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5. WATER QUALITY

5.1 Introduction

5.1.1 This Section assesses the potential water quality impacts associated with the construction and operation of the Project in accordance with the requirements stated in *Clause 3.4.6* of the *EIA Study Brief (ESB-334/2020) (EIA SB)*. Potential impacts to the Water Sensitive Receivers (WSRs) have been identified and evaluated, and mitigation measures recommended where necessary to minimise the potential impacts.

5.2 Relevant Legislation and Guidelines

5.2.1 The following legislation and relevant guidance or non-statutory guidelines are applicable to the evaluation of water quality impacts associated with the construction and operation of the Project.

- *Water Pollution Control Ordinance (WPCO) (Cap. 358)*;
- *Technical Memorandum for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal* Waters (TM-DSS);
- *Environmental Impact Assessment Ordinance (EIAO)* (Cap. 499) and the *Technical Memorandum on EIA* Process (EIAO-TM), Annexes 6 and 14;
- *Practice Note for Professional Persons, Construction Site Drainage (ProPECC PN1/94);*
- *ETWB Technical Circular (Works) No. 5/2005 Protection of Natural Streams/Rivers from Adverse Impacts Arising from Construction Works*
- *Drainage Services Department Practice Note No. 3/2021: Guidelines on Design for Revitalisation of River Channel*; and
- *Hong Kong Planning Standards and Guidelines (HKPSG)*

Water Pollution Control Ordinance (WPCO) (Cap. 358)

5.2.2 The *Water Pollution Control Ordinance (WPCO)* is the primary legislation for the control of water pollution and water quality in Hong Kong. Under the *WPCO*, Hong Kong waters are divided into 10 Water Control Zones (WCZs). Each WCZ has a designated set of statutory Water Quality Objectives (WQO). The Project site is located within the Southern WCZ. The applicable WQOs for Southern WCZ are presented in **Table 5.1**.

Table 5.1 - Water Quality Objectives for the Southern WCZ

	Water Quality Objective	**Southern WCZ**
A	AESTHETIC APPEARANCE	
a)	Waste discharges shall cause no objectionable odours or discolouration of the water.	Whole zone
b)	Tarry residues, floating wood, articles made of glass, plastic, rubber or of any other substances should be absent.	Whole zone
c)	Mineral oil should not be visible on the surface. Surfactants should not give rise to lasting foam.	Whole zone
d)	There should be no recognisable sewage-derived debris.	Whole zone
e)	Floating, submerged and semi-submerged objects of a size likely to interfere with the free movement of vessels, or cause damage to vessels, should be absent.	Whole zone
f)	Waste discharges shall not cause the water to contain substances which settle to form objectionable deposits.	Whole zone
B	BACTERIA	
a)	The level of *Escherichia coli* should not exceed 610 per 100 mL, calculated as the geometric mean of all samples collected in one calendar year.	Secondary Contact Recreation Subzone & Fish Culture Zones
b)	The level of Escherichia coli should not exceed 180 per 100 mL, calculated as the geometric mean of all samples collected from March to October inclusive in one calendar year. Samples should be taken at least 3 times in a calendar month at intervals of between 3 and 14 days.	Bathing Beach Subzones (L.N. 453 of 1991)
C	DISSOLVED OXYGEN	
a)	Waste discharges shall not cause the level of dissolved oxygen to fall below 4 milligrams per litre for 90% of the sampling occasions during the year; values should be calculated as the water column average (arithmetic mean of at least 3 measurements at 1 metre below surface, mid-depth, and 1 metre above seabed). In addition, the concentration of dissolved oxygen should not be less than 2 milligrams per litre within 2 metres of the seabed for 90% of the sampling occasions during the year.	Marine waters excepting Fish Culture Subzones
b)	The dissolved oxygen level should not be less than 5 milligrams per litre for 90% of the sampling occasions during the year; values should be calculated as water column average (arithmetic mean of at least 3 measurements at 1 metre below surface, mid-depth and 1 metre above seabed). In addition, the concentration of dissolved oxygen should not be less than 2 milligrams per litre within 2 metres of the seabed for 90% of the sampling occasions during the year.	Fish Culture Subzones
c)	Waste discharges shall not cause the level of dissolved oxygen to be less than 4 milligrams per litre.	Inland waters of the Zone

	Water Quality Objective	**Southern WCZ**
D	pH	
a)	The pH of the water should be within the range of 6.5-8.5 units. In addition, waste discharges shall not cause the natural pH range to be extended by more than 0.2 units.	Marine waters excepting Bathing Beach Subzones; Mui Wo (A), Mui Wo (B), Mui Wo (C), Mui Wo (E) and Mui Wo (F) Subzones.
b)	The pH of the water should be within the range of 6.0-9.0 units.	Mui Wo (D) Sub-zone and other inland waters.
c)	The pH of the water should be within the range of 6.0-9.0 units for 95% of samples. In addition, waste discharges shall not cause the natural pH range to be extended by more than 0.5 units.	Bathing Beach Subzones
E	TEMPERATURE	
a)	Human activity should not cause the natural daily temperature range to change by more than 2.0ºC.	Whole zone
F	SALINITY	
a)	Change due to waste discharge not to exceed 10% of natural ambient level	Whole zone
G	SUSPENDED SOLIDS	
a)	Waste discharges shall neither cause the natural ambient level to be raised by 30% nor give rise to accumulation of suspended solids which may adversely affect aquatic communities.	Marine waters
b)	Waste discharges shall not cause the annual median of suspended solids to exceed 20 milligrams per litre.	Mui Wo (A), Mui Wo (B), Mui Wo (C), Mui Wo (E) and Mui Wo (F) Subzones.
c)	Waste discharges shall not cause the annual median of suspended solids to exceed 25 milligrams per litre.	Mui Wo (D) Sub-zone and other inland waters.
H	AMMONIA	
a)	The ammonia nitrogen level should not be more than 0.021 milligram per litre, calculated as the annual average (arithmetic mean), as unionised form.	Whole zone
I	NUTRIENTS	
a)	Nutrients shall not be present in quantities sufficient to cause excessive or nuisance growth of algae or other aquatic plants.	Marine waters
b)	Without limiting the generality of objective (a) above, the level of inorganic nitrogen should not exceed 0.1 milligram per litre, expressed as annual water column average (arithmetic mean of at least 3 measurements at 1 metre below surface, mid-depth and 1 metre above seabed).	Marine waters
J	5-DAY BIOCHEMICAL OXYGEN DEMAND	
a)	Waste discharges shall not cause the 5-day biochemical oxygen demand to exceed 5 milligrams per litre.	Inland waters of the zone
K	CHEMICAL OXYGEN DEMAND	
a)	Waste discharges shall not cause the chemical oxygen demand to exceed 30 milligrams per litre.	Inland waters of the zone
L	DANGEROUS SUBSTANCES / TOXIC SUBSTANCES / TOXINS	
a)	Waste discharges shall not cause the concentrations of dangerous substances in marine waters to attain such levels as to produce significant toxic effects in humans, fish or any other aquatic organisms, with due regard to biologically cumulative effects in food chains and to toxicant interactions with each other.	Whole zone
b)	Waste discharges of dangerous substances shall not put a risk to any beneficial uses of the aquatic environment.	Whole zone

