

Tender No. 8/21

**Dredging and Sand Nourishment at
Netania Coastal Cliff Protection Scheme- ISRAEL**

Section I: Technical Specifications

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1 DEFINITIONS, ABBREVIATIONS

AIS	Automatic Identification System
Beach rock	Friable to well-cemented sedimentary rock that consists of a variable mixture of gravel, sand, mixture of shells, rock fragments and silt-sized sediment that is cemented with carbonate minerals and has formed along a shoreline.
Conglomerate	Rock consisting of individual clasts within a finer-grained matrix that have become cemented together.
DGPS	Differential Global Positioning System
GIS	Geographic Information System
H & S	Health & Safety
IHO	International Hydrographic Organization
Kurkar	Calcareous Sandstone
LSD	Land Survey Datum
MBE	Multi-Beam Echosounder
MCCP	Mediterranean Coastal Cliff Preservation Government Company
MEP	Ministry of Environmental Protection, Sea and Coast Division
Non-contaminated material	As instructed by the MEP
NTU	Nephelometric Turbidity Unit
Contaminated dredged material	As instructed by the MEP
PSD	Particle Size Distribution
SBM	Single-Beam Echosounder
SBP	Sub-Bottom Profiler
SSS	Side Scan Sonar
TSHD	Trailing Suction Hopper Dredger
TSS	Total Suspended Solids [mg/liter]
VALHOF	Committee for for Coastal Environment Preservation
QC	Quality Control

CODES AND STANDARDS

IS	Israeli Standards
ASTM	American Society for Testing and Materials
BS	British Standards
IHO	International Hydrographic Organization

2 GENERAL

2.1 Description

The Mediterranean Coastal Cliff Preservation Government Company (MCCP) is implementing the Netania Coastal Protection Scheme. The works include construction of twelve detached breakwaters, 100, 120 and 200 meters long, followed by sand nourishment to widen the existing narrow beach and enable development of the coastal strip for leisure and tourist purposes.

The scheme has been thoroughly studied by the Statutory Authorities e.g. Ministry of Environmental Protection (MEP), Central District Planning Committee, Committee for Coastal Environment Preservation (Valhof), approved and a Building Permit has been issued by the local Netania Building Committee for the construction of the first stage.

The length of the complete coastal scheme is 2,605 m and its first stage includes execution of the six northern breakwaters and corresponding sand nourishment. This stage is presently under construction and the second will follow.

The first Task consists of dredging and nourishment of 240,000 cubic meter of sand in front of the beaches of Netanya, all as detailed in the relevant Work Order, all as stipulated in the Agreement.

The second optional Task includes dredging and nourishment of up to 240,000 cubic meter of sand but not less than 200,000 cubic meters in front of the beaches of Netanya and/or any other shore in the Israeli coast line all as detailed in the Work Order, all as stipulated in the Agreement.

According to the Valhof's ruling dated 20.01.2021 and MEP's instructions, sand for the nourishment will be dredged from an area situated between the Ashdod Marina and the perpendicular to the shore leg of the Ashdod Port Main Breakwater, as depicted in the attached drawing.

For the sake of clarity, it is stressed that the exact location of the borrow sand pit for each of the two stages, will be advised by the MEP, shortly before the starting of operations.

The MCCP has carried out testing of sea bottom sand samples, which show that the sand to be dredged is characterized by a D_{50} ranging 140 to 250 microns.

Furthermore, the authorized cut depth in the sand borrow area shall not exceed one metre and the preferred season for both campaigns is during the Fall but not mandatory.

These specifications refer to dredging of sand at a borrow pit located south of the Port of Ashdod, sailing to Netania about 40 nautical miles to the north (one way), mooring offshore, pumping sand to the shore and spreading it according to the nourishment drawings.

The dredged material shall be classified as contaminated and non-contaminated according to the regulations and instructions issued by the Ministry of Environmental Protection (MEP) and/or MCCP.

Contaminated material shall be dumped at the "Alpha" dumping site, situated circa 42 km (23 nautical miles) west to Haifa Port. The site area is defined by the following coordinates: 32° 56' N 34° 36' E.

2.2 Site Conditions

The work covered by this specification includes the furnishing of all labour, equipment, appliances and materials and the performance of all operations required in connection with dredging, transporting, disposal of contaminated dredged material, pumping sand by floating pipeline to land, building containing bunds and spreading the sand material, completely in strict and full accordance with this specification and the applicable drawings, and subject to the terms and conditions of the Contract.

The Contractor, by submitting his offer, declares that he is acquainted with all work details and site conditions concerning wave climate, sea state duration, tides, currents, winds and other meteorological, geotechnical and environmental data as well as with the ship traffic to and from the Port and any and all interaction with the works to be performed.

The sea conditions in the area of Ashdod Port and Netania have been investigated in a number of surveys and studies and have been summarized and presented in reports, made available for the Contractors' inspection at MCCP's office.

Soundings have been carried out and bathymetric maps of the borrow pit and nourishment areas have been prepared by the MCCP and made available to the Contractor.

The geotechnical data in the area of the works have also been investigated and the relevant reports have been made available for the Contractors' inspection at MCCP main office. Contractor's Responsibility

All the above-mentioned data are given or made available for inspection to the Contractor in good faith and it is understood and agreed that any validation and/or interpretation of the said data is the Contractor's sole and absolute responsibility and that he may elect to make soundings, vibro-cores, borings, collect seabed samples or obtain additional information.

The Contractor acknowledges that he has visited and examine the site, reviewed the works, and sand gradation curves.

It is further understood and agreed that the Contractor shall make no claim for additional compensation over his price proposal unit prices, irrespective of the nature of the material and/or its silt content (percent of fines passing ASTM sieve No. 200) and/or hard layers actually encountered, whether he did or did not obtain additional information.

It is further understood and agreed that the Contractor shall make no claim for additional compensation over his price proposal unit prices, arising from weather and/or sea conditions, ship traffic from and to the port.

The Contractor is fully responsible for the safety of all permanent and temporary structures during all phases of his operations including buoys.

Any damage caused to these structures as a result of his operations shall be repaired at his own expense. The Contractor shall pay special attention and operate with utmost care, while dredging along and/or adjacent to the Ashdod Port Main Breakwater, in order to avoid inflicting any damage to it

Should any type of these events occur, the Contractor shall immediately stop dredging, notify the MCCP and proceed with his dredging operations according to the MCCP's written instructions.

All operations shall be carried out in such manner as to cause no interference with port operations traffic and navigation in the approach waterways. It is understood and agreed that the Contractor has taken into account in preparing his proposal that other Contractors will be carrying out works on behalf of Israel Ports and/or Ashdod Port Companies, as well as Israeli Navy and/or others. These works may take place in the same areas and/or adjacent to the Contractor's ones. The Contractor is deemed to have taken into account all costs in this respect, including coordination with other Contractor's activities as well as cooperation with the MCCP and complying with its written instructions.

The equipment to be used in the dredging works is subject to approval by the MCCP, before commencing the works.

The Contractor shall submit for the MCCP's approval a detailed Method Statement, not later than thirty calendar days before the actual start of dredging works, as instructed by the MCCP in the first Task.

The MCCP shall have the right to request the Contractor to submit a Method Statement for each and every following Task.

The MCCP shall review the documents submitted by the Contractor and shall instruct the Contractor to introduce the required amendments and/or additions, so that, to the sole discretion of the MCCP, the Method Statement fully complies with these Specifications.

Works shall commence only upon approval of the Method Statement by the MCCP. The Method Statement shall be binding and shall not be modified without the MCCP's written approval.

Approval of the Method Statement shall not be construed as relieving the Contractor from any and all his contractual responsibilities and obligations.

The Method Statement shall include the following items, which are considered compulsory in order to comply with these Specifications.

