12. SCHEDULE AND RECOMMENDED MITIGATION MEASURES

12.1 The implementation schedule of proposed mitigation measures for the proposed Project is presented in Table 12.1-12.7.

Table 12.1 Implementation Schedule for Construction Noise Control

ES Ref. #	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measure?	Location of the measure	When to implement the measure?				What requirements or standard for the measures to achieve?
					Des	C	O	Dec	
S3.30	Good Site Practice • Only well-maintained plant should be operated on-site and plant should be serviced regularly during the construction program; • Silencers or mufflers on construction equipment should be utilized and should be properly maintained during the construction program; • Mobile plant, if any, should be sited as far from NSRs as possible; • Machines and plant (such as trucks) that may be in intermittent use should be shut down between work periods or should be throttled down to a minimum; • Plant known to emit noise strongly in one direction should, wherever possible, be orientated so that the noise is directed away from the nearby NSRs; and • Material stockpiles and other structures should be effectively utilised, wherever practicable, in screening noise from on-site construction activities.	To minimise potential construction noise impact	Contractor	Work site / During the construction period		√			ProPECC PN2/93 and NCO

ES Ref. #	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measure?	Location of the measure	When to implement the measure?				What requirements or standard for the measures to achieve?
					Des	C	O	Dec	
S3.31-3.32	Use of Quieter PME	To minimise potential construction noise impact	Contractor	Work site / During the construction period		√			ProPECC PN2/93 and NCO
S3.33-3.36	Movable Noise Barrier and Temporary Noise Barriers	To minimise potential construction noise impact	Contractor	Work site / During the construction period		√			ProPECC PN2/93 and NCO

All recommendations and requirements resulted during the course of EIA/ES Process, including ACE and / or accepted public comment to the proposed project.
* Des - Design, C - Construction, O – Operation, and Dec - Decommissioning

Table 12.2 Implementation Schedule for Construction Dust Control

ES Ref. #	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measure?	Location of the measure	When to implement the measure?				What requirements or standard for the measures to achieve?
					Des	C	O	Dec	
S4.14	Implementation of the Air Pollution Control (Construction Dust) Regulation and good site practices: • Use of regular watering to reduce dust emissions from exposed site surfaces and unpaved road, with complete coverage, particularly during dry weather; • Use of frequent watering for particularly dusty static construction areas and areas close to air sensitive receivers; • Tarpulin covering of all dusty vehicle loads transported to, from and between site location; • Establishment and use of vehicle wheel and body washing facilities at the exit points of the site; • Routing of vehicles and positioning of construction plant should be at the maximum possible distance from ASRs. • Stockpiled excavated materials should be covered with tarpaulin, and should be removed off-site within 24 hours to avoid any odour nuisance arising.	To minimise potential construction dust impact	Contractor	Work site / During the construction period		√			Air Pollution Control (Construction Dust) Regulation

All recommendations and requirements resulted during the course of EIA/ES Process, including ACE and / or accepted public comment to the proposed project.
* Des - Design, C - Construction, O – Operation, and Dec - Decommissioning

Table 12.3 Implementation Schedule for Water Quality Control

ES Ref. #	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measure?	Location of the measure	When to implement the measure?				What requirements or standard for the measures to achieve?
					Des	C	O	Dec	
S5.28	*Construction Runoff and Drainage* • Before commencing any site formation work, all sewer and drainage connections shall be sealed to prevent debris, soil, sand etc. from entering public sewers/drains. • Temporary ditches shall be provided to facilitate run-off discharge into appropriate watercourses, via a silt retention pond. • Sand/silt removal facilities such as sand traps, silt traps and sediment basins shall be provided to remove sand/silt particles from runoff to meet the requirements of the Technical Memorandum standard under the Water Pollution Control Ordinance. The design of silt removal facilities shall be based on the guidelines provided in ProPECC PN 1/94. All drainage facilities and erosion and sediment control structures shall be inspected monthly and maintained to ensure proper and efficient operation at all times and particularly during rainstorms. • Water pumped out from foundation excavations shall be discharged into silt removal facilities. • During rainstorms, exposed slope surfaces shall be covered by a tarpaulin or other means. Other measures that need to be implemented before, during, and after rainstorms are summarized in ProPECC PN 1/94. • Exposed soil areas shall be minimized to	To minimise potential water quality impact	Contractor	Work site / During the construction period		√			ProPECC PN 1/94; Water Pollution Control Ordinance (WPCO)

ES Ref. #	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measure?	Location of the measure	When to implement the measure?				What requirements or standard for the measures to achieve?
					Des	C	O	Dec	
	reduce potential for increased siltation and contamination of runoff. • Exposed soil surfaces shall be protected by paving or fill material as soon as possible to reduce the potential of soil erosion. • Open stockpiles of construction materials or construction wastes on-site of more than 50 m^3 shall be covered with tarpaulin or similar fabric during rainstorms.								
S5.29	• WSD's conditions of working within Water Gathering Grounds should be strictly followed for the drainage improvement works to Upper Lam Tsuen River and She Shan River: • Adequate measures shall be taken to ensure that no pollution or siltation occurs to the catchwater and catchments. • No earth, building materials, fuel, oil or toxic materials and other materials which may cause contamination to the water gathering ground are allowed to be stockpiled or stored on site. • All surplus spoil and/or excess/unsuitable material which cannot be reused on site as backfill material shall be removed from the water gathering ground as soon as possible. • Temporary drains with silt traps intercepting all runoff and wash waters and preventing them from being directly discharged to nearby watercourse shall be constructed at the boundary of the site prior to the commencement of any earthwork.	To minimise potential water quality impact	Contractor	Work site / During the construction period		√			

ES Ref. #	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measure?	Location of the measure	When to implement the measure?				What requirements or standard for the measures to achieve?
					Des	C	O	Dec	
S5.30	• Regular cleaning of the silt traps shall be carried out to ensure that they function properly at all time. • All excavated or filled surfaces which have the risk of erosion shall be protected from erosion at all time. • Facilities for washing the wheels of vehicles before leaving the site shall be provided. • Any construction plant which causes pollution to catchwater or catchment due to leakage of oil or fuel shall be removed off-site immediately. • Site formation and drainage plans for temporary diversion, if necessary, shall be submitted to WSD for approval prior to commencement of works. • The use of chemicals or insecticide of any kind is subject to the approval of the Director of WSD. • Excavation and widening works within catchwaters or streamcourses shall only be carried out in the extended dry season between October and April. • Short excavation and backfilling sections to reduce excavation pumping requirements. • Excavated material from the Upper Lam Tsuen River and She Shan River shall be transported out of the Water Gathering Ground once it is removed from the river. If excavated material is required to be temporarily stockpiled on site, the base and surface of the stockpiles shall be								

ES Ref. #	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measure?	Location of the measure	When to implement the measure?				What requirements or standard for the measures to achieve?
					Des	C	O	Dec	
	covered with tarpaulin or similar fabric within fenced-off areas, so that the possibility of the material spoiling the water quality in the vicinity would be minimized.								
S5.31	*Sewage from Construction Workforce* • Temporary sanitary facilities, such as portable chemical toilets, shall be employed on-site. A licensed contractor shall be responsible for appropriate disposal and maintenance of these facilities. The provision of temporary toilet facilities within the Water Gathering Grounds is subject to the approval of the Director of WSD.	To minimise potential water quality impact	Contractor	Work site / During the construction period		√			WPCO
S5.32	*River Channel Excavation Works* • Excavation and widening works for the drainage improvements to the Upper Lam Tsuen and She Shan river channels shall be carried out in sections (approximately 300 – 400 m in length) and in dry condition. Containment measures such as bunds and barriers shall be used within the river channel and the excavation works restricted to within an enclosed dry section of the channel. • All excavation works for lowering the inverts and widening of riverbanks of the Upper Lam Tsuen River and She Shan River, as well as the formation of the foundations of the gabion lining near the river invert, shall be carried out in the extended dry season from October to April.	To minimise potential water quality impact	Contractor	Work site / During the construction period		√			

ES Ref. #	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measure?	Location of the measure	When to implement the measure?				What requirements or standard for the measures to achieve?
					Des	C	O	Dec	
S5.33	*Maintenance Desilting of River Channels* • For maintenance desilting of the Upper Lam Tsuen and She Shan river channels, temporary barrier walls shall be used to provide a dry work zone for desilting work. Maintenance desilting shall be carried out during periods of low flow in the dry season.	To minimise potential water quality impact	Contractor	Work site / During the operation period			√		

All recommendations and requirements resulted during the course of EIA/ES Process, including ACE and/or accepted public comment to the proposed project.
* Des - Design, C - Construction, O – Operation, and Dec - Decommissioning

Table 12.4 Implementation Schedule for Waste Management Implications

ES Ref. #	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measure?	Location of the measure	When to implement the measure?				What requirements or standard for the measures to achieve?
					Des	C	O	Dec	
S6.30	Good site practices • Nomination of approved personnel, such as a site manager, to be responsible for good site practices and making arrangements for collection of all wastes generated at the site and effective disposal to an appropriate facility. • Training of site personnel in proper waste management and chemical waste handling procedures. • Provision of sufficient waste disposal points and regular collection for disposal. • Appropriate measures to minimise windblown litter and dust during transportation of waste by either covering trucks or by transporting wastes in enclosed containers. • Separation of chemical wastes for special handling and appropriate treatment at the Chemical Waste Treatment Facility. • Regular cleaning and maintenance programme for drainage systems, sumps and oil interceptors. • A recording system for the amount of wastes generated, recycled and disposed (including the disposal sites) should be proposed. • A Waste Management Plan should be prepared and submitted to the Engineer for approval. One may make reference to ETWB TCW No. 15/2003 for details.	To minimise and control potential construction waste arising	Contractor	Work site / During the construction period		√			
S6.31	• WSD's conditions of working within Water Gathering Grounds shall be strictly followed for the drainage improvement works to Upper	To minimise and control potential construction	Contractor	Work site / During the construction		√			

