

Contents

	Page
9 Fisheries	1
9.1 Legislation, Standards and Guidelines	1
9.2 Methodology for Baseline Establishment and Impact Assessment	2
9.3 Fisheries Baseline Conditions	4
9.4 Impact Identification and Evaluation	7
9.5 Cumulative Impacts	9
9.6 Mitigation Measures	9
9.7 Environmental Monitoring and Audit Requirement	9
9.8 Residual Impacts	9
9.9 Conclusion	10
9.10 Reference	10

Figures

<u>Figure 9.1</u>	Sites of Fisheries Importance
<u>Figure 9.2</u>	Location of Home Ports of Local Fishing Vessels (Source: AFCD Port Survey 2016/2017)
<u>Figure 9.3</u>	Distribution of Fishing Operations – Overall (Source: AFCD Port Survey 2016/2017)
<u>Figure 9.4</u>	Distribution of Fishing Operations – Sampan (Source: AFCD Port Survey 2016/2017)
<u>Figure 9.5</u>	Distribution of Fishing Operations – Other Types of Fishing Vessels (Source: AFCD Port Survey 2016/2017)
<u>Figure 9.6</u>	Distribution of Fisheries Production – Overall (Source: AFCD Port Survey 2016/2017)
<u>Figure 9.7</u>	Distribution of Fisheries Production – Sampan (Source: AFCD Port Survey 2016/2017)
<u>Figure 9.8</u>	Distribution of Fisheries Production – Other Types of Fishing Vessels (Source: AFCD Port Survey 2016/2017)
<u>Figure 9.9</u>	Fisheries Sampling Locations of Tung Chung New Town Extension EIA

9 Fisheries

9.1 Legislation, Standards and Guidelines

9.1.1.1 The local relevant regulations, legislation and guidelines for the assessment of fisheries impacts include the following:

- Environmental Impact Assessment Ordinance (EIAO) (Cap. 499) and the associated Technical Memorandum (EIAO-TM);
- Fisheries Protection Ordinance (Cap. 171) and its subsidiary legislation, the Fisheries Protection Regulations;
- Marine Fish Culture Ordinance (Cap. 353) and its subsidiary legislation;
- Marine Parks Ordinance (Cap. 476); and
- Water Pollution Control Ordinance (Cap. 358) and its subsidiary regulations and statements.

9.1.1.2 Annex 17 of the EIAO-TM sets out the general approach and methodology for assessments of fisheries impacts arising from a project or proposal, to allow a complete and objective identification, prediction and evaluation of the potential fisheries impacts. Annex 9 recommends the criteria that can be used for evaluating fisheries impacts.

9.1.1.3 Destructive fishing practices such as the use of explosive, toxic substances, electricity, dredging, suction and trawling devices for the purpose of fishing are detrimental to fisheries and the marine ecosystem are prohibited under the Fisheries Protection Ordinance (Cap 171).

9.1.1.4 Marine fish culture is protected and regulated by the Marine Fish Culture Ordinance (Cap. 353) which requires all marine fish culture activities to operate under licences in designated fish culture zones.

9.1.1.5 Under the Marine Parks Ordinance (Cap. 476), fishing activities, including commercial fishing, inside marine parks are restricted, and could only be conducted with a permit issued by the Authority.

9.1.1.6 Water Pollution Control Ordinance (Cap. 358) aims to control water pollution in the waters of Hong Kong. According to the Ordinance and its subsidiary legislation, Hong Kong waters are divided into ten water control zones (WCZ). Water control zones are designated with individual water quality objectives to promote the conservation and best use of those waters in the public interest. Corresponding statements of Water Quality Objectives (WQO) are stipulated for different water regimes (marine waters, inland waters, bathing beaches subzones, secondary contact recreation subzones and fish culture subzones) in each of the WCZ.

