



Civil Engineering and Development Department

Agreement No. CE 38/2008 (HY)

Trunk Road T2

Environmental Impact Assessment

Executive Summary

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Report No F0146-EB000560-MIEL-HKR-02

Date 11 July 2013

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1 INTRODUCTION

1.1 Project Background

1.1.1 The overall Kai Tak Development (KTD) was a designated project under Schedule 3 of the Environmental Impact Assessment Ordinance (EIAO). The Schedule 3 EIA Report for the overall Kai Tak Development (EIAO Register No. AEIAR-130/2009) was carried out under the Kai Tak Development Engineering Study (KTDES, Agreement No. CE35/2006(CE)) and was approved by Environmental Protection Department under the EIAO on 4 March 2009. As a part of the strategic road network within the KTD, Route 6 forms an east west express link between West Kowloon and Tseung Kwan O. Route 6 comprises the Central Kowloon Route (CKR), Trunk Road T2 and Tseung Kwan O – Lam Tin Tunnel (TKO-LTT).

1.1.2 The Trunk Road T2 project (the Project) is a designated project under Schedule 2 of the EIAO and previously broadly assessed in the KTD Schedule 3 EIA. The Civil Engineering and Development Department (CEDD) (Project Proponent) submitted the Project Profile (No. PP-379/2009) for application for an EIA study brief for the Trunk Road T2 Project under the EIAO on 24 March 2009. Accordingly, an EIA Study Brief (ESB-203/2009) for the Trunk Road T2 Project was issued on 30 April 2009.

1.1.3 The main element of the Trunk Road T2 works comprise the construction of a trunk road connecting with the CKR at the South Apron area and the TKO-LTT at the Cha Kwo Ling (CKL) area. [Figure 1.1](#) shows the demarcation between the Trunk Road T2, CKR and TKO-LTT, which will form the basis of respective environmental impact assessments (EIAs). This Executive Summary highlights the key findings of the EIA for the Trunk Road T2 project to comply with the EIA Ordinance (EIAO).

1.2 Alignment Options and Construction Method

1.2.1 A number of alignment options were identified and considered based upon project constrains. Also, construction methods including the immersed tube (IMT) method and the tunnel boring machine (TBM) method were considered for the major part of T2 i.e. the subsea tunnel. It is concluded that the selected option in [Figure 1.1](#), which is based on the TBM method, is preferred from overall environmental and engineering considerations.

1.2.2 Compared with the subsea tunnel from the IMT method in the KTDES, the subsea tunnel's horizontal alignment of the selected option generally follows the horizontal alignment in the KTDES except that the overall width of two tunnel tubes, plus the separation in-between, is wider than that of the IMT method of the subsea tunnel in the KTDES. The subsea tunnel's vertical alignment of the selection option is generally deeper than the vertical alignment of the subsea tunnel in the KTDES because the TBM method requires a deeper vertical alignment than the IMT method due to technical reasons.

1.2.3 For the land section at the South Apron, the selected option's tunnel alignment, after entering the seawall at South Apron, rises at a gradient of up to about 5%. The

westbound carriageway of the tunnel, under this gradient, has added a climbing lane to ensure smooth traffic flows. The carriageway rises up through a depressed road and becomes at-grade at the location of Jordan Valley Box Culvert.

- 1.2.4 For the land section at the Cha Kwo Ling, the selected option's tunnel alignment connects with the TKO-LTT near the waterfront at about the same location in the KTDES. The vertical alignment at this short section of tunnel is considerably deeper than that in the KTDES due to the adjustment in level of the TKO-LTT compared with its vertical alignment at that time.

2 PROJECT DESCRIPTION

2.1 Project Scope

- 2.1.1 Further to the recommendations of the option assessment and subsequent alignment developments, the preferred Trunk Road T2 is shown in [Figure 1.1](#) and will comprise:

- a dual two-lane trunk road of approximately 3.0km long with about 2.7km of the trunk road in the form of a tunnel;
- ventilation and administration buildings and a traffic control and surveillance system; and
- associated civil, electrical, mechanical, landscaping and environmental protection and mitigation works.

