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DEENDAYAL PORT AUTHORITY

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EG/WK/5202 (D)/ Part (CRZ 2)/ 39

Dated: 14/07/2025

To,
The Director (Env.) & Member Secretary,
Forest & Environment Department,
Govt. of Gujarat,
Gujarat Coastal Zone Management Authority,
Block No.14, 8th floor, New Sachivalaya,
Gandhinagar - 382 010

Sub: Single Point Mooring (SPM) and allied facilities off Veera in Gulf of Kutch for handling crude oil on BOT basis in the state of Gujarat by M/s. Kandla Port Trust (Now Deendayal Port Authority)– **Six monthly compliance report of conditions stipulated in CRZ Recommendations reg.**

Ref.:
1. Letter No. ENV-10-2011-1883-E dated 24/05/2012
2. DPT letter No. EG/WK/4712/Part I/1164 dated 06/06/2013
3. DPT letter No. EG/WK/4712/Part I/1164 dated 04/01/2014
4. DPT letter No. EG/WK/4712/Part I/128 dated 15/05/2014
5. DPT letter No. EG/WK/4712/Part I/226 dated 15/10/2014
6. DPT letter No. EG/WK/4712/Part I/227 dated 06/05/2015
7. DPT letter No. EG/WK/4712/Part I/165 dated 15/10/2015
8. DPT letter No. EG/WK/4712/Part I/130 dated 09/05/2016
9. DPT letter No. EG/WK/4712(EC)/Part I/128 dated 08/12/2016
10. DPT letter No. EG/WK/4712(EC)/Part I/233 dated 28/06/2017
11. DPT letter No. EG/WK/4712(EC)/Part II/601 dated 12/12/2017
12. DPT letter No. EG/WK/4712(EC)/Part II/286 dated 08/06/2018
13. DPT letter No. EG/WK/4712(EC)/Part II/10 dated 15/02/2020
14. DPT letter No. EG/WK/4712/EC/Part II/40 dated 12/11/2020
15. DPT letter No. EG/WK/4712/EC/Part II/152 dated 12/07/2021
16. DPA letter No. EG/WK/(D) Part (CRZ 2) /134-1 dated 01/02/2022
17. DPA letter No. EG/WK/(D) Part (CRZ 2)/126 dated 30/06/2022
18. DPA letter No. EG/WK/5202 (D)/Part (CRZ 2)/228 dated 01/02/2023
19. DPA letter No. EG/WK/5202 (D)/Part (CRZ 2)/345 dated 04/08/2023
20. DPA letter No. EG/WK/5202 (D)/Part (CRZ 2)/12 dated 10/01/2024
21. DPA letter No. EG/WK/5202 (D)/Part (CRZ 2)/124 dated 30/08/2024
22. DPA letter No. EG/WK/5202 (D)/Part (CRZ 2)/28 dated 12/02/2025

Sir,

Kindly refer above-cited references for the said subject.

In this connection, it is to state that the Gujarat Coastal Zone Management Authority, vide the above-referred letter dated 24/05/2012, had recommended Deendayal Port Authority the subject project.

.....cont.....

Subsequently, the MoEF&CC, GoI, had accorded the Environmental & CRZ Clearance vide letter dated 11/12/2013 for the subject project. Subsequently, MoEF&CC extended the validity of the Environmental Clearance till 10/12/2023.

Now, as directed under Specific Condition No. 26 mentioned in the CRZ Clearance letter dated 25/05/2012, i.e. ***A six-monthly report on compliance of the conditions mentioned in this letter shall have to be furnished by the DPT on a regular basis to this Department and MoEF&CC, GoI'***, please find enclosed herewith point-wise compliances of the conditions stipulated in CRZ recommendations issued by GCZMA vide letter dated 24/05/2012 along with necessary annexures (**Annexure 1**) for the period October, 2024 to March, 2025 for kind information & record please.

Further, as per the MoEF&CC, Notification S.O.5845 (E) dated 26.11.2018, in which it is mentioned 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 a soft copy of the same via e-mail in ID gczma.crz@gmail.com & direnv@gujarat.gov.in.

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

Yours faithfully,

14/03/25

XEN & EMC (I/c)
Deendayal Port Authority

Encl.: as above

Copy to:-

Shri Amardeep Raju, MoEF&CC, GoI
Scientist E, Ministry of Environment, Forest and Climate Change,
& Member Secretary (EAC-Infra.1),
Indira Paryavaran Bhavan,
3rd Floor, Vayu Wing, Jor Bagh Road, Aliganj,
New Delhi-110003.
Email ID: ad.raju@nic.in

Annexure -1

Annexure 1

Compliance Report for the period October 2024 to March 2025

Subject: Point-wise Compliance of the conditions stipulated in CRZ recommendation granted by Forest & Environment Department, GoG for the project "Single Point Mooring (SPM) and allied facilities off Veera in Gulf of Kutch for handling crude oil on BOT basis in the state of Gujarat by M/s. Kandla Port trust".

Ref No : CRZ recommendations issued vide letter No. ENV-10-2011-1883-E dated 24/05/2012 for the subject project.

S. No.	CRZ Conditions	Compliance Status
	SPECIFIC CONDITIONS	
I	The DPT shall strictly adhere to the provisions of the CRZ Notification, 2011, issued by the Ministry of Environment, Forests and Climate Change, Government of India	It is assured that the provisions of the CRZ Notification, 2011 shall be strictly adhered to by DPA.
II	The COT shall be outside the CRZ areas as submitted by the KPT.	No activity has started yet.
III	The KPT shall obtain all necessary permissions from different Government Departments/Agencies before commissioning their activities.	No activity has started yet. However, it is relevant to mention that, DPA had already obtained CTE/NOC from GPCB vide letter No. PC/ CCA – KUTCH – 971/ GPCB ID: 36299/ 106252 dated 06/03/2012 and GPCB further extended the CTE validity vide Order dated 02/03/2017.
IV	No dredging, reclamation and construction activities shall be carried out in the CRZ area categorised as CRZ I (A), and it shall have to be ensured that the mangrove habitats and other ecologically important and significant areas, if any, in the region are not affected due to any of the project activities	No activity has started yet.
V	The KPT shall be held responsible for any accidental oil spill, if takes place due to rupture/damage of pipelines and the KPT shall bear the total cost for remedial measures and restoring the original environment in the area.	No activity has started yet.
VI	No effluent or sewage shall be discharged into the sea/creek or in the CRZ area and shall be treated to confirm to the norms prescribed by the Gujarat Pollution Control Board and would be	No activity has started yet.

