Agreement No. CE 35/2006 (CE)

Kai Tak Development Engineering Study cum Design and Construction of Advance Works – Investigation, Design and Construction

Waste Management Plan for the Dredged Material from Seawall Removal

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MAUNSELL CONSULTANTS ASIA LTD
Waste Management Plan for the Dredged Material from Seawall Removal

Contents

1 INTRODUCTION................................................................................................................ 1
  1.1 Introduction............................................................................................................1
  1.2 Background............................................................................................................1
  1.3 Project Description.................................................................................................4
  1.4 Purpose and Objective of this Waste Management Plan.........................................5

2 IMPLEMENTATION FRAMEWORK AND PROGRAMME .................................................. 7
  2.1 Implementation Framework....................................................................................7
  2.2 Implementation Programme ...................................................................................7

3 DEVELOPMENT CONSTRAINTS...................................................................................... 8
  3.1 Introduction............................................................................................................8
  3.2 Development Constraints .......................................................................................8

4 REFERENCE DESIGN FOR EDGE STRUCTURES AND TRANSITION EDGE STRUCTURES................................................. 10
  4.1 Introduction..........................................................................................................10
  4.2 Justification for Adopting the Reference Design....................................................10
  4.3 Estimated Quantities of C&D Materials Generated and Imported Fill Materials
      Required for Reference Design.............................................................................11
  4.4 Suitability of Recycling Hard C&D Materials and/or Sorting of C&D Materials
      on Site..................................................................................................................11

5 MANAGEMENT OF C&D MATERIALS............................................................................ 12
  5.1 Generation and Reuse of C&D Materials..............................................................12
  5.2 Programme of Generation and Reuse of C&D Materials.......................................14

6 CONCLUSION AND RECOMMENDATION...................................................................... 15
  6.1 Summary and Conclusion ....................................................................................15
  6.2 Recommendation.................................................................................................15
APPENDICES

Appendix A  Breakdown for Estimation of Quantities of C&D Materials
Appendix B  Schedule of Quantities of C&D Materials Generated and Reused and Additional Fill Materials Required

DRAWINGS

101  General : General Layout
401  Edge Structures : Quay - General Arrangement
451  Edge Structures : Seawall - General Layout
501  Southern Transition Edge Structures : Quay - General Arrangement
511  Southern Transition Edge Structures : Seawall - General Layout
531  Northern Transition Edge Structures : Quay - General Arrangement
541  Northern Transition Edge Structures : Seawall - General Layout

FIGURES

F4.1  Envisaged Implementation Programme for Edge Structures, Southern Transition Edge Structures and Northern Transition Edge Structures
F4.2  Indicative Location Plan of Temporary Stockpiling Area
INTRODUCTION

1.1 Introduction

1.1.1 In January 2007, the Government of the Hong Kong Special Administrative Region, represented by the Director of Civil Engineering and Development Department, appointed Maunsell Consultants Asia Ltd (MCAL) and its sub-consultants to carry out the consultancy services as defined in Agreement No. CE 35/2006 (CE) Kai Tak Development Engineering Study cum Design and Construction of Advance Works – Investigation, Design and Construction (hereinafter referred to as the Project).

1.1.2 The commencement date of the Project was 30th January 2007 and the design services are anticipated to be completed by November 2010.

1.2 Background

South East Kowloon Development (SEKD) Study

1.2.1 The airport at Kai Tak was relocated to Chek Lap Kok in July 1998, which offered an opportunity for a major development project in the Metro Area. In September 1991, the Metroplan Selected Strategy proposed a broad land use framework for redevelopment of the Kai Tak Airport, which included reclamation at Kowloon Bay, Kai Tak Approach Channel and Kwun Tong Typhoon Shelter and extension of highway and railway networks, and port-related facilities.

1.2.2 In November 1993, the South East Kowloon Development Statement Study translated the Metroplan Framework into more specific planning objectives. Under the Outline Master Development Plan (OMDP), a development area of about 580 hectares of land is planned to accommodate a population of 285,000.

1.2.3 The Feasibility Study completed in December 1997 had fine-tuned the OMDP scheme and identified phased and integrated developments for the early development packages. The scheme was incorporated in the draft Kai Tak (North) and Kai Tak (South) OZPs No. S/K19/1 and S/K21/1 exhibited in September 1998. Strong public objections, mainly on the extent of reclamation were received.