2.2 Project Programme

- 2.2.1 The Trunk Road T2 project construction works are anticipated to commence at the end of 2015 with completion of the project by end 2020.

2.3 Need of the Project

- 2.3.1 The Trunk Road T2, together with the proposed CKR and TKO-LTT, will form the Route 6 alignment, a strategic road network. Route 6 will provide an east-west express link between West Kowloon and Tseung Kwan O (TKO) and provide the necessary relief to the existing heavily utilised road network in the central and eastern Kowloon areas, thereby reducing the associated environmental impacts in these areas.

- 2.3.2 The CKR is planned to be completed in 2020 to avoid serious traffic congestion in major east-west road links, such as Gascoigne Road Flyover and Chatham Road North. The TKO-LTT is also planned to be completed in 2020 to meet the anticipated traffic demand generated from further development of Tseung Kwan O (TKO). The Trunk Road T2, being the middle section of Route 6 connecting the CKR and TKO-LTT, is, therefore, also, targeted to be completed in 2020 to tie in with the completion of the remaining sections of Route 6.

- 2.3.3 On an independently-operated basis, that is without Trunk Road T2, CKR functions primarily as a link between West Kowloon and Kowloon Bay. The TKO-LTT, also, under an independently-operated basis, functions primarily as a link between Tseung Kwan O and Kwun Tong. Traffic from West Kowloon to TKO or vice versa in these cases would primarily rely on the district and strategic roads including Kwun Tong Bypass, Kwun Tong Road, Kai Fuk Road, etc and would increase the usage of these roads with the traffic growth and incur capacity issues. Thus, the Trunk Road T2, being the middle part of Route 6, has to be in place in order to provide a direct link between CKR and TKO-LTT. Without Trunk Road T2, existing roads would become more congested leading to potentially more noise and pollution impacts when CKR and TKO-LTT are completed.

3 KEY FINDINGS OF THE ENVIRONMENTAL IMPACT ASSESSMENT

3.1 Overall Approach

- 3.1.1 The EIA Study has been conducted in accordance with the EIAO Study Brief No. ESB-203/2009, following the guidelines on assessment methodologies in the Technical Memorandum on Environmental Impact Assessment (EIAO-TM).
- 3.1.2 The Trunk Road T2 is middle part of Route 6 connecting CKR and TKO-LTT. In this regard, relevant environmental impacts of the Trunk Road T2 have been assessed as part of the cumulative impacts in the CKR and TKO-LTT EIA Reports, both of which have already been submitted under the EIAO and have been approved for consultation by the Director of Environmental Protection (DEP).

3.2 Environmentally Friendly Design

- 3.2.1 As noted above, a thorough option assessment has been undertaken into to define and select the best environment scheme both from a construction and operational perspective.
- 3.2.2 The vertical alignment has been selected on the basis that it will avoid impacts to large areas of existing and future sensitive receivers in the Kai Tak Runway and Kowloon Bay area. While the Trunk Road T2 will pass through the future Kai Tak Development on the South Apron, the Trunk road T2 project is largely in tunnel and the planned developments that would be sensitive to air and noise impacts are being suitably planned with measures including setbacks and centralised air conditioning.
- 3.2.3 While the number and locations of the ventilation buildings are driven by functional requirements, both have been reviewed to minimise and avoid environmental impacts. Two ventilation buildings at either end of the alignment are preferred on environmental grounds having air, noise and landscape and visual benefits over a much larger single building or more buildings. The location of the western ventilation building on the South Apron is highly constrained but has been located as far as practical from the future developments in the Kai Tak development. At the Cha Kwo Ling (CLK) end, it is proposed to locate the eastern ventilation building within the Lam Tine Interchange.

This arrangement reduces visual impact on the CKL seafront, is further away from the CKL village and, is, also, on land that is already developed or will be disturbed for the TKO-LTT project and as such, would not affect any natural resources.

