14 Conclusion

This chapter summarizes the potential environmental impacts associated with the Shenzhen River Regulation Project Stage III Works and the recommended mitigation measures, and explains the acceptability of the project from environment point of view.

14.1 Environmental Benefit from the Project

The Shenzhen River Regulation Project aims at flood control. The formerly completed Stage I Project has approved that the project objectives proposed in the planning stage are practical. After completion and operation of Stage II and Stage III, the Project will certainly create greater significant benefits.

Stage Ⅲ of the Shenzhen River Regulation Project possesses following environmental benefits:

(1) Reducing and avoiding the environmental pollution caused by flooding

Area along the Shenzhen River often suffers from flooding. The pollutant carried by the floodwater from the seriously polluted Shenzhen River water often lead to environmental pollution in submerged area.

Flooding in the downstream of the Lo Wu Railway Bridge could almost be resolved by the implementation of Stage Ⅰ and Ⅱ works. However, flood control is still a problem to the upstream of the Lo Wu Railway Bridge. The flooding on 24 May 1998 and 23 August 1999 caused a serious damage to Shenzhen City and the New Territories in Hong Kong.

Implementation of the Project can greatly enhance the flood control capability of the Shenzhen River against fifty-year return period floods and environmental pollution caused by flooding. Flooding will affect the residents on both sides of Shenzhen and Hong Kong along the river.

(2) Improving the water quality of the Shenzhen River

The results of the Study shows that both the storage capacity and the exchanging vo-

lume of the river channels during the tidal period will considerably increase, and the time needed for the river water flowing into the sea will significantly cut down, pollutants in the river can be better diluted, decomposed and transformed. As a result, the river water quality that is presently seriously polluted will be much improved after implementation of the Project.

The removal of contaminated soil in the river channel will be beneficial to improve the water quality of the Shenzhen River.

Moreover, because the flood discharge and hydraulic condition of the river channel greatly improved, this will ultimately provide conditions to control the water pollution of the Shenzhen River.

(3) Protecting and improving ecological system

Once a flood occurs, some wild animals will drown because there is not sufficient time for them to escape. Many wild animals have to move to other places, as a result, their former habitats or feeding grounds are lost. Besides, all grassland and bushes become slower in growth or perish because of insufficient supply of sunlight and nutrients due to inundation and slow flood retreating. Implementation of the Project can greatly enhance flood control capacity of the Shenzhen River, providing a more safe living environment for the wild animals and plants in the region.

Meanwhile, the reduction of the environmental pollution caused by flooding will also improve the ecological system in the region.

The improvement of the water quality of the Shenzhen River is also beneficial to improving the aquatic ecosystem of the River.

(4) Abating odour

When the Project is completed with significant improvement in because of water quality and silt clearance, the odour of the Shenzhen River will also decrease or diminish, and as a result, the air quality in surrounding area will also be improved.

(5) Beautifying landscape

After completion of the Project and implementation of the mitigation measures, former unpleasant scenes will be totally replaced. The river channel will become wider

and straighter with the bed silt dredged; rows of trees and green grasses along the river banks will be in place, and as a result, the landscape along both banks will become a scenic sight.

(6) Benefit to the public health

The frequent flooding provides a favorable breeding ground for mosquito and fly, which is adverse for public health. After completion of the Project, the flooding will be avoided, so that the breeding of the mosquito and fly, etc. will be greatly reduced and benefit to public health.

14.2 Major Environmental Impacts

The major possible environmental impacts from the construction are:

(1) Air

1) Dust emission during the construction period is the major air quality impact of the Project. Without mitigation measures, the predicted TSP levels with the background concentration taking into account, two sensitive receivers on Shenzhen side and four sensitive receivers on Hong Kong side will exceed relevant standards. With mitigation measures, however, the daily average TSP level at the sensitive receivers will decrease by 15-60% and satisfy the relevant standards on both Shenzhen and Hong Kong side.

2) During construction, emissions from the trucks for carrying material, bulldozers, etc. would affect air quality to certain extent. Past experience reveal that the exhausted NO_2, CO and TSP will be rather limited and the impact is not significant.

3) Reprovisioning of Man Kam To Bridge will not cause air quality impact.

4) The construction activity might worsen the odour pollution. However, with measures adopted, the odour impact will not exceed the 5 odour unit set out in Annex 4 of the *Technical Memorandum of the Environmental Impact Assessment Ordinance in* Hong Kong.

5) Work volume of maintenance dredging is rather small (less than 500,000 m^3), and conducted underwater. The air quality impact is minimum.

6) After the completion of the project, the air quality will be greatly improved along with the improvement of overall environmental quality in the region.

With the recommended mitigation measures, the air quality impact due to the Project could be controlled with the criteria as set out in Annex 4 of the *Technical Memorandum on Environmental Impact Assessment Process*.

(2) Noise

1) During construction, on Hong Kong side of the Shenzhen River, it is not difficult to meet the standard of Hong Kong for construction noise in daytime. When each set of construction activities is separately carried out, the noise levels at the NSR on the Hong Kong side such as Lo Wu Tsuen (1# on the Hong Kong side), Muk Wu Tsuen (3# on the Hong Kong side), and Nga Yiu Tsuen (4# on the Hong Kong side) will meet the noise standard of 75 dB (A) in daytime, and the noise level at Lo Wu Public School (2# on the Hong Kong side) will also meet the noise standard of 70 dB (A). During examination period, however, the noise level at Lo Wu Public School will exceed the standard of 65 dB (A), with an exceedence of 2-4 dB (A). However, the noise level at Lo Wu Public School can be reduced to an acceptable level of 63 dB (A) after adopting mitigation measures.

2) On the Shenzhen side, it is difficult to satisfy the standard of construction noise during the daytime as the standard is based on the boundary of construction site. Even a single set of machinery equipment in operation may cause exceedance of the standard on the construction site boundary during construction period. When each set of construction activities is separately carried out, the noise levels at Xiangxi Middle School, Huaqiao New Village and Xinxiu Village will not exceed the associated standards. When each set of construction activity, excluding bridge reconstruction is carried out separately, the noise levels at the dormitory of the inspection station and Lo Wu No. 4 Village will exceed the associated standards, with an excess of 2-4 dB (A) at Lo Wu No. 4 Village. As the dormitory is very close to the construction site boundary (28 m), the exceedance will be significant, ranging from 10-12 dB (A). Therefore, additional measures should be adopted to reduce the noise level to acceptable range.

3) Since the standard of noise in nighttime is more stringent, operation of a single set

of construction equipment might make the noise level at the NSRs on both sides of the Shenzhen River exceed the relevant standard. Therefore, construction should be prohibited during nighttime and general holiday except that an emergency occurs.

