9 Conclusion

9.1 General

In accordance with the EIA Study Brief (No. ESB-282/2014) issued under the Environmental Impact Assessment Ordinance (EIAO) for this Project, an assessment of the potential environmental impacts associated with construction and operation of the Project has been conducted. Environmental issues covered in this EIA include:

- Water Pollution (Water Quality Impact)
- Marine Ecological Impact
- Fisheries Impact
- Hazard to Life
- Noise Impact
- Waste Management Implications.

The findings of this EIA study have determined the likely nature and extent of environmental impacts and identified environmental control measures for incorporation into the planning and design of the Project to ensure compliance with environmental legislation and standards during construction and operation phases. The implementation schedule for the recommended mitigation measures are presented in **Chapter 11**.

9.2 Summary of Environmental Outcomes

9.2.1 Environmentally Friendly Options Considered and Incorporated in the Preferred Option

Alternative options were considered in the selection of the preferred option and due consideration was given to the environmental benefits and dis-benefits of different options for channel alignments, dredging methods and target dredge depths for the Channel.

The alignment options evaluation identified the existing Channel alignment as the most environmentally friendly option largely based on the reduced dredge volumes associated with the existing hydrographic profile and the limited environmental benefits that may be accrued from alternative alignments. Dredging methods available in the market were evaluated and only those that are demonstrated as feasible and environmentally acceptable with proven track records in Hong Kong and environmental credentials were proposed. The proposed Channel target dredge depth of -16.5 mPD was determined based on an assessment of dredge volumes and dredging recurrence intervals taking into account historical siltation rates to identify an optimum depth for recurrent improvement dredging. This effectively presents the most operationally efficient option which also balances frequency of environmental disturbance against dredged quantities (and associated duration of each dredging period).

In addition, the dredge quantity depends on the actual areas and depth of high spots that are formed by siltation. As each recurrent dredging event will be specifically tailored to those areas requiring dredging (based on bathymetry surveys taken before the dredging event), with rotation between selected high spot dredging and full re-profiling, the actual dredge quantities would be minimised while maintaining the target 4 to 10 year recurrence interval.

9.2.2 Environmental Designs Recommended

Dredging activities for the Project are conventional by nature while the Project involves improvement dredging of an existing navigation channel, hence environmental designs are restricted to the adoption of more environmentally friendly construction plant where applicable such as closed grab dredgers with silt curtains.

Design of the construction works areas (zones) has sought to retain flexibility for future Contractors while safeguarding the environment by applying restrictions on allowable dredging rates both within each zone (if each zone is dredged individually) and between zones (if more than one zone is dredged concurrently). This approach enables any multitude of construction scenarios / sequences to be implemented without compromising on environmental protection.

9.2.3 Estimated Population and Environmentally Sensitive Areas Protected

Sensitive areas in the vicinity of the Project have been protected through the avoidance and/or minimisation of environmental impacts due to the construction and operation of the Project. Populations protected from noise impacts due to dredging activities of the Project include village houses in Ko Long, Wang Long and Lo So Shing, Northern Lamma School, YMCA Lamma Island Youth Hostel and Concerto Inn at Hung Shing Ye. Environmentally sensitive areas protected from adverse water quality impacts include seawater intakes at Lamma Power Station and Southern Hong Kong Island, beaches at West Lamma and Cheung Chau, corals near the coastline of Lamma Island, Cheung Chau, Hei Ling Chau, Peng Chau and Southern Hong Kong Island, fish culture zones at Lo Tik Wan, Sok Kwu Wan and Cheung Chau, green turtle inter-nesting habitats and Finless Porpoise habitats along western and southern Lamma Island waters, and other ecologically important areas include the Sham Wan Site of Special Scientific Interest and the potential Marine Park at South Lamma.

9.2.4 Key Environmental Problems Avoided and Compensation Areas Included

With the recommended maximum allowable dredging rates and deployment of silt curtains (for the grab dredger option only), adverse water quality impacts at water sensitive receivers (WSRs) within the study area would be avoided. Similarly, by capping the number of construction plants working concurrently, there would be no adverse noise impacts to NSRs along western Lamma Island. Adverse noise impacts on noise sensitive receivers (NSRs) within the study area have been avoided through capping the maximum number of construction plants that may operate concurrently.

