14 FISHERIES IMPACT ASSESSMENT

14.1 Introduction

This section presents the Fisheries Impact Assessment for the development of the proposed NDAs at Kwu Tung North (KTN) and Fanling North (FLN). The assessment area for fisheries activity included all areas within the Project Area boundary as well as any fisheries within 500m of the Project Area and any other areas likely to be affected by the project.

There are no known capture fisheries within the assessment area. As such, this section only covers culture fisheries, with special attention given to the potential impacts on the fishing and aquaculture activities at Kwu Tung North and Fanling North, and the loss of fish ponds.

14.2 Environmental Legislation, Policies, Plans, Standards and Guidelines

The following legislation and guidance notes are applicable to the evaluation of fisheries impact related to the Project:

- Environmental Impact Assessment Ordinance (Cap. 499); and
- Technical Memorandum on Environmental Impact Assessment Process (TM-EIAO), Annexes 9 and 17."

14.3 Methodology

A literature review was conducted to assess the baseline status of pond fish culture activity within the Assessment Area with respect to the fisheries activity of Hong Kong as a whole. Literature and websites reviewed include:

- AFCD annual reports (1997 – 2011/12);
- AFCD website (http://www.afcd.gov.hk/english/fisheries/fish_aqu/fish_aqu.html);
- AFCD Accredited Fish Farm Scheme Website

  (http://www.hkaffs.org/en/index.html)
- EPD website (http://www.epd.gov.hk/epd/misc/ehk08/index.html);
- Hong Kong Bird Watching Society website (http://www.hkbws.org.hk);
- HyD. 2004. Improvements to San Tin Interchange. EIA report submitted to the EPD;
- KCRC. 2002. EIA report for Sheung Shui to Lok Ma Chau Spur Line. EIA report submitted to the EPD;
- Mutual Luck Investment Limited. 2008. Proposed Development at Fung Lok Wai, Yuen Long at Lot 1457 R.P. in D.D.123. EIA report submitted to the EPD; and

- Profit Point Enterprises Limited. 2008. Proposed Comprehensive Development at Wo Shang Wai, Yuen Long. EIA report submitted to the EPD.

In addition to desktop survey, site visits were undertaken in November 2008 and March/April 2009 to investigate the actual status of fisheries within the assessment area. Observations during these site visits were supplemented with any observations of fisheries-related activity during other field surveys. Photo records of site visits are shown in **Appendix 14.1**. In addition, due to the long duration of the study, update visits were undertaken in March 2013 to verify current pond conditions. Additional data supplied by Hong Kong Birdwatching Society (*in litt* April 2013) has been incorporated to reflect the status of ponds in Long Valley and Ho Sheung Heung, particularly those shallow ponds managed for wildlife. The actual pond status was then further updated based on regular information obtained from AFCD.

Based upon observations during the site visits, ponds within the Assessment Area were categorized as follows:

- **Active:** currently utilised for commercial aquaculture activities; this category includes commercial fish ponds, fish fry ponds and water flea ponds;
- **Inactive:** no current commercial aquaculture activities, but no major physical constraints to the resumption of such activity in the short-term; this includes ponds with fish present in non-commercial quantities and ponds used for casual sport fishing or for water sports;
- **Abandoned:** ponds in which there is physical evidence that aquaculture has not taken place for many years (typically ponds overgrown with vegetation) and/or where there are obvious physical constraints to the resumption of fisheries activity (for example, ponds that are fenced off and thus inaccessible); concreted ornamental ponds are also included in this category.

During the site visits, local villagers, fish farmers and pond owners were interviewed to obtain information about fisheries activity in the area. A committee member of the Hong Kong New Territories Fish Culture Association (HKNTFCA) was also interviewed to obtain further information on local pond fisheries. The Hong Kong Bird Watching Society (HKBWS) was also contacted to obtain information regarding fisheries activity at Long Valley (within the Kwu Tung North NDA); some fisheries in this area are managed by HKBWS and the Conservancy Association (CA), with the co-operation of landowners and local farmers, under a management agreement funded by the Environment and Conservation Fund (ECF) as part of the New Nature Conservation Policy.

Several former meanders of the Sheung Yue River (KTN NDA) and Ng Tung River (KTN/FLN NDAs) were isolated during channelisation of these rivers and are currently managed by AFCD as mitigation for the ecological impacts of channelisation. Although the resulting wetlands superficially resemble ponds, these were not included as part of the assessment because the primary intention of these sites is for wildlife conservation purposes, and these areas have not previously been used for aquaculture activity.

