For discussion on
24 February 2014

THE LEGISLATIVE COUNCIL
PANEL ON ENVIRONMENTAL AFFAIRS

ENVIRONMENTAL INFRASRTUCTURE PROJECTS

PURPOSE

Timely provision of adequate waste treatment and disposal infrastructure is indispensable in any sustainable waste management strategy. This paper **seeks Members' support** for our proposal to –

(a) upgrade **5164DR** (Southeast New Territories (SENT) landfill extension) to Category A at an estimated cost of $1,997 million[1] in money-of-the-day (MOD) prices; and

(b) upgrade **5177DR** (Integrated Waste Management Facilities (IWMF) Phase 1) to Category A at an estimated cost of $18,201 million[2] in MOD prices.

2. This paper will also **report progress** on the following two projects which have been supported by this Panel on 27 May 2013. We intend to seek approval at the same Finance Committee (FC) meeting, for the upgrading of the following two projects together with SENT landfill extension and IWMF Phase 1:

(a) **5163DR**: Northeast New Territories (NENT) landfill extension (upgrade to Category A); and

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[1] The MOD estimate of 5164DR is basically adjusted from the previous MOD estimate presented in the EA Panel Paper of May 2013 due to inflation, revised cashflows and inclusion of a consultancy at an estimated cost of $8.8 million (in September 2013 prices) to carry out contract preparation and other ground investigation work. The price adjustment factors will be reviewed in March 2014 and the MOD estimate will be adjusted accordingly.

[2] The MOD estimate of 5177DR is basically adjusted from the previous MOD estimate presented in the EA Panel Paper of March 2012 due to inflation and revised cashflows. The price adjustment factors will be reviewed in March 2014 and the MOD estimate will be adjusted accordingly.

(b) **5165DR**: West New Territories (WENT) landfill extension (part upgrade).

WASTE MANAGEMENT STRATEGY

3. To tackle our imminent waste challenge, the Environment Bureau released the "**Hong Kong Blueprint for Sustainable Use of Resources 2013–2022**" (hereafter referred to as the "Action Blueprint") on 20 May 2013, which maps out a comprehensive strategy, with targets, policies and action plans for waste management for the coming 10 years. We have set an aggressive target to reduce the per capita disposal rate of municipal solid waste (MSW) by 40% by 2022. To this end, **concurrent actions** on the following perspectives are being pursued:

(a) reduction at source, including quantity-based MSW charging;
(b) Food Wise Hong Kong Campaign;
(c) clean recycling;
(d) turning waste-to-energy; and
(e) more hygienic waste transportation and treatment operations.

4. To step up efforts to reduce waste at source and promote the development of the **recycling industry,** the Government has set up the Steering Committee to Promote the Sustainable Development of the Recycling Industry (the Steering Committee) under the chairmanship of the Chief Secretary for Administration in August 2013[3]. The Steering Committee reviews existing policies and support measures, and will identify new approaches to support the recycling industry in a sustainable manner, including Recycling Fund, expansion of collection network and enhancing the provision of affordable land etc..

5. The Chief Executive has announced in the 2014 Policy Address that a Recycling Fund will be set up with $1 billion earmarked to support the sustainable development of the recycling industry. The Steering Committee will study in depth the specific uses of the fund in consultation

[3] Details of efforts on the promotion of recycling industry were set out in LegCo papers No. CB(1)500/13-14(03) and No. CB(1)787/13-14(03).

with the stakeholders.

Incineration and landfills are essential waste treatment infrastructure

6. Even if measures and facilities are taken forward as planned, and waste reduction targets are achieved as set, there will still be about 10 000 tonnes of waste that require disposal every day in 2017. With the three existing landfills to be exhausted one by one by 2019 (see **Annex A**), we need to proceed with the extension of the existing landfills and the development of modern waste-to-energy facilities in time to treat MSW, otherwise we cannot maintain the high hygiene standard expected of a modern, world-class city. For a densely populated city like Hong Kong where land is a scarce resource, relying on landfills as the sole MSW disposal facilities is not sustainable.

7. Advanced waste incineration facility was firstly proposed in the Waste Reduction Framework Plan in 1998. It is a facility designed to handle 3 000 tonnes MSW each day by advanced incineration meeting European Union's standard. The treatment process can reduce the volume of MSW by 90% before the residual ashes are disposed of at landfills. Indeed, modern incineration technology can be environmental-friendly, effective, and convert waste to energy. Incineration is nowadays commonly used in international cities for proper treatment of MSW. In this connection, Hong Kong is seriously lagging behind in the application of advanced incineration for waste management.

8. No matter how hard we work to reduce waste, there will still be inert materials, non-recyclables, non-combustible waste, construction waste and post-treatment residues that need to be disposed of. Therefore, landfills are an essential and ultimate part of the waste management chain. Yet, in the longer run, our waste management system has to evolve in the direction of reducing direct landfilling of MSW.

Additional measures to reduce nuisance caused by operation of landfills and the refuse collection vehicles to the neighbouring environment

9. We have put in place a wide array of stringent control measures

to prevent potential nuisances in the operation of landfills to its surrounding environment. We have further stepped up relevant measures in the past few months in view of concerns received from the local community and from this Council. The following measures will benefit the community around SENT Landfill, some of which will also benefit the community as a whole:

Improvement by Enhancement

(a) **SENT landfill extension part will be farther away** from existing residential developments. The distance between residential development and extension part will be around double of that of the existing landfill. Upon the restoration of existing SENT Landfill, it will provide substantial intermediary buffer with greenery between residential development and the operating landfill;

(b) future development of restored landfills will be expedited by the **Restored Landfill Revitalisation Funding Scheme** announced in the Policy Address with $1 billion funding earmarked. This will expedite the development of community, environmental or recreational facilities at restored landfills, including Tseung Kwan O (TKO) Stage I and TKO Stage II/III restored landfills;

(c) we have introduced the Waste Disposal (Refuse Transfer Station) (Amendment) Regulation 2013 (RTS Amendment Regulation) to **optimize the use of the refuse transfer station** (RTS) system through fee reduction for some RTSs and opening of the Sha Tin Transfer Station to private waste collectors. This initiative will enhance the use of RTSs and reduce road transport of waste to landfills;

(d) to further enhance **communication** with the local communities regarding operation of major waste treatment facilities, we will set up a **District Liaison Group** in the districts concerned including one for SENT Landfill;

(e) we have enhanced **odour monitoring** by setting up an on-site

monitoring team which provided speedy responses to complaints of odour;

(f) to step up monitoring on **air quality**, we have been measuring PM2.5 at Wan Po Road since July 2013, and will also establish an air quality monitoring station in TKO. For addressing concerns on **dust**, frequent cleansing of Wan Po Road has been arranged;

(g) Environmental Protection Department (EPD) and Food and Environmental Hygiene Department (FEHD) have enhanced enforcement actions against **fly-tipping** at Wan Po Road and nearby areas. As a result, fly-tipping incidents in the areas were reduced from an average of 37 cases per month in the first 9 months of 2013 to an average of 12 cases per month from October 2013 to January 2014;

(h) to combat illegal fly-tipping at car-parks near the TKO Industrial Estate, EPD installed a close-circuit television system at the Chun Cheong Street public car-park. Since its commissioning on 5 December 2013, one suspected fly-tipping case has been identified and prosecution work is underway;

Improvement by Reduction

(i) amendments to the Waste Disposal (Designated Waste Disposal Facility) (Amendment) Regulation 2013 (DWDF Amendment Regulation) have been introduced and approved by the Legislative Council (LegCo) on 22 January 2014. The DWDF Amendment Regulation will change **SENT Landfill to receive only construction waste**[4]. When such designation takes effect, not only will the odour concern be removed, the number of **vehicular trips** going to the SENT landfill will also **drop** from about 1 000 to 500 daily.

