- cost of both construction and operation - including greater cost to provide additional personnel to man underground stations and additional air conditioning and lighting costs;
- results of economic evaluation, including any loss or savings in land premium cost due to the above ground or underground options;
- construction and operational safety implications; and
- construction duration.

7.3 Strategic Environmental Assessment of the Component Schemes

7.3.1 Having provided a broad overview of the generic environmental impacts that may be associated with the construction and operation of railways, the following sections highlight the key strategic findings of the environmental assessments that were undertaken for each of the Component Schemes within the proposed rail development options.

7.3.2 As the environmental assessments have been undertaken on schemes that have been developed as part of a strategic study, they cannot be considered as representing definitive alignments. Each of the schemes will be subject to further development before they can be implemented, and as such, the final optimised alignment and construction methodology may differ from that assumed at the time of undertaking the assessments. Consequently, in addition to presenting the key strategic impacts, the indicative alignment details and preliminary construction methodologies that have been assumed to undertake these assessments are also outlined for each of the schemes.

North Island Line

Description and Assumed Construction Methodology

7.3.3 The NIL is proposed to connect the existing Hong Kong station (HOK) with Fortress Hill (FOH), via the new Tamar (TAM) and the HK Convention & Exhibition Centre (EXH). Two alignment options have been proposed, with Option 1 being a route outside reclamation (ie an 'inland' option), and Option 2 requiring the implementation of the Phase III Central Reclamation in the vicinity of TAM Station and the Wanchai Phase II reclamation in the vicinity of EXH Station for it to be feasible.

7.3.4 The preliminary design information indicates that the NIL will be constructed entirely underground, using a combination of cut and cover, soft and rock bored tunnelling techniques. As the alignment will be entirely underground, the potential for operational impacts is considered to be minimal. The magnitude and extent of any construction phase impacts will be dependant upon the exact construction methodology that is employed (details of which has still to be finalised). However, such impacts are likely to be relatively short lived, and therefore unlikely to present insurmountable strategic impacts. Nevertheless, where impacts are envisaged, these are discussed below.

Key Potential Environmental Impacts

7.3.5 The following key potential environmental issues have been identified:

- Potential noise, dust and traffic impacts are likely to be experienced during the construction of the cut and cover sections. The extent and exact locations of these cut and cover sections has still to be finalised as part of the design development process. However, it is envisaged that with the adoption of appropriate mitigation measures (for example, standard dust suppression techniques, the use of quiet plant, noise barriers and/or enclosures, and careful programming of the works), such impacts should be controlled to within acceptable criteria.
- The sections constructed using soft or rock bored tunnelling are not expected to present any insurmountable environmental impacts. As the majority of the construction will be underground, impacts would only be anticipated at the shafts/worksites locations due to the insertion and removal of the tunnel boring machines and the removal of the spoil. The magnitude of the impacts will be dependant upon the details of the construction methodology employed, and in particular, the siting of the shafts/worksites. These details have yet to be finalised, however, it is recommended that environmental considerations are taken into account whilst planning the siting of the shafts/worksites. Similarly, once defined, the environmental impacts from the shafts/worksites will need to be considered further during any subsequent EIA evaluation, and if appropriate, suitable mitigation measures developed.
- The Exterior of the Old Supreme Court is registered as a Declared Monument under the Antiques and Monuments Ordinance (Cap.53). Whilst no direct impacts are envisaged to this Declared Monument, it is recommended that the potential impacts are further evaluated during the design and EIA processes, and that, if necessary, appropriate alignment alterations and/or mitigation measures are incorporated into the design.
- The preliminary design for Option 1 (outside reclamation), indicates that there may be the temporary loss of a number of recreational facilities between TAM and FOH including the Wanchai Sports Ground, the Wan Chai Public Swimming pool, the Harbour Road Indoor sports centre. It is not considered that these temporary losses would result in any insurmountable strategic environmental impacts, particularly as it is envisaged that the facilities would, wherever practicable, be reprovisioned to alternative locations.
- There is a proposal to include a station at Victoria Park (VIP). The construction of this facility may involve cut and cover working within the park, although it is likely that the tunnels will primarily be constructed by means of bored tunnelling. The cut and cover working and the provision of any above ground structures (e.g. station entrances) are likely to respectively result in temporary and permanent impacts to this recreational facility and area of Regional Open Space. Whilst the loss of recreational and amenity facilities is undesirable, the loss due to construction will be only temporary, and it is envisaged that the area can be recreated to a standard as good, if not better, than originally existed. Similarly, it is envisaged that the amount of land lost to above ground structures will be relatively small, and that the visual impact of such structures can be effectively mitigated through sensitive design and the provision of

appropriate landscaping. Consequently, in strategic terms, the anticipated losses are not considered to present an insurmountable environmental impact. Nevertheless, these issue will need to be further assessed at the EIA stage once the design is progressed.