4) On the Shenzhen side, any combination of simultaneous construction activities are prohibited when the site is less than 145 m away from the NSRs. While the distance is over 145 m, the combined construction activities can be carried out simultaneously. On the Hong Kong side, combination of simultaneous construction are not allowed within a distance of 84 m from the NSRs, while selected combination of simultaneous construction are allowed when the distance is over 84 m away from the NSRs.

5) Traffic noise is different from fixed noise source in nature. In general, traffic noise could be acceptable except within a close proximity. In the construction period, the traffic noise impact on the NSRs within the construction site is acceptable.

6) In the case of normal operation of bridge, the traffic noise impact on the NSRs is within noise criteria because the NSRs around the new Man Kam To Bridge are over 300 m away.

7) The NSRs on the Shenzhen side will be affected by the noise from shipping during both construction period and maintenance period, and the noise levels will exceed the standard of Shenzhen side. The impact on the Hong Kong side caused by shipping is within the noise criteria, as the NSRs are far away from the River. The shipping-produced noise levels at all NSRs of both sides can be kept under the respective noise criteria after the mitigation measures are taken.

With the recommended mitigation measures, the noise impact due to the Project could be controlled with the criteria as set out in Annex 5 of the *Technical Memorandum on Environmental Impact Assessment Process*.

(3) Hydraulic condition

After Stage III Project is completed, the 50-year return period flood will be controlled downstream of River Ganges. The water level at the River mouth will decline due to smooth discharge of inflow from Liantang River and River Ganges. The flood-carry-

ing condition in upper reaches will be improved and the loss from flooding will be reduced.

With the improvement of water flow condition, the partial inverse scouring will occur in the reaches up from River Ganges mouth and the channel will be cut and become wider. The extent of scouring will decrease towards the upstream side. The scoured sediment will settle in the section channel of Stage Ⅲ Project downstream from the River Ganges mouth.

(4) Sediment transportation

When Stage Ⅲ Project is started, Stage Ⅰ and Ⅱ Project will have been completed and put into operation. At that time, the average river width of the reaches from Lo Wu to the river mouth will be 60～140 m wide. The siltation is dominant in this reach except for the flood season. During the construction of the Project, the estimated leakage of sediment is 18,000 m^3, which will mainly deposit in the downstream of the River.

After two years consecutive siltation, parts of the Shenzhen River will not satisfy the design demand. Due to the randomness of upstream flood, maintenance dredging for the Shenzhen River will be necessary to ensure the safe passage of flood during operation of the Project.

After completion of the project, except deluge, most of the sediment from upstream will deposit in the regulated river course. During deluge, scouring will happen in the river reach 1000 m downstream from Lo Wu.

Most of the resuspended sediment from maintenance dredging will settle in the channel.

(5) Water quality

The Project will not deteriorate the water quality since no pollution load is added by the Project itself. The sediment resuspension and pollutants released from the dredging work will indirectly affect the water quality of the Shenzhen River. The study indicated that re-suspended sediment caused by construction will be controlled to an acceptable level, as long as mitigation measures are implemented.

After the Project is completed, water pollution of the Shenzhen River will be reduced as the conditions of pollutant dilution and relocation are improved.

With mitigation measures, the water quality of the Shenzhen River will not deteriorate during maintenance dredging.

Improvement of hydraulic condition of the river channel at estuary of River Ganges will improve the transportation of pollutants to downstream. As a result, the environmental assimilating capacity of River Ganges is increased. For this reason, Stage III Project will improve the water quality at upstream of River Ganges.

Maintenance dredging will not increase pollution load of the Shenzhen River. Hence the river water quality will not be worsened. No noticeable impact will be caused on river water quality due to the dredging work with the mitigation measures proposed in this EIA being implemented.

The Project will be beneficial in improving the water quality in the Shenzhen River, but it could not entirely solve the problem. Also, reducing the pollutant in the river water is not the main purpose of the Project. To strengthen pollution control ordinance is one of the ways to improve the river water quality.

With the recommended mitigation measures, the water impact due to the Project could be controlled with the criteria as set out in Annex 6 of the *Technical Memorandum on Environmental Impact Assessment Process*.

(6) Spoil disposal

The quality of soil at the river bank within the area of Stage Ⅲ Project is good. Impact from land disposal of these mud on terrestrial ecology is slight. Thus, disposing them on land is possible. Part of pollutant concentrations will exceed the limited value set by State Ocean Bureau for marine disposal. But results from the elutriation test indicate that associated requirements can be satisfied. Therefore, it is permitted to dispose of at the state designated places.

More than half of the river channel sediment is uncontaminated (or slightly contaminated) mud and part of the mud is contaminated by heavy metal with Class C standard. If land disposal is applied, extreme ecological damage will be induced. Thus, contaminated spoil is not allowed for land disposal.

Among all the 6 disposal options considered in the project design stage, the former 5 options are not feasible. In Option 6, the contaminated soil will be dumped in East Sha Chau (Hong Kong) Marine Dumping Ground. Thus the potential ecological impact caused by terrestrial dumping can be avoided. Part of the uncontaminated spoil will be dumped in Nam Hang low-lying land and valleys at the south bank of the Shenzhen River, while the remainder will be dumped on Neilingding Island. This meets the principle of "disposing spoil on land as much as possible" and has less ecological impact. From environmental point of view, Option 6 is the best one for mud disposal. Therefore, the recommended mud disposal option is:

East Sha Chau is used as the contaminated mud dumping site (totally dumping 201, 800 m^3), part of uncontaminated mud (about 500,000 m^3 dry excavation soil) will be disposed of at the low-lying land and valley of Nam Hang, while the remaining mud (901,800 m^3) will be disposed of at Neilingding Island.

If the recommended option is adopted, the environmental impacts arising from mud dumping are expected as follows:

1) The impact on water quality caused by spoil disposal is insignificant and can be avoided.

2) Without mitigation measures, the construction will lead concentration of TSP level at two ASRs on the Shenzhen side and four ASRs on the Hong Kong side exceeding respective standards. The dust from internal transportation is one of the reasons of exceedance. After adopting mitigation measures, the concentration of TSP at all ASRs will meet the standard. Since only uncontaminated soil is to be disposed in Nam Hang, there will not be any impact on odor arising from the disposal ground.

3) The noise caused by spoil barging will exceed noise limit at NSRs on Shenzhen side, with no exceedance on Hong Kong side. After adopting mitigation measures, the noise level on the NSRs on both Shenzhen and Hong Kong caused by navigation will be acceptable.

4) Totally, 2.3 hm^2 of marshes, 0.8 hm^2 of woodlands and 1.2 hm^2 of fishponds will be lost due to spoil disposal. However, the affected woodland is sparsely and fragmentarily distributed, marshes are small with low quality, and fishpond is abundant. Dust caused from spoil disposal operation may affect the local plants, but these plants

have a low importance, moreover, mitigation measures can be taken. Spoil disposal will not make the nearby important habitats more fragmentized. The disturbance caused by spoil unloading and transporting will be completely limited within the disposal area, however, some animals will be affected, mainly being grassland insects of low ecological significance. These insects are of commonly seen species in Hong Kong, and are not protected by local laws and regulations. In sum, the ecological impact caused by spoil disposal is rather insignificant.