ES Ref. #	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measure?	Location of the measure	When to implement the measure?				What requirements or standard for the measures to achieve?
					Des	C	O	Dec	
	Lam Tsuen River and She Shan River: • No earth, building materials, fuel, oil or toxic materials and other materials which may cause contamination to the water gathering ground are allowed to be stockpiled or stored on site. • All surplus spoil and/or excess/unsuitable material which cannot be reused on site as backfill material shall be removed from the water gathering ground as soon as possible.	waste arising		period					
S6.32	• In order to monitor the disposal of C&D material at public filling areas and to control fly tipping, a trip-ticket system shall be included as one of the contractual requirements. One may make reference to ETWB TCW No. 31/2004 for details.	To minimise and control potential construction waste arising	Contractor	Work site / During the construction period		√			Waste Disposal Ordinance (Cap.54) ETWB TCW No. 19/2005
S6.33	• Waste reduction is best achieved at the planning and design stage, as well as by ensuring the implementation of good site practices. Recommendations to achieve waste reduction include: • Segregation and storage of different types of waste in different containers, skips or stockpiles to enhance reuse or recycling of materials and their proper disposal. • To encourage collection of aluminium cans by individual collectors, separate labelled bins shall be provided to segregate this waste from other general refuse generated by the work force. • Any unused chemicals or those with remaining functional capacity shall be recycled.	To minimise and control potential construction waste arising	Contractor	Work site / During planning & design stage, and construction stage	√	√			ETWB TCW No. 19/2005

ES Ref. #	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measure?	Location of the measure	When to implement the measure?				What requirements or standard for the measures to achieve?
					Des	C	O	Dec	
	• Maximising the use of reusable steel formwork to reduce the amount of C&D material. • Prior to disposal of C&D waste, it is recommended that wood, steel and other metals shall be separated for re-use and / or recycling to minimise the quantity of waste to be disposed of to landfill. • Proper storage and site practices to minimise the potential for damage or contamination of construction materials. • Plan and stock construction materials carefully to minimise amount of waste generated and avoid unnecessary generation of waste.								
S6.35 – S6.36	*Construction & Demolition (C&D) Material* • C&D material generated from the drainage improvement works to Upper Lam Tsuen River and She Sham River with suitable characteristics/size shall be reused on-site as fill material as far as practicable, such as for construction of embankments, and small cobbles and rocks shall be used in the construction of the recreated channel bed. The contaminated soil excavation from the riverbed would be treated off-site before reused on-site. • When disposing C&D material at a public filling area, it shall be noted that the material shall only consist of soil, rock, concrete, brick, cement plaster/mortar, inert building debris, aggregates and asphalt. The material shall be free from marine mud, household refuse,	To minimise and control potential construction waste arising	Contractor	Work site / During the construction period		√			WBTC No. 4/98, 12/2000 ETWB TCW No. 19/2005, 31/2004

ES Ref. #	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measure?	Location of the measure	When to implement the measure?				What requirements or standard for the measures to achieve?
					Des	C	O	Dec	
	plastic, metals, industrial and chemical waste, animal and vegetable matter, and other material considered to be unsuitable by the Filling Supervisor.								
S6.37	*Excavated Riverbed Material* • Use of water-tight trucks for the transportation of excavated riverbed material to the designated barging point for disposal at the designated public filling area, or transported directly to the public filling area. • In the case of excavated material from the upstream section of the Upper Lam Tsuen River (Chainage CH 0.430 to CH 0.530), the contaminated excavated soil from the riverbed would be transported to an off-site treatment area.	To minimise and control potential construction waste arising	Contractor	Work site / During the construction period		√			
S6.38	*Chemical Waste* • If chemical wastes are produced at the construction site, the Contractor shall register with the EPD as a Chemical Waste Producer and follow the guidelines stated in the Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes. Good quality containers compatible with the chemical wastes shall be used, and incompatible chemicals shall be stored separately. Appropriate labels shall be securely attached on each chemical waste container indicating the corresponding chemical characteristics of the chemical waste, such as explosives, flammable, oxidizing, irritant, toxic, harmful, corrosive, etc. The Contractor shall use a	To minimise and control potential construction waste arising	Contractor	Work site / During the construction period		√			Waste Disposal (Chemical Waste) (General) Regulation

ES Ref. #	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measure?	Location of the measure	When to implement the measure?				What requirements or standard for the measures to achieve?
					Des	C	O	Dec	
	licensed collector to transport and dispose of the chemical wastes generated at the Chemical Waste Treatment Centre at Tsing Yi, or other licenced facility, in accordance with the Waste Disposal (Chemical Waste) (General) Regulation.								
S6.39	*General Refuse* • General refuse shall be stored in enclosed bins or compaction units separate from C&D material. A reputable waste collector shall be employed by the contractor to remove general refuse from the site, separately from C&D material. An enclosed and covered area is preferred to reduce the occurrence of 'wind blown' light material.	To minimise and control potential construction waste arising	Contractor	Work site / During the construction period		√			Public Health and Municipal Services Ordinance (Cap. 132)

All recommendations and requirements resulted during the course of EIA/ES Process, including ACE and / or accepted public comment to the proposed project.
* Des - Design, C - Construction, O – Operation, and Dec - Decommissioning

Table 12.5 Implementation Schedule for Ecological Requirements

ES Ref. #	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measure?	Location of the measure	When to implement the measure?				What requirements or standard for the measures to achieve?
					Des	C	O	Dec	
S7.70	*Drainage Channel Design* The following key features should be included in channel design for She Shan Stream and Lam Tsuen River: <u>She Shan Stream</u> • Impacts to the more natural, upstream areas of SSS would be largely be avoided through the construction of a by-pass channel approximately 150m in length running alongside the existing stream channel. • Along approximately 200m of the section of SSS to be improved, works would be limited to one bank of the existing stream channel. <u>Lam Tsuen River</u> • Much of the existing LTR within the proposed works areas has already been modified, with some sections of the river variously lined with shotcrete and other artificial materials. Under the proposed drainage improvements, the most natural section of the existing river channel within the works area (a 200m stretch of river near Chuen Pei Lung) would be retained. <u>General</u> • The following design features would be incorporated into channel design at both SSS and LTR: • Channel beds would be constructed using natural materials such as small cobbles and boulders. To closely re-create existing	To minimize/ compensate potential ecological impact	Detailed Design Team & Contractor	Works Site / Design & Construction Phase	√	√			

ES Ref. #	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measure?	Location of the measure	When to implement the measure?				What requirements or standard for the measures to achieve?
					Des	C	O	Dec	
	conditions, materials collected from the existing stream/river beds during the construction phase would be used to line the newly improved channels. Where possible, the existing stream and riverbeds would be retained, and the natural width and alignment of the river would be maintained as far as practicable. This habitat would provide a suitable environment for many organisms dependent on the existing watercourses. • Channel banks would be trapezoidal, and lined with rock-filled gabion. • The depth of the channels would be varied to re-create the pool-riffle sequence found in natural streams. • Larger pools in the stream and river currently maintained for crop irrigation would be re-instated. Fish ladders or similar passage devices would be constructed to facilitate the movement of fish populations throughout the rivers and streams.								
S7.94	*Capture Surveys of Aquatic Species of Conservation Interest* The proposed works at LTR and SSS have the potential to impact species of conservation interest. To minimize these potential impacts, it is recommended that capture-surveys of the proposed works areas are conducted prior to the commencement of construction works. At SSS, capture surveys should include all dragonfly larvae of conservation interest,	To minimize potential ecological impact	Ecologist appointed by Project Proponent	She Shan Stream & Lam Tsuen River/ design and construction phase.	√	√			

ES Ref. #	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measure?	Location of the measure	When to implement the measure?				What requirements or standard for the measures to achieve?
					Des	C	O	Dec	
	including the four species previously recorded from the stream (i.e., *Macromia urania*, *Onychothemis testacea*, *Labrogomphus torvus* and *Burmagomphus vermicularis*). At LTR, capture surveys should include Hong Kong Newts (including eggs and juveniles) along with the fish species of conservation interest previously recorded from the river, *Rhinogobius cervicosquamus*. Any of these species caught during the surveys should be re-located to areas of the watercourse upstream of the proposed works areas. The capture surveys should be conducted in the dry season by a suitably qualified ecologist(s) appointed by the Project Proponent. A detailed methodology for faunal translocation should be formulated during the detailed design stage of the Project.								
S7.95	*Minimising Disturbance to Aquatic Habitats* Measures should be implemented to minimise potential sedimentation and other water quality impacts to areas downstream of the proposed works areas. All excavation works carried out within or close to water bodies should be carried out in the dry season where possible, with construction carried out by land-based plant. Excavation works within the stream channel should be restricted to an enclosed dry section of the river, with containment measures such as bunds and barriers used within the river to minimize the impacts upon the downstream	To minimize potential ecological impact	Contractor	Works areas/ construction phase		√			

ES Ref. #	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measure?	Location of the measure	When to implement the measure?				What requirements or standard for the measures to achieve?
					Des	C	O	Dec	
	water body. Site runoff should be directed towards regularly cleaned and maintained silt traps and oil/grease separators to minimise the risk of sedimentation and pollution of river water. The silt and oil/grease separators should be appropriately designed for the local drainage and ground conditions. To minimize leakage and loss of sediments during excavation in narrow channels, tightly sealed closed grab excavators should be deployed where material to be handled is wet.								
S7.96	*Minimise Works Areas* To ensure some areas of relatively undisturbed habitat are maintained, excavation works would be carried out in sections. Along more natural areas of SSS and LTR with extensive existing riparian vegetation, works would be carried out in relatively short sections. Works would be carried out in longer sections along areas of the watercourses that have been modified previously (e.g., lined with concrete) and are already disturbed.	To minimize potential ecological impact	Contractor	Works areas/ construction phase		√			
S7.97	*Minimise Construction Phase Disturbance* Noise mitigation measures including the use of quiet construction plant and temporary noise barriers (Section 3 of the reports refers) should be implemented to minimise disturbance to habitats adjacent to the works areas.	To minimize potential ecological impact	Contractor	Works areas/ construction phase		√			
S7.98	*Site Practice*	To minimize	Contractor	Works areas/		√			

ES Ref. #	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measure?	Location of the measure	When to implement the measure?				What requirements or standard for the measures to achieve?
					Des	C	O	Dec	
	Standard good site practice measures should be implemented throughout the construction phase. The measures should include: • Placement of equipment or stockpile in designated works areas and access routes selected on existing disturbed land to minimise disturbance to natural or moderate-high ecological value habitats. • Construction activities should be restricted to work areas that should be clearly demarcated. The work areas should be reinstated after completion of the works. • Waste skips should be provided to collect general refuse and construction wastes. The wastes should be disposed of timely and properly off-site. • General drainage arrangements should include sediment and oil traps to collect and control construction site run-off. • Open burning on works sites is illegal, and should be strictly prohibited.	potential ecological impact		construction phase					
S7.99	*Maintenance Works* Potential operational phase activities in newly improved channels would be limited to regular maintenance such as de-silting. Impacts to aquatic communities resulting from these activities are expected to be minor. Nevertheless, the following measures are recommended to minimise potential impacts resulting from operational phase activities:	To minimize potential ecological impact	Contractor	Works areas/ operation phase			√		