The project boundary has avoided encroaching into the indicative area of the potential Marine Park in South Lamma, despite that this potential Marine Park and its future boundaries are yet to be determined / confirmed. No environmentally sensitive areas are directly affected by the Project, and mitigation measures have been recommended to minimise any potential indirect impacts.

As the Project does not directly affect any ecologically sensitive or ecologically important areas, no compensation areas are required.

9.2.5 Environmental Benefits of Environmental Protection Measures Recommended

Key environmental protection measures recommended in the EIA and their environmental benefits include:

- Silt curtains surrounding grab dredgers which will reduce the release of suspended solids into the surrounding marine environment during dredging activities
- Avoidance of dredging activities at a particular zone during the calving season from February to April will further protect Finless Porpoise calves during this sensitive period
- Adoption of a maximum vessel speed limit of 10 knots in south and east Lamma waters will further protect Finless Porpoise from the risk and disturbance due to marine construction vessel movements
- Implementation of the recommended design, safety and operation measures for dredging near the submarine gas pipeline will minimise and control the risks associated with dredging near this sensitive submarine infrastructure
- Implementation of best practices for transport and disposal of the dredged marine sediment will minimise the potential for leakages / spillages into the marine environment

9.3 Key Assessment Assumptions and Limitations of Assessment Methodologies

A summary of key assessment assumptions, limitation of assessment methodologies and related prior agreements with relevant Government Departments is presented in **Table 9.1**.

Table 9.1: Key Assessment Assumptions, Limitations of Assessment Methodologies

Assessment Methodology	Key Assessment Assumptions	Limitations of Assessment Methodology / Assumptions	Prior Agreements with the Director or other Authorities	Proposed Alternative Assessment Tools / Assumptions (if applicable)	Justification / Supporting Documents for Alternative Assessment Tools / Assumptions (if applicable)
Water Quality Impact – Construction and Operation Phase					
Water quality impact assessment has been prepared in accordance with the EIAO-TM Annex 6 & 14 and Section 3.4.2, Appendix B, Appendix B1-1 of the EIA Study Brief. Hydrodynamic and water quality modelling is based on the validated 3-dimensional hydrodynamic model (Update Model), with local refinement for the project area. The models adopted include: ▪ Delft3D-FLOW for hydrodynamic simulations ▪ Delft3D-WAQ for sediment plume and dilution simulations To enable the findings of the water quality impact assessment to be applicable to both construction phase and operation phase recurrent dredging, a 'backwards' modelling approach is adopted, which enables the maximum dredging rates that would ensure no unacceptable environmental impacts during both construction phase and operation phase recurrent dredging to be derived.	▪ Grab dredging and dredging via TSHD will not occur concurrently ▪ While the dredging activities will be moving all the time within the Channel, the most adverse impact of the whole dredging operation can be represented by dredging at either Location A, B, C or D within each zone as shown in **Figure 3.3**, as these are the locations within each zone that is nearest to WSRs. ▪ Assumptions adopted for sediment release from concurrent projects	▪ The large coverage extent of the original Update Model makes it impractical to refine the entire grid to achieve the desired resolution within the study area, hence local refinement was adopted; ▪ Due to the large coverage area of the WSRs and model stability constraints, the model grid resolution at some WSRs will be larger than 75m x 75m, particularly those located furthest away from the project.	Methodology paper agreed with EPD, including: ▪ Model grid schematisation, validation and modelling parameters; ▪ Assessment criteria; ▪ Methodology, assumptions and calculations; and ▪ Cumulative impacts.	N/A	N/A
Marine Ecological Impact – Construction and Operation Phases					
Marine ecological impact assessment has been prepared in accordance with the EIAO-TM Annex 8: ▪ Habitat quality ▪ Size of habitat and numbers of marine organisms affected; ▪ Duration of impacts; ▪ Reversibility of impacts; and ▪ Magnitude of impacts and environmental changes. The potential direct, indirect, on-site and off-site impacts on marine ecological habitats and their associated species arising from the proposed dredging works are identified and significance of the potential impacts are evaluated using the 6 point range: "severe", "severe-moderate", "moderate", "moderate-minor", "minor" and "negligible".	A 'backwards' modelling approach is adopted, which estimates the maximum dredging rates which would ensure no unacceptable environmental impacts. Therefore, it is anticipated that will be no adverse indirect ecological impact caused by the deterioration of water quality.	The objective of the baseline study of an ecological assessment is to provide adequate and accurate ecological baseline information for ecological impact assessment. It would not be practicable or cost-effective for the baseline survey to provide exhaustive ecological information of the study site.	Methodology paper for ecological field survey to acquire ecological baseline information has been agreed with AFCD before conducting the field surveys.	N/A	N/A
Fisheries Impact – Construction and Operation Phases					
Fisheries impact assessment has been prepared in accordance with the EIAO-TM Annex 9: ▪ Size of affected area; ▪ Loss of fisheries resources / production ▪ Destruction and disturbance of nursery and spawning grounds; ▪ Impact on fishing activity; and ▪ Impact on aquaculture activity	The Project area is within the existing Lamma Power Station Navigation Channel with moderately used by ocean-going vessels that are conflict with the usage with other fishing vessels. A 'backwards' modelling approach is adopted, which estimates the maximum dredging rates which would ensure no unacceptable environmental impacts. Therefore, it is anticipated that will be no significant adverse indirect fisheries impact caused by the deterioration of water quality.	N/A	N/A	N/A	N/A
Hazard to Human Life – Construction and Operation Phases					
Relevant technical information (e.g. method statement, previous risk assessment/EIA study) have been reviewed to identify relevant hazardous scenarios. A hazard identification workshop has been organised with various stakeholders including HK Electric to identify potential hazardous scenarios, together with existing and recommended mitigation measures, associated with Grab Dredging and TSHD method near the submarine pipeline. All identified hazards have been	None	Qualitative risk approach has been adopted in the current study. This method can only allow the potential hazards being evaluated qualitatively.	Methodology Paper agreed by the Gas Authority (EMSD) of Hong Kong	None	None