- Depending upon the finalised location of the station within Victoria Park, some trees and shrubs could be lost. However, it is not envisaged that this would have an significant ecological impact as the trees are generally considered to be ornamental species of little ecological value. Whilst the loss of any trees/shrubs also has the potential to result in a deterioration in landscape value, it is envisaged that wherever practicable the trees/shrubs would be replaced. Consequently, it is not considered that this potential impact would give rise to any insurmountable strategic environmental impact. Nevertheless, this issue will need to be further assessed at the EIA stage once the design is progressed.
- For Options 1 and 2, no insurmountable operational environmental impacts are anticipated as the routes are predominantly underground, thereby providing an effective form of mitigation to airborne noise and visual impacts. Whilst there is the potential for groundborne noise and vibration impacts since the route passes beneath an urban environment, it is envisaged that such issues can be adequately addressed, through, if necessary, the specification of appropriate trackform or operational constraints, during the design and EIA stage.
- It is not envisaged that any reclamation will be required specially for the construction of the NIL. However, reclamation would be required as part of the Central and Wanchai Reclamation Project to enable Option 2 to be feasible. The construction of this reclamation is subject to political pressures (regarding the loss of the harbour front) and it would also be likely to give rise to environmental impacts (such as potential water quality impacts). However, it should be noted that the reclamation works would not constitute part of the rail development and consequently, any impacts associated with the reclamation will need to be addressed as part of a study specifically related to the reclamation works.

East Kowloon Line

Description and Assumed Construction Methodology

7.3.6 The East Kowloon Line (EKL) is proposed to connect HUH station with Diamond Hill (DIH). North of HUH there are two minor alignment alternatives, either via Ho Man Tin (HMT) or Gillie's Avenue (GIA), after which, the alignment is currently envisaged as progressing to Ma Tau Wai (MTW), To Kwa Wan (TKW) and Kai Tak (KTA) before terminating at DIH.

7.3.7 The preliminary design information indicates that the EKL will be constructed entirely underground, using a combination of cut and cover and soft and rock bored tunnelling techniques. A depot is also proposed at the former Kia Tak site, south east of Concorde Road, for the stabling and maintenance of trains.

Key Potential Environmental Impacts

Section from HUH to MTW

7.3.8 Two minor alignment alternatives have been proposed within this section of alignment, although both are underground. The first alternative follows a more easterly route via GIA, through an area of old low rise residential and commercial blocks, while the second passes to the west of Chatham Road North, under Ho Man Tin Football pitch and Ko Shan Road Park.

7.3.9 The preliminary designs for both alternatives indicate that they will be constructed using a combination of soft and rock bored tunnelling and cut and cover. Both alternatives were considered to result in the same potential strategic environmental impacts as set out below.

- In environmental terms, bored tunnelling is preferable to cut and cover as there is less potential for noise, dust and traffic impacts to result from the heavy civil engineering activities, including the handling of large quantities of excavated material that are associated with this construction method. The construction of the bored tunnel sections is considered unlikely to result in any insurmountable environmental impacts. Nevertheless, impacts may occur at any shaft/worksites locations that are required for the insertion/removal of the tunnel boring machines and the removal of the spoil. The magnitude of the impacts will be dependant upon the details of the construction methodology employed, and in particular, the siting of the shafts/worksites. These details have yet to be finalised, however, it is recommended that environmental considerations are taken into account whilst planning the siting of the shafts/worksites. Similarly, once defined, the environmental impacts from the shafts/worksites will need to be considered further during any subsequent EIA evaluation, and if appropriate, suitable mitigation measures should be developed.
- Depending upon the timing of the construction and occupation of the Valley Road Housing Estate (at Ho Man Tin), there may be the potential for noise and dust impacts from the construction of HMT station. However, such impacts are only likely if the residential properties are occupied during the construction phase. Nevertheless, it is considered that such potential impacts could be effectively controlled with the use of appropriate mitigation, and no insurmountable impacts are envisaged.
- The potential exists for operational ground-borne and vibration impacts to occur in areas where the alignment passes under residential developments, however, with the development of appropriate track-form design during the detailed design stage, no insurmountable impacts are anticipated.

Section from MTW to DIH

7.3.10 The preliminary design indicates that the entire length of this section will be constructed underground using mainly cut and cover. From MTW to TKW, the alignment passes through an area of low rise residential, commercial and industrial estates, before entering the old Kai Tak Airport site.