ES Ref. #	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measure?	Location of the measure	When to implement the measure?				What requirements or standard for the measures to achieve?
					Des	C	O	Dec	
	• To minimise sedimentation, de-silting should be limited to the dry season (November-March). • For maintenance desilting, temporary barrier walls shall be used to provide a dewatered zone for desilting work. • The implementation of de-silting and other activities that could disturb aquatic fauna should be phased to ensure some areas of relatively undisturbed habitat remain available for resident aquatic fauna at all times. • Waste material produced during de-silting should be disposed of in a timely and appropriate manner.								
S7.101	*Compensatory Planting* Planting of trees and other vegetation along the banks of the newly improved channel would provide compensation for unavoidable tree-felling and loss of riparian vegetation resulting from the proposed works. Compensatory planting should make use of native plant species with flowers/fruits attractive to wildlife.	To minimize potential ecological impact	Contractor	Works areas/ construction phase		√			
S7.105 S11.9- S11.13	*Ecological Monitoring & Audit of Ecological Mitigation Measures* The proper implementation of ecological mitigation measures should be audited. A specific monitoring programme of both She Shan Stream and Lam Tsuen River is recommended (refer to section 11.9-11.13).	To minimize potential ecological impact	Ecologist appointed by the DSD.	She Shan Stream & Lam Tsuen River/ Design, construction and operation phases	√	√	√		

ES Ref. #	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measure?	Location of the measure	When to implement the measure?				What requirements or standard for the measures to achieve?
					Des	C	O	Dec	

All recommendations and requirements resulted during the course of EIA/ES Process, including ACE and / or accepted public comment to the proposed project.
Des - Design, C - Construction, O - Operation and Dec – Decommissioning

Table 12.6 Implementation Schedule for Cultural Heritage Impact

ES Ref. #	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measure?	Location of the measure	When to implement the measure?				What requirements or standard for the measures to achieve?
					Des	C	O	Dec	
S8.115	<u>She Shan River</u> • Any excavation associated with works within the boundary of She Shan Archaeological Site be monitored by qualified archaeologist in order to record any artefacts and/or archaeological data. The archaeologist must obtain a licence from the AMO prior to the commencement of monitoring works. • The boundary of the area to be monitored will consist of all work areas within and in close proximity (defined as being located within 50m) to the She Shan Archaeological Site, see **Figure 8.1** for details. This should include the ground surface area as well as the sub-surface boundaries of the Assessment Area. An appropriate sampling procedure must be developed by the qualified archaeologist and approved by the AMO. Sampling should be set at not less than 2.5% of the work area in order to ensure meaningful representation. The area immediately adjacent to the site where surface material was recorded should also be included. The area for which an archaeological monitoring programme is recommended is shown in **Figure 8.1**. <u>Upper Lam Tsuen River</u> • Any excavation associated with works within	To minimise potential impact to cultural heritage resources	Qualified archaeologist	She Shan River and Upper Lam Tsuen River		√			

ES Ref. #	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measure?	Location of the measure	When to implement the measure?				What requirements or standard for the measures to achieve?
					Des	C	O	Dec	
	the boundary of San Tong Ha Archaeological Site be monitored by qualified archaeologist in order to record any artefacts and/or archaeological data. The archaeologist must obtain a licence from the AMO prior to the commencement of monitoring works. • The boundary of the area to be monitored will consist of all work areas within and in close proximity (defined as being located within 50m) to the San Tong Ha Archaeological Site, see **Figure 8.2** for details. Other requirements in terms of monitoring are similar to those described for She Shan River.								
S8.125	• The channel design should include proposals for designs that will minimise any change in character to the environmental setting, such as the incorporation of building materials for the channelisation, that are compatible to the existing environment, such as cobbles and gravel and the incorporation of features that will encourage vegetation growth along the banks, such as grass concrete and natural verges.	To minimise potential impact to cultural heritage resources	Detailed Design Team & Contractor	Project work areas at She Shan River and Upper Lam Tsuen River	√				
S8.129	• If mature trees felling cannot be avoided during construction phase, compensatory planting should be undertaken.	To retain mature trees	Detailed Design Team & Contractor	Project work areas at She Shan River and Upper Lam Tsuen River		√			

All recommendations and requirements resulted during the course of EIA/ES Process, including ACE and / or accepted public comment to the proposed project.
* Des - Design, C - Construction, O – Operation, and Dec - Decommissioning

Table 12.7 Implementation Schedule for Landscape and Visual Impact

ES Ref. #	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measure?	Location of the measure	When to implement the measure?				What requirements or standard for the measures to achieve?
					Des	C	O	Dec	
S10.87 -10.89 and Table 10.5	*Physical Extent of Construction Work Sites and Work Areas* • The physical extent of construction works sites and works areas shall be minimized as far as possible. They shall be delimited so as to retain and protect existing trees located around their perimeter. In visually sensitive locations, decorative hoardings shall be erected around site boundaries.	To minimize the potential impact of the physical extent of construction work sites on trees	Detailed Design Team & Contractor	Works Site / Design & Construction Phase	√	√			EIAO-TM
S10.87 -10.89 and Table 10.5	***Identification, Storage and Reuse of Topsoil*** • Topsoil, where identified, shall be stripped and stored for re-use in the construction of the soft landscape works, where practical. The Contractor Specifications shall include for identification, storage and reuse of topsoil as appropriate. Under the Specification, the Contractor shall be required to identify at the commencement of the contract any existing topsoil for preservation, storage and re-use, for comment and approval by the Engineer.	To preserve, store and reuse the topsoil	Detailed Design Team & Contractor	Works Site / Design & Construction Phase	√	√			EIAO-TM
S10.87 -10.89 and Table	*The Potential of Soil Erosion* • The potential for soil erosion shall be reduced by minimising the extent of vegetation disturbance on site and by providing a protective cover (e.g. plastic sheeting or a grass cover established by hydro-seeding)	To minimize potential for soil erosion	Detailed Design Team & Contractor	Works areas / Works Site construction		√			EIAO-TM

ES Ref. #	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measure?	Location of the measure	When to implement the measure?				What requirements or standard for the measures to achieve?
					Des	C	O	Dec	
10.5	over newly exposed soil.			phase					
S10.87 -10.89 and Table 10.5	*Existing Trees* • All works shall be carefully designed to minimise impacts on existing trees. Certain trees and groups of trees must be retained and protected – these 'must retain and protect' trees are identified in the specific measures listed below. In addition, for certain other important groups of large trees, the contractor shall demonstrate to the Independent Checker that he has taken all practical steps to minimise impacts on the existing trees before he may undertake any work that may impact the trees. These important groups of trees are also identified in the DP-specific measures listed below. • All retained trees shall be recorded photographically at the commencement of the contract, and carefully protected during construction by fencing them off from the rest of the works. A detailed Tree Protection Specification shall be provided in the Contract Specifications. Under this specification, the Contractor shall be required to submit, for approval, a detailed Working Method Statement for the protection of trees prior to undertaking any works adjacent to all retained trees, including trees in contractor's works areas.	To minimize the potential impact on existing trees	Detailed Design Team & Contractor	Works areas/ construction phase	√	√			EIAO-TM

ES Ref. #	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measure?	Location of the measure	When to implement the measure?				What requirements or standard for the measures to achieve?
					Des	C	O	Dec	
S10.87 -10.89 and Table 10.5	*Tree Felling / Transplanting Programme* • Trees unavoidably affected by the works shall be transplanted where practical. A detailed Tree Transplanting Specification shall be provided in the Contract Specifications, if applicable. Sufficient time for necessary tree root and crown preparation periods prior to moving the trees shall be allowed in the project programme.	To minimize felling trees	Design Team / Contractor	Works areas/ construction phase	√	√			EIAO-TM
S10.87 -10.89 and Table 10.5	*Lighting and Glare* • Control night lighting and prevent glare to surrounding VSRs by directing all security lighting downward into works sites and works areas.	To control night lighting and prevent glare	Design Team / Contractor	Works areas/ works sites/ construction phase		√			EIAO-TM
S10.87 -10.89 and Table 10.5	*Natural Stream* Preservation and protection of the existing natural stream-course outside the works areas. The stream and immediately surrounding vegetation, measured 10m from the centreline of the stream, shall be fenced off at the commencement of the contract and protected during the contract period by sturdy protective fencing. The contractor shall not be allowed into the protected area without written authority from the Engineer.	To minimize the potential impact on natural stream	Design Team / Contractor	Works areas/ construction phase	√	√			EIAO-TM

ES Ref. #	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measure?	Location of the measure	When to implement the measure?				What requirements or standard for the measures to achieve?
					Des	C	O	Dec	
S10.87 -10.89 and Table 10.5	*Slope Stabilisation* • The slope stabilisation works to the existing slopes along Lam Kam Road and at the edge of Natural woodland at the west of Mui Shue Hang Treatment Works shall be undertaken in such a manner so as to avoid impact on the stream course. The Contractor shall demonstrate compliance with this mitigation measure to the Independent Checker prior to commencement of the associated works.	To avoid the potential impact on the stream course.	Design Team / Contractor	Works areas/ construction phase	√	√			EIAO-TM
S10.87 -10.89 and Table 10.5	*Existing trees within construction site* • Construction of the works in the land temporarily alienated shall be done in a way that avoids all impacts on existing trees.	To avoid impact on existing trees within site.	Design Team / Contractor	Works areas/ construction phase	√	√			EIAO-TM
S10.87 -10.89 and Table 10.5	*Existing trees along the edge of site* • The works site and working methods for the construction of the whole drainage channel works site shall be designed so as to retain and protect all existing large trees along the edge of the site.	To minimize impact on existing trees along the edge of site.	Design Team / Contractor	Works areas/ construction phase	√	√			EIAO-TM
S10.87 -10.89	*Above Water Structural Design* • All above water level structures, including gabion drainage walls, footpath, footbridge in	To minimize potential adverse	Design Team/	Works Areas/ work sites/	√	√	√		EIAO-TM