(j) the environmental nuisance in the operation of **refuse collection**

[4] The change in the use of the landfill will be implemented upon a date to be gazetted when the extension is approved.

vehicles (RCVs) will be greatly **reduced** as a result of:

(i) subsidy is being provided to retrofit all private RCVs such that they will be equipped with a metallic tailgate and waste water sump tank. This will bring their environmental performance up to the prevailing standard of RCV fleet of the Government or under Government contract. This will greatly reduce nuisance caused by dripping of waste water and splattering of waste from RCVs;

(ii) the DWDF Amendment Regulation requires, among other things, that all RCVs driven into landfills or RTSs be equipped with a metal tailgate cover and waste water sump tank of suitable construction and in good working condition;

(iii) the stepping up of monitoring and enforcement by joint actions of the Hong Kong Police Force (HKPF), FEHD and EPD against RCVs found to be causing hygiene, overloading or other problems[5]; and

(iv) the phasing out of pre-Euro IV diesel commercial vehicles will cover all RCVs. Consequently, the age of the RCV fleet will be lowered and it will reduce emissions from the RCVs.

(k) **Odour concerns** could be further reduced:

(i) upon full commissioning of the Sludge Treatment Facility in end 2014, odourous **sludge will no longer be landfilled**; and

(ii) progressive **reduction in food waste** to be landfilled through, e.g. Food Wise Hong Kong Campaign, food donation, diversion to other facilities such as Organic Waste

[5] Joint actions amongst HKPF, FEHD and EPD against dripping of waste water and spattering of waste from waste collection vehicles, uncovered waste, overloading as well as speeding at Wan Po Road have led to the issue of over 280 summons and warnings from August to Dec 2013. We will keep in view on the operation of such vehicles in all districts with landfill and will tighten the monitoring and control where necessary.

Treatment Facilities.

(l) to reduce our reliance on landfilling in the long run, we will embark on preparatory work this year for a **strategic study** on future waste management facilities. The study will look into various issues such as types, scale, technology, locality and timing of new strategic and regional facilities and services needed with a view to drawing up a strategic masterplan of waste management facilities for future; and

(m) the operating hours of TKO **fill bank** have been **reduced by** around 4 hours a day. It has closed on Sunday and public holidays since early 2014. We have also strived to increase the use of marine routing for fill transportation.

5164DR: SENT Landfill Extension

10. The SENT Landfill is expected to be exhausted in 2015, the first among the three existing landfills. It is essential to extend the SENT Landfill because it is the territory's single largest disposal outlet for construction waste due to the synergy created by the proximity of the SENT Landfill, the construction waste sorting facility and a public fill bank in TKO Area 137. Some 2 320 tonnes of construction waste are being disposed of at the SENT Landfill each day, which account for about 67% of the overall construction waste disposed of daily at the three landfills. Without the extension, the capacity of the remaining two landfills will be exhausted sooner. The proposed scheme of the extension, which will occupy about 13 hectares (ha) of land in TKO Area 137 and about 30 ha of land within the existing SENT Landfill, will provide a total capacity of about 6.5 million cubic metres. With the implementation of the extensive and vigorous improvement measures as set out in paragraph 9 to address the concerns expressed earlier in our previous submission to the Panel, we recommend Members' support to the SENT landfill extension proposal.

11. The scope of **5164DR** comprises all works necessary for the development of SENT landfill extension including –

(a) landfill design[6] and site formation (including utilities provision and drainage diversion);

(b) provision and relocation of landfill infrastructure (including demolition of existing infrastructure and reprovision of new infrastructure);

(c) provision of landfill liner system[7];

(d) provision of leachate collection and treatment system[8];

(e) provision of landfill gas collection and management system[9];

(f) implementation of measures to mitigate environmental impacts, and environmental monitoring and auditing for construction works;

(g) engagement of community stakeholders; and

(h) construction of restoration and aftercare[10] facilities.

12. A plan showing the location of the proposed scheme of the SENT landfill extension is at **Annex B**. Subject to the funding approval by the FC, we will commence with contract procurement and seek to start the construction works in early 2015 with a view to commencing waste intake

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6 The landfill is designed as a secure containment system, which primarily consists of multilayer impermeable composite liners to contain landfill gas and leachate generated, so that the waste is deposited and treated under a controlled environment.

7 The landfill liner system consists of multilayer impermeable composite liners installed at the formation level to contain landfill gas and leachate produced during the degradation process and prevent them from leaving the landfill to the surrounding environment.

8 Leachate is the liquid that has percolated through solid waste. The source of the liquid is primarily the water already present in the waste and any water induced from an external source such as rain water and ground water. The leachate management system comprises leachate collection network, pump sumps, storage lagoons, rising mains and treatment plants for handling and treating leachate.

9 Landfill gas is produced during the waste degradation process. It is made up of several gases such as methane which are potentially flammable and harmful to health. The landfill gas management system comprises collection network, gas extraction system and flaring unit for handling and treating landfill gas.

10 Restoration and aftercare facilities include the installation of the capping system, sub-surface drainage system, monitoring facilities and landscape works.

in 2016.

Financial Implications

13. We estimate that:

(a) the capital cost of the proposed landfill extension project to be about $1,997 million in MOD prices, including the funding requirement of $8.8 million (in September 2013 prices) for the consultancy study for design and construction;

(b) the annual recurrent expenditure will be reduced by about $22 million after commissioning the SENT landfill extension; and

(c) the proposed works will create about 351 jobs (277 for labourers and another 74 for professional/technical staff) providing a total employment of 10 800 man-months.

14. The capital and recurrent costs arising from the project would be taken into consideration when determining the affected fees and charges as appropriate in accordance with "polluter pays" principle.

Public Consultation/Engagement and Follow-up work

15. We have adopted a continuous public involvement approach with the statutory bodies, non-statutory organizations and local representatives since the inception of the project in 2004.

16. When we consulted the Sai Kung District Council (SKDC) on 3 May 2011, the meeting concluded that a majority of the SKDC members present at that meeting supported or had no objection to the scheme under which the landfill extension will be reduced and only construction waste will be received and thereby addressed the community's concern on the odour problem. At the meetings of the LegCo Panel on Environmental Affairs (EA Panel) and Public Works Subcommittee (PWSC) for upgrading the project to Category A on 27 May 2013 and 26 June 2013 respectively, views from LegCo Members and representatives of the public were received. On 6 September 2013, the Secretary for the Environment

met with SKDC members, briefed them on the Action Blueprint and listened to their views on waste management and addressed the local concerns.

17. Paragraph 9 above has set out our actions to respond to the views and concerns raised by LegCo members, the local community and the public on landfill extensions in general and those on SENT landfill extension in particular.

Environmental Implications

18. **5164DR** is a designated project and the Environmental Impact Assessment (EIA) report for the original scheme of the Extension was approved under the EIA Ordinance on 6 May 2008 after consulting the general public and the Advisory Council on the Environment (ACE). The Environmental Permit (EP) for the construction and operation of the landfill was issued on 5 August 2008. The project would need to comply with the requirements in accordance with the EP conditions.

19. In accordance with the proposal to restrict the SENT landfill extension to accept construction waste only, it is anticipated that the environmental impacts and the traffic impact of the proposed scheme will be significantly reduced. An environmental review report with an application for variation of EP was submitted to the EIA Authority on 9 December 2011. The report concluded that with the implementation of the proposed mitigation measures, the environmental impacts of the proposed scheme are acceptable. On 6 January 2012, the Director of Environmental Protection (DEP) issued an amended EP for the proposed scheme of the extension. We will continue to comply with the conditions in the amended EP.

