



Contract No. DPW 01/2020 Environmental Team for Drainage Improvement Works at Ngong Ping

Aquatic Fauna Translocation Survey Report | Hong Kong

0118/20/ED/0554b 02 | 26 February 2021

Formal Submission

Drainage Services Department



Document Control

Document Information

Project Title	Environmental Team for Drainage Improvement Works at Ngong Ping
Document Title	Contract No. DPW 01/2020 Environmental Team for Drainage Improvement Works at Ngong Ping
Fugro Project No.	0118-20
Fugro Document No.	0118/20/ED/0554b
Issue Number	02
Issue Status	Formal Submission
Fugro Legal Entity	Fugro Technical Services Limited
Issuing Office Address	A Room 723 & 725, 7/F, Block B, Profit Industrial Building, 1-15 Kwai Fung Crescent, Kwai Chung, Hong Kong

Client Information

Client	Drainage Services Department
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Client Document No.	00JPZQ in DP R 8/4163CD

Document History

Issue	Date	Status	Comments on Content	Prepared By	Checked By	Approved By
00	18 Jan 2021	For Review	For IEC Verification	KJB	FN	CL
01	27 Jan 2021	Addressed IEC comment	Addressed IEC comment on 27 January 2021	KJB	FN	CL
01	02 Feb 2021	No adverse comment from IEC and DSD	Awaiting EPD comments	KJB	FN	CL
02	26 Feb 2021	Addressed EPD comment	Addressed EPD comments sent last 23 February 2021	KJB	FN	CL

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Abbreviations

AFCD	Agriculture, Fisheries and Conservation Department
EIA	Environmental Impact Assessment
EIAO	Environmental Impact Assessment Ordinance
ET	Environmental Team
IEC	Independent Environmental Checker
ind.	Individuals
WS	Work Section

1. Introduction

1.1 Background

- 1.1.1 To enhance the capacity of the trunk drainage system and reduce the flood risk in Ngong Ping, long term drainage improvement works are proposed to be implemented under "PWP Item No. 4163CD – Drainage Improvement Works at Ngong Ping" (hereafter referred to as "the Project").
- 1.1.2 The Project is a designated project under Schedule 2 of the Environmental Impact Assessment Ordinance (EIAO) (Cap.499). An Environmental Impact Assessment (EIA) Report together with an Environmental Monitoring and Audit (EM&A) Manual (hereafter referred to as the "approved EM&A Manual") (Register No. AEIAR-169/2013) was prepared for the Project and approved by Environmental Protection Department (EPD) on 21 April 2013. An Environmental Permit (EP) was first issued on 7 August 2013 and its current version (EP No. EP-456/2013/A) as issued on 29 March 2019. These documents are available through the EIAO Register.
- 1.1.3 Fugro Technical Services Limited (FTS) has been appointed as the Environmental Team (ET) by Drainage Services Department (DSD) to implement the EM&A programme in accordance with the EP No. EP-456/2013/A and the approved EM&A Manual. As the ET, part of the scope of FTS, is to prepare and submit an Aquatic Fauna Translocation Survey Report (hereafter referred to as the "Report").

1.2 Purpose of the Survey

- 1.2.1 Baseline ecological studies recorded aquatic fauna species of conservation interest in the streams and tributaries just outside the Works Area as described in **Section 6 of the EIA report** and **Section 5 of the approved EM&A Manual**. However, despite their locations, these species may be present in the Project Area at the time the works commence and consequently may be potentially affected by the Project due to the connectivity of waterbodies.
- 1.2.2 In relation to this, an Aquatic Fauna Translocation Survey, a necessary avoidance measure was conducted by the qualified ecologist of the ET to confirm the presence of any aquatic fauna species of conservation interest and their current actual numbers in the adjacent waterbodies.
- 1.2.3 The survey was conducted in accordance with the requirements and methodology as stipulated in **EP Conditions 2.3 and 2.11; Item 10 of Table 5.2 of the approved EM&A Manual Section 5.5.2.1 and 5.5.2.17; and Section 6.12.3.7 of the EIA report**.

1.3 Relevant Legislations, Standards, Guidelines and Criteria

The Survey was undertaken in accordance with the guidelines, standards, documents, government ordinances and regulations as described below:

- *Building Department (BD) Practice Note for Authorized Persons and Registered Structural Engineers 295: Protection of Natural Streams/Rivers from Adverse Impacts Arising from*

Construction Works. A practice note for authorized persons and registered structural engineers which advises that construction works in or affecting natural streams/ivers (EIS) should be restrained where possible to minimise possible disturbance to these streams/ivers;