1.2.4 In November 1997, the Comprehensive Feasibility Study for the Revised Scheme of South East Kowloon Development (SEKDCFS) was commissioned to prepare more detailed proposals for the revised scheme and to examine the overall feasibility that addressed the public objections. In mid-2000, a Preliminary Layout Plan (PLP) on the revised scheme was promulgated for public consultation. With the general support from the community on PLP, the SEKDCFS completed an OMDP along with preliminary design for the entire SEKD by mid-2001.

1.2.5 The draft Kai Tak (North) and draft Kai Tak (South) OZPs No. S/K19/2 and S/K21/2 incorporated relevant proposals of the SEKDCFS and the OMDP, were gazetted in August 2001 providing the statutory planning framework for the area. The revised OZP had a planned population of 260,000, along with planned tourism node, cruise terminal, multi-purpose station and Metropolitan Park was approved by the Chief Executive in Council on 25 June 2002.
Kai Tak Planning Review

1.2.6 According to the Judgment of the Court of Final Appeal [CFA] on the draft Wan Chai North OZP handed down on 9 January 2004, the Protection of the Harbour Ordinance [PHO] established a statutory principle recognizing the harbour as a special asset and a natural heritage of Hong Kong people and prescribing that it is to be protected and preserved. According to the CFA Judgment, the presumption against reclamation under s.3(1) of the PHO can only be rebutted by establishing an overriding public need for reclamation, i.e. “the overriding public need test”. In view of the CFA judgment, a comprehensive review of the Kai Tak OZPs was required to ensure the planning framework meeting the statutory requirement.

1.2.7 On 13 January 2004, the Government agreed to commission Consultants to undertake a Comprehensive Planning and Engineering Review of SEKD. The Comprehensive Review is broadly divided into two parts. Part I of the Review is a Planning Review. It started with “no reclamation” as the planning basis to formulate conceptual development options. Part II is an Engineering Review to undertake detailed engineering feasibility studies and Environmental Impact Assessment (EIA) study, including Schedule 3 EIA Study, to confirm the feasibility of the Preliminary Outline Development Plan (PODP), as well as to produce a Recommended Outline Development Plan.

1.2.8 In July 2004, Planning Department commissioned the Kai Tak Planning Review (KTPR) as Part I of the Comprehensive Review. The KTPR include 3 stages of public participation. Stage 1 was to engage the public in determining vision and key issues. Stage 2 was to engage the public on the OCPs. Stage 3 was to engage the public on the draft PODP.

1.2.9 Three OCPs were formulated for the Stage 2 public participation namely “City in the Park”, “Kai Tak Glamour” and “Sports by the Harbour” for public participation before preparation of a draft PODP. The community and stakeholder groups were consulted on the draft PODP in stage 3.

Preliminary Outline Development Plan

1.2.10 On the basis of 'no reclamation', the PODP proposed residential developments for about 86,000 persons. The PODP proposed to create a new urban node at Kai Tak, supported by a belt of office developments, several residential neighbourhoods and a variety of Government, Institution or Community (GIC) facilities, a multi-purpose stadium complex fronting Victoria Harbour, a cruise terminal and a tourism node at the end of the former runway and a Metro Park in the northern section of the runway and surrounding the Kai Tak Approach Channel.

1.2.11 Under the PODP, there will be six main sub-areas of Kai Tak, namely Kai Tak City Centre, Sports Hub, Metro Park, Runway Precinct, Tourism and Leisure Hub, and South Apron Corner through change in land uses and road alignments:

(a) The proposed Kai Tak City Centre, to be located in the northeastern part of the North Apron area, will be the main development area of Kai Tak. The area mainly consists of an office belt to meet the long-term demand in office space as recommended under the Hong Kong 2030 Study, inter-mixing with hotel developments. The Shatin to Central Link (with one station in Kai Tak) and the surrounding Station Square will form the centre of this new district. Nevertheless, the proposal of providing two stations, namely Kai Tak Station and To Kwa Wan Station, both of which fall within the Kai Tak Development is also an option being considered.
(b) A multi-purpose stadium was planned in the Sports Hub at the waterfront areas, which would become a new icon in the Victoria Harbour and would give a very strong impression of Kai Tak when entering the site from To Kwa Wan. The multi-purpose stadium complex comprises a main stadium of about 45,000 seats, with retractable roof, a secondary stadium of about 5,000 seats, and sports arena of about 4,000 seats with swimming pool and ball courts.

(c) The Metro Park adjacent to the Kai Tak Approach Channel will be connected with a long promenade around the runway and along the south apron area. This would be the waterfront park of Victoria Harbour in providing venues for passive and active recreation, and was planned to be the “central park” of East Kowloon. The park with a planned area of about 24 hectares is 1.4 times of Victoria Park.

