



Preparation of Land Use Plan & Geo tagging of Assets of Visakhapatnam Port Authority

**Final Detailed Land Use &
Conceptual Business Master &
Utilization plan 2047
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Submitted by :-



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EXECUTIVE SUMMARY

India, one of the fastest-growing economies, recorded a 7.2% GDP growth rate in 2024. Ports play a pivotal role in India's development, handling 95% of trade volume and 70% of trade value. Ports like JNPA, Mundra, and Visakhapatnam have become vital economic hubs. Visakhapatnam Port is India's leading container port, handling a significant share of the nation's container freight. Under the Major Ports Authorities Act, 2021, the Visakhapatnam Port Authority (VPA) gained autonomy to prepare and approve development plans, supporting national and global trade. Aligned with the "Sagar Mala" policy, VPA promotes port-led industrialization, enhanced connectivity, and infrastructure development.

VPA manages 7,618 acres, requiring an updated land use plan per the Policy Guidelines for Land Management, 2014. Assystem India Limited has been engaged to prepare an Existing Land Use Map and Proposed Land Use Plan to guide optimal land utilization over 20 years, with reviews every decade. The current land use includes residential (0.94%), commercial (0.38%), public/semi-public (1.38%), transportation and communication (7.2%), utilities (0.89%), port operations (13.25%), industrial (36.71%), open spaces (18.17%), and unoccupied areas (5.47%). Most vacant lands are accessible via existing or planned roadways.

The vision is to develop VPA as a modern port city with high-end facilities, reducing dependence on Visakhapatnam for social and economic infrastructure. Proposed developments include malls, multiplexes, IT parks, and transportation networks. The land use allocation follows a "Broad Zoning" approach, offering flexibility and aligning land resources with strategic objectives. The eight proposed zones include residential areas for housing, hotels, and staff quarters; commercial zones with banks, offices, and retail outlets; and industrial zones for manufacturing, warehousing, and data centers. This integrated plan positions VPA as a key driver of regional economic growth and a globally competitive port city.

The proposed zone plan includes broad zones:

The Visakhapatnam Port Authority (VPA) has a comprehensive land-use plan that categorizes 7,618 acres into residential, commercial, industrial, port operational, transport, green, mixed, and logistics zones. Residential areas focus on housing, hotels, hostels, and communal facilities, while commercial zones include banks, offices, retail outlets, and service garages. The industrial zone spans 2,899 acres and supports manufacturing, warehousing, and utility services. The port operational zone, covering 844.65 acres, includes container terminals, storage yards, and RO-RO services. Transport zones enhance connectivity with roads, parking, and logistics hubs, while green zones emphasize open spaces, water bodies, and sustainability. A logistics zone integrates warehouses, tank farms, and storage yards to support industrial and port activities.

VPA aims to develop underutilized lands in Mulakuddu (292.9 acres) and Lankelapalem (306.8 acres), leveraging their proximity to Visakhapatnam. Mantripalem village and its surroundings, partially covered by hilly terrain, are also targeted for development. Visakhapatnam, with modern facilities, strong connectivity, and first-rate infrastructure, is a hub for MICE (Meetings, Incentives, Conferences, and Exhibitions) tourism. Proposed facilities include food plazas, auditoriums, villas, skill development centers, and play areas.

Mulakuddu, 22 km from Visakhapatnam, is ideal for waterfront tourism and water sports, such as kayaking and boating. Proposed amenities include water parks, indoor game zones, gift shops, conference rooms, and lodging facilities. Alternatively, a Marine-Aqua Agro Processing Zone covering 154 acres is planned to capitalize on the region's seafood and agricultural industries. This project allocates 101.93 acres for saleable land, with provisions for infrastructure, roads, green belts, and open spaces. Classified as an Orange Category industry under CPCB guidelines, it requires environmental clearance and includes processing units, cold storage, logistics hubs, and quality control facilities. A 1.5 km approach road to State Highway-144 will be expanded to four lanes for better connectivity. This initiative promises economic growth, employment, and sustainable development, positioning Visakhapatnam as a leader in marine and agro-industrial sectors.

1 INTRODUCTION

One of India's most important ports, Port of Visakhapatnam is situated halfway between Kolkata and Chennai on the east coast. The Port is located at Latitude 17° 41' N and Longitude 83° 18' E. Iron ore, coal, crude oil, petroleum products, LPG, fertilizers, dry cargo, liquid cargo, and containers are just a few of the cargo kinds that the port can handle. VPA makes a substantial contribution to the marine trade of Europe, America, Africa, the Persian Gulf, Asia, and the Asia Pacific areas. In terms of traffic, the Port of Visakhapatnam was placed second on the East Coast and third among Major Ports.

Vishakhapatnam Port is the only significant port in India with three foreign accreditations for environmental management systems, occupational health and safety management systems, and quality environment management systems.

India has 13 major ports, which handle about 58% of sea borne traffic and around 205 non-major ports, which handle about 42% of sea borne traffic. Most ports in India are wholly government owned under the Ministry of ports, shipping and waterways. Individual terminals and facilities may be operated by private organizations. Major ports are Kolkata, Paradip, Vishakhapatnam, Ennore, Chennai, Tuticorin, Kandla, Cochin, New Mangalore, Mormugoa, Mumbai, JNPA and Port Blair as shown in below figure.

