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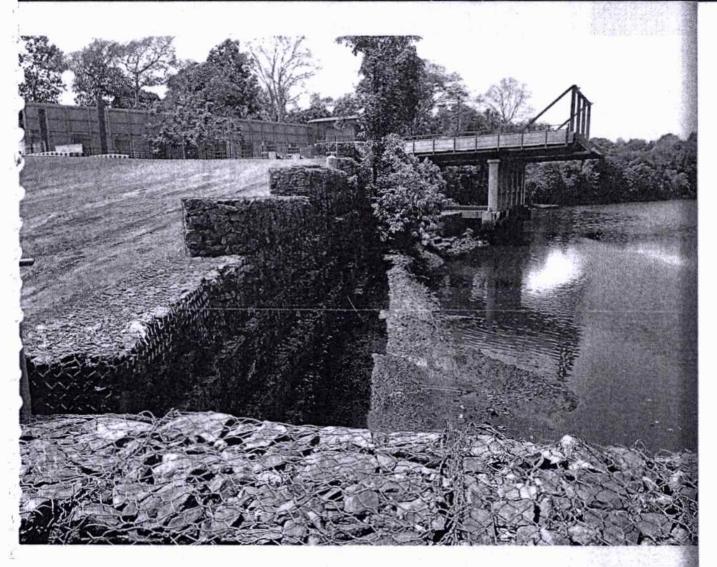
Project No: AESPL/INF-E/20-21/EIA/004

Environmental Impact Assessment Report

Proposed Construction of Jetty and Platforms for Loading and Unloading, Strengthening of existing bund along Zuari river at Survey No. 29/0, 30/1, 34(P), 35(P), 36/0, 37/0, 41/1, 41/4, 41/9, 41/24, 5/3 at Village Odar & Xelvona, Taluka Quepem, South Goa District, Goa

Baseline Monitoring: Summer 2022

M/s. Dinar Tarcar Resources (India) Pvt. Ltd



February 2024

Environmental Consultant, Aditya Environmental Services Pvt. Ltd., Mumbai QCI- NABET Accredited EIA Consultant www.aespl.co.in

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Declaration by Experts contributing to the EIA

Declaration by Experts contributing to the EIA report Proposed Construction of Jetty and Platforms for Loading and Unloading, Strengthening of existing bund along Zuari river at Survey No. 29/0, 30/1, 34(P), 35(P), 36/0, 37/0, 41/1, 41/4, 41/9, 41/24, 5/3 at Village Odar & Xelvona, Taluka Quepem, South Goa District by M/s. Dinar Tarcar Resources (India) Pvt. Ltd.

I, hereby, certify that I was a part of the EIA Team in the following capacity that developed the above EIA.

EIA Coordinator:

Name: N. K. Shendye

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G. C. E. N. A.

hward No. 6406

Date: 05/03/26

Signature & Date: 29th February 2024
Period of involvement: since 24.11 2020.

Contact information: 022-242127500 E-mail: contact@aespl.co.in

Functional Area Experts:

S.N.	Functional Areas	Name of the Expert/s	Involvement (Period& Task**)	Signature & Date
1	AP*	Rajiv Aundhe	since November 2020	Ah
2	WP*	Rajiv Aundhe Poonam Morye	since November 2020	
3	SHW* SW	Rajiv Aundhe Poonam Morye	since November 2020	(H) 3
4	SE*	Mamta Bodhale	since November 2020	W. Breg Note
5	EB*	Radhika Powar	since November 2020	Lyman
6	HG*	Comp.		
7	GEO*	-		_
8	AQ*	-		
9	NV*	-	-	
10	LU*	Bela Pharate	since November 2020	AM
11	RH*	-	**	—
12	SC*	-		1:44:

NOTE

(*) Full forms of abbreviations given on Next Page

(**) Tasks for each Functional Area Expert given on Next Page

Environmental Baseline monitoring and analysis for this project was carried out by in-house, environmental analytical laboratory.

Environmental Consultant

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Declaration by Experts contributing to the EIA

Declaration by the Head of the Accredited Consultant Organization

I, Rajiv V. Aundhe, hereby, confirm that the above-mentioned experts prepared the EIA report for Proposed Construction of Jetty and Platforms for Loading and Unloading, Strengthening of existing bund along Zuari river at Survey No. 29/0, 30/1, 34(P), 35(P), 36/0, 37/0, 41/1, 41/4, 41/9, 41/24, 5/3 at Village Odar & Xelvona, Taluka Quepem, South Goa District by M/s. Dinar Tarcar Resources (India) Pvt. Ltd.. I also confirm that I shall be fully accountable for any mis-leading information mentioned in this Statement.

Name: Rajiv V. Aundhe Designation: Director

Name of the EIA Consultant Organization: Aditya Environmental Services Pvt. Ltd.

NABET Certificate No. & Issue Date: NABET/ EIA/2225/ RA 0262 dated 18th Oct 2022.

Sr. No.	Functional Area Code	Complete Name of the Functional Areas	Tasks
1	AP	Air Pollution Prevention, Monitoring & Control	Assessing baseline ambient air quality, stack emission, possible impacts and control measures
2	WP	Water Pollution Prevention, Control & Prediction of Impacts	Assessing baseline surface/ ground water quality, stack emission, possible impacts and control measures
3	SHW	Solid Waste and Hazardous Waste Management	Assessing solid/hazardous waste generation, treatment and disposal
4	SE	Socio-Economics	Assessing baseline Socioeconomic, demographic situation, impacts and CSR plan/ measures for upliftment
5	EB	Ecology & Biodiversity	Assessing baseline biodiversity status in study area, impacts and Biodiversity management plans
6	HG	Hydrology, ground Water & Water Conservation	Assessing baseline hydrogeological situation in study area, impacts and management plans
7	GEO	Geology	Assessing baseline geological situation in study area, impacts and management plans
8	AQ	Meteorology, Air Quality Modeling & Prediction	Assessing nature and scale of impacts on ambient air quality through modelling and management plans
9	NV	Noise/ Vibration	Assessing baseline ambient noise quality, possible sources, impacts and control measures
10	LU	Land Use	Assessing baseline Land use Land cover possible impacts and control measures
11	RH	Risk Assessment & Hazard Management	Assessing safety measures taken up by company modelling to assess scale of impacts, disaster management and control measures
12	SC	Soil Conservation	Assessing soil quality, scale of impacts and suggest management and control measures



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Dinar Tarcar Resources (India) Pvt. Ltd.

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TO WHOMSOEVER IT MAY CONCERN

This is to confirm that we have checked the EIA report prepared by M/s. Aditya Environmental Services Pvt. Ltd. for our Proposed Construction of Jetty and Platforms for Loading and Unloading, Strengthening of existing bund along Zuari river at Survey No. 29/0, 30/1, 34(P), 35(P), 36/0, 37/0, 41/1, 41/4, 41/9, 41/24, 5/3 at Village Odar & Xelvona, Taluka Quepem, South Goa District. We also confirm that the data/ information related to our process and project is correct as per our understanding of the process/ project at the moment.

EDGAR MAX DESOUZA Authorised Signatory

For Project Proponent

M/s. Dinar Tarcar Resources (India) Pvt. Ltd.

SESOURCE PANAJI GOA

Date: 04.03.2024

Place: Panaji - Goa



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Dinar Tarcar Resources (India) Pvt. Ltd.

TO WHOMSOEVER IT MAY CONCERN

This is to confirm that we have understood the Environment Management Plan prepared as a part the EIA report prepared by M/s. Aditya Environmental Services Pvt. Ltd. for our Proposed Construction of Jetty and Platforms for Loading and Unloading, Strengthening of existing bund along Zuari river at Survey No. 29/0, 30/1, 34(P), 35(P), 36/0, 37/0, 41/1, 41/4, 41/9, 41/24, 5/3 at Village Odar & Xelvona, Taluka Quepem, South Goa District. We also confirm that Environment Management Plan included as a part of EIA report, will be made part of Concessionaire Agreement/ other relevant documents.

EDGAR MAX DESOUZA Authorised Signatory

For Project Proponent

M/s. Dinar Tarcar Resources (India) Pvt. Ltd.

PANAJI GOA

Date: 04.03.2024

Place: Panaji - Goa



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Aditya Environmental Services Pvt. Ltd.

GSTN: 27AADCA4730B1Z4 CIN: U74999MH2001PTC132091 UAN: MH19E0035348

TO WHOMSOEVER IT MAY CONCERN

This is to confirm that the EIA/ EMP for the Proposed Construction of Jetty and Platforms for Loading and Unloading, Strengthening of existing bund along Zuari river at Survey No. 29/0, 30/1, 34(P), 35(P), 36/0, 37/0, 41/1, 41/4, 41/9, 41/24, 5/3 at Village Odar & Xelvona, Taluka Quepem, South Goa District by M/s. Dinar Tarcar Resources (India) Pvt. Ltd. has been prepared by me in the capacity of EIA Coordinator. I confirm that the EIA prepared is based on factual data and all due diligence has been followed in preparing the same.

Date: 29th February 2024

Place: Mumbai

For Aditya Environmental Services Pvt. Ltd

N. K. Shendye

EIA Coordinator



Aditya Environmental Services Pvt. Ltd.

GSTN: 27AADCA4730B1Z4 CIN: U74999MH2001PTC132091 UAN: MH19E0035348

Plagiarism Check Sheet

Title of EIA Report	Proposed Construction of Jetty and Platforms for Loading and Unloading, Strengthening of existing bund along Zuari river at Survey No. 29/0, 30/1, 34(P), 35(P), 36/0, 37/0, 41/1, 41/4, 41/9, 41/24, 5/3 at Village Odar & Xelvona, Taluka Quepem, South Goa District		
Name of Accredited Organization	Aditya Environmental Services Pvt. Ltd.		
Unique Identification Number	Project No: AESPL/INF-E/20-21/EIA/004		
Name of EIA Coordinator (EC)	N.K Shendye		
Name of the Software	Plagiarism Checker X		
Date of Check	29th February 2024		
Time of Check	1.30 pm		

Declaration by the Head of the Accredited Consultant Organization

I hereby certify that this EIA Report has been evaluated using online/ In-house software viz., Plagiarism Checker X. The report produced has been analyzed by the system and based on it, I certify that the EIA Report has been produced in accordance with good scientific practice.

M

29th February 2024

Date and Sign of EIA Coordinator

Name: N K Shendye

Designation: EIA Coordinator

29th February 2024

Date and Sign of Head of Accredited Organization

Aditya Environmental Services Pvt. Ltd.

NABET Certificate No.: NABET/EIA/2225/RA 0262 and Issue Date: 18th October 2022 valid up

to 01st May 2025

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Explanation of Terms Used

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Abbreviation	Full form
ToR	Term of Reference
AAQ	Ambient Air Quality
MoEFCC	Ministry of Environment, Forest & Climate Change
GSPCB	Goa State Pollution Control Board
CPCB	Central Pollution Control Board
CGWA	Central Ground Water Authority
EIA	Environment Impact Assessment
EMP	Environment Management Plan
EMC	Environment Management Cell
PM	Particulate Matter
BDL	Below Detectable Limit
O&M	Operation and Maintenance
NOC	No Objection Certificate
EC	Environment Clearance
LULC	Land Use Land Cover
MTPD	Metric Ton Per Day
MTA	Metric Ton Per Annum
CMD	Cubic Meter Per Day
BOD	Biological Oxygen Demand
COD	Chemical Oxygen Demand
AAQ	Ambient Air Quality
NAAQS	National Ambient Air Quality Standard
CRZ	Coastal Regulation Zone
MSL	Mean Sea Level
w.r.t.	With Respect To
PA	Protected Area
ESZ	Eco-Sensitive Zone

Chapter 1 - Introduction

1 INTRODUCTION

1.1 Introduction

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Goa is a State on the southwestern coast of India within the region known as the Konkan, and geographically separated from the Deccan highlands by the Western Ghats. It is surrounded by the Indian States of Maharashtra to the north and Karnataka to the east and south, with the Arabian Sea forming its western coast. It is India's smallest State by area and it is fourth-smallest by population. Goa has the highest GDP per capita among all Indian States, two and a half times as high as the GDP per capita of the country as a whole. The Eleventh Finance Commission of India named Goa the best-placed State because of its infrastructure, and India's National Commission on Population rated it as having the best quality of life in India (based on the commission's "12 Indicators"). It is the third-highest ranking among Indian States in human development index.

Panaji is the State's capital, while Vasco da Gama is its largest city. The historic city of Margao in Goa still exhibits the cultural influence of the Portuguese, who first voyaged to the subcontinent in the early 16th century as merchants, and conquered it soon thereafter, whereupon Goa became an overseas territory of the Portuguese Empire, part of what was then known as Portuguese India, and remained as such for about 450 years, until it was annexed by India in 1961. Goa's official language, which is spoken by a majority of its inhabitants, is Konkani.

Goa is visited by large numbers of international and domestic tourists each year because of its white-sand beaches, active nightlife, places of worship, and World Heritage-listed architecture. It also has rich flora and fauna because it lies on the Western Ghats range, a biodiversity hotspot.

Mormugao Port is one of the foremost port in Goa, commissioned in 1885 is one of the oldest ports on the west coast of India in the State of Goa and is blessed with a protected open type natural harbour. Over the years, it has developed a deep draft channel. With its location at the mouth of the Zuari River, it is a crucial component in the flourishing export industry of the State of Goa. It became one amongst the major ports of the country in 1964 and has been relentlessly serving the nation in its economic development.

There are also many jetties spread along the bank of River Mandovi and Zuari for different purposes such as fishing, ferries and loading/unloading of various goods.

Goa being the major exporter of Iron ore throughout the world, M/s. Dinar Tarcar Resources (India) Pvt. Ltd. proposes construction of a Jetty and two Platforms for loading and unloading at Village Odar & Xelvona, Taluka Quepem, District South Goa. The purpose of jetty is transport, loading-unloading, storage and handling of Iron ore and other mineral ores and non-hazardous dry goods.

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Chapter 1 - Introduction

1.2 Purpose of Environmental Impact Assessment (EIA) Report

The purpose of this Environmental Impact Assessment report is to investigate & assess the principal environmental concerns associated with development of infrastructure facilities viz. construction of jetty, construction of platform with ramp and approach road. These will help smooth loading/unloading of various goods.

1.3 Identification of Project & Project Proponent

The present site is vacant and has an area of 1,27,380 m² for constructing a modern jetty and platform/quay to handle Iron ore along with many other industrial products which can provide sustainable livelihood and economic activity throughout the year. The riverine stretch of this location is ideally suited to increase river & road logistics.

With the above background, M/s. Dinar Tarcar Resources (India) Pvt. Ltd. proposed Construction of Jetty and Platforms for Loading and Unloading, Strengthening of existing bund along Zuari river at Village Odar & Xelvona, Teh. Quepem, Dist. South Goa, Goa.

Waterfront is allotted by Captain of Ports for designated use. The back-up land is owned by M/s. Dinar Tarcar Resources (India) Pvt. Ltd. for storage, handling of ores and non-hazardous dry cargo.

1.4 Location of the Project & Its Importance in the Country, Region

1.4.1 Location of the Project

The project is located at Survey Nos. 29/0, 30/1, 34(P), 35(P), 36/0, 37/0, 41/1, 41/4, 41/9, 41/24, 5/3 at Village Odar & Xelvona, Tal. Quepem, Dist. South Goa, Goa.

Reference coordinates are as follows:

Latitude: 15°15'6.09"N

Longitude: 74°05'7.37"E

The site is accessible from Margao -Chandor- Curchorem. The site is at distance of 15 km from Margao city.

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Chapter 1 - Introduction

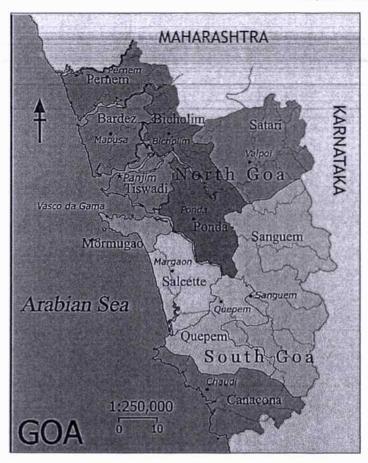


Figure 1.1: Taluka Map Showing Location of Quepem

1.4.2 Importance of the Project to the Country, Region

The location has an area of 1,27 380 m² for constructing a modern Jetty and Platform to handle Iron ore along with many other industrial products which can provide sustainable livelihood and economic activity throughout the year. The riverine stretch of this location is ideally suited to increase the river & road logistics.

The project would contribute substantially to increase the various supplies to both domestic and export markets. The average annual total handing of cargo from the year of stabilization of the project (Year 2) would amount to 3 MT valued at Rs. 10,225 lakhs, at the boat side process. The project would give employment to 450 - 650 Tippers and about 75 persons in other allied activities. Thus, 725 persons would be benefited directly in the loading and unloading activities after project implementation, apart from the indirect benefits that would accrue as a result of developmental efforts.

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The income earned by the each Tipper would be of the order of Rs. 1.25 lakhs per month minimum, whereas the net income earned by vessel owners after meeting provisions for various cargo maintenance, maintenance and replacement, interest and payment of installment dues towards loan etc. aggregate to Rs. 22 lakhs.

1.4.3 Regulatory Framework

Ports and Harbours infrastructure facilities are permitted under clause no 8 (ii) as CRZ-I of CRZ notifications dated 06th January 2011 and require prior CRZ clearance.

Ports and Harbours infrastructure facilities are permitted under clause no 5.1.2 as CRZ-IB of CRZ notifications dated 18th January 2019 and require prior CRZ clearance.

1.4.4 Scope of the EIA Study

The scope of work has been prepared based on guidelines issued by MoEFCC for conducting EIA studies. The scope covers following details:

- Assessment of environmental features and pollution control measures.
- Assessment of environmental features of proposed development, it's location w.r.t. CRZ (based on map prepared by authorized agency) and conformity to permissible activities.
- Establishment of present status of land, air, noise, water, biological and socioeconomic and cultural components of the environment. This study also includes marine water & sediment.
- Identification of likely impacts due to development of infrastructure facilities on environmental components during the construction, commissioning, operation and decommissioning phases.
- Study of operations/ activities at jetty.
- Assimilation of collected and generated data during the course of EIA studies.

Delineation of an Environmental management plan (EMP) outlining measures to be implemented by Commissioner of Fisheries for mitigation of adverse impacts.

1.5 Methodology of EIA

Any development project is likely to impact surrounding environment. The nature and magnitude of impact on different components of the environment will depend on the nature and size of project as well as location aspects of the project site and steps taken for mitigating the environmental impact. The final net impact due to the proposed project on environmental components can be evaluated through Environmental Impact Assessment (EIA) studies within the study area prior to its implementation. The results of EIA Studies form the basis for preparation of a viable Environmental management plan (EMP).

Chapter 1 - Introduction

The EIA Studies can be broadly divided in to three phases.

- 1st PHASE: The first phase involves identification of significant environmental components and assessing their baseline status within the study area.
- 2nd PHASE: The second phase involves identification of impacts on various identified significant environmental parameters due to proposed project. Data regarding the proposed construction activities, design capacity of the individual units, water consumption, solid/ hazardous waste, sewage/ effluent generation, characteristics of disposal medium and topography of the study area is also taken into consideration to evaluate project related environmental features.
- 3rd PHASE: The third phase covers the evaluation of final impacts and delineation of an Environmental management plan to mitigate adverse impacts on the quality of surrounding environment.

For the purpose of assessing the impacts study area of 10 km radius from project site was identified for the EIA study as per CRZ Notification and was studied in Summer 2022. It is also proposed to find out total benthic loss due to clearing of navigational channel, construction of platform, groynes etc.

The EIA involved detailed investigations to assess the impacts on different environmental components. The base line studies were carried out and the predictions made on the basis of the above are presented in the EIA report. The various facets of the work carried out are briefly reported below.

1.5.1 Baseline Environmental Studies

These include study of environmental conditions in Summer 2022, close to site as well as in study area. Details of various components covered therein are as below:

1.5.1.1 Land Environment

Preliminary information pertaining to topography, land-use pattern, development pattern and landscape features within the study area, location aspects of site was collected through toposheets (OSM maps), Google Earth Imagery, available geographical and road maps of study area. Land Use Land Cover (LULC) map was prepared based on satellite imagery and was finalized by undertaking ground truthing using GPS in the study area. Soil and marine sediment characteristics were also established by collecting data at site and in nearby area.

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1.5.1.2 Air Environment

The preliminary information regarding topography of the study area and possible air pollution sources were collected through reconnaissance survey and review of available data and literature. Based on the information, Particulate Matter (PM₁₀), Sulphur dioxide (SO₂), Oxides of Nitrogen (NO_x), CO (Carbon Monoxide), emissions were identified as major project related primary air pollutants, mainly due to construction activity. The baseline status of these parameters in ambient air was assessed at Odar Village in Summer 2022, and data presented in the report. Meteorological data on wind speed, wind direction, temperature and relative humidity were sourced from climatological tables (IMD) and other internet sources.

1.5.1.3 Noise Environment

Noise level data was collected near site to identify existing baseline status.

1.5.1.4 Water Environment

Reconnaissance studies included identification of available water resources (ground/ surface) in the study area. Primary data collection and analysis of marine & ground/ surface water was carried out to assess its quality as baseline study.

1.5.1.5 Biological Environment

Study includes identification of species of flora and fauna by making visits at various locations in study area. Information was also collected from secondary sources like Forest department, published literature.

1.5.1.6 Socio Economic Environment

Studies included collection of information about population in study area, income profile of people, standard of living and literacy rate of the population staying in study area from authorized sources like Census 2011, data from Primary Health Centres in vicinity.

1.5.2 Impact Assessment Matrix

From a study of the nature of activities during construction phase & after completion & knowledge of existing baseline/ background levels of various environmental parameters viz. Air/ Water/ Noise level/ Sediment/ Population density in/ around the site, the nature & severity of impact on environment was estimated.

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Chapter 1 - Introduction

Impact Matrix was prepared delineating activities v/s tangible impacts. Environmental management plan was prepared for the project to reduce negative impacts of the project.

1.5.3 Environment Management Plan

From the identified impacts, Environmental management plan is prepared to outline pollution control measures to be implemented in order to ensure minimum impact on environment due to proposed operation at fish landing centres.

1.6 Regulatory Scoping & Its Compliance

No scoping was done for this project.

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Chapter 2 - Project Description

2 PROJECT DESCRIPTION

2.1 Type of Project

Construction of the Jetty and Platform is for loading and unloading, storage, handling of ores and non-hazardous dry cargo. The site is in CRZ IVB (Zuari estuary), IB and CRZ III (land adjoining bank of Zuari estuary).

Details of each component are given in subsequent paragraphs in this chapter.

2.2 Need for the Project

The location has an area of 1,27,380 m² for constructing a modern Jetty and Platforms to handle Iron ore along with many other industrial products which can provide sustainable livelihood and economic activity throughout the year. The riverine stretch of this location is ideally suited to increase the river & road logistics.

The project would contribute substantially to increase the various supplies to both domestic and export markets. The average annual total handing of cargo from the year of stabilization of the project (Year 2) would amount to 3 MT valued at Rs. 10,225 lakhs, at the boat side process. The project would give employment to 450 - 650 Tippers and about 75 persons in other allied activities. Thus, 725 persons would be benefited directly in the loading and unloading activities after project implementation, apart from the indirect benefits that would accrue as a result of developmental efforts.

The income earned by the each Tipper would be of the order of Rs. 1.25 lakhs per month minimum, whereas the net income earned by vessel owners after meeting provisions for various cargo maintenance, maintenance and replacement, interest and payment of installment dues towards loan etc. aggregate to Rs. 22 lakhs.

2.3 Location Details

Construction of Jetty, Platforms and associated infrastructure for Loading & Unloading facilities at Survey No. 29/0, 30/1, 34(P), 35(P), 36/0, 37/0, 41/1, 41/4, 41/9, 41/24, 5/3 at Village Odar & Xelvona, Taluka Quepem, District South Goa.

Odar Village falls under Assolda Village Panchayat in Quepem Taluka. Xelvona, Sanvordem etc. are other Villages in surrounding.

Project site and entire 10 km study area is covered in Open Series Map (OSM published by Survey of India) the same is depicted below; Site Layout map showing proposed facilities is enclosed overleaf.

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Chapter 2 - Project Description

Reference coordinates of site are as follows:

Latitude:

16°16'6.09"N

Longitude:

74°05'7.37"E

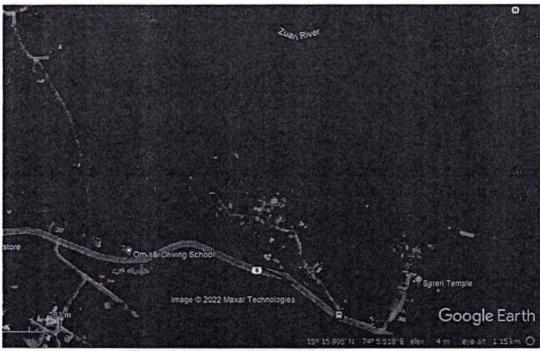


Figure 2.1 Proposed site and vicinity

2.4 Size/ Magnitude of Project

The project would be implemented in two years, after obtaining all statutory approvals and shall comprise the following principal components. The proposed activity is new construction of the Jetty and Platform is for loading and unloading, storage, handling of ores and non-hazardous dry cargo. The site is in CRZ IVB (Zuari estuary), IB and CRZ III (land adjoining bank of Zuari estuary) zone.

At present the barges are ranging with capacity of 1500-2500 MT. However, the capacity of navigation channel is higher & can take barge capacity up to 3000-3500 MT.

Sizing details of the project:

Capacity: 3 MTPA

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Chapter 2 - Project Description

Waterfront Activities:

Description	Size	Area in Sq.m	
Platform/quay	12 x 10 M (2 Nos)	336	_
Jetty	12 x 18 M (1 Nos)	237	L
Strengthening of bunds with Gabion	267 m (Length)		

Backup Area

Description	Area in Sq.m
Office	140
Substation	100
Garage	160
Toilet	25
STP	100
Wheel wash	49
Watch Tower	10
Stock Yard 1	3342
Stock Yard 2	3404
Internal Road	12678
Security Check post	12
Washing Ramp	65
Proposed Weighbridge	209
Proposed Weighbridge Office	30
Future Expansion	107056
Total Plot Area	127380

2.4.1 Capital Investment for Proposal

The total capital expenditure for construction of boat yards, approach road, solid jetty etc. will include construction material, transport, labour, equipment and machinery, fuel, design consultancy charges, approval consultancy charges, statutory fees, administrative & other charges is estimated to be Rs. 18 Crores.

2.5 Proposed Schedule for Approval & Implementation

The forward path of CRZ Clearance for the proposed activities is as below:

- CRZ clearance 6 8 months
- Construction phase (10 months)

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Chapter 2 - Project Description

Conceptual bar chart is provided in table below:

Table 2-1 Conceptual bar chart for proposed project completion

Sr.	Details of Work	Estimated time period – 10 Months									
No.	Control of the same of the same of	1	2	3	4	5	6	7	8	9	10
1	Construction of approach road			all the same of the	HARMON	The state of the s	AND THE PERSON NAMED IN	2010000	THE R. P. LEW.	Laterardi	N-5100.0 1000
2	Construction of boat yards						M.				
3	Construction of jetty & ramp										

2.6 Technology, Methodology of Activities, Environmental & Safety Aspects

Details of proposed activities are given below:

2.6.1 Construction of boat yard, ramp, jetty and approach road

Steps Involved:

- · Alignment survey for jetty and platforms.
- · Marking of as per alignment plan for jetty and platforms.
- Providing rubble soling of trap stones.
- Providing cement concrete bedding M15 of trap metal in foundation of walls.
- Providing and constructing cement concrete M25 retaining walls.
- Providing trap rubble filling inside retaining wall.
- Providing and laying cement concrete M15 bedding between walls above filling.
- Providing and laying cement concrete M20 for approach slab above bedding.
- Providing and laying cement concrete M20 for wearing course above slab.

2.7 Environmental Aspects in Project Activities

Environmental aspects envisaged are as below:

- Proposed activities are located in sub-tidal and intertidal region.
- Cutting of trees for proposed construction.
- Construction material will have to be brought to the site through road.
- Construction activity will require use of trucks/ tippers, Poclain, excavators, D.G. sets, Cranes etc.
- Construction of ramp and jetty in small extent, may lead to obstruction of sediment transportation along shore resulting in sediment deposition towards west side of structure.
- Cutting and filling of land for proposed new road construction.
- Construction activity will result in increase in turbidity which will affect the marine ecosystem temporarily.

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Chapter 2 - Project Description

2.8 Construction Material, Other Requirements & Sourcing

The material required is mainly civil construction material and it is proposed to obtain it from market of nearby cities. Sourcing locations and distances are indicated below:

Table 2-2 Construction Material & Source Locations

Sr. No.	Material Quantity Source-Place		Distance (km)	Direction w.r.t. Site	
1.	Cement	5000 Bags	AMC-ACC	20	North
2.	Steel	80 Tons	Jai Ganesh Ispat & Ferro Alloys Pvt. Ltd.	150 Maharashtra	West
3.	Metal (< 40mm)	600 cum	M DCosta	12	West
4.	Sand	500 cum	Authorised Sand Suppliers	60 km	North
5.	NP3 1000mm dia	15 Nos	Jai Ganesh Ispat & Ferro Alloys Pvt. Ltd.	150	West
6.	NP3 600 mm dia	25 Nos	Jai Ganesh Ispat & Ferro Alloys Pvt. Ltd.	150	West
7.	Trap rubble	200 cum	Authorised Local Suppliers	30	West

2.9 Utilities Required During Construction Phase

Various utilities/ Equipment required and respective fuel consumption for construction purpose is given in following table:

Table 2-3 Utilities, Equipment, Fuel Consumption

Machinery	Number	Fuel (Diesel) Required
Volvo (2.30 m3)	2	22 Ltr/Hr
JCB (0.60 m3)	1	18 Ltr/Hr
Truck/Tipper (upto 14 m3)	10-40 Nos	12 kmpl
Concrete Mixer (0.60 m3)	1 No	7-8 Ltr/hr
Needle Vibrator	5 HP	10 km
Crane (25T)	1 No	10 ltr/Hr
Diesel Generator (125-250 KVA)	1 No	6 ltrs /hr
Water tanker (10000 Ltr)	2 Nos	0.5 Ltr/Km
Wheel Loader (2.5-3.5 cum)	6 Nos	18-20 Ltr/hr
Barge Loader	1200-1500 TPH	

Chapter 2 - Project Description

2.9.1 Water Requirement

Total water requirement for project during operation phase is 20 KLD. Source of water will be public water supply and tanker water.

Water requirement and source for project is given in following table

Quantity (m3/day) Sr. No. Use 1 Mixing 4.0 2 4.0 Curing 3 0.5 Drinking 4 Other uses 2.0 Total 10.5

Table 2-4 Project based water requirement

2.9.2 Work Shift and Manpower

The work execution will be influenced by the tidal condition. The time available for actual work execution is too low. And hence, work will be carried out in double shift (day /night). The duration per shift is about 8hrs. Manpower required for proper execution of this project is depicted in below table.

Table 2-5 Project based manpower and work-shifts

Sr. No.	Type	Numbers
1	Operator	4
2	Supervisor	2
3	Mechanic	2
4	Electrician	2
5	Mazdoor	20
6	Driver	5
	Total	35

2.10 Solid & Hazardous Waste Generation

The non-degradable waste will be first segregated so as to remove the material that can be recycled. Metal items shall be collected and sold to scrap dealers. Worn out Tyres can be turned into fenders. The plastic materials are to be collected and periodically handed over to authorized scrap dealers. Hazardous waste such as oily rags, empty drums, waste oil shall be disposed to recyclers authorized by Goa Pollution Control Board.

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Chapter 2 - Project Description

2.10.1 Solid Waste Generation

Construction Phase:

Quantity of cement bag: 5000 numbers (Reuse within site during monsoon for protection and runoff of stocked material)

Quantity of excavated material 50 cum (Reuse within site for filling)

Operational Phase:

Paint cans:

10 nos. /annum

Oil Cans:

10 nos. /annum

Organic waste: 19 kg/day

Inorganic waste: 28 kg/day

2.10.2 Hazardous Water Treatment and Disposal

Construction phase

Paint/ Antirust/ CPCC solution containers (category 33.1, schedule I as per HW rules 4th April 2016) etc. - 10 nos. /annum

Operational phase

Used batteries: 24 nos. /annum Used spent Oil:- 5 litres /annum

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Chapter 3 -Description of the Environment

3 DESCRIPTION OF THE ENVIRONMENT

Environmental baseline data of site and surrounding region prior to construction of new jetty and platform at Odar covering land, ambient air, water, noise, biological & socio-economic including marine environment in the study area was collected by undertaking primary surveys through field visits, sampling/ monitoring, laboratory analysis, questionnaire surveys and discussions with fishermen co-operative society. Secondary data was collected from relevant agencies, such as census abstract, Forest Department and Directorate of Census Operations.

The baseline data collected and generated, together with the relevant project activities will be considered for identifying likely impacts of the project on the environment. Subsequently, an appropriate environmental management plan (EMP) will be presented to enable the project proponent to run the project within acceptable level of environmental impact and meet the compliance of the regulatory criteria (MoEF's Guidelines). An Environmental Impact Statement (EIS) will be ultimately made to summarize the post project status of the environment, with the project proponent incorporating the suggested EMP measures.