5) Unacceptable adverse impact on landscape and vision will not occur.

6) No potential impact of spoil disposal on cultural heritage will occur.

7) The 1.2 hm^2 of fishpond, which will be lost due to spoil disposal, have already been abandoned, thus no commercial activities will be affected.

8) There is no effect on future development of the spoil disposal sites.

According to Annex 7 of *Technical Memorandum on Environmental Impact Assessment Process*, environment impact caused by spoil will be acceptable after adopting mitigation measures.

(7) Ecology

Woodlands, marshes and ponds of great ecological importance exist within the Study Area while other open areas are of smaller ecological importance. Only one protected plant species was found on the Hong Kong side of the Study Area while several protected wildlife species were recorded in the marshes and ponds of the Study Area. Potential ecological impact caused by river dredging includes permanent impact and temporary impact.

The permanent impacts include:

● Direct loss of habitats

Woodland: 1.1 hm^2; Low-lying grassland/fallow field: 14.4 hm^2; agricultural land: 4.0 hm^2; marshes: 2.7 hm^2; ponds: 2.1 hm^2

● Increased fragmentation, low-lying grassland and associated animals will be affected

● Larger ecological barrier

● Decreased wetland biota.

The temporary impacts of constructing the improvement works include:

● Disturbance to wildlife

● Impact of spoil barging

● Dust pollution

● Soil erosion

● Habitat damage

● Drained fishponds: De-watering of the 3 fishponds during construction will decrease fish and most of the other aquatic organisms.

The ecological impact likely caused by spoil disposal includes:

● Permanent loss of habitat

Woodland: 0.8 hm^2; Fishpond: 1.2 hm^2; Marshes: 2.3 hm^2; shrub land: 0.2 hm^2; hillside grassland: 5.1 hm^2; low-lying grassland /fallow field: 1.5 hm^2.

● Increased fragmentation

No fragmentation would be added to important ecological habitats.

● Disturbance to wildlife

Very few animals would be displaced from the Nam Hang middle valley. They are common and not protected.

● Impact of spoil barging

The impact of spoil barging via Deep Bay is not significant since the frequency of barging is very low.

● Dust pollution

Negligible with dust suppression and restoring vegetation measures in place.

● Soil erosion

Negligible with run-off control and restoring vegetation measures in place.

In order to alleviate the ecological impacts, mitigation measures are essential. The residual impacts are negligible if these measures are carried out effectively.

The mitigation package including planting of over 150,000 trees, 3.8 hm^2 of fishpond for 3.3 hm^2 loss, 6.9 hm^2 of wetland for 5.0 hm^2 loss and 4.8 hm^2 woodland for 1.9 hm^2 loss. Since the compensated areas of woodland are more than the area affected by the project, there is positive impact on the ecology.

According to Annex 8 of *Technical Memorandum on Environmental Impact Assessment Process*, Project impact on ecology will be acceptable after adopting mitigation measures.

(8) Soil erosion

Due to rapid urban development in Shenzhen City, large scale of earth borrowing, quarry, road construction, house building and other construction activities have been taken place in this region. As a result, the original vegetation in upper basin has been destroyed, and the topography and structure of the earth body are significantly disturbed. These man-made influences, in combination with the natural factors, have resulted in and further aggravated the water and soil erosion in this area.

During construction of Stage III Project, due to river dredging, spoil disposal, dyke construction, stockpiling and other construction activities, the present configuration of the earth's surface and land utilization pattern in relevant regions will be changed to different extents. In addition, the original vegetation and some of water and soil conservation facilities might be damaged, and the land will loss its original function of water and soil retention. If no proper water and soil conservation measures are adopted, new water and soil erosion will be resulted.

It is expected that water and soil loss could be controlled and avoided as long as water and soil conservation measures are adopted.

(9) Landscape and vision

Landscape impact

In construction stage, construction of the project needs to occupy a large area of land, this will affect landscape resources, thus have a high negative impact on landscape resources. Besides, all construction equipment, construction site, and temporary construction establishments will cause high to moderate negative impacts on landscape character, and river channel excavation and lining, embankment and bridge reconstruction will cause the change of local landscape character, leading to an impact on landscape character. Meanwhile, part of the construction occupied land will become bared ground, therefore having a high negative impact on landscape character. But, the affected landscape resources can be restored after mitigation measures are taken. For example, high to moderate negative impact caused by construction can be mitigated by means of enhancing construction management.

In operation stage, because of the modifications that the river channel is wider thus water surface is widened, the sediment is cleared, and the reprovisioned bridges are more beautiful, positive impacts on landscape resources can be expected.

After the project is finished,the layout of the rivercourse will change, and the new channel is straighter than before, which has low negative impact on landscape character; the newly built riverbanks modify local landscape character, which has moderate negative impact on landscape character; artificially concrete or block-stone lined channel replaces the natural one, which has moderate to low negative impact on landscape character. Moreover, on the first day of the operation stage, quality of the restored landscape resources cannot reach original level. Accordingly, the impacts on landscape character will still exist, though the impact on landscape resources caused in construction stage will have been restored when construction is finished. However, the magnitude is small. After ten years, quality of the restored landscape resources can reach original level, and then, landscape impacts can be negligible.

Visual impact

In construction stage, negative visual impacts are mainly visual barrier to VSRs caused by all kinds of construction equipment, construction site and fences, storage, temporary housing and other construction establishments. Besides, bridge construction also causes visual barrier to VSRs. The open construction sites can cause uncomfortable visual feeling to VSRs. But, negative visual impacts can be mitigated after measures are taken. For example, negative visual impacts caused by construction can

be mitigated by means of enhancing construction management; restored landscape resources and restored vegetation on the construction site can help VSRs to regain good visual feeling.

In operation stage, VSRs can get a good visual feeling because river channel is widened and therefore eyeshot is widened, and sediment in former river channel is cleared, which will have positive visual impacts.

Newly built bridges are basically placed at the site of existing bridges, but are more beautiful than existing bridges, therefore, they will not form new visual barrier.

The new river course is artificially lined with concrete and block stones, it will give VSRs a visual felling not so good as that of the natural one which is usually covered with green plants. But, after mitigation measures are taken, plants will grow in the new river course, mitigating the negative visual impacts. The newly built border fence and roads will be closer to VSRs because river channel is widened, their visual barriers will be a little greater than before, however, the impact is low.

Conclusion

Negative landscape and visual impacts caused by the project are mainly within construction stage, and accordingly are temporary ones. Furthermore, most impacts can be mitigated to below moderate level after measures are taken.