ES Ref. #	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measure?	Location of the measure	When to implement the measure?				What requirements or standard for the measures to achieve?
					Des	C	O	Dec	
and Table 10.5	village environs etc shall be sensitively designed in a manner that responds to the existing and planned urban context, and minimises potential adverse landscape and visual impacts.	landscape and visual impact	Contractor	construction and operation Phase					
S10.87 -10.89 and Table 10.5	*Streetscape Elements* • Footpath and footbridge elements in village environs along the drainage channel (e.g. paving, signage, lighting etc.) shall be sensitively designed in a manner that responds to the existing and planned urban context, and minimises potential adverse landscape and visual impacts.	To minimize potential adverse landscape and visual impact	Design Team/ Contractor	Works Areas/ work sites/ construction and operation phases	√	√	√		EIAO-TM
S10.87 -10.89 and Table 10.5	*Footpath and Landscape Areas* • All footpath areas in village environs and hard and soft landscape areas disturbed during construction shall be reinstated to equal or better quality, to the satisfaction of the relevant Government depts.	To minimize potential adverse landscape and visual impact	Design Team/ Contractor	Works Areas/ work sites/ construction and operation phases	√	√	√		EIAO-TM, and to the satisfaction of the relevant Government depts
S10.87 -10.89 and Table	*Compensatory Planting Design* • Compensatory Tree Planting for all felled trees shall be provided to the satisfaction of relevant Government departments. It is suggested to use native plants, which are	To use native plants and be agreed by maintenance	Design Team/ Contractor	Works Areas/ work sites/ construction	√	√	√		Tree Felling Application

ES Ref. #	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measure?	Location of the measure	When to implement the measure?				What requirements or standard for the measures to achieve?
					Des	C	O	Dec	
10.5	common species at the surrounding environment for compensatory planting. Required numbers and locations of compensatory trees shall be determined and agreed separately with Government during the Tree Felling Application process under WBTC14/2002 & ETWBTC 2/2004.	parties		and operation phases					process under WBTC14/2002 and ETWBTC 2/2004
S10.87 -10.89 and Table 10.5	*Greening Effect on the Visible Structures* • Attractive soft landscape for footpath in village environs along drainage channel and other visible structures so as to provide a visual softening and greening effect.	To provide a visual softening and greening effect to the visible structures	Design Team/ Contractor	Works Areas/ work sites/ construction and operation phases	√	√	√		EIAO-TM
S10.87 -10.89 and Table 10.5	*Exposed engineering features* • Any exposed engineering features such as drainage channels, access steps, safety railings etc shall be coloured 'earth' colours to blend in with the surrounding landscape.	To minimize potential adverse landscape and visual impact	Design Team/ Contractor	Works Areas/ work sites/ construction and operation phases	√	√	√		EIAO-TM and to the satisfaction of relevant Government depts.
S10.87 -10.89	*Gabion walls* • Gabion walls shall be provided with planting strips to allow planting of herbaceous plant or	To provide a visual softening	Design Team/	Works Areas/ work sites/	√	√	√		EIAO-TM and to

ES Ref. #	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measure?	Location of the measure	When to implement the measure?				What requirements or standard for the measures to achieve?
					Des	C	O	Dec	
and Table 10.5	self-clinging climbing plants along the top of the walls, sufficient to cover the entire walls in time.	and screening effect to the visible structure	Contractor	construction and operation phases					the satisfaction of relevant Government depts.
S10.87 -10.89 and Table 10.5	*Amenity area* • An attractive hard and soft landscaped amenity strip shall be created along the strip of land beside the footpath in village environs along the drainage channel. Tall shade trees shall be provided alongside footpaths and pedestrian areas for the comfort of pedestrians.	To improve the visual and landscape impact.	Design Team/ Contractor	Works Areas/ work sites/ construction and operation phases	√	√	√		EIAO-TM and to the satisfaction of relevant Government depts.

All recommendations and requirements resulted during the course of EIA/ES Process, including ACE and / or accepted public comment to the proposed project.
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11. IMPLEMENTATION SCHEDULE OF PROPOSED MITIGATION MEASURES

Table 11.1 Implementation Schedule for Construction Noise Control

ES Ref#	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages*				Relevant Legislation and Guidelines
				Des	C	O	Dec	
S3.33	Good Site Practice • Only well-maintained plant should be operated on-site and plant should be serviced regularly during the construction program; • Silencers or mufflers on construction equipment should be utilized and should be properly maintained during the construction program; • Mobile plant, if any, should be sited as far from NSRs as possible; • Machines and plant (such as trucks) that may be in intermittent use should be shut down between work periods or should be throttled down to a minimum; • Plant known to emit noise strongly in one direction should, wherever possible, be orientated so that the noise is directed away from the nearby NSRs; and • Material stockpiles and other structures should be effectively utilised, wherever practicable, in screening noise from on-site construction activities.	Work site / During the construction period	Contractor		√			ProPECC PN2/93 and Noise Control Ordinance
S3.34 - S3.35	Use of quiet PME	Work site / During the construction period	Contractor		√			ProPECC PN2/93 and Noise Control Ordinance
S3.36 - 3.39	Temporary / Movable Noise Barriers	Work site / During the construction period	Contractor		√			ProPECC PN2/93 and Noise Control Ordinance
S3.40 – S3.42	Use of Acoustic Shed	Work site / During the construction period	Contractor		√			ProPECC PN293 and Noise Control Ordinance

All recommendations and requirements resulted during the course of EIA/ES Process, including ACE and / or accepted public comment to the proposed project.
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Table 11.2 Implementation Schedule for Construction Dust Control

ES Ref#	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages*				Relevant Legislation and Guidelines
				Des	C	O	Dec	
S4.15	Implementation of the Air Pollution Control (Construction Dust) Regulation and good site practices: • Use of regular watering to reduce dust emissions from exposed site surfaces and unpaved road, with complete coverage, particularly during dry weather; • Use of frequent watering for particularly dusty static construction areas and areas close to air sensitive receivers; • Tarpulin covering of all dusty vehicle loads transported to, from and between site location; • Establishment and use of vehicle wheel and body washing facilities at the exit points of the site; • Routing of vehicles and positioning of construction plant should be at the maximum possible distance from ASRs. • Stockpiled excavated materials should be covered with tarpaulin, and should be removed off-site within 24 hours to avoid any odour nuisance arising.	Work site / During the construction period	Contractor		√			Air Pollution Control (Construction Dust) Regulation

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Table 11.3 Implementation Schedule for Water Quality Control

ES Ref#	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages*				Relevant Legislation and Guidelines
				Des	C	O	Dec	
S5.24	*Construction Runoff and Drainage* • Before commencing any site formation work, all sewer and drainage connections shall be sealed to prevent debris, soil, sand etc. from entering public sewers/drains. • Temporary ditches shall be provided to facilitate run-off discharge into appropriate watercourses, via a silt retention pond • Sand/silt removal facilities such as sand traps, silt traps and sediment basins shall be provided to remove sand/silt particles from runoff to meet the requirements of the Technical Memorandum standard under the Water Pollution Control Ordinance. The design of silt removal facilities shall be based on the guidelines provided in ProPECC PN 1/94. All drainage facilities and erosion and sediment control structures shall be inspected monthly and maintained to ensure proper and efficient operation at all times and particularly during rainstorms. • Water pumped out from foundation excavations shall be discharged into silt removal facilities. • During rainstorms, exposed slope surfaces shall be covered by a tarpaulin or other means. Other measures that need to be implemented before, during, and after rainstorms are summarized in ProPECC PN 1/94. • Open trench excavation for the urban drainage improvement works in Tai Po shall be avoided in the wet season as far as practicable, and the trench shall be excavated and backfilled in short sections. • Exposed soil surfaces shall be protected by paving or fill material as soon as possible to reduce the potential of soil erosion.	Work site / During the construction period	Contractor		√			ProPECC PN 1/94; WPCO
S5.25	*General Construction Activities* • Debris and refuse generated on-site shall be collected, handled and disposed of properly to avoid entering any nearby water bodies and local storm water drains. Stockpiles of cement and other construction materials shall be kept covered when not being used.	Work site / During the construction period	Contractor		√			ProPECC PN 1/94; WPCO

ES Ref#	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages*				Relevant Legislation and Guidelines
				Des	C	O	Dec	
S5.26	• Oils and fuels shall only be used and stored in designated areas which have pollution prevention facilities. All fuel tanks and storage areas shall be provided with locks and be sited on sealed areas, within bunds of a capacity equal to 110% of the storage capacity of the largest tank. The bund shall be drained of rainwater after a rain event.							
S5.27	*Sewage from Construction Workforce* • Temporary sanitary facilities, such as portable chemical toilets, shall be employed on-site. A licensed contractor shall be responsible for appropriate disposal and maintenance of these facilities.	Work site / During the construction period	Contractor		√			WPCO
S5.28	*Maintenance Desilting* • For maintenance desilting of the Upper Lam Tsuen re-profiled river channel, temporary barrier walls shall be used to provide a dry work zone for desilting work. Maintenance desilting shall be carried out during periods of low flow in the dry season.	Work site / During the operation period	Contractor			√		

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Table 11.4 Implementation Schedule for Ecological Requirements

ES Ref#	Environmental Protection Measures/Mitigation Measures	Location/ Timing	Implementation Agent	Implementation Stages*				Relevant Legislation and Guidelines
				Des	C	O	Dec	
S6.34	Measures should be implemented to minimise potential sedimentation and other water quality impacts to marine habitats downstream of the proposed works areas. All excavation works carried out within or close to water bodies should be carried out in the dry season where possible, with construction carried out by land-based plant. Excavation works within river/stream channels should be restricted to enclosed dry sections of the river, with containment measures such as bunds and barriers used within the river to minimize the impacts upon the downstream water body. Site runoff should be directed towards regularly cleaned and maintained silt traps and oil/grease separators to minimise the risk of sedimentation and pollution of river water. The silt and oil/grease separators should be appropriately designed for the local drainage and ground conditions. To minimize leakage and loss of sediments during excavation in narrow channels, tightly sealed closed grab excavators should be deployed where material to be handled is wet.	Work site / During the construction period	Contractor		√			-
S6.35	Noise mitigation measures including the use of quiet construction plant should be implemented to minimize disturbance to habitats adjacent to the works areas.	Work site / During the construction period	Contractor		√			-
S6.36	Standard good site practice measures should be implemented throughout the construction phase. The measures should include: • Placement of equipment or stockpile in designated works areas and access routes selected on existing disturbed land to minimise disturbance to natural or moderate-high ecological value habitats. • Construction activities should be restricted to work areas that should be clearly demarcated. The work areas should be reinstated after completion of the works. • Waste skips should be provided to collect general refuse and construction wastes. The wastes should be disposed of timely and properly off-site.	Work site / During the construction period	Contractor		√			-

ES Ref#	Environmental Protection Measures/Mitigation Measures	Location/ Timing	Implementation Agent	Implementation Stages*				Relevant Legislation and Guidelines
				Des	C	O	Dec	
	• General drainage arrangements should include sediment and oil traps to collect and control construction site run-off. • Open burning on works sites is illegal, and should be strictly prohibited.							

