

## Environmental Mitigation Implementation Schedule

EIA Ref.	EM&A Log Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Implementation Agent	Location / Timing	Implementation Phase	Requirements and / or standards to be achieved
<i>Air Quality Impact</i>							
S3.4.5	A1	<p><u>Construction Dust Control</u></p> <ul style="list-style-type: none"> <li>Any excavated or stockpile of dusty material including those on barges should be covered entirely by impervious sheeting or sprayed with water to maintain the entire surface wet and then removed or backfilled or reinstated where practicable for the excavation or unloading;</li> <li>Site hoardings of not less than 2.4m high should be provided as far as practicable along the site boundary with provision for public crossing. Subject to site constraints, the Contractor may review the practicability of taller site hoarding for ASRs in close vicinity to the site boundary. Good site practice shall also be adopted by the Contractor to ensure the conditions of the hoardings are properly maintained throughout the construction period;</li> <li>Any dusty materials remaining after a stockpile is removed should be wetted with water and cleared from the surface of roads;</li> <li>Any skip hoist for material transport should be totally enclosed by impervious sheeting;</li> <li>Every stock of more than 20 bags of cement or dry pulverised fuel ash (PFA) should be covered entirely by impervious sheeting or placed in an area sheltered on the top and the 3 sides;</li> <li>Cement or dry PFA delivered in bulk should be stored in a closed silo fitted with an audible high level alarm which is interlocked with the material filling line and no overfilling is allowed;</li> <li>Loading, unloading, transfer, handling or storage of bulk cement or dry PFA should be carried out in a totally enclosed system or facility, and any vent or exhaust should be fitted with an effective fabric filter or equivalent air pollution control system; and</li> <li>Exposed earth should be properly treated by compaction, turfing, hydroseeding, vegetation planting or sealing with latex, vinyl, bitumen, shotcrete or other suitable surface stabilisers within six months after the last construction activity on the construction site or part of the construction</li> </ul>	Control construction dust	Contractor	All construction sites	Construction phase	<ul style="list-style-type: none"> <li>Air Pollution Control Ordinance (APCO)</li> <li>Air Pollution Control (Construction Dust) Regulation</li> <li>HKAQO</li> <li>Annex 4, EIAO-TM</li> </ul>

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		site where the exposed earth lies. These measures shall take into account the construction programme.					
S3.4.5	A2	<p><u>Emission Control on Non-Road Mobile Machinery (NRMMs)</u></p> <ul style="list-style-type: none"> <li>• Only approved or exempted NRMMs with a proper label are allowed to be used in specified activities and locations including construction sites;</li> <li>• Regulated machines shall be used and exempted NRMMs should be avoided where practicable;</li> <li>• Optimize the number of on-site machinery to minimize gaseous and PM emissions for each construction site with consideration of actual site constraints or circumstances;</li> <li>• Use cleaner fuel such as ultra-low sulphur diesel in diesel-operated construction plant to reduce sulphur dioxide emission;</li> <li>• Zero emission or clean fuels shall be considered as far as practicable for transportation activities;</li> <li>• Use of electric PMEs where practicable;</li> <li>• Connect construction plant and equipment to main electricity supply and avoid use of diesel generators and diesel-powered equipment as far as practicable;</li> <li>• Switch off the engine of PMEs when idling;</li> <li>• Implement regular and proper maintenance for plant and equipment; and</li> <li>• Employ plant and equipment of adequate size and power output and avoid overloading of the plant.</li> </ul>	Control air emission from NRMMs	Contractor	All construction sites	Construction phase	<ul style="list-style-type: none"> <li>• Air Pollution Control Ordinance (APCO)</li> <li>• Air Pollution Control (NRMMs) (Emission) Regulation</li> <li>• HKAQO</li> <li>• Annex 4, EIAO-TM</li> </ul>
S3.4.5	A3	<p><u>Emission Control Measures for Drill-and-Blast Activities</u></p> <ul style="list-style-type: none"> <li>• Impermeable blast covers at the mucking out locations should be shut;</li> <li>• The blasting should only be carried out in a fully enclosed environment;</li> <li>• All neighbouring construction activities should be suspended during blasting;</li> <li>• The areas within 30m from the blasting area should be wetted with water prior to blasting and blasting shall not be carried out when the strong wind signal or tropical cyclone warning signal No. 3 or higher is hoisted; and</li> </ul>	Control construction dust due to drill-and-blast	Contractor	Construction workfronts that involve drill-and-blast activities	Construction phase	<ul style="list-style-type: none"> <li>• Air Pollution Control Ordinance (APCO)</li> <li>• Air Pollution Control (Construction Dust) Regulation</li> <li>• HKAQO</li> <li>• Annex 4, EIAO-TM</li> </ul>

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		<ul style="list-style-type: none"> <li>Where necessary, mist spraying measures should be installed at the mucking out locations.</li> </ul>					
S3.4.5	A4	<u>Emission Control Measures for Open Blasting Activities</u> <ul style="list-style-type: none"> <li>Provision of blast cages or roof-over protective cover, which are risk control measures, but also help to reduce a large amount of dust emission since they cover the blasting region;</li> <li>Water spray before blasting and on blasted material prior to transportation;</li> <li>Minimise the fall and drop height from conveyors during loading and unloading; and</li> <li>Cover conveyors, transfer and unloading points with dust extraction system.</li> </ul>	Control construction dust due to open blasting	Contractor	Construction workfronts that involve open blasting activities	Construction phase	<ul style="list-style-type: none"> <li>Air Pollution Control Ordinance (APCO)</li> <li>Air Pollution Control (Construction Dust) Regulation</li> <li>HKAQO</li> <li>Annex 4, EIAO-TM</li> </ul>
S3.4.5	A5	<u>Emission Control Measures for Barging Facilities</u> <ul style="list-style-type: none"> <li>Provide vehicle washing facilities at every designated exit point of the construction worksites;</li> <li>The entire area of the barging facility should be paved with concrete, bituminous materials or hardcores;</li> <li>All construction vehicles will be washed at the exit before leaving the barging facilities;</li> <li>Unloading points at the barging facilities shall be provided with an enclosed system with 3-side screen with top cover and provision of water spraying system;</li> <li>Regular watering once per hour on all exposed stockpiles;</li> <li>After unloading the spoil into barge inside the enclosed system, the trucks should be sprayed by water inside the unloading point;</li> <li>If barges would need to stay overnight at the barging point, spoils on the deck of the barges shall be covered by tarpaulin to avoid dust emission; and</li> <li>The engine of the barge shall be switched-off during berthing as far as practicable. Provision of on-shore power supply shall also be considered wherever possible to minimize air quality impact from the marine vessels, with consideration of actual site constraints or circumstances to be further reviewed during detail design stage.</li> </ul>	Control gaseous and dust emission from barging facilities	Contractor	Barging facilities	Construction phase	<ul style="list-style-type: none"> <li>Air Pollution Control Ordinance (APCO)</li> <li>Air Pollution Control (Construction Dust) Regulation</li> <li>HKAQO</li> <li>Annex 4, EIAO-TM</li> </ul>

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S3.4.4	A6	<ul style="list-style-type: none"> <li>Close liaison between the contractors of concurrent projects and the Project would be maintained to minimise dusty activities to be conducted concurrently as far as practicable. Adverse cumulative dust impacts from TMB and the concurrent projects are therefore not anticipated.</li> </ul>	Minimize cumulative air quality impact with concurrent projects	HyD	Construction sites	Construction phase	<ul style="list-style-type: none"> <li>Air Pollution Control Ordinance (APCO)</li> <li>HKAQO</li> <li>Annex 4, EIAO-TM</li> </ul>
<b><i>Vehicle Emission</i></b>							
S3.5.5	A7	<p><u>Design of Ventilation Buildings Planned Air Sensitive Uses within the Operation Area of the TMB</u></p> <ul style="list-style-type: none"> <li>During the subsequent design stage and the operational stage, the ventilation engineer should conduct reviews on the ventilation scheme covering different periods of a day, taking into account the contemporary circumstance such as latest traffic forecast, traffic composition, update on the ambient air quality, etc., and then review and update the air quality assessment as necessary to re-affirm full compliance of the AQOs. These reviews would allow the designer and operator to optimize the operation of the ventilation system without compromising the compliance of AQOs.</li> <li>The TMB highway / tunnel operation and maintenance facilities (i.e. the northern ventilation building, satellite control building and operation area in Lam Tei, as well as maintenance compound and training ground and supporting area in Pillar Point) would partially fall within the potential exceedance zone at 1.5mAG. The planned air sensitive uses within the highway / tunnel operation and maintenance facilities of the TMB shall be properly designed such that any openings, openable windows, and/or fresh air intakes will be located and avoided from the predicted exceedance zone at 1.5mAG. Further review of the layout and design of operation area will be conducted in Detailed Design Stage to re-affirm compliance of the AQOs.</li> </ul>	Re-affirm compliance of AQOs based on the latest design of ventilation buildings and planned air sensitive uses within the operation area of the TMB	HyD	Proposed ventilation buildings and planned air sensitive uses within the operation area of the TMB	Design stage	<ul style="list-style-type: none"> <li>Air Pollution Control Ordinance (APCO)</li> <li>HKAQO</li> <li>Annex 4, EIAO-TM</li> </ul>

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<i>Construction Noise Impact</i>							
S4.3.4	N1	<p><u>Good Site Management Practices</u></p> <ul style="list-style-type: none"> <li>The following measures should be implemented: <ul style="list-style-type: none"> <li>Only well-maintained plant should be operated on-site and plant should be serviced regularly during the construction programme;</li> <li>Machines and plant (such as trucks, cranes) that may be in intermittent use should be shut down between work periods or should be throttled down to a minimum;</li> <li>Plant known to emit noise strongly in one direction, where possible, be orientated so that the noise is directed away from nearby NSRs;</li> <li>Silencers or mufflers which available on construction equipment should be properly fitted and maintained during the construction works;</li> <li>Locate mobile plant as far away from NSRs as possible and practicable; and</li> <li>Material stockpiles, site office and other structures should be effectively utilised, where practicable, to screen noise from on-site construction activities.</li> </ul> </li> </ul> <p>Additional mitigation measures such as rescheduling will be adopted. Mucking out and construction traffics will only be operating from 0700 to 1900 within the normal working hours, i.e. non-restricted hours Other noisier tasks such as piling and mucking out works will also only be done within non-restricted hours.</p>	Control construction airborne noise	Contractor	All construction sites	Construction phase	<ul style="list-style-type: none"> <li>Annex 5, EIAO-TM</li> </ul>
S4.3.4	N2	<p><u>Use of Quality Powered Mechanical Equipment (QPME) and Quieter Construction Methods</u></p> <ul style="list-style-type: none"> <li>Use of quiet plant associated with the construction works shall be made reference to the QPME (e.g. air compressor, asphalt paver, bulldozer, compactor, crane, excavator, generator, etc) / other commonly used PME listed in EPD web pages as far as possible which includes the SWLs for specific quiet PME, and the quiet construction method and equipment listed in EPD web page; and</li> <li>The use of quieter construction equipment/ methods, if necessary, will be further reviewed in the detailed design and construction stage, and in the CNMP.</li> </ul>	Reduce the noise levels from plant items	Contractor	All construction sites where practicable	Construction phase	<ul style="list-style-type: none"> <li>Annex 5, EIAO-TM</li> </ul>

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S4.3.4	N3	<p><u>Use of Site Hoarding with Higher Surface Density and Height at the Site Boundary where Adjacent to NSRs</u></p> <p>Purpose-built temporary noise barriers located on the site boundaries between noisy construction activities and NSRs could generally reduce noise levels of NSRs at village houses through partial screening. It would be possible for the Contractor to provide these in the form of site hoardings to achieve this attenuation effect, provided that the barriers have no openings or gaps and have a superficial surface density of at least 14kg/m<sup>2</sup>. Good site practice shall also be adopted by the Contractor to ensure the conditions of the hoardings are properly maintained throughout the construction period.</p>	Minimise the construction noise levels through screening	Contractor	All construction sites where practicable	Construction phase	<ul style="list-style-type: none"> <li>Annex 5, EIAO-TM</li> </ul>
S4.3.4	N4	<p><u>Use of Movable Noise Barrier and Full Enclosure for Relatively Stationary Plant Source</u></p> <ul style="list-style-type: none"> <li>Movable temporary noise barriers that can be located close to noisy plant and be moved concurrently with the plant along a worksite can be very effective for screening noise from NSRs effectively;</li> <li>Typical design used locally, i.e. is a wooden framed barrier with a small-cantilevered upper portion of surface mass density no less than 14kg/m<sup>2</sup> on a skid footing with 50mm thick internal sound absorptive lining;</li> <li>A cantilevered top cover would be required to achieve screening benefits at upper floors of NSRs; and</li> <li>Temporary movable noise barrier that can be placed close to noise source locally as far as practicable.</li> <li>The use of standard enclosure would be installed to relatively fixed plant, including air compressor and generator, etc.</li> </ul>	Minimise the construction noise levels through screening	Contractor	All construction sites where practicable	Construction phase	<ul style="list-style-type: none"> <li>Annex 5, EIAO-TM</li> </ul>
S4.3.4	N5	<p><u>Noise Enclosure Mucking out at Temporary Adit and Spoil Storage Area / Excavation for the Ventilation Building</u></p> <ul style="list-style-type: none"> <li>Installation of full noise enclosures for the construction of temporary adit and spoil storage area / excavation area for the ventilation building. The temporary full noise enclosure shall cover these adit portals, leaving only mucking outs for conveying spoil / transporting machinery etc during daytime period. Where practicable, the openings of these mucking outs should be facing towards</li> </ul>	Minimise the construction noise levels through covering the adit portals	Contractor	Construction works area for temporary adit and MVB prior to the built excavation	Construction phase	<ul style="list-style-type: none"> <li>Annex 5, EIAO-TM</li> </ul>