In operation stage, landscape and visual impacts caused by the project include positive and also negative ones. The positive impacts are mainly in the magnitude of moderate to low. On the first day of the operation stage, negative impacts are mainly in the magnitude of moderate. Then, with the implementation of the mitigation measures such as planting grass and trees, etc. , the negative impact will gradually decrease. The impacts will be negligible till the tenth year.

The landscape resource affected by the Project is totally 50. 612 hm^2, and the restored landscape resource is 51. 974 hm^2. So, the loss of landscape resource caused by the Project could be compensated. To sum up, when the project is finished, landscape in the Project Area will not be significantly affected, and the key eyeshots will not be spoiled. Besides, construction of the project will not significantly spoil the aesthetic environment. Moreover, sediment clearing and tree planting along the riverbanks will

help beautifying the local landscape.

According to Annex 10 of *Technical Memorandum on Environmental Impact Assessment Process*, Project impact on landscape and vision will be acceptable after adopting mitigation measures.

(10) **Cultural relics**

The Lo Wu Railway Bridge and Lo Wu Old Footbridge that will be affected by the project were assessed to have historical value. It is recommended to preserve the Lo Wu Railway Bridge. The Lo Wu Old Footbridge, though with some historical value, will be removed. A comprehensive record of the bridge will be kept.

The Nga Yiu Ancient Kiln Site is excluded from the construction site so that the construction activities will not affect the ancient kiln.

Archaeological potential of the project area is low. However, a detailed archaeological investigation is still recommended to ensure it.

According to Annex 10 of *Technical Memorandum on Environmental Impact Assessment Process*, Project impact on cultural relics will be acceptable after adopting mitigation measures.

(11) Public health

During the construction and maintenance periods, environmental hygienic condition may become worse in the construction sites and adjacent areas (e.g. both sides of the transport roads) for river course excavation, piling and transportation of spoil, which will have a short-term effect on public health. On general, the health condition of the construction workers and residents nearby may not be affected and those affected will get well upon completion of the Project construction. The public health condition along Stage III Project river reach will be improved remarkably after completion of the Project. Thus, construction of the Project will have more beneficial effects than negative ones in view of public health.

14.3 Mitigation Measures of Environmental Impact

The main mitigation measures recommended in the EIA are shown in Table 14.1.

Table 14.1 Summary of Environmental Impact from Project and Mitigation Measures

Parameters	Environmental Impacts	Mitigation Measures	Responsible parties	Timing			
				Pre-construction Stage	Construction Stage	Maintenance Stage	Operation Stage
Air	The main impact of the Project on air quality is dust emission in the construction period. Without mitigation measures, due to the cumulative effect of the predicted TSP above the background concentration, TSP at two sensitive receivers on the Shenzhen side and four sensitive receivers on the Hong Kong side will exceed the associated standard. With mitigation measures, however, the daily mean TSP content at the sensitive receivers will decrease by 15 – 60% and satisfy the associated standards on both Shenzhen and Hong Kong side. 2) During the construction, emission from trucks for carrying material, bulldozers, etc. would affect air quality to certain extent. It is known from similar experience that the exhausted NO_x, CO and particle will be	1) The vehicle velocity on the haul road and at the site shall be restricted within 8 km/h; 2) The bulldozer traveled on the haul road and at the site shall be limited within 8km/h; 3) Water spray shall be applied four times a day on the haul roads and twice a day at the construction site; 4) Every vehicle shall be washed to remove any dusty material from its body and wheels before leaving the site.; 5) The watering device shall be used during the handling of dusty material; 6) The sealed system shall be adopted for cement transportation; 7) Stockpiling of cement at open space shall be avoided; 8) All vent holes shall be fixed with	Contractor		X	X	

Table 14.1 Summary of Environmental Impact from Project and Mitigation Measures

Parameters	Environmental Impacts	Mitigation Measures	Responsible parties	Timing			
				Pre-construction Stage	Construction Stage	Maintenance Stage	Operation Stage
	rather limited and the impact is insignificant. 3) Reprovisioning of Man Kam To Bridge Modification Project will cause no impact on air quality. 4) The construction activity might worsen the odor pollution, but if proper mitigation measures are adopted, it will not exceed the 5 odour unit set in Annex 4 of *Technical Memorandum on Environmental Impact Assessment Process*. 5) As the scale of maintenance dredging is rather small, it has little impact on air quality.	appropriate filter; 9) Watering and cleaning of the construction site, shall be carried out regularly especially during dry season; 10) Construction equipment with minimum dust emission shall be used; 11) The raw material for concrete production shall be wetted before putting in the concrete mixer; 12) Any stockpile of aggregates or spoil shall be completely covered and water applied. 13) Any stockpile of dusty material shall be located from any ASRs and the entrance of the construction site ; 14) The load on the vehicles shall be covered entirely by clean impervious sheeting to ensure that the dusty materials do not leak from the					

Table 14.1 Summary of Environmental Impact from Project and Mitigation Measures

Parameters	Environmental Impacts	Mitigation Measures	Responsible parties	Timing: Pre-construction Stage	Timing: Construction Stage	Timing: Maintenance Stage	Timing: Operation Stage
		vehicle; 15) The haul road and construction machinery should be arranged as far away as possible from the sensitive receivers; 16) Water spray shall be applied to dusty materials before it is unloaded on site; 17) In the process of typical concrete mixing, dustproof methods should be adopted, such as installing filter on the ventilation opening, watering regularly, spraying water at loading areas and enclosing part of or whole material-loading area etc.. 18) The contaminated mud shall be removed at once;					
Noise	1) During construction, on the Hong Kong side of the Shenzhen River, it is not difficult to meet the standard of Hong Kong for construction noise in daytime.	**Construction noise:** 1) The construction programme shall be arranged carefully. 2) The mechanical equipment shall be	Contractor		X		

Table 14.1 Summary of Environmental Impact from Project and Mitigation Measures

Parameters	Environmental Impacts	Mitigation Measures	Responsible parties	Timing			
				Pre-construction Stage	Construction Stage	Maintenance Stage	Operation Stage
	When each set of construction activities is separately carried out, the noise levels at the NSR on the Hong Kong side such as Lo Wu Tsuen (1# on the Hong Kong side), Muk Wu Tsuen (3# on the Hong Kong side), and Nga Yiu Tsuen (4# on the Hong Kong side) will meet the noise standard of 75 dB (A) in daytime, and the noise level at Lo Wu Public School (2# on the Hong Kong side) will also meet the noise standard of 70 dB (A). During examination period, however, the noise level at Lo Wu Public School will exceed the standard of 65 dB (A), by 2-4 dB (A). But, the noise level at Lo Wu Public School can be cut down to an acceptable level of 63 dB (A) after adopting appropriate mitigation measures. 2). On the Shenzhen side, it is difficult to satisfy the standard of	carefully arranged to avoid working in the same area (especially on the site boundary) 3) Engine noise silencer muffler and temporary noise barrier shall be used as far as possible 4) Use quite power mechanical equipment 5) Unused equipment for a long time shall not be used and maintenance of renewal of equipment shall be carried out regularly 6) Setting up temporary noise barrier 7) On the Shenzhen side, within 145 m away from NSRs only one set of construction activity can be carried out. On the Hong Kong side , within 84m away from NSRs only one set of construction activity can be carried out. 8) Construction at night time shall be prohibited. **Shipping noise:**	Contractor		X	X	

