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2 Project Description

2.1 Purposes and Objectives of the Project

2.1.1.1 As discussed in **Section 1.1**, the Railway Development Strategy 2014 (RDS-2014) had included the conceptual scheme of Tung Chung West (TCW) Extension and a possible Tung Chung East (TCE) Station. The Project forms one complementary package of sustainable transport solution in support of the future land supply, housing developments, and airport expansion plans at Lantau North.

2.1.1.2 It should also be noted that this new railway system is included in the approved Schedule 3 Environmental Impact Assessment (EIA) for Tung Chung New Town Extension (TCNTE) (i.e. AEIAR-196/2016). The purpose of this Project is to provide an environmental and convenient public transportation mode for both the existing and future population in TCE and TCW. Hence, it is an integral part of the new town extension.

2.1.1.3 By introducing this new transportation infrastructure to Tung Chung, the local communities, both the existing and planned population, could enjoy a modern and green railway system and hence reduce the reliance on road-based traffic.

2.1.1.4 According to the latest design, a new intermediate station would be introduced in TCE area (i.e. TCE Station). Some sections of the existing Tung Chung Line (TCL) tracks in TCE Area would need to be slightly diverted to suit the location of the new TCE Station which is located on reclaimed land formed by the new town reclamation. The existing TCL will also be extended westward by approximately 1.3km from the existing Tung Chung Station (TUC). Another new station in TCW area (i.e. TCW Station) will be introduced at the end of this extension and is located to the west of Yat Tung Estate.

2.2 Need of the Project

2.2.1.1 As discussed in **Section 2.1**, the approved EIA study of TCNTE is a Designated Project (DP) under Schedule 3 of Environmental Impact Assessment Ordinance (EIAO), which has already included the proposed railway stations at TCE area and TCW area and the associated trackwork and tunnel. However, a separate Schedule 2 EIA study for this railway system is conducted to address the associated environmental impacts, taking into the account of the latest design.

2.2.1.2 With the TCE and TCW Stations in place, both the existing and planned population would be offered the opportunity for convenient access to a modern and green train system that connects to other parts of Hong Kong (HK) efficiently. For TCE area, in particular, the latest planning is to accommodate a new population of more than 140,000. The existing population including but not limited to Ying Tung Estate would also enjoy the convenience of accessing the new TCE Station. Similarly,

for TCW area, the latest planning is to accommodate a new population of more than 35,000. The existing population including but not limited to Yat Tung Estate, Mun Tung Estate, village houses along Tung Chung Road, etc. would enjoy the convenience of accessing the new TCW Station.

2.2.1.3 These 2 new stations would attract more people to select this electrified train system instead of relying on road-based vehicles. In other words, implementing the Project would help to control the increase of road traffic noise and vehicular emission throughout the new town extension process.

2.3 Scenarios "With" and "Without" the Project

2.3.1 Without Project Scenario

2.3.1.1 Without the Project in place, the planned population and neighbouring existing population requiring commuting to other parts of HK would either select road-based vehicles (i.e. buses or private cares, etc.) to travel to their destinations directly, or select connecting buses to the existing TUC aTnd transit via TCL. For TCW area as an example, most of the existing population at Yat Tung Estate, Mun Tung Estate, villages along Tung Chung Road would also need to take connecting buses to the existing TUC and transit via TCL. This would obviously increase the reliance on road-based vehicles. Hence, the road traffic noise impact and air quality impact due to increase of vehicles would be adverse.

2.3.2 With Project Scenario

2.3.2.1 With the introduction of the 2 new train stations at TCE and TCW areas, all the planned population and neighbouring existing population would have the choice to get access to these new stations and then transit to TCL swiftly. This would definitely reduce the reliance on road-based vehicles for commuting to other parts of HK.

2.4 Environmental Benefits of the Project

2.4.1.1 As discussed above, the Project would help to reduce the reliance on road-based vehicles within the Tung Chung area and hence the road traffic noise and vehicular emission as much as practicable. This is a positive step to minimise the potential traffic noise and air quality impacts on both the existing and planned population in Tung Chung.

2.5 Considerations of Options

2.5.1.1 Due considerations have been given in formulating options to address the environmental challenges in this Project. The hierarchy of “Avoid, Minimize and Mitigate” has been fully adopted in the process to protect the environment as much

as practicable. A summary of the key considerations for options on the alignment, design, and construction methodology of the Project is given below.

2.5.2 Consideration of Alignment and Development Options

2.5.2.1 As discussed in **Section 2.1**, the alignment for TCE area is on reclaimed land and hence there would be neither ecological nor cultural heritage concerns. Besides, the alignment corridor is bounded by Airport Express Line (AEL) and North Lantau Highway (NLH) to the south, and the planned roads and development under TCNTE (East). There is limited space for the adjustment of the alignment. Hence, alternative alignment options are not considered for the alignment for TCE.

2.5.2.2 For the alignment in TCW area, however, there are many environmental resources/constraints in the neighbouring of Tung Chung Bay. These environmental resources/constraints include but not limited to the followings. More description of these resources/constraints is given in the respective sections in this report.

- Tung Chung River and its estuary;
- Wong Lung Hang and its estuary;
- Mudflats, mangroves, and woodland in and near Ma Wan Chung;
- Ma Wan Chung Site of Archaeological Interest (SAI), Tung Chung Game Board Carving SAI, Sha Tsui Tau SAI, Fu Tei Wan Kiln (relocated to Tung Chung) SAI;
- Archaeological potential areas identified in the TCNTE EIA study; and
- Tung Chung Battery, Tung Chung Fort, Tung Chung Hau Wong Temple.

2.5.2.3 In order to avoid and minimise these environmental resources/constraints, the Project Proponent has taken the initiative to identify practicable alternative alignment options to achieve the balance between railway operation and environmental impacts. A total of 3 alignment options has been identified and they are described in more detail in the following sections.

- **Alignment Option 1** – Alignment in the EIA SB;
- **Alignment Option 2** – Yu Tung Road Alignment; and
- **Alignment Option 3** – Chung Yan Road Alignment.

Alignment Option 1 – Alignment in the EIA SB

2.5.2.4 **Alignment Option 1** has been adopted in the Project Profile and hence in the EIA Study Brief (SB) (see **Figure 2.1**). It is basically a tunnel connecting the existing TUC and the new TCW Station to the west of Yat Tung Estate. The tunnel will be constructed by a TBM with the launching shaft near Tung Chung Crescent. The length of the TBM tunnel is approximately 1.3km long. The new station to the west

of Yat Tung Estate would be an underground station with entrances and vent shaft structures. It would require a top-down cut-&-cover approach for the TCW Station construction. This alignment would avoid the southern part of the Ma Wan Chung village while underpass a small northern part of the Ma Wan Chung village.

2.5.2.5 By adopting TBM as the tunnel construction method, all direct impacts on the mangroves, mudflats, woodland, etc. would be totally avoided. In addition, the use of TBM tunnelling underneath Ma Wan Chung have largely avoided the Ma Wan Chung SAI. However, subject to actual site circumstances, hoarding erection, site clearance and water barrier installation will be conducted and workers may inspect the site within the western end of the Ma Wan Chung SAI, but these would not involve any excavation works. According to the latest ecological survey results (see **Section 8**), the habitat where the TCW Station is located is mainly orchards with low ecological value. This alignment option including overrun tunnel would not require any diversion of Wong Lung Hang nullah. Land resumption would however be required for some private lands at the west and north of the TCW Station. In addition, the tunnel would run underneath the burial ground on Rocky Lion Hill along Shun Tung Road, but with a vertical separation of about 10 - 50m in the granite layer.

Alignment Option 2 - Yu Tung Road Alignment

2.5.2.6 **Alignment Option 2** - Yu Tung Road Alignment (see **Figure 2.1**) would be in a form of an S-curve running underneath the North Lantau Hospital. This alignment would totally avoid the environmental resources and constraints in Ma Wan Chung as well as the ecological resources since the station box would be constructed on the existing Yu Tung Road. However, the TCW Station under this alignment would need to be located at the southwest of Yat Tung Estate and underneath Yu Tung Road. Hence, diversion of Wong Lung Hang nullah is required near the TCW Station. Land resumption on private land is not required for this option.

2.5.2.7 As this alignment must meet the operational requirements of minimum radius curve, it would inevitably pass underneath the North Lantau Hospital. The key concerns would be the potential impacts of electromagnetic interference and the groundborne noise and vibration caused during the construction of the TBM tunnels and the future operation of trains running underneath. These potential impacts may cause disturbance to the operation of the North Lantau Hospital. Given the short vertical separation and the local geology, the operational rail vibration at the North Lantau Hospital would likely exceed the limits set by the hospital operator even with the best practicable mitigation measures in place. Besides, this alignment would run close to the burial ground on Rocky Lion Hill along Shun Tung Road, but with a vertical separation of about 10 - 50m in the granite layer.

Alignment Option 3 - Chung Yan Road Alignment

2.5.2.8 **Alignment Option 3** – Chung Yan Road Alignment (see **Figure 2.1**) would be in a form of a C-curve running underneath Ma Wan Chung SAI. The new TCW Station would be located underneath Chung Yan Road and is located to the east of Yat Tung Estate. It would avoid impacts to the ecological resources such as mangroves and mudflats at Ma Wan Chung. The overrun tunnel will be extending and pass the junction between Yu Tung Road and Chung Yan Road. Diversion of Wong Lung Hang nullah is not required. Land resumption on private land is not required for this option.

2.5.2.9 As compared to other alignment options, the location of TCW Station under this option is not as attractive compared with the other options, because it is more separated from the existing and planned population in TCW area including Mun Tung Estate, Area 33, Area 38, as well as the planned public transport interchange etc. The population would still require to walk a considerable distance or travel by road-based transportation to TCW Station, which is not a cost-benefit and environmentally friendly approach. In addition, the tunnel would run underneath the burial ground on Rocky Lion Hill along Shun Tung Road, but with a vertical separation of about 10 - 50m in the granite layer.