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		existing terrain instead of the existing NSRs. The mucking outs should also be closed during evening, night-time and restricted hours to minimise noise emanating out.					
S4.3.4	N6	<p><u>Install Acoustic Tunnel Door or Enclosure at the Construction Shafts for Tunnelling Activities during Restricted Hours</u></p> <ul style="list-style-type: none"> <li>• Installation of acoustic tunnel door or enclosure at the tunnel portals for construction works to be conducted inside the tunnels during both the restricted hours and non-restricted hours;</li> <li>• The acoustic tunnel door or enclosure should be made of acoustic panels and the ventilation openings of the tunnel door or enclosure should also be fitted with silencers; and</li> <li>• The Contractor should select a proper type of acoustic panel and silencer which can provide necessary noise reduction performance to achieve the full compliance with the EIAO-TM's requirements and ANLs under CNP application.</li> </ul>	Minimise the construction noise levels through screening for tunnelling activities during restricted hours	Contractor	Construction works area for tunnelling activities	Construction phase	<ul style="list-style-type: none"> <li>• Annex 5, EIAO-TM</li> </ul>
S4.3.5	N7	<p><u>Construction Noise Management Plan</u></p> <ul style="list-style-type: none"> <li>• Construction Noise Management Plan (CNMP) containing a quantitative construction noise impact assessment, the adopted quieter construction method(s) and equipment, noise mitigation measures and the construction noise impact monitoring and audit programme will be submitted to the EPD with reference to the updated and identified plant inventories once available and in any case before the tendering and commencement of the project construction, and if there is any change to the construction noise mitigation measures recommended in the CNMP, an updated CNMP shall be submitted one month before the implementation of such change;</li> <li>• CNMP shall include an implementation schedule to clearly list out the mitigation measures, the implementation party, construction noise impact monitoring and audit programme, locations and timing of implementation; and</li> <li>• Mitigation measures recommended and requirement specified in the CNMP shall be fully implemented by the Contactor.</li> </ul>	Conduct quantitative construction noise impact assessment and propose noise mitigation measures based on latest information	Contractor / HyD	N/A	Construction phase	<ul style="list-style-type: none"> <li>• Annex 5, EIAO-TM</li> <li>• GW-TM</li> <li>• EIAO Guidance Note "Preparation of Construction Noise Impact Assessment under the Environmental Impact Assessment Ordinance" [GN 9/2010]</li> </ul>

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<b>Operation Noise Impact</b>							
S4.4.2	N8	<u>Road Traffic Noise</u> <ul style="list-style-type: none"> <li>In accordance with HyD Guidance Notes on Road Surface Requirements for Expressways and High Speed Roads (RD/GN/032A), Highly Modified Friction Course (HMFC) is proposed as the standard surfacing material on the high speed road sections of new road projects with design speed of 80km/hr or above and expressway.</li> </ul>	Along the Project road/ Permanent/ Prior to first operation of the Project road	Contractor/ HyD	According to the respective construction programme	Operational Phase	<ul style="list-style-type: none"> <li>Annex 5, EIAO-TM</li> </ul>
S4.5.4	N9	<u>Fixed Noise Sources</u> <ul style="list-style-type: none"> <li>Possible mitigation measures with reference to EPD's "Good Practices on Ventilation System Noise Control" could be considered the fixed noise sources, for examples: <ul style="list-style-type: none"> <li>Quieter equipment;</li> <li>Silencer;</li> <li>Barrier; and</li> <li>Enclosure, etc.</li> </ul> </li> <li>The detailed design should incorporate the following good practice in order to minimize the nuisance on the neighboring NSRs. <ul style="list-style-type: none"> <li>Louvres should be orientated away from adjacent NSRs, preferably onto main roads which are less sensitive.</li> <li>The façade for these ventilation shafts should have adequate sound insulation properties to minimise the noise emanating through the building fabric.</li> </ul> </li> </ul>	Control fixed noise source impact of neighboring NSRs	Contractor/ HyD	Fixed noise sources (e.g. administration buildings and ventilation buildings)	Operational Phase	<ul style="list-style-type: none"> <li>Annex 5, EIAO-TM</li> <li>NCO</li> <li>Good Practices on Ventilation System Noise Control</li> </ul>
S4.5.4	N10	<u>Fixed Noise Sources Management Plan</u> <ul style="list-style-type: none"> <li>Fixed Noise Sources Management Plan (FNMP) containing the quantitative fixed noise sources impact assessment, noise mitigation measures and fixed noise sources impact monitoring and audit programme shall be submitted to the EPD, with reference to the updated and identified inventories and utilization schedule once available and in any case before tendering and commencement of the project;</li> <li>If there is any change to the specifications of the planned fixed noise sources, layout design, operation modes,</li> </ul>	Conduct quantitative fixed noise source impact assessment and propose noise mitigation measures based on latest information	Contractor / HyD	N/A	Operational phase	<ul style="list-style-type: none"> <li>NCO</li> <li>Annex 5, EIAO-TM</li> </ul>



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		<p>mitigation measures, or any other factors that would have implications on the fixed noise sources impact as concluded in the FNMP, an updated FNMP shall be submitted to the EPD no later than one month before the implementation of any such change;</p> <ul style="list-style-type: none"> <li>• FNMP shall include an implementation schedule clearly listing out the mitigation measures, the implementation party, location and timing of implementation; and</li> <li>• Mitigation measures recommended and requirement specified in the FNMP shall be fully implemented by the Contactor.</li> </ul>					
<b>Water Quality Impact (Construction Phase)</b>							
S5.7.1	W1	<p><u>General Construction Activities</u></p> <p>Best Management Practices (BMPs) should be implemented as far as practicable according to The Professional Persons Environmental Consultative Committee (ProPECC) Practice Note (PN) 1/94 “Construction Site Drainage”. The details of BMPs are presented as follows:</p> <ul style="list-style-type: none"> <li>• All effluent discharged from the construction site should comply with the standards stipulated in the DSS-TM;</li> <li>• At the start of site establishment, perimeter cut-off drains to direct off-site water around the site should be constructed with internal drainage works and erosion and sedimentation control facilities implemented;</li> <li>• Channels (both temporary and permanent drainage pipes and culverts), earth bunds or sand bag barriers should be provided on site to direct stormwater to silt removal facilities. The design of the temporary on-site drainage system will be undertaken by the contractor prior to the commencement of construction;</li> <li>• The dikes or embankments for flood protection should be implemented around the boundaries of earthwork areas;</li> <li>• Temporary ditches should be provided to facilitate the run-off activities discharge into an appropriate watercourse, through a silt/sediment trap, which should be incorporated in the permanent drainage channels to enhance deposition rates;</li> </ul>	To reduce water quality impact from construction site runoff and general construction activities	Contractor	All construction sites	Construction phase	<ul style="list-style-type: none"> <li>• WPCO</li> <li>• ProPECC PN 1/94 “Construction Site Drainage”</li> <li>• EIAO-TM</li> <li>• DSS-TM</li> <li>• Technical Circular No. 1/2017</li> <li>• Practical Notes No. 1/2017</li> <li>• DSD Stormwater Drainage Manual</li> </ul>

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		<ul style="list-style-type: none"> <li>• The design of efficient silt removal facilities should be based on the guidelines in Appendix A1 of ProPECC PN 1/94. The detailed design of the sand/silt traps should be undertaken by the Contractor prior to the commencement of construction;</li> <li>• All areas with exposed earth should be vegetated as soon as possible after earthworks have been completed;</li> <li>• Exposed slope surfaces shall be covered by tarpaulin or other means;</li> <li>• All drainage facilities, and erosion and sediment control structures should be regularly inspected and maintained to ensure proper and efficient operation at all times, particularly following rainstorm;</li> <li>• Deposited silt and grit should be removed regularly and disposed of by spreading evenly over stable, vegetated areas;</li> <li>• For works area that is close to watercourses, excavation works shall avoid the rainy season whenever possible. Excavation works shall be proceeded section by section to reduce the amount of works are with exposed earth;</li> <li>• If the excavation of trenches in rainy seasons are necessary, it should be excavated and backfilled in short sections wherever practicable;</li> <li>• Water pumped from trenches or foundation excavations should be discharged into storm drains installed with silt removal facilities;</li> <li>• All open stockpiles of construction materials (i.e. aggregates, sand and fill material, etc.) should be covered with tarpaulin or similar fabric during rainstorms;</li> <li>• Measures should be taken to prevent the washing away of construction materials, soil, silt or debris into any drainage system;</li> <li>• Manholes (including newly constructed ones) should always be adequately covered and temporarily sealed to prevent silt, construction materials or debris from being washed into the drainage system and storm run-off being directed into foul sewers;</li> <li>• Precautions should be taken during rainy seasons, and actions as summarised in Appendix A2 of ProPECC PN</li> </ul>					

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		<p>1/94 should be taken when a rainstorm is forecasted or imminent. Particular attention should be paid to the control of silty surface run-off during storm events;</p> <ul style="list-style-type: none"> <li>• All vehicles and plants should be cleaned before leaving construction sites to minimise the deposition of earth, mud, debris and other potentially polluting particles on roads;</li> <li>• An adequately designed and sited wheel washing facilities should be provided at every construction site exit where practicable;</li> <li>• 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;</li> <li>• The section of access road leading to, and exiting from, the wheel-wash bay to the public road should be paved with sufficient back fall towards the wheel-wash bay to prevent vehicles from tracking of soil and silty water to public roads and drains;</li> <li>• Oil interceptors should be provided in the drainage system downstream of any oil/fuel pollution sources. The oil interceptors should be emptied and cleaned regularly to prevent the release of oil and grease into the storm water drainage system after accidental spillage. A bypass should be provided for the oil interceptors to prevent flushing during heavy rain;</li> <li>• Construction solid waste, debris and rubbish on site should be collected, handled, and disposed of properly to minimise adverse water quality impacts;</li> <li>• Water used for tests to check for leakages in structures and pipes should be reused for other purposes as far as practicable. Surplus unpolluted water could be discharged into storm drains;</li> <li>• Earthworks final surfaces should be compacted, and the subsequent permanent work or surface protection should be carried out immediately after the final surfaces are formed to prevent erosion of earth caused by rainstorms. Appropriate drainage with intercepting channels should be provided where necessary;</li> <li>• Extracted groundwater from activities such as water pumped from basement or foundation construction, and</li> </ul>					

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		<p>groundwater seepage pumped from tunnel or cavern constructions should be discharged into storm drains after the removal of silt through silt removal facilities;</p> <ul style="list-style-type: none"> <li>Water used in ground boring and drilling for site investigation or rock/soil anchoring should as far as practicable be recirculated after sedimentation. When there is a need for final disposal, the wastewater should be discharged into storm drains through silt removal facilities;</li> <li>The temporary drainage system during the construction phase could cope with a design return period of 1 in 10 years rainfall as recommended in DSD Technical Circular No. 1/2017 “Temporary Flow Diversions and Temporary Works Affecting Capacity in Stormwater Drainage System” and DSD’s Practice Notes No. 1/2017 “Design rainfall and profile for temporary works within the Dry Season”;</li> <li>Good site practices should be adopted to remove rubbish and litter from construction sites so as to prevent the rubbish and litter from spreading from the site area. It is recommended to clean the construction sites on a regular basis; and</li> <li>Requirements to be incorporated in the contract document of the Project should be established based on the water quality mitigation measures as mentioned above.</li> </ul>					
S5.7.2	W2	<p><u>Tunnelling and Underground Works</u></p> <p>Whilst conducting tunnelling works, the Contractor should adopt suitable water control strategies as far as practicable, including:</p> <ul style="list-style-type: none"> <li>Face confinement (TBM tunnelling): The confinement pressure to be applied at the TBM front should at least balance the existing groundwater pressure to ensure no seepage flow will occur through the TBM face, and hence no groundwater table drawdown throughout the excavation is anticipated;</li> <li>Probing ahead (Drill-and-blast Tunneling): The Contractor should undertake rigorous probing of the ground ahead of tunnel excavation works to identify zones of potential</li> </ul>	To avoid drawdown of groundwater table	Contractor	Tunnelling Works area	Construction phase	<ul style="list-style-type: none"> <li>WPCO</li> <li>EIAO-TM</li> <li>Geoguide 2</li> <li>Geoguide 4</li> </ul>

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		<p>significant water inflow. The probe drilling results should be evaluated to determine where grouting is required in line with the tunnel ahead. In zones where significant water inflow could occur due to discrete, permeable features, grouting should be applied to reduce overall inflow of groundwater;</p> <ul style="list-style-type: none"> <li>• Pre-grouting (Drill-and-blast Tunneling): Where water inflow quantities are excessive, pre-grouting will be required to reduce the water inflow into the tunnel, which will be achieved via a systematic and carefully specified protocol; and</li> <li>• In principle, the grout pre-treatment would be designed based on probe hole drilling ahead of the tunnel face.</li> </ul> <p>In the event where there is still excessive drawdown of the groundwater table, even after the implementation of water control strategies, post-grouting should be applied as far as practicable, which is described below:</p> <ul style="list-style-type: none"> <li>• Post-grouting: Groundwater drawdown will most likely be caused by inflows of water into the tunnel that have not been sufficiently controlled by pre-grouting measures. Should there be groundwater drawdown, post-grouting should be undertaken before the lining is cast. Whilst post-grouting is unlikely required, it should still be considered as a contingency measure to further reduce the permeability of the tunnel to limit groundwater inflow to acceptable levels.</li> </ul> <p>The tunnel sections adopting TBM tunnelling should be constructed using a closed face TBM to limit water inflow into the excavation face. The cutter head for the machine will be sealed during excavation and therefore the water inflow from the face will be kept to a minimum. Precast undrained linings should be installed and back grouted behind the TBM as it advances along the tunnel alignment to minimize the potential inflow of water behind the cutter head.</p>					
S5.7.3	W3	<p><u>Ventilation Buildings, Satellite Control Building and Administration Building</u></p> <p>For underground excavations for the proposed ventilation buildings, satellite control building and administration</p>	To minimize the water quality impact due to the temporary dewatering	Contractor	Ventilation buildings and administration	Construction phase	<ul style="list-style-type: none"> <li>• WPCO</li> <li>• EIAO-TM</li> </ul>

