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**for information**

## **Review of the Public Filling Strategy and Programme**

This paper informs Members of the background of the Review of the Public Filling Strategy and Programme and the proposed new long-term Public Filling Strategy.

### **Introduction**

2. In 1997 over 5.7 million cubic metres of Construction and Demolition (C&D) material was generated in Hong Kong and comprised around 20% C&D Waste and 80% Public Fill by weight. C&D Waste is organic in nature and comprises bamboo, glass, plastics, timber, vegetation and other organic material whereas Public Fill comprises rock and concrete, debris from demolitions and excavated soil.

3. Ideally, public fill material should be delivered to Public Filling Areas (PFAs), for re-use as reclamation material and C&D Waste should be delivered to landfill for disposal. However, in the past, large quantities of Public Fill have been disposed of at landfill sites. This is undesirable because it occupies valuable and expensive landfill space, and thus significantly reduces the lifespan of the landfill.

4. With the development of more Public Filling Areas, the quantities of C&D Material disposed of at the strategic landfills has fallen from 77% of the total in 1991 to less than 23% of the total in 1997. This has contributed to prolonging the lifespan of the strategic landfills for the proper disposal of Municipal Solid Waste. However, by diverting more Public Fill to the existing Public Filling Areas the available capacity has been used more quickly than planned.

5. The Civil Engineering Department now anticipate that there will be a shortfall of capacity at the existing Public Filling Areas in early 2001, or even sooner, and so have commissioned this Study to review the existing Strategy and to formulate a new long term Public Filling Strategy covering 1997 to 2011. This new Strategy will ensure that all of Hong Kong's forecast C&D Material is managed in a beneficial, efficient and environmentally friendly way.

### **Planning Model**

6. In order to determine the likely quantities of C&D Material arising in the future, the Public Fill Planning Model was developed to assist the Civil Engineering Department in planning for the beneficial reuse of Public Fill. The model is designed to be continuously updated to improve the accuracy of its forecasts, using data from the Fill Management Committee, the Buildings Department, the Planning Department, the Ratings and Valuation Department, and data from projects managed by the Housing Authority and Housing Society.

## **Alternative Uses of Public Fill**

7. One of the options examined during this Study is the use of Public Fill other than as fill in marine reclamation projects. This option focussed upon the production of recycled aggregates from Public Fill and their potential use in concrete and roadworks. It was concluded that as long as the use of recycled aggregate was acceptable from an engineering point of view, and it was commercially viable to use, it is likely that its introduction would be accepted by both the concrete producing and concrete using industries.

8. It was noted, however, that in order to produce recycled aggregates from Public Fill, the usable aggregate must be separated from the mixed Public Fill. If source separation is not possible, then C&D Material Sorting Facilities would be required to undertake this task.

9. On land, it is possible to use Public Fill instead of general fill material at construction and land formation sites, although there may be engineering difficulties where only a shallow thickness of fill material is required.

10. Another potential use of Public Fill, especially oversized blocks and boulders, is the creation of artificial reefs at designated marine sites - the Artificial Reef Deployment Study is now being undertaken by the Agriculture and Fisheries Department and will recommend suitable sites. It should be stressed that artificial reefs constructed from oversized Public Fill should be the result of an environmental need identified by the Agriculture and Fisheries Department and not simply the desire to "dispose" of Public Fill.

## **C&D Material Sorting Facilities**

11. As mentioned above, C&D Material Sorting Facilities (including crushing processes) would be needed to separate recycled aggregates from mixed Public Fill, if this was required. However C&D Material Sorting Facilities would still be needed even if recycled aggregate production is not to be promoted.

12. The strategic landfills have strict criteria for the acceptance of waste - only C&D Material containing not more than 20% by volume of inert material (Public Fill) may be disposed of. However, Public Filling Areas have acceptance criteria according to the Conditions of the Dumping Licence and so it is possible that some C&D Material is not acceptable at either facility. It is this Mixed C&D Material, comprising both C&D Waste and Public Fill which requires separation at C&D Material Sorting Facilities into its constituent parts.

13. At present, Mixed C&D Material arises because of inadequate separation of inert and non-inert materials at the construction and demolition sites throughout Hong Kong. There are many reasons why this occurs but most are related to the small size of the urban sites which do not allow separate stockpiling of different materials, and to the lack of awareness by both designers and site managers as to the benefits of source separation. Also, the operation of large scale sorting plant on site would not be socially or environmentally acceptable in heavily populated urban areas.

14. The operation of C&D Material Sorting Facilities was assessed and a new conceptual design produced as part of the overall Public Filling Strategy. The new conceptual design incorporates environmental mitigation measures and methods to improve energy efficiency, while reducing the inherent noise and dust generation.

15. The location of C&D Material Sorting Facilities was a major aspect of this study as Hong Kong has little suitable land for siting C&D Material Sorting Facilities, and even less surviving natural environment to lose to development of Public Fill Disposal Sites.

16. For the siting of C&D Material Sorting Facilities, suitable areas of previously used land were identified - in or near the three strategic landfills in the New Territories, and also at Anderson Road Quarry in Kowloon.