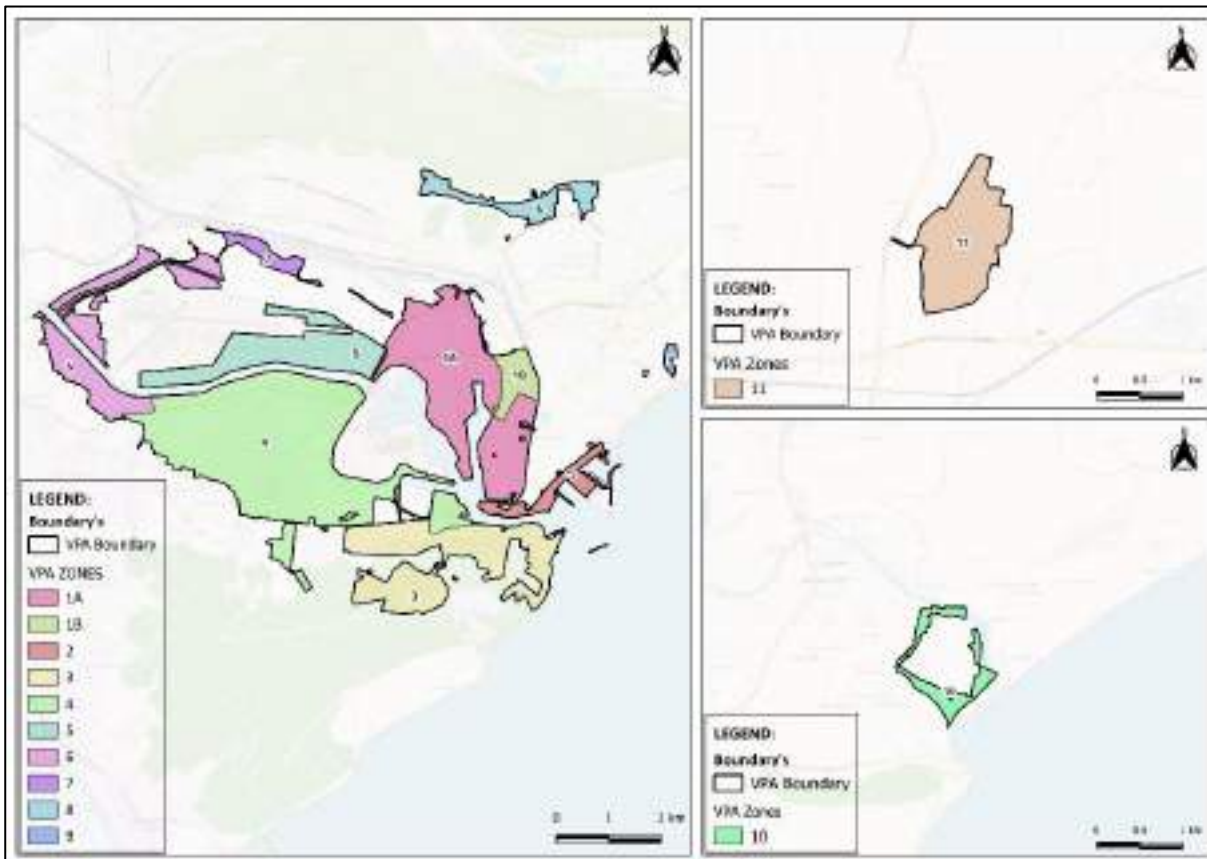
Figure 1-1 Map of India-Major Ports



Amongst the 13 major ports, Kandla Port handled the maximum cargo traffic of 12.24 million tonnes with a share of 17.8% in the total cargo handled at major ports followed by Paradip Port (15.9%), Vishakhapatnam Port (10.3%), JNPA (9.7%), Kolkata (9.08%), Mumbai Port (8.6%), Chennai Port (6.6%), New Mangalore (5.5%), Tuticorin port (5.12%), Cochin Port (4.8%), Ennore (4.5%) and Mormugao Port (2.2%). VPA ranks third amongst Indian major ports in terms of total cargo handled in 2020. Thus, Visakhapatnam Port plays a pivotal role in Indian maritime transportation by having its share around ten percentage.

Despite being a top port on the east coast of India, Visakhapatnam Port faces fierce competition from private port operators, particularly in that area. Three areas make up the port land: Mulakuddu, Lankelapalem, and the VPA port area. The NH5/EXIM park & Major Industrial Area, Port Operational areas, Hilly area, and Mixed-Use area are the four main areas that make up the VPA port area. VPA should investigate significant cargo handling tactics, such as redistributing open stacking spaces, controlling storage facilities, improving the road and rail network, and regulating the environment. Notified port limits are attached here with the report as per the gazette notification as annexure.

Figure 1-2 VPA Zones



The Inner Harbor and the Outer Harbor are the two parts of the port. An approach channel that is roughly 2.5 km long, 250 m wide, and 22 m deep allows access to the Outer Harbour. This is as far as the lighthouse on the Dolphin's nose. This results in a 610 m-diameter turning circle. An extension of this approach channel, which starts at Dolphin's nose lighthouse and spans 1.6 km, provides access to the Inner Harbour. It is 16.1 meters deep and ranges in width from 111 to 168 meters. This results in a 440 m-diameter turning circle.

The Inner Harbor is a naturally occurring harbour featuring three navigable arms — northern, western, and northwestern — as well as a turning basin. About 100 hectares of water are spread out in total. There are 20 slots available. It can hold fully laden Panamax ships measuring 260 meters long, 43 meters wide, and 14.5 meters deep. With a total water spread area of 200 hectares, the Outer Harbour is an artificial harbour. Two breakwaters, the 1540-meter-long southern breakwater, and the 1070-meter-long eastern breakwater, guard its basin. It can fit six berths. It can hold fully laden 390 m LoA, 42 m beam, and 18.0 m draft Capsize boats.

1.1 Necessity of Land Use Planning

Every major port is required to establish a land use plan that covers all the land that the port owns and/or manages, in accordance with the Policy Guidelines for Land Management 2014 (PGLM), these were distributed to all major ports for implementation. As per these Policy guidelines, the Board will adopt these proposals, and a copy will be sent to the government. The Board would only approve any change proposal for the land use plan after considering the feedback and objections from the various stakeholders. The Board will also examine the land use plans of major ports at least once every five years. It is essential to regularly examine these standards given the competitive climate in which the ports operate.

The Major Port Authorities Act of 2021 was released on February 18, 2021. The Act's clause No. 25 and rule No. 8 grant the powers to the VPA Board for the planning and development of the port area and its territory. Subject to the rules created under the Act, the board is authorised to prepare land use plans for any infrastructure or development that is established or planned to be established within the port limits and the area adjacent thereto. This land use plan will not be subject to any local, state, or federal government rules. If the Board's regulations and those set by the local authority disagree, the Land Use plan developed by the board shall prevail.

Land is one of the key resources available to the port authorities to advance their operations and handle the growing volume of port traffic. Under the Major Port Authorities Act, 1963, Sub-Section (1) of Section 34 grants ports the authority to lease land for a maximum of thirty years; if the lease is for a longer period, the Central Government's prior approval is required. To control allotment of land, the Ministry of Shipping has been publishing rules from time to time. The Land Policy Guidelines also covers the purposes of MPT Act of 1963. The Major Port Authority Act of 1963 standards and central government guidelines stipulate that a GIS based land use plan is required.

1.2 Existing Land Use Planning for VPA

The land use plan was prepared in the year 2021 and since is in place. Under the Land use Plan proposal, for all the zones and the vacant land parcels are allotted to industrial or mixed land use. The requirement is that this plan needs to be reviewed during the assessment stage, zone wise and parcel wise. The proposals prepared in the plan also need to be verified with the ground conditions and implementation status.

1.3 Scope of Consultancy Assignment

To prepare a Revised Land Use Plan 2024, for utilization of the land and waterfront available with VPA, it has to be based on the prevalent / revised Land Use Plan. Such detailed plan prepared needs to be for Port development for short /long term requirements, considering various non-port activities such as adventure and non-adventure water sports activities. mining, scuba diving, sea walk, beach tourism, floating hotels / restaurants, seaplanes, marina, ship repair, boat building, floating solar panel, ferry services, harbour cruises, ship breaking etc. All these need to be outlined overall rational indicative project investment programme, with time frame and order of priority, by taking into consideration all future projects/ activities proposed to be undertaken till 2047.