- Cut and cover sections have the potential to give rise to noise, dust and traffic impacts, with the severity of impact being dependent upon the construction methodology used (e.g. sheet piling or diaphragm walling), and the proximity of the works to any sensitive receivers. In environmental terms, it is preferable to keep the amount of cut and cover working to a minimum. However, it is noted that the need for cut and cover working often arises as a result of engineering constraints (eg ground conditions that limit the use of tunnel boring techniques). Wherever practicable, it is recommended that the need for cut and cover working be minimised; although it is appreciated that it is unlikely to be practicable to dispense with this construction method entirely. Environmental issues should be considered when determining whether it is viable to undertake cut and cover working in any particular location. The current preliminary design envisages that cut and cover working will be required between MTW and DIH. The actual extent and exact locations of the cut and cover sections have still to be finalised, however, undertaking cut and cover working along To Kwa Wan Road would result in the works being undertaken in close proximity to dense residential accommodation. As such, noise and dust impacts would be likely. It is recommended that alternative construction methods are employed, if practicable. If cut and cover working is necessary, careful consideration will need to be given to the development of appropriate mitigation measures along this section (for example, the use of quiet plant, noise barriers and/or enclosures, and careful programming of the works). With the development of an appropriate package of mitigation measures, and considering the relatively short period over which construction impacts may be experienced, it is not considered that the cut and cover working should result in any insurmountable strategic environmental impacts. Nevertheless, this matter will need careful consideration during the development of the construction methodologies and during the design and EIA stages.
- Land contamination issues arising from the cut and cover activities at the former Kai Tak Airport may also be anticipated. Remediation is already in progress to remove the contamination from the site, and it is anticipated that this will be completed before the commencement of the railway construction works. Whilst no insurmountable impacts are anticipated, it is recommended that further consideration is given to the potential for both construction and operational phase impacts. In particular, this issue may need to be considered during the development of the construction methodology, and during the design of the tunnel and/or station box design. This matter may also require further consideration during the EIA stage.
- The proposed alignment enters the Consultation Zone of the HK& China Gas facility at Ma Tau Kok. The PHI's Consultation Zone is 300 m and, with the currently assumed alignment, one (underground) station and 720 m of track would be within the Consultation Zone. As such, a Hazard Assessment will be required. The outcome of the hazard assessment will be dependant upon may factors, however, since the EKL will be operated underground it is not anticipated that there will be any insurmountable impacts. Nevertheless, this matter will need to be taken into account during the design development process, and if required, appropriate mitigatory measures incorporated into the design and/or operation of the railway.

Kai Tak Depot

7.3.11 Whilst the detailed arrangements for the proposed depot are still at an early stage of development, an assessment of the potential key environmental impacts that may be associated with its construction and operation is presented below.

- The depot will be constructed at-grade. The construction works will have the potential to give rise to construction related impacts; particularly noise and dust. The timing of the construction phase will determine the number of potential receivers that may be affected by the works. If the depot were to be constructed after the occupation of premises constructed as part of the South East Kowloon Development Project, then receivers may be affected. It is currently understood that construction of the South East Kowloon Development will commence in either 2004 or 2005. As such, it is currently not envisaged that the premises will be occupied when the depot is under construction. With the development and implementation of suitable mitigation measures, it is envisaged that the noise and dust impacts can be controlled, and as such, these factors such not result in any insurmountable impacts.
- During the operation of Kia Tak airport, there were a number of known leakages of aviation fuel which gave rise to land contamination concerns. Field investigations undertaken in 1996 as part of the TDD's South East Kowloon Development Feasibility Study, and subsequently the EIA for the decommissioning of northern apron of Kia Tak Airport, identified the areas of concern. Remediation of these areas is underway. Whilst none of the identified areas of contamination fall within the area proposed for the depot, there is still the possibility that there may have been some migration of the contaminants and that 'hot-spots' may be encountered during the construction works. As such, this matter will be given further consideration during any further environmental studies, and during the EIA. If appropriate, precautionary mitigation measures should be developed to minimise the potential impacts. With adequate consideration and the use of appropriate mitigation measures (e.g. use of mechanical excavators, use of suitable protective equipment etc) this issue would not be considered to result in any insurmountable strategic impacts.
- The depot is likely to be used for both general and heavy maintenance of the trains. As a consequence, there is the potential for noise impacts to arise. However, it is envisaged that the depot will be totally enclosed, and as such, the operational noise impacts are expected to be minimal. Whilst noise impacts could arise from the air conditioning plant, previous experience suggests that such impacts can be controlled through the careful design and planning of the air conditioning outlets (e.g. locating and angling them away from sensitive receivers), and the defining and enforcement of appropriate noise specifications for the air conditioning plant.
- It is envisaged that the depot will also include a train wash. As such, there is the potential for water quality impacts if the waste water is not adequately treated. However, experience from other depots suggests that through appropriate mitigation measures (such as the use of bio-degradable detergents) and the recycling and treatment of the waste water, such impacts can be controlled and the water quality standards can be achieved.

- Waste materials (e.g. oils, grease, packaging waste etc) will be produced as a result of the depot's operations. However, with the adoption of suitable waste management practices (e.g. waste avoidance practices, waste minimisation and recycling, and the proper disposal of waste) it is not envisaged that this would result in any insurmountable impacts.
- If the area above the depot is used for residential developments, there may be the potential for operational noise and/or vibration impacts to these sensitive receivers. Consideration will need to be given to this matter during the design of the depot and possible residential developments. However, with the use of mitigation measures (eg trackform and barriers etc) it is not envisaged that this matter would result in any insurmountable impacts.

