

April 12, 2018

Tests required for the import of sand for shores nourishment

The national outline plans for protection of the coastal cliffs of Israel: NOP 13/9A and 13/9 enable the construction of marine and land protections of the coastal cliffs.

These protections include the sand nourishment of the coasts, the transportation of sand by land, the laying of geotechnical textile (sunken geo-tubes filled with sand) and the construction of rigid marine protection (such as detached breakwaters) in which the sand is required for feeding in the shallow region created between the marine protection and the coastline.

Due to the shortage of available sources of marine sand in Israel, it is proposed to import sand from external sources. The following are the instructions for execution of tests for the imported sand in order to check its suitability for sand nourishment of the coasts of Israel.

Clarifications

- 1. These instructions are from the Ministry of the Environment only and are not coordinated with other regulators such as the Ministry of Health or the Israel Nature and Parks Authority. These bodies may demand additional tests before they approve this activity by law. It is recommended to consult them in an initiative for the import of the sand as soon as possible.**
- 2. These instructions are intended for execution of the first tests of the sand and do not constitute conditions for the import of the sand. Our opinion will be given only after all the tests have been completed. Subject to official approval by the Ministry it shall be possible to continue the activity for import of the sand.**
- 3. In the case of the sand being approved for import, the Ministry is expected to determine conditions for prior treatment of the sand. For example, the removal of the top 20 cm of the excavated sand and the import of the layer of sand located beneath it only and/or drying of the sand on a land site before laying it in the sea. The findings of the tests required in the documents of the tender shall be used for determination of the conditions, including the need for preliminary treatment.**

Definitions

Marine sand – Sand located between the high and low tide marks, and on the seabed.

Coastal sand – Sand located above the high tide line and in the entire dry part of the shore.

Sand from a marine source – Sand dredged from a site located inside the sea with the aim of importing it to Israeli shores.

State of Israel The Ministry of the Environment	The marine environment protection division
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Sand from a land source – Sand excavated from a site located on land with the aim of importing it to Israeli shores.

The aim of the document

This document defines the tests of the sand to be made. The findings of the tests shall be used for determination of the suitability of the imported sand for nourishment of the Mediterranean shores of Israel, in accordance with the following principles:

- 1) The imported sand shall not contain any kinds of foreign flora and fauna and/or having a potential for spreading and invasion of illnesses or parasites.
- 2) The imported sand shall not contain chemical pollutants in concentrations that endanger the marine and shore environment or the health of users of the shore.
- 3) The imported sand shall have characteristics that do not change the living conditions of the shore and marine fauna and flora on the laying site and in its surroundings, with emphasis on the conditions require for nesting of sea turtles.

a. Sand from a marine source

The following are instructions for testing and for information that it is mandatory to be included in an orderly report as set forth below.

1) Spatial information regarding the sand that it is intended to import and regarding the site from which it is mined.

- a) A general map (drawing of the surroundings) on a suitable scale and an aerial photograph shall be presented of the mining site and its surroundings. There shall be indicated on the map the boundaries of the site, topography and bathymetry, infrastructures and buildings existing along the shore and in the sea (including ports, anchorages, desalination facilities, marine piping, drainage outlets, rivers, and sea outlets, power stations, breakwaters, etc.). The land border of the map shall be 300m from the shoreline in the direction of the land. The other boundaries shall be (at least) 5 km from the boundaries of the site. The coastline shall be marked on the map. The marine part of the map shall include the latest existing bathymetry. The depth lines on the map shall be presented with a resolution of at least 1m. The above-mentioned bathymetric mapping and topographic mapping shall be presented so that it shall be possible to continuously connect the two maps. There shall be displayed on the bathymetric map the site from which the marine sand shall be mined. The various existing habitats, within 4 km of the site, shall be displayed on the map. The mouths of streams and rivers, drainages, and outlets of sewage (industrial or municipal) to the sea, located at a distance of up to 5 km from the boundary of the mining site, shall be displayed.