Assessment Methodology	Key Assessment Assumptions	Limitations of Assessment Methodology / Assumptions	Prior Agreements with the Director or other Authorities	Proposed Alternative Assessment Tools / Assumptions (if applicable)	Justification / Supporting Documents for Alternative Assessment Tools / Assumptions (if applicable)
ranked according to the Risk Management User Manual published by the Environment Transport and Works Bureau of Hong Kong.					
Noise Impact – Construction Noise					
The noise impact assessment for the project follows Annex 5 and Annex 13 of the EIAO-TM. The assessment of construction noise impact was based on standard acoustic principles, and the guidelines given in GW-TM issued under the NCO where appropriate.	The assumption of all PME items required for a particular construction activity would be located at the notional or probable source position where the activity is to be performed was adopted when assessing the potential construction noise impact.	The prediction of construction noise impact was based on the methodology described in the GW-TM under the NCO. There would be limitations of the methodology such as the accuracy of the predictive base data for future (e.g. plant inventory for proposed construction works).	Methodology paper agreed with EPD	N/A	N/A
Waste Management Implication – Construction and Operation Phases					
Waste management impact assessment has been prepared in accordance with the EIAO-TM Annexes 7 and 15: <u>Analysis of Activities and Waste Generation</u> • Identify the quantity, quality and timing of waste arising as a result of the construction and operation activities of the Project; • Estimate the types and quantities of the wastes required to be disposed of. • Identify the disposal methods / options for each type of waste. • Identify the transportation routings and the frequency of the vessels involved. • Assess the potential impacts from the management of solid waste with respect to potential hazards, air and odour emissions, noise, wastewater discharges, ecology and public transport. <u>Dredging and Dumping</u> • Identify and quantify all dredging, dredged sediment transportation and disposal activities and requirements. • Identify potential dumping ground to be involved. • Identify appropriate field investigation, testing and categories of sediment. • Identify and evaluate the best practicable dredging methods to minimise dredging and dumping requirements.	N/A	N/A	N/A	N/A	N/A

9.4 Summary of Environmental Impacts

A summary of environmental impacts identified in this EIA is provided in **Table 9.2**.

9.4.1 Water Quality Impact

The main potential water quality impact associated with the Project is suspended solid (SS) release during construction phase dredging and operation phase recurrent dredging. A 'backwards' modelling approach has been adopted to determine the maximum allowable SS release from the dredging activities and the associated maximum allowable dredging rates for each working zone within the Project area. The results were then verified with a 'forwards' model taking into account concurrent projects. Mitigation measures have been recommended to control potential water quality impacts. With implementation of the recommended mitigation measures and provided the dredging rates for the Project are below the recommended maximum allowable dredging rates determined by the quantitative assessment, there would be no adverse water quality impacts to water sensitive receivers due to Project activities.

