FINAL - ISSUE 1

Environmental Impact Assessment – Executive Summary

Agreement No. CE 26/2022 (EP) Development of Integrated Waste Management Facilities Phase 2 (I·PARK2)

BINNIES PROJECT NO. 4110377
BINNIES FILE NO. 4110377/40.1041

PREPARED FOR

環境保護署
Environmental Protection Department

SEPTEMBER 2024

binnies

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1 Introduction

1.1 Background

At present, an average of about 11,100 tonnes of municipal solid waste (MSW)[1] are disposed of at landfills in Hong Kong per day. Currently, there are three strategic landfills in operation, namely, the South East New Territories (SENT) Landfill in Tseung Kwan O, the NENT Landfill in Ta Kwu Ling and the West New Territories (WENT) Landfill in Tuen Mun. Among these three landfills, only the NENT Landfill and WENT Landfill receive MSW[2] of around 5,200 and 5,900 tonnes respectively per day.

In the Waste Blueprint for Hong Kong 2035 (the Blueprint), the Government sets out the vision to move away from the reliance on landfills for direct disposal of MSW by around 2035. The Government's strategy has two main directions. The first is to mobilise the entire community to practise waste reduction and waste separation for recycling in the upstream to reduce the overall waste disposal amount. The second is to proactively drive the development of downstream waste-to-energy (WtE) facilities for sustainable disposal of the remaining MSW. According to the strategies set out in the Blueprint, should there be sufficient WtE and waste-to-resources facilities in place by around 2035, we will no longer need to rely on landfills for direct disposal of MSW. By then, only waste that is non-combustible and cannot be recycled or reused, such as construction waste, will be disposed of at the landfills.

The Environmental Protection Department (EPD) is pressing ahead with the development of a network of advanced and highly efficient modern WtE facilities, including modern WtE incinerators and food waste treatment facilities, with a view to moving away from the reliance on landfill for direct disposal of MSW and transforming waste into useful energy resources. Regarding the development of modern WtE incinerators, with the Integrated Waste Management Facilities Phase 1 (I·PARK1) under construction and the proposed Integrated Waste Management Facilities Phase 2 (I·PARK2), Hong Kong's MSW incineration capacity will reach 9,000 tonnes per day. Upon commissioning of the proposed I·PARK2, the NENT Landfill will completely cease MSW reception and will be transformed to receive construction waste only, which does not decay and is odourless, thereby eliminating the odour problem arising from MSW reception. The Government will continue to exert efforts to promote waste reduction and recycling, aiming to achieve "Zero Landfill" in around 2035 and refraining from reliance on direct landfill disposal for MSW.

[1] The figure is based on the Waste Statistics for 2022. In addition, about 4,100 tonnes of construction waste are transported to landfills for disposal per day.

[2] With effect from 6 January 2016, the SENT Landfill and its extension are solely for reception of construction waste for disposal. The NENT Landfill and WENT Landfill currently can receive MSW and construction waste.

The EPD appointed Binnies Hong Kong Limited (**Binnies**) on 28 December 2022 to undertake the consultancy "Agreement No. CE 26/2022 (EP) - Development of Integrated Waste Management Facilities Phase 2 – Investigation, Design and Construction". The consultancy scope includes the carrying out of an Environmental Impact Assessment (EIA) study for Development of Integrated Waste Management Facilities Phase 2 (**the Project** or **I·PARK2**).

1.2 Environmental Impact Assessment Ordinance Requirements

In accordance with the Environmental Impact Assessment Ordinance (EIAO) (Amendment of Schedule 2 and 3) Order 2023, the Project consists of the following Designated Projects (DPs) under Part I, Schedule 2 of the EIAO:

- Item G.3 - An incinerator with an installed capacity of more than 500 tonnes per day (tpd).
- Item G.4(a) - A waste disposal facility (excluding any refuse collection point) with an installed capacity of more than 500 tpd for the disposal of refuse.
- Item G.6 - A waste disposal facility for pulverized fuel ash, furnace bottom ash or gypsum.

The Project will not involve any electricity power plant running on fossil fuel with a production capacity of more than 100 megawatts and is not the type of DP specified under Item D.1, Part I, Schedule 2 of the EIAO. The total capacity of wastewater treatment would be about 3,000 m^3/day. The treated sewage effluent generated from the Project will only be reused within the I·PARK2 site or discharged after meeting relevant standards and will not be used by general public. As such, the Project would not comprise element specified under Items F.1, F.2 or F.4, Part I, Schedule 2 of the EIAO. According to the preliminary design, the storage of dangerous goods (DGs) would be less than 500 tonnes and the Project would not comprise element specified under Item K.13, Part I, Schedule 2 of the EIAO. The reclamation works of the Project (including associated dredging works) is less than 5 hectares (ha) in size. There is no reclamation works / dredging operation that are of more than 1 ha in size and less than 500m from the nearest boundary of an existing or planned specified area or 100m from the nearest boundary of an existing residential area, nor dredging operation with a dredging volume of more than 500,000 m^3 under the Project. As such, the Project would not comprise element specified under Item C.1, C.2 or C.12, Part I, Schedule 2 of the EIAO. The Project is located at the Tsang Tsui Middle Ash Lagoon (TTMAL) (for the proposed waste-to-energy incinerator) and West Ash Lagoon (WAL) (for proposed seawater outfall and associated pipelines). Decommissioning of the TTMAL and WAL would be subject to the requirements under separate Environmental Permit(s) (EP(s)). Thus, this Project will not involve decommissioning activities specified under Part II, Schedule 2 of the EIAO.

1.3 Purpose of this Executive Summary

This Executive Summary summarizes the findings, recommendations and conclusions of the EIA Report for the Project.

2 Project Description

2.1 Project Scope

The Project comprises the construction and operation of I·PARK2 which will have a design treatment capacity sufficient to handle around 6,000 tpd of Municipal Solid Waste (MSW). The Project will adopt state-of-the-art incineration technology to substantially reduce the bulk size of waste. The heat energy from waste incineration process will be recovered for electricity generation. Apart from meeting the electricity demand of the facility, surplus electricity from the Project will be exported to the power grid, thereby boosting up the portion of electricity generation from waste-to-energy (WtE) source. Moreover, effective air pollution control systems will be adopted in the proposed I·PARK2 and flue gas emissions will be monitored during its operation to ensure compliance with the stringent emission standards. Community facilities that will meet the needs of the public will be incorporated in the design of the Project to allow members of the public to benefit.

The Project would comprise the following key facilities:

- MSW reception, storage and feeding system.
- Berthing facility.
- Incineration furnace and boiler system.
- Steam turbine generator and cooling system.
- Power export/import system for electricity supply within the facility and connecting to power grid at 132kV voltage level.
- Flue gas treatment and emission system.
- Reagent reception and storage system.
- Incinerator bottom ash, fly ash and air pollution control residues storage, handling and treatment system.

- Process control and monitoring system.
- Water supply system (including desalination plant).
- Wastewater treatment facilities.

Design-Build-Operate (DBO) contract arrangement would be adopted for the Project. Under this contract arrangement, a DBO contractor would be engaged to conduct the detailed design, construction and operation of the I·PARK2.

The Project is located at the TTMAL and WAL at Nim Wan, Tuen Mun. The proposed waste-to-energy incinerator of I·PARK2 is located at the TTMAL while the proposed seawater outfall and associated pipe laying works are located at WAL. The existing artificial seawall to the north and west of the ash lagoons will be modified for construction of berthing facility and seawater outfall to support operation of I·PARK2. The total area of the Project Site would be about 28.6 ha. The Project location plan is shown in **Figure 1.1**.