All recommendations and requirements resulted during the course of EIA/ES Process, including ACE and / or accepted public comment to the proposed project.

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Table 11.5 Implementation Schedule for Waste Management Implications

ES Ref#	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages*				Relevant Legislation and Guidelines
				Des	C	O	Dec	
S7.30 S7.31	*Good Site Practices* Good site practices during the construction activities include: • Nomination of approved personnel, such as a site manager, to be responsible for good site practices and making arrangements for collection of all wastes generated at the site and effective disposal to an appropriate facility. • Training of site personnel in proper waste management and chemical waste handling procedures. • Provision of sufficient waste disposal points and regular collection for disposal. • Appropriate measures to minimise windblown litter and dust during transportation of waste by either covering trucks or by transporting wastes in enclosed containers. • Separation of chemical wastes for special handling and appropriate treatment at the Chemical Waste Treatment Facility. • Regular cleaning and maintenance programme for drainage systems, sumps and oil interceptors. • A recording system for the amount of wastes generated, recycled and disposed (including the disposal sites) should be proposed. • A Waste Management Plan shall be prepared and submitted to the Engineer for approval. One may make reference to ETWB TCW No. 15/2003 for details. • In order to monitor the disposal of C&D material at landfills and public filling areas, and to control fly tipping, a trip-ticket system shall be included as one of the contractual requirements. One may make reference to WBTC No. 21/2002 for details.	Work site / During the construction period	Contractor		√			Waste Disposal Ordinance (Cap.54) WBTC No.21/2002, ETWB TCW No. 15/2003
S7.32	Waste reduction is best achieved at the planning and design stage, as well as by ensuring the implementation of good site practices. Recommendations to achieve waste reduction include:	Work site / During planning & design stage, and construction	Contractor	√	√			WBTC No.4/98, ETWB TCW No. 15/2003

ES Ref#	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages*				Relevant Legislation and Guidelines
				Des	C	O	Dec	
	• Segregation and storage of different types of waste in different containers, skips or stockpiles to enhance reuse or recycling of materials and their proper disposal. • To encourage collection of aluminium cans by individual collectors, separate labelled bins shall be provided to segregate this waste from other general refuse generated by the work force. • Any unused chemicals or those with remaining functional capacity shall be recycled. • Maximising the use of reusable steel formwork to reduce the amount of C&D material. • Prior to disposal of C&D waste, it is recommended that wood, steel and other metals shall be separated for re-use and / or recycling to minimise the quantity of waste to be disposed of to landfill. • Proper storage and site practices to minimise the potential for damage or contamination of construction materials. • Plan and stock construction materials carefully to minimise amount of waste generated and avoid unnecessary generation of waste.	stage						
S7.38	*General Refuse* General refuse shall be stored in enclosed bins or compaction units separate from C&D material. A reputable waste collector shall be employed by the contractor to remove general refuse from the site, separately from C&D material. An enclosed and covered area is preferred to reduce the occurrence of 'wind blown' light material.	Work site / During the construction period	Contractor		√			Public Health and Municipal Services Ordinance (Cap. 132)
S7.34 – S7.36	*Construction & Demolition (C&D) Material* C&D material generated from the urban drainage improvement works shall be sorted on-site into public fill and C&D waste. In order to minimize the impact resulting from collection and transportation of C&D material for off-site disposal, the excavated soil and rock material from open trench excavation shall be reused on-site as backfilling material as far as practicable. Suitable areas shall be designated within the works site boundaries for temporary stockpiling of C&D material.	Work site / During the construction period	Contractor		√			WBTC No. 4/98, 21/2002, 25/99, 12/2000 ETWB TCW No. 15/2003

ES Ref#	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages*				Relevant Legislation and Guidelines
				Des	C	O	Dec	
	Disused sections of drainage pipes shall be removed from the site regularly to avoid disturbance to pedestrians and road traffic. Within stockpile areas, the following measures shall be taken to control potential environmental impacts or nuisance: • covering material during heavy rainfall; • locating stockpiles to minimise potential visual impacts; and • minimizing land intake of stockpile areas as far as possible. When disposing C&D material at a public filling area, it shall be noted that the material shall only consist of soil, rock, concrete, brick, cement plaster/mortar, inert building debris, aggregates and asphalt. The material shall be free from marine mud, household refuse, plastic, metals, industrial and chemical waste, animal and vegetable matter, and other material considered to be unsuitable by the Filling Supervisor.							
S7.37	*Chemical Waste* If chemical wastes are produced at the construction site, the Contractor shall register with the EPD as a Chemical Waste Producer and follow the guidelines stated in the Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes. Good quality containers compatible with the chemical wastes shall be used, and incompatible chemicals shall be stored separately. Appropriate labels shall be securely attached on each chemical waste container indicating the corresponding chemical characteristics of the chemical waste, such as explosives, flammable, oxidizing, irritant, toxic, harmful, corrosive, etc. The Contractor shall use a licensed collector to transport and dispose of the chemical wastes generated at the Chemical Waste Treatment Centre at Tsing Yi, or other licenced facility, in accordance with the Waste Disposal (Chemical Waste) (General) Regulation.	Work site / During the construction period	Contractor		√			Waste Disposal (Chemical Waste) (General) Regulation

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Table 11.6 Implementation Schedule for Landscape and Visual Requirements

ES Ref#	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages*				Relevant Legislation and Guidelines
				Des	C	O	Dec	
Table T9.1 of Annex A	*Physical Extent of Construction Work Sites and Work Areas* • The physical extent of construction works sites and works areas shall be minimized as far as possible. They shall be delimited so as to retain and protect existing trees located around their perimeter. In visually sensitive locations, decorative hoardings shall be erected around site boundaries.	Works Site / Design & Construction Phase	Detailed Design Team & Contractor	√	√			EIAO-TM
Table T9.1 of Annex A	*Identification, Storage and Reuse of Topsoil* • Topsoil, where identified, shall be stripped and stored for re-use in the construction of the soft landscape works, where practical. The Contractor Specifications shall include for identification, storage and reuse of topsoil as appropriate. Under the Specification, the Contractor shall be required to identify at the commencement of the contract any existing topsoil for preservation, storage and re-use, for comment and approval by the Engineer.	Works Site / Design & Construction Phase	Detailed Design Team & Contractor	√	√			EIAO-TM
Table T9.1 of Annex A	*The Potential of Soil Erosion* • The potential for soil erosion shall be reduced by minimising the extent of vegetation disturbance on site and by providing a protective cover (e.g. plastic sheeting or a grass cover established by hydro-seeding) over newly exposed soil.	Works areas / Works Site construction phase	Detailed Design Team & Contractor		√			EIAO-TM

ES Ref#	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages*				Relevant Legislation and Guidelines
				Des	C	O	Dec	
Table T9.1 of Annex A	*Existing Trees* • All works shall be carefully designed to minimise impacts on existing trees. Certain trees and groups of trees must be retained and protected – these 'must retain and protect' trees are identified in the DP-specific measures listed below. In addition, for certain other important groups of large trees, the contractor shall demonstrate to the Independent Checker that he has taken all practical steps to minimise impacts on the existing trees before he may undertake any work that may impact the trees. These important groups of trees are also identified in the DP-specific measures listed below. • All retained trees shall be recorded photographically at the commencement of the contract, and carefully protected during construction by fencing them off from the rest of the works. A detailed Tree Protection Specification shall be provided in the Contract Specifications. Under this specification, the Contractor shall be required to submit, for approval, a detailed Working Method Statement for the protection of trees prior to undertaking any works adjacent to all retained trees, including trees in contractor's works areas.	Works areas/ construction phase	Detailed Design Team & Contractor	√	√			EIAO-TM
Table T9.1 of Annex A	*Tree Felling / Transplanting Programme* • Trees unavoidably affected by the works shall be transplanted where practical. A detailed Tree Transplanting Specification shall be provided in the Contract Specifications, if applicable. Sufficient time for necessary tree root and crown preparation periods prior to moving the trees shall be allowed in the project programme.	Works areas/ construction phase	Design Team / Contractor	√	√			EIAO-TM

ES Ref#	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages*				Relevant Legislation and Guidelines
				Des	C	O	Dec	
Table T9.1 of Annex A	*Lighting and Glare* • Control night lighting and prevent glare to surrounding VSRs by directing all security lighting downward into works sites and works areas.	Works areas/ works sites/ construction phase	Design Team / Contractor		√			EIAO-TM
Table T9.1 of Annex A	*Trees within Amenity Areas* • The works site and working methods for the construction of pipelines and associated works shall be designed to retain and protect as many existing large trees along the amenity areas as is practical. [Refer also to CS4 and CS5.] The Contractor shall demonstrate compliance with this mitigation measure to the Independent Checker prior to commencement of the associated works.	Works areas/ works sites/ construction phase	Contractor		√			EIAO-TM
Table T9.1 of Annex A	*Trees in Park* • The works site and working methods for the construction of pipelines and associated works A shall be designed to retain and protect as many of the existing important large trees within Yuen Chau Tsai Park, as is practical. [Refer also to CS4 and CS5.] The Contractor shall demonstrate compliance with this mitigation measure to the Independent Checker prior to commencement of the associated works.	Works areas/ work sites/ construction phase	Contractor		√			EIAO-TM

ES Ref#	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages*				Relevant Legislation and Guidelines
				Des	C	O	Dec	
Table T9.1 of Annex A	*Above Water Structural Design* • All above water level structures, including gabion drainage walls, footpath, footbridge and Firemen's' Accesses etc shall be sensitively designed in a manner that responds to the existing and planned urban context, and minimises potential adverse landscape and visual impacts.	Works Areas/ work sites/ construction and operation Phase	Design Team/ Contractor	√	√	√		EIAO-TM
Table T9.1 of Annex A	*Streetscape Elements* • Footpath and footbridge elements along the drainage channel (e.g. paving, signage, street furniture, lighting etc.) shall be sensitively designed in a manner that responds to the existing and planned urban context, and minimises potential adverse landscape and visual impacts.	Works Areas/ work sites/ construction and operation phases	Design Team/ Contractor	√	√	√		EIAO-TM
Table T9.1 of Annex A	*Footpath and Landscape Areas* • All footpath areas and hard and soft landscape areas disturbed during construction shall be reinstated to equal or better quality, to the satisfaction of the relevant Government depts.	Works Areas/ work sites/ construction and operation phases	Design Team/ Contractor	√	√	√		EIAO-TM, and to the satisfaction of the relevant Government depts.