14.4 Baseline Conditions – Review of Existing Information

Pond fish culture has been centred in the northwestern New Territories for a long period of time. Traditionally, primarily freshwater fish and several brackish species, such as Bighead Carp *Aristichthys nobilis*, Edible Goldfish *Carassius auratus*, Grass Carp *Ctenopharyngodon idellus*, Mud Carp *Cirrhinus chinensis*, Flathead Mullet and Nile Tilapia *Oreochromis niloticus*, are farmed. However, in recent years, certain high-value marine species such as Giant Grouper *Epinephelus lanceolatus*, Yellowfin Seabream *Acanthopagrus latus* and Spotted Scat *Scatophagus argus* have also been cultured in diluted seawater by fish farms close to the coast (e.g. at Mai Po). Most ponds in Hong Kong practice polyculture of carp, tilapia and/or grey mullet.

In order to help local fish farms to develop, AFCD has introduced new aquaculture species (i.e. Jade Perch *Scortum barcoo*) to Hong Kong, and also launched the "Accredited Fish Farm Scheme" (AFFS). Under this scheme, products from registered fish farms are "accredited" by AFCD, and can be marketed under the unique brand name of the scheme. The department believes that this scheme can make local aquaculture products "stand out by branding". Fish farms registered under the scheme will be inspected by AFCD officers bimonthly, checking on the farm hygiene conditions, the maintenance of management records, water quality and fish health conditions. A series of advisory leaflets and guidelines on aquaculture management, including "Good Aquaculture Practices Series 3 – Environmental Management on Pond Fish Culture" and "Good Aquaculture Practices Series 5 – Fry Health Management" have been published by Aquaculture Fisheries Division of AFCD. These publications provide guidelines on physical requirements for establishment of fish pond farms, drainage requirements, water quality, and a list of good fish pond culture practices for pond fisheries and fry management.

Several fish farms have started to culture new species and AFCD has carried out much promotional work; according to the data extracted from AFCD's website and AFCD's annual reports, the production of pond fish in Hong Kong has stabilised in recent years. Annual pond fish production and fish pond area in the territory are listed in the **Table 14.1**.

Table 14.1 Annual pond fish production and fish pond area

Year	Pond Fish Production (tonne)	Fish Pond Area (ha)	Overall Pond Fish Production Rate (kg/ha/year)
1997	5000	1125	4444
1998	4900	1110	4414
1999	4500	1094	4113
2000	2817	1060	2657
2001	2550	1059	2407
2002	1989	1030	1931
2003	2114	1029	2054
2004	1977	1026	1927
2005	1897	1026	1849
2006	1943	1024	1897
2007	1927	1160	1661
2008	2266	1160	1953
2009	2105	1160	1814
2010	2190	1109	1975

Year	Pond Fish Production (tonne)	Fish Pond Area (ha)	Overall Pond Fish Production Rate (kg/ha/year)
2011	2315	1130	2049

According to information from AFCD, local pond fish production accounted for approximately only 5% of local freshwater fish consumption in 2011. Most freshwater fish consumed in the territory are imported from the Mainland.

There are no capture fisheries known within the assessment area, and no assessment of impact is carried out. Capture fisheries have not been covered in previous EIA Reports for the area such as those for Improvements to San Tin Interchange (HyD 2004) or the EIA Report for Sheung Shui to LMC Spur Line (KCRC 2002).

14.5 Baseline Conditions – Site Investigation

The two NDAs lie outside the core area for fish production in the north-west New Territories. Some active fish ponds are present in KTN NDA. None of these have joined the AFFS managed by AFCD. The findings of the baseline fish pond surveys are presented in **Figures 14.1** to **14.2.**

14.5.1 Kwu Tung North

Figure 14.1 presents the current status of fish ponds in Kwu Tung North. Three main areas of ponds are present in KTN NDA: near Fung Kong (next to Ma Tso Lung Road), near Ho Sheung Heung and at Long Valley.

Re-profiling of the ponds near Fung Kong (Pond No. 3) was being carried out at the time of the initial site visit (Plate 1 of **Appendix 14.1**) and apparatus related to pond fish culture was also observed (Plate 2 of **Appendix 14.1**), indicating that these ponds were currently actively managed for fish culture. In the course of the update visit in April 2012 it was confirmed that the ponds at Fung Kong continued to be used for fish culture purposes.

According to a Hong Kong New Territories Fish Culture Association (HKNTFCA) committee member interviewed in March 2009, these ponds are owned by a major fish fry supplier and are used for acclimatising imported fish fry (mainly from Mainland China) to local water conditions. Fish species provided by this supplier include Bighead Carp *Aristichthys nobilis*, Common Carp *Cyprinus carpio*, Edible Goldfish *Carassius auratus*, Grass Carp *Ctenopharyngodon idellus*, Mud Carp *Cirrhinus chinensis*, Silver Carp *Hypopthalmichthys molitrix* and White Bream *Parabramis pekinensis*. All are common aquaculture species.