1.4 Report Structure

The report is for the "Preparation of Land Use Plan and Geo-tagging of Assets of Visakhapatnam Port Authority" towards the Sixth deliverable "Final Proposal for the Land

Use Plan 2024 & Conceptual Business/Master & Utilization Plan 2047” which is structured as below:

1. Introduction
2. Methodology
3. Review of Prevailing Land Use Plan & VMRDA Plan
4. Physical Features
5. Existing Facilities at VPA
6. Existing Land Use & Land Allocation
7. Traffic & Transportation
8. Infrastructure
9. Environment
10. Stakeholder Consultation
11. Strategies & Proposals
12. Proposed Land Use Zone Plans
13. Block Cost Estimate for proposed Infrastructure.
14. Annexures

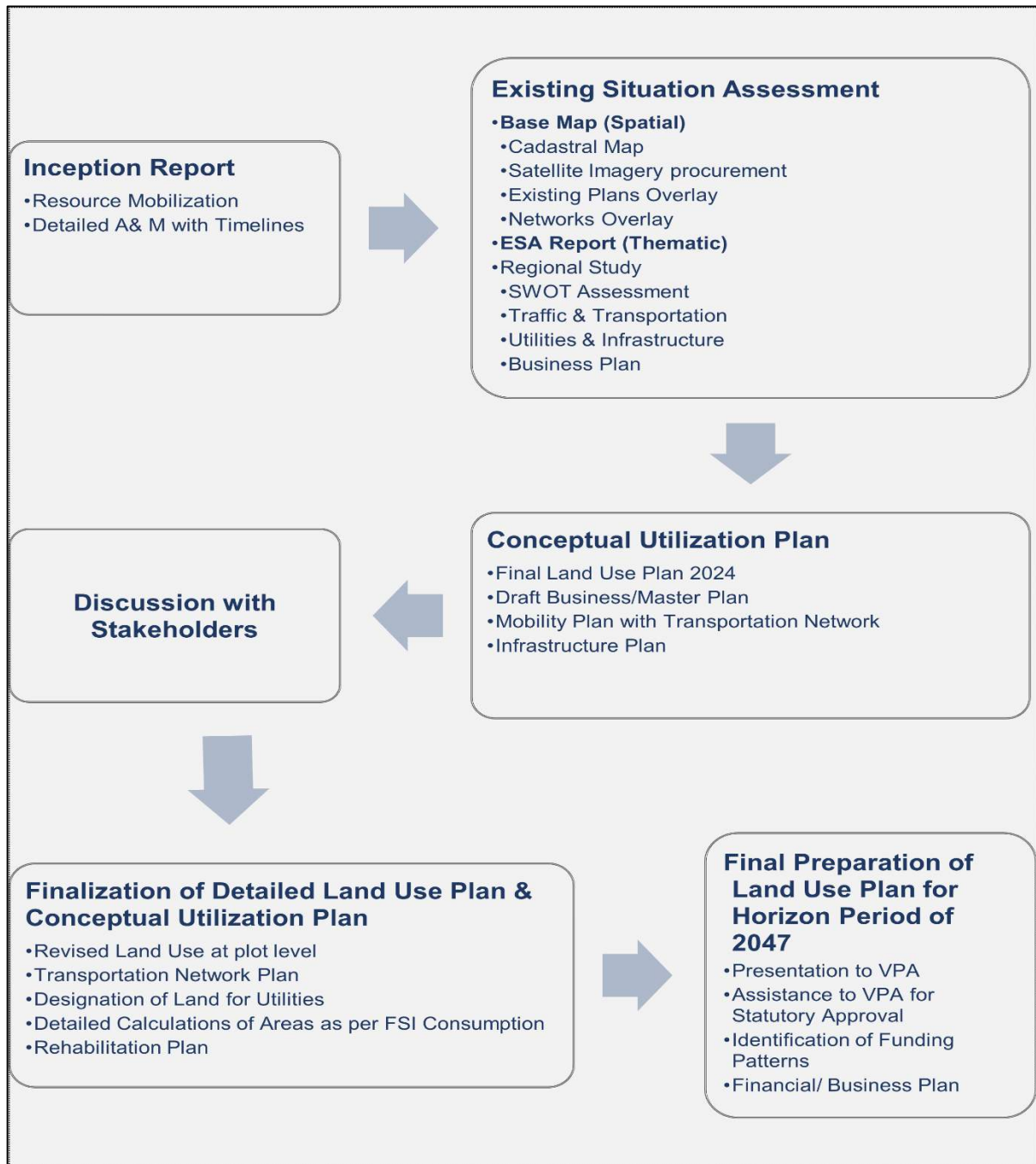
1.5 Acknowledgement

Assystem India Limited sincerely thank Visakhapatnam Port Authority officials for the courtesy and support extended at their office during the meetings, consultations, site visits and for extending cooperation in sharing the available data/ information.

2 METHODOLOGY

2.1 Introduction

The scope of the assignment is studied in detail and detailed tasks set out in, with the objective that the needs of the project are met comprehensively and appropriately. In the following sections, we discuss our proposed methodology relating to the various tasks. These cover all the tasks set out in the scope. The indicated tasks have been broken down into the different service periods and have been fully integrated into our proposed work plan which are presented later in this chapter.



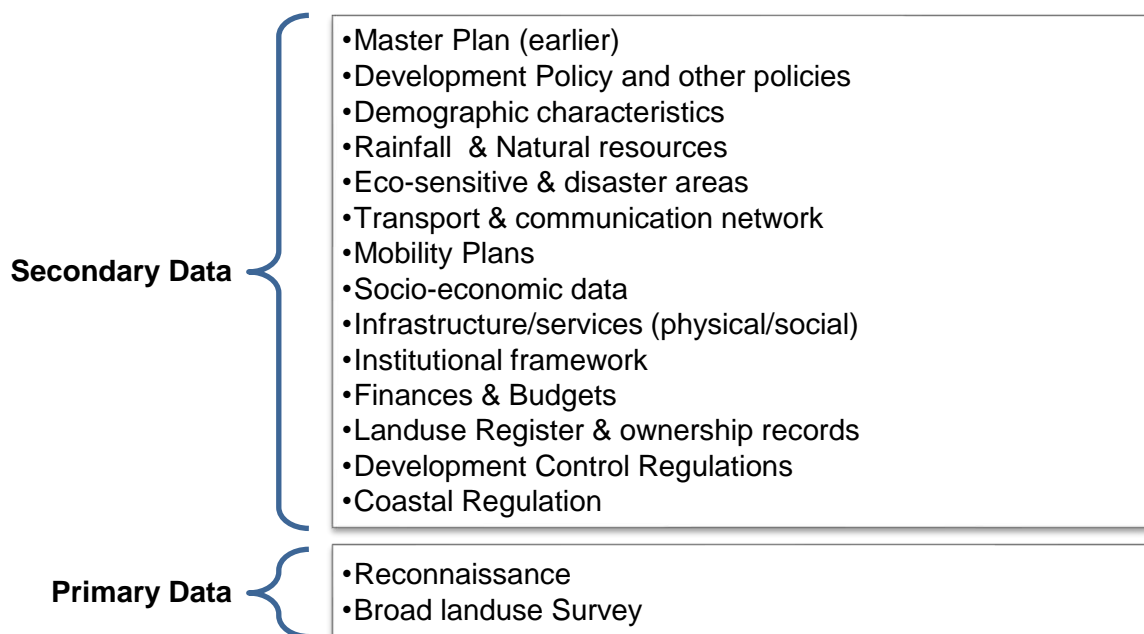
2.1.1 Process

As part of the assignment, Inception report and Existing Situation Analysis report was submitted and reviewed by the authority. The report had detailed out the approach and methodology adopted for the assignment. Assignment is further categorised in 2 parts. One is preparation of land use plan (Part-A), and the other is the geo-tagging of assets (Part-B). In this section, detailing is shown for land use plan preparation which includes the section for Final proposal for the Land Use Plan 2024 & Conceptual Business/Master & utilization Plan 2047 as final deliverable for Part-A.

2.2 Detailed Methodology for Part -A

2.2.1 Task 1: Studying the existing situation

The details on various data collected are outlined as under



2.2.1.1 Data Collection

Secondary data collection includes list of data mentioned in the above chart from different department and available data with VPA. It also included review of all the existing plans and policies and collects all the layouts approved and land use change.

