DEENDAYAL PORT AUTHORITY
(Erstwhile: DEENDAYAL PORT TRUST)

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दीनदयाल पत्तन प्राधिकरण
DEENDAYAL PORT AUTHORITY

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EG/WK/4751/Part (Ro-Pax)/ Dated: 18/03/2024

To,
The Deputy Director General of Forests (C),
Ministry of Environment, Forest & Climate Change,
Integrated Regional Office, Gandhinagar,
A wing- 407 & 409, Aryan Bhawan,
Near CH-3 Circle,
Sector 10 A, Gandhinagar – 382 010.

Sub: Bifurcation (600 mt waterfront out of total 4800 mt) of Environmental and CRZ clearance issued to M/s Essar Bulk Terminal Limited for Expansion of Port Facility at Hazira, Surat, Gujarat – **Submission of Compliance Report of Stipulated Conditions reg.**

Ref.:
1. Bifurcation (600 mt water front out of total 4800 mt) of Environmental and CRZ Clearance issued to M/s Essar Bulk Terminal Limited for expansion of port facility at Hazira, Surat, Gujarat by the MoEF&CC, GoI vide letter F. No. 11-46/2011 - IA III dated 4/4/2022.
2. Environmental and CRZ Clearance for the expansion of port facility at Hazira, Surat, Gujarat by M/s Essar Bulk Terminal Ltd by the MoEF&CC, GoI vide letter F. No. 11-46/2011 - IA III dated 06/05/2014
3. DPT Letter no. EG/WK/4751/Part (Ro-Pax)/156 dated 05/08/2022
4. DPA letter no. EG/WK//4751/Part (Ro-Pax)/347 dated 07/08/2023

Sir,

It is requested to kindly refer above cited reference for the said subject.

In this regard, it is to state that, the MoEF&CC, GoI, New Delhi vide above mentioned letter dated 4/4/2022 cited at Reference 1 had issued Bifurcation of Environmental and CRZ Clearance accorded to M/s Essar Bulk Terminal Limited vide letter of even number dated 6th May, 2014 in the name of Deendayal Port Trust for ***"Development of 600 m Waterfront and 24 ha. Back up Area at Hazira, Surat by Deendayal Port Trust (Now: Deendayal Port Authority)".***

In the said letter dated 4/4/2022, the MoEF&CC, GoI under Para 8 has mentioned that, Deendayal Port Authority shall comply with all the specific & general conditions stipulated in the EC & CRZ Clearance of even no. dated 6th May, 2014 cited at Reference 2.

.....Cont.....

Accordingly, kindly find enclosed herewith compliance report of the conditions stipulated in the EC & CRZ Clearance granted by the MoEF&CC, GoI dated 6th May, 2014 (**Annexure 1**) & Monitoring Report in Data Sheet (**Annexure 2**) (for the period up to November, 2023) along with all the necessary annexures, for kind information and record please.

Further, as per the MoEF&CC, Notification S.O.5845 (E) dated 26.11.2018, which stated that "In the said notification, in paragraph 10, in sub-paragraph (ii), ***for the words "hard and soft copies" the words "soft copy" shall be substituted"***. Accordingly, we are submitting herewith soft copy of the same via e-mail ID iro.gandhingr-mefcc@gov.in

This has the approval of Chief Engineer, Deendayal Port Authority.

Yours faithfully,

Encl.: As above

for SE (PL) & EMC (I/c)
Deendayal Port Authority

Copy along with point wise compliance of stipulated conditions, to:

1) Shri Amardeep Raju,
Scientist E, Ministry of Environment, Forest and Climate Change,
& Member Secretary (EAC-Infra.1),
Indira Paryavaran Bhawan,
3rd Floor, Vayu Wing, Jor Bagh Road, Aliganj,
New Delhi- 110 003;
Email: ad.raju@nic.in

2) Shri Prasoon Gargav,
Scientist E & Regional Director,
Central Pollution Control Board,
Parivesh Bhawan,
Opp. VMC Ward Office No.10, Subhanpura,
Vadodara – 390 023.
Email: prasoon.cpcb@nic.in

3) Shri. M. R. Macwana,
Unit Head, Surat,
Gujarat Pollution Control Board,
Paryavaran Bhavan,
Sector 10A, Gandhinagar- 382 010.
Email: uh-gpcb-sura@gujarat.gov.in

4) Dr. Jignasa D. Oza,
The Regional Officer,
Gujarat Pollution Control Board,
Plot No: 11 – 12/2, 3
GIDC PANDESARA,
SURAT - 394 221.
Email: ro-gpcb-sura@gujarat.gov.in

Annexure -1

Annexure 1

Compliance report (upto November, 2023)

Project: Development of Ro-Ro/Ro-Pax Facility at Hazira by Deendayal Port Authority (600 m water front – 170 m berthing jetty and other allied structure viz. approach jetty, pontoons, link span etc. and 5 Ha. area (onshore facility).

Status of Project: Under Operation Stage (RoRo/RoPax facility: 170 m berthing jetty and other allied structure viz. approach jetty, pontoons, liamnnk span etc. and 5 Ha. area (onshore facility)). As per bifurcated EC & CRZ Clearance dated 4/4/2022 issued by the MoEF&CC, GoI, DPA has obtained Fresh CCA (PCB Id: 88242) from GPCB vide Order dated 10/07/2023 with validity upto 26/07/2027.

However, for remaining development of onshore /offshore facility, DPA engaged Indian Ports Association, New Delhi. After receipt of report of IPA, further development will be undertaken.

Status of compliance of stipulated conditions mentioned in the EC & CRZ Clearance dated 6/5/2014:

Sl. No.	EC Condition	Compliance
6. Specific Conditions		
i.	Consent for Establishment shall be obtained from Gujarat Pollution Control Board under Air and Water Act and a copy shall be submitted to the Ministry before start of any construction work at the site.	As directed in the Bifurcated EC & CRZ Clearance issued by the MoEF&CC, GoI dated 4/4/2022, DPA also obtained Consent to Establish (CTE-55353) (after obtaining Environmental Clearance), vide dated 24/6/2022 **(Copy once again attached – Annexure 1)** from the Gujarat Pollution Control Board (under Water Act 1974 and Air Act 1981) in the name of DPA for development of 600 m waterfront and 24 ha back up area.
ii	Project Proponent shall appoint a consultant to look after and advice on the transportation of dangerous chemicals. Sensors for early detection of leakage of propylene and butadiene shall be provided at berths along with water sprinklers.	N/A. DPA developed Ro-Ro/Ro-Pax facility at Hazira which is being used for public conveyance and also for trailer, trucks, cars etc.
iii.	Project Proponent shall ensure proper flushing/free flow of tidal water to the mangroves.	The GMB had allotted land of 24 Hectares to Deendayal Port Authority devoid of Mangroves. However, due care is being taken for proper flushing/free flow of tidal water to the mangroves in surrounding areas.

iv.	Project Proponent shall submit once in 12 months the latest satellite imagery to MoEF&CC to ensure that mangroves are remains fully intact. Any shrinkage in mangrove area noticed either in the satellite imaginary or during site visit, shall be taken as violation.	N/A. The GMB had allotted land of 24 Hectares to Deendayal Port Authority devoid of Mangroves.
v	The Project Proponent shall get third party inspection carried out once in a year preferably by NEERI to ensure compliance of all the Environmental Clearance (EC) conditions.	It is assured that third party will be engaged for inspection to ensure compliance of all the applicable EC conditions.
vi.	There shall be no encroachment of project activities in the mangrove area. The various referral distances/latitudes/ longitudes as indicated in the enclosed map (Annexure-II) shall be maintained for the conservation of this mangrove area within the port limit.	N/A. The GMB had allotted land of 24 Hectares to Deendayal Port Authority devoid of Mangroves.
vii.	Stock yard on northern side (Hazira Village side) shall be provided with bund and wind screen of atleast 15 mt height with well-designed water spray fogging arrangement along with three rows of trees in canopy formation.	N/A. DPA developed Ro-Ro/Ro-Pax facility which is being used for public conveyance and also for trailer, trucks, cars etc.
viii.	The height of coal stack yard shall be at least 2 feet below the height of wind curtain.	N/A. DPA developed Ro-Ro/Ro-Pax facility which is being used for public conveyance and also for trailer, trucks, cars etc.
ix.	Green belt shall be provided all along stack yard and in the premises.	DPA had already developed required planation (area of about 7000 m2) within the Ro-Ro/Ro-Pax Terminal area.
x.	The existing coal conveyor from berth to stock yard shall be closed with cover since the present water spray appears to be inadequate.	N/A. DPA developed Ro-Ro/Ro-Pax facility which is being used for public conveyance and also for trailer, trucks, cars etc.
xi.	The transportation in the proposed facility shall be in closed conveyor only.	N/A. DPA developed Ro-Ro/Ro-Pax facility which is being used for public conveyance and also for trailer, trucks, cars etc.
xii.	Natural drainage system shall be maintained so that there is free flow to the existing mangroves. Mangrove plantation in 500 ha of land in consultation with	The GMB had allotted land of 24 Hectares to Deendayal Port Authority devoid of Mangroves.

	GEC/Forests Department, Government of Gujarat.	However, due care is being taken so that Natural Drainage System will be maintained. As per the directions of the MoEF&CC, GoI/GCZMA, till date, DPA had undertaken Mangrove Plantation in an area of 1500 Hectares at various locations (Copy of the statement has already been communicated with the compliance report dated 05/08/2022). Further, DPA has carried out additional mangrove plantation of 100 ha. with consultation of Gujarat Ecology Commission vide Work Order No. DD/WK/3050/Pt-I/GIM/PC-44 dated 02/06/2022 (Copy of the work order has already been communicated with the compliance report dated 05/08/2022). For regular monitoring of mangroves, DPA engaged M/s GUIDE, Bhuj during the year 2017 & subsequently, vide work order dated 3/5/2021. The final report submitted by M/s GUIDE has already been communicated with the compliance report dated 05/08/2022.
xiii.	There shall be no disposal of wastes in to the coastal areas.	It is assured that no disposal of wastes will be made in to the coastal areas.
xiv	Hazardous chemicals except the permissible Petroleum products shall not be stored within CRZ area. All the construction, storage shall be as per the CRZ Notification, 2011.	N/A. DPA developed Ro-Ro/Ro-Pax facility which is being used for public conveyance and also for trailer, trucks, cars etc.
xv	All the conditions/recommendations stipulated by Gujarat Coastal Zone Management Authority (GCZMA) No. ENV-10- 2011-877-E dated 01.06.2013 shall be complied with.	The compliance of the conditions/recommendations stipulated by GCZMA vide letter dated 01/06/2013 applicable to this project is attached herewith as **Annexure 2.**
xvi	Oil spill Contingency plan shall be put in place.	No oil handling is envisaged in proposed RoRo/RoPax development. Oil spill can happen only during bunkering and collision of vessels. Hence, the oil spill scenario will be

		considered as Tier 1 (less than 700 tons). RoRo/RoPax operation is proposed and oil spill can occur only if there is any accident.
xvii	Hydrocarbon monitors with provision for alarms set at specific concentrations shall be installed at strategic locations on the berth and around storage tanks as per ISGOTT and OISD.	N/A. DPA developed Ro-Ro/Ro-Pax facility which is being used for public conveyance and also for trailer, trucks, cars etc.
xviii	On site Emergency Management plan shall be put in place.	A copy of Disaster Management plan has already been communicated with the compliance report dated 05/08/2022.
xix	All the recommendation of the EMP, Risk Assessment and DMP shall be complied with letter and spirit. All the mitigation measures submitted in the EIA report shall be prepared in a matrix format and the compliance for each mitigation plan shall be submitted to MoEF along with half yearly compliance report to MoEF-RO.	Point Noted for compliance. A copy of EMP prepared for the Development of Ro-Ro/Ro-Pax Facility at Hazira by Deendayal Port Authority and copy of Risk assessment and disaster management plan already been communicated with the compliance report dated 05/08/2022.
xx	The port shall ensure that the ship under operation follows the MARPOL convention regarding discharge or spillage of any toxic, hazardous or polluting material like ballast water, oily water or sludge, sewage, garbage etc. The emission of NOx and SOx shall remain within the permissible limits.	Point noted for compliance.
xxi	The hazardous wastes generated shall be collected and disposed as per rules, disposable wastes shall be sent to authorized TSDF. MoU in this regard shall be submitted to the Ro, MoEF along with the six monthly monitoring report.	Point Noted for compliance.
xxii	The dredging materials shall be utilized for reclamation and excess shall be disposed at the site identified by CWPRS.	Point Noted for compliance.
xxiii	A study to determine the reasons for increase in cancer patient in the vicinity shall be carried out.	N/A. DPA developed Ro-Ro/Ro-Pax facility which is being used for public conveyance and also for trailer, trucks, cars etc.
xxiv	A separate Environment Monitoring Cell shall be set up especially for this plant and details shall be submitted to the Ministry prior to the commencement of operation.	DPA is already having dedicated EMC. Further, DPA has also appointed expert agency for providing Environmental Experts

		from time to time. Recently, DPA appointed M/s Precitech Laboratories Pvt.Ltd., Vapi for three years vide work order dated 5/2/2021 (Copy of Work Order has already been communicated with the compliance report dated 05/08/2022). In addition, DPA has also appointed Manager (Environment) on contractual basis for a period of 3 years & further extendable for 2 years (Copy of the offer of appointment has already been communicated with the compliance report dated 05/08/2022).
xxv	Controlled cutter suction dredging shall be used along with the enclosure to contain the turbidity.	Point noted for compliance.
xxvi	The responses/commitments made during public hearing shall be complied with letter and spirit.	N/A.
xxvii	CSR activities shall cover the villages within 10 km radius. CSR for fishermen shall be carried out as committed.	As per the CSR Guidelines issued from time to time by the MoPSW, GoI, DPA since the year 2011-12 had carried out various CSR activities. **(Annexure 3)**
xxviii	There shall be no ground water drawl within CRZ area	Point Noted for compliance.
xxix	Sewage shall be treated and the Treatment Facility shall be provided in accordance with the Coastal Regulation Zone Notification, 2011. The disposal of treated water shall confirm the regulation of State Pollution Control Board.	Septic Tanks has already been provided for treatment of sewage.
xxx	Solid Waste Management shall be as per Municipal Solid (Management and Handling) Rules, 2000.	Point Noted for compliance.
xxxi	The project shall be executed in such a manner that there shall not be any disturbance to the fishing activity.	The Ro-Ro/Ro-pax facility is under operation.
xxxii	It shall be ensured that there is no displacement of people, houses or fishing activity as a result of the project.	Not Applicable. The Ro-Ro Ro-pax facility is under operation.