State of Israel The Ministry of the Environment	The marine environment protection division
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- b) Details shall be given in a table regarding all the outlets of sewage and of the mouths of the rivers displayed on the map of the sources of the sewage, whether the flow is done with a permit, who is the regulator giving approval, a list of the pollutants pumped by all the users and their annual load. If this information is unavailable it shall be noted in the table.
- c) If there are outlets of shore streams or rivers, the source of the water in the stream or river shall be indicated. The uses of the land along the stream or river (agriculture, residential, industry), and any existing information regarding the quality of the water of the stream or river and the sediment, shall be indicated as well.

2) Physical testing of the composition of the sand

- a) For all the following tests, the number of samples on the mining site shall be determined in accordance with the volume of the sand excavated (see p. 7 of the attached document).

<http://wedocs.unep.org/bitstream/handle/20.500.11822/559/mts129eng.pdf?sequence=7&isAllowed=y>.

- b) For example, for an excavation volume of 250,000 m³ there shall be samples of at least 7 points. The spread of the points must be done over the excavated area with equal spacing as far as possible and the planned depth of the excavation shall be reached.

Examination of the mineralogical composition – The mineralogical composition of the sand shall be characterized using the XRD method and compared to the mineralogical composition of the shore sand on the shore in which it is wished to be nourished. If the shore intended for sand nourishment is unknown, it is possible to sample sand randomly from the shores of Israel and send it for comparison. It is preferable that the random sampling be taken from the southern shores (Zikim to Ashdod) in order to cover all the Israeli coastline.

- c) Granulometric tests – The granulometric composition of the sand shall be characterized in accordance with the following instructions and compared with the granulometric composition of the sand in the designated shore for sand nourishment. The sediment too be sampled (dry or wet) in the bed or the sub-bed of the sea, depending on the planned dredging depth, shall be fully placed in sealed plastic boxes and taken for execution of analysis of the granule size in a laboratory having proven experience in working with marine and shore sand. The weight of a sample of sampled sediment shall be at least 500g and its full contents shall be dried in an oven for at least 24 hours at a temperature of 100°C.

State of Israel The Ministry of the Environment	The marine environment protection division
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From the overall dry sample, a random sample of sediment shall be taken with the weight of 200g. Weighing shall be done using digital scales having an accuracy of 0.01g. The sample of the dry sediment shall be filtered using a shaker with sieves of eight groups of size: 0.062, 0.075, 0.125, 0.18, 0.25, 0.5, 1, and 2 mm. The quantity of the sediment accumulated in each screen shall be weighed and its cumulative weight percentage calculated. After recording the grain size data, a distribution curve shall be constructed for every sample, and there shall be calculated the median (d50[mm]), the standard deviation (d68.26% [mm]), and two standard deviations (d95.44% [mm]). The data shall be presented in Excel s. The number of tests shall be coordinated with the marine environment protection division after indicating the overall quantity for dredging.

- d) Comparison of the color of the sand that it is intended to import for sand in the local laying (nourishment site – this color shall be defined by means of the Munsell table and compared with the shore sand in every site in which sand nourishment shall be carried out.

3) Chemical and bio tests – Basic list

The full list of the chemical tests shall be determined in accordance with the information received from the review of the potential sources of pollution as set forth in section 1 above. Consequently, there shall be considered the addition or removal of parameters for testing.

- a) The sampling system shall represent the entire area in which the dredging shall be done, and all the layers of sand excavated.
- b) Chemistry
- * Heavy metals (Cd, Cu, Hg, Zn, Cr, Pb, Ni) using the HF method in accordance with ISO 11885, except for mercury that shall be tested with atomic absorption without a flame with a cold vapor fluorescence detector or ICP-MS for all metals and atomic absorption for mercury.
 - * TPH – Total Petroleum Hydrocarbons using the USEPA/SW-846 modified 8100/8015C or the USEPA 481.1 method.
 - * Polycyclic Aromatic hydrocarbons using the USEPA SW-846/8260/GC-MS or the USEPA 8270 method.
 - * PCBs using the GC-MS method.
 - * TBT using the Krone method.
 - * TOC as a percentage of organic material.

State of Israel The Ministry of the Environment	The marine environment protection division
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- * Micro biological – MPN fecal coliform in accordance with SM9221 and enterococcus using the method of Fecal strep SI 885 part 5 on the mining site.
 - * If the site is located at a distance of up to 1 km from a site in which exploration drilling were made or drilling with the production of hydrocarbons, testing shall be done also for Thorium 228, Radium 228, Radium 226.
- c) Microbiology – Fecal coliform and enterococcus in sediment and sea water (at sea level and 1m above the seabed).
- d) Biology – Video survey of the mining site for the location of macro fauna and macro algae having the potential to be invasive in the Israeli shores, such as *Caulerpa taxifolia*. The review shall be done by a marine biologist/ecologist having a PhD and proven experience in marine fauna and flora surveys in the shores of the country in which the sand shall be dredged. Furthermore, an opinion shall be submitted by a marine biologist/ecologist having a PhD and proven experience in marine fauna and flora surveys in the shores of Israel regarding the findings of the survey of the foreign ecologist and their meaning regarding the shores of Israel. A detailed report shall be submitted as well as the raw materials of the video survey. If necessary, an exception shall be made to the requirement for the degree or the experience with approval from the marine environment protection division.
- e) Biology – Fauna inside the layer in a number of points that represent the entire mining area. The aim of this survey is to check whether there exist on the site healthy fauna with a large variety of types. A low variety of types indicates a situation of depression or pollution. The survey shall be conducted in accordance with **EN ISO 16665 Water quality – Guidelines for quantitative sampling and sample processing of marine soft bottom macro-fauna.**
- f) Biology – Spores review – If the source of the sand is in a bay and not in the open sea, a review shall be conducted for the existence of spores of toxic micro algae in the upper layers of the sand. The sampling system must represent the entire mining area.

4) **Threshold conditions for laboratories and the review team**

All the laboratory tests shall be conducted by a certified laboratory for execution of the analyses required in this document, by the country in which the laboratory is situated and operates.

- a) Tests of marine sand shall be conducted in laboratories having proven experience (published scientific papers or reports of surveys and monitoring approved by a

State of Israel The Ministry of the Environment	The marine environment protection division
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regulatory entity that engages with in the marine environment) in sea water and marine sediment.

- b) The sampling must be carried out by a team with proven experience (published scientific papers or reports of surveys and monitoring approved by a regulatory entity that engages in the marine environment) in sampling marine sediment.

5) Submission of the sampling program for approval by the Ministry of the Environment regarding sand originating in the sea:

The sampling program shall be submitted for approval of the Ministry of the Environment. The program shall include the following parts:

Preliminary report – Regional information as set forth in section 1 above and a description of the project – the quantity of sand to be imported and in which shores it is planned to be nourished by it.

In accordance with the preliminary report there shall be determined the chemical and biological analyses require in section 3 above. After the receipt of the list of the analyses, a sampling program shall be submitted.

Sampling program

- a) Review of the existing ecological information regarding the sand mining site.
- b) The sampling program, including a map of the sampling points and the route of the ecological surveys and a table with the coordinates of the points and the route.
- c) Methods of sampling and analysis.
- d) A list of laboratories including the qualification certificates and proof of experience with water and marine sediment.
- e) The team for sampling and the surveys, including CVs also including a list of publications and proof of the required experience.

b. Sand from a land source

- 1) Based on the principles of the policy of the Ministry of the Environment, it is possible to permit recycling for shores nourishment with land sand, only from a source in which no industrial or agricultural use was made, provided that the quality of the sand meets the threshold values VSL 2017. In order to confirm that this activity was not carried out on the site, there shall be submitted for approval of the Ministry of the Environment a historical survey to be carried out in accordance with the instructions of the Ministry of the Environment for execution of this review.
- 2) If it is proved that the mining site has no history of industrial activity, one of the following programs shall be submitted:

State of Israel The Ministry of the Environment	The marine environment protection division
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- a) If the sand has not yet been excavated – a program for execution of a soil survey at the frequency as set in the instructions for execution of a soil survey in the Ministry's website (sampling of open areas on p. 8 of the instructions). In sites abroad in countries that do not belong to the OECD, in which there is doubt of the reliability of the information in the historical review, five bores per dunam shall be drilled.
 - b) If the sand has been excavated and lies in stockpiles, a program for execution of a survey of soil in piles in accordance with the instructions for sampling homogenous stockpiles on the Ministry's website (section 4.6 on p. 13).
- 3) The survey shall include all the analyses appearing in the instructions in section 2 above, and the following parameters as well:
- * General GC-MS scan for the location of PCBs.
 - * Polycyclic Aromatic hydrocarbons – to be done only if the TPH tests indicate the presence of hydrocarbons.
 - * General oils and fats in accordance with FTIR.
 - * Scan of pesticides – GC-MS in accordance with EPA-8270.
 - * Nitrate and nitrite, ammonia, Kjeldahl nitrogen, general phosphorus.
 - * Microbiology – MPN fecal strep in accordance with SM9221 and enterococcus using the method in Fecal Strep SI 885 part 5 on the mining site.
- 4) Tests of the composition of the sand shall be conducted in a similar way to the instructions regarding marine sand in section (2)(a) above.
- 5) **The background survey program shall be submitted for approval by the Ministry after receipt of approval of the historical survey.**

Report of findings

A report with findings of the tests shall be submitted to the Ministry of the Environment for testing the suitability of the sand for nourishment and also for giving instructions for treatment of the sand before being nourished to the shores. If the sand is approved for import there shall be taken into account that the findings of the report shall be published in the Ministry website, under the limitations of the Law for Freedom of Information. If the document includes information that constitutes a commercial secret this should be noted clearly for examination by the Ministry.

The report shall include the following parts:

- a) Contents.

State of Israel The Ministry of the Environment	The marine environment protection division
--	--

- b) A summary in Hebrew and in English, summary of the findings, discussion, and recommendations.
- c) Introduction and description of the project – the quantity of sand to be imported and which shores are planned to be nourished.
- d) Methods of sampling and methods of analysis: details of all the sampling points in a table and on a bathymetric or topographic map, in accordance with the source of the sand. Details of all the sampling activities in the field, treatment and preservation of the samples, methods of measurement (including the method number and its sensitivity), details of the laboratories.
- e) Results
 - 1. Findings of the granulometric and mineralogical tests and tests of the color and findings of comparison with sand on the nourishment sites.
 - 2. Findings of the chemical tests. Concentrations of the pollutants and the microbiology shall be shown in a table as well as the quantity of concentrations on the bathymetric/topographic map of the mining site.

The table shall also show the values of ERL and ERM of every parameter tested and shall emphasize values higher than these values.
 - 3. Findings of the biological reviews (marine sand only):
 - * Findings of the visual survey shall be submitted briefly, together with an updated description of the habitat, including characteristics of the seabed, the fauna, flora, disturbances to the habitat. There shall also be furnished to the Ministry of the Environment the raw materials from the visual survey. Emphasis shall be placed on varieties foreign to the shores of Israel and/or having a potential to being invasive varieties in the shores of Israel. There shall be added the opinion of the local expert and the Israeli expert.
 - * Findings of the fauna inside the layer to be shown in the report:
 - 1) Density of the items.
 - 2) Richness of the varieties (in the various taxonomic groups).
 - 3) Variety – There shall be shown the results from the accepted variety criteria. At least the following criteria shall be used: Shanon-Wiener, Simpson, and additional criteria that describe the composition of the society.
 - 4) Multi variables NMDS analysis after transformation of double square root by means of the imaginary Bray-Curtis factor for

State of Israel The Ministry of the Environment	The marine environment protection division
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characterization of the heterogenic level of the fauna on the seabed of the site.

- * If spores of micro algae are found, this finding shall be displayed on the bathymetric map.

f) Discussion and recommendations.

Signature

Dr. Dror Tzurel

Scientific Center for Marine Monitoring and Research

The marine environment protection division

The Ministry of the Environment