

Provision of Services for Fish Capture and Translocation Survey at Tsang Tsui, Tuen Mun, Stage 1 – Pre-Survey (Quotation Ref.: 23-01319)



Pre-Survey Report

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Ecosystems Limited
生態系統顧問有限公司

Unit B13, 12/F, Block B2, Yau Tong Industrial City
17 Ko Fai Road
Yau Tong, Kowloon.
Tel. 電話: (852) 2553 0468
Fax 傳真: (852) 2552 9191
Email 電郵: info@ecosystems-ltd.com

	Name	Role	Signature	Date
Prepared By	Klinsmann CHEUNG	Qualified Ecologist		30/8/2023
Certified By	Vincent LAI	Environmental Team Leader / Service Management Team Leader		30/8/2023

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1. INTRODUCTION

1.1 Background

1.1.1 The West New Territories (WENT) Landfill is reaching its full capacity. The Environmental Protection Department (EPD) is actively pressing ahead the WENT Landfill Extension (WENTX) project to extend the capacity of the corresponding WENT Landfill, with a view to meeting the long-term waste disposal needs of Hong Kong.

1.1.2 The WENTX project is a Designated Project under Environmental Impact Assessment (EIA) Ordinance. In accordance with the EIA report for the WENTX project (Ref No. AEIAR-147/2009) (approved EIA Report) approved on 20 November 2009, impacts to loss of streams and fish species of conservation concern are considered minor and insignificant. In accordance with the approved EIA Report and Section 10.2 of the respective Environmental Monitoring and Audit (EM&A) Manual, as a precautionary measure, a capture and translocation survey for fish species of conservation concern is recommended at the Tsang Kok Stream and the Stream A (**Appendix A**), to be carried out in wet season prior to the commencement of the WENTX construction works, tentatively in November 2023. The fish species of conservation concern include *Squaliobarbus curriculus*, *Osteochilus vittatus* and *Kuhlia marginata* (Target Species). Target Species, if found during the survey, should be collected and translocated to suitable location(s). Application variation of the WENTX Environmental Permit (VEP-617/2022) was approved on 29 July 2022.

1.1.3 Ecosystems Ltd. was commissioned by the EPD in July 2023 to carry out the services entitled "Provision of Services for Fish Capture and Translocation Survey at Tsang Tsui, Tuen Mun (Quotation Ref.: 23-01319)" which consisted of 3 stages including Stage 1 – Pre-survey; Stage 2 – Fish Capture and Translocation Survey (FCT-Survey) and Stage 3 – Post-translocation Monitoring (PT-Monitoring).

1.1.4 A pre-survey in accordance with the approved Pre-Survey Proposal, was conducted in August 2023. This Pre-Survey Report summarized the observations and findings of the Stage 1 - Pre-Survey, in order to fulfill the requirement of the Section 10.2 under the EM&A Manual of the approved EIA report (AEIAR-147/2009).

2. GENERAL PHYSICAL AND ENVIRONMENTAL INFORMATION OF THE SITE

2.1 WENT Landfill Extension

2.1.1 The eastern part of the site is located in Tsang Kok Valley which is a hilly terrain site sparsely vegetated with grass and limited patches of shrubs. The easterly ridge forms a boundary with the existing landfill. The northern part is the CLP Tsang Tsui Ash Lagoons and the former BBC Relay Station. The southern area is bounded by the natural topography, with ridgelines rising southwards from the coastline to meet the major east-west trending ridgeline at about +290mPD. The southern part of the site will also encroach onto the Tsing Shan Firing Range. The location plan of the WENT Landfill Extension site is shown in **Appendix A**.

2.2 Tsang Kok Stream

2.2.1 Tsang Kok Stream is a small stream flowing from Tsing Shan Firing Range into the southern part of Deep Bay. It is described as one of minor streams in Deep Bay Water Control Zone