Summary of Alignment Options Considered

2.5.2.10 A summary of the above options is given below with the preferred option identified for ease of reference.

Table 2.1 Summary of alignment options considered

Alignment Options	Pros	Cons	Preferred Option (Y/N)
Option 1 Alignment in EIA SB	• Avoided all the mangroves, mudflats, woodland, most of the Ma Wan Chung SAI by adopting TBM tunnelling • TCW Station is located at orchards with low ecological value • Avoided diversion of Wong Lung Hang nullah	• Land resumption for some private lands required at the west and north of the TCW Station • Alignment runs underneath a small part of Ma Wan Chung and the burial ground in Rocky Lion Hill along Shun Tung Road, but would be in granite layer with sufficient vertical separation.	**Y**
Option 2 Yu Tung Road Alignment	• Avoided all environmental resources and constraints in Ma Wan Chung • Avoided the ecological resources • Land resumption for private land not required	• Diversion of Wong Lung Hang nullah required • Likely exceedance of groundborne vibration set by North Lantau Hospital even with best practicable mitigation measures	N

Alignment Options	Pros	Cons	Preferred Option (Y/N)
		• Potential impacts of electromagnetic interference at the North Lantau Hospital • Alignment runs close to the burial ground on Rocky Lion Hill along Shun Tung Road, but would be in the granite layer with sufficient vertical separation.	
Option 3 Chung Yan Road Alignment	• Land resumption for private land not required • Avoided diversion of Wong Lung Hang nullah • Avoided the ecological resources	• Location of TCW Station would not cover the target catchment which makes this option not attractive • Alignment runs underneath the burial ground on Rocky Lion Hill along Shun Tung Road, but would be in granite layer with sufficient vertical separation.	N

2.5.2.11 Option 1 would provide a new station covering the target catchment and avoid the major environmental impacts as listed above. Hence, it is considered that **Option 1 (i.e. Alignment in EIA SB) is the preferred option** and would be adopted.

2.5.3 Consideration of Options for EAP/EEP

2.5.3.1 Similar to the principle adopted in the evaluation of alignment options, options for Emergency Access Point/Emergency Egress Point (EAP/EEP) have also been identified to avoid and minimise the impacts on neighbouring environmental resources/constraints identified. A total of 2 options has been identified for EAP/EEP and they are described in more detail in the following sections.

- **Option A** – EAP/EEP at Tung Chung Road North; and
- **Option B** – EAP/EEP at Shun Tung Road.

Option A – EAP/EEP at Tung Chung Road North

2.5.3.2 This location of the EAP/EEP is adopted in the Project Profile and hence the EIA SB (see **Figure 2.1**). While this location has avoided the Ma Wan Chung SAI, according to the latest ecological survey results (see **Section 8**), the habitat in the vicinity of the EAP/EEP is mainly secondary woodland. As the construction of EAP/EEP would involve both temporary and permanent at-grade works, this option

would inevitably cause a loss of secondary woodland which has moderate ecological value.

2.5.3.3 Other than environmental aspects, this location of EAP/EEP at Tung Chung Road North would have various operational challenges including constrained Emergency Vehicular Access (EVA) access due to the current single lane of Tung Chung Road North, turnback facilities for emergency vehicles, and potential objections from local residents given its proximity to the burial ground.

2.5.3.4 This Option A for EAP/EEP at Tung Chung Road North would only be applicable for Alignment Option 1.

Option B - EAP/EEP at Shun Tung Road

2.5.3.5 Similar to Option A, this location has also avoided the Ma Wan Chung SAI. In order to address the environmental and operational constraints for Option A, another Option B with the EAP/EEP at Shun Tung Road has been identified (see **Figure 2.1**). Unlike Option A which is located at a secondary woodland, Option B for EAP/EEP is located at an artificial slope where merely plantation is found. The ecological impact associated with this Option B at Shun Tung Road is therefore much lower than that of Option A at Tung Chung Road North.

2.5.3.6 In terms of operational requirements, this Option B with the EAP/EEP at Shun Tung Road would pose much fewer constraints for the EVA access. Besides, potential objection from local communities on burial grounds would be much reduced.

2.5.3.7 However, since this Option B with the EAP/EEP is located next to the high-rise residential building (i.e. Tung Chung Crescent), it would require due consideration on the aesthetic design of the above-ground structure to blend in with the environment.

2.5.3.8 This Option B for EAP/EEP at Shun Tung Road North would be applicable for all the 3 Alignment Options.

Summary of Options for EAP/EEP Considered

2.5.3.9 A summary of the above options for EAP/EEP is given below with the preferred option identified for ease of reference.

Table 2.2 Summary of Options for EAP/EEP Considered

Options for EAP / EEP	Pros	Cons	Preferred Option (Y/N)
Option A EAP/EEP at Tung Chung Road North	• Avoided Ma Wan Chung SAI	• Located at secondary woodland which has moderate ecological value, and hence higher ecological impacts • Constrained EVA access	N

Options for EAP / EEP	Pros	Cons	Preferred Option (Y/N)
		• Potential objections from local residents • Able to serve Alignment Option 1 only	
Option B EAP/EEP at Shun Tung Road	• Avoided Ma Wan Chung SAI • Located at an artificial slope with plantation only and hence much less ecological impacts • Fewer constraints for EVA access • Less potential objections from local communities on burial grounds • Able to serve all the 3 Alignment Options	• Requires due consideration on the aesthetic design for the building structure	**Y**

2.5.3.10 Option B would avoid the major environmental resources such as Ma Wan Chung SAI and the secondary woodland. Besides, less constrains on the EVA access are anticipated. Hence, it is considered that **Option B (i.e. with EAP/EEP at Shun Tung Road) is the preferred option** and would be adopted.

2.5.4 Consideration of Options for TBM Launching Shaft

2.5.4.1 As discussed in **Section 2.5.7** below, TBM would be the preferred option for consturction the bored tunnel section between existing TUC and TCW Station. In order to facilitate the TBM construction, it is essential to determine the locations for the launching shaft at which the TBM shield and associated machinery would be launched. The following options have been considered.

Option 1 – Launching at Tung Chung Crescent

2.5.4.2 Launching shaft is located at the open area between Shun Tung Road and the existing Tung Chung Crescent link bridge (see **Figure 2.1**). Some of the associated works sites for the TBM would be accommodated at the opposite side of Shun Tung Road under Temporary Traffic Management Scheme (TTMS) so as to keep the maximum distance from the Tung Chung Crescent residents. Temporary Excavation and Lateral Support (ELS) such as cofferdams would be installed prior to excavation which would need to reach 10m to 15m below ground to form a sufficient space for the installation of the TBM shield and associated machinery. The TBM would then be launched, tunnelling across Shun Tung Road and towards TCW. Once the TBM reaches TCW, it would be dismantled, transported back to the launching shaft, and re-assembled again for the launching of the second tunnel.

2.5.4.3 As the new tunnels need to be connected to the existing overrun tunnels at Tung Chung Station, two sections of cast in-situ tunnels need to be constructed by cut and cover method connecting the bored tunnels by TBM with the existing overrun tunnels. To minimise the impacts to the neighbouring receivers at Tung Chung Crescent, a temporary noise enclosure for the launching shaft will be provided after the excavation reaches a certain level that allows manoeuvring of construction plants, to control the construction noise impacts as far as practicable.

2.5.4.4 It should also be noted that the geology comprising of harder materials immediately south of the launching shaft at Tung Chung Crescent end is more favourable for TBM launching and would offer a better circumstance for fine tuning of the TBM setting to optimise performance and minimise risks.

Option 2 – Launching at TCW

2.5.4.5 TBM would be launched from TCW Station. (see **Figure 2.1**) The size of the shaft at Tung Chung Crescent to retrieve the shield would be similar to the launching shaft in Option 1. The shaft is not only for TBM retrieval, it will also be utilised to construct the tunnel boxes for the connection between the bored tunnels to the existing overrun tunnels. Due to various engineering constraints, such as insufficient over burden and potential obstructions left by previous construction works, adopting TBM tunnelling method for this section is not feasible.

2.5.4.6 In other words, using cut and cover method to construct the retrieval shaft as well as the connecting tunnel boxes to the existing Tung Chung Station overrun tunnels is inevitable. Temporary noise enclosure will be provided to the retrieval shaft near Tung Chung Crescent to mitigate the construction noise impacts as far as practicable.

2.5.4.7 It is also noted that the geology to the north of TCW Station is less favourable for TBM drive with softer material and close to the sea. This would increase the construction risk for the initial tunnel drives. To accommodate concurrent multiple workfronts with other station construction activities, additional land resumption near the launching shaft at TCW Station is likely required. Unlike Option 1 that the land is to be available on day one, the additional time required to complete the land resumption procedure before construction of the launching shaft and other setup will adversely impact upon the tunnel construction programme which will in turn delay the TCW opening. Further impact to the overall programme due to limitation on plant utilisation to control possible noise impact is another concern to be addressed.

Option 3 – Launching at South of Shun Tung Road

2.5.4.8 Option 3 is similar to Option 1 except the TBM launching shaft is shifted to the immediate south of Shun Tung Road and hence further away from Tung Chung Crescent. (see **Figure 2.1**) Extensive site formation, rock excavation and blasting

works are required to form the launching shaft. However, as explained in the descriptions for Option 1 and Option 2, while the TBM launching shaft is further away from Tung Chung Crescent, construction shaft of similar size under Options 1 & 2 at Tung Chung Crescent is also required. The shaft needs to cater for the connection of the new tunnels to the existing overrun tunnels at Tung Chung Station. A temporary noise enclosure for the shaft near Tung Chung Crescent would therefore still be required to control the construction noise impacts as far as practicable. Some of the associated works sites for the TBM would be accommodated same as in Option 1 at Shun Tung Road under TTMS so as to minimise the nuisance to the residents.

2.5.4.9 It should be noted that the launching shaft in this option would require diversion / support in-situ of the large number of existing utilities such as 11kV and 132kV cables, watermains and drainage pipes along Shun Tung Road. Also, the tunnel section under Shun Tung Road would be constructed by cut and cover method with multiple stages of traffic lane closure. This would significantly increase the construction period and hence the construction nuisance to the local community. In addition, more construction and demolition (C&D) materials generated and to be disposed, the launching shaft location would have substantial impacts to the environment due to the larger loss of woodland, shrubland / grassland and vegetation on the slope near Shun Tung Road and the potential impacts to the burial sites in the vicinity.

2.5.4.10 The tunnel construction programme and hence the TCW Station opening day would be adversely impact due to the longer period taken for the site formation and launching shaft excavation mainly in rock.

Table 2.2a Summary of Options for TBM Launching Shaft Considered

Options for TBM Launching Shaft	Pros	Cons	Preferred Option (Y/N)
Option 1 Near Tung Chung Crescent	• Comparatively less construction risk	• Requires noise enclosure for the launching shaft	**Y**
Option 2 At TCW Station	• Nil	• Additional land resumption at TCW likely to be required • Programme for TCW Station opening is adversely affected • Requires noise enclosure for the shaft near Tung Chung Crescent • Slightly higher construction risk	**N**
Option 3 At immediate west of Shun Tung Road	• Nil	• Programme for TCW Station opening is adversely affected	**N**

Options for TBM Launching Shaft	Pros	Cons	Preferred Option (Y/N)
		• Requires noise enclosure for the shaft near Tung Chung Crescent • Additional impacts to existing utilities at Shun Tung Road • Prolonged occupation of Shun Tung Road for construction of cut & cover tunnel • Additional C&D materials are generated • Additional impacts to existing trees and burial grounds on Shun Tung Road slope	

2.5.4.11 Option 3 is not preferred as it would have significant impacts to the environment and also adversely affect the programme for TCW opening.