3.2.4 In respect of the horizontal alignment, the adoption of a deep tunnel to be constructed by Tunnel Boring Machine (TBM) has notable environmental advantages over the other feasible construction methods, particularly compared to a cut and cover and immersed tube tunnel method of construction. The use of TBM has resulted in the following environmental and marine benefits:

- involves no dredging operations;
- no impacts to marine ecology and fisheries resources;
- due to the deeper depth of boring, the excavated material will be mainly alluvial or rock suitable for recycle/ re-use (on site or offsite) as public fill;
- minimises above ground works and, hence, noise, air quality and landscape and visual impacts;
- minimises operational noise and air emissions from traffic;
- avoid the reconstruction of the existing sewage submarine outfall and breakwaters and disturbance to the marine operations in the Kwun Tong Typhoon Shelter (KTTS); and
- avoid permanent and temporary reclamations and disturbance to the harbour area.

3.2.5 The Works Areas for the Trunk Road T2 construction have been selected carefully with a view reducing the impact of transporting materials to and from the site and reducing the impacts on the natural environment. Based upon this, the current locations are all located on already disturbed or developed land and are not vegetated and are located as close to the construction works as possible to reduce transportation and its associated visual, air and noise impacts.

3.2.6 In terms of transportation of materials for the Trunk Road T2 project, marine transport for removal of the spoil materials generated has been selected to minimise environmental impacts, minimise disruption to current projects on the KTD and minimise impacts on the Kwun Tong area, in particular the local road network. A barging point with conveyor system is planned to be located close to the TBM launching shaft to minimise the distance for the transport of spoil. The barging point location has recently been used as a cargo handling point and, thus, would have no impact on existing vegetated areas. There would, also, be no marine impacts as works below the water to prepare the barging point for use would not be required.

3.2.7 In summary, the preferred alignment for the Trunk Road T2 as it is seen to provide:

- A technically feasible alignment;

- The best environmental option resulting in significantly less environmental impacts, including reduced quantities of excavated material, no dredging of potentially contaminated marine deposits, reduced impacts on fisheries, water quality and marine ecology and operational noise and air quality benefits and avoidance of vegetated areas;
- Significantly less impact on the users of the KTTS;
- Minimised impacts to KTD;
- Avoidance of impacts on the existing sewage submarine outfall and breakwater; and
- Avoidance of temporary reclamation in the Victoria Harbour.

3.2.8 Based on above and the adopted tunnel alignment for the Truck Road T2, notable environmental impacts would be avoided or minimised.

3.2.9 The major findings of the EIA study are summarised below.

3.3 Air Quality

3.3.1 Construction Phase

3.3.1.1 The major sources of dust of the Trunk Road T2 project will be from construction activities such as site preparation, excavation, road works, foundation works, construction of road and superstructures, the barging point and conveyor system, TBM launching and receiving shafts, mucking out point for TBM process and wind erosion from open works site/areas and stockpiling areas.

3.3.1.2 With the implementation of specific mitigation, including watering 12 times per day, the predicted dust impacts at the Air Sensitive Receivers (ASRs) would comply with the dust criteria stipulated by the EIAO Technical Memorandum.

3.3.1.3 With these proposed mitigation measures, no irreversible adverse residual impacts on air quality will be anticipated during the construction phase.

3.3.2 Operational Phase

3.3.2.1 Potential air quality impact during the operational phase of Trunk Road T2 and other major existing road networks would be dominated by vehicle gaseous emissions, mainly NO₂ and RSP, either from open roads, or via the proposed tunnel portals and ventilation buildings. The Trunk Road T2 air assessment has adopted a conservative approach, utilising the long term average (last five years) of the most recent air quality monitoring data obtained from the EPD's Kwun Tong Air Quality Monitoring Station. This approach may be replaced by a modelling approach using the PATH (Pollutants in the Atmosphere and their Transport over Hong Kong) model but the background air quality estimated by PATH will be less conservative than the above approach.