20. For impacts during construction stage, 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.

21. During the operation phase, we will control the size of the active tipping area even though the proposed extension scheme will only receive construction waste for disposal.

22. The landfill design is a containment design and its impermeable bottom liner provides a barrier separating the waste mass from the environment. Landfill gas and leachate will be contained, collected and properly treated by treatment facilities to be reprovided on site. We plan to utilize landfill gas on site for generating electricity for site operation and converting to heat energy for leachate treatment process and can be exported off site for other beneficial uses. All leachate storage tanks will be covered up. We shall ensure that both landfill gas and leachate would have no adverse impact on air and water quality of the environment.

23. At the planning and schematic design stages, we have set the base of the landfill above the ground water table 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 at public fill reception facilities. We will require the contractor to maximize the use of recycled / recyclable inert construction waste, and the use of non-timber formwork as far as practicable and cost-effective to further reduce the generation of construction waste.

24. At the construction stage, 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.

25. We estimate that the project will generate in total about 7 450 tonnes of construction waste. Of these, we will reuse about 5 600 tonnes

(75%) of inert construction waste on site. We will dispose of the remaining 1 850 tonnes (25%) of non-inert construction waste at landfill. The total cost for accommodating construction waste at landfill is estimated to be about $0.23 million for this project (based on a unit cost of $125 per tonne for disposal at landfill).

26. Mixed woodland planting will be provided under the landfill extension contract to compensate the loss of shrubland and grassland in the extension area. Advance screen planting will also be provided along the High Junk Peak Trail. When the landfill is fully filled and restored, the site will be planted with vegetation to match with its surrounding landform and patterns.

27. The approved EIA report and subsequent environmental review report have provided comprehensive assessments of the potential environmental impacts associated with the construction, operation, restoration and aftercare phases of the project. With the implementation of the proposed mitigation measures, the reports concluded that the potential environmental impacts of the SENT landfill extension would be controlled to within established standards and guidelines. An environmental monitoring and audit programme is also recommended to ensure the effectiveness of the proposed mitigation measures.

Progress of NENT and WENT Landfill Extensions

28. The proposals to extend the NENT Landfill and part upgrade the WENT landfill extension project for a consultancy study on the design and contract procurement work were supported by PWSC at its meeting of 2 July 2013. However, FC's deliberation of the two projects was adjourned at its meeting of 12 July 2013 after a motion to adjourn the discussion of these projects was passed. We have actively engaged the local communities in addressing their concerns and taking into account their views on fine-tuning the landfill extension proposals. For a more detailed update of the local engagement process and the various improvement measures being taken in connection with the NENT landfill extension and WENT landfill extension projects, please refer to **Annex C** and **Annex D** respectively. It is our intention to proceed with the funding application for the two projects to the FC in the second quarter of 2014, together with

the funding applications for SENT landfill extension project and IWMF Phase 1.

INTEGRATED WASTE MANAGEMENT FACILITIES (PHASE I)

Proposal and Justification

29. As indicated above, even with our best efforts in achieving our waste reduction and recycling targets, it is estimated that by 2017, there will still be about 10 000 tonnes of waste requiring disposal every day. For a densely-populated and compact city like Hong Kong, the current practice of relying on landfills as the sole means of waste disposal is not sustainable. The urgency of the waste problem as exemplified by the exhaustion of the three existing landfills one by one by 2019 calls for timely action regarding the introduction of modern treatment facilities.

30. All statutory procedures and approvals for developing IWMF Phase 1 have been completed[11]. In 2012, four separate applications for Judicial Reviews (JRs) were filed against the first IWMF project at Shek Kwu Chau (SKC). The JRs mainly challenged the decisions on the approval of the EIA report and issuance of the EP by DEP. Some of them also challenged the decision of the Town Planning Board (TPB) to adopt the draft SKC Outline Zoning Plan (OZP). The Court of First Instance (CFI) on 7 June 2012 granted leave to apply for JR to all four JR applications and ordered one of them[12] to proceed to substantive hearing given the JR grounds of the four applications were very similar while the other 3 cases were stayed pending the outcome of the substantive hearing. The substantive hearing was held from 14 to 16 November 2012. The CFI handed down a judgment on 26 July 2013 rejecting all the grounds in support of the JR and dismissed the application for JR.

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[11] The EIA Report was approved by DEP under the EIA Ordinance on 17 January 2012 and an EP for developing the IWMF Phase 1 at the artificial island site near Shek Kwu Chau (SKC) was issued on 19 January 2012. In March 2012, the Chief Executive in Council authorized the proposed reclamation works for the IWMF project under the Foreshore and Sea-bed (Reclamations) Ordinance (FS(R)O) and approved the draft Shek Kwu Chau Outline Zoning Plan (SKC OZP) under the Town Planning Ordinance.

[12] Leung Hon Wai v Director of Environmental Protection and Town Planning Board HCAL 49/2012.

31. The JR Applicant obtained legal aid and filed a Notice of Appeal against the judgment on 23 August 2013. The hearing of the appeal is scheduled to be held on 4 and 5 June 2014. There has not been any court order prohibiting the carrying out of the IWMF Phase 1 project up to today.

32. We have reviewed the timetable and consider that it will serve the best interests of Hong Kong to seek funding approval for the project now instead of awaiting the outcome of the JR appeal. It is because the IWMF Phase 1 requires a lead time of about 7 years for undergoing the open, competitive and fair procedures for the selection of competent contractors, as well as for detailed project design, construction and commissioning. The project has already been held up for two years in view of the JR proceedings. With early funding approval, we could proceed with the procedural work of tendering, which includes tender pre-qualification exercise, invitation and selection of tenderers, which would take around two years, in parallel with the JR appeal proceedings. We would only award the contract to the successful tenderer after the JR appeal proceedings have been determined and the outcome of the JR appeal is in favour of the IWMF project to proceed.

Technology Selection

33. Alongside the waste reduction policies and the territory-wide waste reduction campaigns, the IWMF Phase 1 development would be Hong Kong's significant back-bone infrastructure for MSW treatment. It is imperative that this facility should adopt the most well proven technology so that it can operate reliably and is able to handle a sizeable volume of MSW throughout the year.

34. Back in 2002, the Government has carried out an Expression of Interest exercise to determine suitable technologies for the IWMF. Based on the result of the exercise, it was proposed in 2005 that the IWMF should adopt incineration as the core waste treatment technology [cf. LegCo paper No. CB(1) 1544/04-05(15)]. Since then we have been conducting evaluations and reviews on appropriate technologies for the IWMF. A detailed review was carried out in 2009 which was reported to the ACE. The review found that advanced moving grate incineration is the most suitable core technology for the first modern IWMF in Hong Kong, and the

ACE supported this finding [cf. LegCo Brief on Development of the Integrated Waste Management Facilities issued on 21 February 2011]. We continue to keep track of the latest development of different thermal waste treatment technologies (such as technologies of moving grate[13], fluidized-bed[14], rotary kiln[15], co-combustion[16], gasification[17], pyrolysis[18] and plasma gasification[19]) from various sources including the "White Paper on Alternative Waste Conversion Technologies" published by the International Solid Waste Association in January 2013 as well as the recent International Conference on Solid Waste – Innovation in Technology and Management held in Hong Kong in early May 2013. Our reviews and the most updated information consistently indicate that moving grate incineration technology remains the mainstream MSW treatment technology with substantial proven track record and performance. It has been employed by the majority of the large scale thermal waste treatment plants in the world with many projects underway, which indicates that it is still the mainstream technologies for the years to come. It is the only thermal technology that proved to be capable of treating mixed MSW reliably at a scale comparable to the 3 000 tonnes per day (tpd) capacity we plan for IWMF Phase 1.