Housing Developments

7.3.12 The construction and operation of a new railway line has the potential to give rise to impacts. The scope of the key potential strategic impacts associated with the EKL are highlighted in the preceding text. At the strategic level, it is not practicable, nor the intention, to identify all the potentially sensitive receiver locations that may be affected by the project, nor is it the intention to determine the magnitude of the potential impacts at these locations. However, it is noted that existing and proposed public housing may be located in the vicinity of the currently assumed routes and therefore, to assist with any further environmental studies that may be undertaken during the future development of the line, the locations of these public housing sites have been reviewed and details of housing sites that may be in the vicinity of the rail scheme are presented below. It is noted that the currently assumed alignments are still under development and may be subject to alteration. Therefore, the following should not be taken as a definitive list, and it should be reviewed and updated as part of any further environmental assessments. In compiling this list, reference has been made to the 1999 edition of the 'Location of Housing Authority Estates', the latest version of the Public Housing Development Programme and Control List.

- Existing Public Housing Estates:
  - Lung Poon Court
  - Kwun Fai Court
- Proposed Public Housing Estates:
  - Valley Road Phases 1, 2 & 3
  - Homantin South (Phases 2, 3 & 4)
  - Kwun Hei Court
  - Southeast Kowloon Area 1D
  - Southeast Kowloon Area 1F
  - Southeast Kowloon Area 2D
  - Southeast Kowloon Area 2F
  - Southeast Kowloon Area 2G
  - Southeast Kowloon Area 2K
  - Southeast Kowloon Area 2L
  - Southeast Kowloon Area 1A
  - Southeast Kowloon Area 1B

- Southeast Kowloon Area 1C
- Southeast Kowloon Area 2E
- Southeast Kowloon Area 2J
- Rhythm Garden (Blackdown Barracks)
- Diamond Hill

Fourth Harbour Crossing

Description and Assumed Construction Methodology

7.3.13 Four preliminary designs have been proposed for FHC. These comprise either an extension to East Rail, or the EKL, to Victoria Park and on to Central West (CEW), or extensions of the same two lines to CEW but via EXH and ADM.

7.3.14 For the Victoria Park options, there are two alternative alignments due to the possible siting of the station within Victoria Park, either to the east or west of the park. From Victoria Park the alignment would continue on to CEW via Leighton Hill (LEH), Wan Chai South (WCS) and Hong Kong Park (HKP).

7.3.15 The potential environmental impacts associated with the FHC stage of these alignments are considered to be similar, as the preliminary designs indicate that each alternative would be constructed underground, using similar construction methodologies.

7.3.16 At this stage of the scheme's development, it is assumed that the option to EXH would require some reclamation at the corner of the Causeway Bay Typhoon Shelter near the Police Officers Club in order to construct the landing point of the IMT. However, the option to VIP would not need any reclamation beyond the existing seawall, although there may be a need to provide some form of protective armour around the IMT in the Causeway Bay Typhoon Shelter since it may become exposed during low tide.

7.3.17 The environmental impacts from the sections on Hong Kong Island will vary for the route under consideration, however, the impacts will be the same whether the line comprises an extension to the EKL or East Rail.

Key Potential Environmental Impacts

FHC Section (HUH to VIP and HUH to EXH)

- Depending upon the precise details of the construction methodology adopted and plant used, noise, dust and traffic impacts are likely to occur, especially as a result of cut and cover sections at the Kowloon and Hong Kong land-falls, and the marine cofferdam on the Kowloon side. As stated previously, in environmental terms, it is preferable to limit the amount of cut and cover working as far as is practicable. However, due to engineering constraints, it is unlikely that the need for cut and cover working can be dispensed with during the construction of the landfall sections. Whilst sensitive receivers are present adjacent to the areas where cut and cover working is envisaged, it is predicted that, with the adoption of appropriate mitigation measures, potential impacts can be controlled to within acceptable criteria.