2.5.4.12 Option 1 and Option 2 have similar environmental performance and hence would require similar extent of mitigation measures. However, Option 2 have a higher construction risk especially at the north of the TCW Station. Additional land resumption to accommodate the associated works sites for the TBM is also likely required. Adverse impact to the programme for TCW opening is envisaged due to longer period taken for land resumption at TCW prior to commencement of launching shaft excavation. Therefore, **Option 1 with the launching shaft at Tung Chung Crescent** is preferred after taking into account of all considerations and would be adopted.

2.5.5 Consideration of Options for Station, Tunnel Ventilation Shaft and Station-associated Structures

2.5.5.1 For TCE area, the alignment would be modified based on the existing at-grade rail tracks. Therefore, underground station design is not considered at TCE area and so no tunnel ventilation shaft is necessary. As discussed in **Section 2.5.2**, the alignment at TCE area is bounded by AEL and NLH to the south, and planned road and development under TCNTE (East) to the north. There is limited space for allocating the station-associated structures. Hence, alternative station-associated structures are not considered at TCE area.

2.5.5.2 For TCW area, as all the alignment options would coincide with either existing or future public roads, options of underground station would be considered. The tunnel ventilation shaft and station-associated structures have been duly considered to be located away from nearby sensitive receivers (e.g. Yat Tung Estate) as far as practicable to avoid adverse noise and visual impact.

2.5.6 Consideration of Options for the Works Sites / Works Areas

2.5.6.1 The locations of works sites / works areas including site offices have been selected to be close to the major roads such as Shun Tung Road, Yu Tung Road etc. to avoid the construction vehicles running on the minor roads which are commonly in close proximity to the estates or village houses. This would shorten the travelling time of construction vehicles and minimize the nuisance to nearby sensitive receivers. In addition, the locations of works sites / works areas including site offices have been coordinated with relevant government departments such as Civil Engineering and Development Department (CEDD), Leisure and Cultural Services Department (LCSD) etc. for the land availability.

2.5.7 Consideration of Options for Construction Methodology

2.5.7.1 Other than options for alignments and EAP/EEP locations as discussed above, various construction methodologies have also been considered in view of avoidance and minimization of potential environmental impacts as much as practicable.

Options for Tunnelling through Ma Wan Chung

2.5.7.2 As discussed in **Section 2.5.2**, a tunnel of approximately 1.3km long would need to be constructed between the existing TUC and the new TCW Station under the preferred Alignment Option 1. Within the total tunnel length of about 1.3km, about 450m of it would be passing underneath Ma Wan Chung Village. If this tunnel section under Ma Wan Chung Village is to be constructed by open cut, cut-&-cover, or immersed tube, it would likely require significant marine works such as dredging, temporary reclamation, etc. Given the ecological sensitivity of Ma Wan Chung and the neighbouring areas (such as Tung Chung River and its estuary, mudflat, mangroves, etc.), such significant marine works would inevitably cause major environmental impacts even if all the practicable measures are implemented.

2.5.7.3 The other option is to adopt TBM tunnelling underneath Ma Wan Chung. The TBM will be driving through the composite geological layers of granite and rock at a depth of down to about -20mPD. The use of TBM would induce potential groundborne noise to the surrounding residential buildings. However, as above-ground works would not be required in this case, it would avoid any marine works and hence any direct environmental impacts on the important ecological resources in the vicinity. Specifically, the following environmental aspects would be benefited due to the use of TBM tunnelling.

- Less construction dust impact;
- Less airborne construction noise impact;
- Less water quality impact;
- Fewer trees to be affected;

- Less ecology and fisheries impact;
- Less cultural heritage impact;
- Less landscape and visual impact;
- Less land contamination and sediment issue; and
- Less waste generation.

2.5.7.4 Another option is to adopt drill and blast underneath Ma Wan Chung. As above-ground works would not be required for drill and blast, it would avoid any marine works and hence any direct environmental impacts in airborne construction noise, water quality, ecology and fisheries, land contamination and sediment as well as landscape and visual aspects. However, since use of explosives would be required, this option would induce potential risk and higher impulsive vibration impact. Besides, construction dust would be another concern for constructing a tunnel of approximately 1.3km long under preferred Alignment Option 1 by this option.

Table 2.3 Options for tunnelling through Ma Wan Chung

Tunnelling options through Ma Wan Chung	**Pros**	**Cons**	**Preferred Option (Y/N)**
Option 1 Open cut, cut-&-cover, or immersed tube	• N.A.	• Significant marine works such as dredging and temporary reclamation • Major environmental impacts even if all the practicable measures are implemented	N
Option 2 TBM tunnelling	• Avoidance of marine works • Avoidance of direct environmental impacts in air quality, noise, water quality, waste, ecology, fisheries, land contamination and sediment, landscape and visual aspects	• Potential groundborne noise impact	**Y**
Option 3 Drill and blast	• Avoidance of marine works • Avoidance of direct environmental impacts in airborne construction noise, water quality, ecology, fisheries, land contamination and sediment, landscape and visual aspects	• Potential risk due to the use of explosives • Potential higher impulsive vibration impact • Potential dust impact	N

2.5.7.5 Option 2 would avoid marine works and direct impact on a couple of the environmental aspects. Therefore, the option to **tunnel through Ma Wan Chung using TBM is preferred** and would be adopted.

Options for Establishing Barging Facility

2.5.7.6 As discussed in **Section 1.3**, a barging facility is required for the transportation of materials to facilitate the construction process. In terms of location selection, the area within the bay area of Ma Wan Chung and Tung Chung River is definitely not preferred given the high ecological sensitivity. Hence, the proposed location for the barging facility will be located at the existing seawall of TCE and this would have largely avoided any significant environmental impacts at the outset.

2.5.7.7 However, the water depth at the area close to the existing seawall of the proposed barging facility is not sufficient for safe berthing and manoeuvring of barges. In order to avoid dredging at this area, which would cause any potential release of suspended solids to be transported to Ma Wan Chung and Tung Chung Bay during flood tide, and to the neighbouring marine parks during ebb tides, flat top barges would be deployed to form 2 temporary unloading points to allow lorries/dump trucks to drive on and reach the spoil carriers berthing at the end of the barges. By adopting this approach, any marine works including dredging and seawall modification below the high water mark would be avoided.

2.5.7.8 Hence, **locating the barging facility at the existing seawall of TCE, and using flat top barges to form temporary unloading points is preferred** and would be adopted.

Options for Constructing the TCW Station

2.5.7.9 For the preferred Alignment Option 1 (see **Section 2.5.2**), the TCW Station would be located at the west of Yat Tung Estate with a separation distance as short as about 10m. Given that the residential buildings in Yat Tung Estate are approximately 40 storeys, most of the residential units at the west of Yat Tung Estate would be overlooking the construction site for TCW Station within a very short horizontal separation.

2.5.7.10 **Section 2.7** describes the construction sequence for this TCW Station. Once the D-walls for the station box are progressively completed, the excavation would timely commence in a top-down approach. The slant distance between the construction activities and the neighbouring low-level air and noise sensitive receivers is relatively short. In particular, extensive mitigation measures would be required to ensure that the construction noise impacts are controlled to acceptable noise levels (see **Section 4** for more details on the construction noise predictions and mitigation measures required).

2.5.7.11 In order to contain the construction noise during the excavation as much as practicable, the option of advancing the station slab construction has been duly studied. Once the excavation reaches a certain level that allows manoeuvring of construction plants such as excavators, the station slab structure would be constructed. A number of mucking out locations would be allowed in the station slab structure during the construction period. Hence, once the station slab structure

is installed, it would form a significant screening structure for the excavation activities and other construction activities underneath.

2.5.7.12 With this station slab structure, the following environmental impacts on the neighbouring Yat Tung Estate would be much reduced.

- Less construction dust impact; and
- Less airborne construction noise impact.

2.5.7.13 Hence, the option to **advance the construction of the station slab structure is preferred** and would be adopted.

2.6 Tackling Environmental Challenges

2.6.1.1 Due consideration has been given in formulating the design of the Project to overcome environmental challenges encountered. The hierarchy of "Avoid, Minimize and Mitigate" has been adopted during the process to protect the environment as much as practicable. A summary of key actions adopted to tackle all the environmental challenges are discussed in the following sections.

2.6.2 Avoidance of Marine Works

2.6.2.1 The ecological baseline has revealed that there are abundant marine/intertidal ecological resources in the vicinity, including, mangrove, Tung Chung River and its estuary, mudflats, etc. All these ecological resources are considered to have high ecological value. The design development has been mindful to avoid any direct impacts on these important marine/intertidal ecological resources.

2.6.2.2 For the barging point at the existing seafront at TCE, the existing bathymetry would not allow barges to berth along the existing seawall unless certain dredging is conducted. However, dredging would inevitably cause certain sediment release even with good practices such as silt curtain in place. The engineering team has therefore used a flat top barge arrangement to extend the spoil unloading points at approximately 70 – 80m away from the existing seawall. By adopting this design for the barging point, it is not necessary to conduct any dredging and marine works and hence avoided the disturbance of the seabed.

2.6.2.3 The latest tunnel alignment would run through the bay area of Ma Wan Chung which accommodates mudflats and mangroves that have high ecological value. In order to avoid any direct impacts on these mudflats and mangroves, the design has adopted TBM tunnelling instead of immersed tube tunnelling/open-cut, cut-&-cover tunnelling. By adopting this tunnelling approach, it would not require any marine works such as dredging and temporary reclamation for the tunnelling works in Ma Wan Chung.

2.6.3 Avoidance of Works within / Direct Impact upon Tung Chung River and Its Estuary, and Tai Ho Wan

2.6.3.1 Ecological baseline conditions have also revealed the ecological importance of the Tung Chung River and its estuary. In order to preserve this, the current design has totally avoided any works in the Tung Chung River and its estuary and hence avoided any direct impacts on them.

2.6.3.2 Similarly, for Tai Ho Wan which is also an ecologically important area, the current design and construction would not encroach into Tai Ho Wan and hence avoid any impacts on it.

2.6.4 Avoidance of Works within the Intertidal Zone

2.6.4.1 The TCW Station will be located on the land area and away from the coastline of Tung Chung Bay. Given that the intertidal zone of Tung Chung Bay also has high ecological value, the current design has allowed for a setback from the coastline. This setback will ensure that any direct impact to the intertidal zone in Tung Chung Bay is avoided.

2.6.4.2 The latest ecological survey has also revealed an abandoned drainage channel at the west of Yat Tung Estate. This abandoned drainage channel leads to the Wong Lung Hang estuary and there are mangrove stands identified at the section to the western end which is within the tidal influence zone. In order to avoid encroachment into these mangrove habitats, all the construction works would be limited beyond the tidal influence zone and above the high-water mark. This section of the site boundary will be installed with sheet pile/hoarding with concrete footing to avoid accidental encroachment into the mangrove habitat. By adopting this engineering approach, all the intertidal zone would be totally avoided.

