

10. CONCLUSIONS

10.1 Introduction

This Report presents an assessment of the potential environmental impacts associated with the construction and operation of the widened Yuen Long Highway between Lam Tai and Shap Pat Heung. It can be concluded that the project is unlikely to breach acceptable environmental standards provided that recommended mitigation measures are adopted. Implementation schedule of the recommendations is shown in **Table 10.1**. The principal findings of this Final EIA Report are presented below.

10.2 Noise Issues

Construction Phase

Unmitigated construction activities of the proposed widening works for Yuen Long Highway would cause exceedances of the daytime construction noise criteria at most of the nearby NSRs during the normal working hours.

Adequate control measures will therefore be necessary for the works to meet the criteria. Mitigation measures including the use of quiet plant, on-site movable noise barriers and barriers along work sites boundaries, limiting the number of plant operating concurrently are required. It is also recommended that regular monitoring of noise at NSRs will be required during the construction phase.

For the receivers to be affected by the noise from the construction of the concurrent projects, the predicted noise levels arising from this cumulative effect are found within the noise limits.

Operational Phase

Traffic noise associated with the proposed widening of Yuen Long Highway is a key environmental issue and constitutes the major environmental impact to the nearby development along the road alignment in Yuen Long.

This assessment has predicted that the traffic noise levels from the proposed road widening at the year 2021 will result in exceedances of the road traffic noise criterion, based on the given situation (i.e. 'do-nothing' scenario).

The best practicable mitigation package is recommended to comply with the road traffic noise criterion, comprising a combination of 2 to 6m high road side vertical and cantilever noise barriers.

In consideration with the cumulative impact arising from the adjacent development, exceedance of noise limits will occur at some of the NSRs. All the possible direct mitigation measures have been explored and found unsuccessful to reduce the noise level to acceptable condition. Therefore, indirect mitigation remedies are considered to be the last resort to alleviate the impact on these receivers.

10.3 Air Quality

Typical construction works and the major dust generating activities have been identified and reviewed. Good site work practices based on the statutory requirements laid down in the Air Pollution Control (Construction Dust) Regulations should be conveyed to site staff to ensure effective implementation of dust control measures during the construction phase. Provided that these recommendations are followed, control on fugitive dust emissions is considered to be adequate.

The operational phase impact due to vehicle emissions has been assessed. Under the worst case scenario, when the maximum 15-year peak hour traffic occurs, the predicted maximum hourly concentrations of NO² are predicted to be within the AQO hourly limit of 300 µg/m³ at all ASRs. Also, the predicted maximum daily RSP concentrations are all below the AQO limit of 180 µg/m³. No potential breaches of these critical AQOs and other relevant parameters are anticipated. The air pollutant levels for both the “Do Nothing” and “Mitigated” scenarios for traffic noise control has been predicted. Results confirm that no adverse impacts would occur due to the installation of the proposed noise barriers.

10.4 Water Quality

Road widening works have the ability to impact upon identified water sensitive receivers, principally through the generation and discharge of silt-laden surface runoff from spoil stockpiling areas and during landscape stripping and embankment reworking. Specific mitigation measures have been specified to control such impacts.

Road run-off from the operational widened YLH will contain sediment and organic/inorganic pollutants. If the measures highlighted above are adopted, and if the drainage network is maintained appropriately, the impacts on the water environment should be minimal.

This water quality impact assessment has not highlighted any particular insurmountable problems associated with either the road widening construction works or the completed road operation. A number of mitigation measures have been recommended, which generally relate to good site management. Given the implementation of these measures, potential impacts associated with the construction and operation of the Highway are not considered significant.

10.5 Waste Management

The proposed works are likely to result in the generation of a variety of wastes and require the management of construction materials and the importation of fill. Provided that both waste arisings and imported fill are managed using approved methods as described above, no unacceptable adverse environmental impacts are envisaged.

The mitigation measures recommended in this Chapter should be incorporated into a Waste Management Plan and applied through the contract documents to ensure that environmental nuisance does not arise.

10.6 Land Contamination

There are a number of land uses adjacent to the YLH that, according to Section 3.1 of Annex 19 of the EIA-TM, have the ability to cause land contamination. The proposed widening scheme is

not anticipated to extend beyond the road's existing reserve and thus impinge upon these potentially contaminated plots of land. Therefore, it is considered that the potential for impacts upon site workers during the construction of Yuen Long Highway is not insignificant and a CAP or further measures are not recommended.

10.7 Landscape and Visual Issues

The existing Highway passes through an area that is primarily rural in character, comprising a combination of agriculture with both local village development and more scattered low-rise housing, together with some areas of generally natural hillside, particularly adjacent to the northern parts. As the local character is rural, the alignment corridor is a major contrasting feature across the existing landscape.

Overall the primary source of landscape and visual impacts arise from the disturbance to the existing planted embankments and the loss of the roadside vegetation (including approximately 4,913 trees). Additional sources of visual impact will arise from the extension of the road surfacing and the introduction of some 13,597m of noise barriers.

Mitigation measures have been devised to alleviate the identified landscape and visual impacts including compensatory woodland planting (including some 7,832 trees at standard size) and the consideration of the design of all engineering structures, particularly the noise mitigation measures. These will be designed as at least partially transparent to avoid excessive visual impact, with a potential for sections of thematically patterned panels, and have dense tree and shrub planting in front. It is considered that the mitigation measures will alleviate some of the impacts caused resulting in the long-term impacts being acceptable overall.

The review of the existing planning and development control framework found that the proposals would not conflict with the published land use plans for the Study Area and so no amendment is required as a result of the proposals.

10.8 Cultural Heritage

Key sites of cultural heritage interest identified by the Antiquities and Monuments Office occur in Shung Ching San Tsuen and lie at some distance from the Highway (between 400 and 500 metres). These sites will not be impacted by the proposals either directly, or indirectly.

There are a number of villages along the alignment, which have general features of cultural heritage interest. However, many of these features, (such as Fung Shui) have been affected to some degree by the existing Highway.

Areas of interest include the earth-gods at Sham Chung and Lam Hau. As the proposals do not involve the resumption of additional land, impacts upon these features are not considered significant, and impacts to general disturbance will be offset through mitigatory planting or suitably designed retaining walls as described in Chapter 8. The potential for nuisance around Lam Hau (to the south of the alignment) has been reduced further by incorporation of asymmetrical widening to the north of the Alignment within the Preliminary Design.

Potential impacts of the widening scheme upon existing graves sites and the archaeology of the surrounding area are considered insignificant.

In general, works in the vicinity of the existing villages should be carried out in a manner sensitive to the needs of the local villagers.