Table 14.1 Summary of Environmental Impact from Project and Mitigation Measures

Parameters	Environmental Impacts	Mitigation Measures	Responsible parties	Timing			
				Pre-construction Stage	Construction Stage	Maintenance Stage	Operation Stage
	construction noise during the daytime as the standard is based on the boundary of construction site. Even a single set of machinery equipment in operation may cause exceedance of the standard on the construction site boundary during construction period. When each set of construction activities is separately carried out, the noise levels at Xiangxi Middle School, Huaqiao New Village and Xinxiu Village will not exceed the associated standards. When each set of construction activity, excluding bridge reconstruction is carried out separately, the noise levels at the dormitory of the inspection station and Lo Wu No. 4 Village will exceed the associated standards, with an excess of 2-4 dB (A) at Lo Wu No. 4 Village. As the dormitory is very close to the construction site boundary (28 m),	1) Whistling is prohibited 2) Adopting engine noise abatement, silencer; 3) Adopting engine enclosure					

Table 14.1 Summary of Environmental Impact from Project and Mitigation Measures

Parameters	Environmental Impacts	Mitigation Measures	Responsible parties	Timing			
				Pre-construction Stage	Construction Stage	Maintenance Stage	Operation Stage
	the exceedance will be significant, ranging from 10-12 dB (A). Therefore, additional measures should be adopted to reduce the noise level to acceptable range. 3) Since the standard of noise in nighttime is much stricter, operation of a single set of mechanical equipment might make the noise of the NSR on both sides of the Shenzhen River exceed the standard concerned. Therefore, construction should be prohibited during nighttime except that an emergency occurs. 4) On the Shenzhen side, only one set of construction activity can be carried out within the site that is less than 145 m away from NSRs. On the Hong Kong side, only one set of construction activity can be carried out within the site that is less than 84m away from NSRs.						

Table 14.1 Summary of Environmental Impact from Project and Mitigation Measures

Parameters	Environmental Impacts	Mitigation Measures	Responsible parties	Timing			
				Pre-construction Stage	Construction Stage	Maintenance Stage	Operation Stage
	caused by spoil barging can be controlled below the acceptable level. 4) 2.3 hm^2 of marshes, 0.8 hm^2 of woodlands and 1.2 hm^2 of fishponds will be lost due to spoil disposal. The disturbance will mainly be concentrated in storage area caused by spoil unloading and transporting. Some kind of animals will also be affected, mainly the grassland insects of low ecological significance and of commonly-seen species in Hong Kong, which are not protected by local laws and regulations. In sum,	non-contaminated disposal ground to collect the surface run-off. Discharge shall be permitted only where the water complies with the requirements in "Standard for effluent discharge into group D inland water" in the Technical Memorandum of Water Pollution Control Ordinance in HK. **Air Quality** The contractors should take the following necessary measures to reduce dust emission: 1) The vehicle velocity on the haul road and at the site shall be restricted within 8 km/h; 2) Water spray shall be applied four times a	Contractor		X		

Table 14.1 Summary of Environmental Impact from Project and Mitigation Measures

Parameters	Environmental Impacts	Mitigation Measures	Responsible parties	Timing			
				Pre-construction Stage	Construction Stage	Maintenance Stage	Operation Stage
	as the NSR is far away from the River. The shipping-produced noise levels at all NSRs of both sides can be kept below the acceptable level after the mitigation measures are taken.						
Water Quality	**(1) Construction period** The Project will not deteriorate the water quality since no pollution load is added by the Project itself. The bottom mud of the Shenzhen River has been severely polluted by inorganic and organic pollutants. The sediment re-suspension and pollutants re-emission arising from the dredging will indirectly affect the water quality in the partial section of the Shenzhen River. The affected extent is depended on	**(1) Construction method** Closed grab dredger shall be used for dredging of mud in the river channel. Silt curtain shall be used across the river channel at 200m upstream and 500m downstream of the dredging work to prevent the re-suspended sediment from transport to downstream of the river. Dreading rate shall be reduced by 10% or more if exceedance in relevant standards is recorded during the EM&A work. The dredging rate shall be further reduced until no exceedance is recorded. The construction method of separating and isolating the excavated channel from the existing river shall be used to reduce the	Contractor		X	X	

Table 14.1 Summary of Environmental Impact from Project and Mitigation Measures

Parameters	Environmental Impacts	Mitigation Measures	Responsible parties	Timing			
				Pre-construction Stage	Construction Stage	Maintenance Stage	Operation Stage
	8) There is no effect on future development of the spoil sites.	**Noise** 1) 1) Whistling is prohibited 2) Shipping must be prohibited from 11:00 pm-7: 00 am. **Ecology** The construction site shall be fenced to avoid disturbance on the wild life.. The marshes in the north of bloodworm ponds should be preserved for natural conservation. After completion of the Project, the marshes shall be permanently preserved.	Design engineer to design, contractor to construct, AFCD to maintain on Hong Kong side and SZRRO to maintain on Shenzhen side	X	X	X	X

Table 14.1 Summary of Environmental Impact from Project and Mitigation Measures

Parameters	Environmental Impacts	Mitigation Measures	Responsible parties	Timing			
				Pre-construction Stage	Construction Stage	Maintenance Stage	Operation Stage
	During the operation stage, maintenance dredging will not increase pollution load of the Shenzhen River. The predicted water quality indicates that the river water quality will not become worsened due to maintenance dredging.	sections at a time only. Only one set of dredger is allowed to work at the same time. **(3) Mitigation measures for maintenance dredging** The mitigation measures used during the construction period are also applicable and effective in maintenance dredging.	Contractor			X	
Spoil Disposal	1) The impact on water quality caused by soil disposal is insignificant and can be neglected. 2) The impact on air quality is slight and temporary. 3) The short-time noise impact	**Water quality** 1) The management of barges shall be strengthened and discharge of wastewater into the water is not allowed. 2) Drainage ditches hall be provided at the	Contractor		X		

Table 14.1 Summary of Environmental Impact from Project and Mitigation Measures

Parameters	Environmental Impacts	Mitigation Measures	Responsible parties	Timing			
				Pre-construction Stage	Construction Stage	Maintenance Stage	Operation Stage
		Construction work shall be arranged to avoid disturbance of barges to bird especially during bird migrating period. The construction programme should reflect this requirement. **Landscape** After completion of spoil disposal, the dumping ground must be cleared and re-vegetated. **Construction Method** Before construction activity begins, a detailed contaminated spoil distribution map should be made. During construction, the dredging of	Contractor		X		