2.6.5 Avoidance of Works wtihin Country Parks, SSSI, CA, and CPA

2.6.5.1 According to the latest ecological survey findings, all the construction works and above-ground structures such as station structures, EAP/EEP, etc. would be strategically located at areas of low ecological values including developed areas, plantation, orchard, shrubland/grassland, etc. All these construction works, and above-ground structures would not encroach the Lantau North (Extension) Country Park, Tai Ho Stream Site of Special Scientific Interest (SSSI), Tai Ho Priority Site, Conservation Area (CA), and Coastal Protection Area (CPA) and hence avoid any impacts on them.

2.6.6 Avoidance of Works within Secondary Woodland

2.6.6.1 During the preliminary design, the EAP/EEP was located in a woodland habitat on the hillside behind Ma Wan Chung Village. Given the principle of avoidance, the design had critically reviewed the possibility of relocating the EAP/EEP to another location to avoid/minimise any loss in secondary woodland. After a due review on

various design requirements, the latest design has relocated the EAP/EEP to an artificial slope at Shun Tung Road where merely plantation of low ecological value is identified. Hence, this Project would avoid all secondary woodland.

2.6.7 Avoidance of Re-diversion of Wong Lung Hang Nullah

2.6.7.1 The outlet of Wong Lung Hang nullah is a natural bay area accommodating mudflats and mangroves which there will not be any construction works. In order to further reduce any indirect impacts on this Wong Lung Hang estuary area, the need for re-diversion of Wong Lung Hang nullah has been duly reconsidered by the engineering team. By adjusting the design of the overrun tunnel, the latest design has avoided any re-diversion of the Wong Lung Hang nullah and hence avoided any direct impacts on the Wong Lung Hang estuary area.

2.6.8 Avoidance of Works within Sites of Archaeological Interest

2.6.8.1 As discussed in **Section 2.5**, the selection of Alignment Option 1 together with the use of TBM tunnelling underneath Ma Wan Chung have largely avoided the Ma Wan Chung SAI. There are only two small areas along the bored tunnel section to the north of the TCW Station that encroach on plan with the Ma Wan Chung SAI albeit both occur at the underground stratum at least 10m below ground. One of them is due to the tunnel grout block to the immediate north of the TCW Station box while another one is due to the tunnel structure. The extent of the encroachment on plan is less than 1m from the Ma Wan Chung SAI. As the tunnel would be mainly running within the granite layer, a well-designed TBM methodology (see **Section 2.7.1.8** to **Section 2.7.1.14** for details) would ensure that any impacts on this SAI is within the acceptable limit. Subject to actual site circumstances, hoarding erection, site clearance and water barrier installation will be conducted, and workers may inspect the site within the western end of the Ma Wan Chung SAI. No excavation works would be conducted within the Ma Wan Chung SAI and the engineering works would be conducted at least 10m below ground, which would be the granite layer.

2.6.9 Minimisation of Surface Runoff and Provision of Necessary Treatment Facilities

2.6.9.1 The construction works in TCE would be totally on reclaimed land/developed area and away from ecological sensitive receivers. Hence, good practices such as proper construction site drainage systems and sedimentation tanks would be sufficient to avoid adverse impacts caused by surface runoff.

2.6.9.2 The construction works in TCW however requires more attention to minimise any untreated surface runoff into the Tung Chung River estuary and the Wong Lung Hang estuary. While only land-based construction activities would be conducted, and separation distance from the coastline would be maintained, the Project

Proponent considers that, besides good practices such as proper construction site drainage system and sedimentation tanks, further enhancement measures shall be implemented given the very special ecological conditions of Tung Chung River estuary and the Wong Lung Hang estuary. A summary of these special enhancement measures for containing surface runoff in TCW is given below:

- Subject to actual site circumstances and subsequent detailed design, a barrier in the form of sheet pile/hoarding with concrete footing shall be installed along the western boundary of the construction works sites/works areas for TCW Station (see **Sections 5** and **8** for the water quality and ecological evaluation respectively). This barrier should be designed to contain the surface run-off from releasing to the estuary in an uncontrolled manner during heavy rainfall. Moreover, it has been reviewed and confirmed that the enhancement measures are feasible taking into account the estimates on the runoff during heavy rainfall events and space required for the desilting facilities. The capacity of the sedimentation tanks and perimeter drains shall be reviewed during the detailed design and construction stages to cater for the adverse weather conditions. Prior to the commencement of the construction works, the contractor shall also apply for a discharge licence under the WPCO and shall conduct necessary water quality measurements at the discharge location(s) to demonstrate the compliance with the licence conditions.
- Proper surface channels would be incorporated along the western boundary of the construction works sites/works areas for TCW Station (see **Sections 5** and **8** for the water quality and ecological evaluation respectively) to divert excess flow of site runoff into desilting facilities to minimise the chance of polluting the mangrove habitat.

2.6.10 Minimisation of Noise Disturbance During Construction

2.6.10.1 The mudflat on the estuary of Tung Chung River and Wong Lung Hang is an important feeding ground of large water birds including some migratory species. In order to minimise the impacts on these species, the use of Quality Powered Mechanical Equipment (QPME) and/or quieter mechanical equipment should be considered. Suitable mufflers, silencers, and noise enclosure should also be used to reduce the noise generated by noisy machines.

2.6.10.2 As discussed in **Section 4**, there are many noise sensitive receivers in close proximity to the construction work sites. Some of the key noise mitigation measures are listed below. They are discussed in more detail in **Section 4**.

- Noise enclosure for the mucking out location at the TBM launching shaft/retrieval shaft near Tung Chung Crescent;
- Temporary movable noise enclosures for the D-wall construction of TCW Station;

- Advance the construction of the station slab structure of TCW Station; and
- Screen cover for the mucking out location at the EAP/EEP near Shun Tung Road.

2.6.11 Minimisation of Air Quality Impacts During Construction

2.6.11.1 A number of standard dust suppression measures would be undertaken at the construction site. These measures include regular spray to suppress fugitive dust generation, exposed earth surface covered by tarpaulins, standard wheel washing facilities at the construction site exits, vehicle washing at the exit of the barging facility with the provision of vehicle washing facilities, etc. These measures would help to alleviate the generation of fugitive dust during the construction period and hence minimise any impacts on the neighbouring sensitive areas. Some of the key mitigation measures for fugitive dust are listed below. More detailed description of these mitigation measures are given in **Section 3**.

- Provision of 3-side screen with top cover and spraying system at unloading points at the barging facility;
- Provision of impermeable blast covers during blasting;
- Construction of concrete slab above before blasting at TCW Station;
- Blasting to be carried out in a fully enclosed environment; and
- Watering once per hour subject to weather condition.

2.6.11.2 Besides, the Contractor would be requested to avoid using exempted Non-Road Mobile Machines (NRMM) where practicable and alternatives are available from the market at the time of construction. Any use of exempted NRMM shall be fully justified by the Contractor and subject to agreement. The Contractor shall also use power supplied from power utilities when practicable.

2.6.12 Minimisation of Human Disturbance during Construction

2.6.12.1 Site hoarding of appropriate height along site boundaries will be installed to minimise disturbance due to human activities during construction to the nearby areas as far as practicable. Site hoarding arrangement can be referred to **Figure 5.2**. Construction activities and material storage should be confined within the construction sites. For TCW section, due to the proximity to the Wong Lung Hang estuary and Tung Chung Bay, there would not be dedicated access to the nearby ecological sensitive areas outside of the construction sites, works areas, and works sites, to minimise unnecessary human access and disturbance to these areas.

2.6.13 Minimisation of the Risk of Unauthorised Filling Activities

2.6.13.1 Trip-ticket system should be adopted to monitor the disposal of Construction and Demolition (C&D) materials by contractor(s). Warning signs should be provided

at the entrance of the proposed temporary and permanent vehicular access to deter any illegal dumping activities.

2.6.13.2 The currently proposed transportation routes of the C&D materials would include marine transport at the proposed barging facility and through Tuen Mun – Chek Lap Kok (TMCLK) Link. Proper management of the Contractors would be undertaken to minimise the risk of unauthorised filling activities.

2.6.14 Provision of GPS for Dump Trucks to Prevent Illegal Dumping

2.6.14.1 Throughout the close liaison process with green groups, their views on the concern of potential illegal dumping by dump trucks during transportation of spoil from the site are well received. In order to address this issue, all dump trucks for delivery of inert C&D materials from the site to disposal locations will be installed with Global Positioning System (GPS) or equivalent system to track down their instant locations. The construction team will be designated the role to suitably monitor the dump trucks to avoid any illegal dumping.

2.6.14.2 According to the current design, the transportation routes of dump trucks would be required to use existing roads and avoid all the ecological habitats in Tung Chung Valley (see **Section 6**).

2.6.15 Maintaining the Visual Corridor Planned in TCNTE

2.6.15.1 The planning in TCNTE for TCE had adopted an above-ground station for the TCE Station. Besides, a north-south corridor was planned to connect the TCE Station to the northern end of the reclamation. This visual corridor is one of the planning considerations during the preparation of the RODP adopted in the approved EIA report. The current design of the TCE Station has maintained the same planning approach to align with this intention of the visual corridor.

2.7 Proposed Design for the Project

2.7.1.1 **Section 2.5.2** and **Section 2.5.3** have explained the rationale for selecting the preferred options for alignment and the location of EAP/EEP, and **Section 2.5.7** has provided the justifications for selecting the tunnelling method, methodology for establishing the barging facility, and the approach to construct the underground TCW Station. Besides, **Section 2.6** has summarised all the approaches adopted to avoid and minimise environmental impacts at the outset as much as practicable.

2.7.1.2 Taking into account all the environmental constraints identified and engineering/operational requirements, the design team has developed the preliminary design for the Project, with the key elements summarized in the table below. **Figure 1.1** shows all the key elements for the Project.

Table 2.4 Key elements of the Project

Key element	Location	Descriptions
TCE Station and associated at-grade railway track	Between the existing TUC and Sunny Bay Station	• An above-ground station and its associated facilities • Slight diversion of existing TCL track in TCE is required to suit TCE Station • With at-grade ballast track and station concrete track of about 1.5km in length
TCW Station and associated underground railway track	West of Yat Tung Estate	• An underground station and its associated facilities • Extension of existing TCL • With underground track of about 1.3km in length
TBM tunnelling	Between Tung Chung Crescent and Tung Chung West Station	• With tunnel length of about 1.3km in length • At least 10m below ground underneath Ma Wan Chung Village
EAP/EEP	Artificial slope west of Shun Tung Road	• An above-ground structure • An underground shaft of about 25m in length
Works sites	TCE and TCW	• Construction activities for the construction of TCE Station, TCW Station, railway tracks, tunnel, EAP/EEP, vent shaft • Allocation of associated construction plants, temporary traffic management, site investigation works, minor utility works, etc.
Works areas	TCE and TCW	• General storage • Site offices • Workshops • Barging facility • Temporary traffic management, site investigation works, minor utility works, etc.
Barging facility	To the north of Tung Chung Waterfront Road	• An area of about 13,000m^2 • Two berths for the delivery of construction wastes/materials • A small stockpiling area of about 700m^2

2.7.1.3 Descriptions of the design and construction of the above key elements are given in the following sections.

Tung Chung East Station (TCE Station)

2.7.1.4 TCE Station is an above-ground station located at the south of the TCNTE. Within TCE Station, slab track would be adopted. It is bounded by the AEL and NLH to the south. To the north of the TCE Station is Area 113 in TCNTE (East). In other to allow for accessibility to Area 113 and other areas in TCNTE (East), 2 connection bridges spending over Road P1 will be provided.

