4. TECHNICAL ASSESSMENTS

4.1. Preliminary Environmental Assessment

The Preferred Development Option, as it includes conversion of existing building on the Site (most of which is a declared monument) and partial removal of some underground tunnels/chambers, is a designated project under the Technical Memorandum on Environmental Impact Assessment Process (EIAO-TM). The criteria stipulated in EIAO-TM for evaluating air quality, noise, ecological, water quality, solid waste, and landscape, visual and cultural heritage impacts have hence been adopted where appropriate.

4.1.1. Air Quality

4.1.1.1. A construction dust impact assessment has been carried out for the representative air sensitive receivers (ASRs) nearby the proposed development (Figures 4.1a). Exceedances of the 1-hour and 24-hour average TSP AQO limits at some ASRs are predicted. However, with the implementation of the recommended twice daily watering of the site area and dust suppression measures as stipulated in Air Pollution Control (Construction Dust) Regulation, the 1-hour and 24-hour average TSP levels are expected to be reduced to comply with the AQO limits. Negligible cumulative impact is anticipated from the Salisbury Road Underpass Project as well as the KCRC East Rail Extension project, with the implementation of mitigation measures recommended in the EIA Report of the East Rail Extension Project (to be completed in mid 2004).

4.1.1.2. Some representative ASRs were selected for assessment during the operational phase (Figure 4.1b). The sensitive receivers at ground level facing Salisbury Road and Kowloon Park Drive are predicted to exceed the AQO limit due to high traffic flow. However with the adoption of appropriate mitigation measures (e.g. locating fresh air inlets at platform level), traffic emission impact on the streetfront retail shops will be mitigated.

4.1.1.3. These assessments were based on the available limited data; accordingly it is recommended that further assessments be undertaken in a detailed EIA.

4.1.2. Noise Impact

4.1.2.1. A construction noise impact assessment has been carried out for the proposed development. It is planned to create a hub of contemporary retail and cultural markets within the Site. It is considered that the proposed retail activities and markets are a noise tolerant activity in accordance with the EIAO-TM. Accordingly, it is considered that traffic noise impact is not significant. The assessment also indicates that the noise levels at all the noise sensitive receivers (Figure 4.2) for various
Legend:
Air Sensitive Receiver
P1 Streetfront retail at Canton Road
P2 Streetfront retail at Salisbury Road
P3 Main Building of Former Fire Station
P4 Quarters of Former Fire Station
P5 South-east corner of Marine Police Main Building
P6 Open space to the South-west of Marine Police Main Building

Locations of Representative Air Sensitive Receivers During Operational Phase
construction activities should be within the EIAO-TM criterion and mitigation measures are not required.

4.1.2.2. The nearest construction site of the KCRC East Rail Extension and the Salisbury Road Underpass to the Site is located at Middle Road adjacent to Kowloon Hotel and at Salisbury Road adjacent to Sheraton Hong Kong Hotel, respectively. It is considered that the nearby commercial buildings/hotels, which have been provided with air conditioning could shield the noise sensitive receivers in the vicinity of the Site from the construction noise generated from the two projects. Hence, adverse cumulative noise impact is not expected.

4.1.2.3. Nevertheless, ground-borne vibrations due to the piling works of the project, if any, may have potential impact on the Hong Kong Cultural Centre. Liaison with the Complex Management in this respect should be undertaken.

4.1.3. Water Quality

4.1.3.1. The potential water quality impacts arising from the construction and operation of the proposed development have been assessed. Key water quality issues are mainly related to the construction phase. It is considered that construction run-off and drainage generated during the construction works for the project will have minimal impacts on the receiving waters with the adoption of the recommended mitigation measures.

4.1.4. Ecology

4.1.4.1. The Site is considered of low ecological importance and no significant ecological impacts associated with the construction of the proposed development are anticipated. Nevertheless, it is recommended that the trees within the Site should be preserved where possible, in particular the protected species (*Pyrenaria championi*) and any loss of trees which is unavoidable should be compensated by replanting.

4.1.4.2. During the operational stage, possible disturbance to the ecological resource within the Site may arise as a result of increased human activities. However as the Site is of low ecological importance, the potential ecological impact would not be significant.

4.1.5. Solid Waste Management

4.1.5.1. Site clearance waste, excavated materials, construction and demolition (C&D) material, chemical wastes and general refuse are expected from the construction of the Project. With the implementation of the recommended mitigation measures on waste management practices, and pollution control measures, adverse environmental impacts are not expected.
4.1.6. Landscape, Visual, and Cultural Heritage Aspects

4.1.6.1. The Preferred Development Option reduces the adverse impact of the development by preserving as many mature tree clusters as possible and by designing a row of animated storefront retail and site entrance. In addition, the combination of street tree planting and storefront will enhance the visual quality of the existing retaining wall to a human scale.