Technical Memorandum for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal Waters (TM-DSS)

5.2.3 All discharges during both the construction and operation phases of the proposed Project are required to comply with the *Technical Memorandum Standards for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal Waters (TM-DSS)* issued under *Section 21* of the *WPCO*.

5.2.4 The *TM-DSS* defines acceptable discharge limits to different types of receiving waters. Under the *TM-DSS*, effluents discharged into the drainage and sewerage systems, inland and coastal waters of the WCZs are subject to pollutant concentration standards for specified discharge volumes. These are defined by the Environmental Protection Department (EPD) and are specified in licence conditions for any new discharge within a WCZ.

Technical Memorandum on Environmental Impact Assessment Process (EIAO-TM)

5.2.5 *Annexes 6* and *14* of the *EIAO-TM* provide general guidelines and criteria to be used in assessing water quality impacts.

5.2.6 The *EIAO-TM* recognises that, in the application of the above water quality criteria, it may not be possible to achieve the WQO at the point of discharge as there are areas which are subjected to greater impacts (which are termed by the EPD as the mixing zones), where the initial dilution of the discharge takes place. The definition of this area is determined on a case-by-case basis. In general, the criteria for acceptance of the mixing zones are that it must not impair the integrity of the water body as a whole and must not damage the ecosystem.

Practice Note for Professional Persons, Construction Site Drainage (ProPECC PN1/94)

5.2.7 Apart from the above statutory requirements, the *Practice Note for Professional Persons, Construction Site Drainage (ProPECC PN1/94)*, issued by EPD in 1994, also provide useful guidelines on water pollution associated with construction activities.

ETWB Technical Circular (Works) No. 5/2005 Protection of Natural Streams/Rivers from Adverse Impacts Arising from Construction Works

5.2.8 A notable portion of works to be conducted under this Project involve works within (mostly) natural / minimally-modified river / channel. This ETWB Technical Circular outlined existing measures and improvement measures to be taken by the project proponent to protect such natural streams / rivers.

Drainage Services Department Practice Note No. 3/2021: Guidelines on Design for Revitalisation of River Channel

5.2.9 This Practice Note presents the essential environmental, ecological, and social considerations that should be taken into account in the design of river channels in a revitalization project. On water quality perspective, a number of considerations were

taken into account including, water quality goal for the revitalized water bodies, measures for pollution removal from the catchment, engineered wetland, garbage collection, desiltation, bioremediation as well as mixing. Guiding principles on water quality monitoring and management arrangement are provided under the Practice Note.

Hong Kong Planning Standards and Guidelines (HKPSG)

5.2.10 Drainage works and river training are categorized under potentially polluting uses and activities under the *Hong Kong Planning Standards and Guidelines (HKPSG)*. The main concern is pollution caused by silt, oil and floating refuse while work is in progress. Care should be taken in planning and implementation of works to avoid, minimise or ameliorate the occurrence of these adverse effects on water bodies.

5.3 Description of the Environment

5.3.1 Watercourses identified in the assessment area are presented shown in **Figure 5.1**. As shown, there are a number of rivers / watercourses within the Project site which will be affected due to the proposed drainage works, including River Silver (the lowest tributary among the Mui Wo River System), Luk Tei Tong River (flows North from Luk Tei Tong Tsuen into River Silver), Tai Tei Tong River (flows East from Ma Po Tsuen into River Silver), Pak Ngan Heung River (flows South from Tai Tei Tong Tsuen into River Silver) and Wang Tong River (to the Northeast of the above rivers and has separate river mouth). Part of these rivers / watercourses are already channelized. Wang Tong River, which has a separate catchment, is located to the northeast of the Project and is within the 500 m water quality assessment area. The sections of these rivers located within the assessment area are generally tidally influenced given the relatively low elevation. Also, there are multiple fish ponds identified to the south of River Silver and to the east of Luk Tei Tong River, and they are also located within the assessment area. Furthermore, the assessment area for water quality also encroaches into both the Lantau North and Lantau South Country Parks. Given the nature of the proposed works and the country park areas being at significantly higher elevation, significant water quality impact on these country park WSRs from project works is unlikely.

5.3.2 Water quality in the vicinity of the assessment area is well documented by the EPD's routine river water quality monitoring programme along various tributaries of the Mui Wo River System. EPD river water quality monitoring stations are illustrated in **Figure 5.1**.

5.4 Baseline Condition

5.4.1 In accordance with S.3.4.6.2 of the *EIA SB*, the assessment includes all areas within 500 m from the project boundary and covers the Southern Water Control Zone as designated under the *WPCO (Cap. 358)*. The assessment area shall be extended to include other areas such as stream courses and other water system(s) in the vicinity, if they are found also being impacted during the course of the EIA study and have a bearing on the environmental acceptability of the Project. Accordingly, baseline

conditions around the Project was informed based on publicly available data from EPD's River and Marine Water Quality Monitoring Programmes. These two sources provide long term coverage of water quality in the vicinity and is deemed sufficient. No separate baseline water quality survey was conducted for this EIA.

Mui Wo River

5.4.2 EPD's River Water Quality in Hong Kong in 2021 indicates that the rivers in Lantau Island generally exhibited satisfactory water quality over the past three decades. The WQO compliance rate of Mui Wo River was 97%. As for the Water Quality Index (WQI) grading, all five stations in Mui Wo River maintained "Excellent" grading in 2021. The water quality data in 2021 from EPD monitoring stations along Mui Wo River are provided below in **Table 5.2**. The locations for these EPD monitoring stations along Mui Wo River are shown in **Figure 5.1**.