- a. Description of dredging equipment, auxiliary plant and tools.
- b. Methodology to be applied for:
 - Dredging and dumping, including horizontal and vertical control systems.
 - Pumping ashore, building containing bunds and spreading of sand material on-shore.
 - Water quality control, including turbidity monitoring and reporting.
 - Bathymetric survey data acquisition and processing, including horizontal and vertical control systems and calibration procedures
- c. Quality control procedures.
- d. Signed CV's of Project Manager and Surveyor/Hydrographer.
- e. List of key Personnel.
- f. Health and safety precautions and procedures.
- g. Manufacturer's data sheets of bathymetric survey and turbidity monitoring equipment (hardware and software), dredging equipment, etc.
- h. list of the equipment he proposes to use for dredging operations; this list is subject to the M CCP's approval.

The Contractor may make any additions or deletions to the approved equipment list, only after receiving prior approval by the M CCP.

Notwithstanding the above, the Contractor is at all times solely responsible to ensure that the equipment he provided is suitable to carry out the dredging and disposal works.

3 CONTRACTOR'S FLEET

All floating equipment and plant shall be accompanied by certificates proving their seaworthiness, their suitability to operate in the conditions foreseen in the Contractor's method statement and their compliance with Israeli safety and anti-pollution regulations. All these certificates according to the local regulations in Israel shall be issued by internationally recognized Authorities, shall be valid for the period of their intended use and shall be acceptable to the competent Israeli Authorities, Ministry of Transportation, Shipping and Ports Authority and Ministry of Environmental Protection. Failure to comply with this requirement will be no reason for delaying the works. All dredging and survey vessels shall have AIS, which shall continuously transmit during the execution of the works.

The TSHDs shall be equipped with two propulsion units and one bow thrusters and shall develop an average cruising speed to and from the disposal sites of at least 9 knots.

Should the downtime of one TSHD reach a number of downtime days, due to mechanical and/or hydraulic and/or other type of breakdown as well as crew replacement, fueling, etc., amounting to more than 15 calendar days in each sand nourishment Task, the MCCP shall have the right to instruct the Contractor to deploy another TSHD, in lieu of the malfunctioning one and with the same or higher capacity, as defined above, to his sole and own expenses. The Contractor shall comply with the MCCP's written instruction not later than two weeks from the date of the said instruction.

4 ENTRANCE PERMITS TO THE PORT

Entrance to all ports is subject to obtaining entrance permits for the Contractor's personnel, according to the existing regulations in each and every Port.

The Contractor shall submit to the MCCP, not later than three days upon receiving the Order of Commencement, a detailed list of his personnel, including sub-contractors. Obtaining entry permits in compliance with the relevant regulations shall be carried out by the Contractor in coordination with the MCCP.

5 KEEPING THE SITE CLEAN

The Contractor shall at all times be responsible for the proper upkeep and maintenance of the site and the works.

The site and the works shall be kept free from all rubbish and offensive matter, which shall be disposed of in a manner agreed by the MCCP. The Contractor shall not burn, nor permit to be burned, any material on site without the written consent of the MCCP on each and every occasion.

The Contractor shall not discharge into the sea any oil, solid and/or liquid noxious or floating materials and all water discharged shall be free from foreign matter or any other type of material. All sanitary sewage and litter of any kind shall be disposed at approved land site installations.

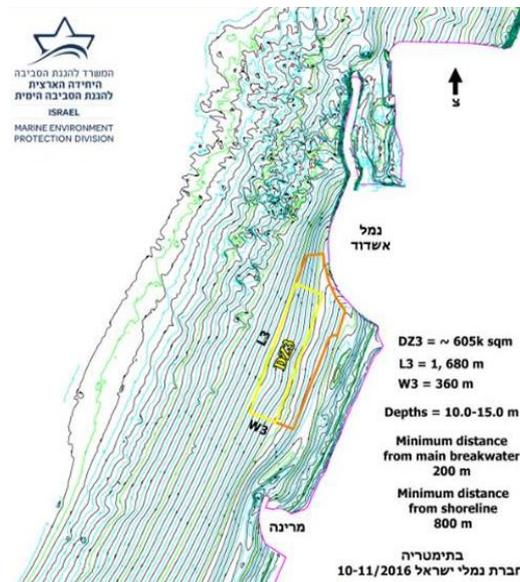
All activities included in this paragraph and whatever needed to remove from the site all rubbish shall be at the expense of the Contractor and in full and strict compliance with all environmental regulations.

6 SCOPE OF WORKS

6.1 Dredging in Borrow Pit

Dredging works in Borrow Pit shall be performed by sailing in a North-South direction, starting at the western edge of the polygon, marked on the drawings. Upon reaching a cut depth of 1 m, the dredging path shall be moved to the east. Dredging shall be performed so that the dredged area, including the whole length of the slopes, shall not exceed the limits of the marked borrow pit.

Dredging operations shall strictly comply with the environmental regulations set forth in these specifications.



The M CCP anticipates that the execution of the dredging and nourishment shall be executed during Spring season (March through May) and/or Autumn season (September through November). However, the M CCP shall have the right to instruct the Contractor to also carry out the Works during other periods, without any extra cost to the M CCP.

Material to be dredged includes sand and/or silty sand with varying amount of fines content (passing sieve #200).

Prior to commencing dredging, but not later than one month before the date of the Order of Commencement for each Task, the Contractor shall obtain sea-bed samples, and test them in the laboratory, according to the environmental regulations, to determine whether the material is contaminated or not. The laboratory tests certificates concerning the presence of contaminated sand material shall be submitted by the Contractor to the M CCP.

Should the laboratory tests results determine the presence of contaminants, the Contractor shall submit for approval a dredging schedule with the purpose of avoiding dredging un-

suitable material and removing the contaminated material, transport and dump it at the Alpha dumping site.

The dredging shall be carried out by deploying a Trailing Suction Hopper Dredger, (TSHD) with a minimum hopper volume of 3,000 m³. This requirement is a fundamental contractual one in order to comply with a monthly sand nourishment volume **of at least 80,000 m³**.

The TSHD shall have On-Line, Real-Time dredging monitoring system with continuous direct link to computers at MCCP's , Supervisor's and Consulting Engineer's offices.

6.2 Pumping ashore and placing fill nourishment

The pumping ashore and placing fill nourishment method shall be proposed by the Contractor and approved by the MCCP, provided that it complies, but not limited to, with the following requirements:

- a. Design of the floating pipeline, including the offshore connection to the dredger, shall be based on a design wave height corresponding to a return period of at least 10 years, relevant to the actual working period of the year and based on long term wave recording off Shikmona coast at Haifa. MCCP will provide data based on 1993-2019 period of wave recording to enable the Contractor to determine the required design wave height at the unloading point in Netania and along the pipeline track. It is the Contractor's sole responsibility to determine the required design assumptions so that the unloading and conveying operations are carried out safely and with no interruptions.
- b. Land arrangements for the pipe shall enable easy shifting along the sand nourishment coastal stretch and allow for construction vehicles traffic. The Contractor shall submit for approval a drawing showing his proposed scheme for the position of the dispensing pipe and the works required for spreading the material with utmost efficiency and minimizing sand losses.
- c. The method shall be coordinated with the Contractor "Maagan" and/or any other Contractor, to whom MCCP has awarded the contract for the execution of the detached breakwaters. The coordination works and schedule shall be submitted for approval by the MCCP, in writing. The coordination shall include all safety measures required, such as but not limited to, signs, fences, warning signs, etc. approved by a registered safety engineer and submitted to MCCP for approval.
- d. Pumping and spreading sand fill working hours shall comply with the limitations set forth by the Nature and Parks Authority, during the turtle nesting season of sea turtles, as follows:
 1. Pumping ashore work will be allowed between 7:00 and 23:00, or in accordance with specific daily instructions of the inspector of NPA, during the

whole nesting season starting May 1st. thru August 31st, to enable NPA supervisors to collect turtles' eggs from nesting places. The Contractor shall resume work upon receiving M CCP's clearance.