4.1.6.2. Where existing tree clusters on slopes abutting the proposed EVA cannot be preserved due to geotechnical reasons, new tree plantings in clusters should be replanted to reassure the innate ambience. Sidewalk widening along Kowloon Park Drive with new street tree planting also softens the existing visual impact of the slope.

4.1.6.3. Existing slope work behind Former Fire Station Quarter will be demolished together with existing trees of low landscape value. New reinforced concrete basement structure will be built to create a stronger edge to frame the proposed plaza area together with the two existing buildings.

4.1.6.4. At the platform level, more trees should be planted to enliven the original character of the place. Open views of the harbour and programmatic uses of the subspaces should be the main consideration for determining the planting areas.

4.1.6.5. Most of the Site is a declared monument, and any earthwork/building work in the Site will require permission under the Antiquities and Monuments Ordinance. Future development of the Site should be prohibited from causing any irreplaceable loss to its historical and architectural quality and characters. The significance of this cultural heritage is to be preserved with proper design approach to the future development.

4.1.6.6. Distinctive stylistic features or examples of skilled craftsmanship that characterise the historical buildings should be treated with sensitivity. Deteriorated architectural features would be repaired rather than replaced, whenever possible. In the event replacement is necessary, the new material should match the material being replaced in composition, design, colour, texture, and other visual qualities. Repair or replacement of missing architectural features will be based on accurate duplication of features, substantiated by historical, physical, or pictorial evidence rather than on conjectural designs or the availability of different architectural elements.

4.1.6.7. While the exterior of the main building is to remain unchanged, all historical artefacts within those buildings are to be preserved. Alterations and additions to the internal layout proved necessary for accommodating the planned uses may be allowed with permission under the Antiquities and Monuments Ordinance. Any works that may structurally affect the stability of the buildings will not be allowed.
4.1.6.8. With the existing barracks being removed, the area in front of the main buildings will be left to restore to its original colonial setting. The open lawn and the landscaped circle in front of the main building will further captivate the public attention to this landmark.

4.1.6.9. It is understood that there were some disconnected tunnels/chambers under the platform, most of which (if not all) however have been backfilled. It is therefore suggested that further investigation of the tunnels should be undertaken and efforts should be made to preserve portions of the tunnels for public appreciation.

4.1.6.10. The Grade III Former Fire Station Main Building at the south-eastern corner of the Site will be retained. The building, together with the former staff accommodation of the Fire Station behind, will be refurbished to become entrance foyers and retail spaces. This allows the heritage to be preserved but with efficient and appropriate usage. Although the small masonry building next to them will be removed, it will be reconstructed as a retail outlet to match the architectural characters of the two adjacent buildings. Together the two former fire station buildings and the new retail outlet will form an entrance courtyard to create a sense of place with strong cultural heritage.

4.1.6.11. The refurbished Main Building, the restored colonial front lawn, and the newly created entrance courtyard will together preserve the cultural heritage of this significant site and further reveal it to the people of Hong Kong and also visitors as a visible and accessible public amenity.

4.2. Preliminary Traffic Assessment

4.2.1.1. The proposed development at the Site is expected to generate and attract 39 pcus during the morning peak hours, and 42 pcus in the evening session.

4.2.1.2. The design year of the traffic impact assessment is 2006 with a +3.5% per annum natural growth rate for the local traffic movements. The development traffic was assigned onto the road network in accordance with the future road network, and the implementation of the Middle Road Improvement Scheme.

4.2.1.3. Capacity assessments of all key junctions in the area have been undertaken. The assessment results reveal that all junctions will perform satisfactorily in both peak hours (Table 4.1). It should be noted that the proposed development would induce minimal traffic impact on the operation of these junctions.
### Table 4.1 2006 Peak Hour Junction Performance