monitored in the EPD regular river water quality programme (EPD 2007). This stream was located immediately adjacent to the existing WENT landfill and subject to modifications previously. The headwater of Tsang Kok Stream, which is immediately outside the existing WENT landfill together with part of its catchment area was found to be filled, probably during the construction of the existing landfill. The middle section of this stream was basically in natural conditions, while its lower section had been modified into a concrete drainage channel. The connecting point of the lower section drainage channel and the natural middle section was a steep and smooth concrete slope with structures for dispersing the energy during flushing flow. This slope prevents the upstream movement of aquatic life from estuary, and thus the stream was fragmented. The concrete drainage channel ran northward along the western boundary of the existing WENT landfill, passed Nim Wan Road through box culverts, and finally joined the Tsang Kok Stream Outfall which separated WENT landfill and the CLP ash lagoon site. While the headwater area was filled, the middle section of this stream was covered by large sized boulders and rocks. The stream flow in Tsang Kok Stream was low year-round and found murky and mostly beneath the boulders, and the stream bed was covered by sediment which was likely brought into the stream by sedimentation within the catchments.

2.3 Stream A

- 2.3.1 Stream A originated on the hill slope immediately to the southeast of Nim Wan Road. It had box culvert modification at its middle section during the construction of Nim Wan Road and was thus more or less fragmented. After passing Nim Wan Road, the stream substratum was mainly bare bedrock of fairly steep gradient until it passed through an orchard, flowing northward and joining Tsang Kok Stream Outfall. Flow volume of the perennial section of Stream A was fair in wet season and low in dry season. A few seasonal tributaries of Stream A joined the main course at different locations. They were either fragmented by Nim Wan Road or of narrow channel width, and all without surface flow during dry season.

3. LITERATURE REVIEW

3.1 Target Species

- 3.1.1 There are three main target fish species for the Pre-Survey including the *Squaliobarbus curriculus*, *Osteochilus vittatus* and *Kuhlia marginata*. Photo of the three target species is shown in **Figure 3.1**. To understand the preliminary ecological information of the freshwater fishes of conservation concern, status, potential habitat, and records from literature review were reviewed.

3.2 *Squaliobarbus curriculus*

- 3.2.1 *S. curriculus* mainly distributed in East Asia which includes China, Vietnam, Western Korea and Amur River drainage in Russia (IUCN, 2022; FishBase). In South China region, *S. curriculus* is one of the economically important and dominant fish species in the western Peral River area (Wang et al., 2021). Its suitable and potential habitat includes freshwater and brackish rivers. Although *S. curriculus* is considered to be a native species in China, its occurrence in Hong Kong still remains doubtful and is considered to be an introduced species in Hong Kong (Jeffery et al., 2023), as the watercourse in Hong Kong is not connected with Zhujiang tributaries (ARUP, 2009). There are only several records of this species with a limited distribution in Hong Kong, the first record of it was reported in concrete silt-trap pool at the channelized section of Tsang Kok Stream near the sea and in the channelized section of Stream A in year 2003 within the

current survey area (ERM, 2003; ARUP, 2009). It is also recorded in the Ng Tung River in New Territories and Tai Ho River in Lantau (GBIF. Org, 2021). This species is considered of no conservation importance since it is not listed in relevant Hong Kong laws/ regulations/ conventions, CITES; List of Wild Animals under State Priority Conservation; Fellowes et al. (2002) and it is evaluated as “Least Concern” in both Red List of China’s Vertebrates and IUCN Red List.

3.3 *Osteochilus vittatus (Osteochilus salsburyi)*

3.3.1 The scientific name *O. vittatus* was used in early literature and previous EIA reports for this Genus *Osteochilus* target species. (ERM, 2003; ARUP, 2009; Lee et al., 2004; Reels, 2001; Yam et al., 2002). However, recent literature and AFCD updated database suggested that *O. salsburyi* should be the only species in the Genus *Osteochilus* recorded in the wild of Hong Kong (AFCD, 2023; Jeffery et al., 2023; Ichthyological Society of Hong Kong, 2009). Therefore, this proposal would regard *O. salsburyi* as the target species. *O. salsburyi* distributed in Asia which includes Laos, northern Vietnam, and southern China with its freshwater rivers and reservoir being its suitable/ potential habitat (FishBase). *O. salsburyi* is regarded as a native inland freshwater fish species with feral population in Hong Kong since the native population was regarded to be extinct (Chong & Dudgeon, 1992; Jeffery et al., 2023). *O. salsburyi* could be found in a few local reservoirs, including Tai Lam Chung Reservoir, Plover Cove Reservoir and High Island Reservoir (Lee et al., 2004) and their population is likely to be introduced through water transfer from Dongjiang water. This species is considered of no conservation importance since it is not listed in relevant Hong Kong laws/ regulations/ conventions, CITES; List of Wild Animals under State Priority Conservation; Fellowes et al. (2002) and it is evaluated as “Least Concern” in both Red List of China’s Vertebrates and IUCN Red List.