		The GMB had allotted 600 m water front & 24 Hectares land to Deendayal Port Authority.
xxxiii	No construction work other than those permitted in Coastal Regulation Zone Notification shall be carried out in Coastal Regulation Zone area.	Currently, the Ro-Ro/Ro-pax facility is under operation.
xxxiv	The project proponent shall set up separate environmental management cell for effective implementation of the stipulated environmental safeguards under the supervision of a Senior Executive.	DPA is already having dedicated EMC. Further, DPA has also appointed expert agency for providing Environmental Experts from time to time. Recently, DPA appointed M/s Precitech Laboratories Pvt. Ltd., Vapi for three years vide work order dated 5/2/2021 (Copy of Work Order has already been communicated with the compliance report dated 05/08/2022). In addition, DPA has also appointed Manager (Environment) on contractual basis for a period of 3 years & further extendable for 2 years (Copy of the offer of appointment has already been communicated with the compliance report dated 05/08/2022).
xxxv	The funds earmarked for environment management plan shall be included in the budget and this shall not be diverted for any other purposes.	The allocation made under the scheme of "Environmental Services & Clearance thereof other related Expenditure" during BE 2023-2024 is Rs. 274 Lakhs.
7. GENERAL CONDITIONS :		
i.	Appropriate measures must be taken while undertaking digging activities to avoid any likely degradation of water quality.	Currently, the Ro-Ro Ro-pax facility is under operation.
ii.	Full support shall be extended to the officers of this Ministry/ Regional Office at Bhopal by the project proponent during inspection of the project for monitoring purposes by furnishing full details and action plan including action taken reports in respect of mitigation measures and other environmental protection activities.	It is assured that full support will be extended to the officers of this Ministry/ Regional Office at Bhopal/Gandhinagar during inspection of the project for monitoring purposes by furnishing full details and action plan including action taken reports in respect of mitigation measures and other environmental protection activities.
iii.	A six-Monthly monitoring report shall need to be submitted by the project proponents to the Regional Office of this Ministry at	DPA had assigned the work of monthly environmental monitoring to M/s A 2 Z Envirotech vide Work

	Bhopal regarding the implementation of the stipulated conditions.	Order dated 15/09/2022. (A copy of the same has already been communicated with the last compliance report submitted). Recently, DPA has assigned the work of monthly environmental monitoring to GEMI, Gandhinagar for a period of 3 years vide letter dated 18/04/2023. The work is in progress, and the latest environmental monitoring report submitted by GEMI, Gandhinagar, is attached herewith as (**Annexure 4**).
iv.	Ministry of Environment & Forests or any other competent authority may stipulate any additional conditions or modify the existing ones, if necessary in the interest of environment and the same shall be complied with.	Point Noted.
v.	The Ministry reserves the right to revoke this clearance if any of the conditions stipulated are not complied with the satisfaction of the Ministry.	Point Noted.
vi.	In the event of a change in project profile or change in the implementation agency, a fresh reference shall be made to the Ministry of Environment and Forests.	Point Noted.
vii.	The project proponents shall inform the Regional Office as well as the Ministry, the date of financial closure and final approval of the project by the concerned authorities and the date of start of land development work.	The Board of Deendayal Port Authority vide resolution no. 101 in its meeting held on 16/1/2021 had accorded approval to the project (Copy of Board Resolution has already been communicated with the compliance report dated 05/08/2022). Accordingly, DPA issued work order to the contractor M/s Marymatha Infrastructure Pvt. Ltd., JV M/s BMS Projects Pvt. Ltd., Cochin vide letter no. CN/WK/1600/Pre-Bid/10 dated 15/4/2021 (Copy of work order has already been communicated with the compliance report dated 05/08/2022). Currently, the Ro-Ro Ro-pax facility is under operation.

viii.	A copy of the clearance letter shall be marked to concern Panchayat/local NGO, if any, from whom any suggestion/ representation has been made received while processing the proposal.	N/A.
ix.	Gujarat Pollution Control Board shall display a copy of the clearance letter at the Regional Office, District Industries Center and Collector's Office/Tehsildar's office for 30 days.	----------
8.	These stipulations would be enforced among others under the provisions of Water (Prevention and Control of Pollution) Act 1974, the Air (Prevention and Control of Pollution) Act 1981, the Environment (Protection) Act, 1986, the Public Liability (Insurance) Act, 1991 and EIA Notification 1994, including the amendments and rules made thereafter.	Point Noted.
9.	All other statutory clearances such as the approvals for storage of diesel from Chief Controller of Explosives, Fire Department, Civil Aviation Department, Forest Conservation Act, 1980 and Wildlife (Protection) Act, 1972 etc. shall be obtained, as applicable by project proponents from the respective competent authorities.	Point Noted for compliance.
10.	The project proponent shall advertise in at least two local Newspapers widely circulated in the region, one of which shall be in the vernacular language informing that the project has been accorded Environmental and CRZ Clearance and copies of clearance letters are available with the Gujarat Pollution Control Board and may also be seen in the website of the Ministry.	Deendayal Port Authority had already given advertisement in two newspapers i.e. GUJARAT SAMACHAR (Surat Edition (In Gujarati)) dated 07/04/2022 & THE TIMES OF INDIA (Surat Edition (In English)) dated 08/04/2022, w.r.t. bifurcation of EC & CRZ Clearance accorded by the MoEF&CC, GoI dated 4/4/2022. The copies of the above advertisement given had already been informed to the integrated Regional Office, MoEF&CC, GoI, Gandhinagar vide letter dated 23/4/2022 (Copy has already been communicated with the compliance report dated 05/08/2022.).
11.	This clearance is subject to final order of the Hon'ble Supreme Court of India in the matter of Goa Foundation Vs. Union of India in Writ Petition (Civil) No.460 of 2004 as may be applicable to this project.	Point Noted.

12	Any appeal against this clearance shall lie with the National Green Tribunal, if preferred, within a period of 30 days as prescribed under Section 16 of the National Green Tribunal Act, 2010.	Point Noted.
13	Status of compliance to the various stipulated environmental conditions and environmental safeguards will be uploaded by the project proponent in its website.	DPA had already uploaded compliance report submitted dated 5/8/2022 to the Integrated Regional Office, MoEF&CC,GoI, Gandhinagar. However, for subsequent period also, it is assured that w.r.t. subject project, the status of compliance to the various stipulated environmental conditions will be uploaded by DPA in website www.deendayalport.gov.in.
14	A copy of the clearance letter shall be sent by the proponent to concerned Panchayat, Zilla Parisad/Municipal Corporation, Urban Local Body and the Local NGO, if any, from whom suggestions/representations, if any, were received while processing the proposal. The clearance letter shall also be put on the website of the company by the proponent.	A copy of Bifurcation of EC & CRZ Clearance accorded by the MoEF&CC, GoI dated 4/4/2022 had already been uploaded in the website of DPA i.e. www.deendayalport.gov.in.
15	The proponent shall upload the status of compliance of the stipulated Clearance conditions, including results of monitored data on their website and shall update the same periodically. It shall simultaneously be sent to the Regional Office of MoEF&CC, the respective Zonal Office of CPCB and the SPCB.	The status of compliance to the various stipulated environmental conditions are being uploaded by DPA in website www.deendayalport.gov.in (DPA had already uploaded compliance report submitted dated 5/8/2022 to the Integrated Regional Office, MoEF&CC,GoI, Gandhinagar) and will also be updated the same periodically. Further, the same will be sent to the Regional Office, MoEF&CC, Gandhinagar & to the CPCB, Vadodara & GPCB, Gandhinagar.
16	The project proponent shall also submit six monthly reports on the status of compliance of the stipulated Clearance conditions including results of monitored data (both in hard copies as well as by e-mail) to the respective Regional Office of MoEF&CC, the respective Zonal Office of CPCB and the SPCB	DPA had already uploaded compliance report submitted dated 5/8/2022 to the Integrated Regional Office, MoEF&CC, GoI, Gandhinagar. However, for subsequent period also, it is assured that w.r.t. subject project, six monthly reports on the status of compliance to the various stipulated Clearance conditions including results of monitoring data will be submitted to the Regional Office, MoEF&CC, Gandhinagar & to

		the CPCB, Vadodara & GPCB, Gandhinagar.
17	The environmental statement for each financial year ending 31" March in Form-V as is mandated to be submitted by the project proponent to the concerned State Pollution Control Board as prescribed under the Environment (Protection) Rules, 1986, as amended subsequently, shall also be put on the website of the company along with the status of compliance of Clearance conditions and shall also be sent to the respective Regional Office of MoEF&CC by e-mail	Point noted. The Ro-Ro Ro-pax facility is under operation. As per bifurcated EC & CRZ Clearance dated 4/4/2022 issued by the MoEF&CC, GoI, DPA has obtained fresh CCA (PCB Id: 88242) from GPCB vide Order dated 10/07/2023 with validity upto 26/07/2027.

Annexure -1

GUJARAT POLLUTION CONTROL BOARD
PARYAVARAN BHAVAN
Sector-10-A, **Gandhinagar** 382010
Phone : (079) 23222425
(079) 23222152
Fax : (079) 23232156
Website : www.gpcb.gov.in

GPCB

Application For CTE after EC

File No : GPCB/ **(PCB ID. - 88242)**

CTE-55353

To,
M/s. Deendayal Port Authority,
, Essar Bulk Terminal Ltd, Adani Hazira Port Rd, Hazira Gam, Suvali, Hazira, Gujarat 394270,
City :Hazira ,
Dist : Surat ,
Taluka : Chorasi

Sub: Consent to Establish (After obtaining Environment Clearance) under Section 25 of Water Act 1974 and Section 21 of Air Act 1981.

Ref: (1) Your online application No. 257450 dated 12/05/2022

(1) Environment Clearance issued by Central Authority vide their letter no. F.No.11-46/2011-IA.III Dated 04/04/2022

Sir,

Without prejudice to the powers of this Board under the Water (Prevention and Control of Pollution) Act-1974, the Air Act-1981 and the Environment (Protection) Act-1986 and without reducing your responsibilities under the said Acts in any way, this is to inform you that this Board grants **Consent to Establish (After obtaining Environment Clearance) under Section 25 of Water Act 1974 and Section 21 of Air Act 1981** for manufacturing of products as mentioned into the Environment Clearance (EC) granted vide letter under reference no (2) above.

Consent To Establish Is Granted Subject To The Following Conditions: -

1) The validity period of this CTE shall be Seven Years from the issue of this order.
2) Applicant shall strictly comply with all conditions stipulated by competent authority in the order of Environment Clearance issued vide letter under reference No. : 2 above.
3) The applicant shall however , not without the prior concern of the Board. Bring into use any new or altered outlet for the discharge of effluent or gaseous emission or sewage waste from the proposed industrial plant. The applicant is required to make applications to this Board for this purpose in the prescribed forms under the provisions of the water Act - 1974, the Air - 1981 and the Environment (Protection) Act - 1986.

For and on behalf of
Gujarat Pollution Control Board

J.D.OZA
ROH Head - Surat

- This order is issued to **, Essar Bulk Terminal Ltd, Adani Hazira Port Rd, Hazira Gam, Suvali, Hazira, Gujarat 394270, City :Hazira, Dist : Surat, Taluka : Chorasi (88242)** for CTE amendment after obtaining EC.

Annexure -2

Annexure I

Compliance report (upto November, 2023)

Project: Development of Ro-Ro/Ro-Pax Facility at Hazira by Deendayal Port Authority (600 m water front – 170 m berthing jetty and other allied structure viz. approach jetty, pontoons, link span etc. and 5 Ha. area (onshore facility).

Status of Project: Under Operation Stage (RoRo/RoPax facility: 170 m berthing jetty and other allied structure viz. approach jetty, pontoons, link span etc. and 5 Ha. area (onshore facility)). As per bifurcated EC & CRZ Clearance dated 4/4/2022 issued by the MoEF&CC, GoI, DPA has obtained Fresh CCA (PCB Id: 88242) from GPCB vide Order dated 10/07/2023 with validity upto 26/07/2027.

Reference:

- MoEF&CC, GoI, vide letter dated 4/4/2022 issued Bifurcation of EC&CRZ Clearance accorded to M/s Essar Bulk Terminal Limited vide letter dated 6th May, 2014 by MoEF&CC, GoI in the name of Deendayal Port Trust (Now Deendayal Port Authority).
- Condition no. (xv) under Specific Conditions "*All the conditions/recommendations stipulated by Gujarat Coastal Zone Management Authority (GZCMA) No. ENV 10-2011-877-E dated 01/06/2013*" of Environmental and CRZ Clearance accorded to M/s Essar Bulk Terminal Limited vide letter dated 6th May, 2014 by MoEF&CC, GoI.

Status of compliance of conditions stipulated in the CRZ Recommendation dated 01/06/2013:

Sl. No.	EC Condition	Compliance
1.	The provisions of the CRZ Notification of 2011 shall be strictly adhered to by M/s EBTL. No activity in contradiction to the provisions of the CRZ Notification shall be carried out by M/s EBTL.	With regard to Ro-Ro/Ro-Pax Facility developed by DPA, the provisions of the CRZ Notification of 2011 are being strictly adhered to by DPA and no activity in contradiction to the provisions of the CRZ Notification has been carried out.
2.	Natural drainage system shall be designed in such a way that there shall be no damage to the existing mangrove patches nearby site.	The GMB had allotted land of 24 Hectares to Deendayal Port Authority devoid of Mangroves. However, due care is being taken so that Natural Drainage System will be maintained.
3.	The Essar Bulk Terminal Limited shall take up mangrove plantation in 500 ha of land in consultation with GEC/Forest department.	The GMB had allotted land of 24 Hectares to Deendayal Port Authority devoid of Mangroves.

		However, due care is being taken so that Natural Drainage System will be maintained. As per the directions of the MoEF&CC, GoI/ GCZMA, till date, DPA had undertaken Mangrove Plantation in an area of 1500 Hectares at various locations (Copy of the statement has already been communicated with the compliance report dated 05/08/2022). Further, DPA has carried out additional mangrove plantation of 100 ha. with consultation of Gujarat Ecology Commission vide Work Order No. DD/WK/3050/Pt-I/GIM/PC-44 dated 02/06/2022 (Copy of the work order has already been communicated with the compliance report dated 05/08/2022). For regular monitoring of mangroves, DPA engaged M/s GUIDE, Bhuj during the year 2017 & subsequently, vide work order dated 3/5/2021. The final report submitted by M/s GUIDE has already been communicated with the compliance report dated 05/08/2022.
4.	Coal, ore and other material handling shall be done through totally closed system.	N/A. DPA developed Ro-Ro/Ro-Pax facility which is being used for public conveyance and also for trailer, trucks, cars etc.

5.	All necessary permissions from different Government Departments/ agencies, including GMB, shall be obtained by M/s EBTL, before commencing the activities.	The Ministry of Ports, Shipping & Waterways, Government of India appointed Deendayal Port Authority (Erstwhile: DPT) as its nominee to take over the Project assets under the Concession Agreement (at Ghogha and Dahej terminals and the maintenance dredging at Dahej terminal) and also the assets at Hazira for the Ro-Pax ferry service. **For the purpose, the 600m waterfront along with 24 ha backup land is allotted to Deendayal Port Authority by the Gujarat Maritime Board, GoG at Hazira for developing Ro-Ro/Ro-Pax Facility at Hazira (Copy of GMB – Annexure 1).** As directed in the Bifurcated EC & CRZ Clearance issued to DPA by the MoEF&CC, GoI dated 4/4/2022 **(Copy once again attached - Annexure 2)**, DPA also obtained Consent to Establish (CTE-55353) (after obtaining Environmental Clearance), vide dated 24/6/2022 (**Copy once again attached – Annexure 3)** from the Gujarat Pollution Control Board (under Water Act 1974 and Air Act 1981) in the name of DPA for development of 600 m waterfront and 24 ha back up area. Further, DPA has obtained fresh CCA (PCB Id: 88242) from GPCB vide Order dated 10/07/2023 with validity upto 26/07/2027.
6.	All the recommendations and suggestions given by WAPCOS in their Environmental Impact Assessment reports for conservation/ protection and betterment of environment shall be implemented strictly by M/s EBTL.	Point noted.
7.	The construction and operational activities shall be carried out in such a way that there is no negative impact on mangroves, if any, and other important coastal / marine habitats.	The GMB had allotted land of 24 Hectares to Deendayal Port Authority devoid of Mangroves. However, due care is being taken so that there is no negative impact on mangroves,

	Construction activity shall be carried out only under the guidance/ supervision of the reputed institute / organization.	if any, and other important coastal/ marine habitat. The Ro-Ro/Ro-pax facility is under operation.
8.	M/s EBTL shall strictly ensure that no rivers are blocked due to any activity at the proposed site.	It is assured that; due care is being taken by DPA so that no rivers are blocked due to any activity at the project site.
9.	The construction debris and / or any other type of waste shall not be disposed of in to the sea, creek or in the CRZ area. The debris shall be removed from the construction site immediately after construction is over.	Currently, The Ro-Ro/Ro-pax facility is under operation.
10.	The construction camps shall be located outside the CRZ area and the construction labour shall be provided with the necessary amenities, including sanitation, water supply and fuel and it shall be ensured that the environmental conditions are not deteriorated by the construction labours.	Currently, the Ro-Ro/Ro-pax facility is under operation.
11.	M/s EBTL shall bear the cost of the external agency that may be appointed by this department for supervision / monitoring of proposed activities and the environmental impacts of the proposed activities.	Currently, the Ro-Ro/Ro-pax facility is under operation.
12.	The groundwater shall not be tapped within the CRZ areas by the EBTL to meet with the water requirements in any case.	Water requirements are met through private tankers.
13.	M/s EBTL shall take up massive greenbelt developmental activities in consultation with Forest Department / GEER Foundation / Gujarat Ecology Commission. A comprehensive plan for this purpose has to be submitted to the Forest and Environment Department.	DPA had already developed required planation (area of about 7000 m^2) within the Ro-Ro/Ro-Pax Terminal area.