S. No.	CRZ Conditions	Compliance Status
	reused/recycled within the plant premises to extract possible.	
VII	The KPT shall prepare and regularly update their Local Oil Spill Contingency and Disaster Management Plan in consonance with the National Oil Spill and Disaster Contingency Plan and shall submit the same to this department after having it vetted through the Indian coast guard.	No activity has started yet. It is relevant to mention that, DPA already has Oil Spill Contingency and Disaster Management Plan.
VIII	No ground water shall be tapped to meet with the water requirements during the construction and/or operation phases.	No activity has started yet.
IX	The KPT shall contribute towards the cost of any common study that may be carried out for the KPT region for environmental protection and management issues.	Point noted
X	The KPT shall implement all the suggestions/recommendations given by the NIO in the marine rapid EIA report.	No activity has started yet.
XI	The KPT shall strictly comply with all the conditions stipulated by the Gujarat Pollution Control Board in its consent to establish (NOC) and the CCA	No activity has started yet.
XII	The KPT 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.	DPA/successful bidders will bear the cost of external agencies that may appoint by the Department for supervision/monitoring of proposed activities and the environmental impact of proposed activities.
XIII	The KPT shall take up mangrove plantation in an area of 50 Ha. as well as greenbelt development with the Gujarat ecology commission/forest department.	As a part of mangrove conservation, DPA has undertaken Mangrove Plantation in an area of 1600 Hectares at various locations since 2005-06 under the directions of the GCZMA and MoEF&CC, GoI. Further DPA has assigned work to to M/s GUIDE, Bhuj vide work order dated 10/06/2024 for "Mangrove Plantation in an area of 50 Ha for Deendayal Port Authority" for the period of 10/06/2024 to 09/03/2025. A copy of the Final Report submitted by GUIDE is attached here as **Annexure A**

S. No.	CRZ Conditions	Compliance Status
		DPA had entrusted the work to Forest Department, Gujarat for developing a greenbelt in and around the Port area at a cost of Rs. 352 lakhs in an area of about 32 hectares and the work is already completed. Further, DPA has appointed the Gujarat Institute of Desert Ecology (GUIDE) for "Green belt development in Deendayal Port Authority and its Surrounding Areas, Charcoal site' (Phase-l)" vide Work Order No.EG/WK/4757/Part [Greenbelt GUIDE], dated 31st May 2022. The final report has already been communicated with the earlier compliance report. DPA has assigned the Greenbelt development in Deendayal Port Authority and its surrounding areas, Phase II, to M/s GUIDE vide Work order EG/WK/4751/Part (Greenbelt)/327 dated 23.06.2023. A copy of the final report submitted by GUIDE has already been communicated along with last compliance report.
XIV	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.	No activity has started yet.
XV	The KPT shall have to contribute finically for taking up the socio-economic up-lifting activities in this region in consultation with the forest and environment department and the district collector/district development officer.	CSR activities are being attended by DPA. Copy of the activities undertaken by DPA as a part of CSR is enclosed as **Annexure B.**
XVI	A separate budget shall be earmarked for environmental management and socio-economic activities and details there of shall be furnished to this department as well as to the MoEF, GOI. The details with	The allocation made under the scheme of "Environmental Services & Clearance thereof other related Expenditure" during RBE 2024-25 is Rs. 585 Lakhs.

S. No.	CRZ Conditions	Compliance Status
	respect to the expenditure from this budget head shall also be furnished.	
XVII	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 already has an Environment Management Cell. Further, DPA has also appointed an expert agency to provide Environmental Experts from time to time. Recently, DPA appointed M/s Precitech Laboratories, Vapi vide work order dated 04/10/2024. A copy of Work Order is attached as **Annexure C** Further, DPA has appointed Manager Environment on a contractual basis for a period of 3yrs, further extended upto 2 years *(A copy of the Office order is shared with earlier compliance)*
XVIII	An environmental 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 the KPT to this department as well as to MoEF, GOI	No activity has started yet.
XIX	A six-monthly report on compliance of the conditions mentioned in this letter shall have to be furnished by the KPT on a regular basis to this department/MoEF, GOI	DPA has been submitting six monthly compliance reports vide referred letters dated 06/06/2013, 04/01/2014, 15/10/2014, 06/05/2015, 15/10/2015, 09/05/2016, 28/06/2017 04/12/2017, 12/11/2020, 12/07/2021 01/02/2022, 30/06/2022, 01/02/2023, 04/08/2023, 10/01/2024, 30/08/2024 and 12/02/2025 to MoEF&CC, GoI
XX	Any other conditions that may be stipulated by this department from time to time for environmental protection/management purpose shall also have to be complied with the KPT.	DPA/Successful bidder will comply with any other condition that may be stipulated by Forest and Environment Department, GoG from time to time for environmental protection/ management purposes.

Annexure -A

FINAL REPORT

for the Project entitled

Mangrove Plantation in an area of 50 Hectares for Deendayal Port Authority, Kandla

(As per EC & CRZ Clearance Dt.01.01.2024. Annexure-B, Specific condition No.7)

DPA Work order No. EG/WK/4751/Part (Revamping-EC onwards)/69. Dt. 10.06.2024

Submitted by

Gujarat Institute of Desert Ecology

Mundra Road, Bhuj-370 001

Dist: Kachchh, Gujarat, India

Submitted to

Deendayal Port Authority
Gandhidham- 370201
Dist: Kachchh, Gujarat-, India

February
2025

Gujarat Institute of Desert Ecology

Certificate

This is state that the Final Report for project entitled "**Mangrove Plantation in an area of 50 Hectares for Deendayal Port Authority, Kandla**" has been prepared in line with the Work order issued by the Deendayal Port Authority Vide. Ref. No. EG/WK/4751/Part (Revamping-EC onwards)/69. Dt.10.06.2024. In order to comply with the stipulated condition of the EC & CRZ Clearance dated 1/1/2024 read with CRZ Recommendation dated 25/8/2023 - Condition no.7.

The work order is for a period of Nine months (10.06.2024 - 09.03.2025) for the above-mentioned study.

Authorized Signatory

DIRECTOR
Gujarat Institute of Desert Ecology
Bhuj - Kachchh.

Gujarat Institute of Desert Ecology Bhuj

Institute

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Project Team

Project Coordinator: Dr. V. Vijay Kumar, Director

Project Personnel

Principal Investigator

Dr. B. Balaji Prasath, Senior Scientist

Co-Investigator

Dr. Kapilkumar Ingle, Project Scientist-II

Team Members

Dr. L. Prabhadevi, Advisor

Mr. Dayesh Parmar, Senior Scientific Officer

Mr. Ketan Kumar Yogi, Junior Research Fellow

Contents

Snapshot of the Project," Mangrove Plantation in an area of 50 Hectares for Deendayal Port Authority, Kandla"

S.No	Components of the Study	Remarks
1	Deendayal Port letter sanctioning the project	EG/WK/4751/Part (Revamping-EC onwards)/69, dated 10.06.2024
2	Duration of the project	Nine months (10.06.2024 - 09.03.2025)
3.	Location of Mangrove Plantation Site	The location finalized for mangrove plantation is shown in Figure 1. Suitable site was selected based on water and sediment quality, intertidal fauna, and propagules.
4.	Total Area	50 Hectares
5.	EC & CRZ Clearance Reference	As per EC & CRZ Clearance Dt. 01.01.2024, Annexure-B, Specific condition No. 7
6	**Field Studies**	
6a	Site Overview	Inspection to understand site conditions and potential risks (e.g., grazing).
6b	Geographical Patterns	Study existing mangrove species to determine their distribution and identify suitable planting locations.
6c	Landscape Assessment	The stability of the root system of existing mangroves were be examined.
7	**Plantation Techniques**	
7a	Raised Bed Method (Otla Method)	Create earthen mounts to plant 15-30 seeds; suitable for areas with low to moderate water currents.
7b	Transplantation of Nursery Raised Saplings	Grow saplings in polythene bags; nature for 3-4 months before transplanting; higher success rate