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		<p>building which will require temporary dewatering during their construction, the following mitigation measures are recommended to minimise the potential adverse effects to the groundwater table during the works:</p> <ul style="list-style-type: none"> <li>• Toe grouting should be applied beneath the toe level of the temporary/permanent cofferdam walls as necessary to lengthen the effective flow path of groundwater from outside and thus control the amount of water inflow to the excavation; and</li> <li>• Recharge wells should be installed as necessary outside the excavation areas. Water pumped from the excavation areas should be recharge back onto the ground.</li> </ul>			tion buildings		
S5.7.4	W4	<p><u>Sewage due to Construction Workforce</u></p> <ul style="list-style-type: none"> <li>• No sewage discharge to the drainage system, watercourses, and marine water will be allowed;</li> <li>• Adequate and sufficient portable chemical toilets should be provided in the works areas to handle sewage generated by the construction workforce.;</li> <li>• Should there be any on-site kitchens or canteens, a temporary storage tank should be provided to collect wastewater;</li> <li>• A registered collector should be employed to clean and maintain the chemical toilets on a regular basis;</li> <li>• Notices should be posted at conspicuous locations to remind the construction workforce not to discharge any sewage or wastewater into the surrounding environment; and</li> <li>• Regular environmental audit of the construction site should be conducted to provide an effective control of any malpractices and to achieve continual improvement of environmental performances on site.</li> </ul>	To minimize the water quality impact due to the sewage from construction workforce	Contractor	Construction Works Area	Construction phase	<ul style="list-style-type: none"> <li>• WPCO</li> <li>• EIAO-TM</li> <li>• DSS-TM</li> </ul>
S5.7.5	W5	<p><u>Construction Works in Close Proximity of Inland Water</u></p> <p>The practices outlined in ETWB TC (Works) No. 5/2005 “Protection of natural streams/rivers from adverse impacts arising from construction works” should also be adopted where applicable to minimise the water quality impacts.</p>	To minimize the water quality impact for construction works in close proximity of inland water	Contractor	Construction Works Area in close proximity of inland water	Construction phase	<ul style="list-style-type: none"> <li>• ProPECC PN 1/94 “Construction Site Drainage”</li> <li>• Conditions for Working within Water Gathering</li> </ul>

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		<p>Relevant mitigation measures from the ETWB TC (Works) No. 5/2005 are listed below:</p> <ul style="list-style-type: none"> <li>• Construction works close to the inland waters should be carried out in dry season as far as practicable where the flow in the surface channel or stream is low;</li> <li>• Trenches should be dug and backfilled in short sections. Measures should be taken to minimize the ingress of rainwater into trenches;</li> <li>• The use of less or smaller construction plants may be specified in areas close to the water courses to reduce the disturbance to the surface water;</li> <li>• Temporary storage of materials (e.g. equipment, chemicals and fuel) and temporary stockpile of construction materials should be located well away from any watercourses during carrying out of the construction works;</li> <li>• Stockpiling of construction materials and dusty materials should be covered and located away from any watercourses. Construction debris and spoil should be covered up and / or disposed of as soon as possible to avoid being washed into the nearby water receivers;</li> <li>• Proper shoring may need to be erected in order to prevent soil or mud from slipping into the watercourses. and</li> <li>• Comply with the Conditions for Working within Water Gathering Grounds provided in Appendix 5.3 of the EIA Report.</li> </ul>					Grounds from WSD
S5.7.6	W6	<p><u>Groundwater from Contaminated Areas and Contaminated Site Run-off</u></p> <ul style="list-style-type: none"> <li>• Any excavated contaminated material and exposed contaminated surface should be properly housed and covered to avoid generation of contaminated run-off, the open stockpiling of contaminated materials should not be allowed;</li> </ul>	To minimize the water quality impact due to the contaminated areas and contaminated site run-off	Contractor	Construction Works Area where groundwater contamination is identified	Construction phase	<ul style="list-style-type: none"> <li>• WPCO</li> <li>• EIAO-TM</li> <li>• DSS-TM</li> <li>• Guidance Note for Contaminated Land Assessment and Remediation</li> </ul>

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		<ul style="list-style-type: none"> <li>• Any contaminated run-off generated under the construction process should be properly collected and treated as necessary before disposal;</li> <li>• The direct discharge of groundwater from contaminated areas is not allowed;</li> <li>• Prior to any excavation works within potentially contaminated areas, the baseline groundwater quality in these areas should be reviewed based on the past relevant site investigation data and any additional groundwater quality measurements to be performed with reference to Guidance Note for Contaminated Land Assessment and Remediation, the review results should be submitted to EPD for approval. If the review results indicated that the groundwater generated from the excavation works would be contaminated, the contaminated groundwater should be either properly treated or properly recharged into the ground in compliance with the requirements of the DSS-TM.</li> <li>• If a water treatment facility is deployed on-site to treat the contaminated groundwater, it should be equipped with suitable instruments (e.g. oil interceptor, activated carbon, etc.) to reduce the pollution level to an acceptable standard and remove to any prohibited substances (such as total petroleum hydrocarbon) to an undetectable range;</li> <li>• All treated effluent from the wastewater treatment plant shall meet the requirements as stipulated in the DSS-TM and should be either discharged into the foul sewers or tankered away for proper disposal;</li> <li>• If the deployment of a treatment facility to treat the contaminated groundwater is not feasible, groundwater recharging wells should be installed as appropriate to recharge the contaminated groundwater back onto the ground;</li> <li>• The recharging wells should be selected at places where the groundwater quality will not be affected by the recharge operation as stipulated in DSS-TM;</li> <li>• The baseline groundwater quality should be determined before selecting the recharge wells and a working plan should be submitted to EPD for agreement. Pollution</li> </ul>					



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		<p>levels of the recharged groundwater shall not be higher than pollutant levels of ambient groundwater at the recharge well;</p> <ul style="list-style-type: none"> <li>• Groundwater monitoring wells should be installed near the recharge points to monitor the effectiveness of the recharge wells, and to ensure that no there is no increase of groundwater level and the transfer of pollutants beyond the site boundary;</li> <li>• Prior to the recharge, oil and grease, if any, should be removed as necessary by installing an oil interceptor;</li> <li>• The Contractor should apply for a discharge licence under the WPCO through the Regional Office of EPD for groundwater recharge operation or the discharge of treated groundwater;</li> <li>• All exposed earth areas should be completed and vegetated as soon as possible after earthworks have been completed;</li> <li>• 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 tarpaulin or other mean;</li> <li>• All drainage facilities and erosion and sediment control structures should be regularly inspected and maintained to ensure proper and efficient operation at all times and particularly following rainstorms;</li> <li>• Deposited silt and grit should be removed regularly and disposed of by spreading evenly over stable, vegetated areas; and</li> <li>• For works area that is close to watercourses, excavation works shall avoid the rainy season as far as possible, and excavation works shall be proceeded section by section.</li> </ul>					
S5.7.7	W7	<p><u>Operation of Barging Point</u></p> <p>To minimise the adverse water quality impacts of the surface run-off generated by the operation of the barging point, the mitigation measures recommended under W1 should be followed.</p>	To minimize the water quality impact due to the transportation of spoil using the barging point	Contractor	Construction sites in barging points	Construction phase	<ul style="list-style-type: none"> <li>• WPCO</li> <li>• ProPECC PN 1/94 “Construction Site Drainage”</li> <li>• EIAO-TM</li> </ul>

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		<p>To minimise the potential adverse water quality impact due to the transportation of spoil using the barging point, the following good site practices should be strictly followed:</p> <ul style="list-style-type: none"> <li>• Loading of barges and hoppers should be controlled to prevent the splashing of material into the surrounding water;</li> <li>• Barges or hoppers should not be filled to a level that will cause the overflow of materials or polluted water during loading or transportation; and</li> <li>• All vessels should be sized so that adequate clearance is maintained between vessels and the seabed in all tide conditions, to minimise that undue turbidity is not generated by turbulence from vessel movement or propeller wash.</li> </ul>					
S5.7.8	W8	<p><u>Accidental Spillage of Chemicals</u></p> <ul style="list-style-type: none"> <li>• The Contractor must be registered as a chemical waste producer if chemical wastes are produced from the construction activities;</li> <li>• The Waste Disposal Ordinance (Cap. 354) (WDO) and its subsidiary regulations, in particular the Waste Disposal (Chemical Waste) (General) Regulation (Cap. 354C), should be observed and complied with for the control of chemical wastes;</li> <li>• The Contractor is recommended to develop management procedures for the chemicals used and prepare an emergency spillage handling procedure to deal with chemical spillage in case of an accident occurs, a contingency plan for any accidental spillage and heavy rainfall event should also be devised;</li> <li>• Any services and maintenance facilities should be located on hard standings within a bunded area, sumps and oil interceptors should be provided;</li> <li>• Activities with the potential for accidental leakage and spillage of chemicals, including the maintenance of vehicles and equipment should only be undertaken within areas that are appropriately equipped to control the discharges from these potential accidents;</li> </ul>	To minimise water quality impact from accidental spillage of chemicals	Contractor	Construction Works Area	Construction phase	<ul style="list-style-type: none"> <li>• WPCO</li> <li>• WDO</li> <li>• EIAO-TM</li> <li>• Code of Practice on the Packaging, Labelling, and Storage of Chemical Wastes</li> </ul>

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		<ul style="list-style-type: none"> <li>The service and maintenance, and any chemical storage areas should not be positioned near watercourses as a safeguard measure;</li> <li>Suitable containers should be used to hold the chemical wastes to avoid leakage or spillage during storage, handling, and transport;</li> <li>Chemical waste containers should be suitably labelled, to notify and warn the personnel who are handling the wastes, to avoid accidents; and</li> <li>Storage area should be selected at a safe location on-site and adequate space should be allocated to the storage area.</li> </ul>					
S5.7.9	W9	<p><u>Diversion of Watercourses</u></p> <p>During diversion of watercourses, precaution measures should be implemented to prevent adverse water quality impact to the surrounding environment and downstream areas. Good site practices as described in ETWB TC(Works) No. 5/2005 “Protection of natural streams/rivers from adverse impacts arising from construction works” and ProPECC PN1/94 “Construction Site Drainage” should be implemented. The following major measures include:</p> <ul style="list-style-type: none"> <li>Cofferdams or impermeable structures should be installed as appropriate to isolate the water flow from the construction works area;</li> <li>Dewatering or flow diversion shall be conducted prior to the construction works to prevent water overflow to the surrounding area;</li> <li>Watercourse removal and flow diversion should be conducted in dry season as far as practicable when the water flow is low;</li> <li>Water drained from the watercourse shall be diverted to new/temporary drainage for watercourse diversion; and</li> <li>Any excavated land-based sediment from the diversion of watercourse shall be properly stored at bunded areas away from any watercourses and covered with tarpaulin before transporting out of the site.</li> </ul>	To minimize the water quality impact due to the diversion of watercourses	Contractor	Construction Works Area where diversion of watercourses is required	Construction phase	<ul style="list-style-type: none"> <li>ETWB TC(Works) No. 5/2005</li> <li>ProPECC PN1/94</li> </ul>

*Water Quality Impact (Operational Phase)*

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S5.8.1	W10	<u>Surface Run-off from Paved Areas of the Project</u> <ul style="list-style-type: none"> <li>Road drainages should be equipped with adequate silt traps and oil interceptors;</li> <li>Regular washing of the roads and paved areas are also recommended to prevent the accumulation of pollutants; and</li> <li>To maintain the equipment's efficiency, contents collected in silt traps and oil interceptors should be cleared regularly, and transferred to an appropriate disposal facility, or to be collected for reuse if possible.</li> </ul>	To minimize the water quality impact from stormwater surface runoff	HyD, FEHD	Entire paved area under the Project (e.g. roads, ventilation buildings, administration buildings, etc.)	Operational Phase	<ul style="list-style-type: none"> <li>WPCO</li> </ul>
S5.8.2	W11	<u>Sewage Effluent from the Proposed Buildings</u> <ul style="list-style-type: none"> <li>Sewage effluent generated should be discharged to the existing sewage networks identified at the vicinity of the proposed administration buildings</li> <li>Sewage system at these buildings should be connected properly whilst ensuring that the public networks have a sufficient capacity to handle the sewage load generated; and</li> <li>Toilets and other sanitary facilities should be cleaned and maintained on a regular basis.</li> </ul>	To minimize the water quality impact from sewage effluent from proposed buildings	HyD	Buildings with sewage effluent (e.g. administration buildings)	Operational Phase	<ul style="list-style-type: none"> <li>WPCO</li> <li>DSS-TM</li> </ul>
S5.8.3	W12	<u>Drainage of Road Surface and Tunnel Runoff</u> <ul style="list-style-type: none"> <li>Discharge of road drainage channels should pass through treatment facilities (i.e. silt traps and oil/grit interceptors) to remove oil, grease and sediment content before the runoff is discharged to the public stormwater drainage system;</li> <li>The treatment facilities including silt traps and oil interceptors should be cleaned and maintained regularly to ensure their continued effectiveness; and</li> <li>Oily contents of the oil interceptors should be transferred to an appropriate facility, or where possible, reused.</li> </ul>	To minimize the water quality impact from discharge of road and tunnel drainage	HyD	Whole alignment	Operational Phase	<ul style="list-style-type: none"> <li>WPCO</li> <li>ProPECC PN 5/93</li> <li>DSS-TM</li> </ul>
S5.8.4	W13	<u>Wastewater Generated from Washing and Maintenance Operation</u> <ul style="list-style-type: none"> <li>Wastewater generated by washing and maintenance activities of ventilation systems should be collected and</li> </ul>	To minimize the water quality impact from wastewater generated from	HyD	Ventilation buildings and tunnel operationa	Operational Phase	<ul style="list-style-type: none"> <li>WPCO</li> <li>WDO</li> </ul>

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		<p>treated via an activated carbon filter before being discharged;</p> <ul style="list-style-type: none"> <li>Wastewater generated by washing and maintenance activities associate with work vehicles should be collected and treated by petrol interceptors before being discharged;</li> <li>A Licensed Chemical Contractor should be employed to collect and dispose of spent lubrication oil generated from vehicle maintenance activities in compliance with the WDO; and</li> <li>No direct discharge of these wastewaters into the inland water will be allowed. Instead, wastewater should be discharged to the public sewerage system properly.</li> </ul>	washing and maintenance operation		I related facilities where maintenance activities would be carried out		
<b>Waste Management Implications (Construction Phase)</b>							
S.6.3.5.2	WM1	<p><u>Good Site Practices</u> The following good site practices are recommended throughout the construction activities:</p> <ul style="list-style-type: none"> <li>Nomination of an approved personnel, such as a site manager, to be responsible for the implementation of good site practices, arrangements for collection and effective disposal to an appropriate facility, of all wastes generated at the site;</li> <li>Training of site personnel in site cleanliness, appropriate waste management procedures and concepts of waste reduction, reuse and recycling;</li> <li>Provision of sufficient waste disposal points and regular collection for disposal;</li> <li>Appropriate measures to minimize windblown litter and dust during transportation of waste by either covering trucks or by transporting wastes in enclosed containers;</li> <li>Regular cleaning and maintenance programme for drainage systems, sumps and oil interceptors;</li> <li>Provision of wheel washing facilities at site exit before the trucks leave the works areas to minimize dust disturbance due to the trucks transportation to the public road network; and</li> <li>The Contractor should prepare a Waste Management Plan (WMP) as part of the Environmental Management Plan (EMP) in accordance with the ETWB TC(W) No. 19/2005.</li> </ul>	Ensure proper waste management system throughout the construction	Construction	All site area	Construction Phase	<ul style="list-style-type: none"> <li>WDO</li> <li>ETWB TC(W) No. 19/2005</li> </ul>