14.	The EBTL shall have to take up bio-shielding development programme as part of CSR in consultation with Forest Department / PCCF and an action plan in this regard shall have to be submitted to the MoEF, GoI and this department.	Not Applicable. DPA developed Ro-Ro/Ro-Pax facility which is being used for public conveyance and also for trailer, trucks, cars etc.
15.	The EBTL shall have to contribute financially for taking up the socio-economic upliftment activities in this region in consultation with the Forest and Environment Department and the District Collector / District Development Officer.	As per the CSR Guidelines issued from time to time by the MoPSW, GoI, DPA since the year 2011-12 had carried out various CSR activities **(Annexure 4)**
16.	A separate budget shall be earmarked for environmental management and socio-economic activities including the greenbelt/ mangrove plantation and details thereof shall be furnished to this Department as well as the MoEF, GoI. The details with respect to the expenditure from this budget head shall also be furnished along with the compliance report.	The allocation made under the scheme of "Environmental Services & Clearance thereof other related Expenditure" during BE 2023-2024 is Rs. 274 Lakhs. The expenditure made under the scheme of "Environmental Services & Clearance thereof other related Expenditure" is Rs. Approx. 272 Lakhs from June, 2023 to November 2023.
17.	A separate Environmental Management Cell with qualified personnel shall be created for environmental monitoring and management during construction and operational phases of the project.	DPA is already having dedicated EMC. In this regard, DPA has also appointed expert agency for providing Environmental Experts from time to time. Currently, DPA appointed M/s Precitech Laboratories Pvt. Ltd., Vapi for three years vide work order dated 5/2/2021 (Copy of Work Order has already been communicated with the compliance report dated 05/08/2022). In addition, DPA has also appointed Manager (Environment) on contractual basis for a period of 3 years & further extendable for 2 years (Copy of the offer of appointment has already been communicated with the compliance report dated 05/08/2022). Further, DPA had assigned the work of monthly environmental monitoring to M/s A 2 Z Envirotech vide Work Order dated

		15/09/2022. The copy of the monitoring reports is attached herewith as **Annexure 5.** Recently, DPA has assigned the work of monthly environmental monitoring to GEMI, Gandhinagar for a period of 3 years vide letter dated 18/04/2023. The work is in progress, and the latest environmental monitoring report submitted by GEMI, Gandhinagar, is attached herewith as (**Annexure 6**).
18.	Environmental Audit report indicating the changes, if any, with respect to the baseline environmental quality in the coastal and marine environment shall be submitted every year by M/s EBTL to this department as well as to the MoEF, GoI.	Point noted for compliance. In this regard, it is relevant to mention here that, DPA had assigned the work of monthly environmental monitoring to M/s A 2 Z Envirotech vide Work Order dated 15/09/2022. The copy of the monitoring reports is attached herewith as **Annexure 5.** Further, DPA has assigned the work of monthly environmental monitoring to GEMI, Gandhinagar for a period of 3 years vide letter dated 18/04/2023. The work is in progress, and the latest environmental monitoring report submitted by GEMI, Gandhinagar, is attached herewith as (**Annexure 6**).
19.	A six monthly report on compliance of the conditions mentioned in this letter shall have to be furnished by M/s EBTL on a regular basis to this Department as well as to the Ministry of Environment and Forest, Government of India.	It is assured that w.r.t. subject project, six monthly report on compliance of the conditions mentioned in this letter will be furnished by DPA on a regular basis to GCZMA as well as to the Regional Office, MoEF&CC, GoI.
20.	Any other condition that may be stipulated by this Department / Ministry of Environment and Forest, Government of India from time to time for Environmental Protection / management purpose shall also have to be complied with by M/s EBTL.	Point noted.

Annexure -3

YEAR WISE ACTUAL WORK COSTING OF CSR WORKS APPROVED BY BOARD

1) CSR Works executed during the year 2011 – 2012 and year 2012 – 2014. (Upto Dec'21)

Sr. no	Name of work	Actual cost (Rs in Lakhs)
1.	(a).Road from Dr. Baba Saheb Ambedkar Circle to N.H. 8-A (Via Ganesh Nagar).	Rs.482.65 Lakhs
	(b)Road from S.T. Bus Stand (N.H. 8 – A) to Sunderpuri Cross Road Via Collector Road.	
	(C)Road from N.H. 8 –A Railway Crossing to Maninagar (Along Rly Track).	
	(d)Road from Khanna Market Road (Collector Road) to Green Palace Hotel.	
2.	Construction of Internal Roads at "Shri Ram" Harijan Co-op. Housing Society Ltd. (Nr. Kidana).	
3.	(a)Construction of Cremation Ground and kabrastan with other facilities at Vadinar.	Rs 19.44 (Lakhs)
4.	(b)Providing Cement Concrete internal roads in village Vadinar Stage –I.	Rs 16.16 (Lakhs)
	(a)Approach Road provided for developing the Tourism at village Veera near Harsidhi Mata Temple where lot of tourists & Pilgrims visit.	Rs. 4.65 (Lakhs)
	(b)Water Tank along with R.O. provided near by developing Tourism area.	Rs. 30,000 (Thousand)
	(c)Creating facility of flooring and steps surrounding the lake to stop the soil erosion and attract the tourists, at Village Veera.	Rs. 4.80 (Lakhs)
	Total Rs	**528 Lakhs**

2)CSR Works for the year 2014-2015.

Sr. no	Name of work	Actual cost (Rs in Lakhs)
1.	Construction of Community Hall-cum school at Maheshwari Nagar, G'dham	Rs 51.90 Lacs
2.	Renovation of "Muktidham" at Kandla	Rs 10.65 Lacs
3.	Sunderpuri-1 valmiki community hall	Rs 5.00 Lacs
	Sunderpuri-2 valmiki community hall	Rs 5.00 Lacs
	Ganeshnagar Community Hall	Rs 10.00 Lacs
	JagjivanMaheshwari community hall	Rs 10.00 Lacs
	Various works of Road of Sapanagar	Rs 99.19 Lac
4.	Construction of compound wall in the Dam of Jogninar village	Rs 14.48 lacs
5.	In addition above 30 Lakhs as committed in Public Hearing meeting held on 18/12/2013 an amount Rs 30 Lakhs shall also be contributed for the CSR works to be carry out at villages Tuna, Vandi , Rampar, Veera etc.	Rs 30.00 Lacs
	Total Rs.	**Rs 236.22 Lacs**

3)CSR Works for the year 2015-2016.

Sr. no	**Name of work**	**Actual cost (Rs in Lakhs)**
1.	Construction of toilets for Girls / Ladies at Khari Rohar village	**Rs. 3.00 Lakhs**
2.	Construction of Toilets for Girls manatMathak Primary School, Mathak Village	**Rs. 3.00 Lakhs**
	Total	**Rs.6.00 Lakhs**

4)CSR Works for the year 2016-2017.

Sr. no	**Name of work**	**Actual cost (Rs in Lakhs)**
1.	RCC Community Hall at Harshidhi Mata Temple, Veera village, AnjarTaluka	Rs.19.00 Lakhs
2.	Fabricated Community Hall at Sanghad village, AnjarTaluka	Rs.21.00 Lakhs
3.	CSR Works for Shri MaheshwariMeghvadSamaj, Gandhidham at Grave Yard , Behind Redison Hotel.	Rs.8.00 Lakhs
4.	CSR works for ShirDhanrajMatiyadevMuktiDham, Sector-14 , Rotary Nagar, Gandhidham	Rs. 30.50 Lakhs
5.	CSR works for NirvasitHarijan Co-operative Housing Society, Gandhidham.(Health Cum Education Centre)	Rs. 41.00 Lakhs
6.	CSR works for Shri Rotary Nagar Primary school, Gandhidham.	Rs. 2.80 Lakhs
7.	CSR works at NU -4 , NU-10(B) Sapnanagar& Saktinagar, Golden Jublee Park, at Gandhidham	Rs. 18.00 Lakhs
	Total	**Rs 140.30 Lakhs**

5)CSR Works for the year 2017-2018.

Sr. no	**Name of work**	**Actual cost (Rs in Lakhs)**
1.	CSR works at Shri Ganesh Nagar Govt High School, Gandhidham	38.30
2.	Grant Financial contribution for facility of Army cantonment for 50 air coolers at Kutch Border Area.	15.00
3.	CSR works at Tuna & Vandi villages (providing drainage lines under Swachh Bharat Abhiyan)	39.80
4.	CSR works for S.H.N Academy English School (Managed by Indian Institute of Sindhology –Bharati Sindhu Vidyapeeth), Adipur	40.00
5.	Construction of Internal Road at Bhaktinagar Society, Kidana	
	Total	**148.10**

6) CSR Works for the year 2018-19

Sr. no	Name of work	Actual cost (Rs in Lakhs)
1.	CSR work to Donate 100 Nos of Computers to Daughters of Martyred Soldiers in the country under the "BETI BACHAO BETI PADHAO" program by Atharva Foundation, Mumbai	Rs 24.00 Lakhs
2.	CSR work to Donate ONE (40 Seater) School Bus for Deaf Children Students for the Institute of Mata Lachmi Rotary Society, Adipur	Rs 18.00 Lakhs
3.	CSR work to Providing One R.O Plant with Cooler at Panchyat Prathmik Sala, Galpadar Village for the ANARDE Foundation, Kandla & Gandhidham Center.	Rs 1.50 Lakhs
4.	CSR work for Providing Drainage Line at Meghpar Borichi village, Anjar Taluka	Rs 25.00 Lakhs
5.	CSR work for Construction of Health Centre at Kidana Village	Rs 13.00 Lakhs
6.	CSR work to provide 4 Nos. of Big Dust Bin for Mithi Rohar Juth Gram Panchayat	Rs 3.40 Lakhs
7.	CSR work for Renovation & construction of shed at Charan Samaj, Gandhidham –Adipur.	Rs 10.00 Lakhs
8.	CSR Work for Renovation/Repairing of Ceiling of School Building at A. P Vidhyalay, Kandla	Rs 10.00 Lakhs
9.	CSR work for Construction of Over Head Tank & Providing 10 Nos of Computers (for students) of Navjivan Viklang Sevashray, Bhachau, Kutch	Rs 9.50 Lakhs
10.	CSR work to Provide Books & Tuition fees for Educational facilities to weaker section children of ValmikiSamaj, Kutch	Rs 2.00 lakhs
11.	CSR work to provide Water Purifier & Cooler for the ST. Joseph's Hospital, Gandhidham	Rs 1.50 Lakhs
12.	CSR work for Construction of Second Floor (Phase – I) for Training Centre of "GarbhSanskran Kendra" "Samarth Bharat Abhiyan" of Kutch KalyanSangh, Gandhidham	Rs 37.00 Lakhs
	Total cost	**Rs 154.90 Lakhs**

7) CSR Works for the year 2019-20

Sr. no	Name of work	Actual cost (Rs in Lakhs)
1.	CSR activities for Providing Drainage line at Nani Nagalpar village.	3.00
2.	CSR activities for Development of ANGANWADI Building at School no- 12 at Ward no 3 & 6 at Anjar.	7.00
3.	CSR activities for Improving the facilities of Garden at Sapna Nagar(NU-4) & (NU-10 B),Gandhidham.	18.00
4.	CSR activities for development of School premises of Shri Guru Nanak Edu. Society, Gim.	30.00
5.	CSR activities for the improvement of the facilities at St JOSEPH Hospital &Shantisadan at Gandhidham	20.00
6.	Consideration of Expenditure for running of St Ann's High School at Vadinar of last five years 2014 to 2019 under CSR.	825.00
7.	CSR activities for development of school premises of Shri Adipur Group Kanya Sala no-1 at Adipur	6.50
8.	CSR activities for development of school premises of ShriJagjivan Nagar PanchyatPrathmiksala, Gandhidham	16.50
9.	CSR activities for development of school premises of Ganeshnagar Government high school, Gandhidham	9.00
10.	CSR activities for improving greenery, increase carbon sequestration and beat Pollution at Kandla, DPA reg.	352.32
11.	CSR activities for providing infrastructures facilities at "Bhiratna Sarmas Kanya Chhatralaya" under the Trust of SamajNav- Nirman at Mirjapur highway, Ta Bhuj.	46.50
	Total cost	**1333.82**

8) CSR Works for the year 2020-21

Sr. no	Name of work	Actual cost (Rs in Lakhs)
1.	CSR Proposal for earmarking of 15% Funds for National Marintime Heritage Complex, Lothal, Gujarat (NMHC) from allocated CSR Fund of Rs 3.46 Cr	51.90
	Total	**51.90**

9) CSR Works for the year 2021-22

Sr. no	Name of work	Actual cost (Rs in Lakhs)
1.	CSR Activities for providing Water supply pipe line for drinking water facilities for poor people & Fishermen at VANDI Village.	20
2.	CSR activities for providing facilities in Girls Hostel of Kasturba Gandhi Balika Vidhyalay, Gandhidham. Cost for Construction of compound wall, entrance gate, girls toilets)	30
3.	CSR works for Construction of Auditorium Hall at RSETI (Rural Self Employment Training Institute) at Bhujodi-Bhuj.	16
4.	CSR works for the providing of SOLAR POWER SYSTEM and other facilities for 0the JEEV SEVA SAMITI at Gandhidham.	9.3
5.	CSR Activities for providing HD projector for KANYA MAHA VIDYALAYA, Adipur	1.5
6.	CSR works for Construction of New Building for Setting up of skill development centre at Rajkot (Sewa Gujarat).	250
7.	CSR Works for Ladies Environment Action Foundation (LEAF) Trust for providing infrastructure to the primary school at Gandhinagar District	46.5
8.	CSR works lor Providing of Furniture for the School "Shri Galpadar Panchayat Prathmic Kumar group Sala" at Galpadar village,Taluka:Gim	5
	Total Cost	**378.3**

10) CSR Works for the year 2022-23

Sr. no	Name of work	Actual cost (Rs in Lakhs)
1.	CSR work for providing One Bore hole with construction one room along with Motor pump at Village MOTI NAGALPAR, Anjar.	18
2.	CSR work for Construction of Shamashan bhoomi (Crematorium) at Gandhidham.	49.5
3.	CSR work for providing metallic sheet DOME in Community Hall at Old Sunderpuri for Shri Juni Sundarpuri Maheshwari Samaj at Gandhidham.	15
4.	CSR Activities for construction of Samajwadi at village: Rampar,Taluka:Anjar.	15
5.	Financial assistance under CSR for providing basic facilities at Gandhidham GSRTC bus station.	25
6.	CSR Activities for construction of School Building for physically disabled, deaf & mute children, Shri & Shrimati Chhaganlal Shyamjibhai Virani Behera Munga Shala Trust, Virani Deaf School at Rajkot.	5
7.	CSR work for construction of new Administrative staff block for the Maitri Maha Vidhyalaya, Adipur.	64.65
8.	Financial support under CSR for providing 60 seater school bus for "Aadhaar Sankul", Manav Seva Trust,Gandhidham.	25
9.	CSR work for extension of Night shelter cum old age home for “DADA BHAGWANDAS ADVANI TRUST” Adipur.	78
10.	Financial assistance under CSR for Rooftop Solar System & Afforestation under clean energy & sustainable development in 10 villages around DPA	63.72
	Total Cost	**358.87**