ES Ref#	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages*				Relevant Legislation and Guidelines
				Des	C	O	Dec	
Table T9.1 of Annex A	*Compensatory Planting Design* • Compensatory Tree Planting for all felled trees shall be provided to the satisfaction of relevant Government departments. It is suggested to use native plants, which are common species at the surrounding environment for compensatory planting. Required numbers and locations of compensatory trees shall be determined and agreed separately with Government during the Tree Felling Application process under ETWBTC14/2002.	Works Areas/ work sites/ construction and operation phases	Design Team/ Contractor	√	√	√		Tree Felling Application process under ETWBTC14/2002
Table T9.1 of Annex A	*Greening Effect on the Visible Structures* • Attractive soft landscape in areas along drainage channel and other visible structures so as to provide a visual softening and greening effect.	Works Areas/ work sites/ construction and operation phases	Design Team/ Contractor	√	√	√		EIAO-TM
Table T9.1 of Annex A	*Amenity Areas and Cycling Trails* • Amenity areas and cycling trails beside Kwong Fuk Estate and Wang Fuk Court shall be re-instated to the satisfaction of LCSD and HyD.	Works Areas/ work sites/ construction and operation phases	Design Team/ Contractor	√	√	√		EIAO-TM and to the satisfaction of LCSD and HyD
Table T9.1 of Annex A	*Park Area* • Yuen Chau Tsai Park shall be re-instated to the satisfaction of LCSD and HyD.	Works Areas/ work sites/ construction and operation phases	Design Team/ Contractor	√	√	√		EIAO-TM and to the satisfaction of LCSD and HyD.

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5. ENVIRONMENTAL PROTECTION MEASURES TO BE INCORPORATED IN THE DESIGN AND ANY FURTHER ENVIRONMENTAL IMPLICATIONS

Environmental Protection Measures to be Incorporated in the Design

Cultural Heritage

Construction Phase

5.1 Although all the drainage improvement works are located at sufficient distances from the recorded resources as a precautionary measure, specific construction method/equipment should be adopted to avoid vibration impacts on the two identified Declared Monuments during the construction phase.

5.2 Monitoring of vibration impacts should be conducted during the construction works to ensure no damage to the existing structures of the resources.

5.3 Other environmental protection measures for controlling impacts of construction noise, dust and site drainage, including the use of quieter PME, implementation of dust suppression measures as specified in the *Air Pollution Control (Construction Dust) Regulation* and site practices outlined in *ProPECC PN1/94 "Construction Site Drainage"*, would minimise any indirect disturbance to the identified built heritage resources.

Operational Phase

5.4 The only identified impacts to built heritage resources during the operational phase would be in relation to aesthetic aspects and therefore mitigation for landscape and visual impacts should be followed.

Residual Environmental Impacts

5.5 With the implementation of the recommended mitigation measures, carrying out of vibration monitoring to ensure that the levels of vibration associated with the construction phase do not exceed the threshold limit, it is anticipated that no adverse impacts on the Remains of Pottery Kilns and Fan Sin Temple would be expected.

5.6 Adverse impact in relation to aesthetic aspects would not be expected provided that proposed mitigation measures for landscape and visual impacts to be implemented during the operation phase.

5.7 Overall, with the implementation of the proposed mitigation measures in construction and operation stages, the identified sites of cultural heritage would be preserved and the Project would comply with the requirements of *Annex 19* of the *EIAO-TM*.

Ecology

Construction Phase

5.8 To minimise and compensate for impacts resulting from the proposed works, a more 'ecologically-friendly' channel design has been adopted over the standard, trapezoidal concrete lined channel used in many early drainage improvement projects. Details of the channel design are described in **Sections 1.6** and **4.14**, and illustrated in **Drawing No. 1.2**. Following public consultation, the channel design was further refined to minimise ecological impacts. Key improvements to the design include:

- The existing riverbed contains many large boulders that form a potentially important microhabitat for herpetofauna. Under the original channel design, these boulders would have

been permanently removed from the Channel. Under the revised design, these large boulders would be returned to the riverbed following excavation works.

- Under the previous channel design, the improvement works would affect both banks of the river. Under the revised design, works from Ch. 0.0m - Ch. 150m would be along one bank of the river only; approximately 150m of the existing, natural riverbank on the western side of the river would be retained (**Drawing No. 1.2** refers).

5.9 The proposed works at the Upper Tai Po River have the potential to impact fish and amphibian species of conservation interest. To minimize these potential impacts, it is recommended that capture-surveys of the proposed works areas be conducted prior to the commencement of construction works in the channel. The surveys should include the Three-lined Chinese Stream Catfish (*Pseudobagrus trilineatus*), Predaceous Chub (*Parazacco spilurus*) and Hong Kong Newt (*Paramesotriton hongkongensis*). Any of these species caught during the surveys should be re-located to areas of the watercourse upstream of the proposed works areas. Capture-surveys of fish and amphibians are an obvious and simple measure that would prevent direct injury to species of conservation importance during the construction phase: there would be no technical difficulties in implementing the capture-surveys. A similar approach to preventing impacts to aquatic species of conservation importance has been recommended in previously approved EIA Reports such as EIA-075/2002 (Improvement to Tung Chung Road between Lung Tseng Tau and Cheung Sha). The capture surveys should be conducted in the dry season by a suitably qualified ecologist(s) appointed by the Project Proponent.

5.10 Measures should be implemented to minimise potential sedimentation and other water quality impacts to areas downstream of the proposed works areas. Excavation works within the river channel should be restricted to an enclosed dewatered section of the river, with containment measures such as bunds and barriers used within the river to minimize the impacts upon the downstream water body. Site runoff should be directed towards regularly cleaned and maintained silt traps and oil/grease separators to minimise the risk of sedimentation and pollution of river water. The silt and oil/grease separators should be appropriately designed for the local drainage and ground conditions. To minimize leakage and loss of sediments during excavation in narrow channel, tightly sealed closed grab excavators should be deployed where material to be handled is wet.

5.11 To ensure some areas of relatively undisturbed habitat are maintained, excavation works would be limited to sections 50-100m long at any one time, Furthermore, flow to areas downstream of proposed works areas will be maintained at all times during the construction phase.

5.12 Noise mitigation measures including the use of quiet construction plant and temporary noise barriers should be implemented to minimise disturbance to habitats adjacent to the works areas.

5.13 Standard good site practice measures should be implemented throughout the construction phase. The measures should include:

- Placement of equipment or stockpile in designated works areas and access routes selected on existing disturbed land to minimise disturbance to natural or moderate-high ecological value habitats.
- Construction activities should be restricted to work areas that should be clearly demarcated. The work areas should be reinstated after completion of the works.
- Waste skips should be provided to collect general refuse and construction wastes. The wastes should be disposed of timely and properly off-site.
- General drainage arrangements should include sediment and oil traps to collect and control construction site run-off.
- Open burning on works sites is illegal, and should be strictly prohibited.

5.14 Planting of trees and other vegetation along the banks of the newly improved drainage channel would provide compensation for unavoidable tree felling and loss of riparian vegetation resulting from the proposed works. Compensatory planting should make use of native plant species with flowers/fruits attractive to wildlife.

Operation Phase

5.15 Potential operational phase activities in the newly improved drainage channel would be limited to periodic channel maintenance such as de-silting. Impacts to aquatic communities resulting from these activities are expected to be minor. Nevertheless, the following measures are recommended to minimise potential impacts resulting from operational phase activities:

- To minimise sedimentation, de-silting should be limited to the dry season (November-March).
- For maintenance desilting of the re-profiled river channel, temporary barrier walls should be used to provide a dewatered zone for desilting work.
- The implementation of de-silting and other activities that could disturb aquatic fauna should be phased to ensure some areas of relatively undisturbed habitat remain available for resident aquatic fauna at all times.
- Waste material produced during de-silting should be disposed of in a timely and appropriate manner.

Ecological Monitoring & Audit

5.16 Considered as one of the key environmental protection measures, a monitoring programme of the newly improved drainage channel is recommended to verify the accuracy of the predictions of the ecological assessment study and to monitor the effectiveness of ecological mitigation measures (section 5.5.1 of *Annex 16* of the *EIAO-TM* refers), as outlined below.

5.17 A proposal containing further details of relevant monitoring and auditing requirements will be submitted to Environmental Protection Department (EPD) and Agriculture, Fisheries and Conservation Department (AFCD) for approval prior to the commencement of the construction works of the Project. Specialist input required for ecological mitigation and monitoring/auditing will be provided as part of the construction works supervision by qualified ecologists working in the Design and Construction Assignment with over 6 years of relevant ecological experience.

5.18 Baseline data will be collected several months before the commencement of the construction phase, covering at least 3 months at the end of the wet season (September/October) and start of the dry season (November/December). Baseline surveys would be conducted at the same time as capture surveys for faunal species of conservation interest recorded from the river (section 5.9 refers) Data collected will include the following parameters:

- Water quality (e.g., dissolved oxygen, pH, conductivity, salinity, BOD, nutrient concentrations)
- Sediment characteristics
- Water flow
- Avifauna species and densities
- Aquatic macroinvertebrate community species composition and abundance
- Fish community species composition and abundance
- Adult odonate community species composition and abundance
- Aquatic, emergent and riparian vegetation community species composition and abundance

5.19 During construction phase, site inspections by the ecologists on a weekly basis will be conducted to monitor and audit the proper implementation of ecological mitigation measures, ensuring that the 'ecologically friendly' features of the channel design are effectively implemented, and disturbance impacts to the river and surrounding habitats are kept to a minimum, and (as stated in section 5.5.1 of *Annex 16* of the *EIAO-TM*) to monitor the effectiveness of mitigation measures.

5.20 During operational phase, ecological monitoring covering the same parameters as the baseline monitoring will be conducted monthly for 2 years after the completion of works. It is expected that ecological communities will have re-colonised and established in the newly improved section of river within this period. However, the need for further operation phase monitoring will be reviewed at the end of this 2 year period.

5.21 Monthly ecological monitoring reports on the findings of monitoring will be submitted to EPD and AFCD for review. A final report summarising the monitoring results over the entire monitoring period will be prepared to serve as a reference for future projects of this kind.

Residual Environmental Impacts

5.22 Direct impacts to aquatic and riparian habitats at the Upper Tai Po River during and immediately after the construction phase are rated moderate. However, no major long-term residual ecological impacts to the river are anticipated. With the proposed mitigation measures in place, it is expected that aquatic communities found in the river would re-colonise the newly improved drainage channel. Further to this, the loss of riparian vegetation would be compensated for through tree planting and other landscaping works. Residual impacts would therefore be limited to temporary and reversible disturbance during periodic maintenance works. Measures would be implemented to minimise impacts resulting from these works. Overall, residual impacts to the Upper Tai Po River are considered acceptable.