M/s. Dinar Tarcar Resources (India) Pvt. Ltd. is proposing to construct a new jetty with modernised infrastructure at Odar. Baseline study of the surrounding area was done by keeping in mind the type and scale of upgradation, considering the MoEF Guidelines.

For the purpose of assessing the impacts, study area of 10 km radius from project site was identified for the EIA as per EIA and CRZ Notification. Concerns have also been accounted about possible impact of project on marine ecology.

3.1 Land Environment

3.1.1 Local Setting

Odar has all the infrastructure facilities like good approach road, power, water supply, post office, telephone, medical, educational, banking facilities etc. The nearest railway station is Sanvordem at 2.5 km away from Odar.

The site selected for the project is a well suitable for new jetty and is adjacent to the bank of Zuari river.

Figures on next page shows the project site with 10 km study area and proposed project activities with surrounding locality in Google imagery. Project site and entire 10 km study area is covered in open series map (OSM published by Survey of India) and the same is depicted in figure 2.4.

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Chapter 3 -Description of the Environment

3.1.2 Regional Setting

Quepem Taluka of South Goa district has rural setting but is also known for the Mining activity. The region has good connectivity by road. Climate in surrounding region is of typical coastal nature. Details of climatic conditions and agriculture are mentioned in subsequent paragraphs.

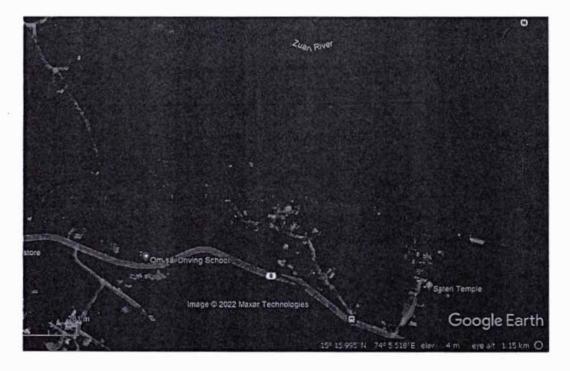


Figure 3.1 Proposed site and vicinity

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Chapter 3 -Description of the Environment

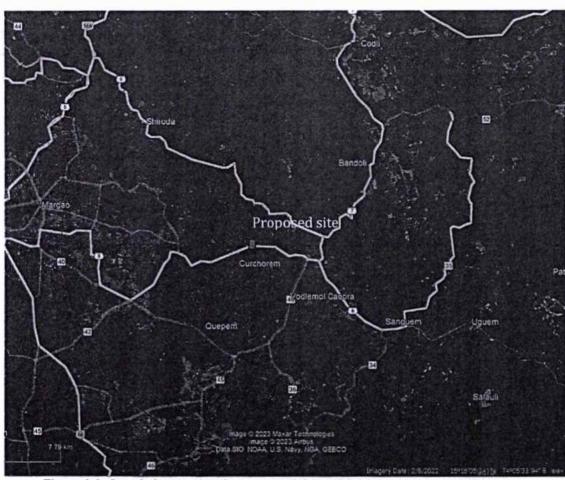


Figure 3.2 Google Image showing connectivity and forest cover around 10 km surrounding the site

Chapter 3 -Description of the Environment

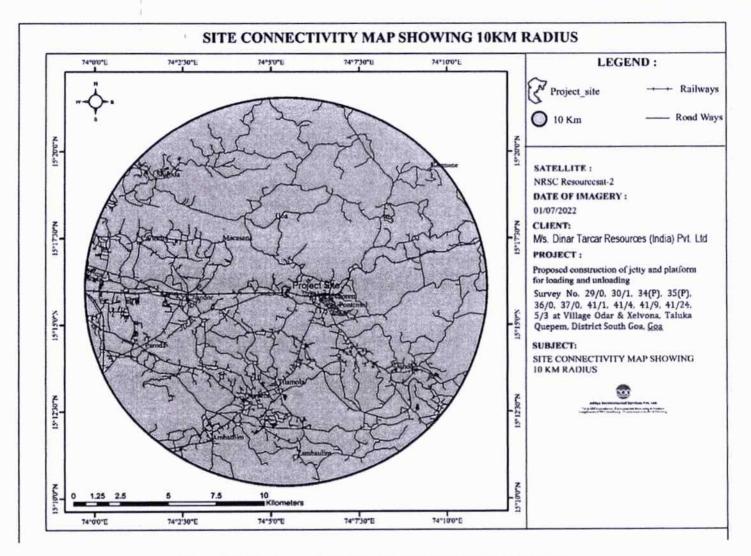


Figure 3.3: Site Connectivity Map within 10 km surrounding the site

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Chapter 3 -Description of the Environment

3.1.3 Land Use Pattern

Proposed upgradation will take place river bank. The land use land cover in study area was assessed through satellite imagery and ground truthing. Available satellite imagery has been interpreted to indicate extent of various land use features.

3.1.3.1 Reconnaissance Survey

The study area shows distinct land use patterns land under coconut, cashew plantation, mangroves, forest, paddy fields; rest other constituted by open/barren areas and number of small Villages spread out evenly and shows a markedly rural environment setting.

3.1.3.2 LULC studies in Study Area

The satellite image procured from National Remote Sensing Centre (NRSC), Hyderabad was in raw format and few pre-processing procedures (georeferencing) were adopted to bring the image to the real-world coordinate system.

An area of 10 km angular distance is generated using ArcGIS 9.3 software from the corner points of the project site. This image is further used to study the land use/ landcover of the project under consideration. Standard image interpretation elements like tone, texture, shape, size, association, shadow and pattern are useful to identify prominent LULC classes. However, a reconnaissance survey visit to the project site is carried out to identify the confusing and doubtful areas. Geographical coordinate of these locations was recorded using a Global Positioning System (GPS).

To achieve planimetric accuracy, the remote sensing scene was rectified with respect to SOI maps on 1:50,000 scales. The Ground Control Points (GCP) in the scene such as railroad intersections, corners of water reservoirs, canals etc. were identified on the image as well as on the reference map. Third order model was constructed and finally registration of image was carried out with nearest neighbourhood resampling taking map as reference and one map registration was achieved.

Table & Figure below shows reference coordinates of project site and LULC map showing study area. % distribution of Land use land cover classes is shown in Figure overleaf.

Table 3-1 Reference Coordinates of Study Area

Study Area (Km²)	Geographical location (centre co-ordinate of study area)			
153.93	Latitude	Longitude		
	15°15'6.09"N	74°05'7.37"E		

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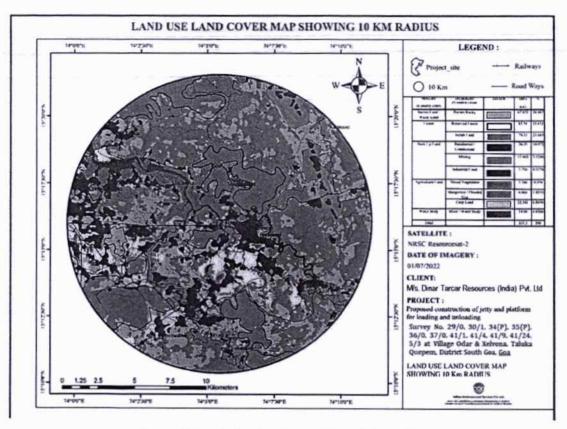


Figure 3.4 Land Use Land Cover Map of Study Area

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Extent of land use land cover pattern in study area is presented in table below and same is depicted in below figure. Out of the total area 153.93Km², the study area comprises of about 35% of water body as the site is located close to seashore. As can be seen from the LULC map, other than water body, most of the study area falls under plantation. It covers about 27.5% and the class mudflat is about 10.5%. Mangrove area is about 0.5%. Built up land is only about 4.1% of the total area under study. Barren land comprises of approximately 6% within the study area.

Table 3-2 Percentage Distribution of LULC Classes within Study Area

Sr. No.	Classification Type	Area (km²)	Percentage
1.	Agriculture Crop Land	22.561	6.8
2.	Plantation	42.27	27.46
3.	Forest	85.58	25.83
4.	Mangroves	6.068	1.83
5.	Barren/ Unculturable /Waste Lands, Scrub Land	67.87	20.48
6.	Built-up	36.35	10.97
7.	Industrial land	1.714	0.51
8.	Water Body	19.98	6.030

3.1.3.3 Solid and Hazardous Waste Generation, Treatment & Disposal

Considering proposed activities, waste generation is mostly of non-hazardous nature and includes metal parts (worn out engine parts), wooden planks, reinforced fibre panels. It is observed during site visit that, there is no designated place or defined disposal mechanism in place, mechanism for disposal of solid waste needs to be established.

3.1.4 Geology and Soil Characteristics

3.1.4.1 Stratigraphy

The stratigraphic succession of rocks in South Goa district is given in Table - 3.3.

3.1.4.2 Distribution of rock types

South Goa district is dominantly covered by the formation of Goa Group belonging to Dharwar Super Group of Archaean to Proterozoic age.

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The Goa Group comprises of metamorphic rocks of green schist facies, andis divided into Barcem, Sanvordem, Bicholim and Vageri formation in the ascending order of superposition. The Goa Group of rocks has been intruded by granite gneiss, feldspathic gneiss, hornblende gneiss and porphyritic granite, followed by basic intrusive.

Table 3-3 Stratigraphy of South Goa District

AGE	GROUP	FORMATION	ROCK TYPE
Quaternary			Beach Sand
Cenozoic			Laterites
Upper Cretaceous to Eocene	Deccan Trap		Basalt
	Clospet		Granite
Lower	Granite		
Proterozoic		Peridotite, Gabbro, Norite	Pyroxenite, Peridotite, Serpentinite, Gabbro
		Vageri Formation	Carbonate-quartz-chlorite schist with Greywacke
			Dolomitic limestone
			Quartz- Sericite schist
			Banded iron formation
		Bicholim Formation	Chert and quartzite
			Quartz-chlorite-biotite schist with
Archaean to	Goa Group		layers of chert, iron oxide, carbonate
Lower			metabasalt and metagabbro
Proterozoic			Greywacke with conglomerate
		Sanvordem Formation	Quartzite
			Quartz-chlorite schist
		Barcem Formation	Meta-acid volcanics
			Metabasalt
			Orthoquartzite
Archaean	Peninsular		Granite Gneiss, Migmatites and
	Gneissic		Granites
	complex		

Source: Ground Water Information Booklet Central Ground Water Board, Ministry of Water Resources

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Metabasalts are also extensively exposed in Canacona and Marmugao Talukasand also as small outcrops in Salcete & Sanguem Talukas. Exposures of greywacke with conglomerate are found to occur in Quepem, Canacona and Sanguem Talukas. Granite gneiss is found to occur in large portion of Salcete taluka and limited exposures are in Quepem, Canacona and Sanguem Talukas. Small outcrops of granite are found to occur in Canacona and Sanguem Talukas.

During the Sub – Recent and Recent times, the rocks have been subjected to lateritisation of varying thickness. Thus, laterite occurs extensively covering almost all the formations in South Goa district.

Coastal alluvium occurs as thin strip along the coastal plains in western part of Salcete taluka. It consists of fine to coarse sands with intercalations of sandy loam, silt and clay.

3.1.4.3 Soil Type

Soils of the district can be classified into 4 types namely (i) Laterite soil (ii) Saline soil (iii) Marshy soil and (iv) Alluvial soil:

- Lateritic soil is the major soil type in the district. It is highly porous & permeable, slightly
 acidic with low pH values, low in organic matter, Calcium and Phosphorus.
- ii. Saline soil in the district occurs in the flood plains of Zuari, Sal, Saleri, Talpona and Galjibagh rivers in Salcete, Marmugao, Quepem and Canacona Talukas. It also occurs to a very limited extent in Sanguem taluka. The soil is deep, poorly drained and less permeable. It is saline, high in pH and contains humus and organic matter.
- iii. Marshy soil occurs to a large extent in Salcete taluka and towards the western part of Canacona taluka. It also occurs in Marmugao taluka. This type of soil occurs in lowlying water logged and tidal affected areas.
- iv. Alluvial soil occurs as very thin strip along the coastline towards western part of Salcete taluka and also a limited exposure occurs in Canacona taluka. It is reddish brown to yellowish, coarse grained and confined to narrow valleys of rivers. It is well drained, acidic with low pH and organic content.

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Table 3-4 Soil Characteristics on site

Sr. No.	Parameter	Re	sult	Unit	Method of analysis	
1.	pН	5	.4	-	IS-2720(part 26)RA2016	
2.	Colour	Bla	ack		IS-2720 Part 4) 1983	
	4	Clay	70	%	IS-2720(part 4)2010	
3.	Particle size	Silt	11	%		
		Fine	19	%		
4.	Texture class	С	ay		IS-2720(part 4)2010	
5,	Electric Conductivity		2.2	µS/cm	IS 14767:2000 RA2016	
6.	Moisture	39	9.6	%	IS-2720(part 2)2010	
7.	Water holding capacity		2	%	IS-14765-2010	
8.	TOC	1.3		%	IS-2720(part 22)2010	
9.	Available Nitrogen	0	.5	%	IS 9497-1980-2015	
10.	Available Potassium	1	1	Kg/hector	IS 9497-1980-2015	
11.	Chlorides	49	9.6	mg/kg	EPA Method 9038:1986	
12.	Sulphates	2	.8	mg/kg	EPA Method 9038:1986	
13.	Calcium	3	6	mg/kg	EPA Method 7000 B. 2:2007	
14.	Magnesium	5	6	mg/kg	EPA Method 7000 B. 2:2007	
15.	Sodium	<0	.04	mg/kg	IS 9497: 1980: 2015	
16.	Iron	<0	.04	mg/kg	EPA Method 3050 B. 2:1996	
17.	Copper	<0	.04	mg/kg	EPA Method 3050 B. 2:1996	
18.	Chromium	<0	.04	mg/kg	EPA Method 3050 B. 2:1996	
19.	Cobalt	<0	.04	mg/kg	EPA Method 3050 B. 2:1996	
20.	Zinc	<0	.04	mg/kg	EPA Method 3050 B. 2:1996	
21.	Lead	<0	.04	mg/kg	EPA Method 3050 B. 2:1996	
22.	Mercury	<0	.04	mg/kg	EPA Method 3050 B. 2:1996	
23.	Nickel	<0	.04	mg/kg	EPA Method 3050 B. 2:1996	
24.	Boron	<0	.04	mg/kg	EPA Method 3050 B. 2:1996	

The test parameters marked with an * are not accredited by NABL (TC-7085)

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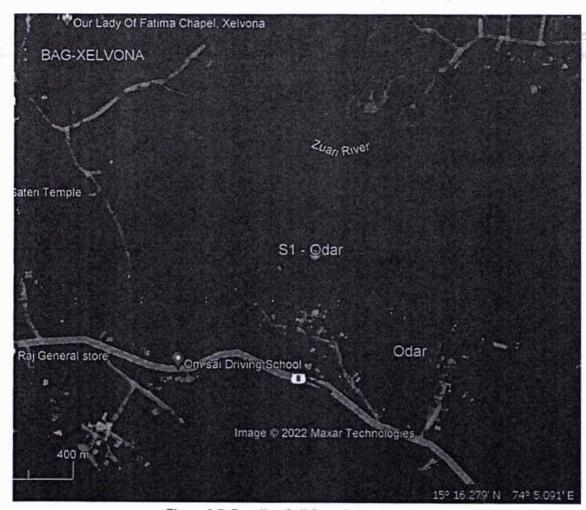


Figure 3.5 Baseline Soil Sample location

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Figure 3.6 Soil Sampling at Odar

As per the results presented in above Table, Soil in Odar Village is neutral, has sufficient humus, phosphorus, average low potash, good concentration of micronutrients, and heavy metals viz. Lead, Chromium and Manganese below detectable limit.

Since the project is in marine environment, it is necessary to study sediment characteristics at proposed site & vicinity to evaluate benthic loss. Accordingly, sediment samples were collected at representative locations and analysed for physico-chemical and biological parameters. Results are discussed in marine water under Macro-benthos section.

3.2 Topography & Meteorology

The study area is open and surrounded by open scrub area. The proposed site is located along south bank of Zuari River which carries the water from nearby areas and drains to Arabian Sea. The slope is towards south to north direction. The highest elevation point of the project site is 17m above MSL.

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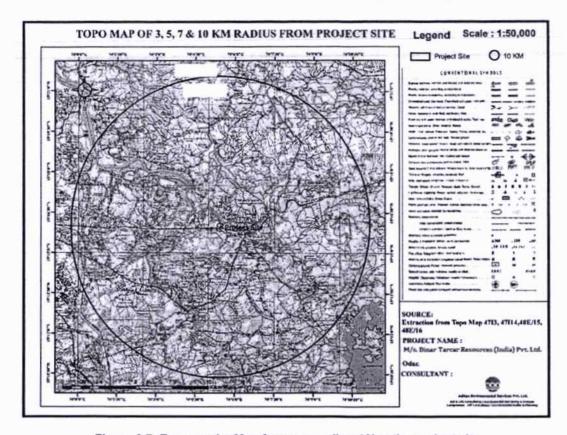


Figure 3.7 Topography Map for surrounding 10km the project site

The meteorology of the region is influenced mainly by the coastal winds.

3.2.1 Wind Profile

Wind profile in study area giving details like wind speed wind direction and magnitude are summarised in wind rose (presented in figure below). In winter season the wind flows predominantly from West direction to East direction flowing the NW and SW direction. Source: iowaStateuniversity website

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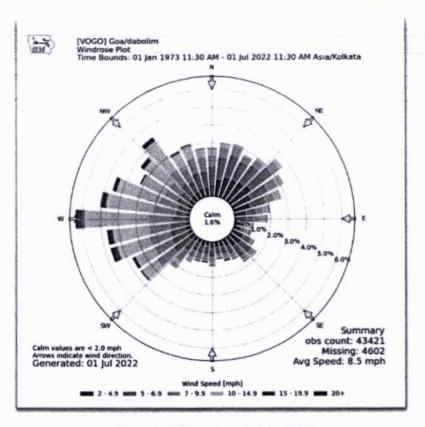


Figure 3.8 Wind Rose in July 2022

3.2.2 Temperature Profile

The State of Goa experiences coastal climate. Due to maritime influence, the diurnal range of temperature during the day is not large. The diurnal range is the least being 40 to 60° C during monsoon season and increases to the maximum of 100 to 200°C during December & January. May is the hottest month where the mean daily temperature increases to 300° C. January is the coolest with mean daily temperature of about 230° C. It is noted that the day temperature is the lowest in monsoon months of July and August and not in the cool winter months of December and January. Temperature is highest (around 330° C) in pre – monsoon months of April & May and again in post monsoon months of November & January.

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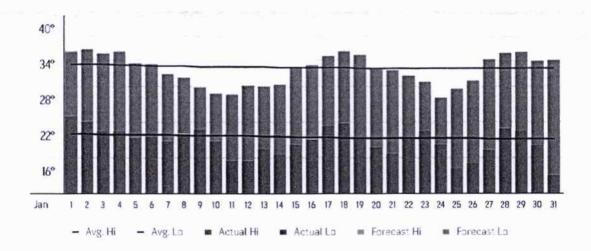


Figure 3.9 Temperature Profile of study area, Winter 2021

(Source: www.accuweather.com)

3.2.3 Rainfall Profile

The study area is located in "Coastal Heavy Rainfall region". It primarily receives the rainfall from Southwest monsoon during the months of June to September each year. Average Annual Rainfall for this area; based on long term annual rainfall observations for last 30 years is found as 2932 mm or 2.93 m with monthly distribution .(Source: IMD Data Panaji)

3.2.4 Humidity

We base the humidity comfort level on the dew point, as it determines whether perspiration will evaporate from the skin, thereby cooling the body. Lower dew points feel drier and higher dew points feel more humid. Unlike temperature, which typically varies significantly between night and day, dew point tends to change more slowly, so while the temperature may drop at night, a muggy day is typically followed by a muggy night. Goa experiences extreme seasonal variation in the perceived humidity.

The muggier period of the year lasts for 9.2 months, from February 16 to November 23, during which time the comfort level is muggy, oppressive, or miserable at least 62% of the time. The month with the most muggy days in Goa is July, with 31.0 days that are muggy or worse. The month with the fewest muggy days in Goa is December, with 16.2 days that are muggy or worse.

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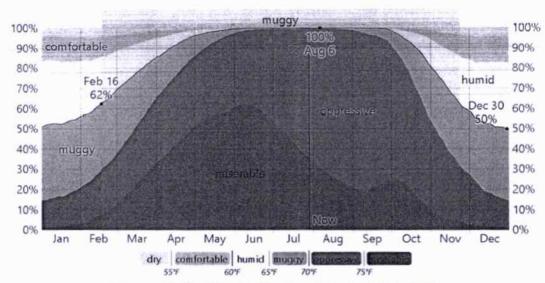


Figure 3.10 Humidity Profile of project site, Winter 2022

3.3 Air Environment

Ambient Air Quality Monitoring should derive from pragmatic basis to determine the impact assessment on air environment, which ultimately helps in formulating a sound Environmental management plan (EMP). The basic considerations for designing such program include:

- Representative selection of sampling locations (primarily guided by nature of project activity that likely to contribute to existing air quality, topography & micrometeorology of the region).
- Adequate sampling frequency.
- Inclusion of all the major pollution parameters.

All these aspects were given due consideration for deciding AAQM location, frequency and parameters for Environmental Impact Assessment (EIA) near project site.

3.3.1 AAQM Locations and Parameters Selected

AAQM, sampling location was selected near site in order to have an idea of baseline air quality at site. Based on study of proposed project activities, baseline air quality was established by monitoring major air pollutants viz PM₁₀, PM_{2.5}, SO₂, NOx & CO for 24 hours during Summer 2022. Ambient air quality monitoring location is shown in figure next.

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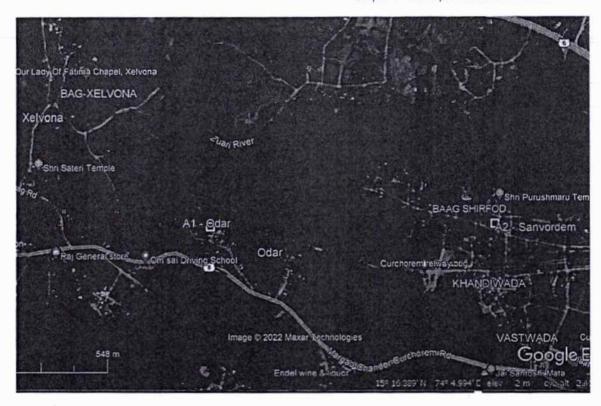


Figure 3.11 AAQM Location Map



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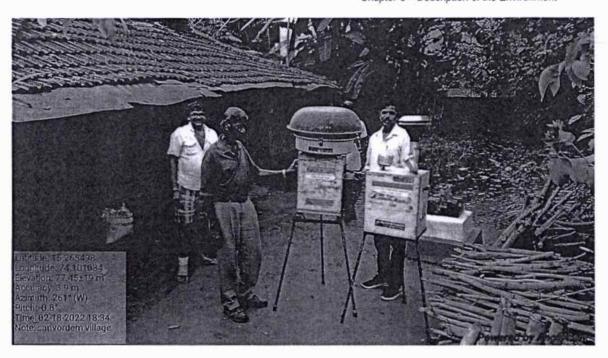


Figure 3.12 AAQM in Odar

3.3.2 AAQM Results

Statistical data at sampling location, standards for relevant parameters and findings are given below:

Concentration of PM_{10} , $PM_{2.5}$ and gaseous pollutants (SO_2 , NO_x & CO) near site are below the CPCB norms. Thus, it can be concluded that ambient air quality near site is not polluted.

Table 3-5 AAQM Monitoring Results (Summer 2022)

Sample	Parameter	PM ₁₀	PM _{2.5}	SO ₂	NOx	CO
Location	Units	(µg/m³)	(µg/m³)	(µg/m³)	(µg/m³)	(mg/m³)
A1	Min	39.6	17.9	8.2	15.8	0.2
	Max	75.8	34.2	12.2	20.6	0.2
	Average	55.0	24.5	10.8	18.8	0.2
	98th Percentile	75.4	34.0	12.1	20.5	0.2
A2	Min	47.9	21.3	8.0	14.5	0.2
	Max	74.5	31.3	9.4	16.2	0.2
	Average	59.6	27.6	8.7	15.2	0.2
	98th Percentile	73.5	31.2	9.4	16.1	0.2

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Table 3-6 Relevant National Ambient Air Quality Standards (CPCB, 2009)

Pollutant	Time		Concentration in A	mbient Air
	weighted average	Industrial, residential, rural & other area	Ecologically Sensitive Area notified by Central Govt	Method of measurement
Sulphur Dioxide (SO ₂), µg/m ³	24 Hours**	80	80	Improved West & Gaeke Ultraviolet fluorescence
Nitrogen Dioxide (NO ₂), µg/m ³	24 Hours**	80	80	- Modified Jacob & Hochheiser (Na- Arsenite) - Chemiluminescence
Carbon monoxide (CO), (mg/m³)	8 hours**	02	02	Non-Dispersive infra-Red (NDIR) spectroscopy
Particulate Matter (PM ₁₀ , µg/m³)	24 Hours**	100	100	- Gravimetric - TOEM - Beta attenuation
Particulate Matter (PM _{2.5} , µg/m ³)	24 Hours**	60	60	- Gravimetric - TOEM - Beta attenuation

^{(**) 24} hourly or 8 hourly or 1 hourly reading to be complied 98% time

3.4 Noise Environment

Sources of noise in study area include miscellaneous noise such as vehicular traffic and railway as Sanvordem Railway station is at 2.5 km, whereas the railway track is passing through plot. The road near to site is less trafficked and heavy vehicle transport is limited.

Figure next shows noise monitoring location & table presents ambient noise monitoring result. The data shows that the noise levels are within limits.

Day time and night time noise levels are close to standard limit though not exceeded. It may be due to traffic movement as the railway station is 2.5 km from site.

Table 3-7 Noise Monitoring Result [Leq (dB [A])] (Summer 2022)

Location	Day Avg.	Norms*	Night Avg.	Norms*
Odar N1	54	CE dD/A)	55	EE AD/A
Odar N2	59	65 dB(A)	55	55 dB(A)

^(*) Standard as prescribed in Schedule II of the Environment Protection Act, 1986

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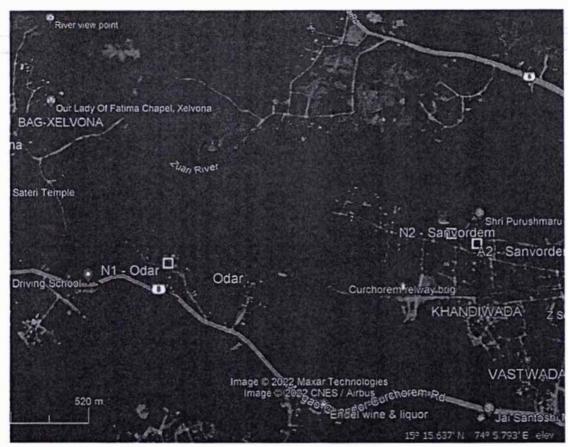


Figure 3.13 Noise Monitoring Location Map

3.5 Water Environment

3.5.1 Reconnaissance Survey

Primary source of drinking water is piped water supply/ well. Agriculture in the area is rain fed.

3.5.2 Sewage Treatment & Disposal

Sewage disposal is done by means of septic tanks followed by soak pit connected to individual toilet blocks in well-to do houses. However open defecation is common in area.

3.5.3 Baseline Water Quality

Selected physico-chemical & biological parameters were analysed to describe baseline status of ground water environment & assess impacts due to proposed project activities.

3.5.3.1 Ground Water

Ground water sample was collected (from open well in Odar) & analysis results are presented in table below. From the analysis results it can be observed that parameters ground water are within permissible limits and is suitable for drinking.

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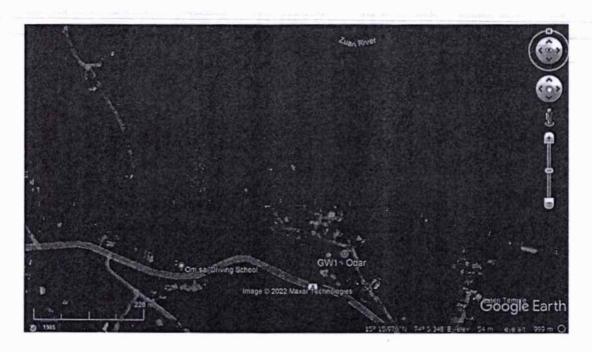


Figure 3.14 Ground water sampling location

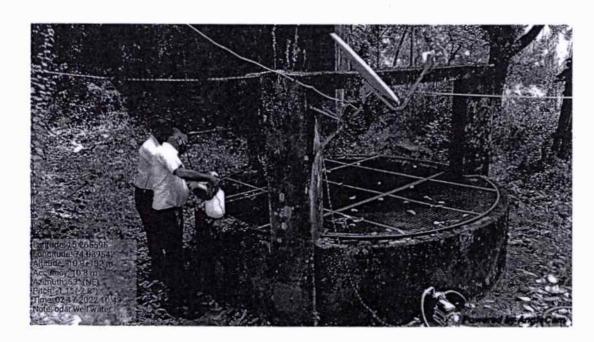


Figure 3.15 Ground Water Sampling near Site

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Table 3-8 Water Analysis Results

Sr.	Parameter	Result	Limits (IS	3 10500:2012)	Method of Analysis		
No.			Desirable	Permissible			
1	Colour, Hazen	<5.0	5 Max	15 Max	IS-3025(P-4) RA2017		
2	pH@ 25°C	7.22	6.5 - 8.5	No Relaxation	IS-3025(P-11) RA2017		
3	Turbidity, NTU	1.5	1 Max	5 Max	IS-3025(P-10) RA2017		
4	TDS, mg/l	50	500 Max	2000 Max	IS-3025(P-16) RA2017		
5	NH ₃ (as N), mg/l	< 0.56	0.5 Max	No Relaxation	IS-3025(P-34) RA2019		
6	Boron, mg/l	0.02	0.5 Max	1.0 Max	IS-3025(P-57) RA2017		
7	Calcium as Ca, mg/l	1.6	75 Max	200 Max	IS-3025(P-40) RA2019		
8	Chlorides, mg/l	14.2	250 Max	1000 Max	IS-3025(P-32) RA2019		
9	Fluoride, mg/l	<0.2	1.0 Max	1.5 Max	IS-3025(P-60) RA2019		
10	Free ResCl ₂ , mg/l	< 0.5	0.2 Min	1.0 Min	IS-3025(P-26) RA2019		
11	Iron, mg/l	0.04	1.0 Max	No Relaxation	IS-3025(P-53) RA2019		
12	Magnesium as Mg,	1.0	30 Max	100 Max	IS-3025(P-46) RA2019		
13	Sulphate, mg/l	<5.0	200 Max	400 Max	IS-3025(P-24) RA2019		
14	Alkalinity, mg/l	14	200 Max	600 Max	IS-3025(P-23) RA2019		
15	Hardness, mg/l	8.0	200 Max	600 Max	IS-3025(P-21) RA2019		
16	Odour	Agreeable	Agreeable	Agreeable	IS-3025(P-5) RA2017		
17	Aluminum, mg/l	<0.01	0.03 Max	0.2 Max	IS-3025(P-55) RA2019		
18	Detergents, mg/l	<0.1	0.2 Max	1.0 Max	APHA-2017(5540-C)		
19	Arsenic, mg/l	< 0.01	0.01 Max	No Relaxation	IS-3025(P-37) RA2019		
20	Barium, mg/l	< 0.01	0.7 Max	No Relaxation	APHA-2017(3111-D)		
21	Copper, mg/l	< 0.01	0.05 Max	1.5 Max	IS-3025(P-42) RA2019		
22	Manganese, mg/l	< 0.01	0.1 Max	0.3 Max	IS-3025(P-59) RA2019		
23	Chromium, mg/l	< 0.01	0.05 Max	No Relaxation	IS-3025(P-52) RA2019		
24	Zinc, mg/l	< 0.01	5 Max	15 Max	IS-3025(P-49) RA2019		
25	Cadmium, mg/l	< 0.01	0.003 Max	No Relaxation	IS-3025(P-41) RA2019		
26	Nitrate, mg/l	<0.5	45 Max	No Relaxation	APHA-2017(4500NO ₃		
27	Phenolic comp, mg/l	< 0.05	0.001Max	0.002Max	IS-3025(P-43) RA2019		
28	Selenium, mg/l	<0.01	0.01 Max	No Relaxation	IS-3025(P-56) RA2019		
29	Sulphide, mg/l	<0.5	0.05 Max	No Relaxation	IS-3025(P-29) RA2019		
30	Lead, mg/l	< 0.01	0.01 Max	No Relaxation	IS-3025(P-47) RA2019		
31	Mercury, mg/l	< 0.05	0.001 Max	No Relaxation	IS-3025(P-48) RA2019		
32	Molybdenum, mg/l	< 0.01	0.07 Max	No Relaxation	APHA-2017(3111-D)		
33	Nickel, mg/l	< 0.01	0.02 Max	No Relaxation	IS-3025(P-54) RA2019		
34	Chloramines, mg/l	<2.0	4.0 Max	No Relaxation	APHA-2017(4500CL-G		
35	Mineral oil, mg/l	<0.5	0.5 Max	No Relaxation	IS-3025(P-39) RA2019		
36	Silver, mg/l	<0.1	0.1 Max	No Relaxation	APHA-2017(3111-B)		
37	Cyanide, mg/l	<0.05	0.05 Max	No Relaxation	IS-3025(P-27) RA2019		

3.5.4 Water Use

Total water requirement during construction phase is 10.5 KLD, out of which for drinking purpose is 0.5 KLD from Govt.. supply/ tanker and for the construction activity is 10.0 KLD from tanker.