Table 5.2 - Summary of Water Quality Statistics for Mui Wo River in 2021

Parameter	Unit	MW1	MW2	MW3	MW4	MW5
Dissolved Oxygen	mg/L	8.2 (6.0 - 9.1)	7.7 (5.7 - 9.8)	8.2 (5.5 - 9.7)	7.0 (5.7 - 8.6)	7.6 (4.6 - 9.9)
pH		7.5 (7.1 - 7.9)	7.6 (7.0 - 8.0)	6.9 (6.5 - 7.6)	7.1 (6.5 - 7.6)	7.4 (7.0 - 7.6)
Suspended Solids	mg/L	2.6 (0.5 - 9.4)	5.4 (2.2 - 16.0)	1.1 (<0.5 - 19.0)	6.7 (3.5 - 20.0)	5.5 (1.2 - 15.0)
5-Day Biochemical Oxygen Demand	mg/L	0.6 (<0.1 - 2.1)	1.4 (0.5 - 8.0)	0.4 (<0.1 - 1.4)	0.9 (0.3 - 9.0)	1.3 (0.5 - 2.2)
Chemical Oxygen Demand	mg/L	8 (<2 - 17)	12 (5 - 32)	5 (<2 - 14)	12 (4 - 35)	9 (2 - 22)
Oil & Grease	mg/L	<0.5 (<0.5 - <0.5)	<0.5 (<0.5 - <0.5)	<0.5 (<0.5 - <0.5)	<0.5 (<0.5 - <0.5)	<0.5 (<0.5 - <0.5)
E. coli	counts/100mL	710 (72 - 4 400)	7 000 (700 - 250 000)	180 (17 - 1 600)	1 300 (270 - 6 000)	6 300 (1 400 - 18 000)
Faecal Coliforms	counts/100mL	3 700 (110 - 20 000)	21 000 (6 900 - 480 000)	3 400 (690 - 8 400)	6 200 (760 - 20 000)	23 000 (3 100 - 57 000)
Ammonia-Nitrogen	mg/L	0.064 (0.024 - 0.270)	0.420 (0.100 - 2.300)	0.024 (0.014 - 0.046)	0.310 (0.130 - 0.530)	0.250 (0.064 - 0.450)
Nitrate-Nitrogen	mg/L	0.275 (0.063 - 1.200)	0.295 (0.063 - 0.650)	0.265 (0.150 - 1.200)	0.255 (0.010 - 1.000)	0.160 (0.120 - 0.610)
Total Kjeldahl Nitrogen	mg/L	0.43 (0.27 - 0.74)	1.14 (0.96 - 1.70)	0.45 (0.40 - 0.55)	0.78 (0.41 - 0.96)	0.75 (0.58 - 0.91)
Orthophosphate Phosphorus	mg/L	0.053 (0.016 - 0.082)	0.062 (0.005 - 0.190)	0.043 (0.017 - 0.080)	0.035 (0.022 - 0.070)	0.024 (<0.002 - 0.076)
Total Phosphorus	mg/L	0.12 (0.08 -	0.17 (0.08 -	0.09 (0.07 -	0.08 (0.06 -	0.10 (0.09 -

Parameter	Unit	MW1	MW2	MW3	MW4	MW5
		0.14)	0.19)	0.13)	0.18)	0.12)
Sulphide	mg/L	<0.02 (<0.02 - <0.02)	<0.02 (<0.02 - <0.02)	<0.02 (<0.02 - <0.02)	<0.02 (<0.02 - <0.02)	<0.02 (<0.02 - <0.02)
Aluminium	µg/L	<50 (<50 - <50)	<50 (<50 - <50)	<50 (<50 - 231)	<50 (<50 - <50)	<50 (<50 - <50)
Cadmium	µg/L	<0.1 (<0.1 - <0.1)	<0.1 (<0.1 - <0.1)	<0.1 (<0.1 - <0.1)	<0.1 (<0.1 - <0.1)	<0.1 (<0.1 - <0.1)
Chromium	µg/L	<1 (<1 - 2)	<1 (<1 - 2)	<1 (<1 - <1)	1 (<1 - 2)	<1 (<1 - 2)
Copper	µg/L	2 (<1 - 4)	1 (<1 - 5)	<1 (<1 - 1)	3 (1 - 7)	1 (<1 - 5)
Lead	µg/L	<1 (<1 - <1)	<1 (<1 - <1)	<1 (<1 - <1)	<1 (<1 - <1)	<1 (<1 - <1)
Zinc	µg/L	<10 (<10 - 17)	<10 (<10 - 14)	<10 (<10 - 13)	<10 (<10 - 22)	<10 (<10 - 17)
Flow	m^3/s	0.060 (0.006 - 0.744)	NM	0.028 (0.008 - 0.326)	0.267 (0.043 - 0.726)	0.039 (0.005 - 0.176)

Source: River Water Quality in Hong Kong in 2021 (EPD, 2022)

Southern Water Control Zone

5.4.3 The marine water quality of the Southern WCZ is routinely monitored by EPD. The nearest EPD marine water quality monitoring station (SM11) just off the Silver Mine Bay. The overall WQO compliance rate of the Southern WCZ in 2021 is 77%, with full attainment of the dissolved oxygen (DO) and unionized ammonia (UIA) WQOs. While the total inorganic nitrogen (TIN) level in the southern waters was generally lower than the adjacent western and central waters, it could not meet the more stringent TIN WQO of the WCZ of 0.1 mg/L. This also applies to SM11, where minimum TIN level recorded in 2021 was 0.10 mg/L, which is above the corresponding TIN WQO. Summary of water quality data at SM11 is shown in **Table 5.3**. The location of SM11 is shown in **Figure 5.1**.