- Water quality impacts are anticipated during the excavation and dredging of the submarine trench for the immersed tube tunnel in Victoria Harbour, and possibly during the construction of the marine cofferdam. Appropriate mitigation measures will have to be employed to prevent any adverse impacts. This aspect of the schemes will require further consideration during the design and EIA process. However, it is envisaged that the environmental impacts can be mitigated to acceptable levels, and therefore, no insurmountable environmental impacts are envisaged.
- Potential contamination issues arising from the excavation and dredging activities in the Causeway Bay Typhoon Shelter may also be anticipated. Remediation may involve the removal and disposal of contaminated marine sediments (e.g. mud/sand) from the site before construction works can commence. This matter will require further consideration during the development of the FHC, however, it is predicted that such concerns can be effectively mitigated and therefore, no insurmountable problems are envisaged.
- If the option to Exhibition is implemented, this is likely to require some reclamation at the corner of the Causeway Bay Typhoon Shelter (near the Police Officers Club) in order to enable the construction of the landing point for the IMT. As with other proposed reclamations in the harbour, these works would be likely to be the focus of political pressures (regarding the loss of the harbour front), and they would also be likely to give rise to environmental impacts (such as potential water quality impacts). The environmental implications would require further detailed evaluation during the design and EIA stages. However, it is envisaged that, with the development and implementation of appropriate mitigation measures, water quality impacts would not result in any insurmountable strategic impacts.
- The Victoria Park options are likely to involve cut and cover working within the park for the construction of the proposed station, although it is likely that the tunnels will primarily be constructed by means of bored tunnels. The cut and cover working and the provision of any above ground structures (e.g. station entrances) are likely to respectively result in temporary and permanent impacts to this recreational facility and area of Regional Open Space. Whilst the lost of recreational and amenity facilities is undesirable, the loss due to construction will be only temporary, and it is envisaged that the area can be recreated to a standard as good, if not better, than originally existed. Similarly, it is envisaged that the amount of land lost to above ground structures will be relatively small, and that the visual impact of such structures can be effectively mitigated through sensitive design and the provision of appropriate landscaping. Consequently, in strategic terms, the anticipated losses are not considered to present an insurmountable environmental impact. Nevertheless, these issue will need to be further assessed once the design is progressed.
- Depending upon the finalised location of the station within Victoria Park, some trees and shrubs could be lost. However, it is not envisaged that this would have a significant ecological impact as the trees are generally considered to be ornamental species of little ecological value. Whilst the loss of any trees/shrubs also has the potential to result in a deterioration in landscape value, it is envisaged that wherever practicable the trees/shrubs would be replaced. Consequently, it is not considered that this potential

impact would give rise to any insurmountable strategic environmental impact. Nevertheless, this issue will need to be further assessed once the design is progressed.

- For the option via EXH, the preliminary design information indicates that there may be a temporary loss of amenity due to the closure of Wanchai Stadium. It is not considered that this temporary loss would give rise to any insurmountable strategic environmental impact, particularly as it is envisaged that the facility would be reprovisioned in an alternative location.

Section from EXH to CEW (via ADM)

- As this section is proposed to be constructed predominantly using a combination of soft and rock bored tunnelling techniques, it is not envisaged that there will be any insurmountable construction impacts. The potential impacts and further work required will be as described for other bored tunnel sections.
- Vibration or groundborne noise impacts are possible from the construction and operation of the alignment as it will pass beneath, or in close proximity to, a number of sensitive receivers located between Wanchai and Central. Notable examples include, the HK Convention & Exhibition Centre, HK Academy for Performing Arts and Government House (Declared Monument). During the construction phase, the extent of any impact will be dependent upon the construction methodology, however, with careful planning and execution of the works, no insurmountable impacts are envisaged. During the operational phase, it is envisaged that, with the development of appropriate track-form during the detailed design stage, no insurmountable impacts are anticipated.
- A number of Declared Monuments have been identified in the vicinity of this alignment. These include Flagstaff House, Helena May Institute, Government House, Duddell Street steps and gas lamps, St John's Cathedral, Victoria Prison, Central Police Station Compound and former Central Magistracy. The Antiques and Monuments Ordinance (Cap.53) provides statutory protection against the threat of development against these historic sites. Whilst no direct impacts are envisaged to these resources, it is recommended that the potential impacts are further evaluated during the design and EIA processes, and that, if necessary, appropriate alignment alterations and/or mitigation measures are incorporated into the design.

Section from VIP to CEW (via LEH, WCS and HKP)

7.3.18 The key potential impacts for this alignment are discussed below:

- As described above for the section of the FHC between HUH and VIP, there may be both temporary and permanent impacts to Victoria Park. However, in strategic terms, these impacts are not envisaged to result in any insurmountable impacts. Whilst the alignment will pass below Hong Kong Park, it is envisaged that this section of the alignment will be in bored tunnel, hence, it is not predicted that there will be any impacts to this important recreational and amenity area. In order to verify the extent of any impacts to

Victoria Park and Hong Kong Park, it is recommended that these areas of concern are given thorough evaluation during the design and EIA stages.

- Overall, as the majority of the alignment within this section is envisaged to be constructed in bored tunnel, the potential for impacts is considered minimal. Potential impacts and recommendations for further work required will be as described for other bored tunnel sections.
- A number of Declared Monuments have been identified in the vicinity of this alignment. These include the Old Wanchai Post Office, Tin Hau Temple, Flagstaff House, Helena May Institute, St John's Cathedral, Government House, Duddell Street steps and gas lamps, Former French Mission Building, Old Pathological Institute, Victoria Prison, Central Police Station Compound and Former Central Magistracy. The Antiques and Monuments Ordinance (Cap.53) provides statutory protection against the threat of development against these historic sites. Whilst no direct impacts are envisaged to these resources, it is recommended that the potential impacts are further evaluated during the design and EIA processes, and that, if necessary, appropriate alignment alterations and/or mitigation measures are incorporated into the design.