2.2.1.2 Preparation of Base Map

A preliminary base map was prepared marking all the basic features such as buildings, roads, transport facilities, utilities, utility lines, natural features etc. Afield verification was carried out to mark the land use of buildings. In the same field visit all the features marked in base map are also be updated to the ground situation.

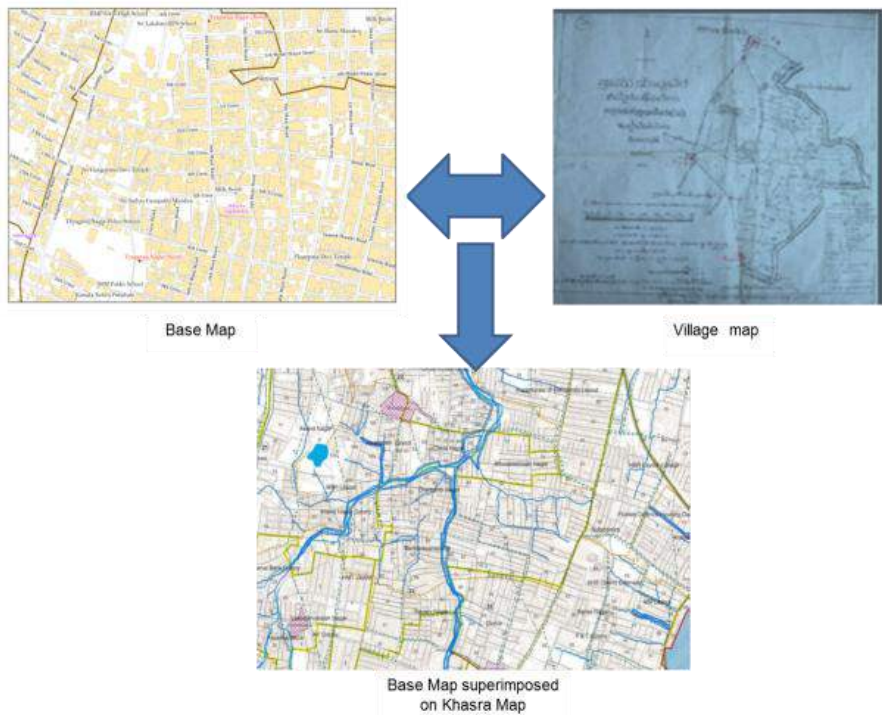
Figure 2-1 Base-Map preparation process



BASE MAP – WITH CADASTRAL INFORMATION

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    graph TD
      A[Village Cadastral Map] --> B[Scan Village Cadastral Maps]
      B --> C[Digitised Village Cadastral Map]
      C --> D[Geo-Reference Cadastral Maps]
      E[DGPS Survey] --> D
      D --> F[Superimpose Cadastral Map on Satellite Imagery]
      F --> G[Edge Matching & Rectification Process]
      G --> H[Draft Cadastral Map]
      I[QA & QC Check] --> H
      J[Correctness Audit] --> H
      H --> K[Final Cadastral Map]
      L[Validation by Stakeholders] --> K
      M[Ground Verification] --> K
      K --> N[Identify Lakes as per Revenue Records]
    
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2.2.1.3 Land Use Assessment Methodology

2.2.1.3.1 Digitization of features on Satellite Imagery

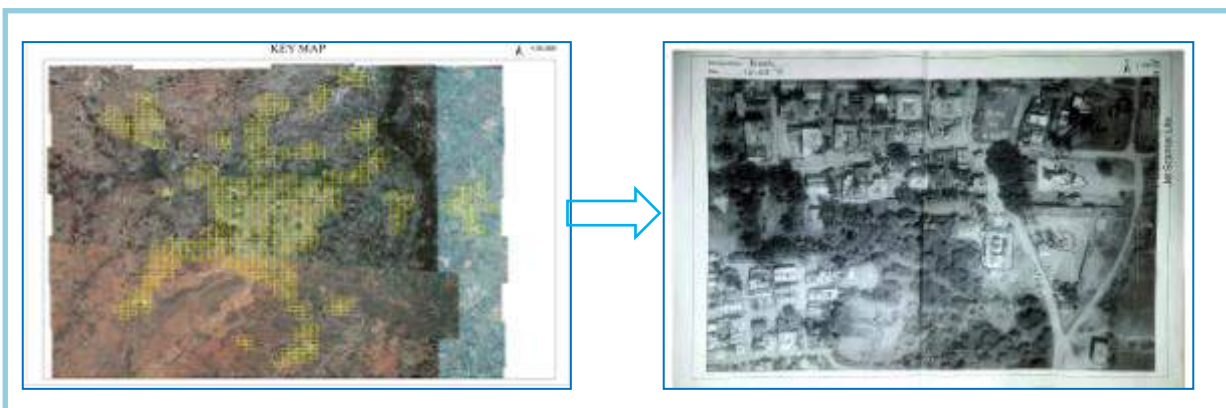
Satellite imagery for the study area is procured from NRSC. Cartosat-3 Series imagery is suitable for our study. This imagery is used in mapping of features in the study area. And as part of base map preparation, all the features in the study area are digitized. Major features are buildings, roads, utilities, water bodies, hills etc. Each feature is given with unique id which represents its type and the number.

Figure 2-2 Methodology for Land Use Survey



2.2.1.3.2 Grid Map Generation

Figure 2-3 Grid Map Generation



After digitizing the map, a grid layer was created with the dimensions of 100 meters X 100 meters. And this layer was overlaid on the base map and satellite imagery.

These grid maps along with the overall grid map are distributed to the survey. Before starting the survey, one day training on survey was given to the survey team.

2.2.1.3.3 Feature Marking

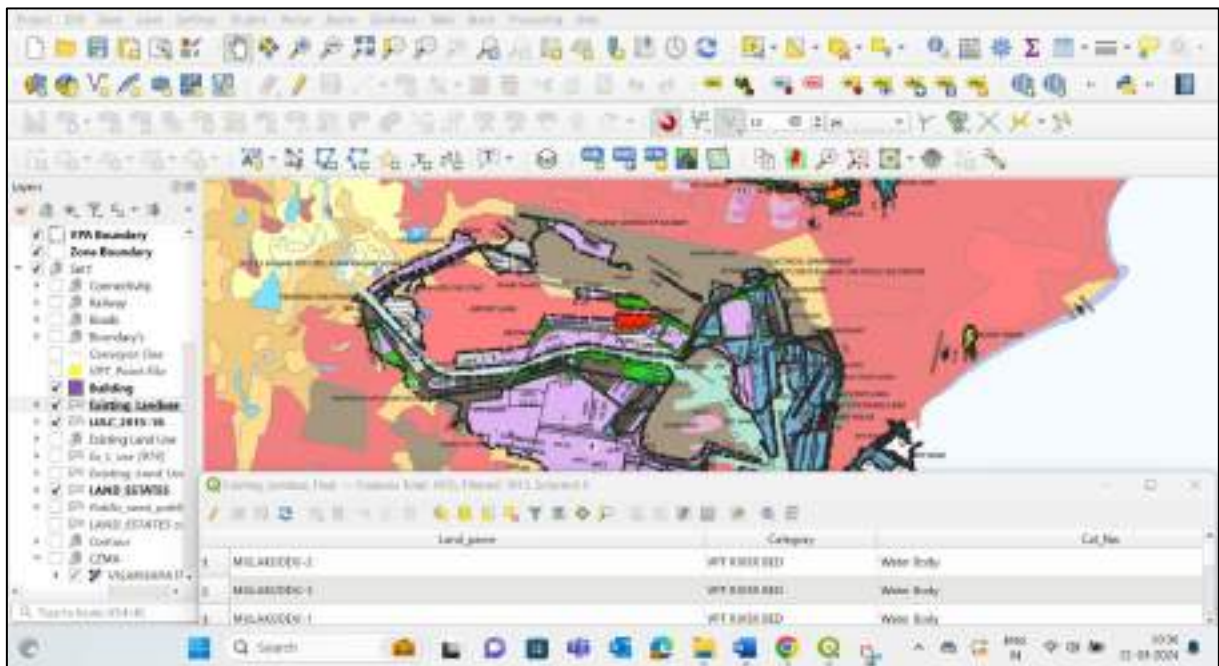
All the mapped features were marked on the maps with the help of respective codes that were given to the teams. To enhance the quality of attribution sub types were used, to avoid in correct entry of data into the respective fields. First the sub type fields were created and defined at the geodatabase level with the codes. Then at the feature class the sub types are assigned the codes that were used while digitizing. Each feature was attributed to its code and sub-code. For example, a building was given code of 07-04, in which, 07 represents Residential and 04 represents an individual house.