1. Background of the study

Mangroves are among the most productive ecosystems, providing various ecosystem services and resources to both the ocean environment and humankind. This unique ecosystem occurs in the tropics and subtropics, where land meets the oceans, often bordering estuaries and backwaters. Mangrove forests have the remarkable ability to rise upward in place or move landward or seaward in response to sea level changes (Woodroffe *et al*. 2016). Mangroves typically grow on wet, muddy substrates with minimal water fluctuations, specifically in the mudflat regions of tropical and subtropical areas. These are dense forests of trees and shrubs that are tolerant to salt, usually flourishing in tidal areas. The importance derived from these forests is critical, including coastal protection, biodiversity conservation, and climate change mitigation. All mangroves produce fertilizer from rotting litter fall and root growth deceiving ambient water sediment. Mangrove ecosystems support various plant and animal species, breeding, nursery and feeding grounds for numerous marine and terrestrial organisms. Despite their ecological importance, mangrove forests face different threats such as deforestation, pollution, and climate change. Specific measures have been taken towards conserving these valuable ecosystems including them into biosphere reserves and Ramsar sites.

According to the Forest Survey of India (FSI, 2019), the global mangrove cover is approximately 14.79 million hectares. Asia leads with 5.55 million hectares, followed by Africa with 3.24 million hectares, North and Central America with 2.57 million hectares, and South America with 2.13 million hectares. South Asia has the highest mangrove area, constituting about 6.8% of the world's total mangrove cover. Anthropogenic pressures have reduced global range of these forests to less than even half of their original total cover throughout the globe as mentioned by Ragavan *et al.* (2016) while Singh (2020) observed that almost 75% of the tropical coast has been taken up by mangrove forests. India's mangrove ecosystems are incredibly important, covering around 4,992 km^2, which makes up about 0.15% of the country's total land area. Despite occupying a relatively small fraction of India's geographical area, mangroves are hotspots of biological activity, supporting a wide range of flora and fauna. They help in sequestering carbon, thus mitigating climate change effects. Major mangrove areas in India include the Sundarbans in West Bengal, which is the largest mangrove forest in the world.

The present study on "Mangrove Plantation in an area of 50 Hectares for Deendayal Port Authority, Kandla" is being conducted to comply with the specific conditions outlined in the EC & CRZ Clearance dated 01.01.2024 and CRZ Recommendation condition no. 7 as given in Annexure B.

1.1. Mangrove status in Gujarat and Gulf of Kachchh

Gujarat state has the longest coast (1650 km^2) with largest coastal area (28,000 km^2) under cover of mangroves. Gujarat mangrove ecosystem is the second largest after Sundarbans in West Bengal (ISFR 2019). Though contentious, around 15 mangrove species are reported from 13 coastal districts of Gujarat. Of these, the southern coast of Gulf of Kachchh and South Gujarat coast are important for mangrove diversity. The species *Avicennia marina* is the most populous along the Gujarat coast. Along the coastal stretch of Gulf of Kachchh (GoK) has the most considerable mangrove extent of 986 km^2 out of 1140 km^2. Kachchh district, constituting the northern coast (northern shore) of GoK alone has 798 km^2 of mangroves constituting 70% of the whole Gujarat mangroves. Waterlogged mud with low oxygen levels supports such vegetation in tropical and subtropical regions. In the Kachchh coast has various habitats such as expansive mudflats and small sandy beaches with different physico-chemical variables like extreme salinity temperature inundation factor. This vibrating ecosystem can allow the species to thrive and exhibit many adaptive modifications.

Biodiversity-oriented planting schemes aim to boost species richness through ongoing plantation and meticulous monitoring activities. Restoring mangrove ecosystems with dominant species like *Avicennia marina, Ceriops tagal,* and *Rhizophora mucronata* plays a crucial role in enhancing species diversity. By increasing the variety of plant species, these schemes not only create a more resilient and productive ecosystem but also help in providing essential resources and services to local populations, such as fish breeding habitats, wood, and other forest products. Continuous planting and monitoring ensure that these ecosystems remain healthy and sustainable, benefiting both the environment and the people living in coastal regions. Mangrove biodiversity seeks attention towards such spots on the Kachchh coast, which require supplementation of plant cover at selected sites. For instance, although successful efforts at restoring mangroves exist, the presence of *A. marina* alone in most parts corroborates the role of high salinity of the water because of limited fresh water influx annually. The arid coastal conditions lack of

continuous freshwater flow through the river inhibits the spread and growth of mangroves which are constantly exposed to tidal inundation. The plantation of mangroves as well as creation of awareness regarding the importance of mangrove and their ecosystem services are the crucial tasks to avoid such loss.

1.2. Rationale of the project

Deendayal Port Authority (DPA) has been one of India's largest ports in terms of cargo volume handled. Being located in Gujarat state on the northwest coast of India, the port is one of the biggest creek-based ports in India. In India, it is one among twelve major ports and situated at Gulf of Kachchh's tail end, Gujarat's western part. The greatest advantage of this location is a high semi-diurnal tidal range of about 6 to 7 meters which allows for sufficient draft in the dredged channels at the Port. DPA has been and still is undergoing continuous development and expansion particularly over recent times and is located in the creek environment encompassing mangroves (193.1 km^2) and mudflats (312.9 km^2).

Over the last seven decades, it should be noted that due to these vast resources available at its doorstep; the port authorities have a desire to conserve, protect and enhance these coastal habitats. The coastal belt in and around Kandla region is characterized by a network of creek systems and mudflats which are covered by sparse halophytic vegetation like scrubby to dense mangroves, creek water and salt encrusted land mass which forms the major land component. The surrounding environment in a radius of 10 km from the Port is mostly built-up areas consisting salt works, human habitations and Port related structures on west and north, creek system, mangrove formations and mudflats in the east and south.

Deendayal Port as part of the expansion of the infrastructure facility has significant movements of materials and people within the area and construction activities as well. Additionally, as part of the environmental policy intended to accomplish 50 ha mangrove plantation and the task is entrusted with the Gujarat institute of Desert ecology, Bhuj, Kachchh district Similar efforts towards conserving and preserving mangrove cover in the prospective areas have been implemented by the Deendayal Port Authority (DPA) to maintain numerous unheralded ecological services by these marine plants. Total mangrove plantation till date by DPA through several implementing agencies at Sat Saida Bet, Nakti Creek and Kantiyajal.. To ensure the project follows the

most contemporary standards and practices in the field. In accordance with the CRZ Recommendation Condition, Mr. Nischal Joshi of the Gujarat Ecology Commission (GEC) was consulted for his expert opinion during the initial stages of the work.

2. Objectives

Within the overall objective of mangrove plantation in the DPA port limits the following activity wise objectives are envisaged.

- Assess the technical suitability of the proposed land for mangrove plantation
- Assess the physico-chemical properties of soil and nearby water and tidal pattern in the proposed plantation site.
- Formulate site specific plantation strategy and execute it with the adopting appropriate techniques.