11) CSR Works for the year 2023-24

Sr. no	Name of work	Actual cost (Rs in Lakhs)
1.	CSR works for Shree Kachchh Mahila Kalyan Kendra, Bhuj-Kutch	55
2.	CSR Activities for Installation of 125 no. Sanitary Pad Vending Machines at Women Hostels,NGOs etc, in Kutch District	15
3.	CSR Fund for Vadinar Village & surrounding	128.54
4.	CSR Activities for Girls Hostel at Kasturba Gandhi Balika Vidhyalaya At Shinay, Taluka:Gim.	33.25
5.	CSR request for Allotment of fund for construction of Community hall at Adipur for Maheshwari Meghval Samaj.	25
6.	CSR Request for requirement of funds for renovation work in Sector-7, Gandhidham (Aryasamaj Gandhidham)	30
7.	CSR Request for providing"Antim Yatra Bus" & Mortuary Cabinet Morgue" for Adipur-Gandhidham from CSR Funds,	25
8.	CSR Request for creation of a Children park at Gandhidham Military Station, Gandhidham	15
9.	CSR Request for construction of Toilet block units for Girls & Boys NAV JIVAN VIKLANG SEVA SHREY Bhachau	3.04
10.	CSR Request for laying Synthetic Athletic track in Galpadar and to Provide One E-Kart facility for Conveyance of youths at BSF Campus, Gandhidham	75
11.	CSR request for submitted by AAS, Indore for solid waste Management at Gandhidham & Kandla.	49.93
12.	CSR request from Trikamsaheb Manav Seva Trust at Madhapar Near Bhuj for grant for Construction of Community Hall, Compound Wall etc.	40
13.	CSR Request for construction of Dome shaped shed at Rampar Village Prathmik Shala,Rampar	24
14.	CSR Fund for development of School premises of Shri Guru Nanak Education	4.5
15.	CSR Request for conducting Awareness campaigns on T.B. Prevention & treatment, Mumbai	60
16.	CSR Request for fund under CSR for Railway Institute, Gandhidham, Western	5
17.	CSR Proposal project for Sanitary Pad Making Machine for School Girls, Anjar	12.39
	Total Cost	**600.65**

Annexure -4

सत्यमेव जयते

Forests & Environment Department
Government of Gujarat

Monthly Environmental Monitoring Plan (EMP report)

For

"Preparing and Monitoring of Environmental Monitoring and Management Plan for Deendayal Port Authority at Dahej-Hazira-Ghogha for a period of 3 years"

(13th October to 12th November 23)

(Final Report)

Ref. No. GEMI/835(2)/69/2024

Submitted to:

Deendayal Port Authority (DPA), Kandla

Gujarat Environment Management Institute (GEMI)

(An Autonomous Institute of Government of Gujarat)

GEMI Bhavan, 246-247, GIDC Electronic Estate, Sector-25, Gandhinagar-382025

"An ISO 9001:2015, ISO 14001:2015 and ISO 45001:2018 Certified Institute"

ABOUT THIS DOCUMENT

Gujarat Environment Management Institute (GEMI) has been assigned with the project **"Preparing and Monitoring of Environmental Monitoring and Management Plan for Deendayal Port Authority at Dahej-Hazira-Ghogha for a period of 3 years" (Final EMP report for 13th October to 12th November 2023) by Deendayal Port Authority, Kandla.** Under the said project the report titled "Monthly Environmental Monitoring Plan Report *(Final EMP report for 13th October-12th November 2023)"* is prepared.

Name of the Report:	Monthly Environmental Monitoring Plan (EMP report) for "Preparing and Monitoring of Environmental Monitoring and Management Plan for Deendayal Port Authority at Dahej-Hazira-Ghogha for a period of 3 years" *(Final EMP report for 13th October-12th November 2023)*
Date of Issue:	06/03/2024
Version:	1.0
Document Ref.:	GEMI/835(2)/69/2024
Prepared by:	Ms. Ankita Modi, Assistant Environmental Engineer Ms. Jalpa Darji, Deputy Environmental Engineer & Unit Head – 2
Contribution by	Mr. Yagneshkumar Pandit (Project Assistant) Ms. Nishi Shah (Project Assistant) Mr. Nikunj Choksi (Project Assistant) Mr. Ashish Patat (Project Manager, Ghogha) Mr. Pritish Shrimali (Project Manager, Hazira) Mr. Anandgiri Gosai (Project Manager, Dahej)
Reviewed by:	Dr. Nitasha Khatri, Senior Scientific Officer & Lab Head
Approved by:	Dr. Jaipal Singh, IFS, APCCF & Director

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Chapter 1. Introduction

1.1 Introduction

Deendayal Port Authority (Erstwhile Kandla Port Trust) is one of the twelve major ports in India and is located on the West Coast of India, in the Gulf of Kutch at 23001'N and 70013'E in the state of Gujarat in India. DPA has commissioned Ro-Ro/Ro-Pax facilities at Hazira and Ghogha, Gujarat. This waterfront is proposed to be operated for berthing and unberthing of ROPAX Ferry vessels to load and unload vehicles along with embarking and disembarking passengers. The travel time between Ghogha and Hazira has reduced from 10 hours to 3.15 hours with the start of the Ro-Ro ferry service. The road distance from Surat to Bhavnagar is 360 kilometers. Whereas the sea route distance is 67 nautical miles only. So, Ro-Ro/Ro-Pax vessels are deployed to reduce travel time and thereby, reduce carbon emission. In compliance with the conditions stipulated in statutory clearances viz. Environmental/CRZ Clearance from the Ministry of Environment & Forest, CRZ Recommendations from the State Forest & Environment Department, and NOC from the State Pollution Control Board, and to ensure implementation of the project in an environmentally sustainable manner in & around the project site, it is important to monitor the environmental status and prepare an effective Environmental Monitoring and Management Plan of the port facility for sustainable development.

In this regard, Deendayal Port Authority proposes to formulate a detailed and effective environmental monitoring and management plan by conducting monthly environmental monitoring for its onward submission to the statutory bodies.

Under the said study, monitoring of the various aspects of the environment such as Ambient air, DG stack emissions, meteorology, drinking water, soil, noise, and marine environment- Water, Sediment & Ecological characteristics for the locations at Hazira, Dahej & Ghogha for 3 years needs to be carried out.

This report includes the monthly Environmental Monitoring Plan (EMP) Report for monitoring carried out for the month of "13th October-12th November 2023".

1.2 Locations for Environmental Monitoring

Finalized monitoring locations as per the preliminary site visit report are shown in **Table 1** and **Figures 1 to 3**. The monitoring photographs are shown in **Figure 4**.

Table 1: Locations of Environmental Monitoring Components

Locations	Sample code	Latitude	Longitude
Ambient Air Monitoring			
Admin building at Ghogha Ro-Ro ferry	AM-G	21.673483	72.284497
Terminal building at Hazira Ro-Ro ferry	AM-H1	21.077458	72.657147
Staff accommodation at Ro-Ro ferry at Hazira	AM-H2	21.0775717	72.6551994
Admin building at Ro-Ro ferry service at Dahej	AM-D	21.666383	72.561889
Drinking Water Monitoring			
Canteen building at Ghogha Ro-Ro ferry	DW-G	21.677216	72.283060
Terminal building at Hazira Ro-Ro ferry	DW-H	21.077399	72.657189
Canteen building at Ro-Ro ferry service at Dahej	DW-D	21.66435	72.563489
Noise Monitoring			
Admin building at Ghogha Ro-Ro ferry	N-G	21.673481	72.284464
Terminal building at Hazira Ro-Ro ferry	N-H1	21.077458	72.657147
Staff accommodation at Ro-Ro ferry at Hazira	N-H2	21.0775717	72.6551994
Admin building at Ro-Ro Ferry Service at Dahej	N-D	21.666383	72.5561889
Meteorological Data Monitoring			
Admin building at Ghogha Ro-Ro ferry	M-G	21.673483	72.284497
Terminal building at Hazira Ro-Ro ferry	M-H	21.077458	72.657147
Admin building at Ro-Ro Ferry Service at Dahej	M-D	21.666383	72.561889
Soil Quality Monitoring			
Terminal building at Ghogha Ro-Ro ferry	S-G	21.67496	72.284388
Near Terminal building at Hazira Ro-Ro ferry	S-H	21.076353	72.657294
Ro-Ro ferry service at Dahej	S-D	21.666037	72.563489
Marine Water, Ecology and Sediment Monitoring			
Near Ro-Ro ferry terminal at Ghogha	MA-G1	21.67954	72.29433
Away from Ro-Ro ferry terminal at Ghogha and along the ferry route from Ghogha to Hazira	MA-G2	21.665054	72.336313
Near Ro-Ro ferry terminal at Hazira	MA-H1	21.07577	72.65839
Away from Ro-Ro ferry terminal at Hazira and along the ferry route from Hazira to Ghogha	MA-H2	21.072114	72.657794
Near Ro-Ro ferry Service at Dahej	MA-D	21.65988	72.56365
DG stack emission Monitoring			
Near substation-3 at Ghogha Ro-Ro ferry	DG-G	21.6739638	72.2835000
Generator Room near Terminal building at Hazira Ro Ro ferry	DG-H	21.0775041	72.6563279
Near Substation-1 at Dahej Ro-Ro ferry	DG-D	21.665902	72.562056

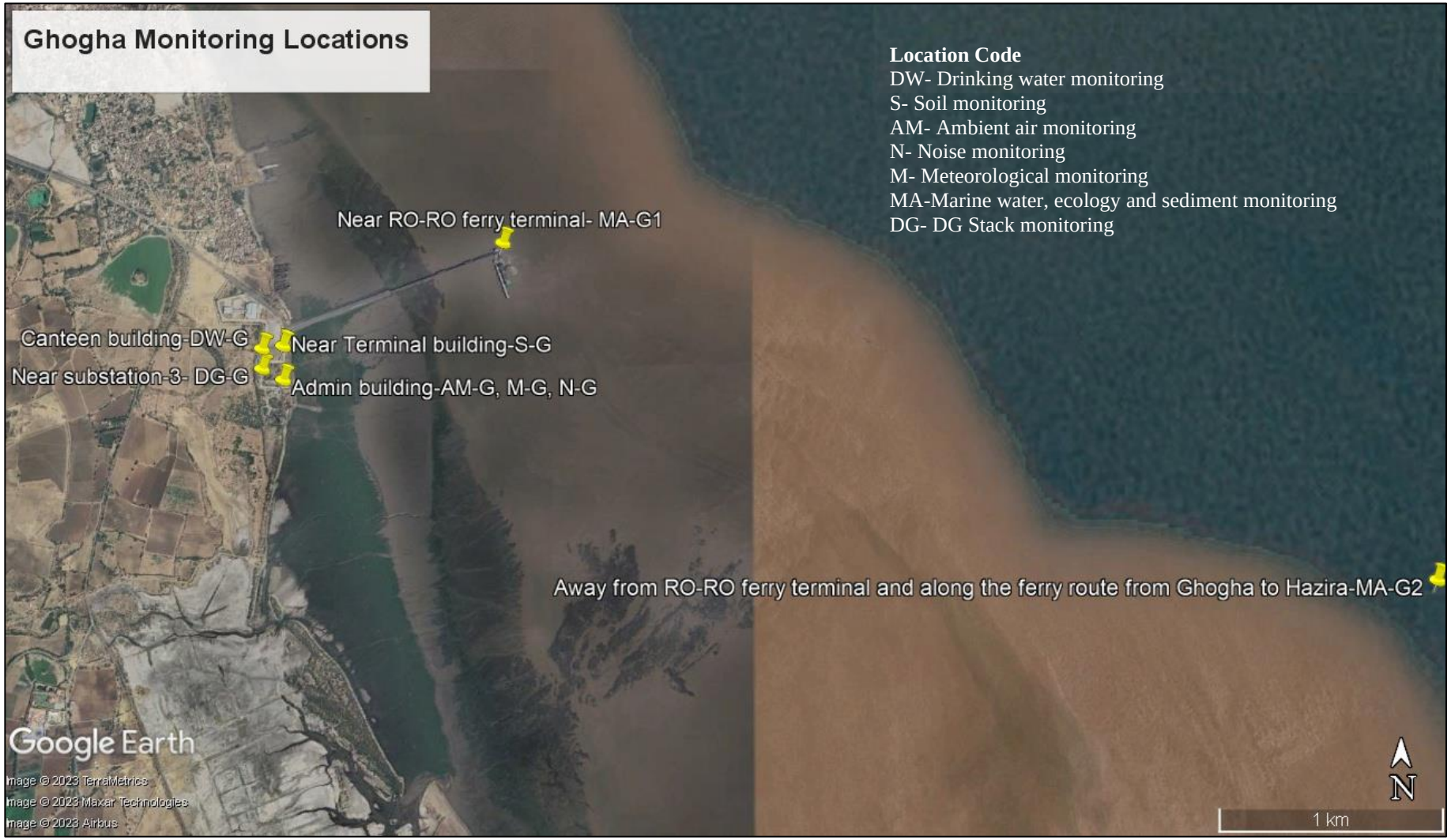

Fig. 1: Sampling locations at Ghogha

Fig. 2: Sampling locations at Hazira

Fig. 3: Sampling locations at Dahej

Fig. 4: Photographs of Environmental Monitoring

1.3 Details of Environmental Monitoring Components

Detailed plan of environmental monitoring components and its parameters is shown in **Table 2.**

Table 2: Detailed Environmental Monitoring Components

Sr. No	Parameter	No. of locations	Frequency	Parameters
1.	Ambient Air Quality Monitoring (4 Locations)	1 at Ghogha, 2 at Hazira and 1 at Dahej	Twice a week	PM_{10}, $PM_{2.5}$, Sulphur Dioxide, Oxides of Nitrogen, Carbon Monoxide
			Once in a month	Hydrocarbons
				Benzene
				Volatile Organic Compound
				Non-methane VOC
2.	Drinking Water Monitoring (3 Locations)	1 at Ghogha, 1 at Hazira and 1 at Dahej	Once in a month	Odor, Color, pH, Turbidity, TDS, TSS, Conductivity, Chloride, Calcium as Ca, Magnesium, Total Hardness, Sulphate as SO_4, Nitrate as NO_3, Nitrite as NO_2, Fluoride as F, Sodium as Na, Iron as Fe, Potassium as K, Manganese, Total Chromium, Hexavalent Chromium, Copper, Cadmium, Arsenic, Lead, Zinc, Mercury, Salinity, Free Residual Chlorine, Microbiological (MPN)
3.	Noise level Monitoring (4 Locations)	1 at Ghogha, 2 at Hazira and 1 at Dahej	24 hrs period once in a month	Leq (Day) & (Night)
4.	Soil Quality Monitoring (3 Locations)	1 at Ghogha, 1 at Hazira and 1 at Dahej	Once in a month	Total Organic Matter, Organic Carbon, Inorganic Phosphate, Texture, pH, Conductivity, Particle size distribution & Silt content, SAR, Water Holding Capacity, Aluminum, Chromium, Nickel, Copper, Zinc, Cadmium, Lead, Arsenic, Mercury
5.	Meteorologi-cal Data Monitoring (3 Locations)	1 at Ghogha, 1 at Hazira and 1 at Dahej	Daily	Wind Speed, Wind Direction, Rainfall, Humidity, Temperature, Solar Radiation
6.	DG emissions (3 Locations)	1 at Ghogha, 1 at Hazira and 1 at Dahej	Once in a month	Particulate Matter, Sulphur Dioxide, Oxides of Nitrogen, Carbon Monoxide, Carbon Dioxide
7.	Marine Water Quality (5 Locations)	2 at Ghogha, 2 at Hazira and 1 at Dahej	Once in a month	Odor, Color, pH, Turbidity, TDS, TSS, Conductivity, DO, Particulate Organic Carbon, COD, BOD, Silica, Phosphate, Sulphate as SO_4^-, Nitrate as NO_3, Nitrite as NO_2, Sodium as Na, Potassium as K, Manganese,

Sr. No	Parameter	No. of locations	Frequency	Parameters
				Iron as Fe, Total Chromium, Hexavalent Chromium, Copper, Cadmium, Arsenic, Lead, Zinc, Mercury, Oil & grease, Floating Material (scum), Microbiological (MPN), Density
8.	Marine Water Quality for Biological Monitoring (5 locations)	2 at Ghogha, 2 at Hazira and 1 at Dahej	Once in a month	Chlorophyll-a, Pheophytin, Productivity (Net & Gross), Biomass, Relative Abundance, species composition and diversity of phytoplankton, Relative Abundance, species composition and diversity of zooplankton, Relative Abundance, species composition and diversity of benthic invertebrates (Meio, Micro and macro benthos), Particulate oxidizable organic carbon Secchi Depth
9.	Sediments Quality (5 Locations)	2 at Ghogha, 2 at Hazira and 1 at Dahej	Once in a month	Texture, Organic Matter, Inorganic Phosphate, Silica, Phosphate, Sulphate, Nitrite, Nitrate, Calcium, Magnesium, Sodium, Potassium, Aluminum, Copper, Chromium, Nickel, Zinc, Cadmium, Lead, Arsenic, Mercury.