(d) The Runway Precinct will include a hotel belt, apart from supporting the cruise terminal development as a tourism project. This precinct allows the flexibility for provision of a third berth in the future thru change in land use and roadway system. It also includes a row of low-density residential development. A continuous waterfront promenade was proposed on both sides of the Precinct to bring people to the harbour.

(e) A two-berth cruise terminal and a tourism node are proposed at the Tourism and Leisure Hub, which would be two major anchor projects to attract local and overseas visitors. Flexibility is provided to cater for possible extension of a third berth by designating land uses compatible with cruise terminal development e.g. conference and hotel facilities, on sites adjacent to the potential third berth. The Runway Park at the tip of the runway will provide the opportunity to include facilities of aviation theme, such as reprovisioning of the ex-air traffic control tower. A cross-boundary heliport is proposed abutting the cruise terminal at the runway tip to meet the forecast growth of cross-boundary helicopter services in the longer term.

(f) At the lower part of south apron area is a South Apron Corner where commercial/office and GIC (including hospital) uses are proposed to help rejuvenate this waterfront area of Kowloon Bay. This also takes into account of the noise and air quality problems from the vehicular traffic on Kwun Tong Bypass. Open space corridor and waterfront promenade are proposed as a venue for community activities.

1.2.12 In response to public comments, the PODP has designated reserves for possible future provision of a rail-based environmentally friendly transport system and bridge link from Kai Tak Point to the Kwun Tong waterfront. This link may include pedestrian and potential vehicular facilities. Viability of this proposal is subject to further detailed investigations.

1.2.13 The PODP as part of the proposals for provision of enhanced pedestrian facilities to connect with existing districts, has included landscaped/retail footbridges and pedestrian subways with retail facilities. This includes a comprehensive underground shopping street system connecting Kowloon City and San Po Kong areas with the future Kai Tak Station.

1.2.14 The comments/proposals received and the responses of concerned bureaux/departments and the study consultants were set out in the Report of Stage 3 Public Participation, which has now been uploaded to the Planning Department’s website. It should be noted that flexibility has been allowed on the PODP for provision of the 3rd berth in response to the public comment for the long term CT development. The implementation of the hotel and residential developments at the Runway Precinct has been deferred to a later stage to cater for the future possible change in land use.
Other Related Studies

1.2.15 Apart from the KTPR by Planning Department, other concerned Government departments had embarked on a number of feasibility studies and design studies on projects related to Kai Tak Development under their purview:

(a) SEKD Infrastructure at the North Apron area of ex-Kai Tak Airport in South East Kowloon Development - Design and Construction (commenced in January 2002)

(b) SEKD Kai Tak Approach Channel Reclamation – Design and Construction (commenced in January 2002 and terminated in July 2006)

(c) SEKD Kowloon Bay Reclamation and Engineering Works - Design and Construction (commenced in December 2002 and terminated in July 2006)

(d) Further Urban Design Study for Planning and Development of South East Kowloon (commenced in September 2002 and terminated in June 2006)

(e) Focus Study on Early Development of Proposed Tourism Node Incorporating a Cruise Terminal within SEKD (commenced in April 2002 and completed in 2003)

(f) Implementation Study for a District Cooling System at SEKD (commenced in January 2000 and completed in September 2003)

(g) Feasibility Study of Common Utility Enclosure (CUE) in Hong Kong (commenced in March 2002 and completed in December 2003)

(h) The Implementation of an Automated Refuse Collection System (ARCS) at SEKD – Feasibility Study (commenced in December 2002 and completed in April 2004)

(i) Feasibility Study on Recycling Effluent for Potable and Non-Potable Uses in HK (commenced in March 2001 and completed in mid-2002)

1.3 Project Description

1.3.1 The Site Formation cum Marine Works for the Cruise Terminal (“Site Formation cum Marine Works”) comprise the following major elements:

(a) construction of an approximately 850m long quay structure for the future Cruise Terminal;

(b) re-construction of a section of the existing seawall as part of the quay structure and transition to the existing seawall;

(c) dredging of seabed and disposal of dredged materials for vessel navigation channel; and

(d) relocation and / or re-provisioning of existing marine facilities including Government Mooring Buoys (GMBs) and Eastern Quarantine & Immigration Anchorage (EQIA).