3. Study Area

The location finalized for mangrove plantation is shown in Figure 1, as per their suitability including water and sediment quality characteristics, occurrence of intertidal fauna, availability of propagules, signs of natural regeneration etc. Further, based on the water quality characteristics reported elsewhere, the site is better choice for the plantation of mangrove species, *A. marina*. In the studies conducted earlier, the salinity levels of this area is reported to be ranging between 35 - 40 ppt which is suitable for the selected species. The pH of the pour water is recorded to be in the range of 6.0 - 8.5. In addition to the above said criteria, plantation in general should be established in Intertidal areas where a good tidal flushing is happening atleast 15 days in a month.

Figure.1 Proposed location for Mangrove plantation activities at DPA area

4. Methodology

4.1. Field Studies

4.1.1. Site Overview:

- The inspection were provide an overall understanding of the site, not only for the plantation but also for potential risks (such as camel or cattle grazing).
- Accessibility for post-plantation monitoring were be evaluated to ensure ease of assessment.

4.1.2. Geographical Patterns:

- Existing mangrove species in the area were be studied to understand their presence and distribution.
- Geographical patterns were be analyzed to identify suitable locations for planting mangroves.

4.1.3. Landscape Assessment:

- Rainwater runoff into the creeks and the influencing zones were be observed to assess its impact on the mangrove ecosystem.
- The stability of the root system of existing mangroves were be examined.
- Sources of freshwater within the area were also be considered.

4.2. Plantation Techniques

Three methods preferred for the sake of mangrove plantation which were be as follows in this study period:

4.2.1. Raised bed method (Otla method)

- This is popular method of mangrove plantation in Gujarat useful for a few species such as *A. marina* and provide better result compare to other methods.
- In this method, earthen mounts of a specific height were be made which support to plant 15 to 30 seeds/ propagules.
- This method is suitable in the areas where the current of water is low and moderate (Plate 1).

4.2.2. Transplantation of nursery raised saplings (Poly bag method).

- This technique has higher success rate unlike other methods and therefore, nursery of the various species is required to grow the saplings (Plate 2).
- This technique is time consuming and laborious compared to direct dibbling and raised bed methods.
- On the open intertidal mudflats, the saplings were be grown in polythene bags through sowing the matured seeds or propagules.
- The saplings were be nurtured 3-4 months before transplantation and after attaining a height 30-45 cm in polythene bags.
- Site specific conditions were determining the number of saplings to be transplanted, however, 2500 saplings per ha is generally followed.
- In some occasions also nursery raised saplings were be used for gap filling and thereby increasing the survival rate of the plants table1.

After being successfully raised in the nursery, saplings between 30 and 45 cm tall should be chosen at different times to be transplanted at the intended location. Below are the specifics of the plantation's sapling height and germination period (plate 3). A total of 46 nursery beds were established, with each bed containing 800 to 1,200 polybags. Each polybag is sown with 3 to 4 seeds, facilitating optimal seedling production (Figures 8-13). In addition, otla raised method, in each bed sown 5 – 6 seeds were raised in plantation site (Figures 15-17)

Table 1: Details of sapling for plantation

Species	Germination period (days)	Germination percentage	Height (cm)of saplings
Avicennia marina	6-10	70-80	30-45
Rhizophora mucronata	30-35	50-60	60

With these methods, the extra seeds were also spreaded in the plantation area where the older trees are present and generally the area where natural regeneration of seeds happens.

5. Site visit

Before the initiation of mangrove plantation activity, a through pre-project survey was conducted to examine the proposed plantation site. In this survey, the crucial technical factors like land elevation, tidal pattern, physical and chemical properties of soil and water (by laboratory analysis), access to the site, level of protection such as cattle grazing, human disturbance and other potential risks, etc. were observed. This survey helps to decide the suitability of site for mangrove plantation in DPA port limit.

5.1. On-site observations

- The indicators of regular flooding of site by tide water was observed in on-site visit. The site area was wet and with plenty of mud which is required for plantation.
- There was no presence of very hard, dried soil surface in the site was observed anywhere.
- The presence of a few natural mangrove (*A. marina*) trees was observed around and in the plantation site which denotes the site is suitable for the plantation.
- The presence of crab holes and mudskippers holes is the indicator that the soil of the site is soft and regularly get wet due to tides.
- The pneumatophores of nearby mangroves were found in the nearby area which indicate that there is no sediment deposition and buried pneumatophores in this area.
- Nearby area also shows the presence of halophytic/ salt marsh plants such as *Sesuvium* and also *Salicornia* nearby creek.
- The *Sesuvium* leaves were green and fresh, also not thicker which represent the good condition of the site.
- The presence of sub-creek system may ensure the availability of tidal water which were be primary need of the plantation.
- A few natural regeneration plants were also observed in the site.
- The presence of the jackal foot marks observed which denotes the overall area have a good ecosystem and where the jackal food (crabs) sources are available.

5.2. Analysis of water and sediment samples

5.2.1. Water analysis

The water samples were collected from the plantation site in pre-cleaned polyethene bottles and rinsed with sample water, and transported to the laboratory in icebox for further analysis such as pH analysis by pH meter, salinity was determined by refractometer. The pH of water sample was found 7.25 and salinity 18 psu. Although there is no domestic freshwater source, and tidal water salinity generally higher, due to the rainy season the salinity shows lower values. However, the lower salinity is also in favour of germination of mangrove seeds.

5.2.2. Sediment/ soil analysis

Sediment samples were collected by using a non-metallic plastic spatula from random locations; three from each transect to cover the whole study area. The collected samples were air-dried at room temperature (Jackson, 1958), homogenized using an agate mortar and pestle, sieved through a standard sieve of 2 mm mesh (Tandon, 2005). The particles with size less than 2mm were retained in pre cleaned plastic bottles for further analysis for various parameters. Total Organic Carbon (TOC), pH, texture, bulk density, etc were analysed.

Texture of sediment: The texture of soil/sediment is one of the key factors when choosing a site for plantation mangroves. Generally, mangrove ecosystems typically have the types of soils which includes muds or clay or sandy mud, etc. The texture of soil significantly impacts the survival and growth of mangroves. The presence of clay texture which makes soil muddy may expected to offer a stable base for mangrove roots to flourish under tidal conditions. Thus, evaluating the soil conditions at the plantation site is crucial before starting mangrove planting activities. Here we collected 3 samples, and all shows good amount of clay percentage in them which may be favourable for the plantation.