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		The WMP should be submitted to the Project Manager or Project Manager's Representative (PMR) for approval.					
S6.3.5.3	WM2	<p><u>Waste Reduction Measures</u> The following recommendations are proposed to achieve reduction:</p> <ul style="list-style-type: none"> <li>• Segregate and store different types of waste in different containers, skip or stockpiles to enhance reuse or recycling of materials and their proper disposal;</li> <li>• Proper storage and good site practices to minimize the potential for damage and contamination of construction materials;</li> <li>• Plan and stock construction materials carefully to minimize amount of waste generated and avoid unnecessary generation of waste;</li> <li>• Sort out demolition debris and excavated materials from demolition works to recover reusable/ recyclable portions (i.e. soil, broken concrete, metal etc.); and</li> <li>• Provide training to workforce on the importance of appropriate waste management procedures, including waste reduction, reuse and recycling.</li> </ul>	Reduce waste generation	Contractor	All site area	Construction Phase	<ul style="list-style-type: none"> <li>• WDO</li> </ul>
S6.3.5.8 – 6.3.5.10	WM3	<p><u>Storage, Collection and Transportation of Waste</u> The following recommendations should be implemented to minimize the impacts:</p> <ul style="list-style-type: none"> <li>• Maintain and clean storage areas routinely;</li> <li>• Non-inert C&amp;D materials such as top soil should be handled and stored well to ensure secure containment of the materials;</li> <li>• Stockpiling area should be provided with covers and water spraying system to prevent materials from wind-blown or being washed away;</li> <li>• Different locations should be designated to stockpile each material to enhance reuse;</li> <li>• Conveyor belt systems should be fully enclosed and equipped with water spray to suppress dust generation; and</li> <li>• Slurry treatment plant will be fully enclosed by a noise enclosure, which would help in alleviating the dust impact.</li> </ul> <p>The following recommendations should be implemented to minimize the impacts:</p>	Minimise impact to the environment due to storage, collection and transport of waste	Contractor	All site area	Construction Phase	<ul style="list-style-type: none"> <li>• WDO</li> <li>• Land (Miscellaneous Provisions) Ordinance</li> <li>• ETWB TC(W) No. 19/2005</li> </ul>

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		<ul style="list-style-type: none"> <li>Remove waste in timely manner;</li> <li>Employ the trucks with cover or enclosed containers for waste transportation;</li> <li>Obtain relevant waste disposal permits from the appropriate authorities; and</li> <li>Disposal of waste should be done at licensed waste disposal facilities.</li> <li>All dump trucks and vessels engaged on site should be equipped with Global Positioning System (GPS) or equivalent automatic system for real time tracking and monitoring of their travel routings and parking locations to prohibit illegal dumping and landfilling of C&amp;D materials.</li> </ul>					
S.6.3.7.1	WM4	<p><u>Mitigation Measures for C&amp;D Materials</u> During design phase, a Construction and Demolition Material Management Plan (C&amp;DMMP) will be prepared in accordance with Section 4.1.3 “Construction and Demolition Materials” of the Project Administration Handbook for Civil Engineering Works and will be submitted together with the EIA Report to the department Vetting Committee for endorsement then to Public Fill Committee (PFC) for approval.</p>	Minimize waste impacts from C&D materials handling	Project Proponent	All site area	EIA Phase	<ul style="list-style-type: none"> <li>WDO</li> <li>Land (Miscellaneous Provisions) Ordinance</li> <li>ETWB TC(W) No. 19/2005</li> </ul>
S.6.3.7.2	WM5	<p><u>Mitigation Measures for C&amp;D Materials</u> Wherever practicable, C&amp;D materials should be segregated from other wastes to avoid contamination and ensure acceptability at PFRFs or reclamation sites. The following mitigation measures should be implemented in handling the excavated and C&amp;D materials:</p> <ul style="list-style-type: none"> <li>Carry out on-site sorting;</li> <li>Make provisions in the Contract documents to allow and promote the use of recycled aggregates where appropriate; and</li> </ul> <p>Implement a trip-ticket system for each works contract in accordance with DEVB TC(W) No. 6/2010 to ensure that the disposal / handling of C&amp;D materials is properly documented and verified, so as to avoid the illegal dumping and landfilling of C&amp;D materials.</p>	Minimize waste impacts from C&D materials handling	Contractor	All site area	Construction Phase	<ul style="list-style-type: none"> <li>WDO</li> <li>Land (Miscellaneous Provisions) Ordinance</li> <li>ETWB TC(W) No. 19/2005</li> <li>DEVB TCW No. 06/2010</li> </ul>
S.6.3.7.4 – 6.3.7.6	WM6	<p><u>On-site Sorting of C&amp;D Materials</u></p>	Minimize waste impacts from	Contractor	All site area	Construction Phase	<ul style="list-style-type: none"> <li>WDO</li> <li>Land (Miscellaneous</li> </ul>

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		<ul style="list-style-type: none"> <li>Spoil storage areas would be located within the site during construction phase for temporary storage of inert C&amp;D materials.</li> <li>All C&amp;D materials arising from the construction would be sorted on-site to recover the inert C&amp;D materials, and reusable and recyclable materials prior to disposal off-site as far as practicable. Non-inert portion of C&amp;D materials should also be reused whenever possible and be disposed of at landfills as a last resort.</li> <li>The Contractor would be responsible for devising a system to work for on-site sorting of C&amp;D materials and promptly remove all sorted and processed material arising from the construction activities to minimize temporary stocking on-site. It is recommended that the system should include the identification of the source of generation, estimated quantity, arrangement for on-site sorting and/ or collection, temporary storage areas, and frequency of collection by recycling contractor or frequency of removal off-site.</li> </ul>	C&D materials handling				Provisions) Ordinance <ul style="list-style-type: none"> <li>ETWB TC(W) No. 19/2005</li> </ul>
S.6.3.7.7	WM7	<u>Reuse of C&amp;D Materials</u> The following potential measures should be explored to maximize the reuse/ recycle of C&D materials generated from the Project: <ul style="list-style-type: none"> <li>Reuse suitable inert C&amp;D materials on-site as far as practicable;</li> <li>Reuse suitable excavated rock by reworking at approved quarries (e.g. crushed as aggregates);</li> <li>Sorting of demolition debris and excavated materials from demolition works to recover reusable/ recyclable portions (e.g. soil, broken concrete, metal); and</li> <li>Protect recyclable material to keep it in usable condition.</li> </ul>	Minimize waste impacts from C&D materials handling	Contractor	All site area	Construction Phase	<ul style="list-style-type: none"> <li>WDO</li> <li>Land (Miscellaneous Provisions) Ordinance</li> <li>ETWB TC(W) No. 19/2005</li> </ul>
S.6.3.7.8 – 6.3.7.9	WM8	<u>Specification of Inert C&amp;D Materials to be Delivered Off-site</u> In case there are surplus inert C&D materials generated in the Project and are required to be delivered to the PFRFs, the inert C&D materials should fulfil the following requirements: <ul style="list-style-type: none"> <li>Reclaimed asphalt pavement should not be mixed with other materials when delivered to the PFRFs;</li> <li>Moisture content of inert C&amp;D materials should be lowered to 25% max. when delivered to the PFRFs;</li> </ul>	Reduce waste generation	Contractor	All site area	Construction Phase	<ul style="list-style-type: none"> <li>WDO</li> <li>Land (Miscellaneous Provisions) Ordinance</li> <li>ETWB TC(W) No. 19/2005</li> </ul>



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		<ul style="list-style-type: none"> <li>Inert C&amp;D materials delivered to the PFRFs should be of a size less than 200mm; and</li> <li>Inert construction waste should not be in liquid form such that it can be contained and delivered by dump truck instead of tanker truck. Inert C&amp;D materials in liquid form should be solidified before delivering to the PFRFs.</li> </ul> <p>Nevertheless, the acceptance criteria of inert C&amp;D materials to PFRFs are subject to the advice by the Public Fill Committee.</p>					
S.6.3.7.10	WM9	<p><u>Use of Standard Formwork and Planning of Construction Materials Purchasing</u></p> <p>Standard formwork should also be used as far as practicable in order to minimize the arising of non-inert C&amp;D materials. The use of more durable formwork (e.g. metal hoarding) or plastic facing should be encouraged in order to enhance the possibility of recycling. The purchasing of construction materials should be carefully planned in order to avoid over ordering and wastage.</p>	Reduce waste generation	Contractor	All site area	Construction Phase	<ul style="list-style-type: none"> <li>N/A</li> </ul>
S.6.3.7.11 – 6.3.7.12	WM10	<p><u>Mitigation Measures for Chemical Waste</u></p> <p>For those processes which generate chemical waste, it may be possible to find alternatives to eliminate the use of chemicals, to reduce the generation quantities or to select a chemical type of less impact on environment, health and safety as far as possible. Wherever possible, opportunities for the reuse and recycling of materials will be taken.</p> <p>If chemical wastes are produced at the construction site, the Contractor should register with EPD as chemical waste producers. Storage, handling, transport and disposal of chemical waste should be arranged in accordance with the Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes published by the EPD. Chemical waste should be stored in appropriate containers and collected by a licensed chemical waste collector. Chemical wastes (e.g. spent lubricant oil) should be recycled at an appropriate facility as far as possible, while the chemical waste that cannot be recycled should be disposed of at either the CWTC, or another licensed facility, in accordance with the Waste Disposal (Chemical Waste) (General) Regulation.</p>	Control the chemical waste and ensure proper storage, handling and disposal	Contractor	All site area	Construction Phase	<ul style="list-style-type: none"> <li>Waste Disposal (Chemical Waste) (General) Regulation</li> <li>Code of Practice on the Packaging, Labelling and Storage of Chemical Waste</li> </ul>

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S6.3.7.13 – 6.3.7.14	WM11	<p><u>Mitigation Measures for General Refuse</u> General refuse should be stored in enclosed bins separately from construction and chemical wastes. Recycling bins should also be placed to encourage recycling. Preferably enclosed and covered areas should be provided for general refuse collection and routine cleaning for these areas should also be implemented to keep areas clean. A reputable waste collector should be employed to remove general refuse on a daily basis. Arrangements should be made with the recycling companies to collect the recycle waste as required. It is expected that such arrangements would minimize potential environmental impacts.</p> <p>The Contractor should Implement an education programme for workforce relating to avoiding, reducing, reusing and recycling general refuse. Participation in a local collection scheme should be considered by the Contractor to facilitate waste reduction.</p>	Minimise production of the general refuse and avoid odour, pest and litter impacts	Contractor	All site area	Construction Phase	<ul style="list-style-type: none"> <li>WDO</li> </ul>
<b><i>Waste Management Implications (Operation)</i></b>							
S.6.4.5.1– 6.4.5.2	WM12	<p><u>Mitigation Measures for Chemical Waste</u> The requirements given in the Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes should be followed in handling of these chemical wastes. A trip-ticket system should be operated in accordance with the Waste Disposal (Chemical Waste) (General) Regulation to monitor all movements of chemical wastes which will be collected by a licensed collector to a licensed facility (i.e. CWTC) for final treatment and disposal.</p> <p>If chemical wastes are produced at the operating sites, the Contractor should register with EPD as chemical waste producers. Storage, handling, transport and disposal of chemical waste should be arranged in accordance with the Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes published by the EPD. Chemical waste should be stored in appropriate containers and collected by a licensed chemical waste collector. Chemical wastes (e.g. spent lubricant oil) should be recycled at an appropriate facility as far as possible, while the chemical waste that</p>	Control the chemical waste and ensure proper storage, handling and disposal	Operator	All site area	Operational Phase	<ul style="list-style-type: none"> <li>Waste Disposal (Chemical Waste) (General) Regulation</li> <li>Code of Practice on the Packaging, Labelling and Storage of Chemical Waste</li> <li>DEVB TCW No. 06/2010</li> </ul>

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		cannot be recycled should be disposed of at either the CWTC, or another licensed facility, in accordance with the Waste Disposal (Chemical Waste) (General) Regulation					
S.6.4.5.3	WM13	<p><u>Mitigation Measures for General Refuse</u></p> <p>A reputable waste collector should be employed to remove general refuse generated from administration buildings and ventilation buildings on a daily basis to minimize odour, pest and litter impacts. Arrangements should be made with the recycling companies to collect the recycle waste as required. It is expected that such arrangements would minimize potential environmental impacts.</p>	Minimise production of the general refuse and avoid odour, pest and litter impacts	Operator	All site area	Operational Phase	<ul style="list-style-type: none"> <li>WDO</li> </ul>
<b>Land Contamination</b>							
S.7.10.1.1-7.10.1.3	LC1	<p><u>Recommended Further Works</u></p> <p>Prior to the development of these areas, site re-appraisal of the whole Project Areas should be carried out to ascertain the evaluation and recommendation reported and update the corresponding findings (e.g. location of hotspots) and sampling and testing requirements presented in the CAP. The supplementary CAP(s), incorporating the findings of the site re-appraisal and the updated sampling and testing strategy, should be prepared and submitted to EPD for agreement prior to the commencement of SI works.</p> <p>SI works shall be carried out according to the EPD agreed supplementary CAP. Upon the completion of SI works. CAR shall be prepared and submitted to EPD for agreement. If land contamination is identified based on SI results, a combined CAR-RAP shall also be submitted to the EPD for agreement to formulate necessary remedial measures.</p> <p>Soil and/or groundwater remediation works shall be carried out according to the EPD agreed CAR-RAP if land contamination is confirmed. Upon the completion of remediation works, Remediation Report (RR)s shall be submitted to the EPD for agreement to confirm that the necessary remediation works has been completed.</p>	Minimise the potential land contamination impact during construction	Contractor	All site area	Prior to commencement of construction	<ul style="list-style-type: none"> <li>EIA</li> <li>Guidance Manual for Use of Risk-based Remediation Goals for Contaminated Land Management</li> <li>Practice Guide for Investigation and Remediation of Contaminated Land</li> <li>Guidance Note for Contaminated Land Assessment and Remediation</li> </ul>