Ponds at Ho Sheung Heung (Area 7b) were a mixture of active, inactive or abandoned. The pond owner reported that these ponds were used for polyculture, including cultivation of Bighead Carp, Common Carp, Edible Goldfish, Grass Carp, Mud Carp and Nile Tilapia. The main feed for the cultured fish was bread unfit for sale and residues from local food factories. Such practices are typical of traditional methods of fish production in Hong Kong.

Two ponds at Ho Sheung Heung have been transformed into recreational ponds for casual sport fishing and water sports. These are unlikely to be commercially active in the production of edible fishes, and no evidence of such activity was recorded. At the time of the site visits, one of these

ponds was found to have recently been partially filled. Active and abandoned fish ponds are in Long Valley (Area 7c in **Figure 14.1**). According to the pond owner, aquaculture in these ponds follows traditional methods involving polyculture of Cyprinids and Tilapia, which are fed on bread and food residue. Although HKBWS reported that fish produced in these ponds were primarily for consumption by birds, the pond owner reported that some fish reaching marketable size (which are generally too large to be eaten by wetland birds) would be harvested and sold.

In addition, several shallow ponds (less than 0.5 m in depth) are present in Long Valley; these are considered too shallow for the production of edible fish. Some of these are used for farming Water Flea *Moina macrocopa*, which is used as food for ornamental fish (Plate 3 of **Appendix 14.1**), and/or are managed for the benefit of wildlife (Plate 4 of **Appendix 14.1**). Fish observed in some of these shallow ponds included Mosquito Fish *Gambusia affinis* and Nile Tilapia *Oreochromis niloticus*. Since these are not currently utilised for culture fisheries and there is the possibility that they could be converted into fish ponds following extensive excavation and modifications, these ponds have been categorized as Abandoned in this assessment. In addition to these larger groups of ponds, several smaller ponds are scattered throughout KTN NDA. Most are thought to be derived from water storage ponds for former pig farms, and are in various states of activity.

14.5.2 Fanling North

Figures 14.2a and 14.2b presents the current status of fish ponds in Fanling North. Several ponds were found close to Fu Tei Au Road, at the western end of the FLN NDA (Area 17). According to the pond owner, these ponds are mainly used for dumping vegetables not fit for sale, and are not actively managed for commercial fisheries production. Fish species observed in these ponds were Mosquito Fish and Nile Tilapia. These are regarded as inactive.

Also within the 500m assessment area (but outside the NDA boundary), another area of ponds is located on the eastern side of Ng Tung River, to the north of the Sewage Treatment Works at Fu Tei Au (Pond Area 19). These ponds are considered to be not commercially active, as no sign of fisheries operation was observed.

Other small ponds are scattered throughout the assessment area, including ponds at Siu Hang San Tsuen, San Uk Tsuen and Wing Ning Tsuen. These ponds are all considered to be abandoned, and most are overgrown with vegetation.

Table 14.2. Status of ponds in Study Area.

Pond Location Ref. No.	Inside Project Area?	Location	Status	Water Quality	Remarks
Kwu Tung North					
1a	No	Tit Hang	Active, wet.	Fair	According to recent information it is commercially active.
1b	Yes	Tit Hang	Abandoned.	Dry	Overgrown.
2	Yes	Pak Shek Au	Abandoned, wet.	Poor	Full of vegetation, water level low.
3	Yes	Fung Kong	Active, wet.	Good	Fish fry pond.

Pond Location Ref. No.	Inside Project Area?	Location	Status	Water Quality	Remarks
4	Yes	Fung Kong	Active and Abandoned, wet.	Fair	One pond active, two ponds abandoned.
5	Yes	Fung Kong Shan	Abandoned, filled.	NA	The pond is filled, no longer exists.
6a	No	Ma Tso Lung	Inactive, wet.	Fair	Water level low.
6b	No	Ma Tso Lung	Abandoned seasonally wet.	Fair	Overgrown.
6c	No	Ma Tso Lung	Active.	Fair	According to recent information it is commercially active.
7a	Yes	Ho Sheung Heung South	Abandoned, wet.	Fair	Partially overgrown.
7b	Yes	Ho Sheung Heung	Abandoned / Inactive / Active.	Fair	Most ponds abandoned/ inactive. Seven ponds are commercially active according to pond owners.
7c	Yes	Long Valley	Active. Abandoned	Fair	Four ponds commercially active for fish production according to pond owners. Other ponds are shallow and are managed for non-fisheries purposes and/or for wildlife and have been categorised as Abandoned
8	No	Lo Wu Correctional Institution	Active.	Fair	According to recent information it is commercially active.
9	Yes	Lo Wu Correctional Institution	Abandoned.	NA	Reinstated fish pond, but holds very little water; overgrown with marsh vegetation and grasses (Plate 5 in Appendix 14.1).
10	No	Ng Tung River West	Active/ Abandoned wet.	Fair	Five ponds, two now active and three abandoned and overgrown (Plate 6 in Appendix 14.1).
11	No	Ngam Pin	Active.	Fair	Perhaps formerly used for rearing ducks. Considered active from recently received information.
12	No	Kwu Tung South	Abandoned, seasonally wet.	NA	Two ponds, both overgrown.