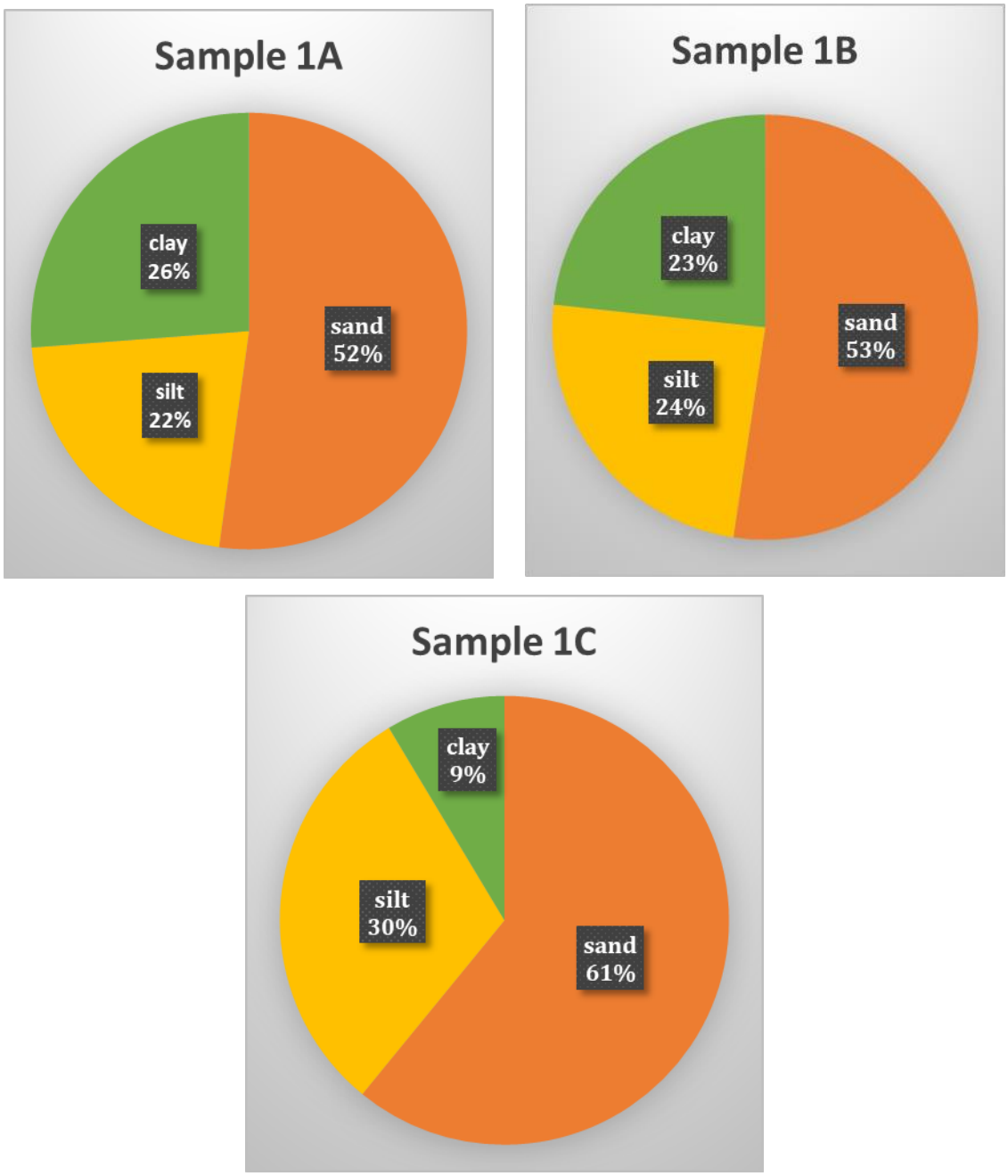

Figure 2: Sediment textural composition in the sampling sites

Bulk density of soil: It refers to the amount of soil organic matter within a given volume of soil. This property can vary significantly and is influenced by the soil's texture, structure, and organic matter content. Soils with high organic matter tend to have lower bulk density, while compacted soils exhibit higher bulk density.

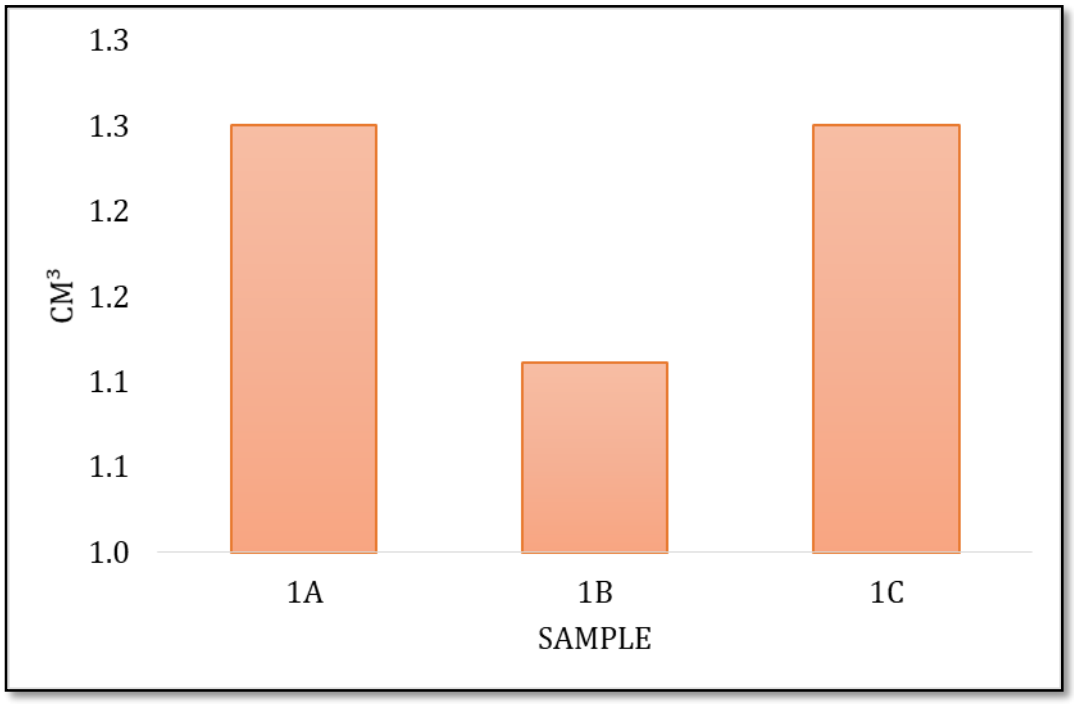

Figure 3: Bulk density of sediment samples

Total Organic Carbon: Organic carbon levels are influenced by living organisms, and the diversity of life forms in mudflats affects the total organic carbon (TOC) estimates. In all samples, the TOC percentage was ranged from 2.7 % to 2.85%