2.2 Need and Benefit of the Project

The Project will adopt state-of-the-art incineration technology to substantially reduce the bulk size of waste through incineration process and recovery of useful resources such as metals and treated Incinerator Bottom Ash (IBA), which can reduce the amount of MSW to be disposed of at landfills substantially. The heat energy from waste incineration process will be recovered for electricity generation. Apart from meeting the electricity demand of the facility, surplus electricity from the Project will be exported to the power grid, thereby boosting up the portion of electricity generation from waste-to-energy (WtE) source. This can help reduce electricity generation by fossil fuel and greenhouse gas emissions such as methane generated from decomposition of MSW in landfills. Moreover, the design of the Project will incorporate community facilities that will meet the needs of the public to allow members of the public to benefit.

Development of I·PARK2 is an important step to move away from the reliance on landfills for direct disposal of MSW disposal. It can also make good use of valuable land resources, and at the same time transform waste into energy and useful resources, thereby achieving a "multi-win situation".

2.3 Consideration of Alternatives

Consideration of alternatives and selection of preferred option including design and construction method of the Project are summarized as follows:

- Moving grate incineration technology is well-established and is the most commonly used thermal treatment technology for MSW globally. It is widely proven at large scale for a range of mixed MSW feedstocks and is selected as the most suitable option for I·PARK2.

Other alternative technologies not well proven for complex and mixed composition of MSW with large treatment scale are not further considered.

- The MSW treatment capacity of I·PARK2 has been increased from 4,000 tpd to 6,000 tpd upon effective utilisation of the proposed I·PARK2 site and the application of the state-of-the-art technology.
- Once-through seawater cooling system, utilizing seawater as a non-intermittent renewable resource of cooling, can preserve freshwater resource, and provide more energy saving. Conventional air-cooled system is considered proven and reliable with lower operation and maintenance requirements and would not involve spent cooling water discharge. With consideration of the above factors, both air-cooled system and once-through seawater cooling system are considered as feasible options in the reference design for I·PARK2.
- Seawater reverse osmosis (SWRO) technology will be adopted for desalination process due to lower energy consumption and smaller footprint required compared to Multi-stage flash desalination (MSF) technology.
- The bottom ash would be treated for off-site beneficial uses and the disposal of bottom ash at landfill would be the last resort if all possible options of the beneficial uses/outlet are exhausted. This can reduce the amount of treated ashes to be disposed of at landfills and extend the service life of landfills.
- Effluent outfall is needed for discharge of brine water from desalination plant and seawater cooling effluent from seawater cooling system (if adopted) into the sea. Seawall effluent outfall will be adopted and located at the artificial seawall with low ecological and fisheries value, avoiding direct loss of marine habitat and fishing ground and indirect environmental disturbances (e.g. changes of water quality) associated with construction of submarine effluent outfall.
- Percussive piling should be avoided as far as practicable to minimize noise disturbances.
- The non-dredged ground treatment method, i.e. Deep Cement Mixing (DCM) will be adopted for construction of the berthing facility to minimise dredging and the associated impacts on the water quality, marine ecology and fisheries resources as well as the need for sediment disposal.
- In terms of the construction sequence, concurrent construction of different Project facilities is proposed to shorten the duration of construction phase environmental impacts and meet the tight construction programme of the Project.

2.4 Project Programme

The Project was expected to be completed in early 2030s. To promote the development of I·PARK2, the Government is streamlining procedures and synchronising various works, including investigation, technical assessment, developing reference design, drafting tender

documents and undertaking relevant statutory procedures. Moreover, the Government has had multiple exchanges with major overseas and Mainland waste incineration enterprises on how to accelerate Hong Kong's development of the proposed I·PARK2. Having consolidated the opinions from the expert team and large-scale Mainland waste incineration enterprises in relation to the actual setting of the proposed I·PARK2 site, the construction period (discounting the circumstances affected by inclement weather) is estimated to be about 54 months.

3 Key Findings of Environmental Impact Assessment

3.1 Air Quality Impact

3.1.1 Construction Phase

Potential air quality impacts arising from construction activities of the Project have been considered and evaluated in the EIA. With implementation of the good engineering practice and requirements as stipulated in the Air Pollution Control (Construction Dust) Regulation and the Air Pollution Control (Non-road Mobile Machinery) (Emission) Regulation and the mitigation measures recommended in the EIA Report, no adverse air quality impact on air sensitive receivers (ASRs) during construction phase of the Project is anticipated. Construction dust monitoring shall be conducted during the construction phase of the Project to check the effectiveness of the air quality control measures, and to ensure the compliance with the requirements set out in the EIA report.

3.1.2 Operation Phase

During the operation of the I·PARK2, the potential sources of air quality impacts include air emissions from the stacks of incineration process and the odour nuisance.

The I·PARK2 facilities including wastewater treatment facility, waste reception hall, waste storage areas and waste feed system shall adopt an enclosed design and maintained at negative pressure by withdrawing the air through the bunkers. Odorous air of the wastewater treatment facilities, waste reception hall, waste storage areas and waste feed system will be drawn into the combustion chamber of the incinerator for combustion and treated by flue gas treatment system before discharge. The incinerator furnace will be designed with proper control of combustion gas temperature, residence time, air supply and gas turbulence to

ensure effective destruction of odorous substances in the waste gas. Odour control system with odour removal efficiency of more than 95% shall be provided for treatment of odorous air before discharging into open atmosphere during a shut-down or under the circumstances that the odorous air cannot be withdrawn into the combustion chamber of the incinerator for combustion.

The incinerator shall be designed, equipped, built and operated in such a way that the waste is thoroughly combusted at high temperature above 850℃ with sufficient air supply under high turbulent condition for at least two seconds to ensure effective destruction of organic pollutants including dioxin. The I·PARK2 shall be designed to meet the target emission levels for the incinerator presented in **Appendix A** by making reference to the standards for pollution control on the MSW incineration in the Mainland China (GB 18485-2014) and Shenzhen (SZDB/Z 233-2017), the best available techniques (BAT) reference document for waste incineration in the European Union (EU), as well as the prevailing guidance note on the best practicable means (BPM) for incinerators (municipal waste incineration) in Hong Kong. In particular, the I·PARK2 will meet a more stringent target hourly NOx emission level of 60 mg/Nm^3 with a view to minimising potential air quality impact. The I·PARK2 contractor will be required to adopt advanced air pollution control system and ensure compliance with the target air emission levels and criteria for evaluating air quality impact set out in Annex 4 of the EIAO-TM. The air pollution control system shall include a combination of the following techniques:

- Selective non-catalytic reduction (SNCR) and selective catalytic reduction (SCR) to reduce NOx emissions;
- Dry alkaline sorbent (sodium bicarbonate or lime) injection(s) combined with bag filter(s), semi-dry absorber and/or wet scrubber to reduce acidic gases such as HCl, HF and SO_2;
- Dry sorbent (activated carbon) injection combined with bag filter to reduce dioxin and metals; and
- Bag filter(s) to reduce particulates.

The cumulative air quality and odour impact assessment results show that all the representative ASRs in the vicinity of the Project site would comply with the Air Quality Objectives and criteria for evaluating air quality impact set out in Annex 4 of the EIAO-TM. Hence, adverse air quality impact arising from operation phase of the Project is not anticipated. As the incinerator at I·PARK2 is a specified process under Cap. 311 Air Pollution Control Ordinance (APCO), the I·PARK2 contractor shall be required to obtain a licence pursuant to section 14 of the APCO and comply with the terms and conditions in the licence.

The I·PARK2 contractor shall conduct stack monitoring during the incineration process in accordance with the monitoring requirements in the prevailing guidance note on the BPM for incinerators (municipal waste incineration) in Hong Kong to ensure that the emissions from the stack will meet the proposed target emission levels for the incinerator. The monitoring

requirements given in the EM&A Manual of this Project shall also be followed. Besides, odour patrol will be carried out during operation of the Project to ensure that there would be no adverse odour impact arising from the Project. The monitoring of emissions from the IBA treatment facility shall be carried out on a regular basis upon the commissioning.

3.2 Noise Impact

No existing, committed or planned noise sensitive receiver (NSR) is identified within 300m from the boundary of the I·PARK2 site. Adverse noise impacts from the I·PARK2 site are not anticipated during both construction and operation phases. Practicable measures such as quieter construction methods and construction equipment set out in the Professional Persons Environmental Consultative Committee Practice Note (ProPECC) PN 1/24 "Minimizing Noise from Construction Activities" and noise control techniques such as selection of quiet equipment, use of enclosure or silencer set out in the "Good Practices on the Control of Noise from Electrical & Mechanical Systems" promulgated by EPD will be adopted by the I·PARK2 contractor as far as practicable with a view to minimising noise from construction activities during construction phase and fixed noise sources such as fan units during operation phase, respectively. The I·PARK2 contractor shall also be required to ensure compliance with the EIAO-TM and Noise Control Ordinance (Cap. 400).

The potential traffic noise impact due to the off-site traffic along Lung Kwu Tan Road during operational phase of the Project has been reviewed in the EIA. Upon the operation of the Project, it is anticipated that the number of waste collection vehicles passing through the existing Lung Kwu Tan Road will be similar to the prevailing scenario of MSW delivery to WENT Landfill. Given that the peak traffic generated by the Project to the Lung Kwu Tan Road is insignificant and would not fall within night time or early morning (i.e. between 11pm and 7am), adverse road traffic noise impact due to the Project is not anticipated.

Currently, MSW loaded in containers is delivered to the berth of WENT Landfill and its extension by marine vessels along the northern seafront of the I·PARK2. During the operational phase of the Project, some vessels originally planned to deliver MSW to the WENT Landfill and its extension will be diverted to the I·PARK2 while treated ashes from I·PARK2 might be transported off-site for beneficial uses by marine vessels. Only 1 to 2 additional marine vessels per day would be anticipated during operation. Given that there is no NSR identified within the 300m assessment area from the boundary of the Project and minimal no. of vessel trips induced from the Project per day, adverse marine traffic noise impact due to the Project is not anticipated.

3.3 Water Quality Impact

3.3.1 Construction Phase

3.3.1.1 Land-based Impact

The key sources of water quality impact arising during the land-based construction of the Project include the construction site runoff and drainage, wastewater generated from general construction activities, accidental spillage, general refuse and sewage from the workforce. The impacts could be mitigated and controlled by implementing the recommended mitigation measures set out in the ProPECC PN 2/23 "Construction Site Drainage". No adverse water quality impact is expected. The I·PARK2 contractor shall be required to obtain a licence under Cap. 358 Water Pollution Control Ordinance (WPCO) before commencement of any discharge subject to control of the WPCO and comply with the terms and conditions in the licence including the monitoring requirements.

3.3.1.2 Marine-based Impact

Marine-based water quality impact would arise from the seawall modification and construction of new berthing facility for I·PARK2. Non-dredged ground treatment method (i.e. DCM) is recommended for the proposed marine construction works. The DCM method enables *in-situ* stabilisation of the underlaying sediments without excavation, dredging, shoring or dewatering, and thus there is less exposure of wastes to the water environment. By placing the sand blanket layer on top of the DCM works areas before the DCM treatment, release of fines and cement slurry from the DCM operation is expected to be negligible.

The water quality impacts due to the sand blanket laying work have been quantitatively assessed by mathematical modelling. Suspended solids (SS) is identified as the key parameter of concern. It is predicted that the SS elevations and sedimentation caused by the small-scale sand blanket laying works would be insignificant. Full water quality compliances are predicted at all representative water sensitive receivers (WSRs) under the unmitigated scenario. Precautionary measures including the deployment of silt curtains would be implemented during the marine construction works to ensure the water quality in the vicinity will not be affected.

3.3.2 Operational Phase

Change of coastline configuration due to the seawall modification and new berthing facility as well as discharge of brine water from desalination plant and seawater cooling effluent from seawater cooling system (if adopted) into the sea could affect the local hydrodynamics and water quality conditions. The potential change in hydrodynamics and water quality due to the I·PARK2 operation was assessed by means of mathematical modelling. The hydrodynamics regimes in the assessment area are predicted to be similar before and after the implementation of I·PARK2. The mixing zones of the brine and spent seawater cooling effluent discharges are

predicted to be localized and would not encroach on any WSRs. Full water quality compliances for all concerned parameters are predicted. Apart from the above, wastewater arising from operation of the Project shall be treated for reuse within I·PARK2 or discharged into the existing Urmston Road Submarine Outfall in the North Western Water Control Zone outside Deep Bay after meeting relevant standards. The I·PARK2 contractor shall also be required to obtain a licence under the WPCO before commencement of any treated effluent discharge and comply with the terms and conditions in the licence including the monitoring requirements. Hence, adverse hydrodynamics and water quality impacts arising from operation of the Project are not anticipated.

3.4 Waste Management Implications

3.4.1 Construction Phase

Construction and demolition (C&D) materials will be generated during the construction phase of the Project. Waste generated during construction works include inert C&D materials, non-inert C&D materials, chemical waste and general refuse. Approximately 501,830 m^3 of inert C&D materials would be generated of which 413,350 m^3 (82%) would be reused on-site and 88,480 m^3 (18%) would be disposed of at designated Public Fill Reception Facility (PFRF). All pulverised fuel ash (PFA) excavated (approximately 148,850 m^3) would be reused for backfilling on-site and covered by at least 1m thick general fill so that no off-site disposal of PFA will be required in this Project. Approximately 79,410 m^3 of non-inert C&D materials would be generated of which 15,880 m^3 (20%) would be recycled and 63,530 m^3 (80%) would be disposed of at designated landfill.

It is estimated that about 50 litres of chemical waste would be generated per month and collected by licensed chemical waste collector for disposal at licensed treatment facility i.e. Chemical Waste Treatment Centre at Tsing Yi. About 650 kg of general refuse would be generated per day. Recyclable materials recovered from the general refuse would be delivered to suitable waste recyclers and any non-recyclables of the general refuse would be disposed of at landfill.

3.4.2 Operational Phase

During operational phase, the MSW will be transported to I·PARK2 mainly by sea, with limited number of waste collection vehicles collecting MSW from local districts e.g. Tuen Mun and Lung Kwu Tan passing through the existing Lung Kwu Tan Road similar to the prevailing scenario of MSW delivery to WENT Landfill. The MSW will be fully enclosed in sealed containers or covered entirely to ensure that the MSW do not leak from vessels or vehicles during transportation. The MSW containing vessel will be equipped with GPS trackers to provide real time vessel location, which serves as an effective surveillance measure to avoid waste dumping at sea. In addition, incineration by-products including bottom ash, fly ash and air pollution control (APC) residues would be generated from the Project. It is estimated that

approximately 660 to 1,200 tonnes per day (tpd) and 265 tpd of bottom ash would be generated from the Project operation and imported from I·PARK1, respectively for co-treatment. The bottom ash will be treated by screening, crushing, sieving and metal removal for off-site beneficial uses after meeting the relevant requirements[3]. Disposal of bottom ash at landfill would be the last resort if all possible options of the beneficial uses/outlet are exhausted. On the other hand, it is estimated that approximately 200 to 440 tpd of fly ash / APC residues would be generated from the Project operation. As the existing technology for recovering fly ash is immature with a high cost, the fly ash / APC residues would be treated by cement solidification or chemical stabilization to ensure compliance with the incineration residue pollution control limits and the leachate parameters set out for landfills in Hong Kong prior to landfill disposal. The Government will keep in view the development of fly ash treatment technology and consider recovering fly ash for beneficial use when the technology becomes mature and cost-effective. The monitoring requirements for the bottom ash and stabilized fly ash / APC residues to be disposed of at landfill given in the EM&A Manual of this Project shall also be followed.

Apart from the above, dewatered sludge from on-site wastewater treatment plants of the Project, chemical waste and general refuse arising from operation of the Project will be properly handled, collected, treated or disposed of at appropriate treatment facilities. Floating refuse may be trapped or accumulated along the artificial seawall during construction and operation of the Project. Considering no sharp turns or abrupt indentation for shoreline along the artificial seawall, entrapment or accumulation of floating refuse along the artificial seawall would be minimal. Floating refuse trapped within the Project area will be collected and properly treated or disposed of as general refuse. With the implementation of the recommended mitigation measures during the construction and operational phases of the Project, no adverse impact on waste management is anticipated.

3.5 Ecological Impact

3.5.1 Terrestrial Ecology

The proposed Project would cause a direct terrestrial habitat loss of about 24.2 ha of wasteland, developed area and ash lagoon in the Project site with limited ecological value. The impact in terms of direct habitat loss is considered as low. As low to moderate fauna diversity and abundance were recorded within the Project site and the fauna recorded within the Project site generally are highly mobile, direct impact to wildlife due to the Project is expected to be low. As a precautionary measure, site check(s) by qualified ecologist(s) before commencement

[3] The treatment requirements will be subject to the possible options of beneficial uses/outlet of the treated bottom ash. Taking MSW incineration bottom ash treated for use as aggregate in Mainland China as an example, the relevant requirements in GB/T 25032-2010 "Municipal solid waste incineration bottom ash aggregate" should be met. More stringent treatment requirements might be required for other options of beneficial uses/outlet of the treated bottom ash.

of the construction phase are recommended to be carried out to confirm there is no breeding activity of avifauna species of conservation importance within the Project site.

Indirect impacts would include noise and human disturbance, air pollutants and site runoff etc. during construction and operational phases. Good site practices and mitigation measures such as quieter construction methods, use of quiet equipment, control of construction site run-off, implementation of construction dust suppression measures / air pollution control measures as well as light and glare control measures are recommended to mitigate the potential disturbance impacts. With proper implementation of the recommended good site practices and mitigation measures, no adverse terrestrial ecological impact due to the construction and operation of I·PARK2 would be expected.

3.5.2 Marine Ecology

The Project would cause a minor loss of marine habitat along the shore of Middle Ash Lagoon and West Ash Lagoon due to the seawall modification and new berthing facility. The affected area would be 4.4 ha and 1.8 ha during construction and operational phases respectively. The ecological value of the affected habitat would be low. The loss of marine habitat caused by this Project is negligible.

Mitigation measures such as non-dredged ground treatment method (i.e. DCM) and deployment of silt curtain are recommended for the proposed marine construction works to reduce potential impacts on the water quality which will, in turn, reduce impacts on marine ecological resources. Indirect water quality changes to marine life in terms of SS elevations and sedimentation rates arising from the proposed marine construction works are predicted to be insignificant. The predicted water quality changes are short term and localised to immediate vicinity of the works area. Full water quality compliances are predicted at all identified marine ecological sensitive receivers.

During the operational phase, the water quality effects due to discharge of brine water from desalination plant and seawater cooling effluent from seawater cooling system (if adopted) into the sea would also be localised in vicinity of the outfalls. Full water quality compliances are predicted at all identified marine ecological sensitive receivers during the Project operation. Neither marine species of conservation importance nor recognized sites of conservation importance are located at and near the Project area. The proposed seawater intake of the Project will be located at the artificial seawall of I·PARK2 where marine ecological resources would be limited. No adverse impacts are expected from the impingement and entrainment of marine life in the proposed seawater intake system of the Project.

3.6 Fisheries Impact

A literature review of fisheries baseline information in the assessment area has been undertaken. Results from the review indicate that level of fisheries production of the Project

area is low, whereas the level of fisheries operation of the Project area is moderate. Fisheries sensitive receivers identified in the assessment area include the oyster culture activities in Deep Bay, important spawning ground for commercial fisheries resources in North Lantau and artificial reefs in Sha Chau and Lung Kwu Chau Marine Park.

Loss of seabed fisheries habitat is predicted along the shore of Middle Ash Lagoon due to the construction and operation of the new berthing facility for I·PARK2. The affected area would be small of 4.4 ha and 1.8 ha during construction and operational phases respectively. The level of fisheries production of the affected habitat would also be low. The loss of fishing area caused by this Project is considered minor.

Mitigation measures such as non-dredged ground treatment method (i.e. DCM) and deployment of silt curtain are recommended for the proposed marine construction works to reduce potential impacts on the water quality which will, in turn, reduce impacts on fisheries resources. Indirect water quality changes to fisheries resources in terms of SS elevations and DO depletion from the proposed marine construction works are predicted to be insignificant. The predicted SS elevations and DO depletion are short term and localised to immediate vicinity of the works area. Full SS and DO compliances are predicted at all identified fisheries sensitive receivers.

During the operational phase, the water quality effects due to discharge of brine water from desalination plant and seawater cooling effluent from seawater cooling system (if adopted) into the sea would also be localised in close vicinity of the outfalls. For the spent seawater cooling effluent discharge, alternative seawall outfall locations have been considered at WAL which are located further away from the oyster culture activities in Deep Bay with a view to reducing the potential water quality impact. Full water quality compliances are predicted at all identified fisheries sensitive receivers during the Project operation. Neither important spawning nor nursery ground is located at and near the Project area. The ichthyoplankton and fish larvae resources in the assessment area would be limited. No adverse fisheries impacts are expected from the impingement and entrainment of fish and crustacean larvae or eggs in the proposed seawater intake systems of the Project.

Under the existing situation, most of the MSW is delivered to the WENT Landfill via marine route. During the operational phase, MSW will be delivered to I·PARK2 using the same marine route. No new navigation channel for marine vessel is proposed under this Project. Maintenance dredging along the seafront of I·PARK2 is an existing operation. Any future maintenance dredging during the I·PARK2 operation would be similar to that carried out under the existing baseline scenario. No additional fisheries impact would arise from the maintenance dredging work of I·PARK2.

The waste / ash will be placed in containers that are sealed to prevent spillage of the contents during transportation. The containers shall be in good condition and free from damage or any other defects. Marine delivery of waste or ash would not cause any fisheries impact.

3.7 Visual Impact

The visual impact assessment shall focus on permanent visual impacts during operation of the Project. Representative public viewing points of the Project site include the sea travellers in the Deep Bay to / from Shekou, visitors of T·Park and Tsang Tsui Columbarium and travellers along Nim Wan Road. With proper implementation of practicable design and mitigation measures including aesthetic design of buildings, infill planting, tree planting along site boundary, green roof and vertical greening, the overall visual impact will be ranging from negligible to moderate[4]. The I·PARK2 contractor shall further develop the architectural and landscape design during detailed design stage, taking into account the proposed design and mitigation measures to reduce or moderate the visual effects and enhance the overall visual quality.

3.8 Health Impact

The health risks arising from construction and operation of I·PARK2 have been identified and the likelihood and consequences to aerial emissions and wastes and ashes that may contain toxic pollutants have been assessed. Inhalation is identified as the major route for aerial emissions arising from operation of the Project while other indirect exposure pathways such as direct dermal contact are negligible. The predicted total carcinogenic risks at all representative health sensitive receivers (HSRs) due to inhalation do not exceed the target acceptable risk level of $1x10^{-5}$ as recommended in the USEPA risk management guidance. Assessment of the cumulative chronic and acute non-carcinogenic health impacts revealed that there would be no exceedance to the relevant local and international criteria due to inhalation. It is concluded that there would be no significant carcinogenic health risk or adverse chronic and acute non-carcinogenic health impacts arising from the aerial emissions of I·Park2.

On the other hand, waste and ash will be fully enclosed in sealed containers or covered entirely to prevent leakage from vessels or vehicles during transportation, while storage and handling of waste and ash will be carried out in an enclosed environment. For the PFA on-site, all PFA excavated would be reused for backfilling on-site and covered by at least 1m thick general fill so that no off-site disposal of PFA will be required in this Project. With proper implementation of the recommended good site practices, the potential health risks from radon emissions associated with PFA arising from the construction and operation of the Project will be minimal. The I·PARK2 contractor will be required to develop and implement a Project-specific emergency response / contingency plan to handle potential accidental events during construction and operation of the I·PARK2 Project with a view to minimising the health impacts associated with the potential accidental events.

[4] The impact is moderate if there will be some adverse visual effects caused by the Project, but these can be eliminated, reduced or moderated to a certain extent by design / mitigation measures.

3.9 Landfill Gas Hazards

The southeastern corner of I·PARK2 falls within the 250m consultation zone of the West New Territories Landfill Extension (WENTX) and therefore a qualitative landfill gas (LFG) hazard assessment has been conducted. Based on the assessment findings, the level of risk is low during construction phase and medium during operation phase. While LFG cut-off trench barrier will be built along the WENTX landfill site boundary under the WENTX project to prevent LFG migration to the Project site, the I·PARK2 contractor will be required to install monitoring wells within the Project site to monitor the LFG concentration. Moreover, LFG protection measures such as passive and/or semi-active control measures and gas detection systems will be incorporated in the buildings of the I·PARK2 Project. The future I·PARK2 contractor shall prepare a detailed qualitative risk assessment and submit the detailed design of the LFG protection measures to the Landfills and Development Group of EPD for vetting pursuant to the requirements under the Landfill Gas Hazard Assessment Guidance Note during detailed design stage. With proper implementation of the recommended precautionary and protection measures, no adverse LFG hazard would be anticipated during the construction and operation of the Project.

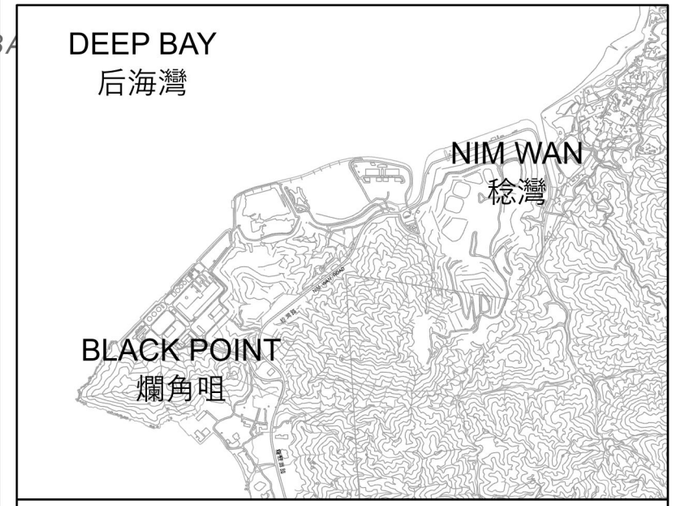
4 Conclusion

The EIA has identified and assessed the potential environmental impacts during the construction and operation of the Project in accordance with the criteria and guidelines of the Technical Memorandum on EIA Process (EIAO-TM) and the EIA Study Brief. The EIA has, where appropriate, identified mitigation measures to ensure compliance with environmental legislation and standards. The summary of the environmental impacts for the Project is presented in **Appendix B**.

The EIA has concluded that with the implementation of the recommended mitigation measures, no unacceptable residual environmental impacts are envisaged as a result of the construction and operation of the Project.

The Project will follow the requirements of the Environmental Monitoring and Audit (EM&A) Manual to monitor the environmental performance during construction and operational phases and ensure proper implementation and effectiveness of the recommended mitigation measures.

Figures



KEY PLAN 主圖
A3: 1:50,000

LEGEND 圖例

- I·PARK2 發展綜合廢物管理設施第二期
- PROPOSED SEAWALL MODIFICATION / BERTHING FACILITY 擬議海堤改造 / 停泊設施
- PROJECT BOUNDARY 項目範圍
- LOCATION OF PROPOSED OUTFALL 擬議排水口位置

Outfall Option 1
排水口選項1

Outfall Option 2
排水口選項2

Outfall Option 3
排水口選項3

Revision 修訂	Description 描述			
	Designed 設計	Reviewed 審核	Drawn 草稿	Checked 檢查
Initial 草簽	PSY	Amy	PSY	Amy
Date 日期	08/24	08/24	08/24	08/24

Approved 批核
-

Agreement No. 合約編號
CE 26/2022 (EP)

Project Title 工程項目名稱
Development of Integrated Waste Management Facilities Phase 2- Investigation, Design and Construction
發展綜合廢物管理設施第二期 – 勘察、設計及建造

Figure Title 附圖名稱
Project Location Plan
工程項目位置圖

Drawing No. 草圖編號
Figure 圖 1.1

Revision 修訂
-

Scale 比例
A3: 1:8,000

Client 業主
Environmental Protection Department
The Government of the Hong Kong Special Administrative Region

Consultant 顧問
BINNIES HONG KONG LIMITED
賓尼斯工程顧問有限公司

Appendix A

Target Emission Levels for I·PARK2

Appendix A Target Emission Levels for I·PARK2

Air Pollutants	Target Emission Levels for I·PARK2 [1]		Hong Kong's Guidance Note on the Best Practicable Means for Incinerators (Municipal Waste Incineration), BPM 12/1 (2024) [1]		National Standard for Pollution Control on Municipal Solid Waste Incineration, GB 18485-2014 [1]		Shenzhen Standard, SZDB/Z 233-2017 [1]		EU Best available techniques (BAT) Reference Document for Waste Incineration [1]
	daily averaged	1-hour	daily averaged	1-hour	daily averaged	1-hour	daily averaged	1-hour	daily averaged (upper bound)
Particulates	5	10	5	10	20	30	8	10	5
Gaseous and vaporous organic substances, expressed as total organic carbon (TOC)	10	10	10	10	/	/	10	10	10
Carbon Monoxide (CO)	30	50	30	50	80	100	30	50	50
Nitrogen Oxides (NO_x), expressed as Nitrogen Dioxide	60 [2]	60 [2]	80	80	250	300	80	80	120
Sulphur Dioxide (SO_2)	30	30	30	30	80	100	30	30	30
Hydrogen Chloride (HCl)	6	8	6	8	50	60	8	8	6
Hydrogen Fluoride (HF)	1	2	1	2	/	/	1	2	1
Ammonia (NH_3)	10	15	10	/	/	/	/	/	10
Mercury (Hg) [3]	0.02		0.02		0.05		0.02		0.02
Total Cadmium & Thallium (Cd & Tl) [3]	0.02		0.02		0.1		0.04		0.02
Total Heavy Metals [3][5]	0.3		0.3		1		0.3		0.3
Dioxins & Furans (in ng I-TEQ/Nm^3) [4]	0.04		0.04		0.1		0.05		0.04

Notes:

[1] Air pollutant concentrations (mg/Nm^3 unless otherwise specified) are expressed at reference conditions of 0°C temperature, 101.325 kilopascals pressure, dry and 11% oxygen content conditions.

[2] As compared with the concentration limit of 80 mg/Nm^3 for NO_x emissions set out in BPM 12/1(24), more stringent target NOx emission level of 60mg/Nm^3 is adopted for I·PARK2 with a view to minimising potential air quality impact.

[3] Average value over the sampling period of a minimum of 30mins and maximum of 8hrs.

[4] Average value over the sampling period of a minimum of 6hrs and maximum of 8hrs.

[5] Total heavy metals include As, Co, Cr, Cu, Mn, Ni, Pb, Sb and V. V is not included in GB 18485-2014.

Appendix B

Summary of Environmental Impacts

Appendix B: Summary of Environmental Impacts

Key Sensitive Receivers / Assessment Points	Results of Impact Predictions	Key Relevant Legislations, Standards or Criteria	Extents of Exceedances Predicted	Key Impact Avoidance Measures Considered and Mitigation Measures Proposed	Residual Impacts (After Mitigation)
Air Quality Impact					

▪ Offices of government facilities and industrial establishment in Tsang Tsui
▪ Residential uses at Ha Pak Nai, Sheung Pak Nai and Nim Wan Road
▪ Lau Ancestral (place of worship) in Lung Kwu Sheung Tan
	The predicted air quality impact complied with the relevant standards or criteria at all representative air sensitive receivers during Project operation.
	Air quality impact from construction works could be mitigated by air quality control measures.
	No adverse air quality impact is predicted.
		▪ Technical Memorandum on Environmental Impact Assessment Process (EIAO-TM) Annexes 4 and 12
		▪ Air Pollution Control Ordinance (Cap. 311) and Hong Kong Air Quality Objectives (HKAQOs)
		▪ Air Pollution Control (Construction Dust) Regulation (Cap. 311R)
		▪ Air Pollution Control (Non-road Mobile Machinery) (Emission) Regulation (Cap. 311Z)
		▪ Air Pollution Control (Fuel Restriction) Regulation (Cap. 311I)
		▪ Air Pollution Control (Fuel for Vessels) Regulation (Cap. 311AB)
		▪ Air Pollution Control (Marine Light Diesel) Regulation (Cap. 311Y)
		▪ GB 18485-2014 Standard for pollution control on the municipal solid waste incineration
		▪ SZDB/Z 233-2017 Shenzhen standard and guiding technical document for operational specifications for municipal solid waste treatment facilities
		▪ Best available techniques (BAT) reference document for waste incineration in the European Union (EU)
		▪ Guidance Note on the Best Practicable Means for Incinerators (Municipal Waste Incineration) BPM 12/1 (2024)
		▪ Guidance Note on the Best Practicable Means for Mineral Works (Stone Crushing Plant) BPM 11/1 (95)
		▪ Recommended Pollution Control Clauses for Construction Contracts
		▪ Environmental, Transport and Works Bureau Technical Circular (Works) (ETWB TCW) No. 19/2005 – Environmental Management on Construction Sites
		▪ Development Bureau Technical Circular (Works) (DEVB TCW) No. 13/2020 – Timely Application of Temporary Electricity and Water Supply for Public Works Contracts and Wider Use of Electric Vehicles in Public Works Contracts
		▪ DEVB TCW No. 1/2015 – Emissions Control of NRMM in Capital Works Contracts of Public Works
			No exceedance is predicted.	▪ Implement dust suppression measures and good site practices during construction phase.
				▪ During operation, the waste shall be thoroughly combusted at high temperature above 850℃ with sufficient air supply under high turbulent condition for at least two seconds to ensure effective destruction of organic pollutants including dioxin.
				▪ Adopt advanced air pollution control system and carry out continuous flue gas emission monitoring at stack to ensure compliance with the target air emission levels.
				▪ The air pollution control system shall include a combination of the following techniques:
				  ▪ Selective non-catalytic reduction (SNCR) and selective catalytic reduction (SCR) to reduce NOx emissions;
				  ▪ Dry alkaline sorbent (sodium bicarbonate or lime) injection(s) combined with bag filter(s), semi-dry absorber and/or wet scrubber to reduce acidic gases such as HCl, HF and SO2;
				  ▪ Dry sorbent (activated carbon) injection combined with bag filter to reduce dioxin and metals; and
				  ▪ Bag filter(s) to reduce particulates.
				▪ Adopt enclosed design for wastewater treatment facility, waste reception hall, waste storage areas and waste feed system and maintain at negative pressure to avoid spillage of odour.
				▪ Odorous air shall be drawn into the combustion chamber of the incinerator for combustion. Odour control system with odour removal efficiency of more than 95% shall be provided for treatment of odorous air before discharging into open atmosphere during a shut-down or under the circumstances that the odorous air cannot be withdrawn into the combustion chamber of the incinerator for combustion.
				▪ Carry out odour patrol to ensure that there would be no adverse odour impact arising from the Project.
					No unacceptable residual air quality impact.

Key Sensitive Receivers / Assessment Points	Results of Impact Predictions	Key Relevant Legislations, Standards or Criteria	Extents of Exceedances Predicted	Key Impact Avoidance Measures Considered and Mitigation Measures Proposed	Residual Impacts (After Mitigation)
Noise Impact					
No noise sensitive receiver (NSR) is identified in the assessment area	No NSR within 300m from the Project boundary. Adverse noise impacts from the I·PARK2 site are not anticipated during both construction and operation phases.	▪ EIAO-TM Annexes 5 and 13 ▪ EIAO Guidance Note No. 9/2023 ▪ Noise Control Ordinance (NCO) (Cap. 400) ▪ Technical Memoranda under NCO ▪ Recommended Pollution Control Clauses for Construction Contracts ▪ Professional Persons Environmental Consultative Committee Practice Note (ProPECC) PN 1/24 "Minimizing Noise from Construction Activities" ▪ "Good Practices on the Control of Noise from Electrical & Mechanical Systems"	No NSR within 300m from the Project boundary. No adverse noise impact is anticipated.	▪ Adopt quieter construction methods/ equipment and good construction site practices. ▪ Adopt noise control techniques such as selection of quiet equipment, use of enclosure or silencer with a view to minimising noise from fixed noise sources such as fan units. ▪ Transport MSW to I·PARK2 mainly by sea. The number of waste collection vehicles collecting MSW from local districts e.g. Tuen Mun and Lung Kwu Tan passing through the existing Lung Kwu Tan Road will be similar to the prevailing scenario of MSW delivery to WENT Landfill. ▪ Traffic generated by the Project would not fall within night time or early morning (i.e. between 11pm and 7am) under normal operation.	No unacceptable residual noise impact.
Water Quality Impact					
▪ Seawater intakes, marine ecological and fisheries sensitive receivers such as Pak Nai Site of Special Scientific Interest (SSSI) and oyster production area in Deep Bay	The predicted water quality complied with the relevant standards or criteria at all representative water sensitive receivers (WSRs) during Project construction and operation.	▪ EIAO-TM Annexes 6 and 14 ▪ Water Pollution Control Ordinance (WPCO) (Cap. 358) ▪ Water Quality Objectives (WQOs) stipulated under WPCO ▪ Technical Memorandum on Standards for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal Waters (TM-DSS) (Cap. 358AK) ▪ ProPECC PN 2/23 "Construction Site Drainage" ▪ ProPECC PN 1/23 "Drainage Plans subject to Comment by the Environmental Protection Department" ▪ Sediment deposition criterion for benthic ecology ▪ The United States Environmental Protection Agency (USEPA) criterion for Total Residual Chlorine (TRC) ▪ Seawater intake water quality criteria from intake operators.	No exceedance is predicted.	<u>Construction Phase</u> ▪ Follow good practices outlined in ProPECC PN 2/23. ▪ Implement good site practices and proper refuse collection, storage and disposal measures. ▪ Implement proper chemical handling, storage and disposal measures. ▪ Provide sufficient chemical toilets in works areas. ▪ Adopt suitable design and mitigation measures for marine construction including the use of non-dredged method and associated water pollution control measures e.g. deployment of silt curtains. ▪ Implement good site practices for construction vessels. <u>Operational Phase</u> ▪ Proper treatment of wastewater arising from operation of the Project for reuse within I·PARK2 or discharge into the existing Urmston Road Submarine Outfall in the North Western Water Control Zone outside Deep Bay after meeting relevant standards. ▪ Follow good practices outlined in ProPECC PN 1/23. ▪ Adopt best management practices for non-point sources surface runoff	No unacceptable residual water quality impact.
Waste Management Implications					
N/A	The Project construction would generate Construction and	▪ EIAO-TM Annexes 7 and 15 ▪ Waste Disposal Ordinance (Cap. 354)	With proper design and planning of the	<u>Construction Phase</u> ▪ Adopt construction waste management strategy to	No unacceptable residual environmental impact due

Key Sensitive Receivers / Assessment Points	Results of Impact Predictions	Key Relevant Legislations, Standards or Criteria	Extents of Exceedances Predicted	Key Impact Avoidance Measures Considered and Mitigation Measures Proposed	Residual Impacts (After Mitigation)
	Demolition (C&D) materials, chemical waste and general refuse. The Project operation would generate incineration by-products, dewatered sludge, chemical waste and general refuse. Potential environmental impacts could be minimised by proper design and planning of the Project, as well as proper handling, storage and disposal of all wastes.	▪ Waste Disposal (Chemical Waste) (General) Regulation (Cap. 354C) ▪ Waste Disposal (Charges for Disposal of Construction Waste) Regulation (Cap. 354N) ▪ Land (Miscellaneous Provisions) Ordinance (Cap. 28) ▪ Public Health and Municipal Services Ordinance (Cap. 132) - Public Cleansing and Prevention of Nuisances Regulation (Cap. 132BK) ▪ ETWB TC(W) No. 19/2005 – Environmental Management on Construction Site ▪ DEVB TCW No. 6/2010 – Trip Ticket System for Disposal of Construction & Demolition Materials	Project, as well as proper handling, storage and disposal of all wastes, no adverse environmental impact due to waste management.	avoid, minimise, reuse, recycle and finally dispose of waste with the desirability in descending order. ▪ Reuse excavated PFA for backfilling on-site and covered by at least 1m thick general fill without off-site disposal of PFA. ▪ Develop a Waste Management Plan (WMP) as part of the Environmental Management Plan (EMP) in accordance with ETWB TC(W) No. 19/2005 for the Engineer's approval before commencement of Project construction. ▪ Follow EMP and best management practices for waste management. ▪ Implement Trip Ticket System to track the disposal of C&D materials through the use of Disposal Delivery Form in accordance with DEVB TCW No. 6/2010. ▪ Monitor the transportation of construction waste by means of dump trucks equipped with real-time tracking and monitoring devices. <u>Operational Phase</u> ▪ Transport MSW to I·PARK2 mainly by sea. The number of waste collection vehicles collecting MSW from local districts e.g. Tuen Mun and Lung Kwu Tan passing through the existing Lung Kwu Tan Road will be similar to the prevailing scenario of MSW delivery to WENT Landfill. ▪ The MSW and ashes shall be fully enclosed in sealed containers or covered entirely to ensure that the MSW do not leak from vessels or vehicles during transportation or disposal. ▪ The MSW container vessels shall be equipped with GPS trackers to provide real time vessel location, which serves as an effective surveillance measure to avoid waste dumping at sea. ▪ The bottom ash shall be treated by screening, crushing, sieving and extracting metal removal for off-site beneficial uses. Disposal of bottom ash at landfill would be the last resort if all possible options of the beneficial uses/outlet are exhausted. ▪ Fly ash / air pollution control residues shall be treated by cement solidification or chemical stabilization to ensure compliance with the incineration residue pollution control limits and the leachate parameters set out for landfills in Hong Kong prior to landfill disposal.	to waste management.

Key Sensitive Receivers / Assessment Points	Results of Impact Predictions	Key Relevant Legislations, Standards or Criteria	Extents of Exceedances Predicted	Key Impact Avoidance Measures Considered and Mitigation Measures Proposed	Residual Impacts (After Mitigation)
Ecological Impact					
Terrestrial Ecology					
Direct habitat loss	The land-based Project area is about 24.2 ha and the affected habitats include wasteland, developed area and ash lagoon with generally low ecological value. The ash lagoon would become developed area before commencement of construction of the Project. Hence, the ecological impact arising from direct habitat loss due to the Project is considered as low.	▪ EIAO-TM Annexes 8 and 16 ▪ EIAO Guidance Note No. 6/2010 ▪ EIAO Guidance Note No. 7/2023 ▪ EIAO Guidance Note No. 10/2023 ▪ Forests and Countryside Ordinance (Cap. 96) ▪ Wild Animals Protection Ordinance (Cap. 170) ▪ Protection of Endangered Species of Animals and Plants Ordinance (Cap. 586)	No adverse ecological impact arising from direct habitat loss.	N/A	No unacceptable residual ecological impact arising from direct habitat loss.
Direct impact to wildlife	The fauna diversity and abundance recorded within the Project site are generally low and the recorded species are highly mobile. Hence, the ecological impact arising from direct injury or mortality of wildlife due to the Project is considered as low.		No adverse ecological impact arising from direct injury or mortality of wildlife.	As a precautionary measure, site check by qualified ecologist before commencement of construction is recommended to confirm there is no breeding activity of avifauna species of conservation importance within the Project site	No unacceptable residual ecological impact arising from direct injury or mortality of wildlife.
Indirect disturbance impact to wildlife during construction and operational phases of the Project	The habitat quality, fauna diversity and abundance recorded within the assessment area are generally low. With proper implementation of the recommended good site practices and mitigation measures during construction and operational phases, the ecological impact arising from indirect disturbance to wildlife due to the Project is considered as low, taking into account the ability of fauna to move away from source of disturbance and availability of alternative habitats nearby).		With proper implementation of the recommended good site practices and mitigation measures during construction and operational phases, no adverse ecological impact arising from indirect disturbance to wildlife.	<u>Construction Phase</u> ▪ Promote environmental awareness of all construction site personnel particularly on the requirements for protection of ecological resources in nearby areas. ▪ Provide clear delineation and fencing of works areas strictly prohibit construction outside the works areas. ▪ Adopt quieter (non-percussive) piling method, quality powered mechanical equipment and good site practices to reduce noise disturbances. ▪ Implement proper construction site drainage and measures to control construction site runoff and site discharges. ▪ Implement appropriate dust reduction measures. ▪ Implement light nuisance control measures. <u>Operational Phase</u> ▪ Adopt noise control techniques such as selection of quiet equipment, use of enclosure or silencer with a view to minimising noise from fixed noise sources such as fan units.Adopt air emission control measures.	No unacceptable residual ecological impact arising from indirect disturbance to wildlife.

Key Sensitive Receivers / Assessment Points	Results of Impact Predictions	Key Relevant Legislations, Standards or Criteria	Extents of Exceedances Predicted	Key Impact Avoidance Measures Considered and Mitigation Measures Proposed	Residual Impacts (After Mitigation)
				▪ Implement landscape planting to screen the visual interface. ▪ Implement best management practices to control non-point source surface runoff. ▪ Adopt suitable light nuisance control measures.	
Habitat fragmentation and isolation	The habitats affected by the Project include wasteland, developed area and ash lagoon with generally low ecological value. The ash lagoon would become developed area before commencement of construction of the Project. The Project area has generally low abundance and distribution of wildlife. No habitat fragmentation and isolation are expected.		No adverse ecological impact arising from habitat fragmentation and isolation.	N/A	No unacceptable residual ecological impact arising from habitat fragmentation and isolation.
Impact on ecological carrying capacity	The habitats affected by the Project include wasteland, developed area and ash lagoon with generally low ecological value. The ash lagoon would become developed area before commencement of construction of the Project. No impact on ecological carrying capacity is expected.		No adverse impact on ecological carrying capacity.	N/A	No unacceptable residual impact on ecological carrying capacity.
Marine Ecology					
Direct loss of marine habitat	The proposed seawall modification and construction of berthing facility along the middle ash lagoon and west ash lagoon will affect about 4.4 ha marine habitat (including 2.6 ha of temporary habitat loss during construction and 1.8 ha of permanent habitat loss). There is neither species of conservation importance nor recognized sites of conservation importance for the affected marine habitat and hence the ecological value is low. The ecological impact arising from direct loss of marine habitat due to the Project are considered as low.	▪ EIAO-TM Annexes 8 and 16 ▪ EIAO Guidance Note No. 6/2010 ▪ EIAO Guidance Note No. 7/2023 ▪ EIAO Guidance Note No. 11/2023 ▪ Wild Animals Protection Ordinance (Cap. 170) ▪ Protection of Endangered Species of Animals and Plants Ordinance (Cap. 586)	No adverse ecological impact arising from direct loss of marine habitat.	N/A	No unacceptable residual ecological impact arising from direct loss of marine habitat.

Key Sensitive Receivers / Assessment Points	Results of Impact Predictions	Key Relevant Legislations, Standards or Criteria	Extents of Exceedances Predicted	Key Impact Avoidance Measures Considered and Mitigation Measures Proposed	Residual Impacts (After Mitigation)
Indirect disturbance impact to marine ecological and sensitive receivers such as Pak Nai SSSI, mudflat, seagrass, horseshoe crab, and Sha Chau and Lung Kwu Chau Marine Park	The predicted water quality complied with the relevant standards or criteria at representative marine ecological sensitive receivers during Project construction and operation.		Representative marine ecological sensitive receivers are considered in the water quality impact assessment. No exceedance is predicted.	Mitigation measures recommended in the water quality impact assessment would also serve to protect marine ecological resources.	No unacceptable residual ecological impact arising from indirect disturbance to representative marine ecological sensitive receivers.
Fisheries Impact					
Oyster culture activities in Deep Bay, important spawning ground of commercial fisheries resources in North Lantau, and artificial reefs in Sha Chau and Lung Kwu Chau Marine Park	The proposed seawall modification and construction of berthing facility along the middle ash lagoon and west ash lagoon will affect about 4.4 ha fisheries habitat (including 2.6 ha of temporary habitat loss during construction and 1.8 ha of permanent habitat loss). There is neither important spawning nor nursery ground nor site of fisheries importance for the affected fisheries habitat and the level of fisheries production is low. Hence the fisheries impact arising from direct loss of fisheries habitat due to the Project are considered as minor. The predicted water quality complied with the relevant standards or criteria at representative fisheries sensitive receivers during Project construction and operation. The fisheries impact arising from indirect disturbance to fisheries resources (including water quality impact and impingement and entrainment of fisheries resources at seawater intake) during construction and operational phases of the Project is considered	▪ EIAO-TM Annexes 9 and 17 ▪ Fisheries Protection Ordinance (Cap. 171) ▪ Marine Fish Culture Ordinance (Cap. 353)	No adverse fisheries impact arising from direct loss of fisheries habitat and fishing ground. Representative fisheries sensitive receivers are considered in the water quality impact assessment. No exceedance is predicted.	▪ Mitigation measures recommended in the water quality impact assessment would also serve to protect fisheries resources. ▪ For the spent seawater cooling effluent discharge, alternative seawall outfall locations have been considered at west ash lagoon which are located further away from the oyster culture activities in Deep Bay.	No unacceptable residual fisheries impact.

Key Sensitive Receivers / Assessment Points	Results of Impact Predictions	Key Relevant Legislations, Standards or Criteria	Extents of Exceedances Predicted	Key Impact Avoidance Measures Considered and Mitigation Measures Proposed	Residual Impacts (After Mitigation)
	as low				
Visual Impact					
Public Viewing Points (VPs) including travellers and visitors	There will be some adverse visual effects during operational phase of the Project, but these can be reduced or moderated to a certain extent by design / mitigation measures.	▪ EIAO-TM Annexes 10 and 18 ▪ EIAO Guidance Note No. 8/2023 ▪ DEVB TCW No. 3/2012 – Site Coverage of Greenery for Government Building Projects ▪ ETWB TCW No. 8/2005 – Aesthetic Design of Ancillary Buildings in Engineering Projects	Based on the findings of the qualitative assessment, no adverse visual impact is anticipated with proper implementation of the recommended design / mitigation measures.	Implement practicable design and mitigation measures including aesthetic design of buildings, tree planting, green roof and vertical greening.	No unacceptable residual visual impact.
Health Impact					
▪ Offices of government facilities and industrial establishment in Tsang Tsui ▪ Residential uses at Ha Pak Nai, Sheung Pak Nai and Nim Wan Road ▪ Lau Ancestral (place of worship) in Lung Kwu Sheung Tan	Inhalation is identified as the major route for aerial emissions arising from operation of the Project while other indirect exposure pathways such as direct dermal contact are negligible. No significant carcinogenic health risk or adverse chronic and acute non-carcinogenic health impacts arising from the aerial emissions of I·PARK2.	▪ Air Pollution Control Ordinance (Cap. 311) and HKAQOs ▪ EIAO-TM Annex 4 ▪ Standards or criteria and risk management guidance adopted by the World Health Organization, the United States Environmental Protection Agency and other recognized international organizations. ▪ ProPECC PN 1/99 "Control of Radon Concentraton in New Buildings" ▪	The representative health sensitive receivers are considered in the air quality impact assessment. No exceedance is predicted.	▪ Measures recommended in the air quality impact assessment would also serve to ensure no adverse health impact due to aerial emissions arising from construction and operational phases of the Project. ▪ Develop and implement emergency response / contingency plan to handle potential accidental events during construction and operation of the Project with a view to minimising the health impacts associated with the potential accidental events. <u>Construction Phase</u> ▪ Excavated PFA shall be reused for backfilling on-site and covered by at least 1m thick general fill. No off-site disposal of PFA will be required. ▪ Provide personal protective equipment including suitable dust masks to the workers, observe relevant requirements promulgated by the Labour Department in respect of occupational safety and health and comply with relevant statutory requirements. <u>Operational Phase</u> ▪ Follow the measures for control of radon concentration in new buildings outlined in ProPECC PN 1/99. ▪ The MSW and ashes will be fully enclosed in sealed containers or covered entirely to ensure that the MSW do not leak from vessels or vehicles during transportation or disposal. ▪ Adopt enclosed design for storage and handling of	No unacceptable residual health impact.

Key Sensitive Receivers / Assessment Points	Results of Impact Predictions	Key Relevant Legislations, Standards or Criteria	Extents of Exceedances Predicted	Key Impact Avoidance Measures Considered and Mitigation Measures Proposed	Residual Impacts (After Mitigation)
				waste and ashes and maintain at negative pressure, with air drawn into the combustion chamber of the incinerator for combustion or discharged into open atmosphere through dust exhaust with bag filter of no less than 99% dust removal efficiency, and install misting system as fugitive emission control.	
Landfill Gas Hazard					
Construction workers, I·PARK2 operators and visitors	The landfill gas hazard is low and medium during construction and operational phases respectively, but the potential hazard can be reduced by suitable precautionary / protection measures.	▪ EIAO-TM Annexes 7 and 19 ▪ Landfill Gas Hazard Assessment Guidance Note (EPD/TR8/97) ▪ ProPECC PN 3/96	Based on the findings of the qualitative assessment, no adverse impact due to landfill gas hazard is anticipated with proper implementation of the recommended precautionary / protection measures to reduce the potential landfill gas hazard.	▪ Follow the requirements outlined in ProPECC PN 3/96 and Landfill Gas Hazard Assessment Guidance Note (EPD/TR8/97). <u>Construction Phase</u> ▪ Implement safety / precautionary measures during construction phase and carry out landfill gas monitoring by safety officer. <u>Operational Phase</u> ▪ Install monitoring wells to monitor landfill gas concentration during operational phase and ensure the effectiveness of the landfill gas cut-off trench barrier built along the WENTX landfill site boundary under the WENTX project to prevent landfill gas migration to the Project site. ▪ Incorporate landfill gas protection measures e.g. passive / semi-active control measures and gas detection systems in the buildings of the Project.	No unacceptable residual impact due to landfill gas hazard.