

**Proposal for Alternative  
Water Quality Monitoring Location (Rev.3)**

**for**

**Inter-Reservoir Transfer Scheme –  
Water Tunnel Between Kowloon Byewash Reservoir  
and Lower Shing Mun Reservoir  
(Contract No.: DC/2018/08)**

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<b>Signature</b>		
<b>Date</b>	15 May 2019	16 May 2019

## 1. Introduction

- 1.1 In October 1998, DSD commissioned the Preliminary Project Feasibility Study (PPFS) Report for the Lai Chi Kok Transfer Scheme (LCKTS) with a view to formulate a cost-effective scheme to resolve the flooding problems in that area. The objective of LCKTS was to improve the existing engineered drainage system by intercepting water from the hinterland and upstream areas and convey the runoff via a tunnel to the sea. The LCKTS was to be designed with sufficient capacity to transfer overflow from Kowloon Group Reservoirs (KGR) and stormwater flow from the associated catchments. During the study, an innovative idea which is now known as the Inter-Reservoirs Transfer Scheme (IRTS) emerged. The concept for the IRTS is to provide a tunnel connection that will allow surplus overflow from the KGR to be transferred to the Lower Shing Mun Reservoir (LSMR). The proposed IRTS in association with LCKTS will conserve precious water resources by reducing and transferring the overflow from KGR to LSMR and optimise the size of Lai Chi Kok Drainage Tunnel (LCKDT) to be constructed under the LCKTS project to alleviate flood risk in the Lai Chi Kok area.
- 1.2 The construction contract, with contract No. DC/2018/08, has been commenced since Feb 2019 and the construction works is anticipated to be completed by the end of year 2022. The construction site is mainly divided into two parts, which are the intake site (Kowloon Byewash Reservoir, KBR) and the outfall site (LSMR). Site layouts are attached in Appendix A.
- 1.3 Acuity Sustainability Consulting Limited (ASCL) is commissioned as the project Environmental Team (ET) as defined in the Environmental Permit with Permit No. EP-345/2009.
- 1.4 Objective of this document is to report the latest condition of Water Quality Monitoring Points pre-determined in the approved EM&A Manual, to evaluate the feasibility for conducting monitoring at pre-determined locations and to propose locations for conducting actual Baseline and Impact monitoring.

2. Latest Condition of Monitoring Locations

2.1 According to the approved EM&A Manual (Report No. 240564/04/E), Water Quality Monitoring should be conducted at monitoring station C1, C2, D1 and D2 as detailed in Table 1. Locations of the original monitoring stations are shown in Appendix A, which are Figure 5.1 and 5.2 from the approved EM&A Manual.

Location ID	Description
C1	Control Point near Intake Site
C2	Control Point near Outfall Site
D1	Discharge Point near Intake Site
D2	Discharge Point near Outfall Site

Table 1 – Original Water Quality Monitoring Stations

2.2 According to Section 5.4.1 of the approved EM&A Manual, final locations and number of the monitoring points should be agreed with EPD prior to the commencement of water quality monitoring activities. Field visits were conducted on 23 and 25 April 2019 to verify the conditions of the original water monitoring points. Findings are summarised in Table 2 to 5.

Table 2 – Existing Condition of C1	
Photo	 A photograph showing a stepped channel structure. The channel is made of concrete steps and has a metal railing on the right side. A red circle highlights a specific area on the channel, possibly a monitoring point or a specific feature. The background shows dense green foliage.
Type of Watercourse	Stepped channel
Accessibility	Accessible
Observation	The function of this stepped channel is mainly for collecting and diverting surface run-off to the stream adjoining C1 as shown in Appendix A. There was no water flow observed at the stepped channel. It is believed that the situation would be the same during non-rainy days. There is also no safe access to reach the downstream watercourse joining C1 and D1.
Recommendation	Monitoring point should be relocated due to unstable water source from stepped channel and unreachable downstream watercourse between C1 and D1.