2. Night work permit is subject to Ministry of Environmental Protection and NPA's written approval.

- e. Containing bunds shall be designed so that the loss of sand material is kept at an absolute minimum.
- f. Spreading of sand shall comply with the details indicated on the drawings and the specified tolerances hereinunder.

7 MOBILIZATION AND DEMOBILIZATION

7.1 Scope

The work includes the furnishing at the site of all vessels, equipment, materials and labour required for the execution of the works and to remove all plant, equipment and materials, including clean up of the premises at the end of the work on Site.

Mobilization and Demobilization for the works under this chapter, will be measured and paid under different pay items, as described below:

- a. Dredging from borrow pit at Ashdod, transporting to Netania, pumping ashore, building containing bunds and spreading sand material for the first Task.
- b. Ditto but for the second Task.

7.1.1 Description of the Work

Mobilization shall include the following:

- a. Assembly, preparation and loading for shipment of all equipment at the Contractor's home station or source of supply.
- b. Transportation of plant, equipment and material from the home station or source of supply to the site.
- c. Unloading and installation, ready to operate, of all equipment and whatever else required for the execution of the dredging and disposal of dredged material works.

- d. Provision and maintenance during the Construction period land and sea transportation equipment including crew, where and when necessary, for the use of the MCCP on Site.
- e. Installation, setting up and maintenance of fixed survey reference points, linked to the existing National GPS grid.

Demobilization shall include the following:

- a. The dismantling, preparation and loading for shipment of all Contractor's equipment at the site.
- b. The transportation of all above equipment and materials from the site to the home station.
- c. The clean-up of the Site and Work area in a satisfactory manner and removal of materials, debris, waste, etc. from all areas, and make good damage or temporary alterations to buildings or installations to the total satisfaction of the MCCP.
- d. The description given in this paragraph is stated in brief; the Contractor must study the whole of the conditions of contract documents and make allowances in his bid for any work and services not especially itemized in the above or in any other pay items in the specifications and which he considers to bear a monetary value.

8 ORDER OF WORK

8.1 Sequence of Activities

Upon receiving the Work Order as detailed in the Agreement, the Contractor shall submit for the MCCP's approval his detailed schedule and receive the MCCP's approval to proceed. The Contractor shall not dredge or dump, outside of the prescribed limits, unless approved in writing by the MCCP.

The schedule of operations shall include detailed and specific references concerning the required coordination with the different authorities, other Contractors' work, etc., fully complying with the requirements set forth in the relevant chapters of these Specifications.

8.2 Coordination with Harbour Master

All dredging operations including disposal of dredged material, etc. are to be carried out in continuous coordination with the Ashdod Port Harbour Master, Ministry of Defense and Is-

raeli Navy, who shall have the right to direct the M CCP to amend the Contractor's schedule of operations in order to suit Port and Navy operations and the Contractor shall amend his schedule of operations accordingly.

The Contractor hereby declares that he has satisfied himself with the information available at the Ministry of Transportation, Shipping and Ports Authority (<http://asp.mot.gov.il/he/>) concerning records of arrivals and departures of ships at Ashdod Port.

It is understood that the ship traffic information so obtained, is given to the Contractor in good faith and that any interpretation of the information is the Contractor's sole responsibility.

The Harbour Master has the right to instruct the Contractor, at short notice, to clear any part of the waterways from his floating equipment and the Contractor shall duly abide to this instruction at the Contractor's sole expense.

8.3 Marking of Sea Site

The Contractor shall at his own expense mark with buoys and lights during the whole period of the works, day and night, the locations of his anchors, lines, craft, etc. and he shall bear the sole responsibility for clearly denoting the presence of these obstacles to all traffic in the vicinity, in full and strict compliance with International Regulations.

The buoys and marks shall comply with the instructions issued by the Shipping and Ports Authority.

Lighting shall comply, inter-alia, with the following:

- Minimum of two red lights, visible at 500 meters.
- The lights shall not cause any blinding.

8.4 Fleet Servicing

The Contractor will be requested by the Port company to pay various fees, as defined in the regulations ("Anchorage Fee"). The Contractor will bear all fees and dues.

All port dues, in connection to removal of garbage, supply of fresh water, collection of bilge water, renting of storage space, berthing times for bunkering & repairs, expenses, etc. shall be to the Contractor's own account

8.5 Weather Down-Time

In preparing his proposal the Contractor will allow for the influence of weather and sea conditions on his operations, mooring and servicing facilities as described above.

He will receive no compensation for loss of time or stand by compensation due to the effect of adverse weather and sea conditions and/or working hours limitations as detailed in above.

8.6 Plant Positioning

The Contractor shall propose and submit for approval to the M CCP, a method of fixing the positioning of the dredging plant, in order to secure that dredging is accomplished within the required tolerances. Such method shall allow for a record to be kept of the location of such plant at all times by means of a continuous GPS recording. The Contractor shall submit to the M CCP monthly reports including records of his Plant position during the past month of operations.

9 DREDGING AND SAND NOURISHMENT

9.1 Materials to Be Dredged

Dredging shall be carried out in any and all material (silt, sand, clay, of all types), encountered at any depth of dredging. the upper 1 m thick sea-bottom sand layer (see paragraph 2 above).

The Contractor shall carry out on board, three PSD test for each TSHD load. The tests shall be executed by Laser Particle Size Analyzer. Should the mean of the three tests show a D_{50} value below 120 microns, the Contractor shall dump the full load on the existing beach, i.e. above +0.50 m elevation, by preparing the required bunds and/or closed areas with appropriate drainage pipes, prior to commencing the pumping ashore operation.

The Contractor shall submit to the M CCP a weekly report of the PSD test

9.2 Clay layers

Should clay layers be encountered, the Contractor shall immediately notify M CCP, prepare a mapping of the area covered by said layers, abandon that part of the borrow pit and switch to a suitable path in the dredging area.

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It is understood that the Contractor has inspected existing soil data information and has satisfied himself about the type of clay he may encounter and has considered the relevant impact on the dredging operations and included all required costs in submitting his unit prices.

9.3 Stones

Stones having a dimension of 40 cm may be left on the seabed. All other stones shall be removed, stacked on deck and disposed of at the Alpha disposal area and/or any other off-shore disposal site as approved by the relevant authorities. at no extra cost to MCCP.

The stone dimension is defined as the largest of the three main dimensions along perpendicular axis.

10 COMPLIANCE WITH ENVIRONMENTAL REGULATIONS

Without derogating from the Agreement, the Contractor declares and accepts that the whole dredging, disposal of dredged material of any type, pumping ashore, building containing bunds, storing sand material onshore and spreading sand nourishment shall be carried out under the instructions of the MCCP and the Ministry of Environmental Protection, Sea and Coast Division.

The Contractor will execute the works in strict compliance with these instructions, as issued in writing by the MCCP and / or the Ministry of Environmental Protection authorized representative.

These instructions include, inter-alia, the following (see also Section I, Annex 1):

- a. The doors of hoppers shall be equipped with devices monitoring their sand tightness and indicating loss of material through it. Prior to commencing dredging, the Contractor will carry out testing of the hopper doors tightness of all his equipment of this kind. The test will be done by a chartered naval architect, which will duly issue a certificate to the MCCP and the Ministry of Environmental Protection.
- b. The cost of the test and certificate will be borne by the Contractor.
- c. The sailing route to and from the pumping site at Netania and dumping site (Alpha) shall be approved by the Shipping and Ports Authority Ashdod Harbour Master and the Israeli Navy, fully comply with navigational regulations and shall be recorded by DGPS.
- d. The dredger shall be equipped with a suitable device to ensure accurate positioning of the drag head and avoid unnecessary over dredging.
- e. The dredger shall be equipped with under keel overflow and green valve.
- f. The dredger shall be equipped with AIS system.
- g. Debris collecting container, positioned on deck.
- h. The use of towed hopper barges is absolutely forbidden.