1.4 Sample collection, preservation, storage and transportation to GEMI's Laboratory

Sampling of water and wastewater samples was carried out by GEMI's sampling protocol for Water and wastewater approved by the Government of Gujarat vide letter no. ENV-102013-299-E dated 24-04-2014 under the provision of the Water (Preservation and Control of Pollution) Act 1974. Soil sampling was conducted as per the Soil Sampling Manual by GEMI published in November 2016. Whereas, for the other components of the environment such as Ambient Air, Noise, & Marine Ecology, the guidelines/manuals brought out by CPCB were followed. The sampling was carried out by GEMI's trained manpower. The details of the environmental samples and their respective standards are summarized in **Table 3.**

Table 3: Details of Sample Collection and Analysis Method for Each Environmental Component

Sr. No.	Type of sample		Manual/ Standards and Protocols	Instruments
1.	Ambient Air	IS 5182 (Part 23): 2006	PM_{10}	Respirable Dust Sampler (RDS) Conforming to IS:5182 (Part-23): 2006
		IS:5182 (Part:24):2019	$PM_{2.5}$	Fine Particulate Sampler (FPS) Conforming to IS:5182 (Part-24): 2019
		IS:5182 (Part-2):2001	SO_x	Gaseous Attachment Conforming to IS:5182 (Part-2):2001
		IS:5182 (Part-6):2006	NO_x	Gaseous Attachment Conforming to IS:5182 (Part-6): 2006
		GEMI/SOP/AAQM/11; Issue no 01, Issue date 17.01.2019: 2019	Carbon Monoxide	Sensor-based Instrument
		IS 5182 (Part 11): 2006	Benzene	Low Flow Air Sampler Conforming to IS:5182 (Part-11): 2006
		IS 5182 (Part 11): 2006	VOC	Low Flow Air Sampler Conforming to IS:5182 (Part-11): 2006
		IS: 5182 (Part 17): 1979	Hydrocarbon	Aluminized plastic bags with on/off valve Conforming to IS 5182 (Part 17):1979
		IS: 5182 (Part 17): 1979	Non-Methane VOC	Aluminized plastic bags with on/off valve Conforming to IS 5182 (Part 17):1979
2.	DG Emissions		IS: 11255 and USEPA Method	Sensor-based Flue gas analyzer (Make: TESTO, Model 350) Stack Monitoring Kit
3.	Meteorological data		Installation of Automatic Weather Stations so as to get the periodic Meteorological data as per the requirement	Automatic Weather Stations

Sr. No.	Type of sample	Manual/ Standards and Protocols	Instruments
4.	Water (Drinking Water, Surface Water)	Sampling Protocol for Water & Wastewater approved by the Government of Gujarat vide letter no. ENV-102013-299-E dated 24-04-2014 under the provision of Water (Preservation and Control of Pollution) Act 1974.	For drinking water- Titration Apparatus, pH meter and conductivity meter Sample collection method: Grab sampling For marine water - Niskin Sampler
5.	Soil and Marine Sediments	Soil Sampling Manual by GEMI published in November 2016	For sediment sample collection –Van Veen grab sampler
6.	Noise	IS 9989:2014	Noise meter
7.	Marine Ecology	Technical guidance book – An introduction to aquatic Biomonitoring using Macro-invertebrates,2021 by CPCB	The sampling of the Benthic Invertebrates will be carried out with the help of D-frame nets, whereas the sampling of zooplankton and phytoplankton shall be carried out with the help of Plankton nets (60 micron and 20 micron).

1.5 Environmental Monitoring Plan for 13th October -12th November 2023

The Environmental monitoring was carried out for Ambient Air, Soil, Drinking water, Noise, Meteorology, DG Stack and Marine environment – Water, Sediment and Ecology. The detailed Environmental Monitoring Plan for 13th October -12th November 2023 is given in **Table 4**.

Table 4: Environmental Monitoring Plan for Dahej, Hazira and Ghogha for 13th October -12th November 2023

Sampling and Monitoring Team	Mr. Ashish Patat-Project Manager (Ghogha), Mr. Pritish Shrimali-Project Manager (Hazira), Mr. Anandgiri Gosai-Project Manager (Dahej)			
Task	**Actual Monitoring Dates**			
	Project sites			
Monitoring of Drinking water, Soil, Noise, Marine Water, Sediments and ecology	**Dahej**	**Hazira-1**	**Hazira-2**	**Ghogha**
Soil Monitoring	20-Oct-23	18-Oct-23	-	17-Oct-23
Drinking Water	20-Oct-23	18-Oct-23	-	17-Oct-23
Marine Water and Marine Sediments and Marine Ecology	20-Oct-23	18-Oct.-23	18-Oct-23	17-Oct-23
Noise Monitoring	2-Nov-23	06-Nov-23	10-Nov-23	17-Oct-23
Monitoring of DG Stack	11-Oct-23	13-Oct.-23	-	08-Nov-23
Monitoring of Ambient Air	16-Oct-23	16-Oct-23	16-Oct-23	16-Oct-23
	18-Oct-23	18-Oct-23	18-Oct-23	18-Oct-23
	22-Oct-23	22-Oct-23	22-Oct-23	22-Oct-23
	25-Oct-23	25-Oct-23	25-Oct-23	25-Oct-23
	01-Nov-23	01-Nov-23	01-Nov-23	01-Nov-23
	03-Nov-23	03-Nov-23	03-Nov-23	03-Nov-23
	06-Nov-23	05-Nov-23	05-Nov-23	05-Nov-23
	08-Nov-23	07-Nov-23	07-Nov-23	07-Nov-23
Meteorological Monitoring	13th October to 12th November 23			

Chapter 2. Results and Observations of Environmental monitoring at Dahej, Hazira & Ghogha

2.0 Monitoring of Various Environmental Components

Monitoring of various environment components was carried out at the locations listed in **Table 1** above. Details of each component have been mentioned as below

2.1 Ambient Air Monitoring

Air monitoring was carried out at four locations, 1 at Dahej, 2 at Hazira, and 1 at Ghogha. The monitoring cycle was twice a week for 24 hours sampling. Sampling for Benzene, Hydrocarbon, Non-methane VOC, and VOC was done once in a month. **Table 5** shows the results of ambient air monitoring.

Table 5: Result of Ambient Air Quality Monitoring

Sr. No.	Parameters	NAAQ Standards, 2009 (Industrial, Residential, Rural & Other Areas) for 24 hours	Location Code: (AM-D)							
			Sampling Date							
			16-10-2023	18-10-2023	22-10-2023	25-10-2023	01-11-2023	03-11-2023	06-11-2023	08-11-2023
1	PM_{10} (µg/m^3)	100 (µg/m^3)	71.39	157.72	153.79	167.81	170.2	226.47	191.85	189.41
2	$PM_{2.5}$ (µg/m^3)	60 (µg/m^3)	24.33	28.45	27.56	29.67	30.26	35.78	35.78	36.12
3	SO_2 (µg/m^3)	80 (µg/m^3)	6.58	7.74	21.41	73.4	56.69	9.18	46.21	45.29
4	NO_2 (µg/m^3)	80 (µg/m^3)	32.62	24.13	21.88	25.19	27.7	22.26	66.28	64.38
5	CO (µg/m^3)	2000 (µg/m^3)	920	980	1020	960	1040	980	1060	1030

Sr. No.	Parameters	NAAQ Standards, 2009 (Industrial, Residential, Rural & Other Areas) for 24 hours	Location Code: (AM-H1)							
			Sampling Date							
			16-10-2023	18-10-2023	22-10-2023	25-10-2023	01-11-2023	03-11-2023	05-11-2023	07-11-2023
1	PM_{10} (µg/m^3)	100 (µg/m^3)	172.32	253.53	194.75	299.38	226.09	237.86	167.90	238.90
2	$PM_{2.5}$ (µg/m^3)	60 (µg/m^3)	59.57	63.74	64.57	89.57	108.32	112.90	56.66	91.23
3	SO_2 (µg/m^3)	80 (µg/m^3)	9.29	7.61	7.02	33.80	13.17	42.66	32.56	37.75
4	NO_2 (µg/m^3)	80 (µg/m^3)	31.83	34.97	40.21	47.28	42.17	52.78	40.73	51.47
5	CO (µg/m^3)	2000 (µg/m^3)	470	500	530	490	530	480	520	500

Sr. No.	Parameters	NAAQ Standards, 2009 (Industrial, Residential, Rural& Other Areas) for 24 hours	Location Code: (AM-H2)							
			Sampling Date							
			16-10-2023	18-10-2023	22-10-2023	25-10-2023	01-11-2023	03-11-2023	05-11-2023	07-11-2023
1	PM_{10} (µg/m^3)	100 (µg/m^3)	171.57	255.18	193.69	298.11	227.34	236.57	168.12	239.36
2	$PM_{2.5}$ (µg/m^3)	60 (µg/m^3)	57.25	64.92	63.41	87.68	107.13	111.39	57.23	92.48
3	SO_2 (µg/m^3)	80 (µg/m^3)	9.72	6.86	6.58	34.28	14.48	43.21	33.82	36.39
4	NO_2 (µg/m^3)	80 (µg/m^3)	32.43	35.23	39.92	48.37	41.82	53.72	41.58	52.82
5	CO (µg/m^3)	2000 (µg/m^3)	480	520	510	500	520	490	530	510

Sr. No.	Parameters	NAAQ Standards, 2009 (Industrial, Residential, Rural& Other Areas) for 24 hours	Location Code: (AM-G)							
			Sampling Date							
			16-10-2023	18-10-2023	22-10-2023	25-10-2023	01-11-2023	03-11-2023	05-11-2023	07-11-2023
1	PM_{10} (µg/m^3)	100 (µg/m^3)	62.11	52.63	96.45	111.96	182.95	129.53	139.40	187.00
2	$PM_{2.5}$ (µg/m^3)	60 (µg/m^3)	26.64	17.48	38.30	24.98	38.29	97.40	27.06	36.21
3	SO_2 (µg/m^3)	80 (µg/m^3)	<5	<5	<5	<5	7.44	<5	<5	<5
4	NO_2 (µg/m^3)	80 (µg/m^3)	16.28	24.80	18.09	13.57	38.63	10.46	20.15	22.74
5	CO (µg/m^3)	2000 (µg/m^3)	520	510	530	490	500	480	490	470

Sr. No.	Parameters	NAAQ Standards, 2009 (Industrial, Residential, Rural & Other Areas) for 24 hours	Location Code: (AM-D)	Location Code: (AM-H1)	Location Code: (AM-H2)	Location Code: (AM-G)
			Sampling Date			
			16-10-2023	25-10-2023	26-10-2023	01-11-2023
1	Benzene (µg/m^3)	5 (µg/m^3)	<4.0	<4.0	<4.0	<4.0
2	Hydrocarbons (µg/m^3)	-	<4.0	<4.0	<4.0	<4.0
3	Non-methane VOC (µg/m^3)	-	<4.0	<4.0	<4.0	<4.0
4	VOC (µg/m^3)	-	<4.0	<4.0	<4.0	<4.0

Observations:

- The results of ambient air quality were compared with the National Ambient Air Quality Standards (NAAQS), 2009 specified by the Central Pollution Control Board (CPCB).
- Dahej: PM_{10} was found to be higher than the standard concentration of 100 µg/m^3 in all samples except for 16/10/23, whereas all other monitored parameters were determined to be within the standard range.
- Hazira:
  - The concentration of SO_2, NO_2, CO, Benzene, Hydrocarbons, Non-methane VOC, and VOC were observed within the standard limit.
  - PM_{10} was found to be higher than the standard concentration of 100 µg/m^3 in all samples.
  - For most of the samples collected during the month, the $PM_{2.5}$ was found to be higher than the standard concentration of 60 µg/m^3.
- Ghogha:
  - The concentration of SO_2, NO_2, CO, Benzene, Hydrocarbons, Non-methane VOC, and VOC were observed within the standard limit in all the samples.
  - PM_{10} was found to be higher than the standard concentration of 100 µg/m^3 in most of the samples.
  - $PM_{2.5}$ exceeded the standard limit only once and was within the standard limit in remaining samples.
- The high concentration of PM_{10} and $PM_{2.5}$ could be attributed to vehicular movement in the port area, surrounding road dust causing the dispersion of emitted particulate matter in the ambient air.

Preventive measures:

- Practice should be initiated by using a mask as a preventative measure, to avoid the health risk associated with the inhalation of dust particles to the person working in the port area.
- Water sprinkling on roads should be practiced to reduce dust suspension and its emission during vehicular movement.
- The primary port-related particulate matter sources are from the exhaust of engines of the power landside equipment, Seagoing marine vehicles, Ro-pax facilities operated at Hazira and Ghogha for loading and unloading vehicles, other industrial and commercial sources that burn fuel. This can be controlled by regular maintenance of the engines of the power landside equipment, Seagoing marine vehicles and Ro-pax facilities. Further, verification of Pollution Under Control (PUC) Certificate of vehicles loading into the Ro-pax ferry and within the port area can also help in reducing the emissions.

2.2 Drinking Water Monitoring

Drinking water sampling was carried out once a month at three locations i.e., 1 at Dahej, 1 at Hazira, and 1 at Ghogha. The analysis results were compared with the stipulated standards as per IS 10500:2012 and mentioned in **Table 6** below.