Table 14.1 Summary of Environmental Impact from Project and Mitigation Measures

Parameters	Environmental Impacts	Mitigation Measures	Responsible parties	Timing			
				Pre-construction Stage	Construction Stage	Maintenance Stage	Operation Stage
	the ecological impact caused by spoil disposal is rather insignificant. 5) spoil disposal will not cause unacceptable impact on landscape and vision。 6) No potential impact of spoil disposal on cultural heritage will occur. 7) The 1.2 hm^2 of fishpond, which will be lost due to spoil disposal, have been abandoned. No commercial activities will be affected.	day on the haul roads and twice a day at the construction site; 3) Every vehicle shall be washed to remove any dusty material from its body and wheels before leaving the site.; 4) The load on the vehicles shall be covered entirely by clean impervious sheeting to ensure that the dusty materials do not leak from the vehicle; 5) The haul road shall be located from ASRs as far as possible.; 6) The mud loaded onto the vehicles shall be covered during transportation to avoid leakage and odour emission.	Contractor		X		

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Table 14.1 Summary of Environmental Impact from Project and Mitigation Measures

Parameters	Environmental Impacts	Mitigation Measures	Responsible parties	Timing			
				Pre-construction Stage	Construction Stage	Maintenance Stage	Operation Stage
	hm^2 Increased fragmentation: Low-lying grassland and associated animals will be affected Disturbance to wildlife: In absence of mitigation measures, some amphibians & reptiles, and most birds & mammals are likely to be affected by loud noises, operational construction facilities and the presence of construction workers. Drying of the 3 fishponds during construction will cause loss of fish and other aquatic biota. Dust pollution: This impact on vegetation and animals can be mitigated easily, and will be small, if dust suppression and restoring vegetation measures are taken.	deterioration 6) Planting native species trees along the outside embankment slopes; 7) Restoring the abandoned meanders to marshcrete; 8) Restoring the temporarily occupied fishponds; 9) Establishing grasscrete along the crests of embankments; 10) Compensation for the lost woodland. 11) Creation of grasscrete berm along the embankments;	Design engineer to design, contractor to construct, DSD to maintain on Hong Kong side and SZRRO to maintain	X	X	X	X

Table 14.1 Summary of Environmental Impact from Project and Mitigation Measures

Parameters	Environmental Impacts	Mitigation Measures	Responsible parties	Timing			
				Pre-construction Stage	Construction Stage	Maintenance Stage	Operation Stage
		Spoil disposal in the Nam Hang middle valley will form two platforms with elevations of 12 m and 18 m respectively. According to the project design, it is recommended to relocate the border fence onto the outer slope of the new dyke and plant trees and grasses on the platforms. The areas within the Sandy Ridge Cemetery are to be restored as grassland after completion of spoil disposal. The other part of the upper terrace is to be covered by local lignosa, including arbor and shrub. Priority is given to the native plants, which are more suited to the living conditions in the Nam Hang middle valley and also provide food for wild animals.					

Table 14.1 Summary of Environmental Impact from Project and Mitigation Measures

Parameters	Environmental Impacts	Mitigation Measures	Responsible parties	Timing			
				Pre-construction Stage	Construction Stage	Maintenance Stage	Operation Stage
	Woodland: 0.8hm^2, Fishpond: 1.2 hm^2, Marshes: 2.3 hm^2, shrub land: 0.2 hm^2, hillside grassland: 5.1hm2,low-lying grassland /fallow land: 1.5 hm^2. Increased fragmentation: No fragmentation would be added to ecologically important habitats. Disturbance to wildlife: Very few animals would be displaced from the Nam Hang middle valley. They are common and not protected. Impact of spoil barging: The impact of spoil barging on the Deep Bay is not significant since the frequency of barging is very low.						

Table 14.1 Summary of Environmental Impact from Project and Mitigation Measures

Parameters	Environmental Impacts	Mitigation Measures	Responsible parties	Timing			
				Pre-construction Stage	Construction Stage	Maintenance Stage	Operation Stage
		Class C contaminated soil should be separated from dredging of other materials according to the map. A system should be designed to record the final disposal position of each part of contaminated soil.					
Ecology	**(1) Construction impact** Direct loss of habitat: Woodland: 1.1hm^2; Low-lying grassland/fallow field: 14.4 hm^2; agricultural land: 4.0 hm^2; marshes: 2.7 hm^2; ponds: 2.1 hm^2 Temporary damage of habitat: Woodland: 0.6 hm^2; shrub land: 0.4 hm^2; low-lying grassland/fallow field: 6.6 hm^2; agricultural land: 1.7 hm^2; marshes: 2.3 hm^2; ponds: 3.7	1) Reprovisioning of two-way vehicular bridge in Man Kam To; 2) No dumping of dredged spoil in ecologically important habitats adjacent to the construction site; 3) Ecological habitats outside the river channel shall be protected by fences / barriers; 4) Minimizing barging disturbance to wildlife; 5) Preventing the residual marshes from	Design engineer to design, contractor to construct, AFCD to maintain on Hong Kong side and SZRRO to maintain on Shenzhen side	X	X	X	X

Table 14.1 Summary of Environmental Impact from Project and Mitigation Measures

Parameters	Environmental Impacts	Mitigation Measures	Responsible parties	Timing			
				Pre-construction Stage	Construction Stage	Maintenance Stage	Operation Stage
	Marshes: 7.33 hm^2, Farmland: 5.7 hm^2, Woodland: 2.51hm^2, hillside grassland: 6.022hm^2, shrub land: 0.4 hm^2. Excavation and lining of the new river channel and embankment will cause moderate negative impacts on landscape character. A large amount of construction occupied land will become bared ground when construction is finished, it will has an impacts on landscape. Building dyke will cause moderate impacts on landscape. Bridge reconstruction will cause moderate impacts on landscape. Newly built border fence and patrol roads will have high	must be as far away from VSRs as possible. 5) All machinery and vehicles parked temporarily should be laid in order. 6) When temporary construction facilities, such as housing, storage and processing plant, are designed and built, aesthetic requirements must be considered in designing and construction. 7) For river section with vertical wall cross-section, liane will be planted on the dyke crests. （such as 爬墙虎）. 8) Plant grasscrete on the newly built banks. 9) Restore the river meander into ponds and marshes and plant native riparian trees.	**Design**	X			

Table 14.1 Summary of Environmental Impact from Project and Mitigation Measures

Parameters	Environmental Impacts	Mitigation Measures	Responsible parties	Timing			
				Pre-construction Stage	Construction Stage	Maintenance Stage	Operation Stage
	Soil erosion: Negligible with run-off control and restoring vegetation measures in place. **(2) Operation impact** Reduce habitat value: without mitigation measures, the ecological value of the residual marshes will becomes lower than before. Larger ecological barrier: Low-lying grassland, marshes and associated animals will be affected Decreased wetland biota: Plants confined to wetlands will be eliminated and associated animals will be reduced. **(3) Impact caused by spoil disposal (adopting scheme 6):** Permanent loss of habitat:		on Shenzhen side				