2.7.1.5 This station is located at the reclaimed land formed under the TCNTE. Typical construction sequence of this above-ground TCE Station is given below:

- Site clearance/site formation;

- Pre-bored socket H-piling and bored piling for foundations;
- Construction of above-ground structures; and
- Site reinstatement.

At-Grade Tracks in the Vicinity of Tung Chung East Station

2.7.1.6 In order to cater for the latest location of the TCE Station, a section of 1.5km ballast track would need to be diverted. However, as the existing TCL would need to be operational throughout the entire construction period, the diversion of the new ballast track would need to be timely implemented to ensure all the operational and safety requirements are not compromised. About 80m of the existing noise barrier fronting Ying Tung Estate would be removed for the realignment of TCL tracks. According to the latest design, the installation of the new ballast track would be implemented in phases as summarised below. The following table summarizes the 4 implementation phases and illustrated in **Appendix 2.1**.

Table 2.5 Implementation phases of at-grade tracks

Implementation Scenarios	Construction Period	Descriptions
Scenario A	2023 – 2027	• Existing alignment of both TCL up track and down track • Addition of 2 turnouts at TCL down track • Removal of about 80m of existing noise barriers along TCL down track
Scenario B	2027 – 2029	• Realign TCL down track • Complete construction of TCE Station • Addition of 2 turnouts at TCL up track
Scenario C	2029 – 2030	• Realign TCL up track • Commencement of TCE Station for public service
Scenario D	2030 – Ultimate	• Removal of all turnouts at both TCL down track and up track

2.7.1.7 Typical construction sequence of implementation at-grade track is given below:

- Site clearance;
- Construction of mini-piles and retaining wall;
- Site formation;
- Removal of existing noise barriers;
- Existing TCL track modification;
- Installation of turnouts;
- Provision of noise barriers;
- Realignment of TCL down track;
- Site formation;
- Realignment of TCL up track;

- Site reinstatement; and
- Removal of abandoned TCL tracks.

Tunnel Between Tung Chung Crescent and Tung Chung West Station

2.7.1.8 As discussed in **Section 2.6**, there are various environmental challenges in the vicinity of Ma Wan Chung, Wong Lung Hang, Tung Chung Rivers, and their estuaries. These challenges include but not limited to woodland, mudflats, mangroves, SAIs, etc. After considering all the environmental challenges and the engineering feasibilities, TBM tunnelling has been selected to construct the tunnel between Tung Chung Crescent and the new TCW Station.

2.7.1.9 The TBM launching/retrieval shaft would be located near the Tung Chung Crescent to the east of Shun Tung Road. The size of this launching/retrieval shaft is approximately 35m by 30m and has a depth of approximately 10m deep. The TBM will be assembled inside this launching/retrieval shaft and the TBM machine will be set to drive southwest towards the TCW Station.

2.7.1.10 Starting from the launching/retrieval shaft, the top of the tunnel would be approximately at -4mPD. The shortest horizontal distance between the tunnel alignment and Tung Chung Battery is approximately 100m and the vertical separation is approximately 25m. The location of Tung Chung Battery is indicated in **Figure 11.2**. According to the preliminary geological information available at this time, the tunnel would be totally in granite in this section.

2.7.1.11 At the section when the tunnel passes underneath Ma Wan Chung, a vertical separation of at least 10m below ground would be maintained and the tunnel would mainly be within granite. In order to maintain safety of the existing village houses in Ma Wan Chung and avoid any accidental spillage of slurry to Tung Chung Bay, reservation of adequate soil cover and / or identification and sealing of any likely open path including the charted boreholes would be provided before the TBM passes by. According to the current design, the use of TBM for tunnelling would avoid any marine works within Ma Wan Chung.

2.7.1.12 After passing Ma Wan Chung, the tunnel will turn south and eventually reach the northern end of the TCW Station. The cutter head of TBM will then be taken out from the northern end of the TCW Station. It will be transferred back again into the launching / retrieval shaft near Tung Chung Crescent for excavating the second tunnel. The excavation soil/ rock from the TBM drive will be collected from the launching / retrieval shaft at Tung Chung Crescent by enclosed piping and then followed by dewatering process and proper disposal procedure.

2.7.1.13 According to the latest design of TBM launching/retrieval shaft, pipe pile and diaphragm wall would be constructed along the perimeter of the cofferdam after site clearance. The cofferdam would be excavated progressively, and struts would be installed as temporary lateral support. Afterward, bottom-up construction would

be adopted for the permanent cast-in-situ concrete tunnels between the existing overrun tunnels and the future TBM tunnel. Last, all struts would be removed, and the site would be backfilled and reinstated.

2.7.1.14 Typical construction sequence of the TBM launching and retrieval shaft are given below:

- Site clearance;
- Construction of pipe pile and diaphragm wall;
- Excavation and installation of struts;
- Construction of permanent cast-in-situ concrete tunnels between the existing overrun tunnels and the future TBM tunnel;
- Removal of struts; and
- Backfilling and site reinstatement.

Tung Chung West Station (TCW Station)

2.7.1.15 Unlike the TCE Station, TCW Station is an underground station at the west of Yat Tung Estate. The nearest separation distance between TCW Station and Yat Tung Estate is approximately 10m. While TCW Station is underground, it would need the following above-ground structures.

Table 2.6 Above-ground structures for TCW Station

Above-Ground Structures	Approx Dimensions (L x W x H)
South Vent Shaft Structure	38m x 7m x 10m
North Vent Shaft Structure	67m x 24m x 12m
Entrance A	70m x 26m x 6m
Entrance B	71m x 13m x 7m

2.7.1.16 The eastern and western D-walls of TCW Station would be the key elements to commence. The construction sequence for the D-walls is summarised below.

- Construction of D-wall at east side; and
- Construction of D-wall at west side.

2.7.1.17 The construction of the D-walls has been divided into the east side and the west side. D-wall along the east side of TCW Station would be constructed, and then followed by D-wall along the west side. Within each side, the construction would be further divided into several sub-zones to allow the construction works to be carried out alternatively. Hence, it would reduce the construction dust and noise impacts from these sub-zones.

2.7.1.18 Once the D-walls for the station box are progressively completed, the excavation would timely commence in a top-down approach. As discussed in **Section 4**, in order to abate the construction noise impacts during the excavation as much as practicable, the feasibility of advancing the station roof construction has been duly studied. According to the latest construction planning, once the excavation reaches a certain level that allows manoeuvring of construction plants, the station roof structure would be constructed. A number of small openings for mucking out would be allowed in the station roof structure during the construction period. Once the station roof structure is constructed, it would form a significant noise screening structure for the excavation activities and some of the subsequent construction activities would be carried out underneath. As a result, the construction noise and dust impact could be largely alleviated. Without this station roof structure, the construction noise impacts on the neighbouring Yat Tung Estate would be much significant.

2.7.1.19 According to the preliminary geological information available at this time, the bulk excavation for the TCW Station would be within superficial deposits, and completely or highly decomposed rock layers. However, depending on the results from a more detailed Ground Investigation (GI) to be conducted during the detailed design stage, there may be a possibility of encountering the rockhead at a shallower depth above the bottom of the TCW Station (i.e. about -20mPD). Hence, subject to site circumstances, it may require some small-scale drill-&-blasting at such circumstances. It should be noted that, when the excavation reaches the bottom of the TCW Station, the concrete slabs for station concourses and platforms would be expected to be completed, and any drill-&-blasting would be conducted underneath these slabs for concourses and platforms. Prior to blasting, all the construction team will be instructed to evacuate from the TCW Station area, and impermeable blast covers at the mucking out locations will be shut. These blast covers would only be opened after the blasting and when the dust level within the TCW Station settles. Where necessary, mist spraying measures will be installed at the mucking locations when the impermeable blast covers open again. These mist spraying measures would only be turned off with the approval from the Engineer.

2.7.1.20 According to the current construction programme, the number of blasting would be limited to once per day at TCW Station, and the explosives will be transported to site on the day of blasting. There will be no overnight storage of explosives on site.

2.7.1.21 Typical construction sequence of the underground TCW Station construction is given below. After site clearance, the diaphragm wall and foundation would be constructed. The cofferdam would be excavated progressively and struts would be installed as temporary lateral support. Afterward, top-down construction would be adopted for the permanent concrete structure of the station box. Last, all struts would be removed, and the site would be backfilled.

- Site clearance;

- Construction of D-walls;
- Construction of piles;
- Excavation and installation of struts;
- Construction of roof (ground level) slab of station box;
- Construction of transfer level slab;
- Construction of concourse level slab;
- Construction of track level (base) slab;
- Construction of platform level structure;
- Removal of struts;
- Construction of internal walls; and
- Backfilling and site reinstatement.

2.7.1.22 Typical construction sequence (i.e. from ground floor to roof) of above-ground station entrances and the vent shaft structures is given below. The entrances and vent shaft structures would be constructed from ground floor to roof.

- Construction of ground level slab;
- Construction of walls; and
- Construction of roof slab.

EAP/EEP at West of Shun Tung Road

2.7.1.23 As discussed in **Section 2.5.3**, the EAP/EEP has been relocated from woodland at Ma Wan Chung to an artificial slope west of Shun Tung Road. Dimensions of the above-ground structure of the EAP/EEP are approximately 15m(L) x 7m(W) x 12m(H).

2.7.1.24 For the shaft between the EAP/EEP and the tunnel, it would be constructed mainly by excavation. Firstly, after site clearance, a pipe pile wall would be constructed along the perimeter of the cofferdam facing the slope. The slope would be cut progressively, and struts and soil nails would be installed as temporary lateral support. Afterwards, a pile foundation would be constructed. The underground shaft would be excavated and rock dowels would be installed. The permanent concrete structure would be constructed. Last, all struts would be removed. According to the latest design, the shaft would be approximately 25m in length. The typical construction sequence of EAP/EEP is given below:

- Site clearance;
- Construction of pipe pile wall;
- Excavation and installation of struts and soil nail for EAP/EEP building;

- Foundation construction;
- Excavation and installation of rock dowel for underground shaft;
- Structural construction; and
- Site reinstatement.