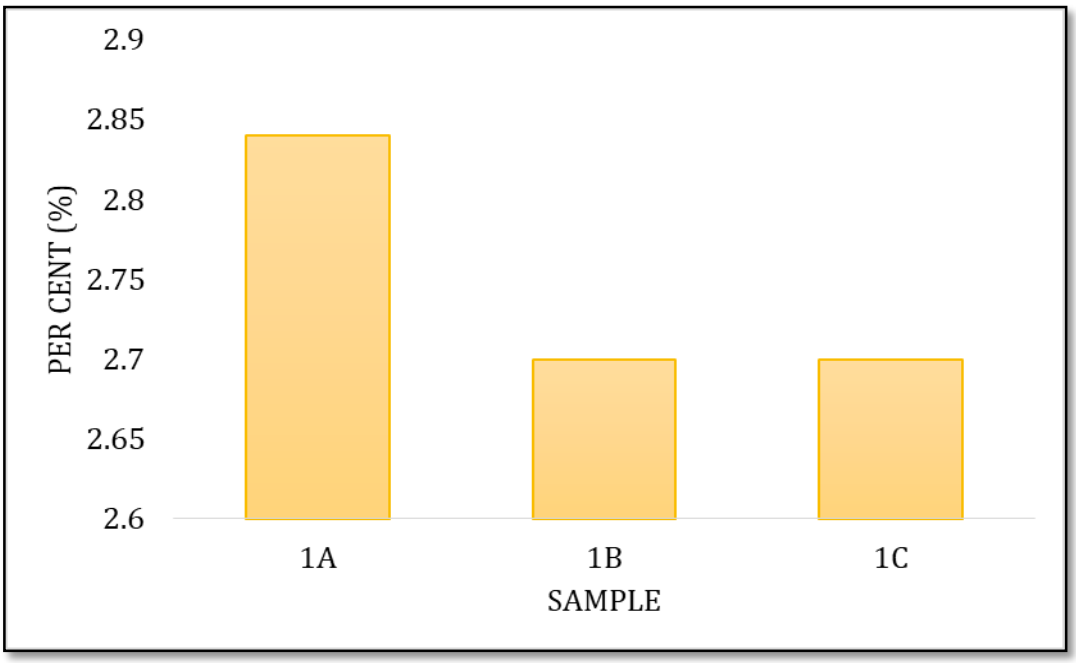

Figure 4: Total Organic Carbon content of sediment samples

Plate 1: Selection of suitable sites for mangrove plantation in DPA area based on sediment characteristics, tidal pattern, cattle grazing etc

Plate 2: Site identification, planning and field observation at mangrove plantation site on July 17th to 31st, 2024

Plate 3: Mangrove Seed Collection at Kandla on 1st to 07th August, 2024

Plate 4: Team involved in collection and separation of healthy mangrove seeds on 8th to 17th August, 2024

Plate 5: Women involved in processing of mangrove seeds on 17th to 25th August, 2024

Plate 6: Preparation and filling of bags for submerged Nursery Development Activity on 25th to 30th August, 2024

Plate 7: Labour Involvement in filling of bags for nursery preparation at Kandla on 25thAugust to 5th September, 2024

Plate 8: Seed sowing of *Avicennia marina* in polybags at nursery at Kandla on 6th to15th September, 2024

Plate 9: Site submerged during high tide on 15th September, 2024

Plate 10: Germination of *A. marina* seeds in polybags and germination during visit of GUIDE team at Kandla on 15th to 25th September, 2024

Plate 11: Nursery of *A. marina* saplings in natural tidal inundation at Kandla on 5th to 25th October, 2024

Plate 12: Insect pests and diseases in *A. marina* leaf and stem in saplings during visit of GUIDE team at Kandla on 25th October to 5th November, 2024

Plate 13: Labour Involvement in Otla bed raised method at Kandla 1st to 07th September, 2024

Plate 14: Seed sowing of *A. marina* in Otla beds at nursery at Kandla on 10th to 25th September, 2024

Plate 15: Germination of *A. marina* in Otla beds observed during visit of GUIDE team at Kandla on 5th to 25th October,

Plate 16: Mangrove Growth of *A. marina* prior to Transplanting from Nursery to Plantation Site by the GUIDE Team at Kandla on 30th November

Plate 17: Labour Participation in Loading Nursery Bags onto Boats for Transportation to Plantation Sites at Kandla on 1st December to 15th December, 2024

Plate 18: Labour Involvement plantation the *A. marina* at Kandla on 1st December, 2024 to 31st January, 2025

Plate 19: Labour Involvement plantation the *A. marina* at Kandla on 1st December, 2024 to 31st January, 2025

Plate 20: Labour Involvement in *A. marina* Plantation during GUIDE Team Visit to Kandla on 15th January, 2025

Plate 21: *A. marina* Plantation during GUIDE Team and DPA Team Visit to Kandla on 15th January, 2025

Plate 22: Mangrove outplanting, including row establishment and saplings placing inside hole, levelling soil surface at Kandla on 10th February, 2025

6. Summary of the Report

The aim of the report is to assess the situation of growing mangrove saplings at DPA Gulf of Kutch. In order to comply with the stipulated condition of the EC & CRZ Clearance dated 1/1/2024 accorded by the MoEF&CC, GoI read with CRZ Recommendation dated 25/8/2022 for "Augmentation of Liquid Cargo Handling capacity from 8 to 23.8 MMTPA through modernization of existing Pipeline network at Oil Jetty area of DPA, Kandla"), DPA assigned work of "Mangrove Plantation in an area of 50 Hectares for Deendayal Port Authority reg.", to GUIDE, Bhuj vide work order dated 10/6/2024.

The DPA has initiated a program for plantation of mangroves to improve these ecosystems within the limits of its port. The general focus of this project is to evaluate mangrove plantation in an area of 50 Hectares for Deendayal Port Authority, site conditions for planting, study the soil and water characteristics, and formulate and execute a site-specific planting plan utilizing nursery grown transplant, otla method and other forms. The objective is to increase the mangrove species, improve the resilience of the ecosystem and provide the local population with valuable resources and services, all while ensuring the sustainability of mangrove cover over the long term. The increased ecological stability and productivity of the region, and provide necessary resources and services to the local and marginalized communities throughout the work in a selected, defined and timetabled manner to observe the speed of the work done. The Mangrove Plantation in an area of 50 Hectares of *Avicennia marina* and *Rhizophora mucronata* at scientifically identified location (Satsaida bet) is completed.