- *Country Parks Ordinance (Cap. 208).* Provides for the designation and management of country parks and special areas. Country parks are designated for the purpose of nature conservation, countryside recreation and outdoor education. Special Areas are created mainly for the purpose of nature conservation;
- *Drainage Services Department (DSD) Practice Note No. 1/2015.* A practice note which specifies guidelines on environmental and ecological considerations for river channel design;
- *Environmental Impact Assessment Ordinance (EIAO) (Cap. 499).* An ordinance for assessing the impact on the environment of certain projects and proposals, for protecting the environment and for incidental matters;
- *Environment, Transport and Works Bureau Technical Circular (Works) / ETWB TC (W) No. 5/2005.* A circular that designates the 690 m long section of the Ngong Ping Stream as an Ecologically Important Stream/River (EIS) in 2005;
- *EIAO Technical Memorandum Annexes 8 and 16.* Ecological assessment specific annexes which provide the criteria for evaluating ecological impact and guidelines for ecological assessment, respectively;
- *EIAO Guidance Notes No.7/2010 and 10/2010.* Guidance notes on the general guidelines for conducting an ecological baseline survey for ecological assessment and on some methodologies in conducting terrestrial and freshwater ecological baseline surveys, respectively;
- *Hong Kong Planning Standards and Guidelines Chapter 10 (HKPSG).* Covers planning considerations relevant to conservation. This chapter details the principles of conservation, the conservation of natural landscape and habitats, historic buildings, archaeological sites and other antiquities. It also addresses the issue of enforcement. The appendices list the legislation and administrative controls for conservation, other conservation related measures in Hong Kong and government departments involved in conservation;
- *Hong Kong Planning Standards and Guidelines (HKPSG) Chapter 10 "Conservation".* Provides landscape and conservation guidelines to achieve a balance between the need for development and the need to minimise disruption of the landscape and natural resources;
- *Protection of Endangered Species of Animals and Plants Ordinance (Cap. 586) and its subsidiary legislation.* Regulates the import, introduction from the sea, export, reexport,

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;

- *Site of Special Scientific Interest (SSSI) Register*. Lists the designated sites under the Town Planning Ordinance with special faunal, floral, ecological or geographical features;
- *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;
- *Town Planning Ordinance (Cap. 131)*. Provides for the designation of coastal protection areas, Sites of Special Scientific Interest (SSSIs), Conservation Area, Country Park, Green Belt or other specified uses that promote conservation or protection of the environment;
- *United Nations Convention on Biodiversity (1992)*. Requires signatories to make active efforts to protect and manage their biodiversity resources. Hong Kong Government has stated that it will be 'committed to meeting the environmental objectives' of the Convention (PELB 1996); and
- *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.

1.4 Structure of the Report

1.4.1 Succeeding Section 1 Introduction, the remainder of this Plan is presented as follows:

- Section 2 details the methodology of the Survey;
- Section 3 describes survey results; and
- Section 4 describes requirement for post-translocation monitoring

2. Methodology

This section presents the methodology and approach of the Survey during the pre-construction stage of the Project.

2.1 Personnel

The Survey was conducted by a qualified ecologist supported by a team of experienced ecologists as part of the Environmental Team (ET).

2.2 Survey Area

The Survey was conducted last 31 December 2020 to 03 January 2021 in the affected sections of the stream courses at Works Sections (WS) 1 and 6 and covered the stretch of the stream course 5 m upstream and 5 m downstream of the works as described in **Section 2.11 of the EP, Section 5.5.2.17 of the approved EM&A Manual, and Section 6.12.3.7 of the EIA report**. The construction works at WS 1 and 6 both commenced on 8 January 2021, dates within one week after the completion of the Survey as required in **Section 2.11 of the EP**. Representative photos of the affected sections are shown in **Figure 2.1 to Figure 2.3** while the maps of Survey Area are presented in **Appendix A.1 to Appendix A.4**.



Figure 2.1: Affected section of the stream course at Works Section 1



Figure 2.2: Affected section of the stream course at Works Section 6 adjacent to proposed Intake C



Figure 2.3: Affected section of the stream course at Works Section 1 upstream portion of the proposed Outfall B

2.3 Anticipated Species and Number

Several aquatic fauna species of conservation interest were pre-identified in the EIA report to be present in the affected sections of the stream courses at Works Sections (WS) 1 and 6. These include the stream crab *Somanniathelphusa zanklon*, reptile Reeves' terrapin *Mauremys reevesii* and the amphibian lesser spiny frog *Quasipaa exilispinosa*. In addition to this is the Romer's tree frog *Liuixalus romeri* and any other aquatic fauna species of conservation interest which also have possible presence in these areas.

The estimated numbers of aquatic fauna species of conservation interest for translocation works were based from their baseline relative abundance as described in the EIA report. The anticipated numbers are discussed in the succeeding sections.

Indicative EIA locations of these three species relative to the Project Area as described in **Table 6.6** and shown in **Figures 6.5a** and **6.5b** of the **EIA Report** are presented in **Appendix A.1** to **Appendix A.3** while photographs are shown in **Appendix B**.