9.4.2 Marine Ecological Impact

The impact on marine ecology is generally minor. The Finless Porpoise was considered to be key species potentially affected both directly and indirectly by the dredging works given that the Project Area lies within its range with low density of usage, and it has moderate usage of the southwest and southern waters of Lamma. Recommended mitigation/precautionary measures including avoidance of dredging at Zone 4 of the navigation channel (except for necessary hotspot / localised dredging) during the calving season from February to April and slowing down of vessels to 10 knots in the vicinity of key Porpoise habitat areas in south and east Lamma waters can further minimise potential impact of the dredging works on this key species for both construction and operation (operation dredging) phases. In addition, with the adoption of recommended maximum allowable dredging rates, implementation of water quality mitigation measures and water quality monitoring, no residual impact on the marine environment or marine ecological sensitive receivers is expected.

9.4.3 Fisheries Impact

The potential fisheries impacts including loss of fishing ground, loss of spawning / nursery grounds for commercial fisheries resources, loss of fisheries resources and impact on fisheries operation are considered to be minor for the improvement dredging works during construction phase and operation period due to the short-term and small-scale nature of the works. A 'backwards' modelling approach has been adopted, which estimated the maximum dredging rates which would ensure no unacceptable environmental impacts. The results were then verified with a 'forwards' model taking into account concurrent projects. The modelling result proved that there would be no significant adverse indirect fisheries impact caused by the deterioration of water quality. Therefore, no unacceptable adverse indirect

fisheries impact caused by the water quality deterioration is anticipated. With the implementation of water quality control measures, no fisheries specific measure is considered necessary.

9.4.4 Hazard to Life

A Hazard Identification workshop has been organized with various stakeholders including HK Electric and EIA consultant to identify the hazards associated with the dredging works using the Grab Dredging method and TSHD method near the existing natural gas submarine pipeline. For each of the identified hazards, both existing and potential mitigation measures have been explored. The findings have been properly recorded in the worksheets.

The Hazard Analysis has evaluated the risk based on the risk acceptability defined in the ETWB Risk Management User Manual and has considered all the existing engineering measures and procedural controls in order to reduce the risks to acceptable level.

For the Grab Dredging method, a total of 30 hazards have been identified, with 13 of them being ranked in High risk level while the rest are in Medium risk level. For TSHD method, a total of 23 hazards have been identified, with 15 of them being ranked in High risk level while the rest are in Medium risk level.

Where the level of risk is initially assessed as high, additional safeguards have been recommended by the attendees during the workshop that will be effective in controlling the risk to an acceptable level. All the risk items will be subject to ongoing review and monitoring to ensure the level of risk will not increase throughout the dredging operation of the project.

9.4.5 Noise Impact

The construction noise impact assessment has been conducted based on the best available information (taking into account other concurrent projects). With the optimum quantity of construction plants, the construction noise levels at all NSRs are predicted to comply with the relevant noise criteria. Adverse construction noise impacts are therefore not anticipated in this project.

The proposed construction has been assessed on a 24 hours per day basis. As the construction noise impact levels at the representative NSR are predicted to comply with the noise criteria during restricted hours, it is considered feasible for the construction works to be undertaken during restricted hours. In case of any construction activities during restricted hours, it will be the Contractor's responsibility to ensure compliance with the NCO and the relevant TMs. The Contractor will be required to submit a CNP application and obtain a CNP from the Noise Control Authority.

Same plant inventory has been assumed for the operation dredging as that for the construction dredging in this Project, the noise levels at the representative NSR during operation dredging are expected to be no worse than during the construction phase and will comply with the construction noise criteria.

9.4.6 Waste Management Implications

The major waste types generated by the Project will be marine sediment during construction phase dredging and operation phase recurrent dredging. The marine sediment to be dredged is classified as Category L (for Type 1, Open Sea Disposal). With implementation of the recommended mitigation measures and management procedures in accordance with the requirements of PNAP ADV-21, no environmental impact is anticipated.

Chemical waste will be generated from maintenance and servicing of dredging plant and equipment as well as general refuse to be generated from the workforce. Provided that all these identified wastes are handled, transported and disposed of in strict accordance with the relevant legislative and recommended requirements and that the recommended mitigation measures are properly implemented, no adverse environmental impact is expected during the construction and operation phase.