Table 5.3 - Summary of Water Quality Statistics at Selected Stations in Southern Water Control Zone in 2021

Parameter (Unit)	Lantau Island (East) SM11
Temperature (°C)	25.5 (19.7 - 29.4)
Salinity	30.9 (27.3 - 33.2)
Dissolved Oxygen (mg/L)	5.1 (4.1 - 6.3)
Dissolved Oxygen - Bottom (mg/L)	5.0 (3.5 - 7.0)

Parameter (Unit)	Lantau Island (East) SM11
Dissolved Oxygen (% Saturation)	74 (60 - 93)
Dissolved Oxygen - Bottom (% Saturation)	72 (53 - 104)
pH	7.6 (7.3 - 8.0)
Secchi Disc Depth (m)	2.4 (1.4 - 3.7)
Turbidity (NTU)	6.4 (3.0 - 13.1)
Suspended Solids (mg/L)	5.9 (2.3 - 10.7)
5-day Biochemical Oxygen Demand (mg/L)	1.3 (0.4 - 3.0)
Ammonia Nitrogen (mg/L)	0.101 (0.054 - 0.150)
Unionised Ammonia (mg/L)	0.002 (<0.001 - 0.006)
Nitrite Nitrogen (mg/L)	0.029 (0.002 - 0.082)
Nitrate Nitrogen (mg/L)	0.155 (0.044 - 0.343)
Total Inorganic Nitrogen (mg/L)	0.29 (0.10 - 0.50)
Total Kjeldahl Nitrogen (mg/L)	0.69 (0.57 - 1.05)
Total Nitrogen (mg/L)	0.80 (0.63 - 1.19)
Orthophosphate Phosphorus (mg/L)	0.011 (0.003 - 0.020)
Total Phosphorus (mg/L)	0.06 (0.04 - 0.10)
Silica (as SiO_2) (mg/L)	0.88 (0.09 - 1.80)
Chlorophyll-a (μg/L)	8.5 (1.0 - 16.3)
E.coli (cfu/100mL)	3 (<1 - 32)
Faecal Coliforms (count/100mL)	7 (<1 - 81)

Source: Marine Water Quality in Hong Kong in 2021 (EPD, 2022)

Silver Mine Bay Beach

5.4.4 The water quality of the Silver Mine Bay Beach was monitored like other gazetted beaches in Hong Kong. According to EPD's Beach Water Quality Report 2022, the water quality at the Silver Mine Bay Beach was ranked as "Fair" in 2022. The geometric mean level of *E.coli* marine water quality of the Southern WCZ is routinely monitored by EPD. In 2022, the geometry mean of recorded *E.coli* level throughout the bathing season (March to October) was 51 counts/100 mL.

5.5 Assessment Methodology

5.5.1 In accordance with S.3.4.6.2 of the *EIA SB*, the assessment includes all areas within 500 m from the project boundary and covers the Southern Water Control Zone as designated under the *WPCO (Cap. 358)*. The assessment area shall be extended to include other areas such as stream courses and other water system(s) in the vicinity, if they are found also being impacted during the course of the EIA study and have a bearing on the environmental acceptability of the Project. Judging from the extent of the Project and the hydrology of surface water feature of the immediate surrounding, it is anticipated that any potential change in water quality and flow regime should be confined to within 500 m from the project boundary. Potential sources of water quality impact that may arise during the construction and operation of the Project were discussed in **Section 5.7**. Mitigation measures are recommended in **Section 5.9.6** to reduce the potential adverse impact on water quality.

5.6 Water Sensitive Receiver

5.6.1 Water sensitive receivers (WSRs) under this Project are identified following list of beneficial uses in Section 3 of Annex 14 of the EIAO-TM, which include areas of ecological or conservation values, brackish/freshwater fish ponds and beach within the identified assessment area within 500 m from the project boundary. There are a number of watercourses which run through or at close proximity of the Project site, including the River Silver, Luk Tei Tong River, Tai Tei Tong River, Pak Ngan Heung River and Wang Tong River. These watercourses are considered to be areas of ecological or conservation values and are identified as WSRs which may experience water quality impacts during project construction and operation stages. The nearby Silver Mine Bay Beach is a gazetted beach and is also considered to be a WSR. Furthermore, identified fish ponds to the east of the Luk Tei Tong River, as well as swath of marshes identified around different sections of the surrounding rivers are also considered to be WSRs. Representative WSRs within the assessment area is shown in **Figure 5.1**.

Table 5.4 - Identified Water Sensitive Receivers

ID (Shown in Figure 5.1)	WSR Name	Status and Relevance to this Project
R1	River Silver	River Silver is at the lowest stream of the Mui Wo River catchment connected to the sea and is highly tidal. The river is highly modified with artificial sloped armour rock seawall and natural substrate bottom. This water body will be affected by the construction of tidal gate as well as all indirect water quality impact from the works in the upstream sections.
R2	Luk Tei Tong River	The Luk Tei Tong River originates from the Nam Shan hillside and feeds into River Silver from the South. The river has been modified previously and has notable channelized section. There will be gabion wall reconstruction on the left bank of this river, installation of mechanical penstock as well as construction of short section of box culvert in the upstream of this river under this Project. The Luk Tei Tong Bypass Channel is fully channelized and feeds into the Luk Tei Tong River. The bypass channel is dry in normal condition and will only accept overflow water from upstream passing from Ha Tsuen Long for the protection of Luk Tei Tong Village and Ma Po Tsuen. Under this Project, this channel will be improved under river revitalization. Some land-based construction works would be conducted for proposed stormwater drain in the periphery of this river as well. This water body will be affected by the construction works listed above directly and indirectly.
R3	Tai Tei Tong River	The Tai Tei Tong River originates from the hillside to the west of Mui Wo and feeds into River Silver. This river is semi-natural and partly modified, particularly in the lower reach. Under this Project, flood wall and gabion wall would be constructed at multiple locations for protection at Tai Tei Tong Village and Ma Po Tsuen. Fish ladders will be installed at mid-stream and upstream and river reprofiling would be conducted near Tai Tei Tong Village. Modification of agricultural weirs will be conducted as well. Some land-based construction works would be conducted for proposed stormwater drain and stormwater pumping station in the vicinity of this river as well. This water body will be affected by the construction works listed above directly and indirectly.
R4	Pak Ngan Heung River	The Pak Ngan Heung River originates from the north side of Mui Wo. This river is semi-natural and partly modified at the lower reach near Ling Tsui Tau. Under this Project, some land-based construction works would be conducted for proposed stormwater drain and stormwater pumping station in the vicinity of this river as well. This water body will be affected by the construction works listed above directly and indirectly.