Table 10.1 Implementation Schedule

EIA Ref	Environment Protection Measures	Location / Timing	Implementation Agent	Implementation Stages*			Relevant Legislation and Guidelines
				D	C	O	
Section 3	<p><u>Noise Mitigation</u></p> <p><u>Construction Mitigation Measures</u></p> <ul style="list-style-type: none"> Plant and vehicles shall be inspected annually to ensure that they are operating efficiently. Plant such as compressor, excavator, tracked crane, vibratory roller and bulldozer etc., operating on intermittent basis should be turned off or throttled down when not in active use Plant such as excavator, that is known to emit noise strongly in one direction should be orientated to face away from the NSRs Silencers, mufflers and enclosures for plant such as dump truck, tracked crane and generator etc., should be used and maintained adequately throughout the works Plants such as generator, standard bored pile oscillatory should be sited away from NSRs as far as practicable 	<p>Within the boundaries of all construction sites / Operation Time (07:00-19:00 from Monday to Saturday except public holiday</p>	Hyd & Contractor		<p>✓</p> <p>✓</p> <p>✓</p> <p>✓</p> <p>✓</p>		TM on EIA Process, NCO

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YLH – Yuen Long Highway

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Section 3	<ul style="list-style-type: none"> 3 m high moveable barriers with skid footing and a small cantilevered upper portion can be located along the work area within about 6 metres from stationary plant and about 5 m from mobile plant Noisy Deep Bay Link construction activities should be avoided during the examinations periods Contractor should use the particular plant such as excavator, dump truck, vibratory roller, tracked crane, standard bored pile oscillatory, vibratory poker, generator, water pump, concrete lorry mixer and air compressor with equipment noise levels quieter than those specified in GW-TM. Restrict on the number of plant or group of equipment operating concurrently in areas where is less than 5 metres away to the NSRs Noise monitoring will be carried out at the most affected NSRs. In general, Leq(5 min) noise levels are required to be measured at these affected NSRs which were listed in the Chapter 2 Table2.1. Path for complaints and handling procedures should be set up and implement. 	Within the boundaries of all construction sites / Operation Time (07:00-19:00 from Monday to Saturday except public holiday	Hyd & Contractor		✓ ✓ ✓ ✓ ✓ ✓ ✓		TM on EIA Process, NCO

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EIA Ref	Environment Protection Measures	Location / Timing	Implementation Agent	Implementation Stages*			Relevant Legislation and Guidelines
				D	C	O	
Section 3	<p>Operational <u>Mitigation</u> Measures</p> <ul style="list-style-type: none"> • 2m vertical barriers located at Yuen Long Highway- West bound from chainage 7000 to 7270 (270m) • 2m vertical barriers located at Yuen Long Highway- West bound from chainage 7341 to 7974 (633m) • 2m vertical barriers located at Slip road joining Route 10 and YLH (East bound) to the north-west of main chainage 2482 (143m) • 3m vertical barriers located at Yuen Long Highway- West bound from chainage 6768 to 7000 (232m) • 3m vertical barriers located at Yuen Long Highway- West bound from chainage 7270 to 7341 (71m) • 3m vertical barriers located at Slip road joining Castle Peak Road and YLH (East bound) chainage 1440 at Lam Tei Interchange (159m) • 3m vertical barriers located at Slip road slip off YLH (East bound) from chainage 4336 at Tin Shui Wai West Interchange merging Hung Tin Road (144m) 	During the YLH Operation	Hyd	✓	✓	✓	TM on EIA Process, NCO

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				D	C	O	
Section 3	<ul style="list-style-type: none"> 3m vertical barriers located at Slip road joining Route 10 and YLH (East bound) to the north-west of main chainage 2582 (94m) 3m vertical barriers located at Slip road joining Route 10 and YLH (East bound) to the north-west of main chainage 2735 (380m) 3m vertical barriers located at Slip road joining Route 10 and YLH (West bound) to the south of main chainage 1800 (192m) 3m vertical barriers located at Yuen Long Highway- West bound from chainage 2800 to 2850 (50m) 4m vertical barriers located at Yuen Long Highway- West bound from chainage 5900 to 6298 (398m) 4m vertical barriers located at Yuen Long Highway- East bound from chainage 4700 to 4843 (143m) 4m vertical barriers located at Hung Tin Road (West bound) to the north-west of main chainage 4475 (63m) 4m vertical barriers located at Slip road slip off YLH (East bound) from chainage 5746 at Tong Yan San Tsuen Interchange merging Long Tin Road (142m) 	During the YLH Operation	Hyd	✓	✓	✓	TM on EIA Process, NCO

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Section 3	<ul style="list-style-type: none"> 4m vertical barriers located at Slip road slip off YLH (West bound) from chainage 5900 at Tong Yan San Tsuen Interchange merging Long Tin Road (124m) 4m vertical barriers located at Yuen Long Highway- West bound from chainage 950 to 1160 (210m) 4m vertical barriers located at Slip road slip off YLH (West bound) at Tin Shui Wai West Interchange merging Hung Tin Road to the south-east of main chainage 4717 (59m) 4m vertical barriers located at Slip road slip off YLH (West bound) from chainage 1339 at Lam Tei Interchange merging Castle Peak Road (106m) 4m vertical barriers located at Yuen Long Highway- East bound from chainage 7448 to 7940 (480m) 4m vertical barriers located at Yuen Long Highway- West bound from chainage 2750 to 2800 (50m) 5.5m vertical barrier plus 1.5 m cantilever at 45° located at Yuen Long Highway- West bound from chainage 4857 to 5014 (157m) 	During the YLH Operation	Hyd	✓	✓	✓	TM on EIA Process, NCO

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Section 3	<ul style="list-style-type: none"> 5.5m vertical barrier plus 1.5 m cantilever at 45° located at Slip road joining Long Tin Road and YLH (East bound) chainage 5905 at Tong Yan San Tsuen Interchange (182m) 5.5m vertical barrier plus 1.5 m cantilever at 45° located at Slip road joining Long Tin Road and YLH (West bound) at Tong Yan San Tsuen Interchange (115m) 5.5m vertical barrier plus 1.5 m cantilever at 45° located at Yuen Long Highway- East bound from chainage 4152 to 4336 (184m) 5.5m vertical barrier plus 1.5 m cantilever at 45° located at Yuen Long Highway- East bound from chainage 4400 to 4562 (172m) 5.5m vertical barrier plus 1.5 m cantilever at 45° located at Yuen Long Highway- East bound from chainage 6134 to 6247 (113m) 5.5m vertical barrier plus 2.5 m cantilever at 45° located at Yuen Long Highway- West bound from chainage 5014 to 5160 (146m) 5.5m vertical barrier plus 2.5 m cantilever at 45° located at Slip road joining Route 10 and YLH (East bound) chainage 3550 (445m) 5.5m vertical barrier plus 2.5 m cantilever at 45° located at Slip road joining Castle Peak Road and YLH (East bound) at Lam Tei Interchange to the north of main chainage 1285 (93m) 	During the YLH Operation	Hyd	✓	✓	✓	TM on EIA Process, NCO

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Section 3	<ul style="list-style-type: none"> 5.5m vertical barrier plus 2.5 m cantilever at 45° located at Yuen Long Highway- East bound from chainage 5746 to 5881 (135m) 5.5m vertical barrier plus 2.5 m cantilever at 45° located at Yuen Long Highway- East bound from chainage 1714 to 1955 (241m) 5.5m vertical barrier plus 2.5 m cantilever at 45° located at Yuen Long Highway- West bound from chainage 1378 to 1800 (422m) 5.5m vertical barrier plus 2.5 m cantilever at 45° located at Yuen Long Highway- West bound from chainage 3083 to 3318 (235m) 5.5m vertical barrier plus 2.5 m cantilever at 45° located at Hung Tin Road (West bound) to the north-west of main chainage 4470 (59m) 5.5m vertical barrier plus 2.5 m cantilever at 45° located at Yuen Long Highway- West bound from chainage 4160 to 4343 (183m) 5.5m vertical barrier plus 2.5 m cantilever at 45° located at Yuen Long Highway- East bound from chainage 5905 to 6134 (229m) 5m vertical barriers located at Yuen Long Highway- East bound from chainage 6774 to 7448 (684m) 	During the YLH Operation	Hyd	✓	✓	✓	TM on EIA Process, NCO