<table>
<thead>
<tr>
<th>Junction No.</th>
<th>Junction Location</th>
<th>Junction Type/ Capacity Index</th>
<th>Reference</th>
<th>Design</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Salisbury Road / Canton Road</td>
<td>Signal / RC</td>
<td>AM Peak</td>
<td>PM Peak</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>+35%</td>
<td>+29%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>+32%</td>
<td>+26%</td>
</tr>
<tr>
<td>2</td>
<td>Salisbury Road / Kowloon Park Drive</td>
<td>Signal / RC</td>
<td>AM Peak</td>
<td>PM Peak</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>+52%</td>
<td>+37%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>+50%</td>
<td>+36%</td>
</tr>
<tr>
<td>3</td>
<td>Salisbury Road / Nathan Road</td>
<td>Signal / RC</td>
<td>AM Peak</td>
<td>PM Peak</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>+31%</td>
<td>+42%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>+31%</td>
<td>+41%</td>
</tr>
<tr>
<td>4</td>
<td>Peking Road / Canton Road</td>
<td>Signal / RC</td>
<td>AM Peak</td>
<td>PM Peak</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>+101%</td>
<td>+82%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>+101%</td>
<td>+82%</td>
</tr>
<tr>
<td>5</td>
<td>Peking Road / Kowloon Park Drive</td>
<td>Signal / RC</td>
<td>AM Peak</td>
<td>PM Peak</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>+70%</td>
<td>+59%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>+70%</td>
<td>+59%</td>
</tr>
<tr>
<td>6</td>
<td>Middle Road / Kowloon Park Drive</td>
<td>Signal / RC</td>
<td>AM Peak</td>
<td>PM Peak</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>+72%</td>
<td>+68%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>+72%</td>
<td>+68%</td>
</tr>
</tbody>
</table>

*Note:* (1) RC = reserve capacity for signalised junction

4.2.1.4. Due to the requirement to retain the existing headquarters building and the physical constraints of the Site, there is limited space for the provisions of on-site parking facilities. However the Site is easily accessible by public transport, and there is a large supply of car parking spaces in the adjacent commercial developments to fulfil demand.

4.2.1.5. To provide a vehicle-free environment, the platform level will be restricted from normal vehicular access though an access will be provided for emergency vehicles. During normal situation, the ramp will be used as an access for pedestrians to the platform (see Figure 3.6). A loading/unloading area will be provided underneath the platform at street-level (Figure 3.7). The ingress/egress of the area will be located at the northbound carriageway of Kowloon Park Drive allowing left-in left-out movements only. A total of 7 loading/unloading bays for goods vehicles (4 for HGV and 3 for LGV) will be provided on-site in compliance with the requirement stipulated in the Hong Kong Planning Standards and Guidelines.

4.2.1.6. Swept path analysis was also carried out and the results show that manoeuvring of HGV within the site and at the ingress/egress will be satisfactory, and no reverse manoeuvring onto public road will be necessary.

4.2.1.7. The majority of the pedestrians in the area are making multi-purpose trips. The number of pedestrians purely generated from the proposed development is not expected to be high. Nevertheless to further improve the environment for pedestrians, it is proposed to widen the footpaths adjacent the Site along Canton Road and Kowloon Park Drive. Allowances for future provisions of pedestrian linkages with the commercial developments adjacent to the Site are also desirable to complement the planned pedestrian system.
4.3. Preliminary Geotechnical Assessment

4.3.1. In a recent study (PGA 5/2000), GEO has also noted that there is insufficient information to assess the interaction between the disused tunnels and the Main Building and Stable Block. The developer should be required to investigate the locations and conditions of the disused tunnels and assess the interaction effects between the disused tunnels and the historical buildings and to construct strengthening works for the tunnel and building foundations, if required.

4.3.2. As the retail development under the Preferred Development Option requires demolition of some of the disused tunnels, GEO has also recommended that the risk of ground collapse during excavation for the development could be minimised by well-phased excavation limited to small areas. The development programme should allow extra time for the construction of the retail development. The Signal Tower should also be supported during the tunnel/chamber restoration works to avoid potential structural damages caused by the restoration works.

4.3.3. According to GEO's recent study, the potential impacts of the railway tunnels on the historical buildings would be minimal. It has also noted that any effects of any blast induced vibrations on the retail development during excavation for the railway tunnels could be kept within acceptable limits.

4.3.4. Geotechnical Works for Existing Slope Stability

4.3.4.1. There are two slopes (11SW-B/R3 and 11SW-B/C1) on the northern boundary that have been upgraded. No stability assessments have been conducted for the remaining slopes. Based on the available information, the remaining slopes may need to be stabilised and stability assessment and upgrading works should be required. This will see a combination of cantilevered retaining walls, soil nails, and hydroseeding utilised. The retaining walls may be decorated by painting, granite block facing or partially shielded street planting plus climbers.

4.3.5. Geotechnical Works for the EVA Formation

4.3.5.1. The proposed EVA is formed on the north-western corner of the Site. A retaining wall will be necessary to maintain stability along the EVA. This is likely to be a bored pile cantilever structure to minimise excavation and is considered technically feasible. An attractive paint or lighting scheme can be utilised to enhance the finish of the wall.