2.3.1 Stream Crab

2.3.1.1 *S. zanklon* (**Appendix B.1**) is of Global Concern (Fellowes et al., 2002) and Endangered (Esser and Cumberlidge, 2008). However, it is widely distributed within Hong Kong with records from at least 43 sites in Lantau Island, northwestern and northeastern New Territories (Stanton and Leven, 2016). This species forages in irrigation ditches, flooded furrows; and slow-flowing stream and rivers (Dudgeon and Corlett, 1994).

2.3.1.2 *S. zanklon* individuals (ind.) were recorded in streams outside but close to the Project Area particularly at sampling points R2 and W2 near WS 1; and point W8 near WS 6. Relative abundance of this species ranged from 1 to 10 ind. in these three sampling points (**Table E7.1 of Appendix E7 of the EIA Report**).

2.3.2 Reptile

2.3.2.1 The Reeves' terrapin (**Appendix B.2**) although fairly common in Hong Kong (Karsen et al. 1998) is of Global Concern (Fellowes et al. 2002) and Endangered (van Dijk, 2011). This species is protected locally under the Wild Animals Protection Ordinance (Cap. 170). This inhabits reservoirs, ponds, rivers and slow-flowing streams.

2.3.2.2 Only one of individual of the Reeves' terrapin was recorded in the downstream survey point of W8 (**Table E4.2 of Appendix E4 of the EIA Report**)

2.3.3 Amphibian

2.3.3.1 The lesser spiny frog (**Appendix B.3**) which is a common and widely distributed species in Hong Kong and is present in hill streams and its adjacent areas, is considered to be of Potential Global Concern by Fellowes et al. (2002) and Vulnerable (Lau and Baorong, 2004).

2.3.3.2 Individuals of this species were recorded in the streams outside but close to the WS 1 of the Project Area particularly at sampling points R2, W1, and W2 with relative abundance ranging from 1 to 10 ind. during the wet season freshwater stream fauna survey of the EIA study (**Table E7.1 of Appendix E7 of the EIA Report**). Tadpoles were also recorded at point R2 during the dry season surveys.

2.3.3.3 The Romer's tree frog *Liuixalus romeri* (**Appendix B.4**) an endemic species in Hong Kong and distributed in woodlands of Lantau Island, has its largest population present in Ngong Ping (**Section 6.3.1.3 of the EIA Report**). This species is listed in Wild Animals Protection Ordinance (Cap. 170); considered to be of Potential Global Concern by Fellowes et al. (2002) and Endangered (Lau and Zhao, 2004).

2.4 Survey Methodology

Since most of the target aquatic fauna species of conservation interest, as described in the EIA report are nocturnal, night-time survey activities were conducted. Surveys started after sunset with reference to the Hong Kong Observatory and lasted for three hours. Any aquatic fauna of conservation interest found and collected during the Survey were translocated to the approved

receptor site on the same survey date. Separate plastic containers (**Figure 2.4**) were prepared, however, only one was used as temporary storage for the only fauna category actually collected during the translocation process. Translocation duration from the collection site to the receptor site only took less than one hour as both areas had accessible routes.



Figure 2.4: Plastic container as temporary storage during the translocation process

2.4.1 Stream Crab

Night-time surveys were conducted by kick netting and sweep netting. The net contents were sorted in a white sorting tray to retrieve the freshwater crab (if any) for translocation. However, kick netting was not possible in stream courses at WS1 and at WS6 portion directly adjacent to the proposed Intake C due to the very low water level in these areas. It was only feasible and done in sections particularly upstream area of the proposed Outfall B at WS6. The very low water level and slow to no flow condition of these stream courses were influenced by the current dry season period.

2.4.1.1 Kick Netting

Kick netting activity (**Figure 2.5**) was conducted at WS6. It was done in the water with the mouth of the net facing the water current. The substrate was disturbed by kicking to trap any dislodged crab from the stream bed. Other organisms accidentally collected during the process were returned to the stream.



Figure 2.5: Kick netting of the streambed at WS6

2.4.1.2 Sweep Netting

Survey activity included trailing of emergent vegetation and roots along the stream banks (Figure 2.6).



Figure 2.6: Trailing of emergent vegetation and roots along the stream banks

2.4.2 Reptile

Night-time surveys were conducted by active searching and hand collection. Appropriate microhabitats and refugia such as stones, crevices, woody debris and leaves along the riparian areas were actively searched (**Figure 2.7**). Separate plastic containers were prepared as temporary storage for each of fauna category of any species of conservation interest that might be collected. The plastic containers had some leaf litter and moist soil to provide cover and moisture for the species before the immediate release.



Figure 2.7: Active searching on appropriate microhabitats and refugia along the riparian areas

2.4.3 Amphibian

Night-time surveys were conducted by active searching, hand collection, sweep netting and setting of pitfall traps for adult amphibians of conservation interest while sweep-netting for their tadpoles. The collected individuals were temporarily stored in separate plastic container before release. The plastic container had enough amount of water to maintain amphibian moisture.