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Section 3	<ul style="list-style-type: none"> 5m vertical barriers located at Slip road slip off YLH (West bound) from chainage 4857 at Tin Shui Wai West Interchange merging Hung Tin Road (169m) 5m vertical barriers located at Yuen Long Highway- Central divider from chainage 1345 to 1800 (455m) 5m vertical barriers located at Slip road joining Route 10 and YLH (East bound) to the north-west of main chainage 2656 (82m) 5m vertical barriers located at Yuen Long Highway- East bound from chainage 5279 to 5742 (468m) 5m vertical barriers located at Yuen Long Highway- West bound from chainage 4343 to 4440 (97m) 5m vertical barriers located at Yuen Long Highway- Central divider from chainage 1200 to 1290 (90m) 5m vertical barriers located at Yuen Long Highway- East bound from chainage 1440 to 1714 (274m) 5m vertical barriers located at Slip road slip off YLH (West bound) from chainage 3083 merging Route 10 (961m) 	During the YLH Operation	Hyd	✓	✓	✓	TM on EIA Process, NCO

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Section 3	<ul style="list-style-type: none"> 5m vertical barriers located at Yuen Long Highway- West bound from chainage 1224 to 1308 (84m) 5m vertical barriers located at Yuen Long Highway- East bound from chainage 3550 to 4152 (602m) 5m vertical barriers located at Slip road slip off YLH (East bound) at Tin Shui Wai West Interchange merging Hung Tin Road to the north-west of main chainage 4453 (50m) 5m vertical barriers located at Yuen Long Highway- East bound from chainage 4843 to 5023 (180m) 5m vertical barriers located at Yuen Long Highway- East bound from chainage 6300 to 6506 (206m) 5m vertical barriers located at Yuen Long Highway- West bound from chainage 2700 to 2750 (50m) 6m vertical barriers located at Slip road slip off YLH (East bound) from chainage 1955 merging Route 10 (78m) 6m vertical barriers located at Yuen Long Highway- West bound from chainage 3318 to 3446 (128m) 	During the YLH Operation	Hyd	✓	✓	✓	TM on EIA Process, NCO

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Section 3	<ul style="list-style-type: none"> 6m vertical barriers located at Yuen Long Highway- East bound from chainage 6247 to 6300 (53m) 6m vertical barriers located at Hung Tin Road- Central divider (76m) 6m vertical barriers located at Yuen Long Highway- East bound from chainage 5023 to 5279 (256m) 6m vertical barriers located at Yuen Long Highway- East bound from chainage 6506 to 6774 (268m) 6m vertical barriers located at Slip road off YLH (West bound) merging Castle Peak Road to the south of main chainage 1378 (41m) 6m vertical barriers located at Yuen Long Highway- West bound from chainage 2167 to 2700 (533m) 6m vertical barriers located at Slip road joining Long Tin Road and YLH (West bound) chainage 5160 at Tong Yan San Tsuen Interchange (458m) 	During the YLH Operation	Hyd	✓	✓	✓	TM on EIA Process, NCO

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Section 4	<p><u>Air Quality Mitigation</u></p> <p><u>Construction Mitigation Measures</u></p> <ul style="list-style-type: none"> The Contractor shall undertake at all times to prevent dust nuisance as a result of his activities. Dust suppression measures such as water spraying are necessary and should be installed to ensure that the air quality at the boundary of the site and at any sensitive receivers complies with the Hong Kong Air Quality Objectives The Contractor shall notify any specific construction work as stated in the Air Pollution Control (Construction Dust) Regulation to the Authority before the commencement of such work. The Contractor shall apply for a licence or permit under the requirements of the relevant legislation (e.g., Air Pollution Control Ordinance and its subsidiary regulations) wherever applicable. 	<p>Within the boundaries of all construction sites / Operation Time (07:00 – 19:00 form Monday to Saturday except public holiday)</p>	Contractor/Hyd		<p>✓</p> <p>✓</p> <p>✓</p>		<ul style="list-style-type: none"> APCO Air Pollution Control (Construction Dust) Regulations AQOs TM (Annex 4)

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Section 4	<ul style="list-style-type: none"> Watering of unpaved areas, access roads, construction areas and dusty stockpiles shall be undertaken at least eight times daily during dry and windy weather. Watering of the haul road shall be undertaken four to eight times daily during dry or windy weather. Water sprays may be either fixed or mobile to follow individual areas to be wetted as and when required. Application of suitable wetting agents, such as dust suppression chemicals, shall be used in addition to water, especially during the dry season (October to December) Effective water sprays shall be used during the delivery and handling of all raw sand and aggregate, and other similar materials, wet dust is likely to be created and to dampen all stored materials during dry and windy weather Stockpiles of sand, aggregate or any other dusty materials greater than 20 m³ shall be enclosed on three sides, with walls extending above the pile and 1 metre beyond the front of the pile Suitable chemical wetting agent such as dust suppression chemical shall be used on completed cuts and fills to reduce wind erosion. Areas within the construction site where there is a regular movement of vehicles shall have a paved surface and be kept clear of loose surface material. 	Within the boundaries of all construction sites / Operation Time (07:00 – 19:00 form Monday to Saturday except public holiday)	Contractor/Hyd		✓		<ul style="list-style-type: none"> APCO Air Pollution Control (Construction Dust) Regulations AQOs TM (Annex 4)
					✓		
					✓		
				✓	✓		

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Section 4	<ul style="list-style-type: none"> The Contractor shall restrict all motorized vehicles within the construction site, excluding those on public roads, to maximum speed of 20 km per hour and confine haulage and delivery vehicles to designated roadways inside the Site. Construction working areas will be restricted to a minimum practicable size. The Contractor shall ensure that no earth, rock or debris is deposited on public or private rights of way as result of his activities, including any deposits arising from the movement of plant or vehicles. The Contractor shall provide a wheel washing facility at the exits from work areas to the satisfaction of the Engineer and to the requirements of the Commissioner of Police. Water in wheel washing facilities and sediment shall be changed and removed respectively at least once a month. The Contractor shall submit details of the wheel washing facilities; such shall be usable prior to any earthworks excavation activity on the construction site. The Contractor shall also provide a hard-surfaced road between any washing facility and the public road. 	Within the boundaries of all construction sites / Operation Time (07:00 – 19:00 form Monday to Saturday except public holiday)	Contractor/Hyd	✓	✓		<ul style="list-style-type: none"> APCO Air Pollution Control (Construction Dust) Regulations AQOs TM (Annex 4)
				✓	✓		
					✓		
				✓	✓		
				✓	✓		

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Section 4	<ul style="list-style-type: none"> In the event of any spoil or debris from construction works being deposited on adjacent land, or streams, or any silt being washed down to any area, then all such spoil, debris or material and silt shall be immediately removed and the affected land and areas restored to their natural state by the Contractor to the satisfaction of the Engineer. If spoil cannot be immediately transported out of the Site, stockpiles should be stored in sheltered areas. Plant and vehicles shall be inspected annually to ensure that they are operating efficiently and that exhaust emissions are not causing a nuisance. All Site vehicle exhausts should be directed vertically upwards or directed away from ground. Dust monitoring will be included in the EM&A Manual at the most affected ASRs. In general, 24-hour total suspended particulates and 1-hour total suspended particulates are required to be measured at the most affected ASRs which were listed in the Chapter 2 Table2.1. Path for complaints and handling procedures should be set up and implement. 	Within the boundaries of all construction sites / Operation Time (07:00 – 19:00 form Monday to Saturday except public holiday)	Contractor/Hyd		<ul style="list-style-type: none"> ✓ ✓ ✓ ✓ 		<ul style="list-style-type: none"> APCO Air Pollution Control (Construction Dust) Regulations AQOs TM (Annex 4)