Table 14.1 Summary of Environmental Impact from Project and Mitigation Measures

Parameters	Environmental Impacts	Mitigation Measures	Responsible parties	Timing			
				Pre-construction Stage	Construction Stage	Maintenance Stage	Operation Stage
	channel, construction of dikes, transportation of construction materials and spoil, construction equipment and site fence, will have a moderate impact on all sensitively vision receivers. Temporary construction work will have a moderate impact on all sensitively vision receivers. Reconstruction of Man Km To Bridge will have a moderate impact on staff of border inspection station on both sides.						
Cultural Heritage	The impacts on Lo Wu Railway Bridge and Lo Wu Old Footbridge are the main impacts on cultural relics. According to the plan of the Stage III Project, the bridge will be removed and replaced by a new bridge which will greatly affect	Responsible parties and funding agent: Project proponent Timing: 12 months before project commencement to the completion of the project A detailed scheme has to be worked out and agreed by both Shenzhen and Hong Kong on	DSD SZRRO	**X**	**X**		

Table 14.1 Summary of Environmental Impact from Project and Mitigation Measures

Parameters	Environmental Impacts	Mitigation Measures	Responsible parties	Timing			
				Pre-construction Stage	Construction Stage	Maintenance Stage	Operation Stage
	Dust pollution: Negligible if dust suppression and restoring vegetation measures are taken. Soil erosion: Minimal with run-off control and restoring vegetation measures in place.						
Landscape and Vision	**（1）Landscape impact** Excavation of the river channel, embankment, newly built border fences and border roads, spoil stack and temporary construction site will occupy pond, marsh, farmland, woodland and low grassland, affecting landscape resources, which are negative impacts. Loss or damage of landscape resources: Fishpond: 7.00 hm^2,	1) Design carefully and construct nicely to reduce losses of woodland, grassland, pond and marsh as much as possible. 2) When construction is completed, all temporary construction establishments must be removed in each construction site and original usage or vegetation must be restored. 3) Restore the temporary works area to its original usage and vegetation. 4) Roads planned for transportation of spoil	Design engineer to design, contractor to construct, AFCD to maintain on Hong Kong side and SZRRO to maintain on Shenzhen side	X	X	X	X

Table 14.1 Summary of Environmental Impact from Project and Mitigation Measures

Parameters	Environmental Impacts	Mitigation Measures	Responsible parties	Timing			
				Pre-construction Stage	Construction Stage	Maintenance Stage	Operation Stage
		procedures, dismantle programme, guidelines for preserving the dismantled materials, location of re-erection, restoration programme and detailed rules for restoration. The bridge shall only be demolished after the dismantle proposal has been approved by the Hong Kong Antiquities and Monuments Office and other relevant offices. The project proponent should preserve and store the parts of the bridge according to the Guidelines for preserving components of structures of the "Dismantle of Lo Wu Railway Bridge ". The project proponent should employ experts for mapping, recording and taking photographs of the Lo Wu Old Footbridge. The project proponent should start the demolition of the bridge only after the mapping and photography are taken and the records are submitted to and approved by the Hong Kong Antiquities and					

Table 14.1 Summary of Environmental Impact from Project and Mitigation Measures

Parameters	Environmental Impacts	Mitigation Measures	Responsible parties	Timing			
				Pre-construction Stage	Construction Stage	Maintenance Stage	Operation Stage
	impacts on landscape. **(1) Vision impact** Strengthening of Lo Wu New Footbridge mainly aims at treating the foundations of the bridge. With the shelter from surrounding structures, no impact will be exerted on sensitive vision receivers. Reconstruction Lo Wu Old Footbridge will have a moderate negative impact on foot passengers and staff of border inspection station on both sides. Construction of Lo Wu Railway Bridge will have a moderate negative impact on foot passengers and staff of border inspection station on both sides. Construction activities, such as site clearance, excavation of river	10) A Landscape Master Plan should be submitted to relevant department before the commencement of the Project. 11) Establish grasscrete along the berm of the new river channel.	**engineer** Design engineer to design, contractor to construct, DSD to maintain on Hong Kong side and SZRRO to maintain on Shenzhen side	X	X	X	X

Table 14.1 Summary of Environmental Impact from Project and Mitigation Measures

Parameters	Environmental Impacts	Mitigation Measures	Responsible parties	Timing			
				Pre-construction Stage	Construction Stage	Maintenance Stage	Operation Stage
	extents, the original vegetation and water and soil conservation function will be damaged. In addition, the original function of water and soil conservation of land will be lost due to river dredging, spoil disposal, and dyke construction, material pile-up and other construction activities. As a result, it will lead to about 80% of the land (about 260 hm^2 or 2.6 km^2) in project area and the affected area to become the new water and soil erosion area. If measures for water and soil conservation are not taken in the construction period, the gross water and soil erosion might be	will avoid the forming bare land to reduce water and soil erosion. 2) The water retaining facilities should be provided in upper-stream side of the excavation face to hold up the run-off from upper-stream; drainage ditches should e provided in the other marginal part for rainwater drainage in the surrounding area, to prevent the erosion around the borrow area. 3) Settling tanks shall be set up in theborrow area., In addition, water drainage system needs to be improved. 4) The slope of the excavated face must be less than the natural stable angle of the earth material. The height of the excavation shall generally be less than 4 m. 5) The spoils and rocks produced in the					

Table 14.1 Summary of Environmental Impact from Project and Mitigation Measures

Parameters	Environmental Impacts	Mitigation Measures	Responsible parties	Timing			
				Pre-construction Stage	Construction Stage	Maintenance Stage	Operation Stage
	bridge, which will greatly affect the Bridge's special historical significance.	whether to re-erect the Lo Wu Railway Bridge on the upper reach of the Shenzhen River but prohibit its use by passenger or to re-erect the bridge as a pedestrian bridge in other place or to preserve the bridge in the museum. Before the demolition of the Lo Wu Railway Bridge, the project proponents (Shenzhen River Regulation Office and Hong Kong Drainage Services Department) have to engage historical heritage experts whose qualification has to be verified by the Hong Kong Antiquities and Monuments Office and Shenzhen Relics Management Committee. The experts have to conduct a study on the "Dismantle of Lo Wu Railway Bridge " within at least 6 months before start of the project. The content of the "Dismantle of Lo Wu Railway Bridge " shall include detailed rules on information recording, dismantle					