9.2 Methodology for Baseline Establishment and Impact Assessment

9.2.1 Methodology for Baseline Establishment

9.2.1.1 Existing information about the fisheries baseline conditions within the assessment area was reviewed. The relevant literature reviewed includes previous EIA studies, research studies, consultancy studies, and data from the Agriculture, Fisheries and Conservation Department (AFCD). The review, with the focus primarily on the Project and secondarily on the assessment area, aimed to collect fisheries data, establish the fisheries baseline conditions and identify practices, areas and species of potential fisheries importance which may be affected by the Project for incorporation into the assessment.

9.2.1.2 This review has included the followings:

- Port Survey 2016/17;
- AFCD latest Annual Report and website; and
- Other relevant reports from government and private sectors

9.2.1.3 Port Survey is a comprehensive survey conducted by AFCD from time to time to collect data on fisheries production and fishing operations in Hong Kong waters. The Hong Kong's waters are put into uniform-sized grids of 720ha each and the information related to fisheries (e.g. production, vessel number) for each grid is presented.

9.2.1.4 The latest Port Survey was carried out from 2016 to 2017 and is commonly referred to as Port Survey 2016/17. The results of Port Survey 2016/17 are available on the AFCD website. The fisheries activities and resources within the assessment area of this Project were evaluated based upon the information from Port Survey 2016/17.

9.2.1.5 AFCD's latest Annual Report and website provide the most updated information on the development and trend in Hong Kong fisheries. The latest annual fisheries production is also provided.

9.2.1.6 Other fisheries studies relevant to this Fisheries Impact Assessment (FIA) include:

- Fisheries Resources and Fishing Operations in Hong Kong Waters (ERM 1998);
- Consultancy Study on Fisheries and Marine Ecological Criteria for Impact Assessment (CCPC 2001);
- Survey of Juvenile Fish Resources at the Three Marine Parks at Northeast Hong Kong (Leung *et al.* 2014); and
- Hong Kong Fisheries Resources Monitoring Report (SCSFRI 2017).

9.2.1.7 The validity of the information compiled during the literature review was assessed before it is adopted into the present FIA study.

9.2.2 Methodology for Impact Assessment

Assessment area

9.2.2.1 According to Clause 3.4.10.2 of the EIA Study Brief, the assessment area of FIA shall be the same as the assessment area for Water Quality Impact Assessment, which shall include areas within 500m from the boundary of the Project and shall cover the North Western WCZ and water sensitive receivers in the vicinity of the Project, including the Tung Chung Bay, estuary of Tung Chung Stream, Wong Lung Hang Stream, Ma Wan Chung bay area, the Brothers Marine Park and Tai Ho Wan Inlet.

Identification of fisheries sensitive receivers

9.2.2.2 Fisheries Sensitive Receivers (FSRs) are defined in this FIA as resources or sites of fisheries importance and potentially be affected directly or indirectly by the Project.

Impact identification and assessment

9.2.2.3 Impacts in the absence of mitigation were assessed. The construction and operational phase impacts on capture fisheries and culture fisheries activities were also assessed individually, then cumulatively, in combination with other existing, committed, and proposed developments.

9.2.2.4 The FIA followed the criteria and guidelines for evaluating and assessing fisheries impact as stated in Annexes 9 and 17 of the EIAO-TM.

9.2.2.5 The assessment covered potential impact on both capture and culture fisheries during the construction and operational phases of the Project, and in combination with any cumulative impacts caused by projects implemented concurrently with or prior to the Project. The assessment covered:

- Description of the physical environment;
- Description and quantification of the existing fisheries activities (e.g. capture fisheries, aquaculture, shellfish farming, collection, etc.);
- Description and quantification as far as possible of the existing fisheries resources (e.g. major fisheries products and stocks, etc.);
- Identification of parameters (e.g. water quality parameters) and areas (e.g. breeding/spawning grounds, nursery grounds, reefs) that are important to fisheries;
- Identification and quantification as far as possible of any direct/indirect, on-site/off-site impacts on fisheries (e.g. water quality deterioration of fishing grounds/fish culture zones caused by the Project);

- Evaluation of cumulative impacts on fisheries due to other planned and committed concurrent development projects at or near the assessment area;
- Proposals of practicable mitigation measures with details on justification, description of and programme feasibility as well as staff and financial implications including those related to subsequent management and maintenance requirements of the measures; and
- Review of the need of monitoring during the construction and operational stages of the Project and, if necessary, proposals for a monitoring and audit programme.