ID (Shown in Figure 5.1)	WSR Name	Status and Relevance to this Project
R5	Wang Tong River	Wang Tong River is over 200 m northeast to the Project works and is separated from the Luk Tei Tong / Tai Tei Tong / Pak Ngan Heung River / River Silver catchment. Given the lack of works with this catchment, direct water quality impact from this Project is not anticipated.
B1	Silver Mine Bay Beach	Silver Mine Bay Beach is a gazetted beach about 200 m north to the mouth of River Silver and also over 200 m from the Project works. Given the physical separation from works under this Project, direct water quality impact from this Project is not anticipated.
FP1	Fish ponds to the east of the Luk Tei Tong River	Cluster of fishponds were identified to the east of Luk Tei Tong River. Some of these ponds appeared to be in the process of being filled. These ponds are connected to the surrounding marsh and subsequently to Luk Tei Tong River. No in-river or land-based construction works would be conducted in these fishponds under this Project. The nearest works would be located on the left bank of Luk Tei Tong River and thus direct water quality impact from this Project is not anticipated.
WL1	Marshes to the East of Luk Tei Tong River	Swath of marsh was identified to the east and west of Luk Tei Tong River. Waterbodies of the marsh connect to Luk Tei Tong River at a few openings. River revitalization for Luk Tei Tong Bypass Channel, gabion wall and box culvert construction would be conducted within the catchment and could potentially affect water quality of the marsh.
WL2	Marshes near Luk Tei Tong	
WL3	Marshes near Ha Tsuen Long	Swath of marsh was identified to the east of Ha Tsuen Long. The marsh is adjacent to Tai Tei Tong River to the north. Under this Project, a proposed box culvert connecting Tai Tei Tong River and Luk Tei Tong Bypass Channel as well as a short section of stormwater drain will be constructed in the vicinity, which could both affect the water quality of this marsh.
WL4	Marshes near Pak Ngan Heung / Lim Po Tsuen	Swath of marsh was identified to the east of Pak Ngan Heung / Lim Po Tsuen and west to Pak Ngan Heung River. This marsh is well upstream to the proposed works in Pak Ngan Heung River and away from all other works under this Project. Given the physical separation from works under this Project, direct water quality impact from this Project is not anticipated.
WL5	Marshes near Wang Tong River / Tai Wai Yuen	Swath of marsh was identified around Wang Tong River / Tai Wai Yuen. Given the physical separation from works under this Project, direct water quality impact from this Project is not anticipated.

5.7 Identification and Evaluation of Environmental Impacts

Construction Phase

5.7.1 Potential sources of water quality impact associated with the construction of the Project have been identified as follow.

- Construction site runoff, wastewater and sediment release from land-based works into water bodies;
- Construction works within river channels; and
- Sewage from workforce.

Operation Phase

5.7.2 Potential sources of water quality impact associated with the operation of the Project have been identified as follow.

- Maintenance works of the drainage channels;
- Change in flow regime;,
- Change in water quality; and
- Change in sedimentation/ erosion pattern.

5.8 Construction Phase Impact Assessment

Construction site runoff, wastewater and sediment release from land-based works into water bodies

5.8.1 Construction site runoff typically carries sediment or other contaminants as a result of erosion from site surface, drainage channels, stockpiles and earth working areas. In addition, potential release of concrete or cement materials with construction runoff and stormwater will contribute to high level of suspended solids, pollutant levels, elevated level of pH, etc. It should be noted that construction works that involve long (i.e. along river) or large areas will proceed by segments, and thus any potential sources of water quality impact would be more localized and could be better managed, controlled and avoided.

5.8.2 Potential adverse water quality impacts will also arise from release of wash water from dust suppression sprays and wheel washing facilities and fuel, oil, solvents/lubricants from maintenance of construction vehicles and machinery.

5.8.3 Besides, accidental release of contaminants and sediments from construction works, vehicle washing, concrete washing, spillage of chemicals and refuse generated by the construction activities will cause pollution and potential blockages to adjacent water

courses. Accidental spillage of chemicals / chemical wastes could contaminate soil, runoff and / or watercourses and result in change in water quality. Chemicals such as lubrication and fuel would be used onsite and the spillage of such chemicals could elevate the level of hydrocarbon in the water. Its effect can be minimized or controlled with the implementation of specific measures recommended under **Section 5.10.5**.

5.8.4 All runoff and wastewater generated from the works areas should be collected and treated to the standards listed in the *TM-DSS* under *WPCO*. The contractor will need to apply to EPD for a discharge licence for discharge of effluent from the construction site under the *WPCO*.

5.8.5 Mitigation measures for preventing the polluted runoff from entering the adjacent watercourses should be implemented. With the implementation of the mitigation measures listed in **Sections 5.10.1** to **5.10.4**, unacceptable water quality impacts are not expected to occur.

Construction works within river channels

5.8.6 As discussed in **Chapter 2**, a number of proposed works require construction works within river channels, including river reprofiling, construction of flood wall, gabion wall, fish ladders, penstock, tidal gate, etc. In addition, excavation works will be required during construction of stormwater pumping station, outlet channel to River Silver, tidal gate at River Silver and diversion box culvert. Note that the majority of these excavation works will be away from rivers but the part of works connecting the drainage infrastructure to rivers will be conducted on the bank of these rivers. Temporary access to the works site should be carefully planned and located to minimise disturbance caused to the substrates of streams/rivers and riparian vegetation by construction plant. Before proceeding to construction works within the channels, river flow will be diverted to the far side of the works area. Cofferdams and/or other means of temporary flow diversion will be undertaken before any excavation / major works within the existing watercourses to ensure that the flow is not affected and to provide a dry working environment.

5.8.7 Excavation works within channelized/semi-natural watercourses for the Project should be undertaken in a confined and dry condition to minimize the adverse impact on water quality due to disturbance of sediment. Less and smaller construction plants would be selected to minimize disturbance to the surrounding. In addition, excavation works in the riverbed will be carried out in dry seasons (typically from November to March) as far as practicable. For instance, sediment removal would be required at the proposed location for tidal gate at River Silver. The required sediment removal works would be conducted in phases (so not to obstruct flow significantly) in dried area behind cofferdam (formed by concrete block seawall) and thus has limited potential impact on water quality of River Silver. Other works would be conducted in similar approach, which involve diversion of flow and (if necessary) cofferdam to provide dry working conditions. Stockpiles and excavated spoils should be located well away from rivers/streams. Runoff from these stockpile areas should be collected for treatment by sedimentation. The design of temporary on-site drainage should prevent runoff going through site surface, construction machinery and equipment in order to avoid or

minimize polluted runoff.