A broad predominant area wise land use survey was conducted. All property units are uniquely labelled for data linking and processing. Other land use classes include development boundaries/jurisdictions, residential, commercial, industrial, public & semi-public, circulation spaces, physical & social infrastructure/amenities, water bodies, open spaces, heritage & tourist potential zones, environmentally conservative & eco-sensitive zones, agriculture & open scrub areas etc were also verified with the prepared base maps.

2.2.1.3.4 GIS updation of Features

All the feature attributes were updated on GIS platform with the help of maps that were marked in the field survey.

Figure 2-4 Attribute Updation on GIS Platform



After completion of the process, a check was carried out in the field. Survey quality was checked in this verification in which buildings were checked randomly.

Appropriate GPS Controls were established for the correction of the images and establishing the spatial framework for the GIS.

The spatial data was comprised of satellite images, the maps derived from them, maps from other departmental sources resolved to the current GIS database standards, thematic maps and analytical maps.

Geotagging of 2000 boundary pillars, 250 buildings & other infrastructure facilities in VPA were carried out after preliminary assessment and field surveys by the consultant. The

attributes for the assets were confirmed with the authorities and include basic details like location, name, Category, etc.

Table 1: Content Specifications of VPA GIS database

Spatial Data	Non-Spatial data
<p>A. From Images / Topo Maps:</p> <ul style="list-style-type: none"> ▪ Urban land use / land cover ▪ Physiography ▪ DEM ▪ Geomorphology ▪ Geological structures ▪ Drainage ▪ Soil ▪ Surface water bodies ▪ Road ▪ Rail ▪ Canal ▪ Transportation nodes 	<ul style="list-style-type: none"> ▪ Regional Setting ▪ Demography ▪ Socio-Economic Development ▪ Industry ▪ Land Use ▪ Housing And Slums ▪ Traffic & Transportation ▪ Facilities And Services ▪ Environment ▪ Governance
<p>B. Incorporated maps to be obtained from VPA</p> <ul style="list-style-type: none"> ▪ Topography ▪ Geomorphology ▪ Geological structures ▪ Soils ▪ Location of all heritage sites ▪ Location of slums, squatters, and other blighted area ▪ Village revenue boundary ▪ Cadastral map ▪ Location of pollution generating industries/facilities ▪ Earthquake epicentre data ▪ Past flooding data ▪ Land value ▪ Soil depth ▪ Soil texture 	
<p>Location points of major utilities (water, post office, telecom, power, sewerage etc.)</p>	

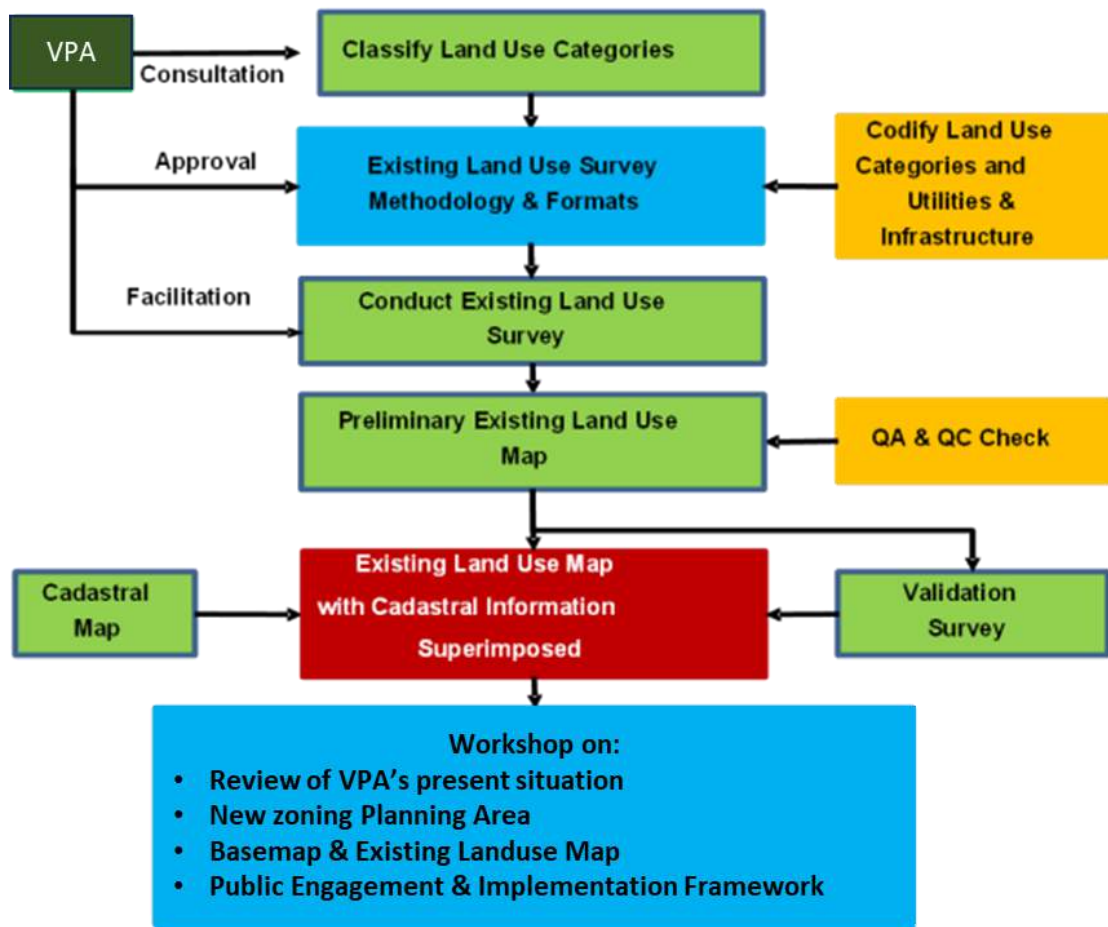
2.2.2 Existing Land Use Plan 2024

The plan was prepared in 2 major heads, one is spatial combining all the layers collected and updated during the inception stage and land use survey. The other was thematic considering business plan, infrastructure gap assessment, source identification and land requirements for the utility projections.