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Section 5	<p><i>Water Quality Mitigation</i></p> <p>Construction Mitigation Measures</p> <ul style="list-style-type: none"> works sites and areas used for imported fill stockpiling should, as far as possible, avoid the water sensitive receivers. stripping of existing vegetation should be sequential to avoid exposure of large areas of embankment slopes; special precautions should be taken when working in the near vicinity of nullahs and streams, especially when bridges along the YLH are being widened. This may involve the installation of temporary drainage works to ensure that runoff does not enter the nullahs directly; typical example of this type of measure is the provision of suitable temporary drainage system, such as peripheral channels around the site, to intercept all on-site runoff to water quality treatment devices such as sedimentation pond / sand trap. Only treated runoff from these devices will be discharged offsite. Sizes and arrangement details of these drainage works depend on local conditions and will be addressed during the detailed design stage. 	Within the boundaries of all construction sites / Operation Time (07:00 – 19:00 form Monday to Saturday except public holiday)	Contractor		✓ ✓ ✓		TM on EIA process, WPCO, ProPeCC PN 1/94 Deep Bay WCE

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Section 5	<ul style="list-style-type: none"> perimeter cut-off drains to direct off-site water around the works sites should be constructed and internal drainage works and erosion and sedimentation control facilities implemented. Channels, earth bunds or sandbag barriers should be provided on site to direct stormwater to silt removal facilities. The design of efficient silt removal facilities should be based on the guidelines provided in ProPECC PN 1/94; sediment tanks of sufficient capacity, constructed from pre-formed individual cells of approximately 6-8 m³ capacity are adopted as a general mitigation measure which can be used for settling wastewaters prior to disposal. The tanks are readily available and used primarily for recycling water for bored piling operations. The system capacity is flexible and able to handle multiple inputs from a variety of sources and particularly suited to applications where the influent is pumped. Various physical and chemical filters such infiltration tank can be added should refinement of the sedimentation process be required; Construction works should be programmed to minimise surface excavations/ cutting during the rainy season (April to September). If excavation of soil cannot be avoided during the rainy season, or at any time of year when rainstorms are likely, 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 summarised in ProPECC PN 1/94. Particular attention should be paid to the control of silty surface run-off during storms events, especially for sites located near steep slopes; 	Within the boundaries of all construction sites / Operation Time (07:00 – 19:00 form Monday to Saturday except public holiday)	Contractor	✓	✓		TM on EIA process, WPCO, ProPeCC PN 1/94 Deep Bay WCE
				✓	✓		
				✓	✓		

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Section 5	<ul style="list-style-type: none"> all exposed earth areas should be completed and re-vegetated promptly after earthworks have been completed, or alternately, within 14 days of the cessation of earthworks. earthworks final surfaces should be well compacted and subsequent permanent work or surface protection should be carried out immediately after final surfaces are formed in order to prevent rainstorm erosion; the overall slope of the site should be kept to a minimum to reduce the erosive potential of surface water flows and all trafficked areas and access roads protected by coarse stone ballast. An additional advantage accruing from the use of crushed stone is the positive traction gained during prolonged periods of inclement weather and the reduction of surface sheet flows; silt contained in ground water and drilling water collected from any boring operations, dewatering etc. should be removed with properly designed silt removal facilities, such as the specified portable sedimentation tanks referred to above, such that Technical Memorandum on Effluent Standards are achieved prior to the discharge of waters; 	Within the boundaries of all construction sites / Operation Time (07:00 – 19:00 form Monday to Saturday except public holiday)	Contractor		✓		TM on EIA process, WPCO, ProPECC PN 1/94 Deep Bay WCE
					✓		
				✓	✓		
				✓	✓		

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EIA Ref	Environment Protection Measures	Location / Timing	Implementation Agent	Implementation Stages*			Relevant Legislation and Guidelines
				D	C	O	
Section 5	<ul style="list-style-type: none"> 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 following rainstorms. Deposited silt and grit should be removed monthly and disposed of by spreading evenly over stable, non-sensitive vegetated areas; measures should be taken to minimise the ingress of site drainage into excavations. If the excavation of trenches in wet periods (June – October) is necessary, they should be dug and backfilled in short sections. Water pumped out from trenches or foundation excavations should be discharged into the silt removal facilities; open stockpiles of construction materials (e.g. aggregates, sand and fill material) of more than 50m³ should be covered with a tarpaulin or similar fabric during rainstorms. Measures should be taken to prevent the washing away of construction materials, soil, silt or debris into any drainage system; manholes (including newly constructed ones) should always be covered and temporarily sealed so as to prevent silt, construction materials or debris being washed into the drainage system; 	Within the boundaries of all construction sites / Operation Time (07:00 – 19:00 form Monday to Saturday except public holiday)	Contractor		✓		TM on EIA process, WPCO, ProPeCC PN 1/94 Deep Bay WCE
				✓	✓		
					✓		
				✓	✓	✓	

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Section 5	<ul style="list-style-type: none"> all vehicles and plant should be cleaned before leaving the construction site to ensure no earth, mud and debris is deposited on roads. An adequately designed and sited wheel washing bay should be provided at every site exit and wash-water should have sand and silt settled out and removed at least on a weekly basis to ensure the continued efficiency of the process. The section of access road leading to, and exiting from the wheel-wash bay to the public road should be paved with sufficient backfill toward the wheel-wash bay to prevent vehicle tracking of soil and silty water to public roads and drains; water used for construction purposes on site should, as far as practical, be recycled for use; information detailing storm run-off and wastewater discharge points, and the corresponding maximum (or range of) volumes of discharges expected from the construction sites on a dry day should be provided in the WPCO license application. In general, assuming adequate information has been provided together with the license application, EPD would need at least 20 days for the processing of a license for a discharge. It is therefore recommended that the Contractor submit the licence application to EPD as early as possible before the commencement of any discharge. 	Within the boundaries of all construction sites / Operation Time (07:00 – 19:00 form Monday to Saturday except public holiday)	Contractor	✓	✓		TM on EIA process, WPCO, ProPeCC PN 1/94 Deep Bay WCE
				✓	✓		
				✓	✓		
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Section 5	<p>Construction Material</p> <ul style="list-style-type: none"> • stockpiles of cement and other construction material should be kept covered when not being used; • stockpiles of cement and other construction material should not be located adjacent to nullahs and streams; • entry points into the surface drainage system should be fitted with oil interceptors; • waste oils and other chemical wastes as defined in the Waste Disposal (Chemical Waste) (General) Regulation will require disposal by an appropriate means and could require pre-notification to EPD prior to disposal. An appropriate disposal facility could be the Chemical Waste Treatment Centre (CWTC) at Tsing Yi. If chemical wastes are to be generated, the contractor will need to register with EPD as a chemical waste producer and observe the requirements for chemical waste storage, labelling, transportation and disposal. 	Within the boundaries of all construction sites / Operation Time (07:00 – 19:00 form Monday to Saturday except public holiday)	Contractor	✓	✓		TM on EIA process, WPCO, ProPeCC PN 1/94 Deep Bay WCE