5.8.8 As the excavation works will be undertaken under dry condition, the works will not cause release of riverbed sediment into the water column nor increased turbidity in the river. Unacceptable adverse impacts to water quality are not expected to be anticipated with the implementation of recommended measures from *ProPECC PN1/94* and *ETWB Technical Circular (Works) No. 5/2005 Protection of Natural Streams/Rivers from Adverse Impacts Arising from Construction Works* listed above and under **Section 5.9.6**.

Sewage from workforce

5.8.9 Sewage will be generated from the on-site construction workforce. The sewage contains high levels of organic matters, ammonia and *E. coli*. Sufficient number of chemical toilets and sanitary facilities should be provided on site within construction works areas. It is estimated that a maximum of about 60 construction workers will be working on site at any one time during the construction phase of the Project. With a sewage generation rate of 0.35 m^3 per worker per day, the maximum amount of sewage to be generated will be about 21 m^3 per day. Sufficient number of chemical toilets should be provided to accommodate the need for construction workers. The chemical toilets and sanitary facilities should be properly maintained and regularly emptied and cleaned by a licensed contractor for disposal at off-site sewage treatment plants.

5.8.10 With proper handling and management of chemical toilets and sanitary facilities, no on-site sewage discharge is anticipated during construction phase. As such, adverse water quality impact from the workforce sewage is not anticipated.

5.9 Operation Phase Impact Assessment

Maintenance works of the drainage channels

5.9.1 Dredging operation in the river channels is not expected during routine maintenance works in the operation phase. For maintenance at tidal gate, penstock and river channels in general, only desilting would be required.

5.9.2 Regular maintenance desilting and debris clearance will be necessary for the river channel of Tai Tei Tong River, Pak Ngan Heung River, Luk Tei Tong Bypass Channel and Luk Tei Tong River to remove excessive silts, vegetation growth, rubbish and obstructions. Typically, desilting and debris clearance would be conducted in monthly interval and after rainstorm in wet season (April to October), and only after rainstorm during dry season (November to March). Channel desilting works will be scheduled section by section and the works will be confined in a small works zone which is isolated from the rest of the channel by temporary barrier walls to prevent suspended sediment being transport downstream. The maintenance works are considered small scale and will require only light mechanical equipment such as small loader and crane truck and hand-held equipment.

5.9.3 With implementation of good operation and management practices, unacceptable water quality impacts are not anticipated to occur.

Change in flow regime

5.9.4 With reference to the Drainage Impact Assessment (DIA) report, the installation of box culverts, large diameter drains, floodwalls/ gabion walls, mechanical penstock, tidal gate and stormwater pumping station significantly reduce level of residual flooding and the extent of flooding under tidal dominant events. Both the tidal gate and mechanical penstock would remain open under normal condition and will only be closed in anticipation of potential flooding risk. Similarly, the proposed stormwater pumping station would only operate if potential flooding occurred. It is considered that implementation of the proposed works under the Project can enhance the hydraulic performance in Mui Wo and thus reduce flood risk at low-lying area during peak flow condition.

5.9.5 The proposed drainage improvement works aim to reduce flood risk at low-lying area, i.e. Nam Bin Wai and Ma Po Tsuen. Real time monitoring system will be implemented to control the inflow. The proposed box culverts will only operate under heavy rainstorm, thus the flow across the different channels will remain mostly unchanged under normal circumstances. In view of the above, no unacceptable change in flow regime is anticipated.

Change in water quality

5.9.6 This Project aims to provide drainage improvement and remediate flood risk. No new pollution load would be generated from the operation of this Project. The reduction of flood risk and improvement of drainage generally reduce water pollution flooding washes a lot of pollutants and trashes into bodies of water. Also, given the same drainage catchment will be served and no major change in river flow would be resulted in normal operation under this Project, the pollution loading and flushing for the affected river should remain unchanged. Overall, no unacceptable adverse change in water quality would be expected from the Project operation.

Change in sedimentation/ erosion pattern

5.9.7 As stated in previous section, there will be limited change in flow regime of the river under normal condition as the improved flood control would only be activated under heavy rainstorm. Therefore, the associated change in sedimentation/ erosion pattern to the rivers within the Project area is also expected to be limited under normal condition.

5.9.8 While changes in sedimentation/ erosion pattern may occur in case of heavy rainstorm because of diverted flow, such conditions are generally rare and will not last for long period of time and thus the resulted changes would be limited. In case of heavy rainstorm, inspection by DSD staff would be followed and necessary maintenance/ clearance would be arranged. Therefore, excessive sedimentation as a result of stormwater diversion under this Project is not anticipated.

5.10 Mitigation Measures

Construction Phase

5.10.1 Land-based construction works as well as works within river channels that cover long or large areas should be conducted by segments/ smaller areas to allow better control and limit potential water quality impact.

5.10.2 The following standard measures and good site practices from *ProPECC PN 1/94 Construction Site Drainage* are recommended to be implemented to avoid/ minimise the potential impacts from construction activities:

- Excavation works for the drainage improvements should be carried out in dry condition as far as possible. Containment measures such as cofferdam, bunds and barriers should be provided within the river channel to isolate the excavation works areas. The excavation should be carried out in the dry season (typically from November to March) as far as practicable.
- Temporary storage of excavated riverbed material should be provided in the stockpile areas for dewatering by natural ventilation. Runoff from these stockpile areas should be collected for treatment by sedimentation. Coagulant should be considered when necessary. The treated water should be reused on site for water spraying or wheel washing.
- The dewatered excavated material should be reused on-site as backfilling material, as far as practicable.
- Best Management Practices (BMPs) of mitigation measures in controlling water pollution and good site management, as specified in the *ProPECC PN 1/94* "*Construction Site Drainage*" are followed, where applicable, to prevent runoff with high level of SS from entering the surrounding waters.
- Manholes should always be adequately covered and temporarily sealed so as to prevent silt, construction materials or debris being washed into the drainage system and storm runoff being directed into foul sewers.
- Diversion of natural stormwater away from work site should be provided as far as possible. The design of temporary on-site drainage should prevent runoff going through site surface, construction machinery and equipment in order to avoid or minimize polluted runoff.
- Sedimentation tanks with sufficient capacity, constructed from pre-formed individual cells of approximately 6 to 8 m^3 capacities, are recommended as a general mitigation measure which can be used for settling surface runoff prior to disposal. The system capacity shall be flexible and able to handle multiple inputs from a variety of sources and suited to applications where the influent is pumped.
- The dikes or embankments for flood protection should be implemented around the boundaries of earthwork areas. Temporary ditches should be provided to facilitate the runoff discharge into an appropriate watercourse, through a

silt/sediment trap. The silt/ sediment traps should be incorporated in the permanent drainage channels to enhance deposition rates.