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Total water requirement during operation phase is 10.5 KLD, out of which for drinking purpose is 0.5 KLD from Govt.. supply/ tanker and for commercial purpose is 10.0 KLD from tanker.

3.6 Biological Environment

3.6.1 Bio-geographical Setting of State and North Goa District

Goa is the smallest of all the States in the country yet it shows an astonishing diversity of endemic species, habitats and ecosystems. From the marine biome of the Arabian Sea to the terrestrial forest biome of the Western Ghats, it is endowed with wide range of ecosystems and habitats e.g. ranging from rich natural resources such as forests to scrubby tract and dense forest, Ghats, alluvial plains, coasts, navigable rivers, estuaries, mangroves, wetlands etc. serving as ideal ground for nesting and breeding of birds.

The eco-physiology of the habitats is governed by complex ecological and meteorological conditions having varying range of habitats (extreme habitats such as rock pools and the salt pans) and microhabitats (e.g. the termite mounds).

The status of biodiversity in each of these habitats varies, depending on a variety of genetic and environmental factors and also as it is exploited for its valuable mineral ore deposits like iron and manganese, fertile agricultural land, abundant rainfall, considerable marine and inland fishing potential, beautiful coastline and an important natural harbour.

Goa has three distinct geographical regions viz. coastal plains, along western boundary, midland plateau and the hill ranges of Sahyadri, part of Western Ghats, situated along eastern boundary. Midland plateau region is the transient region between the coastal plain land agricultural belt to the west and the hilly region undulating towards to the east with most of the iron ore mines located on the hill slopes in this region.

North Goa & South Goa are the two districts of Goa State, as name indicates situated in northern & southern part of State, respectively.

Further with respect to bio-geographical zone classification of India, eastern belt of State (hilly region along the border) falls under 'Western Ghats' and provides major catchment area and gives origin to prominent rivers.

Seven protected areas in Goa are situated in these hill ranges as seen from the adjoining map.

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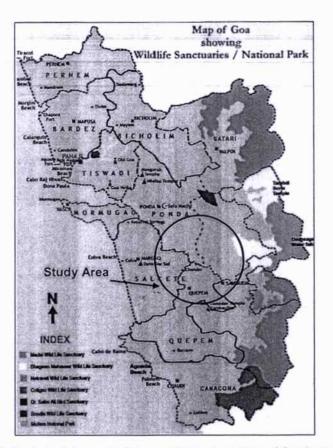


Figure 3.16 Protected Areas in Goa and Appx. Location of Study Area (Red Circle)

Goa has a very large forest cover- according to 'India State of Forest Report, 2021', Forest Survey of India; forest cover in North Goa district is about 53.90% of geographical area, while for South Goa its 66.56%. District wise Area (km²) distribution of forest cover is presented below:

Table 3-9 District wise forest cover (Km2), 2021

District		% of GA	Change*	Scrub				
		Very Dense Forest	Moderately Dense Forest	Open Forest	Total			
North Goa	1,736	127.00	229.77	578.95	935.72	53.90	2.81	0
South Goa	1,966	410.53	346.72	551.24	1,308.49	66.56	3.91	0
Total	3,702	537.53	576.49	1,130.19	2,244.21	60.62	6.72	0

Source: India State of Forest Report, 2021', Forest Survey of India

^{*}Change figures are based on comparison of 2021 assessment with that of 2019.

^{**}GA: Geographical Area

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While area under mangrove cover at South Goa is 4 km² (Moderately Dense) & 1 km² (Open) out of total 22 km² area in Goa State. Goa's only bird sanctuary, Dr. Salim Ali Bird Sanctuary, situated at Chorao in the plains in North Goa District.

According to Champion and Seth 1968, forests in Goa are classified in five types, viz. Tropical Wet Evergreen, Tropical Semi Evergreen, Tropical Moist Deciduous, Littoral & Swamp and Tropical Dry Deciduous. Percentage area distribution of these forest types in Goa are shown next.

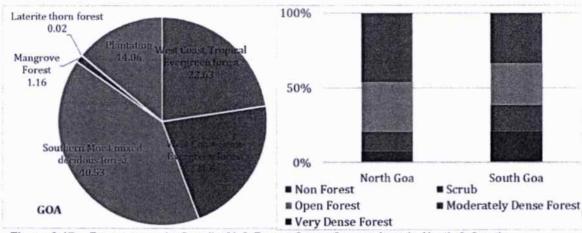


Figure 3.17: Forest types in Goa (Left) & Forest Cover Comparison in North & South Goa District, (India State of Forest Report, 2021, Forest Survey of India)

The above comparison of forest types evidently shows that percentage of Very dense & moderately dense forests is more in South Goa, while percentage of Non Forest & Open Forests is more in North Goa.

The Project Site falls in midland region of South Goa along the bank of Zuari River, while the study area encompasses of Salcete, Quepem, Sanguem talukas of South Goa & Ponda of North Goa.

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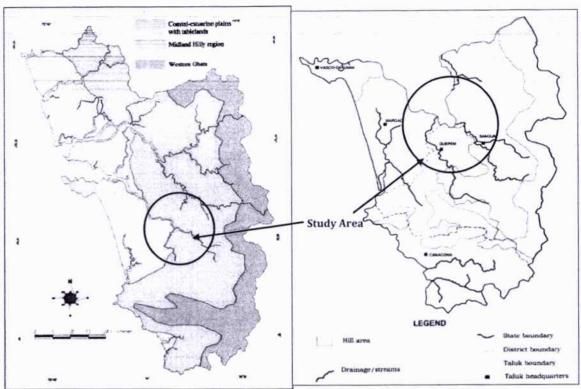


Figure 3.18 Goa State bio-geographical zone map & Study Area marked in South Goa District

3.6.2 Baseline Studies of Study Area

Ecology & Biodiversity study pertaining to Environmental Impact Assessment Report based on studies was carried out within and 10 km around of project site in Winter 2022.

Study area under consideration encompasses Salcete, Quepem, Sanguem talukas of South Goa & Ponda of North Goa (Fig 3.15 above).

The topographic view of study area shows that it is divided by Zuari river, with maximum hillocks forming undulating terrain with a maximum altitude of 374 m and having reserved forests in North to East portion of study area. Even the Bondla WLS is to north and Mollem National Park & Bhagwan Mahavir WLS is to east from proposed site.

Further toposheet study shows several distinct land features in the study area such as cultivated fields which are generally barren in Summer, orchards under 'Jungle', swamps with stunted mangroves or without significant vegetation, rivers, canal, lakes, luxuriant mangroves, islands (with one or more landscape elements within them), coconut groves, mining areas, hillocks covered with vegetation (with various recognisable elements such as hard lateritic barren areas, scrub vegetation, mixed forests, cashew plantations, etc),

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settlements and mines and almost negligible salt pans, mud flats & Kazhan lands (reclaimed areas for paddy cultivation).

Some of the minor lakes with aquatic flora & avifauna diversity were noted.

Primary Study was carried out by visiting locations at dusk, Day and dawn, taking care that all such habitats were covered. Listing of flora and fauna was done based on actual locals. indirect sighting. interviewing evidences, Literature survey of published research works & official sites is done through internet for gathering of secondary information. To ensure maximum coverage of study area, faunal species were noted even 1.5 to 2 Km beyond study area. Occurrences of Flora & faunal species in study area are presented in Annexure III.

Field visits, reveals similar observations as that of secondary, i.e., presence of minor cultivated plains, mangroves swamps with intermittent human habitation and major RF's open scrub, dense/deciduous (mixed, Cashew & bamboo), forming prevailing forest type in the region & with Each habitat having its own attributes which support typical composition of flora and fauna within them of the relevant kinds of habitats, and have been described as follows.

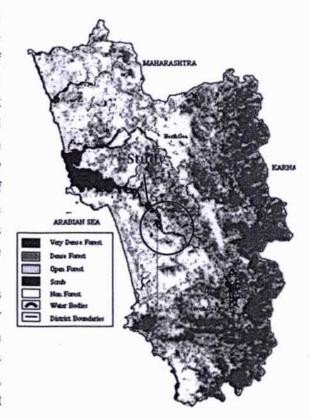


Figure 3.19 Forest Cover of Goa (India State of Forest Report, 2021', Forest Survey of India)

The major types of habitats in the study area are discussed here below:

3.6.2.1 Vegetation

The landscape elements based on vegetation type is very difficult to classify due to various reasons. The important reasons are: 1) the landscape is heterogeneous showing continuous variability in its physiognomy, 2) the natural vegetation, except in mangroves and in Protected areas, rest is found to be absent, 3) cashew was commonly seen in vegetated areas, 4) the proportion of cashew or any other cultivated plant (teak, bamboo, pineapple, coconut etc.) in these forest areas are also uneven and 5) degradation of vegetation with

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mixed plantations.

However, the vegetation can be generally classified into five types. They are: a) Mangroves, b) Open Scrub, c) Dense Mixed forests (of moist deciduous type), 4) Vegetation around and within settlements and 5) Plantations.

Further it is also observed that due to lack of irrigation facilities within the study area only major kharif crop is cultivated by the local farmers in the months of June to September and after harvesting rice crop in October very few farmers continue farming with the help of limited sources of ground water available. Hence, the land remains fallow for rest of the year. However, some farmers grow pulses and other food grains that correspond to tiny % of, the total land use. It is noteworthy to mention that Mango, Coconut, Jackfruit, Areca nut as well as Banana plantations are seen in plentiful throughout the study area.

The vegetation near Human habitation observed is either planted or absent due to heavy civilization & cultivation.



Figure 3.20 Biological richness in the study area (Source: bis.iirs.gov.in/maps)

Above map shows the biological richness in the study area, that majority of study area is seen of Low biological richness with noteworthy patches of in North, South, South west i.e., has high biological richness, dense mixed forest patterns.

A. Mangroves:

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Mangroves in study area are distributed along the Zuari in patches/fringes of various size & shapes throughout along the water course of the study area and has diversity with respect to their composition and physiognomy. Generally, as observed mangroves were stunted on mud flats and mostly composed of Avicennia officinalis, A. marina, Bruguiera cylindrica, Kandelia candel, Rhizophora mucronate, Sonneratia caseolaris and Acanthus ilicifolius and at times Sonneratia species. Presence of mangroves along the riverbank in a thin fringe is a common sight in the study area.

Out of these six species of major mangroves found, A. officinalis is the most widely populated followed by *Rhizophora mucronata*. The species such as *B. cylindrica*, *Kandelia candel* and *S. caseolaris* are sparsely populated.

The minor mangroves distributed in the study area are Acanthus ilicifolius, Excoecaria agallocha & Porteresia coarctata. Among the minor mangroves A. ilicifolius & E. agallocha are moderately populated.

The mangrove associates are Acrostichum aureum, Clerodendrum inerme, Derris trifoliata, Ipomoea violacea, Porteresia coarctata, Sesuvium portulacastrum & Salvadora persica is found occasionally growing amidst Avicennia spp.

Phyto-sociological study in this habitat was carried out to know Species composition of trees, shrubs, herbs and climbers at each location which are presented below.

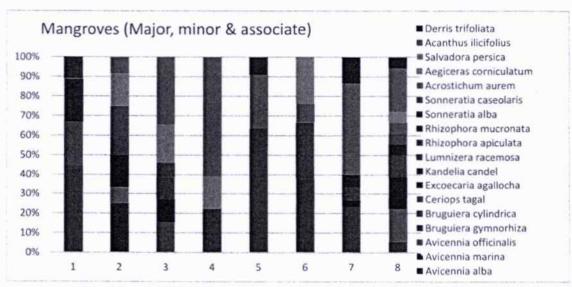


Figure 3.21 Graph showing floral composition in mangrove habitat in study area

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The composition is found to be dominated by tree sp where Avicennia Sp forming the major flora.



Figure 3.22: Inflorescence of Bruguiera gymnorhiza & Kandelia kandel & Aegiceras corniculatum (respectively) captured during survey.

The Proposed Site, waterfront has no prominent presence of mangroves as observed.

B. Open Scrub

The scrub vegetation is usually seen in the areas where generally hard lateritic rocks were seen. These lateritic plateaus barely support deep root system required for big tree species. Locally such areas are called as 'Maal' or 'Sada'. Variation is seen even within these scrubs depending upon the extent of lateritic rocks and soil. Open Scrub vegetation is uncommon, while dense mixed vegetation is predominant in study area.

The important plants of scrub vegetation noted are: Holarrhena pubsecens, Grewia nervosa, Memecyon umbellatum, Ziziphus rugosa, Capparis zeylanica, Ziziphus oenoplia, Carissa congesta, Acacia catechu, Mimosa intsia, Acacia pennata. These thick scrubs are difficult to penetrate. While at in some of these scrub vegetation occasional tree elements are also seen such as Ziziphus mauritiana, Strychnos nuxvomica, Lannea coromandelica, Caryota urens, Bombax ceiba, Zanthoxylum rhetsa, Sterculia urens, Carallia brachiata etc. Cashew is commonly grown on such lands and hence it is hard to see natural thick scrub vegetation. If the hard laterite forms the substrate of these scrubs than Cashew plantations are not common. It is observed that most of these scrubs have been degraded due to various reasons that include Cashew cultivation, mining, industry, fire wood etc.

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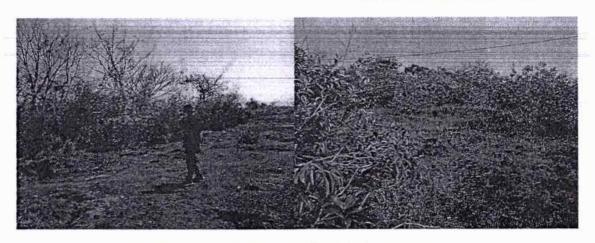


Figure 3.23 Typical open scrub land during survey

Phyto-sociological study in this habitat was carried out (figure above during open scrub land visit) to know Species composition of trees, shrubs, herbs and climbers at each location which are presented below.

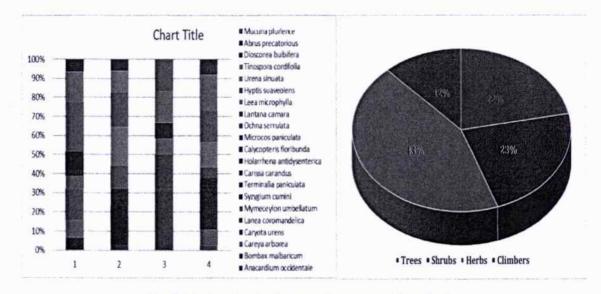


Fig. 3.24: Graph showing species composition & Pie-chart showing overall composition in open scrub land within study area

Floral composition found to be dominated by shrubs followed by herbs and trees (Fig. 3.9, pie-chart). This is typical composition in open scrub land, where tree species are often occasionally found & for number of instance Cashew plantation has overtaken the natural scrub covers.

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C. Mixed forests:

Mixed type of vegetation is seen along the hill slopes throughout and on hillocks especially in North, North-east & east in study area and have been protected under Reserve Forest Category, while some are notified as protected forests, Wild life sanctuary and national parks. Hence, invariably these patches have been away from human interference. Heterogeneity is very high in this type of forest in the study area due to different degrees of biotic interference and variations in the habitat.



Figure 3.25 Typical mixed forest during survey

This type is moist deciduous forest type and in toposheet this is mentioned as open mixed jungle or dense mixed jungle which forms dominant vegetation type in study area.

Our field studies show that compared to north Goa, there is still presence of natural vegetation left in south goa, though there has been degradation to various degrees. Only common thing is the presence of Cashew in every patch though the proportion varies. In these patches, though tall and mature trees are present there are no young trees or saplings, i.e. in the event of a mature tree dying there are no young plants to fill the gap. However, these forests appear dense.

Phyto-sociological study in this habitat was carried out to know Species composition of trees, shrubs, herbs and climbers at each location which are presented below. Floral composition is found to be dominated by trees followed.

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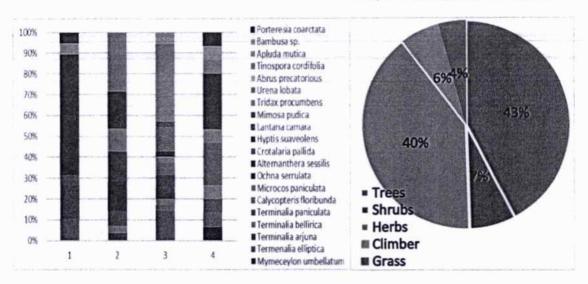


Fig. 3.26: Graph showing species composition & overall composition (pie-chart) in dense mixed forest within study area

Floral composition found to be dominated by trees equivalently by herbs followed by shrubs and grasses.

The common natural vegetation observed were Bombax malbaricum, Lanea coromandelica, Erythrina indica, Terminalia sp & Mymeceylon umbellatum in tree species; Calycopteris floribunda in shrub sps.

D. Plantation

The pure plantations of coconut, arecanuts, cashew, mango, teak, acacia etc. are seen only in small patches. Otherwise, the plantations are part of the forests or scrub jungles depending upon the type. Pure Coconut plantations are seen especially along the river banks in form of Coconut grooves in interior areas. In the valleys between hillocks it is basically Arecanut and Coconut plantations (Kulagar). However, Cashew remains the most dominant crop throughout study region. It occupies right from lateritic rocky hillocks to well vegetated hill slopes almost giving appearance of pure plantation though it mixes with the scrub vegetation of the rocky areas.

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Fig. 3.27: Coconut/ Supari & Banana plantation in study area

In this region organized plantations such as that of Alphonso Mango & Cashew and related Farm Based Processing Units have guaranteed local labourers round the year employment ultimately changing the face of livelihood. In fact, the sector starves from farm labour shortage. These Orchards are managed with fences and compounds running on solar energy, irrigation and use of organic material such as vermi-compost and other compost to maintain soil fertility. The perishable Cashew apple which is major part of Cashew Produce is used to extract Alcohol "Fenny", doesn't go waste like in Maharashtra.

Other cultivated crops are Coconut, Kokum, Areca nut and Jackfruit.

Phyto-sociological study in this habitat was carried out to know Species composition of trees, shrubs, herbs and climbers at each location which are presented below. Floral composition is found to be dominated by trees followed.

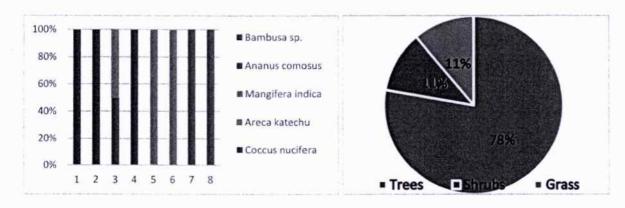


Figure 3.28 Graph showing species composition & overall composition (pie-chart) in plantations within study area

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3.6.2.2 Agricultural Fields

Agricultural fields were observed within human settlement in plains. The staple produce of Goa is Rice (Oriza Sativa) hence seen as major crop followed by coconut trees (Cocoa Nucifera) which accounts for variety of uses and paddy is seen growing abundantly with coconut groves all along the coastal stretch of the State, at many places often interspersed with horticultural plantations. Besides this, millets and other cereal, pluses are also taken after rice. Agriculture once upon was supplemented by plantation of cash crops like spices, coconut, areca, mango and cashew along with livestock, but now has replaced and taken as main occupation and once widely cultivated paddy fields now lay as open uncultivated lands.

Typically known local vegetables like Navalcol, tambadi bhaji, Chitki, Mirsaang etc were observed widely being cultivated in small quantity in Summer (Fig. 3.29).



Figure 3.29 Paddy & Vegetable cultivation within study area

Phyto-sociological study reveals shrubs are dominated followed by herbs & trees (Fig. 3.30 below). This is mainly because of dry season (no standing crop/fields were prepared for cultivation). Species composition of trees & shrubs are presented below.

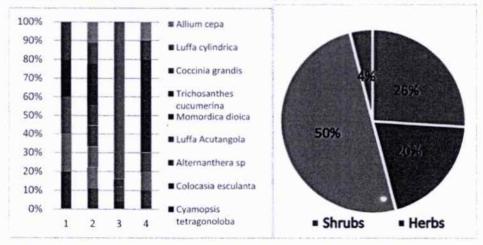


Figure 3.30 Graph showing tree species composition & overall floral composition (pie-chart) in agriculture fields

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3.6.2.3 Human Settlements

The settlements are primarily dependent on Tourism related activities & occupied by agricultural/horticultural & allied activities. The settlements appear green due to abundant avenue tree growth and paddy fields around settlements. Flora within and in ambience of settlement found to be grown from aesthetic, economic or from human benefit point of view. Faunal life observed associated accordingly. This also includes domesticated fauna. Settlement is highly dependent on biodiversity of this area like agriculture & horticulture from cashew fruits, fishing & aquacultures etc. As some settlements are linear along the foothills the vegetation of these settlements almost merge with the vegetation from the hillocks. However, Coconut is the dominant plant especially in the settlements close to riverine or estuarine belts.

On the North eastern part of the study area, mining industry was observed to be dominating. The rocky plateaus and slopes are with sparse scrub vegetation or cashew plantations, though extensive barren rocky outcrops are also very common.

Floral composition is found to be dominated by grass & herbs followed by trees. This may be due to plantation of species intentionally for the purpose of beautification, shade, protection from stray/grazing animals and for food value (e.g. public garden, green belt in additional MIDC). Similarly, faunal species of interest such as cattle, domestic animals/ birds were inhabited. Non-indigenous species plantation has cause interference to local/indigenous biodiversity.

3.6.2.4 Water body

The study area has Zuari - one of major & best waterway of Goa as major form of waterbodies along with complex network of the tidal flows, wetland swamps.

Table 3-10 Details of river basins in Goa

Sr. No.	Name of the Length within River Basin the State (km)		Length within the salinity Zone (km)	Basin area (km²)	Average runoff (MCM)	
1	Terekhol	26	26	71	164.25	
2	Chapora	32	32	255	588.35	
3	Baga	10	10	50	116.42	
4	Mandovi	52	36	1580	3580.04	
5	Zuari	145	42	973	2247.4	
6	Sal	40	14	301	694.39	
7	Saleri	11	5	149	343.04	
8	Talpona	32	7	233	515.59	
9	Galgibag	14	4	90	187.11	
	TOTAL	362	176	3702	8436.59	

Source: Master Plan for Madei / Mandovi River Basin A Report by The Panel of Experts, Vol. I, Vol. II

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Besides ground water as discussed in respective section, estuarine water (Zuari River) at 5 locations up/ downstream were analysed to understand estuarine water quality and is presented below here.

Zuari River - Marine Studies

The project site being located on bank of Zuari River - one of best waterway of Goa, mangrove swamps, the marine water quality has been assessed for standard parameters for physico-chemical and biological characteristics and are as presented below.



Fig. 3.31 Marine sampling location in Zuari, and site marked on Google imagery

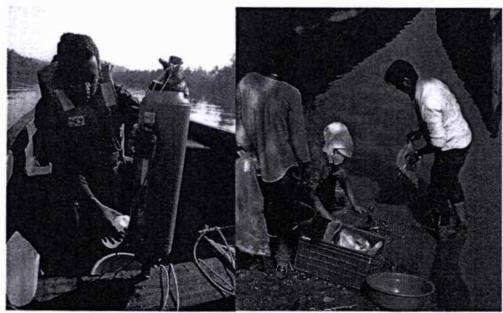


Fig. 3.32 Field sampling in Zuari, near site

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.Table 3-11 Sampling location

Station No.	Location	Lat. & Long.		
Z1	Zuari river bank,	15.265863° & 74.112564°		
Z2	Sanvordem	15.266560° & 74.102843°		
Z3	Zuari river bank, Odar	15.268214° & 74.091715°		
Z4	7	15.273427° & 74.087211°		
Z5	Zuari river bank, Xelvona	15.275806° & 74.078723°		

A. Physico-chem

Water quality results show healthy water quality as it is well aerated as seen from rather high DO values (> 5 mg/l) and is low in salinity/ TDS (~ 1 ppt). The results are as follows.

Table 3-12 Estuarine water quality report

Loc	ation	Z1		Z	Z2 Z3		3	3 Z		Z	5
		S	В	S	В	S	В	S	В	S	В
T	°C	27.0	27.0	27.0	27.0	27.0	27.0	27.5	27.5	27.5	27.5
p	Н	6.74	6.73	6.79	6.75	6.72	6.69	6.68	6.65	6.72	6.68
DO,	, mg/l	6.4	6.9	6.2	7	5.9	6.4	6	5.9	5.9	6.2
BOD), mg/l	1.6	1.9	1.6	1.8	1.6	1.9	1.8	1	1.9	1.3
Salin	ity, ppt	0.22	0.24	0.42	0.46	0.67	0.9	1.26	1.41	1.65	2.07
TSS	, mg/l	7.8	6.8	9	9.8	6.8	8.6	13	13.6	12.8	17
TDS	, mg/l	1040	1088	1788	1960	2650	2988	4222	4818	5510	6908
P04-P	(µmol/l)	0.29	0.37	0.44	0.38	0.08	0.10	0.19	0.14	0.00	0.01
NO2-N	(µmol/l)	3.05	3.28	2.63	2.52	2.92	2.78	3.42	3.03	2.24	2.12
NO3-N	(µmol/l)	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
NH4-N	(µmol/l)	0.77	0.54	0.70	0.39	0.87	0.61	0.94	0.45	0.77	0.29
Fe,	mg/l	0.31	0.33	0.42	0.6	0.27	0.3	0.32	0.34	0.5	0.64
Zinc,	(mg/l)	0.16	0.28	0.12	0.24	0.14	0.21	0.21	0.28	0.11	0.24
Cd,	(mg/l)	0.08	0.02	0.1	0.06	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Pb,	(mg/l)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cr,	(mg/l	<0.01	<0.01	0.03	0.04	0.08	0.12	0.11	0.06	0.04	0.08
PHC	(µg/l)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pheno	ol (µg/l)	82.56	118.56	203.76	122.64	95.76	54.48	3.12	125.52	84.24	194.4

Table 3-13 Sediment Report

Sediment Analysis	Z1	Z2	Z3	Z4	Z5
Iron as Fe, mg/kg	0.12	0.18	0.08	0.06	0.14
Manganese as Mn, mg/kg	<0.04	<0.04	<0.04	<0.04	<0.04
Zinc as Zn, mg/kg	0.18	0.24	0.28	0.12	0.16
Nickel as Ni, mg/kg	0.12	0.18	0.16	0.14	0.12
Cadmium as Cd, meq/l	<0.04	<0.04	<0.04	<0.04	<0.04
Chromium as Cr, mg/kg	0.18	0.16	0.18	0.14	0.12
Lead as Pb, mg/kg	0.06	0.08	0.12	0.08	0.06

B. Phytoplankton

Table 3-14 Primary water quality parameters

Parameter	Z	1	2	Z2		.3		Z4	Z5	
Parameter	S	В	S	В	S	В	S	В	S	В
Chlorophyll (mg/m³)	3.74	0.53	7.48	4.81	3.21	3.74	5.35	4.81	7.48	3.74
Pheophytin (mg/m³)	0.75	6.15	2.25	0.80	1.28	1.87	1.02	0.43	0.37	0.75
Population (no x 10 ³ /L)	32	12.8	19.2	7.2	13.6	8	8	6.4	21.6	8.8
Total Genera (No)	11	8	10	6	8	10	8	8	10	10
	Leptocylindr	Thalassios	Nitzschia	Nitzschia	Nitzschia	Thalassi	Thalassios	Coscinodis	Scenedes	Planktoniell
	us	ira	(41.7%)	(33.1%)	(41.2%)	osira	ira	cus	mus	а
	(55.0%)	(25.0%)	Navicula	Navicula	Navicula	(10%)	(20%)	(12.5%)	(44.4%)	(18.2%)
	Nitzschia	Closterium	(12.5%)	(11.1%)	(17.6%)	Navicula	Nitzschia	Nitzschia	Thalassio	Cyclotella
Major	(20%)	(18.8%)	Thalassiosi	Thalassios	Thalassios	(10%)	(20%)	(12.5%)	sira	(9.1%)
Genera	Navicula	Navicula	ra	ira	ira	Pleurosig	Navicula	Thalassios	(22.2%)	Navicula
	(7.5%)	(6.3%)	(12.5%)	(11.1%)	(11.8%)	ma	(10%)	ira	Nitzschia	(9.1%)
	Pleurosigma	Nitzschia	Pleurosigm	Pleurosig	Pleurosig	(10%)	Pleurosig	(12.5%)	(7.4%)	Noctiluca
	(2.5%)	(6.3%)	а	ma	ma	Nitzschia	ma	Navicula	Cyclotella	(9.1%)
			(8.3%)	(11.1 %)	(5.9%)	(10%)	(10%)	(12.5%)	(3.7%)	
Diversity Index	1.49	1.87	1.89	1.68	1.76	2.3	2.03	2.08	1.74	2.27

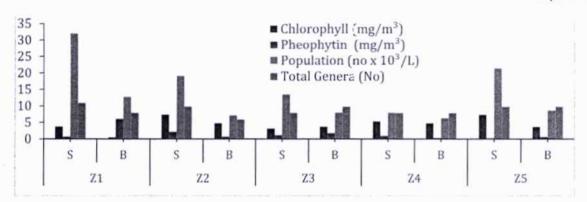


Fig. 3.33 Graph presenting phytoplankton standing stock

The primary stock studies showed average population & diversity, with steady trend across the Zuari study length. The only difference across the river channel was in the generic diversity, i.e. Z1, upstream location showed major composition of *Closterium* which are profoundly present in freshwater habitat while rest all had genera from brackish water habitat, majorly *Nitzschia Thalassiosira Navicula & Pleurosigma*.

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C. Zooplankton

Table 3-15 Zooplankton standing stock

Zooplankton	Z1	Z2	Z3	Z4	Z 5
Population (no x 10 ³ /100m ³)	0.12	0.06	1.71	5.42	14.09
Total Group (No)	3	3	2	6	7
Major Groups	Decapoda (52.43%) Copepoda	Copepoda (83.33%) Decapoda	Copepoda (89.14%) Decapoda	Copepoda (83.29%) Decapoda	Copepoda (94.92%) Decapoda
	(46.60%)	(15.15%)	(10.86%)	(14.83%)	(4.95%)
Biomass (ml/100m³)	0.1	0.1	0.4	0.6	0.8
Diversity Index	0.74	0.5	0.34	0.51	0.21

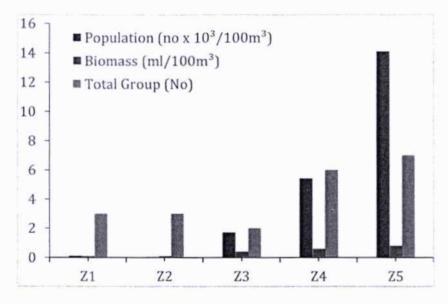


Figure 3.34 Graph presenting Zooplankton standing stock

The Zooplankton biomass remained more or less low at all locations, except that the population and no of groups kept rising as we moved from upstream (Z1) to downstream (Z5) locations gradually.

D. Macro-benthos

Table 3-16 Macrobenthos report

Macrobenthos	Z1	Z2	Z3	Z4	Z5
Population (no /m²)	17	139	52	35	17
Total Group (No)	1	2	1	1	1
Biomass (gm/m²)	0.09	0.38	0.24	0.36	0.06
Diversity Index	0	0.38	0	0	0
Major Groups	Amphipod (100%)	Polychaetae (87.50%) Amphipod (12.50%)	Polychaetae (100%)	Polychaetae (100%)	Amphipod (100%)

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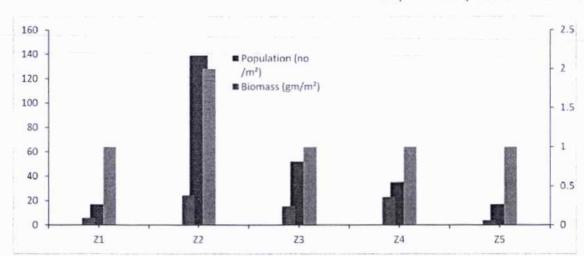


Fig. 3.35 Graph presenting Benthic standing stock

Overall, the macro-benthos diversity, biomass & population remained poor at all locations.

Benthic loss evaluated from direct & indirect impacts is of @0.23 gm/m² as calculated from aggregating the number of observations from Subtidal benthic stations affected by project activity.

Conclusions:

The water quality seems to be as expected with low salinity and low diversified w.r.t. biological parameters. The overall standing stock is at average while the diversity remains much lower. This may be due the dynamic change w.r.t. salinity & temporal gradients in the water column.

3.6.2.5 Khazans, inundations, lakes

The study area has few *khazans* & few inundations, which basically are saline lowland floodplains along tidal estuaries, and have been reclaimed over centuries by constructing an intricate system of bunds (dykes) and sluice gates.

The tidal inflow and outflow (flushing) of waters in these unique agro ecosystems is maintained by strategically located sluice gates made up of wooden doors along the contours which primarily protects the adjoining fields from inundation and control the water flow in and out of the rivulets in most of the khazan lands. The sluice gates help to flush out during the monsoon that enables to harvest the Kharif crop during monsoon in certain areas.

