For information

Legislative Council
Panel on Environmental Affairs

Information Note on
Development of Management Framework for Dredged Sediments

PURPOSE

The purpose of this paper, prepared in response to the Panel's request, is to brief Members on the latest development of the management framework for dredged sediments.

BACKGROUND

2. Dredging of sediments is normally undertaken to avert environmental hazards, to prevent flooding, to maintain harbour fairways and navigation channels, and for emergency and safety reasons. Hong Kong only has limited disposal capacity for dredged sediments. At present, uncontaminated sediments are disposed of at open sea disposal grounds at South Cheung Chau, East of Ninepin, North Lantau, East Tung Lung Chau, West of the Brothers and South Tsing Yi, while contaminated sediments are disposed of at the confined marine disposal[1] site at East Sha Chau. Civil Engineering Department (CED), which is responsible for the management of these disposal grounds, implements an environmental monitoring and audit programme on the disposal grounds and imposes specific conditions on dumping operators to make sure that any marine disposal operations will not cause unacceptable impact to the marine environment.

3. To protect the marine environment and make the best use of the limited capacity of the disposal grounds, the Government discourages unnecessary dredging of sediments and normally would not allocate disposal capacity for a project unless the project proponent can

[1] Confined marine disposal refers to disposing of contaminated dredged sediments in seabed pits after sand extraction. When the pits are filled up, they will be capped with a thick layer of clean sediments to isolate the contaminated sediments from the marine environment.

satisfactorily demonstrate a clear need for dredging.

1992 SEDIMENT CLASSIFICATION SYSTEM

4. In 1992, the Government introduced a chemical screening system (shown in **Enclosure 1**) as the basis of classifying sediments. Sediments which passed the chemical screening criteria were considered to be suitable for open sea disposal, while those sediments which failed the criteria had to be disposed of at the confined disposal site. Under this system, sediments were classified according to their levels of contamination by seven heavy metals as measured against designated sediment quality criteria adopted by Environmental Protection Department (EPD). These designated criteria were developed from the "Contaminated Spoil Management Study" commissioned by EPD in 1991. In developing this chemical screening system, the Study had taken into account the background quality of local sediments in late 1980s and also made reference to the prevailing practices and the sediment quality criteria adopted by other major economies (e.g. the US, Canada and Netherlands) at that time. Though the Study recognized that organic pollutants in Hong Kong sediments might be of concern, the 1992 Sediment Classification System (the 1992 System) had not included any screening criteria for organic pollutants in view of the limited capabilities of local laboratories and the lack of monitoring data on organic pollutants in local sediments at that time. Nevertheless, our adoption of a chemical screening system was in line with the then prevailing practice of most economies. Indeed, criteria values adopted in our 1992 System were generally more stringent than those adopted by other major economies.

NEED FOR A NEW FRAMEWORK

5. Notwithstanding the fact that most economies including Hong Kong had been using chemical screening in classifying sediments up to mid-1990s, it was commonly accepted that chemical screening was only an indirect method to gauge the potential harmful effect of sediments to the environment as it did not consider the biological effect of sediments. In fact, heavy metals would only have adverse impact on marine organisms and the environment if they were readily taken up and assimilated by living organisms. In this regard, the Contracting Parties to the Convention on the Prevention of Marine Pollution by Dumping of

Wastes and Other Matter (the London Convention)[2] had recognized the limitation of chemical screening and started a review of the management framework with a view to improving its effectiveness in protecting the marine environment.

6. In 1995, the Eighteenth Consultative Meeting of Contracting Parties to the London Convention eventually agreed to adopt a more detailed and scientific framework for assessing dredged materials intended for marine disposal. The Meeting recommended the use of biological screening as an additional means to supplement chemical screening in determining the most appropriate marine disposal arrangements for dredged sediments. The recommendation was subsequently reflected in the 1996 Protocol to the London Convention.

7. Separately, we had conducted a review of the 1992 System and concluded that our sediment classification system could be further enhanced as our chemical screening criteria only covered seven key heavy metals, and did not include some other contaminants (e.g. organic pollutants) which could also cause environmental problems. In addition, since chemical screening had not considered the biological effect of sediments, some sediments that had been dumped at the confined disposal site could have been dumped at open sea disposal grounds without causing unacceptable environmental impact. Our review concluded that if we continued to solely rely on chemical screening, it would lead to premature exhaustion of the limited capacity of the confined marine disposal facility which should have been used for disposal of highly contaminated sediments only.

8. In the light of the promulgation of the 1996 Protocol and our review findings (paragraph 7 above), we considered that Hong Kong should improve protection of our marine environment by following the direction set out in the 1996 Protocol, i.e. using both biological and chemical screening in our sediment management framework.