2.7.1.25 According to the preliminary geological information available at this time, the excavation for this shaft would be with the mixed ground and moderately decomposed rock layers. However, depending on results from more detailed GI to be conducted during the detailed design stage, there may be the possibility of encountering rockhead at a level close to the bottom of the shaft (i.e. about 7mPD). Hence, subject to site circumstances, it may require some small-scale drill-&-blasting at such circumstances. Prior to blasting, all the construction team will be instructed to evacuate from the shaft, and impermeable blast covers at the mucking out locations will be shut. These blast covers would only be opened after the blasting and when the dust level within the shaft settles. Where necessary, mist spraying measures will be installed at the mucking locations when the impermeable blast covers open again. These mist spraying measures would only be turned off with the approval from the Engineer.

2.7.1.26 According to the current construction programme, the number of blasting would be limited to once per day at EAP / EEP, and the explosives will be transported to site on the day of blasting. There will be no overnight storage of explosive on site.

2.7.1.27 Considering the potential blasting at both EAP / EEP and TCW Station, the number of blasting would be limited to twice per day for the whole Project.

Work Sites/Works Areas

2.7.1.28 In order to facilitate the construction of the above key elements, it is essential to identify the necessary works sites and works areas. **Figure 1.1** shows the latest locations of works sites and works areas. Works sites include the areas for construction activities that may require site formation, station box, at-grade station, tunnel, at-grade track, EAP/EEP construction, vent shaft, foundations works, excavation works, etc., hence environmental impacts (e.g. noise, dust, water, etc.) relating to the above construction activities are anticipated. Apart from the above construction activities, works sites also include the area for allocation of associated construction plants to support the construction activities, temporary traffic management, site investigation works, minor utility works, etc. **Appendix 2.3** shows the works sites with heavy construction activities including but not limited to site formation works, slope works, excavation and filling works, superstructure works, etc.

2.7.1.29 Works areas are those areas for site offices, general storage, workshops, barging facility, temporary traffic management, site investigation works, minor utility works, etc. where construction phase environmental impacts are not anticipated

except for the barging facility. All the works areas are located within urbanised areas with low ecological value.

Barging Facility and Transportation of Materials

2.7.1.30 A barging facility is required and will be established at the north of Tung Chung Waterfront Road. The barging facility would commence operation tentatively by late 2023. It is currently used as a barging facility by another project (see **Figure 1.1** for location). The area of this barging facility is approximately 12,700m^2 and would consist of 2 berths to allow the transportation and unloading of spoil/materials onto the barges. In order to avoid marine dredging, 2 temporary unloading points using flat top barges will be established to allow construction vessels/trucks to reach the barges. The maximum number of barges would be 1 per berth at any one time.

2.7.1.31 It should be noted that the spoil generated from the construction of stations, tunnel, EAP/EEP, etc will be transported either to the barging facility via construction vehicles for subsequent transfer to Tuen Mun Area 38 Fill Bank via marine transportation or directly to the fill bank at Tuen Mun Area 38 via Tuen Mun Chek Lap Kok Connection Road via land transport, depending on actual site circumstances and weather conditions. Besides, the non-inert Construction and Demolition (C&D) materials will be disposed of at the NENT Landfill via the Tuen Mun Chek Lap Kok Connection Road while the chemical waste will be disposed of at the Chemical Waste Treatment Centre (CWTC) via the North Lantau Highway. **Appendix 2.2** shows the designated land-based transportation routes for different types of wastes before and after the commencement of barging facility. The transportation routes have been duly considered to make use of the perimeter roads of the Tung Chung town such as Yu Tung Road, Shun Tung Road, Tung Chung Waterfront Road, etc., which run along either hillside or seaside. In addition, these major roads would have adequate capacity to cater to the dump trucks and would require fewer start-stop events for dump trucks. Hence, less nuisance on air quality and noise would be anticipated.

2.7.1.32 For the worst-case scenario that all the spoil would need to be transported off-site via the barging facility, it is estimated that there would be a total of 33 construction vehicles/berth/hour unloading spoil onto the respective barge (i.e. a total of 66 construction vehicles/hour). There would be approximately 600 and 11 construction vehicles per day for the transfer of inert and non-inert C&D materials respectively. In order to reduce the dust generated during the spoil unloading, the installation of a 3-sided screen with top cover and the provision of water sprays at the unloading point would be provided.

2.7.1.33 In order to avoid double handling, all the construction vessels will be unloading the spoil to the barges directly, and without the need for a large stockpiling area. However, a small stockpiling area of approximately 700m^2 is still required within

the barging facility to allow for the contingency case that any sediment/C&D materials excavated may need to stay overnight. In that case, the sediment/C&D materials in the stockpiling area will be covered with tarpaulin sheets as per the requirements in Environment, Transport and Works Bureau (ETWB) Technical Circular (Works) (TC(W)) No. 19/2005 "Environmental Management on Construction Sites".

2.7.1.34 The transportation of materials to and away from works sites and works areas would utilise neighbouring roads including Yu Tung Road, Shun Tung Road, Tung Chung Waterfront Road, Ying Hei Road, etc. The Contractor will be requested to implement GPS on the dump trucks to ensure that only designated routes are strictly adopted to avoid ecologically sensitive areas including those in Tung Chung Valley.

2.7.1.35 During the initial stage (for approximately 24 months) for the construction of the TCW Station during which the land resumption for private lands to the west and north of TCW Station is uncertain, the loading/unloading of materials by crane lorries may need to utilise the northern and western portion of the estate road within Yat Tung Estate. According to the current design, the number of crane lorries would be limited to 2 at any one hour. The Contractor will seek agreement with the respective estate management on the necessary arrangements.

2.8 Environmental Initiatives

2.8.1.1 Whilst a number of design initiatives have been proactively implemented to tackle various environmental challenges, the Project aims to achieve more than the statutory requirements. In addition, the Project would be designed to adapt the climate change and consider strategies to improve climate resilience. Thus, various environmental initiatives have been identified for the Project. These initiatives cover different aspects including:

- PV Panels;
- Solar Tubes; and
- Rainwater Harvesting.

2.8.1.2 However, whilst these initiatives are generally considered practicable at this stage, the extent of applications and other details have to be revisited and further established during the detailed design stage when the engineering design is further developed. **Table 2.7** summarises all those environmental initiatives envisioned at this stage.

Table 2.7 Environmental initiatives to be further reviewed and developed during detailed design stage

Aspect	Environmental Initiatives	Environmental Benefits
Energy Saving	• PV Panels	• Reduce electricity consumption from fossil fuels and offset with renewable energy sources

Aspect	Environmental Initiatives	Environmental Benefits
		• Demonstrate a sustainable building design in an urban context • Reduce solar heat gain in the roof area, thus reduce cooling load demand in the station
	• Solar Tubes	• Reduce the need for artificial lighting due to the light provision by natural light and promote daylighting so as to uplift user experience • Capture sunlight indirectly by a solar tube system to minimise heat gain during solar energy harvesting.
Water Conservation	• Rainwater Harvesting	• Reduce the freshwater irrigation demand through the recycled rainwater

2.9 Collating and Addressing Public Views

Engagement with Villagers

2.9.1.1 The Project Proponent arranged a discussion with the villagers from Ma Wan Chung village in September 2020. During the discussion, views on issues including but not limited to alignment, geotechnical investigation, environmental impacts, building safety, emergency evacuation, etc. were exchanged. A summary of the key environmental issues raised by the villagers is given in the following table. Also shown in the table are the approaches that the design has incorporated to address those concerns.

Table 2.8 Summary of approaches adopted to address comments from villagers

Summary of Comments on Environmental Aspects	Responses & Approaches Adopted
Alternative alignments should be duly considered	As discussed in **Section 2.5,** a number of alignment options have been identified and duly examined to consider their practicability and pros and cons in different aspects. Results concluded that Alignment Option 1 is the preferred alignment.
The environmental impacts during both construction and operation should be monitored. Environmental impacts that need to be considered include noise, vibration, ecology.	This EIA has conducted a comprehensive assessment for all the relevant technical assessments including noise, air quality, water quality, waste and land contamination, landscape and visual, ecology, fisheries, cultural heritage, hazard-to-life. For each of the technical aspects, the assessment has identified all the key potential impacts during both the construction and operation phases. Recommendations for mitigation measures and good practices have also been made as necessary. Besides, an environmental monitoring system has been recommended to ensure that the impacts caused during the construction and operational phases would comply with the legislative requirements.
The ecological conditions in the vicinity of Ma Wan Chung have an abundance of mangroves and the project shall take this into consideration.	As discussed in **Section 2.6**, avoiding any impacts on the ecological habitat in the Ma Wan Chung area has been one of the priorities in the selection of alignment and the design of the new railway system. The current design has adopted the

Summary of Comments on Environmental Aspects	Responses & Approaches Adopted
	use of TBM for tunnel construction. This would have largely avoided any impacts on the ecological habitats at the outset.
The alignment shall avoid having adverse impacts on the burial grounds in the vicinity	The burial grounds are mainly located on the Rocky Lion Hill along Shun Tung Road. The tunnel at this section is approximately 30m deep and in granite. Any impacts on the burial ground would therefore be insignificant.

Discussion with IDC

2.9.1.2 During the Island District Council (IDC) meeting on Jun 2020, the members had raised number of concerns on the Project. A summary of the key environmental issues raised by the IDC Members is given in the following table. Also shown in the table are the approaches that the design has incorporated to address those concerns.

Table 2.9 Summary of approaches adopted to address comments from IDC members

Summary of Comments on Environmental Aspects	Responses & Approaches Adopted
GI works shall not cause water pollution to the sea	All the good practices would be implemented to ensure that all GI works would avoid water pollution to the sea.
The alignment shall avoid having adverse impacts on the burial ground in the vicinity	The burial ground is mainly located on the Rocky Lion Hill along Shun Tung Road. The tunnel at this section is approximately 30m deep and in granite. Any impacts on the burial ground would therefore be insignificant.
The tunnel construction shall not cause adverse groundborne noise impacts on neighbouring receivers	A comprehensive groundborne noise assessment has been conducted (see **Section 4.5**). The assessment has taken into account the vibration strength of typical TBM and the local geology. According to the assessment results, the predicted groundborne noise impacts at neighbouring sensitive receivers during the tunnelling process would comply with the statutory requirements.

Summary of Comments Received During the EIA Process

2.9.1.3 During the course of the EIA study (including the exhibition of Project Profile), comments obtained from consultations with green groups and members of the public have been duly revisited and were incorporated in the design, construction, and operation of the Project where appropriate. **Table 2.9** summarises all these comments and how the Project Proponent has addressed them suitably.