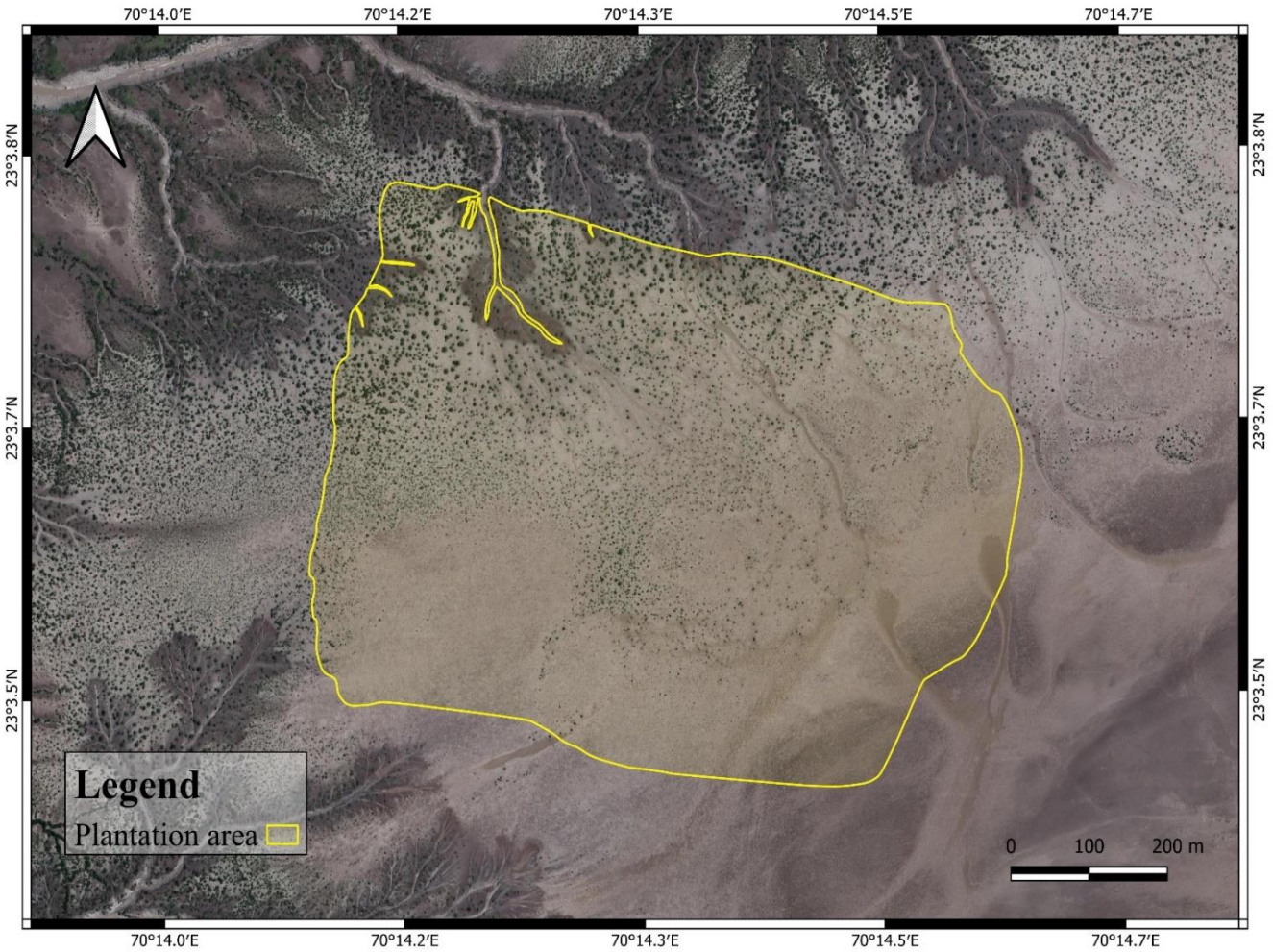

Figure 5: Mangrove plantation site area at Kandla, Gujarat, India

Plate 24: Growing saplings during GUIDE Team Visit to Kandla on 10th February, 2025

Plate 25: Labour Involvement plantation the *Rhizophora mucronata* at Kandla on 31st January to 28th March, 2025

Table: 2 GPS Points of Mangrove Project Site at Kandla, Gujarat, India

No	Point No.	Longitude	Latitude
1	**K-18**	70.243	23.062
2	**K-19**	70.244	23.06
3	**K-23**	70.243	23.058
4	**K-25**	70.241	23.057
5	**K-27**	70.239	23.057
6	**K-28**	70.235	23.058
7	**K-31**	70.235	23.061
8	**K-33**	70.235	23.062
9	**K-35**	70.237	23.064
10	**K-37**	70.24	23.063

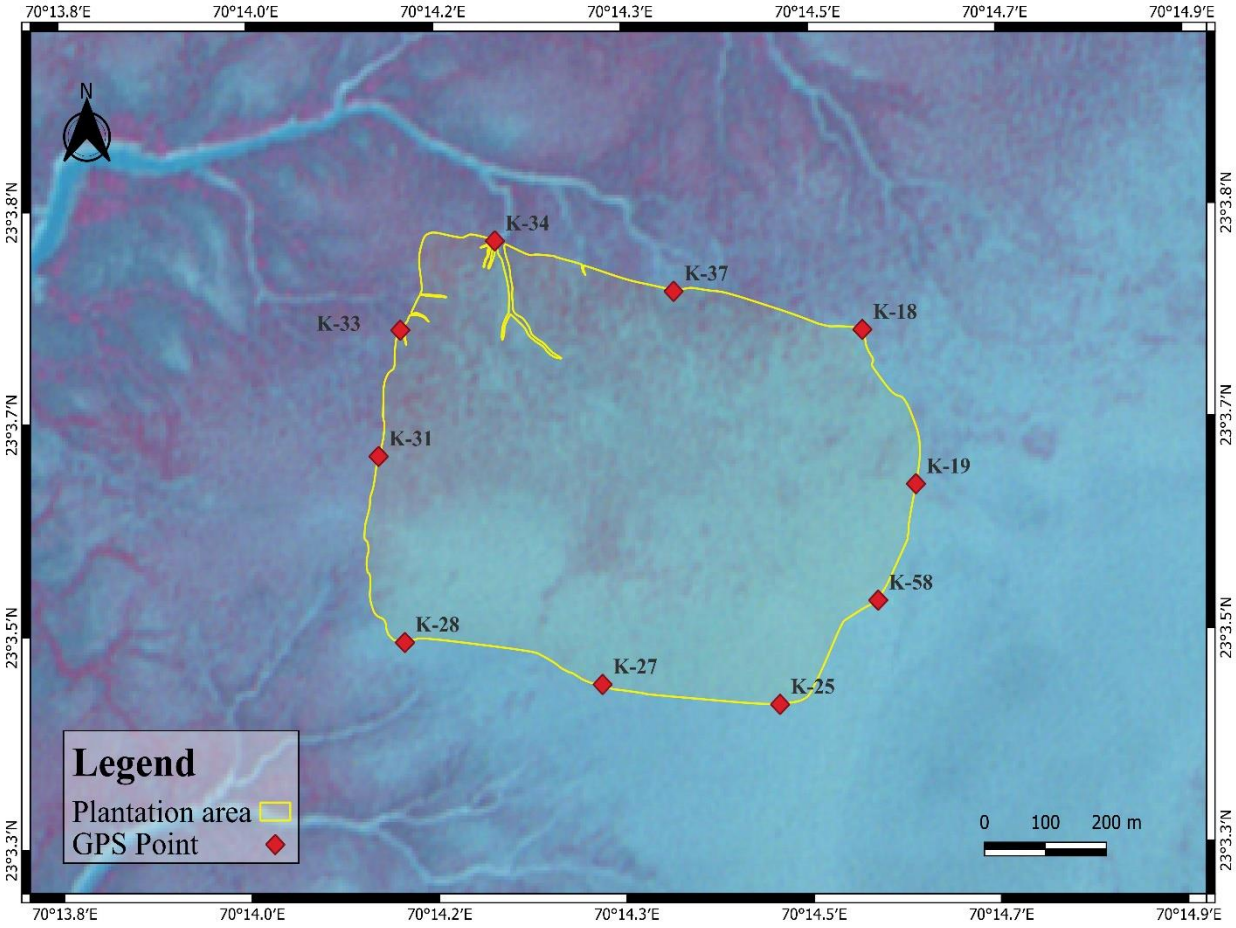

Figure 6: Mangrove plantation site area with GPS location points at kandla, Gujarat, India

7. Future Considerations for Mangrove Plantation

DPA needs to focus on the mangrove plantation project in Kandla. In ensuring that, this report puts forward the steps that need monitoring for the future.