NEW SEDIMENT MANAGEMENT FRAMEWORK

9. In 1997, EPD and CED started to develop a new sediment

[2] The London Convention is an international treaty controlling marine pollution caused by marine dumping. It was applicable to Hong Kong before 1997 and has been extended to Hong Kong by the Central Government following the reunification in 1997.

management framework that would meet the new requirement as set out in the 1996 Protocol. Based on the review findings, EPD presented a draft version of the new framework to the Scientific Group of the London Convention for review. The draft new framework was well received by the Scientific Group. Separately, the proposed new framework was presented to the Advisory Council on the Environment (ACE) in October 1997. ACE supported the introduction of the proposed framework, and recommended that the framework be put in place at the earliest opportunity. Subsequently, EPD submitted an information paper to the Scientific Group of the London Convention again in May 2000 to give an update on the progress of the new management framework.

10. The new management framework introduced in 2000 follows closely the spirit of the 1996 Protocol to the London Convention and the Guidance document of the International Maritime Organization[3]. It comprises three tiers of screening (shown in **Enclosure 2**), namely -

Tier I - Review of existing information to see if there is sufficient information and data to determine whether the sediment is uncontaminated and suitable for open sea disposal. Otherwise, Tier II assessment will have to be conducted.

Tier II - **Chemical** screening of a prescribed list of chemical contaminants[4] to classify the sediments into three categories, namely, Categories L (low contaminant level), M (moderate contaminant level) or H (high contaminant level) materials before Tier III assessment is conducted. Category L sediments will be suitable for open sea disposal while categories M and H[5] sediments must go through Tier III assessment.

Tier III - **Biological** screening of the biological impact of the

[3] International Maritime Organization (the organization administering the London Convention) has issued a Guidance document on biological characterization technique to assess the potential impact of dredged sediments to be dumped at sea on marine life and human health. Biological testing of dredged materials is recommended if the potential impact could not be assessed through chemical and physical characterization.

[4] The prescribed list of chemical contaminants consists of eight heavy metals, arsenic, and organic pollutants including PAHs, PCBs and TBT.

[5] All Category H sediments would need to go through Tier III assessment, except for those sediments with a contaminant level less than ten times of the Lower Chemical Exceedance Level.

sediments on marine organisms[6] so as to determine the most appropriate disposal options for categories M and H sediments.

11. Under the new management framework, the following additional safeguards have been introduced to further reduce the environmental risks -

(a) chemical screening (Tier II) covers a more comprehensive list of contaminants than that in the 1992 System which covered only seven heavy metals;

(b) an Upper Chemical Exceedance Level is adopted to ensure that no sediment with contaminant concentration above this level is allowed for open sea disposal;

(c) adoption of a set of biological screening criteria which is more stringent than those commonly used by overseas economies, including the US, Canada, and Australia; and

(d) biological screening on diluted samples is adopted to identify those "seriously" contaminated sediments which may require special pre-treatment before marine disposal at the confined disposal site.

12. In summary, the new management framework ensures that only those sediments with low contaminant level or insignificant biological effect may be taken to open sea disposal. It also ensures that sediments with high contaminant level or significant biological effect would be isolated from the marine environment by confined disposal, or be subjected to other special disposal arrangements under special circumstances. Apart from Hong Kong, many overseas economies such as the US, Canada, and Australia have already adopted biological screening in assessing dredged materials. In addition, as the Mainland is a Contracting Party to the London Convention, Hong Kong will be expected to follow the spirit of the Convention after the Mainland has ratified the 1996 Protocol.

---

[6] The biological screening would measure the biological responses (survival rate, growth rate and normality survival) of three species of marine organisms including amphipod, polychaete and bivalve or echinoderm.

IMPLEMENTATION OF NEW MANAGEMENT FRAMEWORK

13. Following confirmation that local laboratories have acquired the necessary expertise and equipment to conduct biological screening on sediments, Works Bureau formally introduced the new sediment management framework through a Technical Circular in April 2000. To allow an appropriate transition period for those ongoing projects which have undergone the 1992 System, the Technical Circular for the new framework has included a cut-off date of 31 December 2001 whereby only projects whose construction works commence on or after 1 January 2002 are required to follow the new management framework in carrying out sediment assessment and to submit the sediment quality report. After consulting relevant stakeholders, the new framework was also applied to private sector projects through a Practice Note to Authorized Persons[7] issued by the Buildings Department in May 2001. The Practice Note is applicable to all private sector projects which involve disposal of dredged sediments and whose dredging works commence on or after 1 January 2002.