4.3.6. Geotechnical Works for Street Front Retail Construction

4.3.6.1. To minimise the effects on the trees located along Canton Road and Salisbury Road, a tunnelling method can be utilised to construct the retail structures. Horizontal steel piles can be installed into the slope to act as a retaining wall. The soil beneath the retaining structure will then be excavated and temporary vertical supports will be inserted.
Reinforced concrete structures will then be constructed to house the retail facilities. Again the geotechnical works involved is considered technically feasible.

4.3.7. Geotechnical Works for Under-platform Construction

4.3.7.1. After partial completion of the reinforced concrete works for street front retail, vertical piles can be installed on the platform for bulk excavation in the southern site area. Temporary struts will be installed to provide lateral support. The basement reinforced concrete will then be constructed utilising mini piling or raft type foundations. It is considered that the granite underlying the Site will form a competent founding material for this type of foundation.

4.3.7.2. The two KCR Kowloon Southern Link tunnels will be excavated in rock beneath the Site. The tunnels will encroach into that part of the Site beneath the south-western corner of the main building, but will not encroach beneath the Stable Block and the Signal Tower. Subsequently, the potential effects on the historical buildings on the Site are expected to be minor. Excavation methodologies can be utilised to further reduce vibration levels.

4.3.8. Additional Stabilisation of the Signal Tower and Main Building

4.3.8.1. The hundred-year old Signal Tower’s stability may be enhanced by the utilisation of mini piling and enlarging the raft footing. As for the main building, small size steel I-beams and columns along the long span of the slab or beam may be installed to mitigate the vibration effect on the structure during construction works. Preliminary estimation indicates that potential impact of the construction works on its structure should be acceptable. Based on the available geological information, permanent stabilisation works may comprise additional grouting in the vicinity or beneath the building foundations in order to strengthen the bearing soil. Such stabilisation works should be subject to further ground investigation on site.

4.3.9. Constraints Due to Existing Disused Tunnels and Proposed KCRC Kowloon Southern Link

4.3.9.1. A large portion of the existing disused tunnels will be removed during the under-platform construction works. Part of the tunnels will be preserved and the soil surrounding it should be strengthened and no additional surcharge acting across the void is allowed. Any remaining disused tunnel can be backfilled by concreting and grouting. Nonetheless as there is currently limited information on the tunnels, further investigation in this respect is recommended. In the Preferred Development Option, under-platform retail is proposed above the KCRC Kowloon Southern Link railway reserve. The foundation of the under-platform structure is proposed to span across the railway reserve and rest on shallow rockhead by short piling.
4.3.10. Hence it is concluded that the Preferred Development Option is geotechnically feasible and the constraints due to the existing disused tunnels and the proposed Kowloon Southern Link could be overcome with the proposed engineering measures. In terms of implementation, it is recommended that the following requirements be incorporated into the land disposal document:

- Requirement for detailed investigation of the existing disused tunnels in particular those at the northern part of the Site and construction of necessary stabilisation works for these tunnels.

- Requirement for detailed investigation of the foundations of the existing historical buildings including the Main Building, the Stable Block and the Signal Tower, and construction of necessary stabilisation works for these buildings.

4.4. Financial Assessment

4.4.1. Methodology

4.4.1.1. The residual method of valuation was adopted to assess the preliminary financial viability of the Preferred Development Option (Appendix IV). Land value is the residual element of the residual valuation. The option is considered to be financially viable if the residual valuation produces a positive land value after all the relevant development costs have been deducted from the gross development value generated from the option.

4.4.1.2. It is understood that the Lands Department adopts an interest rate of 2% over the prime rate for land premium valuation. A similar interest rate has been applied in this assessment. Based on a prevailing prime rate of 9.5% as in July 2000, the assumed interest rate is 11.5% p.a..

4.4.1.3. A risk free interest rate is adopted to capitalise the recurrent maintenance cost of the cultural/museum elements in order to obtain a capital sum for that component. With this capitalisation rate, a monthly income for the recurrent maintenance of the museum and cultural elements can be secured. The risk free rate adopted in our assessment is based on 30 year US Treasury bond which is 5.823% p.a., as reported by the Hong Kong Economic Journal at the date of assessment on 25/07/2000.

4.4.2. Estimate of Gross Development Value (GDV)

4.4.2.1. It is considered that upon completion of the proposed redevelopment, the Site will become a good shopping location in the Tsim Sha Tsui area due to the existing heavy pedestrian flow from the Star Ferry and Peking Road directions, and the new tourist attraction facilities within the Site.