Table 14.1 Summary of Environmental Impact from Project and Mitigation Measures

Parameters	Environmental Impacts	Mitigation Measures	Responsible parties	Timing			
				Pre-construction Stage	Construction Stage	Maintenance Stage	Operation Stage
		1) Proper dredging equipment shall be used to minimize the discharge and re-suspension of sediments in dredging operation in the existing river. 2) When excavation in new river channels or for reprovisioning work, dry excavation inside cofferdam is recommended to prevent water and soil erosion. 3) Dredging and excavation should be arranged in dry season as much as possible. 4) The site that is not liable to erosion by run-off shall be selected to store the soils excavated, with temporary drainage ditch in surrounding area to drain water. 5) Outer slope of the new built dyke shall be grassed with drainage facility. **(4) Preventive measures for material storage**					

Table 14.1 Summary of Environmental Impact from Project and Mitigation Measures

Parameters	Environmental Impacts	Mitigation Measures	Responsible parties	Timing			
				Pre-construction Stage	Construction Stage	Maintenance Stage	Operation Stage
		Monuments Office and Shenzhen Relics Management Committee. The ancient kiln should be excluded from the site and be protected by site fence. A detailed special archeology investigation should be carried out in the Study Area. If any archaeological sites are found in the Project Area, archaeologist must report to the Hong Kong Antiquities and Monuments Office and prepare further mitigation measures such as relocation of ancient site or archaeological excavation after the investigation. But the Hong Kong Antiquities and Monuments Office must approve these mitigation measures in advance.					
Water and Soil Conservation	The present ground surface and land utilization pattern in these areas will be changed to different extents the original vegetation and	**(1) Preventive measures in borrow area** 1) Excavation should be carried out in steps of divided sub-areas, which should be restored timely after construction is completed. This	Contractor		X		

14.4 Environmental Management Plans

For the effective implementation of the mitigation measures, monitoring and remedial requirements presented in the EIA, EM&A and Implementation Schedule (IS), a systematic Environmental Management Plans (EMP) shall be set up by the Contractor. Project Proponent will audit against the EMP and advise the necessary remedial actions required. These remedial actions shall be enforced by the Engineer through contractual means.

The EMP will require the Contractor (together with it's sub-contractors)to define in details how to implement the recommended mitigation measures in order to achieve the environmental performance defined in the Hong Kong Environmental Legislation and the EIA documentation .

In the first instance, each Tenderer shall prepare a skeletal EMP for submission as part of the tendering process; the skeletal EMP will demonstrate the determination and commitment of the organisation and indicate how the environmental requirements laid out in the available EIA documentation will be met. It is a clear indication to all Tenderers of the Project Proponents commitment to the minimisation and management of environmental impacts. Upon Contract Award, the successful Tenderer shall be required to submit a draft EMP for the approval of the Engineer and a final version prior to the commencement of the works.

Under the EMP, the Contractor is recommended to define the significant environmental aspects for each construction activities , identify the legal requirement need to comply with , setup an objective and target in order to achieve the requirements. The environmental management programme shall be formulated. The structure and responsibilities of each operation team leaders shall be identified. Appropriate training shall be provided to both management and working levels in order to meet the specified performance. Channels of communication, document control, operational control and emergency procedure shall be listed out in detail in the EMP. The checking and corrective action procedures, together with the Contractor's management review procedure shall be elaborated. This requirement shall be put down as the tender requirement.

The environmental performance review programme comprises the regular assessment

Table 14.1 Summary of Environmental Impact from Project and Mitigation Measures

Parameters	Environmental Impacts	Mitigation Measures	Responsible parties	Timing			
				Pre-construction Stage	Construction Stage	Maintenance Stage	Operation Stage
	caused by project is 3900 t.	borrow area shall be properly stored to prevent loss. They could be used for back-filling pits in the borrow area after completion of borrowing. 6) After borrowing, the area shall be restored in accordance with the measures for water and soil conservation. **(2) Measures for spoil disposal** 1) Cut-off facilities shall be established to effectively control water and soil erosion in spoil ground 2) Drainage ditch shall be constructed in surrounding area of the spoil disposal ground for draining. 3) After completion of disposal, soil shall be covered and vegetation shall be restored. 4) Measures for preventing leakage shall be adopted in transporting spoil.	Contractor		X		
		(3) Preventive measures for construction of river channel, embankment reprovisioning work	Contractor		X		

These findings of the EIA have clearly demonstrated the Stage Ⅲ Project will not cause unacceptable residue environmental impacts on air, noise, water quality, disposal of spoil, ecology, water and soil losses, landscape and vision, sites of cultural heritage, and public health with mitigation measures in place.

Table 14.1 Summary of Environmental Impact from Project and Mitigation Measures

Parameters	Environmental Impacts	Mitigation Measures	Responsible parties	Timing			
				Pre-construction Stage	Construction Stage	Maintenance Stage	Operation Stage
		1) Measures for preventing leakage shall be adopted in transporting material. 2) The field that is not liable to erosion shall be chosen to store the material in the open air and the material shall be covered by felt. 3) Temporary drainage ditches shall be built in the surrounding area of the stockpiling area to drain water.	Contractor		X		
		(5) Restoration of the construction site	Contractor		X		

Note: DSD – Drainage Services Department of Hong Kong SAR Government
AFCD – Agriculture, Fisheries and Conservation Department of Hong Kong SAR Government
SZRRO – Shenzhen River Regulation Office of Shenzhen Municipal Government

of the effectiveness of the EMPs. Specifically it shall ensure that the environmental aspects are correctly identified, site practices and procedures are being followed. reliable internal audit work are in placed, and environmental standards are maintained.

The criteria against which the reviews will be conducted shall be derived from:

- The approaches, procedures and commitments given by the Contractor in the EMP;
- The clauses contained within the Contractual Documentation ; and
- Those parts of the Contractor's Method Statements which relate to the minimisation of environmental impacts

The review of on-site environmental performance shall be undertaken by Project Proponent through a systemic checklist and audit trail once the project commences. Objective evidence shall be inspected in the following areas:

- The identification and evaluation of significant environmental aspects;
- The consequent objectives and targets;
- The performance monitoring , measuring , reporting and review against the objective and targets;
- The effectiveness of the environmental management activities;
- The speed and effectiveness of response to complaints; and
- The way to handle frequent non-compliance.

14.5 Feasibility of the Project

The EIA aims at providing a comprehensive assessment on the potential environmental impacts exerted by construction of the Project, so as to confirm the environmental acceptability of the Project. In addition, EIA recommends the mitigation measures for construction and operation of the project, environmental monitoring and audit requirements, which will be integrated into the detailed design, so as to avoid or mitigate the adverse impacts and maintain the suitable environmental quality standard.

These findings of the EIA have clearly demonstrated the Stage Ⅲ Project will not cause unacceptable residue environmental impacts on air, noise, water quality, disposal of spoil, ecology, water and soil losses, landscape and vision, sites of cultural heritage, and public health with mitigation measures in place.