- 3.3.2.2 Because of the above reason, the overall predicted cumulative levels in this EIA report appear higher than some other EIAs based on the PATH method. However, it should be noted that the contribution of Trunk Road T2 project is low and in the region of only 0% to 8.8% for NO₂, with the majority of the contributions being below 0.5%, and 0 to 1.5% for RSP.
- 3.3.2.3 Notwithstanding the conservative approach adopted, the operational air quality modelling results did not predict any exceedance of the hourly, 24 hourly and annual NO₂ or the 24 hourly and annual RSP AQOs are predicted. Therefore, no mitigation measures are required. No adverse residual impacts are expected to occur during the operation phase.
- ### 3.4 Noise
- 3.4.1 Construction Phase
- 3.4.1.1 Noise Sensitive Receivers (NSRs) identified within proximity of the Trunk Road T2 project include a future hospital development and residential development at the South Apron in Kai Tak, and village houses at Cha Kwo Ling Village.
- 3.4.1.2 Assessments for construction airborne noise and ground-borne noise from the use of the Tunnel Boring Machine (TBM) have been completed at the identified NSRs. The assessment results for air borne noise show that the Trunk Road T2 project would not cause significant impacts to the nearby NSRs with proper implementation of mitigation measures, including quiet equipment and temporary noise barriers, and adverse residual impacts would not be expected. No impacts are predicted for the daytime ground-borne noise and no mitigation measures are required.
- 3.4.2 Operational Phase
- 3.4.2.1 Potential NSRs identified within proximity of the projects included four future hospital developments and a residential development at the South Apron, and village houses at Cha Kwo Ling Village and two future residential developments at ex-Cha Kwo Ling Kaolin Mine Site and Yau Tong Bay.
- 3.4.2.2 Assessments for operation traffic noise and operation fixed plant noise have been completed at the identified NSRs. The proposed fixed plant on the proposed ventilation buildings at the South Apron and Cha Kwo Ling (TKO-LTT Interchange) are not predicted to cause adverse noise impacts during the operational stage at the nearby NSRs. For traffic noise impact, the future NSRs identified at the South Apron have been confirmed as being noise insulated and will, therefore, not rely on openable windows for ventilation and hence, no direct mitigation measures are required. There will be no traffic noise contribution at Cha Kwo Ling by the Trunk Road T2 Project during operation phase as the road will be contained within tunnel along this section.

3.5 Water Quality

3.5.1 Construction Phase

3.5.1.1 The subsea tunnel will be constructed by TBM and as such, no disturbance to the marine waters or seabed will occur and the marine transportation of Construction and Demolition (C&D) materials, will not result in any significant disturbance. Potential water pollution sources have been identified as construction run-off, wastewater discharge from tunnelling and excavation, contaminated groundwater, sewage effluent, accidental spillages and waste construction materials. Mitigation measures including providing perimeter drains, sand/silt removal facilities and oil interceptors, covering excavated and construction materials and spill response plans have been recommended to mitigate any adverse water quality impacts. Routine audit of the implementation of the mitigation measures is recommended during the construction phase EM&A. No adverse water quality impacts are predicted.

3.5.2 Operational Phase

3.5.2.1 Operational phase water quality impacts may be associated with tunnel run-off, surface road run-off, sewage from ventilation buildings and accidental spillage. However, any impacts are considered negligible provided that the recommended mitigation measures are implemented and adverse water quality impacts are not predicted.

3.6 Marine Ecology

3.6.1 Construction Phase

3.6.1.1 As the Trunk Road T2 project is largely in tunnel and the TBM construction method of tunnelling has been adopted, habitat losses in the marine environment have been avoided. The potential site run-off from land based works may lead to temporary water quality issues and an increase in local suspended solids for a short period of time. However, these impacts are predicted to be minor and can be further controlled by the implementation of the recommendations in the Water Quality Impact Assessment and ProPECC PN 1/94 Construction Site Drainage and, thus, they would be temporary and negligible with good site practices in place. Given that the ecological value of the surrounding marine habitats are generally considered to be low to very low, the impact would be considered to be of minor significance and acceptable.

3.6.2 Operational Phase

3.6.2.1 Minor impacts to marine ecological resources due to potential accident spillages of chemical/oil and road surface run-off have been predicted as a result of the operation of the Trunk Road T2 project and no ecological specific mitigation measures are required. The implementation of the mitigation measures recommended for the protection of water quality, including provision of adequate drainage system with silt traps and oil interceptors, will help to minimise any impacts further.