Analysis of Existing Situation

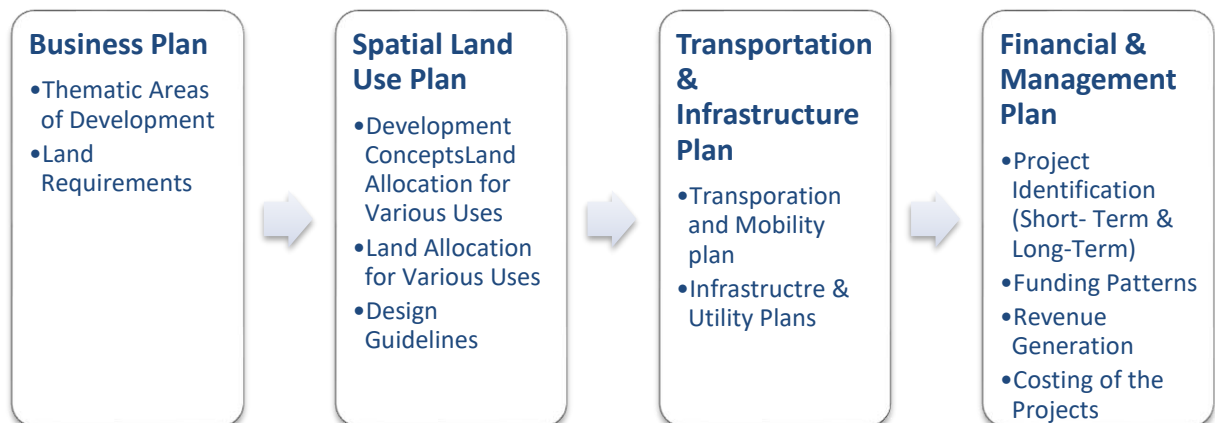
- Review of Policies, various sectoral analysis, environmental assessment, investments in VPA Spatial planning and land use modelling
- Spatial planning and land use modelling
- **The analysis will indicate the Strength, Weakness, Opportunities and Threats (SWOT)**

Figure 2-5 Process followed for VPA Land use Plan 2021



2.2.3 Conceptual Utilization plan 2030

The Conceptual Utilization Plan 2030 was prepared considering the population and economic projections, Infrastructure requirements, transportation plan, Urban Design guidelines and other relevant policies.



2.2.3.1 Preparation of Concept Master Plan

2.2.3.1.1 Circulation and Mobility:

In the case of the proposed economic units the following elements were taken into consideration:

- Integrating the transportation network into the overall land use
- Evaluating the potential impact of the proposed large-scale developments on the circulation in the surrounding neighbourhoods.
- Identifying key routes to destinations in the area that support efficient mobility patterns

2.2.3.1.2 Socio-Cultural Context:

For the area's residents to embrace a long-term plan that would ultimately benefit the community, it is critical to instil a sense of pride and belonging to the community. The community's cultural assets, its customs, and the evolution of the development over time, was used as a tool to place past trends in the context of future opportunities and to establish an urban design framework that would be sensitive and reflective of the area's past.

2.2.3.1.3 Regional Context:

Future growth is closely related to the economic health and development climate of the entire region. This phase included a review of pertinent studies, initiatives and programs that would have an impact on the future of the project area.

2.2.3.1.4 Planning and Regulatory Context:

Before creating development concepts and alternatives, it was necessary to consolidate the information contained in Development Control Regulations, and other relevant plans into a workable, agreed upon, guiding document for future development in the area. Therefore, the inventory had to focus on the review and assimilation of the information contained in previous documents.

2.2.3.1.5 Urban Design Context:

To support the vision of creating a sustainable integrated industrial destination that attracts the investments and residents to the area, it was critical that the essential elements of successful urban areas are in place.

The concept plan report illustrated the following elements at a minimum:

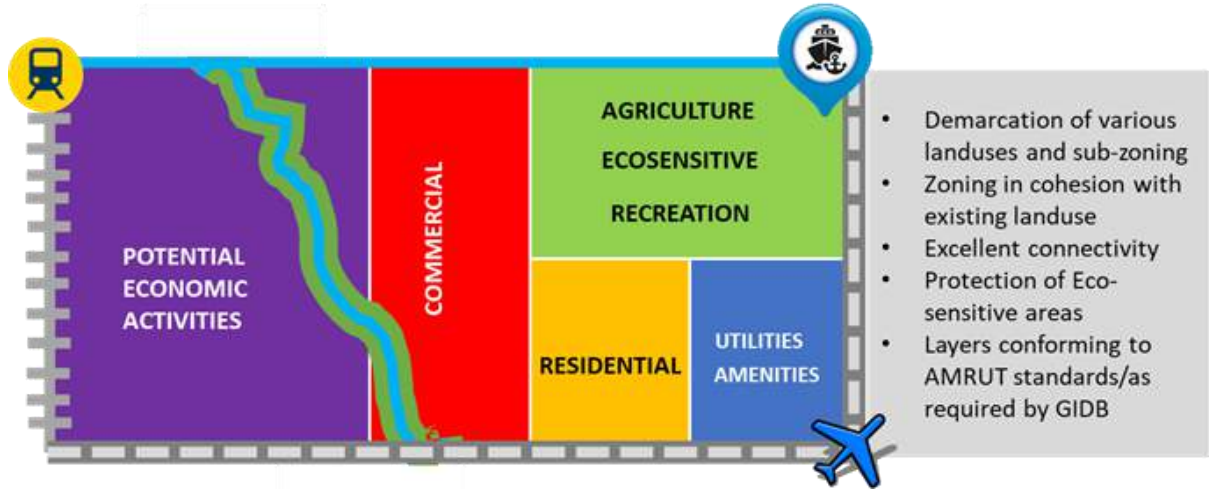
- Vision Statement with KPIs
- Integration of existing features and natural assets
- Future Land Use Mix and Development Programme
- Zoning and Land Allocation
- Circulation, Mobility and Connectivity
- Open Space and Recreation
- Public Realm Improvements
- Economic Development Strategies
- Urban Design Considerations
- Open Space and Landscape Design
- Infrastructure Interventions
- Environmental and Social Considerations

Adequate space profiling is given in the Master Plan for an Eco-Friendly development. Continuous green cover area was planned. Simultaneously ensuring that adequate saleable component of the land was achieved, while preparing the layout/land use option.

Development of social infrastructure & other allied infrastructures was based on additional demand in the area.

2.2.4 Land Use Plan for 20 to 30 years

Figure 2-6: Vision for Land use Plan 2021 for VPA



The land use Plan for 20-30 years was prepared considering the potential for different sectors. This was also listed out in terms of short-, medium- and long-term projects with costs, O&M expenditures, and Implementation/Financial Plan.

2.2.5 Block Cost Estimation

Line estimates of capital expenditure was developed based on the applicable schedule of Rates of Government of Andhra Pradesh. The project cost estimates included land development cost, cost of provision of basic infrastructure within the developed land (like internal roads, power supply, water supply, sewerage system, wastewater disposal, surface drainage, cost of greenbelt, etc) and Estimates for Operation and Maintenance costs.

3 REVIEW OF PREVAILING LAND USE PLAN & VMRDA PLAN

The last prepared land use plan for the Visakhapatnam Port Authority was in 2021. VPA had hired consultants Design & Planning Council for the preparation of the plan, and they had prepared the document in five chapters.