Khazan lands are ecologically, economically and socially very important for both agriculture and pisciculture. The local farming community traditionally practices rice cultivation by growing salt–tolerant species during monsoon in conjunction with shrimp aquaculture during off seasons. The

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mangrove vegetation near the external or internal bunds provides the most important natural anti-erosive barrier.

INUNDATION: Khazan land gets inundated mainly due to breaching of bunds, caused of barge activities as well as purposeful breaching by local people for pisciculture. These have resulted in flooding of such areas leading to various adverse effects:

- > Loss of Agricultural crops
- Destruction of Saltpans
- Destruction of coconut grooves
- Increase in soil salinity, thereby affecting its fertility
- > Saline water intrusion in groundwater resources
- Air corrosion

Few Lakes in study area have typical existence, basically they are formed from inundations or minor estuarine inlet. Example of such lakes in study area are Curtorim, Comminidade and Macazona.

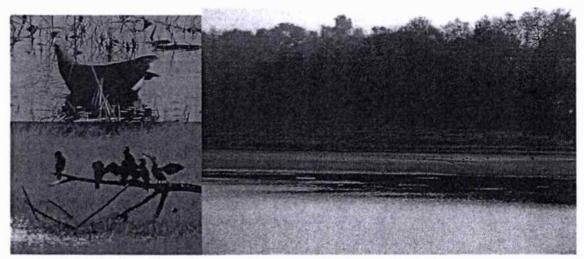


Fig. 3.36 Avi-fauna in study area on Macazona lake observed in during survey

The **mangrove** forests are extensive along the Mandovi and Zuari estuaries, particularly in the silted up intertidal fringes of the Kumbharjua canal. The mangrove habitat findings are presented in respective sub-section above.

3.6.2.6 Protected Areas

The Study Area has number of hillocks in North extending up to North East in study area having maximum Reserved forests in this region of study area. Even the Bondla WLS is to north at approx. 13.2 km aerial distance and Mollem National Park & Bhagwan Mahavir WLS is to east at approx. 8.2km aerial distance from proposed site on banks on Zuari River. The study area has number of RF's having 'Dense vegetation' as predominant class type along with intermittent Open Scrub & fairly dense class, having major vegetation type as mixed vegetation with cashew

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& bamboo introduced as cash crops. The Study area has Nanda Lake on South west of project site & is conserved for its avifaunal attraction.

Nanda Lake | Country: India Coordinates: 15°14'12"N 74°06'26"E | is designated RAMSAR site, number 2,471 on 08-06-2022 located in Quepem Municipality, Village Quepem, Quepem Taluka, South Goa, Goa, India having area 42 ha.

Site details in RSIS Nanda Lake comprises intermittent freshwater marshes that lie adjacent to one of the major tributaries of the Zuari River. They are linked to the adjacent river channel by a sluice gate, which when closed enables the flooding of the marshes. This wetland supports a wide variety of migratory waterbirds and many other important plants and animals. Notable bird species include black-headed ibis (Threskiornis melanocephalus), common kingfisher (Alcedo atthis), wire-tailed swallow (Hirundo smithii), bronzewinged jacana (Metopidius indicus), brahminy kite (Haliastur indus), intermediate egret (Ardea intermedia), little cormorant (Microcarbo niger) and lesser whistling duck (Dendrocygna javanica). The Site enables local communities to store water during the off-monsoon season, to cultivate rice paddies downstream of the lake and support fishing and recreation. The lake also protects downstream areas from monsoon floods. Threats include invasive non-native species, garbage and solid waste, overfishing, and harvesting of aquatic resources. However, there is no management plan to address these issues.

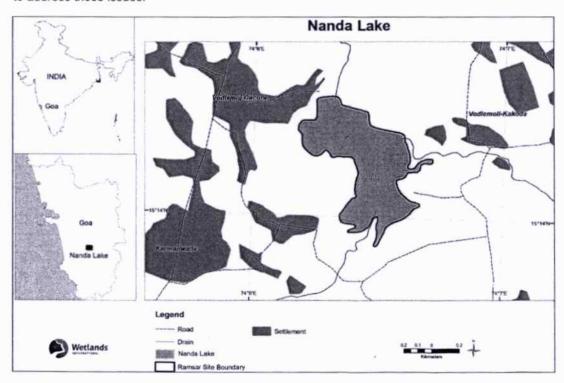


Figure 3.37 Location of Nanda Lake as presented in RAMSAR.

Source: https://rsis.ramsar.org/ris/2471

Along with fishing, agriculture and grazing in surrounding area, The moist soil surrounding the lake supports luxuriant growth of grasses and about 25 identified varieties. Wild varieties of rice grow in & around as it acts as a permanent source of water for a large area of rabi rice & hence is important from scientific and natural history aspects.

List of flora and fauna observed/reported from above habitats are presented in images below and listed in **Annexure III** For the purpose of listing species even if found/ reported from location, adjacent to habitat, it is included in respective habitat.



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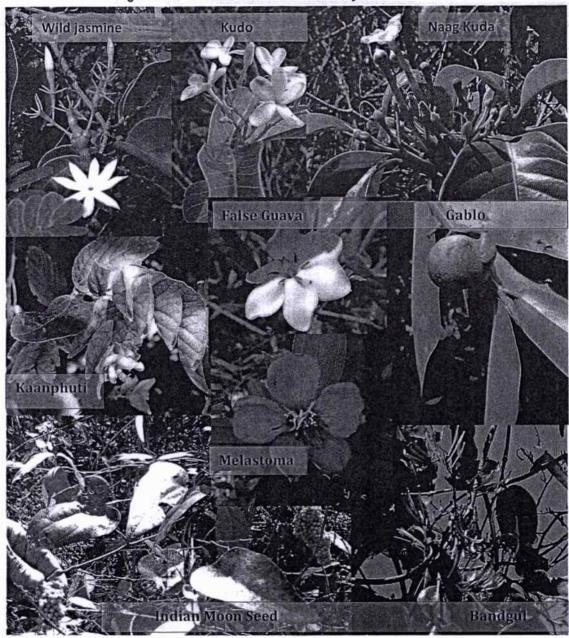


Figure 3.38 Avi-fauna Observed in Study Area

Figure 3.39 Flora Observed in Study Area

3.6.3 Baseline Studies at Site

Proposed site is situated on west bank of Zuari with ongoing proposed activity along the river bank since years. The Study site has existing human disturbances w.r.t. presence of coconut groves as visible in shared site & google images with the site plot being of coconut plantation covered. The site surrounding still attracts avifauna and supports aquatic ecosytem & natural random green covers with no mass nesting observed in vicinity. The flora-faunal listing as per observed during survey is presented in **Annexure III.**

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Figure 3.40 Plot view of site, with coconut groves

Observations & Conclusions in Study area:

- 1 Vegetables are grown alternating paddy cultivations.
- 2 There is no 'virgin' vegetation in the area except mangroves.
- 3 Mangroves form a prominent type of vegetation though the number of species is limited.
- Other major types of vegetation are scrubs and mixed forests and both of them are often planted with Cashew, though bamboo brakes, mango etc. are uncommon.
- 5 Pineapple plantation and Kulagars are also common in the area.
- In study area Number of Schedule I species harbors confirmed through sighting/calls -White bellied Sea Eagle, Peacock etc.

Table 3-17 List of Flora observed on site

Sr. No.	Scientific Name	Common Name	Local Name	
Tree			1	
1	Cocos nucifera	Coconut	Naal	
2	Caryota urens	Fishtail Palm	Bhillemad	
3	Areca catechu	Arecanut	Maadi	
4	Anacardium occidentale	Cashew	Kaju	
5	Mangifera indica	Mango	Aamo	
6	Polyalthia longifolia	Mast Tree (False Ashok)		
7	Alstonia scholaris	Devils Tree	Saton	
8	Trema orientalis	Indian Charcoal Tree	Gollulo	
9	Macaranga peltata	Chandada	Chanado	
10	Erythrina variegata	Indian Coral Tree	Pangaro .	
11	Peltophorum pterocarpum	Copperpod	N.A.	
12	Delonix regia	Gulmohar	Shankar	
13	Leucaena leucocephala	White Babool	Supabul	
14	Albizia lebbeck	Siris Tree	Shiras	
15	Pterocarpus marsupium	Indian Kino Tree	Rakth Redo/Hasar	
16	Gliricidia sepium	Mexican Lilac	N.A.	
. 17	Pongamia pinnata	Pongam Tree	N.A.	
18	Tectona grandis	Teak tree	Saylo	
19	Grewia tilifolia	Dhaman	Dhaman	
20	Azadirachta indica	Neem	Kadu Limb	

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Table 3-18 List of avi-fauna observed/ evidenced within site

Sr. No.	Scientific Name	Common/ Local Name	Family		
1	Copsychus saularis	Magpie Robin	Musicicapidae		
2	Delichon dasypus	Asian house Martin	Hirundinidae		
3	Merops orientalis	Green Bee-eater	Meropidae		
4	Prinia sylvatica	Jungle Prinia	Cisticolidae		
5	Saxicoloides fulicatus	Indian Robin	Musicicapidae Alcedinidae		
6	Halcyon smyrnensis	White-throated Kingfisher			
7	Dicrurus macrocercus	Black Drongo	Dicruridae		
8	Coracias benghalensis	Indian roller	Coraciidae		
9	Saxicola caprata	Pied bushchat	Muscicapidae		

3.7 Socio – Economic Environment

3.7.1 Reconnaissance

The proposed project is for Construction of Jetty and Platform for loading and unloading, storage and handling of cargo (mostly ore) Capacity - <3 million tonnes per annum at Village – Odar Taluka – Quepem, District – South Goa On east bank of Zuari estuary.

3.7.2 Baseline Status:

The socio-economic data is generated using secondary sources i.e. official records such as census records 2011, district census handbook 2011, Town directory 2011 of Goa & website of Archaeological Survey of India.

3.7.3 Study Area:

The area within 10 km distance from the proposed project site is designated as study area. Details of various facets of socioeconomic environment are described below:

3.7.4 Demographic Structure of the Study Area

Demographic structure of the study area was studied in terms of selected parameters such as households, population, sex ratio, scheduled caste, scheduled tribes, literacy etc. Urban & rural area wise demographic structure of the study area & summarized information is shown in below tables and administrative details are present in the **Figure 3.1.**

Table 3-19 Demographic Structure of the Study Area

Total Household	Total Population	Total Male	Total Female	0-6 Child Population	Total SC	Total ST
39166	168203	85812	82391	16417	2054	23735

Source: Primary Census Abstract CD 2011 North Goa District, Goa State

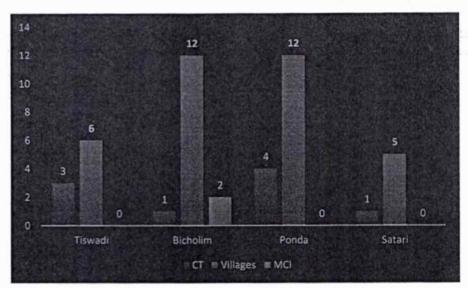


Figure 3.41 Administrative details taluka wise

Table 3-20 Demographic Summary Of The Study Area

Description	2011 (Census Data)
No. of District	1
No of talukas	4
No. of Municipal Council	02
Total No. of CT	09
No of Village	35
Population: Male	85812
Female	82391
Total	168203
No. of Household	39166
Child Population (0 - 6 years)	16417
Sex Ratio (No. of females per 1000 males)	960
Family Size (person per household)	4.3
Scheduled Caste (%)	2054(1%)
Scheduled Tribe (%)	23735(14%)
Literates (%)	80%
Male Literates (%)	43%
Female Literates (%)	37%

Source: Primary Census Abstract CD 2011 North Goa District, Goa State

As per census 2011 census record, population of study area is 168203 of which male and female are 85812 and 82391 respectively. There are 39166 households in the study area with average family size is 4.3 persons per household. Total literate persons in study area are 135122 of which 72235 are males while 62887 are females. Average literacy rate of study area is 80 percent. The sex ratio of study area is 960 females to per 1000 males. Total children (0-6

yrs.) in study area are 16417 as per 2011 census which forms 10% of total population of study area. Scheduled Castes and Scheduled Tribes population is 1% and 14% respectively. Demographic details given in **Annexure IV** & cast wise population details present in **Figure 3.2.**

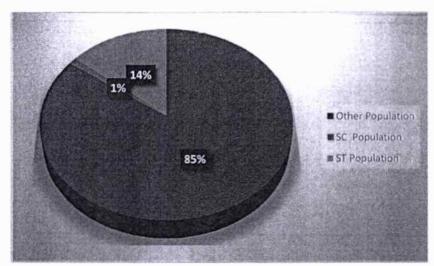


Figure 3.42 Cast wise population details

3,8.3.2 Employment pattern

Occupational structure of the study area is shown in below Table 3.21 & Figure 3.3:

Table 3-21 EMPLOYMENT STRUCTURE OF THE STUDY AREA

Total Workers	Total Male Workers	Total Female Workers	Main Workers	Marginal Workers	Non-Workers
67818	49902	17916	55525	12293	100385

Source: Primary Census Abstract CD 2011 North Goa District, Goa State

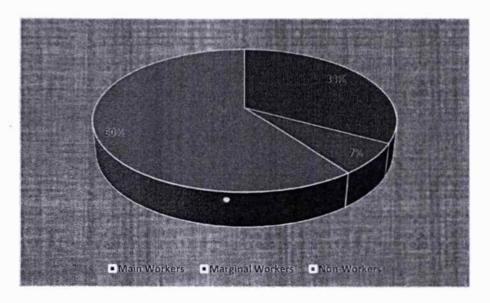


Figure 3.43 Percentage of Main, marginal & Non-Workers in the Study Area

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There are 67818 (40%) persons reported as workers in the study area. Among them 49902 (74%) are male workers and female workers are 17916 (26%).

In total workers, there are 2 categories main workers and marginal workers. In main workers there are total 55525(33%) and in marginal workers there are total 12293(7%) workers are present. It means unemployment level is high in the region as non-worker population share higher percentage which is about 100385 (60%).

ECONOMIC CATEGORY WISE DISTRIBUTION OF WORKERS

Distribution of Workers	Total		
Cultivators	2818		
Agricultural Labourers	1026		
Household Industry Workers	1415		
Other Workers	50266		
Total	55525		

Source: Primary Census Abstract CD 2011 North Goa District, Goa State

The total main workers in the study area are 55525 (33%) of total population. Highest percentage of main working population is in other worker includes work such as service & business, constructions, trade and commerce, transport, storage, fishing and communications etc. 50266 (90.53%), main worker engaged in Household Industry Workers 1415 (2.55%), Agricultural Labourers 1026 (1.85%) & Cultivators 2818(5.08%).

3.8.4 Infrastructure details

The details of infrastructure facilities (Education, health, water, drainage, communication, transportation, power facilities) have been taken from District census handbook 2011 of Goa State.

Table 3-22 INFRASTRUCTURE FACILITIES PRESENT IN NUMBER OF VILLAGES

Education

Govt. Pre-Primary School (Nursery/LKG/UKG)	Govt. Primary School	Govt. Middle School	Govt. Secondary School	Govt. Pol	ytechnic	Private Non-Formal Training Cen		al Training Centre
15	32	9	6	1				
Health Facilities			 					
Primary Health Centre	Primary Health Sub Centre	Maternity And Child Welfare Centre	TB Clinic	Dispensary	Veterinary Hospital	Family Welfare Centre	Traditional Practitioner and Faith Healer	Non-Government Medical facilities Medicine Shop
1	15	1	1	4	2	16	11	5
Vater Facilities								
Tap Water-Treated	Tap Water Untreated	Covered Well	Uncovered Well	Hand Pump	Tube Wells/Borehole	Spring	River/Canal	Tank/Pond/Lake
34	10	24	33	7	13	22	22	25

Drainage Facilities

Communication Facilities

Closed Drainage	Open Drainage	No Drainage	Open Pucca Drainage Covered with Tiles Slabs	Open Pucca Drainage Uncovered	Open Kuccha Drainage	Post Office	Sub Post Office	Telephone
11	30	6	10	21	23	2	18	35

Transportation Facilities

Public Bus Service	Private Bus Service	Railway Station	Auto/Modified Autos	Taxi	Vans
30	33	1	8	9	9

Road Facilities

Black Topped (pucca) Road	Gravel (kuchha) Roads	All Weather Road	Navigable Waterways	Footpath
35	35	22	9	35

Banking Facilities

Power Facilities

Commercial Bank	Cooperative Bank	Agricultural Credit Societies	Power Supply for Domestic Use	Power Supply for Agriculture Use	Power Supply for Commercial Use	Power Supply for All Users
7	5	3	35	33	34	33

- Education: Out of total Villages in the study area in 15 Villages pre-primary education facility exist. Primary schools present in 32 Villages, middle school facility was availed in 9 Villages & Secondary schools were present in 6 Villages.1 Govt. polytechnic facility was also present in the study area.
- ➤ Health facilities: In 15 Villages sub-center were present & 1 PHC was providing health care facilities. Other facilities were in the form of MCW, dispensary, TB clinic, traditional Practitioner and Faith healer, Family Child Welfare, medical facility etc.
- ➤ Water: Major water sources in the Villages were tap water, well, hand pump, spring & river. 97% Villages had access of treated tap water facility.
- ➤ **Drainage**: Out of 35 Villages, only in 10 Villages pucca drainage facility, in 11 Villages closed drainage facility was availed, in 6 Village there were no drainage facility present. In other Villages there were mixed type of drainage pattern (open, kaccha etc.) availed.
- Communication: For communication purpose, 2 post offices and 18 sub post office were present in the study area. Other modes were telephone & PCO.
- > Transportation: Transportation was depending on both public and private transport, with addition 1 railway station also present for transportation purpose.
- Road: In 97% Villages pucca road as well as gravel road facility was present, almost all Villages using footpath facility. Overall road condition was satisfactory in the Villages.
- Banking: Agricultural credit societies were present in 3 Villages. Commercial bank present in 7 Villages & cooperative banks present in 5 Villages.
- > Power: Power facilities were available for all purposes (domestic, commercial, agricultural etc.).

3.7.4.1 Town Details

Town details have been taken from the town directory 2011 of Goa State. Town details with class, civic status, area, growth rate, population density, transportation, drinking water facilities with main commodities details are presented below.

Table 3-23 TOWN DETAILS

Sr. No.	Town Name	Class	Civic Status of Town	Area (sq. km.)	Growth Rate Town (Census 2011)	Density (Census 2011)	System of Storage Source-1	Manufactured Commodity (First)	Manufactured Commodity (Second)	Manufactured Commodity (Third)
1	Corlim (C l)	V	CT	5.7	36.7	1144.3	TT	RICE PRODUCTS	COCONUT PRODUCTS	CHILLY PRODUCTS
2	Cumbarjua (CT)	VI	CT	2.4	9.3	2048.8	TT	COUNTRY LIQUOR	BAKERY PRODUCT	FURNITURE
3	Goa Velha (CT)	VI	СТ	10.1	-19.9	427.9	TT	SOFT DRINKS	CHILLY PRODUCTS	COCONUT PRODUCTS
4	Sanquelim (M CI)	IV	M CI	14.7	21.9	928.6	TT	IRON ORE	LIQUOR BOTTLE CAPS	NA
5	Carapur (CT)	V	СТ	8.6	3	639.5	TT	COUNTRY LIQUOR	NA	NA
6	Bicholim (M CI)	IV	M CI	14.5	13.9	1171.4	TT	BRASS WARE	SOAP	POTTERY
7	Candola (CT)	V	CT	8.52	27.2	628.4	TT	CERAMIC TILES	COCONUT PRODUCTS	NA
8	Orgao (CT)	VI	CT	3.5	3.7	1314.9	TT	DRY FISH	PAPAD	ICE
9	Priol (CT)	V	СТ	13.9 2	7.8	586.5	TT	PLASTIC BOTTLES	FABRICATION	HANDICRAFT ITEMS
10	Usgao (CT)	IV	CT	25.4	0.4	489.6	TT	BAKERY PRODUCT	CASHEW NUTS	CHOCOLATES
11	Onda (CT)	V	СТ	7.93	30.2	739.3	TT	BUS COACHES	COUNTRY LIQUOR	NA

Source: Town Directory 2011 Goa

Note: M CI: Municipal Council, CT:, TT: Treated tap water

Out of 11 towns, 9 towns come under CT and 2 come under M Cl. Among the 11 towns, 10 town population growth rate was increasing. Cumbarjua town had highest population density and lowest for Goa Velha. All towns had treated tap water facility. Rice products, liquor, soft drinks, brass ware, ceramic tiles, dry fish, papad, coconut product, chilly product etc. were main commodities in the towns.

3.8.6 Tourist Places in Study Area

There are 15 notified heritage sites declared by ASI as well as 1 historical place falls under the study area. All sites are well known and large number of visitors visits these places. Detail is presented below Table.

Table 3-24 TOURIST PLACES IN THE STUDY AREA

Sr. No.	Details	Distance in km	Direction
Notified H	leritage Site declared by ASI		
1.	Church of Lady of Rosary, Old Goa	10.13	West
2.	Church of St. Augustine, Old Goa	9.99	West
3.	Basilica of Bom Jesus, Old Goa	9.42	West
4.	Chapel of St. Francis Xavier and connected Buildings, Old Goa	9.40	West
5.	Largo of St. Francis Xavier, Old Goa	9.40	West
6.	Portal remains of St. Paul's Collage, Old Goa	8.72	West
7.	Chapel of St. Catherine, Old Goa	9.51	West
8.	Church & Convent of St. Francis Assisi, Old Goa	9.42	West
9.	Se Cathedral, Old Goa	9.32	West
10.	House of Bull, Old Goa	9.14	West
11.	Arch of Viceroy, Old Goa	9.15	West
12.	Arch of Adil Shah's Palace, Old Goa	9.09	West
13.	Largo of Cajetan together with other monuments, Old Goa	9.04	West
14.	Largo of St. Francis Xavier, Old Goa	8.98	West
15.	Rock Cut Caves, Harvalem/Arvalem	5.25	North East
Historical	Place		
16.	Pandavas Cave, Deulwada, Surla	3.06	South Eas

Source: Archeological Survey of India & Google earth

Impacts on Socio-economic Environment:

- > During construction phase employment generation for short time period is anticipated for local workers.
- > Increase in traffic during transportation of construction material is expected

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Chapter 4 - Anticipated Environmental Impacts & Mitigation Measures

4 ANTICIPATED ENVIRONMENTAL IMPACTS & MITIGATION MEASURES

4.1 Introduction

The proposed Construction of Jetty and Platform/quay for Loading and Unloading, storage, handling of ore and non-hazardous centre will have various impacts on environmental parameters like marine sediment, marine water quality, air quality of surrounding area due to various operations explained in earlier chapter.

4.2 Identification of Impacts

Environmental impact identification is based on the type, scale and location of proposed project activity. Environmental components that may be affected negatively and positively due to proposed activity are identified.

Following parameters are selected for impact assessment due to proposed activity during various phases of the project cycle:

Table 4-1 Environmental Aspects and Impacts of Proposed Project

Sr.	Step/Activity	Environmental Aspect	Impact		
No.	Otep/Activity	Life in the internal Aspect	Туре	Severity	
1.0	Construction of infrastructure	Fuel burning, Emission to air (dust)	Air & Noise Pollution	Temporary	
	facilities	Use of water, energy and materials	Natural resource consumption	Temporary	
		Use of manpower	Employment	Temporary	
		Waste Discharge on land	Land pollution	Temporary	
		Suspension of sediment in marine water	Benthic Biodiversity loss and water pollution	Temporary	
2.0	Erection and	Waste Disposal	Marine/ Land Pollution	Temporary	
	Commissioning	Use of manpower	Employment	Temporary	
3.0	Operation	Use of fuel & energy	Natural resource consumption	Permanent	
		Air Emission	Air Pollution	Temporary	
		Waste disposal	Land Pollution	Permanent	
		Noise generation	Noise pollution due to vessel and vehicular movement	Periodically	
		Suspension of sediment in marine water	Benthic Biodiversity loss and water pollution	Temporary	
		Socio-economic	Will fulfil long standing demand import and export	Permanent	

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Chapter 4 -Anticipated Environmental Impacts & Mitigation Measures

Sr. No.	Chan (A adi ila		Impact		
	Step/Activity	Environmental Aspect	Type	Severity	
4.0	Closure and	Stoppage of use of facility	Revenue & employment loss	Permanent	
	Decommissioning	Decommissioning	Land pollution	Permanent	

4.3 Impact Identification & Mitigation Measures in Construction Phase

4.3.1 Land Environment

Anticipated Impacts

Construction of infrastructure facilities involves generation of solid waste in the form of cut/extra metal pieces, substratum removed during foundation, unused concrete, bricks, packaging materials (cement bags, plastic cans and drums) etc. Hazardous waste generated includes paint containers etc. Improper waste disposal will lead to unhygienic conditions & hazards to nearby populace and marine life.

Construction material (concrete, sand, other ancillary material, machinery etc.) and manpower transport will lead to increase in number of vehicles plying on Village road leading to site. Existing road is single lane with regular traffic and occasional traffic congestion is expected at the time of material transportation especially during weekends. This will lead to increase in noise levels and idling emissions.

Mitigation Measures

- Construction team will be trained for collection and disposal of solid/ hazardous waste at designated place.
- Separate, impervious area will be earmarked for storage of solid and hazardous wastes generated during construction phase. After completion of construction phase, hazardous waste will be given to given to GSPCB authorized recyclers.
- Substratum removed will be used for filling/levelling within site itself.
- Wastes like iron scrap will be sold to scrap dealers for recycle.
- Majority of material transport will occur from Goa and Karnataka adjacent State. Traffic (of
 material transport for project) will be diverted to Village road. All material will be
 transported through medium sized carriage vehicle. Open space at end of approach road
 will be earmarked for parking of construction trucks.
- Work force will be sourced from nearby Villages like Odar, Sanvordem and nearby Villages. No camp site for work force will be provided.

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Chapter 4 - Anticipated Environmental Impacts & Mitigation Measures

4.3.2 Air Environment

Anticipated Impacts

Construction of facilities involves operation of concrete mixer, D.G. set, use of excavators, trucks which create localized temporary air emissions. Hence, there will be insignificant impact of construction phase on air environment in study area.

Mitigation Measures

- Provision of PPE (dust masks, goggles) for onsite workers particularly near concrete mixer.
- Screening of construction area near concrete mixer with tin sheets.
- Construction machineries will be well maintained, lubricated and cleaned periodically having valid PUC certificate.

4.3.3 Noise & Vibration Environment

Anticipated Impacts

Transportation and actual construction activities (like cutting, operation of concrete mixer, D.G. set, excavators) will increase noise levels in surrounding. This kind of noise and vibrations will be of temporary nature.

Mitigation Measures

- Adequate PPE (earmuffs/ ear plugs) for construction workers.
- Screening of construction area near concrete mixer with tin sheets.
- Construction machineries will be maintained, lubricated and cleaned periodically.
- Schedule the jobs such that recipients will not be exposed to high noise for continuous durations.

4.3.4 Water Environment

Anticipated Impacts

Water (10.5 cmd) required will be supplied from existing water supply facility or tankers. About 725 workers from nearby areas will be employed.

Chapter 4 - Anticipated Environmental Impacts & Mitigation Measures

Excavation, filling, concreting during construction of solid jetty and providing rubble protection will result in temporary increase in turbidity and suspended matter.

Mitigation Measures

- Temporary arrangement of drinking water will be provided for workers.
- Sanitation provisions (mobile toilets).
- Entire construction activity in intertidal area will be carried out in non-monsoon season during low tide period.
- Use of river water for curing purposes.

4.3.5 Ecological & Biological Environment

Anticipated Impacts

Construction phase do has removal of vegetation such as coconut groves. Construction activities and vehicular movement will generate noise and particulate matter that disturb flora and fauna temporarily thus insignificant impacts on flora and fauna are envisaged.

Due to construction activity, benthic organisms will be permanently lost. Benthic loss of about @0.23 gm/m² was calculated aggregating the no of observations from Subtidal locations affected by project activity. Project activity will also increase turbidity in water column which result in less penetration of light and decrease in primary productivity which overall hampers marine ecosystem. Noise, vibration and turbidity compel ichthyofauna to move away.

Mitigation Measures

- There will be cutting or pruning of vegetation at site but no Mangroves will be impacted due to project activity as all project activities are restricted outside of Mangrove buffer zone.
- The construction activity will ensure minimum disturbance of water column trough intervals & appropriate management & disposal of wastes at designated sites.

4.3.6 Socio-economic Environment

Anticipated Impacts

There will be temporary employment for about 25 to 35 persons for about 8-10 months. It will create business opportunities to suppliers of construction material, fabricators, manpower

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Chapter 4 - Anticipated Environmental Impacts & Mitigation Measures

suppliers, civil contractors etc. Local labours will be employed during construction phase. Health of workers may be affected due to dust and noise and possibility of accidents.

Mitigation Measures

- Engage local contractors and work force.
- Provide adequate water supply and mobile sanitation facilities for onsite workers.
- Adequate provision of PPE (helmets, safety shoes, harness, ear plugs/ muffs, dust masks and goggles) for construction workers.

4.4 Impact Identification & Mitigation Measures during Final Erection and Commissioning

Anticipated Impacts

Impacts during commissioning phase will be due to:

Waste generation Solid waste in the form of packing material etc. Unscientific disposal will create eyesore and unhygienic conditions.

Mitigation Measures

Solid waste generated will be stored and disposed through municipal solid waste system.

Socio-Economic

- Additional manpower will be required for laying cables, erecting lamp poles etc.
- This is deemed to be a positive impact as it will give rise to local employment for short period.

4.5 Impact Identification & Mitigation Measures in Operation Phase

4.5.1 Land Environment

Anticipated Impacts

Major concern in land environment during operation phase is contamination of land by:

 Improper handling of wastes arising from loading/unloading cargo resulting in leachate contaminating the soil/ sediment.

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Chapter 4 - Anticipated Environmental Impacts & Mitigation Measures

Mitigation Measures

 Handling of cargo will be under senior supervision to avoid leachate contaminating the soil/ sediment. Care will be taken during handling loading/unloading cargo.

Sources of non-hazardous waste generation and their quantities, mode of disposal due to project activity will be as in table below:

Table 4-2 Proposed Solid Waste Generation & Disposal

Sr. No.	Type of Waste	Quantity	Mode of Disposal
1	Empty Paint Cans	10 Nos/Annum	GSPCB Authorised Dealers
2	Empty Oil Cans	10 Nos/Annum	GSPCB Authorised Dealers
3	Organic waste	19 kg/day	GSPCB Authorised Dealers
4	Inorganic waste	28 kg/day	GSPCB Authorised Dealers

Sources of hazardous waste generation, their total quantities after project implementation and disposal methodologies are shown in the table below:

Table 4-3 Hazardous Waste Generation & Disposal Details

Sr. No.	Category	Type of Waste	Quantity	Mode of Disposal
1	Category 33.1, schedule I as per HW rules 4th April 2016	Paint/ Antirust	10 Nos/Annum	Registered recycler/Dealer
2.	Category 5.1 schedule I as per HW rules 4th April 2016	Used Spent Oil	5 litre/Annum	Registered recycler/Dealer

Close monitoring and control over contractors are essential to ensure that the waste reaches the designated waste disposal site and is not dumped at undesignated areas or adversely impact marine environment.

4.5.2 Air Environment

Anticipated Impacts due to loading and unloading

- Movement of transportation vehicles will result in minor air pollution.
- Handling of cargos while loading/unloading result in air pollution.

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Chapter 4 - Anticipated Environmental Impacts & Mitigation Measures

Mitigation Measures

- Transport vehicles with PUC Certificate.
- Sprinkling of water in area of loading/unloading.

4.5.3 Noise Environment

Anticipated Impacts

 During operation phase, noise generating sources will be movement of barges, cranes and Dumpers for loading-unloading dry cargo.

Mitigation measures

 Operators and Drivers will be encouraged to ensure regular preventive maintenance of their barges/dumpers.

4.5.4 Water Environment

Anticipated Impacts

- Indiscriminate disposal of solid waste such as torn pieces of plastic/ glass bottles,
 Polystyrene (thermocol)/ resin foam pieces, fibreglass panels, wooden planks may lead to water pollution.
- Construction of ramp and jetty will provide hard substratum for organisms like Barnacles, Clamps etc. which found home in to surface of structures and grows which ultimately increase in active biomass in the area, partially recovering biomass loss caused in construction phase.

Mitigation Measures

Following mitigation measures will be provided to reduce impacts on water environment:

 Solid waste generated will be stored and re-used wherever possible or disposed through solid waste system. を

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Chapter 4 - Anticipated Environmental Impacts & Mitigation Measures

4.5.5 Socio – economic Environment

Anticipated Impacts

Proposed project will provide employment directly or indirectly residing in Odar Village. Thus, this is a positive impact which will benefit the local community to a great extent.

4.5.6 Corporate Social Responsibilities & Socio-Economic Welfare

Proposed project itself is about provision of improvement of upgradation facilities. This has been planned as per long standing demand and development of Goa State.

4.6 Impact Identification & Mitigation Measures in De-Commissioning Phase

This section examines impacts during decommissioning of project.

Anticipated Impacts

De-commissioning phase of jetty will be non-usage of various facilities. This will result in dilapidated situation of structures in long run. Unattended, unused channel will allow sediment deposition within channel. This situation is dangerous for unintentional human visit. Such No man's land near seashore may become favored location for unworthy elements of society which in turn is detrimental to peaceful civilization.