**Table 3 – Existing Condition of D1**

<p><b>Photo</b></p>	
<p><b>Type of Watercourse</b></p>	<p>Junction of stepped channel and overflow channel of KBR</p>
<p><b>Accessibility</b></p>	<p>Accessible</p>
<p><b>Observation</b></p>	<p>Outfall of the stepped channel adjoining D1 could not be found at the location indicated in the approved EM&amp;A Manual.</p>
<p><b>Recommendation</b></p>	<p>Monitoring point should be relocated due to discrepancy between the approved EM&amp;A Manual and existing field condition.</p>

**Table 4 – Existing Condition of C2**

<p><b>Photo</b></p>	
<p><b>Type of Watercourse</b></p>	<p>Natural Stream</p>
<p><b>Accessibility</b></p>	<p>Temporarily Inaccessible</p>
<p><b>Observation</b></p>	<p>Natural stream flowing towards the LSMR was observed. A temporary access could be provided after confirmation of monitoring location.</p>
<p><b>Recommendation</b></p>	<p>The stream where C2 is located at is the major source of catchment supply to the reservoir area which the construction is going to take place at. Therefore, water quality of that stream should be similar to that of the reservoir at the construction area. It is feasible to conduct water quality monitoring at C2 once temporary access is provided.</p>

**Table 5 – Existing Condition of D2**

<p><b>Photo</b></p>	
<p><b>Type of Watercourse</b></p>	<p>Junction of stepped channel and overflow channel of Kowloon Byewash Reservoir</p>
<p><b>Accessibility</b></p>	<p>Accessible</p>
<p><b>Observation</b></p>	<p>Outfall of the stepped channel was observed at D2. Water trail from the stepped channel was also observed but there was no water flow. The function of this stepped channel is mainly for collecting and diverting surface run-off from the Southeast corner of the Lower Shing Mun Reservoir to the overflow channel of the Lower Shing Mun Supply Basin.</p>
<p><b>Recommendation</b></p>	<p>Monitoring point should be re-located due to proximity to the construction site. Furthermore, there is unlikely to have water flow during non-rainy days.</p>

3. Proposed Water Quality Monitoring Location

3.1 After reviewing existing conditions of the original water quality monitoring stations, it is recommended that monitoring stations C1, D1 and D2 should be relocated so that representable and practical monitoring can be conducted. Meanwhile, monitoring stations C2 is feasible for conducting water quality monitoring.

3.2 As shown in Appendix B, which is layout showing identified water sensitive receivers (WSRs), major catchment supply of the KBR is the overflow channel connecting from Kowloon Reception Reservoir (KRR) and directing to KBR. Water flow was observed in this channel while the amount was relatively small. This issue could be tackled by paying extra attention during water sampling so as to reduce the chance of stirring up sediment at the channel-bed. Therefore, it is proposed that C1 should be relocated to C1b as shown in Appendix A. The proposed alternative control point is located just at the upstream of site boundary. Water Supplies Department / Drainage Services Department should be consulted since the channel is fenced off as a measure of flood risk control. Existing conditions of proposed alternative monitoring point C1b is summarised in Table 6.

**Table 6 – Proposed Alternative Monitoring Station C1b**

<p><b>Photo</b></p>	
<p><b>Type of Watercourse</b></p>	<p>Overflow channel of KRR</p>
<p><b>Accessibility</b></p>	<p>Temporarily Inaccessible</p>
<p><b>Justification</b></p>	<p>The overflow channel is directing water flow to the site area and may be exposed to risk of direct impact during construction. Therefore, it is proposed to be the alternative control point for the intake site.</p>

- 3.3 Monitoring station D1 is proposed to be relocated to D1b as shown in Appendix A. As the KBR is the waterbody which the construction would take place at, water in the KBR should have the highest potential of experiencing direct impact by the construction works. Besides, KBR is the receptor of stream water flowing through the proposed control point C1b, therefore it is considered that any impact to the water body of KBR arising from the construction works could be readily reflected at D1b. Existing conditions of proposed alternative monitoring point D1b is summarised in Table 7.