2.4.3.1 Active Search and Hand Collection

Active searching of appropriate microhabitats and refugia such as stones, crevices and leaf litter/debris along the riparian area were conducted. One hand cupped over the frog to prevent its escape and then gently grab the frog by the waist (Chan et al., 2005).

2.4.3.2 Sweep Net

Sweep net was used to collect amphibians found that were not collected by hand. Tadpoles were also collected using this equipment (**Figure 2.8**).



Figure 2.8: Sweep netting of tadpole individuals of the amphibian lesser spiny frog *Quasipaa exilispinosa*

2.4.3.3 Pitfall Trap

Traps were set using drift fence and sinking a plastic bucket (10 L) (Steinhilber et. al., unpublished) in the ground with the top of the bucket on ground level (**Figure 2.9** to **Figure 2.13**). Sections of drift fence were placed at intervals where applicable on the riparian area or part of the aquatic/terrestrial interface (Willson and Gibbons, 2010) such that incoming and outgoing amphibians were guided into the pitfall traps. Small holes were punched into the bottom of the buckets to avoid drowning of other organisms accidentally trapped inside due to accumulation of water in the bucket. The traps were left on the sites for three consecutive nights and were checked early the following mornings. Traps were closed during daytime intervals between night time surveys and were removed from the sites (**Section 2.6**) after the completion of all survey activities.



Figure 2.9: First pitfall trap set at a riparian area along stream course at WS 1



Figure 2.10: Second pitfall trap set at a riparian area along stream course at WS 1



Figure 2.11: First pitfall trap set at a riparian area along stream course at WS 6



Figure 2.12: Second pitfall trap set at a riparian area along stream course at WS 6



Figure 2.13: Third pitfall trap set at a riparian area along stream course at WS 6

2.5 Contingency Measures

Various methodologies were employed as aforementioned in **Section 2.4** to ensure that the maximum number of individuals of aquatic fauna species with conservation interest were surveyed and translocated. However, it may be possible that residual individuals may remain in the collection sites. For the vicinity within the proposed Outfall B and Intake C areas, fence shall be installed from the ground around it to prevent re-entry of the targeted species before the work starts. Nonetheless, to further ascertain that there are no aquatic fauna species with conservation interest present in other parts of the Project Area before commencement of construction works, the Survey was completed no more than one week before start of construction activities at WS 1 and 6 and prior to site clearance works. The ecologist of the ET may also carry out a visual inspection of the streams adjacent to the Project Area prior to the actual commencement of the relevant construction activities. During construction works, the ET regular water quality monitoring may provide information on the possible residual presence of these organisms and the regular site environmental audits shall ensure strict compliance to the recommendation in Sections 5.8.8.1 and 6.12 of the EIA Report such as the design of efficient silt removal facilities as based on the guidelines by ProPECC PN 1/94; and regular inspection and maintenance of all drainage facilities, among others; and Section 5.5.2.19 of the approved EM&A Manual to minimize and/or mitigate potential impact to the aquatic ecosystem, including these species of conservation interest.

In addition, environmental briefing/training sessions were provided for site staff to raise their awareness on environmental protection.

To avoid the translocated individuals from re-entering the streams within the Project Area, a suitable receptor site outside and far from the Project Area was selected. The details of the receptor site are described in the succeeding section.

2.6 Site Reinstatement

Pitfall traps were removed and sites were reinstated (Figure 2.14 to Figure 2.18) after the completion of all survey activities.



Figure 2.14: Reinstated site of first pitfall trap set-up at a riparian area along stream course at WS 1



Figure 2.15: Reinstated site of second pitfall trap set-up at a riparian area along stream course at WS 1



Figure 2.16: Reinstated site of first pitfall trap set-up at a riparian area along stream course at WS 6



Figure 2.17: Reinstated site of second pitfall trap set-up at a riparian area along stream course at WS 6



Figure 2.18: Reinstated site of third pitfall trap set-up at a riparian area along stream course at WS 6

3. Survey Results

3.1 Actual Species Present and Number

Among the pre-identified species of conservation interest anticipated to be present in the affected sections of the stream courses at Works Sections (WS) 1 and 6 such as the stream crab

Somaniathelphusa zanklon, reptile Reeves' terrapin *Mauremys reevesii* and the amphibian lesser spiny frog *Quasipaa exilispinosa*; and any other aquatic fauna species of conservation interest including but not limited to the Romer's tree frog *Liuixalus romeri*, only the *Q. exilispinosa* was present, collected and translocated during the survey period.

A total of nine healthy *Q. exilispinosa* tadpole individuals (**Figure 3.1**) with sizes that ranged from 43 mm 50 mm (**Appendix C**) was collected through sweep netting at a pool area of the stream course present in WS 1 (**Figure 2.1**). These individuals were temporarily stored at a plastic container (**Figure 3.2**) before release to the receptor site.