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S.7.10.2.1-7.10.2.3	LC2	<p><b>Possible Remediation Measures</b> The actual remediation methods should be confirmed after completion of the site re-appraisal and the approved CAR and RAP at the later stage of the project before construction. The RAP will provide details of the remedial actions for any identified contaminated soil and groundwater.</p> <p>For soil, there are several technologies commercially available to tackle these contaminants. Technologies that are commonly used in Hong Kong are biopiling and cement solidification/ stabilization. These ex-situ methods have been proven to be effective in treating the target COCs (cement solidification/stabilization on metals and biopiling on hydrocarbons).</p> <p>For groundwater, some examples of remediation techniques of contaminated groundwater (e.g. air sparging, recovery trenches / wells, in-ground containment/capping and permeable reactive barriers) are shown in the Practice Guide from EPD.</p>	Minimise the potential land contamination impact during construction	Contractor	All site area	Prior to commencement of construction	<ul style="list-style-type: none"> <li>• EIA</li> <li>• Guidance Manual for Use of Risk-based Remediation Goals for Contaminated Land Management</li> <li>• Practice Guide for Investigation and Remediation of Contaminated Land</li> <li>• Guidance Note for Contaminated Land Assessment and Remediation</li> </ul>
S.7.10.3.1	LC3	<p><b>Mitigation Measures for Remediation Works</b> Mitigation measures for the remediation works would depend on the nature / extent of contamination and the method of treatment. The mitigation measures will be recommended in the RAP and would typically include the following:</p> <ul style="list-style-type: none"> <li>• Excavation profiles must be properly designed and executed with attention to the relevant requirements for environment, health and safety;</li> <li>• Excavation shall be carried out during dry season as far as possible to minimize contaminated runoff from contaminated soils;</li> <li>• Supply of suitable clean backfill material (or treated soil) after excavation;</li> <li>• Stockpiling site(s) shall be lined with impermeable sheeting and bunded. Stockpiles shall be fully covered by impermeable sheeting to reduce dust emission;</li> <li>• Vehicles containing any excavated materials shall be suitably covered to limit potential dust emissions or</li> </ul>	Minimise the potential land contamination impact during remediation works	Contractor	Area for remediation works	During remediation works (if necessary)	<ul style="list-style-type: none"> <li>• EIA</li> <li>• Guidance Manual for Use of Risk-based Remediation Goals for Contaminated Land Management</li> <li>• Practice Guide for Investigation and Remediation of Contaminated Land</li> <li>• Guidance Note for Contaminated</li> </ul>

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		<p>contaminated wastewater run-off, and truck bodies and tailgates shall be sealed to prevent any discharge during transport or during wet conditions;</p> <ul style="list-style-type: none"> <li>• Speed control for the trucks carrying contaminated materials shall be enforced;</li> <li>• Vehicle wheel and body washing facilities at the site's exit points shall be established and used; and</li> <li>• Pollution control measures for air emissions (e.g. from biopile blower and handling of cement), noise emissions (e.g. from blower or earthmoving equipment), and water discharges (e.g. runoff control from treatment facility) shall be implemented and complied with relevant regulations and guidelines.</li> </ul>					Land Assessment and Remediation
<b><i>Hazard to Life (Construction Phase)</i></b>							
S8.9.5	H1	<p><u>Recommendations for Meeting the ALARP Requirements</u></p> <ul style="list-style-type: none"> <li>• The truck should be designed and improved to reduce the amount of combustibles in the cabin. The fuel carried in the fuel tank should also be minimized to reduce the duration of any fire;</li> <li>• The accident frequency of the explosive truck should be minimized through the implementation of a defensive driving attitude and a dedicated training programme for both driver and his attendants which includes regular briefing sessions. Moreover, drivers should be selected based on good safety record and provided with regular medical checks;</li> <li>• The required quantity of explosives should only be transported for a particular blast to avoid any unused explosives send back to the magazine;</li> <li>• The contractor should combine the explosive deliveries for a given work area as far as practicable;</li> <li>• A minimum headway between two consecutive truck convoys of 10 minutes should be maintained whenever practicable; and</li> <li>• To reduce the explosive truck fire involvement frequency, a better emergency response and training should be implemented to ensure adequate fire extinguishers are used and attempt is made to evacuate the area of the incident or securing the explosive load if possible. All</li> </ul>	Minimize risk due to storage, transportation and use of explosive	Contractor	Worksites involved in transportation, storage and use of explosive	Construction Phase	<ul style="list-style-type: none"> <li>• Annex 4 of the EIAO-TM</li> </ul>

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		explosive vehicles should also be equipped with bigger capacity AFFF-type extinguishers.					
S8.9.5	H2	<p><u>General Recommendations</u></p> <ul style="list-style-type: none"> <li>• Each blasting activities including storage and transport of explosives should be supervised and audited by competent site staff to ensure strict compliance with the blasting permit conditions; and</li> <li>• For the storage and transport of explosives, the recommendations listed below should also be considered:               <ul style="list-style-type: none"> <li>• The security plan should address different alert security level to reduce opportunity for arson or deliberate initiation of explosives;</li> <li>• Emergency plan like magazine operation manual should be developed to address uncontrolled fire in magazine area and during transport of explosives; and</li> <li>• Adverse weather working guideline should be developed to clearly define procedure for transport of explosives during thunderstorm.</li> </ul> </li> </ul>	Minimize risk due to storage and transportation of explosive	Contractor	Worksites involved in transportation and storage of explosive	Construction Phase	<ul style="list-style-type: none"> <li>• Annex 4 of the EIAO-TM</li> </ul>
S8.9.6	H3	<p><u>Good Practices to be Implemented for Use of Explosives</u></p> <ul style="list-style-type: none"> <li>• Carry out checking of the contractor's blasting method statement;</li> <li>• Check (including both document and site checks) and satisfy, for each blast, that the contractor's blast design and precautionary measures comply with the plans approved by the Building Authority and the blasting permit requirements;</li> <li>• Verify on site that the ground conditions and geology are as stated or assumed in the blasting assessment, and that the provisions in the method statement and the preventive, protective and precautionary measures are adequate for the conditions as encountered on site;</li> <li>• Ensure that the preventive measures, if required, have been properly carried out prior to commencement of the blasting works;</li> <li>• Prepare regular reports with records of the condition of the site, sensitive receivers, adjacent grounds, structures and services etc. after each phase of blasting operation and completion of related works;</li> </ul>	Minimize risk due to use of explosive	Contractor	Worksites involved in use of explosive	Construction Phase	<ul style="list-style-type: none"> <li>• Annex 4 of the EIAO-TM</li> <li>• Practice Note for Authorized Persons and Registered Structural Engineers – Control of Blasting (APP-72)</li> </ul>

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		<ul style="list-style-type: none"> <li>Inspect the construction of preventive works, if required, for the sensitive receivers;</li> <li>Inspect the provision and installation of all necessary protective and precautionary measures prior to each blast, in accordance with the blast design;</li> <li>Monitor the site operations and working methods to ensure that they meet the safety requirements set out in the blasting permit; and</li> <li>Inspect and monitor the conditions of all sensitive receivers regularly and carry out reviews of the quality of monitoring for the sensitive receivers before and after each blast.</li> </ul>					
S8.9.6	H4	<p><u>Good Practices to be Implemented for Magazine Site</u></p> <ul style="list-style-type: none"> <li>To ensure the undertaken work activities during the operation of the magazine are properly controlled, a suitable work control system such as an operational manual including Permit-to-Work system should be introduced;</li> <li>Good house-keeping should be maintained within the magazine and outside the magazines stores to ensure that combustible materials are not allow to accumulate and to ensure combustibles (including vegetation) are removed;</li> <li>The magazine store should not have any open drains, traps, pits or pocket which any molten ammonium nitrate could flow and be confined in the even of a fire;</li> <li>Regular checking of the magazine building should be conducted for water seepage through the roof, walls or floor;</li> <li>Caked explosives shall be disposed of in an appropriate manner;</li> <li>Permission to remain the secured fenced off magazine store area shall not be given to explosives delivery vehicles; and</li> <li>Speed limit control should be implemented within the magazine area in order to reduce the risk of a vehicle impact or incident within the magazine area.</li> </ul>	Minimize risk due to operation of explosive magazines	Contractor	Explosive magazines	Construction Phase	<ul style="list-style-type: none"> <li>Annex 4 of the EIAO-TM</li> <li>Guidance Note No. GN 8 How to Apply for a Mode A Store Licence for Storage of Blasting Explosives</li> </ul>
S8.9.6	H5	<p><u>Good Practices to be Implemented for Transport of Explosives</u></p> <ul style="list-style-type: none"> <li>Typical Removal Permit Conditions;</li> </ul>	Minimize risk due to	Contractor	Transport for explosives	Construction Phase	<ul style="list-style-type: none"> <li>Annex 4 of the EIAO-TM</li> </ul>

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		<ul style="list-style-type: none"> <li>• A placard as specified in the section 80 of Dangerous Goods (Control) Regulation must be displayed in a conspicuous place on the vehicle carrying explosives;</li> <li>• No unnecessary waiting or parking of the vehicle is permitted at any place along the transportation route;</li> <li>• The vehicle carrying the explosives is prohibited from passing through any tunnel on a public road;</li> <li>• Except with the permission in writing by the Authority, the vehicle must not carry more than 200kg net explosives content of explosives at any one time. The vehicle for moving explosives shall be a licensed vehicle equipped with effective fire-extinguishers and maintained in good running conditions at all time;</li> <li>• The vehicle shall use the intended route of transportation specified in the application for this conveyance permit;</li> <li>• The vehicle with explosives on board is prohibited from refuelling at any fuel station;</li> <li>• Conveyance of blasting explosives or entertainment fireworks shall only be undertaken by the vehicle/s and driver/s approved by the Authority and in the presence of a Resident Explosives Supervisor and a Shot Firer or a Fireworks Master/Assistant. When carrying explosives/fireworks, the approved vehicle/s shall display the correct dangerous goods placards and warning signs;</li> <li>• Explosives and detonators must be conveyed on separate vehicles or in separate compartments on the vehicle. Electric detonators must be carried in an approved and properly labelled wooden container; and</li> <li>• The Permittee is required to input the actual date and time of the use of this Permit in Centralised Explosives Licensing and Management System (CELIMS) after the conveyance of the explosives as soon as reasonably practicable. If the Permit is unused before its expiry date, the Permittee is also required to provide reason(s) for not using the Permit in CELIMS.</li> <li>• Safer Design of the Explosives Carrying Vehicle</li> </ul>	transportation of explosives				<ul style="list-style-type: none"> <li>• Guidance Note No. GN 2 Approval of an Explosives Delivery Vehicle</li> <li>• Guidance Note No. GN 3 Application and Handling of a Removal Permit</li> </ul>



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		<ul style="list-style-type: none"> <li>• Fire screen could be installed between the cabin and the load of the vehicle to reduce the chance of fire escalating to the load and cause explosion.</li> <li>• Reduction of Accident Involvement Frequency               <ul style="list-style-type: none"> <li>• Different administrative measures can be implemented to reduce the accident involvement frequency and increase the situational awareness of the driver during the transportation of explosives;</li> <li>• Administrative measures can include “Tool-box” talk training regarding the safety precautions when transporting explosives;</li> <li>• Ensuring that the detonators and the cartridged emulsion are under good conditions and well-intact within their packaging before transporting; and</li> <li>• Recruiting experienced driver with good safety record and checking their health condition in a regular basis.</li> </ul> </li> <li>• Reduction of Fire Involvement               <ul style="list-style-type: none"> <li>• Carrying fire extinguishers or other active fire protection devices with higher standard and higher capacity onboard of the explosives carrying vehicle;</li> <li>• Create a contingency plan with consideration of different scenarios that may occur, such as the action that the driver should take in case of fire near the explosives carrying vehicle in the middle of traffic jam;</li> <li>• Regulations for the drivers should be set, such as hot work should be prohibited when handling explosives to avoid any sources of ignition; and</li> <li>• Working guidelines should be developed to provide clear instructions to the drivers when encountering different situations like extreme weather.</li> </ul> </li> </ul>					
S8.9.6	H6	<p><u>Continual Liaison with LTUQ</u></p> <p>Subject to the liaison of the three concurrent projects Route 11 , Tuen Mun Bypass (TMB) and Lam Tei Underground Quarrying (LTUQ), a Hazard Management Plan would be formulated with a view to aligning the understanding of the risk of the three projects so that all the working populations at Lam Tei Quarry area, which includes the workforce induced under the construction and operational stage of three</p>	Minimize risk due to use of explosives	Contractor / HyD	Lam Tei	Construction Phase	<ul style="list-style-type: none"> <li>• Annex 4 of the EIAO-TM</li> <li>• Guidance Note No. GN 2 Approval of an Explosives Delivery Vehicle</li> </ul>

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		projects, could be considered as on-site populations in the QRA for all the three projects. The measures stipulated in the Hazard Management Plan may include, but not limited to, the adjustment of the blasting schedules of the three projects to minimize the potential cumulative impact, provision of common trainings and drills to the workforce of all the three projects, etc. The Hazard Management Plan, which would be agreed among the three projects, would be submitted to EPD for agreement prior to the tender invitation of construction phases of Route 11, TMB and LTUQ, whichever is earlier.					<ul style="list-style-type: none"> <li>Guidance Note No. GN 3 Application and Handling of a Removal Permit</li> <li>Practice Note for Authorized Persons and Registered Structural Engineers – Control of Blasting (APP-72)</li> </ul>
S8.2.8	H7	<p><u>Monitoring and Mitigation Measures for Tunneling Activities Close to LPG storage installations</u></p> <p>Monitoring and mitigations measures below would be proposed to control the ground vibration or ground settlement induced by TMB tunnelling:</p> <ol style="list-style-type: none"> <li>1) Define trigger levels (AAA levels) during the construction stage that will be based on the statutory limits provided by relevant regulations and Ordinances currently in force;</li> <li>2) Carry out specific vibration and settlement monitoring for TM44 LPG store;</li> <li>3) Carry out a robust precondition survey to practically utility survey before closing to this LPG installation; and</li> <li>4) Consider reducing TBM thrust force and cutterhead rotation speed in the nearby sections.</li> </ol>	Minimize risk to the LPG storage installation	Contractor / HyD	Near LPG storage installation	Construction Phase	<ul style="list-style-type: none"> <li>Annex 4 of the EIAO-TM</li> </ul>
<b>Landfill Gas Hazard (Design Phase)</b>							
S.9.9.3.1	LG1	During the detailed design stage, the detailed design consultant should provide a more detailed assessment and finalize the design of the gas protective measures or ventilation to underground confined utility pits, manholes and ground floor rooms. The detailed design (drawings and specification) of landfill gas protection measures as well as the requirement for maintenance and monitoring should be prepared by a competent professional person and submitted to EPD for vetting. These measures include a combination of passive and active systems.	Minimise safety risk related to landfill gas	Project Proponent	Area with safety concern related to landfill gas	Design Phase	<ul style="list-style-type: none"> <li>EPD/TR8/97</li> <li>ProPECC PN 3/96</li> </ul>