Table 9.2: Summary of Environmental Impacts

Assessment Points	Results of Impact Predictions	Relevant Standards / Criteria	Extent of Exceedances Predicted	Impact Avoidance Measures Considered	Mitigation Measures Proposed	Residual Impacts
Water Quality Impact – Construction and Operation Phase						
WSRs within: ▪ Southern WCZ ▪ Western Buffer WCZ	▪ No exceedance of SS criteria ▪ No exceedance of sedimentation criteria ▪ No adverse water quality impact due to turbidity ▪ No adverse water quality impact due to release of contaminants from marine sediment ▪ No adverse water quality impact due to depletion of dissolved oxygen at WSRs ▪ No significant changes in hydrodynamics before and after dredging	▪ EIAO-TM Annex 6 & 14 ▪ Water Pollution Control Ordinance (WPCO) ▪ Dumping at Sea Ordinance (DASO) ▪ Southern WCZ WQO ▪ Western Buffer WCZ WQO ▪ WSD's water quality criteria for flushing water intake ▪ Sediment Deposition and SS Criteria for Corals, *"Standards and Criteria for Pollution Control in Coral Reef Areas"* ▪ European Union Environmental Quality Standards (EU EQS) ▪ The US Environmental Protection Agency (USEPA) Criteria Maximum Concentration (CMC) ▪ The USEPA Criteria Continuous Concentration (CCC) ▪ Australian and New Zealand (ANZ) guidelines for aquatic ecosystems	No exceedances predicted due to the project.	▪ Maximum allowable dredging rates specified in **Section 3.7.1.3** for each respective working zone and for the respective dredging method. ▪ Prohibiting use of lean mixture overboard (LMOB) system for TSHDs	▪ Dredging by either closed grab dredgers and/or TSHDs. The grab dredgers shall not be operating at the same time as the TSHDs. ▪ Application of the lowest maximum allowable dredging rate in total if dredging work is carried out in more than one working zone in any day. ▪ Use of cage-type silt curtains for the grab dredger options. ▪ Closed grab capacity of grab dredgers to be not less than 8 m^3 (except near the submarine pipeline). ▪ Sizing of vessels to reduce undue turbidity generated by turbulence from vessel movement or propeller wash ▪ Reducing vessel speeds to no more than 10 knots within the project site boundary ▪ Good site practices for operation of grab dredger, TSHD, barges and hoppers.	No adverse residual impacts predicted
Marine Ecological Impact – Construction and Operation Phase						
Flora, fauna and other components of the ecological habitats within: ▪ Southern WCZ ▪ Western Buffer WCZ	The key ecological impacts mainly arise during construction phase: ▪ Direct impact – Loss of subtidal soft bottom habitat and benthic communities due to dredging ▪ Indirect disturbance impact on benthic communities associated with sedimentation generated by dredging works ▪ Indirect disturbance impact on coral communities associated by water quality impacts ▪ Indirect disturbance impact on intertidal communities associated with potential perturbations in water quality ▪ Disturbance impact on Green Turtles and their inter-nesting habitat ▪ Disturbance impact on cetaceans' habitat use and other indirect impacts associated with construction vessels ▪ Impacts associated with disposal of dredged sediment	▪ Wild Animals Protection Ordinance (Cap. 170); ▪ Protection of Endangered Species of Animals and Plants Ordinance (Cap. 586); ▪ Marine Parks Ordinance (Cap. 476); ▪ Town Planning Ordinance (Cap. 131); ▪ Environmental Impact Assessment Ordinance (Cap. 499) and the Technical Memorandum on Environmental Impact Assessment Process (EIAO-TM); ▪ EIAO Guidance Notes No. 6/2010 Some Observations on Ecological Assessment from the Environmental Impact Assessment Ordinance Perspective; ▪ EIAO Guidance Notes No. 7/2010 Ecological Baseline Survey for Ecological Assessment; ▪ EIAO Guidance Note No. 11/2010 Methodologies for Marine Ecological Baseline Surveys; ▪ The Convention on Biological Diversity (1992) and the Strategic Plan for Biodiversity 2011-2020 and Aichi Biodiversity Targets;	N/A	Precautionary Measures proposed for further avoiding potential impact on Finless Porpoise: ▪ Avoid dredging for Zone 4 of the navigation channel from February to April when it is the most sensitive period for the calves, with the exception of necessary hotspot / localised dredging of up to 500,000 m^3 and being kept under the recommended maximum allowable dredging rates which would ensure no unacceptable disturbance impacts on Finless Porpoise.	Mitigation/ Precautionary Measures Proposed for further protecting Finless Porpoise: ▪ Vessel movements to disposal grounds are recommended to bypass the Finless Porpoise habitat area in southwest and east Lamma ▪ Implement a maximum speed limit of 10 knots in south and east Lamma waters ▪ All vessel operators working on the Project should be thoroughly briefed on the possible occurrence of Finless Porpoise within and in the vicinity of the Project Area and along routes to the Project Area, as well as rules for safe vessel operation around cetaceans and slowing down to 10 knots in the presence of cetaceans in south and east Lamma waters.	Residual impacts are negligible