<b>Table 7 – Proposed Alternative Monitoring Station D1b</b>	
<b>Photo</b>	
<b>Type of Watercourse</b>	Water in Kowloon Byewash Reservoir
<b>Accessibility</b>	Accessible
<b>Justification</b>	The proposed alternative impact monitoring station is located right in front of the main dam of KBR and right next to the construction site boundary as shown in Appendix A. It is considered the waterbody is the most susceptible to the construction works since the site will occupy part of the reservoir. It is also close enough to the proposed control monitoring point C1b and therefore more representable assessment result could be expected by comparing data collected at C1b and D1b.

3.4 Monitoring station D2 is proposed to be relocated to D2a as shown in Appendix A. As the Lower Shing Mun Reservoir (LSMR) is the waterbody which the construction would take place at, water in the LSMR should have the highest potential of experiencing direct impact by the construction works. Besides, LSMR is the receptor of stream water flowing through the proposed control point C2, therefore it is considered that any impact to the water body arising from the construction works could be readily reflected at D2a. Existing conditions of proposed alternative monitoring point D2a is summarised in Table 8.

<b>Table 8 – Proposed Alternative Monitoring Station D2a</b>	
<b>Photo</b>	
<b>Type of Watercourse</b>	Water in Lower Shing Mun Reservoir
<b>Accessibility</b>	Accessible
<b>Justification</b>	The proposed alternative impact monitoring station is located at the Southeast corner of LSMR and right next to the construction site boundary (cofferdam) as shown in Appendix A. It is considered the waterbody is the most susceptible to the construction works since the site will occupy part of the reservoir. It is also close enough to the proposed control monitoring point C2a and therefore more representable assessment result could be expected by comparing data collected at C2 and D2a.

3.5 Locations of proposed alternative monitoring points are shown in Appendix A.

#### 4. Conclusion

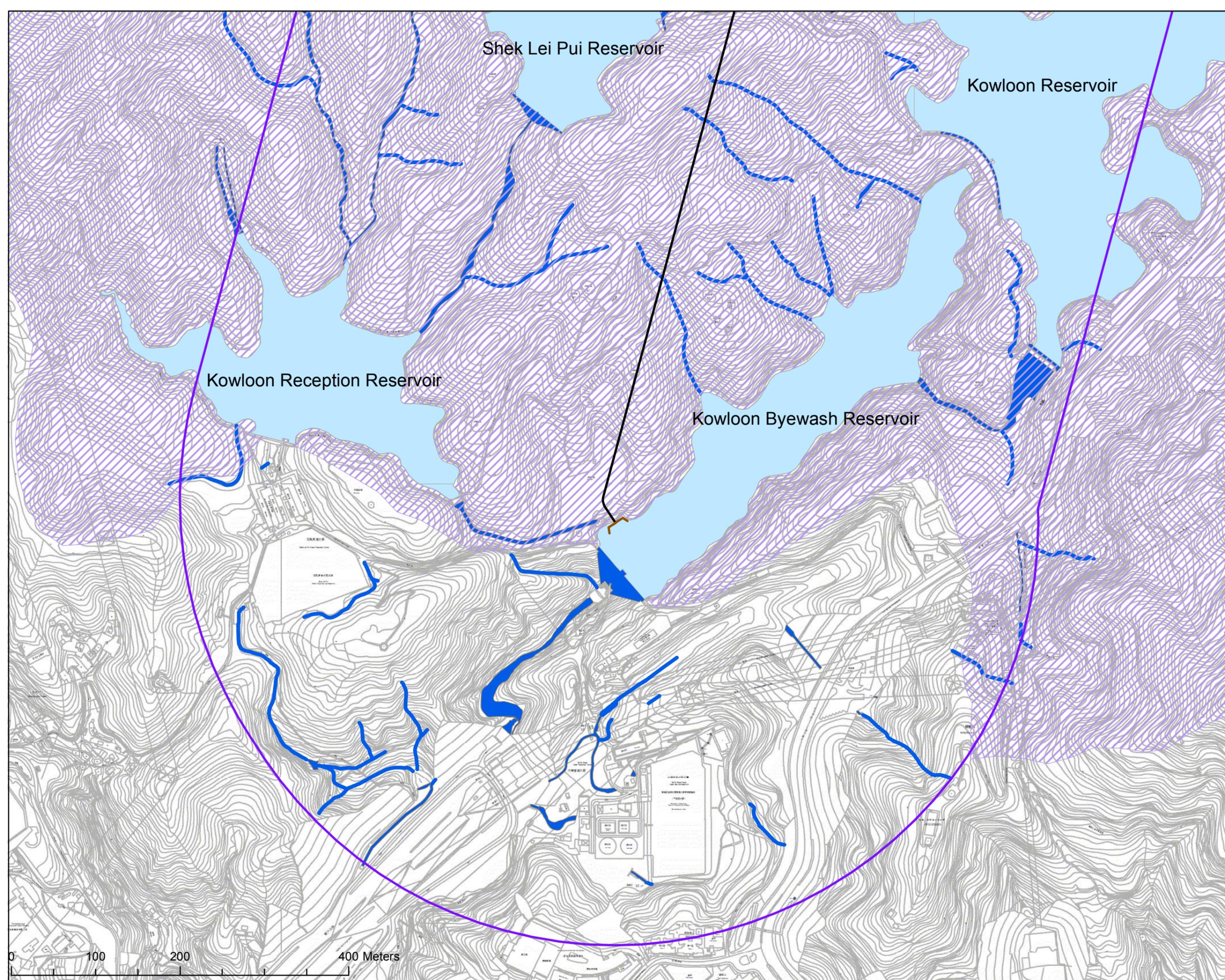
- 4.1 In conclusion, water quality monitoring of this project is proposed to be conducted at monitoring stations C1b, D1b, C2 and D2a. The proposed locations are considered to be representable in reflecting water quality as well as effectiveness of mitigation measures associated with the project during construction phase.