Pond Location Ref. No.	Inside Project Area?	Location	Status	Water Quality	Remarks
13	No	Kwu Tung South	Abandoned, filled.	NA	Filled.
14	No	Kam Tsin	Abandoned (ornamental pond)	Fair	Concreted ornamental pond.
15	No	Chau Tau	Abandoned, wet.	NA	Completely overgrown.
Mitigation Wetlands	Yes (except one in south)	Sheung Yue River	Wet.	Fair	Ecological mitigation wetlands. Not for fisheries purposes.
Fanling North					
16	No	Ng Tung River East	Inactive, wet/ Abandoned, overgrown.	Fair	Small pond on the northwestern side is filled. Others inactive. Ponds to the south of these (opposite the pipeline) are overgrown and abandoned.
17	Yes	Fu Tei Au	Inactive, wet.	Fair - Poor	According to the pond owner, the ponds are mainly for dumping unsaleable vegetables and are not commercially active.
18	No	Siu Hang San Tsuen	Abandoned, wet.	NA	Water level very low, full of vegetation.
19	No	San Uk Tsuen	Abandoned, wet.	Poor	Full of vegetation.
20	No	Wing Ning Tsuen	Abandoned, wet.	Fair	Full of vegetation.
21	No	Cheung Po Tau	Abandoned, wet.	Fair	Partially overgrown.
22	No	Nam Wa Po	Abandoned, wet.	Fair	Partially overgrown, some construction waste dumping (Plate 7 in Appendix 14.1).
Mitigation Wetlands	Yes	Ng Tung River	Wet.	Fair	Ecological mitigation wetlands. Not for fisheries purposes (Plate 8 in Appendix 14.1).

14.5.3 Summary

The current status and area of ponds within the Assessment Area are summarized in **Table 14.3.** The total area of fish ponds (including active, inactive and abandoned ponds) in the NDAs is very small, representing approximately 2.0% of the total fish pond area present in Hong Kong (1130 ha in 2011 according to data from AFCD).

Table 14.3. Status and Area (ha) of Fish Ponds within the Assessment Area

Pond Category	Fisheries Status	Kwu Tung North	Fanling North	Total
Active	Fish fry pond	0.95	-	0.95
	Commercial fish pond (Long Valley)	1.33	-	1.33
	Commercial fish pond (Ho Sheung Heung)	3.12	-	3.12
	Commercial fish pond (others)	1.67	-	1.67
Inactive	Production of fish for self-consumption or not in a commercial manner/ for casual sport fishing/ water sports	0.99	4.56	5.55
Abandoned	Abandoned/ filled/ overgrown/ ornamental/managed for wildlife	11.19	1.41	12.60
Total		**19.25**	**5.97**	**25.22**

14.6 Identification and Evaluation of Impacts

14.6.1 Potential Construction Phase Impacts to Fisheries

A series of potential impacts to fisheries may occur, both directly or indirectly during the construction phase of the project. These include the following:

14.6.1.1 Direct Impacts

- Direct loss: this may occur during the construction phase, but continues to be a permanent loss during the operation phase. These impacts are discussed further in **Sections 14.6.3 and 14.6.4**.
- Dumping of Construction Waste - this could cause a direct impact on pond fisheries, which, if uncontrolled, would be significant. However, given the distance between active fish ponds and potential construction works areas, this impact is not considered to be significant.

14.6.1.2 Indirect Impacts

- Bund Stability and Water Seepage - There is also the potential for adverse impact on bund stability and water seepage due to construction works in close proximity.
- Blockage of Existing Access- There is the potential for access to fish ponds to be blocked due to construction works, which may have an impact on management activities and fisheries production.
- Hydrological disruption – ground works and foundations may cause hydrological disruptions to nearby ponds and cause draw-down of the water table.
- Deterioration of water quality - Fish ponds close to the construction site may be affected by runoff, dust, silt and chemical wastes arising from construction activities. Untreated runoff and sediment would raise the level of suspended solids and increase turbidity. An elevated suspended solids level may have acute or chronic effects on fish. In addition, as the nearby streams may be sources of water for active fish ponds, pollutants discharging into these water bodies may eventually impact fisheries. Blockage of these water bodies due to poor construction activities (e.g. disorderly dumping of excavated material) may also affect the water supply to fish ponds and thus affect culture activities.