35. In November 2013, the Alliance for Promoting Sustainable Waste Management for Hong Kong, which comprises 68 members from professional bodies, academia and trade associations issued a joint statement agreeing that modern incineration is a mature technology and

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[13] Moving grate incineration is a kind of mass burn incineration system, which involves combustion of mixed MSW on a moving grate that transports MSW through the furnace.

[14] Fluidized-bed incineration system is the combustion system in which the combustion takes place in a floating bed of granular materials such as sand grains that can withstand high temperatures.

[15] Rotary kiln incineration system comprises a slowly rotating re-fractory lined cylinder in which waste is dried, combusted as it moves along the length of the cylinder.

[16] Co-combustion involved the conversion of MSW to refuse-derived fuel (RDF) and then combusting the RDF with other fuel for industrial process such as cement production.

[17] Gasification is a process that converts the organic material into gaseous mixtures at a high temperature with a limited amount of oxygen and/or steam.

[18] Pyrolysis is a process in which organic waste is decomposed to produce oil, carbonaceous char and combustible gases in the absence of oxygen.

[19] Plasma gasification involves transformation of organic materials under oxygen-starved environment using an external high heat source (i.e. plasma) to produce syngas (comprises of energy rich gas products such as carbon monoxide, hydrogen and methane, and various hydrocarbons) for energy recovery.

could also turn waste into energy. As regards the choice of technology, the Alliance supported the recommendation that Hong Kong should adopt mass burn moving grate technology. Other emerging but less-proven technologies may be considered in the future when they have become more mature.

Scale and Site Selection

36. In 2012, we completed an engineering feasibility and EIA study of the two proposed sites, (i) the Tsang Tsui Ash Lagoons site in Tuen Mun (TTAL site); and (ii) an artificial island near SKC. According to the findings of the EIA Report, with implementation of appropriate mitigation measures, construction and operation of the first IWMF on the artificial island near SKC or the TTAL site will be environmentally acceptable

37. Having considered the IWMF EIA findings, the spatial distribution of our waste management facilities, environmental factors and transport efficiency, the Government has chosen the artificial island next to SKC as the site for the first IWMF on the following grounds:

(a) The proposed choice ensures a more balanced spatial distribution of waste facilities. For the western New Territories, there is WENT Landfill and the proposed WENT landfill extension. There is also a Sludge Treatment Facility with a capacity of 2 000 tpd in Tuen Mun. For the northern New Territories, there is NENT Landfill and the proposed landfill extension. For eastern New Territories, there is SENT Landfill and proposed landfill extension. For the urban area, we have a network of RTSs, including two at both ends of Hong Kong Island. The Chemical Waste Treatment Centre is situated in Tsing Yi. The development of the first IWMF at the southern tip of Hong Kong will present a more balanced spatial distribution of facilities;

(b) The SKC site is far away from the densely populated areas. It is located at about 3.5 to 5 km from Cheung Chau, which is not in the direction of prevailing wind (northeasterly wind towards southwest in the sea). The first IWMF will have advanced

incineration technology and air cleansing systems on site. We target to achieve the emission standard of at least the standard of European Union;

(c) The artificial island next to SKC is a convenient location as it is much closer to the Island East, Island West and West Kowloon refuse transfer stations, the catchment area for the first IWMF, when compared with the TTAL site. This routing will not cause significant impact on the marine traffic in the area. Consequently, the transport of MSW to the island will help reduce the current transport of MSW to the WENT Landfill, hence reducing marine traffic in the busy Ma Wan Channel; and

(d) The first IWMF and its on-site educational and community facilities under planning would bring economic benefits to the nearby islands (e.g. Cheung Chau). Workers and visitors will generate economic activities (e.g. retail and catering) to the benefit of nearby community like Cheung Chau.

Scope of Work

38. The scope of **5177DR** comprises all works necessary for the development of IWMF Phase 1 including:

(a) design and construction of an advanced MSW incineration plant of a design capacity of 3 000 tpd employing state-of-the-art, proven and reliable moving grate waste-to-energy technology, including waste reception, storage and feeding system; moving grate incinerators;

(b) advanced system and facilities for the recovery of energy from waste as a renewable energy source and to reduce greenhouse gas emissions from power generation, including waste heat recovery, turbine generator and cooling system, boiler feedwater treatment system and the associated ancillary and supporting facilities, including submarine power cables, electrical sub-station and electrical system;

(c) flue gas treatment and discharge system; fly ash, bottom ash and residues storage, treatment and handling system; bulky waste storage and handling system, reagent reception and storage system; and process control and monitoring system[20];

(d) a desalination plant providing sustainable water supply to the facility and SKC, advanced wastewater treatment plant to recycle wastewater for reuse, a mechanical sorting and recycling plant, minor supporting facilities for a marine park, an environmental education centre and associated facilities showcasing state of the art technologies and environmental protection measures;

(e) design and construction of reclamation of about 16 ha using the advanced environmentally friendly technology to form an artificial island near SKC as well as the construction of seawalls; and

(f) enhanced environmental and safety management, extensive landscaping for greening; enhanced and comprehensive monitoring and auditing for the project.

39. A plan showing the location of the IWMF Phase 1, is at **Annex E**. More basic information of the IWMF Phase 1 is at **Annex F**. We plan to implement the proposed works and the follow-on operation under a Design-Build-and-Operate (DBO) contract. The contractual operation period will be 15 years. Subject to funding approval of the FC, prequalification exercise will start in mid-2014 to be followed by tendering procedures. We would only award the contract to the successful tenderer after the JR appeal proceedings have been determined and the outcome of the JR appeal is in favour of the IWMF project to proceed. If the contract can be awarded in 2015/16, we estimate the design and construction works may commence in mid 2016 with a view to commission the facilities in 2021/22.

[20] Including off-site monitoring stations and associated strengthening/relocation works.

Financial Implications

40. We estimate that -

(a) the capital cost of the WMF Phase 1 to be about $18,201 million in MOD prices;

(b) the additional annual recurrent expenditure arising from the IWMF Phase 1 is about $402 million;

(c) under the existing policy, ex-gratia allowance (EGA) may be granted to fishermen and mariculturists affected by marine works projects in Hong Kong waters. The estimated amount of EGA payable to fishermen is about $6.28 million based on the revised EGA package as approved by LegCo FC in April 2012, adjusted with fish price index and contingency. A special one-off EGA for mariculturists affected by marine works in the Western waters has been granted. The mariculturists who have opted to cease their operations for two years may resume culture in April 2014. If the water quality in a fish culture zone is adversely affected by the proposed marine works project and the prescribed criteria are met, mariculturists in the affected fish culture zone may be eligible to a further EGA. The estimated maximum amount of EGA payable to mariculturists is about $15.9 million assuming that all the affected mariculturists opt to cease their operations; and

(d) the proposed works will create about 3 950 jobs (3 250 for labourers and 700 for professional/ technical staff) providing a total employment of 80 500 man-months. In addition, we estimate that the operation of the project will create about 200 permanent jobs (53 for labourers and 147 for professional / technical staff)[21].

41. The capital and recurrent costs arising from the project would be taken into consideration when determining the fees and charges in

[21] The estimated manpower figures during operation are the result of the Engineering Investigation and Environmental Studies for IWMF Phase 1 – Feasibility Study.

accordance with "polluter pays" principle.