- The design of efficient silt removal facilities should be based on the guidelines in Appendix A1 of *ProPECC PN 1/94*. The detailed design of the sand/ silt traps should be undertaken by the contractor prior to the commencement of construction.
- All drainage facilities and erosion and sediment control structures should be regularly inspected and maintained to ensure proper and efficient operation at all times and particularly following rainstorms. Deposited silt and grit should be removed regularly and disposed of by spreading evenly over stable, vegetated areas.
- Regular monitor the construction plants in areas close to the water courses to avoid potential spillage to the adjacent watercourses.
- All open stockpiles of construction materials (for example, aggregates, sand and fill material) should be covered with tarpaulin or similar fabric during rainstorms. Measures should be taken to prevent the washing away of construction materials, soil, silt or debris into any drainage system.
- Install sufficient lateral support to avoid loose soil or mud from slipping into the watercourses.
- The precautions to be taken at any time of year when rainstorms are likely together with the actions to be taken when a rainstorm is imminent or forecasted and actions to be taken during or after rainstorms are summarized in *Appendix A2* of *ProPECC PN 1/94*.
- All vehicles and plant should be cleaned before leaving a construction site to ensure no earth, mud, debris and the like is deposited by them on roads. An adequately designed and sited wheel washing facility should be provided at every construction site exit where practicable. Wash-water should have sand and silt settled out and removed at least on a weekly basis to ensure the continued efficiency of the process. The section of access road leading to, and exiting from, the wheel-wash bay to the public road should be paved with sufficient backfall toward the wheel-wash bay to prevent vehicle tracking of soil and silty water to public roads and drains.
- Construction solid waste, debris and rubbish on site should be collected, handled and disposed of properly to avoid water quality impacts.
- Appropriate numbers of chemical toilets will be provided by a licensed contractor to serve the construction workers over the construction sites to prevent direct disposal of sewage into the water environment. No onsite discharge from these chemical toilets will be allowed.

- All fuel tanks and chemical storage areas will be provided with locks and be sited on sealed areas. The storage areas will be surrounded by bunds with a capacity equal to 110% of the storage capacity of the largest tank.
- The contractors shall ensure that leakages or spillages are contained and cleaned up immediately.

5.10.3 All runoff and wastewater generated from the works areas should be collected and treated to the meet standards as listed in the *TM-DSS* under *WPCO*. The contractor will need to apply to EPD for a discharge licence for discharge of effluent from the construction site under the *WPCO*.

5.10.4 Control measures outlined under ETWB Technical Circular (Works) No. 5/2005 Protection of Natural Streams/ Rivers from Adverse Impacts Arising from Construction Works should be considered:

- The proposed works should preferably be carried out during the dry season (typically from November to March) where flow in the stream/ river is low.
- Temporary access to the works site should be carefully planned and located to minimise disturbance caused to the substrates of streams/ rivers and riparian vegetation by construction plant.
- The use of less or smaller construction plant may be specified to reduce disturbance to the riverbed where aquatic inhabitants are located.
- Temporary sewerage system should be designed and installed to collect wastewater and prevent it from entering rivers and streams.
- Proper locations well away from rivers/ streams for temporary storage of materials (e.g. equipment, filling materials, chemicals and fuel) and temporary stockpile of construction debris and spoil should be identified before commencement of the works.
- The proposed works site inside or in the proximity of natural rivers and streams should be temporarily isolated, such as by placing of sandbags or silt curtains with lead edge at bottom and properly supported props, to prevent adverse impacts on the stream water qualities. Other protective measures should also be taken to ensure that no pollution or siltation occurs to the water gathering grounds of the work site.
- The natural bottom and existing flow in the river should be preserved as much as possible to avoid disturbance to the river habitats. If temporary access track on riverbed is unavoidable, this should be kept to the minimum width and length. Temporary river crossings should be supported on stilts above the riverbed. Construction debris and spoil should be covered up and/or properly disposed of as soon as possible to avoid being washed into nearby rivers/ streams by rain.
- Construction effluent, site run-off and sewage should be properly collected and/or treated. Proper locations for discharge outlets of wastewater treatment facilities well away from the natural streams/ rivers should be identified. Adequate lateral

support may need to be erected in order to prevent soil/mud from slipping into the stream/ river, but without unduly impeding the flow during heavy rain.

- Supervisory staff should be assigned to station on site to closely supervise and monitor the works.

5.10.5 For sediment removal before the installation of tidal gate at River Silver, cofferdam would be first installed to create isolation area for part of the cross section without significantly impeding the flow to contain any loss of sediment into the water column. No open dredging in river would be conducted.

5.10.6 The following measures should be implemented for proper control, handling and disposal of chemicals, reduce risk of accidental spillage and proper clean up of spillage:

- The Contractor will register as a chemical waste producer with the EPD. Chemical waste will be handled in accordance with the *Code of Practice on the Packaging, Handling and Storage of Chemical Wastes* as listed in **Section 6.5.13**.
- Other applicable measures listed under **Sections 6.5.14** to **6.5.16** should be followed on handling of chemical waste.
- Suitable containers should be used to hold the chemical wastes to avoid leakage or spillage during storage, handling and transport.
- Chemicals and chemical waste containers should be suitably labelled, to allow handlers to be warned about the potential risk.
- Chemicals and chemical waste should be stored at secured sheltered location on site with bunded areas or drip tray to control any risk of spillage.
- An emergency spillage handling procedure to deal with chemical spillage should be prepared according to the *Waste Disposal (Chemical Waste) (General) Regulation (Cap. 354C)*. Any chemical spillage should be promptly contained and cleaned up following the handling procedure, removed and contained in specified container(s) for chemical waste for proper disposal under *Cap.354C*. Adequate training to the staff should be provided.

Operation Phase

5.10.7 The design of the Project should take into account the guiding principles outlined in *Drainage Services Department Practice Note No. 3/2021: Guidelines on Design for Revitalisation of River Channel* to ensure the water quality and hydrology of the revitalized rivers suit the intended purpose of the planned beneficial uses.

5.10.8 DSD staff will inspect rivers and other drainage systems after heavy rainstorm and arrange for necessary maintenance.