14.6.2 Potential Operational Phase Impacts to Fisheries

14.6.2.1 Direct Impacts

No direct impacts to fisheries are predicted during the operational phase.

- Indirect impacts Blockage of Existing Access - Access by way of existing paths to active fish ponds may be blocked during the operational phase (i.e. blocked by proposed connection roads).
- Deterioration of water quality - Sewage and runoff from the proposed developments and alignments could potentially cause impacts on nearby fish ponds. This, in turn, could cause a deterioration of water quality and affect fish.

14.6.3 Construction Phase Impacts to Fisheries in Kwu Tung North

14.6.3.1 Impacts to Fish Fry Farm at Fung Kong

According to the HKNTFCA committee member interviewed in March 2009, most fish fry are imported from outside Hong Kong (including Mainland China and Taiwan) and must pass through an acclimatisation process before introduction into local fish ponds. This process requires a certain amount of skill and carries a risk of high fish fry mortality. In order to avoid this risk, local fish farmers seldom import fish fry directly from overseas suppliers, but prefer to purchase fish fry from local suppliers such as that at Fung Kong. The HKNTFCA committee member reported that there are not many such fish fry suppliers in Hong Kong.

AFCD has confirmed the value of this fish fry farm to the local pond fisheries industry. The ponds operated by a Mr. Mak at Fung Kong provide approximately 70% of the pond fish fry supplied to Hong Kong

pond fisheries. Loss of the ponds would therefore have a significant impact on local fisheries production.

Under the most recent RODP the site of the fish fry ponds would be redeveloped. As described above, the loss of this site would impact not only the individual farm operator but would also have an impact on pond fisheries throughout Hong Kong by stopping the supply of acclimatised fish fry to other pond operators. Whilst factors of supply and demand may ultimately play a role in encouraging the re-establishment of acclimatisation facilities by another pond operator, in the absence of the farm at Fung Kong the interruption in the supply of fish fry during establishment of an alternative fish fry farm location may have a significant temporary impact on other fisheries throughout Hong Kong.

14.6.3.2 Impacts to other Fisheries in KTN

Under the most recent RODP, active fish ponds at Ho Sheung Heung would retain the existing land zoning as agricultural land. Fisheries activity is permitted under this land zoning, and it is not therefore predicted that these ponds would be significantly impacted by the development. Four active ponds along with several abandoned ponds (water flea ponds or managed for wildlife) in Long Valley will fall within the proposed Other Uses (Nature Park) zone. It is the intention that existing agricultural activities, including culture of aquatic fauna, will continue in the Long Valley Nature Park. Although the nature of such culture may change, there is not predicted to be any loss in the area of land devoted to culture activities.

Other ponds (i.e. excluding the fish fry pond described in **Section 14.6.2.1**) that are predicted to be lost in this area (1.17ha near Ho Sheung Heung, 0.22ha at Pak Shek Au and 0.36ha at Fung Kong) are small in overall area and thus no significant fisheries impacts are expected from the loss of these ponds.

14.6.4 Construction Phase Impacts to Fisheries in Fanling North

No commercial fisheries activity was identified in FLN NDA, and there is no evidence that such activity will commence in the foreseeable future. One small inactive pond will be lost to the east of Fu Tei Au; this pond appears not to have been used for fish production for many years and the fisheries impact of loss of this pond is low. All other ponds in FLN would be available for the resumption of fisheries activities in the future.

14.6.5 Other Fisheries in the NDAs

The proposed AGR zoning to the north of Sheung Yue River would retain the existing land use in this area. This would avoid impacts to fish ponds at Ho Sheung Heung (Area 7b) from development activities. There are several fish ponds present in this area, with an approximate area of 5ha, all of which will be retained under the current proposals. These ponds are currently inactive or abandoned, but recent information reveal seven ponds are currently under active management.

Four ponds at Long Valley are used for fish cultivation, along with 14 abandoned ponds (water flea ponds or managed for wildlife) and would be zoned for inclusion in the Long Valley Nature Park (LVNP). The future management of the LVNP is addressed in the ecological impact assessment for the Project and will be finalised under a subsequent

study. Currently it is anticipated that aquaculture activities in some form would continue in these ponds, though the details are to be finalized in a separate and future study. However, should it be decided to discontinue fisheries activities on these ponds, the loss of fisheries from these ponds would be very small in a Hong Kong context and thus not considered significant.

Since there would not be impacts on other active fish ponds elsewhere in the NDAs, no further mitigation measures are proposed.

14.6.6 Summary of Construction and Operational Phase Impacts to Fisheries in KTN and FLN Assessment Areas arising from the Project

Predicted construction and operational phase impacts to fisheries arising from the Project in KTN and FLN are summarized in **Table 14.4** and locations are shown in **Figures 14.3, 14.4a and 14.4b**.