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Section 5	<ul style="list-style-type: none"> impacts associated with spillages should be managed through careful handling procedures. Oils and fuels should only be used and stored in designated areas which have pollution prevention facilities. Fuel tanks and drums of fuel oils and other polluting fluids/chemicals should be provided with locks and bunded to a capacity of 110% of the storage capacity of the largest tank. The bund should be drained of rain water after raining event. <p>Construction Worker Sewage</p> <ul style="list-style-type: none"> Plans for the collection, treatment and disposal of sewage wastewater during the construction phase must be specified. Sewage generated on site should be disposed of through connection of the sanitation facilities with the existing foul sewerage system. Where this is not possible, temporary portable chemical toilets, septic tanks or package sewage treatment plants may need to be used. 	Within the boundaries of all construction sites / Operation Time (07:00 – 19:00 form Monday to Saturday except public holiday)	Contractor	✓	✓		TM on EIA process, WPCO, ProPeCC PN 1/94 Deep Bay WCE
				✓	✓		
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EIA Ref	Environment Protection Measures	Location / Timing	Implementation Agent	Implementation Stages*			Relevant Legislation and Guidelines
				D	C	O	
Section 6	<p><u>Waste Management</u></p> <p><u>Waste Management Plan</u></p>	<p>Within the boundaries of all construction sites as well as transportation routes to designated areas for off-site disposal of materials / Prior to and during construction activities</p>	<p>Contractor</p>				<ul style="list-style-type: none"> • Waste Disposal Ordinance (Cap 354) • Waste Disposal (Chemical Waste)(General) Regulation (Cap 354) • Land (Miscellaneous Provisions) Ordinance (Cap 28) • Public Health and Municipal Services Ordinance (Cap 132) – Public Cleansing and Prevention of Nuisances (Urban Council) and (Regional Council) By-laws

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Section 6	<ul style="list-style-type: none"> A Waste Management Plan shall be prepared, which details the provisions for the management of wastes and materials arising as a result of the construction activities. Detailed volumes of waste arisings and materials balance shall be calculated during the detailed design. Sources of fill and intended recipients for off-site disposal of all waste / surplus materials shall be identified in the WMP. 	Within the boundaries of all construction sites as well as transportation routes to designated areas for off-site disposal of materials / Prior to and during construction activities	Contractor	✓	✓		<ul style="list-style-type: none"> Waste Disposal Ordinance (Cap 354) Waste Disposal (Chemical Waste)(General) Regulation (Cap 354) Land (Miscellaneous Provisions) Ordinance (Cap 28) Public Health and Municipal Services Ordinance (Cap 132) – Public Cleansing and Prevention of Nuisances (Urban Council) and (Regional Council) By-laws

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Section 6	<ul style="list-style-type: none"> Inert excavated material and construction and demolition material deemed suitable for fill should be re-used on site; Inert material deemed unsuitable for reuse on site, reclamation or land formation; and non-inert construction waste material should be disposed of at a landfill. The suitability (or otherwise) of material for reuse on site shall be detailed in the WMP. If, for any reason, inert C&D material cannot be reused on site, full justification should be given in the WMP for approval by EPD. 	Within the boundaries of all construction sites as well as transportation routes to designated areas for off-site disposal of materials / Prior to and during construction activities	Contractor		✓		<ul style="list-style-type: none"> Waste Disposal Ordinance (Cap 354) Waste Disposal (Chemical Waste)(General) Regulation (Cap 354) Land (Miscellaneous Provisions) Ordinance (Cap 28) Public Health and Municipal Services Ordinance (Cap 132) – Public Cleansing and Prevention of Nuisances (Urban Council) and (Regional Council) By-laws

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Section 6	<ul style="list-style-type: none"> The Contractor shall ensure that all site staff undergo training, in the concepts of waste management procedures including waste reduction, reuse, recycling and site cleanliness. The WMP shall be kept up to date on a monthly basis with records of the actual quantities of wastes generated, recycled and disposed of off-site, as well as fill imported to site. Quantities shall be determined by weighing each load or other methods agreed to by the Engineer's Representative. 	Within the boundaries of all construction sites as well as transportation routes to designated areas for off-site disposal of materials / Prior to and during construction activities	Contractor	✓	✓		<ul style="list-style-type: none"> Waste Disposal Ordinance (Cap 354) Waste Disposal (Chemical Waste)(General) Regulation (Cap 354) Land (Miscellaneous Provisions) Ordinance (Cap 28) Public Health and Municipal Services Ordinance (Cap 132) – Public Cleansing and Prevention of Nuisances (Urban Council) and (Regional Council) By-laws

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Section 6	<ul style="list-style-type: none"> Appropriate measures should be employed to minimise windblown litter and dust during transportation by either covering trucks or transporting wastes in enclosed containers. <p>Excavated Materials (Public Fill)</p> <ul style="list-style-type: none"> Excavated materials should be segregated, such that topsoil is stored separately from fill and treated accordingly to avoid degradation Any stockpiles should be sited away from existing watercourses 	Within the boundaries of all construction sites as well as transportation routes to designated areas for off-site disposal of materials / Prior to and during construction activities	Contractor	✓	✓		<ul style="list-style-type: none"> Waste Disposal Ordinance (Cap 354) Waste Disposal (Chemical Waste)(General) Regulation (Cap 354) Land (Miscellaneous Provisions) Ordinance (Cap 28) Public Health and Municipal Services Ordinance (Cap 132) – Public Cleansing and Prevention of Nuisances (Urban Council) and (Regional Council) By-laws