7.1. Carry out regular monitoring of mangrove plantation

The regular monitoring of mangrove plantations is must in the plantation site to ensure growth status of the planted mangroves. It will also help in detection of any signs of disease or damage early. Regular monitoring also helps to understand any threats to mangrove such as potential erosion or grazing etc, also help to protect the local ecosystem and biodiversity. It will useful in the measurement of effectiveness of conservation efforts.

7.2. Regular gap filling to be done

Maintenance of the plantation is crucial for its continued success. Regular upkeep is needed, including filling in gaps where plants may have failed to establish. In addition to *Avicennia marina*, it's important to plant a variety of mangrove species to boost biodiversity. This increased diversity enhances the ecosystem's resilience to environmental changes, such as fluctuations in salinity, temperature, and sea level rise. Regular monitoring and management practices ensure the plantation's long-term health and ecological stability, contributing to the protection of coastal areas and marine life habitats.

8. References

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Annexure -B

List of CSR Works for the Oct 2024 to Till March-2025		
Sr.No	**Name of work**	**Approved cost (Rs in Lakhs)**
1	Request for construction of relocatable of sports arena at Gandhidham Military Station,HQ 98 Artillery Brigade Military Station Gandhidham	₹ 28.00
2	Proposal for construction of Police Community Hall at Police Headquarters Shinay.Office of the Superintendent of Police, East – Kutch Gandhidham.	₹ 100.00
3	Proposal for providing AWG system at their check posts located in the Runn of Kutch,Commandant BSF Station Gandhidham	₹ 82.70
4	Proposal for providing 4000 pieces of Tripal/Tarpaulin,Matri Sena Charitable Trust	₹ 32.00
5	Proposal for Upgrading Satellite Eye Hospital at Bhuj.1.Request for financial support for the addition of cornea and retina outpatient departments (OPD), a spectacle dispensing unit, and a medicine counter as part of our OPD activities, & equipment purchase.	₹ 35.08
6	Proposal for financial assistance for purchase of C Arm and OT table to start Orthopedic at St. Joseph's Hospital Gandhidham,ST. Joseph's Hospital Trust, Gandhidham.	₹ 28.78
7	Proposed to establish a women empowerment center, through Ujjas Mahila Sangh,Gandhidham	₹ 119.48
8	CSR fund for extension of building of pre- primary unit of S.H.N. Academy School being managed by Indian Institute of Sindhology at Adipur	₹ 71.55
9	CSR Grant for 'Strengthening of School Ecosystem at Primary School Level in Kachchh District,Ladies Environment Action Foundation (LEAF), Gandhinagar	₹ 50.00
Total Amount		₹ 547.59

Annexure –C

दीनदयाल पोर्ट प्राधिकरण
DEENDAYAL PORT AUTHORITY

Office of the Dy. Chief Engineer
(EMC & I/c), Ground Floor,
Administrative Office Building
Post Box No. 50, Gandhidham–Kachchh
Email: seplkpt@gmail.com,
www.deendayalport.gov.in

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No: EG/WK/4783/VII/ 143 **Date: 04/10/2024**

To,
M/s. Precitech Laboratories Pvt. Ltd.
1st floor, Bhanujyot Complex,
Plot no. C5/27, B/h. Pachratna Complex,
Near GIDC Char Rasta,
VAPI-396195
Mail – vapi@precitechlab.com

WORK ORDER

Sub: "Strengthening of Existing Environmental Management Cell of Deendayal Port Authority: Appointment of Environment Expert for two years and further extendable for one years."

Ref: 1) Tender dated 28/12/20223 submitted by M/s Precitech Laboratories Pvt. Ltd., Vapi.
2) LOA No. EG/WK/5375/171 dated 19/09/2024.
3) Performance Guarantee submitted by M/s. Precitech Laboratories Pvt Ltd in the form of Bank Guarantee of Rs. 9,45,000.00 vide Bank Guarantee no. 1102924BG0B00238 dated 30.09.2024 issued by State Bank India, Commercial Branch, Vapi.

Sir,

Kindly refer above cited Letter of Acceptance dated 19/09/2024.

1) You shall have to provide Key Experts as per tender requirement during the entire contract period. Accordingly, you shall have to submit the qualification and experience certificates of the Key experts to be appointed at DPT, as per tender conditions for verification & approval.
2) Please submit the agreement of contract as per Tender Conditions.
3) Kindly commence the work on or before 07/10/2024.

Please note that the time period for providing Consultancy service for the subject work will be Initially for Two years and further extendable for one year on mutual consent as per tender condition.

Accordingly, a copy of Form-III is enclosed herewith for information and necessary action please.

Encl: Form – III

04/10/24
Dy. Chief Engineer (PL) & EMC (I/c),
Deendayal Port Authority

CC: 1. TPA to CE - For kind information to Chief Engineer, please.
2. RAO, DPA
3. Sr. DD (EDP) with a request to hoist this work order in website of DPA.

4. A.M.(W/A)

दीनदयाल पोर्ट प्राधिकरण
DEENDAYAL PORT AUTHORITY

Office of the Dy. Chief Engineer
(EMC & I/c), Ground Floor,
Administrative Office Building
Post Box No. 50, Gandhidham–Kachchh
Email: seplkpt@gmail.com,
www.deendayalport.gov.in

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No: EG/WK/4783/VII/ **Date: 4/09/2024**
10

FORM – III

(Under rule 21(2) of the Contract Labour (Regulation and Abolition) Central Rules,1970; and Rules 7(3) of the Inter-State Migrant Workmen (Regulation of Employment and Conditions of Service) Central Rules, 1980)

CERTIFICATE BY PRINCIPAL EMPLOYER FOR OBTAINING LICENCE FROM ASSISTANT LABOUR COMMISSIONER (C), GOPALPURI.

Certified that:

I have engaged the applicant "Precitech Laboratories Pvt Ltd. 177, 1st floor, Bhanujyot Complex, Plot no. C5/27, B/h. Pachratna Complex,Near GIDC Char Rasta,VAPI-396195. as a contractor in my establishment for the work **"Strengthening of Existing Environmental Management Cell of Deendayal Port Authority: Appointment of Environment Expert for two years and further extendable for one years."** to be carried out for **24 months** (as per tender) and the work will be commenced on or before **07/10/2024**.

1) I undertake to be bound by all the provisions of the Contract Labour (Regulations and Abolition) Act, 1970 (37 of 1970) and the Contract Labour (Regulations and Abolition) Central Rules, 1971 The inter-State Migrant Workman (Regulation of Employment and Conditions of Service) Act, 1979 (30 of 1979) and the Inter State Migrant Workmen (Regulation of Employment and Conditions of Service) Central Rules, 1980* in so far as the provisions are applicable to me in respect of the employment of Contract Labour/inter-state migrant workmen by the applicant in my establishment.

2) The engagement of contract labour in the said work is not prohibited under sub-section (1) of section 10 of the Contract Labour (Regulation and Abolition) Act, 1970 (37 of 1970) or an award or a settlement.

04/09/24

Dy. Chief Engineer (PL) & EMC (I/c),
Deendayal Port Authority