Public Consultation/Engagement

42. We have been actively engaging the public on the development of the project for more than ten years. A summary of previous consultation and discussion at the LegCo EA Panel regarding the project was provided in the previous EA Panel paper on 26 March 2012 [cf. LegCo Paper No. CB(1) 1369/11-12(01)]. Since February 2011, we had met with over 2 500 concerned people and about 60 groups/ organizations and attended 70 meetings to explain the need for the project and to address their queries on various aspects of the project, including air quality and health, air pollution control technology, ecology, water quality and fisheries. A summary of our responses is in **Annex G**.

43. At DC level, we briefed the Islands District Council (IsDC) on 21 February 2011 at which some DC members raised objection to the Administration's preference for SKC as the site for the first IWMF. We have further responded to members' enquiries at IsDC meeting on 20 February 2012, at which IsDC agreed to follow up the project by setting up a dedicated working group under the DC.

44. Following the release of the Action Blueprint in May 2013, we organized two visits to the Macao Refuse Incineration Plant on 7 December 2013 and 4 January 2014 for IsDC members and the local community to see for themselves the waste-to-energy facility and the development of waste management facilities in Macau. We presented the Action Blueprint and the latest progress of the first IWMF project at IsDC's working group meeting on 27 November 2013, and at IsDC's meeting on 16 December 2013. Members acknowledged the imminent challenges brought by the waste problems in Hong Kong and the need for the IWMF. In view of resident's concerns about possible health impact, the DC asked the Administration to commit on the following with concrete actions before proceeding with the project:

(a) should achieve the emission standards of European Union with public monitoring on the emission performance during operation;

(b) should set up liaison committee with participation from locals, which will take part and provide views regarding design and monitoring;

(c) should provide compensation for the fishery community affected by the reclamation; and

(d) should positively address needs of community nearby through enhancing community facilities etc.

45. We will continue to maintain close liaison with the IsDC, local community and other relevant stakeholders in taking forward the project. We will set up an Islands District Liaison Group comprising local personalities and other stakeholders on the IWMF Phase 1 in the district as well as other related issues.

Environmental Implications

46. **5177DR** is a designated project under the EIA Ordinance and an EP is required for its construction and operation. We carried out an EIA study for the project since November 2008 in accordance with the requirements set out in the EIA Ordinance. According to the findings of the EIA Report, with implementation of appropriate mitigation measures, the potential environmental impacts of the phased and simultaneous construction and operation of IWMF at the two sites would be controlled to within the established standards and guidelines. The EIA report was made available to the public for inspection from November to December 2011 in accordance with the EIA Ordinance. Upon consideration and endorsement by the ACE, the EIA report was approved under the EIA Ordinance on 17 January 2012. The EP for developing the IWMF at SKC site was issued under the EIA Ordinance on 19 January 2012. We will implement the conditions stipulated in the EP.

47. 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

site inspections to ensure that these recommended mitigation measures and good site practices are properly carried out.

48. We will require the contractor to submit for approval a plan setting out the waste management measures, which will include appropriate 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 control the disposal of non-inert construction waste to landfills through a trip-ticket system. The inert construction waste will be reused on site for reclamation. We will also encourage the contractor to maximize the use of recycled / recyclable inert construction waste, and the use of non-timber formwork to further reduce the generation of construction waste.

49. In addition, we will require use of public fill for the reclamation works to help relieve the pressure for disposal sites for construction and demolition materials in Hong Kong. We estimate the proposed works will use a total of about 4 million tonnes (Mt) of public fill.

50. The project upon commissioning could divert some 1.1 Mt of MSW from landfill disposal every year which could help extend the life span of landfills, reduce landfill gas and leachate. Moreover, renewable energy derived from the project will help replace the use of fossil fuel for electricity generation. The reduction of using fossil fuel for electricity generation, coupled with less MSW being landfilled, would reduce the total emission of greenhouse gas in Hong Kong by about 440 000 tonnes carbon dioxide each year. Moreover, surplus electricity energy will be exported via the submarine cables to the existing power grid.

51. The proposed reclamation works will comprise about 16 ha of permanent reclamation area, cofferdam/seawalls, breakwaters and berths. The area enclosed by the breakwater (including the area of the breakwater) will be about 31 ha. The reclamation and construction works of the breakwaters and vertical seawall would adopt non-dredging method such as cellular cofferdam approach to minimize dredging works and the reclamation footprint, thereby localizing and minimizing potential impacts on marine water quality, ecology and fisheries. The proposed submarine cable installation works would be carried out using an environmentally

friendly and non-dredging method, which would only take several work weeks and would not damage the South Lantau coast line.

52. The project will incorporate various green design concepts to make the first IWMF an environmentally friendly facility. Apart from employing one of the most advanced incineration technologies which ensures compliance with the most stringent environmental control standards and 90% reduction of waste volume, and the renewable recovered for gainful use, the first IWMF 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. No effluent will be discharged to the nearby water body. We will include a requirement in the DBO contract provisions that the architectural design should be creative and attractive to make the IWMF an eco-friendly and eye-pleasing infrastructure blending into the surroundings.

ADVICE SOUGHT

53. Members are invited to support our proposal for putting forward the proposed upgrading of **5164DR** and **5177DR** to Category A to the LegCo PWSC for approval. Subject to Members' advice, we plan to submit our proposals for consideration by the LegCo PWSC in April 2014 with a view to seeking the FC's approval in May 2014. In addition, Members may wish to note that we intend to seek the FC's approval for the proposed upgrading of 5163DR and part upgrading of 5165DR to Category A at the same FC meeting.

Environment Bureau/Environmental Protection Department
February 2014

Annex A

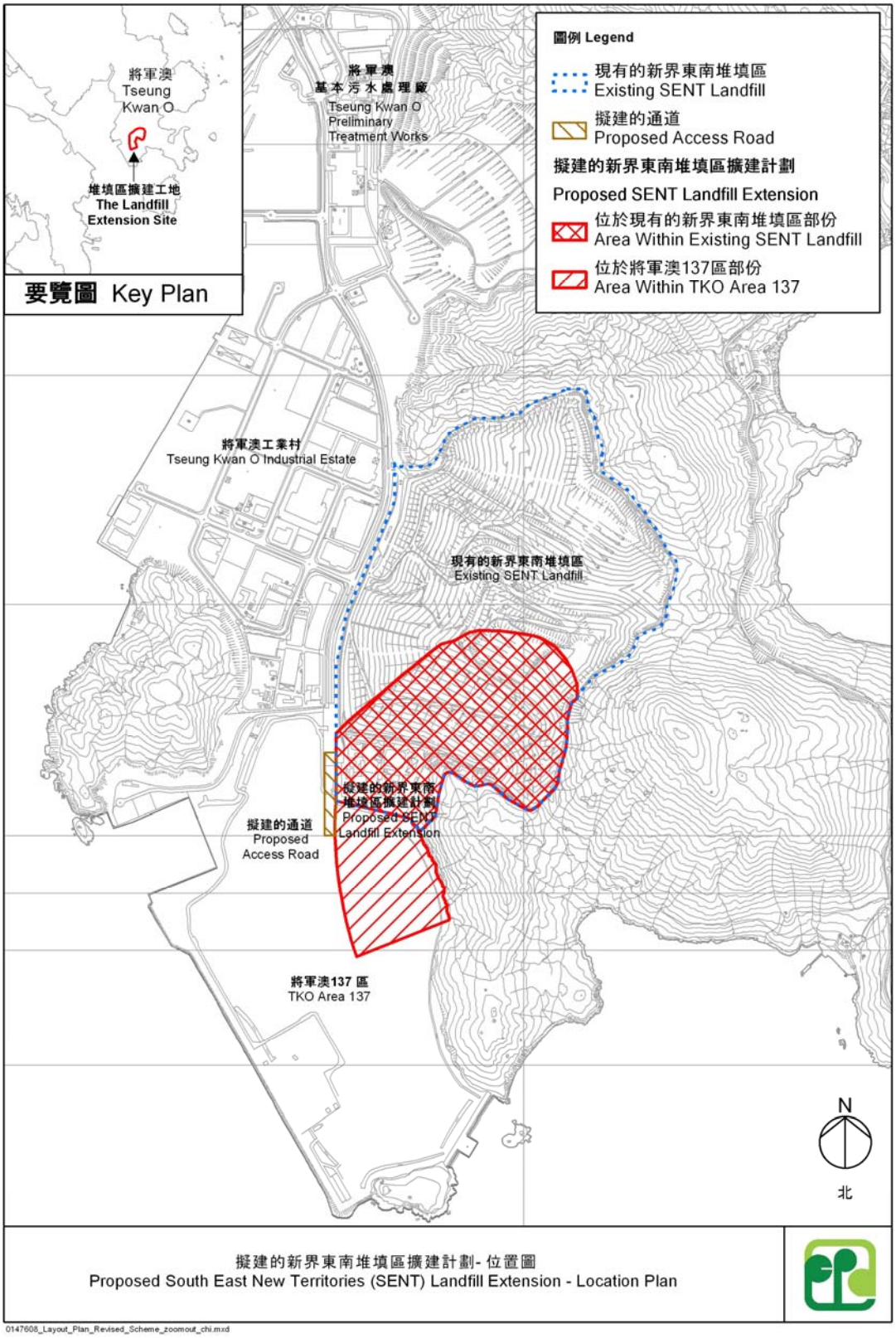
Remaining Capacities of Existing Landfills (Scenario: Without Extensions)