- i. The M CCP and / or the Ministry of Environmental Protection supervisors, at their own and sole discretion, will take samples of the dredged soil and the Contractor will provide at his own expenses, the required equipment and / or labour.
- j. The Ministry of Environmental Protection supervisors and/or the M CCP's representatives will be allowed on board the dredger(s), at their request, at any time and without giving any notice. The Contractor shall allocate suitable accommodation on board for the use of the supervisor during the whole period of work.
- k. The Contractor will supply, at his own expense, the required means of transportation for the supervisors reaching and leaving the vessel.
- l. Should the dredging activities cause any environmental pollution and / or hindrance and the authorized Ministry of Environmental Protection official issues an injunction, stopping the dredging works, the Contractor shall immediately stop any dredging and/or dumping operations. The stoppage will be solely at the Contractor's expense.

11 *SUNKEN OBJECTS AND/OR WRECKS*

During the course of the dredging operations, the Contractor may encounter objects and/or wrecks on or in the seabed, within the areas to be dredged, of a size larger than those which can be raised by his dredging equipment. He shall immediately map the location of the sunken object and/or wreck and establish its dimensions, inform the M CCP of its existence including all relevant details and proceed with his routine dredging operations and/or abandon that part of the borrow pit and switch to a suitable path in the dredging area.

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The M CCP will decide by what means and by whom the object shall be raised.

Sunken objects which can be raised by the Contractor's equipment shall be raised by it, and shall be disposed of with the contaminated dredged material, unless instructed to the contrary by the M CCP.

No special payment will be made for raising sunken objects during normal dredging operation, nor will the Contractor be compensated in any manner for locating and mapping objects that cannot be raised nor shall it be a reason for any other claim and/or delay in the completion of the works.

12 *TOLERANCES*

12.1 Dredging in the borrow pit

Dredging into the borrow pit shall be carried out to a depth of 1m from the existing sea bed according to the pre-dredge survey with a vertical tolerance of 0.25 m, i.e. a maximum dredging depth of 1.25 m.

At the completion of each phase of the works, the levels and the slopes of the sand nourishment, shall be as specified on the drawings or as directed by the M CCP.

11.2 Sand nourishment

The lines shown on the drawings indicate theoretical boundaries. Sand nourishment shall be carried out to a depth equal to or below the specified level as indicated in the drawings, with the following tolerances.

Vertical tolerance

Sand nourishment will be accomplished within 20 cm. above and 10 cm. below the design levels shown on the drawings or as directed by the M CCP.

Horizontal tolerance

The sand nourishment +0.50 contour, as indicated on the drawings shall be -1 m/ +3m, the positive direction measured towards West, i.e. increasing distance from the cliff toe.

Slope tolerance

Slope tolerances are defined by two theoretical lines, parallel to the theoretical slope denoted on the drawings, drawn from the horizontal tolerance points on the theoretical bottom level, as applicable and in accordance with the definition sketch included in the drawings.

In case of any contradiction between the different definitions of tolerances, the vertical one shall prevail.

13 STAND-BY TIME

The Contractor shall take into account, while preparing his offer, the duration of stand-by periods of his equipment, crew, installations, etc. between the various stages of the works and/or due to weather and sea conditions, Harbour Master's instructions in connection to Health and Safety, navigation restrictions, port traffic, surveys, maintenance & repair of his equipment, bunkering, organization or scheduling problems, non-compliance with environmental requirements, failure by the Contractor to obtain any required permit by any Authority, religious, national or other Israeli holidays, industrial strikes, etc.

14 SURVEY, EXAMINATION AND ACCEPTANCE

14.1 Setting Out

The Contractor shall prepare during his Mobilization period and maintain during the contract period, all at his own expense, base lines and reference lines by which he shall perform his dredging and sand nourishment operations and from which soundings shall be made. Base and reference lines as well as the location and distances between the lines to be surveyed shall be coordinated with the M CCP and approved by him, before they are set out.

All base and reference lines shall be connected to the Survey of Israel GPS reference lines, approved Bench Marks and levels.

14.2 Dredging

Soundings have been carried out and bathymetric and topographic maps of the areas to be dredged have been prepared by M CCP during the Task Mobilization Period.

Two weeks before commencement of any dredging, the existing seabed depth shall be established in the borrow pit area by means of a first survey carried out by the Contractor and witnessed by the M CCP, to the Contractor's own account.

The Contractor shall submit for the M CCP's approval, a list of his surveying personnel, headed by a certified Hydrographer.

All surveying works shall comply with the recommendations of the International Hydrographic Organization (IHO).

The area to be surveyed shall be as indicated on the drawings.

This first survey, to be also extended to areas of sand nourishment, as instructed by M CCP, but not including Alpha, shall be on the account of the Contractor who shall provide a survey vessel, the necessary equipment, instruments, labour and crew for sea and/or land survey including a multi-beam echo-sounder.

This instrument shall record soundings with a vertical accuracy of +/- 10 cm and a horizontal one of 0.50m. The spacing between points to be sounded shall be along paths at 10-meter intervals and additional, perpendicular paths, at 20 meter intervals.

The maps, submitted to the Employer, jointly signed by the M CCP and by the Contractor, shall form the base for evaluation of volumes of dredging to be made by the Contractor.

This evaluation **is not for payment purposes** but for overall control and data acquisition to be submitted to the regulatory authorities.

During the progress of the work, acceptance of the sand nourishment will be established by soundings. Such soundings will be conducted as soon as practicable, after the completion of each phase of the work as determined by the MCCP. Any work disclosed by these examinations as not being in conformance with the specifications and drawings shall be corrected by the Contractor without additional compensation.

These intermediate surveys shall be entirely on account of the Contractor, who shall provide a survey vessel, the necessary equipment, instruments, labour and crew for sea and/or land survey, including a multi-beam echo-sounder and related hardware.

In addition to the examinations referred to above and as a prerequisite for the issuing of a Certificate of Acceptance, the final survey at the areas to be dredged, extended also to areas of sand nourishment, shall be jointly executed by the MCCP and the Contractor, on account of the Contractor.

If the results of the final survey will show that the works have not been executed according to the specifications, the cost of the subsequent surveys shall be in accordance with this clause and at the Contractor's expenses.

All surveys described above shall be to the Contractor's sole expense.

The following maps shall be prepared:

- a. Map of the existing sea bottom to a 1 in 1000 scale, measured prior to any dredging and sand nourishment operations being carried out.
- b. Final maps of the borrow pit sea bottom to a scale of 1 in 1000, for the final acceptance by the MCCP.
- c. Final 3D Imaging color maps to a scale of 1 in 1000 and in 20 m resolution for the sand nourishment areas.
- d. Sections for acceptance of the sand nourishment at 50 meters intervals, to a undistorted scale of 1 in 50 horizontal, shall be drawn by the Contractor on his own account and submitted to the MCCP for approval.
- e. All sounding which will form the base of the maps will be related to Land Survey Datum, after correction of tide. All maps, sections, etc. will be drawn on tracing paper and submitted to MCCP, including AutoCAD compatible files.
- f. Depths will be measured, recorded and signed by the MCCP and the Contractor prior to and at the completion of each sand nourishment stage.

- g. All surveys shall be carried out by a team headed by a certified Hydrographer who shall carry out supervision of the field work, data acquisition, analyses and processing of data, preparation of charts, etc. and shall duly sign all documents.

Notwithstanding the above, the M CCP shall have the right at any time, to carry out surveys by a registered hydrographer, at his own expense. The M CCP will inform the Contractor about the execution of the surveys and the Contractor will be entitled to witness their being carried out. The surveys so obtained, shall be the governing ones for quantity computations and acceptance of the Works.