Mitigation Measures

- Decommissioning of facilities will be properly planned and finished in fixed time period. All civil structures will be demolished ensuring safety.
- Concrete rubbles will be used for filling/leveling ex situ.
- Iron/steel will be sold to authorized scrap dealer.
- Care will be taken that none of the demolition waste will contaminate marine environment.

4.6.1 Environmental Impact Matrix

The possible impacts of various construction and operational activities as identified above have been denoted in a matrix form. A rating has been devised to give severity of impacts in the following manner:

Appreciable Impact - 1

Severe Impact - 4

Significant Impact - 2

+ Sign Indicates Beneficial Impact

Major Impact - 3

Sign Indicates Adverse Impact

Chapter 4 - Anticipated Environmental Impacts & Mitigation Measures

Based on importance of each environmental parameter, a value has been assigned to each parameter (called as weightage). Ultimately, the final assessment is made according to the impact scale discussed below.

Table 4-4 Significance of Impact

Total Score	Significance of Impact- Beneficial Impact
Up to 700	No appreciable impact on environment
701 to1000	Low adverse impact. Appropriate mitigation measures required.
1001 to 2000	Significant impact, Major control measures
2001 to 4000	Major impact. Project site/ technology to be reviewed.
4001 to 5000	Not suitable. Alternative site to be considered.
	Up to 700 701 to 1000 1001 to 2000 2001 to 4000

Sr. No.	Total Score	Significance of Impact- Adverse Impact
1	Up to -700	No appreciable impact on environment
2	-701 to -1000	Low adverse impact. Appropriate mitigation measures required.
3	-1001 to -2000	Significant impact, Major control measures
4	-2001 to -4000	Major impact. Project site/ technology to be reviewed.
5	-4001 to -5000	Not suitable. Alternative site to be considered.

Environmental impact matrix due to proposed project activity and with and without environmental protection measures are presented in tables below.

M/s. Dinar Tarcar Resources (India) Pvt.Ltd.
Chapter 4 –Anticipated Environmental Impacts & Mitigation Measures

Table 4-5 Environmental Impact Matrix without Mitigation Measures

Sr.	Environmental Parameter	Weightage	Weightage Phase of Activity			Net	- Incorporate	
No.		weightage	Construction	Commissioning	Operation	De- Commissioning	Impact	Score
1				Land Environment			Name and Address of the Owner, where the Owner, which is the Owner, where the Owner, which is the Owner, where the Owner, which is the Owner, which i	Alconomic
Α	Land Use Land Cover	50	-1	0	0	- 2	-3	-150
2		Water Environment						
Α	Water Availability	50	-1	-1	-2	+2	-2	-100
В	Ground/ Surface water quality	50	-1	0	0	0	-1	-50
С	Marine Water Quality	100	-3	-1	-2	+1	-5	-500
3				Air Environment				
Α	Air Quality	50	-2	-1	-1	+1	-3	-150
С	Odor nuisance	50	0	0	-2	+2	0	0
Н	Noise Level	50	-2	-1	-1	+2	-2	-100
4				Biological Environme	ent			
Α	Marine Ecology	100	-3	-1	-1	-1	-6	-600
В	Marine Sediment	100	-3	-1	-1	-1	-6	-600
5			Soc	io Economic Enviror	nment			
Α	Employment	50	+2	+1	0	-1	+2	+100
В	Ease in operation	100	0	0	+4	-2	+2	+200
							NET	-1950

As can be seen from the impact matrix, the net impacts due to proposed upgradation, new infrastructure facilities without mitigation measures will be -1950. This indicates significant adverse impact on environment, requiring well designed control measures.

Chapter 4 - Anticipated Environmental Impacts & Mitigation Measures

Table 4-6 Environmental Impact Matrix with Mitigation Measures as per EMP

Sr.	Environmental	Weightage		Phase of	of Activity		Net	
No.	Parameter	Weightage	Construction	Commissioning	Operation	De- Commissioning	Impact	Scor
1				Land Environment			LICONOMINA PROPERTY AND ADDRESS OF THE PARTY A	ALL PROPERTY OF THE PARTY OF TH
Α	Land Use Land Cover	50	0	0	0	-1	-1	-50
2		•		Water Environment	t Total			
Α	Water Availability	50	-1	-1	0	0	-2	-100
В	Ground/ Surface water quality	50	0	0	0	0	0	0
С	Marine Water Quality	100	-2	-1	-1	+1	-3	-300
3		,		Air Environment				
Α	Air Quality	50	-1	0	-1	+1	-1	-50
С	Odor nuisance	50	0	0	-2	+2	0	0
Н	Noise Level	50	-1	-1	0	+1	-1	-50
4				Biological Environme	ent			
Α	Marine Ecology	100	-2	-1	0	+2	-1	-100
В	Marine Sediment	100	-2	-1	0	+1	-2	-200
5			Soc	io Economic Enviror	ment			
Α	Employment	50	+2	+1	0	-2	+1	+50
В	Ease in operation	100	0	0	+4	-3	+1	+100
							NET	-700

As can be seen from the impact matrix, the net impacts due to proposed jetty with mitigation measures will be -700. This indicates non appreciable adverse impact on environment.

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Chapter 5 -Analysis of Alternatives (Technology & Site)

5 ANALYSIS OF ALTERNATIVES (TECHNOLOGY & SITE)

5.1 Analysis of Alternative Sites

The proposed project activities are construction of jetty and platform for loading and unloading at Odar Village.

Following aspects are considered to evaluate alternate site:

- Land is under ownership of M/s. Dinar Tarcar Resources (India) Pvt. Ltd., there is no settlement within the property, hence no issues of R & R.
- Availability of power at site.
- Connected by road.
- · Economy of the project and integration with existing facilities.

Thus, due to above reasons no other site was considered for the proposal.

5.2 Analysis of Alternative Technologies

Not Applicable

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6 ENVIRONMENTAL MONITORING PLAN

Based on the identified & assessed impacts as well as the baseline environmental status of the study area, an environmental monitoring program is suggested for implementation during various stages of the project.

6.1 Objective of Environmental Monitoring Program

For tracking of the effectiveness of mitigation measures & EMP at specific interval, regular monitoring of the necessary environmental parameters is required. With this vision, an environment monitoring program is prepared with due consideration of the baseline status of the site, various components of project & environmental attributes likely to be affected.

Major objectives of the Environmental Monitoring Program are as under:

- To comply with the statutory requirements of monitoring conditions of CRZ Clearance,
 Consent to operate and provisions under Environmental Protection Act, 1986.
- Assessment of the changes in environmental conditions, if any, during the project operation/ activities.
- Monitoring & tracking the effectiveness of Environmental management plan & implementation of mitigation measures planned.
- Identification of any significant adverse transformation in environmental condition to plan additional mitigation measures; if & as required.

The Project Proponent will ensure that the necessary requisite facilities are made available and budgetary provision is made as & when required to ensure regular efficient environmental monitoring activities.

6.2 Environmental Monitoring Program

Environmental monitoring parameters and frequencies of monitoring are given in table below.

Chapter 6 - Environmental Monitoring Plan

Table 6-1 Environment Monitoring Plan for Proposed Facilities

Sr.	Project	Environmental	Parameters	Frequency	Locations	Conducted by		
No.	Phase	Component						
			Air	Environment				
		Ambient Air	PM ₁₀ , SO ₂ , NOx & CO	Once/Month	Odar Village	MoEFCC recognized Laboratory		
		Ambient Noise Level	Leq day and night time	Once/Month	Odar Village	MoEFCC recognized Laboratory		
			Wate	er Environment				
1	Constructio n	Marine Water Quality	Temperature, pH, PHC, DO, Suspended solids, Dissolved solids, Salinity, Microbiological parameters, Nutrients, Chlorophyll, Phytoplankton, Zooplankton	Once/month	Baseline sampling locations	MoEFCC recognized Laboratory		
		Land (Sediment) Environment						
		Marine Sediment Quality	Texture, Corg, PHC, Macrobenthos, Pb	Once/month	Baseline sampling locations	MoEFCC recognized Laboratory		
	C	Air Environment						
2	Commission	Ambient Noise Level	Leq	Once/month	At the Site	MoEFCC recognized Laboratory		
			Air	Environment				
		Ambient Air	PM ₁₀ , SO ₂ , NOx & CO	Once in six Month	Odar Village	MoEFCC recognized Laboratory		
3	Operation Phase	Ambient Noise Level	Leq day and night time	Once in six Month	Odar Village	MoEFCC recognized Laboratory		
	Filase		Land (Sed	liment) Environment				
		Marine Sediment Quality	Texture, Corg, PHC, Macrobenthos, Pb	Once in six Month	Baseline sampling locations	MoEFCC recognized Laboratory		

Chapter 6 - Environmental Monitoring Plan

Sr. No.	Project Phase	Environmental Component	Parameters	Frequency	Locations	Conducted by	
	经 费可以1000000000000000000000000000000000000		Wate	r Environment	· · · · · · · · · · · · · · · · · · ·	A STATE OF STATE OF	
		Marine Water Quality	Temperature, pH, PHC, DO, Suspended solids, Dissolved solids, Salinity, Microbiological parameters, Nutrients, Chlorophyll, Phytoplankton, Zooplankton	Once in six Month	Baseline sampling locations	MoEFCC recognized Laboratory	
	Danamminai	. Air Environment					
4	Decommissi	Ambient Air	PM ₁₀ , SO ₂ , NOx & CO	Once/Month	Odar Village	MoEFCC recognized Laboratory	
	oning	Ambient Noise	Leq day and night time	Once/Month	Odar Village	MoEFCC recognized Laboratory	

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6.2.1 Measurement Methodologies

Monitoring of environmental samples shall be done as per the methods/ guidelines provided by MoEFCC/ CPCB and /or relevant Indian Standards or methods as specified by Standard Methods for Water and Wastewater Treatment by American Public Health Association (APHA).

6.2.2 Reporting Schedules

The records of the monitoring program viz marine water, sediment, air, noise shall be prepared and preserved properly. The records showing results of the monitoring programs will be submitted as per the schedule below.

Monitoring reports will be reviewed regularly by Environment Head of M/s. Dinar Tarcar Resources (India) Pvt. Ltd. with Environmental Consultant for necessary improvement of the monitoring plan/ mitigation measures/environmental technologies as well as for necessary actions of environmental management cell.

Table 6-2 Reporting Schedule of CRZ Clearance Compliance

Sr. No.	Phase of Project	Reporting Schedule	Applicable Statute	Compliance Reporting To
1	Construction	As specified in CRZ clearance/ GSPCB Consent to Operate	CRZ clearance/ GSPCB Consent to Operate	a) SEIAA, Goa b) GSPCB – Regional Office c) GCZMA Or Other authorities as specified
2	Commissioning	As specified in CRZ clearance/GSPCB Consent to Operate	CRZ clearance/ GSPCB Consent to Operate	a) SEIAA, Goa b) GSPCB – Regional Office c) GCZMA d) Or Other authorities as specified
3	Operation	As specified in CRZ clearance/GSPCB Consent to Operate	CRZ clearance/ GSPCB Consent to Operate	a) SEIAA, Goa b) GSPCB – Regional Office c) GCZMA d) Or Other authorities as specified
4	Decommissioning	As specified in CRZ clearance/GSPCB Consent to Operate	CRZ cloarance/ GSPCB Consent to Operate	a) SEIAA, Goa b) GSPCB – Regional Office c) GCZMA d) Or Other authorities as specified

Chapter 9 - Environmental Cost Benefits Analysis

7 ADDITIONAL STUDIES

7.1 Disaster Management Plan

A Disaster Management Plan (DMP) forms an integral part of any Risk Assessment and Management exercise. The purpose of Disaster Management Plan is to identify the possible emergency incidents to prevent or manage their occurrence efficiently to reduce the damage. A DMP can be made only after proper Risk Assessment study at site. The recent approach to Disaster Management Plan involves i) Risk Identification and ii) Risk Evaluation.

Risk identification is an important process and involves identification of hazardous installations in the project having a tendency to cause loss/harm during the construction and operation; threaten health and safety of workers, threaten public health and cause damage to the environment. Risk identification can help in adopting measures for risk reduction.

Risk evaluation involves calculation of damage potential of identified hazards with probable extent of damage. The hazardous event and subsequent damage in case of incident at the project site may depend upon various factors such as use of sub-standard material viz. steel, cement, etc; non performance of proper geotechnical or foundation study, no proper drive for piles, electricity, etc.

7.1.1 Objectives of Disaster Management Plan (DMP).

The main objectives of DMP are:

- i) To identify the probable Risks and Hazards to the project.
- To have advance planning for each possible scenario to combat and minimize the adverse effect on humans/people, material and the environment.
- To cater to the advanced warnings for evacuation of personnel at site to ensure that the loss of life and injuries to people are minimized.
- To rescue, provide relief and rehabilitate the affected people, the settlements and the environment.
- To ensure that harm to the people, damage to the environment and loss to the property are minimized.
- vi) To ensure that the relief measures are prompt and effective.

7.1.2 Disaster Management Plan (DMP)

The elimination of Risks and Hazards to avoid the Disaster/s can be achieved through the prompt action by the operator and emergency staff as follows:

- The risks posing hazards which may occur during the construction or operation phase should be identified and evaluated. These can be either man made or natural such as cyclone, earthquake, tsunami, fire, etc.
- Effective Communication: Information should be disseminated to all the concerned inside or outside on the consequences of emergency.
- Emergency Control Centre should be active 24/7.
- Proper and effective Alarm system should be put in place and Assembly point should be identified.
- Shutdown of various activities to prevent the spread of fire and facilitate the fire control room for extinguishing fire.
- Onsite resources should be mobilized.
- To obtain assistance from outside agencies.
- Initiating and organizing the evacuation of affected workmen.
- · Providing necessary first-aid and other medical services to the needy.
- · Assessing the development and the reasons and other information for the same.
- Noise generation control during construction affecting the workers health.
- Care to be exercised in material used/handled during construction phase, e.g. Fuels, lubricants, paints and other substances which can cause fire.
- It should be ensured that there are no live wires to cause short circuits.
- Natural Calamities as mentioned below causing hazards should be integrated into the planning. They are:
 - As per the Seismic zoning map of India, Goa is falling in Zone III which is a moderate intensity zone with regard to seismic activity. The design of the jetties should incorporate this factor to provide the structural integrity and stability.
 - Overall necessary mitigation steps should be adopted during the Cyclone and monsoonal flood for the Disaster Management Plan.

7.1.3 Disaster Mitigation Measures

For a successful Disaster Management Plan (DMP) the adoption of suitable mitigation measures are very important. Suggested below are some of the precautions to be taken and procedures to be adopted to mitigate a Disaster.

- SOP should be in place for controlling the accidents with minimum damage.
- Reduce the damage at the site without harm to the people.
- Rescue victims as early as possible on priority and treat them suitably.
- Identify the persons affected and inform the relatives of the casualties.
- Provide authentic information to the news media and other relevant Administration.

Chapter 9 - Environmental Cost Benefits Analysis

- Maintain records of disaster event with its cause, damage level and equipment needed as evidence during inquiry.
- · Rehabilitate the facility, plant and the affected area.

Formulation of Disaster Management Plan and Emergency Services

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Chapter 9 - Environmental Cost Benefits Analysis

8 PROJECT BENEFITS

8.1 Improvement in Infrastructures

The proposed project is to be located at Odar Village. It does not require additional transportation facilities except road connectivity from public road to the proposed jetty.

8.2 Employment Potential

The proposed peak manpower requirement during construction and commissioning will be 725 Persons.

Most of the recruitments will be done from local area which will be the considerable benefit to the local area considering the demography of the region. Further, the indirect employment, local economic activities will also add in the employment potential of the proposed project. Thus, the potential of employment will be greatly beneficial to the local people.

8.3 Other Tangible & Intangible Benefits

- Direct employment to locals.
- Export revenue will increase.
- Living standards will improve of employees as well as surrounding communities due to increase of activities.

Chapter 9 - Environmental Cost Benefits Analysis

9 ENVIRONMENTAL COST BENEFIT ANALYSIS

All the required Environmental protection measures will be implemented appropriately to ensure compliance with the norms.

The overall project cost is estimated at Rs. 14 crores.

The M/s. Dinar Tarcar Resources (India) Pvt. Ltd. has made a budgetary allocation for environmental protection measures at a capital cost of Rs. 15 lakhs and an annual budget of Rs. 3.1 Lakhs.

Implementation of project in turn will give better infrastructure facilities for transport and export business, will help to increase the economy of Goa.

Chapter 10 - Environmental Management Plan

10 ENVIRONMENT MANAGEMENT PLAN

10.1 Introduction

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Description of the administrative aspects of ensuring the mitigation measures is implemented and their effectiveness monitored, after approval of EIA are presented in this chapter.

10.1.1 Objective & Scope of EMP

Environmental management plan is prepared with the main objective of enlisting all the requirements to ensure effective mitigation of adverse impacts for all the components of the proposed project. The objectives taken into account in preparation of EMP are summarized here as follows:

- The prevention, control and abatement of pollution, i.e. air pollution, marine water pollution, sediment pollution and noise pollution,
- b) To comply with the stipulated enviro-legal requirements and standards,
- To direct the steps to be followed, for effective maintenance and regulation of infrastructure facilities provided.

10.2 Environmental Management Cell

Fisheries department will form an environment management cell (EMC) with vision to implement the EMP as suggested in the EIA. The illustrative presentation of the EMC is presented below.

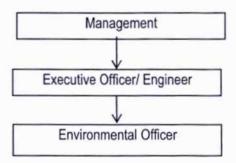


Figure 10.1 Environment Management Cell

As indicated in Organogram, Executive Officer/ Engineer will be appointed by Management and will be assisted by Environmental Officer.

The responsibilities of the above personnel are as below:

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Chapter 10 - Environmental Management Plan

Management will lead the team and will direct the EMC in timely manner and make budget available.

Standard operating procedures will be prepared by Environmental Officer well before the inception of operation phase of the project. SOPs will be reviewed and approved by Executive Engineer.

10.2.1 Environmental Activities

- Major environment protection features are solid waste management awareness. Awareness will be spread from commencement of construction phase and commissioning phase.
- Maintenance will be done throughout the extent of operation phase.

10.2.2 Budgetary Provisions for EMP

Project cost of proposed activities is estimated as Rs. 14 Crores. M/s. Dinar Tarcar Resources (India) Pvt. Ltd. has made budgetary provision which includes budget for environmental management. The same is presented below.

Table 10-1 Budgetary Provisions for EMP

Environmental Controlling Measures	Capital Investment (Rs. In Lakhs)	O & M Cost/ Annum (Rs. In Lakhs)
Sewage Treatment Plant	10	0.5
Waste management	2	0.1
Greenbelt	3	1.5
Environment Monitoring Programme	/=)	1
Total	15	3.1

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11 SUMMARY AND CONCLUSIONS

Proposed Jetty and Platform requires prior CRZ clearance under CRZ notification 06th January 2011 and Environmental Clearance under EIA Notification 2006.

The proposed activities will be located at Village Odar, Tal. Quepem, Dist. South Goa of Goa State.

The Project proponent is proposing to construction of new jetty and platform, for loading and unloading, storage, handling of ore and non-hazardous dry cargo.

Basic raw materials for construction work will be sourced from nearby market places.

The proposed project will meet its water and energy requirement by public water supply and tanker respectively.

There is no effluent generation, wastewater generated will be disposed in septic tank, hazardous waste such as empty containers and used batteries will be given to GSPCB authorised recyclers and solid waste to authorized recycler.

Baseline monitoring has been done in Summer 2022 to understand ambient air quality, water quality (including marine), soil quality (including sediment), noise level, biological and socio-economic status of study area.

Study area of 10 Km area around site is taken as to establish baseline environment. Study area consists of the total area 331.3 km², the study area comprises of about 6.03% of water body as the site is located adjacent to Zuari River. As per LULC map, other than water body, most of the study area falls under Mining 3.5 % and Industry 0.5 %. Built up land for residential/commercial is only about 10.97 % of the total area under study. The main plantation in region is Coconut.

Soil quality has been checked in Odar Village Soil is neutral, has sufficient humus, less phosphorus, very low potash, good concentration of micronutrients, and heavy metals viz. Lead, Chromium and Manganese below detectable limit. AAQM has been done for PM₁₀, PM_{2.5}, SO₂, NOx and CO near site in Odar and, it is observed that all parameters are within the prescribed limits. Ambient Noise levels found close to standard though both day and night readings are within limit. Water quality has been checked at Odar (1- Ground water). Ground water has all the parameters within permissible limit. Water is suitable for drinking. Study area has Eco fragile Area. There are no Mangroves and Mangrove buffer zone at site. The site has

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coconut grove, hence coconut tree cutting is required at site. Species observed in surrounding to site are commonly found in other parts of region.

Study area and data from Government agencies is assessed to check socio-economic status of the region. The area is rural in nature and has moderate sex ratio and literacy. The area has average transportation facility, infrastructure, education, banking and health facilities. Major source of income in the area is agriculture/ orchard, mining and employment. Rice is major crop of the area and agriculture is rain fed.

Environmental impact matrix evaluation has been done for land environment, air environment, water environment, solid and hazardous waste management, biological environment socio-economic environment with & without control measures. Proposed facilities will have negative impacts if proper mitigation measures are not taken. Details impacts and mitigation measures for four stages of projects cycle namely Construction, Commissioning, Operation & Decommissioning phases are described in chapter 4.

Detailed Environmental monitoring program covering all four stages of project cycle has been presented in chapter 6, along with EMP budget and schedule for compliances.

The Environmental management plan is prepared giving roles and responsibilities throughout the EMC for implementation of EMP.

The proposed project of M/s. Dinar Tarcar Resources (India) Pvt. Ltd. will have nonappreciable adverse impact with due implementation of control measures as suggested. Continued vigilance with budgetary support will be ensured from the management in order to implement the EMP.

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Chapter 12 - Disclosure of Consultants Engaged

12 DISCLOSURE OF CONSULTANTS ENGAGED

Name	Aditya Environmental Services Pvt. I	_td			2.2						
Reg. Office	107, Hiren Light Industrial Estate, Mo	ogul Lane, Mahin	n, Mumba	ai – 4000	16						
Phone No.	(022) 42127500/(022) 24456473/730)4794854 E	mail id	: contac	ct@aespl	l.co.in					
Website	http://www.aespl.co.in/										
Laboratory	Aditya Environmental Services Pvt. L P1, Commercial Complex, MIDC Col Maharashtra PIN - 410222		aluka Kh	alapur, D	Dist. Palg	har,					
Phone No.	(02192) 252008/ (02192) 250352	Email id		: pglab(@aespl.c	o.in					
Contacts:	Goa, Pune, Ahmedabad, Delhi & Va	dodara									
Obtained	 OHSAS 18001:2007 Certifie NABL Accredited (TC-7085) (Wastewater & Water) and Soil & Ro (Drinking, Ground, Surface & Swimm (Sewage water) 	for Chemical Te	ils) Biolo	gical Te	sting: -	Water					
Accredited	S. Sector Description Sector (as per) Car										
Accredited Sectors	1 Mining of minerals opencast only 2 Onshore oil and gas exploration, develop 3 River Valley projects- Irrigation only 4 Thermal power plants 5 Metallurgical industries (ferrous only) 6 Cement plants 7 Petroleum refining industry 8 Chemical fertilizers 9 Pesticides industry and pesticide-specific 10 Petrochemical based processing 11 Synthetic organic chemicals industry 12 Air ports 13 Industrial estates/ parks/ complexes/ Special Economic Zones, Biotech Parks, I 14 Common hazardous waste treatment, st 15 Bio-medical waste treatment facilities 16 Ports, harbours, break waters and dredg	intermediates areas, export process eather Complexes orage and disposal fac	0.00	1 2 3 4 8 9 10 16 17 20 21 29 31 32 32A 33 34	1 (a) (i) 1 (b) 1 (c) 1 (d) 3 (a) 3 (b) 4 (a) 5 (a) 5 (b) 5 (e) 5 (f) 7 (a) 7 (c) 7 (d) 7 (da) 7 (e) 7 (f)	A A A A A A A A A A A A A A A A A A A					
	17 Highways, 18 Common Effluent Treatment Plants (CEI 19 Common Municipal Solid Waste Manage 20 Building and construction projects 21 Townships and Area development project	ment Facility (CMSWN	(F)	36 37 38 39	7 (h) 7 (i) 8 (a) 8 (b)	B B B					
	17 Highways, 18 Common Effluent Treatment Plants (CET 19 Common Municipal Solid Waste Manage 20 Building and construction projects 21 Townships and Area development project	ment Facility (CMSWN		37 38	7 (i) 8 (a)	B					

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Chapter 12 - Disclosure of Consultants Engaged

- Risk Analysis Studies & On Site/ Off Site Emergency Management Plan.
- Environment Health & Safety audits & Due Diligence audits
- Effluent Treatment Treatability Studies & Project Management Consultancy
- ► Analytical Services covering entire spectrum of environmental analysis
- Environmental Training and awareness
- Project management consultancy for installation of effluent treatment plant
- Environmental monitoring and legislation compliance services
- Operation of effluent treatment plants



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National Accreditation Board for Education and Training



Certificate of Accreditation

Aditya Environmental Services Pvt. Ltd., Mumbai

110, Hiren Light Industrial Estate, Mogul Lane, Mahim, Mumbai-400016

The organization is accredited as Category-A under the QCI-NABET Scheme for Accreditation of EIA Consultant Organization, Version 3: for preparing EIA-EMP reports in the following Sectors —

S.	Sector Description		(as per)		
No	Sector Description	NABET	MoEFCC	Cat.	
1	Mining of minerals opencast only	1	1 (a) (i)	A	
2	Onshore oil and gas exploration, development & production	2	1 (b)	A	
3	River Valley projects- Irrigation only	3	1 (c)	В	
4	Thermal power plants	4	1 (d)	A	
5	Metallurgical industries (ferrous only)	8	3(a)	A	
6	Cement plants	9	3(b)	A	
7	Petroleum refining industry	10	4 (a)	A	
8	Chemical fertilizers	16	5 (a)	8	
9	Pesticides industry and pesticide-specific intermediates	17	5 (b)	A	
10	Petrochemical based processing	20	5 (e)	A	
11	Synthetic organic chemicals industry	21	5 (f)	A	
12	Air ports	29	7 (a)	A	
13	Industrial estates/ parks/ complexes/areas, export processing Zones, Special Economic Zones, Biotech Parks, Leather Complexes	31	7 (c)	A	
14	Common hazardous waste treatment, storage and disposal facilities	32	7 (d)	A	
15	Bio-medical waste treatment facilities	32A	7 (da)	В	
16	Ports, harbours, break waters and dredging	33	7 (e)	A	
17	Highways,	34	7 (f)	A	
18	Common Effluent Treatment Plants (CETPs)	36	7 (h)	В	
19	Common Municipal Solid Waste Management Facility (CMSWMF)	37	7 (i)	В	
20	Building and construction projects	38	8 (a)	В	
21	Townships and Area development projects	39	8 (b)	В	

Note: Names of approved EIA Coordinators and Functional Area Experts are mentioned in RAAC minutes dated Sept 30, 2022 and poster on QC-NABET website.

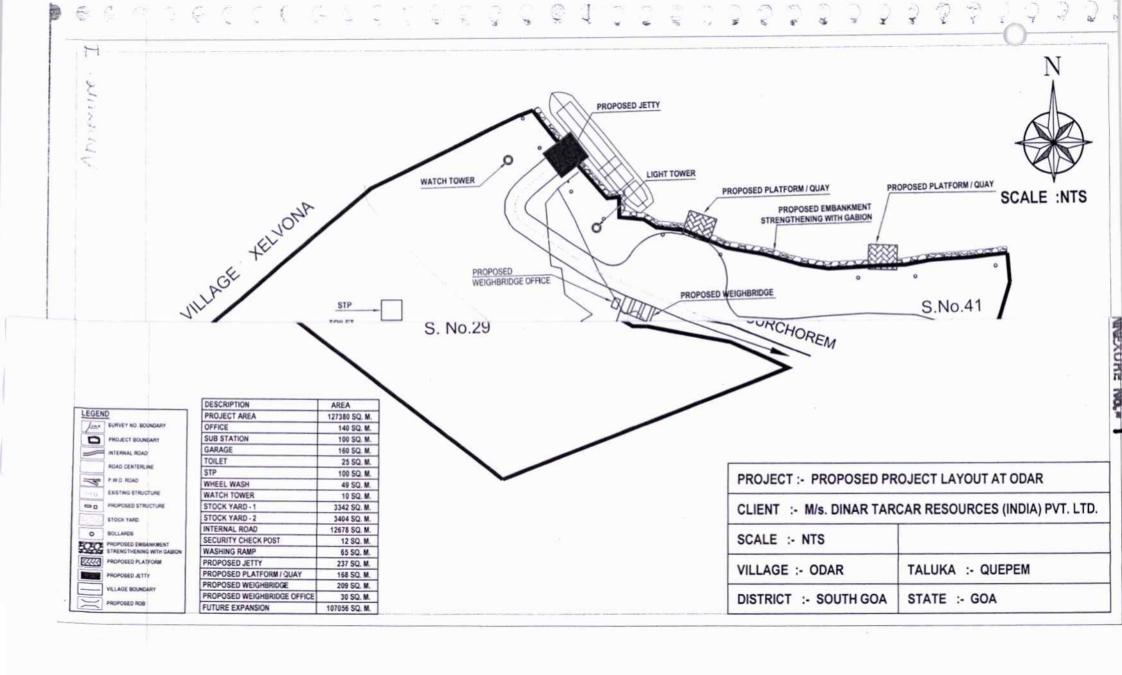
The Accreditation shall remain in force subject to continued compliance to the terms and conditions mentioned in OCI-NABET's letter of accreditation bearing no CicUNABET/ENV/ACO/22/2557 dated Oct 18, 2022. The accreditation needs to be renewed before the expiry date by Aditya Environmental Services Pvt. Ltd., Mumbai following due process of assessment.