### **Public Filling Barging Points**

17. Another key requirement of the Strategy is to provide a suitable design and to locate acceptable sites for Public Filling Barging Points at strategic locations throughout Hong Kong. This was a contentious issue as many members of the general public have the perception that operations at Public Filling Barging Points are dirty and noisy - this may even have been true in the past.

18. At Public Filling Barging Points, Public Fill is brought from construction and demolition sites and loaded into large barges which are then transported to marine based Public Filling Areas. At existing Public Filling Barging Points, the incoming material is inspected by supervisory staff prior to being tipped so as to ensure that only suitable Public Fill is accepted.

19. A conceptual design was provided for a new generation of Public Filling Barging Points which may incorporate joint site use as well as stringent environmental mitigation measures to control dust, noise and visual impact. For example, flexible plastic sheeting with water sprays surrounding the tipping chute to reduce dust, the provision of baffle walls around the site perimeter to reduce dust and noise, and the provision of a full canopy over the tipping area to reduce dust and visual impact.

20. It was recommended that at least three Public Filling Barging Points should be provided on Hong Kong Island in order to reduce road traffic through the cross harbour tunnels and also because barge transportation is more efficient, and thus environmentally friendly, than road transport for this type of bulky material. Other sites were also recommended in Kowloon, the New Territories and Lantau.

### **Buffer Storage Areas**

21. The quantity of Public Fill used in ongoing and proposed reclamations is only part of the fill requirement and there is considerable scope for increasing the capacity currently allocated to Public Fill in reclamation projects without affecting engineering requirements. The only limiting factor was seen to be the supply of Public Fill to match the required reclamation programme.

22. Reclamations generally require large quantities of fill material in a relatively short period of time whereas Public Fill is generated at variable rate. This was one of the most cited reasons for the reluctance to use Public Fill in such projects, ie, that the supply of Public Fill could not be guaranteed.

23. To resolve this problem, Buffer Storage Areas were recommended which accept Public Fill in times of high production and/or low demand and then supply Public Fill when needed. By regulating the supply, Public Fill can be delivered on demand for fast-track developments.

#### **Disposal Sites - The Contingency Plan**

24. The recommended strategy requires that a contingency plan be put in place in the event that all Public Fill generated cannot be accommodated in planned reclamation projects. The contingency plan is to dispose of Surplus Public Fill in an environmentally acceptable manner to form a new and improved landscape.

25. For the disposal of Surplus Public Fill, a number of land reclamations were identified at some of the smaller Outlying Islands, but with no end use defined, and considering the environmental impact which would be involved, these sites were not recommended unless potential land uses could be identified in further studies.

26. As a result, terrestrial sites remain as the only suitable option for consideration. Tan Kwai Tsuen Borrow Area and Tan Kwai Tsuen Quarry, in the Western New Territories, have no current or planned use and were recommended. Adjacent to one of the Country Parks and in greenbelt zoning, it was recommended that one of these sites, after further study, could be used as a Buffer Storage Area and Disposal Site if necessary.

27. The overall recommendation was that using Surplus Public Fill, the site should be recontoured to blend with surrounding landforms, and then revegetated with indigenous species to blend in with the adjacent Country Park. The overall aim of this process would be not only to provide disposal space for Surplus Public Fill, but also to enhance the natural environment in an area of degraded landscape.

28. All suggested sites were assessed using preliminary environmental, road traffic and marine traffic impact assessments where appropriate. Detailed assessments would be undertaken in accordance with statutory procedures and requirements for those recommended sites which are selected for further study.

#### **The New Strategy and Programme**

29. It has been recommended that the avoid, minimise, reuse / recycle, treat, and dispose waste management hierarchy be adopted for C&D Material; "Avoidance" and "Recycling" would have limited overall effect on reducing quantities of C&D Material, although should be examined further; "Minimisation" is already being addressed by Government in the Draft Waste Reduction Plan; and it is not necessary to "Treat" Public Fill prior to "Disposal" since the material is inert and will not decompose significantly. Thus, "Reuse" provides the greatest potential to efficiently manage the Public Fill arising.

30. Although the Strategy will effectively manage forecast arisings, any slippage of the major reclamation projects could result in a shortage of capacity as predicted by Civil Engineering Department. For this reason a contingency option - the "dispose" level in the hierarchy - was also recommended. This option appears practicable but, of course, would only be implemented after detailed environmental and traffic impact assessments have been completed.

### **Conclusions**

31. The Study concluded that present and planned marine reclamation projects should be able to accommodate the forecast amounts of Public Fill. However, this is dependent upon all projects progressing according to schedule. It is likely that delays in the implementation of these projects will occur in which case there may well be a surplus of Public Fill.

32. To avoid this scenario becoming reality, a greater allocation of void space needs to be given to Public Fill within the existing and planned reclamations. In order for this to be acceptable to project managers, the supply of Public Fill must be reliable. To achieve this, Buffer Storage Areas will be required.

33. In conclusion, if the recommended Strategy and Programme is implemented, it will be possible to deal with current and forecast arisings of C&D Material within Hong Kong. This can be undertaken in an environmentally acceptable way which will not only provide fill material for new land formation but will also save valuable capacity in the strategic landfills and thus extend their lifespan.

**Civil Engineering Office, Civil Engineering Department**  
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