods of the WENT Landfill Extension.
- 3.3.11** Proper site maintenance will be undertaken during the restoration and aftercare periods to ensure that the capping system, leachate collection and treatment systems will be performed to comply with the design requirements. Surface water, groundwater and effluent quality monitoring will also be undertaken during the restoration and aftercare periods in accordance with the monitoring plan. With the provisions of all these control and monitoring systems, no cumulative impacts are expected to occur during the restoration and aftercare phases.

3.4 Waste Management

- 3.4.1** Through the analysis of the Project activities, the quantity, quality and timing of waste arising have been identified, including excavated materials from site preparation, chemical waste arising from maintenance of plant and equipment, general waste from daily activities, and sludge from leachate treatment plant. By adopting a material balance approach (e.g. balance cut-and-fill in site formation design, general waste from daily activities to be collected and recycled, etc.) and with the appropriate mitigation measures in place, no adverse environmental impact is anticipated during construction, operation, restoration and aftercare phases.

3.5 Landfill Gas

- 3.5.1** The results of this qualitative risk assessment for LFG hazards associated with the construction, operation, restoration and aftercare phases indicate that the overall risks to the receivers within the WENT Landfill Extension would be categorised as “**Medium**” to “**High**” and that to the receivers outside the WENT Landfill Extension would be “**Low**” to “**Medium**”. The sensitive receivers falling within the newly proposed 250m consultation zone shall be prone to LFG potential risk and appropriate protective and precautionary measures including engineering design and monitoring programme have been proposed to reduce such risk to acceptable levels. With these measures in place, no adverse impact would be anticipated.

3.6 Landscape and Visual

- 3.6.1** The assessment of potential landscape and visual impacts due to the WENT Landfill Extension has been carried out under the methodology of EIAO Guidance Notes 8/2002 – Preparation of Landscape and Visual Impact Assessment under EIAO. For the identified landscape and visual sensitive receivers, such as their sensitivities, magnitude of change, significances of impacts, mitigation measures and residual impacts have also been assessed.

- 3.6.2** The Project site of the WENT Landfill Extension is mainly made up largely by the Stockpile and Borrow Area (SBA) and haul roads, in terms of area. Furthermore, the existing WENT Landfill Site is located immediately adjoining to the east of the WENT Landfill Extension. It is noted the landscape resources and landscape characters of the Project site of the WENT Landfill Extension have already largely deteriorated by the SBA of the existing WENT Landfill site. Due to their proximity, the existing landfill site, its SBA and the WENT Landfill Extension will affect the similar group of visually sensitive receivers. It is noted that the existing WENT Landfill site and its associated SBA have altogether also deteriorated the existing views of the Project site.
- 3.6.3** The existing landscape resources and landscape characters to be affected by the WENT Landfill Extension are mainly those of disturbed land associated with the SBA and haul roads. The landscape value of the disturbed land is low and its sensitivity is low too. Yet, it is noted that natural vegetation on the hillside to the periphery of the SBA will be affected by the WENT Landfill Extension. It is noted that some valuable landscape resources will be affected in terms of permanent change and loss. The residual impact during construction & operation phases is still significant.
- 3.6.4** The existing visual quality of the majority of the WENT Landfill Extension is that of the disturbed land associated with the SBA. The visual quality is considered poor. Relatively, the key visual impact during the construction & operation phases is arising from the loss of the natural vegetation on hillside outside the existing landfill boundary. The loss of the natural vegetation on hillside will be carried out phase by phase in line with the operation of WENT Landfill Extension. Thus the visual obstruction caused by the loss of natural vegetation will be changed phase by phase. It is also presumed that the higher the final level of landfill, the larger the visual impact near the end of construction & operation phases.
- 3.6.5** The WENT Landfill Extension will be restored and vegetated to match with its surroundings in terms of landform and vegetation patterns in restoration and aftercare phases. Loss of landscape resources and change in landscape characters in construction & operation phases will be compensated and enhanced. Visual impact in construction & operation phases will be eliminated with provision of vegetation all over the final surface. Visual intrusion of new visual element (the final landform of the WENT Landfill Extension) would be minimized by careful design of the final level and final landform to match the surroundings.
- 3.6.6** In summary, the potential impact during construction and operation phases shall be significant due to large scale of site formation phase by phase in terms of site area. Within this period, the natural vegetation will be portionally loss for each phase of site formation works and advanced planting will be provided as mitigation measures. During restoration phase, the mature advanced planting can act as screening effect for the proposed development in human eye level. During aftercare phase, the compensatory planting as mitigation shall be under germination, which provides preliminary vegetation cover for site area of the proposed development. At that time, the potential impact shall be marginally acceptable with mitigation measures. Finally after the whole period of restoration and aftercare phases, the potential impact would be greatly mitigated by semi-mature compensatory woodland, shrubland and grassland with the proper mitigation maintenance, e.g. thinning of pioneer trees and enhancement planting of native tree species. Although there will be permanent loss of some landscape resources, the residual impact would be mitigated during restoration & aftercare phases in long run. It is anticipated the residual landscape and visual impact during the restoration & aftercare phases would not be significant.
- 3.6.7** In conclusion, the particular impacts can be reduced to a large extent by implementing the proposed mitigation measures during construction & operation phases and restoration & aftercare phases. The overall residual impacts would be

treated as “acceptable with mitigation measures” after implementing the mitigation measures.