15 MEASUREMENT AND PAYMENT

Unit prices shall include relevant costs for equipment, materials, personnel, surveying, water quality monitoring, any and all additional expenses and the specific items listed herein below, necessary for the complete execution of the work as specified.

15.1 Mobilization and Demobilization

Will be paid for per complete unit (l.s.) under the relevant items in the Bill of Quantities.

Payment will be in two stages:

85% for Mobilization.

15% for Demobilization.

The Mobilization will be paid for upon the Contractor has fully complied and obtained the M CCP's approval for each and all of the following activities:

- a. Arrival at site, assembly, ready to operate, of all equipment included in the detailed list for each Mobilization and Demobilization items in the Bill of Quantities, according to the requirements.
- b. Completion of construction and erection of all facilities and installations including but not limited to, establishment of fixed points, laying floating and/or land pipelines, etc.
- c. Actual and effective start of operations.

Demobilization will be paid after the Contractor will fully comply with the requirements of these Specifications, to the full satisfaction of the MCCP and the MCCP will issue the Certificate of Acceptance of the Works.

The mobilization-Demobilization unit price shall not be higher than 20% of the total amount of the Contractor's proposed complete Bill of Quantities.

15.2 Dredging, transporting, pumping and spreading sand nourishment

Dredging sand for sand nourishment shall be measured by volume, cubic meters of material dredged, transported and placed in the specified locations, to the full satisfaction of the MCCP and approved by him, according to the method defined herein below.

The Contractor shall prepare and submit for the MCCP's approval, a detailed calibration chart of the vessel's hopper to be deployed, surveyed and certified by an independent chartered Israeli naval surveyor, approved by the MCCP. The MCCP will review the chart and instruct the Contractor to incorporate required modifications and/or additions. The Contractor shall submit a final calibration document for the MCCP's final approval. The approved calibration chart shall be binding. All expenses incurred in the preparation and final approval of the calibration chart shall be to the Contractor's own account

The volume shall be computed based on survey of the settled material in the hopper. The survey shall be carried out manually by the Contractor, in the presence of the MCCP's representative, prior to starting pumping ashore. Any material remaining in the hopper after pumping (Residual volume) shall be subtracted from the surveyed hopper volume quantities.

The unit price shall be deemed to include all costs for the dredging, re-dredging, conveying, pumping, building containing bunds and spreading sand at the sand nourishment site, bulking, maintaining of the nourished areas throughout the Contract period, calibration of hoppers and full compliance with the Environmental regulations and instructions, surveys, records and reports of hopper loads measurement, removal of stones in the pumps and/or the hopper or any other work related to stones of any size and any other operation required to complete dredging and disposal at sea works in accordance to the specifications and to the full satisfaction of the MCCP.

15.3 Removal of sunken objects and/or wrecks

Removal of sunken objects and/or wrecks, if instructed in writing by MCCP, will be measured for payment as a complete unit (unit). The unit price shall be based on a detailed breakdown submitted by the Contractor and approved by MCCP.

The unit price shall be deemed to include all equipment and labour, necessary for the removal, handling, transporting and disposing of at an authorized dumping site of the sunken object and /or wreck. The unit price also includes all required surveys, inspections, obtaining permits and approvals and any other work arising from the instructions of the competent authorities, as specified in this specification.

TENDER No.

Part 2, Schedule A, Section I, Annex 1

ENVIRONMENTAL PROTECTION REQUIREMENTS

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1. FOLLOWING LAWS AND ORDINANCES

- 1.1. The Contractor must fulfill all directions and statutes regarding protection of the environment.
- 1.2. The Contractor must adhere to all legal mandates and all that derives of these, and any law in place at the time that work is carried out.
- 1.3. Without diminishing from following these laws, the Contractor must follow, at his own expense, all conditions and all preventative measures, required by any authority, including issues of planning and construction, business licensing, poison control, sanitation, cleanliness etc., regarding the execution of the work.

2. KEEPING SITE CLEAN

- 2.1. The Contractor shall at all times be responsible for the proper upkeep and preservation of the site and the works.
- 2.2. The site shall be kept free from all rubbish and offensive matter, which shall be disposed of to an authorized dump site according to the regulations of the Ports, MEP, and all other authorities having jurisdiction. The Contractor shall not burn, nor permit to be burned, any material on site, without the written consent of the MCCP on each and every occasion.
- 2.3. The site shall not be used for storage of materials other than those to be used in the execution of the works.
- 2.4. Materials and equipment shall be positioned, stored, and stacked in a safe and orderly manner.
- 2.5. The Contractor shall not discharge into the sea, soil, or aquifers, any oil, solid, noxious, or floating materials, and all water discharged shall be free from foreign matter.

- 2.6. All equipment, materials, and other goods shall be removed from the site when no longer required for the purpose of the works .
- 2.7. All activities included in this Annex 1 and whatever needs to be removed from the site, including all rubbish, shall be at the expense of the Contractor.

3. COMPLIANCE WITH ENVIRONMENTAL REQUIREMENTS

3.1. GENERAL

- 3.1.1. The MCCP is negotiating a ‘Sand Nourishment Permit’ for the works with the MEP and is awaiting instructions as to the precautions to be taken during dredging, pumping sand ashore, building bunds and spreading sand activities in order to control noise, dust, water pollution, etc., and to avoid any pollution. Some of these instructions are indicated in the following paragraphs, but are subject to change on receipt of the relevant ‘Sand nourishment Permit’.
- 3.1.2. The Contractor shall be responsible for carrying out his activities in such a way as to comply with all relevant requirements.
- 3.1.3. Any failure in so doing and any measure and/or instruction by the MEP supervisor(s) arising from the Contractor's failure, shall be the Contractor's sole responsibility.
- 3.1.4. The MCCP shall not be responsible for any stoppage to the works imposed by the MEP supervisor(s) consequent to the Contractor's failure to comply with the requirements herein.
- 3.1.5. The above stoppage(s) shall not constitute reason to extend the execution period and/or to support any claim by the Contractor.
- 3.1.6. In order to be allowed to operate at the site, the Contractor shall submit to the MCCP, for approval, a plan showing the measures taken to comply with all specified environmental aspects.
- 3.1.7. All installations and activities referred to in this Annex 1 (those which are not specifically mentioned in the Bill of Quantities) shall be at the Contractor's expense .

3.2. AVOIDANCE OF SEA AND FRESH WATER POLLUTION

- 3.2.1. The Contractor shall carry out the Works in such a manner as to minimize any adverse impact on sea water quality throughout the execution of the Works. In particular, he shall devise and arrange his method of working to minimize any adverse impact on water quality within the area of the Site and on adjacent transport routes to and from the Site.
- 3.2.2. All marine equipment shall use the existing Port facilities for refueling, removal of bilge water, removal of solid waste, sewage, etc. The Contractor shall make arrangements with the Port to carry out these operations.
- 3.2.3. Handling of marine equipment, engines, etc. shall not be performed near the water, but in a remote area where care shall be taken to avoid pollution of soil, ground water, and/or sea water .
- 3.2.4. Pollution of sea water shall be forbidden .
- 3.2.5. The Contractor shall have basic equipment on site to deal with sea pollution according to the requirements of the MEP (see also sub-paragraph 2.3 below). This equipment shall be ready to operate at any time, and to block and/or pump oil spillage from the sea, in case this might occur .
- 3.2.6. All floating craft used by the Contractor shall be equipped with a proper sanitary system.
- 3.2.7. In the Contractor's on-shore Area, care shall be taken to avoid the washing of unsuitable materials to sea during rainfall .
- 3.2.8. The Contractor shall obtain the standard procedures, if available, of the MEP, Sea and Coast Division, the Employer and the Port, and on this basis shall develop a manual indicating his actions in case sea pollution occurs.
- 3.2.9. Fueling of land operated equipment shall be by a fuel tank placed above ground level on an impermeable container, whose volume shall be 1.1 times the fuel tank volume, underneath the fuel tank, in case leakage occurs.
- 3.2.10. The Contractor shall bear all damages and expenses caused by his negligence.