Assessment criteria

9.2.2.6 The significance of fisheries impacts was evaluated primarily based on the criteria set forth in Annex 9 of the EIAO-TM, including:

- Nature of impact;
- 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.

9.3 Fisheries Baseline Conditions

9.3.1 Capture Fisheries

9.3.1.1 In 2020, the capture fisheries industry produced an estimated 116,000 tonnes of fisheries, valued at about \$2.7 billion (AFCD, 2021). This industry is operated by approximately 10,100 local fishermen with 5,030 fishing vessels. Fishing activities area mainly conducted in the waters of the adjacent continental shelf in the South China Sea. Main fishing methods include trawling, long-lining, gill-netting and purse-seining with the majority of the total catch obtained through trawling. Trawling landed the majority of the catch in Hong Kong waters prior to 31 December 2012, after which a ban on trawling was implemented with the intensions of protecting marine resources and ecosystem so that damaged seabed and depleted marine resources can rehabilitate. Some recent data on local capture fisheries industry are summarised in the table below.

Table 9.1 Recent figures of Hong Kong capture fisheries industry

Parameter	2012	2013	2014	2015	2016	2017	2018	2019	2020
No. of vessels	4,000	4,000	4,500	5,050	5,160	5,150	5,050	5,030	5,040
No. of local fisherman engaged in capture fisheries	8,800	8,800	9,400	10,500	10,800	10,600	10,200	10,100	10,150
Production (tonnes)	155,230	170,129	160,789	145,193	142,775	127,554	124,000	123,000	116,000

Source: AFCD Departmental Annual Reports

9.3.1.2 The location of home ports of local fishing vessels is shown in **Figure 9.2**. According to Port Survey 2016/17 by AFCD, Tung Chung Bay, the channel between north Lantau coast and the Airport Island, and the area around the existing TCE reclamation site were supporting moderate number of vessels i.e. >200 – 600 nos. dominated by sampans (**Figure 9.3 – 9.5** refer). Other types of fishing vessels were scarce i.e. <50 nos. within the assessment area (**Figure 9.5** refers).

9.3.1.3 In terms of fisheries production by weight per hectare of area, the fisheries production within Tung Chung Bay was low i.e. >50 – 100 kg/ha (**Figure 9.6 – 9.8** refer) while the production was moderate in the Brothers Marine Park i.e. >100 – 200 kg/ha (**Figure 9.6** refers).

9.3.1.4 According to South China Sea Fisheries Research Institute (SCSFRI, 2017), the main commercial families of fisheries resources in North-Western waters of Hong Kong are penaeid shrimps (Penaeidae), croaker (Sciaenidae), flatheads (Platycephalidae), crabs (Portunidae), shad (Clupeidae), ponyfishes (Leiognathidae), tonguefish (Cynoglossidae), mantis shrimps (Squillae), threadfins (Polynemidae) and lizardfishes (Synodontidae).

9.3.1.5 According to TCNTE EIA (CEDD, 2016), a fisheries verification survey by gill netting and caging had been conducted in 2013 in Sha Lo Wan, Hau Hok Wan, Tung Chung West, Tung Chung East, Tai Ho and Sham Shui Kok which were largely overlap with the current Assessment Area (**Figure 9.9** refers). This was a relatively recent fisheries baseline for the current Assessment Area. A total weight of 16.5 kg samples was collected from the survey covering dry and wet seasons. Among the 40 species (257 nos. of individuals in total) collected, 30 species of fish and 10 species of crustaceans were collected. Most of the species collected were of low commercial value (e.g. *Acentrogobius caninus*, *Gerres* sp., *Johnius belangerii* etc.) to no commercial value (e.g. *Takifugu* spp., *Charybdis* spp. and *Macrophthalmus* sp. etc.) The results of the verification survey showed that the catches were of low abundance and low biomass.