Tai Wai to Diamond Hill Link

Description and Assumed Construction Methodology

7.3.19 The TDL is proposed to connect the EKL (from Diamond Hill (DIH)) to Tai Wai (TAW). Depending on the operator of the EKL an interchange with the MOS Line may have to be provided at TAW. Two preliminary alignment options have been proposed.

7.3.20 Option 1, which would link into the MOS Line and allow through running of KCR trains from Lee On to DIH, would be above ground (for approximately the first 1,100m south-west of Tai Wai station) before entering a tunnel portal and continuing in tunnel to DIH. The proposed option 1 alignment would be to the east of East Rail.

7.3.21 Option 2 would following a more westerly alignment. After leaving the 3 way interchange at Tai Wai (for East Rail, MOS Rail and the TDL) the proposed alignment would enter into a shallow cut and cover tunnel (for approximately 300m) before continuing in a combination of rock and soft bore tunnel for the next 4,000m, after which there would be a short section of cut and cover tunnel before the alignment joins the end of the EKL overrun tracks at DIH. The alignment to the south west of Tai Wai would be to the west of the existing East Rail alignment.

7.3.22 As indicated above, the preliminary design information indicates that both Options 1 and 2 of the TAW-DIH Link would be constructed mainly underground in bored tunnel, although short sections of cut and cover would be likely for both options at TAW and DIH. Option 1 would have a short section above ground near Tai Wai.

Key Potential Environmental Impacts - Option1

TAW to Tunnel Portal

- A short section (of approximately 450 m) of cut and cover construction will be required south east of TAW station. As with other sections of cut and cover, this construction technique has the potential to give rise to noise, dust and potentially traffic related impacts. As described in preceding sections, it is recommended that the extent of cut and cover working be kept to a minimum practicable level. If cut and cover working is required, the magnitude of the impacts will determine by the construction methodology that is adopted (e.g. sheet piling or diaphragm walling). However, in strategic terms, the duration of such impacts will be relatively short, and, with the adoption of appropriate mitigation, it is not envisaged that any insurmountable impacts will result.
- As option 1 includes at-grade tracks, rather than an alignment totally underground (as proposed for option 2), there is the potential for operational noise impacts, (including cumulative impacts from the existing East Rail, committed MOS Rail and planned TDL). However, with the development of appropriate mitigation measures (including, for example, noise barriers, enclosures and trackform, together with careful scheduling of services etc) it is envisaged that potential operational noise impacts can be controlled to within the required noise criteria. As a general environmental principle, it is considered better practice to plan rail routes underground, wherever practicable, in order to minimise the potential for noise and other (e.g. landscape and visual) impacts. However, it is acknowledged that this is not always practicable.
- Option1 would pass within the Consultation Zone of the Shatin Water Treatment Works (PHI). The PHI's Consultation Zone is 1,000 m and, with the currently assumed alignment, 320 m of above ground track and 580 m of underground track would be within the Consultation Zone. Whilst the preliminary design information indicates that option 1 may have a section of above ground track within the in the Consultation Zone, it is noted that, at a distance of approximately 700 m north-east the PHI, the alignment enters into tunnel and continues below ground passed the PHI. It should also be noted that the above ground section of the TDL alignment would be located to the east of the existing East Rail (ie at an increased distance from the PHI than East Rail) and that East Rail is above ground in closer proximity to the PHI than is proposed from the TDL. Consequently, it is therefore envisaged that the potential hazard implications related to the TDL would be lower than those which currently exist for the operation of East Rail. Therefore, at a strategic level, the proximity of the preliminary alignment to the PHI is not considered likely to constitute a factor that would prevent the further development of this alignment. However, a hazard assessment will be required to accurately evaluate the potential hazard implications, and if necessary develop appropriate mitigation (for example, the development of an 'early warning system' to prevent trains from approaching the PHI in the event of an incident at the PHI).

Underground Section from Tunnel Portal to DIH

- The preliminary design information indicates that a combination of bored and cut and cover tunnels are proposed between TAW and DIH. The soft and rock bored tunnel sections are expected to have limited impacts associated with construction phase. As described for other bored tunnel sections, potential noise, dust and traffic impacts are likely to be confined to the insertion and removal of the tunnel boring machines and the removal of the spoil from the shafts/worksites. The magnitude of the impacts will be dependant upon the details of the construction methodology employed, and in particular, the site of the shafts/worksites. However, it is considered that such impacts can be suitably controlled through the development and implementation of appropriate mitigation measures. Nevertheless, these potential impacts will need to be further assessed during the EIA stage.
- The cut and cover sections are expected to give rise to noise, dust and traffic impacts. As described in preceding sections, it is recommended that the extent of cut and cover working be kept to a minimum practicable level. If cut and cover working is required, the magnitude of the impacts will determine by the construction methodology that is adopted (e.g. sheet piling or diaphragm walling). However, in strategic terms, the duration of such impacts will be relatively short, and, with the adoption of appropriate mitigation, it is not envisaged that any insurmountable impacts will result at either Tai Wai or DIH.