5.23 Residual impacts to other habitats resulting from the proposed works would include the loss of small areas of cultivated land, village/developed area and shrubland. As the affected habitats are of low or low-moderate ecological value, and no species of conservation interest would be directly affected, these impacts are considered minor.

5.24 Overall, it is expected that no substantial adverse residual ecological impacts would result from the proposed works, and that with the implementation of the proposed mitigation measures, the Project would comply with the requirements of *Annex 16* of the *EIAO-TM*.

Noise

Construction Phase

Good Site Practice

5.25 Although the noise mitigation effects are easily quantifiable and the benefits may vary with site conditions and operating conditions, good site practices are easy to implement and do not impact upon the works schedule. The site practices listed below should be followed during each phase of construction:

- Only well-maintained plant should be operated on-site and plant should be serviced regularly during the construction program.
- Silencers or mufflers on construction equipment should be utilized and should be properly maintained during the construction program.
- Mobile plant, if any, should be sited as far from NSRs as possible.

- Machines and plant (such as trucks) that may be in intermittent use should be shut down between work periods or should be throttled down to a minimum.
- Plant known to emit noise strongly in one direction should, wherever possible, be orientated so that the noise is directed away from the nearby NSRs.
- Material stockpiles and other structures should be effectively utilised, wherever practicable, in screening noise from on-site construction activities.

Adoption of Quieter PME

5.26 In order to alleviate the construction impacts on the NSRs, the adoption of quieter PME is recommended. The type of quieter PME adopted in this assessment is not a must that the Contractors have to use specific items of plant for the construction operations. The Contractors are allowed to use other type of quieter PME, which have the same total SWL, to meet their needs.

5.27 A list of quieter PME recommended for adoption during the construction phase is presented in **Table 5.1** and **Appendix 5.1**. The quieter PME adopted in the assessment were taken from the BS5228: Part 1:1997. It is confirmed that the proposed list of quieter PME is practical to be used in completing the works within the schedule.

Table 5.1 Quieter PME Recommended for Adoption during Construction Phase

Powered Mechanical Equipment (PME)	Reference	Sound Power Level (SWL)
Excavator / Loader	BS C3/97	105
Dump Truck	BS C9/39	103
Generator	CNP103	95
Crane	BS C7/114	101
Vibratory Roller	BS C3/116	106
Vibratory Poker	BS C6/32	100
Concrete Lorry Mixer	BS C6/23	100
Water Pump	CNP283	85

Use of Temporary Barrier

5.28 The erection of purpose-built temporary barriers along the boundaries of the work areas would also be considered as an effective noise mitigation provided that the line of sight between the noise sources and the affected NSRs are blocked. Barrier material of surface mass in excess of 7kg/m^2 is desirable to achieve the maximum screening effect. The minimum height of a barrier should be such that no part of the noise source would be visible from the NSR being protected.

5.29 Having taken account the surrounding NSRs in the various works areas, the predicted noise impacts as well as the access, safety and operational requirements, a 2m high vertical barrier could be provided to alleviate the noise impact predicted at the affected NSRs. **Drawing No. 5.1** shows the location of the proposed temporary noise barriers.

5.30 Based on the site survey, all the NSRs within the Study Area are low-rise in nature of one to three storey high. In addition, the majority of the channel construction works would be undertaken below the ground levels of the NSRs. As such, the line of sight of the NSRs to the construction site could be totally screened by the temporary noise barriers erected along the work area boundary. This would thus allow a reduction the predicted noise level of 10dB(A) as per the *GW-TM*.

Mitigated Construction Noise Impacts

5.31 Mitigated construction noise levels were predicted at various NSRs (**Table 5.2** refers) taking into account the noise reduction provided by the above-mentioned mitigation measures. A sample

calculation of construction noise levels for the mitigated scenario is provided in **Appendix 5.2**. Ranges of mitigated and unmitigated construction noise levels predicted at representative NSRs are both shown in **Table 5.2**.

Table 5.2 Ranges of Unmitigated and Mitigated Construction Noise Levels

NSR	Unmitigated Noise Levels, dB(A)	Mitigated Noise Levels, dB(A)	Mitigation Measures Proposed
UTP1	54 - 87	40 - 66	Quieter PME & Temporary Barrier*
UTP2	55 - 86	50 - 75	Quieter PME
UTP3	64 - 96	44 - 75	Quieter PME & Temporary Barrier*
UTP4	62 - 88	48 - 67	Quieter PME & Temporary Barrier*
UTP5	56 - 97	46 - 75	Quieter PME & Temporary Barrier*
UTP6	63 - 96	44 - 75	Quieter PME & Temporary Barrier*
UTP7	64 - 95	45 - 75	Quieter PME & Temporary Barrier*
UTP8	58 - 96	45 - 75	Quieter PME & Temporary Barrier*
UTP9	52 - 90	42 - 69	Quieter PME & Temporary Barrier*
UTP10	48 - 96	38 - 75	Quieter PME & Temporary Barrier*
UTP11	47 - 77	47 - 66	Quieter PME

Notes: *10 dB(A) noise reduction was assumed with the use of temporary barrier.
EIAO-TM Normal Daytime Construction Noise Criteria is 75dB(A).

5.32 As shown in **Table 5.2**, with the adoption of practicable noise mitigation measures, construction noise levels due to the proposed works at Upper Tai Po River would comply with the *EIAO-TM* daytime construction noise criteria. The proposed mitigation measures and plant have made reference to the projects with of similar nature and conditions in Hong Kong. The recommended measures and plants are applicable and available to this Project, and they are expected to be practical in completing the works within the schedule.

5.33 As one of the environmental protection measures, weekly construction noise monitoring at representative NSRs should be carried out to ensure the above noise mitigation measures would be implemented properly.

Residual Environmental Impacts

5.34 With the recommended mitigation measures in place, no adverse residual construction noise impact would be expected.

Air Quality

Construction Phase

Construction Dust

5.35 To ensure compliance with the guideline level and AQO at the ASRs, the *Air Pollution Control (Construction Dust) Regulation* should be implemented and good site practices should be incorporated in the contract clauses to minimize construction dust impact. A number of practical measures are listed below:

- Use of regular watering to reduce dust emissions from exposed site surfaces and unpaved road, with complete coverage, particularly during dry weather.

- Use of frequent watering for particularly dusty static construction areas and areas close to ASRs.
- Tarpaulin covering of all dusty vehicle loads transported to, from and between site location.
- Establishment and use of vehicle wheel and body washing facilities at the exit points of the site.
- Routing of vehicles and positioning of construction plant at the maximum possible distance from ASRs.

Odour

- Cover any odorous stockpiled excavated materials with tarpaulin, and remove off-site within 1 day of work to avoid any odour nuisance arising.

5.36 Weekly site inspections to inspect the proper implementation of the above-recommended control measures should be conducted during construction phase of the Project.

Residual Environmental Impacts

5.37 With the implementation of the proposed dust suppression measures, good site practices along with regular environmental audits, no adverse residual construction phase air quality impact would be expected.

Water Quality

Construction Phase

5.38 The excavation and widening works for the drainage improvements to the Upper Tai Po river channel should be carried out in sections (approximately 50-100m in length) and in dewatered condition. Special construction method by adopting containment measures such as bunds and barriers should be used within the river channel and the excavation works restricted to within an enclosed dewatered section of the channel (See **Drawing No. 4.1**). Although flooding of the proposed contaminant section seldom occurs during the dry season, the excavation should consider to temporarily stop when flood water enter the containment causing leakage of runoffs to stream water. This method of channel excavation is feasible and practical as proposed by the Project Engineer and should be specified in the contract document for implementation.

5.39 The site practices outlined in *ProPECC PN 1/94 "Construction Site Drainage"* should be followed as far as practicable during the drainage improvement works in order to minimise surface runoff and the chance of erosion, and also to retain and reduce any suspended solids prior to discharge. These practices include the following items:

- Before commencing any site formation work, all sewer and drainage connections should be sealed to prevent debris, soil, sand etc. from entering public sewers/drains.
- Temporary ditches should be provided to facilitate run-off discharge into appropriate watercourses, via a silt retention pond.
- Sand/silt removal facilities such as sand traps, silt traps and sediment basins should be provided to remove sand/silt particles from runoff to meet the requirements of the Technical Memorandum standard under the *Water Pollution Control Ordinance*. The design of silt removal facilities should be based on the guidelines provided in *ProPECC PN 1/94*. All drainage facilities and erosion and sediment control structures should be inspected monthly and maintained to ensure proper and efficient operation at all times and particularly during rainstorms.
- Water pumped out from foundation excavations should be discharged into silt removal facilities.

- During rainstorms, exposed slope surfaces should be covered by a tarpaulin or other means. Other measures that need to be implemented before, during, and after rainstorms are summarized in *ProPECC PN 1/94*.
- Exposed soil areas should be minimized to reduce potential for increased siltation and contamination of runoff.
- Exposed soil surfaces should be protected by paving or fill material as soon as possible to reduce the potential of soil erosion.
- Open stockpiles of construction materials or construction wastes on-site of more than 50 m^3 should be covered with tarpaulin or similar fabric during rainstorms.

5.40 Disposal of any slurry water would need to comply with the *Technical Memorandum - Standards for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal Waters* under the *Water Pollution Control Ordinance*.

5.41 Debris and refuse generated on-site should be collected, handled and disposed of properly to avoid entering the river channel and local storm water drains. Stockpiles of cement and other construction materials should be kept covered when not being used.

5.42 Oils and fuels should only be used and stored in designated areas which have pollution prevention facilities. To prevent spillage of fuels and solvents to nearby water bodies, all fuel tanks and storage areas should be provided with locks and be sited on sealed areas, within bunds of a capacity equal to 110% of the storage capacity of the largest tank. The bund should be drained of rainwater after a rain event.

5.43 Temporary sanitary facilities, such as portable chemical toilets, should be employed on-site. A licensed contractor would be responsible for appropriate disposal and maintenance of these facilities.

5.44 Weekly site audits should be carried out during construction phase of the Project to inspect the construction activities at all works areas to ensure the above water pollution control measures are properly implemented.

Operation Phase

5.45 For maintenance desilting of the Upper Tai Po re-profiled river channel, temporary barrier walls should be used to provide a dewatered zone for desilting work. Maintenance desilting should be carried out during periods of low flow in the dry season.