1.3.2 The general layout of the Project is shown in Drawing 101.
1.4 Purpose and Objective of this Waste Management Plan

1.4.1 The current policy related to the dumping of Construction and Demolition (C&D) material is documented in the Works Branch Technical Circular No. 2/93, ‘Public Dump’. Construction and demolition materials that are wholly inert, namely public fill, should not be disposed of to landfill, but taken to public filling areas, which usually form part of reclamation schemes. The Land (Miscellaneous Provisions) Ordinance requires that dumping licences are obtained by individuals or companies who deliver public fill to public filling areas. The Civil Engineering and Development Department (CEDD) issues the licences under delegated powers from the Director of Lands.

1.4.2 Under the Waste Disposal (Charges for Disposal of Construction Waste) Regulation, enacted in January 2006, construction waste delivered to a landfill for disposal must not contain more than 50% by weight of inert material. Construction waste delivered to a sorting facility for disposal must contain more than 50% by weight of inert material, and construction waste delivered to a public fill reception facility for disposal must consist entirely of inert material.

1.4.3 Measures have been introduced under Environment, Transport and Works Bureau (ETWB) TCW No. 33/2002 to enhance the management of C&D material including rock, and to minimize its generation at source. The enhancement measures include: (i) drawing up a Construction and Demolition Material Management Plan (C&DMMP) at an early design stage to minimize C&D material generation and encourage proper management of such material; (ii) vetting of the C&DMMP prior to upgrading of the project to Category A in the Public Works Programme; and (iii) providing the contractor with information from the C&DMMP in order to facilitate him in the preparation of the Waste Management Plan (WMP) and to minimize C&D material generation during construction.

1.4.4 Although the Cruise Terminal project is a private project and does not directly fall within the scope of ETWB TC (W) No. 33/2002, according to Practice Note for Authorized Persons and Registered Structural Engineers (PNAP) No. 243, the project officer is required to seek confirmation from the Public Fill Committee of CEDD whether public filling facilities are available for disposal of the public fill, and from Environmental Protection Department (EPD) whether landfills are available for disposal of the C&D Waste during planning stage of a project. To make the application for designated disposal outlets, the project officer is required to provide to CEDD and EPD information including anticipated quantities of disposal, programme for disposal, types of public fill / waste etc, which are similar to the content of a C&DMMP required under ETWB TC (W) No. 33/2002.

1.4.5 The Cruise Terminal project will be implemented by Land Tender which will be similar to a Design – Build – Operate style of contract. Whilst the design of Cruise Terminal will be carried out by the successful tenderer, this Waste Management Plan (WMP) has been prepared to provide an appraisal of the C&D materials that will be generated arising from removal of the existing seawall and the seabed underneath along the southern tip of the former Kai Tak Airport runway (which forms part of the Site Formation cum Marine Works and does not include excavation within the land limits as defined in paragraph 3.2.2). The quantities of C&D materials covered in this WMP have been estimated based on the Reference Design for the Site Formation cum Marine Works (Reference Design) and are slightly different from those quantities stated in the EIA Report on Dredging Works for Proposed Cruise Terminal at Kai Tak due to design refinement after the submission of the EIA report. The successful tenderer is free to develop his own scheme and will carry out his own assessment on the C&D materials.
1.4.6 This WMP is a submission in accordance with Condition 2.10 and Note 7 of the Environmental Permit (EP) No. EP-284/2008 for the “Dredging Works for Proposed Cruise Terminal at Kai Tak”.

1.4.7 The main principles for the management and planning of C&D material adopted in this WMP includes:

- Reduce the generation of C&D materials at source;
- Maximize the reuse of C&D materials; and
- Maximize the recycling of C&D materials.
2 IMPLEMENTATION FRAMEWORK AND PROGRAMME

2.1 Implementation Framework

2.1.1 The Tourism Commission plans to construct the Cruise Terminal in two stages:

- 450m long Phase I Berth and approximately 153m long Southern Transition Edge Structures to be completed by early 2012; and
- 400m long Phase II Edge Structures and 50m long North Transition Edge Structures to be completed by early 2013.

2.2 Implementation Programme

2.2.1 The envisaged implementation programme for the Edge Structures, the Southern Transition Edge Structures and the North Transition Edge Structures of the Cruise Terminal based on the Reference Design is shown in Figure F4.1.