3.4 *Kuhlia marginata*

3.4.1 *K. marginata* distributed throughout Asia including Taiwan, Philippines, and Indonesia to islands in the Pacific (FishBase). The species mainly inhabits clean freshwater streams. Although it is catadromous meaning that they are able to migrate in between freshwater and marine water, it is considered to be a freshwater species primarily (KFBBG, 2019). Its suitable/potential habitat includes freshwater watercourses and brackish water estuaries. In Hong Kong it is recorded in Lantau Island, Hong Kong Island and Sai Kung (AFCD, 2023). It was also reported in Stream A in a survey for STF ES (Metcalf and Eddy 2006). This species is considered of conservation importance since it is listed in Fellowes et al. (2002) and evaluated as “Regional Concern”, however is it not listed in relevant Hong Kong laws/ regulations/ conventions, CITES; List of Wild Animals under State Priority Conservation; Red List of China’s Vertebrates and it is evaluated as “Least Concern” in IUCN Red List.

4. RELEVANT LEGISLATION, STANDARD AND GUIDELINES

4.1 Legislation and Guidelines

4.1.1 This report is prepared and would be executed in accordance with the guidelines, standards, documents, government ordinances and regulations as described below:

- Protection of Endangered Species of Animals and Plants Ordinance (Cap. 586) and its subsidiary legislation. Regulates the import, introduction from the sea, export, re-export,

and possession of specimens of a scheduled species, including live, dead, parts or derivatives. The Ordinance applies to all activities involving endangered species which include the parties of traders, tourists and individuals;

- The IUCN Red List of Threatened Species. Widely recognised as the most comprehensive, objective global approach for evaluating the conservation status of plant and animal species. Provides information and analyses on the status, trends and threats to species in order to inform and catalyse action for biodiversity conservation;
- Wild Animals Protection Ordinance (Cap. 170) protects wild animals from being hunted, whilst their nests and eggs are protected from injury, destruction and removal. All birds and most mammals are protected under this Ordinance.
- Environmental Impact Assessment Ordinance (Cap. 499) and the associated TM
- Ecological Baseline Survey for Ecological Assessment (EIAO Guidance Note No. 7/2010)
- Methodologies for Terrestrial and Freshwater Ecological Baseline Survey (EIAO Guidance Note No. 10/2010)

4.2 Freshwater Species of Conservation Importance

4.2.1 In accordance with Table 3, Annex 8 of the TM-EIAO, the ecological value of species was assessed in terms of protection status, distribution, and rarity. For freshwater species, the protection status (e.g. fauna protected under the Wild Animals Protection Ordinance, Protection of Endangered Species of Animals and Plants Ordinance, and/or regional/global laws/conventions), the species distribution (e.g. endemic), listed by IUCN or CITES, or listed as Category I or II protected species in mainland China); and the rarity (e.g. rare or restricted, or level of concern highlighted in Fellowes et al. (2002)) were considered.

4.2.2 The following laws/regulations/conventions/books/publications are relevant to the evaluation of the conservation importance of freshwater species.

- Forestry Regulations (Cap. 96A) which are subsidiary legislation of the Forests and Countryside Ordinance (Cap. 96);
- Wild Animals Protection Ordinance (Cap. 170);
- Protection of Endangered Species of Animals and Plants Ordinance (Cap. 586);
- The International Union for Conservation of Nature and Natural Resources (IUCN) Red List of Threatened Species (Species which are classified by IUCN as Near Threatened (NT), Least Concern (LC), Data Deficient (DD), or Not Evaluated (NE), and not covered by any other laws/regulations/conventions are not considered of conservation importance in the present Services);
- The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES);
- Category I or II of List of Wild Animals under State Priority Conservation;

- PRC Wild Animal Protection Law;
- Red List of China's Vertebrates (Jiang et al. (2016)); and
- Fauna species considered of concern in Fellowes et al. (2002).