	Average Daily Intake (in 2012)	Filling Capacity		Anticipated Year of Exhaustion
		Design	Remaining (as at end 2012)	
	(Unit: tpd)	(Unit: Mm^3)	(Unit: Mm^3)	[Note 1]
SENT Landfill	MSW: 2,080 Construction Waste: 2,320 Other Waste: 400	43	7	2015
NENT Landfill	MSW: 1,940 Construction Waste: 520 Other Waste: 220	35	18	2016/17
WENT Landfill	MSW: 5,260 Construction Waste: 600 Other Waste: 500	61	31	2019
Total	MSW: 9,280 Construction Waste: 3,440 Other Waste: 1,120	139	56	--

Note 1 In assessing the anticipated year of exhaustion of the landfill, certain planning assumptions have been adopted to allow for fluctuation in waste disposal notwithstanding the continuing efforts in waste reduction and recycling. As landfills are the last resort for waste disposal, prudent and realistic planning assumptions are applied. Such assumptions include moderate growth in wastes due to population growth, increases in economic activities and major development projects having regard to historical trend and economic forecasts. For planning purposes, the amount of construction waste is also assumed to remain constant.

Annex B

Location Plan of the proposed SENT Landfill Extension



Annex C

Update on Progress of the NENT Landfill Extension

Engagement with Local Community

As the proposed NENT landfill extension site is located between Ta Kwu Ling (TKL) and Sha Tau Kok (STK), the Ta Kwu Ling District Rural Committee (TKLDRC) and the Sha Tau Kok District Rural Committee (STKDRC) are among the key stakeholders.

2. In response to local concerns and objections, the North District Office (NDO) and the Environmental Protection Department (EPD) set up a Working Group with representatives from the TKLDRC and STKDRC in early 2009. Liaison meetings under this Working Group have been held regularly to brief and update members of the latest development of the landfill extension project. The eleventh Working Group meetings with the STKDRC and TKLDRC were held on 16 October and 8 November 2013 respectively. During the meetings, we briefed the two RCs on the latest development of the project. At the request of the two RCs, we have assisted the relevant villages to pursue various local village improvement and enhancement works (such as village offices, pai laus "牌樓", greening or community facilities, water supply to remote villages and irrigation water supply to farmlands, etc). EPD will continue to follow up on these works.

North District Council (NDC) Consultation

3. On 25 July 2013, the NDC discussed a member's proposal in relation to the NENT Landfill. While a couple of members expressed objections to the proposed extension, others suggested the Administration to step up its efforts in implementing a comprehensive waste management strategy. Members also requested EPD to step up its liaison with them and local stakeholders, and address their concerns over and objections to the proposed extension. On 12 December 2013, the Secretary for the Environment briefed members on the Action Blueprint. He reiterated the determination of the Government to tackle the waste problems by

undertaking multiple and concurrent actions as detailed in the Action Blueprint, including the urgent need for waste infrastructure, such as waste-to-energy integrated waste management facilities and extension of the three existing landfills. Members supported the directions of the comprehensive waste management strategy as outlined in the Action Blueprint.

Blitz Actions

4. To address the concerns of the local community regarding the hygiene and safety issues (such as uncovered waste, dripping of waste water, and spattering of waste, etc.) of the waste collection vehicles running on roads in the vicinity of waste facilities, in particular the landfills, an Interdepartmental Coordination Committee has been set up to tackle various issues. Among the actions, joint "Blitz Operations" conducted by the Hong Kong Police Force, Food and Environmental Hygiene Department and EPD were carried out to tackle problematic waste collection vehicles. A total of 122 waste collection vehicles were stopped and inspected during the four Blitz Operations carried out since May 2013 and 7 fixed penalty tickets were issued.

Way Forward

5. We will continue with our close engagement with the local stakeholders, including the local communities of the TKLD and STKD to address their concerns over the landfill extension, as well as working closely with them to improve the local community environment.

6. To this end, on the basis of the Working Group formed in early 2009, we will form a District Liaison Group to further enhance communication with the stakeholders in the district and seek their views on the operation of the NENT Landfill. In addition, we will also enlist the assistance of the District Liaison Group in disseminating information to the local community, and promoting community participation.

Annex D

Update on Progress of the WENT Landfill Extension

Actions Taken

Engagement with community of Tuen Mun and Yuen Long has been rolled out on various fronts, at the levels of district councils and local communities, to strengthen our communication and to address their concerns on the proposed WENT landfill extension and other waste facility projects.

2. Over the past year, a number of improvement and enhancement measures have been or are being undertaken (e.g. construction of the iconic footbridge across the Tuen Mun River, planning study of Tuen Mun Area 46 for high value usage, revitalisation of Tuen Mun industrial area and establishment of an air quality monitoring station in Tuen Mun town centre). During the consultation, we have received different comments and recommendations on improving both the local environment and the Hong Kong as a whole. We have provided response as set out below and **discussion will continue**, e.g. at the upcoming special meeting of Tuen Mun District Council (TMDC) on 13 March 2014:

(a) At our consultation with the TMDC's special meeting on 20 January 2014, we have committed to continue our progress in the following areas:

Improvement by Enhancement

(i) Better communication with the local community

We are establishing a **District Liaison Group** with representatives from Tuen Mun and Yuen Long to address the concerns of the two districts on various issues, including waste management, transportation, environmental monitoring and hygiene, etc.;

(ii) Better address the community development needs

We are aware of the community needs for better transportation network between Tuen Mun and Yuen Long. For upgrading of Nim Wan Road and Deep Bay Road, we have set up a task force with relevant government departments and briefed the Environment, Hygiene and District Development Committee under the TMDC and the Ha Tsuen Rural Committee on 15 and 28 November 2013 respectively, and also briefed the Yuen Long District Council about the proposed consultancy study scope of this road project on 10 December 2013. Although we were not able to obtain funding for this consultancy study through the block allocation mechanism from the LegCo Finance Committee (FC) on 10 January 2014, we are planning to take the matter forward after the LegCo has approved the funding for the consultancy study on the WENT landfill extension.