Sr. Director, NABET Dated: Oct 18, 2022 Certificate No. NABET/EIA/2225/RA 0262 Valid up to May 01, 2025

For the updated List of Accredited EIA Consultant Organizations with approved Sectors please refer to the QCI-NABET web

ANNEXURE



Annexure II
List of Observed & Reported Flora in Study area

Sr No	Scientific Name	Common/ Local Name	Family
	Trees		
1	Anacardium occidentale	Kaju, Cashew	Anacardiacea
2	Annona squamosa	sitaphal	Annonaceae
3	Arecu kutechu	Supari	Arecaceae
4	Avicennia alba	Mangrove	Acanthaceae
5	Avicennia marina	Grey Mangrove	Acanthaceae
6	Avicennia officinalis	White mangrove, Tivar	Acanthaceae
7	Bombax malbaricum	Silk Cotton Tree, Shalmali	Bombacaceae
8	Bridelia retusa	Spinous Kino Tree, asana	Phyllanthaceae
9	Bruguiera cylindrica	Mangrove	Rhizophoraceae
10	Bruguiera gymnorhiza	Black Mangrove	Rhizophoraceae
11	Careya arborea	Wild Guava, Kumbhi	Lecythidaceae
12	Caryota urens	Fishtail palm	Arecaceae
13	Catunaregam spinosa	Ghela	Rubiaceae
14	Ceriops tagal	Mangrove	Rhizophoraceae
15	Cocus nucifera	coconut	Arecaceae
16	Cordia dichotoma	Indian cherry, Lasora	Boraginaceae
17	Diospyros malabarica	Gablo	Ebanaceae
18	Erythrina indica	Indian Coral Tree, Pangara	Fabaceae
19	Excoecaria agallocha	Blinding White Mangrove	Euphorbiaceae
20	Falconeria insignis	Uro	Euphorbiaceae
21	Ficus religiosa	scared fig/Pimpal	Moraceace
22	Gmelina arborea	Gamhar	Verbenaceae
23	Grewia tiliifolia	Dhaman	Tiliaceae
24	Holptelea integrifolia	Vavala, Indian Elm	Ulmaceae
25	Kandelia candel	Mangrove	Rhizophoraceae
26	Lanea coromandelica	Indian Ash Tree, Mohin	Anacardiaceae
27	Lumnizera racemosa	Mangrove	Combretaceae
28	Mangifera indica	Mango, aam	Anacardiaceae
29	Musa paradisiaca	Banana	Mucaceae
30	Mymeceylon umbellatum	Anjan, Ironwood tree	Melastomatacea
31	Polyalthia longifolia	False Ashoka	Annonaceae
32	Rhizophora apiculata	Stilt mangrove	rhizphoraceae
33	Rhizophora mucronata	Kandal	Rhizophoraceae
34	Sonneratia alba	Apple Mangrove	Lythraceae
35	Sonneratia caseolaris	Apple Mangrove	Lythraceae
36	Syzygium cumini	Jamun	Myrtaceae
37	Tabernarmontana alternifolia	Naag kuda	Apocynaceae
38	Termenalia elliptica	Ain, Asan	Combretaceae
39	Terminalia arjuna	Arjuna	Combretaceae
40	Terminalia bellirica	Baheda	Combretaceae
41	Terminalia catappa	indian badam	combretaceae
42	Terminalia myriocarp	Silk Cotton Tree, Shalmali	Combretaceae
43	Terminalia paniculata	Kinjal	Combretaceae

Sr No	Scientific Name	Common/ Local Name	Family
	Shrubs		
1	Abelmoschus esculentus	Lady's finger	Malvaceae
2	Acanthus ilicifolius	Mangrove	Acanthaceae
3	Aegiceras corniculatum	River black mangrove	Myrsinaceae
4	Ananus comosus	Pine apple	Bromoliaceae
5	Brassica oleraceae	Navalcol	Brassicaceae
6	Calycopteris floribunda	Baguli/ Ukshi	Combretaceae
7	Capsicum frutescene	Chilli	Solanaceae
8	Carissa carandus	Karawandi	Apocynaceae
9	Citrus limetta	sweet lime	rutaceae
10	Cyamopsis tetragonoloba	Cluster beans	Fabaceae
11	Flemingia strobilifera	Kanphuti	Fabaceae
12	Hibiscus rosa sinensis	China Rose, Jaswand	Malvaceae
13	Holarrhena pubescens	Kudo	Apocynaceae
14	Ipomoea batatas	Sweet potato	Solanaceae
15	ixora coccinea	ixora	Rubiaceae
16	Ixora indica	INOTA	Rubiaceae
17	Melastoma malabathricum	Maleastoma	Melastomataceae
18	Microcos paniculata	Hasale	Tiliaceae
19	Ochna serrulata	Mickey mouse plant	Ochnaceae
20	Raphanus sativus	Raddish	Brassicaceae
21	Salvadora persica	Mangrove Associate	Saldoraceae
22	Solanum melongena	Egg plant	Solanaceae
	Herbs	Lgg plant	Solaliaceae
1	Lantana camara	wild sage/Ghaneri	verbenaceae
2	Alternanthera sessilis	who sage/ dhaheri	Amaranthaceae
3	Alternanthera sp	Tambadi bhaji	Amaranthaceae
4	Brassica juncea	Mustard	Brassicaceae
5	Colocasia esculanta	Alu	Araceae
6	Crossandra infundibuliformis	Aboli	acanthaceae
7	Crotalaria pallida	rattle pod	Fabaceae
8	Eranthemum roseum	Ranaboli	Acanthaceae
9	Hyptis suaveolens	Ran tulas	Lamiaceae
10	Leea microphylla	Dinidi	
11	Mimosa pudica		Ampelideae
11	Pseuderanthemum	Touch me not/ laajalu	Mimosaseae
12	malabaricum	False earanthemum	Acanthaceae
13	Sesuvium portulacastrum	Mangrove Associate	Aizoaceae
14	Tridax procumbens	Dagadi	Asteraceae
15	Urena lobata		Malvaceae
16	Urena sinuata	hibiscus burr, Van Bhendi	Malvaceae
TO STATE	Climbers	moiscus ouri, van bhenui	Marvaceae
1	Abrus precatorious	Cunia	Leguminossas
2	Coccinia grandis	Gunja Tendli	Leguminoceae cucurbitaceae
3	Cyclea peltata		
4	Derris trifoliata	Indian Moonseed	Menispermaceae
		Common derris	Fabaceae
5	Dioscorea bulbifera	Air yam	Dioscoriaceae

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Sr No	Scientific Name	Common/ Local Name	Family
6	Jasminum malabaricum	Wild Jasmine	Oleaceae
7	Luffa Acutangola	Anantamul	Asclepiadaceae
8	Luffa cylindrica	Doodhi	cucurbitaceae
9	Momordica charantia	Karela	cucurbitaceae
10	Momordica dioica	Bristle Gourd	cucurbitaceae
11	Mucuna monosperma	Mothi Kuili	Fabaceae
12	Mucuna pruriens	Khajkuhiri	Leguminoceae
13	Tinospora cordifolia	Gulve (Amarvel)	Menispermaceae
14	Trichosanthes cucumerina	Snake Gourd	cucurbitaceae
	Epiphytes		
1	Acampe praemorsa	Maravasha	Orchidaceae
2	Aerides maculosa	Thipke irid amri	Orchidaceae
3	Bulbophyllum mysorensa	Mysore bulbleaf orchid	Orchidaceae
4	Dendropthoe falcata	Kala Kuda	Loranthaceae
5	Cuscuta reflexa	Giant Dodder, Amar bel	Convolvulaceae
	Ferns		
1	Nephrolepis exeltata	Sword fern	Lomariopsidaceae
2	Acrostichum aurem	Mangrove Associate	Pteridaceae
3	Adiantum capilus veneris	Maiden hair fern	Pteridaceae
	Grasses		
1	Allium cepa	Onion	Amaryllidaceae
2	Apluda mutica	grass	Poaceae
3	Bambusa arundinacea	Bamboo	Poaceae
4	Bambusa sp.	Bamboo	Poaceae
5	Coix lachryma-jobi	•	Poaceae
6	Cynodon dactylon	Harli	Poaceae
7	Eragrostis unioloides	Chinese Love grass, seete-che pohe	Poaceae
8	Oryza sativa	Rice	Poaceae
9	Panicum miliare	Wari	Poaceae
10	Porteresia coaretata		Poaceae

List of Observed & Reported Fauna in Study area

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Sr. No.	Scientific Name	Common/ Local Name	Family	Schedule
	Mammals			
1.	Bos indicus	Cow	Bovidae	
2.	Bubalus bubalis	Buffalo	Bovidae	
3.	Canis lupus familiaris	Dog	Canidae	
4.	Capra hircus	Goat	Bovidae	
5.	Equus Asinus	Donkey	Equidae	
6.	Felis catus	Cat	Felidae	C. A. III A ETHAN ST
7.	Funambulus palmarum	Squirell	Sciuridae	
8.	Herpestes edwardsi	Indian Grey Mongoose	Herpestidae	II
9.	Hystrix indica	Indian Porcupine	Hystricidae	IV
10.	Lepus nigricollis	Black Naped Hare	Leporidae	IV

Sr. No.	Scientific Name	Common/ Local Name	Family	Schedule		
11.	Muntiacus muntjak	Barking Deer	Cervidae	III		
12.	Mus musculus	House mouse	Muridae			
13.	Pipistrellus coromandra	Little Indian Bat	Vespertilionidae			
14.	Rattus sp.			IV		
15.	Semnopithecus hypoleucos	Black Footed Grey Langur	Cercopithecidae	II		
16.	Suncus murinus	House shrew	Soricidae			
17.	Sus cristatus	Pig	Suidae			
18.	Sus scrofa	Indian Wild Boar	Suidae	III		
19.	Pteropus giganteus	Flying fox	Pteropodidae			
	Reptiles	, ,				
1.	Calotes calotes	Common Calotes	Agamidae			
2.	Calotes rouxii	Wild Lizard	Agamidae	11 11 11 11		
3.	Calotes versicolor	Common Garden Lizard	Agamidae			
4.	Crocodilus palustris	Marsh Crocodile	Crocodylidae	1		
5.	Echis carinatus	Saw-Scaled Viper	Viperidae	IV		
6.	Hemidactylus flaviviridis	Yellow-bellied House Gecko	Gekkonidae			
7.	Lacerta varius	Common Monitor Lizard	Varanidae	I		
8.	Mabuya carinata	Common Skink	Scincidae			
9.	Naja naja	Common Cobra	Elapidae	1		
10.	Psammophilus dorsalis	South Indian rock agama	Agamidae			
11.	Ptyas mucosa	Dhaman	Colubridae	II		
	Birds					
1.	Accipiter badius	Indian Shikra	Accipitridae			
2.	Acridotheres fuscus	Jungle Myna	Sturnidae	IV		
3.	Acridotheres tristis	Common Myna	Sturnidae	IV		
4.	Aethopyga siparaja	Crimson Sunbird	Nectariniidae	IV		
5.	Amaurornis phoenicurus	White Breasted Water hen	Rallidae			
6.	Anastomus oscitans	Asian Open bill Stork	Ciconiidae	IV		
7.	Anthus rufulus	Paddy field Pipit	Motacillidae	IV		
8.	Apus apus	Common swift	Apodidae	1 7 7 7 7 7		
9.	Apus nipalensis	House Swift	Apodidae			
10.	Ardea alba	Large Egret	Ardeidae	IV		
11.	Ardea cinerea	Grey Heron	Ardeidae	IV		
12.	Ardeola grayii	Pond Heron	Ardeidae	IV		
13.	Artamus fuscus	Ashy wood swallow	Artamidae			
14.	Bubulcus ibis	Catle Egret	Ardeidae	IV		
15.	Centropus sinensis	Greater Coco	Cuculidae	IV		
16.	Ceryle rudis	Lesser Pied Kingfisher	Cerylidae	IV		
17.	Ciconia ciconia	White Stork	Ciconiidae	IV		
18.	Cinnyris asiaticus	Purple Sunbird	Nectariniidae	IV		
19.	Cisticola juncidis	Streaked Fantail Warbler	Cisticolidae			
20.	Clamator jacobinus	Pied Crested Cockoo	Cuculidae	IV		
21.	Columba livia	Blue rock pigeon	Columbidae			

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Sr. No.	Scientific Name	Common/ Local Name	Family	Schedule
22.	Copsychus saularis	Oriental Magpie Robin	Muscicapidae	
23.	Copsychus trichixos	Shama	Muscicapidae	V
24.	Corvus macrorhynchos	Jungle Crow	Corvidae	V
25.	Corvus splendens	House Crow	Corvidae	IV
26.	Coturnix coromandelica	Rain Quail	Phasianidae	IV
27.	Cuculus micropterus	Indian Cuckoo	Cuculidae	
28.	Dendrocitta vagabunda	Rufous Treepie	Corvidae	IV
29.	Dicrurus adsimilis	Black Drongo	Dicruridae	IV
30.	Dicrurus caerulescens	White bellied Drongo	Dicruridae	IV
31.	Dicrurus macrocercus	Black Drongo	Dicruridae	IV
32.	Dicrurus paradiseus	Racket Tailed Drongo	Dicruridae	IV
33.	Dinopium benghalense	Golden backed Woodpecker	Picidae	IV
34.	Egretta garzetta	Little Egret	Ardeidae	IV
35.	Eudynamys scolopacea	Koel	Cuculidae	IV
36.	Francolinus pictus	Painted Partridge	Phasianidae	IV
37.	Galerida cristata	Crested Lark	Alaudidae	IV
38.	Halcyon smyrnensis	White Throated Kingfisher	Halcyonidae	
39.	Haliastur indus	Brahminy Kite	Accipitridae	IV
40.	Himantopus himantopus	Black Winged Stilt	Recurvirostridae	
41.	Hirundo smithii	Wire tailed Swallow	Hirundinidae	
42.	Lanius schach	Rufous backed shrike	Laniidae	IV
43.	Lonchura striata	White backed munia	Estrildidae	
44.	Megalaima haemacephala	Coppersmith Barber	Megalaimidae	IV
45.	Megalaima virdis	White cheeked Barbet	Megalaimidae	IV
46.	Megalaima zeylanica	Brown headed barbet	Megalaimidae	. 34
47.	Merops leschenaulti	Chestnut headed Bee Eater	Meropidae	
48.	Merops orientalis	Small Green Bee eater	Meropidae	IV
49.	Microcarbo niger	Little Cormorant	Phalacrocoracidae	IV
50.	Micropternus brachyurus	Rufous Woodpecker	Picidae	
51.	Milvus migrans	Black Kite	Accipitridae	
52.	Motacilla cinerea	Grey Wagtail	Motacillidae	
53.	Motacilla flava	Yellow Wagtail	Motacillidae	
54.	Motacilla maderaspatensis	White browed Wagtail	Motacillidae	IV
55.	Nectarinia asiatica	Purple Sunbird	Nectariniidae	IV
56.	Nectarinia zeyonica	Purple rumped Sunbird	Nectariniidae	IV
57.	Nycticorax nycticorax	Black Crowned Night Heron	Ardeidae	
58.	Ocyceros birostris	Indian grey Hornbill	Bucerotidae	IV
59.	Oriolus larvatus	Black headed Oriole	Oriolidae	IV
60.	Oriolus oriolus	Golden Oriole	Oriolidae	

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Sr. No.	Scientific Name	Common/ Local Name	Family	Schedule
61.	Orthotomus sutorius	Tailor Bird	Cisticolidae	IV
62.	Parus major	Great Tit	Paridae	
63.	Passer domesticus	Sparow	Passeridae	I
64.	Pavo cristatus	Common Peafowl	Phasianidae	IV
65.	Perdicula asiatica	Jungle Bush Quail	Phasianidae	IV
66.	Perdicula erythrorhyncha	Painted Bush Quail	Phasianidae	IV
67.	Perdix perdix	Grey Partridge	Phasianidae	IV
68.	Pericrocotus cinnamomeus	Small Minivet	Campephagidae	IV
69.	Pericrocotus ethologus	ericrocotus ethologus Long tailed Minivet Campephagidae		IV
70.	Pericrocotus flammeus	Scarlet Minivet	Campephagidae	
71.	Phaenicophaeus leschenaultii	Sirkeer Malkoha	Cuculidae	IV
72.	Phalacrocorax carbo	Greater Cormorant	Phalacrocoracidae	IV
73.	Phalacrocorax fuscicollis	Indian Cormorant	Phalacrocoracidae	IV
74.	Pitta brachyura	Indian Pitta	Pittidae	
75.	Prinia Socialis	Ashy prinia	Cisticolidae	IV
76.	Psittacula eupatria	Alexandrine Parakeet	Psittaculidae	IV
77.	Psittacula krameri	Rose ringed Parakeet	Psittaculidae	IV
78.	Pycnonotus cafer	Red Vented Bulbul	Pycnonotidae	IV
79.	Pycnonotus jocosus	Red wiskerd bulbul	Pycnonotidae	
80.	Saxicoloides fulicata	Indian Robin	Muscicapidae	IV
81.	Streptopelia chinensis	Spotted Dove	Columbidae	IV
82.	Sturnus pagodarum	Brahminy Starling	Sturnidae	IV
83.	Zoothera citrina	Orange headed Thrush	Turdidae	
84.	Zosterops palpebrosus	Oriental White Eye	Zosteropidae	
	Ampbians			A SELECTION OF THE SECOND
1	Euphlyctis cyanophlyctis	Skipper Frog	Dicroglossidae	
	Insects		The state of the s	
1.	Cepora nerissa	Common Gull	Pieridae	11
2.	Danaus chrysippus	Plane Tiger	Nymphalidae	
3.	Delias eucharis	Common Jezebel	Pieridae	
4.	Junonia lemonias	Lemon Pancy	Nymphalidae	
5.	Parantica aglea	Glassy Tiger	Nymphalidae	\$4.07Exp. Z
6.	Tirumala limniace	Blue Tiger	Nymphalidae	
7.	Argiope anasuja	Signature Spider	Araneidae	

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ANNEXURE III

그리트 본 시 시 선 또 나 시 니 프로그 그는 그 사 내 가 가 다 내 가 가 다 되고 그 수 된 중 축

DEMOGRAPHIC DETAILS

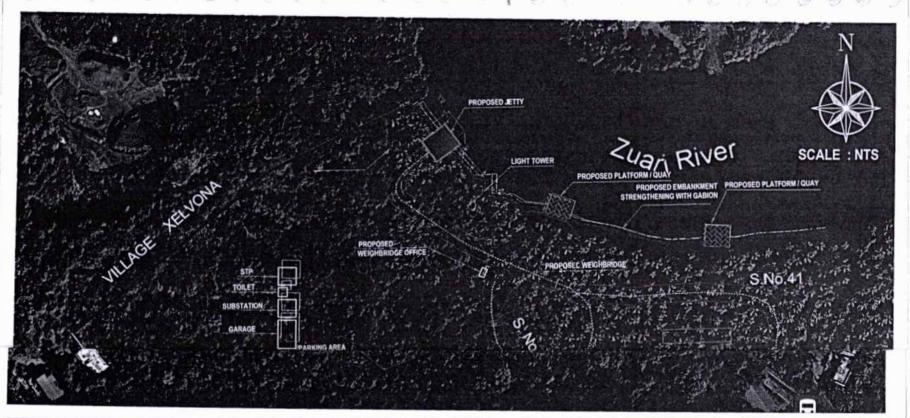
Sr.	Distr	Talu	Town/		TR	No_	тот	TOT	TOT	P_0	P_	P_S	P_LI	TOT_W	MAINW	MARGW	NON_W
No	ict	ka	Village	Name	U	HH	_P	_M	_F	6	SC	T	T	ORK_P	ORK_P	ORK_P	ORK_P
	South	Salce			Ru		344	159	184				273				
1	Goa	te	626908	Dramapur	ral	861	1	5	6	386	34	125	7	912	712	200	2529
	South	Salce			Ru		305	157	148				232				
2	Goa	te	626909	Dicarpale	ral	695	7	3	4	345	29	560	9	1147	963	184	1910
	South	Salce			Ru		222	103	119				173				
3	Goa	te	626910	Cavorim	ral	576	8	1	7	230	22	54	5	704	461	243	1524
	South	Salce			Ru												
4	Goa	te	626911	Chandor	ral	184	707	307	400	71	0	5	542	183	157	26	524
	South	Salce			Ru												
5	Goa	te	626912	Paroda	ral	151	620	295	325	40	0	0	520	278	156	122	342
	South	Salce			Ru		279	134	145			107	200				
6	Goa	te	626913	Mulem	ral	668	9	9	0	325	8	3	1	900	788	112	1899
	South	Salce			Ru		227	100	127				178				
7	Goa	te	626914	Sarzora	ral	605	0	0	0	239	63	267	1	646	623	23	1624
					Ur												
	South	Salce			ba	214	876	443	432	868	15	485	719				
8	Goa	te	803249	Margao (M Cl)	n	06	50	67	83	8	81	7	28	35656	32696	2960	51994
					Ur												
	South	Salce			ba	258	107	525	545	110		296	838				
9	Goa	te	626925	Raia (CT)	n	0	06	6	0	6	66	8	7	3545	3028	517	7161
					Ur												
	South	Salce			ba	310	128	621	667	130		162	100				
10	Goa	te	626926	Curtorim (CT)	n	2	86	6	0	9	53	8	51	4537	3608	929	8349
	S. S.	- 25		- 200	Ur												
	South	Salce		Sao Jose de	ba	247	102	521	501	127	11	232	767				
11	Goa	te	626927	Areal (CT)	n	0	29	3	6	4	3	1	2	3698	3097	601	6531
					Ur							0.000					
	South	Salce			ba	340	153	784	750	188	49	162	119				
12	Goa	te	626928	Davorlim (CT)	n	8	50	4	6	5	3	7	21	5747	5060	687	9603

South Que Ru 13 Goa 118 12 540 pem Assolda ral South Que Ru Xic-Xelvona 14 Goa pem ral South Oue Ru 15 Goa Xelvona pem ral Que South Ru 16 Goa pem Odar ral South Que Ru 17 Goa pem Cotombi ral Que South Ru 18 Goa Avedem pem ral Que South Ru Goa pem Chaifi ral Que South Ru Sirvoi 6 375 20 Goa pem ral Que South Ru 21 Goa pem Nagvem ral Que South Ru Zanodem 22 Goa ral pem South Que Ru Molcarnem 23 Goa pem ral South Que Ru 24 Goa Ambaulim pem ral Ur Quepem (M South Oue ba Goa pem n Ur Curchorem-South Que ba Cacora (M Cl) 26 Goa pem n Ur South Que ba Xeldem (CT) Goa pem n Sang Cormonem 28 South

	Goa	uem			ral												
20	South	Sang	626001	C 111	Ru		380	195	184			400	295	4500		2.10	22.60
29	Goa	uem	626981	Codli	ral	884	1	5	6	353	55	628	2	1533	1191	342	2268
30	South Goa	Sang uem	626982	Camarconda	Ru ral	173	793	395	398	66	0	553	583	309	158	151	484
31	South Goa	Sang uem	626983	Moissal	Ru	2	8	5	3	1	0	3	7	4	4	0	4
32	South Goa	Sang	626984	Bandoli	Ru ral	231	106	512	548	144	14	546	688	453	277	176	607
33	South Goa	Sang	626985	Rumbrem	Ru	131	646	300	346	90	11	7	450	283	132	151	363
34	South	Sang	626987	Santona	Ru	343	140	739	664	196	5	29	992	577	491	86	826
35	South	Sang	626988	Calem	Ru	574	268	131	136	288	42	568	203	911	754	157	1772
36	South Goa	Sang	626995	Dudal	Ru	97	446	229	217	48	0	155	300	226	108	118	220
37	South Goa	Sang	626996.	Costi	Ru	196	881	503	378	84	0	1	671	394	364	30	487
38	South Goa	Sang	626997	Coranginim	Ru ral	9	32	14	18	2	0	0	27	11	8	3	21
39	South Goa	Sang uem	626998	Comproi	Ru ral	150	620	301	319	54	0	3	489	226	203	23	394
40	South Goa	Sang	626999	Muguli	Ru	119	508	225	283	47	0	334	374	249	125	124	259
41	South Goa	Sang uem	627000	Cotarli	Ru ral	258	112	563	558	117	4	293	848	469	394	75	652
42	South Goa	Sang	627001	Xelpem	Ru ral	66	255	122	133	22	0	65	205	85	71	14	170
43	South Goa	Sang uem	627003	Uguem	Ru ral	608	255 7	124 8	130 9	307	57	540	179 9	1003	787	216	1554
44	South Goa	Sang	803253	Sanguem (M Cl)	Ur ba n	154 5	644 4	316	328	664	72	379	510	2476	2077	399	3968

Tota	i					8	146	365	781	7	31	7	612	99434	83677	15757	159712
						17	259	129	129	89	39	22	203				
						62				26		35					
49	h Goa	a	626864	Ponchavadi	ral	931	5	0	5	407	3	882	0	1568	1255	313	2727
	Nort	Pond			Ru		429	214	215				336				
48	h Goa	a	626863	Siroda	ral	7	41	6	5	4	7	5	90	5372	4264	1108	8669
	Nort	Pond			Ru	319	140	688	715	128	29	289	111				
47	Nort h Goa	Pond a	626862	Conxem	Ru ral	39	186	94	92	24	0	0	137	75	55	20	111
46	Nort h Goa	Pond a	626861	Nirancal	Ru ral	406	177 2	880	892	135	0	278	136 9	640	488	152	1132
45	South Goa	Sang	627021	Sanvordem (CT)	Ur ba n	118 7	510 3	255 2	255 1	634	14	48	384	2143	1872	271	2960

Source: Primary census abstract 2011, Goa state



LEGEN	ID .
Line	SURVEY NO. BOUNDARY
0	PROJECT BOUNDARY
	INTERNAL ROAD
	ROAD CENTERLINE
-	P.W.D. ROAD
00.	EXISTING STRUCTURE
00	PROPOSED STRUCTURE
111111111111111111111111111111111111111	STOCK YARD
0	BOLLARDS
00	PROPOSED EMBANKMENT STRENGTHENING WITH GABION
2225	PROPOSED PLATFORM
	PROPOSED JETTY
	VILLAGE BOUNDARY
\times	PROPOSED ROB

DESCRIPTION	AREA
PROJECT AREA	127380 SQ. M
OFFICE	140 SQ. M.
SUB STATION	100 SQ. M.
GARAGE	160 SQ. M.
TOILET	25 SQ. M.
STP	100 SQ. M
WHEEL WASH	49 SQ. M.
WATCH TOWER	10 SQ. M.
STOCK YARD - 1	3342 SQ. M.
STOCK YARD - 2	3404 SQ. M.
INTERNAL ROAD	12678 SQ. M.
SECURITY CHECK POST	12 SQ. M.
WASHING RAMP	65 SQ. M.
PROPOSED JETTY	237 SQ. M.
PROPOSED PLATFORM / QUAY	168 SQ. M.
PROPOSED WEIGHBRIDGE	209 SQ. M.
PROPOSED WEIGHBRIDGE OFFICE	30 SQ. M.
FUTURE EXPANSION	107056 SQ. M.

PROJECT :- PROPOSED PR	OJECT LAYOUT AT ODAR
CLIENT :- M/s. DINAR TAR	CAR RESOURCES (INDIA) PVT. LTD.
SCALE :- NTS	
VILLAGE :- ODAR	TALUKA :- QUEPEM
DISTRICT :- SOUTH GOA	STATE :- GOA



Date :	07/05/2015			न	मुना नं '	१ व १४	}		Page	1	of 1		
Taluka	QUEF	PEM								vey I	No. 2	29	
तालुका									सर्वे न				
Village	Hoda	r							Sub	Div.	No. ()	
गांव Name	of the Field Muddi								हिस्स Ten	ा नंबर ure			
शेताचें न	ia								सत्ता	प्रकार			
Cultivab	le Area (Ha.Ars.Sq.Mtr	s) लागण	क्षेत्र (हे आ	र चौ मी)									
Dry Cre	op Garden		Rice	Khaja	ın	K	er		Morad			al Cultivable / । लागण क्षेत्र	Area
ाजरायत	वागायत		ारी	खाजन		के			मोरइ		6%,	। लागण जन	
0.0000	0.00 0001.73.0	0 (0.00.0000	0 0000.	00.00	00	00.00	0.00	0.000.0	00.00	0	0001.73.00	
	वर्ग (ब)	बराब Fotal Un-0 एकूण न		e Area	Gran एकूण	nd Tota	al	Rer	marks 🤻	ोरा			
					0001.7	1000	· · · · · · · ·			-	-		
Asses आकार	ssment: Rs. 0.00		Foro फोर	Rs. 0.00			redia देयाल	Rs.	0.00		Rent रॅट	Rs. 0.0	0
S.No.	Name of the Occ कब्जेदाराचे नांव	upant				Khata खाते न			utation No. हरफार नं		Remark	ks शे	रा
1	Minescape Minerals F	VT. LTD.						2	3315				
S.No.	Name of the Ten	ant कुळा	ने नांव		2		ta No		Mutation फेरफार		Remark:	3	
1		Nil-							0.710.5		70,50		
Other	Rights इतर हक्							Mutati	on No.	Rem	arks		
	of Person holding rights a धारण करणा-याचे नांव व		of rights.					फेरफार	नं	शेरा			
रूप र हुव	जारन करनान्याय नाय य	Nil			-		_	-		-			
		De	tails of C	Propped Ar	rea पिव	नाखाली	ल क्षेत्र	ाचा ता	पशील				
Year	Name of the	Mode	Season	Name	Irrigate			rigated		Availa	ble for	Source of	Remarks
वर्ष	Cultivator	रीत	मौसम	of Crop	बागाय	त	जिराय	यत	cultivatio	1		irrigation	शेरा
	लागण करणा-याचे			पिकाचे नांव	Ha.Ars.S	Sa Mts	Ha Are	.Sq.Mts	Nature	2010	rea क्षेत्र LArs.Sq.Mts	सिंचनांचा	
	नांव 💮				हे. आर. च		1	चौ, मी.	प्रकार		आर. चौ. मी.	प्रारि	
	Nil												
					End of								
or any fi	irther inquires, please co	ntact the M	amlatdar o	f the concern	ed Taluk	a.					(=	老	

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· Panag - Coa



(11)

Ob:

			FORM I	& XIV			
Date :	07/05/2015		नमुना नं	9 व 9४	Page	1 1	of 1
Taluka	QUEP	EM				vey N	10. 30
तालुका					सर्वे न		
Village	Hodar					Div. I	OHES A
गांव Name o	f the Field Muddi				हिस्स Ten	ा नंबर ure	
शेताचें नां	व				सत्ता	प्रकार	
Cultivable	Area (Ha.Ars.Sq.Mtrs) लागण क्षेत्र (हे. आर.	चौ. मी.)				
Dry Cro	p Garden	Rice	Khajan	Ker	Morad		Total Cultivable Area
जिरायत	बागायत	तरी	<u>धाजन</u>	केर	मोरड		एकूण लागण क्षेत्र
00.00.00	.00 0002.02.00	000.00.00	00.00.00	0000.00	0.000 000.0	00.00	0002.02.00
	वर्ग (ब)			nd Total	Remarks [§]	ोरा	
Assess आकार	sment: Rs. 0.00	Foro F फोर	Rs. 0.00	Predia ग्रेदियाल	Rs. 0.00		Rent Rs. 0.00
S.No.	Name of the Occu	ipant		Khata No. खाते नंबर	Mutation No. फेरफार नं		Remarks शेरा
1 1	Minescape Minerals P	VT. LTD.			23316		
S.No.	Name of the Tena	ant कुळाचे नांव		Khata No खाते नंबर	Zali Daniel Park	100000000000000000000000000000000000000	Remarks शेरा
1	***************************************	Nil					
Name of	- Rights इतर हक्क Person holding rights ar धारण करणा-याचे नांव व ह				Mutation No. फेरफार नं	Rema शेरा	arks
House I	belongs to						
1) Roqu	ue Mascarenhas						
2) Shrik	ant Vithoba Fadte						
	a Dhaktu Fadte						
	Chandru Naik						
	Chandru Naik						
554 00000	ant Dattaram Fadte						
7							
			opped Area पि	the same of the sa	ाचा तापशील igated Land not	Averites	ble fee
Year	Name of the	Mode Season N	ame Irrigat	ed Other	gateu Land not	rivalial	ble for Source of Remarks

पिकाचे नांव Ha.Ars.Sq.Mts Ha.Ars.Sq.Mts है, आर. ची. मी. है, आर. ची. मी.

of Crop

End of Report

बागायत

जिरायत

For any further inquires, please contact the Mamlatdar of the concerned Taluka.

रीत

Cultivator

लागण करणा-याचे

-----Nil--

वर्ष

w/s

मौसम

OFFICE IM CHARGE LAND RECORDS 192 CONS. FIT ORDER

cultivation नापिक जमीन

Area क्षेत्र

Ha.Ars.Sq.Mts

हे, आर. चौ. मी.