3.1 Review of Aims and Objectives of the Prevailing Plan

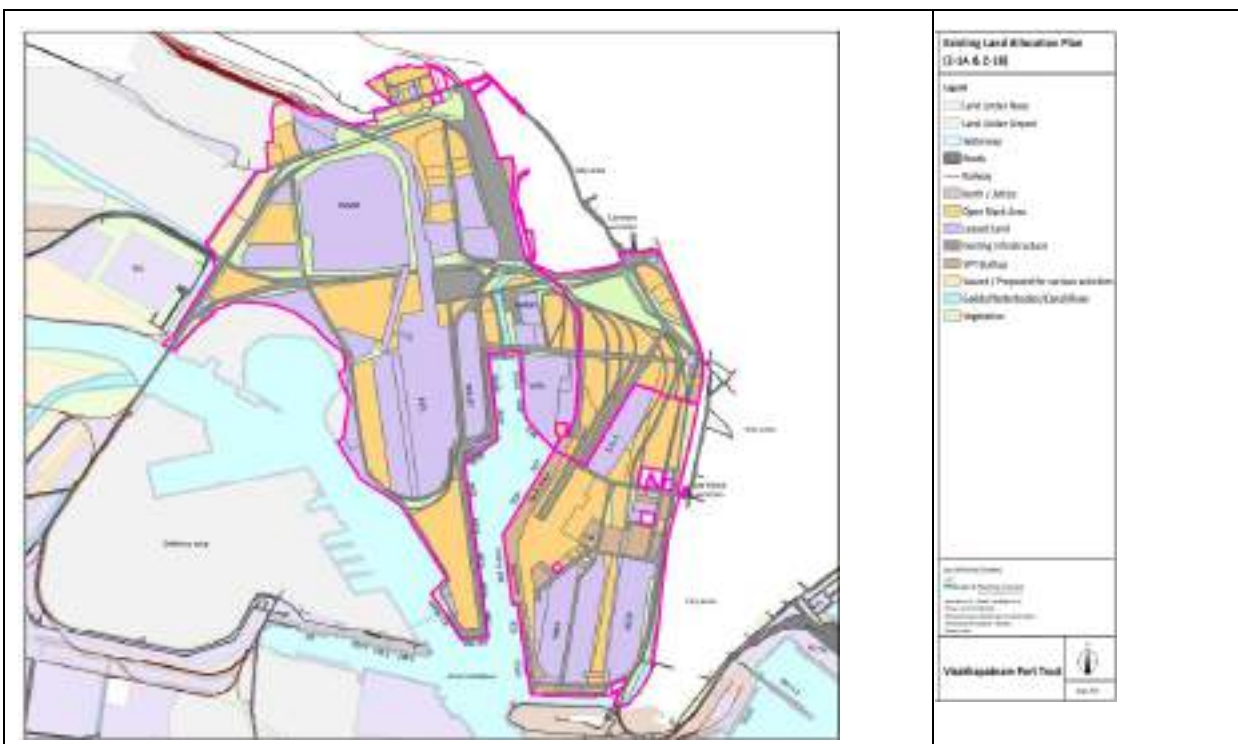
3.1.1 Content of the Land Use Plan 2021 report

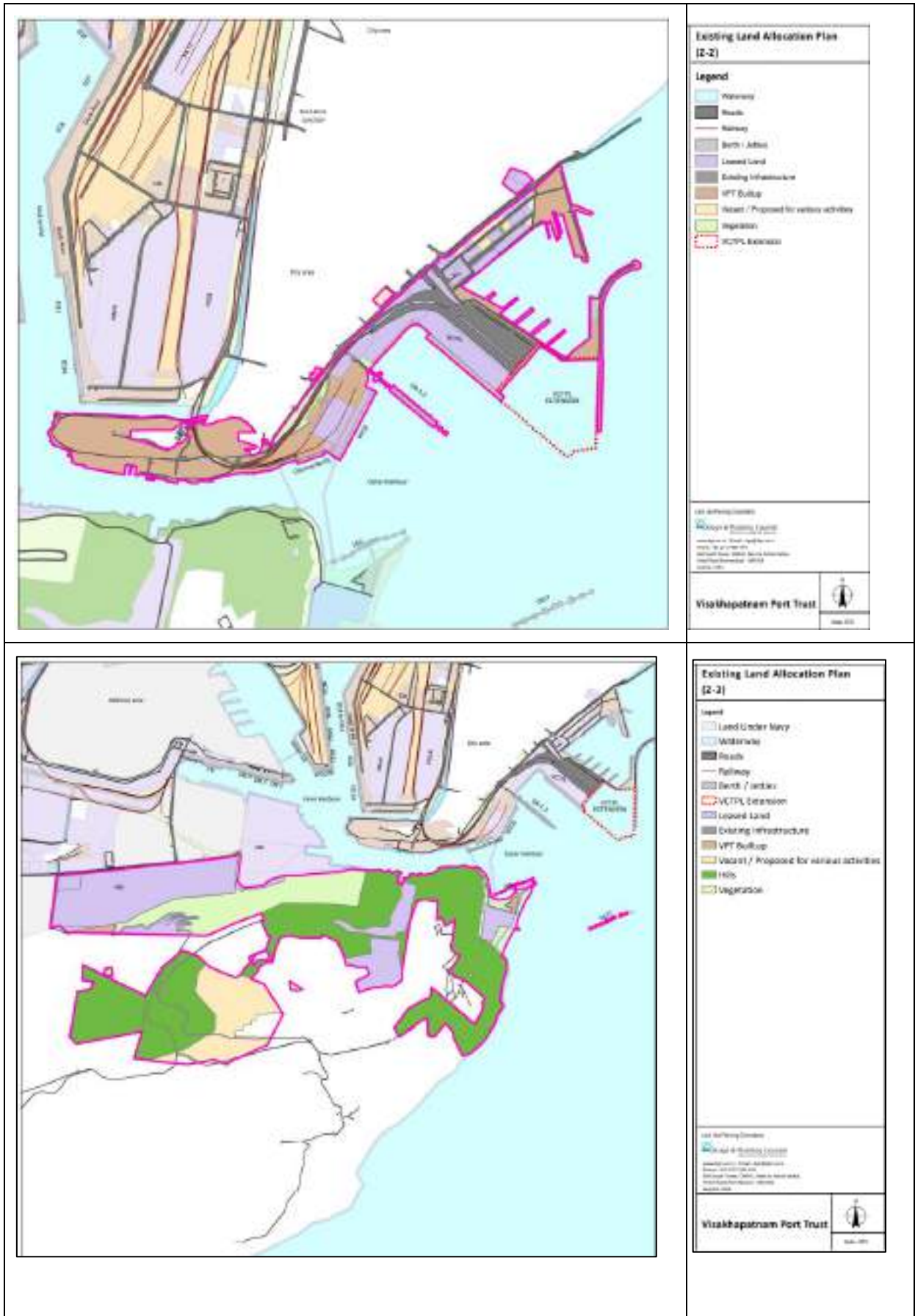
First chapter discussed about the Port and its context., where Visakhapatnam port is discussed in the global, national, and local contexts. Second Chapter discusses about the Port and its analysis, where the Layout of the port with berthing details, commodity handling, connectivity, storage facilities are discussed. Third chapter discusses about the existing land allocation in VPA which categorises the land into two areas, one is inside the port area and the other is outside port area. The Fourth chapter discusses the land use proposal for the port area focusing on infrastructure upgradation, optimisation of land and creating green buffer for better environment. Finally, the last chapter is of annexures. Review of all five chapters of previous Land Use Plan 2021, are detailed out in this chapter.