FURTHER DEVELOPMENT WORK

14. At present, the marine organisms used for biological screening are imported from overseas. Some academics and green groups have suggested the use of local species for biological screening, which could help further improve our assessment of the impact of dredged sediments on local ecosystem. EPD has been working with local universities to identify indigenous marine organisms, and to develop testing protocols if local species are found suitable for routine screening tests.

15. EPD will continue to monitor the relationship between sediment contaminant levels and biological responses with a view to refining the chemical screening criteria and reducing the need for biological sediment analysis for future projects.

16. The new sediment management framework will be reviewed

[7] Authorized Persons refer to architects, engineers and surveyors registered under the Buildings Ordinance (Cap 123).

three years after its implementation on 1 January 2002.

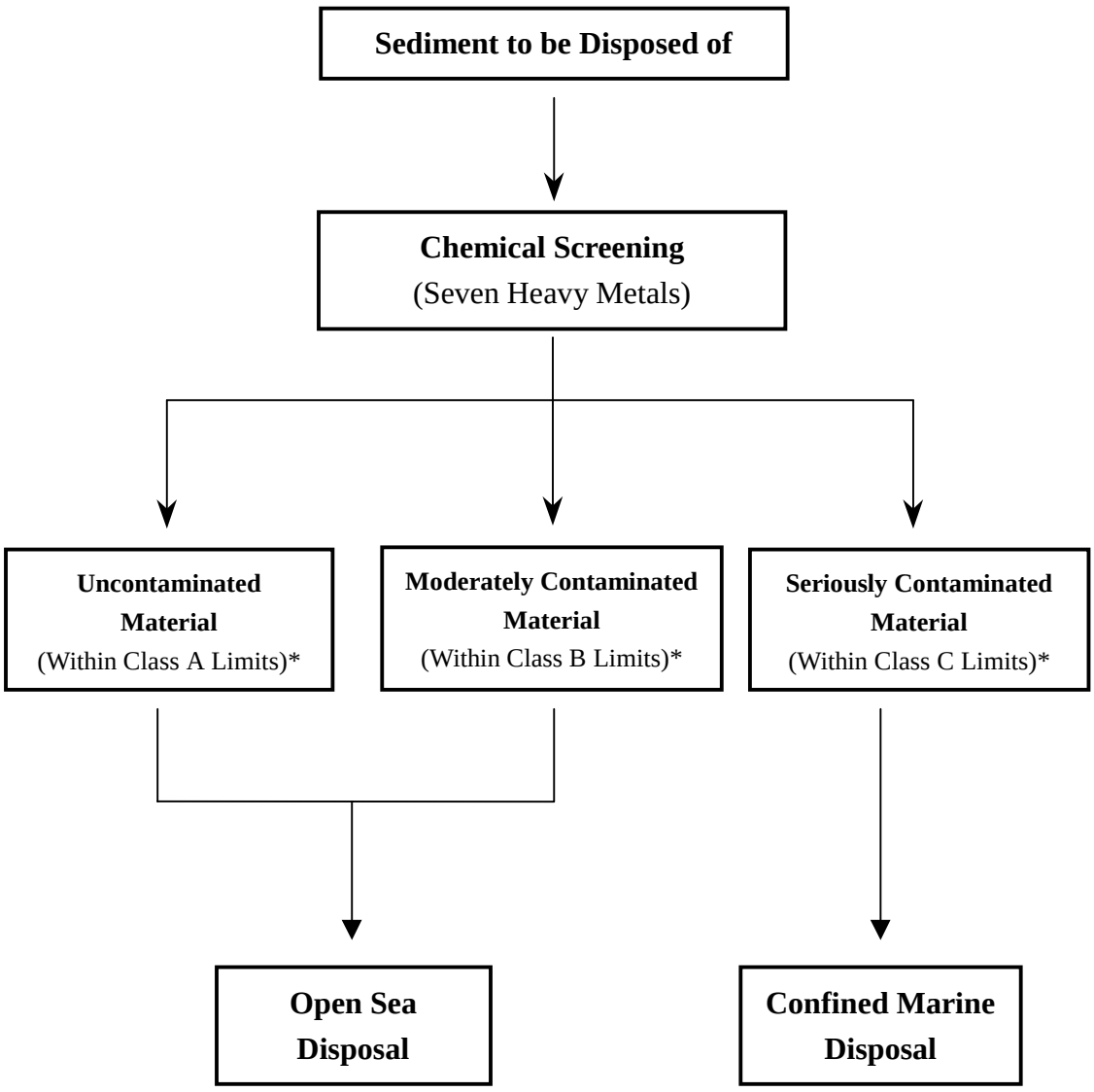