Table 2.10 Summary of approaches adopted to address comments collated during EIA process

Issue	Summary of Comments	Responses & Approaches Adopted
General	The Project should avoid encroaching into Tung Chung West	All the works sites/works areas have been proposed with due consideration to avoid the sensitive areas at Tung Chung West
	The original EAP/EEP should be relocated from the Ma Wan Chung	The location of EAP/EEP has been relocated from the Ma Wan Chung hillside to an artificial slope to the west of Shun Tung Road.

Issue	Summary of Comments	Responses & Approaches Adopted
	hillside (to a developed area/area with less vegetation or trees).	Only plantation has been identified on this artificial slope.
	The TBM tunnelling shall prevent any slurry leakage from underground to aboveground through a plugged borehole	Preventive measures such as reservation of adequate soil cover and / or identification and sealing of any likely open path including the charted boreholes would be provided before the TBM passes by.
Ecology	The alignment in TCW should avoid ecologically sensitive areas The EIA/engineering design should conduct assessments on the environmental and hydrological impacts to the Tung Chung River-cum-Bay area generated	The selected alignment has adopted the TBM tunnelling method and hence has avoided marine works and hence direct impact to ecologically sensitive areas in TCW. Assessments on all the related environmental aspects have been carried out and presented in this EIA study.
	The Project should avoid using any ecologically important areas and their vicinity (including Areas 38A, 38B, all CPAs, CAs, freshwater bodies, secondary woodlands, and areas with important species recorded in any ecological studies) within TCVOZP as sites for station-associated structure or as construction sites	All the works sites/ works areas have avoided using any ecologically important areas and their vicinity.
	The ecological survey schedule should be extended to cover the typical wet season period as well, and more efforts should be expeditated to cover horseshoe crabs, amphibians (e.g. Romer's Tree Frogs), the ecologically important seagrass bed at San Tau, and the sea horse in Tung Chung Bay.	The ecological survey schedule has been adjusted to cover the typical wet season period (i.e. from August to October 2020, from April to July 2021) as well. This updated survey schedule shall cover the most active horseshoe crab season, amphibians, the ecologically important seagrass bed at San Tau and the sea horse in Tung Chung Bay.
	The Project should avoid all stream courses and water channels, their tributaries and small streams with unclear sources (such as that flowing into the Wong Lung Hang mangroves), and their riparia from any construction sites, diversion, excavation, shortcreting, paving of beds and banks, stockpiling The Project should prohibit any direct discharge of sewage or effluent from construction sites into any water bodies including Wong Lung Hang stream and Tung Chung Bay during both the construction and operational phases	For the control of surface run-off during construction phase, all the good site practices including temporary site drainage, sedimentation tanks, etc. will be recommended for implementation by the Contractor. In addition, in the TCW Station area, a barrier in the form of sheet pile/hoarding with concrete footing would be proposed along the western boundary of the construction site/ works areas for TCW Station to avoid construction site surface run-off from flowing into the Tung Chung estuary without proper treatment. All the sewage generated by the construction team will be collected by chemical toilets which will be transported away by a licensed Contractor for proper disposal. No sewage will be allowed to be discharged to the natural watercourses. For the operational phases, stormwater surface runoff generated should be discharged to the nearby government drainage system.

Issue	Summary of Comments	Responses & Approaches Adopted
		Adequate sewerage will be provided to convey to public sewers to avoid direct discharge of sewage and wastewater to the nearby drainage system and water environment.
Water Quality	The Project should formulate and adopt ecological-based statutory water quality standards for the preservation of the aquatic ecosystem of Tung Chung River, Estuary, and Bay	Regular environmental site inspection at least once per week shall be carried out during construction phase to ensure that the recommended best management practices are properly implemented. The prevailing water quality objectives/ standards had been considered. The effluent quality during construction and/ or operational phases would be checked regularly against the statutory requirements.
	The Project should consider construction methods other than cut-and-cover for the proposed railway	The adopted alignment construction methodology has proposed TBM to construct the tunnel sections. The areas requiring cut-and-cover are minimised as much as practicable.
Waste	The Project should prohibit large vehicles, construction/dump trucks, and similar machineries from entering the section of Tung Chung Road between Ha Ling Pei and Shek Mun Kap, and all sections of South Lantau Road, as well as Chung Mun Road The Project should collect C&D waste mandatorily and provide transportation to designated facilities to ensure no C&D materials are dumped or stored in ecologically sensitive areas	GPS devices will be installed on all dump trucks to closely monitor the construction activities.

2.10 Tentative Implementation Programme

2.10.1.1 A tentative programme for the construction of the Project is shown in **Appendix 2.4**. A summary of the key construction works period is listed below. The site reinstatement works at all areas would be carried out between Q1 2028 and Q4 2029 except that in TCW which would start in Q4 2027. After the commencement of the Project, the removal of the existing TCL track and associated site reinstatement would be conducted from Q4 2029 to Q4 2030. The utilization of the barging facility would attain its peak from 2024 to 2026 according to the latest design. Activities within the barging facility starting from 2028 would be relatively much less (approx. few percent of the peak utilization). In addition, all committed mitigation measures would remain unchanged throughout the operation of the barging facility, the associated environmental impacts caused by the barging facility from 2028 would be insignificant.

- TCE: Q2 2023 – Q1 2028
- Launching/Retrieval Shaft at Tung Chung Crescent: Q2 2023 – Q3 2027

- EAP/EEP: Q2 2023 – Q4 2025
- TCW: Q2 2023 – Q4 2027
- Barging Facility: Q2 2023 – Q4 2029

2.11 Concurrent Projects

2.11.1.1 A number of concurrent projects have been identified for the evaluation of any potential cumulative impacts during both construction and operational phases of the Project. A discussion of the potential environmental impacts caused by these concurrent projects is given below and their respective locations are shown in **Figure 2.2**.

2.11.2 Reprovisioning, Remedial and Improvement Works

2.11.2.1 According to the latest information, there would be one Reprovisioning, Remedial and Improvement Work (RRIW) item in the vicinity of the Project. This RRIW item is the demolition and reprovision of the footbridge across Yu Tung Road to the south of Yat Tung Estate (see **Figure 2.2** for its location). The existing ramp along the northern side of Yu Tung Road would be demolished to allow site access, and a new ramp along the immediate south of Yat Tung Estate would be constructed as a reprovision. The section of footbridge spanning over Yu Tung Road and the ramp along the southern side of Yu Tung Road would remain intact.

2.11.2.2 Given that the demolition of the existing ramp and the construction of the new ramp along the northern side of Yu Tung Road would be constructed concurrently with the Project, the cumulative construction noise and dust impact due to the construction of the RRIW would therefore be evaluated in this EIA for conservative approach. Cumulative impacts on other environmental aspects during construction phase and all environmental impacts during operation phase would not be anticipated.

2.11.3 TCNTE

2.11.3.1 Since the approval of the EIA Report for TCNTE (AEIAR-196/2016), the project proponent has been refining the design and implementation of the new town extension. According to the latest information collated from the project proponent, the construction for TCE has commenced and the construction for TCW would commence soon. According to the information obtained from the Planning Department (PlanD) and CEDD, the anticipated population intake years of different phases of TCE and TCW are listed below. **Appendix 2.5** shows the locations of the implementation phases at TCE and TCW. The construction for TCE and TCW would last till 2030 and hence throughout the construction period of this railway project. Hence, cumulative construction noise and dust impacts are anticipated. However, with the provision of appropriate mitigation measures at

TCNTE, cumulative impacts on other environmental aspects during construction phase and all environmental impacts during operation phase would not be anticipated.

TCE

- Phase 1: Year 2024 – Year 2027
- Phase 2: Year 2025 – Year 2028
- Phase 3: Year 2027 – Year 2029
- Phase 4: Year 2030

TCW

- Phase 1: Year 2025 – Year 2030
- Phase 2: Year 2025 – Year 2028

2.11.4 Siu Ho Wan Station and Siu Ho Wan Depot Replanning Works

2.11.4.1 Siu Ho Wan Station and Siu Ho Wan Depot Replanning Works are located more than 1km away. The construction works would tentatively commence in 4th quarter of 2021. Hence, given the large separation distance, significant cumulative environmental impacts with the Project are not anticipated.

2.11.5 Proposed Comprehensive Residential and Commercial Development atop Siu Ho Wan Depot

2.11.5.1 The Proposed Comprehensive Residential and Commercial Development atop Siu Ho Wan Depot is located more than 1km away. According to the approved EIA Report (AEIAR-213/2017), the construction works would commence in 2023 for completion by 2038. Hence, given the large separation distance, significant cumulative environmental impacts with the Project are not anticipated.

2.11.6 Additional Sewerage Rising Main and Rehabilitation of the Existing Sewage Rising Main between Tung Chung and Siu Ho Wan

2.11.6.1 This concurrent project incorporates the construction of an additional sewage rising main of about 6.5km with a diameter of 1,200mm from Tung Chung sewage pumping station to Siu Ho Wan sewage treatment works and rehabilitation of the existing sewage rising main with a diameter of 1,200mm. The construction of the proposed works commenced in 2016 and would be completed by 2025[1].

[1] https://www.dsd.gov.hk/EN/Our_Projects/All_Projects/4381DS.html

2.11.6.2 This concurrent project has no major site formation and thereby it is anticipated that there is no cumulative impact on fugitive dust. However, the use of powered mechanical equipment (PME) would lead to cumulative impacts on airborne noise. For water quality, due to small scale of the project, cumulative adverse water quality impact during both construction and operational phase is not anticipated.

2.11.7 Expansion of Hong Kong International Airport into a Three-Runway System (3RS)

2.11.7.1 The new Three-Runway System is located more than 3.5km away. Besides, according to the information on the AAHK's website[1], by the time of 2023 when the construction of the Project commences, the majority of the civil construction such as site formation of the 3RS project would have been substantially completed. Hence, together with the large separation distance, significant cumulative environmental impacts with the Project are not anticipated.

2.11.8 Planning, Engineering and Architectural Study for Topside Development at HKBCF Island of the HZMB – Feasibility Study

2.11.8.1 The Topside Development at Hong Kong Boundary Crossing Facilities (HKBCF) Island of the Hong Kong-Zhuhai-Macau Bridge (HZMB) at more than 1.5km away. Besides, it is understood the respective project proponent is reviewing the overall planning for this project. Nevertheless, given the large separation distance, significant cumulative environmental impacts with the Project are not anticipated.

2.11.9 SkyCity Development at the Hong Kong International Airport

2.11.9.1 The SkyCity development is located more than 1.5km away and its construction is in progress. The hotel development is targeted to be completed in 2021 while the retail / dining / entertainment development will be completed from 2022 in phases. However, given the large separation distance, significant cumulative environmental impacts with the Project are not anticipated.

2.11.10 Intermodal Transfer Terminal (ITT) – Bonded Vehicular Bridge and Associated Roads

2.11.10.1 The Project is located more than 2km away. AAHK targets to commission ITT in end 2022. Given the large separation distance, significant cumulative environmental impacts with the Project are not anticipated.