- 3.2.11. Rubbish and litter, such as rubber tires, ropes, chains, iron or metal scrap, wood, plastic containers, etc., shall not be disposed of at sea but shall be collected into a container to be located on the dredging vessel, and shall be disposed at an authorized dumping site on shore. Only material approved in the dumping permit application may be discharged at the placement site at sea, including non-contaminated inert geological materials such as stones, rocks and the like.
- 3.2.12. The dredging vessel shall use computerized navigation equipment ('**Tracking Device**'), which shall keep a record of the route, by a GPS system, from the borrow pit to the placement and/or dumping site. These records shall be attached to the dumping reports.

3.3. MEANS TO DEAL WITH SEA POLLUTION

- 3.3.1. The Contractor shall provide and have available on site (or shall enter into a Contract with a company owning and operating such equipment in the Port) the following equipment to deal with incidences of sea pollution:
- a) Oil Absorbent Boom ;
 - b) Absorbing Material.
- 2.3.2. Each sea-going vessel shall maintain on board a treatment kit and contingency plan to deal immediately with any pollution event.

3.4. AVOIDANCE OF AIR POLLUTION

The Contractor shall ensure that the level of emission of small particles into the air shall not exceed the threshold values established by the applicable regulations, during all his working phases.

3.5. REMOVAL OF WASTE AND DEBRIS

- 3.5.1. All waste and debris accumulated on site shall be stored in waste containers and removed from the site to an authorized dumping site.
- 3.5.2. Used oils shall be returned to the supplier for recycling.

4. DREDGED MATERIAL DISPOSAL AT SEA

- 4.1. The rules and regulations for the prevention of marine pollution by dumping of waste and other materials at sea are applicable to the dredging and/or disposal/and or placement operations. These include, but are not limited to:
 - a) Israeli Law for the Prevention of Sea Pollution 1983 ;
 - b) Israeli Regulation for the Prevention of Sea Pollution 1984.
- 4.2. The Contractor declares and agrees that the dredging, transportation, disposal and placement operations shall be carried out under the supervision of the MCCP and/or the Ministry of Environmental Protection (MEP), Marine and Coastal Environment Division.
- 4.3. The Contractor shall perform the Works in strict compliance with all:
 - a) Applicable prevention of pollution and environmental rules and regulations;
 - b) Instructions of the '**Dredging and Nourishment Permit(s)**' issued by the MEP preceding each dredging task;
 - c) Instructions of the MCCP and/or the Consultant and/or Laboratory (as described in chapters 9-11 below).
- 4.4. All required actions and/or instructions referred to in this document are specifically brought to the attention of the Contractor, emphasized, and shall be carried out under the full responsibility of the Contractor for their performance and are taken into account in the payments to the Contractor. The Contractor shall include in his prices in the Bill of Quantities all and any costs to cover all turbidity monitoring and water pollution control during each dredging task as specified hereafter.

5. DREDGERS' PERFORMANCE

- 5.1. All dredging equipment to be used by the Contractor shall be equipped with an echo sounder and with a recording differential positioning system (DGPS) and other navigational aids like radio communication, etc. The Contractor shall maintain a detailed record of each dumping and/or discharge, including date, hour, and exact position, as determined and recorded by the DGPS.
- 5.2. The track lines, coordinates (in New Israeli Grid and Lat/Lon) and times of the dredger(s) shall be stored automatically and electronically ('**Tracking Device**') at least once per five (5) minutes and the data must be submitted to the MCCPs' representative once per week in a suitable electronic format. In addition, the **Tracking Device** shall be able to relay online the position(s) of the dredger(s) continuously to the office of the MCCP's representative and/or to the MEP. All relevant costs, including installation of hardware and/or software, shall be borne by the Contractor.

6. OVERFLOWING AND/OR DISCHARGING

- 6.1. Disposal of dredged materials is only permitted in the designated areas.
- 6.2. The overflow system of the TSHD must exit below the keel of the ship. Overflow systems with discharge on or above or near the sea surface shall not be permitted on site.
- 6.3. In general, overflowing shall be allowed only on a limited and/or reduced scale. In particular, the flumes of suspended particles, Total Suspended Solids (TSS) and turbidity levels resulting from the dredging activities must be controlled and limited in accordance with the requirements in these Technical Specifications and in accordance with further instructions by MEP.
- 6.4. The TSHD overflow levels inside the hopper shall be remotely adjustable from the bridge (constant tonnage system).
- 6.5. The use of Poor Mixture Overboard System of TSHD is not permitted.

- 6.6. Flushing/cleaning/jetting of the deck and/or the hopper of the dredger shall not be permitted within the Port boundaries and/or adjacent areas.

7. WATER POLLUTION CONTROL

- 7.1. The Contractor shall carry out the Works in such a manner as to minimize any adverse impact on the existing sea water quality throughout the execution of the Works.
- 7.2. The Contractor shall devise and arrange methods of working to minimize any unreasonable impact on water quality stemming from his operations and to meet the water quality requirements regarding turbidity, and shall provide experienced personnel with suitable training to ensure that these methods are implemented.
- 7.3. After commencement of the Works, if the Contractor's equipment or method of working are, in the opinion of the MCCP and/or MEP, causing serious water quality impacts, the MCCP may require that deployment of the Contractor's existing equipment be immediately adjusted to meet the water quality requirements, and the equipment or working method shall be reviewed, and remedial proposals drawn up and/or submitted by the Contractor for approval prior to being implemented.
- 7.4. If the MCCP and/or MEP find that the approved remedial measures have not been implemented and that serious impacts persist, he may direct the Contractor to cease related parts of the Works until the measures have been implemented and the Contractor's equipment and/or work methods have been modified accordingly. Any delays and/or costs arising from remedial measures to meet the water quality specification shall be entirely the responsibility of the Contractor, and no claims by the Contractor shall be entertained in connection with such a direction by the MCCP and/or MEP.
- 7.5. Before the marine plant is used in the works, the Contractor shall submit to the MCCP seaworthy certificates in accordance with the requirements of the State of Israel, including the Ministry of Transport and the MEP, for approval, and to ensure that the plant is suitable for the Project. The Contractor shall provide all necessary facilities to the MCCP for inspecting or checking such plant, and shall not use such plant for the Works without written agreement of the MCCP. The MCCP may require the Contractor to carry out tri-

als of any plant or vessel to prove its suitability. Marine plant found unsuitable by the M CCP shall be immediately removed from the site at the Contractor's expense.

- 7.6. The Contractor shall execute the works in strict compliance with the instructions, as issued in writing by the M CCP and/or the MEP's authorized representative. These instructions include, inter-alia, the following:
- a) Prior to commencing dredging, the Contractor shall carry out testing of the hopper door tightness for all his equipment of this kind. The Contractor shall provide proof of the sand tightness of all his hoppers and barges, prior to the start of dredging. All doors and valves shall be opened and closed three times, in order to remove all loose material from the hopper (sand, clay, wood, etc.) and the hopper or barge shall then be filled with water to the highest possible level. The water level shall be monitored for six (6) hours. No reduction of the water level should result. The test shall be performed by a chartered naval architect, who will duly issue a certificate to the M CCP and the MEP. The cost of the test certificate(s) shall be borne by the Contractor.
 - b) During the execution of the dredging works, the M CCP may instruct the Contractor to repeat the leakage test, if the M CCP suspects that there is leakage occurring. All such tests shall be to the account of the Contractor .
 - c) The M CCP's and/or the MEP's Supervisors, at their own and sole discretion, may take samples of the dredged soil, and the Contractor shall provide, at his own expenses, the required equipment and/or labor.
 - d) The M CCPs' and/or the MEP's Supervisors will be allowed on board the dredger(s), at their request, any time and without giving any notice.
 - e) The Contractor shall supply, at his own expense, the required means of transportation for the inspectors to reach and leave the vessel(s), all at his expense.
 - f) Should the dredging activities cause any environmental pollution and/or hindrance, and the authorized MEP official issues an injunction stopping the dredging and/or disposal works, the Contractor shall immediately stop any dredging and/or placement operations. The stoppage shall be solely at the Contractor's expense.
 - g) The Contractor will immediately take all measures to correct the cause of pollution, danger to people or other hindrance and will resume his dredging or placing activi-

ties only after the MCCP and/or MEP representative lifts his injunction in writing. The Contractor will bear all expenses incurred in correcting occurrences resulting from his activities.