Figure 3.1: Collected tadpole individuals of the amphibian lesser spiny frog *Quasipaa exilispinosa*



Figure 3.2: Collected tadpole individuals of the amphibian lesser spiny frog *Quasipaa exilispinosa* temporarily stored in plastic container before release

3.2 Collection Site

The stream course (**Figure 2.1**) was characterized with sand to boulder substrate and was approximately 1.3 m in width. This water body had a very low water level of approximately 3 inches deep. During the surveys, the area had a slow to not flowing water which could be due to the current dry season period. Plant litter were observed in the stream course as input from the riparian vegetation composed of ferns, shrubs and trees.

3.3 Receptor Site

Prior to commencement of the construction activities, all tadpole individuals of *Q. exilispinosa*, an aquatic fauna of conservation interest collected during the Surveys were translocated to a suitable habitat (**Figure 3.3**) at a portion of the Ecologically Important Stream/River (EIS) inside the Ngong Ping Site of Special Scientific Interest (SSSI) (**Appendix A.1** and **Appendix A.4**). As an EIS, it has a high ecological value and already supported two fauna species of conservation interest including *S. zanklon* and *L. romeri* (Meinhardt Environment, Ltd., 2013). During the EIA study, *S. zanklon* was present in the area with relative abundance of 10-50 individuals (**Table E7.1 of Appendix E7 of the EIA Report**). Furthermore, it being located within an SSSI will be beneficial for the survival of the translocated individuals as, normally, no new development will be permitted within this zone unless it is necessary for conservation of the site (Hong Kong Planning Standards and Guidelines, Chapter 10).

During the translocation works, the site had a comparable substrate type, width, water depth, water velocity, plant litter presence and riparian vegetation characteristics with the collection site. The receptor site had a sand to boulder substrate type and with approximately 2 m width.

Its water depth was approximately 3 inches deep, with leaf litter present in the area as input from the riparian vegetation of herbs, shrubs, aroids and trees.



Figure 3.3: Translocation works for the nine tadpole individuals of the amphibian lesser spiny frog *Quasipaa exilispinosa* to a suitable habitat

4. Post-translocation Monitoring

No post-translocation monitoring is recommended as the receptor site is located outside the Project Area and inside an SSSI where no direct disturbance from the construction activities are expected. The regular construction phase monitoring programme shall ensure that the potential off-site disturbance impacts from the construction works are minimized to environmentally acceptable level and/or mitigated.