Table 6: Result of Drinking Water Quality Monitoring

Sr. No.	Parameters	Unit	Acceptable limit	Permissible limit	Location Code and Sampling Date		
			Standards IS 10500:2012		DW-D	DW-H	DW-G
					20-10-2023	18-10-2023	17-10-2023
1	pH	-	6.5-8.5	-	7.93	7.25	8.69
2	EC	µS/cm	-	-	221	189.4	205
3	TDS	mg/L	500	2000	116	96	104
4	Chloride	mg/L	250	1000	21.99	31.99	33.49
5	Total Hardness	mg/L	200	600	88	22	100
6	Calcium as Ca	mg/L	75	200	24.00	3.2	28
7	Magnesium as Mg	mg/L	30	100	6.72	3.36	7.2
8	Turbidity	NTU	1.00	5.00	BQL● (QL=0.5)	BQL● (QL=0.5)	BQL● (QL=0.5)
9	Fluoride as F	mg/L	1	1.5	0.395	0.673	BQL● (QL=0.3)
10	SO_4	mg/L	200	400	10.069	11.893	BQL● (QL=10)
11	Na	mg/L	60	-	11.76	39.70	28.28
12	K	mg/L	-	-	BQL● (QL=5)	BQL● (QL=5)	BQL● (QL=5)
13	NO_3	mg/L	45	-	3.523	7.162	6.829
14	NO_2	mg/L	-	-	BQL● (QL=0.1)	BQL● (QL=0.1)	BQL● (QL=0.1)
15	Odour	TON	Agreeable	Agreeable	1	1	1
16	Hg	mg/L	0.001	No Relaxation	BQL● (QL=0.0005)	BQL● (QL=0.0005)	BQL● (QL=0.0005)
17	Salinity	mg/L	-	-	0.11	0.09	0.10
18	Free Residual Cl	mg/L	0.2	1	BQL● (QL=2)	BQL● (QL=2)	BQL● (QL=2)
19	Pb	mg/L	0.01	-	BQL● (QL=0.002)	BQL● (QL=0.002)	BQL● (QL=0.002)
20	Cd	mg/L	0.003	No Relaxation	BQL● (QL=0.002)	BQL● (QL=0.002)	BQL● (QL=0.002)
21	Fe	mg/L	0.3	No Relaxation	BQL● (QL=0.1)	BQL● (QL=0.1)	BQL● (QL=0.1)
22	Total Cr	mg/L	0.05	No Relaxation	BQL● (QL=0.005)	BQL● (QL=0.005)	BQL● (QL=0.005)
23	Hexavalent Cr	mg/L	-	-	BQL● (QL=0.01)	BQL● (QL=0.01)	BQL● (QL=0.01)

Sr. No.	Parameters	Unit	Acceptable limit	Permissible limit	Location Code and Sampling Date		
			Standards IS 10500:2012		DW-D	DW-H	DW-G
					20-10-2023	18-10-2023	17-10-2023
24	Cu	mg/L	0.05	1.5	BQL● (QL=0.005)	BQL● (QL=0.005)	BQL● (QL=0.005)
25	Zn	mg/L	5.00	15.00	0.657	BQL● (QL=0.5)	BQL● (QL=0.5)
26	As	mg/L	0.01	0.05	BQL● (QL=0.005)	BQL● (QL=0.005)	BQL● (QL=0.005)
27	Color	Hazen	5.00	15.00	5	1	1
28	TSS	mg/L	-	-	116	BQL● (QL=2)	BQL● (QL=2)
29	Microbiological (MPN) (Total Coliforms)	CFU/ 100 ml	Shall not be detectable in any 100 ml sample		810	310	850
30	Mn	mg/L	0.1	0.3	BQL● (QL =0.04)	BQL● (QL =0.04)	BQL● (QL=0.04)

BQL – Below Quantification Limit QL– Quantification Limit

Observations:

- The samples were collected from the respective RO system at the monitored locations. The following were observed from the analysis of drinking water samples.
- Dahej:
  - The concentration of all the parameters was found to be within the standard acceptable limit except for total coliform content.
- Hazira:
  - All other physicochemical parameters were within the standard acceptable limit.
  - Total coliform content was detected in the sample.
- Ghogha:
  - pH of sample was found to be alkaline and little higher than the standard limit. It will not have any adverse health impact.
  - Total coliform content was detected in the sample.

Preventive measures:

- Total Coliforms were detected in samples of all locations which indicates the microbiological contamination. Therefore, the regular cleaning and maintenance of the RO system is recommended. The disinfection system should be replaced to prevent the contamination of water from coliform.

2.3 Noise level monitoring

Noise monitoring was conducted at all four locations, i.e., 1 at Dahej, 2 at Hazira and 1 at Ghogha. The Noise has been monitored once a month at all the locations for 24 hours. The results of the Noise monitoring are mentioned in **Table 7**. The results were compared with the prescribed limit of noise level as per the Noise Standards of Environment Protection Rules,2000 as given in **Table 8**.

Table 7: Result of Noise Monitoring

Sr. No.	Location Code	Oct-Nov 23						
		Date of Monitoring	Day Time			Night Time		
			Max.	Min.	Leq.	Max.	Min.	Leq.
1	N-D	02-Nov-23	70.9	49.8	60.0	53.7	48.2	51.4
2	N-H1	06-Nov-23	73.2	56.5	63.6	60.2	54.9	58.2
3	N-H2	10-Nov-23	72.2	57.4	58.2	61.3	54.7	56.4
4	N-G	17-Oct-23	50.6	32.6	45.5	41.7	30.5	38.4

Table 8: Ambient Air Quality Norms in Respect of Noise

Area Code	Type of area	Noise dB(A) Leq	
		Day time	Night time
A	Industrial area	75	70
B	Commercial area	65	55
C	Residential area	55	45
D	Silent zone	50	40

Observations:

- Average Leq noise levels, for Day-time and Night-time at all locations, Dahej, Hazira, and Ghogha, were found below maximum permissible limits defined for “Industrial area”

2.4 Soil quality monitoring

Soil quality monitoring was carried out at all three locations, 1 at Dahej, 1 at Hazira and 1 at Ghogha once a month. **Table 9** shows the analysis results of soil quality.

Table 9: Result of Soil Quality Monitoring

Sr. No.	Parameters		Unit	Location Code & Date of Sampling		
				S-D	S-H	S-G
				20-10-2023	18-10-2023	17-10-2023
1	Organic Carbon		%	0.7	0.2	0.5
2	Total Organic Matter		%	1.2	7.24	0.87
3	Inorganic Phosphate (Av. Phosphorous)		kg/Ha	1.15	0.12	1.05
4	Particle size distribution & silt content	Sand %	-	16.25	50.24	28.24
5		Silt %	-	43.43	29.44	39.44
6		Clay %	-	40.31	20.32	32.32
7	Texture	Type of soil	-	Silty Clay	Sandy clay loam	Clay loam
8	pH		-	8.66	8.76	8.53
9	Conductivity		dSm/cm	0.241	2.99	0.27
10	SAR		meq/L	0.19	7.24	0.13
11	Water Holding Capacity		%	62	50	64
12	Al		mg/kg	643.74	1064.5	989.6
13	Cr		mg/kg	94.80	84.20	194.80
14	Ni		mg/kg	43.46	37.50	116.90
15	Cu		mg/kg	78.05	47.20	83.40
16	Zn		mg/kg	53.83	55.50	139.10
17	Cd		mg/kg	BQL● (QL=1)	BQL● (QL=1)	BQL● (QL=1)
18	Pb		mg/kg	2.89	0.80	4.70
19	As		mg/kg	2.89	3.00	11.50
20	Hg		mg/kg	BQL● (QL=0.005)	BQL● (QL=0.005)	BQL● (QL=0.005)

BQL – Below Quantification Limit QL- Quantification Limit

To classify the soil quality, the soil quality standards- “Soil fertility class by Soil Health card 2015” & “Standard limit EU 2002” were adopted and shown in **Table 10** below.

Table 10: Soil Quality Standard

Soil fertility class by Soil Health Card (SHC 2015)				
Sr. No.	**Parameter**	**Range & Interpretation of Result**		
1	**pH**	Acidic <6.5	Normal 6.5-8.2	Alkaline >8.2
2	**Electrical Conductivity (dSm/m)**	Normal <1	Medium 1-3	Harmful >3
3	**Available Phosphorus (kg/Hectare)**	Low < 28	Medium 28-56	High >56
4	**Organic Carbon (%)**	Low < 0.5	Medium 0.5-0.75	High > 0.75
5	**Zinc (mg/kg)**	Low < 0.5	Medium 0.5-1.0	High >1.0
6	**Copper (mg/kg)**	Low < 0.2	Medium 0.2-0.4	High >0.4
Standard limit EU 2002				
7	**Chromium (mg/kg)**	150		
8	**Lead (mg/kg)**	300		
9	**Cadmium (mg/kg)**	3.0		
10	**Nickel (mg/kg)**	75		

Observations:

- The texture of the soil of all locations was Silty Clay to Clay loam.
- The pH value in soil was found alkaline in nature at all three locations, Dahej, Hazira, and Ghogha.
- Electrical Conductivity at Dahej and Ghogha was found to be in the 'Normal' class; whereas, at Hazira, EC was observed to be 'Medium' category.
- Available phosphorus falls under the 'Low fertility' quality class at all three locations.
- The Organic carbon content in the soil was found in 'Medium Fertility' class at Dahej and Ghogha, while it was in 'Low fertility' class at the Hazira.
- The values of Zn and Cu were found higher and were in 'High fertility' class at all three locations.
- The heavy metals including Cr, Pb, Cd, and Ni were detected within permissible limits at Dahej and Hazira; whereas at Ghogha Cr and Ni were detected higher than the limit.
- The overall quality of soil at all three locations were found to have low essential nutrients, hence less suitable for plant growth.

Preventive measures:

- Soil fertility can be improved by incorporating cover crops that add organic matter to the soil, which leads to improved soil structure and promotes a healthy and fertile soil.

2.5 Marine Water, Sediment & Ecology Monitoring

Marine water, sediment, and ecology monitoring was carried out at five locations, 1 at Dahej, 2 at Hazira, and 2 at Ghogha. The results and observations are mentioned below.

2.5.1 Marine Water Quality Monitoring

The analysis results of the marine water are presented in **Table 11** below. The results of marine water quality were compared with the water quality criteria for the designated best use for the coastal water stipulated by the 'Environment (Protection) Act, 1986' shown in **Table 12.**

Table 11: Result of Marine Water Quality Monitoring

Sr. No.	Parameters	Unit	Location code & Date of Sampling				
			MA-D 20-10-2023	MA-H1 18-10-2023	MA-H2 18-10-2023	MA-G1 17-10-2023	MA-G2 17-10-2023
1	EC	µS/cm	8,930	44,300	44,600	36,800	37,300
2	DO	mg/L	6.8	6.2	6.5	6.6	8.3
3	pH	-	8.05	7.88	7.94	8.10	8.12
4	Color	Hazen	5	5	10	10	20
5	Odor	TON	1	1	1	1	1
6	Turbidity	NTU	796	544	598	483	620
7	TDS	mg/L	20,014	28,314	28,576	23,124	23,642
8	TSS	mg/L	712	508	558	418	586
9	Particulate Organic Carbon	mg/L	2.47	4.47	4.36	3.34	2.34
10	COD	mg/L	25.87	37.81	39.80	41.86	54.88
11	BOD	mg/L	3.88	4.73	4.98	5.23	6.86
12	Silica	mg/L	>5 (DL=5)	>5 (DL=5)	>5 (DL=5)	>5 (DL=5)	>5 (DL=5)
13	PO_4	mg/L	1.35	1.26	1.80	1.33	1.99
14	SO_4	mg/L	1603.4	2368.4	2291.5	1531.3	1654.70
15	NO_3	mg/L	5.46	4.76	4.45	6.70	6.306
16	NO_2	mg/L	BQL● (QL=0.1)	BQL● (QL=0.1)	BQL● (QL=0.1)	0.184	BQL● (QL=0.1)
17	Na	mg/L	5289	7685	8530	6809.00	7398
18	K	mg/L	145.12	230.10	233.00	201.00	211.10
19	Mn	mg/L	0.16	0.24	0.30	0.24	0.29

Sr. No.	Parameters	Unit	Location code & Date of Sampling				
			MA-D 20-10-2023	MA-H1 18-10-2023	MA-H2 18-10-2023	MA-G1 17-10-2023	MA-G2 17-10-2023
20	Fe	mg/L	2.56	5.68	5.70	3.52	3.13
21	Total Cr	mg/L	0.0072	0.018	0.0167	0.0095	0.0077
22	Hexavalent Cr	mg/L	BQL● (QL=0.01)	BQL● (QL=0.01)	BQL● (QL=0.01)	BQL● (QL=0.01)	BQL● (QL=0.01)
23	Cu	mg/L	0.01	0.046	0.022	0.014	0.016
24	Cd	mg/L	BQL● (QL=0.002)	BQL● (QL=0.002)	BQL● (QL=0.002)	BQL● (QL=0.002)	BQL● (QL=0.002)
25	As	mg/L	BQL● (QL=0.005)	BQL● (QL=0.005)	BQL● (QL=0.005)	BQL● (QL=0.005)	BQL● (QL=0.005)
26	Pb	mg/L	BQL● (QL=0.002)	BQL● (QL=0.002)	0.0021	BQL● (QL=0.002)	0.0027
27	Zn	mg/L	BQL● (QL=0.5)	BQL● (QL=0.5)	BQL● (QL=0.5)	BQL● (QL=0.5)	BQL● (QL=0.5)
28	Hg	mg/L	BQL● (QL=0.0005)	BQL● (QL=0.0005)	BQL● (QL=0.0005)	BQL● (QL=0.0005)	BQL● (QL=0.0005)
29	Oil & grease	mg/L	BQL● (QL=1)	BQL● (QL=1)	BQL● (QL=1)	BQL● (QL=1)	BQL● (QL=1)
30	Microbiological (MPN) (Total Coliforms)	100 ml/MPN	6	350	310	BQL (QL=2)	2
31	Density	kg/m^3	>1000 (QL=1000)	>1000 (QL=1000)	>1000 (QL=1000)	>1000 (QL=1000)	>1000 (QL=1000)
32	Floating material (Scum, Petroleum products)	-	ND	ND	ND	ND	ND

BQL – Below Quantification Limit, QL- Quantification Limit, ND- Not detected

Table 12: Water Quality Criteria: Primary Water Quality Criteria for Designated Best Uses for Coastal Waters [As per "The Environment (Protection) Act, 1986]

Parameters	SW-I	SW-II	SW-III	SW-IV	SW-V
pH	6.5 – 8.5	6.5 – 8.5	6.5 – 8.5	6.0 – 9.0	6.0 – 9.0
Dissolved oxygen (as O_2), mg/l, min	5 or 60% of saturation value, whichever is higher	4 or 50% of saturation value, whichever is higher	3 or 40% of saturation value, whichever is higher	3 or 40% of saturation value, whichever is higher	3 or 40% of saturation value, whichever is higher
Color & Odour	No noticeable color or offensive Odour	No noticeable color or offensive Odour	No noticeable color or offensive Odour	No noticeable color or offensive Odour	None in such concentrations that would impair any usages specifically assigned to this class
Floating Matters	No visible, obnoxious floating debris, oil slick, scum	Nothing obnoxious or detrimental for use purpose	No visible, obnoxious floating debris, oil slick, scum	10 mg/l max. (including Oil & grease & scum / petroleum products)	-
Oil & grease, mg/L max. (including petroleum products)	0.1	-	-		-
Suspended solids	None from sewage & industrial origin	-	-	-	-
Heavy metals • Mercury, mg/L(as Hg) • Lead, mg/L (as Pb) • Cadmium, mg/L (as Cd)	• 0.001 • 0.001 • 0.01	-	-	-	-

Parameters	SW-I	SW-II	SW-III	SW-IV	SW-V
Turbidity, NTUmax.	-	30	30	-	-
Fecal coliforms, MPN/100ml,max	-	100	500	500	500
BOD, mg/L, 3 days at 27°C, max	-	3	-	5	-
Dissolved Iron, mg/L max (as Fe)	-	-	0.5	-	-
Dissolved Manganese, mg/L max (as Mn)	-	-	0.5	-	-
Sludge deposits,solid refuse, floating solids, oil & grease,scum	-	-	-	-	None except for such small amount that may result from discharge of appropriately treated sewage & or industrial waste

SW-I: Salt Pans, Shell fishing, mariculture and ecologically sensitive zone.
SW-II: Bathing, Contact Water Sports and Commercial Fishing
SW-III: Industrial Cooling, Recreation (non-contact) and Esthetics
SW-IV: Harbor Waters
SW-V: Navigation and Controlled Waste Disposal

2.5.2 Marine sediment quality monitoring

The quality of the Marine sediment samples collected from Dahej, Hazira & Ghogha from 13th October -12th November 2023 has been summarized in **Table 13**.