Table 14.4. Construction and Operational Phase Impacts to Fisheries in KTN and FLN arising from the Project in the absence of mitigation measures

Criteria	Description (construction phase)	Description (operation phase)
Nature of impact	KTN – permanent loss of active and abandoned ponds. FLN – permanent loss of inactive pond. Both - Potential indirect impacts (construction waste dumping, bund stability and water seepage, blockage of access roads, hydrological disruption, deterioration of water quality). Indirect impacts to these ponds are considered to be a **Very Low Fisheries Impact.**	No direct fisheries impact. Potential indirect impacts (blockage of access roads, deterioration of water quality through run-off). Indirect impacts to these ponds are considered to be a **Very Low Fisheries Impact.**
Size of affected Area	KTN - Permanent loss of active pond (0.99ha) and abandoned pond (1.69ha). FLN – Permanent loss of inactive pond (0.29ha) Accordingly permanent loss of these ponds, a cumulative maximum of slightly less than 0.4% of the overall fish pond area in the northwest New Territories, is considered to have **Low Fisheries**	No fisheries impact.

Criteria	Description (construction phase)	Description (operation phase)
	Impact.	
Loss of fisheries resources/production	KTN - Fish fry supplies to local pond fisheries would be affected; since this is one of the few major suppliers, loss of these ponds is considered to be a potential **Moderate Fisheries Impact** in the absence of mitigation measures.	No fisheries impact.
Destruction and disturbance of nursery and spawning grounds	No fisheries impact.	No fisheries impact.
Impact on fishing activity	No fisheries impact.	No fisheries impact.
Impact on aquaculture activity	Fish fry supplies to local pond fisheries would be affected; since this is one of the few major suppliers, loss of these ponds is considered to be a potential **Moderate Construction Fisheries Impact** in the absence of mitigation measures.	Demand from fish farmers will, in time, result in the current operator resuming acclimatisation operations in another location; and/or another operator may undertake this role; and/or farmers may import fish directly. Under the first two of these scenarios, there would be a **Low Operational Phase Fisheries Impact**; if no acclimatisation ponds are established to replace the facility there would be a **Moderate Operational Phase Impact**, however this is a matter for market forces to decide.

14.6.7 Potential Indirect Pollution Impacts to fisheries outside the assessment area

There are many watercourses in the NDAs, all of which ultimately drain into the polluted Ng Tung River and then the Shenzhen River, neither of which are water sources for culture fisheries. The Shenzhen River ultimately drains into Deep Bay, which does support such fisheries; however, these are over 10km from the Project Area, and hence construction and/or operational impacts to such fisheries are predicted to be insignificant due to the dilution effect. The Ma Tso Lung Stream, however, drains into the important fish pond area at Hoo Hok Wai and may provide water for active fish ponds in this area; any impacts to the water quality of this stream may have an indirect impact on pond fish culture downstream.

Due to the local land form, very little of the NDA drains into the Ma Tso Lung Stream. Much of the land surrounding the stream is zoned as Green Belt (KTN area H1-1), and would not therefore be subject to pollution sources arising from construction. Some of the middle and lower

parts of the stream are, however, zoned for development associated with the Lok Ma Chau Loop (KTN area F1-3). The proposed road connection to the Lok Ma Chau Loop would also cross the Ma Tso Lung Stream.

Construction in this area may affect the Ma Tso Lung Stream by input of runoff, dust, silt and chemical waste arising from construction activities. Untreated runoff and sediment would raise the level of suspended solids, which may have acute or chronic effects on fish. Blockage of this stream due to untidy construction activities (for example from disorderly dumping of excavated material) may also affect the water supply to the active fish ponds and thus affect fish culture activities. Implementation of standard mitigation measures and good site practices to control site runoff of suspended solids and other pollutants caused by construction activities should ensure that the off-site indirect impacts to fisheries will not be significant. During operation, the main source of pollution from sewage would be discharged through the public sewerage system and would not impact water bodies. No indirect fisheries impacts are therefore anticipated during operation of the scheme.

14.6.8 Impacts to Capture Fisheries

No capture fisheries are present within the Study Area and as such no impacts are predicted to capture fisheries in the construction or operational stages of this Project.

14.6.9 Cumulative Impacts

Other significant developments proposed in the northern New Territories that involve potential impacts to fisheries include the Closed Area Feasibility Study, the development of the Lok Ma Chau Loop and the proposed Liantang/Heung Yuen Wai Boundary Crossing Point (BCP) and access road. The development of the Lok Ma Chau Loop may impact the fisheries around Hoo Hok Wai; the potential impacts to these fisheries are addressed as part of the EIA for that project, and are assessed to be of low significance. Developments arising from the Closed Area Feasibility Study and construction of the Liantang/Heung Yuen Wai BCP and access road and other concurrent or proposed projects are not expected to have significant impacts on fisheries. Given the limited impacts of these developments on fisheries, the small area of fish ponds present in the NDAs and the limited hydrological connection between the fish pond areas, it is not anticipated that there would be any significant cumulative impact on fisheries from these developments.