- h) The Contractor shall give special attention to and comply with any and all instructions, regulations, procedures, permissions, laws and by-laws issued by the Israel MEP .
- i) The MCCP shall endeavor to obtain from MEP a valid '**Dredging and Nourishment Permit**' (written in Hebrew), allowing the Contractor to use his proposed dredging and marine equipment for this contract. If the MEP objects to the use of a certain piece of marine equipment, the Contractor shall replace it immediately with a suitable one, at his expense and responsibility. Such replacement shall not be a reason for delays.
- j) A copy of the valid '**Dredging and Nourishment Permit**' must be kept onboard of all floating plant and equipment. The Contractor shall explain the terms and conditions of the 'Permit' to all his officers, crew and personnel. If the officers do not speak Hebrew, the Contractor shall make a certified, written translation in the crew's native language, with a copy issued to the MCCP. The instructions in the 'Permit' must be strictly adhered to. Violations by the Contractor may have severe consequences, such as fines, suspension of works, etc.

7.8. Notwithstanding the above, the Contractor shall arrange and secure, at his sole expense, the relevant permits for the dredging and marine equipment, issued by the Ministry of Transportation and/or any other Israeli and/or foreign authority, before starting to work on this contract.

8. WATER QUALITY REQUIREMENTS

- 8.1. The requirement is to prevent any unreasonable impact resulting from the Contractor's dredging, transportation, pumping, disposal and/or placement operations on the water quality anywhere along the coast. To achieve this, the Contractor shall design and implement methods of working that:
- a) Prevent disturbance to the surrounding seabed while dredging;
 - b) Prevent loss of material during transport;
 - c) Prevent discharge of dredged material, except at the designated placement areas;
 - d) Prevent unacceptable deterioration in the water quality, causing adverse effects on marine life;
 - e) Prevent excess suspended solids from being present in any waters which may enter intake structures of the near power station and/or (future) desalination facilities;
 - f) Minimize the total suspended solid concentration, measured in a column.
- 8.2. The TSHD shall have remotely controlled adjustable levels of the hopper-overflow. This system shall be in good working condition at all times. The hopper-overflow shall be pulled-up to its highest-level during sailing from the borrow pit area to the placement area to prevent excess water in the hopper from being accidentally spilled into the sea.
- 8.3. At any time, turbidity flumes and/or sediment spill as a result of the dredging operations shall be controlled and limited around and/or behind the TSHD or any other dredging plant & equipment, so as to comply with the instructions and requirements of MEP.
- 8.4. The excess water flowing through the hopper overflow shall exit below the keel of the TSHD. Hoppers shall not be allowed to overflow at seawater level. After completing a load, the TSHD must proceed immediately to the placement area to discharge/unload the hopper.
- 8.5. An **Anti-Turbidity** or **Environmental** or **'Green' Valve** (see Figure 1) shall be installed in the hopper overflow system to reduce turbidity during dredging operations. **The 'Green' Valve** shall be manufactured and installed in accordance with the recommenda-

tions, latest standards and best engineering practice by experienced TSHD-designers and manufacturers, such as IHC Holland BV, VOSTA LMG BV, Damen Dredging Equipment, etc.

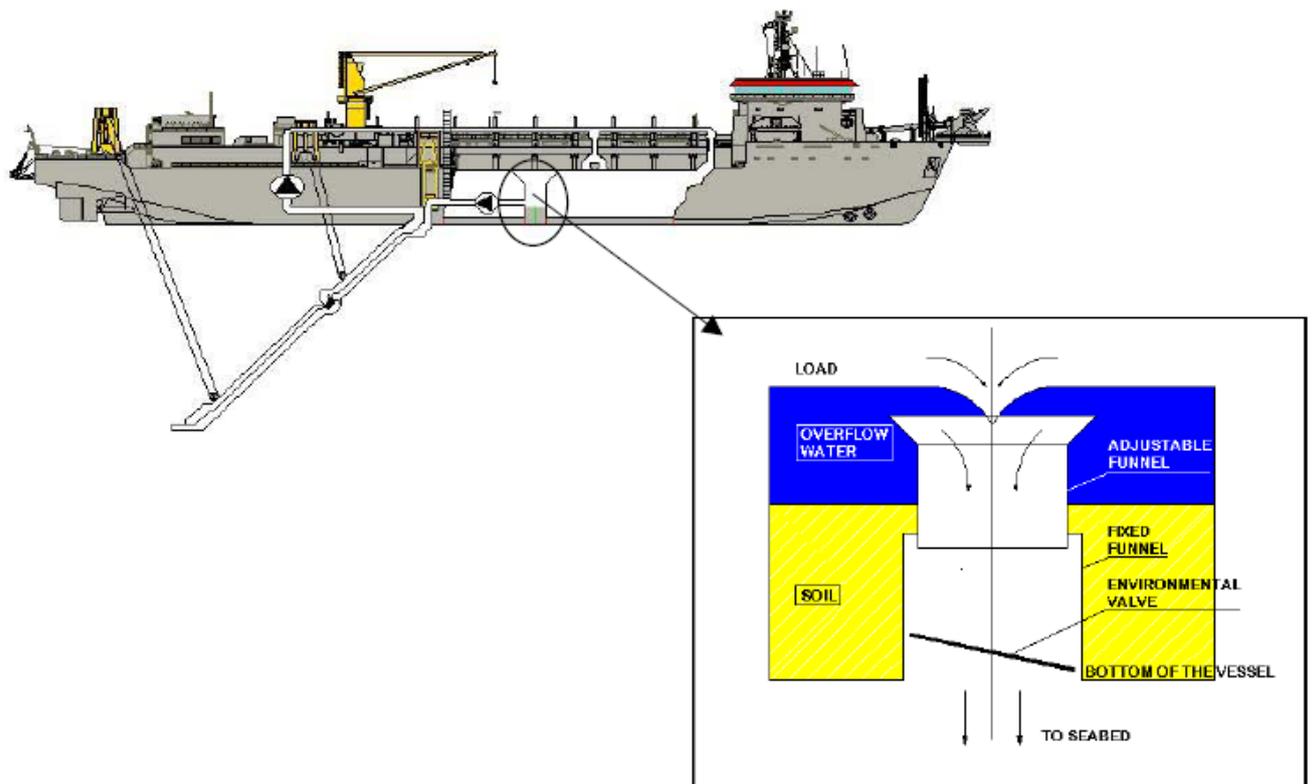


Figure 1 - Sketch showing the Anti-Turbidity or Environmental or 'Green' Valve of a Trailing Suction Hopper Dredger.

- 8.6. During sailing from the borrow pit area to the dumping/placement area and vice versa, overflowing is not permitted and escape of hopper water and/or slurry mixture and/or dredged materials must be totally prevented.
- 8.7. During sailing from the borrow area to the dumping/placement area and vice versa, leaking from the floor of from the bottom doors of the hopper and/or creating a trail of suspended materials at sea is totally forbidden.