5. SURVEY METHODOLOGY

5.1 Pre-Survey Methodology

- 5.1.1 The pre-survey was carried out 3 times, starting from around 10 am to around 4 pm, on 16, 17 and 21 August 2023 (The last day of pre-survey was originally scheduled on 18 August 2023 but was cancelled due to inclement weather and was re-scheduled on 21 August 2023.) at both Tsang Kok Stream and Stream A, and their downstream watercourses leading to the sea outlet (shown in **Appendix A**).
- 5.1.2 A preliminary walk-through was conducted by three surveyors along both Tsang Kok Stream and Stream A to obtain the general information of the streams. After the preliminary walk-through, a walk-through survey with direct observation and active searching using hand-net were carried out from the accessible section of downstream to upper section of both Tsang Kok Stream and Stream A. If any of the Target Species or other fish species of conservation importance observed/caught, species, size and condition of it would be immediately recorded along with photographic record. The location(s) of freshwater species of conservation importance was recorded (if any) and the nomenclature for freshwater fishes followed AFCD (2023).
- 5.1.3 Baited fish traps with bread as baits, with dimension about 30cm x 30cm x 60cm (**Figure 5.1**) were also placed along the survey streams in three sections including lower, middle and upper stream (locations according to the general information from the preliminary walk-through) for at least one hour. The indicative sampling locations are shown in **Appendix A**, i.e. Three sampling locations at each watercourse.

6. OBSERVATIONS AND FINDINGS OF PRE-SURVEY

6.1 Condition of Stream A and Tsang Kok Stream

- 6.1.1 In general, the conditions of Stream A and Tsang Kok Stream are both semi-natural with artificial modification, the water quality was in moderate to poor condition and highly turbid (Photos of different sections of Stream A and Tsang Kok Stream are shown in **Figure 6.1**). Both streams join together near the estuary.
- 6.1.2 In the upper section of Stream A (i.e. section that is near and above Nim Wan Road), the watercourse is channelized and highly modified. With concrete riverbed and steep slope, no fish species was recorded within this section. Further up the steep concrete slope, the watercourse remains little waterflow and covered with dense plantation, no fish species was recorded as well. For the middle section of Stream A, the watercourse is relatively natural than the upper section, but modification was still observed. Dense vegetation was observed in the riparian zone. Since a lot of trash (**Figure 6.2**) were found in the watercourse, probably due to a metal recycling facility is situated next to the lower-mid section of the stream, the water remains in high turbidity with poor water quality, only exotic fish species were observed in this section. While the lower

section of Stream A is channelized but with sediment accumulated in the riverbed, where scattered mangroves were colonized at the side of the watercourse. As the lower section is closer to the estuary, more catadromous/ estuary fish species were observed in this area.

6.1.3 For Tsang Kok Stream, the upper section remains natural and unmodified, it is a stream with sandy substrate, and covered by rocks and boulders, with shrubland or mixed woodland in the riparian zone. In the middle section, a steep and smooth concrete slope fragmented the stream between the upper and lower sections. In the lower section which is a channelized section, the watercourse turns into a slow waterflow channel with sandy and muddy riverbeds. Although the water is relatively clear with no notable water pollution, no fish species were observed in Tsang Kok Stream until it reaches the estuary.

6.2 Freshwater Fish Species Recorded

6.2.1 In the three days pre-survey, no target fish species (i.e. *S. curriculus*, *O. vittatus* and *K. marginata*) was observed. On the other hand, a total of nine other fish species, nine species in Stream A, and three species in Tsang Kok Stream, were recorded (**Appendix B**). Most of the recorded fishes are observed at the lower section and estuary section in both streams. Only Tilapia and Snakehead Murrel were observed in the middle section of Stream A, probably due to their high tolerance to poor water quality. Some freshwater invertebrates such as freshwater prawn and bee shrimp were also observed in middle and upper sections of both streams. However no fishes were found in the upper section. All the recorded fishes are common and widespread in Hong Kong, and none of them is of conservation importance.