2.2.2 The envisaged implementation programme has been developed based on the following key assumptions:

- The target date for award of the Land Tender is second quarter of 2008;
- About 9 months are allowed for design of the Edge Structures, the Southern Transition Edge Structures and the North Transition Edge Structures; and
- The successful tenderer will carry out the construction of the Phase I Edge Structures, the Southern Transition Edge Structures, the Phase II Edge Structures and the North Transition Edge Structures in one single phase in order to reduce construction costs, minimize disruption to operation of Phase I Berth and avoid abortive work associated with temporary transition edge structures.
3 DEVELOPMENT CONSTRAINTS

3.1 Introduction

3.1.1 This section intends to provide an insight into the development constraints of the Edge Structures, the Southern Transition Edge Structures and the Northern Transition Edge Structures leading to the development of the Reference Design.

3.2 Development Constraints

3.2.1 The key constraints for the Edge Structures, the Southern Transition Edge Structures and the Northern Transition Edge Structures are summarized as follows:

*The Protection of Harbour Ordinance*

3.2.2 The Cruise Terminal Edge Structures will need to be constructed within the land limits (existing high water mark) of the existing Kai Tak runway to comply with the Protection of Harbour Ordinance (PHO). Therefore the outer face of the fender should be aligned with the High Water Mark (HWM), i.e., +2.3m above Principal Datum (+2.3mPD) as defined in the District Survey Office Technical Manual Version 1.1 published by Survey & Mapping Office of Lands Department. (See Drawings 401 and 451)

*Construction programme*

3.2.3 Required completion date of Phase I Berth is early 2012 and this programme should be achieved to ensure the availability of the Cruise Terminal without delay.

*Interface with Cruise Terminal Building construction / development*

3.2.4 The Cruise Terminal Building is to be constructed next to the Edge Structures. Design and construction of the Edge Structures should therefore be carried out with due considerations of the Cruise Terminal Building construction / development in order to avoid potential conflict between the two items of works.

*Settlement which affects terminal operations and services*

3.2.5 Differential settlement should be within acceptable limit, since it may affect the utilities and services installed in the Edge Structures and the operation of mobile passenger boarding bridge.

*Need for local dry dock/additional storage area for casting and transportation of precast units*

3.2.6 Establishment of a local dry dock in Hong Kong for casting and transportation of precast units of Edge Structures, if required, may generate environmental impact whereas off-site dry dock and additional storage area at sea adjacent to site may result in marine impact although it can be resolved by specific marine traffic arrangement and management. In view of this, design proposals involving provision of a dry dock/additional storage area are considered not preferable.

*Wave Reflection*

3.2.7 The Edge Structures should be designed with a good performance in dissipation of wave energy and reduction in wave reflection.
3.2.8 The Edge Structures should be readily accessible for maintenance inspection and repair to minimize disruption to the operation of Cruise Terminal.
4 REFERENCE DESIGN FOR EDGE STRUCTURES AND TRANSITION EDGE STRUCTURES

4.1 Introduction

4.1.1 The Cruise Terminal is to be procured by a Land Tender process. The successful tenderer will have the freedom to propose various possible options and select his preferred option based on his assessment.

4.1.2 A number of types of quay structures have been developed and evaluated under this consultancy for the Cruise Terminal development. Piled quay deck was finally selected in the Reference Design as the structural form for the Edge Structures, the Southern Transition Edge Structures and the Northern Transition Edge Structures. The piled quay deck comprises a reinforced concrete beam and slab system supported on piles. Vertical driven steel tubular pile with in-situ reinforced concrete infill system which is commonly adopted in Hong Kong for marine structures is proposed as the pile type. The piled quay deck overlies a sloping seawall with a slope of 1 vertical in 1.6 horizontal with a nominally sized rock revetment and rockfill core which minimizes wave reflection. A rear blockwork retaining wall is behind the piled quay deck. Excavation is expected to be only required to provide a thickness of underlying rockfill sufficient to provide adequate slope stability.

4.1.3 The general arrangements of the piled quay deck for the Edge Structures, the Southern Transition Edge Structures and the Northern Transition Edge Structures are illustrated on Drawings 401, 451, 501, 511, 531 and 541.

4.2 Justification for Adopting the Reference Design

4.2.1 Piled quay deck has been selected in the Reference Design as the structural form for the Edge Structures and Transition Edge Structures for the following main reasons:-

(i) Compared with other quay structure options, the piled quay deck with underlying seawall has less excavation and associated environmental impact and imposes less restriction of construction of the Cruise Terminal Building and associated basement behind the quay deck.

(ii) The piled quay deck will optimize the on-site reuse of the existing airport runway seawall rock armour within the seawall underlying the quay structure.