14.7 Mitigation Measures

14.7.1 Loss of Pond Areas

Permanent loss of a small area of active, inactive and abandoned ponds is considered to be a minor impact, in view of the small contribution to the total fish pond area in Hong Kong. It is considered that no mitigation is required for this loss.

14.7.2 Fish Fry Farm at Fung Kong

Given the location of the existing fish fry farm and surrounding proposed land uses, retention of the ponds to avoid impacting the farm is not considered feasible. In order to avoid impacting fisheries production in the Deep Bay area, it would be necessary for the function of this fish fry farm to be reinstated at an alternative location. The re-instated fish fry production activities should preferably commence operation prior to the

loss of the existing farm (preferably for a period of at least six months), to ensure an uninterrupted supply of fish fry to other pond fisheries in Hong Kong. Without addressing the issue prior to the closure of the existing farm, it is possible that the time taken to find an alternative site and to set up the necessary facilities and activities may result in a temporary shortage of fish fry supplies to other fisheries in Hong Kong.

There is no statutory requirement (under EIAO or other ordinance) and no precedent for reprovision of a commercial fishery as mitigation. Under the current land policy, Government would not reprovision commercial facilities affected by public works and the fish farm operator has to find an alternative site for relocation of his farm. The usual approach in cases where commercial fisheries are impacted by a development would be to compensate fisheries operators financially for their loss. It would then be the decision of the fishery operator whether to continue with the fishery production at an alternative location, in which case it would be his responsibility to arrange for the creation of the required facilities at a chosen location.

In the case of the Fung Kong fish fry farm, if the pond operator decided to reinstate the fish fry farm activities at another location, there are no particular characteristics of the ponds to be used for fish fry acclimatisation that would limit the alternatives for pond location. The ponds would, however, require a suitable, stable water supply and would require access for lorries so that fry can be imported into the ponds, and later taken away to other ponds elsewhere in Hong Kong. The area of ponds should be similar to that currently existing at the fish fry farm (0.95 ha). Possible locations for reprovisioning of the fish fry farm can be found in and around the KTN NDA, including ponds near Ho Sheung Heung and a pond on the western side of the Ng Tung River; possible locations are shown in **Figure 14.5**. It would be the responsibility of the fishery operator to negotiate with the relevant landowners to arrange a lease for the ponds.

Given the importance of the ponds at Fung Kong for the provision of fish fry to other fisheries in Hong Kong, any interruption of fish fry supply from this farm would potentially have impacts upon other fisheries, even if the facilities were reinstated at an alternative location. In order to minimise the risk of a temporary interruption of fish fry supply, and consequent impact upon other fisheries, it would be preferable to inform the fishery operator at the earliest opportunity, so that he is able to make any necessary arrangements for reinstatement of the required facilities, and to ensure a smooth transfer in operation between the existing farm and an alternative location. If the current operator were to decide not to continue operation, providing sufficient notice to the Hong Kong New Territories Fish Culture Association of the possibility of farm closure would give that organization the opportunity to look for an alternative source for fish fry, or to encourage another operator to provide the appropriate facilities prior to the closure of the existing farm at Fung Kong.

14.7.3 Dumping of Construction Waste

Illegal dumping of waste and excavated material will be properly managed (see **Chapter 7**), and thus such impact is not predicted to occur.

14.7.4 Bund Stability and Water Seepage

During the construction stage, should works be required close to any fish ponds, a layer of permanent sheet pile wall should be erected along the

site boundary adjacent to fish ponds after commencement of site works. The sheet pile wall should be constructed by silent piling method (Press-in method) which induces minimal vibration. Therefore the stability of the fish pond bund will not be influenced by the construction of the sheet pile wall. In addition, the sheet pile wall should have grouting or a grout curtain to avoid water seepage from the fish pond to the excavation area. With these measures, significant impacts are not anticipated.

No operational impacts anticipated.

14.7.5 Blockage of Access Roads to Fish Ponds

Temporary traffic arrangements should be instigated to maintain or provide alternative access to fish ponds during construction phase if required. Detailed arrangement cannot be provided at this stage, but the project proponent will be responsible for drawing up such an arrangement with the contractor as and when necessary throughout the construction period. Subsequently, access to the fish ponds should not be blocked in the operational phase.