5.10.9 EPD and/or other relevant departments will be informed if maintenance works is located at or near an environmentally sensitive and/or ecologically important areas. The following standard measures are recommended to be implemented to avoid/ minimise the potential impacts from maintenance works:

- Containment structures such as sandbags barrier should be used for the desilting works area to facilitate a dry and confined working area within the drainage channel.
- Channel maintenance works and debris/ vegetation clearance should be undertaken in dry condition. Light machinery and hand-held machine should be considered when undertake maintenance desilting works and debris clearance.
- Where no maintenance access is available for the channel, temporary access to the works site should be well planned to minimize disturbance caused to the drainage channel and nearby water quality sensitive receivers.
- The waste material /dredged materials should be temporary stored away from the channel and cover with tarpaulin sheet. These materials should be disposed of in a timely and appropriate manner. Disposal locations of the materials should be agreed with relevant departments before commencement of the maintenance works/ desiltation.
- Avoid and minimize the use of concrete or the like.
- Applicable mitigation measures from *ETWB Technical Circular (Works) No. 5/2005 Protection of Natural Streams/Rivers* from Adverse Impacts Arising from Construction Works listed under **Section 5.10.4** should be applied.

5.11 Cumulative Impacts

5.11.1 Based on the latest available information, the Project construction is expected to commence in 3rd quarter of 2025 and completed in 4th quarter of 2029. Based on such programme, there are a few potential concurrent projects that could have significant effect on water quality within the Southern WCZ. They are summarized in **Table 5.5** below.

Table 5.5 - Concurrent Projects Considered in This Water Quality Impact Assessment

	Concurrent Projects	Works Involved	Consideration in this Water Quality Impact Assessment
1	Desilting works at River Silver Mui Wo	On-going desilting works for berthing bay at River Silver.	Under the Environmental Permit Specific Condition 2.2 to 2.6, the desilting works will only be allowed to carry out during non-bathing season from December to February or closing date of Silvermine Bay Beach specified by as announced by Leisure and Cultural Services Department. Silt curtains will be installed enclosing the 2 openings of the berthing bay to contain the suspended solid from entering River Silver. As such, no adverse cumulative environmental impacts are envisaged during both construction and operation of the Project.

	Concurrent Projects	Works Involved	Consideration in this Water Quality Impact Assessment
2	PWP Item No. 4353DS - Outlying Islands Sewerage Stage 2 - Extension of Sewerage System to Other Unsewered Villages in Mui Wo Village Sewerage Works at Luk Tei Tong and Ma Po Tsuen	Sewerage improvement works has started in November 2021 and is expected to be completed in June 2025.	Water quality impacts are mainly caused by excavation works, construction site runoff and sewage discharge during the pipe lining works and reinstatement works. It is expected that the cumulative impacts from this Project will not lead to exceedance of any relevant water quality criteria, as the construction programme of this project will not be overlay with the Proposed Project. As such, no adverse cumulative environmental impacts are envisaged during both construction and operation of the Project.
3	7414 RO "Improvement Works at Mui Wo - Remaining Phase	The proposed improvement work is currently being studied by CEDD and there is no clear implementation schedule. The remaining works are mostly located around the Mui Wo Ferry Pier and are over 300 m away from the Project footprint. Some minor works involve the provision / improvement of cycling track network and heritage trail across Mui Wo Old Town, Wang Tong, Pak Ngan Heung, Tai Tei Tong, and Luk Tei Tong, which are closer to the Project footprint.	The cumulative impact from works around the Mui Wo Ferry Pier is expected to be negligible given the separation. For the minor works for improvement of cycling track network and heritage trail, the potential water quality impact is expected to be limited with implementation of standard measures and good site practices.
	LV cable laying at Nam Bin Wai near Tai Tei Tong, Mui Wo	LV cable laying at Nam Bin Wai.	There is insufficient detail for assessment. Minor works of small scale is not expected to result in notable water quality impact with implementation of standard measures and good site practices.
5	LV cable laying & meter box erection at Ling Tsui Tau Lot. 41, 42, 43, Mui Wo, Lantau	LV cable laying and meter box erection at Ling Tsui Tau.	

5.12 Residual Impacts

5.12.1 With the proper implementation of the mitigation measures listed in **Section 5.10**, no unacceptable residual impact on water quality is expected to be anticipated in construction and operation phases.

5.13 Environmental Monitoring and Audit Requirements

5.13.1 The implementation of good site practice and specific mitigation measures for excavation works (i.e. excavation works for the Project will be undertaken in a confined and dry condition) is considered important to avoid adverse impacts on water quality during the construction and operation phases of the Project. It is recommended to conduct construction phase water quality impact monitoring as well as regular site inspections and audits throughout the construction period. The specific monitoring requirements are detailed in the standalone Environmental Monitoring and Audit (EM&A) Manual.

5.13.2 With implementation of good operation and management practices, unacceptable water quality impacts are not anticipated to occur for the regular maintenance, desiltation and debris removal works. The potential change in flow regime from the Project is expected to reduce the peak flow conditions and thus would result in minor change in overall flow regime only. Therefore, operation phase water quality monitoring is not deemed necessary.

5.14 Conclusion

Construction Phase

5.14.1 Potential water quality impact from construction surface runoff, wastewater and sediment release from works into water bodies, construction works within river channel and sewage from workforce have been assessed. With the implementation of mitigation measures (in particular to carry out excavation works for the Project in a confined and dry condition) and proper good site practice proposed under **Section 5.10**, no adverse water quality impact is anticipated during the construction phase of the Project.

Operation Phase

5.14.2 The potential water quality impacts arising associated with maintenance works of the drainage channels and change in flow regime have been assessed. Regular maintenance works will be undertaken in dry condition in confined areas. Unacceptable water quality impacts are not expected with appropriate preventive and mitigation measures listed in **Section 5.10**.

5.14.3 The proposed drainage improvement works is effective in stormwater diversion. The flow across the different channels will remain mostly unchanged under normal circumstances and thus limited change in flow regime would be expected from Project operation. Since there will be no new pollution source under this Project, there will be no unacceptable adverse change in water quality. Sedimentation/ erosion pattern is

not expected to be significantly affected given the limited change in flow regime, and any excessive accumulation in the affected rivers after heavy rainstorm will be handled by DSD staff. Appropriate preventive and mitigation measures stated in **Sections 5.10.7 to 5.10.9** are recommended to minimise the potential water quality impact from the proposed drainage improvement works. No unacceptable water quality impact from the proposed drainage improvement works has been predicted.