3.7 Cultural Heritage

- 3.7.1** Built heritage survey and archaeological survey have been conducted within the study area of the WENT Landfill Extension. During the built heritage survey, the Hung-Shing and Dragon Mother Temple (Hung-Shing Temple) was investigated for its dating and heritage value, and nine graves were investigated for their dating and current status. During the archaeological survey, 15 test pits and 24 auger holes were excavated.
- 3.7.2** As for the built heritage impact assessment, the Hung-Shing Temple was completely rebuilt in 1988, and two graves at Tsang Tsui have been rebuilt in the past two decades. Therefore, the cultural heritage value of these structures is relatively low. In order to facilitate the construction works, these structures have to be removed or relocated. It is unnecessary to take further mitigation measures on the two graves. The Hung-Shing Temple, however, should be duly surveyed for record purpose prior to the relocation.
- 3.7.3** Since the WENT Landfill Extension would cover the area of the Tsang Tsui Archaeological Site, a rescue excavation shall be conducted before the commencement of the construction. An additional archaeological survey shall be conducted first to determine the extent of the rescue excavation.

3.8 Ecology

- 3.8.1** Ecological resources recorded within the 500m study area of WENT Landfill Extension include woodland, plantation, orchard/village, grassland/shrubland, fish pond, mangroves/mudflats, stream/channel, ash lagoon, artificial seawall, urbanised/disturbed areas and coastal waters and its associated flora and fauna species. Apart from mangroves/mudflat habitat which had moderate ecological values, other habitats had low or low to moderate ecological values. Species of conservation interest recorded within the study area included four flora and thirty-eight fauna species (including bats, birds, butterflies and other fauna).
- 3.8.2** The WENT Landfill Extension area will largely occupy existing grassland/shrubland habitat. The overall impacts to terrestrial and freshwater habitats are ranked as low to moderate for woodland and ash lagoon habitat for Little Grebe, and low to negligible for other habitats and associated wildlife. This project would not involve any marine works and there would be no direct marine or intertidal habitat loss from the project. Mitigation measures include transplantation of species of conservation interest, compensatory woodland planting, and creation of pond habitats. With the implementation of the above mitigation measures, the residual impacts are considered minimal and acceptable.

3.9 Pulverized Fuel Ash

- 3.9.1** An evaluation of previous health risk assessments of radon emission from PFA has been conducted. Based on the findings from various literature researches, the radon health risk for construction, operation, restoration and aftercare of the WENT Landfill Extension is of insignificant level.
- 3.9.2** Recommended measures/ good practices are to be considered during the design, construction, operation, restoration and aftercare of the WENT Landfill Extension to control radon health risk.

3.10 Environmental Monitoring and Audit (EM&A)

- 3.10.1** Environmental monitoring and audit (EM&A) requirements have been specified in an EM&A Manual. The EM&A Manual contains full details of proposed baseline and compliance monitoring programme, as well as performance specifications, audit requirements and monitoring procedures.