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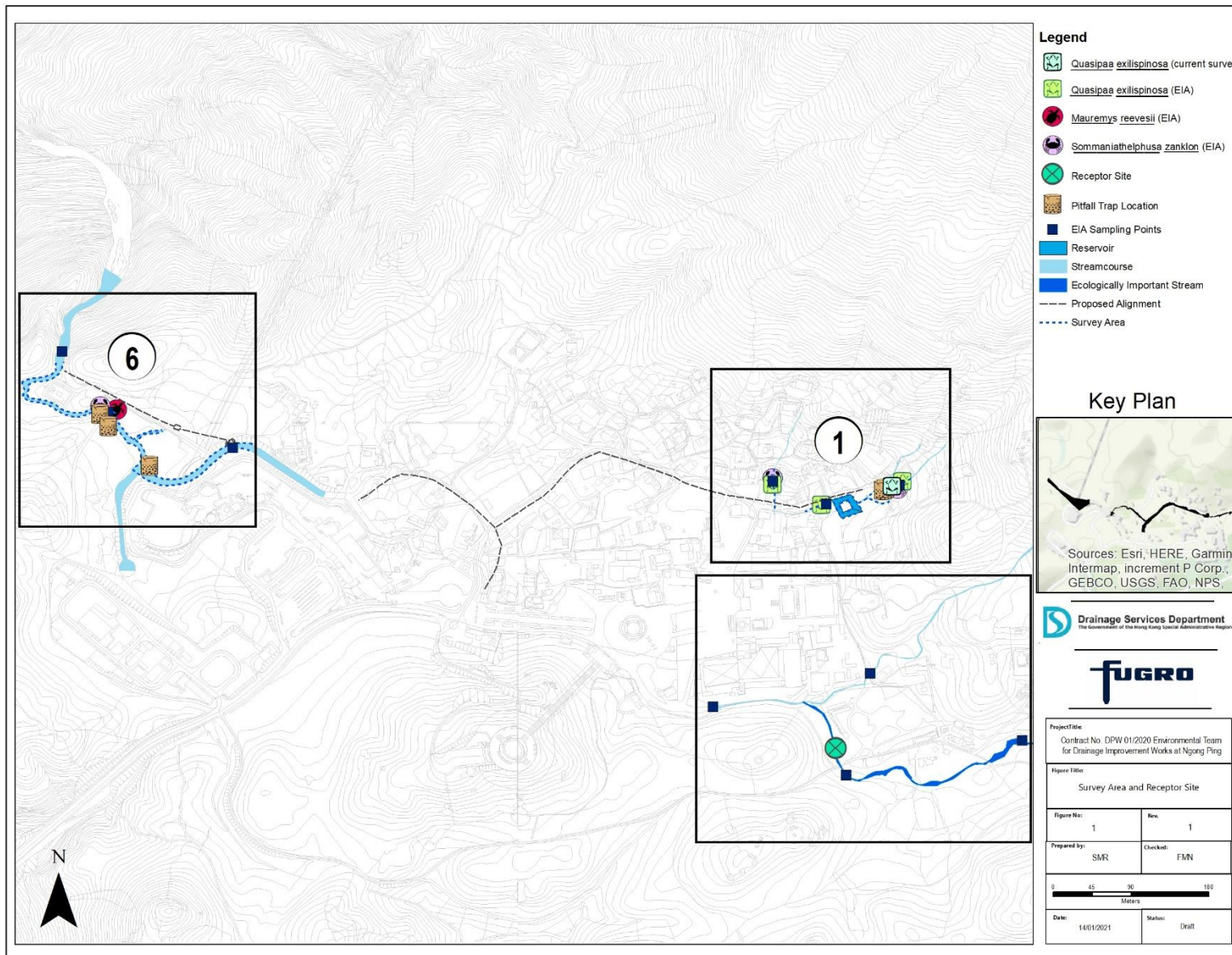
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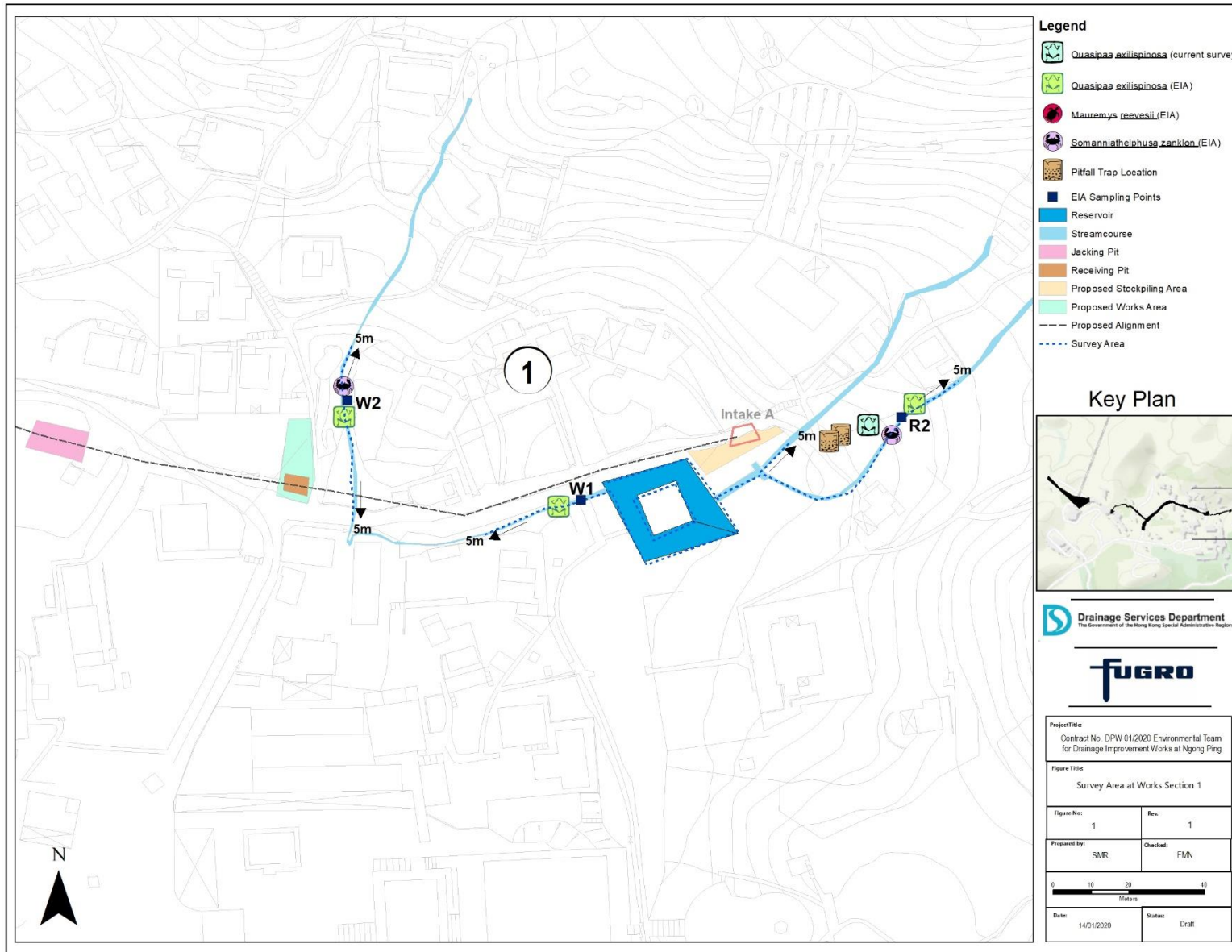
Willson, J. and J.W Gibbons. 2010. Drift fences, coverboards and other traps. *Amphibian Ecology and Conservation: A Handbook of Techniques*. 229-245.