Table 13: Result of Marine Sediment Quality Monitoring

Sr. No.	Parameters	Unit	Location Code and Sampling Date				
			MA-D	MA-H1	MA-H2	MA-G1	MA-G2
			20-10-2023	18-10-2023	18-10-2023	17-10-2023	17-10-2023
1	Texture	-	Loam	Loam	Silt loam	Silt loam	Clay
2	Organic Matter	%	0.7	0.54	1.47	1.3	0.03
3	Inorganic Phosphate (Av. Phosphorus)	kg/Ha	1.66	1.46	3.47	1.74	0.87
4	Silica	mg/kg	614.03	553.88	557.61	514.29	563.61
5	Phosphate (Total Phosphorous)	mg/kg	157.01	218.87	195.53	101.71	185.93
6	SO_4	mg/kg	41.96	78.92	92.61	70.99	73.85
7	NO_2	mg/kg	0.16	0.29	0.25	0.10	0.32
8	NO_3	mg/kg	5.23	6.63	8.14	8.59	4.56
9	Ca	mg/kg	2200	2500	2500	2800	3500
10	Mg	mg/kg	1708	2379	2867	2074	1586
11	Na	mg/kg	5777	8545	10119	8096	5477
12	K	mg/kg	2383	2071	3381	3490	9653
13	Al	mg/kg	612.542	1070.8	553.935	1079.1	991.7
14	Cr	mg/kg	98.462	96.7	107.171	101.1	195
15	Ni	mg/kg	38.546	45.8	42.648	43.5	116.5
16	Zn	mg/kg	72.90	62.00	63.62	69.30	138.40
17	Cd	mg/kg	BQL● (QL=1)	BQL● (QL=1)	BQL● (QL=1)	BQL● (QL=1)	BQL● (QL=1)
18	Pb	mg/kg	3.9	1.0	2.8	1.7	4.2
19	As	mg/kg	3.4	3.1	3.1	3.6	11.9
20	Hg	mg/kg	BQL● (QL=0.005)	BQL● (QL=0.005)	BQL● (QL=0.005)	BQL● (QL=0.005)	BQL● (QL=0.005)
21	Cu	mg/kg	70.40	67.60	66.62	52.00	83.6

BQL – Below Quantification Limit QL- Quantification Limit

Observations:

The marine sediment quality at Dahej, Hazira, and Ghogha was compared based on the obtained results, and following were observed.

- Organic matter in sediment consists of carbon and nutrients in the form of carbohydrates, proteins, fats, and nucleic acids. Sediment organic matter is derived from plant and animal detritus, bacteria, or plankton formed in situ, or derived from natural and anthropogenic sources in catchments. Organic matter was found to be 0.7% at Dahej, 0.54 to 1.47% at Hazira, and 0.03 to 1.3 % at Ghogha.
- Inorganic phosphate was found to be 1.66 kg/Ha at Dahej, 1.46 to 3.47 kg/Ha at Hazira, and 0.87 to 1.74 kg/Ha at Ghogha. The capacity of sediment to retain or release phosphorus is one of the important factors, which influence the concentration of inorganic/organic phosphorus in the overlying waters (Saravanakumar, Rajkumar, Serebiah, & Thivakaran, 2008).
- Sediments ranged in texture from Loam at MA-D, MA-H1 and Silt loam at MA-H2, MA-G1, and Clay at MA-G2.
- The concentration of Sulphate was found to be 41.96 mg/kg at Dahej, 78.92 to 92.61 mg/kg at Hazira, and 70.99 to 73.85 mg/kg at Ghogha. Sulphate concentrations in marine sediment can vary naturally based on geological and hydrological factors.
- Nitrite concentration was found 0.16 mg/kg at Dahej, 0.25 to 0.29 mg/kg at Hazira, and 0.10 to 0.32 mg/kg at Ghogha.
- Nitrate concentration was found to be 5.23 mg/kg at Dahej, 6.63 to 8.14 mg/kg at Hazira, and 4.56 to 8.59 mg/kg at Ghogha.
- Ca was found to be 2200 mg/kg at Dahej, 2500 mg/kg at Hazira, and 2800 to 3500 mg/kg at Ghogha. The source of Ca accumulation in marine sediment may be because of its naturally occurring element and its concentration can vary widely local geological, hydrological conditions and environmental factors. It depends on various factors, including the composition of the underlying rocks, and the presence of calcareous organisms like coral reefs.
- Mg was observed to be 1708 mg/kg at Dahej, 2379 to 2867 mg/kg at Hazira and 1586 to 2074 mg/kg at Ghogha. Mg values varied in the range from 1586 to 2867 mg/kg. Magnesium is an essential component of marine sediments and plays a significant role in marine ecosystem dynamics. The concentration of magnesium in marine sediments can depend on various factors, including the composition of the underlying rocks, sediment type, and local hydrological conditions.

- The values for Sodium in marine sediment were found to be 5777 mg/kg at Dahej, 8545 to 10119 mg/kg at Hazira, and 5477 to 8096 mg/kg at Ghogha. Sodium concentrations in marine sediments are often correlated with salinity levels. It is an essential component of marine ecosystems.
- The value for Potassium was found to be 2383 mg/kg at Dahej, 2071 to 3381 mg/kg at Hazira, and 3490 to 9653 mg/kg at Ghogha. Potassium is an essential nutrient for plants and organisms and contributes to various biological processes. The concentration of potassium in marine soils can depend on factors such as the composition of parent materials, sediment types, weathering processes, and local hydrological conditions.
- The Silica in marine sediment was found to be 614.03 mg/kg at Dahej, 553.88 to 557.61 mg/kg at Hazira, and 514.29 to 563.61 mg/kg at Ghogha. Its presence in marine sediments can be attributed to both natural geological processes and biological contributions such as mineral weathering, biogenic silica, aquatic plants, and oceanographic processes.
- The Total phosphorus concentration was found to be 157.01 mg/kg at Dahej, 195.53 to 218.87 mg/kg at Hazira, and 101.71 to 185.93 mg/kg at Ghogha. Phosphorus is an essential nutrient for marine ecosystems, playing a crucial role in biological processes. Its presence in marine sediments can have significant implications for nutrient cycling and ecosystem health. It can accumulate on the seafloor through land runoff, natural weathering, decomposition of organic matter, local geology etc.
- The sediment quality for the trace metals concentration was compared with respect to the (US Environmental Protection Agency, 1977), (Saravanakumar, Rajkumar, Serebiah, & Thivakaran, 2008), (Augustynowicz, et al., 2013), (Sanyal, Anilava, & Subrata, 2017) (Tokatli, 2017), (Perin, Bonardi, & Scotto, 1997), (Onjefu & Kwaambwa, 2020), (B., X., X., & S., 2018), (Pazi, 2011), as shown in **Table 14**.

Table 14: Sediment Quality Guidelines (SQG) of the US Environmental Protection Agency (EPA) 1977

Metals	Sediment quality (mg/kg)		
	Not polluted	Moderately polluted	Heavily polluted
As	<3	3-8	>8
Cu	<25	25-50	>50
Cr	<25	25-75	>75
Ni	<20	20-50	>50
Pb	<40	40-60	>60
Zn	<90	90-200	>200
Al	ND	ND	ND

Metals	Sediment quality (mg/kg)		
	Not polluted	Moderately polluted	Heavily polluted
Cd	-	<6	>6
ND- Not detected			

- As per the comparison of the metals to this guideline, a variation in the concentration of the metals was found. The concentration of Pb and Zn was found in the 'Not polluted' quality class except Zn at MA-G2 whereas, As, Ni, Cu, and Cr were in the 'Moderately polluted' to 'Heavily polluted' quality class. Sediments are highly dynamic, constantly being deposited and carried away by water currents (Labenua, et al., 2023). The Possible reasons for the higher concentration of some heavy metals may be attributed to the high sedimentation rate and due to various natural and anthropogenic factors.

2.5.3 Marine Ecological Monitoring

The various parameters monitored for Marine ecological monitoring are mentioned in **Table 15** and **Table 16** as follows:

Table 15: Result of Marine ecological monitoring for Biomass, NPP, GPP, Pheophytin, Chlorophyll-a, Secchi depth & Particulate Oxidizable Organic Carbon

Location Code	Sampling Date	Biomass	Net Primary Productivity (NPP)	Gross Primary Productivity (GPP)	Pheophytin	Chlorophyll-a	Secchi Depth	Particulate Oxidizable Organic Carbon
		mg/L	mg/L/Hr	mg/L/Hr	mg/m^3	mg/m^3	meter	mg/L
MA-D	20-10-2023	220	-	-	BQL	2.59	0.056	2.47
MA-H1	18-10-2023	190	-	-	BQL	0.94	0.058	4.47
MA-H2	18-10-2023	220	-	-	BQL	2.54	0.066	4.36
MA-G1	17-10-2023	242	BQL	BQL	BQL	BQL	0.048	3.34
MA-G2	17-10-2023	222	BQL	BQL	BQL	0.79	0.061	2.34

BQL – Below Quantification Limit

Table 16: Result of Marine ecological monitoring for Benthic macroinvertebrates, phytoplankton and zooplankton

Location Code	Sampling Date	Benthic macroinvertebrates (Counts/L)		Phytoplankton (Counts/L)		Zooplankton (Counts/L)	
		Observation	Individual count	Genera	Individual count	Observation	Individual count
MA-D	20-10-2023	Nil	Nil	Nil	Nil	Nil	Nil
MA-H1	18-10-2023	–	–	Nil	Nil	Nil	Nil
MA-H2	18-10-2023	–	–	Nil	Nil	Nil	Nil
MA-G1	17-10-2023	Mollusca - Bithynidae	7	Nil	Nil	Nil	Nil
MA-G2	17-10-2023	–	–	Nil	Nil	Nil	Nil

Observations and Interpretation:

- Biomass content ranged from 190 to 242 mg/L; this is an indication of a low to moderate population of organisms in the sampling stations. This could be due to the presence of a mixed population including chlorophyll-containing organisms as well as chlorophyll-lacking organisms. This implies to the lower Secchi depth values.
- Phytoplankton and zooplankton count were nil; The main growth factors behind algae include mainly phosphorus and nitrogen with the presence of some other micronutrients such as iron and silicon. The phosphorus concentration was around 1 mg/L, whereas the nitrate concentrations ranged from 4.45 to 6.7 mg/L. These values are likely to show nutrient-limited environments in the water that are insufficient for promoting the growth of phytoplankton. (Elser, et al., 1990)
- When there is an availability of adequate light and favorable temperature, nutrient unavailability can result in limited or no growth of phytoplankton species. (Hecky, R. E., & P., 1988)
- Rapid fluctuations in the level of salinity are likely to retard the growth of stenohaline plankters (The Oceans, Their Physics, Chemistry, and General Biology.). Hence, the resultant productivity levels were found to be almost negligible.
- Low benthic macroinvertebrate count: Fluctuations in salinity levels are also responsible for limited or no growth of benthic macroinvertebrate species.

2.6 Meteorological Monitoring

To determine the prevailing micro-meteorological conditions at the project site the Automatic Weather Monitoring Stations (AWS) have been installed at the sites the sites of Dahej, Hazira, and Ghogha at 10 m above the ground.

The summary of hourly meteorological observations recorded at the observatory, Dahej, Hazira, and Ghogha for 13th October- 12th November 2023 for the significant parameters has been mentioned in **Table 17.**

Table 17: Result of Meteorological Monitoring

Sr. No.	Location	Month	Wind Direction	Wind Speed (m/sec)			Rain mm/hr	Relative Humidity (%)			Temperature (°C)			Solar Radiation W/m^2
				Mean	Max	Min	(Avg.)	Mean	Max	Min	Mean	Max	Min	(Avg.)
1	M-D	October-November 2023	From South-East	1.14	3.82	0.14	0	44.61	48.26	40.94	30.52	31.34	29.72	82.52
2	M-H		From east-south-east	2.15	5.36	0.76	0	53.49	58.67	48.36	31.98	32.8	31.21	35.85
3	M-G		From North	1.12	3.91	0.17	0	56.57	60.04	52.93	29.76	30.62	28.93	77.77

Observations:

The monthly average of maximum and minimum daily observed values summarized in **Table 17** have been discussed as follows.

- **Temperature**

  Dahej: The ambient temperature varied in the range of 29.72-31.34°C with an average temperature of 30.52 °C.

  Hazira: The ambient temperature varied in the range of 31.21-32.8°C with an average temperature of 31.98°C.

  Ghogha: The ambient temperature varied in the range of 28.93-30.62°C with an average temperature of 29.76°C.

- **Relative Humidity**

  Dahej: The relative humidity was recorded in the range of 40.94-48.26% with an average humidity of 44.61%.

  Hazira: The relative humidity was recorded in the range of 48.36-58.67%, with an average humidity of 53.49%.

  Ghogha: The relative humidity was recorded in the range of 52.93-60.04%, with an average humidity of 56.57%.

- **Rainfall**

  No rainfall was recorded during the period at Dahej, Hazira and Ghogha.

- **Wind Speed**

  Wind speed and direction play a significant role in transporting the pollutants and thus decide the air quality.

  The wind speed at Dahej, Hazira and Ghogha ranged from 0.14-3.82 m/s, 0.76-5.36 m/s and 0.17-3.91 m/s, respectively.

- **Solar Radiation**

  The average solar radiation at Dahej, Hazira, and Ghogha was 82.52 W/m^2, 35.85 W/m^2 and 77.77 W/m^2 respectively.

- **Wind rose diagram**

  The wind-rose diagram for 13th October-12th November 2023 has been drawn based on hourly wind speed and direction data. This wind rose reveals that the prevailing winds in Dahej, Hazira and Ghogha predominantly blow from a South-East (SE), East-South-East (ESE), and North (N) direction, respectively.