Assessment Points	Results of Impact Predictions	Relevant Standards / Criteria	Extent of Exceedances Predicted	Impact Avoidance Measures Considered	Mitigation Measures Proposed	Residual Impacts
		▪ Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES); ▪ The IUCN Red List of Threatened Species; and ▪ Wild Animal Protection Law of the Peoples' Republic of China (PRC).				
Fisheries Impact – Construction and Operation Phase						
▪ Lo Tik Wan FCZ and associated artificial reefs (ARs) ▪ Sok Kwu Wan FCZ ▪ Cheung Sha Wan FCZ ▪ Nursery and spawning ground for fisheries ▪ Capture fisheries activities around Lamma waters	• Low impact on loss of fishing ground, fisheries resources and fishing operation	▪ EIAO-TM Annexes 9 and 17 ▪ Fisheries Protection Ordinance (Cap.171) ▪ Marine Fish Culture Ordinance (Cap. 353) ▪ Water Pollution Control Ordinance (Cap. 358)	No exceedances predicted due to the project.	▪ Maximum allowable dredging rates specified in **Section 3.7.1.3** for each respective working zone and for the respective dredging method. ▪ Prohibiting use of lean mixture overboard (LMOB) system for TSHDs	▪ Dredging by either closed grab dredgers and/or TSHDs. The grab dredgers and TSHDs shall not be operating at the same time. ▪ Application of the lowest maximum allowable dredging rate if dredging work is carried out in more than one working zone in any day. ▪ Use of cage-type silt curtains for the grab dredger options. ▪ Closed grab capacity of grab dredgers to be not less than 8 m^3 (except near the submarine pipeline). ▪ Sizing of vessels to reduce undue turbidity generated by turbulence from vessel movement or propeller wash ▪ Reducing vessel speeds to no more than 10 knots within the project site boundary	No adverse residual impacts predicted
Hazard to Human Life – Construction and Operation Phase						
Grab Dredging Method and Trailing Suction Hopper Dredging Method (TSHD) near the existing natural gas submarine pipeline	<u>For Grab Dredging method</u> A total of 30 hazards have been identified, with 13 of them being ranked in High risk level while the rest are in Medium risk level. <u>For TSHD method</u> A total of 23 hazards have been identified, with 15 of them being ranked in High risk level while the rest are in Medium risk level	Risk Management User Manual published by the Environment Transport and Works Bureau 2005	N/A	<u>General</u> 1. Rock armour with 730m long is provided along the pipeline inside the Channel. 2. Shut down the pipeline in case of a large gas release. 3. Non anchor zone will be applied. 4. Navigation lights and markers on will be provided on working vessel. 5. When the visibility is low, navigational warnings will be broadcast to advise vessels to proceed with a safe speed. 6. Typhoon moorings for all marine plant shall be arranged. 7. Marine operations terminated and marine plant sent to the designated typhoon moorings when No.3 or above typhoon signal is hoisted. 8. Mariner Notice will be sent out to notify the dredging works area. 9. Coordinate marine traffic arrangement . 10. The Contractor will be requested to comply with all local requirement for safe traveling inside Hong Kong. 11. The Engineer evaluates the marine traffic arrangement. 12. Advance notice will be sent to Contractor about the berthing and unberthing of coal vessel. 13. Any vessel occupying the navigation channel shall be removed before	<u>General</u> 1. Confirm all anchors are secured in position. 2. Avoid the working vessel traveling during berthing and unberthing of coal vessel or after sunset/low visibility. 3. Check the weather information from Marine Department. 4. Consider the preliminary coal vessel shipping plan provided by HK Electric. 5. Confirm that all large and moveable objects are secured on the dredger. 6. Use electrical appliance for cooking and smoking onboard not allowed. 7. Store dangerous goods in an explosion proof cabinet according to local requirements. 8. Check any loosen anchoring system on board regularly to avoid drifting of the working vessel. 9. Prepare a plan to cater for drifting of working vessel. 10. Provide maintenance records of the working vessel and lifting appliance and gears for dredger. 11. Request working vessel not to stay right above the pipeline unless necessary. 12. Prepare a method statement for dredging works and ensure it is followed during the operation. 13. Conduct the dredged profile	Adverse residual impact is not anticipated.