CONCLUSION

17. Members are invited to note the content of this paper.

Environmental Protection Department
April 2002

Enclosure 1

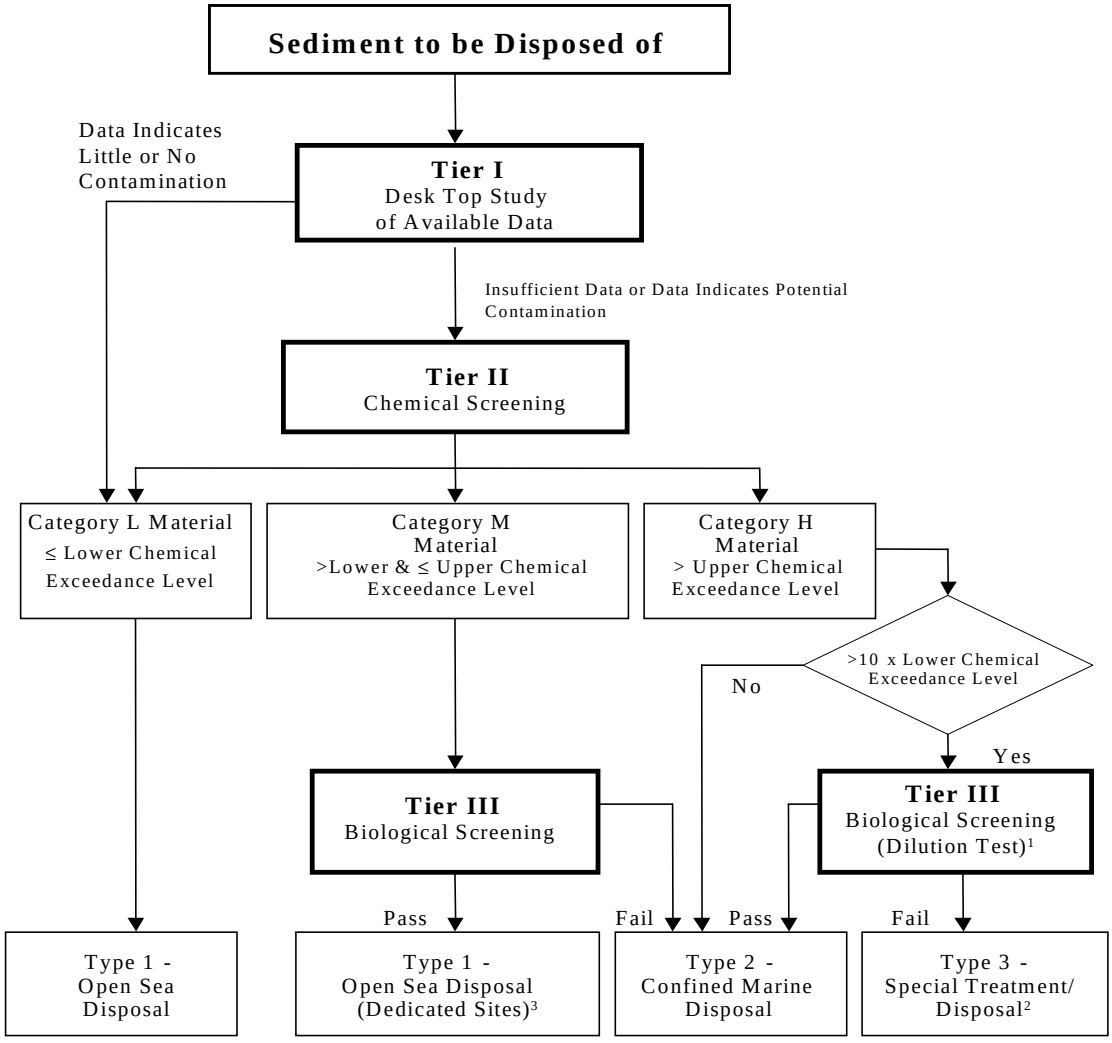
1992 Sediment Classification System of Dredged Sediment for Marine Disposal



* Under the 1992 System, sediments would be classified according to their levels of contamination by seven heavy metals as measured against designated sediment quality criteria in three classes.

Enclosure 2

New Management Framework for Dredged/Excavated Sediment



1. Dilution test is carried out by mixing test sediments with nine portions of reference sediments to evaluate the likely biological impact of sediments on the marine environment.
2. Special treatment/disposal includes stabilization or containment of sediments prior to landfilling or confined marine disposal.
3. A dedicated site, to be set up at North of the Brothers, would be monitored to ensure that the disposal would not cause adverse impact on the marine environment.