14.7.6 Other Indirect Impacts

Standard mitigation measures to control site runoff and other pollutants (e.g. dust) caused by construction activities and good site practices will be implemented during the construction phase of the Project. Excavated material and other inert construction wastes produced will be transferred to proper recipients (i.e. landfill) (see Waste Management Section). Sewage from the proposed development will be dealt with via a sewerage system and will not be discharged directly to surrounding water bodies. With these measures, indirect impacts on fisheries due to construction activities will be insignificant (for details of measures protecting nearby water bodies including fish ponds please see Water Quality Impact Assessment).

14.7.7 Good Site Practice

14.7.7.1 Dust Minimization

During all excavation works, good site practice should be adopted to minimize impacts on fisheries. The below site practices should be adopted during this time.

- Any excavated or stockpile of dusty material should be covered entirely by impervious sheeting or sprayed with water to maintain the entire surface wet and then removed or backfilled or reinstated where practicable within 24 hours of the excavation or unloading;
- Any dusty materials remaining after a stockpile is removed should be wetted with water and cleared from the surface of roads;
- Exposed earth should be properly treated by compaction, turfing, hydroseeding, vegetation planting or sealing with latex, vinyl, bitumen, shortcrete or other suitable surface stabiliser within six months after the last construction activity on the construction site or part of the construction site where the exposed earth lies;
- Excavation profiles must be properly designed and executed with attention to the relevant requirements for environment, health and safety;

- In case the soil to be excavated is situated beneath the groundwater table, it may be necessary to lower the groundwater table by installing well points or similar means;
- Supply of suitable clean backfill material after excavation, if required;
- Vehicles containing any excavated materials should be suitably covered to limit potential dust emissions or contaminated run-off, and truck bodies and tailgates should be sealed to prevent any discharge during transport or during wet season;
- Speed control for the trucks carrying contaminated materials should be enforced; and
- Vehicle wheel washing facilities at the site's exit points should be established and used.

14.7.8 Contingency Plan

The contractor should prepare an emergency contingency plan for actions to be taken if significant impacts, such as accidental spillage of chemicals, water seepage from fish ponds, damaged/ destabilized pond bunds, pond water contamination by site runoff, on fish ponds occur. The contractor should submit the emergency contingency plan dealing with, but not limited to, the aforementioned potential impacts to the engineer for review, comment and approval. The fish pond operators will also be consulted for the details of the contingency plan, which will also be submitted to AFCD for review and comment. The plan should include, but not limited to, the following:

- Potential emergency situations;
- Chemicals or hazardous materials used on-site (and their location);
- Emergency response team;
- Emergency response procedures;
- List of emergency telephone hotlines;
- Locations and types of emergency response equipment;
- Training plan and testing for effectiveness.

During the operational phase, it is also suggested that similar plan should be in place to deal with any accidental spillage event.

14.8 Residual Environmental Impacts and Monitoring and Audit

With the above measures, and measures for mitigating water quality impacts and managing waste, no residual impact is anticipated.

Given the monitoring and audit requirement for water quality and waste management for the Project as a whole (see EM&A Manual); a specific programme for fisheries is not deemed necessary.

14.9 Conclusions

The current RODP would result in the loss of a fish fry farm at Fung Kong in KTN NDA. The loss of this pond would have a moderate impact on fisheries production in Hong Kong. It is proposed that appropriate notice should be given to the operator to permit the reinstatement of activities at an alternative location prior to the closure of the existing farm.

Other than the fish fry farm, pond fisheries in the two NDAs are of low importance to the overall pond fish production of Hong Kong. Impacts to other fisheries are not considered to be significant in a Hong Kong context. Direct and indirect impacts of the Project on fisheries, proposed mitigation measures and residual fisheries impacts following implementation of recommended mitigation measures are detailed in **Table 14.5**.

Table 14.5. Potential Total Fisheries Impacts of the Project in the absence of Mitigation, Mitigation Measures Proposed and Severity of Residual Impacts

Impact	Mitigation	Residual Impacts
Construction and operational phase loss of active fish pond (0.99ha): **Low**.	None.	**Low** severity.
Construction and operational phase loss of inactive and abandoned fish ponds (1.98ha): **Low**.	None.	**Low** severity.
Loss of fisheries resources/ production: **Moderate**.	Early notification of operator of resumption programme to permit timely relocation of fish fry farm to an alternative location.	**No** impact.
Destruction and disturbance of nursery and spawning grounds: **None**.	Not required.	**No** impact.
Impact on fishing activity: **None**.	Not required.	**No** impact**.**
Impact on aquaculture activity in the absence of mitigation measures: **Moderate**.	Early notification of operator of resumption programme to permit timely relocation of fish fry farm to an alternative location.	**No** impact.
Pollution of watercourses resulting in downstream impacts to fisheries: **Low**.	Standard on-site measures to minimize impacts of run-off and pollution events.	**Low** severity.
Overall Severity: **Moderate**.	-	**Low** severity.