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Section 6	<ul style="list-style-type: none"> Stockpiles should be covered in order to prevent wind erosion and air quality. <p>Construction and Demolition Materials</p> <ul style="list-style-type: none"> Construction planning and good site management shall be employed to minimise over ordering and generation of surplus materials such as concrete, mortars and cement grouts. 	Within the boundaries of all construction sites as well as transportation routes to designated areas for off-site disposal of materials / Prior to and during construction activities	Contractor	✓	✓		<ul style="list-style-type: none"> Waste Disposal Ordinance (Cap 354) Waste Disposal (Chemical Waste)(General) Regulation (Cap 354) Land (Miscellaneous Provisions) Ordinance (Cap 28) Public Health and Municipal Services Ordinance (Cap 132) – Public Cleansing and Prevention of Nuisances (Urban Council) and (Regional Council) By-laws
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Section 6	<ul style="list-style-type: none"> The design of formwork should maximise the use of standard wooden panels so that high reuse levels can be achieved. Alternatives such as steel formwork or plastic facing should be considered to increase the potential for reuse. C&D materials should be segregated on site into different waste and material types to increase the feasibility of certain components of the waste stream being recycled by specialised contractors. 	Within the boundaries of all construction sites as well as transportation routes to designated areas for off-site disposal of materials / Prior to and during construction activities	Contractor	✓	✓		<ul style="list-style-type: none"> Waste Disposal Ordinance (Cap 354) Waste Disposal (Chemical Waste)(General) Regulation (Cap 354) Land (Miscellaneous Provisions) Ordinance (Cap 28) Public Health and Municipal Services Ordinance (Cap 132) – Public Cleansing and Prevention of Nuisances (Urban Council) and (Regional Council) By-laws
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Section 6	<ul style="list-style-type: none"> Inert construction and demolition material deemed suitable for fill should be re-used by the contractor on site as much as possible; Waste containing putrescible materials should be disposed of to landfill. Where materials cannot be reused on site, opportunities for recycling materials off-site shall be explored. Potential opportunities for recycling and reuse of C&D materials from the Widening works includes: 	Within the boundaries of all construction sites as well as transportation routes to designated areas for off-site disposal of materials / Prior to and during construction activities			✓		<ul style="list-style-type: none"> Waste Disposal Ordinance (Cap 354) Waste Disposal (Chemical Waste)(General) Regulation (Cap 354) Land (Miscellaneous Provisions) Ordinance (Cap 28) Public Health and Municipal Services Ordinance (Cap 132) – Public Cleansing and Prevention of Nuisances (Urban Council) and (Regional Council) By-laws
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Section 6	<ul style="list-style-type: none"> milling wastes arising from regrading of the existing pavement could be recycled on site and reused as either road-base in the new carriageways or fill for new embankments; existing marginal roadside barriers comprise pre-cast units, it may be possible to re-use these following widening works; and existing bridge parapets comprise aluminium post and railings, these have a recyclable value and could be sold on for reconditioning or reused for scrap metal. 	Within the boundaries of all construction sites as well as transportation routes to designated areas for off-site disposal of materials / Prior to and during construction activities	Contractor	✓	✓		<ul style="list-style-type: none"> Waste Disposal Ordinance (Cap 354) Waste Disposal (Chemical Waste)(General) Regulation (Cap 354) Land (Miscellaneous Provisions) Ordinance (Cap 28) Public Health and Municipal Services Ordinance (Cap 132) – Public Cleansing and Prevention of Nuisances (Urban Council) and (Regional Council) By-laws
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Section 6	<p><i>Chemical Waste</i></p> <ul style="list-style-type: none"> Find alternatives which generate reduced quantities or even no chemical waste, or less dangerous types of chemical waste. The Contractor shall register with EPD as a Chemical Waste producer. Containers used for the storage of chemical wastes should: 	<p>Within the boundaries of all construction sites as well as transportation routes to designated areas for off-site disposal of materials / Prior to and during construction activities</p>	Contractor				<ul style="list-style-type: none"> Waste Disposal Ordinance (Cap 354) Waste Disposal (Chemical Waste)(General) Regulation (Cap 354) Land (Miscellaneous Provisions) Ordinance (Cap 28) Public Health and Municipal Services Ordinance (Cap 132) – Public Cleansing and Prevention of Nuisances (Urban Council) and (Regional Council) By-laws

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Section 6	<ul style="list-style-type: none"> be suitable for the substance they are holding, resistant to corrosion, maintained in a good condition, and securely closed; have a capacity of less than 450L unless the specifications have been approved by the EPD; and display a label in English and Chinese in accordance with instructions prescribed in Schedule 2 of the Regulations. 	Within the boundaries of all construction sites as well as transportation routes to designated areas for off-site disposal of materials / Prior to and during construction activities	Contractor	✓	✓		<ul style="list-style-type: none"> Waste Disposal Ordinance (Cap 354) Waste Disposal (Chemical Waste)(General) Regulation (Cap 354) Land (Miscellaneous Provisions) Ordinance (Cap 28) Public Health and Municipal Services Ordinance (Cap 132) – Public Cleansing and Prevention of Nuisances (Urban Council) and (Regional Council) By-laws
				✓	✓		
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Section 6	<ul style="list-style-type: none"> Chemical waste shall be handled in accordance with the Code of Practice on the Packaging, Handling and Storage of Chemical Wastes. The storage area for chemical wastes should: <ul style="list-style-type: none"> be clearly labelled and used solely for the storage of chemical waste; be enclosed on at least 3 sides; 	Within the boundaries of all construction sites as well as transportation routes to designated areas for off-site disposal of materials / Prior to and during construction activities	Contractor		✓		<ul style="list-style-type: none"> Waste Disposal Ordinance (Cap 354) Waste Disposal (Chemical Waste)(General) Regulation (Cap 354) Land (Miscellaneous Provisions) Ordinance (Cap 28) Public Health and Municipal Services Ordinance (Cap 132) – Public Cleansing and Prevention of Nuisances (Urban Council) and (Regional Council) By-laws

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Section 6	<ul style="list-style-type: none"> have an impermeable floor and bunding, of capacity to accommodate 110% of the volume of the largest container or 20% by volume of the chemical waste stored in that area, whichever is the greatest; have adequate ventilation be covered to prevent rainfall entering (water collected within the bund must be tested and disposed as chemical waste if necessary); and 	Within the boundaries of all construction sites as well as transportation routes to designated areas for off-site disposal of materials / Prior to and during construction activities	Contractor		✓		<ul style="list-style-type: none"> Waste Disposal Ordinance (Cap 354) Waste Disposal (Chemical Waste)(General) Regulation (Cap 354) Land (Miscellaneous Provisions) Ordinance (Cap 28) Public Health and Municipal Services Ordinance (Cap 132) – Public Cleansing and Prevention of Nuisances (Urban Council) and (Regional Council) By-laws

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Section 6	<ul style="list-style-type: none"> be arranged so that incompatible materials are adequately separated. Waste oils and other chemical wastes as defined in the Waste Disposal (Chemical Waste) (General) Regulation will require disposal by an appropriate means and could require pre-notification to EPD prior to disposal. Disposal of chemical waste should: 	Within the boundaries of all construction sites as well as transportation routes to designated areas for off-site disposal of materials / Prior to and during construction activities	Contractor		✓		<ul style="list-style-type: none"> Waste Disposal Ordinance (Cap 354) Waste Disposal (Chemical Waste)(General) Regulation (Cap 354) Land (Miscellaneous Provisions) Ordinance (Cap 28) Public Health and Municipal Services Ordinance (Cap 132) – Public Cleansing and Prevention of Nuisances (Urban Council) and (Regional Council) By-laws
				✓	✓		

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Section 6	<p><i>Municipal Wastes</i></p> <ul style="list-style-type: none"> General refuse generated on-site should be stored in enclosed bins or compaction units separate from construction and chemical wastes. A waste collector should be employed by the Contractor to remove general refuse from the site, separately from construction and chemical wastes, on a daily or every second day basis to minimise odour, pest and litter impacts. 	<p>Within the boundaries of all construction sites as well as transportation routes to designated areas for off-site disposal of materials / Prior to and during construction activities</p>	Contractor		✓		<ul style="list-style-type: none"> Waste Disposal Ordinance (Cap 354) Waste Disposal (Chemical Waste)(General) Regulation (Cap 354) Land (Miscellaneous Provisions) Ordinance (Cap 28) Public Health and Municipal Services Ordinance (Cap 132) – Public Cleansing and Prevention of Nuisances (Urban Council) and (Regional Council) By-laws