(iii) From an operation viewpoint, the piled quay deck provides the most reliable and operationally efficient structure. This option is most prevalent in Hong Kong for similar facilities and provides the most serviceable scheme for minimal operational disruption. The reinforced concrete piles protected by sacrificial steel tubes above seabed enable convenient inspection and maintenance and relatively minimal maintenance costs over the 50 year design life.

(iv) Having considered that Phase I Berth of the Cruise Terminal is targeted to be completed by early 2012 with less than 4 years for detailed design, BD approval, tender and construction, the programme for the piled quay deck structure option is considered to be more reliable and more readily able to be accelerated because of the dependence on the number and size of piling rigs and numerous potential work fronts.

(v) The piled deck structures are supported on piles with negligible settlement effect.
(vi) The cost of the piled quay structure is low and just slightly higher than the lowest cost of other quay structure options.

(vii) The piled quay deck overlies a sloping seawall which provides a better performance in dissipation of wave energy and reduction in wave reflection than the wave absorbing chamber for the gravity options.

(viii) The piled deck option is therefore more favorable for berthing operation of vessels as the seawall under deck gives better performance on wave reduction and provide more space to displace the water volume when the vessel is berthing towards the quay structures.

4.3 Estimated Quantities of C&D Materials Generated and Imported Fill Materials Required for Reference Design

4.3.1 Existing seawall along the runway is required to be dredged to facilitate the construction of the Edge Structures of the Cruise Terminal. In the Reference Design, the new sloping seawall of the Edge Structures would be provided with sufficient thickness of rockfill and armour layer depending on the stability condition. The new seawall underlying the quay deck provides an opportunity to utilize the armour, rockfill and general fill of the existing seawall.

4.3.2 The estimated quantities of C&D materials to be generated, reused and disposed offsite arising from the dredging works required for the construction of the Phase I Edge Structures, the Phase II Edge Structures, the Southern Transition Edge Structures and the Northern Transition Edge Structures are summarized in Table 4.4.

<table>
<thead>
<tr>
<th>Item</th>
<th>Estimated Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Volume of dredged materials</td>
<td>256,100 m³</td>
</tr>
<tr>
<td>Volume of materials reused in seawall construction</td>
<td>213,110 m³</td>
</tr>
<tr>
<td>Volume of materials reused in works other than seawall construction or disposed offsite</td>
<td>42,990 m³</td>
</tr>
<tr>
<td>Additional fill materials required</td>
<td>231,490 m³</td>
</tr>
</tbody>
</table>

Notes:
(1) Please refer to the Notes of Table 5.1 below for detailed description of the above estimated quantities.

4.4 Suitability of Recycling Hard C&D Materials and/or Sorting of C&D Materials on Site

4.4.1 Based on the as-built drawings, on-site inspection and site investigation results, it is anticipated that the majority of the rock armour dredged from the existing runway seawall is of suitable size and condition and can be sorted and re-used in the new seawall revetment of the piled deck option. As regards rockfill, the portion of the dredged materials which are suitable for re-use is expected to be generally lesser given the increased difficulty in sorting these finer materials to meet the required size and grading for re-use. As for general fill, since the grading requirement is generally less stringent than that of rockfill, the percentage of re-use is expected to be higher than that of rockfill.
5 MANAGEMENT OF C&D MATERIALS

5.1 Generation and Reuse of C&D Materials

5.1.1 C&D materials will be generated from dredging of existing seawall to provide adequate water depth in the berth box and to allow for the construction of the seawall revetment under the piled quay deck of the Edge Structures, the Southern Transition Edge Structures and the Northern Transition Edge Structures for the Cruise Terminal. These C&D materials will be primarily granular in nature, comprising mainly rock armour, granular fill and general fill.

5.1.2 The major construction activity which requires large quantities of fill material is the construction of the seawall revetment below the piled quay deck of the Edge Structures, the Southern Transition Edge Structures and the Northern Transition Edge Structures for the Cruise Terminal. The fill materials required include rock armour, rock fill, filter and general fill.

5.1.3 Considerations have been taken in development of the Reference Design to maximize reuse of the C&D materials generated from dredging of existing seawall. The existing rock armour from the runway seawall will be reused in the proposed seawall revetment subject to the actual sizes and conditions of the rock armour. The rockfill mound of the existing seawall will be reused as rockfill core for the new seawall and the reclamation fill of the runway behind the rockfill mound of the existing seawall will be used as general fill material for the proposed seawall subject to the actual sizes and conditions of the dredged materials.