9.3.2 Spawning/Nursery Grounds and Artificial Reefs

Embayment serving as spawning ground

9.3.2.1 Embayment, especially those with mangroves and intertidal mudflats are considered as important spawning grounds for marine fauna, including commercially valuable species (ERM, 1998). There are several such embayment along the north Lantau shore including Tai Ho, Tung Chung Bay, Hau Hok Wan, Sha Lo Wan and Sham Wat. Tung Chung Bay and Tai Ho are being the two nearest to the Project Site. Tung Chung Bay is located adjacent to the Project Site in Ma Wan Chung. Tai Ho is also about 100m from the nearest works area (**Figure 9.1** refers).

Artificial reefs (existing and to be deployed)

9.3.2.2 Artificial reefs are deployed as a fisheries resource enhancement measure and/or conservation measure for marine mammal. Therefore, artificial reefs are considered as fisheries sensitive receivers. Existing artificial reefs include the northeast corner of the Airport Island within Marine Exclusion Zone 3 and Sha Chau and Lung Kwu Chau Marine Park (SCLKCMP). The government had also committed to deploy a number of artificial reefs in the Brothers Marine Park. The extent is described in a notice published in the Government Gazette in June 2018. The proposed artificial reefs are about 3.5 km to the northeast of the nearest Project Site.

Spawning ground for fisheries species

9.3.2.3 The North Lantau waters between the Brothers and Lung Kwu Chau were identified as important spawning grounds of fish and shrimp during a fisheries study in Hong Kong (ERM, 1998), which consist of spawning individuals of high commercial value (e.g. *Lateolabrax japonicus*, *Metapenaeus affinis* and *Oratosquilla oratoria*) (*ibid*). The shortest separation distance of the spawning area is around 2.8 km from the Project Site (**Figure 9.1** refers). Major species included Pony fish *Leiognathus brevis*, Sea bass *Lateolabrax japonicus*, and Gizzard shad *Clupanodon punctatus*.

The Brothers Marine Park

9.3.2.4 The nearest works site to the boundary of the Brothers Marine Park is about 1.4 km (**Figure 9.1** refers). Designated in December 2016, the Brothers Marine Park aims to help better conserve the Chinese White Dolphin (CWD), their habitats and enhance the marine and fisheries resources therein. It is the second marine park in Hong Kong with the implementation of the management concept of “Core Area” after the Tung Ping Chau Marine Park. A Core Area of about 80 ha is demarcated to provide protection to the prey sources of the CWD and the fisheries resources. Fishing activities are prohibited within the Core Area. The Core Area is enclosing the East Brother island (Siu Mo To).

9.3.3 Culture Fisheries

Ma Wan Fish Culture Zone (FCZ)

9.3.3.1 Marine fish culture is protected and regulated by the Marine Fish Culture Ordinance (Cap. 353) which requires all marine fish culture activity to operate under licence in designated fish culture zones. The nearest fish culture zone is located in Ma Wan which is about 10.7km from the nearest works site (**Figure 9.1** refers).

9.3.3.2 In 2020, production from the aquaculture sector was 3,322 tonnes valued at \$127 million which was 3% in weight and 4% in value of the total fisheries production.

For marine fish culture, the estimated production in 2020 was about 687 tonnes valued at \$52 million. There are currently 26 fish culture zones occupying a total sea area of 209 ha with some 925 licensed operators in Hong Kong. There is no pond fish culture nor oyster culture activities identified within the assessment area. The nearest aquaculture activity is located at Ma Wan Fish Culture Zone which is about 10.7 km to the northeast of the nearest Project Site.