Appendix A

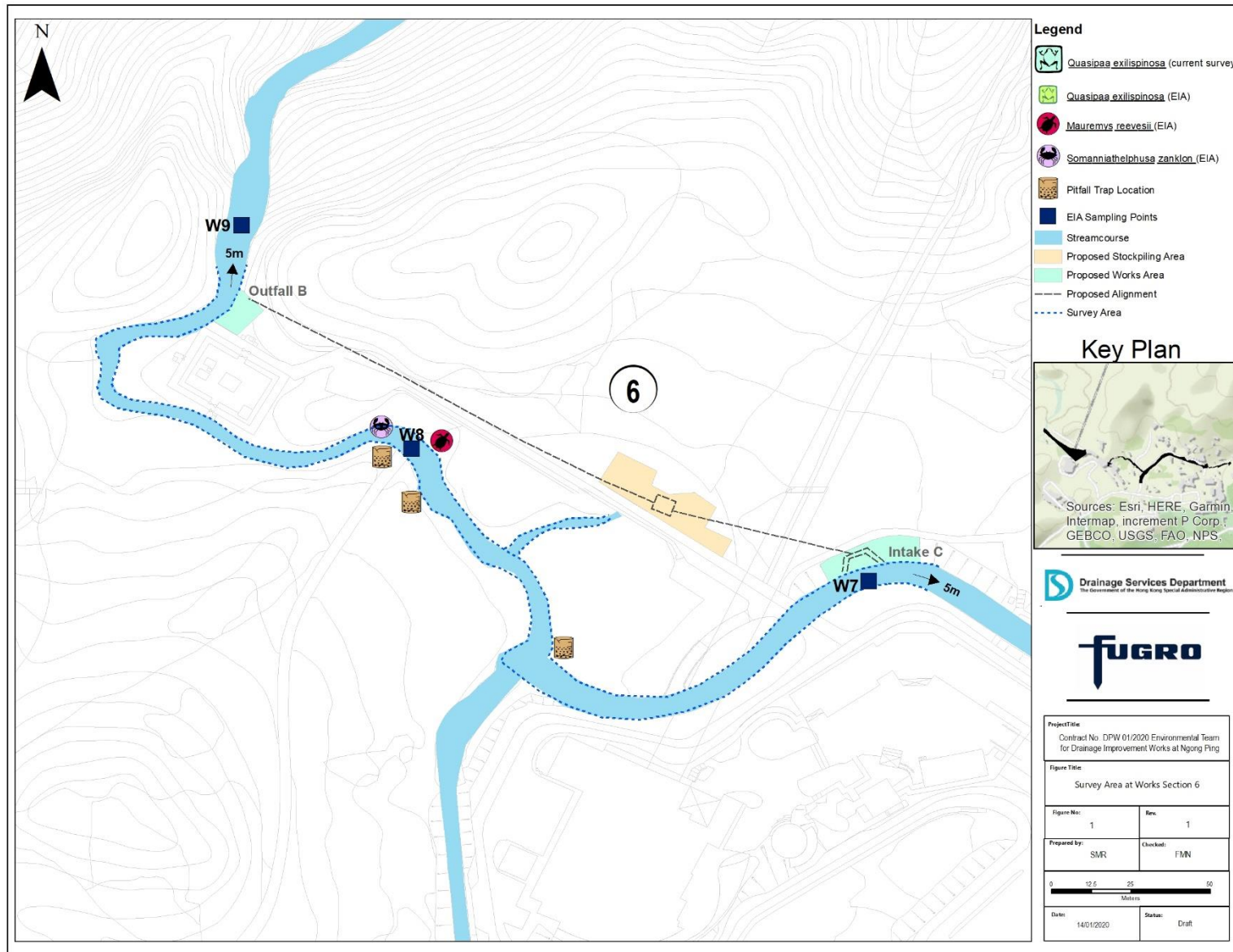
Survey area, collection site and
receptor site