5.1.4 The dredged materials which are suitable for reuse including the armour, rockfill and general fill will be screened, sorted and stockpiled at a temporary stockpiling area. This stockpiling area is estimated to be approximately 1.5 hectares during the peak period. Based on the envisaged programme, the peak period for stockpiling of the dredged materials would occur in second half of 2009 when construction of the new seawall revetment will have just commenced. Since there will be other concurrent construction activities to be constructed in parallel with the Edge Structures, the temporary stockpiling area may be reduced by better programming of the concurrent construction activities. The surplus materials would be disposed to the public fill site(s) designated by the Public Fill Committee. It is anticipated that the surplus materials would be disposed via land route after sorting on site. To monitor the disposal process, a trip-ticket system should be included as one of the contractual requirements. Existing public fill reception facilities available to the public include: (i) Tseung Kwan O Area 137 Fill Bank; (ii) Quarry Bay Temporary Public filling barging point (iii) Mui Wo Temporary Public fill Reception Facility and (iv) Tuen Mun Area 38 Fill Bank. Of these public fill reception facilities, Tseung Kwan O Area 137 Fill Bank is the nearest one to the Cruise Terminal site.

5.1.5 Provided that the temporary stockpiling area of about 1.5 hectares is available, the estimated total volume of different types of C&D materials generated, reused & disposed arising from dredging of the existing seawall and the total volume of different types of fill materials (including additional fill materials required) required for construction of the Edge Structures, the Southern Transition Edge Structures and the Northern Transition Edge Structures including the new seawall revetment based on the Reference Design are summarized in the Table 5.1 below. Based on a preliminary review, about 1.5 hectare area could be accommodated within the project site, yet the location and the final arrangement would be subject to the detailed construction site arrangement to be formulated and implemented by the successful tenderer. An indicative location of the temporary stockpiling area is shown in Figure F4.2. Alternatively, the successful tenderer may consider applying for an alternative stockpiling area outside the Cruise Terminal lot boundary subject to land availability and compliance with relevant environmental protection requirements. The breakdown for the estimation of the quantities of C&D materials is provided in Appendix A. Please however note that the actual quantities of the C&D materials generated and the additional fill materials required are subject to the design and construction methods to be adopted by the successful tenderer. Mitigation measures and good site practices should be implemented to control potential environmental impact from handling and transportation of
C&D material including those activities associated with the temporary stockpile in accordance with the Air Pollution Control (Construction Dust) Regulation and EPD’s Practice Note for Professional Persons on Construction Site Drainage (ProPECC PN 1/94). Mitigation measures of particular relevance to temporary stockpile include:

- Temporary stockpile if any shall be located away from waterfront or storm drains as far as possible.
- Open stockpiles of construction materials or construction wastes on-site should be covered with tarpaulin or similar fabric.
- Skip hoist for material transport should be totally enclosed by impervious sheeting.
- All dusty materials should be sprayed with water prior to any loading, unloading or transfer operation so as to maintain the dusty materials wet.
- The height from which excavated materials are dropped should be controlled to a minimum practical height to limit fugitive dust generation from unloading.

### Table 5.1 Summary of C&D materials Generated, Reused & Disposed arising from the Dredging Works required for the Construction of Edge Structures, Southern Transition Edge Structures and Northern Transition Edge Structures (including Seawall Re-construction)

<table>
<thead>
<tr>
<th>Type of Materials</th>
<th>Dredged (see note 1)</th>
<th>Required (see note 2)</th>
<th>Reused in Seawall Construction (see note 3)</th>
<th>Reused in Works other than Seawall Construction or Disposed Offsite (see note 4)</th>
<th>Additional Fill Materials Required (see note 5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade II or above rock</td>
<td>Rock Armour 56,900</td>
<td>74,800</td>
<td>56,900</td>
<td>0</td>
<td>17,900</td>
</tr>
<tr>
<td>Grade III or below rock</td>
<td>Rock fill 143,300</td>
<td>248,600</td>
<td>100,310</td>
<td>42,990</td>
<td>148,290</td>
</tr>
<tr>
<td>Inert soft C&amp;D materials</td>
<td>General Fill 55,900</td>
<td>72,700</td>
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<td><strong>Total</strong></td>
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<td><strong>213,110</strong></td>
<td><strong>42,990</strong></td>
<td><strong>231,490</strong></td>
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</tbody>
</table>