Nature

प्रकार

- Caroliteri

irrigation

सिंचनांचा

प्रारि

शेरा



Page

1 of 1

1

-

07/05/2015

Date:

Taluka	QL	JEPEM							Surv सर्वे न	ey ۱،	No. 3	4	
तालुका Village	Но	dar								Div.	No. 1		
गांव		tegal							7.2	ा नंबर			
ापवागट शेताचें न	and the second second second second	tegai								पास प्रकार			
21.07.11			- A A						4411	ячис			
	le Area (Ha.Ars.Sq.		क्षत्र (ह. व	श्रार. चा. मा.)									nower and a second
Dry Cr जिरायत	A-8-5		Rice तरी	Khaja खाजन		Ke केर			Morad मोरड			l Cultivable A लागण क्षेत्र	vrea
0000.0	0.000 0000.0	0.00	0000.16.	80 0000	.00.00	000	00.00	0.00	0.000.0	0.00	0	000.16.80	
	(a) Class (b) वर्ग (व)	ट खराब Total Un एक्ण		le Area		nd Tota	ı		marks शे n/217/04dt.3 m		oyDy.Col.&S	DO	
Asses आकार	ssment: Rs. 0.	00	Foro फोर	Rs. 0.00			edia याल	Rs.	0.00		Rent रॅट	Rs. 0.00)
S.No.	Name of the C कब्जेदाराचे नांव	ccupant				Khata। खाते नंद			lutation No. हरफार नं		Remark	(S शे	ττ
1	Minescape Minera	ls PVT. LTD						2	3326				
S.No.	Name of the T	enant कुळ	ाचे नांव			Khata खाते	a No		Mutation फेरफार		Remarks शेरा	5	
1		Ni											
Name o	Rights इतर हक्क of Person holding righ हिंदारण करणा-याचे नांब	व हक्क प्रकार	of rights:					Mutati	20110120	Rema शेरा	arks		
		Nil											
		D	atails of	Cropped A	roa Ma	craralta	r sha	,	mofter.				
Year	Name of the	Mode	Season	Name	Irrigate	- 1	_	rigated	Land not			Source of	Remarks
वर्ष	Cultivator लागण करणा-याचे नांव	रीत	मौसम	of Crop पिकाचे नांव	बागाय Ha.Ars.S हे. आर. च	Sq.Mts		.Sq.Mts चौ. मी.	cultivation Nature प्रकार	Ar	जमीन ea क्षेत्र Ars.Sq.Mts आर. चौ. मी.	irrigation सिंचनांचा प्रारि	शेरा
	Ni	l											
or any fi	urther inquires, please	contact the N	Aamlatdar (of the concern		Report a.					(F)		

OFFICIAL JAPAGE

JULY TEDORES

TO COLUMN A PATORDER

THE STATE AND A PATORDER

Place Panoli - Goa



Date:	07/05/2015			न	मुना नं °	। व १४		Page	1	of 1		
Taluka	QUE	PEM						Surv		lo. 3	4	
ालुका								सर्वे नं	बर			
/illage	Hoda	r						Sub	Div.	No. 2		
ांव								हिस्सा				
	of the Field Bintega	al						Tenu	ire			
ताचें न	ांव							सत्ताऽ	कार			
ultivab	le Area (Ha.Ars.Sq.Mtr	s) लागण	क्षेत्र (हे. अ	र. चौ. मी.)								
Dry Cre	op Garden		Dies	Vhois		Ker		Morad		Tota	l Cultivable A	rea
जिरायत	बागायत		Rice तरी	Khaja स्राजन	n	केर		मोरड		एकूण	लागण क्षेत्र	
0.000	4.00 0000.04.5	0	0.00.00.0		00.00	0.000.0	0.00	0000.00	0.00	0	000.08.50	
n-cultiv	able Area (Ha.Ars.Sq.	Mtrs) नारि	पेक क्षेत्र (हे.	आर. चौ. मी	t.)							
	Pot-Kharab पोट स	ाराव	11-31-146		.,		Ren	narks शे	रा			
Class	(a) Class (b)			50 C C C C C C C C C C C C C C C C C C C	Gran	d Total						
वर्ग (अ)	वर्ग (ब)		नापिक जामी	7	एकूण							
00.000	0.75 0000.00.00	00	00.09.25		0.000	0.00						
Asses जाकार	ssment: Rs. 0.00		Foro फोर	Rs. 0.00		Predia प्रेदियाल	KS	0.00		Rent रैंट	Rs. 0.00)
.No.	Name of the Occ कब्जेदाराचे नांव	upant				Khata No. खाते नंबर		itation No. रफार नं		Remark	(S शे	σ
1	Minescape Minerals F	VT. LTD					23	3327				
S.No.	Name of the Ten	ant कुळा	ाचे नांव			Khata N		Nutation		Remarks	;	
						खाते नंब	τ .	फेरफार न	<u> </u>	शेरा		
1		Ni					L					
Other	Rights इतर हक्क						Mutatio	n No.	Rema	arks		
Name o	of Person holding rights a		of rights:				फेरफार	नं	शेरा			
इतर हक्क	धारण करणा-याचे नांव व											
		Nil										
		De	etails of C	Cropped Ar	ea पिव	जखालील क्षे	त्राचा ता	1शील				
Year	Name of the	Mode	Season	Name	Irrigate	11.1.1	rrigated	Land not	Availa	ble for	Source of	Remarks
14	Cultivator	रीव	मौसम	of Crop	बागाय	त जिर	यत	cultivation	नापिः	व बंधीन	irrigation	शेरा
1	लागण करणा-याचे			पिकाचे नांव	Ha,Ars,S	a Maria	s.Sq.Mts	Nature	Area क्षेत्र		सिंचनांचा	
	नांव				हे. आर. व	ALCOHOL: THE PARTY OF	इ.5q.Mts c. चौ. मी.	प्रकार	100	Ars.Sq.Mls आर. चौ. मी.	प्रारि	
	Nil								4.			
	•			1	End of	Report						



Place Parioli - Goa



Date :	22/10/2019		नम्ना नं 1	2016	F	Page 1	of 2
Taluka	QUE	PEM				Survey	No. 35
तालुका						वर्वे नंबर	
Village	Hoda	ır				Sub Div.	
गांव	of the Field Uddi F	Cantom				हेस्सा नंब Fenure	τ
शिताचें न		Carnetti				ासा प्रकार	
		> _ > _	4 -0 ,			। सा अकार	
-		rs) लागण क्षेत्र (हे. आर.	चा. मा.)				
Dry Cr जिरायत	F.,	Rice	Khajan	Ker		orad	Total Cultivable Area एकुण लागण क्षेत्र
0000.0		तरी 50 0000.00.00	खाजन 0000.00.00	केर 0000.00	मो	एड 00.00.00	0002.44.50
			77.017.017.017.0	0000.00	7.00 00	00.00.00	0002.44.00
	Pot-Kharab पोट	Mtrs) नापिक क्षेत्र (हे. आ खराब	र. चा. मा.)		Remarks	. शेरा	
Class	OCTOTORIO	Total Un-Cultivable Ar	rea Gran	d Total	Remarks	,	
वर्ग (अ)	वर्ग (ब)	एकूण नापिक जामीन	एकूण				
0000.03	CONTRACT TO THE PROPERTY OF THE PARTY OF THE	1 AVAI AND	0000.4				
Asses आकार	ssment: Rs. 0.00	Foro फोर	3. 0.00	Predia प्रेदियाल	Rs. 0.00)	Rent Rs. 0.00
S.No.	Name of the Occ	upant		Khata No.	Mutation	No.	Remarks शेरा
	कब्जेदाराचे नांव			खाते नंबर	फेरफार	i	
1 1	Minescape Minerals I	PVT. LTD.			23322		
2	Minescape Minerals f	PVT, LTD.			23321		
S.No.	Name of the Ten	ant कळाचे नांव		Khata No	o. Muta	ion No.	Remarks
1		3		खाते नंबर	फेर	फार नं	शेरा
1		Nil					
Other	Rights इतर हक्क				Mutation No.	Rem	arks
Name o	of Person holding rights a				फेरफार नं	शेरा	
इतर हक्क	धारण करणा-याचे नांव व	हक्क प्रकार					
I House	s belongs to						
1) Yes	u naik						
[2) Gar	nesh Yeshwant Naik						
3) Yes	liwant Raghoba Fadte				2		
4) Rag	hoba Raghuvir naik						
5) Date	aram Pundalik Sawan	t					
·	cunth Daklu Fadte						





FORM I & XIV

Date: 22/10/2019

नम्ना नं 1 व 14

Page 2 of 2

Taluka

QUEPEM

Survey No.

35

तालुका Village

3

Hodar

सर्वे नंबर

Sub Div. No. 1

े गाव

Name of the Field Uddi Kantem

हिस्सा नंबर

Tenure

शेताचें नांव

सत्ता प्रकार

Details of Cropped Area पिकाखालील क्षेत्राचा तापशील

Year	Name of the Cultivator	Mode Season रीत मौसम		Name	Irrigated बागायत	Unimigated जिरायत	Total and the second	Available for नापिक बमीन	Source of irrigation	Remarks शेरा
वर्ष	लागण करणा-याचे नांव	, dd		of Crop पिकाचे नांव	Ha.Ars.Sq.Mts हे. आर. ची. मी.	Ha.Ars.Sq.Mts हे. अर. ची. मी.	Nature प्रकार	Area क्षेत्र Ha.Ars.Sq.Mts हे. आर. ची. गी.	सिंचनांचा प्रारि	
	Nil									

End of Report

For any further inquires, please contact the Mamlatdar of the concerned Taluka.





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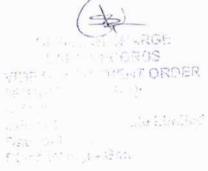
Date:	07/05/2015			न	ामुना नं '	9 व 98			Page	1	of 1		
Taluka	QUE	PEM								ey l	No. 3	6	
गालुका									सर्वे न	वर			
√illage	Hoda	r							Sub	Div.	No. 0	1	
गांव										ा नंबर	ζ		
	or the French	na Dam o	r Bori Ban	ndol					Ten	ure			
ताचें न	iव								सत्ता	प्रकार			
Cultivab	le Area (Ha.Ars.Sq.Mtr	s) लागण	क्षेत्र (हे. उ	गर. चौ. मी.)									
Dry Cr			Rice	Khaja	an .	Ker	_		Morad			Cultivable /	Area
जिरायत	बागायत		तरी	सान्		नेर केर			मोरड		एकूण	लागण क्षेत्र	
0002.2	9.00 0001.00.5	0	0.00.0000	0000.	.00.00	000	00.00	.00	0.000	0.00	0	003.29.50	
Jn-cultiv	vable Area (Ha.Ars.Sq.	Mtrs) नारि	वेक क्षेत्र (हे	. आर. चौ. र्म	f.)								
	Pot-Kharab पोट र	ाराब						Rem	arks ?	रा			
Class					Gran	nd Total	1						
वर्ग (अ)			नापिक जामी 00.00.00	न	एकूण		_						
0000.00					0003.2						D. 1		
Asses	ssment: Rs. 0.00		Foro	Rs. 0.00			edia	Rs.	0.00		Rent	Rs. 0.00)
आकार			फोर			प्राद	याल				रेंट		
S.No.	Name of the Occ	upant				Khata I		6000	tation No.		Remark	(S शे	रा
-	मब्जेदाराचे नांव					खाते नंब	14		क्षार नं				
1	Dinar Tarcar Resource	es (India)	Pvt. Ltd.					24	932				
S.No.	Name of the Ten	ant कुळा	चे नांव			Khata	a No	. N	lutation	No.	Remarks	6	
						खाते	नंबर		फेरफार	नं	शेरा		
1		Nil											
Othor	Diabte 227.22							Mutation	n No	Rem	arks		
Name o	Rights इतर हक्क of Person holding rights a	nd nature	of rights:					फेरफार		शेरा	dika		
इतर हब	धारण करणा-याचे नांव व	हक्क प्रकार						40.40.	•	41.51			
		Nil											
							_		21				
743				Cropped Ar		- 1						10 1	
Year	Name of the	Mode	Season	Name	Irrigate				Land not			Source of irrigation	Remark
वर्ष	Cultivator	रीत	मौसम	of Crop	वागाय	त ।	जेराय	ď	Nature	1	rea क्षेत्र	सिंचनांचा	शेरा
	लागण करणा-याचे			पिकाचे नांव	Ha.Ars.5		la.Ars.5	Sq.Mts	प्रकार		.Ars.Sq.Mts	प्रारि	
	नांवNil				हे. आर. व	बी. मी.	, आर.	थी. भी,		हे.	आर. चौ. मी.		_
	IVII		1	1,					1				
or any fu	urther inquires, please co	ntact the N	famlatdar e	of the concern	End of ed Taluk	n.				/	13		
										(1		
									APERC	1	THE PARTY	36	

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Date:	07/05/2015			- 1	मुना न	1970			Page	1	of 1		
Taluka	QUE	PEM							Surv	ey I	No. 3	7	
तालुका									सर्वे न	विर			
Village	Hoda	r							Sub	Div.	No. 0		
गांव										ा नंबर	0		
Name	of the Field Odkler	madam or B	ori Banda	il					Ten	ure			
शेताचें न	गंब								सत्ता	प्रकार			
Cultivab	le Area (Ha.Ars.Sq.Mt	s) लागण क्षे	त्र (हे. आर	र. चौ. मी.)									
Dry Cr	op Garden	-		Whele		Vac	_		Mand		Tota	I Cultivable A	Area
जिरायत	बागायत	ਰ	ice fr	Khaja खाजन		Ker केर			Morad मोरड		एकूण	लागण क्षेत्र	
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Un-cultiv	vable Area (Ha.Ars.Sq.	Mtrs) नापिव	क्षेत्र (हे.	आर. चौ. र्म	1.1								
	Pot-Kharab पोट र	बराब						Rem	arks शे	रा			
Class	The state of the s				Gran	d Total							
वर्ग (अ)			पेक जामीन		एक्ण								
00.000		0000	.00.00		0000.3	4							
Asses आकार	ssment: Rs. 0.00		Foro फोर	Rs. 0.00		Pre प्रेदिय	dial गल	Rs.	0.00		Rent रेंट	Rs. 0.00	0
S.No.	Name of the Occ	upant				Khata N खाते नंब			tation No. फार नं		Remark	(S शे	रा
1			NS 1835			वात नव	_		936				
	Dinar Tarcar Resource	es (India) P	vt. Ltd.					24	936				
S.No.	Name of the Ten	ant कुळाचे	नांव		*.	Khata	No.	N	lutation	No.	Remarks	3	
						खाते :	नंबर		फेरफार व	नं	शेरा		
1	-	Nil											
Other	Rights इतर हक्क						I	Autation	. No	Rem	arks		
Name of	of Person holding rights a		rights:					hरफार न		शेरा	OTTIO .		
इतर हु	धारण करणा-याचे नांव व	हक्क प्रकार								51.51			
		Nil											
		Deta	ails of Cr	opped Ar	ea पिव	नखालील	क्षेत्राः	वा ताप	शील				
Year	Name of the			Name	Irrigate	100		ated	Land not	Availa	ble for	Source of	Remarks
वर्ष	Cultivator	रीत र		of Crop	बागाय	त वि	ने रायत	r	cultivation	1		irrigation	शेरा
	लागण करणा-याचे			पेकाचे नांव	Ha.Ars.S	io Mis	a.Ars.Sc	Mis	Nature	75.50	ea क्षेत्र Ars.Sq.Mts	सिंचनांचा	
	नांव				हे, आर. प		अर. च		प्रकार		अर. चौ. मी.	प्रारि	
	Nil												
					End of	Report					/:		-

For any further inquires, please contact the Mamlatdar of the concerned Taluka.





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				-	ORM I							
Date:	07/05/2015			=	ामुना नं '	9 व 98		Page	1	of 1		
Taluka	QL.	EPEM							rey N	No.	1 .	
तालुका								सर्वे न				
Village	e Ho	dar						Sub	Div.	No. 1		
गांव									ा नंबर			
Name	of the Field Bor	bandal						Ten	ure			
शेताचें न	गंव							सत्ता	प्रकार			
Cultivab	le Area (Ha.Ars.Sq.	Mtrs) लागण	क्षेत्र (हे. उ	गर. चौ. मी.)								
Dry Cr		1	Rice	Khaja	20	Ker		Morad			d Cultivable	Area
जिरायत	बागायत		तरी	- साम्बाह्य खाजन		केर		मोरड		एकूप	। लागण क्षेत्र	
0.0000	0.00 0001.0	7.00	0.00.000.0	0000	.00.00	0000	0.00.00	0.000.0	0.00	C	001.07.00	
Un-cultiv	vable Area (Ha.Ars.	Sq.Mtrs) नार्रि	पेक क्षेत्र (हे	. आर. चौ. र्म	ft.)							
	Pot-Kharab पो	ट खराब					F	Remarks ®	रा			
Class					Gran	d Total						
नर्ग (अ)			नापिक जामी	न	एकूण		_					
0000.00		00 00	00.53.00		0001.6							
Asses आकार	ssment: Rs. 0.	00	Foro फोर	Rs. 0.00		Pre प्रेदिय		Rs. 0.00		Rent रेंट	Rs. 0.0	0
S.No.	Name of the O	ccupant				Khata No खाते नंबर		Mutation No.		Remark	KS शे	रा
1	Dinar Tarcar Reso	irces (India)	Pvt Ltd			खात नबर		24935				
0.11						100		1				-
S.No.	Name of the T	enant मुळ	ाचे नांव			Khata		Mutation		Remarks	3	
		N.				खाते न	बर	फेरफार	ने	शेरा		
1		NI	1									
Other	Rights इतर हक्क						Mu	itation No.	Rema	arks		
Name	of Person holding righ		of rights:				फेर	फार नं	शेरा			
इतर हु	ह धारण करणा-याचे नांव						-					
		Nil										
		De	etails of (Cropped Ar	rea पिव	जखालील :	क्षेत्राचा	तापशील				
Year	Name of the	Mode	Season		Irrigate			ted Land not	Availal	ole for	Source of	Remarks
হৰ্	Cultivator			of Crop	बागाय	त जि	रायत	cultivation	া নাথিক	जमीन	irrigation	शेरा
44	लागण करणा-याचे	rà la			- 11		Nature	100	ea क्षेत्र	सिंचनांचा		
	नांव			The state of the s	Ha.Azsi.S हे. आर. प	T. C. Sept. 10	.Ars.Sq.M आर. चौ. म	प्रकार	100	Ars.Sq.Mis तर. चौ. मी.	प्रारि	
	Ni					-			1	W. H 015 - 251		
				-	End of	Report						
or any 6	urther inquires, please	contact the N	Aamlatdar ((1)		

Vita ORGAN Date of Plane Plan Place Precii - Gra



				FO	RM I	& XIV	7						
Date :	07/05/2015			न	मुना नं '	व १४	3		Page	1	of 1		
Taluka	QUE	PEM							Surv	ey I	No. 4	1	
तालुका									सर्वे न	बर			
Village	Hoda	ır							Sub	Div.	No. 4		
गांव									हिस्स		Ţ.		
	of the Field								Ten	ure			
शेताचें न	ांव								सत्ता	प्रकार			
Cultivab	le Area (Ha.Ars.Sq.Mt	rs) लागण	क्षेत्र (हे. आ	र. चौ. मी.)									
Dry Cr	op Garden		Die	Whate	2		er		Morad		Tota	I Cultivable A	Area
जिरायत	बागायत		Rice नरी	Khaja खाजन	n.	के			Morad मोरड		एकूण	लागण क्षेत्र	
0.000.0	0.00 0000.00.		0.00.000.0		00.00		00.00	0.00	0.000.0	0.00	0	000.00.75	
Un-cultiv	vable Area (Ha.Ars.Sq	Mtrs) नापि	क क्षेत्र (हे	आर. चौ. मी	t.)								
		खराब	16		,			Re	marks शे	रा			
Class		Total Un-0	Cultivable	Area	Gran	d Tot	al	0.00					
वर्ग (अ)	वर्ग (ब)		ापिक जामीन	-T	एकूण								
0000.00		75.379	0.00.00		0.000.0								
Asses	ssment: Rs. 0.00		Foro	Rs. 0.00			redia	Rs	0.00		Rent	Rs. 0.00	O
आकार	710.		फोर	110.		ग्रे	देयाल	110		000	रेंट	110	
S.No.	Name of the Occ	upant				Khata	No.	N	Autation No.		Remark	(S शे	रा
	कब्जेदाराचे नांब					खाते न	वर		भरफार नं				
1	Dinar Tarcar Resource	ces (India)	Pvt. Ltd.					1	24934				
S.No.	Name of the Ter	ant agri	वे नांव			Kha	ta No	o. T	Mutation	No.	Remarks		
53410540	Traine or the re-	idire gari				खा	ते नंबर		फेरफार		शेरा		
1		Nil-											
Other	Rights इतर हक्क of Person holding rights	and notice	of sighter					2000000	on No.	Rem	arks		
	ा Person nooing ngms ह धारण करणा-याचे नांव व		or rights:					फेरफा	रन	शेरा			
40.00	, 41(17)	-Nil					_						
		De	tails of C	ropped Ar	ea पिव	नखाली	ल क्षेत्र	ाचा त	पशील				
Year	Name of the	Mode	12.4	Name	Irrigate			igated		Availa	ble for	Source of	Remarks
वर्ष	Cultivator	रीत	मौसम	of Crop	वागाय	त	जिराय	ात	cultivation) नापि	क जमीन	irrigation	शेरा
	लागण करणा-याचे			पिकाचे नांव	Ha.Ars.S	in Mte	Ha.Ars.	Sa Mrs	Nature		rea क्षेत्र i.Ars.Sq.Mts	सिंचनांचा	
	नांव				हे. आर. प	V market	हे. अर.	AL POLICE	प्रकार	100	अर. चौ. मी.	प्रारि	
	Nil												
		_			End of				_				

End of Report

For any further inquires, please contact the Mamlatdar of the concerned Taluka.

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				-	VICTOR I								
Date :	07/05/2015			7	नमुना नं 9	व 98		Page	1 0	of 1			
Taluka	QU	EPEM						Surv	ey N	lo. 4	11		
तालुका								सर्वे नं	बर				
Village	Hoo	dar						Sub	Div. I	No. g)		
गांव									ा नंबर				
	of the Field							Teni	ure				
रोताचें न	वि							सत्ता	प्रकार				
Cultivab	le Area (Ha.Ars,Sq.I	Atrs) लागण	। क्षेत्र (हे. अ	ार. चौ. मी.))								
Dry Cr		ı	Rice	Khaja	an	Ker		Morad			al Cultivable /	Area	
जिरायत	बागायत		तरी	खाजन		केर		मोरड		एकूण लागण क्षेत्र			
0000.0	0.000 0000.0	2.75	0.00.00.0	0000	.00.00	0.000.0	0.00	0.000	0.00	(0000.02.75		
	(a) Class (b)	ट खराब Total Un		e Area		d Total	Ren	marks शे	रा				
00.000			00.00.00		0000.0	2.75	1						
Asses आकार	ssment: Rs. 0.0	00	Foro फोर	Rs. 0.00	1000010	Predia प्रेदियाल	RE	0.00		Rent रेंट	Rs. 0.00	0	
S.No.	Name of the O	ccupant				Khata No. खाते नंबर	1000	utation No. रफार नं		Remar	ks शे	रा	
1 2	Minescape Mineral							3317 3323					
S.No.	Name of the To	enant कुळ	ाचे नांव			Khata N खाते नंबर	- 1	200			Remarks शेरा		
1		Ni	l			3,111,141		TO THE					
Name o	Rights इतर हक्क of Person holding right ह धारण करणा-याचे नांव		of rights:				Mutatio फेरफार	0.7-27/27/2	Rema शेरा	rks			
		Nil											
						· ·		0					
V	I			Cropped A		11.1.1.1	प्राचा ताप rigated	पशील Land not	Availab	lo for	Course of	I	
Year	A MATCHINE SECTION IN CO.	Name of the Mode Season Cultivator रीत गौराम लागण करणा-याचे		Name Irrigate of Crop बागाय पिकाचे नांव HaAre.S				cultivation			Source of irrigation	Remark	
वर्ष	लागण करणा-याचे						i.Sq.Mts	Nature	Are	rea क्षेत्र सिंचनांचा		शेरा	
	नांव				हे. आर. चं	ATTY OF	, चौ. मी.	प्रकार	100	ार. चौ. मी.	4005		
	Nil		1										

For any further inquires, please contact the Mamlatdar of the concerned Taluka.

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				FO	RM I	& XIV	,						
Date :	07/05/2015			,	मुना नं '	2011			Page	1	of 1		
Taluka		QUEPEM							Surv	ey N	No. 4	1	
तालुका									सर्वे नं				
Village	1	Hodar							Sub	Div.	No. 2	4	
गांव										ा नंबर			
Name	of the Field	Dhaklem Salavo							Ten	ure			
शेताचें न	ांव								सत्ता	प्रकार			
Cultivab	le Area (Ha.Ars.	Sq.Mtrs) लागण	क्षेत्र (हे. अ	ार, चौ. मी.)									
Dry Cr	-	den	Rice	Khaja	n	Ke	or.		Morad			Cultivable A	rea
जिरायत	बाग	यत	तरी वरी	सावाव खाजन		के			मोरड		एकूण	लागण क्षेत्र	
0000.0	00.00	0.23.25	0.00.000.0	0 0000.	00.00	00	00.00	00.0	0.000.0	0.00	00	000.23.25	
Un-culti	vable Area (Ha.A	rs.Sq.Mtrs) नारि	ोक क्षेत्र (हे	. आर. चौ. र्म	t.)								
	Pot-Kharab	पोट खराव						Rei	marks शे	रा			
Class		b) Total Un-				d Tota	al						
वर्ग (अ)			गपिक जामी	न	एकूण								
0000.00			00.48.75		0000.7	-							
Asse	ssment: Rs.	0.00	Foro	Rs. 0.00			redia देयाल	Rs.	0.00		Rent	Rs. 0.00)
आकार			फोर			31	दयाल	- 1			रेंट	1	
S.No.	Name of the कब्जेदाराचे नांव	Occupant				Khata खाते न			lutation No. हरफार नं		Remark	(S शे	ਧ
1	Minescape Min	erals PVT, LTD.						2	3319				
2	Minescape Min							2	23324				
								4					
S.No	Name of the	e Tenant कुळा	चे नांव			100000000000000000000000000000000000000	ta No		Mutation		Remarks	3	
		Ni				खा	ते नंबर	-	फेरफार	न	शेरा		
		Nii									L		
Other	Rights इतर ह	Æ						Mutati	on No.	Rema	arks		
Name	of Person holding	rights and nature	of rights:					फेरफार	नं	शेरा			
इतर ह	ह धारण करणा-याचे						_			-			
		Nil											
		De	staile of (Cropped Ar	oa fila	cran-ft	य धेन	ाजा जा	गाशीस				
Year	Name of the	Mode	Season	Name Name	Irrigato			gated		Availa	ble for	Source of	Remarks
	Cultivator	रीत	मौसम	A CONTRACTOR OF THE PARTY OF TH	बागाय		जिराय		cultivation			irrigation	शेरा
वर्ष	लागण करणा-याचे	5.10		of Crop पिकाचे नांव					Nature		ea क्षेत्र	सिंचनांचा	
	नांव			नगान गाव	Ha.Ars.S हे. आर. व		Ha.Ars. ≩ arr	Sq.Mts चौ. मी.	24-401-€		a.Ars.Sq.Mls . आर. ची. मी.		
		-Nil			g. vii C. 1		6. 46.0	41, 411		6.			
	1			1	End of	Report		-					
For any f	urther inquires, ple	ase contact the M	famlatdar o								(1)		
											(A)	_	
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												10.1 3	

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Date :	07/05/2015		नमुना न ९	वि १४	Page	1 of	1	
Taluka	QUEPEM				Surv सर्वे नं	ey No.	. 5	
तालुका	Xelvona					Div. No	0. 3	
Village गांव	Aeivona					ा नंबर	z. <u>3</u>	
	f the Field Culha Morod				Ten			
रोताचें नां					सत्ता	प्रकार		
Cuttivable	e Area (Ha.Ars.Sq.Mtrs) लागप	ा क्षेत्र (हे. आर. च	वौ. मी.)					
Dry Cro				Ker			Total Cultivable Area	
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0000.00. Assess आकार	oo 0000.00.00 00 sment : Rs. 0.00	000.00.00 Foro Rs फोर	0.00	0.50 Predia प्रेदियाल	Rs. 0.00		Rent Rs. 0.00	
S.No.	Name of the Occupant			Khata No. खाते नंबर	Mutation No. फेरफार नं	R	Remarks शेरा	
1 1	Dinar Tarcar Resources (India) Pvt. Ltd.			24933			
S.No.	No. Name of the Tenant कुळाचे नांव				o. Mutation फेरफार	1:	Remarks ।रा	
1	N	il						
Name of	Rights इतर हक्क Person holding rights and nature धारण करणा-याचे नांव व हक्क प्रकार	e of rights:			Mutation No. फेरफार नं	Remark	s	
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		etails of Crop	ped Area पि	ताखालील क्षेत्र	ाचा तापशील	-		

Year	Name of the Cultivator	Mode fla	Season भौसम	Name of Crop	Irrigated बागायत	Unirrigated जिरायत	Land not Av		Source of irrigation	Remarks शेरा
वर्ष	सामण करणा-याचे नांव	No.		पिकाचे नांव	Ha.Ars.Sq.Mus हे. आर. भी. भी.	Ha.Ars.5q.Mts हे. बार. ची. मी.	Nature प्रकार	Area क्षेत्र Ha.Ars.5q.Mis है. आर. ची. मी.	सिंचनांचा प्रारि	,,,,
	Nil									

End of Report

For any further inquires, please contact the Mamlatdar of the concerned Taluka

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VIDE COVERTIZE NT ORDER 201/200, 201 (1.5) date di Titore di Sidia autoro private Limited

Date of Issue

Place Panaji - Goa



OFFICE OF THE VILLAGE PANCHAYAT

Assolda, Xelvona, Xic-Xelvona & Hodar.

P.O. Chandor, Assolda, Goa 403714. Email:vpassolda@gmail.com.

Ref. NO. VP/ASD/2024 -25/681

Timal

Date: 12/12/ 2024

Member Becrotury

G. C. Z. M. A.

Inward No. 3016.
Detopolistan

То

The Director, (Environment)
 Goa State Environment Impact Assessment Authority,
 EIA - Goa state secretariat,
 1st Floor, Dempo Tower,
 Patto, Panaji- Goa.

Member Secretary,
 The Goa State Pollution Control Board
 Saligao Bardez Goa.

- The Dy. Town Planner, Quepem – Goa.
- The Dy. Collector, Quepem, Goa.

5 The Member Secretary,
Goa Coastal Zone Management Authority,
Dempo Towers,
Patto Plaza, Panaji, Goa.

How Wardin

Subject: Objection to the construction of two barge loading jetties and one platform/Quay for loading and unloading material at Xelvona village and construction of barge loading Jetty and two Platforms /Quay for loading and unloading material at Hodar village in Survey Number 84/2 of Xelvona Village and Survey number 36/0,37/0 & 41/1 of Hodar village, issued to the M/S. Dinar Tarcar resources (India) Pvt. Ltd.

Sir/Madam,

The residents of Xelvona, Hodar and the Village Panchayat of Assolda in South Goa, write to express strong objection to the proposed construction of two barge loading jetties and one platform/Quay for loading and unloading material at Xelvona village and construction of barge loading Jetty and two Platforms /Quay for loading and unloading material at Hodar village in Survey Number 84/2 of Xelvona Village and Survey number 36/0,37/0 & 41/1 of Hodar village, issued to the M/S. Dinar Tarcar resources (India) Pvt. Ltd.

Contd.....

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Lack of Transparency and Manipulation: We are deeply troubled by the lack o transparency in the decision-making process. It has come to our attention that the Environmental Impact Assessment (EIA) was manipulated to secure approvals without proper community consultation. This is a gross violation of our rights and undermines the integrity of the process. Also brings to your kind notice that there is existence of sand dunes and its heights, existence of the lagoons, backwater or other water bodies in the proposed area, Full of mangrove trees Site for the Jetties presently is full of coconut trees and people are tapping those trees for toddy as their livelihood option. Should Indian railways and mining companies destroy these occupations for their Jetty projects? We don't think so. Toddy tapping as an occupation needs protection from predatory projects such as these Jetty ones.

Jetties for ore loading and unloading are known to be environmentally messy affair with air pollution as well as water pollution spreading in abundance. These set of planned Jetties too is destined to create dangerous situation to our Village.

Barges transporting is recorded to be one of top polluters of rivers in Goa. This is recorded in the very first meeting of Goa State Pollution Control Board (GSPCB). Barges transporting ore are destined to destroy marine ecology as well as fishing occupations in Zuari river that needs clean water. Good fish needs clean water.

Legal Compliance: We insist that all directives from the National Green Tribunal (NGT) and other court orders be strictly followed. Any development within the coastal regulation zone must adhere to the highest legal and environmental standards. **Hereto annexed the copy of drown images pictures**

We hope the authorities will honour our request to hold consultation or any approval with Village Panchayat Assolda before rolling out any plans and put an immediate hold on the current construction plans.

Thanking you,



Yours faithfully

(Custodio Fernandes)
SARPANCH
V.P. ASSOLDA
Xelvona-XIC-Xelvona & Hodar

Copy to: -

Shri Nilesh Cabral, Hon'ble M.L.A. for Curchorem constituency, for information.



OFFICE OF THE VILLAGE PANCHAYAT

Assolda, Xelvona, Xic-Xelvona & Hodar.

P.O. Chandor, Assolda, Goa 403714.

Email:vpassolda@gmail.com.

Member Secretary

Ref. NO. VP/ASD/2025 -26/

Date: 17/05/ 2025

To

1. The Member Secretary,
Goa Coastal Zone Management Authority,
Dempo Towers,

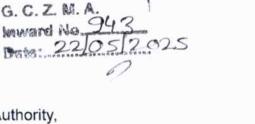
Patto Plaza, Panaji, Goa.

The Director, (Environment)
 Goa State Environment Impact Assessment Authority,

ELA - Goa state secretariat

EIA - Goa state secretariat, 1st Floor, Dempo Tower, Patto, Panaji- Goa.

 The Dy. Collector & SDO, Quepem – Goa.



John Sora

Subject: STRONG OBJECTION FOR RECOMMENDATION FOR CRZ CLEARENCE FOR PROPOSED JETTY AND PLATFORM FOR LOADING AND UNLOADING, STRENGHNING OF EXISTING BUND ALONG WITH ZUARI RIVER AT PROPOSED AT SY NOS. 69/2,83/0 AND 84/2 AT VILLAGE XELVONA BY M/S DINAR TARCAR RESOURCES (INDIA) PVT LTD.

Sir/Madam,

The residents of Xelvona, Hodar and the Village Panchayat of Assolda in South Goa, write to express strong objection to the proposed construction of two barge loading jetties and one platform/Quay for loading and unloading material at Xelvona village and construction of barge loading Jetty and two Platforms /Quay for loading and unloading material at Hodar village in Survey Number 84/2 of Xelvona Village and Survey number 36/0,37/0 & 41/1 of Hodar village, issued to the M/S. Dinar Tarcar resources (India) Pvt. Ltd.

Environmental Destruction: * The proposed site threatens to devastate our local environment. Over 5,000 forest trees, vital streams, and a plethora of forest species—including endangered wildlife—face imminent destruction. *During a visit to the site, the Panchayat discovered feathers of peacocks, quills of porcupines, and traces of rabbit paw prints, highlighting the rich biodiversity at risk. * This environmental degradation would be catastrophic, especially considering the proximity of the proposed site to natural springs and the religious temple of Shree Durgesh Devasthan, a place of worship for over eight decades.

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(Custodio Fernandes)

V.P. ASSOLDA Xelvona-XIC-Xelvona & Hodar

Copy to: -

Shri Nilesh Cabral, Hon'ble M.L.A. for Curchorem constituency, for information.

UFFICE OF THE VILLAGE PANCHAYAT



Assolda, Xelvona, Xic-Xelvona & Hodar.

P.O. Chandor, Assolda, Goa 403714.

Email:vpassolda@gmail.com.

Ref. NO. VP/ASD/2025 -26/

Date: 17/05/ 2025

To

The Member Secretary,
 Goa Coastal Zone Management Authority,
 Dempo Towers,
 Patto Plaza, Panaii, Goa

Patto Plaza, Panaji, Goa.

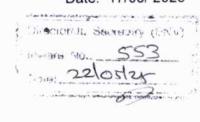
The Director, (Environment)

Goa State Environment Impact Assessment Authority,

EIA - Goa state secretariat, 1st Floor, Dempo Tower,

Patto, Panaji- Goa.

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por Solar

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(Custodio Fernandes) SARPANCH V.P. ASSOLDA Xelvona-XIC-Xelvona & Hodar

Copy to: -

Shri Nilesh Cabral, Hon'ble M.L.A. for Curchorem constituency, for information.



OFFICE OF THE VILLAGE PANCHAYAT

Assolda, Xelvona, Xic-Xelvona & Hodar.