Key Potential Environmental Impacts - Option2

TAW to DIH

- Option 2 would be constructed entirely underground using a combination of cut and cover and bored tunnelling. The potential impacts will be as described for other sections constructed using the same construction methodologies. Again, it is recommended that, wherever practicable, the extent of cut and cover working is minimised. Whilst the cut and cover working immediately to the west of Tai Wai station is envisaged as having the greatest potential to result in noise and dust impacts (due to the proximity to residential premises), its is predicted that, with the adoption of the mitigation measures outlined previously, no insurmountable impacts should result.
- As option 2 is proposed to be entirely in tunnel, no strategic environmental impacts are envisaged from the operational phase.
- The preliminary alignment for option 2 would pass within the Consultation Zone of the Shatin Water Treatment Works (PHI). The PHI's Consultation Zone is 1,000 m and, with the currently assumed alignment, 600 m of underground track would be within the Consultation Zone. Whilst (with regard to its horizontal alignment) option 2 would pass closer to the PHI than option 1, the alignment would be in tunnel. At a strategic level, this is considered to provide an effective form of mitigation, and the potential hazard implications are not envisaged to prevent the further development of this alignment. However, a hazard assessment will be required to accurately evaluate the potential hazard implications from both the construction and operation of the railway. If necessary, appropriate mitigation measures may need to be

developed and implemented. With the adoption of such mitigation measures, no insurmountable impacts are anticipated.

Housing Developments

7.3.23 The construction and operation of a new railway line has the potential to give rise to impacts. The scope of the key potential strategic impacts associated with the TDL are highlighted in the preceding text. At the strategic level, it is not practicable, nor the intention, to identify all the potentially sensitive receiver locations that may be affected by the project, nor is it the intention to determine the magnitude of the potential impacts at these locations. However, it is noted that existing and proposed public housing may be located in the vicinity of the currently assumed routes and therefore, to assist with any further environmental studies that may be undertaken during the future development of the line, the locations of these public housing sites have been reviewed and details of housing sites that may be in the vicinity of the rail scheme are presented below. It is noted that the currently assumed alignments are still under development and may be subject to alteration. Therefore, the following should not be taken as a definitive list, and it should be reviewed and updated as part of any further environmental assessments. In compiling this list, reference has been made to the 1999 edition of the 'Location of Housing Authority Estates', the latest version of the Public Housing Development Programme and Control List.

- Existing Public Housing Estates:
  - Lung Poon Court
  - Fung Chuen Court
  - Fung Lai Court
  - Fung Tak Estate
  - Tsz Lok Estate
  - Tsz On Estate
  - Tsz Ching Estate
  - Tsz Man Estate
  - Tsz Oi Court (I & II)
  - Tsz On Court (I & II)
  - Chuk Yuen North
  - Chuk Yuen South
  - Pang Ching Court
  - Tsui Chuk Garden
  - Tin Ma Court
  - Tin Wang Court
  - Lower Wong Tai Sin Estate
  - Wang Tau Hom Estate
  - Lo Fu Estate
  - Fu Keung Court
  - Hong Keung Court
  - Ka Keung Court
  - Ka Tin Court
  - Hin Keng Estate
  - Lung Hang Estate
  - King Tin Court
  - Carado Garden

- Sun Chui Estate
- Grandway Garden
- Holford Garden

- Proposed Public Housing Estates:

  - Diamond Hill
  - Shatin Pass Phase 1
  - Tsz Ching Phases 2 & 3
  - Tsz On Phase 3 (NCC)
  - Man Chun Court (Tsz Man Phase 2)
  - Tsz Oi Court (III)
  - Tsz Oi (Phases 3 & 4)
  - Upper Wong Tai Sin (Phases 1, 2 & 4)
  - Upper Wong Tai Sin (Phase 3)
  - Wong Tai Sin Police Married Quarters
  - Shatin Area 31A (Hin Keng Street)
  - Shatin Area 28 (Hin Wo Lane)
  - Ying Fuk Court (Yuen Tung)
  - Wang Tau Hom Phase 13
  - Wang Tau Hom Phase 14
  - Lo Fu Phase 7
  - Tak Keung Court (Wang Tau Hom Phase 4)

Kowloon Southern Loop

Description and Assumed Construction Methodology

7.3.24 It is proposed that this scheme would comprise an extension of West Rail from Nam Cheong Station (NAC) via West Kowloon Station (WKN) to East Tsim Sha Tsui (ETS). Depending upon the extent of reclamation, a station may be provided at Kowloon Point (between WKN and ETS).