The various works components under the Tuen Mun River Beautification Scheme are being implemented progressively. Apart from the commencement of works for the iconic footbridge construction project mentioned earlier, the beautification works for the Tin Hau Temple Plaza was completed in November 2013;

(iii) Better use of restored landfills

Making better use of the restored landfills for the enjoyment of the community is also an effective measure to care for the development of community. We expect that the Restored Landfill Revitalisation Funding Scheme announced under the 2014 Policy Address will greatly expedite better use of these landfill sites, for recreational, environmental or other community uses.

The revitalisation scheme may also encourage more creativity so that the restored landfills can have more lively and diversified development. We will make reference to the experience developed in the revitalisation scheme in planning

for the restoration of the existing landfills to better serve the community;

#

Improvement by Reduction

(iv) Reduce the reliance on landfilling

We will embark on preparatory work this year for a strategic study on future waste management facilities. The study will look into various issues such as types, scale, technology, locality and timing of new strategic and regional facilities and services needed with a view to drawing up a strategic masterplan of waste management facilities for the future;

(v) Reduce the waste transportation by road

Currently, about 72% of municipal solid waste (MSW) delivered to the WENT Landfill daily is by sea. Legislation was amended on 22 January 2014 to adjust the fee and strategy of refuse transfer stations (RTSs) and encourage more use of the RTSs, thereby increase the use of marine routing for waste transportation. We expect that proportion of MSW transportation to WENT Landfill by sea will be at a high level of around 80%. The remaining 20% will then be transported to the WENT Landfill mainly via the Northwest New Territories RTS, with the rest by direct haulage from area nearby the landfill;

We are also planning to gradually shift to marine transportation for the cover material from the public fill bank in Tuen Mun to the WENT Landfill for daily operation. The current use of Lung Kwu Tan Road and Nim Wan Road for this transportation, about 100 vehicle trips per day, will no longer be required in due course;

(vi) Reduce the planned area of WENT landfill extension

The existing landfill extension proposal was made based on many governing factors such as topography, capacity, engineering and disposal needs. We have to make the best

use of the limited resources in providing the optimal landfill capacity to meet disposal needs of the whole Hong Kong.

Despite that, in response to the concern of the residents nearby, we will set back the boundary of the extension closest to residential development, by setting up extensive planting with priority in development. We will also study the feasibility of developing the extension portion **in phases** in the proposed consultancy study, for which the funding support will be sought from the FC in the second quarter of 2014. We aim to **restrict each landfill development phase to within a certain area** so as to minimize the visual impact to the surroundings whilst meeting the disposal needs at the same time. The arrangement details will be reviewed in the proposed consultancy study.

(b) As regards the consultation with the village representatives of Lung Kwu Tan, we have continued our close liaison with the stakeholders to address the needs and concerns of the local community, including environmental hygiene, road safety and cleanliness, etc, particularly those on landfill related issues.

(c) Similarly, for the consultation with the village representatives of Ha Pak Nai, we have also continued our close liaison with the stakeholders to address the needs and concerns of the local community, in areas of environmental hygiene, road safety and cleanliness, etc. In particular, we have helped convey the frequent flooding problem of Ap Tsai Hang Bridge (鴨仔坑橋) in Pak Nai to Highways Department (HyD), Drainage Services Department and the Yuen Long District Office. With the help of HyD, the level of the bridge deck was recently raised to reduce the possible occurrence of flooding in the area.

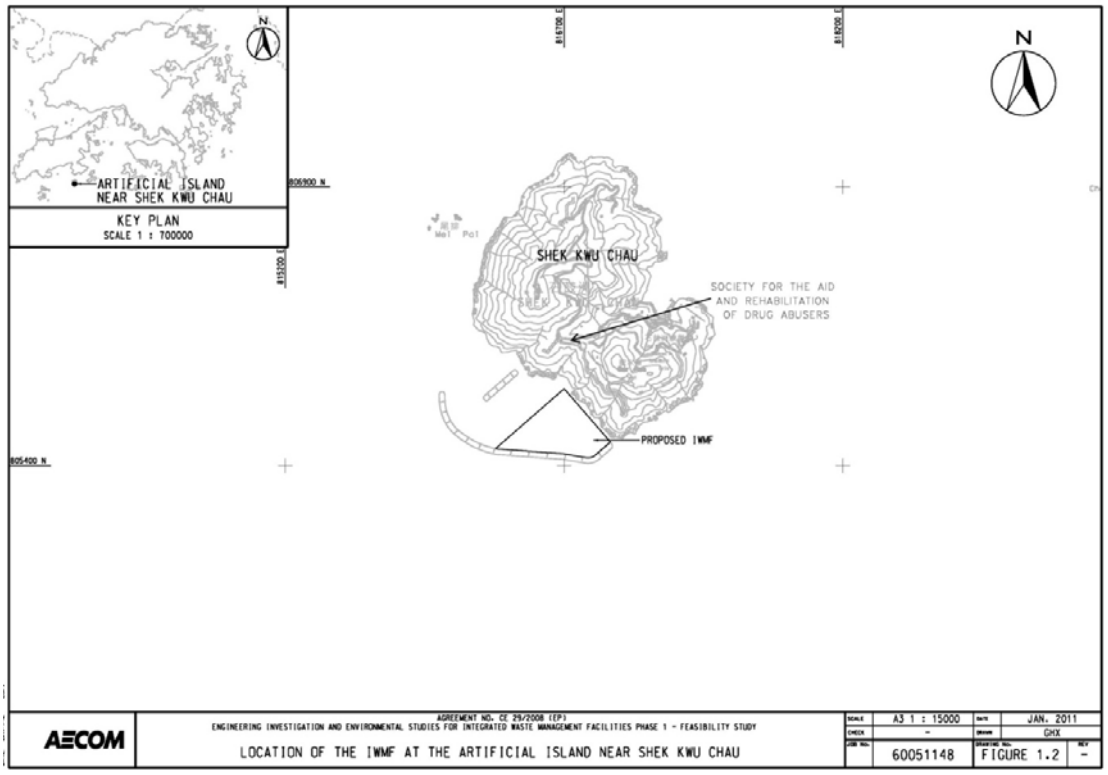
Way Forward

3. We will continue with our close engagement with the relevant stakeholders to address their concerns over the landfill extension, as well as working closely with them to improve the local community environment.

The District Liaison Group will provide a new platform for work on this front. The part upgrading of the WENT landfill extension project would enable the Administration to study and confirm the engineering feasibility of the various comments / recommendations put forth during the local consultation in respect of landfill extension, and also to meet the waste disposal needs, long-term demand and aspirations of the community in future.

Annex E

Location Plan of the IWMF Phase 1



Annex F

Information Relating to the IWMF Phase 1

Annex G

Responses to Major Concerns

1. Air Quality and Health

1.1 The emissions from the IWMF will comply with the European Union (EU) standards, which are currently the most stringent international standards, and hence will not affect the health of the residents of Shek Kwu Chau, South Lantau and Cheung Chau.

1.2 **Design and Operation**: The IWMF will be designed and operated to the most up-to-date international standards and practices. In addition to the adoption of advanced incineration technology, an advanced air cleansing system will be installed in the IWMF to ensure that the emissions from the IWMF will comply with the EU standards which are currently the most stringent international standards.