P.O. Chandor, Assolda, Goa 403714.

Email:vpassolda@gmail.com.

Ref. NO. VP/ASD/2024 -25/822.

Date: 17/02/ 2025

To
The Member Secretary
Goa Coastal Zone Management Authority (CZMPA)
Patto Panji Goa

0. C. Z. M. A. Warrard No. 5860 December 17/02/25

Subject: Regarding Strong objection for issuing NOC.

Dear Madam/Sir,

Please find enclosed herewith resolution passed by the Gram Sabha held on 16/02/2025 for further needful action at your end.

Kindly acknowledge the same.

Thanking you,

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Dandichar Constitution of the Constitution of

Yours faithfully

(Custodio Fernandes)

SARPANCH V.P. ASSOLDA

Xelvona-XIC-Xelvona & Hodar

ENcl: 1. Resolution copy 1. Significa copy

Mob: 9404757770



OFFICE OF THE VILLAGE PANCHAYAT

Assolda, Xelvona, Xic-Xelvona & Hodar.

P.O. Chandor, Assolda, Goa 403714.

Email:vpassolda@gmail.com.

Ref. NO. VP/ASD/2024 -25/

Date: 17/02/ 2025

TRUE COPY OF RESOLUTION PASSED IN THE GRAM SABHA MEETING HELD ON 16/02/2025

Resolution No. 04.

Subject: Regarding strong objection for issuing NOC proposed and existing jetties at Xelvona & Hodar Village.

Shri Manojkumar V. Naik, to the notice of Gram Sabha meeting, that M/s Dinar Tarcar Resources Pvt. Ltd. has applied for CRZ permission for proposed and existing jetties and handling of iron ore and other material at Xelvona and Odar villages, Quepem taluka, including the jetty and platform for loading and unloading proposed by M/s Dinar Tarcar Resources (India) Pvt Ltd at sy nos 29/0, 30/1, 34(P), 35(P), 36/0, 37/0, 41/1, 41/4, 41/9, 41/24, 5/3 at villages Odar and Xelvona,

After due discussion over the matter Gram Sabha members unanimously decided to oppose proposed and existing jetties and handling of iron ore and other material at Xelvona and Odar villages, Quepem taluka, including the jetty and platform for loading and unloading proposed by M/s Dinar Tarcar Resources (India) Pvt Ltd at sy nos 29/0, 30/1, 34(P), 35(P), 36/0, 37/0, 41/1, 41/4, 41/9, 41/24, 5/3 at villages Odar and Xelvona, and also requested to inform local Panchayat i.e. Village Panchayat Assolda for granting any further N.O.C's for said project.

Further it was also resolved that GCZMA meeting held on 03/10/2024 without taking into confidence of this Panchayt and report submitted by Project proponent is totally manipulated and joint inspection is not held with Local Panchayat. So Gram Sabha has strong objection for said project.

Resolution was proposed by Shri Manojkumar V. Naik & Seconded by Shri Felix Fernandes.



SARPANCH V.P. ASSOLDA Xelvona-XIC-Xelvona & Hodar 7

PROCEEDING

Meeting No.		PROC		1146
	Proposals & An	nendments	Particular	s of Voting
St. Subject	Name of the Proposer & Seconder	Proposal or Amendments	For	Against
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Josinhio C. Perenia		Paint!		
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		LO ACCO	RPANCH ASSOLDA C-Xelvona & Hodar	
		Xelvona-XIC-Xelv		

GOA STATE EXPERT APPRAISAL COMMITTEE

Constituted by the Ministry of Environment, Forest and Climate Change, Government of India

> C/o Department of Environment and Climate Change 4th Floor, Dempo Towers, Patto Panaji Goa - 403001.

e-mail: goaseac@gmail.com

No.225/3/2025-26/GSEIAA/Project-Prop/9/

Date: // /07/2025

To,

The Director,

M/s. Dinar Tarcar Resources(India)Pvt. Ltd.

M.G. Road, Panaji-Goa.

Sub: Proposed construction of jetty and platforms for loading and unloading strengthening of existing bund along Zuari river at Survey No.29/0, 30/1, 34(P), 35(P), 36/0, 37/0, 41/1, 41/4, 41/9, 41/24, 5/3 at village Odar & Xelvona, Quepem taluka, South Goa

Sir,

This Committee is in receipt of recommendation letter dated 25/04/2025 from Goa Coastal Zone Management Authority regarding above mentioned subject matter.

The Committee after visiting the on 26/06/2025 decided to raise the following queries:-

- 1. Details of access road to the site.
- Study of river giving details such as width of the river, number of existing jetties, number of proposed jetties, functions of each jetty, available draft.
- 3. To give details of sand mining zones in the vicinity of the proposed project.
- Details and type of products to be loaded and unloaded. (EMP should be according to the type of products to be handled)
- Carrying capacity of the river within 5km in length on either side (upstream and downstream) of the proposed project.
- Letter from Captain of Ports giving details of number of barges registered in State of Goa.
- 7. To submit documentation on river fauna (e.g. fish, bivalves etc.)
- Based on the Annexure II EB list of flora and fauna observations regarding the ecological impact of the project:
- a) Names and credentials of qualified taxonomists or local biodiversity experts along with the methodology used for identification list of flora and fauna.

- b) Biodiversity varies by season; monsoon and post-monsoon periods are crucial for amphibians, insects, and epiphytes. PP to specify the Seasons covered during the survey.
- Area-wise distribution of key species, particularly those under Schedule I and II of the Wildlife Protection Act, 1972
- d) Protective measures to conserve mangrove habitats as the proposed site is CRZ notified area.
- e) List of species marked as endangered, vulnerable, or near threatened by IUCN or the Indian Red List.
- f) Steps undertaken to prevent biodiversity loss specially the Invasive Plants like Lantana camara and Mimosa pudica.
- g) Permission from the Chief Wildlife Warden for any disturbance of Several Schedule I species are recorded (e.g., Crocodilus palustris, Naja naja, Monitor Lizard, Peafowl). Mitigation measures proposed to avoid human-wildlife conflict.
- h) 80 bird species listed are bioindicators. PP to submit details of ornithologist involved in the survey. Effect of the project on nesting or breeding habitats.
- i) Presence of Pteropus giganteus and Pipistrellus coromandra—important for pollination and pest control. Is there any tree cutting that could destroy roosting sites.
- j) Details of mapping of butterfly hotspots.
- k) Impact of dust, noise, and vibration on amphibians and reptiles species.
- 1) Details of Biodiversity Impact Assessment (BIA) conducted separately from the EIA
- m) Details of Eco-Sensitive Zones (ESZs) or Protected Areas (PA) within 10 km radius.
- n) Details of wildlife corridor study. Considering presence of Muntjac (Barking Deer) and Wild Boar, which require safe movement routes.
- o) Details of biodiversity management plan (BMP) with long-term conservation commitments.
- p) Details of any plan for compensatory afforestation or creation of biodiversity parks
- q) Plan to conserve the indigenous plant species during site development.

In view of above, you are directed to submit the data the earliest in order to process the application.

Yours faithfully

(Sanjeev Joglekar)

Member Secretary, Goa-SEAC

Site Inspection Report

The Goa-SEIAA is in receipt of recommendation for CRZ Clearance from Goa Coastal Zone Management Authority for proposed construction of jetty and platforms for loading and unloading strengthening of existing bund along Zuari river at Survey No.29/0, 30/1,34(P), 35(P),36/0,37/0,41/1,41/4,41/9,41/24,5/3 at village Odar & Xelvona, Quepem taluka, South Goa by M/s. Dinar Tarcar Resources(India) Pvt. Ltd.

The matter was discussed in 154th Goa SEIAA meeting held on 08/05/2025 in which the Authority noted the project falls under para 4(i)d of the CRZ Notification, 2011

Although GCZMA has recommended to grant CRZ permission, as per the Office Memorandum dated 26/04/2022 (procedure for clearance of permissible activities as per CRZ Notification, 2011 and IPZ Notification, 2011) the SEIAA is the competent Authority to grant standalone CRZ permission for the activities attracting para 4(i)d of CRZ Notification, 2011 with recommendation of the State Expert Appraisal Committee (SEAC). The matter was forwarded to Goa for appraisal.

In this regards inspection was carried out by the Goa State Expert Appraisal Committee on 26/06/2025 at 04.00 pm. The Project Proponent was represented by Mr. Prakash Naik (Sr. Manager, M/s. Dinar Tarcar Resources India Pvt. Ltd), Mr.Laxmikant Kamat (Dy. Manager), Mr. Jagdish Kamat (Dy. Manager), Ms. Maisie Menezes (Sr. Manager), Meldein Afonso (Geologist), Maruti Kesari (Associate Manager) and Mr. Chandresh Naik ,Scientist from M/s. Aditya Env. Services, NABET registered consultant.

The details of the proposed structures are as follows:-

Sr. No.	Description of Structures	Area in Sq. mtrs.
1.	Platform/ Quay for loading and Unloading, storage, handling of ores and non- hazardous dry cargo	336.00 sqmtrs
2.	Jetty for loading and unloading storage, handling of ores and non- hazardous dry cargo	237.00 sqmtrs
3.	Gabion wall for strengthening of existing bund	267.00 rmt.

During the site inspection the Committee the following is observed and noted as below:-

- 1. The access to the proposed jetty and allied structures, stockyard areas etc as shown in the plan is not in existence at loco.
- 2. The vegetations observed on the site was mostly of mangroves and coconut plantation.

3. There exist a jetty at a distance of approximately 252m from the proposed jetty which belongs to Chowgule Pvt. Ltd.

- Based on the Annexure II EB list of flora and fauna observations regarding the ecological impact of the project:
- Names and credentials of qualified taxonomists or local biodiversity experts along with the methodology used for identification list of flora and fauna.
- Biodiversity varies by season; monsoon and post-monsoon periods are crucial for amphibians, insects, and epiphytes. PP to specify the Seasons covered during the survey.
- Area-wise distribution of key species, particularly those under Schedule I and II of the Wildlife Protection Act, 1972
- Protective measures to conserve mangrove habitats as the proposed site is CRZ notified area.
- List of species marked as endangered, vulnerable, or near threatened by IUCN or the Indian Red List.
- Steps undertaken to prevent biodiversity loss specially the Invasive Plants like Lantana camara and Mimosa pudica.
- vii. Permission from the Chief Wildlife Warden for any disturbance of Several Schedule I species are recorded (e.g., Crocodilus palustris, Naja naja, Monitor Lizard, Peafowl).
 Mitigation measures proposed to avoid human-wildlife conflict.
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- ix. Presence of Pteropus giganteus and Pipistrellus coromandra—important for pollination and pest control. Is there any tree cutting that could destroy roosting sites.
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- xi. Impact of dust, noise, and vibration on amphibians and reptiles species.
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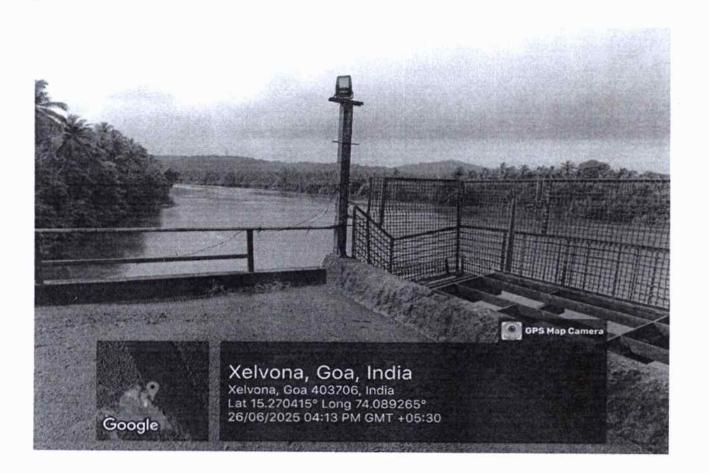
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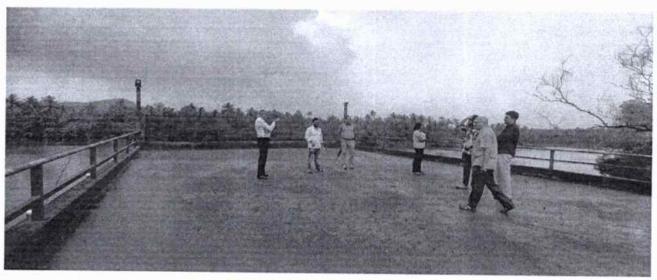
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Photographs showing the site condition are enclosed herewith.



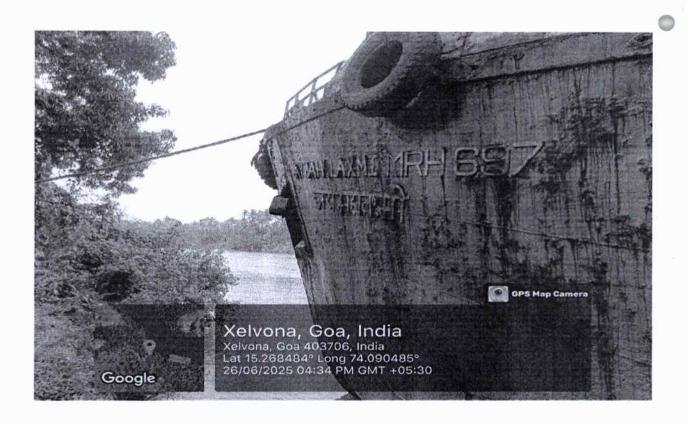


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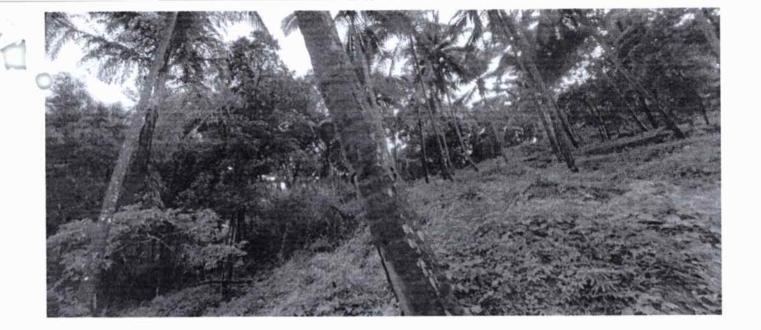




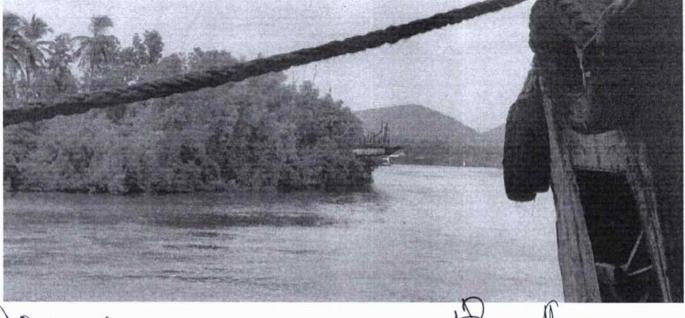


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Dr. Jose Romeno Faleiro (Member; SEAC)	falero.
Dr. Nitin Sawant (Member; SEAC)	awant
Dr. Subhash H. Bhosale(Member; SEAC)	Dhu
Er. Prasad Shashikant Rangnekar (Member; SEAC)	Sport
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Shri. Sanjay Jahagirdar (Member; SEAC)	Anjahagisdan

GOA COASTAL ZONE MANAGEMENT AUTHORITY

C/o Department Environment (Govt. of Goa)

4th floor, Dempo Tower, Patto Plaza, Panaji Goa-403 001

Website: www.czma.goa.gov.in

Ref. No. GCZMA/S/23-24/86/ 3 0 6

Date: 25/04/2025

To,

The Member Secretary, Goa State Environment Impact Assessment Authority (GSEIAA), Panaji – Goa.

Sub: Recommendation for CRZ Clearance for the Proposed Construction of Jetty & Platforms for Loading & Unloading, Strengthening of existing bund along Zuari river at Sy. No. 29/0, 30/1, 34(P), 35(P), 36/0, 37/0, 41/1, 41/4, 41/9, 41/24, 5/3 at village Odar & Xelvona, Quepem Taluka – Goa of M/s. Dinar Tarcar Resources (India) Pvt. Ltd.

Ref: Vide application dated 05/03/2024.

Sir / Madam,

With reference to the application on the above-mentioned subject, the Goa Coastal Zone Management Authority (GCZMA) has examined the aforementioned proposal in its 427th meeting held on 28/01/2025 in accordance with the provisions of para 4.2(ii) (c) of the CRZ Notification, 2011 as amended from time to time. The Authority after detailed discussion decided to recommend for grant of CRZ Clearance for Proposed Construction of Jetty & Platforms for Loading & Unloading, Strengthening of existing bund along Zuari river at Sy. No. 29/0, 30/1, 34(P), 35(P), 36/0, 37/0, 41/1, 41/4, 41/9, 41/24, 5/3 at village Odar & Xelvona, Quepem Taluka - Goa. The details of the proposed structures are tabulated as follows: -

Sr. No.	Description of Structures	Area in Sqmtrs
Platform / quay for Loading and Unloading, storage, handling, of ores and non-hazardous dry cargo		336.00sqmtrs
 Jetty for Loading and Unloading, storage, handling, of ores and non-hazardous dry cargo 		237.00sqmtrs
3.	Gabion wall for strengthening of existing bund	267.00R.Mt .

The CRZ Clearance may be considered with subject to compliance of the following conditions.

- All the provisions of the CRZ Notification, 2011 as amended should be strictly complied with. In the event of a change in project profile or change in the implementation agency, a fresh reference shall be made to the GCZMA.
- There shall not be any disturbance to navigation channel, traditional fishing activities and free flow of water due to said activity.
- 3. No additional construction or extension into the river should be done without

- obtaining the permission of this Authority.
- 4. No cutting of mangroves in surrounding vicinity if any.
- 5. No disturbance / hindrance to the fishing activities in surrounding areas.
- 6. This NOC/Approval is issued without prejudice to any other permission as required under the law including that of ownership, court case etc. As such, prior to the commencement of the aforementioned 'Construction', work, it will be incumbent upon the applicant to obtain permission from any other authority as required under the law including the local authority, Town and Country Planning Department, Revenue Authority etc.
- 7. Construction debris shall not be disposed in the CRZ area.
- 8. Traditional access/easement shall not be blocked if any.
- The applicant / occupier should ensure that no waste is discharged into the nearest
 water body from the proposed construction activities.
- 10. All other mandatory permissions from different Departments / Authorities should be obtained prior to the commencement of work.
- 11. The Applicant shall also obtain NOC from the Goa State Pollution Control Board (GSPCB) when operations are commenced.
- 12. The GCZMA may stipulate any additional conditions subsequently; if deemed necessary, for environmental protection, which shall be complied with.
- 13. All conditions stipulated in the CRZ Notification 2011, as amended shall be applicable to the applicant, owner, architect, project consultant, builder, developer and occupier. They shall be liable for violation or non-adherence to the provisions stipulated therein.
- 14. In the event of any change in the project profile, a fresh reference shall be made to the GCZMA.
- 15. This permission shall be valid for 07 years from the date of issue of this letter.
- 16. The safe disposal of waste water and solid wastes generated during the construction phase should be ensured.
- 17. Disposal of debris including the excavated material during construction phase shall not create adverse effect on neighbouring communities and shall be disposed off within the project site with the approval of the competent authority after taking the necessary precautions for general safety and health aspects.
- 18. Vehicles hired for bringing construction material at site should be in good conditions and confirm to applicable air and noise emission standards.
- 19. Ambient noise levels should confirm to residential standards both during day and night. Incremental pollution load on the ambient air and noise quality should be closely monitored during construction phase.
- 20. The construction materials and debris shall be properly stored and handled to avoid negative impacts such as air pollution and public nuisances by blocking the roads and the public passages. Appropriate barricading shall be done and signboards shall be put at such sites.

- Quarterly monitoring reports should be submitted to the GCZMA in soft and print format.
- 22. It is encouraged that dredging depth be reassessed by limiting to the actual, minimum requirement such that the dredging volume can be minimized.
- 23. Care should be taken at all times to avoid any water / air / noise pollution during the dredging activity, which should be carried out by standard operating procedures and guidelines.
- 24. Regular site inspections shall be carried by the team comprises of the Expert Members of the GCZMA and or other Authorities / Departments to ensure compliance of aforestated condition. In case of any non-compliance of the terms and conditions stipulated above, the action as deemed fit including that of demolition of structure.
- 25. It is of paramount importance that a proper site be identified for dumping and environmental viability of this site should be estimated. Any negligence on this part can be detrimental to the environment.
- 26. Prior to the commencement of the development work on the site, it will be incumbent upon the applicant to obtain all the requisite permissions / NOC etc., as required under law.
- 27. The plan approved by the Authority for the Proposed Construction of Jetty & Platforms for Loading & Unloading, Strengthening of existing bund along Zuari river at Sy. No. 29/0, 30/1, 34(P), 35(P), 36/0, 37/0, 41/1, 41/4, 41/9, 41/24, 5/3 at village Odar & Xelvona, Quepem Taluka Goa is annexed herewith.
- 28. This is liable to be revoked, if it is found, at any stage, that the application contained false information / wrong plan / calculations / documents / misleading or false information.

Yours faithfully,

(Sachin S. Desai)

Member Secretary (GCZMA)

Encl: As above

Copy to:

- P. A to Secretary (Environment) / Chairman (GCZMA), Secretariat, Porvorim.....for kind information.
- 2. The Chief Town Planner, Town & Country Planning Department, Patto, Panaji-Goa.....for information and necessary action.
- 3. The Dy. Collector & SDO, (Quepem), Quepem- Goa....for information and necessary action.
- 4. The Captain, Department of Ports, Panaji-Goa...... for information and necessary action
- The Commissioner, Corporation of the City of Panaji, Panaji Talukafor information and necessary action.

- The Member Secretary, Goa State Pollution Control Board, Saligao..... for information and necessary action.
- The Secretary, Village Panchayat Xelvona, Quepem Taluka, Goa..... for information and necessary action.
- 8. M/s. Dinar Tarcar Resources (India)Pvt. Ltd, M.G. Road, Panaji Goa for information and necessary action.

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GOA COASTAL ZONE MANAGEMENT AUTHORITY

C/o Department of Environment, (Govt. of Goa) 4th Floor, Dempo Tower, patto Plaza, Panaji-Goa 403001

SITE INSPECTION REPORT (PROPOSAL)

- i) Name of the Applicant: M/s. Dinar Tarcar Resources(india) Pvt. Ltd., M.G. Road, Panaji, Goa.
- ii) Date of the Application: 05/03/2024
- **iii) Application for:** Proposed construction of Jetty & Platforms for Loading &Unloading strengthening of existing bund along Zuari river at Sy. No. 29/0,30/1, 34(P), 35(P), 36/0,37/0, 41/1,41/4, 41/9, 41/24,5/3 at village odar, & Xelvona, Quepem Taluka-Goa.
- iv) Date of construction based on the documents: NA.
- v) Date of Inspection: 27/03/2024
- vi) Name of the Official / Expert Member, GCZMA:
 - 1) Radha Rao, Expert Member (GCZMA)
 - 2) Tejas G. Naik, Engineer (GCZMA)
 - 3) Gorakh Tuenkar, Field Surveyor, (GCZMA)
- vii) Name of the Parties Present: Manish Agnihotri, G.M Dinar Tarcar Resources (india) pvt.ltd.

viii) Location:

Sy. No: 29/0, 30/1, 34(P), 36/0, 37/0, 41/1, 41/4, 41/9, 41/24, 5/3

Village: Odar Taluka: Quepem.

ix) Classification of CRZ Area:

 Survey No. 36/0, 37/0, 41/1,41/4, 41/9, 41/24 :Falls within No Development Zone – CRZ III

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- x) Existence of Sand dunes and its height: No.
 - xi) Whether any lagoons, backwaters or other water bodies exist in the plot: NO.
 - xii) Existence of Vegetation, if any: Garden trees.
 - xiii) Plinth area of the structure / alleged violation: NA.
 - xiv) Nature of the structure: Permanent structure(Proposed Drawings)
 - xv) Approvals / NOC's issued by any other Department's / Authorities: NO.
 - xvi) Whether the proposed construction meet the CZMP Guidelines: Yes.

Details of Proposed Project :

The Applicant M/s. Dinar Tarcar Resources(india) Pvt.Ltd. has proposed for construction of Jetty & Platforms for Loading & Unloading, Strengthening of existing Bundalong zuari river.

Need/Purpose of the proposed Project: The Location has an area of 1,27,380 m² for construction of modern Jetty and Platforms to handle Iron ore with many other industrial products. The project would contribute substantially to increase the various supplies to both domestic and exports markets. The average annual total handling of cargo would amount to 3MT.

CSIR -National Institute of Oceanography report

With Reference to the CSIR -National Institute of Oceanography report The Proposed Part of plots survey no.s 36/0, 37/0, 41/1,41/4, 41/9,41/24 in odar Taluka Quepem, South fall withinthe No Development zone(River NDZ) From River HTL – CRZ III

The proposed jetty partly falls in NDZ (River NDZ) and CRZ IB

The proposed Gabion wall falls in CRZ IB

The proposedbollards, light tower weighbridge, stockyard-1, falls in NDZ(River NDZ) area.

Findings from EIA:

 The project is regarding construction of the jetty and platform for Loading and Unloading, storage, handling, of ores and non-hazardous dry cargo.

2. The proposed site is located in survey nos. 29/0, 30/1, 34(P), 35(P), 36/0, 37/0,41/1,41/4,41/9 at village odar &xelvona.

3. Activities:

Description	size	Area in Sq.m
Platform/quay	12mx10m	336
Jetty	12mx18m	237
Strengthening of bunds with Gabion	267 m (length)	

4. Environmental Aspects in Project Activities :

- Proposed activities are located in sub-tidal and intertidal region
- Cutting of trees in proposed construction
- Construction of ramp and jetty may lead to obstruction of sediment transportation along shore resulting in sediment deposition towards west side of structure.
- · Cutting and filling of land is proposed for construction of road.
- Construction activity will result in increase in turbidity which will affect the marine ecosystem temporarily.
- Construction materials to be consumed in proposed projectare cement, steel, Metal(<40mm), sand, NP3 1000mm, NP3 600mm dia, Trap rubble
- Water requirement for the project will be sourced from public water supply and tanker water. 10.5 cubic meter per day water will consumed.
- Solid & Hazardous Waste Generation the non-degradable waste will be first segregated so as to remove the material that can berecycled. Plastic waste will be collected and handed over to authorised scrap dealers. Hazardous waste such as oily rags, empty drums, waste oil shall be disposed to recyclers authorised by Goa Pollution Control Board.

Environmental Aspects and Impacts of Proposed Project:

As per the Environmental impact matrix(EIM) prepared in accordence to EIA report without mitigation measures as EMP The net impacts due to proposed upgradation, new infrastructure facilities will be negative 1950 this indicates significant adverse impact on environment, requiring well designed control measures. Environmental impact matrix with mitigation measures as EMP The net impacts due to proposed upgradation, new infrastructure facilities will be negative700 this indicates non appreciable adverse impact on environment. Therefore, in view of the project proponent to conduct activities by following the mitigation measures.

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Conclusions from EIA report:

- The proposed project will meet its water and energy requirement by public water supply and tankers.
- Wastewater generated will be disposed in septic tank, hazardous waste such as empty containers and used batteries will be given to GSPCB authorised recyclers and solid waste to authorised recyclers.
- As per the study done for 331.3km² the study area comprises of about 6.03% of water body. As per LULC map other than water body most study area falls under mining and industry. Built up residential area is about 10.97 %. The main plantation in region is coconut.
- As per the EIM evaluation has been done for land environment, air environment, water environment, solid and hazardous waste management, biological environment socio economic environment with & without control measures. Proposed facilities will have negative impacts if proper mitigation measures are not taken.

Details of Proposed drawings (Submitted):

1. Proposed barge loading (jetty) – 20mx9.50m

Details of the jetty:

- a. Length of deck slab = 20m
- b. Width of Deck slab = 9.0m

Details of Foundation and superstructure—R.C.C pile foundation is adopted for the foundation of jetty construction. 7 nos. of pile with spacing 2.250m and 1.50m(at ends) are adopted as per the design drawings. R.C.C pile cap with length of 12+1.7+1.7=15.4m and width of 1.5m. The deck of the jetty is resting on girders and girder is resting on R.C.C columns of 400mm x 750mm and R.C.C tie beams are used as bracings for support to girders. The deck slab is resting on main girders and tie beams are used as bracings to main girders.

2. Concrete Retaining wall is proposed at approach of jetty.

Details of R.C.C retaining wall:

- a. Height = 3.5m from Ground level.
- b. Depth of Foundation = 1.3m (rubble soling and Pcc)
- c. Width at bottom = 3.670m



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3. Unloading Platform:

RCC slab of 12.00 m x 10.00 m with R.C.C Plinth beams provided of dimension of 600mm x 1500mm

Tie beams = $1100 \text{mm} \times 750 \text{ mm}$

Rcc piles are provided of 750mm dia.

- Weigh Bridge: Dimension 7.86m x 5.50m is provided. With 7mx3m weigh bridge platform.
- 5. Gabbion wall: The project proponent has proposed gabion wall construction. The Details of the same are as follows:

Construction material = Basaltic stones of not less than 30cm in size are

Used, hard lateritic boulders are used for foundation. Gabion is made of
mechanically woven hexagonal shape, wire mesh of dia 3.2mm.

The detailed drawing of the Gabion wall is not submitted by the applicant.

- 6. Proposed office and parking area: 20m x 7m permanent structure with utilities rooms as cloak room, store tool room, battery room, jr. electrical room, jr mechanical room, manager room. Parking area 13m x 20m is proposed in the drawing. The section drawing of the proposed office room is not shown in the drawing.
- 7. Watch tower: Tower height= 14m

Platform height = 10 m

Canopy height = 3m from platform Staircase width=1mts.

8. Proposed weigh bridge office:

dimension – Length x breadth = $3m \times 2.5m$ Height = 5m from ground level.

 Proposed Road: Proposed road of 8.00 meters width and 1163.00meters in length.

> In the proposed drawing project proponent has shown proposed road of 25m width by SWR and Goa Govt. the details of the same are not submitted.

10. Washing Ramp & oil collection/ separation tank: Dimensions 15.60 m x 10.6m, height of structure 8.79m, collection tank

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dimension 5.8m x 3m with 8m depth, oil separation chamber of 7.5m x 2.1m with 8m depth. The disposal of the waste is not mentioned.

Recommendations:

- The proposed construction should be carried out strictly as per the provisions of CRZ notification, 2011 (as amended from time to time) and guidelines / clarifications given by MoEF from time to time.
- In the proposed drawing project proponent has shown proposed road of 25m width by SWR and Goa Govt. the details of the same are not submitted.
- Construction debris shall not be disposed in the CRZ area.
- Environment Management Plan (EMP) shall be implemented effectively.
- All other mandatory permissions from different Departments /
 Authorities should be obtained prior to the commencement of work.
- The safe disposal of waste water and solid wastes generated during the construction phase should be ensured.
- Disposal of debris including the excavated material during construction phase shall not create adverse effect on neighbouring communities and shall be disposed off within the project site with the approval of the competent authority after taking the necessary precautions for general safety and health aspects.
- Vehicles hired for bringing construction material at site should be in good conditions and confirm to applicable air and noise emission standards.
- Ambient noise levels should confirm to residential standards both during day and night. Incremental pollution load on the ambient air and noise quality should be closely monitored during construction phase.
 - The construction materials and debris shall be properly stored and handled to avoid negative impacts such as air pollution and public

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nuisances by blocking the roads and the public passages. Appropriate barricading shall be done and signboards shall be put at such sites.

- In the event of any change in the project profile, a fresh reference shall be made to the GCZMA.
- The Mangroves, if any, on the site should not be disturbed in any way.
- The GCZMA or any other competent Authority may stipulate any additional conditions subsequently, if deemed necessary, for environmental protection, which shall be complied with.
- Quarterly monitoring reports should be submitted to the GCZMA in soft and print format.

Report Enclosed with EIA Report.

Radha Rao

Tejas Naik

Gorakh Tuenkar

(Expert Member, GCZMA) (Engineer, GCZMA)

(Field Surveyor, GCZMA)

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GOA COASTAL ZONE MANAGEMENT AUTHORITY

C/o Department of Environment, (Govt. of Goa)
4th Floor, Dempo Tower, patto Plaza,
Panaji-Goa 403001

PROCEEDINGS OF SITE INSPECTION

FILE NO: - GCZMA | 5 23-24 /86

DATE: 27 /03 /2024

SUB: Proposed construction of Jetty & platforms for Loading & unloading.

REF:

Village: odar & xclvon a Taluka: Quelpem Survey: Sub. Div. No.

Parties/Officers Present:

1) Radha Rao - Expert member GCZMA

2) Tejas Naik - Engineer GCZMA (27) 27/3/24

3) Gorakh tuenkar - Field surveyor ACZMA (27) 27/3/24

4) Manish Agniholai - G.M.

(A) Manish Agniholai - G.M.

Brief description of proceedings:-

As per the direction of member secretary aczma. Site inspertion was carried out along with above officials. At 1000 there trees bushes overpr and regetations are present.

The applicant/project proponent is directed to submit necessary proporty documents, detected drawing of all the structures proposed in the which falls in CRZ area, and other necessary documents beguined.

21 3 24 May 27/3/24 Pal 24/3/24

Signatures: