

15. SUMMARY OF ENVIRONMENTAL OUTCOMES

15.1 Impact Summary for Tsang Tsui Ash Lagoon Site

15.1.1 *General*

15.1.1.1 This EIA Report has provided an assessment of the potential environmental impacts associated with the construction and operation of the IWMF at the TTAL site, with the consideration of the potential cumulative impact from other concurrent projects in the vicinity of the TTAL site. Specific mitigation measures requirements for the Project, as well as an environmental monitoring and auditing programme, have been developed. A summary of the environmental impacts associated with the Project are presented below.

15.1.2 *Air Quality Impact*

Construction Phase

15.1.2.1 Air quality impacts from the construction works for the Project would mainly be related to construction dust from excavation, materials handling, filling activities and wind erosion. With the implementation of mitigation measures specified in the Air Pollution Control (Construction Dust) Regulation, dust impact on air sensitive receivers would be minimal.

Operation Phase

15.1.2.2 During the operation of the IWMF, the potential sources of air quality impact would be the air emissions from the incinerator stacks and the odour nuisance from the waste reception halls, the waste storage area, the mechanical treatment plant and the wastewater treatment plant.

15.1.2.3 Advanced air pollution control system, including SCR for NO_x removal and activated carbon for dioxins removal and continuous emissions monitoring system will be installed for the IWMF to ensure that the emissions from the IWMF stacks will meet the target emission limits that are more stringent than those stipulated in Hong Kong and the European Commission for waste incineration. Nitrogen oxides (NO_x) is the most critical parameter in Hong Kong in complying with the Air Quality Objectives (AQOs). The Government has decided to adopt advanced technology to improve the quality of air emissions. With the adoption of the selective catalytic reduction (SCR) process, the Government has committed to set a more stringent NO_x limit for the IWMF. The daily average emission limit of NO_x is lowered to 100 mg/m³, which is a 50% reduction when compared with the European Union (EU) standard.

15.1.2.4 Cumulative air quality impact assessment has been undertaken for the Project at the TTAL site taking into account the emissions from both regional and local sources, including the emissions within the Pearl River Delta Economic Zone and major local air pollution sources in Hong Kong. The predicted maximum cumulative concentrations of relevant AQO parameters at the representative air sensitive receivers in areas that might be impacted by the IWMF emission all complied with the corresponding AQO.

15.1.2.5 Besides, odour nuisance may arise from the operation of the on-site wastewater treatment plant, the waste reception halls, the waste storage area and the mechanical treatment plant of the IWMF. The wastewater treatment plant, the waste reception halls and the waste storage areas would be fully enclosed and the odorous air in this facility would be extracted and used as combustion air for incineration to remove the odorous compounds. For the mechanical plant, they would be equipped with deodorizing system of 95% odour removal efficiency. Besides, the wastewater treatment plant, waste reception halls, waste storage area and mechanical treatment plant would also be operated under negative pressure to prevent odour leaking to the outdoor environment.

The predicted cumulative odour concentrations would comply with the criteria required in the EIAO-TM. Adverse odour impact on nearby ASRs would not be expected.

15.1.3 Noise Impact

15.1.3.1 The TTAL site is situated in a remote location and no existing or planned noise sensitive receiver (NSR) is identified within 300m from the boundary of the site. Adverse noise impacts from the TTAL site on NSRs during both construction and operation phases are therefore not anticipated.

15.1.3.2 Having said that, an assessment has been undertaken to examine the potential traffic noise impact on the NSRs along Lung Kwu Tan Road due to the off-site traffic such as trucks delivering maintenance equipment and coach for employee and visitors that are associated with the operation of the IWMF. The assessment results indicated that the predicted change in noise levels at the NSRs would all be below 1 dB(A). In other words, the off-site traffic generated from the IWMF would not result in significant increase of traffic noise impact on the NSRs along Lung Kwu Tan Road.

15.1.4 Water Quality Impact

Construction Phase

15.1.4.1 The potential sources of water quality impact arising during the construction phase of the Project include construction site runoff and drainage, wastewater generated from general construction activities and sewage from the workforce. With implementation of the recommended mitigation measures and site practices outlined in ProPECC PN 1/94 (*Practice Note for Professional Persons on Construction Site Drainage*), no unacceptable residual impacts on water quality are expected.

Operation Phase

15.1.4.2 During the operation phase, wastewater will be generated from the proposed incineration plant and mechanical treatment plant. An on-site wastewater treatment plant will be provided. All generated wastewater will be discharged to the on-site wastewater treatment plant for treatment. The treated effluent from the wastewater treatment plant will be reused in the incineration plant and mechanical treatment plant or for washdown and landscape irrigation within the IWMF site. A “net zero discharge” scheme will be adopted during the operation of the IWMF.

15.1.4.3 An on-site desalination plant will be provided for supplying water to the IWMF. Saline water would be discharged from the desalination plant at a low discharge rate. The saline water has been quantitatively assessed to be minor and acceptable. Adverse impacts on water quality due to the saline water discharge would not be expected.

15.1.5 Waste Management Implications

Construction Phase

15.1.5.1 The types of waste that would be generated during the construction phase of the Project include construction and demolition (C&D) materials from the construction activities, general refuse from the workforce and chemical wastes from the maintenance of construction plant and equipment. Provided that the wastes are handled, transported and disposed of properly and good site practices and waste reduction measures are implemented accordingly, adverse environmental impact is not expected during the construction phase of the Project.

Operation Phase

- 15.1.5.2 The end product from the incineration process of the IWMF would include bottom ash, fly ash and air pollution control residues, which would be disposed of at a landfill after checking for compliance with the proposed incineration residue pollution control limits. Pre-treatment of fly ash and air pollution control residues will be undertaken prior to disposal at landfill. A small amount of non-combustible inert refuse (e.g. glass, sand, residual metals etc.) sorted out in the mechanical treatment process would also be disposed of at the WENT Landfill.
- 15.1.5.3 Limited amount of chemicals or chemical wastes would be used or generated for the operation of the IWMF. With proper implementation of the recommended practices and response procedures on land contamination prevention, the potential for land contamination due to the IWMF operation is expected to be minimal.

15.1.6 Ecological Impact

Construction Phase

- 15.1.6.1 The major ecological impact of the Project would be the loss of about 11 hectares of ash lagoon habitat, of which about 82% is usually dry and support scarce vegetation which has a low biodiversity and ecological value. The loss of the remaining ash lagoon with low to moderate ecological value including 1.98 hectares breeding ground of Little Grebe would be mitigated by the provision of about 1.2 ha permanent pond habitat within the IWMF site and the existing WENT Landfill, as well as the interim habitat enhancement work for about 4.5ha of the southern unoccupied Middle Lagoon. Disturbance impact to the breeding activities of Little Grebe would be minimized by scheduling the commencement of site formation work in the dry season. As a precautionary measure, the works area would be thoroughly inspected by experience ecologist(s) to confirm no breeding activities of Little Grebe would be affected by the construction work before commencement of site clearance.
- 15.1.6.2 Other indirect impacts would include noise and human disturbance, release of PFA leachate and construction site runoff and wastewater. With proper implementation of good site practices including the use of quiet machinery to reduce noise emissions, proper drainage arrangement to minimize construction runoff etc., adverse ecological impact is not anticipated. The implementation of mitigation measures would be subject to regular audit as part of the EM&A programme.

Operation Phase

- 15.1.6.3 No direct habitat loss would be resulted from the operation of the proposed Project. Disturbance impacts would include human activities and noise due to increased operational traffic. Mitigation measures such as landscape planting and boundary wall have been recommended to screen the visual interface and to limit public access to the adjoining lagoon habitat. The ecological function of the recreated pond as an alternative habitat for Little Grebe will be monitored.
- 15.1.6.4 With the implementation of the recommended mitigation measures, no unacceptable ecological impact due to the operation of the proposed Project would be expected.

15.1.7 Fisheries Impact

- 15.1.7.1 No loss of fishing ground and resources is expected during construction and operation phases of the proposed Project. The construction of the IWMF would be mainly land-based with only minor work anticipated at the seawall for the construction of the saline water outfall. No unprocessed or processed effluent would be discharged into the Deep Bay during the IWMF operation. With proper implementation of the recommended

mitigation measures, including the use of sand/ silt removal facilities to collect and control construction site runoff and the implementation of “net zero discharge” scheme during the operation phase, no adverse impact on fisheries resources is expected.

15.1.8 Health Impact

- 15.1.8.1 The cancer risk arising from exposure to compounds of potential concern (COPCs) associated with the emissions of the IWMF has been evaluated in this EIA Study. The highest incremental (excess) cancer risk arising from the IWMF is predicted to be 9.82×10^{-7} which is within the screening level of 1×10^{-5} adopted by USEPA and it is considered that the Project would not present an unacceptable risk and no further analysis is necessary. The highest predicted total Hazard Index (HI) at all receptors are well below 0.25, which is an initial screening exposure benchmark derived from a conservative approach by the USEPA. Cumulative acute non-carcinogenic health impact of the IWMF imposed to the worst impacted human receptors were assessed and compared with local and overseas guideline levels. It was concluded that the levels of non-carcinogenic chemicals were found to be insignificant when compared to the adopted/derived reference levels. For the classical COPCs of the HKAQO, while it is not possible to rule out adverse health effects from the IWMF with complete certainty, the impact on health from small additional air pollutants is likely to be very small and unlikely to be quantifiable.
- 15.1.8.2 As the vast majority of foods in Hong Kong are imported, the impact of waste facility emissions on any one individual's exposure through ingestion of home-grown foods is likely to be very limited. Nonetheless, assessment was undertaken to determine the concentration of certain metals present in home-grown foods in the vicinity of the Project site due to the deposition of the emissions from the Project. The predicted concentrations were compared with the maximum permitted concentration stipulated in “Food Adulteration (Metallic Contamination) Regulations” by the Centre for Food Safety. The predicted concentrations of Antimony, Arsenic, Cadmium, Chromium, Lead and Mercury at all receptors fall under the maximum permitted concentrations listed in the first and second schedules of the Regulations.
- 15.1.8.3 The existing practices of transporting wastes in enclosed containers will be followed. With regards to the storage and handling of waste and ash, given that all the reception halls and ash storage pits will be fully enclosed with slightly negative air pressure and a closed grab will be used to grab waste and ash. Leakage of any fugitive emissions to the outdoor environment is not expected. With the implementation of the recommended health risk control measures, the potential health impacts associated with the transportation, storage and handling of waste and ash are considered to be insignificant.
- 15.1.8.4 The potential health risk induced by radon emissions associated with PFA arising from the construction and operation was also evaluated. The estimation indicated that there would be no significant radiological hazard to workers working outdoors in the IWMF or in the restored/ operating ash lagoon area adjacent to the IWMF.
- 15.1.8.5 The IWMF will be designed and operated to the most up-to-date standards and practices. The operator must be well trained to avoid any accidental events as well as to implement industry best practice with reference to international standards and guidelines. To avoid or minimize the potential health impacts associated with potential accidental events, an emergency response plan will be developed and properly implemented for the IWMF. It should be noted that the emergency response plan should be specific to the final design and operation of the IWMF. The recommended preventive measures include the use of best available techniques, continuous and regular stack emission monitoring, as well as conducting regular safety monitoring and audit. With the implementation of the recommended preventive measures and an effective emergency response plan for the IWMF, the health impacts associated with any potential accidental events could be minimized if not avoided.

15.1.9 *Landscape and Visual Impact*

Landscape Impact

- 15.1.9.1 During the construction phase, the impact to the landscape resources and landscape character areas would be “insubstantial”, except the Ash Lagoon (LR1 & LCA1). The impact to the Ash Lagoon (LR1 & LCA1) before mitigation would be “substantial”.
- 15.1.9.2 During the operation phase, the proposed works has negligible impact to most of the landscape resources and landscape character areas, except the Ash Lagoon (LR1 & LCA1) where the project site locates. The impact to the Ash Lagoon would be “substantial”. Mitigation measures including proper landscape design blending the facilities into the surroundings, rooftop/vertical greening design, landscape treatment, provision of compensatory habitat for Little Grebe, etc. are anticipated to mitigate the landscape impact and enhance the overall landscape quality of the environment. The long-term residual impact to the Ash Lagoon would be reduced to “slight” in both day 1 and year 10 of operation.
- 15.1.9.3 Surrounded by facilities of similar nature (e.g. STF, Black Point Power Station), the development of the IWMF at the TTAL site is considered compatible with the surrounding context. With the landscape design of the IWMF being coherent with the adjacent STF, the development of the two facilities could be integrated and blend well in the surrounding landscape. The two developments would form a harmonic view, and the cumulative landscape impact of the two developments would be alleviated. Another concurrent project is the WENT Landfill Extension. The construction phase of the IWMF will occur concurrently during the early construction phase of the WENT Landfill Extension while the operation phase of the IWMF will occur during the construction, operation, restoration and aftercare phases of the WENT Landfill Extension. The construction and operation of the WENT Landfill Extension will cause significant cumulative impact to the area due to large-scale site formation. During the restoration & aftercare phases of the WENT Landfill Extension, the IWMF and STF would be in Year 8 and Year 11 of the operation phase respectively. The mature advanced planting at the WENT Landfill Extension can act as screening effect for the WENT Landfill Extension, and the compensatory planting at the WENT Landfill Extension will be provide preliminary vegetation cover for site area of the WENT Landfill Extension. The WENT Landfill Extension will become compatible with the surrounding IWMF and STF in which various landscape mitigation measures, such as landscape planting, green roof, vertical greening, have been implemented for a substantial period of time. After the whole period of restoration and aftercare phases of the WENT Landfill Extension, the impact due to the WENT Landfill Extension would be greatly mitigated by semi-mature compensatory woodland, shrubland and grassland. The IWMF, STF and resorted WENT Landfill Extension would blend well and be merged as a whole. No significant residual cumulative impact is anticipated.

Visual Impact

- 15.1.9.4 The visual impact to most of the visual sensitive receivers during the construction phase would be “moderate”, and the visual impact to sea travellers of Deep Bay (VSR4) would be “substantial”. After the implementation of the mitigation measures, the residual impact to the sea travellers of Deep Bay would become “moderate / substantial” during construction.
- 15.1.9.5 The visual impact to most of the visual sensitive receivers during the operation phase would be “moderate”, and the visual impact to the residents/visitors of Ha Pak Lai (VSR5) and the sea travellers of Deep Bay (VSR4) would be “moderate/substantial” and “substantial” respectively. After the implementation of the proposed mitigation measures, the residual impact to most of the visual sensitive receivers would be reduced to “slight”, and the residual impact to the residents/visitors of Ha Pak Lai (VSR5) and the sea travellers of Deep Bay (VSR4) would be “slight/moderate” in year 10 of operation.

15.1.9.6 Regarding the visual impacts during waste transportation / handling and its cumulative visual impacts, the impact is expected to be insignificant. During the operation stage, MSW will be contained in containers and transported to the berth of WENT Landfill from the Refuse Transfer Stations (RTSs) through marine transport. This is the current mode of transportation to transfer MSW from the RTSs to the WENT Landfill. After arriving berth of the WENT Landfill, the container will be transported to the IWWMF by land transport and MSW will then be discharged from the containers to the bunker at the IWWMF reception hall, which is enclosed in a covered building. The potential visual impact due to waste transportation / handling is anticipated to be minimal.

15.1.9.7 As mentioned in **Section 15.1.9.3**, the development of the IWWMF at TTAL is surrounded by facilities of similar nature (e.g. STF, Black Point Power Station). The IWWMF is considered compatible with the surrounding context. With the architectural and landscape design of the IWWMF being coherent with the adjacent STF, the development of the two facilities could be integrated and blend well in the surrounding landscape. The two developments would form a harmonic view, and the cumulative visual impact of the two developments would be alleviated.

Overall Residual Impact

15.1.9.8 In conclusion, the potential landscape and visual impacts can be effectively reduced by implementing the proposed mitigation measures during construction and operation phases. With reference to criteria defined in Annex 10 of the EIAO TM, the overall residual impact is considered as “acceptable with mitigation measures” after implementing the mitigation measures.

15.1.10 Impact on Cultural Heritage

15.1.10.1 Based on the results of the desktop review and survey, the Tsang Tsui Archaeological Site has a high archaeological potential. However, the Tsang Tsui Archaeological Site is located approximately 150m from the Project boundary and adverse impacts associated with this Project are not expected.

15.1.10.2 The Hung Shing and Dragon Mother Temple and two clan graves are identified within the study area. However, the Temple was built in early to mid 20th century and renovated in the 1980s. Given the large separation between these built heritages and the IWWMF, no adverse impacts during the construction and operation phases are anticipated.

15.1.11 Landfill Gas Hazards Assessment

15.1.11.1 A qualitative assessment of the potential hazards associated with landfill gas migration from the WENT Landfill Extensions to the IWWMF site has been conducted. A source-pathway-target analysis shows that the overall risk level for construction and operation phase of the IWWMF are Medium and High respectively.

15.1.11.2 A number of measures have been recommended for the Project to safeguard the safety of all personnel and the general public (i.e. visitors) present at the Project site during construction and operation phase. These include site safety measures and routine monitoring of landfill gas at excavation areas during construction phase, and installation of gas barrier and monitoring wells and other building protection measures as necessary during the operation phase. With the implementation of these measures, no adverse impact of landfill gas hazard on this Project is anticipated.

15.2 Impact Summary for the IWMF at an artificial island near SKC

15.2.1 General

15.2.1.1 This EIA Report has provided an assessment of the potential environmental impacts associated with the construction and operation of the Project at an artificial island near Shek Kwu Chau (SKC), with the consideration of the potential cumulative impact from other concurrent projects in the vicinity of the artificial island near SKC. Specific mitigation measures requirements for the Project, as well as an environmental monitoring and auditing programme, have been developed. A summary of the environmental impacts associated with the Project are presented below.

15.2.2 Air Quality Impact

Construction Phase

15.2.2.1 Air quality impacts from the construction works for the Project would mainly be related to construction dust from excavation, materials handling, filling activities and wind erosion. With the implementation of mitigation measures specified in the Air Pollution Control (Construction Dust) Regulation, dust impact on air sensitive receivers would be minimal.

Operation Phase

15.2.2.2 During the operation phase, the potential sources of air quality impacts would be the air emissions from the incinerator stacks and the odour nuisance from the waste reception halls, the waste storage area and the mechanical treatment plant.

15.2.2.3 Advanced air pollution control system, including SCR for NO_x removal and activated carbon for dioxins removal and continuous emissions monitoring system will be installed for the IWMF to ensure that the emissions from the IWMF stacks will meet the target emission limits that is more stringent than those stipulated in Hong Kong and the European Commission for waste incineration.

15.2.2.4 Cumulative air quality impact assessment has been undertaken for the Project at the artificial island near SKC. The cumulative air quality impact assessment has taken into account the emissions from both regional and local sources, including the emissions within the Pearl River Delta Economic Zone and major local air pollution sources in Hong Kong. The predicted maximum cumulative concentrations of relevant AQO parameters at the representative air sensitive receivers in areas that might be impacted by the IWMF emission all complied with the corresponding AQO.

15.2.2.5 Besides, odour nuisance may arise from the operation of the on-site wastewater treatment plant, the waste reception halls, the waste storage area and the mechanical treatment plant of the IWMF. The wastewater treatment plant, the waste reception halls and the waste storage areas would be fully enclosed and the odorous air in this facility would be extracted and used as combustion air for incineration to remove the odorous compounds. For the mechanical plant, they would be equipped with deodorizing system of 95% odour removal efficiency. Besides, the wastewater treatment plant, waste reception halls, waste storage area and the mechanical treatment plant would also be operated under negative pressure to prevent odour leaking to the outdoor environment. The predicted cumulative odour concentrations would comply with the criteria required in the EIAO-TM. Adverse odour impact on nearby ASRs would not be expected.

15.2.3 Noise Impact

Construction Phase

- 15.2.3.1 The assessment results have demonstrated that daytime noise criteria would not be exceeded by the predicted construction noise levels under the unmitigated scenario. Having said that, good practices for the control of noise emissions from construction sites are recommended to further eliminate the potential of noise impact. These include good site practices to limit noise emissions at source and the use of quiet plant and working methods, whenever practicable.
- 15.2.3.2 Besides, a construction noise EM&A programme is recommended to check the compliance of the noise criteria during normal daytime working hours.

Operation Phase

- 15.2.3.3 Operation noise impacts from fixed plant noise can be effectively mitigated by including noise control treatment at the source during the design stage and implementing the same during operation. Adverse residual operation noise impacts are not anticipated. The need for noise measurement during commissioning of fixed noise sources should be included in the contract documents of the IWMF.

15.2.4 Water Quality Impact

Construction Phase

- 15.2.4.1 The potential sources of water quality impact arising during the construction phase of the Project include construction site runoff and drainage, wastewater generated from general construction activities and sewage from the workforce. With implementation of the recommended mitigation measures and site practices outlined in ProPECC PN 1/94 (*Practice Note for Professional Persons on Construction Site Drainage*), no unacceptable residual impacts on water quality are expected.
- 15.2.4.2 To minimize dredging and filling activities and the associated environmental impacts, cellular cofferdam and breakwater instead of sloping seawall are proposed to be adopted. Large-scale sediment dredging is therefore not anticipated for the proposed reclamation and breakwater construction works at the artificial island near SKC. Only small-scale dredging may be required along the proposed cofferdam to remove the top 1m of clayey marine deposit for installation of an anti-scouring protection layer. The water quality impact during the dredging for anti-scouring protection layer has been quantitatively assessed using the near field sediment dispersion model. The model results indicated that the water quality impact generated from the dredging works would be localized and minor under the mitigated scenario and would unlikely contribute to any significant water quality impact. Mitigation measures including the employment of silt curtain system, control of dredging and filling rates etc. are proposed to ensure that no unacceptable water quality impact would be resulted from the dredging works.
- 15.2.4.3 Besides, during installation of submarine cables, the seabed sediment will be released at the bottom of the water column which will result in high localized suspended sediment concentrations. An analysis has been undertaken to determine the potential transport of fine sediments suspended into the water column during the cable laying process. The analysis results indicated that the sediment disturbed during laying of the submarine cable will settle onto the seabed within approximately 80m of the cable alignment. Since all the identified water sensitive receivers are located beyond this impact zone and the whole submarine cable installation works will be completed within a short duration, the potential water quality impacts are considered short term and acceptable.

Operation Phase

- 15.2.4.4 During the operation phase, wastewater will be generated from the proposed incineration plant and mechanical treatment plant. An on-site wastewater treatment plant will be provided. All generated wastewater will be discharged to the on-site wastewater treatment plant for treatment. The treated effluent from the wastewater treatment plant will be reused in the incineration plant and mechanical treatment plant or for washdown and landscape irrigation in the IWFM site. There would be no wastewater effluent discharged to the coastal waters of Southern WCZ.
- 15.2.4.5 An on-site desalination plant will be provided for supplying water to the IWFM. Saline water would be discharged from the desalination plant at a low discharge rate. The saline water has been quantitatively assessed to be minor and acceptable. Adverse impacts on water quality due to the saline water discharge would not be expected.

15.2.5 Waste Management Implications

Construction Phase

- 15.2.5.1 The types of waste that would be generated during the construction phase of the Project include dredged marine sediment, construction and demolition (C&D) materials from foundation works and piling works, general refuse from the workforce and chemical wastes from the maintenance of construction plant and equipment. Provided that the wastes are handled, transported and disposed of properly and good site practices and waste reduction measures are implemented accordingly, adverse environmental impact is not expected during the construction phase of the Project.

Operation Phase

- 15.2.5.2 The end product from the incineration process of the IWFM would be bottom ash, fly ash and air pollution control residues which would be disposed of at landfill after checking for compliance with the proposed incineration residue pollution control limits. Pre-treatment of fly ash and air pollution control residues will be undertaken prior to disposal at landfill. A small amount of non-combustible inert refuse (e.g. glass, sand, residual metals etc.) sorted out in the mechanical treatment process would also be disposed of at landfill.
- 15.2.5.3 Limited amount of chemicals or chemical wastes would be used or generated from the IWFM operation. Good practices and response procedures for contamination prevention have been recommended. With proper implementation of the recommended practices and procedures, the potential for land contamination due to the IWFM operation is expected to be minimal.

15.2.6 Ecological Impact

- 15.2.6.1 The waters to the South of Lantau and Lamma Island, including the area near SKC, is an important habitat for Finless Porpoise (*Neophocaena phocaenoides*), a species of conservation interest, due to their high occurrence in the area. A total of 15 species of corals, including one uncommon species, have been identified along the shore of Shek Kwu Chau within and in the vicinity of the Project site. An active nest of White-bellied Sea Eagle (*Haliaeetus leucogaster*), an uncommon species with restricted breeding sites, had been recorded near the proposed reclamation area.
- 15.2.6.2 The key potential direct impacts identified under the Project include the permanent loss of 31 hectares of important habitat for Finless Porpoise, covering the reclamation and the embayment area within breakwater. Mitigation measures proposed to mitigate this loss include firm commitment from the Project Proponent to designate an appropriate area of waters of about 700 hectares between Shek Kwu Chau and Soko Islands as a marine park, in accordance with the statutory process stipulated in the Marine Parks Ordinance.

A marine park study would be conducted to identify the location and coverage of the park area, and to determine suitable marine route, and limitation of vessel speed to ten knots at areas with high Finless Porpoise sighting density. With the implementation of the proposed mitigation measures, adverse impacts on Finless Porpoise would be mitigated to acceptable level.

- 15.2.6.3 A total of 198 coral colonies of small sizes and low coverage (<1%), comprising 1 hard coral and 7 octocoral species, within the proposed reclamation area may be directly affected. As all the corals to one uncommon species that are located along the shore of Shek Kwu Chau, may be indirectly affected by the potential elevation in suspended solid level during construction phase; however the impact could be effectively mitigated through water quality control measures. With the implementation of the proposed measures, unacceptable impacts on corals are not anticipated.
- 15.2.6.4 The White-bellied Sea Eagle breeding pair and their nest may receive indirect disturbances during construction and operation of the IWMF. Such impacts could be mitigated through avoidance of noisy works during the breeding season of White-bellied Sea Eagle, restriction of vessel access near the nest of White-bellied Sea Eagle, and avoidance of unnecessary lighting and provision of shielding for lights to minimize glare disturbance from the IWMF. It is hence expected that the potential impacts on White-bellied Sea Eagle could be minimized to acceptable level.
- 15.2.6.5 Besides the above marine works, the construction of the Project also involves laying of submarine cables between Shek Kwu Chau and Cheung Sha as well as the construction of a landing portal at Cheung Sha. The benthos communities of the temporarily affected areas are expected to recolonise the seabed areas after the short period of submarine cable laying operation (about 20 working days). In view of the low to moderate ecological value of the subtidal habitats and temporary nature of the impact, the potential impact on subtidal habitat and the associated benthos communities due to submarine cable laying works is considered to be low. Moreover, considering the localized nature of sediment plume and short term duration of the works, as well as the natural adaption of fish, no significant impacts are expected on the potential fish spawning and nursery ground due to the submarine cable laying works. For the construction of Cheung Sha landing portal, considering the small scale of landing portal works, existing turbid condition, and absence of ecological sensitive receiver along the shoreline, with the adoption of good site practice and water quality control measures, potential impact on ecological resources during construction of Cheung Sha portal is considered to be acceptable.
- 15.2.6.6 Monitoring programmes for Finless Porpoise, coral colonies, and White-bellied Sea Eagle have also been recommended to assess the effectiveness of the proposed mitigation measures. With the implementation of the recommended mitigation measures and the EM&A programme, adverse ecological impacts due to the construction and operation of the proposed Project would be minimized to acceptable levels.

15.2.7 Fisheries Impact

- 15.2.7.1 Permanent loss of 31 hectares of fishing ground, of which 15.9 hectares is a previously identified fisheries spawning and nursery ground, is expected. Indirect impact on fisheries due to elevation in suspended solids level during construction phase would be temporary and localized. Mitigation measures such as adoption of silt curtain, reduced dredging rate, and phasing of marine works have been recommended, in order to minimize adverse impact on water quality, hence protecting fisheries resources. During operation phase, although the rate of water intake for water supply at the desalination plant of the IWMF is slow, the potential impact from impingement and entrainment of fisheries resources would be further minimized by provision of screen at the seawater intake.
- 15.2.7.2 With the proper implementation of the recommended mitigation measures, potential impact on fisheries due to the Project is considered to be acceptable.

15.2.8 Health Impact

- 15.2.8.1 The cancer risk arising from exposure to compounds of potential concern (COPCs) associated with the emissions of the IWMF has been evaluated in this EIA. The highest incremental (excess) cancer risk arising from the IWMF is predicted to be 2.76×10^{-6} which is within the screening level of 1×10^{-5} adopted by USEPA and it is considered that the Project would not present an unacceptable risk and no further analysis is necessary. The highest predicted total Hazard Index (HI) at all receptors are well below 0.25, which is an initial exposure screening benchmark derived from a conservative approach by the USEPA. Cumulative acute non-carcinogenic health impact of the IWMF imposed to the worst impacted human receptors were assessed and compared with local and overseas guideline levels. It was concluded that the levels of non-carcinogenic chemicals were found to be insignificant when compared to the adopted/derived reference levels. For the classical COPCs of the HKAQO, while it is not possible to rule out adverse health effects from the IWMF with complete certainty, the impact on health from small additional air pollutants is likely to be very small and unlikely to be quantifiable.
- 15.2.8.2 As the vast majority of foods in Hong Kong are imported, the impact of waste facility emissions on any one individual's exposure through ingestion of home-grown foods is likely to be very limited. Having said that, assessment was undertaken to determine the concentration of certain metals present in home-grown foods in the vicinity of the Project site due to the deposition of the emissions from the Project. The predicted concentrations were compared with the maximum permitted concentration stipulated in "Food Adulteration (Metallic Contamination) Regulations" by the Centre for Food Safety. The predicted concentrations of Antimony, Arsenic, Cadmium, Chromium, Lead and Mercury at all receptors fall under the maximum permitted concentrations listed in the first and second schedules of the Regulations.
- 15.2.8.3 The existing practices of transporting wastes in enclosed containers will be followed. With regards to the storage and handling of waste and ash, given that all the reception halls and ash storage pits will be fully enclosed with slightly negative air pressure and that closed grab will be used to grab waste and ash, leakage of any fugitive emissions to the outdoor environment is not expected. With the implementation of the recommended health risk control measures, the potential health impacts associated with the transportation, storage and handling of waste and ash are considered to be insignificant.
- 15.2.8.4 The IWMF will be designed and operated to the most up-to-date standards and practice. The operator must also be well trained to avoid any accidental events as well as to implement industry best practice with reference to international standards and guidelines. To avoid or minimize the potential health impacts associated with potential accidental events, an emergency response plan will be developed and properly implemented for the IWMF. It should be noted that the emergency response plan should be specific to the final design and operation of the IWMF. The recommended preventive measures include the use of best available techniques continuous and regular stack emission monitoring, as well as conducting regular safety monitoring and audit. With the implementation of the recommended preventive measures and an effective emergency response plan for the IWMF, the health impacts associated with any potential accidental events could be minimized if not avoided.

15.2.9 Landscape and Visual Impact

Landscape Impact

- 15.2.9.1 During both the construction and operation phases, the impact to the landscape resources and landscape character areas would be "insubstantial", except the Island Landscape (LCA1) which is rated as "moderate" and Seawater (LR3 & LCA2) which are rated as "substantial" before mitigation.

- 15.2.9.2 To avoid direct impact to the valuable landscape resources of SKC, such as the natural shoreline (LR2), the reclamation area is designed not be connected to SKC. The coast of SKC and the reclamation area will be separated by a water channel (about 10 – 40 m in width and 350 m in length). The deeper side of the channel would be about 9m deep. Although the reclamation area will be isolated from SKC and no direct impact to the landscape resources and landscape character areas in SKC is anticipated, mitigation measures are proposed to improve to compatibility of the proposed works which are of industrial nature with the landscape resources and landscape character areas in SKC. The measures include introduction of architectural and landscaping design emphasizing nature as the design concept. Boulders with the similar textures of the existing rocky shores would be employed for the construction of breakwater and the shoreline of the reclamation area to echo the existing natural shoreline of SKC. Rooftop and vertical greening along the periphery of each building would be implemented to increase the amenity value of the IWMF, and more importantly to blend into the surrounding green environment. Landscape would also be introduced at the stack to further enhance the overall natural and green concept.
- 15.2.9.3 For LR3, since the seawater will be permanently replaced by the reclamation area, this portion of landscape resource is lost and cannot be recovered or mitigated. However, the quantity of loss of the seawater as landscape resource is relatively small in comparison to the large extent of the adjacent seawater landscape within and outside the study area. Together with other measures such as efficient site layout and use of cellular cofferdam for the construction of breakwater and the artificial island, the area occupied by the proposed works is reduced to practical minimum so that the impact to LR3 would be as small as possible.
- 15.2.9.4 For LCA2, apart from minimizing the landscape impact as mentioned above, extensive landscape areas and greening will be provided as a mitigation measure to improve the naturalness of the project site. The provision of new landscape elements will transform the existing landscape character.
- 15.2.9.5 Currently, the proposed projects in the vicinity of the artificial island near SKC include the sewerage works in South Lantau and the replacement of the existing submarine water main between Northern Channel of Cheung Chau and Chi Man Wan Peninsula. As the sites of the two projects are distant from the artificial island near SKC, cumulative landscape impact of the IWMF and these projects is not anticipated.

Visual Impact

- 15.2.9.6 During the construction phase, the visual impact to most of the visual sensitive receivers would be “moderate / substantial”, and the visual impact to the sea travellers (VSR4) would be “substantial”. After the implementation of mitigation measures, the residual impact to the VSR4 would become “moderate / substantial” during construction while most of the other VSRs become “slight / moderate” or “moderate”.
- 15.2.9.7 During the operation phase, the visual impact to most of the visual sensitive receivers would be “moderate / substantial” or “moderate”, and the visual impact to the sea travellers (VSR4 & VSR12) would be “substantial” and “moderate / substantial” respectively. As these VSRs are transient in nature, the proposed works would unlikely create a prolonged visual impact to these VSRs.
- 15.2.9.8 Regarding the visual impacts induced by the reclamation and construction of facilities, mitigation measures are proposed including aesthetic design with a view to enhance the aesthetic quality and to blend in the proposed works into the natural surrounding, at the same time reducing the visual mass of the structure. This is achieved by rooftop and vertical greening along the building façade, use of natural materials with recessive colour, provision of sky gardens between the stacks, provision of observation deck to diminish the feeling of chimney, etc.

- 15.2.9.9 To maximize visual compatibility between the existing natural shoreline of SKC and the IWMF, mitigation measure to adopt natural rocks with similar colour as rocky shore of SKC for the construction of breakwater and artificial shoreline will improve the visual quality.
- 15.2.9.10 After the implementation of the proposed mitigation measures, the residual impact to some of the visual sensitive receivers would be reduced to “slight / moderate”, and the residual impact to the sea travellers (VSR4 & VSR12) would become “moderate / substantial” and “moderate” in day 1 of operation and “moderate” and “slight / moderate” respectively in year 10 of operation. The residual impact to some middle / long distance VSRs such as Cheung Sha (VSR5), Pui O Beach (VSR8) and Tong Fuk Beach (VSR11) would remain “moderate” in year 10 of operation due to the fact that some of the mitigation measures such as rooftop and vertical greening would not easily be appreciated from a distance.
- 15.2.9.11 The two proposed projects in the vicinity of the artificial island near SKC, including the sewerage works in South Lantau and the replacement of the existing submarine water main between Northern Channel of Cheung Chau and Chi Man Wan Peninsula, are distant from the artificial island near SKC. Cumulative visual impact of the IWMF and these projects is not anticipated.

Overall Residual Impact

- 15.2.9.12 In conclusion, the potential landscape and visual impacts can be reduced by implementing the proposed mitigation measures during construction and operation phases. With reference to criteria defined in Annex 10 of the EIAO TM, the overall residual impacts are considered as “marginally acceptable with mitigation measures” after implementing the mitigation measures, that is to say “there would be some adverse effects, but these can be eliminated, reduced or offset by specific measures”.

15.2.10 Impact on Cultural Heritage

- 15.2.10.1 Based on the results of the desktop review and survey, no archaeological site was identified within the study area. No adverse archaeological impact is expected.
- 15.2.10.2 Geophysical surveys were conducted to examine the marine archaeological potential in the proposed reclamation area, breakwater and cable corridor for the IWMF. A total of 12 unidentified objects were spotted within the geophysical survey area. Seven out of twelve unidentified objects would be affected by the proposed works. A diver inspection was carried out, trying to locate the unidentified objects and establish their archaeological potential. A detailed search was conducted, but nothing was located. The results of the geophysical survey and diver inspection indicate there are no archaeological resources within the proposed reclamation area, and therefore no adverse marine archaeological impact is anticipated due to the proposed reclamation.
- 15.2.10.3 One grade 3 historic building (Courtyard Complex on the Shek Kwu Chau Treatment and Rehabilitation Centre of the Society for Aid and Rehabilitation of Drug Abusers) and four other built heritage structures with no grading are identified within the study area. However, due to large separation between the built heritages and the IWMF, no adverse impacts during the construction and operation phases are anticipated.

15.3 Impact Summary for IWMF at both Tsang Tsui Ash Lagoon Site and the Artificial Island near SKC (Co-exist Scenario)

15.3.1 General

15.3.1.1 It is expected that the co-exist scenario with a 3,000 tpd IWMF at each of the sites would likely give rise to potential cumulative air quality and health impacts associated with aerial emissions from the two IWMFs during the operation phase. Other potential impacts arising from construction and operation of the two IWMFs would be localized at the respective sites and significant changes in the level of impacts specifically associated with the co-existence of the two IWMFs are not anticipated.

15.3.1.2 This EIA Report has provided an assessment of the potential air quality and health impacts associated with the operation of the two IWMFs at both the TTAL site and the artificial island near SKC, with the consideration of the potential cumulative impact from other concurrent projects in the vicinity of the TTAL site and the artificial island near SKC. Specific mitigation measures required for the Project, as well as an environmental monitoring and auditing programme, have been developed. A summary of the operation phase air quality and health impacts associated with this co-exist scenario is presented below.

15.3.2 Air Quality Impact

15.3.2.1 Advanced air pollution control system, including SCR for NO_x removal and activated carbon for dioxins removal and continuous emissions monitoring system will be installed for the IWMF to ensure that the emissions from the IWMF stacks will meet the proposed target emission limits that is more stringent than those stipulated in Hong Kong and the European Commission for waste incineration.

15.3.2.2 Cumulative air quality impact assessment has been undertaken for the Project for the co-exist scenario. The cumulative air quality impact assessment has taken into account the emissions from both regional and local sources, including the emissions within the Pearl River Delta Economic Zone and major local air pollution sources in Hong Kong. The predicted maximum cumulative concentrations of relevant AQO parameters at the representative air sensitive receivers of the areas that might be affected by the IWMF emissions all complied with the corresponding AQO.

15.3.3 Health Impact

15.3.3.1 The cancer risk arising from exposure to compounds of potential concern (COPCs) associated with the emissions of IWMFs under the co-exist scenario is evaluated in this EIA Study. The highest incremental (excess) cancer risk arising from the IWMF is predicted to be 3.49×10^{-6} which is within the screening level of 1×10^{-5} adopted by USEPA and it is considered that the Project would not present an unacceptable risk and no further analysis is necessary. The highest predicted total Hazard Index (HI) at all receptors are well below 0.25, which is an initial exposure benchmark derived from a conservative approach by the USEPA. Cumulative acute non-carcinogenic health impact of the IWMF imposed to the worst impacted human receptors were assessed and compared with local and overseas guideline levels. It was concluded that the levels of non-carcinogenic chemicals were found to be insignificant when compared to the adopted/derived reference levels. For the classical COPCs of the HKAQO, while it is not possible to rule out adverse health effects from the IWMF with complete certainty, the impact on health from small additional air pollutants is likely to be very small and unlikely to be quantifiable.

15.4 Key Environmental Outcomes and Summary of Environmental Performance Comparison

15.4.1.1 The major sensitive areas within the study area include different type of residential development from village houses to high-rise residential buildings, commercial buildings, industrial premises, recreational areas and place of public worship have been identified. A summary of the key environmental outcomes arising from this EIA study, environmental benefits of the environmental protection measures and comparing the environmental performance of the IWMF at TTAL site and the IWMF at the artificial island near SKC are presented in **Table 15.1** below.

Table 15.1 Summary of Key Environmental Outcomes / Benefits and Environmental Performance Comparison

Issue	Environmental Outcome / Benefits for the IWMF at the TTAL site	Environmental Outcome / Benefits for the IWMF at the artificial island near SKC
Major environmental benefits of the Project and key environmental problems avoided	<p>Compared with other major cities in the world, Hong Kong has uniquely relied mainly on landfills for the disposal of its municipal solid waste (MSW). Over the past years, the quantity of MSW generated has been on an increasing trend due to population growth. In 2008, approximately 18,000 tonnes of MSW were generated per day, which were about 30% more in comparison to the MSW generated over 10 years ago. Consequently the three strategic landfills in Hong Kong are now projected to approach their capacities in early to mid 2010s.</p> <p>If an alternative disposal method for MSW is not sought (i.e. scenario without the Project), MSW would continue to be disposed of at landfills, placing burden on the limited landfill capacity in Hong Kong and shortening the life of the landfills in a rapid rate. The capacity of the landfills will need to be further extended and more land will be occupied for MSW disposal.</p> <p>With the proposed IWMF, the amount of MSW to be disposed of at landfills will substantially decrease as the volume of waste generated after the thermal treatment process would only be about 10% of the original volume. The existing landfills can serve for a longer period of time. Besides, the production of greenhouse gases due to landfilling of MSW will be reduced.</p>	<p>Compared with other major cities in the world, Hong Kong has uniquely relied mainly on landfills for the disposal of its municipal solid waste (MSW). Over the past years, the quantity of MSW generated has been on an increasing trend due to population growth. In 2008, approximately 18,000 tonnes of MSW were generated per day, which were about 30% more in comparison to the MSW generated over 10 years ago. Consequently the three strategic landfills in Hong Kong are now projected to approach their capacities in early to mid 2010s.</p> <p>If an alternative disposal method for MSW is not sought (i.e. scenario without the Project), MSW would continue to be disposed of at landfills, placing burden on the limited landfill capacity in Hong Kong and shortening the life of the landfills in a rapid rate. The capacity of the landfills will need to be further extended and more land will be occupied for MSW disposal.</p> <p>With the proposed IWMF, the amount of MSW to be disposed of at landfills will substantially decrease as the volume of waste generated after the thermal treatment process would only be about 10% of the original volume. The existing landfills can serve for a longer period of time. Besides, the production of greenhouse gases due to landfilling of MSW will be reduced.</p>
Environmentally	A review of the latest development of various MSW	A review of the latest development of various MSW

Issue	Environmental Outcome / Benefits for the IWMF at the TTAL site	Environmental Outcome / Benefits for the IWMF at the artificial island near SKC
friendly designs recommended	<p>treatment technologies was conducted. The results of the review reconfirmed the recommendations from the Advisory Group (AG) on Waste Management Facilities that incineration technology could still play a core role in the IWMF Phase 1 for MSW treatment.</p> <p>An evaluation of three shortlisted thermal treatment technologies, including moving grate incineration, fluidized-bed incineration and gasification technologies, were carried out. The results indicated that moving grate incineration is more suitable to be adopted as a core technology of the IWMF Phase 1, taking into consideration the following advantages:</p> <ul style="list-style-type: none"> • Less volume of flue gas produced from the furnaces and less the amount of the air pollutant generated comparing with fluidized-bed incineration • Proven technology with the capacity to treat large amount of MSW • Least scale-up risks • Long track record of operation • High capability to tolerate the fluctuation of MSW characteristics with robust/ forgiving nature • Less land requirement for the treatment units • Less operation complexity • Less capital and operating costs 	<p>treatment technologies was conducted. The results of the review reconfirmed the recommendations from the Advisory Group (AG) on Waste Management Facilities that incineration technology could still play a core role in the IWMF Phase 1 for MSW treatment.</p> <p>An evaluation of three shortlisted thermal treatment technologies, including moving grate incineration, fluidized-bed incineration and gasification technologies, were carried out. The results indicated that moving grate incineration is more suitable to be adopted as a core technology of the IWMF Phase 1, taking into consideration the following advantages:</p> <ul style="list-style-type: none"> • Less volume of flue gas produced from the furnaces and less the amount of the air pollutant generated comparing with fluidized-bed incineration • Proven technology with the capacity to treat large amount of MSW • Least scale-up risks • Long track record of operation • High capability to tolerate the fluctuation of MSW characteristics with robust/ forgiving nature • Less land requirement for the treatment units • Less operation complexity • Less capital and operating costs
Population and Environmentally Sensitive Areas Protected	The major sensitive areas within the study area include different type of residential development from village houses to high-rise residential buildings, commercial buildings, industrial premises, recreational areas and place of public worship located within north-west New Territories, Tuen Mun, Lantau Island and Kwai Tsing. With the implementation of the proposed control and	The major sensitive areas within the study area include different type of residential development from village houses to high-rise residential buildings, commercial buildings, industrial premises, recreational areas and place of public worship located within Shek Kwu Chau, Lantau Island and Kwai Tsing. With the implementation of the proposed control and mitigation measures, the

Issue	Environmental Outcome / Benefits for the IWMF at the TTAL site	Environmental Outcome / Benefits for the IWMF at the artificial island near SKC
	mitigation measures, the sensitive receivers for different environmental aspects would be protected from adverse impacts arising from the Project during both construction and operation phases. The environmental benefits of environmental protection measures recommended, compensation areas included, and the population and environmental sensitive receivers protected are summarized below.	sensitive receivers for different environmental aspects would be protected from adverse impacts arising from the Project during both construction and operation phases. The environmental benefits of environmental protection measures recommended, compensation areas included, and the population and environmental sensitive receivers protected are summarized below.
Major Emission Sources in the vicinity of the Project Site	Major emission sources include Ecopark, Sludge Treatment Facilities, Green Island Cement Facilities, Existing WENT Landfill and its Extensions, Shiu Wing Steel Mill, Black Point and Castle Peak Power Stations	No major emission sources in the vicinity of Shek Kwu Chau.
Air Quality	<p>Environmental benefits of environmental protection measures recommended:</p> <p>Those ASRs located near the construction sites are protected through implementation of practicable dust suppression measures.</p> <p>Air pollution control and stack monitoring system will be installed for the IWMF to ensure that the emissions from the IWMF stacks will meet the proposed target emission limits that is more stringent than those stipulated in Hong Kong and the European Commission for waste incineration. Besides, all the potential odour emissions associated with the operation of the IWMF will be collected and destroyed by the incineration process or ventilated to deodorizer before discharge to the atmosphere.</p> <p>No unacceptable residual impacts from the cumulative impacts of the IWMF emissions and other existing emissions are anticipated at the ASRs.</p> <p>Compensation areas included:</p> <p>N/A</p>	<p>Environmental benefits of environmental protection measures recommended:</p> <p>Those ASRs located near the construction sites are protected through implementation of practicable dust suppression measures.</p> <p>Air pollution control and stack monitoring system will be installed for the IWMF to ensure that the emissions from the IWMF stacks will meet the proposed target emission limits that is more stringent than those stipulated in Hong Kong and the European Commission for waste incineration. Besides, all the potential odour emissions associated with the operation of the IWMF will be collected and destroyed by the incineration process or ventilated to deodorizer before discharge to the atmosphere.</p> <p>No unacceptable residual impacts from the cumulative impacts of the IWMF emissions and other existing emissions are anticipated at the ASRs.</p> <p>Compensation areas included:</p> <p>N/A</p>

Issue	Environmental Outcome / Benefits for the IWMF at the TTAL site	Environmental Outcome / Benefits for the IWMF at the artificial island near SKC
	<p>Population and environmental sensitive receivers protected:</p> <p>Existing ASRs & planned developments, including residential, commercial and recreational areas located within north-west New Territories, Tuen Mun, Lantau Island and Kwai Tsing.</p>	<p>Population and environmental sensitive receivers protected:</p> <p>Existing ASRs & planned developments, including residential, commercial and recreational areas located within Shek Kwu Chau, Lantau Island and Kwai Tsing.</p>
Noise Impact	<p>Environmental benefits of environmental protection measures recommended:</p> <p>The residual noise exceedances at the representative NSRs are due to the existing off-site traffic flow. The overall road noise contribution due to the off-site traffic generated from the operation of the proposed IWMF would be less than 1 dB(A). No adverse noise impacts arising from the operation of IWMF are predicted at any of the representative NSRs.</p> <p>Compensation areas included:</p> <p>N/A</p> <p>Population and environmental sensitive receivers protected:</p> <p>Existing NSRs located in close proximity along Lung Kwu Tan Road and Lim Wan Road.</p>	<p>Environmental benefits of environmental protection measures recommended:</p> <p>The predicted unmitigated noise levels complied with the noise standards at all NSRs.</p> <p>Silencer and acoustic treatment were proposed for the stack of the incinerator, ventilation systems and air-cooled chillers within the IWMF, no adverse residual operation noise impact is anticipated.</p> <p>Compensation areas included:</p> <p>N/A</p> <p>Population and environmental sensitive receivers protected:</p> <p>Existing and planned NSRs within 300m of the project boundary.</p>
Water Impact	<p>Environmental benefits of environmental protection measures recommended:</p> <p>Mitigation measures and site practices outlined in ProPECC PN 1/94 are recommended to minimize the potential water quality impact from construction site runoff and drainage, wastewater generated from general construction activities and sewerage from the</p>	<p>Environmental benefits of environmental protection measures recommended:</p> <p>Mitigation measures (including construction of breakwaters using cofferdam, reclamation after the reclamation site is enclosed with completed seawall, the use of closed grab for dredging, deployment of frame-type silt curtain and control of dredging rate) are</p>

Issue	Environmental Outcome / Benefits for the IWMF at the TTAL site	Environmental Outcome / Benefits for the IWMF at the artificial island near SKC
	<p>workforce.</p> <p>During the operation phase of the Project, wastewater (including human sewage) generated from the proposed incineration plant and mechanical treatment plant will be treated in an on-site wastewater treatment plant. All treated effluent will be reused on-site. A “net zero discharge” scheme will be adopted during the operation of the IWMF Phase 1.</p> <p>Compensation areas included:</p> <p>The recommended water quality mitigation measures would minimize the water quality impact to the receiving water.</p> <p>Population and environmental sensitive receivers protected:</p> <p>The receiving marine water in the Deep Bay WCZ.</p>	<p>proposed to ensure that no unacceptable water quality impact would be resulted from the marine works for construction of the breakwaters and reclamation.</p> <p>During the operation phase of the Project, wastewater (including human sewage) generated from the proposed incineration plant and mechanical treatment plant will be treated in an on-site wastewater treatment plant. All treated effluent will be reused on-site. There would be no wastewater effluent discharged to the marine waters of Southern WCZ.</p> <p>The incineration waste would be treated and be stabilized before marine transportation to the WENT landfill, and during transportation, the incineration would be stored in storage silo and covered container, to minimized any risk concerning accidental spillage.</p> <p>Compensation areas included:</p> <p>The recommended water quality mitigation measures would minimize the water quality impact to the receiving water.</p> <p>Population and environmental sensitive receivers protected:</p> <p>The receiving marine water in the Southern WCZ, the water sensitive receivers in the Southern WCZ including coral communities near the southwestern coast of SKC, horseshoe crab at the northern coast of SKC, beaches at the southern shore of the Lantau Island and the Cheung Sha Wan Fish Culture Zone</p>
Waste Management Implications	<p>Environmental benefits of environmental protection measures recommended:</p> <p>Implementation of the proposed waste control and mitigation measures would avoid the potential air, noise and water quality impacts associated with handling,</p>	<p>Environmental benefits of environmental protection measures recommended:</p> <p>Small-scale dredging for the construction of the proposed cofferdam would generate approximately 27,300m³ of marine sediment. Based on the chemical</p>

Issue	Environmental Outcome / Benefits for the IWMF at the TTAL site	Environmental Outcome / Benefits for the IWMF at the artificial island near SKC
	<p>transportation and disposal of the identified wastes arising from the construction phase of the Project.</p> <p>During operation phase, the bottom ash, fly ash and air pollution control residues will be disposed of at the landfill after checked for compliance with the proposed incineration residue pollution control limits. Besides, with proper implementation of the recommended practices and response procedures for contamination prevention, the potential for land contamination due to the IWMF Phase I operation would be minimal.</p> <p>No residual waste impact arising from the operation of the Project is expected.</p> <p>Compensation areas included:</p> <p>N/A</p> <p>Population and environmental sensitive receivers protected:</p> <p>Air, noise and water quality sensitive receivers at or near the Project site, the waste transportation routes and the waste disposal site.</p>	<p>screening, these sediments are suitable for Type 1 – Open Sea Disposal. Mitigation measures for dredging, transportation and disposal are recommended, and no adverse impact from sediment dredging is anticipated.</p> <p>No construction and excavation works will be required for the existing land of Shek Kwu Chau. It is estimated that approximately 26,200m³ of inert C&D materials would be generated from the foundation and piling works on the reclaimed land and all of these C&D materials will be re-used on site. In addition, about 4,345m³ of non-inert C&D material would also be generated from the construction activities, in which 869m³ will be re-used on site while the remaining C&D waste will be disposal off site.</p> <p>The amount of fill required for the reclamation of the artificial island near SKC is estimated to be about 2.4Mm³. The reclamation of the artificial island near SKC will thus has a side benefit of utilizing the C&D material stored in the fill banks to alleviate the current C&D material disposal problem in Hong Kong.</p> <p>With proper implementation of the proposed waste control and mitigation measures, the handling, transportation and disposal of the identified wastes arising from the construction phase of the Project will not cause adverse dust, noise and water quality impacts.</p> <p>During operation phase, the bottom ash, fly ash and air pollution control residues will be disposed of at the landfill after checked for compliance with the proposed incineration residue pollution control limits. Besides, with proper implementation of the recommended practices and response procedures for contamination prevention, the potential for land contamination due to the IWMF Phase I operation would be minimal. No</p>

Issue	Environmental Outcome / Benefits for the IWMF at the TTAL site	Environmental Outcome / Benefits for the IWMF at the artificial island near SKC
		<p>residual waste impact arising from the operation of the Project is expected.</p> <p>Should dredging is not required for the reclamation area (subject to results from further geotechnical ground investigation), the site would be susceptible to biogas hazard. Gas monitoring and protective measures are recommended to minimize the impact due to biogas generation.</p> <p>Compensation areas included:</p> <p>N/A</p> <p>Population and environmental sensitive receivers protected:</p> <p>Air, noise and water quality sensitive receivers at or near the Project site, the waste transportation routes and the waste disposal site.</p>
Ecological Impact	<p>Environmental benefits of environmental protection measures recommended:</p> <p>Direct impact to breeding activities of Little Grebe could be avoided by undertaking thorough site inspection in the Middle Lagoon by experienced ecologist before the commencement of any construction activities.</p> <p>Careful selection of location of seawater intake/saline water discharge would avoid direct loss of gorgonian.</p> <p>Indirect disturbance to wildlife in nearby habitat would be minimized through the setup of hoarding, the use of quieter piling machinery and construction plants, and screen planting in or around the project site and associated access road.</p> <p>Water quality control measures would be implemented to minimize indirect impact on seafront and associated wildlife caused by water quality deterioration.</p>	<p>Environmental benefits of environmental protection measures recommended:</p> <p>Avoid</p> <ul style="list-style-type: none"> • direct loss of intertidal habitat at SKC • direct loss of plant species of conservation importance at Cheung Sha • discharge of untreated wastewater into the marine environment, which is the habitat of Finless Porpoise and corals, via a zero discharge scheme <p>Minimise</p> <ul style="list-style-type: none"> • loss of coastal habitat • degradation in water quality, hence marine habitat

Issue	Environmental Outcome / Benefits for the IWMF at the TTAL site	Environmental Outcome / Benefits for the IWMF at the artificial island near SKC
	<p>Compensation areas included: Created habitats for Little Grebe in form of shallow pond(s) would be provided in a less disturbed area within the project site.</p> <p>Population and environmental sensitive receivers protected: Vegetation, wildlife and their associated habitats at and in the vicinity of the project site.</p>	<ul style="list-style-type: none"> • loss of corals by translocation of colonies that may be directly affected • disturbance on Finless Porpoise, corals, and nest of White-bellied Sea Eagle • impacts on fauna from noise disturbance and artificial lighting • impacts on fauna from accidental spillage, sewage effluent, and construction runoff • risk from pest introduction <p>Compensation areas included:</p> <ul style="list-style-type: none"> • Compensate the 31 ha loss of important habitat of Finless Porpoise by firm commitment from Project Proponent to seek to designate a marine park of approximately 700 ha in waters between Soko Islands and Shek Kwu Chau by 2018 to tie in with the operation of the IWMF. <p>Additional enhancement or precautionary measures include:</p> <ul style="list-style-type: none"> • Enhance marine habitat by deployment of artificial reef within the proposed marine park under this Project and release of fish fry. <p>Population and environmental sensitive receivers protected: Vegetation, wildlife and their associated habitats within and in the vicinity of the Project Site.</p>

Issue	Environmental Outcome / Benefits for the IWMF at the TTAL site	Environmental Outcome / Benefits for the IWMF at the artificial island near SKC
Fisheries Impact	<p>Environmental benefits of environmental protection measures recommended:</p> <p>In view of the localized and insignificant water quality change, fisheries impacts due to construction site runoff and seawater intake/saline water discharge are considered as minor and acceptable. Water quality control measures such as use of effective site drainage would minimize indirect impacts on fisheries resources due to change in water quality.</p> <p>Compensation areas included:</p> <p>Not required (no significant adverse fisheries impact is anticipated).</p> <p>Population and environmental sensitive receivers protected:</p> <p>Fisheries resources near the project site</p>	<p>Environmental benefits of environmental protection measures recommended:</p> <p>Alteration to the phasing of works, construction method, and layout plan of the IWMF has been made. The total fishing ground to be permanently lost would be significantly reduced from ~50 ha to ~31 ha. By adopting cofferdam instead of the conventional seawall and breakwater construction method, SS elevation would be greatly reduced, minimising adverse impact on the health of fisheries resources.</p> <p>Provision of a screen at the water intake point for desalination plant would be essential to minimise the risk of impingement and entrainment of fisheries resources (including fish, larvae and egg) through the intake point.</p> <p>The recommended water quality control measures would protect fisheries resources from adverse indirect impact on fisheries resources result from the Project</p> <p>With the proper implementation of the recommended mitigation measures, potential impact on fisheries would be minimised.</p> <p>Compensation areas included:</p> <p>N/A</p> <p>Population and environmental sensitive receivers protected:</p> <p>Fisheries resources, including adult and juvenile fish, and fish egg.</p>
Landscape and Visual Impact	<p>Environmental benefits of environmental protection measures recommended:</p>	<p>Environmental benefits of environmental protection measures recommended:</p>

Issue	Environmental Outcome / Benefits for the IWMF at the TTAL site	Environmental Outcome / Benefits for the IWMF at the artificial island near SKC
	<p>Implementation of mitigation measures, such as advanced screening tree planting, existing trees preservation, transplanting trees to adjacent locations, compensatory landscape planting, landscape design, reuse existing boulders, light control, construction traffic control, planting maintenance, etc. within the site area; aesthetic and greening design of the proposed IWMF matching with adjacent landscape setting of the site; and operation of education center for the public, would enhance the compatibility of the IWMF with the surrounding landscape setting, reduce the impacts to the visual sensitive receivers (VSRs) and alleviate negative public perceptions of the development.</p> <p>Compensation areas included: N/A</p> <p>Population and environmental sensitive receivers protected: Existing and future VSRs identified with the Zone of Visual Influence of the Project.</p>	<p>Implementation of mitigation measures, such as advanced screening tree planting, landscape design, reuse existing boulders similar to SKC natural coastline, light control, planting maintenance, etc. within the site area; aesthetic and greening design of the proposed IWMF matching with adjacent landscape setting of the site; and operation of education center for the public, would enhance the compatibility of the IWMF with the surrounding landscape setting, reduce the impacts to the visual sensitive receivers (VSRs) and alleviate negative public perceptions of the development.</p> <p>Compensation areas included: N/A</p> <p>Population and environmental sensitive receivers protected: Existing and future VSRs identified with the Zone of Visual Influence of the Project.</p>
Human Health Risk	<p>Environmental benefits of environmental protection measures recommended:</p> <p>The predicted health risk levels complied with the proposed criteria at all receptors. No adverse human health risk impact is expected.</p> <p>Besides, design measures for radon, such as a soil cover beneath the buildings before construction works and sufficient ventilation would reduce radon influx; regular maintenance for floor slabs and walls shall make radon reduction techniques more effective and cost-efficient.</p>	<p>Environmental benefits of environmental protection measures recommended:</p> <p>The predicted health risk levels complied with the proposed criteria at all receptors. No adverse human health risk impact is expected.</p> <p>Compensation areas included: N/A</p> <p>Population and environmental sensitive receivers protected: Operation staff of the IWMF Project as well as the</p>

Issue	Environmental Outcome / Benefits for the IWMF at the TTAL site	Environmental Outcome / Benefits for the IWMF at the artificial island near SKC
	<p>Compensation areas included: N/A</p> <p>Population and environmental sensitive receivers protected: Construction and operation staff of the IWMF Project as well as the sensitive receivers in close proximity of the Project site.</p>	<p>sensitive receivers in close proximity of the Project site.</p>
<p>Impact on Cultural Heritage</p>	<p>Environmental benefits of environmental protection measures recommended: A desktop study and field survey have been conducted and revealed no adverse impact to the Tsang Tsui Archaeological Site, Hung Shing Temple and two clan graves identified in the area.</p> <p>Compensation areas included: N/A</p> <p>Population and environmental sensitive receivers protected: N/A</p>	<p>Environmental benefits of environmental protection measures recommended: One grade 3 historic building (Courtyard Complex on the Shek Kwu Chau Treatment and Rehabilitation Centre of the Society for Aid and Rehabilitation of Drug Abusers) and four other built heritage structures with no grading are identified within the study area. However, due to large separation between the built heritages and the IWMF, no adverse impact to the built heritage structures is identified.</p> <p>Regarding the marine archaeological potential in the proposed reclamation area to the southwest of Shek Kwu Chau Island, geophysical survey and diver inspection were conducted. The results of the geophysical survey and diver inspection indicate there are no archaeological resources within the proposed reclamation area, and therefore no adverse marine archaeological impact is anticipated due to the proposed reclamation.</p> <p>Compensation areas included: N/A</p> <p>Population and environmental sensitive receivers protected:</p>

Issue	Environmental Outcome / Benefits for the IWMF at the TTAL site	Environmental Outcome / Benefits for the IWMF at the artificial island near SKC
		N/A
Landfill Gas Hazard	<p>Environmental benefits of environmental protection measures recommended:</p> <p>The recommended protection measures will reduce the landfill gas risk to the IWMF operators and general public (i.e. visitors). In particular, the landfill gas cut-off trench barrier would prevent landfill gas migrates into the IWMF site.</p> <p>Compensation areas included:</p> <p>N/A</p> <p>Population and environmental sensitive receivers protected:</p> <p>IWMF staff and general public (e.g. those visiting the education centre)</p>	N/A