6.3 Record of Amphibian Species of Conservation Importance

6.3.1 During the pre-survey, although no target fish species or fish species of conservation were recorded, approximately five Chinese Bullfrog (*Hoplobatrachus chinensis*) individuals of conservation importance, were directly observed in the middle and lower section of Stream A outside the WENTX boundary under WENTX VEP-617/2022 (Photos and locations shown in **Figure 6.3** and **Appendix A** respectively). Mating call was also heard in the riparian area in the lower section of Stream A. Chinese Bullfrog is an aquatic species which is regarded as of potential regional concern (Fellows et al., 2002) ; listed as Class II in List of Wild Animals under State Priority Conservation (2023), and also regarded as Endangered in Red List of China Vertebrates (2020), although it is considered to be widely distributed in Hong Kong (AFCD, 2023) and it is considered to be least concern under the IUCN Red List of Threatened Species 2022.

6.3.2 According to the EIA report for the WENTX project (Ref No. AEIAR-147/2009) (approved EIA Report), the Chinese Bullfrog was not recorded nor reported from the reviewed literature. In fact, only three amphibian species were recorded and none of them are of conservation importance in the EIA report. It should be worth noting that Chinese Bullfrog is commonly used in the religious practice of mercy release and Hong Kong contain both native and released individual (Lee et al., 2021). However, the individuals observed in the pre-survey are likely to be native ones. Since the morphological characteristics of the observed Chinese Bullfrog individuals match native individuals; no notable wounds observed on snout and limb; few immature individuals were observed and calling behavior was also noted. The observation on Chinese Bullfrog in the Pre-Survey should be relayed to the WENTX project for review when conducting the ecological monitoring in the future.

6.3.3 As the Chinese Bullfrog were found outside WENTX site boundary, there is no anticipated and potential direct impacts on the species of conservation importance due to WENTX. In case the

area where these Chinese Bullfrogs was found would be affected by the WENTX project, as a precautionary measures, the WENTX project should take note of the observation of Chinese Bullfrog in the Pre-Survey and review if any mitigation measures (e.g. capture ad translocation exercise) would be required prior to the commencement of works.

7. Conclusion

- 7.1.1 Stage-1 Pre-Survey for fish capture and translocation survey was conducted in August 2023. There is no target fish species nor fish species of conservation importance observed during the pre-survey. Only common and widespread fish species with no conservation importance were recorded. Therefore, Stage 2 – Fish Capture and Translocation Survey and Stage 3 – Post-translocation Monitoring are not required. However, native Chinese Bullfrog, an aquatic species of conservation importance, which was not reported in previous EIA report, was observed during the pre-survey. As the Chinese Bullfrog were found outside WENTX site boundary, there is no anticipated and potential direct impacts on the species of conservation importance due to WENTX. In case the area where these Chinese Bullfrogs was found would be affected by the WENTX project, as a precautionary measures, the WENTX project should take note of the observation of Chinese Bullfrog in the Pre-Survey and review if any mitigation measures (e.g. capture ad translocation exercise) would be required prior to the commencement of works.

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Figure 3.1 Photos of the Three Target Species (source FishBase and Ichthyological Society of Hong Kong)