Table 9.2 Recent figures of Hong Kong marine fish culture industry

Parameter	2012	2013	2014	2015	2016	2017	2018	2019	2020
No. of licensed operator	1,008	987	968	969	949	938	931	923	925
Production (tonnes)	1,299	1,005	1,255	1,219	1,031	1,004	850	889	687

Source: AFCD Departmental Annual Reports

9.3.4 Need for Field Survey

9.3.4.1 The baseline fisheries data are obtained from AFCD Port Survey 2016/17, TCNTE EIA Study, AFCD latest annual reports and other relevant reports from government and private sectors. Sufficient information within the assessment area are acquired from literature review. Therefore, fisheries survey is considered not necessary.

9.4 Impact Identification and Evaluation

9.4.1.1 As no marine works nor marine dredging would be involved, no direct impact to existing fisheries resource and fishing operation is anticipated. The Project would be underground tunnel passing underneath Ma Wan Chung coast from the existing Tung Chung Station (TUC) to the proposed new station to the west of Yat Tung Estate. The realignment of Tung Chung Line (TCL) in Tung Chung East (TCE) would also be land-based work largely confined in existing railway sections. The potential fisheries impact would be limited to indirect impacts associated with water quality.

9.4.2 Construction Phase – Indirect Impacts

Site runoff and sources of water pollutants from construction sites

9.4.2.1 No marine works nor dredging would be involved in the current Project. The possible fisheries impact would be limited to indirect water quality impacts to fisheries resources due to site runoff. Fishing operations would not be affected. Due to close proximity of the construction works in the proposed Tung Chung West (TCW) Station to the coastal area and Tung Chung Bay, site runoff entering into the Bay might increase the suspended solid level and might bring potential pollutants including oil, grease, grout, solid waste, etc. into the Tung Chung Bay and deteriorate the water quality, hence affecting the habitat quality of the spawning and nursery ground of fisheries resources. During the wet season, heavy rain episodes would be a challenge to the capacity and drainage ability of the

construction site, if the rain water could not be diverted/absorbed properly during heavy rain, the overflow will likely wash away large amount of soil and/or fill from exposed earth into the Bay and indirectly affect the fisheries resources in Tung Chung Bay. The site drainage system especially at the cut and cover station box works site of TCW would need to be able to withstand such episodes. The design of the construction site drainage would take the Best Management Practices (BMPs) of mitigation measures in controlling water pollution and good site management, as specified in the Professional Persons Environmental Consultative Committee (ProPECC) Practice Note (PN) 1/94 “Construction Site Drainage”. Measures including sheet pile/hoarding with concrete footing, surface channels, sedimentation tanks etc. would be employed to minimise water quality issues. Sufficient chemical toilets would also be provided for workers and site staff. Together with measures as stated in Section 5 – Water Quality Impact Assessment in place, the potential impact is considered to be low. Therefore, there would not be significant potential water quality impact during the construction phase to the identified fisheries resources including the several embayment serving as spawning ground (i.e., Tai Ho, Tung Chung Bay, Hau Hok Wan, Sha Lo Wan and Sham Wat), existing and to-be-deployed artificial reefs, Ma Wan FCZ, the recognised spawning ground for fisheries species and the Brothers Marine Park.

Potential pollution from marine vessels during transporting C&D Material

9.4.2.2

The transfer of C&D material from the proposed barging point to the marine vessels might have potential leakage of fill. The transportation of the fill by marine route might also have a risk of leakage. Though such impact is considered to be minor since there would be standard measures to minimise the risk. As stated in Chapter 5 – Water Quality Impact Assessment, to minimise the potential water quality impact due to transportation of fill using the barging point, good site practices below would be strictly followed:

- All vessels should be sized so that adequate clearance is maintained between vessels and the seabed in all tide conditions, to ensure that undue turbidity is not generated by turbulence from vessel movement or propeller wash as far as possible;
- Loading of barges and hoppers should be controlled to prevent splashing of material into the surrounding water. Barges or hoppers should not be filled to a level that will cause the overflow of materials or polluted water during loading or transportation; and

9.4.2.3

Thus, without further specific mitigation measure(s), the level of fisheries impact is low. No significant impact on fisheries is anticipated.