Residual Environmental Impacts

5.46 With the full implementation of the recommended mitigation measures for the construction and operation phases of the proposed Project, no adverse residual impact on water quality is anticipated.

Waste Management

Construction Phase

5.47 Appropriate waste handling, transportation and disposal methods for all waste arisings generated during the construction works should be implemented to ensure that construction wastes do not enter the river channel and coastal waters.

5.48 It is not anticipated that adverse waste management related impacts would arise, provided that good site practices are strictly followed. Recommendations for good site practices during the construction activities include:

- Nomination of approved personnel, such as a site manager, to be responsible for good site practices and making arrangements for collection of all wastes generated at the site and effective disposal to an appropriate facility.
- Training of site personnel in proper waste management and chemical waste handling procedures.
- Provision of sufficient waste disposal points and regular collection for disposal.
- Covering of stockpiled excavated material by tarpaulin.
- Appropriate measures to minimise windblown litter and dust during transportation of waste by either covering trucks or by transporting wastes in enclosed containers.
- Separation of chemical wastes for special handling and appropriate treatment at the Chemical Waste Treatment Facility.
- Regular cleaning and maintenance programme for drainage systems, sumps and oil interceptors.
- A recording system for the amount of wastes generated, recycled and disposed (including the disposal sites) should be proposed.
- A Waste Management Plan should be prepared and submitted to the Engineer for approval. One may make reference to *ETWB TCW No. 15/2003* for details.

5.49 In order to monitor the disposal of C&D material at landfills and public filling areas, as appropriate, and to control fly tipping, a trip-ticket system should be included as one of the contractual requirements. One may make reference to *ETWB TCW No. 31/2004* for details. The use of a trip-ticket system would be required to avoid any illegal or unplanned dumping of waste generated by the Project.

5.50 Good management and control can prevent the generation of significant amounts of waste. Waste reduction is best achieved at the planning and design stage, as well as by ensuring the implementation of good site practices. Recommendations to achieve waste reduction include:

- Segregation and storage of different types of waste in different containers, skips or stockpiles to enhance reuse or recycling of materials and their proper disposal.
- To encourage collection of aluminium cans by individual collectors, separate labelled bins should be provided to segregate this waste from other general refuse generated by the work force.
- Any unused chemicals or those with remaining functional capacity should be recycled.
- Maximising the use of reusable steel formwork to reduce the amount of C&D material.
- Prior to disposal of C&D waste, it is recommended that wood, steel and other metals should be separated for re-use and / or recycling to minimise the quantity of waste to be disposed of to landfill.
- Proper storage and site practices to minimise the potential for damage or contamination of construction materials.
- Plan and stock construction materials carefully to minimise amount of waste generated and avoid unnecessary generation of waste.

5.51 The C&D material generated from the drainage improvement works would comprise public fill, being excavated soil and small rocks. To minimise off-site disposal of public fill, the excavated material with suitable characteristics/size should be reused on-site as fill material as far as practicable, such

as for construction of embankments, and small cobbles and rocks should be used in the construction of the re-created channel bed. The excavated riverbed material at the upstream section of Upper Tai Po River (Chainage CH 0.232 to CH 0.592) should be reused on-site as backfilling material for gabion lining.

5.52 When disposing C&D material at a public filling area, the material should only consist of soil, rock, concrete, brick, cement plaster/mortar, inert building debris, aggregates and asphalt. The material should be free from marine mud, household refuse, plastic, metals, industrial and chemical waste, animal and vegetable matter, and other material considered to be unsuitable by the Filling Supervisor.

5.53 Use of water-tight trucks would be required for the transportation of excavated riverbed material to the designated barging point for disposal at the designated public filling area, or transported directly to the public filling area.

5.54 If chemical wastes are produced at the construction site, the Contractor would be required to register with the EPD as a Chemical Waste Producer and to follow the guidelines stated in the *Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes*. Good quality containers compatible with the chemical wastes should be used, and incompatible chemicals should be stored separately. Appropriate labels should be securely attached on each chemical waste container indicating the corresponding chemical characteristics of the chemical waste, such as explosives, flammable, oxidizing, irritant, toxic, harmful, corrosive, etc. The Contractor should use a licensed collector to transport and dispose of the chemical wastes generated at the Chemical Waste Treatment Centre at Tsing Yi, or other licenced facility, in accordance with the *Waste Disposal (Chemical Waste) (General) Regulation*.

5.55 General refuse should be stored in enclosed bins or compaction units separate from C&D material. A reputable waste collector should be employed by the contractor to remove general refuse from the site, separately from C&D material. An enclosed and covered area is preferred to reduce the occurrence of 'wind blown' light material.

5.56 To determine if wastes are being managed in accordance with approved procedures and waste management plan, and to check the implementation of recommended good site practices and other waste management mitigation measures, an audit near the commencement of construction works, and thereafter regular audits on a quarterly basis are recommended.

Residual Environmental Impacts

5.57 With the implementation of the recommended mitigation measures for the handling, transportation and disposal of the identified waste arisings, unacceptable residual impacts would not be expected during the construction of the proposed drainage improvement works.

Landscape and Visual Impacts

5.58 Based on the *WBTC 14/2002* and *ETWB TC No. 2/2004, Maintenance of Vegetation and Hard Landscape Features*, landscape and visual mitigation measures are recommended for the construction and operational phases.

Construction Phase

- Preservation and protection of the existing natural stream-course outside the works areas e.g. the upper part of the river inside Tai Mo Shan Country Park.
- The slope stabilisation works to the existing slopes at the edge of Natural woodland of Lai Chi Shan and Pun Shan Chau should be undertaken in such a manner so as to avoid impact on the stream course.

- The works site and working methods for the construction of the whole drainage channel works site should be designed so as to retain and protect all existing large trees along the edge of the site.
- All retained trees should be recorded photographically at the commencement of the contract, and carefully protected during construction by fencing them off from the rest of the works.
- Trees unavoidably affected by the works should be transplanted where practical. Sufficient time for necessary tree root and crown preparation periods prior to moving the trees should be allowed in the project programme.
- Topsoil, where identified, should be stripped and stored for re-use in the construction of the soft landscape works, where practical.
- The potential for soil erosion should be reduced by minimising the extent of vegetation disturbance on site and by providing a protective cover (e.g. plastic sheeting or a grass cover established by hydro-seeding) over newly exposed soil.
- Control night lighting and prevent glare to surrounding VSR by directing all security lighting downward into works sites and works areas.

Operation Phase

- All above water level structures, including gabion drainage walls, footpath, footbridge in village environs etc should be sensitively designed in a manner that responds to the existing and planned urban context, and minimises potential adverse landscape and visual impacts.
- An attractive hard and soft landscaped amenity strip should be created along the strip of land beside the footpath in village environs along the drainage channel. Tall shade trees should be provided alongside footpaths and pedestrian areas for the comfort of pedestrians.
- Gabion walls should be provided with planting strips to allow planting of herbaceous plant or self-clinging climbing plants along the top of the walls, sufficient to cover the entire walls in time.
- Compensatory Tree Planting for all felled trees should be provided to the satisfaction of relevant Government departments.
- Any exposed engineering features such as drainage channel, access steps, safety railings etc should be coloured 'earth' colours to blend in with the surrounding landscape.
- Attractive soft landscape for footpath in village environs along drainage channel and other visible structures so as to provide a visual softening and greening effect.
- All footpath areas in village environs and hard and soft landscape areas disturbed during construction should be reinstated to equal or better quality, to the satisfaction of the relevant Government departments.

5.59 A detailed landscape plan for the project should be developed and submitted to the relevant Government Departments for their approval during the detailed design stage. This will also delineate the final boundaries for responsibility.

5.60 All mitigation measures should be implemented in the detailed design and construction phase, so that they are in place at the commissioning of the DSD.

5.61 The design, implementation and maintenance of landscape and visual mitigation measures should be checked by site supervision and monitoring to ensure that the intended mitigation effects are fully realised.

Residual Landscape Impact

Construction Phase

5.62 Residual landscape impacts on most of the LR and LCA are moderate. Given that the temporary nature of the construction works, no long-term adverse residual impact of substantial significance would be envisaged during the construction phase after implementation of the recommended mitigation measures. The residual construction impacts on LR and LCA are detailed in **Appendix 4.3**.

Operation Phase

5.63 Residual operation impacts on LR and LCA are detailed in **Appendix 4.3**. It is considered that there would be no residual impacts of substantial significance on any LR or LCA in the operational phase resulting from the Projects. Residual adverse landscape impacts of moderate significance in the operation phase that would be solely attributable to the project would be at the river channel. The remaining residual impacts in the operation phase would be either slight adverse or insubstantial.

Residual Visual Impact

Construction Phase

5.64 Taken the full mitigation measures into account, there would be changes in view for VSR overlooking the drainage channel alignment due to the impacts on mature trees, temporary works sites and works areas, general construction activities and associated works, and utilities and road and traffic diversion measures. The residual visual impacts of the construction of gabion channel on most of the VSR are *moderate but temporary* in construction stage. Details are provided in **Appendix 4.4**.

Operation Phase

5.65 The residual impacts for VSR are mostly evaluated as *Slight to Insubstantial* after implementation of the recommended mitigation measures (**Appendix 4.4** refers). **Drawing No 5.2** and **No. 5.3** show the photomontage of the existing view, the operation phase without mitigation measure and also implemented with mitigation measure (after 1 day and 10 years).

Severity, Distribution and Duration of Environmental Effects

5.66 No adverse residual environmental impacts are anticipated with the implementation of the recommended mitigation measures during the construction and operation stages of the Project.

5.67 In the operation phase, flood prevention is a long term benefit to protect nearby villages from flooding and avoid danger to human life and damage to properties.

Further Implications

5.68 Between July and October 2004 a public consultation with green groups and local villagers including site visits for the proposed river improvement works was conducted. The public views gathered have been considered and, where appropriate, incorporated into the scheme being developed. In particular, the comments from the local conservation groups to consider improving only one side of the river and to retain the remaining half of the river, with a view to preserving the natural riverbeds and minimising as far as practicable the extent of the proposed works, had been appropriately incorporated in the latest design (refer to Section 5.8). Key parties consulted include:

- Tai Po District Council
- Village Representatives from various villages around Upper Tai Po River
- Tai Po Environmental Association
- Kadoorie Farm & Botanic Garden
- Hong Kong Bird Watching Society
- WWF Hong Kong
- Green Power
- The Conservancy Association
- Friends of the Earth
- Greenpeace