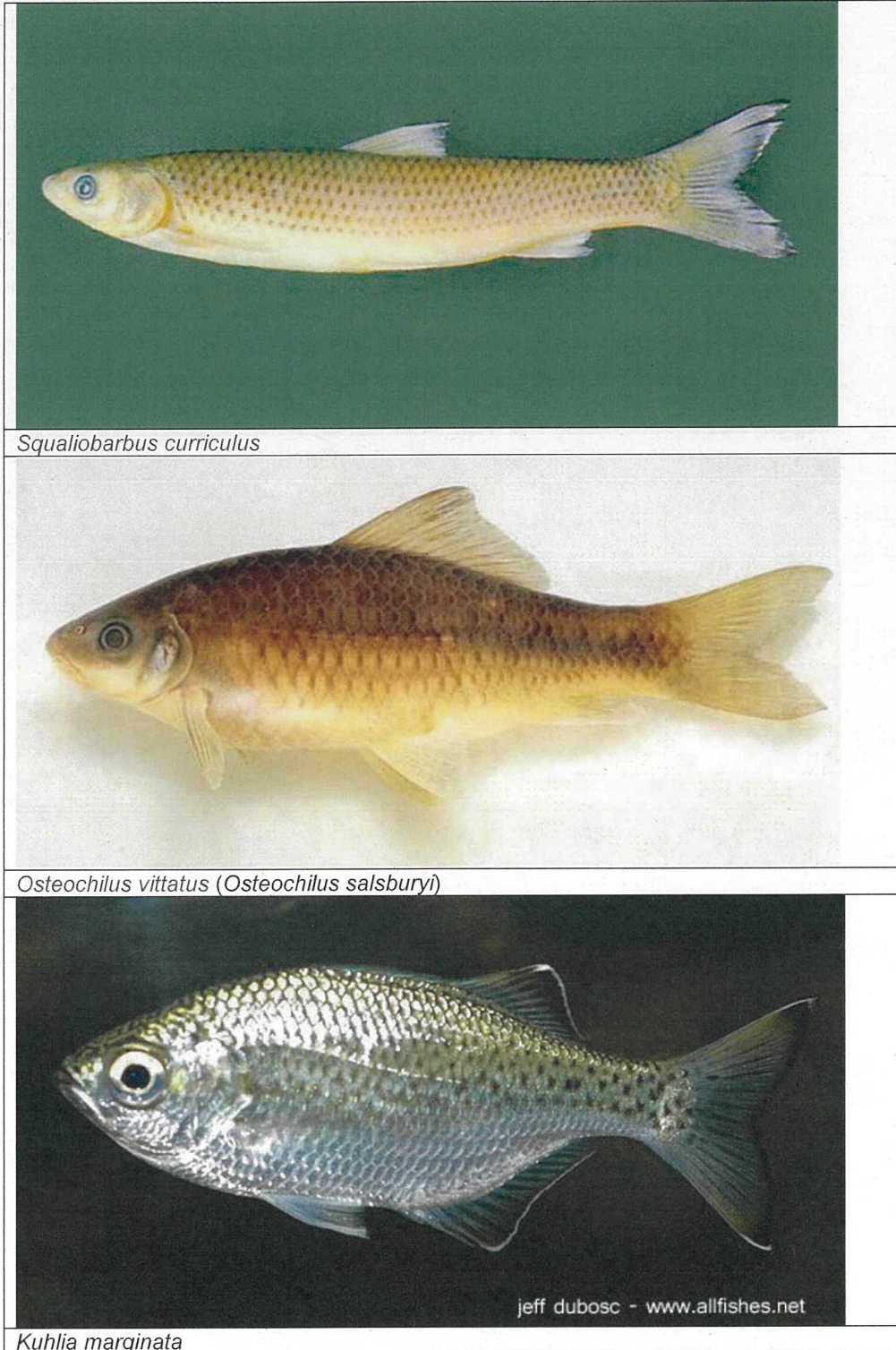


Figure 5.1 **Photos of the Baited Fish Trap**



Figure 6.1 Photos Showing the Condition of the Upper, Middle and Lower Section of Stream A and Tsang Kok Stream