1.3 **Safety Record**: There are many similar advanced incineration facilities operating satisfactorily around the world (e.g. Singapore, the Netherlands, Germany, Denmark, France, USA, Japan, etc) of which about 2 000 incineration facilities have emission controls, including the two largest facilities in Singapore and the Netherlands. Both facilities have a capacity of about 4 000 tonnes per day. These facilities have been operating for many years and also have good safety records.

1.4 **Wind Direction**: The IWMF EIA Study has used scientific mathematical models together with wind tunnel tests to assess in detail the impact of the IWMF's emissions on the air quality of the nearby areas under different wind directions throughout the year, including the impact on South Lantau and Cheung Chau during the summer period. Given that the artificial island site is several kilometers away from the nearby areas, the emissions from the IWMF will be greatly diluted when they reach South Lantau and Cheung Chau.

1.5 **Assessment**: According to the above assessment, the predicted impact of the IWMF's emissions on the air quality of Cheung Chau and

South Lantau will fully comply with the short-term (i.e. hourly) and the long-term (i.e. annual) air quality objectives. For example, taking into account all the sources of emissions in Hong Kong and the nearby regions, the annual average cumulative concentrations of nitrogen dioxide in South Lantau and Cheung Chau are projected to be 17μg/m^3 and 26μg/m^3 respectively, far below the air quality objective of 80μg/m^3. Emissions from the IWMF account for less than 0.12μg/m^3 and 0.08μg/m^3 of such concentrations respectively.

2. Air Cleansing Technology

2.1 When the flue gas is discharged from the IWMF, it will already be treated by the IWMF's multiple cleansing system so as to comply with the emission standards.

2.2 **During the Incineration of Waste**: The IWMF will adopt the advanced 3T (i.e. high temperature, high turbulence and flue gas residence time of at least 2 seconds) moving grate incineration technology to destroy organic pollutants completely. Such technology employs high temperature (> 850 degree Celsius) to combust the waste under high turbulent condition with flue gas residence time of at least 2 seconds to ensure complete combustion of the waste.

2.3 **Treatment after Incineration**: An advanced air pollution control system will also be installed in the IWMF. After the 3T incineration process, flue gas will be treated by the selective catalytic reduction (SCR) for nitrogen oxides (NOx) removal, activated carbon for dioxins removal, etc. The monitoring system will continuously monitor the flue gas quality to ensure that the IWMF's emissions will comply with emission limits that are the same as or more stringent than those stipulated in Hong Kong and the EU for waste incineration.

3. Ecology

3.1 With the implementation of the proposed mitigation measures, the impact of the IWMF on Finless Porpoises would be mitigated to an acceptable level.

3.2 **Full Consideration of Ecology during Site Selection**: The waters of the artificial island near SKC are not located within the statutory or proposed ecological conservation areas. During the selection of the artificial island near SKW for the development of the IWMF, careful consideration has been given to the usage of the site and the SKC conservation area proposed in the South West New Territories Development Strategy. To avoid direct impact on the terrestrial ecology of SKC and to conserve the natural shoreline of SKC and the respective tidal areas and coral communities, the IWMF's artificial island will not be connected to SKC. The coast of SKC and the artificial island will be separated by a water channel.

3.3 **The Waters are not frequented by Chinese White Dolphins**: The EIA Study reveals that the waters around SKC are not frequented by Chinese White Dolphins.

3.4 **Measures to mitigate the impact on Finless Porpoises' Habitats**: Finless porpoises can be found across a vast area of waters. They frequent the vicinity of Po Toi Island in summer and autumn, and the waters to the south of Lantau Island (around the Soko Islands, SKC, Cheung Chau, Lantau Island) and Lamma Island in winter and spring. The construction of the proposed artificial island may result in a permanent loss of 31 ha of the habitats for finless porpoises. To compensate the loss of habitats, the EIA Study has proposed that a marine park of approximately 700 ha should be designated in a suitable area in the waters between SKC and the Soko Islands. In this connection, a marine park study will be conducted to identify the suitable location and area for the proposed marine park and the marine ecological enhancement measures that should be implemented in the proposed marine park. These measures include deployment of artificial reef and release of fish fry to enhance the fisheries resources in the surrounding areas.

3.5 A number of measures have also been proposed in the EIA Study to mitigate the potential indirect impacts on finless porpoises during the construction and operation of the IWMF. The measures include avoidance of noisy works during peak season for finless porpoises' occurrence, monitoring of exclusion zone, adoption of regular traffic route,

and limitation of vessel speed to 10 knots in areas with high sighting density of finless porpoise, etc.

4. Water Quality and Fisheries

4.1 The impact of the construction work of the IWMF on water quality, ecology and fisheries will be localized and minimal.

4.2 **Consideration of the submarine cable installation**: Regarding the dredging and reclamation related to the works between SKC and South Lantau covered in the Gazette Notice G.N.2588, it comprises a narrow strip of area for submarine cable installation from the artificial island to South Lantau and also a works area for the artificial island reclamation. The submarine cable works would be carried out by a non-dredging method that would use water jets to create trench at the seabed immediately followed by cable laying. The sides of the trench would then slip around the cable, burying it and leaving a small depression in the seabed. The whole submarine cable laying process would only take a very short period to complete (about 20 working days) and it would not alter or cause damage to the coast line of South Lantau.

4.3 **Special Measures taken during the Works Period**: Reclamation of an area of about 16 ha is required to create the artificial island near SKC for the development of the IWMF. In order to minimize dredging and filling works and its environmental impacts, the area to be reclaimed has been reduced by about 40% as compared with the original proposal through the adoption of an advanced reclamation method (i.e. cellular cofferdam). The EIA Study has proposed to use cellular cofferdam rather than sloping seawall for reclamation so as to minimize environmental impacts. Cellular cofferdam is a way of reclamation whereby cellular metal coffers are used to enclose an area to be reclaimed before fill materials are poured onto the enclosed waters. By doing so, there will be no need to carry out large-scale sediment dredging works during breakwater construction on the artificial island and this will greatly reduce the required amount of dredging using traditional reclamation method from 2.3 million cubic meter to 0.027 million cubic meter. Hence, the impact of the construction work of the IWMF on water quality, ecology and fisheries will be localized and minimal.

4.4 In addition, a number of mitigation measures including silt curtain system, control over dredging and filling rates and so on, will be taken during construction to reduce impact of the works on marine resources.

4.5 On this basis, the EIA Study has made a quantitative evaluation of the impact on water quality. The results show that with the implementation of mitigation measures, the impact of the construction works on water quality will be localized and minimal. Its indirect impact on fisheries in the nearby waters will also be insignificant and temporary. Given that the fish culture zone in the nearby Cheung Sha Wan, South Lantau is more than 9 km from the artificial island, it is expected that the reclamation for the proposed artificial island will not adversely affect the water quality and the operation in the fish culture zone. The water quality will be subject to close monitoring during construction and operation of the IWMF. The results will be published on the Internet so as to maintain high degree of transparency.

4.6 A scheme will be put in place to achieve zero wastewater discharge during operation of the IWMF. After treatment in a wastewater treatment plant, effluent generated during operation will be reused for washing and landscape irrigation within the IWMF. There will be no impact on water quality, ecology and fisheries after the completion of the IWMF.

4.7 There will be a permanent loss of 31 ha of fishing area on the southern waters of Hong Kong subsequent to the construction of the artificial island for the IWMF. According to the EIA Study, the area supports low to moderate fisheries production of about 100-200 kg/ha. In addition, the 31 ha to be permanently lost accounts for just a very small part of Hong Kong's fishing area as a whole. Therefore, the IWMF should not have any significant impact on Hong Kong's overall fisheries production. Its impact on fisheries will be acceptable. The ecological mitigation measures mentioned above will also help enhance fisheries resources in the surrounding areas.