3.7 Fisheries

- 3.7.1 The Port Survey of 2006 did not record any adult fish or fry production in the existing KTTS (AFCD, 2006). In addition, the assessment area is not a major operating area for large trawler trawling vessels (>15m), with a ban on trawling activities effective from December 2012, the impact on the construction works on fishing vessels would be limited and only small vessels, such as sampans, are used by fishermen in the KTTS which would be only temporarily affected by the Trunk Road T2 construction works.
- 3.7.2 Based on this, the lack of adult fish and fry in the area and the small size of the temporary barging point, it is predicted that no significant impacts in respect to the loss of fishing grounds would occur. As such, the construction and operation of the project would not give rise to any significant impacts to fisheries.
- 3.7.3 No mitigation measures are required for fisheries resources given that the water quality mitigation measures will be implemented as necessary.

3.8 Landscape and Visual

- 3.8.1 As the majority of Trunk Road T2 (the Project) will be in tunnel, landscape and visual impacts will be concentrated on three buildings at the western end, namely the Ventilation and Tunnel Portal Buildings.
- 3.8.2 Based on the Tree Survey, 67 trees are recommended to be felled and 31 trees are recommended to be transplanted by the Project. No Old and Valuable Trees, Wall Trees or Significant Trees will be affected. In the Western Works Area a temporary loss of 75,300 square metres of hard standing which will be temporarily lost in the construction phase, and an permanent loss of 8500 square meters of hard standing, 5029 square meters of planting areas and loss of 66 trees will be mitigated by 15,740 square meters of planting areas and 4,900 square meters of Amenity Area as referred to in the report as RE10 Kai Tak South Apron: Amenity Area. Extensive compensatory planting will include 152 trees in accordance with ETWB TCW No. 3/2006. In the Eastern Works Area one tree and an approximate area of 21,500 square metres of hard standing will be lost. Mitigation for the felled tree has been included within the compensatory trees for the Western Works Area. The site will be reinstated and handed over for future development of Cha Kwo Ling Promenade Park under a separate project. Details of the landscape proposals for the Western Works Area will be reviewed within the detail design stage. It is considered there will be no substantial adverse landscape impacts by the Project during the operation phase.
- 3.8.3 Through careful design consideration the long term affects will be minimised and a series of greening solutions will be implemented to the development as a whole. Provisions have been made for community green spaces, architectural greening measures, street trees, and planting areas. These are envisioned to blend the Project into the proposed surrounding landscape.
- 3.8.3 The Ventilation and Tunnel Portal Buildings will be mitigated by sensitive and contemporary architectural detailing, including vertical greening, green roofs, textural and tonal finishes, and screen planting. These are envisioned to blend the Project into

the proposed surrounding landscape and will be no more than 17mPD in height. In addition to the landscape mitigation measures, the buildings will be in close proximity to the elevated Kwun Tong Bypass, and therefore partially screened to northern VSRs. As a large area of the KTD Runway Precinct and South Apron will also be under construction at the same time, the residual impacts within the western area are not viewed as adverse and cumulative impacts are not considered to be unacceptable within such a context. The overall visual impacts on the surrounding VSRs would not be significant and could be considered positive to a certain extent. There are considered to be no residual visual impacts after mitigation to VSRs in the Eastern Works Area.

3.8.4 Due to the intended 2021 completion dates of the Kai Tak development including the Metro Park, Runway Residential and Hotel Precinct, the Cruise Terminal and Tourism and Leisure Hub, three hospital sites and other government buildings, views from the Victoria Harbour and Southern Kowloon areas will be screened and covered. Substantial adverse visual impacts are not expected.

3.8.5 Overall, it is considered that the residual landscape and visual impacts of the Project are acceptable with mitigation measures during construction and operation phases.

3.9 Cultural Heritage

3.9.1 The archaeology assessment did not identify any areas of terrestrial or marine archaeological potential and no impacts are predicted. However, any antiquity or supposed antiquity discovered during the course of the excavation works will be reported to the AMO immediately.