Notes:
1. These figures refer to the amounts of C&D materials generated from dredging only which does not include excavation within land limits.
2. These figures refer to the quantities of fill materials required for construction of the whole new seawall revetment.
3. These figures refer to the quantities of the dredged C&D materials to be re-used for construction of the new seawall revetment.
4. These figures refer to the quantities of surplus or unsuitable dredged materials which cannot be re-used in construction of the new seawall revetment and need to be re-used in other areas of the Cruise Terminal site or disposed of offsite.
5. These figures refer to the outstanding quantities of the fill materials required for construction of the new seawall revetment after re-using all available dredged C&D materials. The outstanding required quantities can either be supplied by (i) re-using surplus excavated C&D materials generated from land excavation of the existing seawall or other parts of the Cruise Terminal site; or (ii) by importing the required fill materials from off-site sources.
5.2 Programme of Generation and Reuse of C&D Materials

5.2.1 Based on the envisaged implementation programme shown in Figure F4.1, the schedule of quantities of C&D materials generated and reused and the additional fill materials required are shown in Appendix B. Please however note that this programme is based on the Reference Design only and the actual programme is subject to the design and construction method to be adopted by the successful tenderer.
6 CONCLUSION AND RECOMMENDATION

6.1 Summary and Conclusion

6.1.1 The amounts of generation and reuse of C&D materials estimated in this report are based on the Reference Design and the envisaged implementation programme only. The successful tenderer has the freedom to propose various possible options and select his preferred option which may result in different amounts of generation and reuse of C&D materials.

6.1.2 A number of options for the Edge Structures, the Southern Transition Edge Structures and the Northern Transition Edge Structures of the Cruise Terminal have been developed and reviewed in arriving at the selected option in Reference Design – the piled quay deck. Generation and re-use of C&D materials have been considered as one of the key assessment criteria during the evaluation process.

6.1.3 Based on the Reference Design, it is estimated that a total of 256,100 m\(^3\) of C&D materials would be generated from dredging of existing seawall. Of these C&D materials, approximately 22% of the C&D materials is inert soft C&D materials. Approximately 22% is Grade II or above rock, and approximately 56% is Grade III or below rock.

6.1.4 Measures have been taken in both design, programming of the works and arrangement of temporary stockpiling area to maximize re-use of the dredged C&D materials. Approximately 213,110 m\(^3\) of the dredged materials would be re-used in the new construction, which accounts for about 83% of the all dredged materials, subject to actual sizes and conditions of the dredged materials. The assumptions on the percentages of re-use are 100% for the dredged Grade II or above rock, 70% for the dredged Grade III or below rock, and 100% for the dredged inert soft C&D materials.

6.1.5 It is expected that the surplus materials would be disposed off site during period from May 2009 to May 2012. The additional fill materials would be required from October 2009 to August 2012. Please however note that the actual quantities of the C&D materials generated and the additional fill materials required, as well as the actual programme of disposal / requirement of the C&D materials are subject to the design and construction methods to be adopted by the successful tenderer.

6.2 Recommendation

6.2.1 The following measures are recommended to minimize generation of surplus C&D materials:

Programming of Construction Activities

6.2.2 Construction activities involving generation and re-use of C&D materials should be better programmed to minimize the temporary stockpiling area and time required, thus minimizing the work area constraint and possible environmental impact arising from the re-use of the generated C&D materials.

Site Management and Operation Practice

6.2.3 Operation procedures and site practices should be established and implemented for the operation of construction activities and management of C&D materials generated on site. The established procedures for relevant construction operations including dredging, handling of dredged materials, storage and stockpiling of C&D materials and transportation of the C&D materials should be strictly implemented on site in order to prevent contamination of the C&D materials and to ensure the of C&D materials are in satisfaction quality suitable for reuse and recycling purpose.
### Appendix A - Breakdown for Estimation of Quantities of C&D Materials

#### Dredged

<table>
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<tr>
<th>Item</th>
<th>Sectional Area</th>
<th>Length of Edge Structures</th>
<th>Length of Northern Transition Edge Structures</th>
<th>Length of Southern Transition Edge Structures</th>
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#### Required

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Note: Please refer to the attached Sketch 1 showing the extent of the above Sectional Areas.
## Kai Tak Development Engineering Study

The programme and quantities shown above are based on the Reference Design only and the actual programme and quantities are subject to the design and construction method to be adopted by the successful tenderer.

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### Waste Management Plan for the Dredged Material from Seawall Removal

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Agreement No. CE 35/2006
KTD Engineering Study cum Design and Construction of Advance Works
Envisaged Implementation Programme for Edge Structures, Southern Transition Edge Structures and Northern Transition Edge Structures

Figure F4.1