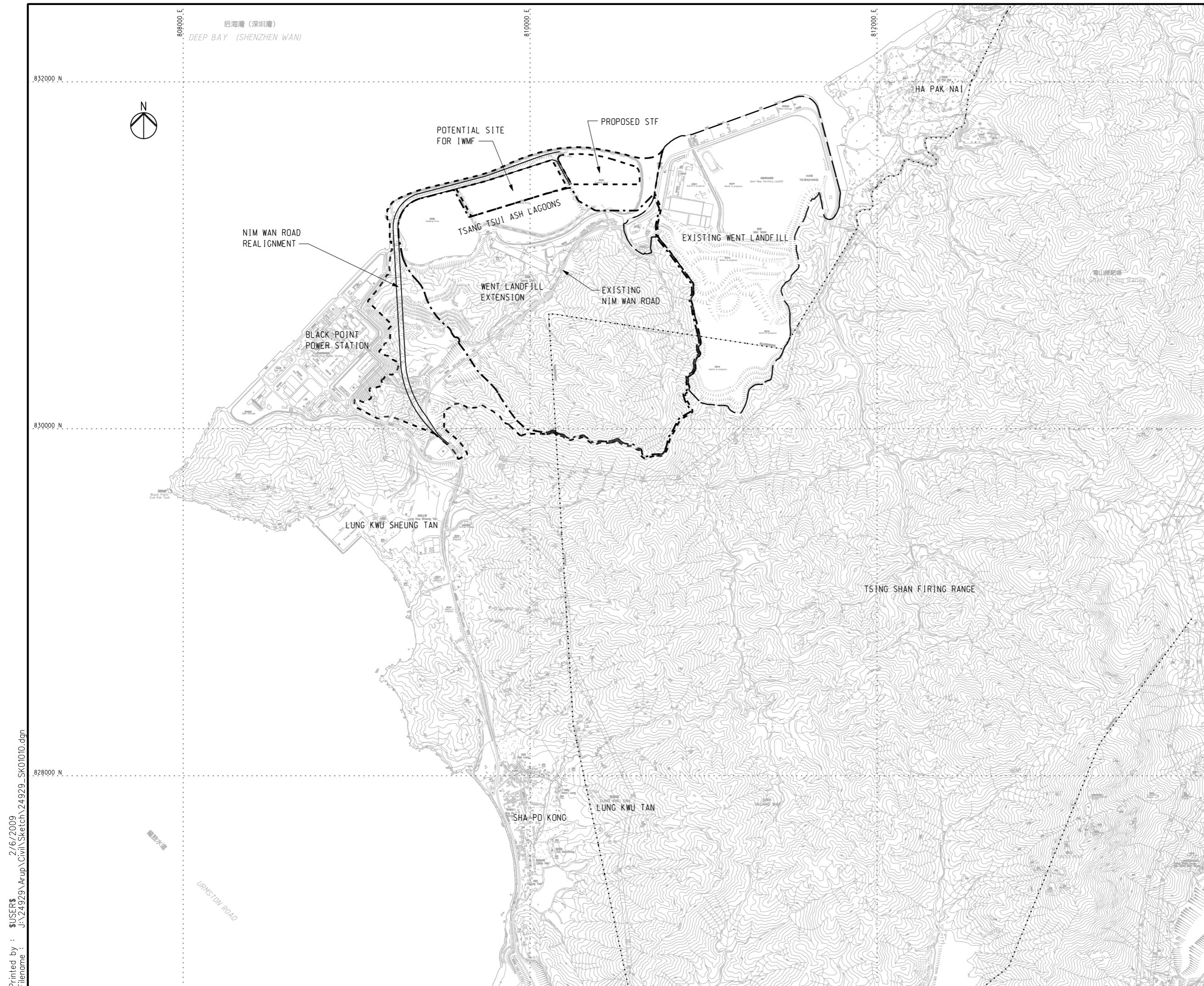
4 Overall Conclusion

An EIA Report has been prepared to fulfil the requirements as specified in the EIA Study Brief No ESB-117/2004 and the TM-EIAO. All the latest design information has been incorporated into the EIA process. The aspects that have been considered in this EIA Report include:

- Layout option evaluation;
- Description of construction, operation, restoration and aftercare activities;
- Air quality impact;
- Noise impact;
- Water quality impact;
- Waste management implications;
- Landfill gas hazards;
- Landscape and visual impact;
- Impact on cultural heritage;
- Ecological impact;
- Pulverized Fuel Ash Impact;
- EM&A requirements.

Overall, the EIA Report has predicted that the Project would be environmentally acceptable with the implementation of the proposed mitigation measures for construction, operation, restoration and aftercare phases. An environmental monitoring and audit programme has been recommended to ensure the effectiveness of recommended mitigation measures.

FIGURE



LEGEND

	BOUNDARY OF EXISTING WENT LANDFILL
	WASTE BOUNDARY OF WENT LANDFILL EXTENSION
	PROJECT BOUNDARY OF WENT LANDFILL EXTENSION
	BOUNDARY OF TSING SHAN FIRING RANGE

Rev	Description	By	Date
-	FIRST ISSUE	PM	03/07

Consultant
ARUP 奧雅納工程顧問
 Ove Arup & Partners Hong Kong Limited

Project title
**Agreement No. CE 43/2006 (EP)
 West New Territories (WENT)
 Landfill Extensions
 Feasibility Study**

Drawing title
LOCATION PLAN

Drawing no. FIGURE 1.1		Rev. -	
Drawn RY	Date 03/07	Checked PM	Approved FW
Scale 1 : 20000 ON A3		Status PRELIMINARY	

COPYRIGHT RESERVED

環境保護署
 廢物設施組
 Environmental Protection Department
 Waste Facilities Group

Printed by : \$USERS\$ 2/6/2009
 Filename : J:\24929\Arup\Civil\Sketch\24929_Sk01010.dgn