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		Active control should always be used in conjunction with passive barriers such as low gas permeable membranes or paint in floors, in order that there is no leakage of air/gas flow through a floor or wall into a structure. Gas detection systems should also be used to monitor gas in extracted air flow, and to monitor internal spaces inside buildings. Active systems are normally required for high-risk sites where landfill gas has been measured in the ground at or close to the development site, and where buildings are close to the source of landfill gas.					
S.9.9.3.2	LG2	Landfill gas may also enter the building/void via service entries. Measures to prevent gas migration through service entries are listed below: <ul style="list-style-type: none"> <li>• Gas Barriers</li> <li>• Gas Vents</li> </ul>	Minimise safety risk related to landfill gas	Project Proponent	Area with safety concern related to landfill gas	Design Phase	<ul style="list-style-type: none"> <li>• EPD/TR8/97</li> <li>• ProPECC PN 3/96</li> </ul>
S.9.9.3.3	LG3	With respect to the nature of the target during the operation phase of the Project, it is considered that providing sufficient venting for underground utility manholes /pits or applying low gas permeability paints will be an adequate and cost-effective measures. For ground floor rooms, providing sufficient nature or active ventilation will be considered as an effective measures to avoid potential accumulation of methane gas within rooms.	Minimise safety risk related to landfill gas	Project Proponent	Area with safety concern related to landfill gas	Design Phase	<ul style="list-style-type: none"> <li>• EPD/TR8/97</li> <li>• ProPECC PN 3/96</li> </ul>
S.9.9.4.4	LG4	Along with the detailed design of the landfill gas protection measure, the monitoring programme and detailed actions should be included in the detailed assessment during the designed design stage and submitted to EPD for approval.	Minimise safety risk related to landfill gas	Project Proponent	Area with safety concern related to landfill gas	Design Phase	<ul style="list-style-type: none"> <li>• EPD/TR8/97</li> <li>• ProPECC PN 3/96</li> </ul>
<b>Landfill Gas Hazard (Construction Phase)</b>							
S.9.9.2.1	LG5	<u>Safety Measures</u> Precautionary measures to be adopted during construction at the Project Site are outlined in Paragraphs 8.3 to 8.49 of EPD's Guidance Note. The following guidance has been extracted from and appended to this to ensure a robust and	Minimise safety risk related to landfill gas	Contractor	Area with safety concern related to landfill gas	Construction Phase	<ul style="list-style-type: none"> <li>• EPD/TR8/97</li> <li>• ProPECC PN 3/96</li> </ul>

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		<p>comprehensive set of measures to protect the construction team are provided.</p> <ul style="list-style-type: none"> <li>• During all works, safety procedures should be implemented to minimise the risks of fires and explosions and asphyxiation of construction team (especially in confined space).</li> <li>• Safety officers, specifically trained with regard to landfill gas related hazards and the appropriate actions to take in adverse circumstances, should be present on the site throughout the works, in particular, when works are undertaken below grade.</li> <li>• All personnel who work on site and all visitors to the site should be made aware of the possibility of ignition of gas in the vicinity of the works.</li> <li>• Those staff who work in, or have responsibility for “at risk” areas, including bore piling and excavation works, should receive appropriate training on working in areas susceptible to landfill gas.</li> <li>• Any offices/quarters set up on site should take precautions against landfill gas ingress, such as landfill gas monitoring and alarm devices. Other storage premises, e.g. shipping containers, where this is not possible should be well ventilated prior to entry.</li> <li>• Adequate precautions to prevent the accumulation of landfill gas under site buildings and within storage shed should be taken by raising buildings off the ground where appropriate and “airing” storage containers prior to entry by personnel and ensuring adequate ventilation at all times.</li> <li>• Smoking and naked flames should be prohibited within confined spaces. “No Smoking” and “No Naked Flame” notices in Chinese and English should be posted prominently around the construction site. Safety notices should be posted warning of the potential hazards.</li> <li>• During the construction works, adequate fire extinguishers and breathing apparatus sets should be made available on site and appropriate training given in their use.</li> <li>• Welding, flame-cutting or other hot works may only be carried out in confined spaces when controlled by a</li> </ul>					

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		<p>“permit to work” procedure, properly authorised by the Safety Officer. The permit to work procedure should set down clearly the requirements for continuous monitoring of methane, carbon dioxide and oxygen throughout the period during which the hot works are in progress. The procedure should also require the presence of an appropriately qualified person who shall be responsible for reviewing the gas measurements as they are made, and who shall have executive responsibility for suspending the work in the event of unacceptable or hazardous conditions. Only those staffs who are appropriately trained and fully aware of the potentially hazardous conditions which may arise should be permitted to carry out hot works in confined areas.</p>					
S.9.9.2.2	LG6	<p><b>Monitoring</b> Monitoring will be undertaken when construction works are carried out in confined space within the Consultation Zone. The monitoring requirements and procedures specified in Paragraphs 8.23 to 8.28 of EPD’s Guidance Note are highlighted below:</p> <ul style="list-style-type: none"> <li>Periodically during ground-works construction, the works area should be monitored for methane, carbon dioxide and oxygen using appropriately calibrated portable gas detection equipment. The equipment should be intrinsically safe and calibrated according to the manufacturer’s instructions.</li> <li>The monitoring frequency and areas to be monitored should be set down prior to commencement of works either by the Safety Officer or by an appropriate qualified person.</li> <li>Routine monitoring should be carried out in all excavations, manholes and chambers and any other confined spaces that may have been created by, for example, the temporary storage of building materials on the site surface.</li> <li>All measurements in excavations should be made with the monitoring tube located not more than 10mm from the exposed ground surface.</li> </ul>	Minimise safety risk related to landfill gas	Contractor	Area with safety concern related to landfill gas	Construction Phase	<ul style="list-style-type: none"> <li>EPD/TR8/97</li> <li>ProPECC PN 3/96</li> </ul>

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		<ul style="list-style-type: none"> <li>• A standard form, detailing the location, time of monitoring and equipment used together with the gas concentrations measured, should be used when undertaking manual monitoring to ensure that all relevant data are recorded.</li> <li>• Monitoring of excavations should be undertaken as follows: For excavations deeper than 1m, measurements should be made:               <ul style="list-style-type: none"> <li>- at the ground surface before excavation commences;</li> <li>- immediately before any staff enters the excavation;</li> <li>- at the beginning of each working day for the entire period the excavation remains open; and</li> <li>- periodically through the working day whilst the construction team is in the excavation.</li> </ul>               For excavations between 300mm and 1m deep, measurements should be made:               <ul style="list-style-type: none"> <li>- directly after the excavation has been completed; and</li> <li>- periodically whilst the excavation remains open.</li> </ul>               For excavations less than 300mm deep:               <ul style="list-style-type: none"> <li>- monitoring may be omitted, at the discretion of the Safety Officer or other appropriately qualified person.</li> </ul> </li> <li>• If methane (flammable gas) or carbon dioxide concentrations are in excess of the trigger levels or that of oxygen is below the levels specified in the Emergency Management in the following section, then evacuation will be initiated.</li> </ul>					
S.9.9.2.3	LG7	<p><u>Actions in the Event of Gas Being Detected</u> Depending on the results of the measurements, actions required will vary and should be set down by the Safety Officer or another appropriately qualified person. As a minimum these should encompass those actions specified in table below:</p>	Minimise safety risk related to landfill gas	Contractor	Area with safety concern related to landfill gas	Construction Phase	<ul style="list-style-type: none"> <li>• EPD/TR8/97</li> <li>• ProPECC PN 3/96</li> </ul>

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		<table border="1"> <thead> <tr> <th>Parameter</th> <th>Measurement</th> <th>Action</th> </tr> </thead> <tbody> <tr> <td rowspan="3">O<sub>2</sub></td> <td>&lt; 19% v/v</td> <td>Increase underground ventilation to restore O<sub>2</sub> to &gt;19% v/v</td> </tr> <tr> <td>&lt; 18% v/v</td> <td>Stop works Evacuate all personnel Increase ventilation further to restore O<sub>2</sub> to &gt;19% v/v</td> </tr> <tr> <td>&gt; 10% LEL</td> <td>Prohibit hot works Increase ventilation to restore CH<sub>4</sub> to &lt;10% LEL</td> </tr> <tr> <td rowspan="2">CH<sub>4</sub></td> <td>&gt;20% LEL</td> <td>Stop works Evacuate all personnel Increase ventilation further to restore CH<sub>4</sub> to &lt;10% LEL</td> </tr> <tr> <td>&gt;0.5% v/v</td> <td>Increase ventilation to restore CO<sub>2</sub> to &lt;0.5% v/v</td> </tr> <tr> <td rowspan="2">CO<sub>2</sub></td> <td>&gt; 1.5% v/v</td> <td>Stop works Evacuate all personnel Increase ventilation further to restore CO<sub>2</sub> to &lt;0.5% v/v</td> </tr> </tbody> </table>	Parameter	Measurement	Action	O <sub>2</sub>	< 19% v/v	Increase underground ventilation to restore O <sub>2</sub> to >19% v/v	< 18% v/v	Stop works Evacuate all personnel Increase ventilation further to restore O <sub>2</sub> to >19% v/v	> 10% LEL	Prohibit hot works Increase ventilation to restore CH <sub>4</sub> to <10% LEL	CH <sub>4</sub>	>20% LEL	Stop works Evacuate all personnel Increase ventilation further to restore CH <sub>4</sub> to <10% LEL	>0.5% v/v	Increase ventilation to restore CO <sub>2</sub> to <0.5% v/v	CO <sub>2</sub>	> 1.5% v/v	Stop works Evacuate all personnel Increase ventilation further to restore CO <sub>2</sub> to <0.5% v/v					
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	S.9.9.2.4-9.9.2.5	LG8	<p><b>Emergency Management</b></p> <p>In order to ensure that evacuation procedures are implemented in the event of the trigger levels specified in table above being exceeded, it is recommended that a professional, such as the Safety Officer, is nominated, with duties, to be responsible for dealing with any emergency which may occur due to landfill gas.</p> <p>In an emergency situation, the nominated person or his deputies, shall have the necessary authority and shall ensure that the confined space is evacuated, and the necessary works implemented for reducing the concentrations of gas. The following organisations shall also be contacted as appropriate:</p> <ul style="list-style-type: none"> <li>• Hong Kong Police Force;</li> <li>• Fire Services Department; and</li> <li>• Environmental Protection Department.</li> </ul>	Minimise safety risk related to landfill gas	Contractor	Area with safety concern related to landfill gas	Construction Phase	<ul style="list-style-type: none"> <li>• EPD/TR8/97</li> <li>• ProPECC PN 3/96</li> </ul>																	
<b>Landfill Gas Hazard (Operational Phase)</b>																									
S.9.9.4.2	LG9	All access to confined spaces should be restricted only to authorized personnel and should be informed of the landfill gas hazard. No general public should be permitted or allowed to access the service voids, manholes, chambers or wells.	Minimise safety risk related to landfill gas	Operator	Area with safety concern related to landfill gas	Operational Phase	<ul style="list-style-type: none"> <li>• EPD/TR8/97</li> <li>• ProPECC PN 3/96</li> </ul>																		
S.9.9.4.3	LG10	During operation, regular monitoring of landfill gas should be conducted at buildings and enclosures (e.g. proposed Administration Building, Maintenance Compound, temporary re-provisioning of EMSD Servicing Centre, service manholes, etc.) within the Consultation Zone to verify the effectiveness and to ensure the continued performance of the implemented	Minimise safety risk related to landfill gas	Operator	Area with safety concern related to landfill gas	Operational Phase	<ul style="list-style-type: none"> <li>• EPD/TR8/97</li> <li>• ProPECC PN 3/96</li> </ul>																		

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		protection measures. Should abnormality be observed, it should be reported to EPD and the PPVL operator.					
S.9.9.4.1	LG11	All operation and maintenance staff should be informed of the potential landfill gas hazards. The operation team will be responsible to train and to ensure that their staff take appropriate safety precautions at all times when entering enclosed rooms or any service voids, manholes, chambers or culvert within the proposed site.	Minimise safety risk related to landfill gas	Operator	Area with safety concern related to landfill gas	Operational Phase	<ul style="list-style-type: none"> <li>• EPD/TR8/97</li> <li>• ProPECC PN 3/96</li> </ul>
<b>Ecological Impact - Terrestrial (Construction)</b>							
S.10.10.3	E1	Minimisation of Habitat Loss/Disturbance and Impacts to Fauna Species of Conservation Importance	To avoid habitat Loss/disturbance and Impacts to Fauna Species of Conservation Importance	Project Proponent	All site area	Design Phase	<ul style="list-style-type: none"> <li>• EIA</li> </ul>
S.10.10.2	E2	Avoidance of Impacts to Ecologically Sensitive Habitats	To avoid direct loss of recognized sites of conservation importance	Contractor	All site area	Construction Phase	<ul style="list-style-type: none"> <li>• EIA</li> </ul>
S.10.10.4	E3	Protection of Flora Species of Conservation Importance  Two flora species of conservation importance, including one individual of <i>Diospyros vaccinioides</i> was recorded and a small patch of <i>Gnetum luofuense</i> in mixed woodland near Pillar Point and near Wah Fat Playground, respectively, within the Project Area (aboveground) during the ecological baseline survey. Detailed vegetation survey should be conducted by suitably qualified botanist/ecologist for the Project Area (aboveground) within mixed woodland and shrubland/grassland at Pillar Point and near Wah Fat Playground prior to the commencement of construction activities at the mentioned locations to confirm the presence of flora species of conservation interest. If on-site preservation is not feasible, transplanted and/or mitigation measures would be recommended as far as possible to minimize the unavoidable direct loss of these species. Transplantation proposal for the affected individuals would be prepared if necessary. Potential recipient sites for the	To protect the individuals of flora species of conservation importance	Contractor	Mixed woodland near Pillar Point and near Wah Fat Playground	Construction Phase	<ul style="list-style-type: none"> <li>• EIA</li> </ul>