3.9.2 The built heritage survey has identified 11 buildings in Cha Kwo Ling. However, no adverse impacts to any of the buildings have been identified during either the construction or operational phases of the project and no mitigation will be required.

3.10 Waste Management Implication and Land Contamination

3.10.1 Waste Management

3.10.1.1 The construction of the Trunk Road T2 will involve a number of activities which will generate waste that can be broadly be classified into distinct categories based on its nature and the options for disposal. These include:

- Excavated marine deposit (sediment) buried underneath the South Apron and Cha Kwo Ling works areas for the construction of cut-and-cover tunnel sections;
- Excavated C&D materials suitable for public fill, including the alluvium from the sub-marine tunnel construction;
- C&D waste which is not suitable for public fill;
- Chemical waste;
- Sewage; and

- General refuse.

3.10.1.2 The majority of the soft C&D material comprising sand fill, Grade III rock and below and alluvium, making up approximately 1.15Mm³, will be suitable for reuse or transfer to the public fill, in some cases, after treatment as required. The predicted surplus amount of this C&D material, in addition to the Grade II or above rock from the subsea tunnel, totally approximately 0.98Mm³, will be transferred to the Tseung Kwan O Area 137 Fill Bank and Chai Wan Public Fill Barging Point by barge. This principle of disposal for the surplus C&D material has been agreed in principle with the CEDD's Vetting Committee on 28 February 2013.

3.10.1.3 With the implementation of the recommended mitigation measures, there would be no adverse residual impacts associated with the handling, storage, transportation or disposal of the waste generated by the Trunk Road T2 project during the construction and operation phases of the Trunk Road T2 Project.

3.10.2 Contaminated Land

3.10.2.1 The land contamination assessment at the concerned previously developed land lot is currently occupied by PCCW and a short section of Cheung Yip Street. As there were no exceedances of the criteria for the land contamination for the Trunk Road T2 project, there would be no adverse impacts due to land contamination anticipated.

There were 2 locations at Cheung Yip Street, namely EH1 and EH3, at which the site investigation (SI) works for the land contamination assessment were not practically accessible. As such, in future, if the concerned locations are confirmed to be acquired as part of the works sites for the Trunk Road T2 construction contract and access is permitted, a supplementary SI to complete the land contamination assessment for EH1 and EH3 and further reconnaissance visits to inaccessible Works Area WA2 would be conducted when these sites become accessible in accordance with the requirements as set out in the endorsed CAP prior to the commencement of construction works so as to verify if any potential land contamination issues exist in these remaining areas. The findings of such supplementary SI works would be submitted as supplementary information to the CAR. If land contamination is determined, the necessary remediation works will be proposed in a RAP for implementation. Following the completion of remaining SI works at locations EH1 and EH3, a supplementary CAR and/or RAP will be submitted to EPD for approval before the commencement of construction works.

3.11 Environmental Monitoring and Audit

3.11.1 An environmental monitoring and audit (EM&A) programme will be implemented during the construction and operation of the Project, to check the effectiveness of the recommended mitigation measures and compliance with relevant statutory criteria. The EM&A procedures are required during construction and operational phases of the project implementation. The EM&A requirements are divided into environmental monitoring and/or project auditing in the form of site inspection and supervision. Only

monitoring for air and noise has been recommended but regular auditing for air, noise, water quality, ecology, LVIA and waste would be required.

Table 3.1 Scope of Environmental Monitoring

Environmental Aspects	Phase	Monitoring Parameter
Dust	Construction	TSP
Airborne Noise	Construction	$L_{eq}(30mins)$
Fixed Noise	Operational	$L_{eq}(30mins)$

4 OVERALL CONCLUSIONS

- 4.1 This EIA study has identified and assessed potential environmental impacts of the Project, in accordance with the EIA study brief and EIAO-TM guidelines. Overall, the EIA study has concluded that the Trunk Road T2 project would be environmentally acceptable, in compliance with environmental legislation and standards. With the implementation of environmental control measures during the construction and operational phases, there would be no significant adverse residual impacts from the Trunk Road T2 project.