Assessment Points	Results of Impact Predictions	Relevant Standards / Criteria	Extent of Exceedances Predicted	Impact Avoidance Measures Considered	Mitigation Measures Proposed	Residual Impacts
				berthing/unberthing of coal vessels. 14. Large and moveable objects on the vessel will be secured. 15. Fire-fighting equipment are provided in the working vessel. 16. Engineer will review and inspect the fire-fighting facilities and licence of the dredger. 17. The section of pipeline rising from seabed to onshore is covered by armour rocks, not being exposed. 18. The project site boundary will be marked with flags, marker buoys and lights. 19. The project site boundary is about 100m away from the seawall where the pipeline transits from onshore to seabed. 20. Floating plant shall be maintained in a satisfactory and seaworthy condition, and shall have adequate attendance by competent seamen at all times. The plant shall be fully provided with sound and satisfactory ropes, lines and moorings and shall be fully equipped with lights. 21. Chain/echo sounding will be conducted during trial run. <u>Specific for Grab Dredging</u> 1. An anchor exclusion zone will be established. All relevant data will be input into the GPS by surveyor. 2. During anchoring, the tugboat masters will make use of the GPS on board of tug boat. 3. A radio communications network shall be provided by the Contractor 4. A competent person will be deployed in the tug boat to oversee the anchor deployment process. 5. Positions of anchor shall be monitored regularly. 6. DGPS will be mounted on top of the dredge boom and the exact location will be displayed. 7. As-built details of the pipeline will be provided. 8. The location of the pipeline will be highlighted at the dredging grid plan and all operatives on board of the dredging team will be aware of it 9. The grab will be held by using braking system in around 100mm layer by layer approaching from existing seabed to the final design level. 10. Four anchors will be deployed. 11. Dredging works performed near to the pipeline shall be performed at day time and away from the seawall. 12. Design capacity of the hopper barge will restrict over loading.	measurement and the results will be immediately reviewed by Engineer. 14. The foreman will have the knowledge about dredged profile measurement. 15. Conduct underwater survey by diver at the location of pipeline after dredging. 16. Impose a safe traveling speed and provide an indicator onshore with a good visibility in the atmosphere when the dredger travels near the seawall <u>Specific for Grab Dredging</u> 1. Provide buoys above pipeline alignment. 2. Deploy a guard boat to alert third party vessel not to travel inside the dredging works area. 3. Dredger maintains an enough separation distance from the seawall of Lamma Power Plant. 4. Check if the anchor dropping point is within the anchorage area. 5. Verify the accuracy of all GPS/DGPS system. 6. Tug boat travels at a low speed when anchor is placed on it. 7. Check if the length of anchor chain is sufficient for the non-anchor zone. 8. Deploy a guard boat to monitor the separation distance between the anchor chain and 3rd party vessel. 9. Observe tidal conditions and sea current in the works area. 10. Check the depth of the seabed and maintain the bottom of the silt curtain to be above the seabed. 11. Verify if the dredger is near the pipeline when it arrives at the project site or when it needs to be relocated. 12. The grab shall be lowered slowly to the seabed when the dredging works takes place near the pipeline. 13. Conduct a trial run for the dredging works. Establish communication network among working members in the trial run. 14. Monitor pressure fluctuation in the pipeline. 15. Use a much smaller grab for dredging works with control movement near the pipeline. 16. Review the type of grab used for the dredging works near the pipeline. 17. Confirm only the correct type of grab will be installed in the dredger. 18. Dredger master observes if there is any rock being dredged from seabed. 19. Send a diver to seabed to indicate the point where the pipeline without rock armour and provide buoys right above it. 20. Retrieve the grab back to the dredger after dredging works in each day.	