- 8.8. Notwithstanding the above, dredging operations must stop immediately if and when the turbidity limits (refer to chapter 11 below) are exceeded and/or if the MCCP and/or the MEP instructs the Contractor to cease dredging operations due to environmental concerns. Such instructions shall not be a reason for any claims by the Contractor.

9. WATER QUALITY MONITORING METHOD, PERSONNEL AND EQUIPMENT

- 9.1. Water quality monitoring may be required during dredging task(s). The MEP will determine per dredging task the required intensity and frequency of monitoring (if any). Chapters 9, 10 and 11 describe an **indicative** water quality monitoring scenario. The Contractor shall **include in his price proposal** all costs associated with any monitoring scenario, whether or not such monitoring scenario is described in this document.
- 9.2. Water quality monitoring shall be carried out under the supervision of an independent, accredited environmental and/or ecological and/or oceanographic Laboratory and/or Consultant (to be arranged by and at the expense of the Contractor) with sufficient knowledge and experience in this type of work. The Laboratory and/or Consultant shall duly co-sign all water quality monitoring records, documents, calibration sheets, etc. which the Contractor shall submit to the MCCP. The Contractor is responsible for the accuracy, integrity and quality of all relevant measurements.
- 9.3. The Contractor shall submit the credentials and experience records of the proposed independent, accredited Laboratory and/or Consultant for approval by the MCCP at least one (1) week before the start of the water quality monitoring activities.
- 9.4. The Consultant and/or Laboratory shall have at his disposal all necessary turbidity meters, water sampling devices, monitoring instruments and other equipment (provided by the Contractor) to perform his job at all times. The turbidity meters and other instruments shall be of the same type throughout each dredging task and shall be used exclusively for the Works. Malfunctioning instruments shall be replaced immediately.
- 9.5. The Contractor shall provide and maintain on the site the specified quantity of turbidity meters in good working condition for the exclusive use on the site throughout the execution of the Works + at least one spare unit (Type '**HACH**' or equivalent turbidity probe

with data logger or equivalent instrumentation, approved by the MCCP). The equipment shall be suitable for turbidity measurements in water depths up to 30 m.

- 9.6. In case a turbidity meter fails, the Contractor shall immediately replace the failing turbidity meter with a spare unit, and he shall notify the MCCP. The Contractor shall repair the failing unit without delay.
- 9.7. In case another turbidity meter fails, while the spare unit is still under repair, the Contractor shall immediately notify the MCCP. The MCCP, at his sole discretion and in consultation with the MEP, may decide to cease the dredging works until all turbidity meters are working in accordance with the specified requirements. The Contractor shall not claim damages or compensation and shall not receive extension of time.
- 9.8. In addition to the normal maintenance requirements, the Contractor shall ensure that all monitoring instruments are checked, calibrated, and certified by an approved accredited Laboratory before use on the Works, and subsequently re-calibrated at two (2) monthly intervals throughout all stages of the water quality monitoring. Copies of all relevant calibration and inspection documents shall be submitted to the MCCP.
- 9.9. The Contractor shall submit in the Tender Documents a Method Statement, explaining his proposed water quality monitoring system before and during the dredging task(s). The Method Statement must explain as a minimum:
- a) Details of the proposed independent, accredited Consultant and/or Laboratory;
 - b) Details of turbidity measurements, water sampling devices (such as 'Niskin' bottles), instruments and equipment;
 - c) Work methods;
 - d) Calibration of instruments;
 - e) Measurement intervals/depths;
 - f) Daily and weekly reporting format to the MCCP;
 - g) Quality Control procedures;
- 9.10. Before commencement of each dredging task, the MCCP may instruct the Contractor to submit additional details about the Method Statement and/or to modify and/or adjust his

Method Statement. The Contractor shall obey such instructions forthwith on his own account.

- 9.11. The approved Method Statement is binding and the Contractor shall not be allowed to unilaterally change his methods and/or instruments and/or equipment and/or personnel without prior written approval of the MCCP.

10. WATER QUALITY MONITORING

- 10.1. Water quality monitoring shall be carried out if and as required by the MEP. The specified requirements shall be determined by the MCCP case-by-case, after receiving the relevant instructions from the MEP.
- 10.2. The position(s), quantity and type(s) of the water quality monitoring station(s) which shall be provided, installed, operated and maintained by the Contractor, if and when required by the MEP, shall be determined by the MCCP case-by-case.
- 10.3. Monitoring, if and when required by the MEP, shall be carried out by the Contractor in-situ, and in accordance with the latest MEP instructions, including, but not limited to, the following:
- a) **Pre-Commencement Phase** – Prior to commencement of each dredging task, background conditions of turbidity will be established by the Contractor, by measuring turbidity at all strategic positions at the borrow area, the placement area on four (4) sampling days per week, at mid-high tide and mid-ebb, for four (4) consecutive weeks prior to the commencement of the dredging works or for any other period as directed by the MEP. Readings shall be taken further to detailed MEP instructions. However, in the absence of such detailed instructions, readings will be taken one (1) meter below the surface, one (1) meter above the seabed, and at mid-depths, except that in water depths less than five (5) meter, the mid-depth measurement is not required. Each series of measurements will comprise two measurements at each depth for each station. Where the difference in value between the first and the second measurements in one series at any depth exceeds 25% of the value of the first reading, further measurements shall be taken until two (2) readings are within 25% of each other.

- b) **Work Phase** – During the course of each dredging task, monitoring, logging and reporting shall be undertaken by the Contractor every day. Monitoring the turbidity at each monitoring station shall be undertaken in accordance with above methodology and such that the interval between the series of measurements will not be less than four (4) hours or as per any other time-interval (such as: **continuously**) as directed by the MEP .
- 10.4. Should the monitoring program record levels of turbidity which are, in the opinion of the MCCP and/or MEP, indicative of a deteriorating situation, such that, in the opinion of the MCCP and/or MEP, closer monitoring is required, then the MCCP and/or MEP may require the Contractor to monitor more frequently at each monitoring station, until the recorded values of these parameters indicate to the MCCP and/or MEP an improving and acceptable level of water quality.
- 10.5. The turbidity monitoring operations must continue even if the dredging task is interrupted for whatever reason or if the TSHD is idle due to repairs, bunkering or due to any other reason.
- 10.6. The Contractor must submit to the MCCP each week his professional and detailed reports about the turbidity monitoring. These reports must be duly signed and stamped by the Contractor and co-signed and stamped by the independent Consultant and/or Laboratory. The reports must be submitted as hard-copy and in an acceptable electronic format.

11. TURBIDITY CONTROL

11.1. The Contractor shall design and implement methods of working to achieve that the average turbidity over the water column at each of the positions of the monitoring stations shall not be more than:

a) Relative Limit:

Twenty-five percent (**25%**) over the ambient value of non-dissolved suspended sediments, measured in the **Pre-Commencement Phase**;

Or:

b) Absolute Limit(s):

1) Twenty-five milligram (**25 mg**) per liter non-dissolved suspended sediments at **inner** port(s);

And:

2) Fifteen milligram (**15 mg**) per liter non-dissolved suspended sediments at **outer** port(s);

The MEP may decide per dredging task(s) to modify the above instructions and/or turbidity threshold level(s). The Contractor shall obey all relevant instructions, at no extra costs to the Employer.

11.2. If the turbidity threshold level(s) are exceeded, the Contractor shall cease the dredging operations immediately and notify the MCCP at once. Notwithstanding the turbidity threshold level(s), the Contractor must obey all and any instructions by the MCCP at all times without the right to claim.

11.3. The Contractor is allowed to apply **NTU** (Nephelometric Turbidity Units), provided a proper, site specific correlation and/or conversion is established in advance between **TSS** (Total Suspended Solids) and **NTU**. Such correlation and calibration shall be done by a professional, accredited Consultant and/or laboratory, shall be at the Contractor's expense and shall be subject to prior MCCP's approval.