2.11.11 Road P1 (Tai Ho – Sunny Bay Section)

2.11.11.1 The Road P1 is located more than 500m away from TCE Station. According to the Project Profile (ESB-337/2020), the construction of the Road P1 would be

[1] https://www.threerunwaysystem.com/en/

completed by 2030. However, given the large separation distance, significant cumulative environmental impacts with the Project are not anticipated.

2.11.12 Improvement Works for Ma Wan Chung Pier

2.11.12.1 The improvement works for Ma Wan Chung Pier are located above the TBM works at Ma Wan Chung. It is approximately 220m from the Yat Tung Estate. Based on the committee meeting[1] in Island District Council, the improvement works would commence in 2022. According to the executive summary[2] of Agreement No. CE 34/2017 (CE) "Study for Pier Improvement at Yung Shue Wan, Shek Tsai Wan, Yi O, and Ma Wan Chung – Investigation", pre-fabrication construction plus off-site element breaking and treatment would be adopted. In addition to this small-scale project, significant cumulative environmental impacts with the Project are not anticipated.

2.11.13 Tuen Mun – Chek Lap Kok Link

2.11.13.1 The Tuen Mun – Chek Lap Lok Link is located right next to the TCE area of the Project. It was commenced in 2020. Therefore, the operation of the Tuen Mun – Chek Lap Kok Link would be considered in the dust impact assessment of the Project.

2.11.14 Airport City Link

2.11.14.1 The Airport City Link is located more than 2km away. According to the Project Profile (DIR-276/2020), the construction of the Airport City Link would be completed by 2027. However, given the large separation distance, significant cumulative environmental impacts with the Project are not anticipated.

2.11.15 Airport Tung Chung Link

2.11.15.1 The Airport Tung Chung Link is located about 250m away. According to the Project Profile (ESB-342/2021) which was submitted for application for EIA study brief on Jun 2021, the construction works of the Airport Tung Chung Link would tentatively commence in 2024/2025 and be completed in 2027/2028. While there is no detailed information about the Project, any potential cumulative impact would need to be addressed in the EIA study for the Airport Tung Chung Link.

2.11.16 Commercial Development-cum-Public Market

2.11.16.1 A potential commercial development-cum-public market in Tung Chung Area 6 is located right next to the TUC. Despite the development programme is not yet confirmed at the time of preparation of this EIA report, the scale of this project is small which occupies only approximate 0.6 hectare and the development would

[1] https://www.districtcouncils.gov.hk/island/doc/2020_2023/en/committee_meetings_doc/TTC/19549/TTC_2021_14_EN.pdf
[2] https://www.pierimprovement-34-2017.gov.hk/uploads/reports/Executive%20Summary_eng.pdf

consist a commercial building only. The environmental impact from this project would be limited. Therefore, significant cumulative environmental impacts with the Project are not anticipated.

2.11.17 Summary of Concurrent Projects

2.11.17.1 A summary of the potential impacts of concurrent projects of the Project is given in **Table 2.11**. The potential cumulative environmental impacts from the concurrent projects would be further assessed in the relevant sections of this EIA report.

Table 2.11 Potential cumulative impacts of concurrent projects

Concurrent Projects	Programme		Potential Cumulative Impacts	
	Start	Complete	Construction Phase	Operational Phase
RRIW	2023	2025	Yes	Insignificant
TCNTE	2017	2030	Yes	Insignificant
Siu Ho Wan Station and Siu Ho Wan Depot Replanning Works	4th quarter of 2021	2036	Insignificant	Insignificant
Proposed Comprehensive Residential and Commercial Development atop Siu Ho Wan Depot	2023	2038	Insignificant	Insignificant
Additional Sewerage Rising Main and Rehabilitation of the Existing Sewage Rising Main between Tung Chung and Siu Ho Wan	2016	2025	Yes	Insignificant
Expansion of Hong Kong International Airport into a Three-Runway System (3RS)	2016	2024	Insignificant	Insignificant
Topside Development at HKBCF Island of the HZMB	The construction programme is yet to be confirmed.		Insignificant	Insignificant
SkyCity Development	2017	2022 in phases	No	Insignificant
Intermodal Transfer Terminal (ITT) - Bonded Vehicular Bridge and Associated Roads	2019	2022	No	Insignificant
Road P1	--	2030	Insignificant	Insignificant
Improvement Works for Ma Wan Chung Pier	2022	--	Insignificant	Insignificant
Tuen Mun – Chek Lap Kok Link	It has been commenced in 2020.		Insignificant	Insignificant
Airport City Link	2023	2027	Insignificant	Insignificant

Concurrent Projects	Programme		Potential Cumulative Impacts	
	Start	Complete	Construction Phase	Operational Phase
Airport Tung Chung Link	2024/ 2025	2027/ 2028	Any potential cumulative impact would be addressed in the EIA study for Airport Tung Chung Link	
Commercial Development-cum-Public Market in Tung Chung Area 6	Development programme is not yet confirmed		Insignificant	Insignificant

2.12 Summary of Environmental Benefits and Environmental Achievements of the Project

2.12.1.1 Throughout the EIA study, site constraints and impacts have been identified and assessed and mitigation measures/good site practices, if necessary, have been recommended to avoid negative environmental impacts to the surroundings. In addition, comments from district councils, green groups, and other stakeholders have also been reviewed and incorporated where practicable. A number of environmental initiatives covering good managing practices, waste minimisation, and nature conservation have been recommended for incorporation in the detailed design.

2.12.1.2 The key environmental benefits and achievements of the Project are listed below.

- Reduce the reliance on road-based vehicles;
- Promote the use of environmentally friendly rail system;
- Reduce road traffic noise; and
- Reduce vehicular emissions.

2.12.1.3 The key recommended mitigation measures / good site practices / enhancement measures and their associated benefits are given in **Table 2.12** for reference:

Table 2.12 Key recommended mitigation measures/good site practices/enhancement measures and their associated benefits

Aspect	Key Recommended Mitigation Measures/Good Site Practices/Enhancement Measures	Associated Benefits
Air Quality	• Adopt dedicated spoil transportation routes away from the identified Air Sensitive Receivers (ASRs) as practicable • Install 3-sided screen with top cover and provide water sprays at the unloading point to barges at the barging facility • Avoid using exempt NRMM as much as practicable and when alternatives are available from the local market at the time of construction. • Implement watering systems for areas with heavy construction.	• Protect Air Sensitive Receivers (ASRs) by reducing fugitive dust emission

Aspect	Key Recommended Mitigation Measures/Good Site Practices/Enhancement Measures	Associated Benefits
	• Adopt CLP power during the construction as much as practicable • The impermeable blast covers at TCW Station and the shaft for EAP / EEP are closed prior to blasting in order to ensure blasting to be carried out in a fully enclosed environment • Vehicle washing before leaving the barging facility with the provision of vehicle washing facilties	
Noise	• Install noise enclosure for the TBM launching shaft/retrieval shaft • Install temporary movable enclosure for D-wall construction at TCW area • Adopt QPME • Adopt temporary noise barriers to screen noise from relatively static Powered Mechanical Equipment (PME) • Use plant items alternatively within one worksite, wherever practicable • Adopt speed reduction of railway at certain sections in TCE during night-time period during the construction period • Provide noise barriers along at-grade railway tracks	• Protect Noise Sensitive Receivers (NSRs) by reducing construction and rail noise impact
Water Quality	• Install a barrier in the form of sheet pile/hoarding with concrete footing along the western boundary of construction site/works areas for TCW Station for preventing uncontrolled discharge of untreated construction site runoff to the nearby Tung Chung Bay • Follow Best Management Practices (BMPs) of mitigation measures in controlling water pollution and good site management as specified in the Professional Persons Environmental Consultative Committee (ProPECC) Practice Note (PN) 1/94 “Construction Site Drainage” • Size all vessels to maintain adequate clearance between vessels and the seabed in all tide conditions • Control loading of barges and hoppers to prevent splashing of materials into the surrounding water	• Protect the neighbouring Water Sensitive Receivers (WSRs) during construction phase
Waste Management	• Adopt good waste management and control practices to avoid the generation of an excessive amount of waste materials • Employ waste collectors for disposal of general refuse to prevent potential nuisance	• Minimise waste generation • Ensure proper handling of chemical waste

Aspect	Key Recommended Mitigation Measures/Good Site Practices/Enhancement Measures	Associated Benefits
	caused by mistreating general refuse, such as windblown, vermin, water pollution, and visual impact • Employ licensed chemical waste collectors for collecting chemical waste • Good management practices for handling and disposal of marine sediment at dedicated marine disposal sites • Equip GPS or equivalent system at all dump trucks engaged on site for delivery of inert C&D materials from the site to PFRFs • Follow the designated land-based transportation routes for different types of wastes before and after the commencement of barging facility • Carry out on-site sorting of C&D material • Make provisions in the Contract documents to allow and promote the use of recycled aggregates where appropriate • Implement a trip-ticket system for each works contract in accordance with DEVB TCW No. 06/2010 to ensure that the disposal of C&D materials is properly documented and verified	• Ensure the C&D materials are disposed to the designated outlets
Land Contamination	• Require site re-appraisal to assess the latest site situation prior to the commencement of the construction	• Ensure any new changes in land use activities that might cause land contamination issue after the agreement of the Land Contamination Review (LCR) but before commencement of the construction could be addressed
Ecology	• Provide a barrier in the form of sheet pile/ hoarding with concrete footing along the western boundary of construction site/ sites areas for TCW Station for preventing uncontrolled discharge of untreated construction site runoff to the nearby Tung Chung Bay	• Minimize the indirect impacts during construction phase
Fisheries	• Mitigation measures/ good sites practices/ enhancement measures for water quality would help to minimize fisheries impact	• No impact to fisheries anticipated
Landscape and Visual	• Preserve existing trees, transplant and compensate unavoidably affected trees where practicable • Reinstate affected landscape, optimise green provision on sturcutre and provide landscape integration and screen planting	• Minimize landscape and visual impact during construction and operational phases

Aspect	Key Recommended Mitigation Measures/Good Site Practices/Enhancement Measures	Associated Benefits
	• Adopt architectural aesthetic design and roof greening for above-ground facilities • Implement aesthetic design on noise barrier at TCE area	
Cultural Heritage	• Conduct field scan, additional test pits and auger tests at the northern end of the TCW Station which are inaccessible at the EIA stage prior to construction stage	• Verify the presence of any archaeology remains and identify measures if necessary prior to construction
Hazard to Life	• No overnight storage of explosives • Provide impermeable blast covers if blasting is adopted	• Protect nearby sensitive receivers from adverse impacts due to blasting
General	• Implement a comprehensive Environmental Monitoring System throughout the entire construction period • Employ an Environmental Team (ET) and Independent Environmental Checker (IEC)	• Ensure compliance with all statutory requirements and those recommendations in the EIA