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		<p>affected flora species were identified within close vicinity of their original locations and indicated in Figure 10.7 of the EIA report. A monitoring programme should be prepared in the transplantation proposal by a suitably qualified botanist/ecologist at the recipient site to monitor the health conditions of the transplanted individuals upon the completion of transplantation works at the recipient site.</p>					
S.10.10.5	E4	<p>Protection of Fauna Species of Conservation Importance</p> <p>Fauna species of conservation importance including Freshwater Crab species, <i>Somanniathelphusa zanklon</i>, was recorded in S2 while <i>Somanniathelphusa zanklon</i>, <i>Cryptopotamon anacoluthon</i>, and <i>Nanhaipotamon hongkongense</i> were recorded were recorded at the lower watercourse section where S2 and S2A is connected. Periphery drainage system surrounding the Project Area is recommended to prevent runoff affecting the three Freshwater Crab species located at S2A.</p> <p>To avoid the potential direct impact on any freshwater crab species of conservation importance, prior to commencement of the stream diversion and construction works near Wah Fat Playground, an update Freshwater Crab survey should be conducted. The survey should be conducted by a qualified ecologist as part of the Environmental Team (ET) and cover the stretch of the watercourse S2 and S2A. Should species of conservation importance be found within the affected watercourse sections, a Freshwater Crab Translocation Plan should be prepared. Freshwater crab translocation should be conducted to move the affected individuals from the Project Area (aboveground) to suitable recipient site(s). A potential recipient site was identified and indicated in <b>Figure 10.7</b>. The recipient site was selected as it was observed to be a semi-natural watercourse with permanent flow and has a pre-existing population of other freshwater crab species of conservation concern within its vicinity which suggest the environmental conditions would have the potential to support the translocated individuals.</p>	<p>To protect the individuals of fauna specie of conservation importance</p>	Contractor	Watercourse S2, S2A	Construction Phase	<ul style="list-style-type: none"> <li>EIA</li> </ul>

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		<p>The Freshwater Crab Translocation Plan should be prepared by the qualified ecologist as a part of the ET, certified by the Independent Environmental Checker (IEC) and submitted to AFCD within four months upon completion of the update aquatic survey to agree the detailed translocation procedures including the identified receptor site(s) and post-translocation monitoring programme. Approval from the Authority (e.g. AFCD and EPD) should be sought prior to conducting the freshwater crab translocation work.</p> <p>The freshwater crab translocation work should be conducted prior to the commencement of the stream diversion works near Wah Fat Playground, following the approved Freshwater Crab Translocation Plan. Upon the completion of the translocation work, post-translocation survey should be conducted at the recipient site to monitor the effectiveness of translocation.</p>					
S.10.10.6.1	E5	<p>The following construction phase mitigation measures are proposed to reduce predicted disturbance impacts and impact of water pollution to an acceptable level:</p> <ul style="list-style-type: none"> <li>• Strong artificial lighting should not be used in the Project Area (aboveground) near Tai Lam Country Park at night to avoid disturbance to the natural habitats. Lighting required for safety purpose should keep minimal and pointed inward. Clear signs should be erected on site to alert all site staff and workers about the requirement;</li> <li>• Stream diversion works with green channel design elements will be carried out to divert any water flow from the upper sections of the watercourses within Project Area (i.e. S1, S2 and S3) to the lower sections of the watercourses with similar ecological features and/or hydrology setting outside the Project Area so as to maintain the flow between unaffected sections of the stream and to avoid excessive water flow entering the construction area. Detailed design of any stream diversion should follow the guidelines in <i>ETWB Technical Circular (Works) No. 5/2005 (Protection of natural streams/rivers</i></li> </ul>	To minimization of physical disturbance to the surrounding habitats	Contractor	All site area	Construction Phase	<ul style="list-style-type: none"> <li>• EIA</li> </ul>

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		<p><i>from adverse impacts arising from construction works) and appropriate construction methods should be used;</i></p> <ul style="list-style-type: none"> <li>• Stream diversion works/works near the periphery of the diverted streams/unaffected downstream sections shall preferably be performed during dry season when waterflow is low to avoid/minimize potential site run-off or associated impacts to the unaffected downstream sections;</li> <li>• Sandbags/appropriate containment measures shall be used to isolate works near the periphery of the diverted streams/unaffected downstream sections to avoid/minimize potential site run-off or associated impacts to the unaffected downstream sections;</li> <li>• Periphery drainage system surrounding the Project Area is recommended to prevent runoff affecting the three Freshwater Crab species located at S2A.</li> <li>• Implementing measures to minimise magnitude of construction runoff and to avoid/ minimise the potential impact of spillage events, if any, and</li> <li>• Appropriate measures including the provision of temporary movable toilets should be adopted. Controlled wastewater discharge to the nearby water bodies will be implemented in accordance with the guidelines stipulated in Environmental Protection Department (EPD)'s Practice Note for Professional Persons on Construction Site Drainage (ProPECC PN1/94) during the construction works to properly control site run-off and drainage and to minimise the potential water quality impact.</li> </ul>					
S.10.10.6.2	E6	<p>Good site practice should also be adopted to minimize potential disturbances to the surrounding habitats, including:</p> <ul style="list-style-type: none"> <li>• Avoid any damage and disturbance, particularly those caused by filling and illegal dumping to the surrounding habitats, especially watercourses;</li> <li>• Excavated materials will be covered and/or properly disposed of as soon as possible to avoid being washed into nearby water bodies;</li> <li>• Regularly check the site boundaries to ensure that they are not breached and that no damage occurs to surrounding</li> </ul>	To minimization of physical disturbance to the surrounding habitats	Contractor	All site area	Construction Phase	<ul style="list-style-type: none"> <li>• EIA</li> </ul>

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		<p>ecologically sensitive habitats (e.g. mixed woodlands, shrubland/grassland and watercourses); and</p> <ul style="list-style-type: none"> <li>Prohibit and prevent open fires within the site boundary during construction and provide temporary firefighting equipment in the work areas</li> </ul>					
S.10.10.7.1 - 10.10.7.5	E7	<p>Vegetation in the Project Area (aboveground), particularly in mixed woodland, plantation and shrubland/grassland, will unavoidably be affected as a result of site clearance. The mixed woodland to be lost are mainly woodland fringes, that are next to developed area and are subject to considerable level of human disturbance, as such is considered to be of low to moderate ecological value, while plantation and shrubland/grassland are considered to be of low ecological value. Compensatory woodland planting is therefore suggested to mitigate the loss of approximately ~2.2ha of mixed woodland.</p> <p>Nevertheless, on-site woodland compensation is not considered feasible due to limited space within the Project Area and on-site impracticability., and thus, off-site compensatory woodland planting is considered the only feasible option.</p> <p>Woodland compensation would follow the “like for like” basis for provision of off-site mitigation measures to the extent that is practicable according to Annex 16 of EIAO-TM, a compensatory woodland planting ratio of 1:1 in terms of the compensatory planting area (~2.2ha) will be considered and thorough justification for any eventually adopted scenario deviating from the aforesaid ratio will be provided.</p> <p>In the compensation site selection process, developed areas, plantation and shrubland/grassland with a slope angle smaller than 35° on government land, outside Country Parks, firing range, SSSIs and “Conservation Area” will be considered as potential compensatory woodland planting sites. Compensatory woodlands can be established on vacant developed areas deprived of vegetation, while native tree species can be planted in shrubland/grassland to facilitate</p>	To minimization of physical disturbance to the surrounding habitats	Contractor	Compensation Site	Construction Phase	<ul style="list-style-type: none"> <li>EIA</li> </ul>

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		<p>succession to woodland. Areas (with approximate size of 3.1 ha) near the Southern Portal in Tuen Mun South (i.e. next to the potential location of compensatory woodland planting sites under the Route 11 Project) fulfilling the criteria above, is identified as a potential compensatory woodland planting sites. The size and extent of the compensatory woodland planting sites will be subject to further review upon to confirmation of the extent of mixed woodland to be lost during the detailed design stage.</p> <p>Compensatory planting with native species is preferred for the purpose of compensatory planting. The native tree species to be selected for planting should be referenced to the native trees occurring in the existing similar habitat within the assessment area. Early and timely arrangement with forest nursery for propagation of the seedlings should be made to ensure the availability of both the species and the quantity required. At maturity, the compensatory planting areas would create a habitat with different layers (i.e. canopy, middle layer and understory), which promotes habitat complexity and in turn enhancing the ecological value. A woodland compensation plan and tree compensation plan will be submitted in the detailed design stage.</p> <p>The management and maintenance of the woodland compensation area should follow the Development Bureau Technical Circular (Works) No. 6/2015 Maintenance of Vegetation and Hard Landscape Features. Details of the management and maintenance program will be included in the woodland compensation plan to be submitted in the detailed design stage and agreed with relevant authorities. With the implementation of the proposed compensatory planting, ecological impact arising from the permanent loss of woodland would be compensated.</p>					
S. 10.10.8	E8	<p><u>Minimization of Groundwater Infiltration</u></p> <p>Whilst conducting tunnelling works, the Contractor should adopt suitable water control strategies, which are applicable</p>	Minimization of groundwater infiltration within	Contractor	Tunneling Sections	Construction Phase	<ul style="list-style-type: none"> <li>EIA</li> </ul>

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		to both TBM tunnelling and drill-and-blast/drill-and-break tunnelling, as far as practicable. With the implementation of suitable mitigation measures no significant impact related to groundwater infiltration is anticipated from the proposed tunnelling works, including those within the Tai Lam Country Park. Detailed measures are stated in Log. Ref. W3.	Tai Lam Country Park				
S. 10.12.1.5	E9	<p><u>Monitoring on Mitigation Measures on Groundwater Infiltration</u></p> <p>No significant impacts related to ground water infiltration is anticipated for the proposed tunnelling works including those within the Tai Lam Country Park with the implementation of suitable mitigation measures as discussed in Log. Ref. W3. As an additional precautionary measure, Surface water level monitoring at natural watercourses within Tai Lam Country Park, Lam Tei Irrigation Reservoir, and in the vicinity of the tunnelling works would be conducted during the construction and operation stages. Monthly monitoring should be conducted at the selected watercourses to monitor parameters (including water depth and water velocity) to record and evaluate if any abnormal significant decrease of the water level is arising from the Project. In case abnormalities are detected, the monitoring arrangement and remedial measures (if required) should be reported to EPD (who is the EIAO authority), AFCDD and other relevant authorities. Details of the monitoring, including the monitoring locations, shall be agreed with AFCDD during the detailed design stage prior to commencement of any construction activities.</p>	Precautionary measure to monitor on mitigation measures on groundwater infiltration	Contractor	Tai Lam Country Park	Construction Phase	<ul style="list-style-type: none"> <li>EIA</li> </ul>
<b><i>Landscape and Visual Impacts (Construction Phase)</i></b>							
S.11.9.1.3	LV1	<p><u>Tree Protection and Preservation</u></p> <ul style="list-style-type: none"> <li>Trees within the Works Area which are not affected by the works shall be protected and preserved during the detailed design stage and construction phase. The tree preservation proposals shall be coordinated with the layout and design of the engineering and architectural works at the detailed design stage for further retention of individual trees.</li> <li>The preservation of existing tree shall provide instant greening and screening effect for proposed works. Tree</li> </ul>	Protect and preserve retained trees	Contractor	All construction on site	Construction Phase	<ul style="list-style-type: none"> <li>EIA</li> <li>DEVB TCW No. 4/2020</li> </ul>

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		<p>protection works to be undertaken in accordance with DEVB TC(W) 4/2020 on “Tree Preservation” and tree risk assessment in accordance with “Guidelines for Tree Risk Assessment and Management Arrangement” by DEVB. The performance of the retained trees shall be monitored throughout the Construction period on a monthly basis by a qualified Arborist. The Contractor shall submit monthly record photo throughout the construction period for all retained trees, to demonstrate the trees’ health condition. All monthly record photos for the retained trees shall be prepared by a tree specialist or a qualified arborist, and endorsed by a registered Landscape Architect (RLA).</p>					
S.11.9.1.3	LV2	<p><u>Tree Transplantation</u></p> <ul style="list-style-type: none"> <li>• Should removal of trees be unavoidable due to construction impacts, trees should be transplanted to other permanent locations, if practicable.</li> <li>• Detailed transplanting proposal will be submitted to relevant government departments for approval and shall be in accordance with “Guidelines on Tree Transplanting” by DEVB. Final locations of transplanted trees shall be agreed prior to commencement of the work.</li> <li>• The performance of the transplanted trees shall be monitored throughout the construction period by a Qualified Arborist. The monthly record photos shall be prepared by a Qualified Arborist, and are endorsed by a registered Landscape Architect (RLA).</li> </ul>	Trees should be transplanted if practicable.	Contractor / Project Proponent	All construction on site	Construction Phase	<ul style="list-style-type: none"> <li>• EIA</li> <li>• DEVB TCW No. 4/2020</li> </ul>
S.11.9.1.3	LV3	<p><u>Works Area and Temporary Works Areas</u></p> <ul style="list-style-type: none"> <li>• Construction area control, where possible, to ensure that the landscape and visual impacts arising from the construction activities are minimized, and all affected area will be re-instated accordingly. This includes the reduction of the extent and location of working areas to avoid sensitive LRs, siting of offices or temporary structures so that they are not visually prominent, and consideration of detailed schedules to shorten the construction period.</li> <li>• Temporary landscape treatments are considered to be adopted such as applying hydro-seeding on temporary</li> </ul>	Landscape and visual impacts arising from the construction activities are minimized.	Contractor	All construction on site	Construction Phase	<ul style="list-style-type: none"> <li>• EIA</li> <li>• DEVB TCW No. 4/2020</li> </ul>

