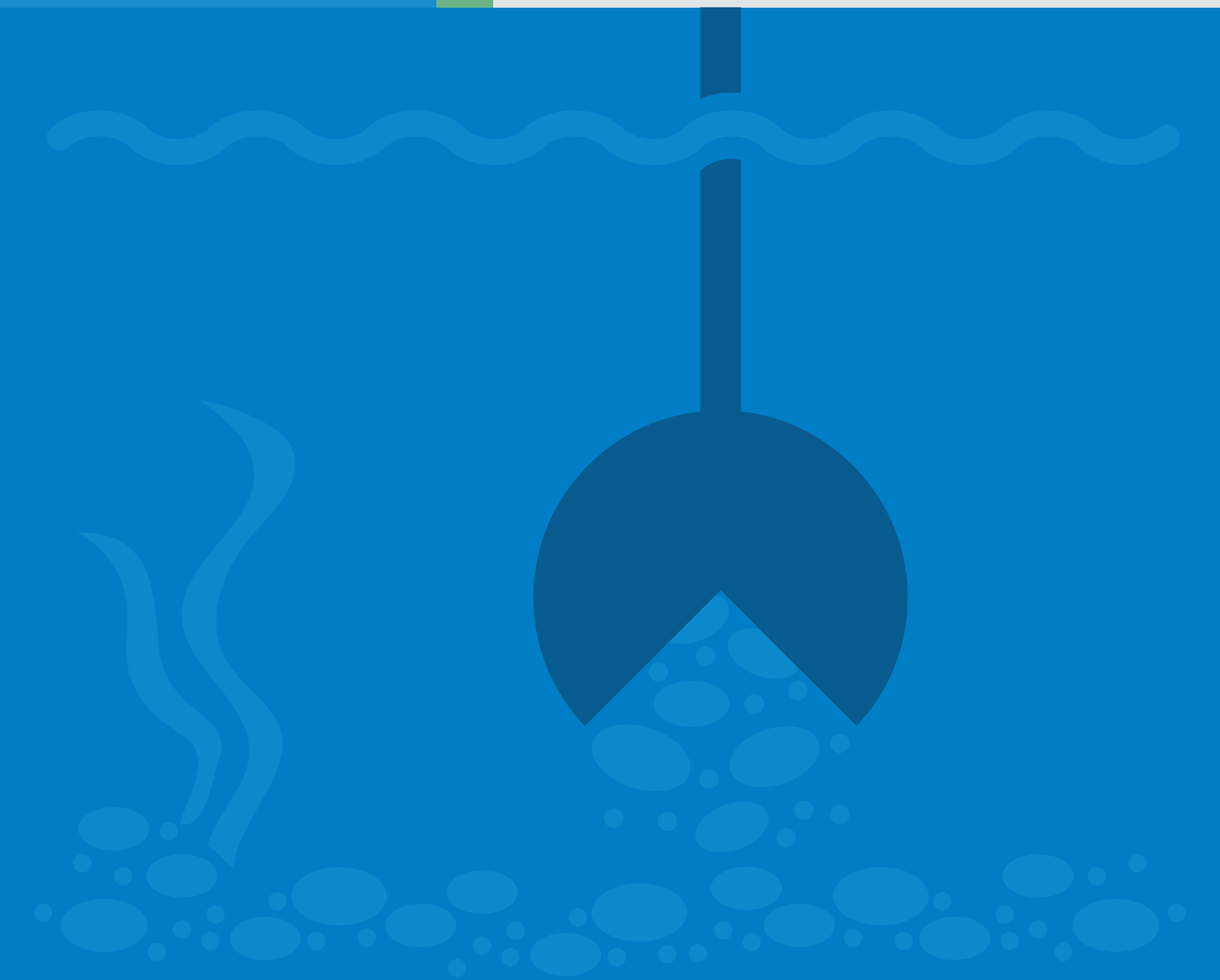
HELCOM

HELCOM Guidelines for Management of Dredged Material at Sea

Baltic Marine Environment Protection Commission

Monitoring & assessment

February 2024



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Published by:

Helsinki Commission – HELCOM
Katajanokanlaituri 6 B
00160 Helsinki, Finland
www.helcom.fi

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For bibliographic purposes this document should be cited as:
"HELCOM Guidelines for Management of Dredged Material at Sea. HELCOM (2024)"

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1. Introduction

1.1 Dredging is essential to maintain navigation to, within and from ports and harbours and for the development of port facilities, as well as for remediation, flood management and to maintain the carrying capacity of marine and coastal systems. Much of the material removed during these necessary activities is eligible for disposal at sea. Most of the material dredged from navigation channels within the Baltic Sea area is either uncontaminated or only slightly contaminated by human activity (i.e. at, or close to, natural background levels). However, a small proportion of dredged material is contaminated to an extent that environmental constraints need to be applied when considering management options.

1.2 Dredged sediments are recognised as part of the natural sediment cycle. Therefore, one management option is to retain dredged material within the same aquatic sedimentary system from where it originated, if it is environmentally, technically, socially and economically feasible to do so. This has the benefits of maintaining the sedimentary system and maintaining the natural accretion/ erosion processes and thus maintaining marine and coastal habitats (PaiPai, 2003[1]; Townend and Whitehead, 2003[2]).

General remarks

1.3 All assessments of the impact of dredging and disposal activities are based on national regulations and not dictated by Helcom. However, with a view to evaluating the possibilities for harmonising or consolidating criteria for assessing dredging and disposal activities Contracting Parties are requested to inform Helcom of criteria adopted or revisions, as well as the scientific basis for the development and refinement of criteria for assessing dredging and disposal activities.

When reporting to the Helsinki Convention, it is requested that the beneficial uses and the non-beneficial uses are reported separately. Information reported on non-beneficial uses allows for more accurate assessments of, the impacts to seabed integrity, the inputs of hazardous substances, inputs of contaminants to marine and coastal sediments, and of physical disturbance associated with disposal at sea. Similarly, information reported on beneficial uses can be used to measure the shift/extent to using sediment as a valuable resource.

Overview of Dredging Activities

1.4 Dredging is carried out for a variety of purposes, such as:

a. *navigation*:

- Maintenance of navigation channels, berths (i.e. to counteract sedimentation and changes in morphology) and
- Capital (or new-work) (i.e. to develop new channels and deepening of existing channels).

[1] Paipai, E., 2003. Beneficial uses of dredged material: Yesterday, today and tomorrow. Terra et aqua, pp.3-12

[2] Townend, I. and Whitehead, P., 2003. A preliminary net sediment budget for the Humber Estuary. Science of the total environment, 314, pp.755-767.

b. *to support infrastructure:*

- For coastal protection *(*use of sediments for such activities as beach nourishment and construction of levees, dykes, jetties, capping, etc.)
- Renewable energy site development and

c. *for the purposes of ecosystem enhancement*:

- Environmental dredging (i.e. to remove contaminated sediment);
- Restoration dredging to restore or create environmental features (i.e. to develop habitats to enhance ecosystem functions) and
- Dredging to support local and regional sediment processes.

2. Scope[3]

2.1 These guidelines are designed to assist Contracting Parties in the management of dredged material in ways that will prevent and eliminate pollution in accordance with Article 3 to the 1992 Helsinki Convention, and protect marine species and habitats in the Baltic Sea area in accordance with Article 15[4]. Dredged materials have been listed in Regulation 1 of Annex V as being permitted to be dumped at sea, as an exception from the general prohibition from dumping in Article 11 (1) of the Convention. Within the frame of these Guidelines cases of disposal of dredged material are differentiate between "dumping" as the deliberate disposal and "placement" in all other cases.

2.2 Any disposal of dredged materials into the maritime area, independently of whether it is considered as "dumping" or "placement" within the Helsinki Convention (Article 2, paragraph 4) should be assessed on a case-by-case basis in order to ensure that it complies with the objectives of the Convention, as outlined in these Guidelines.

2.4 The Guidelines address the management of dredged material in the maritime area subsequent to any dredging technique including hydrodynamic and sidecast dredging. In addition to preventing and eliminating adverse effects, the guidelines, where appropriate, seek to maintain or enhance the existing environmental conditions.

2.5 The guidelines are primarily a scientific and technical framework for assessing dredged material proposed for disposal at sea. While economic considerations are acknowledged, they are not dealt with in detail in these guidelines. This implies that the detailed procedures described in the guidelines will not be applicable in all national or local circumstances.

2.6 In the context of these guidelines, dredged material is deemed to be sediments and/or rocks with associated water, organic matter etc. removed from areas that are normally or regularly covered by water, using dredging or other excavation techniques.

2.7 It is recognised that both removal and disposal of dredged sediments may cause harm to the marine environment. Contracting Parties are therefore encouraged to exercise control over both dredging and dredged material management using a Best Environmental Practice (BEP) approach designed to minimise both the quantity of material that has to be dredged and disposed of, and the impact of the dredging and disposal activities in the maritime area - see Technical Annex II.

Contracting Parties are encouraged to develop local, regional and national dredged material management plans in order to minimise the possible impacts and maximise possible benefits from dredging and disposal. Advice on environmentally acceptable dredging techniques is available from a number of international organisations e.g. the Permanent International Association of Navigation Congresses (PIANC) and the Central Dredging Association (CEDA).

2.8 The schematic shown in Figure 1 presents the steps involved in the application of these Guidelines where important decisions should be made. In general, national authorities should

[3] All Article, Annex or Regulation references mentioned in this chapter refer to the 2014 HELCOM Convention.

[4] EU Member Countries should take into account the Directive 2011/92/EU of the European Parliament and of the Council of 13 December

2011 on the assessment of the effects of certain public and private projects on the environment. Where applicable, the EU Habitat Directive (92/43/EEC) may require an appropriate assessment and the EU-Landfill (99/31/EC) and Water Framework Directives (2000/60/EC) may have implications for dredging and deposit operations. Additionally Directive 2008/56/EC Establishing a Framework for Community Action in the Field of Marine Environmental Policy (Marine Strategy Framework Directive) specifies the deposit of dredged material as a possible pressure with regard to physical loss or damage which needs to be considered when assessing the status of the marine environment

use this schematic in an iterative manner to ensure that all steps receive appropriate consideration, including consideration of BAT and BEP, before a decision is made to issue or decline a permit.

2.9 As a significant number of the Contracting Parties are subject to European Union regulations, the Guidelines can be used as a tool to assist in the management of dredged material that is subject to current European Directives (e.g. Water Framework Directive 2000/60/EC, Marine Strategy Framework Directive 2008/56/EC, Natura 2000 areas under the Birds and Habitat Directives 2009/147/EC and 92/43/EEC). Also, the *Directive 2008/98/EC of the Parliament and of the Council of 19 November 2008 on waste*, (hereinafter the Waste Framework Directive), has been identified by Contracting Parties as having potential implications on the management of dredged material. Annex II attempts to offer clarifications regarding the relationship between the existing national interpretations in the application of the Waste Framework Directive to dredged material and the dredged material management guidelines shared in the Helcom area.