7.3.25 The currently available design information indicates that the Kowloon Southern Loop will be constructed entirely in tunnel, with the section from NCA to WKN proposed to be constructed using a cut and cover technique. South of WKN, the construction technique that would be utilised will be dependant upon the extent of reclamation that had been undertaken at Kowloon Point. If sufficient reclamation has been implemented then it is likely that the alignment would continue in cut and cover tunnel. However, if there has been insufficient reclamation then it is likely that an Immersed Tube Tunnel (IMT) will be used, possibly supported by piled structures. From Kowloon point to ETS the tunnels would most probably be constructed using a bored tunnelling technique, although a short section of cut and cover may be required where the tunnels pass under the Tsuen Wan Line.

Key Potential Environmental Impacts

- As outlined for other cut and cover sections, noise, dust and traffic impacts are likely to occur as a result of this construction methodology. As a general principle, the extent of cut and cover working should be reduced to a minimum practicable level. However, as the area from NCA to WKN is predominantly on reclaimed land that is as yet undeveloped, there are limited sensitive receivers currently in the vicinity of the proposed works. Clearly the presence of existing or planned receivers would need careful review at the EIA stage, however, with the adoption of appropriate mitigation measures, it is envisaged that construction impacts can be controlled to within acceptable criteria.
- If an IMT structure is required, its construction would have the potential to give rise to water quality impacts. The magnitude of such impacts will be dependant upon the final choice of construction method, however, it is envisaged that the construction of the IMT could be undertaken without giving rise to any insurmountable impacts. Nevertheless, it is considered that this is an aspect of this scheme that will required further detailed assessment during the later design and EIA stages of the scheme's development.
- It is not envisaged that any reclamation will be required specially for the construction of the KSL. However, reclamation may be undertaken at Kowloon Point. The construction of this reclamation would be subject to political pressures (regarding the loss of the harbour front) and it would also be likely to give rise to environmental impacts (such as potential water quality impacts). However, it should be noted that the reclamation works would not constitute part of the rail development and consequently, any impacts associated with the reclamation will need to be addressed as part of a study specifically related to the reclamation works.
- Potential contamination issues arising from the excavation and dredging activities associated with the construction of the IMT and reclamation works may also be anticipated. Remediation may involve the removal and disposal of contaminated marine sediments (e.g. mud/sand) before construction works can commence. This matter will require further consideration during the development of the KSL, however, it is predicted that such concerns can be effectively mitigated and therefore, no insurmountable problems are envisaged.
- Operationally, as the alignment is proposed to be totally in tunnel, it is not envisaged that the scheme would give rise to any insurmountable impacts. It is assumed that any potential operational noise/vibration impacts could be controlled through the specification of appropriate trackform.
- Potential impacts could arise from the above ground structures, (i.e. station entrances and railway ventilation systems). Such impacts could include noise, air quality and potential cooling water impacts from the ventilation system. However, it is envisaged that such impacts can be successfully mitigated against and therefore no insurmountable impacts are envisaged.

- A number of Declared Monuments have been identified in the vicinity of this alignment. These include the Former Marine Police Headquarters and the Former Kowloon-Canton Railway Clock Tower. The Antiques and Monuments Ordinance (Cap.53) provides statutory protection against the threat of development against these historic sites. Whilst no direct impacts are envisaged to these resources, it is recommended that the potential impacts are further evaluated during the design and EIA processes, and that, if necessary, appropriate alignment alterations and/or mitigation measures are incorporated into the design.

7.4 Environmental Review of the Stand Alone Schemes

7.4.1 In addition to the work undertaken to assess the key environmental impacts associated with the Component Schemes, a similar exercise was undertaken for the Stand Alone Schemes. The implementation of these schemes is not related to the completion of the FHC, hence each scheme could potentially be implemented at any time; hence the terminology 'Stand Alone'. In general, the development of the Stand Alone Schemes can be considered to be at a less advanced stage than the Component Schemes, with some of the schemes (e.g. the Regional Express Line) being at a very early stage in their development. Consequently, the information presented herein must be considered as representing indicative alignments and preliminary construction methodologies; the indicative alignments are therefore subject to change as the design development process progresses.

7.4.2 This section presents the findings of this assessment for each of the Stand Alone Schemes.

Northern Links

Description and Assumed Construction Methodology

7.4.3 The NOL alignment is proposed to connect Kam Sheung Road (KSR), Au Tau (AUT), Kwu Tung (KTU) and Lo Wu (LOW), although there is also a proposal to provide a connection with the Lok Ma Chau Spur Line.

7.4.4 North of AUT, the preliminary alignment is proposed to pass through, and include a station at, Ngau Tam Mei (NTM), and then on to a station at the San Tin SGA. From here, the alignment would curve east to converge with the Lok Ma Chau Spur Line alignment (towards KTU). It is also proposed that there would be a connection to the Lok Ma Chau Spur Line (towards LMC).

7.4.5 The preliminary design information indicates that the NOL will be constructed mainly above ground on embankment and viaduct, although there will also be sections in cutting and possibly a short length of cut and cover and rock bore tunnel between NTM and KTU.

7.4.6 As the route currently under consideration comprises an at-grade scheme, there is a higher potential for environmental impacts than would exist for an underground (especially bored tunnel option).