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		stockpiles and areas of earthworks to alleviate the potential impacts and minimize soil erosion.					
S.11.9.1.3	LV4	<u>Advance Implementation of Mitigation Planting</u> <ul style="list-style-type: none"> <li>Replanting of existing / disturbed vegetation shall be undertaken as soon as technically feasible during the construction phase.</li> <li>The priority shall be areas at the periphery of the site to ensure that proposed planting fulfils its role in mitigating the predicted impacts including screening views of the proposals as early as possible during the operational phase.</li> </ul>	Replanting of existing / disturbed vegetation as soon as technically feasible.	Contractor	All construction site	Construction Phase	<ul style="list-style-type: none"> <li>Guidelines on Industry Best Practices for External Lighting Installations</li> </ul>
S.11.9.1.3	LV5	<u>Decorative Screen Hoarding</u> <ul style="list-style-type: none"> <li>Decorative screen hoarding will be erected along areas of the construction works site boundary where the works site borders publicly accessible routes and/or is close to visually sensitive receivers (VSRs) to screen undesirable views of the works site.</li> <li>It is proposed that the screening be compatible with the surrounding environment and where possible, non-reflective, recessive colours be used.</li> </ul>	Screen undesirable views of the works site.	Contractor	All construction site	Construction Phase	<ul style="list-style-type: none"> <li>Guidelines on Industry Best Practices for External Lighting Installations</li> </ul>
S.11.9.1.3	LV6	<u>Control of night-time lighting</u> <ul style="list-style-type: none"> <li>Control of night-time lighting and Construction traffic (land and sea) reduced to practical minimum.</li> </ul>	Minimize visual impact of night-time lighting.	Contractor	All construction site	Construction Phase	<ul style="list-style-type: none"> <li>Guidelines on Industry Best Practices for External Lighting Installations</li> </ul>
<b><i>Landscape and Visual Impacts (Operational Phase)</i></b>							
S.11.9.1.5	LV7	<b>Integrated Design Approach</b> <ul style="list-style-type: none"> <li>The alignment and structures associated with the new road should be integrated, as far as technically feasible, with existing roadside structures and the landscape context to reduce the potential cumulative impact of the proposed works. ACABAS submission upon completion of conceptual design should be in accordance with ETWB TCW No. 36/2004 – The Advisory Committee on the Appearance of Bridges and Associated Structures (ACABAS).</li> <li>The location and orientation of the associated structures and tunnel ventilation shaft should where possible avoid</li> </ul>	Improve compatibility with the existing site context.	Contractor/ HyD	Onsite where possible. Otherwise consider off-site locations	Detailed design and operational phase	<ul style="list-style-type: none"> <li>EIAO-TM</li> <li>DEVB TCW No. 4/2020</li> <li>ETWB TC(W) No. 8/2005</li> </ul>



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		<p>landscape and visually sensitive areas such woodland, shrubland, and plantation area. The architectural design should seek to reduce the apparent visual mass of the engineering structures through the use of textured finishes and colour blocking. Earth tones are preferred so as to match the existing landscape and visual context.</p> <ul style="list-style-type: none"> <li>• Aesthetic treatment and Design of the building and tunnel ventilation shaft should be vetted and advised upon by ArchSD in accordance with ETWB TCW No. 8/2005 – Aesthetic Design of Ancillary Buildings in Engineering Projects.</li> </ul>					
S.11.9.1.5	LV8	<p><u>Roadside Planting</u></p> <ul style="list-style-type: none"> <li>• Roadside planting shall be provided along the road improvement works as a green buffer to the adjacent VSRs. Greening Provision in the early project planning stage and shall be in accordance with DEVB TCW No. 2/2012- allocation of space for quality greening on Roads.</li> <li>• Greening provision in the early project planning stage and shall be in accordance with DEVB TC(W) No. 2/2012 – Allocation of Space for Quality Greening on Roads.</li> <li>• Native tree planting on the existing and proposed cut slopes will improve the ecological connectivity between existing woodland habitats with the advantage of creating a more coherent landscape framework.</li> <li>• Vertical greening with native self-clinging climbing would be adopted as far as practical.</li> </ul>	Maximize roadside planting.	Contractor/ HyD	All structures as feasible, final location to be confirmed at detailed design phase	Detailed design and operational phase	<ul style="list-style-type: none"> <li>• DEVB TC(W) No. 4/2020</li> </ul>
S.1.1.9.1.5	LV9	<p><u>Compensatory Planting Proposals</u></p> <ul style="list-style-type: none"> <li>• In accordance with DEVB TC(W) No. 4/2020, the compensatory planting proposal should have the basic primary objective of planting compensatory trees in a ratio not less than 1:1 in terms of quantity as far as practicable.</li> <li>• With the implementation of the proposed compensatory planting plan, there will be no net loss of trees in terms of quantity as far as practicable.</li> <li>• The number of trees to be planted will be confirmed following the completion of the detailed tree survey in Detail Design stage of the project.</li> </ul>	Tree compensation.	Contractor/ HyD	Selected sites as feasible, final location to be confirmed at detailed design phase	Detailed design and operational phase	<ul style="list-style-type: none"> <li>• DEVB TC(W) No. 4/2020</li> </ul>

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S.11.9.1.5	LV10	<p><u>Post-Planting Monitoring</u></p> <ul style="list-style-type: none"> <li>Post-planting monitoring of the compensatory trees shall be undertaken (namely, duration of the post-planting monitoring and monitoring methodology). The monitoring will be aimed to assess the success and performance of the compensatory planting trees, monitor the growth performance of the planted seedlings and whips, and identify any need of vegetation and site maintenance work.</li> <li>All monthly record photos shall be prepared by a tree specialist or a qualified arborist, and endorsed by a registered Landscape Architect (RLA).</li> </ul>	Ensure the performance of the compensatory planting trees.	Contractor/ HyD	Selected structures as feasible, final location to be confirmed at detailed design phase	Detailed design and operational phase	<ul style="list-style-type: none"> <li>EIAO-TM</li> <li>DEVB TC(W) No. 4/2020</li> </ul>
S.11.9.1.5	LV11	<p><u>Treatment of Retaining Wall and Slopes</u></p> <ul style="list-style-type: none"> <li>The design and implementation of the aesthetic appearance of the retaining wall and slopes will be undertaken in accordance with GEO Publication No. 1/2011 – Technical Guidelines on Landscape Treatment for Slopes (2011), and WBTC No. 17/2000 on Improvement to the Appearance of Slopes. All aesthetic treatment shall seek the committee’s view in accordance with the ETWB TCW No. 36/2004- The Advisory Committee on the Appearance of Bridges and Associated Structures (ACABAS).</li> <li>The engineered structures will be aesthetically enhanced through the use of soft landscape works including tree and shrub planting to give these man- made features a more natural appearance and blending them into the local rural landscape.</li> <li>Light standard sized or whip tree planting will be used on the face of soil cut slopes with a gradient of less than 30 degrees, at the crest and toe of the slope, and within berm planters. These smaller, younger plants will adapt to their new growing conditions more quickly than larger sized stock and establish a naturalistic effect more rapidly.</li> <li>Slopes with a gradient of greater than 30 degrees will be hydroseeded using a mixture of native trees and shrubs.</li> </ul>	Improve visual amenity of the retaining structure	Contractor/ HyD	Selected structures as feasible	Detailed design and operational phase	<ul style="list-style-type: none"> <li>GEO Publication No. 1/2011</li> <li>WBTC No. 17/2000</li> <li>ETWB TC(W) No. 36/2004</li> </ul>

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		<p>Vertical greening measures shall also be considered on engineering structures. This includes the use of climbing and trailing plants both planted at the crest and toe of the features, and within pockets within the slopes.</p> <ul style="list-style-type: none"> <li>It is proposed that native species be used to enhance the ecological value of the road corridor and minimize potential maintenance requirements. These measures will be applied to the retaining walls and newly regraded slopes features. Vertical greening with native self-clinging climbing would be adopted as far as practical.</li> </ul>					
S.11.9.1.5	LV12	<p><u>Design of Tunnel Portals</u> The design of the tunnel portals shall be Sensitive form, height and disposition to minimize impact on perceived bulk and views to visual resources. The “natural terrain” idea will be applied to the design of tunnel portals, and should provide:</p> <ul style="list-style-type: none"> <li>Tunnel entry and exit portals and approaches with a minimal physical and visual footprint, retaining or reinstating as much as possible of the surrounding landform and vegetation;</li> <li>Simple, sculptural portal structures (preferably elliptical, parabolic or circular forms) against a backdrop of vegetation;</li> <li>Compatible and blend in with existing site context and background.</li> </ul> <p>All aesthetic treatment shall seek the committee’s view in accordance with the ETWB TCW No. 36/2004- The Advisory Committee on the Appearance of Bridges and Associated Structures (ACABAS). Vertical greening with native self-clinging climbing would be adopted as far as practical.</p>	Improve visual amenity of the tunnel portals.	Contractor/ HyD	Tunnel Portal	Detailed design and operational phase	<ul style="list-style-type: none"> <li>ETWB TC(W) No. 36/2004</li> </ul>
S.11.9.1.5	LV13	<p><u>Reinstatement of disturbed Landscape Space</u></p> <ul style="list-style-type: none"> <li>Existing open space in Wah Fat Street will be impacted upon during construction stage. After completion of the construction for the TMB tunnel, the works area will be reinstated and to integrate with the existing Wah Fat Playground located in Wah Fat Street.</li> <li>All hard and soft landscape areas disturbed temporarily during construction due to temporary excavations,</li> </ul>	Improve visual amenity and re-provide landscape / planting area of the open space.	Contractor/ HyD	Wah Fat Playground	Detailed design and operational phase	<ul style="list-style-type: none"> <li>ETWB TC(W) No. 36/2004</li> </ul>

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		temporary works sites shall be reinstated to equal or better quality, to the satisfaction of the relevant Government Departments.																					
<b>Cultural Heritage (Construction)</b>																							
S.12.6.1.3	CH1	As a precautionary measure, the project proponent and his/her contractor are required to inform AMO immediately when any antiquities or supposed antiquities under the Antiquities and Monuments Ordinance (Cap. 53) are discovered during the course of works.	Minimise impact to any antiquities or supposed antiquities under the Antiquities and Monuments Ordinance (Cap. 53)	Contractor	All site area	Construction Phase	• AMO																
S.12.6.1.6	CH2	<p><u>Built Heritage Mitigation Measures</u></p> <ul style="list-style-type: none"> <li>Potential vibration impact and cumulative built heritage impact rising from concurrent project <i>Traffic Improvement Scheme in Tuen Mun – Widening and Addition of Slip roads at Lung Fu Road/Tuen Mun Road/ Wong Chu Road/ Hoi Wing Road</i> may be a concern for the Shing Miu (Grade 2 historic building) (GB-02). Special attention should be paid to design proposal, method of works and choice of machinery should be targeted to minimize adverse impacts to the Shing Miu (Grade 2 historic building) GB-02, built heritage items BH-02 and BH-03. Any vibration and building movement induced from the proposed works should be strictly monitored to ensure no physical damages made to the heritage sites during the course of works. Monitoring proposal for the GB-02, including checkpoint locations, installation details, response actions for each of the Alert/ Alarm/ Action (3As) levels and frequency of monitoring should be submitted for AMO's consideration. Recommended 3As levels for GB-02 are shown as below:</li> </ul> <table border="1"> <thead> <tr> <th>Type of Monitoring for</th> <th>Alert</th> <th>Alarm</th> <th>Action</th> </tr> </thead> <tbody> <tr> <td>Vibration (PPV)</td> <td>5mm/s</td> <td>6mm/s</td> <td>7.5mm/s</td> </tr> <tr> <td>Settlement</td> <td>6mm</td> <td>8mm</td> <td>10mm</td> </tr> <tr> <td>Tilting</td> <td>1/2000</td> <td>1/1500</td> <td>1/1000</td> </tr> </tbody> </table>	Type of Monitoring for	Alert	Alarm	Action	Vibration (PPV)	5mm/s	6mm/s	7.5mm/s	Settlement	6mm	8mm	10mm	Tilting	1/2000	1/1500	1/1000	Minimise impact to any antiquities or supposed antiquities under the Antiquities and Monuments Ordinance (Cap. 53)	Contractor	At the Shing Miu (Grade 2 historic building) GB-02, built heritage items BH-02 and BH-03.	Construction Phase	• AMO
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S.12.6.1.8	CH3	Furthermore, for BH-03, appropriate protective and mitigation measures are to be recommended during detail design stage of the Project when the structural condition and assessment of BH-03 and the historic features are verified during detailed design stage of the Project. The protective and mitigation measures should be agreed by AMO, and to be implemented to the satisfaction of AMO to safeguard against any potential adverse impact.	Minimise impact to any antiquities or supposed antiquities under the Antiquities and Monuments Ordinance (Cap. 53)	Contractor	At built heritage site, BH-03	Construction Phase	• AMO
S.12.6.1.9	CH4	Excavation works in close vicinity to the heritage site should not jeopardize stability of the historic structures. It should not undermine or cause damage to foundation of the historic structures. Foundation information of the historic structures shall be verified on site if needed, sufficient lateral support should be provided and de-watering (if required) should be carried out with great cautions to control ground movement and change of ground water regime at the heritage site.	Minimise impact to any antiquities or supposed antiquities under the Antiquities and Monuments Ordinance (Cap. 53)	Contractor	At the Shing Miu (Grade 2 historic building) GB-02, . built heritage items BH-02 and BH-03.	Construction Phase	• AMO
S.12.6.1.10	CH5	Installation of monitoring checkpoints shall be carried out in great care and adequate protection shall be provided so as to avoid unnecessary disturbance / damage to the historic fabrics. Photo records of monitoring checkpoints shall be submitted upon installation for AMO's records. Monitoring records should be submitted to AMO on regular basis and please alert AMO should the monitoring reach Alert/ Alarm/ Action levels.	Minimise impact to any antiquities or supposed antiquities under the Antiquities and Monuments Ordinance (Cap. 53)	Contractor	At the Shing Miu (Grade 2 historic building) GB-02, . built heritage items BH-02 and BH-03.	Construction Phase	• AMO
S.12.6.1.11	CH6	Pre and post condition survey should be carried out to record conditions of the heritage site and survey reports should be submitted for AMO's record.	Minimise impact to any antiquities or supposed antiquities under the Antiquities and Monuments Ordinance (Cap. 53)	Contractor	At the Shing Miu (Grade 2 historic building) GB-02, . built heritage items BH-	Construction Phase	• AMO

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