Assessment Points	Results of Impact Predictions	Relevant Standards / Criteria	Extent of Exceedances Predicted	Impact Avoidance Measures Considered	Mitigation Measures Proposed	Residual Impacts
				13. Barges shall not be filled to a level exceeding its maximum capacity. 14. The split type hopper barge will have locking device. 15. Movement of dredger will be controlled by winches after anchoring. <u>Specific for TSHD</u> 1. The TSHD will only moor outside the Channel. 2. Navigation lights and markers will be provided in the TSHD. 3. TSHD manevours away from the pipeline in case the draghead cannot be retrieved back. 4. The dredging path will be in parallel with the pipeline alignment. 5. Electronic sensors will be installed in the dragheads and locking device will be provided in hopper. 6. TSHD is equipped with compensator.	21. Use GPS to ensure the dredger is not carried away by sea current. 22. Monitor the draught of barge. 23. Retrieve all anchors before the vessel travels to non-anchor zone. 24. Hopper barge not to stay near the pipeline. <u>Specific for TSHD</u> 1. The working vessel leaves the Channel in case of fire and not to stay near the pipeline. 2. The dredging path avoids potential infringement to nearby structure. 3. Provide maintenance record for the dredger and the compensator. 4. Prepare a plan to minimize the impact to the pipeline due to failure of suction pipe gantries system or draghead is stuck with rock armour or the seabed. 5. Provide the Contractor the details of the pipeline. 6. TSHD travels in a slow speed and not to lower suction pipe when the dredging works is near the pipeline. 7. Confirm the operability of the compensator by visual check. 8. Remind the dredger master to observe if liquid flow is reduced by clogging of suction pipe.	
Noise Impact – Construction Noise						
The first layer of houses / school of each village located close to the site boundary have been selected as assessment points.	▪ With the optimum quantity of construction plants, the construction noise levels at all NSRs are predicted to comply with the relevant noise criteria. Adverse construction noise impacts are therefore not anticipated in this project	▪ Noise Control Ordinance; ▪ EIAO-TM; relevant Guidance Notes under EIAO; and ▪ Technical Memorandum on Noise from Construction Work other than Percussive Piling.	N/A	▪ The quantity of construction plant not more than the optimum quantity as specified in **Section 7.6**.	N/A	No adverse residual impacts would be anticipated.
Waste Management Implication – Construction and Operation Phase						
Project area	▪ The total volume of dredged sediment requiring marine disposal is estimated to be up to 3.2 million m^3 during construction phase. During operation phase, with recurrent dredging of localised high spots once every 4 years or so (with estimated dredging quantity up to 0.9 million m^3 each time), full re-profiling of the Channel with a dredging quantity of up to 2.9 million m^3 can be delayed to approx. once every 10+ years. Marine sediment to be dredged is classified as Category L (for Type 1, Open Sea Disposal) ▪ Small quantity of chemical waste from maintenance and servicing of dredgers ▪ General refuse of maximum daily arising of approximately 300 kg from construction	▪ Annexes 7 and 15 of EIAO-TM ▪ Waste Disposal Ordinance (Cap. 354); ▪ Waste Disposal (Chemical Waste) (General) Regulation (Cap. 354C); ▪ Dumping at Sea Ordinance (DASO) (Cap. 466); and ▪ Public Cleansing and Prevention of Nuisances Regulation (Cap. 132BK).	N/A	N/A	▪ Distance between the barge and the dredging point should be shortened as far as possible to avoid dropping of sediment from the close grab to seawater; ▪ During transportation and disposal of the dredged marine sediments, mitigation measures should be taken to minimise potential impacts; ▪ Handling of chemical wastes in accordance with the Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes, and disposal of chemical wastes at licensed chemical waste recycling/ treatment facilities; and ▪ General refuse should be stored in enclosed bins or compaction units and delivered to the refuse collection point accordingly.	No adverse residual impacts would be anticipated.

Assessment Points	Results of Impact Predictions	Relevant Standards / Criteria	Extent of Exceedances Predicted	Impact Avoidance Measures Considered	Mitigation Measures Proposed	Residual Impacts
	workforce					