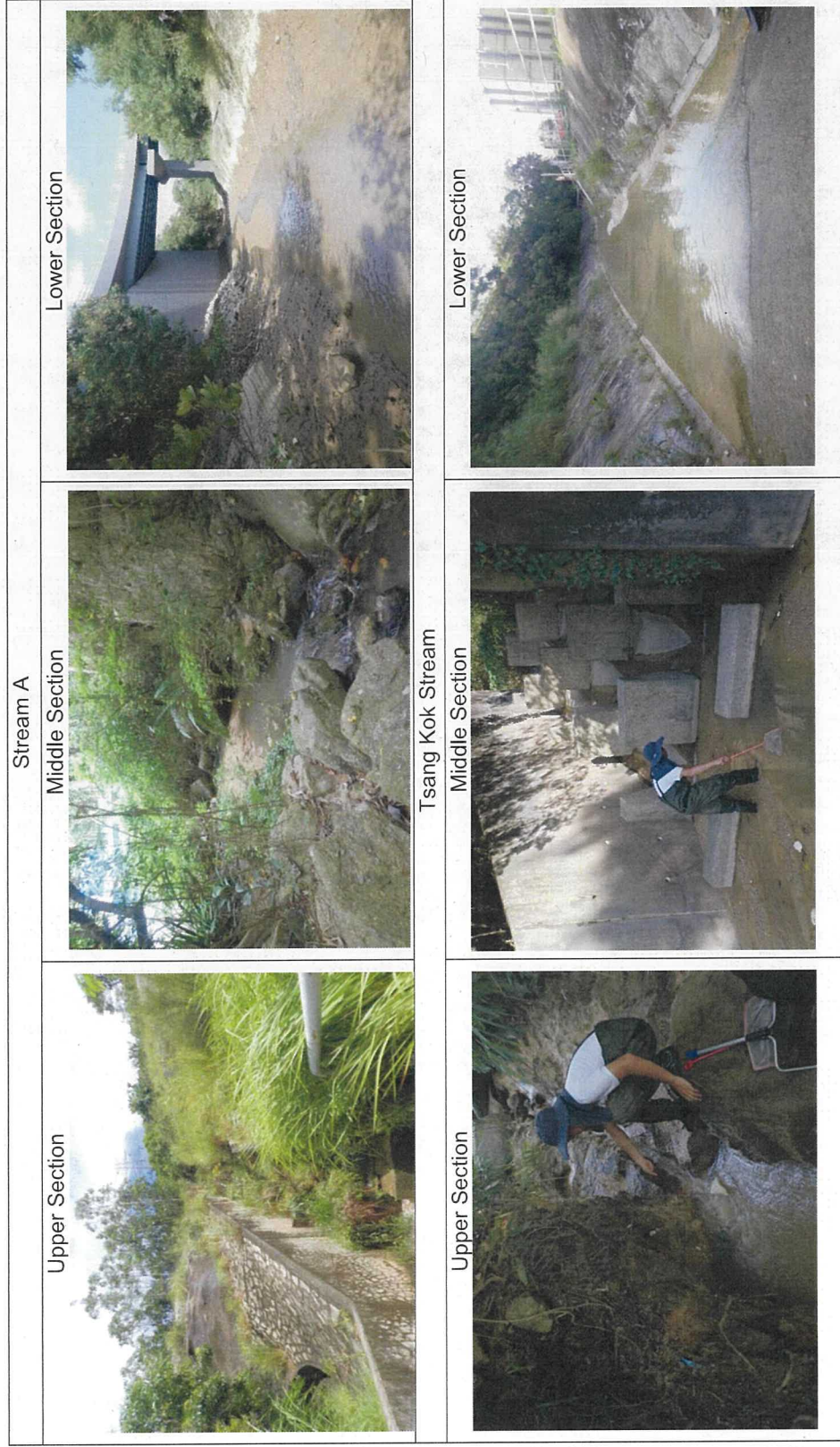


Figure 6.2 Photo Showing Trash in Stream A

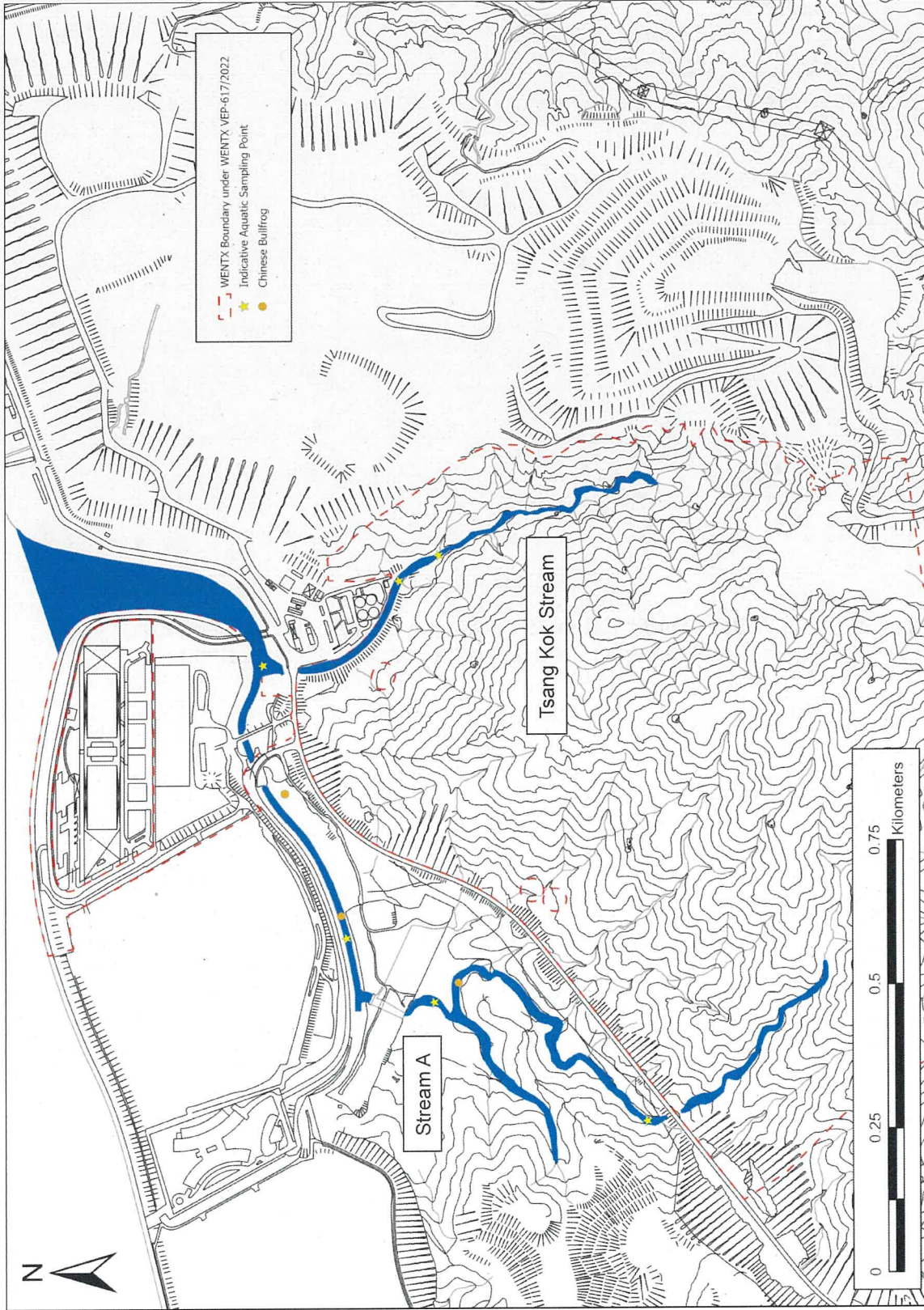


Figure 6.3 Photos Showing Chinese Bullfrog and Freshwater Species Identified during Pre-Survey



Appendix A.

**Map showing WENT Landfill Extension Boundary, Stream A and Tsang Kok Stream,
Indicative Sampling Location and Location of Chinese Bullfrog**



Appendix B Fish Species Recorded in Stream A and Tsang Kok Stream

Common Names	Scientific Names	Rarity and Distribution in Hong Kong ¹	Conservation status	Relative Abundance in Each Location	
				Stream A	Tsang Kok Stream
Jarbua Terapon	<i>Terapon jarbua</i>	Widespread in estuaries and coastal regions of Hong Kong.	-	+	+
Javanese Fathose Goby	<i>Pseudogobius javanicus</i>	A widespread species occurring in estuaries and coastal waters of Hong Kong.	-	+++	
Mullet	<i>Planiliza spp.</i>	Inhabits inlet waters and estuaries of rivers	-	++	
Nile Tilapia	<i>Oreochromis niloticus</i>	A widespread species occurring in most local streams, rivers and reservoirs. The fish is also cultivated in some fish farms.	-	+	
Redbelly Tilapia	<i>Coptodon zillii</i>	Records from streams, rivers and estuaries throughout Hong Kong.	-	++	
Shimofuri Goby	<i>Tridentiger bifasciatus</i>	Records from estuaries of northeast New Territories and Lantau.	-	+	
Shuttles Hoppfish	<i>Periophthalmus modestus</i>	It is the commonest mudskipper in Hong Kong and almost found in all mudflats and estuaries.	-	+	+
Snakehead Murrel	<i>Channa striata</i>	Uncommon in the wild and is an introduced species. Records from a few streams in North District and on Lantau Island.	-	+	
Spotted Scat	<i>Scatophagus argus</i>	Frequently recorded from estuaries and coastal areas. It is also a popular food fish.	-	+	+
Number of fish species recorded in Stream A and Tsang Kok Stream respectively				9	3
Total number of fish species recorded				9	

Notes

1. Agriculture, Fisheries and Conservation Department (2023). Species Database of the Hong Kong Biodiversity Information Hub.

Abbreviations

- Relative abundance: + = Scarce, ++ = Occasional, +++ = Abundant