3. Requirements of the 1992 HELSINKI CONVENTION

3.1 Within the framework of the Convention for the Protection of the Marine Environment of the Baltic Sea (hereinafter called the 1992 Helsinki Convention), dredged materials may, in accordance with Article 11 of the Convention and Annex V, be permitted to be dumped at sea.[5]

3.2 Article 3.1 requires Contracting Parties to take all appropriate measures to prevent and eliminate pollution in order to promote the ecological restoration of the Baltic Sea Area and the preservation of its ecological balance.

3.3 With regard to the disposal of dredged material at sea, Article 11 (2) of the Helsinki Convention requires Contracting Parties to ensure that no such materials are dumped without authorisation or regulation by their competent authorities, unless there is direct danger to human life or the safety of human life or of a ship or aircraft at sea is threatened (Article 11;4 2014 Helcom Convention).

3.4 Regulation 2 (3) of Annex V requires Contracting Parties to report to the Commission on the nature and quantities of dumped material in accordance with Regulation 2 (1c) of this Annex. To this end, HELCOM has agreed on reporting formats for the submission of data on wastes dumped at sea.

3.5 Furthermore, the regulations of Annex V requires Contracting Parties to keep records and report to the Commission on the nature and quantities of material dumped or/and placed at sea and the locations and methods of dumping/placement used in accordance with Regulation 2 (1c) of this Annex. To this end, HELCOM has agreed on reporting format for the submission of data on dumping/placement operations at sea.

3.6 Furthermore, according to the HELCOM Recommendation 20/4 the Contracting Parties are recommended to report on organic tin concentrations in the marine environment in areas where its compounds may be entering to marine environment.

3.7 In the Helsinki Convention the terms dumping and placement are used to separate the deliberate disposal of dredged material and other placement of matter for a purpose other than the mere disposal of dredged material. However, to be clear in English and in line with scientific literature and OSPAR, pointing out that the guideline scope is not meant to cover dumping as the disposed material is not waste, the terms disposal and beneficial use are used in these Guidelines, excluding the parts with a direct reference to the Convention.

[5] All Article, Annex or Regulation references mentioned in this chapter refer to the 2014 HELCOM Convention.

4. Preliminary Considerations for Dredged Material Management

4.1 Before beginning a full assessment of the material and the disposal options the first considerations should be the scale and need for the dredging project. In the event of a subsequent full assessment indicating no acceptable options for disposal it may be necessary to re-address this issue in a broader context.

4.2 Reducing adverse effects on the marine environment can be accomplished through the following three activities:

.1 Controlling and reducing sources of contamination;

.2 Maximising the use of dredged material for beneficial purposes;

.3 Minimising the volumes of sediment that must be dredged by using improved Best Environmental Practices (BEP), as discussed in Technical Annex II

4.3 High priority should be given to the identification of sources of contamination, as well as the reduction and prevention of further contamination of sediments from both point and diffuse sources. Successful implementation of prevention strategies will require collaboration among competent authorities with responsibility for the control of contaminant sources. Sources of contamination include:

1. industrial and domestic discharges;
2. storm water;
3. surface runoff from urban, agricultural areas and coastal landfill;
4. diffuse sources such as harbour activities
5. sewage and waste-water treatment effluents;
6. transport from upstream contaminated sediments;
7. accidental pollution;
8. extreme events such as flooding, releasing contaminants e.g., from upstream.

4.4 In developing and implementing a source control strategy, competent authorities should take into account:

1. the risks posed by contaminants and the relative contributions of the individual sources to these risks;
2. existing source control programmes and other regulations or legal requirements;
3. best available techniques (BAT) and BEP as defined in Annex II of the 1992 Helsinki Convention, inter alia, as regards the technical and economic feasibility;
4. evaluations of the performance or effectiveness of measures taken;
5. consequences of not implementing source control.

4.5 In cases where control measures are not fully effective in reducing contamination and high levels of contamination persist then specific dredged material management options may be required, for example confined disposal facilities or treatment methods.

4.6 Sediment can be a valuable natural resource. Beneficial use of dredged material (described in Chapter 7) should be pursued to the maximum extent practicable.

4.7 There is a need to minimise the release of contaminants to the environment and maximise the re-use of sediment for beneficial purposes. Progress toward more sustainable practice in respect to sediment management (including dredged material management) can be seen in initiatives being undertaken by Contracting Parties.

4.8 In addition, attention needs to be given to ensuring that the quantities of material to be dredged are minimised as far as is practicable. Application of BEP (Technical Annex II) to dredging operations minimises the quantity of material to be dredged and disposed at sea thereby minimising the environmental impact (e.g., PIANC 2009 and CEDA 2010).

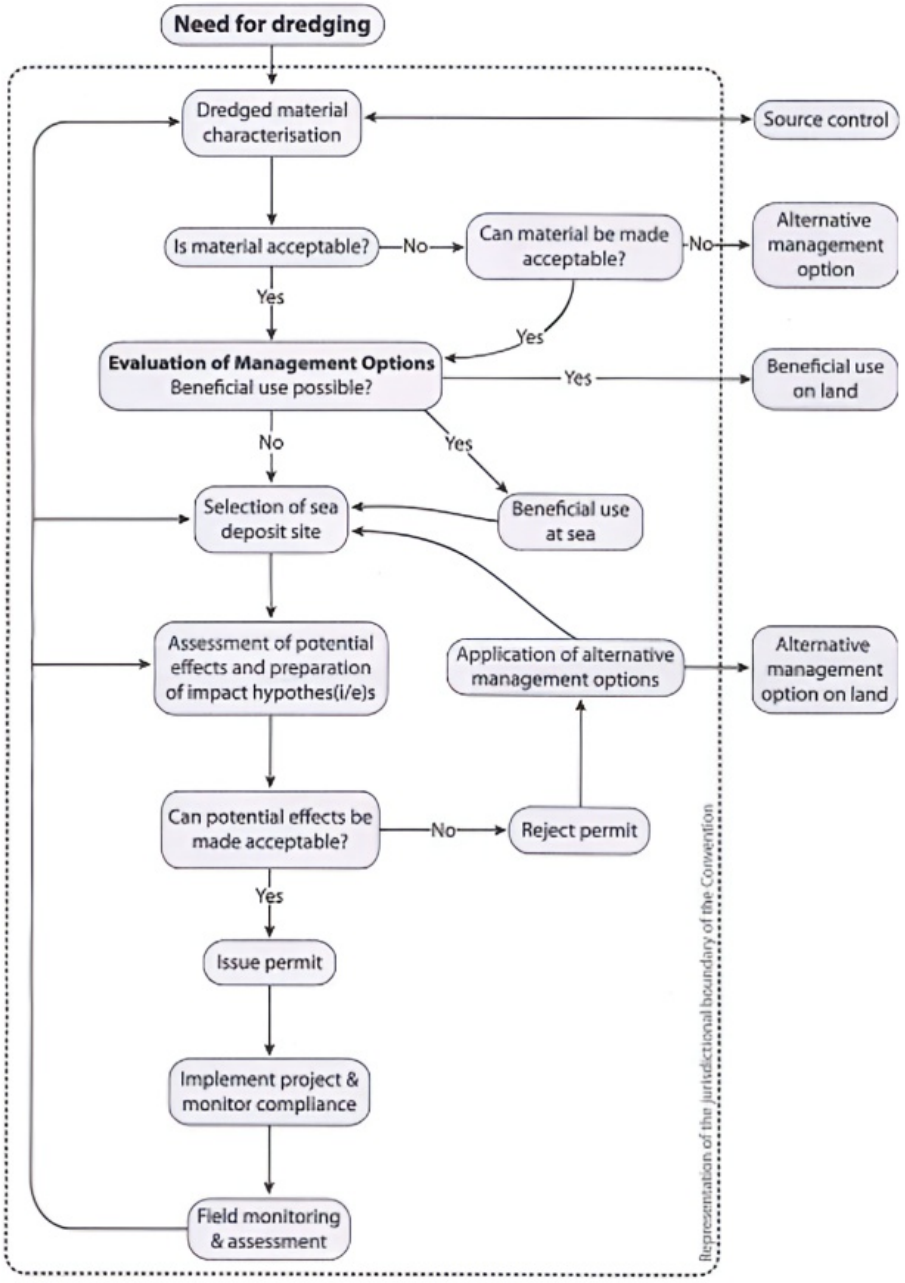

Figure 1. Steps to be considered in assessing permits application for sea disposal.

5. Dredged material sampling

5.1 Dredged material will require sampling and analysis (cf. Technical Annex I) to provide sufficient information for permitting purposes if not exempted under paragraph 6.10. Local conditions will dictate what information is relevant to a particular operation.

5.2 The distribution, location and depth of sampling should reflect the extent of the area to be dredged, the quantity of material to be dredged and the expected variability in the horizontal and vertical distribution of contaminants. Core samples should be taken where the depth of dredging and expected vertical distribution of contaminants suggest that this is warranted. In other circumstances, grab sampling will usually be sufficient. Sampling from dredgers/disposal vessels or barges is not advisable for permitting purposes.

5.3 The indicative number of separate sampling stations required to obtain representative results, assuming a reasonably uniform sediment distribution in the area to be dredged is as follows:

Amount dredged (m^3)	**Number of Stations**
Up to 25 000	3
25 000 - 100 000	4 – 6
100 000 - 500 000	7 – 15
500 000 - 2 000 000	16 – 30
>2 000 000	extra 10 per million m^3

[In addition to the 'volume' table] The number of sample stations can also be determined on the basis of the area to be dredged:

Dredged Area (m2)	**Number of Stations**
<10 000	1-3
10 000 - 50 000	4 – 8
50 000 - 100 000	9 – 10
>100 000	extra 5 per 100 000m^2

The number of sample stations may vary from those indicated above. Samples should provide a good spatial (surface) and vertical (depth) representation of the material to be dredged. In cases where the thickness of sediment to be dredged exceed 1 meter, the volume approach (table 5.3) should be considered. This should take into account of the exchange characteristics of the area, i.e., more samples may be required in a low energy enclosed and semi-enclosed areas, and less in high energy environments such as open areas. Vertical samples should also be considered in cases where sediment thickness exceeds 1 m, with a suggested sampling interval of 0.5 m.

Contracting Parties are encouraged to use the Guidelines for the Sampling and Analysis of Dredged Material Intended for Disposal at Sea (IMO, 2005) to inform sampling regimes.

5.4 Normally, the samples from each sampling station and different depths in the sediment should be analysed separately. However, if the sediment is clearly homogenous with respect to sediment texture, it may be possible to analyse composite samples from no more than three

adjacent sampling stations at a time, providing there are no distinctly different observable attributes (colour, consistency, odour) in the different sub samples and care is taken to ensure that the results allow derivation of valid mean contaminant values. The original individual samples should, however, be adequately stored (frozen) until the permitting procedure has been completed, in case further analyses are necessary.

Frequency of sampling

[6]5.5 The usual period between sampling would be considered to be 3 years, but if the results of the analyses indicate that the material meets national assessment criteria (*e.g.* below lower action level), sampling in the same area could maximum be up to 5 years ,provided that there are no new / continued inputs of contamination likely to lead to deterioration of the quality of the material.

5.6 It may be possible, following assessment of the results of an initial full survey, to reduce either the number of sampling stations or the number of determinants and still provide sufficient information for permitting purposes. If a reduced sampling programme does not confirm the earlier analyses, the full survey should be repeated. If the list of determinants is reduced, further analysis of the complete list of determinants is advisable every 5 years. The second and third sentence of this paragraph needs to be applied consistent with the provisions of the primary list of chemical determinants in Technical Annex I.

5.7 In areas where there is a tendency for sediments to exhibit high levels of contamination, analysis of all the relevant determinants should be frequent and linked to the permit renewal procedure.

6. Dredged material characterisation

6.1 Characterisation should consider physical, chemical and/or biological characteristics. A list of the requirements for the characterisation process should be developed on a project-specific basis. This data should be sufficient to assess possible impacts as a basis for management decisions (e.g. PIANC 1996; 1998a and b). Guidance on the selection of determinants and methods of contaminant analysis, together with procedures to be used for normalisation and quality assurance purposes, can be found in the Technical Annexes.

6.2 If dredged material is so poorly characterised that proper assessment cannot be made of its potential impacts on human health and the environment, it shall not be disposed at sea.

Physical characterisation

6.3 The following information is required:

a. the quantity of material;

b. anticipated or actual loading rate of material at the disposal site;

c. grain size analysis (laser or sieving methods) or exceptionally on the basis of visual determination (*i.e*. clay/silt/sand/gravel/rocks).

Evaluation of the physical characteristics of sediments for disposal is necessary to determine potential impacts and the need for subsequent chemical and/or biological testing (cf. Technical Annex I for further guidance).

Conversion factors for cubic meters of dredged material to metric tonnes are given in the HELCOM Reporting Format for Management of Dredged Material at Sea (Attachment 1).

Chemical characterisation

6.4 Sufficient information for chemical characterisation may be available from existing sources. In such cases new measurements may not be required, provided that this information is still reliable. Details of the substances recommended to be determined are listed in Technical Annex I.

6.5 Considerations for additional chemical characterisation of dredged material are:

a. Potential routes by which contaminants could reasonably have been introduced to the sediments; for example, tin compounds reaching marine environment from previous use of antifouling paints and others can be expected in harbours and marinas

   i. industrial and municipal waste discharges (past and present);

   ii. agricultural and urban surface runoff;

   iii. spills of contaminants in the area to be dredged;

b. source and prior use of dredged materials (e.g., beach nourishment); and

c. a geochemical characteristics of the sediment including redox status and

d. natural deposits of minerals and other natural substances.

6.6 Further information may also be useful in interpreting the results of chemical testing (cf. Technical Annex I).

Biological characterisation

6.7 If the potential impacts of the dredged material cannot be adequately assessed on the basis of the chemical and physical characterisation and available biological information, biological testing may be conducted. Further detailed guidance on biological testing is provided in Technical Annex I.

6.8 Biological tests should incorporate species that are considered appropriately sensitive and representative and should determine, where appropriate.

a. acute toxicity;

b. chronic toxicity;

c. the potential for bioaccumulation; and

d. the potential for tainting.

6.9 Assessment of habitats communities and populations may be conducted in parallel with chemical and physical characterisation, *e.g.* a triad approach. It is important to ascertain whether adequate scientific information exists on the characteristics and composition of the material to be disposed and on the potential impacts on marine environment and human health.

Exemptions from detailed characterisation

6.10 Dredged material may be exempted from testing if there is reason to believe it has not been subject to contamination, i.e.

a. it is composed of previously undisturbed geological material and in the absence of appreciable past and present pollution sources; or

b. it is composed almost exclusively of sand, gravel or rock (the fraction of sediment < 63 µm is less than 10%); or

c. in the absence of appreciable past and present pollution sources and when the quantity of dredged material from operations does not exceed 10 000 tonnes per year.

Exemptions under 6.10b should be supported by sampling data, while exemptions under 6.10 a & c should be supported by local information.

Dredged material that does not meet at least one of these requirements will need stepwise characterisation to assess its potential impact (*i.e.* see paragraphs 6.5-6.9).

Action Lists

6.11 The Action List is a screening mechanism for assessing properties and constituents of dredged material. It is used for dredged material management decisions, including the identification and development of source control measures as described in Section 4 above.

Action Levels

6.12 Action levels are criteria for assessing dredged material and focuses on concentrations of metals, metalloids and organic/organo-metallic compounds to be determined according to the primary and secondary list in technical Annex I). The action levels should be developed on a national or regional basis and might be set on the basis of concentration limits, biological responses, environmental quality standards, flux considerations or other reference values. They should be derived from studies of sediments that have similar geochemical properties to those dredged and/or to those of the receiving system. Thus, depending upon natural variation in sediment geochemistry, it may be necessary to develop individual sets of criteria for locations in which dredging or disposal are conducted. With a view to evaluating the possibilities for harmonising or consolidating the criteria referred to above, Contracting Parties are requested to inform the Helsinki Commission of the criteria adopted, as well as the scientific basis for the development and refinement of these criteria.

6.13 Lower and upper action levels should be developed, e.g. – "

a. Upper action levels – the limit above which dredged material is generally considered unsuitable for normal disposal at sea but may be suitable for other management options, see paragraphs 7.4 – 7.6 below;

b. Material below the upper level but exceeding the lower level requires more detailed assessment before its suitability for disposal at sea can be determined. This may involve additional chemistry, ecotoxicity tests, delineation of the dredge area or additional evidence (e.g., previous contamination levels from the area, literature) or consideration such as physical size distribution, final end use of the material to apply the weight of evidence approach.

c. Lower action levels – the limit below which dredged material is generally considered of little environmental concern for disposal at sea.

6.14 Action levels should be established at least for determinants on the Primary List in Technical Annex I.

6.15 If, as an option of least detriment, dredged material is disposed at sea when one or more criteria exceed the upper level, a Contracting Party should:

a. where appropriate, identify and develop source control measures with a view to meeting the criteria - see paragraphs 4.3 – 4.5 above;

b. utilise management techniques, including confined disposal or treatment methods, to mitigate the impact of the disposal operation on the marine environment see paragraphs 7.4 - 7.5 below; and

c. report the fact to the Secretariat, including the reason for permitting the disposal, in accordance with the format for the annual report.

d. Prepare an impact hypothesis for the receiving system of the dredged material

7. Dredged material management options

7.1 Generally it is the preferred option to keep the sediment in the aquatic, estuarine, or marine system, however the results of the physical/chemical/biological characterisation will determine the dredged material management options. The management options should consider legally defined assessment areas or geographical scales (e.g. Waterbodies under the WFD and/or marine reporting units under the MSFD for those CPs being EU-MS).

Examples of management options for dredged material, depending on the physical and chemical characteristics of the material, include beneficial use, unrestricted open-water disposal, confined aquatic disposal or confined disposal facilities. In some cases, the best option may be to leave the material in-situ.

Options for material assessed to be uncontaminated[7]

7.2 The characterisation carried out in accordance with these Guidelines will be sufficient to determine possible management options in open water and at the shoreline.:

1. Retaining sediment within the natural sediment system to support sediment-based habitats, shorelines, and infrastructure, including
   i) Habitat Restoration and Development using dredged material for enhancement or restoration of natural habitat associated with wetlands, other near-shore habitats, coastal features, offshore reefs, fisheries enhancement, etc.
   ii) Beach Nourishment using dredged material (primarily sandy material) to restore and maintain beaches.
   iii) Shoreline Stabilization and Protection through the disposal of dredged material with the intent of maintaining or creating erosion protection, dike field maintenance, berm or levee construction, and erosion control.
2. Engineering uses (e.g. as capping material, for construction or land reclamation).
3. Disposal at sea (see Chapter 8)

where examples 1 & 2 are examples for the beneficial use of dredged material.

7.3 Additional information about beneficial uses of dredged material, including case studies, can be found at the Central European Dredging Association's (CEDA) website[8]. PIANC (2009) provides technical information on the assessment of options for beneficial use and recommendations on how to overcome constraints based on "lessons learned" from numerous case studies in different situations in various countries.

For the reporting to the to the Helsinki Convention reporting of both beneficial and non-beneficial use is requested.

[7] according to national assessment criteria

[8] CEDA Working Group on Beneficial Use of Sediment: https://dredging.org/ceda-working-group-on-beneficial-use-of-sediment-wgbu/203

Options for material assessed to be contaminated [9]

7.4 The availability of alternative means, other than at sea, should be considered, and a comparative risk assessment should be conducted on both disposal and alternative method.

7.5 Where the characteristics of the dredged material are such that conventional disposal at sea would not meet the requirements of the 1992 Helsinki Convention, treatment or other management options should be considered. These options can be used to reduce or control impacts to a level that will not result in an unacceptable risk to human health, living resources, amenities or interfere with other legitimate uses of the sea.

7.65 Treatment, such as separation of contaminated fractions, may make the material suitable for beneficial use or disposal at sea. However, some Contracting Parties do not allow material to be disposed in the marine environment, including on the littoral zone if the material has had its physical characteristics altered or the material has been temporarily stored on land. Such factors should be considered in the assessment process.

Disposal management techniques to reduce or control impacts may include delineation of the contaminated material such that the material that is not considered to be contaminated, may be dredged and disposed, or used beneficially. The contaminated material may be left in situ or dredged and disposed using contained methods e.g., closed bucket dredger and within construction.

In certain environments, contaminated material may be disposed or buried on the sea floor followed by clean sediment capping, to contain the contaminated material.

Advice on dealing with contaminated dredged material is available from PIANC and CEDA (see references).

[9] according to national assessment criteria

8. Disposal at sea site selection

8.1 The selection of a site for disposal at sea involves environmental consideration and also economic and operational (e.g., accessibility for vessels) feasibility. Site selection should try to ensure that the disposal of dredged material does not interfere with, or devalue, legitimate commercial and economic uses of the marine environment nor produce undesirable effects on vulnerable marine ecosystems or species and habitats on the HELCOM Red List of Baltic Sea species in danger of becoming extinct (BSEP 140) and the Red List of Baltic Sea underwater biotopes, habitats and biotope complexes (BSEP 138) or within the network of Marine Protected Areas (BSEP 124B).

8.2 Site information, as appropriate, should be assessed on:

a. the physical, chemical and biological characteristics of the seabed (e.g., topography, sediment dynamics, , benthic organisms, sediment chemistry);

b. the physical, chemical and biological characteristics of the water column (e.g., hydrodynamics, dissolved oxygen, pelagic species);

c. proximity to any other valid uses of the area[10]:

d. the capacity of the site, taking into account:

(i) hydrography;

(ii) the estimated reduction in water depth due to the dredged material.

(iii) the anticipated loading rates per day, week, month, or year;

d. And for beneficial use sites, the likelihood of the site developing beneficially, as intended.

Such information can be obtained from existing sources, complemented by field work where necessary.

8.3 Information on the characteristics of the site is used to determine the probable fate and effects of the material. The hydrographic conditions in the vicinity of the site will determine the transport and fate of the dredged material. The physical-chemical parameters can be used to assess the mobility and bioavailability of the chemical constituents of the material. The nature and distribution of the biological community and the proximity of the site to marine resources and amenities will, in turn, define the nature of the effects that are to be expected. Careful evaluation will allow determination of environmental processes that may dominate the transport of material away from the site. These processes may be regulated through permit conditions (see also Chapter 10: permit or regulation by other means).

8.4 Existing stresses on biological communities, such as inputs of contaminants to coastal areas through land runoff and discharge, from the atmosphere, resource exploitation and maritime transport, should be considered as part of the assessment. As should the recognition that through the act of dredging and disposal, contaminants and nutrients may be resuspended

[10] Such as: areas of natural, cultural or historical importance; areas of specific scientific or biological importance (*e.g.* Marine Protected Areas); recreational areas; subsistence, commercial and sport fishing areas; spawning, recruitment and nursery areas; migration routes of marine organisms; shipping lanes; military exercise zones; past munitions dump sites; engineering uses of the sea such as undersea cables, pipelines, wind farms; areas of mineral resources (*e.g.* sand and gravel extraction areas);

which otherwise may have remained in-situ. The proposed method of disposal and potential future uses of resources and amenities in the marine receiving area should also be taken into account.

8.5 Information from baseline and monitoring studies at already established sites will be important in the evaluation of any new activity at the same site or nearby.

8.7 For the dredged material which is acceptable for disposal at sea or for beneficial use, the sediments at the receiving location(s), should be of similar characteristics, if possible.

9. Assessment of potential effects

9.1 Some materials should not be disposed in a manner or at a location which may lead to interference with protected species and habitats, fishing, shipping, amenities or other (beneficial) uses of the marine environment.

Disposal sites

9.2 Assessment of potential effects should lead to a concise statement of the expected consequences of the disposal option (*i.e*. the Impact Hypothesis). Its purpose is to provide a basis for deciding whether to approve or reject the proposed disposal option and for defining environmental monitoring requirements.

9.3 This assessment should integrate information on the characteristics of the dredged material and the conditions of the proposed site. It should comprise a summary of the potential effects on human health, living resources, amenities and other legitimate uses of the sea and should define the nature, temporal and spatial scales and duration of expected impacts based on worst case assumptions.

9.4 In order to develop the hypothesis, it may be necessary to conduct a baseline survey which describes not only the environmental characteristics, but also the variability of the environment. It may be helpful to develop sediment transport, hydrodynamic and other models, to determine possible effects of the dredged material on the site.

9.5 For a retentive site, the assessment should delineate the area that will be substantially altered by the presence of the material and what the severity of these alterations might be. At the extreme, this may include an assumption that the immediate receiving area is entirely smothered. In such a case, the likely timescale of recovery or re-colonisation should be projected after operations have been completed as well as the likelihood that re-colonisation will be similar to, or different from, the existing benthic community structure. The assessment should specify the likelihood and scale of residual impacts outside the primary zone.

9.6 In the case of a dispersive site, the assessment should include a definition of the area likely to be altered in the shorter term by the proposed operation (i.e., the near-field) and the severity of associated changes in that immediate receiving environment. It may also specify the likely extent of long-term transport of material from this area and what this flux represents in relation to existing transport fluxes in the area, thereby permitting a statement regarding the likely scale and severity of effects in the long-term and far-field.

9.7 When assessing the potential impacts of disposal of dredged material the specific requirements of the relevant EU-regulations and other Directives have to be considered, as listed in chapter 2.9.

9.8 The Convention on Biological Diversity has produced guidance on biodiversity issues in relation to Environmental Impact Assessment that should be taken into account, when appropriate.

Nature of the impact

9.9 All dredged materials have a physical impact at the point of disposal. This impact includes covering of the seabed and local increases in suspended solids levels. Physical impact may also result from the subsequent transport, particularly of the finer fractions, by wave and tidal action and residual current movements.

9.10 Biological consequences of these physical impacts include smothering of benthic organisms, plants and algae in the disposal area and potentially in the surrounding area. Physical impacts can also interfere with the migration and spawning of fish (or crustaceans.

9.11 The toxicological and bioaccumulation effects of dredged material constituents should be assessed. Disposal of sediments with low levels of contamination is not without environmental risk and requires consideration of the fate and effects of dredged material and its constituents. Substances in dredged material may undergo physical, chemical and biochemical changes within the marine environment and these changes should be considered in the light of the eventual fate and potential effects of the material.

9.12 In relatively enclosed waters, such as some estuarine, archipelagic and fjordic situations, sediments with a high chemical or biological oxygen demand (*e.g.* organic carbon-rich) could adversely affect the oxygen regime of the receiving environment while sediments with high levels of nutrients could significantly affect the nutrient flux.

9.13 An important consequence of the physical presence of dredged material disposal activities is interference with fishery activities and in some instances with navigation and recreation. These problems can be aggravated if the sediment characteristics of the dredged material are very dissimilar to that of the ambient sediment or if the dredged material is contaminated with bulky harbour debris such as wooden beams, scrap metal, pieces of cable etc.

9.14 Consideration may be given to dredged material containing significant amounts of oil or other substances that may float following re-suspension in the water column.

10. Permit or regulation by other means

10.1 If disposal at sea is the selected option, then a permit or regulation by other means (which is in compliance with these guidelines) authorising disposal at sea must be issued in advance.

The permit is an important tool for managing the disposal of dredged material at sea and will contain the terms and conditions under which disposal at sea may take place as well as provide a framework for assessing and ensuring compliance. In granting a permit, the immediate impact of dredged material occurring within the boundaries of the site such as alterations to the local, physical, chemical and biological environment is accepted by the permitting or supervising authority. Notwithstanding these consequences, the conditions under which a permit for disposal at sea is issued should be such that environmental change beyond the boundaries of the disposal site are as far below the limits of allowable environmental change as practicable. The operation should be permitted subject to spatial and temporal (e.g. spawning, migration etc.) conditions which further ensure that environmental disturbance and detriment are minimised and benefits maximised. Regulation by other means may be nationally in place.

For example, in Sweden all dumping/disposal at sea is prohibited. Exceptions are only considered when the dredged materials are of a composition and characteristic, such that a negative impact at the disposal site is as small as possible. Exceptions are granted by the authorities in a case-by-case manner. The existing conditions (hydrological-, geological-, biological- and chemical-), disposal site limiting factors (such as different uses and the proximity to sites of high natural/economical/social value), as well as the properties of the dredged material and the overall impact of the activity are assessed thoroughly.

10.2 Permit conditions should be drafted in plain and unambiguous language and will be designed to ensure that:

a. only those materials which have been characterised or considered exempted from detailed characterisation according to paragraph 6.10, and found acceptable for disposal at sea, based on the impact assessment, are disposed;

b. solid waste[11] contained within the dredged material should be separated and managed on land;

c. the material is disposed at the selected site;

d. any necessary management techniques identified during the impact analysis are carried out; and

e. any monitoring requirements are fulfilled and the results reported to the permitting or supervising authority.

10.4 A permit to dispose dredged material that is assessed to be contaminated according to national assessment criteria should be refused unless the permitting authority determines that appropriate opportunities exist to reuse, recycle or treat the material without undue risks to human health or the environment or disproportionate costs.

[11] as defined in the glossary

11. Management of the Disposal Operation

11.1 This section deals with management techniques to minimise the physical effects of dredged material disposal. The key to management lies in careful site selection and an assessment of the potential for conflict with other interests and activities. In addition, appropriate methods of dredging and of disposal should be chosen in order to minimise the environmental effects. Guidance is given in Technical Annex II.

11.2 Where appropriate, disposal vessels should be equipped with accurate positioning systems and the activity of the vessels may be reported to the permitting or supervising authority. Disposal vessels and operations should be inspected regularly to ensure that the conditions of the disposal permit are being complied with and that the crew are aware of their responsibilities under the permit. Ships' records and automatic monitoring and display devices (e.g. black-boxes), where these have been fitted, should be inspected to ensure that disposal is taking place at the specified disposal site.

11.3 In most cases, blanketing of a comparatively small area of seabed is considered to be an acceptable environmental consequence of disposal. To avoid excessive degradation of the seabed as a whole, the number of sites should be limited as far as possible and each site should be used to the maximum extent that will not interfere with navigation or any other legitimate use of the sea.

11.4 Effects can be minimised by ensuring that, as far as possible, the dredged material and the sediments in the receiving area are similar. Locally, impacts may also be reduced if the disposal area is subject to natural physical disturbance. In areas where natural dispersion is low or unlikely to be significant and where reasonably clean, finer-grained dredged material is concerned, it may be appropriate to use a deliberately dispersive disposal strategy to prevent or reduce blanketing, particularly of a smaller site.

11.5 The rate of disposal of dredged material can be an important consideration since it will often have a strong influence on the impacts at the disposal site. It may therefore need to be controlled to ensure that the environmental management objectives for the site are not exceeded.

11.6 Engineering controls, such as method of dredging and disposal, remediation of contaminated materials, infilling of depressions, deliberate capping or other confinement methods for dredged material disposal may be appropriate in certain circumstances to avoid interference with fishing or other legitimate activities.

11.7 Operational controls can include temporal restrictions on disposal activities, such as tidal and/or seasonal restrictions to prevent interference with e.g. nature protection, anthropogenic uses, migration, spawning or seasonal fishing activity.

12. Monitoring

12.1 The term ‘monitoring’ is used to describe compliance monitoring i.e. surveillance of permit requirements, as well as the ‘environmental impact monitoring’ i.e. field based monitoring.

12.2 The effects of dredged material disposal are likely to be similar in many areas, and it would be very difficult to justify (on scientific or economic grounds) monitoring all sites. It is therefore more appropriate, and cost effective, to concentrate on detailed investigations at a few carefully chosen sites (e.g. those subject to inputs of dredged material posing a high level of risk to the environment and/or anthropogenic uses) to obtain a better understanding of processes and effects.

12.4 The impact Hypothesis forms the basis for defining the monitoring programme. The measurement programme should be designed to ascertain that changes in the receiving environment are within those predicted. In designing a monitoring programme the following questions must be answered:

a. what testable hypotheses can be derived from the Impact Hypothesis?

b. what measurements (e.g. type, location, frequency, performance requirements) are required to test these hypotheses?

c. what should be the temporal and spatial scale of measurements?

d. how should the data be managed and interpreted?

12.5 The permitting or supervising authority is encouraged to take account of relevant research information in the design, modification and if appropriate cessation of monitoring programmes. Measurements should be designed to determine two things:

a. whether the zone of impact differs from that predicted; and

b. whether the extent of change outside the zone of impact is within the scale predicted.

Temporal and spatial measurements facilitate comparison of the predicted and actual impacts of the operations both within and outside of the predicted zone of impact to determine the significance of any change.

12.6 Information gained from field monitoring, (or other related research studies) can be used to:

a. modify or terminate the field monitoring programme;

b. modify or revoke the permit; and

c. refine the basis on which applications to disposal dredged material at sea are assessed.

12.7 Concise statements of monitoring activities should be prepared. Reports should detail the measurements made, results obtained and how these data relate to the monitoring objectives. The frequency of monitoring and reporting will depend upon the scale of disposal activity and the intensity of monitoring.

13. Reporting

According to 1992 Helsinki Convention Annex V Regulation 2 and Article 11 item 5 the Contracting Parties should report on the nature and quantities of the material that has been disposed in the Baltic Sea Area. This should be done according to the HELCOM Reporting Format for Management of Dredged Material at Sea (Attachment 1).

13.1 Reporting of the number of permits issued, the quantity of dredged material, and the associated contaminants, is required according to the 1992 HELCOM convention - see paragraph 3.4 above. The dredged material characterisations process is designed as guidance for permitting purposes. In addition the information gained in this process can be used to keep record of the quantities of dredged materials being disposed, and the total inputs of associated contaminants. At present, this is considered the only approach available for this purpose.

13.2 Together with contaminant data, information on the methods of determination and on quality assurance of analyses of disposed material should be provided as requested in the Reporting Format (Attachment 1).

13.3 Contracting Parties should also inform the Secretariat of their monitoring activities and submit reports when they are available.

13.4 It is requested that the dredging activities are reported to the Secretariat, with the intention of providing sufficient information on the nature of the disposed material. The extent of the information required is specified in the reporting format.

13.5 According to the decision of (HELCOM 41-2020), the HELCOM Secretariat annually reports to the London Convention and its 1996 Protocol on behalf of HELCOM Contracting Parties. The Consolidated report is to be prepared utilizing the data on handling of dredged material at sea that are annually reported by the Contracting Parties, pursuant to HELCOM Recommendation 36-2 REV. The format and technical requirements for the consolidated reporting were agreed between the Secretariats of the London Convention and the Helsinki Convention taking into account the availability of relevant data in the Contracting Parties to the Helsinki Convention. The annual consolidated report to LC/LP is to be prepared in the format and using the instructions given in Attachment 2 to this Guideline.

13.6 Additionally, Contracting Parties are invited to report information on all other dredging activities, if the information is available (Excel template).

14. References

Background information and supplementary literature to the HELCOM Guidelines for the Management of Dredged Material at Sea.

Application of ecosystem principles for the location and management of offshore dumping sites in the SE Baltic Region (ECODUMP Project)

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IMO 2005. Sampling of Dredged Material guidelines for the sampling and analysis of dredged material intended for disposal at sea. IMO publication 1537E.

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International Association of Dredging Companies (IADC)/Central Dredging Association (CEDA), 1999. Environmental Aspects of Dredging, Guide 5: Reuse, Recycle or Relocate.

PIANC, 1992. Beneficial Uses of Dredged Material: A Practical Guide, Report of Working Group No. 19.

PIANC, 1996. Handling and Treatment of Contaminated Dredged Material from Ports and Inland Waterways, Report of Working Group No. 17 of the Permanent Technical Committee 1 - Supplement to PIANC Bulletin No. 89.

PIANC, 1997. Dredged Material Management Guide. Special Report of the Permanent Environmental Commission – Supplement to Bulletin no.96.

PIANC, 1998. Handling and Treatment of Contaminated Dredged material from Ports and Inland Waterways, Vol. 2., Report of Working Group No. 17 of the Permanent Technical Committee 1.

PIANC, 1999. Management of Aquatic Disposal of Dredged Material. Report of ENVICOM Working Group 1 of the Permanent Environmental Commission.

Sustainable Management of Contaminated Sediments (SMOCS Project); Guidelines for applying sustainability approach for management of contaminated sediments in dredging projects.

Annex 1 Glossary and Acronyms

These terms are define for the purpose of these guidelines

action Levels	Guidance values used to trigger action
anoxic	Without oxygen
anthropogenic	Originating from the activity of humans
beneficial use	Dredged sediments can be a resource for supporting coastal, estuarine, and riverine systems and can reduce sediment deficits or be a source of material used for construction or landfills[12]. The beneficial use of sediments can be categorised into five different applications: 1. Raw Material: substitution for virgin manufactured soil or building materials, such as tiles or aggregates. 2. Remediation: clean up of contaminated sites or closure of landfills or mines. 3. Reclamation: creating new or expanding existing land, primarily for human/ commercial development activities. 4. Restoration: creation of habitat to support aquatic organisms and wetlands to improve the natural value of the environment. 5. Resiliency: shoreline nourishment and (dike) reinforcement for defence against floods and extreme climatic events.
benthic	Of, relating to, or occurring at the bottom of a body of water
Best Available Techniques (BAT)	The latest stage of development (state of the art) of processes, of facilities or of methods of operation, which indicate the practical suitability of a particular measure for limiting discharges, emissions and waste. (Regulation 2, Annex II of the Helsinki Convention 1992)
Best Environmental Practice (BEP)	The application of the most appropriate combination of environmental control measures and strategies (Regulation 3, Annex II of the Helsinki Convention 1992)
bioaccumulation	Accumulation of environmental contaminants in living tissue
bioassay	Tests in which organisms are exposed to dredged materials to determine their effects or toxicity
biological testing	Testing via bioassays
biota	Living organisms
capital dredging	Dredging of geological material from previously unexposed layers beneath the seabed and surface material from areas not recently dredged
CEDA	Central Dredging Association, one of the three autonomous sister organizations, along with WEDA and EADA, that constitute WODA

[12] CEDA Position Paper: Assessing the Benefits of Using Contaminated Sediments (https://dredging.org/media/ceda/org/documents/ceda/2019-05-busc-pp.pdf)

clay	Sedimentary mineral particles 0.2 to 2.0 µm in size, usually with a negative charge (anion); the size and charge have profound implications for sediment chemistry and other physical interactions
contaminated dredged material	Dredged material not meeting national assessment criteria (e.g. exceeding upper action levels)
confined disposal	Disposal in a structure planned and designed to contain dredged material and safely contain any released contaminants, preventing their re-entry into the aquatic environment
disposal	Any disposal into the maritime area of dredged materials, independently of whether it is considered as “dumping” or “placement”
dredged material	Sediments and/or rocks with associated water, organic matter etc., removed from areas that are normally or regularly covered by water
dredged material management	Is an overarching term describing a variety of handling methods of dredged materials including, inter alia: dumping (deliberate disposal), re-use, beneficial use, re-location, placement and treatment

dumping	any deliberate disposal at sea or into the seabed of dredged material; subject to a prior special permit issued by the appropriate national authority in accordance with the provisions of Annex V of the 1992 Helsinki Convention (Article 2 (4ai), 11 (2))
eco-toxicological testing	Biological testing via bioassays
fractions	Categories of sediments defined by grain size
gravel	Unconsolidated rock fragment > 2mm to < 63mm
hydrodynamic dredging	The deliberate (re-)suspension of sediment from the sea/riverbed using e.g. water injection with the aim of removing this material from the dredging area utilizing natural processes for transportation
maintenance dredging	Maintenance dredging is the dredging required to maintain berths and navigation channels at advertised depth. It includes material dredged from recently disposed by sedimentation processes in harbour or sea areas
persistence	feature of organic compounds to resist to environmental degradation through chemical, biological, and photolytic processes (i) Evidence that the half-life of the chemical in water is greater than two months, or that its half-life in soil is greater than six months, or that its half-life in sediment is greater than six months; or (ii) Evidence that the chemical is otherwise sufficiently persistent to justify its consideration within the scope of this Convention (Stockholm POPs Convention);

permitting authority	The official department or agency that has the legal authority to permit or refuse disposal in the marine environment and to prosecute violations of disposal regulations
PIANC	The World Association for Waterborne Transport Infrastructure
placement	placement of matter for a purpose other than the mere disposal thereof, provided that such placement is not contrary to the aims of the present Convention (Article 2 (4bii) of the 1992 Helsinki Convention)
practicable	Idea that a project, or scheme that can be realized, with the available resources and within the given constraints of cost and time
retentive sites	Retentive sites can be natural and manmade vertical and horizontally shielded areas of the seabed. Such sites could be; former dredging/raw material extraction holes in the seabed or low energy coastal areas such as fjords and bays where the
rocks	Single boulders or fragments of bedrock exceeding the grainsize for gravel
sand	Mineral particles > 63 µm and < 2 mm in size
sediment	Naturally occurring material that is produced through the processes of weathering and erosion of rocks, and is subsequently transported by the action of fluids such as wind, water, or ice, and/or by the force of gravity acting on the particle itself
sidecast dredging	most common currently applied method to outfall construction involving dredging or excavation of a trench, and placing of excavated material on the seabed to one or both sides of the trench
silt	Mineral particles between 2.0 µm and 63 µm in size;
solid waste	Any persistent, manufactured or processed solid material or items discarded, disposed of or abandoned in the marine and coastal environment
toxic	Has lethal or debilitating effects when ingested or contacted externally, such as exposure to gill membranes during respiration or to skin
treatment	The processing of (contaminated) dredged material to reduce its quantity or to reduce the contamination

Technical Annex 1 Analytical Requirements for Dredged Material Assessment

1. This Technical Annex covers the analytical requirements necessary to implement paragraphs 6.4 - 6.10 of the HELCOM Guidelines for the Management of Dredged Material at Sea.

2. A tiered approach to testing is recommended. At each tier it will be necessary to determine whether sufficient information exists to allow a management decision to be taken or whether further testing is required.

3. As a preliminary to the tiered testing scheme, information required under section 6.3 of the Guidelines will be available. In the absence of appreciable pollution sources and if the visual determination of sediment characteristics leads to the conclusion that the dredged material meets one of the exemption criteria under paragraph 6.3 of the Guidelines, then the material will not require further testing. However, if all or part of the dredged material is being considered for beneficial uses, then it will usually be necessary, in order to evaluate these uses, to determine at least some of the physical properties of the material indicated in Tier I.

4. The sequence of tiers is as follows:

- assessment of physical properties
- assessment of chemical properties
- assessment of biological properties and effects

A pool of supplementary information, determined by local circumstances may be used to augment each tier (cf. section 6.5 of the Guidelines).

5. At each stage of the assessment procedure account must be taken of the method of analysis. Analysis should be carried out on the whole sediment (< 2mm) or in a fine-grained fraction. If analysis is carried out in a fine-grained fraction, the results should be appropriately converted to whole sediment (< 2 mm) concentrations for establishing total loads of the dredged material. Additional information (e.g. as regards storage and pre-treatment of samples, analytical procedures, analytical quality assurance) should be included in relevant HELCOM Monitoring Manual.

6. The physical composition of samples, and therefore the chemical and biological properties, can be strongly influenced by the choice of sampling sites, the method of sampling and sampling handling. These possible influences should be taken into account when evaluating data.

Tier I: PHYSICAL PROPERTIES

Physical analyses are important because they help to indicate how the sediment may behave during dredging and disposal operations and indicate the need for subsequent chemical and/or biological testing. It is strongly recommended that the following determinations be carried out:

Determinant	**Indicating**
• grain size analysis (by laser or sieving methods) • percent solids (dry matter)	• Cohesiveness, settling velocity/resuspension potential, contaminant accumulation potential
• density/specific gravity	• Consolidation of placed material, volume *in situ* vs. after disposal
• organic matter (as total organic carbon)	• Potential accumulation of organic associated contaminants

When dredged material is being considered for beneficial uses, it will also usually be necessary to have available details of the engineering properties of the material e.g. permeability, settling characteristics, plasticity and mineralogy.

Tier II: CHEMICAL PROPERTIES

Primary List

List of metals, metalloids and organic/organo-metallic compounds to be determined:

- Cadmium (Cd)
- Chromium (Cr)
- Copper (Cu)
- Lead (Pb)
- Mercury (Hg)
- Nickel (Ni)
- Zinc (Zn)
- Arsenic
- Polychlorinated biphenyl (ΣPCB) congeners - IUPAC nos 28, 52, 101, 118, 138, 153 and 180 (ICES7).
- Polycyclic aromatic hydrocarbons (PAHs). ΣPAH16 and/or ΣPAH9 as a subgroup of ΣPAH16 (at least the following, but not limited to: anthracene; benzo[a]anthracene; benzo[ghi]perylene; benzo[a]pyrene; chrysene; fluoranthene; indeno[1,2,3-cd]pyrene; pyrene; phenanthrene).
- Tri-butyl tin (TBT) compounds and their degradation products.

As a minimum requirement, national action levels need to be established for the primary list above. However, the determination of PCBs, PAHs and Tri-Butyl tin compounds and their degradation products will not be necessary in circumstances where the sediments are very unlikely to be contaminated with these substances. The relevant circumstances are:

a) sufficient information from previous investigations indicating the absence of contamination is available (cf. para 7.5-7.7 in the HELCOM Guidelines for Management of dredged Material at Sea); or

b)
- there are no known significant sources (point or diffuse) of contamination or historic inputs; and
- the fraction of sediment < 63 µm is less than 10%; and
- the content of total organic carbon is less than 1%.

Secondary List

Based upon local information of sources of contamination (point sources or diffuse sources) or historic inputs, other determinants may require analysis, for instance:

- Other chlorobiphenyls (PCB other than the 7 listed: IUPAC nos 28, 52, 101, 118, 138, 153 and 180)
- Organochlorine pesticides (DDT (DDE/DDD), HCH (lindan) and chlordaner)
- Organophosphorus pesticides (organophosphorus pesticides chlorpyrifos, dichlorvos and parathion, 4-nitrophenol, AMPA and glyphosate)
- Tri-phenyl tin (TPhT)
- Other anti-fouling agents (zinkpyrithion, diuron, Irgarol 1051 and sea-nine)
- Petroleum hydrocarbons (THC – total hydrocarbons)
- Polychlorinated dibenzodioxins (PCDDs)/polychlorinated dibenzofurans (PCDFs)
- Phthalates (DEHP and optionally - DBP/BBP)
- PFOS/PFAS
- Diclofenac
- Hexabromocyclododecane (HBCDD)
- Polybrominated diphenyl ethers (PBDEs)
- Radioactive substance

In deciding which additional individual organic contaminants to determine, reference should be made to existing priority substance lists, such as those prepared by HELCOM[5] and the EU[6] (as applicable).

Normalisation

Normalisation is defined here as a procedure to correct contaminant concentrations for the influence of the natural variability in sediment composition (grain size, organic matter and mineralogy). Most natural and anthropogenic substances (metals and organic contaminants) show a much higher affinity to fine particulate matter compared to the coarse fraction. Constituents such as organic matter and clay minerals contribute to the affinity to contaminants

in this fine material. Fine material (inorganic and organic) and associated contaminants are preferentially disposed in areas of low hydrodynamic energy, while in areas of higher energy, fine particulate matter is mixed with coarser sediment particles. To perform meaningful comparisons of the contaminant levels in sediments of variable granulometry and texture within individual areas, among areas or over time, a normalisation is needed.

When analysing whole sediment (i.e. < 2mm fraction) for spatial distribution surveys, the resulting maps give a direct reflection of the sea bed sediments. However, in areas with varying grain size distributions, a map of contaminant concentrations will be closely related to the distribution of fine grained sediments, and any effects of other sources of contaminants, for example anthropogenic sources, will be at least partly obscured by grain size differences. Also in temporal trend monitoring, differences in grain size distribution can obscure trends. If samples used for a spatial survey consist predominantly of fine material, the influence of grain size distribution is of minor importance and may probably be neglected.

It is recommended that normalised values of contaminants should be used to enable a more reliable comparison of contaminant concentrations in dredged material with those in sediments at disposal or reference sites. Action levels should reflect the normalisation methods used. The normalisation procedure used within a regulatory authority should be consistent to ensure effective comparisons.

In order to be in the position to anticipate the effects of contaminants adsorbed on sediment particles on disposal or filter feeders it is important to have information on the contaminant concentration of the relevant fine fraction (e.g. less than 63 µm or 20 µm), additional to full grain size data. CP's can analyse the fine fraction e.g. less than 63 µm or 20 µm fractions if the effects of contaminants on disposal is relevant for the specific case.

Analytical and Normalisation Techniques

Reference should be made to the Technical Annexes 5 of the CEMP Guidelines for Monitoring Contaminants in Sediments (Agreement 2002/16 – revised in 2018 - http://www.ospar.org/documents?d=32743) and ISO/EN methods for recommended analytical techniques.

Tier III: BIOLOGICAL PROPERTIES AND EFFECTS

In a significant number of cases the physical and chemical properties described above do not provide a direct measure of the biological impact. Moreover, they do not adequately identify all physical disturbances and all sediment-associated constituents present in the dredged material. If the potential impacts of the dredged material to be disposed cannot be adequately assessed on the basis of the chemical and physical characterisation, biological measurements should be carried out.

The selection of an appropriate suite of biological test methods (such as the ones listed below) will depend on the particular questions addressed, the level of contamination at the dredging site and the degree to which the available methods have been standardised and validated.

To enable the assessment of the test results, an assessment strategy should be developed with regard to granting a permit authorising disposal at sea. The extrapolation of test results on individual species to a higher level of biological organisation (population, community) is still very difficult and requires good knowledge of assemblages that typically occur at the sites of interest.

1. Toxicity bioassays:

The primary purpose of toxicity bioassays is to provide direct measures of the effects of all sediment constituents acting together, taking into account their bioavailability. For ranking and classifying the acute toxicity of harbour sediment prior to maintenance dredging, short-term bioassays may often suffice as screening tools.

- To evaluate the effects of the dredged material, acute bioassays can be performed with pore water, an elutriate or the whole sediment In general, a set of 2-4 bioassays is recommended with organisms from different taxonomic groups and different trophic levels (e.g. crustaceans, molluscs, polychaetes, bacteria, echinoderms);
    - In most bioassays, survival of the test species is used as an endpoint. Chronic bioassays with sub- lethal endpoint (growth, reproduction etc.) covering a significant portion of the test species life cycle may provide a more accurate prediction of potential impact of dredging operations. However, standard test procedures are still under development.

[5] List of Harmful Substances according to Annex I of the HELSINKI Convention and the priority hazardous substances contained in HELCOM Recommendation 31-E/1

[6] Water framework directive. DIRECTIVE 2013/39/EU amending Directives 2000/60/EC and 2008/105/EC as regards priority substances in the field of water policy. Decision No. 2455/2001/EC of the European Parliament and of the Council of 20 November 2001 establishing the list of priority substances in the field of water policy and amending Directive 2000/60/EC The daughter directive to WFD on chemical compounds: Directive 2008/105/EC of the European Parliament and of the Council of 16 December 2008 on environmental quality standards in the field of water policy, amending and subsequent repealing Council Directives 82/176/EEC, 83/513/EEC, 84/156/EEC, 84/491/EEC, 86/280/EEC and amending Directive 2000/60/EC of the European Parliament and of the Council.

The outcome of sediment bioassays can be unduly influenced by factors other than sediment- associated chemicals. Confounding factors like ammonia, hydrogen sulphide, grain size, oxygen concentration and pH should therefore be determined during the bioassay.

Guidance on the selection of appropriate test organisms, use and interpretation of sediment bioassays is given by e.g. USACE/EPA (1991/1994) and CEDA & IADC (2008) while guidance on sampling of sediments for toxicological testing is given by e.g. ASTM (1994).

2. Biomarkers:

Biomarkers may provide early warning of more subtle (biochemical) effects at low and sustained levels of contamination. Most biomarkers are still under development but some are already applicable for routine application on dredged material (e.g. one which measures the presence of dioxin-like compounds - Murk *et al*., 1997) or organisms collected in the field (e.g. DNA strand/breaks in flat fish).

3. Microcosm experiments:

There are short-term microcosm tests available to measure the toxicant tolerance of the community e.g. Pollution Induced Community Tolerance (PICT) (Gustavson and Wangberg, 1995)

4. Mesocosm experiment:[13][14]

In order to investigate long-term effects, experiments with dredged material in mesocosms can be performed, for instance to study the effects of PAHs in flatfish pathology. Because of the costs and time involved these experiments are not applicable in the process of authorising permits but are useful in cases where the extrapolation of laboratory testing to field condition is complicated r environmental conditions are very variable and hinder the identification of toxic effects as such. The results of these experiments would be then available for future permitting decisions.

5. Field observation of benthic communities:

Monitoring in the surrounding of the disposal site of benthic communities e.g. *in situ* (fish, benthic invertebrates) can give important clues to the condition of marine sediments and are relevant as a feed-back or refinement process for authorising permits. Field observations give insight into the combined impact of physical disturbance and chemical contamination. Guidelines on the monitoring of benthic communities are provided by e.g. OSPAR, ICES, HELCOM.

6. Other biological properties:

Where appropriate, other biological measurements can be applied in order to determine e.g. the potential for bioaccumulation and for tainting.

[13] Mesocosm and other biotest approach are valid methods to assess potential hazards to aquatic communities, especially in detecting the effect of mixtures of hazardous substances and compounds that may not be assessed. (Albarano et al., 2020) (Heise et al., 2020)

[14] Micro- and mesocosm are valid experimental systems that enable controlling ecologically-relevant components of the natural environment, still in use for different test purposes including marine sediments. (Albarano et al., 2020) (Heise et al., 2020)

SUPPLEMENTARY INFORMATION

The need for further information will be determined by local circumstance and may form an essential part of the management decision. Appropriate data might include: redox potential, sediment oxygen demand, total nitrogen, total phosphorus, iron, manganese, mineralogical information or parameters for normalising contaminant data (e.g. aluminum, lithium, scandium – cf. Technical Annex II). Consideration should also be given to chemical or biochemical changes that contaminants may undergo when disposed of at sea. CPs may also consider use of passive sampling techniques at disposal sites in an effort to develop standard methodologies.

Literature References related to Technical Annex I

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Technical Annex II Best Environmental Practice (BEP)

Introduction

This Technical Annex was prepared bearing in mind that, although the guidelines strictly only apply to the disposal of dredged material, Contracting Parties are encouraged also to exercise control over dredging operations.

This Technical Annex has as its aim to provide guidance to national regulatory authorities, operators of dredging vessels and port authorities on how to minimise the effects on the environment of dredging and disposal operations. Careful assessment and planning of dredging operations are necessary to minimise the impacts on marine species, habitats and other uses.

The items given as BEP under the different headings of this Technical Annex are given as examples. Their applicability will generally vary according to the particular circumstances of each operation and it is clear that different approaches may then be appropriate. More detailed information on dredging techniques and processes can be found in CEDA & IADC (2008).

The headings for the different BEP, can be summarised as:

1. Minimize the quantities dredged
2. Minimise the impacts of dredging
3. Minimise the effects caused by the disposal of dredged material

Please see Table 1 for additional information.

Table 1. Examples of Best Environmental Practice to manage the potential impacts of dredging and disposal.

Minimize the quantities dredged	Minimise the need for dredging	In fluid mud areas this requires an evaluation of the physio- chemical properties of the sediment. Additionally, this may require e.g., continuous underway measurement of sediment density by using a nuclear transmission gauge or measurement of shear forces.
		In areas with sandy waves, selective dredging of sand waves and other mobile structures should be employed.
		Hydraulic engineering, e.g. the construction of structures to reduce sedimentation.
	Optimise dredging operations and management	Monitor of dredge depths using accurate positioning systems e.g., echosounders or swath/ multibeam systems
		Availability of survey data on board: Visualisation of updated bathymetric charts, including topographic data, coastlines, disposal areas, dredge position, dredge head position as well as tidal information
		Evaluate the dredged tracks/profiles/zones, dredging intensity chart, and in the case of muddy material, sand, and gravel: establish optimum overflow time by analysis of load diagrams
	Improve the dredging process	Continuous measurements and presentation of area, heading, speed of dredgers and position, mixture velocity, mixture concentration and hopper fill
		Use selective dredging operations to separate out sediment type (e.g. trailer suction for fluid material) and contaminated material (e.g. closed bucket).
Minimise the impacts of dredging	To decrease turbidity impacts	Use of excavation tools/ dredger heads which minimise turbidity e.g., closed bucket for dredging
		Use of silt and bubble screens
		Minimise overflow through recirculation of overflow water
	To minimise oxygen depletion	Avoid periods when dredging induced turbidity will lead to unacceptable reductions in oxygen levels due to high temperatures
		Avoid periods in which life stages of organisms are sensitive to oxygen depletion
	To decrease contaminant release	Ensure any areas that contain elevated levels of contaminants are dredged with appropriate dredgers e.g., closed bucket to avoid increases in suspended sediments and thus increase in contaminant release
Minimise the effects caused by the disposal of dredged material	Avoid areas of sensitive or ecologically important habitats, through	Returning the littoral zone to its original profile as soon as possible, if material has been used as backfill.
		Avoiding sensitive time periods e.g., spawning, or migratory periods for certain fish species
		Ensuring disposal sites are defined by coordinates and if necessary, apply a buffer
		Ensuring adequate distance to relevant protected and ecologically important areas
	To reduce pollution and suspended sediment	Ensure that all material is passed through a grid screen, to minimise the amount of man-made materials/litter disposed of at sea
		Use pipelines for disposal/placement and/or silt curtains if appropriate
	To ensure the disposal does not affect navigation	To avoid shoaling when appropriate, ensuring material is distributed evenly over the disposal site, which could include stating a maximum depth reduction
	To avoid adverse effects on the environment	Monitoring of the disposal site to ensure depths are not reduced to levels which could cause navigational risk
		Monitoring of the disposal site and the surroundings in case (significant) adverse effects could not be entirely ruled out, and adapt operations accordingly

HELCOM Reporting Format for Management of Dredged Material at Sea

Explanatory notes for 2014 revised reporting format for management of dredged material at sea

GENERAL

1. HOD 51-2016 adopted this revised reporting format for use from 2017 onwards.

2. National data should be entered in the respective sheets of the accompanying spreadsheet by following the instructions given below.

3. Disposal site would be described in Sheet 1a. Only one row per disposal site is allowed

4. Material originating from different locations but disposed of at the same disposal site described in
Sheet 1a should be described in separate lines in sheets 2 and 3.

5. Please do not alter the format of the spreadsheet (*e.g*. by insertion of new columns or rows), but inform the Secretariat of any problems you may encounter.

6. Please indicate clearly the reference for all additional information by using sheet 7 of the spreadsheet**.**

7. Each disposal site will be assigned with unique HELCOM ID/code, which must not change from year to year.

8. The location of disposal sites of each Contracting Party, should be supplied in ArcGIS compatible shape files (in ETRS89LAEA projection) clearly showing the HELCOM codes (as given in the data tables), the location and any other relevant information in the attribute table of the shapefile.

GUIDANCE FOR REPORTING

9. The data should be entered by using the continental decimal (with a space as 1000 separator and a comma as decimal separator) with the maximum number of digits available (*i.e.* with maximum number of digits after the comma) and taking into account the unit given in the column header. This will ensure correct calculations for preparing total amounts. The pre-defined number format in all data cells ensures that the values will be displayed and printed.

10. Missing information should be indicated as follows:

NI no information

ND not determined

< less than (please state in the “text.doc” file the value of the respective limit)

EX exempted from analyses according to the HELCOM Guidelines for the Management of
Dredged Material at Sea (cf. Section 6.3 of the Guidelines)

11. Please submit your data to the HELCOM Secretariat Data@helcom.fi by 1 October of the year following the dredging activity. It is intended that HELCOM Secretariat will combine the information to a database and will make it available online via HELCOM website.

Instructions for reporting data per sheet:

***cf. attached** MS-Excel Spreadsheet*

Sheet 1 – Permits

Contracting Party	Select correct option from dropdown list provided
Year	Year of disposal activity.
Report ID	Unique ID, Contracting Party-Year e.g. PL-2014
Number of permits issued or regulated under other means	Number of permits issued or regulated under other means in year prior to reporting year. By 'other means' any kind of relevant national regulation is meant, that is used for permitting/licensing/allowing disposal operation
Material licensed or regulated by other means (tonnes - dry weight)	See sheet 7 in the attached MS Excel Spreadsheet for conversion from wet weight to dry weight
Dredged material disposed(tonnes - dry weight)	Amount actually disposed
Notes	Information of relevance

Sheet 1a – Disposal site coordinates

proposed by HELCOM, based on IMO LC/LP Tabular reporting format

Report ID	Report code: Contracting party-Year, e.g. PL-2014 PL – country of origin 2014 - year
National Disposal site code	Code for a particular location remains the same from year to year., e.g. 001 – disposal site code
HELCOM Disposal site ID	Unique ID, is generated to differentiate separate disposal sites, with dash separator e.g. *PL-001* PL – country of origin 001 – disposal site code

Specific national site name	Name should preferably indicate name of water system e.g. Bay of Gdansk and then type of water system: river, estuary, harbour, coastal waters, and actual name of the site etc., e.g. "Baltic Proper, Kolobrzeg Harbour waters"
Shapefile submitted	Yes/No-field indicating whether spatial data is included as shapefile (this is recommended) with data submission.
Circular Disposal Site Center Point - Latitude	Area should be reported as GIS Shapefile containing HELCOM Site ID (See instructions for reporting data per shapefiles) *Reference Note:* [1] *Conversion of latitude and longitude coordinates from degrees, minutes and seconds to decimal degrees can be accomplished by accessing the U.S. Federal Communications Commission website at:*
Circular Disposal Site Center Point - Longitude	
Circular Disposal Site - Radius	
Polygonal Disposal Site Coordinate 1 - Latitude	
Polygonal Disposal Site Coordinate 1 - Longitude	
Polygonal Disposal Site Coordinate 2 - Latitude	
Polygonal Disposal Site Coordinate 2 - Longitude	

Polygonal Disposal Site Coordinate 3 - Latitude	*http://www.fcc.gov/mb/audio/bickel/DDDMMSS-decimal.html. It is likely that there are many such sites available to LC/LP member States.* *No need to fill coordinates, if those are reported as shapefile containing geographic area and HELCOM ID*
Polygonal Disposal Site Coordinate 3 - Longitude	
Polygonal Disposal Site Coordinate 4 - Latitude	
Polygonal Disposal Site Coordinate 4 - Longitude	
Activity within Disposal site (optional)	Contains latitude and longitude coordinates of a pointwise disposal operation within a disposal site area/licensed area (polygon or a circular site)
Comments	

Sheet 1b – Dredging site coordinates

HELCOM Dredging site ID	Unique ID for a dredging site to differentiate dredging site
Shapefile submitted	Yes/No-field indicating whether spatial data about dredging site is included as shapefile (this is recommended)
Latitude	Dredging site latitude and longitude coordinates of a pointwise dredging operation within a dredging site area/licensed area (polygon or a circular site)
Longitude	
Specific national site name	Name of dredging site.

Sheet 2 – Contaminated material (to be filled-in case of disposing contaminated sediments)

HELCOM Disposal site ID	Is used to link to disposal site e.g. PL-001; will be generated automatically
HELCOM Dredging site ID	is generated to differentiate separate disposal operations per disposal site per year, e.g. *0009 – dredged material origin code (e.g. permit #)*
Contaminant	
Average concentration in the dredged material (mg/kg dry wt)	
National criteria/upper level (mg/kg dry weight)	
Dredged material disposed (tonnes - dry weight)	
Reasons for allowing disposal	Describe reasoning behind granting of approval.
Additional information	

Sheet 3 – Details of activity (refers to reporting of dredging operations)

HELCOM Disposal site ID	Is used to link to disposal site e.g. PL-001; will be generated automatically
HELCOM Dredging site ID	is generated to differentiate separate disposal operations per disposal site per year, e.g. 0009 – dredged material origin code (e.g. permit #)
Description of dredged material eg silt /sand / gravel	Describe in general terms, the granulometry of the sediment - % gravel, sand and silt

Origin (name of water system dredged)	River, estuary, etc.,
Type of areas dredged	Select correct option from dropdown list provided
Dredging Activity	Select correct option from dropdown list provided
Amount of dredged material disposed (tonnes - dry weight)	As indicated
Amount of dredged material placed Quantity for beneficial use (tonnes - dry weight)	As indicated
Beneficial use	Select correct option from dropdown list provided
Material exempted from characterisation (tonnes - dry weight)	As indicated
Notes (e.g. monitoring reports)	monitoring related to dredging activities
Comments	

Sheet 4 – Contaminant load

HELCOM Disposal site ID	Is used to link to disposal site e.g. PL-001; will be generated automatically
HELCOM Dredging site ID	is generated to differentiate separate disposal operations per disposal site per year, e.g. 0009 – dredged material origin code (e.g. permit #)
Exemption	Yes/No-field indicating whether dredged material is exempted from physical and chemical characterization (see Guideline paragraph 6.3)
Cd (tonnes dry wt)	Tonnes of cadmium disposed (dry weight)
Hg (tonnes dry wt)	Tonnes of mercury disposed (dry weight)
As (tonnes dry wt)	Tonnes of arsenic disposed (dry weight)
Cr (tonnes dry wt)	Tonnes of chromium disposed (dry weight)
Cu (tonnes dry wt)	Tonnes of copper disposed (dry weight)
Pb (tonnes dry wt)	Tonnes of lead disposed (dry weight)
Ni (tonnes dry wt)	Tonnes of nickel disposed (dry weight)
Zn (tonnes dry wt)	Tonnes of zinc disposed (dry weight)
ΣPAH16 (tonnes dry wt)	Tonnes of USEPA 16 selected polycyclic aromatic hydrocarbons disposed, (dry weight) if data available (see glossary below)
ΣPAH9 (tonnes dry wt)	and/or as a part of PAH16; Tonnes of nine selected polycyclic aromatic hydrocarbons disposed (dry weight) (see glossary below)
ΣPCB7 (kg dry wt)	Tonnes of IUPAC nos 28, 52, 101, 118, 138, 153 and 180 (ICES 7) disposed (dry weight)
TBT (kg dry wt)	Kilograms of tributyl tin disposed (dry weight)
DBT (kg dry wt)	Kilograms of dibutyl tin disposed (dry weight)
MBT (kg dry wt)	Kilograms of monobutyl tin disposed (dry weight)
Other contaminants	Contracting Parties are invited to include substances from the Secondary List as relevant, disposed (dry weight)
Petroleum HC (tonnes dry wt)	Tonnes of petroleum hydrocarbons/oil disposed (dry weight) (see glossary below)

HCB (kg dry wt)	Kilograms of Hexachlorobenzene disposed (dry weight)
χ-HCH (kg dry wt)*	Kilograms of χ-Hexachlorocyclohexane (Lindane) disposed (dry weight)
Σ DDT** (kg dry wt)	Kilograms of total DDT disposed (dry weight) (see glossary below)
TPhT (kg dry wt)	Kilograms of total TPhT disposed (dry weight) (see glossary below)
PCDDs/PCDFs (kg dry wt)	Kilograms of total PCDDs/PCDFs disposed (dry weight) (see glossary below)
DEHP (DBP/BBP) (kg dry wt)	Kilograms of total DEHP (DBP/BBP) disposed (dry weight) (see glossary below)
notes	Any additional relevant information (dry weight)

** α-HCH or β-HCH can be optionally reported*

*** Σ DDT refers to Σ of o,p'-DDT; p,p'-DDT; o,p'-DDE; p,p'-DDE; o,p'-DDD; p,p'-DDD" or Σ of 4,4'-DDT, 4,4'- DDE, 4,4'-DDD, 2,4' DDT, 2,4'-DDD, 2,4'-DDE*

Sheet 5 – Analyses quality information

- Purpose of this sheet is to collect relevant information on national quality assurance procedures, which is relevant if the data to be used e.g. for HELCOM assessments;
- Information to be provided only once (upon request) if there are substantial changes in labs used for analysis and/or in case data quality information is needed for assessment purposes
- Details of limits of detection only required where analysis result is below detection limit.
- Analytical quality information for other reported contaminants (from Secondary List) should be also provided in the same manner as for Primary List of substances
- Reference should be made to Part B of the HELCOM Manual for Marine Monitoring (including relevant Annexes, e.g. B-13 Technical Note on the determination of heavy metals and persistent organic compounds in marine sediments) and ISO/EN methods for recommended analytical techniques, e.g.
    - The monitoring laboratories should have a QA/QC system that follows the requirements of EN ISO/IEC 17025 "General requirements for the competence of testing and calibration laboratories" (formerly EN 45001 and ISO Guide 25)
    - Limit of detection, quantification or application are validation parameters which describe the sensitivity of an analytical methods with regard to the detection and quantification of a certain analyte. Therefore, a number of publications recently provided different approaches to define and calculate these measures by instrumental or mathematical approaches (DIN 32645, 1994; EURACHEM, 1992; Geiß and Einax, 2000; ICH, 1996; ISO 11843, 1997-2003; ISO/CD 13530, 2003; IUPAC, 1997, 2002).

Sheet 6 – Action levels

- Action levels should be provided when initially completing new reporting format. Action levels do not need to be reported again unless they are revised.
- Action Level information for other reported contaminants (from Secondary List) should be also provided in
the same manner as for Primary List of substances

Sheet 7 - Additional information for CP

- Calculations for wet weight to dry weight
- Conversion factors from volume to weight which can be used in the event that density has not been measured (see Sheet 7 in the attached MS-Excel Spreadsheet for conversion from wet weight to dry weight)

Instructions for reporting data per shapefile:

The areas of disposal sites (Excel sheet 1a, circular / polygonal disposal site coordinates, Excel sheet 3, details of activity, point coordinates) can be reported using GIS shapefile, which contains the geographic area of the disposal site. The shapefile should have following information content and format:

- Shapefile should be in ETRS89 LAEA projection (EU-INSPIRE compatible projection) (How to define projection/project shapefile in ArcGIS)
- All circular / polygonal disposal sites (Excel sheet 1a) of a contracting party should be reported in one shapefile
- All pointwise activity locations (Excel sheet 3) of a contracting party should be reported in one shapefile
- Each polygon/point in a shapefile should contain the HELCOM Site ID (e.g. PL-2014-001) of the disposal site in the attribute table column titled "HELCOM_ID"

Shapefiles should be reported simultaneously with the reporting MS Excel sheets

Glossary:

Capital dredging	Capital dredging includes geological material dredged from previously unexposed layers beneath the seabed and surface material from areas not recently dredged.
Σ DDT	Dichlorodiphenyltricholoethane (DDT) (CAS no. 50-29-3) is an organochlorinated pesticide; DDT and "related compounds" or sum of DDT refer to p,p'-DDT, o,p'-DDT, p,p'-DDE, o,p'- DDE, p,p'-DDD and o,p'- DDD
Dredged material	Dredged material is sediment dredged from the sea bed, which could consist of *e.g*. boulder, clay, sand, rocks.
Harbour	Harbours include enclosed and semi-enclosed docks, docks entrances, marinas, wharves and unloading jetties
Maintenance dredging	Maintenance dredging is the dredging required to maintain berths and navigation channels at advertised depth. It includes material dredged from recently deposited by sedimentation processes in harbour or sea areas
Oil	Total petroleum hydrocarbons (total oil and grease) C10 – C40
Others	This could include *e.g.* disposals resulting from *force majeure* or emergency situations or the disposal of spoiled cargos.
Σ PAH_9	anthracene; benzo[a]anthracene; benzo[ghi]perylene; benzo[a]pyrene; chrysene; fluoranthene; indeno[1,2,3-cd]pyrene; pyrene; phenanthrene
Σ PAH_{16}	acenaphthene, acenaphthylene, anthracene, benzo[a]anthracene, benzo[b]fluoranthene, benzo[k]flouranthene, benzo[a]pyrene, benzo[ghi]perylene, chrysene, dibenz(ah)anthracene, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, naphthalene, phenanthrene and pyrene.
PCDDs/PCDFs	Polychlorinated dibenzo-p-dioxins (PCDD) and polychlorinated dibenzofurans (PCDF) are environmental contaminants detectable in almost all compartments of the global ecosystem in trace amounts. These compound classes in particular have caused major environmental concern.
ΣPCB_7	CB 28; CB 52; CB 101; CB 118; CB 138; CB 153; and CB 180
Total PCB	Total PCB is the extraction of the 209 congeners
Petroleum HC	Petroleum hydrocarbons are the primary constituents in oil, gasoline, diesel, and a variety of solvents and penetrating oils. The petroleum constituents of primary interest to human health have been the aromatic hydrocarbons (i.e., benzene, ethylbenzene, toluene, and xylenes), polynuclear aromatic hydrocarbons (PAHs)
DEHP (DBP/BBP)	Phthalates, or phthalate esters, are esters of phthalic acid and are mainly used as plasticizers (substances added to plastics to increase their flexibility, transparency, durability, and longevity). Di(2-ethylhexyl) phthalate (DEHP), Di-n-butyl phthalate (DBP) and Benzylbutylphthalate (BBP) and one of most widely used and raising most environmental concerns phthalates.
Sea areas	Areas outside harbours i.e. in open, coastal and offshore sea areas
TPhT	Triphenyltin compounds are organotin compounds with the general formula $(C_6H_5)_3Sn_X$. Triphenyltin compounds have been used extensively as algicides and molluscicides in antifouling products since the 1960s, together with tributyltin compounds and both these classes of compounds are of local (but not global) environmental concern because they are persistent organic pollutants

Attachment 2

Explanatory notes for the reporting template of consolidated reporting to LC/LP, carried out by the HELCOM Secretariat.

- The report consists of two excel sheets: “summary” and “details of sites”. In addition, the report includes a word file with definitions used in the HELCOM reporting on handling of dredged material at sea.
- The “summary sheet” is comprised of a country wise summary of activities on the reporting year. It includes information on the number of activities and the amount material disposed, both separated between capital and maintenance dredging. In addition, it includes a map on the distribution of activities around the Baltic Sea.
- The “details of sites” sheet is comprised of information on individual disposal activities, including disposal site code, location of site (coordinates of the site), sub basin and amount material disposed. Information on the beneficial use is also provided and the last two columns includes the potential amount and purpose of beneficial use.

The procedure and timeframe of the reporting include the following steps:

- An overview of the data reported in accordance with the Annex 1 to this Guideline is to be presented to the relevant HELCOM working group at the first convenience after the reporting deadline for taking necessary actions to accomplish the reporting.
- The reported data will be processed by the Secretariat and compiled into the unified geo-database by 1 December of the same year including all needed clarifications with national data reporters.
- The compiled national datasets will be available for national data reporters after 1 December in Shapefile format. National experts will be invited to verify and approve the datasets in two months’ time by 1 February of the following year.
- After expert’s approval HELCOM Secretariat will compile the consolidated report from the verified data by 1 March and submit it LC/LP after approval by relevant HELCOM working group.

Sheet 1 – summary

Country	Contracting Party of disposal site
Year	Year of activity
Permits	Number of issued permits
Maintenance (Number of activities)	Number of activities, Maintenance dredging
Capital (Number of activities)	Number of activities, Capital dredging
Maintenance (Amount)	Amount material disposed, Maintenance dredging
Capital (Amount)	Amount material disposed, Capital dredging
Total amount	Total amount of material disposed
Unit	Unit of material disposed (e.g. tonnes - dry weight)

Sheet 2 - details of the sites

Country	Contracting Party of disposal site
Code	HELCOM disposal ID
Latitude	Latitude of disposal site (centroid for polygon and line features)
Longitude	Longitude (centroid for polygon and line features)
radius (optional)	Radius of pointwise disposal site
BS sub-basin	HELCOM sub-basin of disposal site
Maintenance (Amount)	Amount material disposed, Maintenance dredging
Capital (Amount)	Amount material disposed, Capital dredging
Total amount	Total amount of material disposed
Unit	Unit of material disposed (e.g. tonnes - dry weight)
Amount (beneficial use)	Amount material disposed for beneficial use
Purpose (beneficial use)	Purpose of beneficial use