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Section 6	<ul style="list-style-type: none"> Never burning of refuse on construction sites as it is prohibited by law. General refuse is generated largely by food service activities on site: so reusable rather than disposable dishware shall be used on site. Aluminium cans are often recovered from the waste stream by individual collectors if they are segregated or easily accessible, so separate, labelled bins for their deposit should be provided if feasible. 	Within the boundaries of all construction sites as well as transportation routes to designated areas for off-site disposal of materials / Prior to and during construction activities	Contractor		✓		<ul style="list-style-type: none"> Waste Disposal Ordinance (Cap 354) Waste Disposal (Chemical Waste)(General) Regulation (Cap 354) Land (Miscellaneous Provisions) Ordinance (Cap 28) Public Health and Municipal Services Ordinance (Cap 132) – Public Cleansing and Prevention of Nuisances (Urban Council) and (Regional Council) By-laws
				✓	✓		
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Section 6	<ul style="list-style-type: none"> Office waste can be reduced through recycling of paper if volumes are large enough to warrant collection. Opportunities for participation in a local collection scheme should be investigated. 	Within the boundaries of all construction sites as well as transportation routes to designated areas for off-site disposal of materials / Prior to and during construction activities	Contractor	✓	✓		<ul style="list-style-type: none"> Waste Disposal Ordinance (Cap 354) Waste Disposal (Chemical Waste)(General) Regulation (Cap 354) Land (Miscellaneous Provisions) Ordinance (Cap 28) Public Health and Municipal Services Ordinance (Cap 132) – Public Cleansing and Prevention of Nuisances (Urban Council) and (Regional Council) By-laws
Section 8	<p><u>Landscape and Visual Impacts</u></p> <p><u>Construction Mitigation Measures</u></p> <p>The following mitigation measures shall be implemented to minimise the landscape and visual impact of the construction works:</p>				✓		

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Section 8	<p><i>Existing vegetation and landscape context</i></p> <p>The methods of protecting existing vegetation proposed by the Contractor should be in accordance with the guidelines laid down in the Tree Survey Report. These measures should be inspected by the Landscape Architect prior to the commencement of the site clearance works and their condition monitored during the Landscape Architects biweekly inspections to ensure compliance;</p> <p>Existing trees will be retained as far as possible on site. The felling of trees will be in accordance with Planning Environment and Lands Branch Technical Circular No. 3/94 (Works Branch Technical Circular No.24/94, Tree Preservation), including compensatory planting plans approved by relevant government departments. Trees identified in the Tree Survey Report and Felling Application as being suitable for transplantation or retention and those requiring felling are to be identified on site by the Contractor and be inspected by a qualified Landscape Architect or Arboriculturalist to ensure compliance with the Tree Felling Application prior to the commencement of clearance works;</p> <p>Operations for the preparation of trees to be transplanted including root pruning should be inspected by Landscape Architect. The soft works Contractor to submit proposals for crown thinning of transplanted trees prior to thinning operation. The optimum time for the transplantation operations is spring, i.e. March - April, although the preparation of the tree including root pruning should be carried out at an earlier date in accordance with the Tree Felling Application; and,</p>	<p>Whole alignment / Prior to commencement of site clearance works and biweekly during the construction period.</p> <p>Whole alignment / Prior to commencement of site clearance works</p> <p>Whole alignment / Prior to commencement of site clearance works</p>	<p>Contractor / Detailed Design Engineer</p> <p>Contractor / Detailed Design Engineer</p> <p>Contractor / Detailed Design Engineer</p>	<p>✓</p> <p>✓</p> <p>✓</p>	<p>✓</p> <p>✓</p> <p>✓</p>	<p></p> <p></p> <p></p>	<p>Planning Environment and Lands Branch Technical Circular No. 3/94 (Works Branch Technical Circular No.24/94, Tree Preservation)</p> <p>Planning Environment and Lands Branch Technical Circular No. 3/94 (Works Branch Technical Circular No.24/94, Tree Preservation),</p> <p>Planning Environment and Lands Branch Technical Circular No. 3/94 (Works Branch Technical Circular No.24/94, Tree Preservation),</p>

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Section 8	A photographic record shall be taken of trees to be retained on site on a monthly basis to monitor condition throughout the construction phase, these should be submitted as part of the construction phase progress report.	Whole alignment / Prior to commencement of site clearance works and on monthly basis through the construction period.	Contractor	✓	✓		Planning Environment and Lands Branch Technical Circular No. 3/94 (Works Branch Technical Circular No.24/94, Tree Preservation),
	Construction site controls						
	Topsoil disturbed by the works should be tested for quality using standard horticultural tests and if worthy for retention, should be stockpiled not greater than 2m high and either temporarily hydroseeded or periodically turned to avoid degradation of the organic material. Topsoil should be reused on completion of the engineering works or on other projects;	Whole alignment / Prior to commencement of construction works	Contractor	✓	✓		EIAO TM
	Erection of decorative screen hoarding to screen construction activity particularly on the boundaries of the temporary works areas;	Temporary works areas / Prior to commencement of construction works	Contractor	✓	✓		EIAO TM
Control of night time lighting on the temporary works areas and within the project limit; and,	Temporary works areas / Prior to commencement of construction works	Contractor	✓	✓		EIAO TM	

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Section 8	The potential for soil erosion should be alleviated through the minimisation of disturbance to existing vegetation and the provision of protective cover for exposed topsoil through the use of for example plastic sheeting or grass cover established through hydroseeding.	Whole alignment / Construction period.	Contractor		✓		EIAO TM
	Temporary construction sites shall be restored to standards as good as, or better than the original condition. Restoration plans shall be designed by a qualified Landscape Architect employed by the contractor.	Temporary works areas / At the end of the construction period	Contractor	✓	✓		EIAO TM
	<u>Design and Construction of the Soft Works</u> Soft landscape measures should be used where appropriate, employing native plant species as far as practicable, to restore the green land cover and enhance the vegetated, rural environment. This includes tree / shrub planting and hydroseeding in the peripheral site area, footpath sides and access roads;	Whole alignment / design and construction period.	Detailed Design Engineer	✓	✓		EIAO TM Allocation of Space for Urban Street Trees (Works Branch), WBTC No. 25/92;

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EIA Ref	Environment Protection Measures	Location / Timing	Implementation Agent	Implementation Stages*			Relevant Legislation and Guidelines
				D	C	O	
Section 8	Scheme design changes resulting in the loss of soft landscape area should be critically reviewed by the Landscape Architect to ensure compliance with the objectives of the EIA Report and to minimise the extent of cutting;	Whole alignment / design phase prior to the finalisation of engineering proposals.	Detailed Design Engineer	✓			Control of Visual Impact of Slopes (Works Branch), WBTC No. 25/93; Improvement to the Appearance of Slopes (Works Branch), WBTC No. 17/2000; Technical Guidelines on Landscape Treatment and Bio-engineering for Manmade Slopes and Retaining Walls (GEO Publication No. 1/2000); Good Roads Guide Volume 10 Design Manual for Roads and Bridges, Highways Agency (UK); Planning Environment and Lands Branch Technical Circular No. 3/94 (Works Branch Technical Circular No.24/94, Tree Preservation),

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Section 8	<p>All detailed landscape design to be carried out by a qualified Landscape Architect;</p> <p>The progress of the engineering works should be regularly reviewed on site during the biweekly inspections to identify the earliest practical opportunities for the landscape works to be undertaken; and,</p> <p>The planting of trees and shrubs are carried out in accordance with the specification and within the planting season (between March and September, although the optimum period is between April and July).</p>	<p>Whole alignment / design phase prior to the finalisation of engineering proposals.</p> <p>Whole alignment / biweekly inspections by landscape architect during the construction period.</p> <p>Whole alignment / During the construction period following the phased completion of the engineering works.</p>	<p>Detailed Design Engineer</p> <p>Detailed Design Engineer</p> <p>Contractor</p>	<p>✓</p>	<p>✓</p> <p>✓</p>	<p>Management & Maintenance of both Natural Vegetation & Landscape Works (Works Branch), WBTC No. 18/94;</p> <p>Management & Maintenance of Landscape Works along Public Roads. Aug 1996 (HyD. Guidance Notes), LU/GN/001;</p> <p>Allocation of Space for Urban Street Trees (Works Branch), WBTC No. 25/92;</p>	