Alteration of ground water level

9.4.2.4

Alteration of ground water level might have indirect water quality impact to fisheries resources e.g. the embayment serving as spawning ground in Tung Chung

Bay. However, the proposed TBM tunnel passing underneath Ma Wa Chung coast would be quickly balanced by the surrounding water, any change of groundwater level caused by the Project would be insignificant and hence significant change in underground hydrology, flow regime, etc. are not anticipated. As stated in Section 5, groundwater monitoring wells would be installed as a precautionary measure at the area closed to TBM and other potential underground works. The potential impact to fisheries resources would be low.

9.4.3 Operational Phase – Indirect Impact

9.4.3.1 Sewage and surface runoff would be collected by sewage and drainage systems. Pollution to the marine environment is not anticipated. Operational phase indirect impact to fisheries is negligible.

9.5 Cumulative Impacts

9.5.1.1 This section examines the possible interactions between the environmental impacts of the Project and those of other developments whose construction or operation phases would overlap with the Project, thereby resulting in cumulative impacts whose synergistic effects would exceed in severity those of the various projects taken individually, and would likely to be wider in scope.

9.5.1.2 Since marine works is not required for the current Project, cumulative direct impact on fisheries resources and fisheries operation contributed by the Project is not anticipated. Potential cumulative impact on fisheries would be possible in the form of indirect water quality impacts due to the Project and other concurrent projects. As stated in Section 5, no significant cumulative water quality impact is anticipated and hence no cumulative indirect impact on fisheries is expected.

9.6 Mitigation Measures

9.6.1.1 No specific fisheries mitigation measures are required.

9.7 Environmental Monitoring and Audit Requirement

9.7.1.1 No specific fisheries monitoring, and audit programme is required.

9.8 Residual Impacts

9.8.1.1 The proper implementation of measures related to water quality as stated in **Section 5**, no adverse residual impact on fisheries is anticipated during the construction phase. With proper connection to the public drainage and sewage systems, adverse residual impact is not anticipated during the operational phase of the Project.

9.9 Conclusion

9.9.1.1 No marine works nor marine dredging would be involved in the Project. The Project would be an underground tunnel passing underneath the Ma Wan Chung coast from the existing TUC to the proposed new station to the west of Yat Tung Estate. The TCL realignment works at Tung Chung East would also be land-based. No direct impact on fisheries is anticipated. Potential fisheries impact would be indirect water quality impact which would be controlled by construction site best practices. No adverse fisheries impact is expected in both construction and operational phase.

9.10 Reference

AFCD 2021. *Overview*. [online] Available at:
https://www.afcd.gov.hk/english/fisheries/fish_cap/fish_cap_latest/fish_cap_latest.html#:~:text=In%202020%2C%20the%20fishing%20industry,about%2010%20150%20local%20fishermen.

AFCD 2018. Port Survey 2016/17. Agriculture, Fisheries and Conservation Department, HKSAR Government.

CCPC 2001. Agreement No. CE 62/98 – Consultancy Study on Fisheries and Marine Ecological Criteria for Impact Assessment. Prepared for Agriculture, Fisheries and Conservation Department, HKSAR Government.

ERM 1998. Fisheries Resources and Fishing Operations in Hong Kong Waters.

Leung, P.T.Y. Mak, S, Ip, J., Yau, C., Lai, V. and Leung, K.M.Y. 2014. Survey of Juvenile Fish Resources at the Three Marine Parks at Northeast Hong Kong. Prepared for Agriculture, Fisheries and Conservation Department, HKSAR Government.

SCSFRI 2017. Hong Kong Fisheries Resources Monitoring Report.

South China Sea Fisheries Research Institute (SCSFRI) 2017. Hong Kong Fisheries Resources Monitoring Report (2010-2015). Prepared for Agriculture, Fisheries and Conservation Department, HKSAR Government.