4.4.2.2. It is a considered opinion that a unit rate of HK$500,000/m² (saleable) may be achievable by shops on the ground level at Canton Road/Salisbury Road. For shops at other levels, we have adjusted this
unit rate with reference to their locations in relation to the shop value at ground level of Canton Road / Salisbury Road.

4.4.2.3. There are no building plans available at this preliminary stage, so an efficiency ratio of 80% has been assumed to calculate the saleable area of each commercial component. This would result in the GDV of the development being in the order of HK$930,000,000 at the date of assessment should the Chinese Cuisine Promotion Centre pay full market rent, and HK$810,000,000 should the Chinese Cuisine Promotion Centre not pay any rent.

4.4.2.4. Estimates of the GDV of the option are attached at Appendix IVA. In these estimates it has been assumed that the Time Museum will not pay any rent.

4.4.3. Estimate of Development Cost and Recurrent Maintenance Cost

4.4.3.1. An estimate of the building cost of the option was conducted with price level references as at 12/1999. According to this estimate, the building cost will be about HK$344,195,291 as shown in Appendix IV B.

4.4.3.2. Development costs which have been taken into account in this preliminary assessment comprise the building cost, interest charges, professional fees and developer’s development profit (at 25% nominal).

4.4.3.3. The recurrent maintenance cost is shown in Appendix IV C, which has taken into account the costs for the annual, 5-year and 10-year maintenance and renovation. While the commercial tenants are assumed to bear the recurrent maintenance cost, that for the cultural/museum facilities may be borne by the developer or by the users. The effects of these two arrangements on land value is shown in para. 4.4.4 below.

4.4.4. Estimate of Development Profit

4.4.4.1. Having regard to the above cost estimate, a residual valuation (Appendix IV D) and estimate of development profit has been undertaken. The option appears viable and produces a land value in the order of HK$207 million and a development profit in the order of HK$186 million if the Chinese Cuisine Promotion Centre pays full market rent. The land value will be less and is in the order of HK$141 million and a development profit in the order of HK$162 million if the Chinese Cuisine Promotion Centre does not pay rent.

4.4.4.2. The option would also be viable but less attractive, if the capitalised recurrent maintenance cost of the museum/cultural elements is included in the residual valuation. The land value and development profit become HK$200 million and HK$186 million respectively if the above recurrent maintenance cost is taken into account under the scenario that the Chinese Cuisine Promotion Centre pays full market rent. Should the Chinese Cuisine Promotion Centre does not pay rent, the figures will be HK$172 million and HK$162 million respectively.
4.4.4.3. Owing to the complexity of the project, a fairly conservative development time frame (i.e. 3.5 years) is assumed for the purpose of this assessment.

4.4.5. Sensitivity Analysis

4.4.5.1. A sensitivity test of the viability of the Preferred Development Option against adverse change in GDV and cost has been undertaken. Table 4.3 shows the magnitude of the adverse change in GDV/cost that make the option no longer viable:

Table 4.3 Viability Sensitivity Test of the Preferred Development Option

<table>
<thead>
<tr>
<th>SCENARIO</th>
<th>ADVERSE CHANGE IN GDV</th>
<th>ADVERSE CHANGE IN COST</th>
</tr>
</thead>
<tbody>
<tr>
<td>A I</td>
<td>-40.67%</td>
<td>+68.55%</td>
</tr>
<tr>
<td>A II</td>
<td>-39.37%</td>
<td>+64.93%</td>
</tr>
<tr>
<td>B I</td>
<td>-31.88%</td>
<td>+46.80%</td>
</tr>
<tr>
<td>B II</td>
<td>-16.34%</td>
<td>+19.54%</td>
</tr>
</tbody>
</table>

* Scenarios:
A: Chinese Cuisine Promotion Centre will pay full market rent
B: Chinese Cuisine Promotion Centre will not pay rent
I: Recurrent maintenance cost of museum/cultural elements not taken into account
II: Recurrent maintenance cost of museum/cultural elements taken into account

4.4.6. Caveats

4.4.6.1. In accordance with normal valuation practice, current values and prices are used in the above analyses and no attempt has been made to forecast the level of values and costs which may apply at future dates. The purpose of the above analyses is to provide an indication of the extent of the viability of the option. Accurate appraisals cannot be carried out at this stage, since detailed design work and cost estimate have not been carried out. All figures are rough estimate at this stage, and are to be used for illustrative purposes only.