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Section 8	<p><u>Design of Structures</u></p> <p>The design of the engineering structures should aim to minimise visual impact as far as possible, for example noise attenuation, maintenance access and drainage should be designed as an integral part of the overall structure;</p>	Whole alignment / Design phase prior to the finalisation of engineering proposals.	Detailed Design Engineer	✓			<p>The Advisory Committee on the Appearance of Bridges and Associated Structures (ACABAS), WBTC No. 19/98;</p> <p>Allocation of Space for Urban Street Trees (Works Branch), WBTC No. 25/92;</p> <p>Visibility of Directional Signs, HyDTC 6/98; and,</p> <p>Appearance of Structures. Lands and Works Branch Technical Circular No. 11/89.</p>

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Section 8	The design of the proposed new embankment slopes should be reviewed by Landscape Architect prior to commencement of works to identify opportunities for the further retention of existing vegetation;	Whole alignment / Design phase prior to the finalisation of engineering proposals.	Detailed Design Engineer	✓			<p>Control of Visual Impact of Slopes (Works Branch), WBTC No. 25/93;</p> <p>Improvement to the Appearance of Slopes (Works Branch), WBTC No. 17/2000;</p> <p>Technical Guidelines on Landscape Treatment and Bio-engineering for Manmade Slopes and Retaining Walls (GEO Publication No. 1/2000);</p> <p>Good Roads Guide Volume 10 Design Manual for Roads and Bridges, Highways Agency (UK);</p> <p>Planning Environment and Lands Branch Technical Circular No. 3/94 (Works Branch Technical Circular No.24/94, Tree Preservation),</p>

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Section 8	The design of the proposed noise barriers should be designed to minimise visual impacts and visually integrate as far as possible into the landscape context. This should be achieved through the use of innovative form, recessive and muted colours and tones, and through the innovative use of materials;	Whole alignment / Design phase prior to the finalisation of engineering proposals.	Detailed Design Engineer	✓			<p>The Advisory Committee on the Appearance of Bridges and Associated Structures (ACABAS), WBTC No. 19/98;</p> <p>Appearance of Structures. Lands and Works Branch Technical Circular No. 11/89.</p> <p>The Advisory Committee on the Appearance of Bridges and Associated Structures (ACABAS), WBTC No. 19/98;</p> <p>Allocation of Space for Urban Street Trees (Works Branch), WBTC No. 25/92;</p> <p>Appearance of Structures. Lands and Works Branch Technical Circular No. 11/89.</p>
	Trees and shrubs to be planted around the structures to soften their landscape and visual impact; and,	Whole alignment / Design phase prior to the finalisation of engineering proposals.	Detailed Design Engineer	✓			

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Section 8	<p><u>Operational Mitigation Measures</u></p> <p>The newly planted trees, shrubs and grassed areas are maintained throughout the establishment period at the intervals established in the soft works specification, particularly in respect to the following:</p> <p>Regular watering throughout the year when climatic conditions dictate and in accordance with good horticultural practice.</p> <p>Regular grass cutting for reinstated areas (frequency to be established in the soft works specification);</p>	<p>Soft landscaped areas throughout the whole alignment / Construction and operational phases following planting.</p> <p>Grass areas throughout the whole alignment / Construction and operational phases following planting.</p>	<p>Contractor</p> <p>Contractor</p>				<p>Management & Maintenance of both Natural Vegetation & Landscape Works (Works Branch), WBTC No. 18/94;</p> <p>Management & Maintenance of Landscape Works along Public Roads. Aug 1996 (HyD. Guidance Notes), LU/GN/001;</p> <p>Management & Maintenance of both Natural Vegetation & Landscape Works (Works Branch), WBTC No. 18/94;</p> <p>Management & Maintenance of Landscape Works along Public Roads. Aug 1996 (HyD. Guidance Notes), LU/GN/001;</p>

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Section 8	Firming up of trees after periods of strong winds (periods to be established in the soft works specification);	Soft landscaped areas throughout the whole alignment / Construction and operational phases following planting.	Contractor		✓	✓	Management & Maintenance of both Natural Vegetation & Landscape Works (Works Branch), WBTC No. 18/94; Management & Maintenance of Landscape Works along Public Roads. Aug 1996 (HyD. Guidance Notes), LU/GN/001;
	Regular checks for and eradication of pests, fungal infection etc. (frequency to be established in the soft works specification);	Soft landscaped areas throughout the whole alignment / Construction and operational phases following planting.	Contractor		✓	✓	Management & Maintenance of both Natural Vegetation & Landscape Works (Works Branch), WBTC No. 18/94; Management & Maintenance of Landscape Works along Public Roads. Aug 1996 (HyD. Guidance Notes), LU/GN/001;

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Section 8	Pruning of dead or broken branches (frequency to be established in the soft works specification);	Soft landscaped areas throughout the whole alignment / Construction and operational phases following planting.	Contractor		✓	✓	Management & Maintenance of both Natural Vegetation & Landscape Works (Works Branch), WBTC No. 18/94; Management & Maintenance of Landscape Works along Public Roads. Aug 1996 (HyD. Guidance Notes), LU/GN/001;
	Replacement of dead plants and reseedling of failed areas of grass as early as possible during the following planting season (between March and September, although the optimum period is between April and July) to ensure the landscape mitigation measures fulfill their design intention; and,	Soft landscaped areas throughout the whole alignment / Construction and operational phases following planting.	Contractor		✓	✓	Management & Maintenance of both Natural Vegetation & Landscape Works (Works Branch), WBTC No. 18/94; Management & Maintenance of Landscape Works along Public Roads. Aug 1996 (HyD. Guidance Notes), LU/GN/001;

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Section 8	<p>The management and maintenance authority will make regular bimonthly inspections of the planted areas during the establishment period to ensure the intended objectives of the landscape and visual mitigation measures are achieved.</p> <p>Compilation of an Operation and Maintenance Manual to ensure that the long term management and maintenance regimes are implemented so as to achieve the objectives of the landscape mitigation measures described in the LVIA.</p>	<p>Soft landscaped areas throughout the whole alignment / Construction and operational phases following planting.</p> <p>Landscaped areas throughout the whole alignment / Operational phases following planting.</p>	<p>Contractor</p> <p>Contractor</p>		<p>✓</p>	<p>✓</p> <p>✓</p>	<p>Management & Maintenance of both Natural Vegetation & Landscape Works (Works Branch), WBTC No. 18/94;</p> <p>Management & Maintenance of Landscape Works along Public Roads. Aug 1996 (HyD. Guidance Notes), LU/GN/001;</p> <p>Management & Maintenance of both Natural Vegetation & Landscape Works (Works Branch), WBTC No. 18/94;</p> <p>Management & Maintenance of Landscape Works along Public Roads. Aug 1996 (HyD. Guidance Notes), LU/GN/001;</p>

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