Appendix A – Site Layout with Locations of Original and Proposed Alternative Water Quality Monitoring Stations





Appendix B – Nearby Identified Water Sensitive Receivers (WSRs)



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Initial	Designed	Reviewed	Drawn	Checked
	PSY	Amy	PSY	Amy
Date	May 2017	May 2017	May 2017	May 2017
Revision	Date	Description	Initial	

- Legend**
- Study Area (500m)
  - Location of Intake Structure
  - Underground Water Tunnel
  - Reservoir
  - Lower Direct Water Gathering Ground
  - Watercourse



Approved

Agreement No. CE54/2006

Project Title  
**INTER-RESERVOIRS TRANSFER SCHEME (IRTS)  
 WATER TUNNEL BETWEEN  
 KOWLOON BYEWASH RESERVOIR AND  
 LOWER SHING MUN RESERVOIR  
 - INVESTIGATION, DESIGN AND CONSTRUCTION**

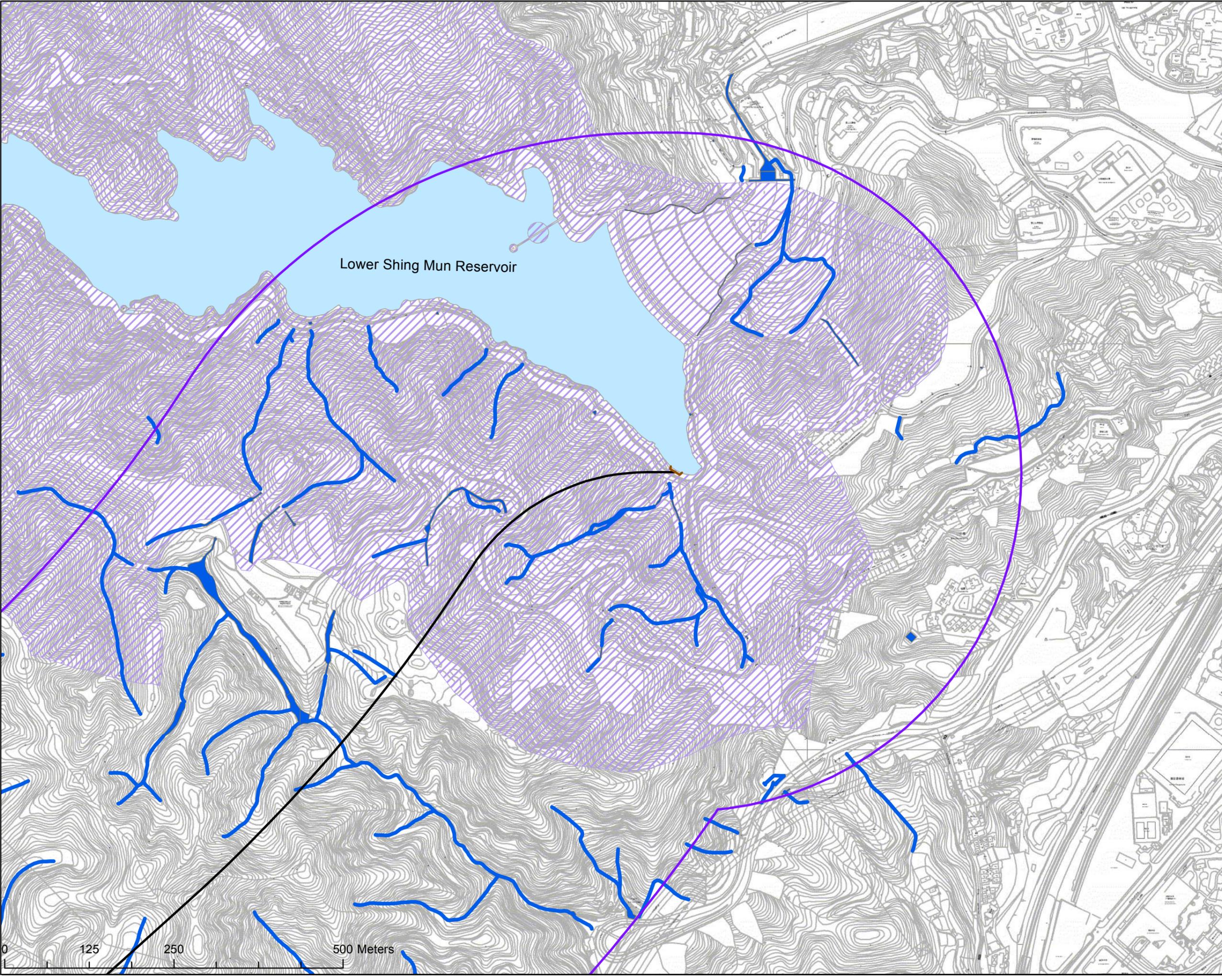
Figure Title  
**Locations of WSRs  
 (Intake End)**

Drawing No. Figure-3	Scale 1:4,000 @ A3
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Initial	Designed	Reviewed	Drawn	Checked
PSY	PSY	Amy	PSY	Amy
Date	May 2017	May 2017	May 2017	May 2017
Revision	Date	Description	Initial	

- Legend**
-  Study Area (500m)
  -  Location of Outfall Structure
  -  Underground Water Tunnel
  -  Reservoir
  -  Watercourse
  -  Lower Direct Water Gathering Ground



Lower Shing Mun Reservoir



Approved

Agreement No. CE54/2006  
 Project Title  
**INTER-RESERVOIRS TRANSFER SCHEME (IRTS)  
 WATER TUNNEL BETWEEN  
 KOWLOON BYWASH RESERVOIR AND  
 LOWER SHING MUN RESERVOIR  
 - INVESTIGATION, DESIGN AND CONSTRUCTION**

Figure Title  
**Locations of WSRs  
 (Outfall End)**

Drawing No. Figure-4      Scale 1:5,000 @ A3

Client  
 渠務署  
 Drainage Services Department

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