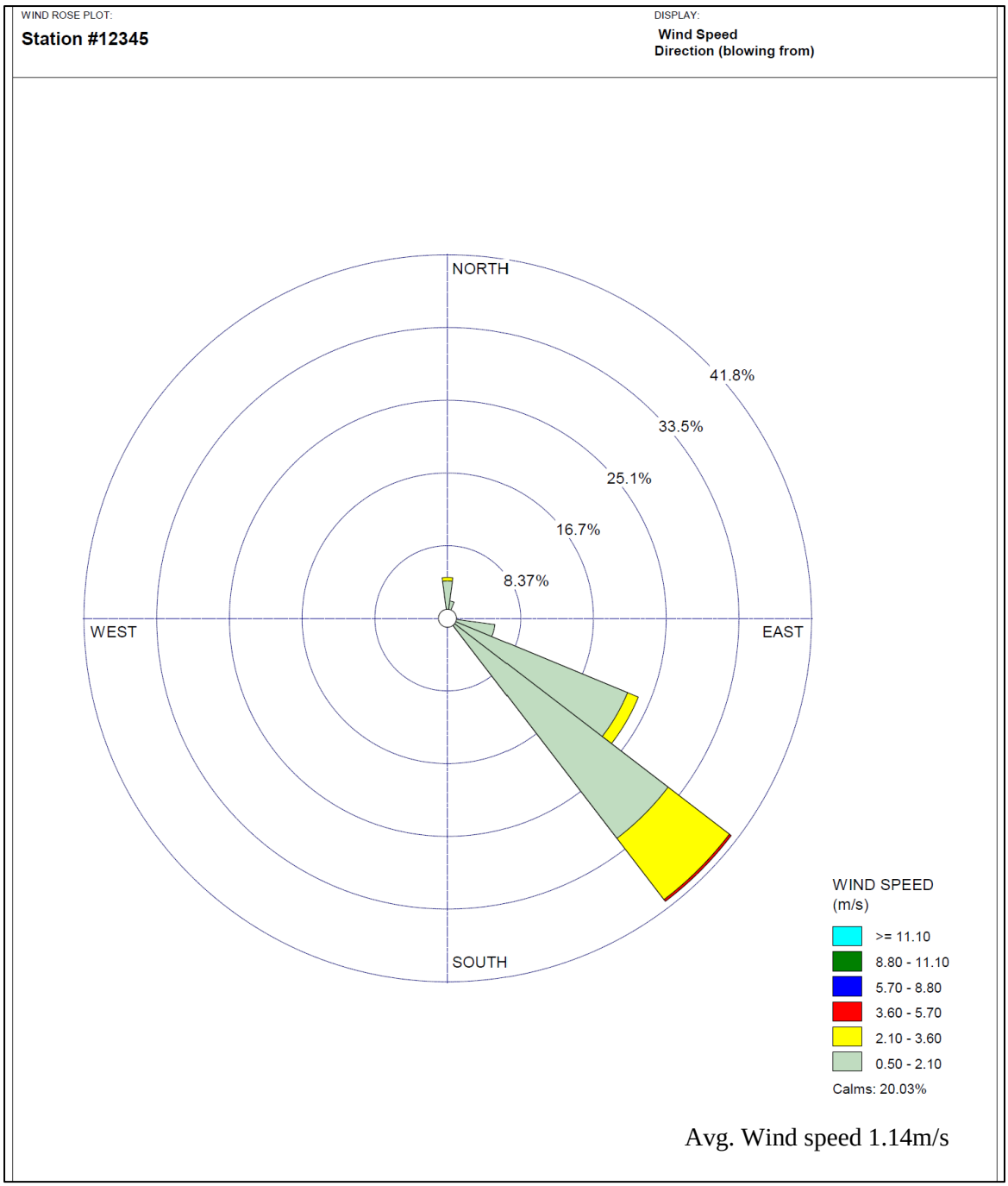

Fig. 5: Windrose diagram of Dahej

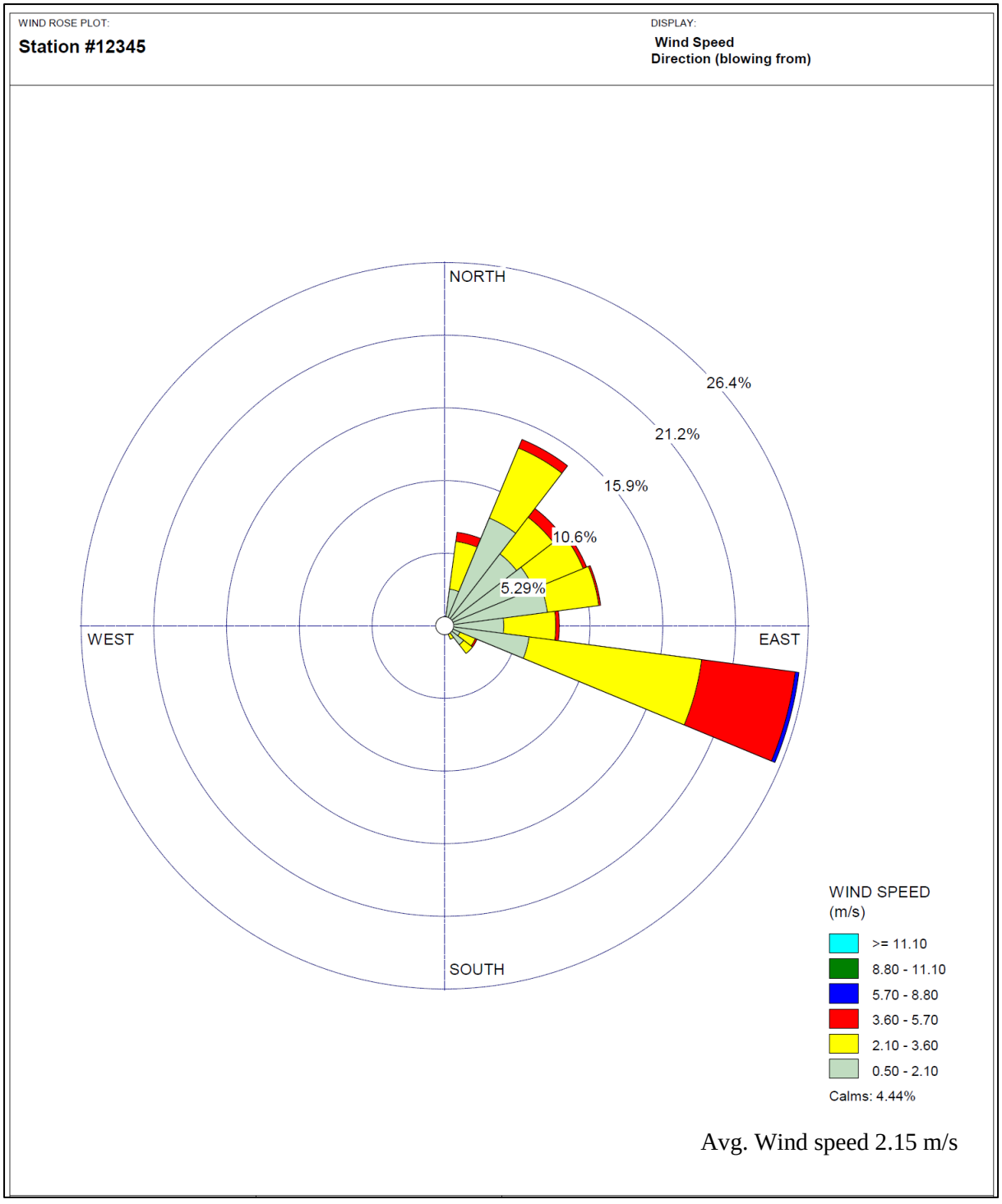

Fig. 6: Windrose diagram of Hazira

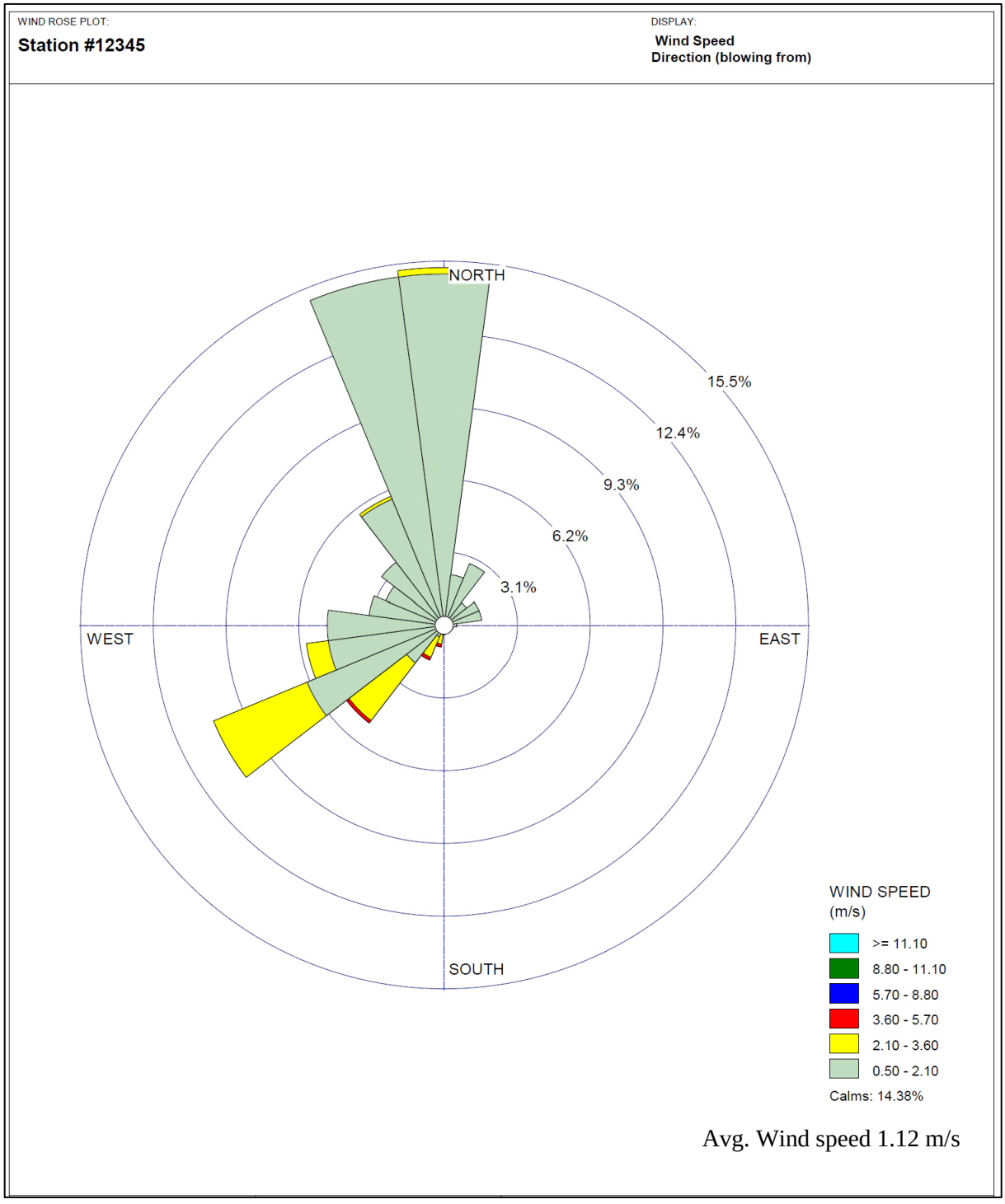

Fig. 7: Windrose diagram of Ghogha

2.7 Monitoring of DG Stack Emissions

DG sets at the Deendayal Port Authority (DPA) are generally utilized as a secondary power source. The sampling and monitoring of the DG stack emissions was carried out at Dahej, Hazira and Ghogha. The monitoring cycle was once a month. Sampling details of the locations are mentioned in **Table 18**.

Table 18: Result of DG Stack Emissions

Sr. No.	Parameters	Unit	DG Set standards	Location Code (DG-D)	Location Code (DG-H)	Location Code (DG-G)
				Sampling Date		
				11-10-2023	13-10-2023	08-11-2023
1.	Suspended Particulate Matter (SPM)	mg/Nm^3	150	126	132	137
2.	SO_2	PPM	100	N.D.	N.D.	N.D.
3.	NOx	PPM	50	47.8	49.3	49.5
4.	CO	%	-	0.0091	0.0095	0.0089
5.	CO_2	%	-	1.45	1.42	1.41

N.D. – Not Detectable

Observations:

The results of DG stack emissions for Hazira, Dahej and Ghogha are compared with the DG Set standards and found within the prescribed limit for SPM, SO_2 and NOx.

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Annexure -2

Monitoring the implemental Safe guards
Ministry of Environment, Forests & Climate Change
Regional office (WZ), Gandhinagar.
Monitoring Report (upto November, 2023)
DATA SHEET

Sr. No.	Particulars	Reply
1.	Project type: River valley/Mining/ Industry/thermal/ nuclear/Other (specify)	Infrastructure and Miscellaneous Projects + CRZ
2.	Name of the project	Development of Ro-Ro/Ro-Pax Facility at Hazira by Deendayal Port Authority (600 m water front and 24 Ha. backup area
3.	Clearance Letter (s). OM no and date	MoEF&CC, GoI vide letter dated 4/4/2022 issued Bifurcation of Environmental and CRZ Clearance accorded to M/s Essar Bulk Terminal Limited vide letter dated 6th May, 2014 in the name of Deendayal Port Trust (Now Deendayal Port Authority)
4.	Location a) District (s) b) State (s) c) Location/latitude/longitude	 Dist: Surat State: Gujarat Location: Geo Coordinates: Latitude: 21° 04' 39.432" N to 21° 4 39.15 N Longitude: 72°38' 26.93" E to 72°38'58.88" E
5.	Address for Correspondence a) address of Concerned Project Chief Engineer (with pin code & telephone/telex/fax numbers b) Address of Executive project Engineer/manager/ (with pin code fax numbers)	Chief Engineer, Deendayal Port Authority, A.O. Building, Annex, Post Box No.-50, Gandhidham- Kutch. Gujarat Pin – 370201 Tel: 02836-233192, Fax-02836-220050. Superintending Engineer (Project), Office of the Superintending Engineer (P), A.O. Building, Annex, Gandhidham, Gujarat .
6.	Salient features a) Of the Project b) Of the Environmental Management Plan	 • Development of 600 m waterfront and 24 ha back up area at Hazira port for RoRo/RoPax facility. Salient Features of EMP prepared for the Development of Ro-Ro/Ro-Pax Facility at Hazira by Deendayal Port Authority has already been communicated with the compliance report dated 05/08/2022.

	Production Details during compliance period and (or) during the previous financial year	N/A. DPA developed Ro-Ro/Ro-Pax facility which is being used for public conveyance and also for trailer, trucks, cars etc.
7.	Breakup of the project area: a) Submergence area: forest & non-forest b) Others	 N/A. Project area is 600 m waterfront and 24 ha back up area
8.	Breakup of the project affected population with enumeration of those losing houses/dwelling units only agricultural land & landless laborer's/artisen a) SC. ST/Adivasis b) Others (please indicate whether these figures are based on any scientific and systematic survey carried out of only provisional figures, if a survey is carried out give details and years of survey).	N/A The GMB had allotted land of 24 Hectares to Deendayal Port Authority. N/A N/A
9.	Financial details a) Project cost as originally planned and subsequent revised estimates and the year of prices reference. b) Allocation made for environmental management plans with item wise and year wise break-up c) Benefit cost ratio/ Internal Rate of Return and the year of assessment Whether (c) includes the cost of environmental management plans so far. d) Actual expenditure incurred on the project. e) Actual expenditure incurred on the environmental management plans so far.	 69.06 Crores The allocation made under the scheme of "Environmental Services & Clearance thereof other related Expenditure" during BE 2023-24 is Rs. 274 Lakhs. The project is carried out on public interest; hence, IRR is not possible. 83.41 Crores The expenditure made under the scheme of "Environmental Services & Clearance thereof other related Expenditure" is Rs. 272 Lakhs from Dec, 2022 to May 2023.

10.	Forest land requirement a) The status of approval for diversion of forest land for non-forestry use b) The status of clear felling c) The status of compensatory a forestation, if any d) Comments on the viability & sustainability of compensatory a forestation programmed in the light of actual field experience so far	Nil (Not Applicable) N/A N/A N/A N/A
11.	The status of clear felling in non-forest areas (such as submergence area of reservoir, approach roads), if any with quantitative information.	N/A
12.	Status of construction: a) Date of commencement (Actual and/or planned) b) Date of completion (Actual and/or planned)	Work Order has been issued on 15/4/2021 and accordingly work has been initiated DPA has developed RoRo/RoPax facility (170 m berthing jetty and other allied structure viz. approach jetty, pontoons, link span etc. and 5 Ha. area (onshore facility)). However, for remaining development of onshore /offshore facility, DPA engaged Indian Ports Association, New Delhi. After receipt of report of IPA, further development will be undertaken.
13.	Reasons for the delay if the Project is yet to start	N/A
14.	Date of site visited a) The dates on which the project was monitored by the regional office on pervious occasion. if any b) The date site visit for this monitoring report	---
15.	Details of the correspondence with project authorities for obtaining action plans/information on status of compliance to safeguard other than the routine letters for logistic support for site visit. (The first monitoring report may contain the details of all the letters issued so far but the later reports may cover only the letters issued subsequently.)	---