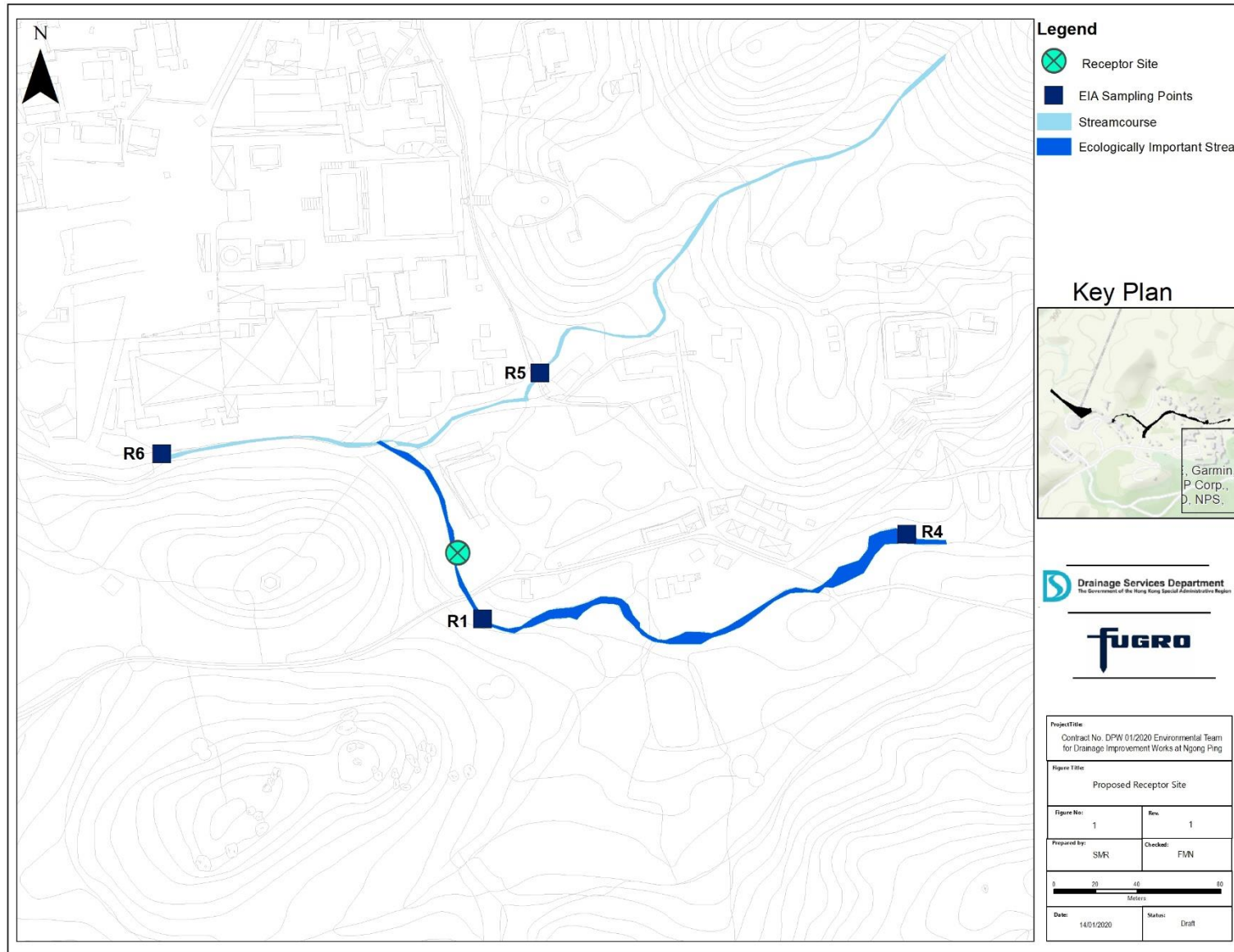
Appendix A.1: Map of the survey area and receptor site for translocation



Appendix A.2: Map of the survey area at Works Section 1



Appendix A.3: Map of the survey area at Works Section 6



Appendix A.4: Map of the receptor site

Appendix B

Anticipated species of aquatic fauna with conservation interest for translocation



Appendix B.1: The stream crab *Somanniathelphusa zanklon* (Huang, et al. 2018)



Appendix B.2: The Turtle Reeves' Terrapin *Mauremys reevesii* (Meinhardt Environment, Ltd., 2013)



Appendix B.3: The Lesser Spiny Frog *Quasipaa exilispinosa* (AFCD, 2020)



Appendix B.4: The Romer's Tree Frog *Liuixalus romeri* (To, und.)

Appendix C

Survey data sheet

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Aquatic Fauna Translocation Survey Data Sheet

Client: Drainage Services Department

Project: Contract No. DPW 01/2020 Environmental Team for Drainage Improvement Works at Ngong Ping

Details	Individual Number									
	1	2	3	4	5	6	7	8	9	
Date:	02 Jan 2021									→
Weather:	Cold; winter									→
Fauna species:	Smilax Smilax									→
Capture location coordinates:	22° 15.404' N 113° 59.537' E									→
Capture location description (substrate type, water body width, water body depth, water flow velocity, presence of plant litter, riparian vegetation characteristics):	Sand to boulder substrate; ~1.3 m width; ~3 in. depth; slow to no flow water body; plant litter present; riparian area with ferns, shrubs & trees									→
Capture equipment:	Sweep net									→
Size (mm):	45	44	48	43	50	45	45	50		44
Health condition (healthy, fair, poor):	Healthy									→