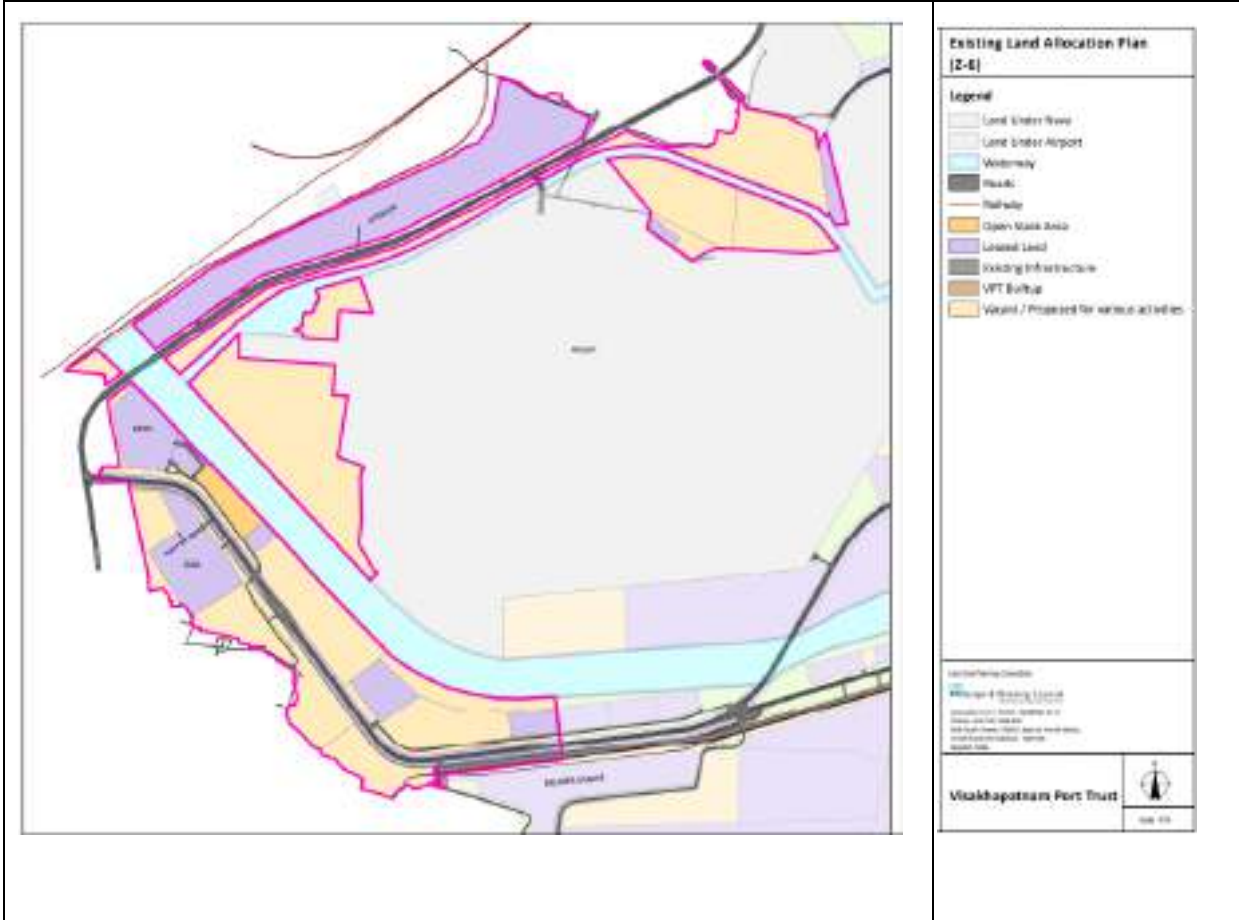
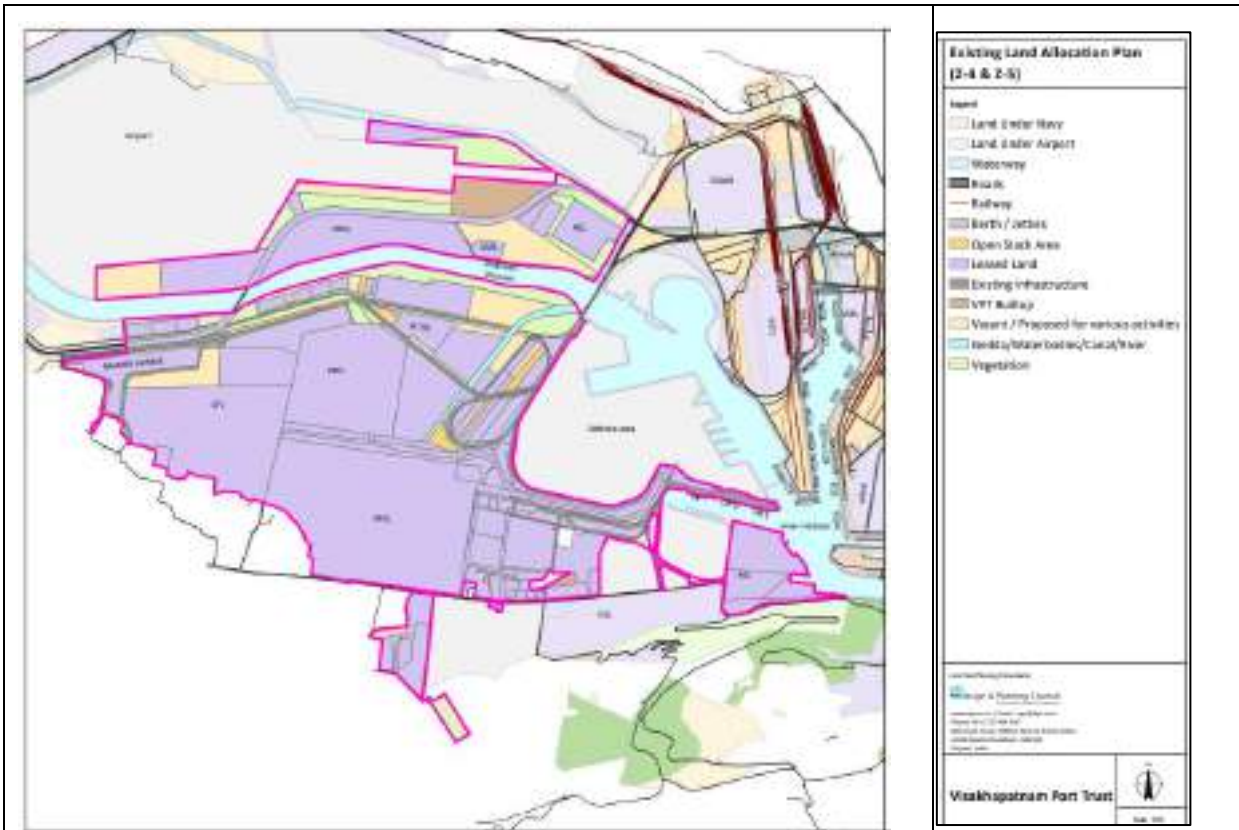
3.1.2 Aims and Objectives of the Land Use Plan

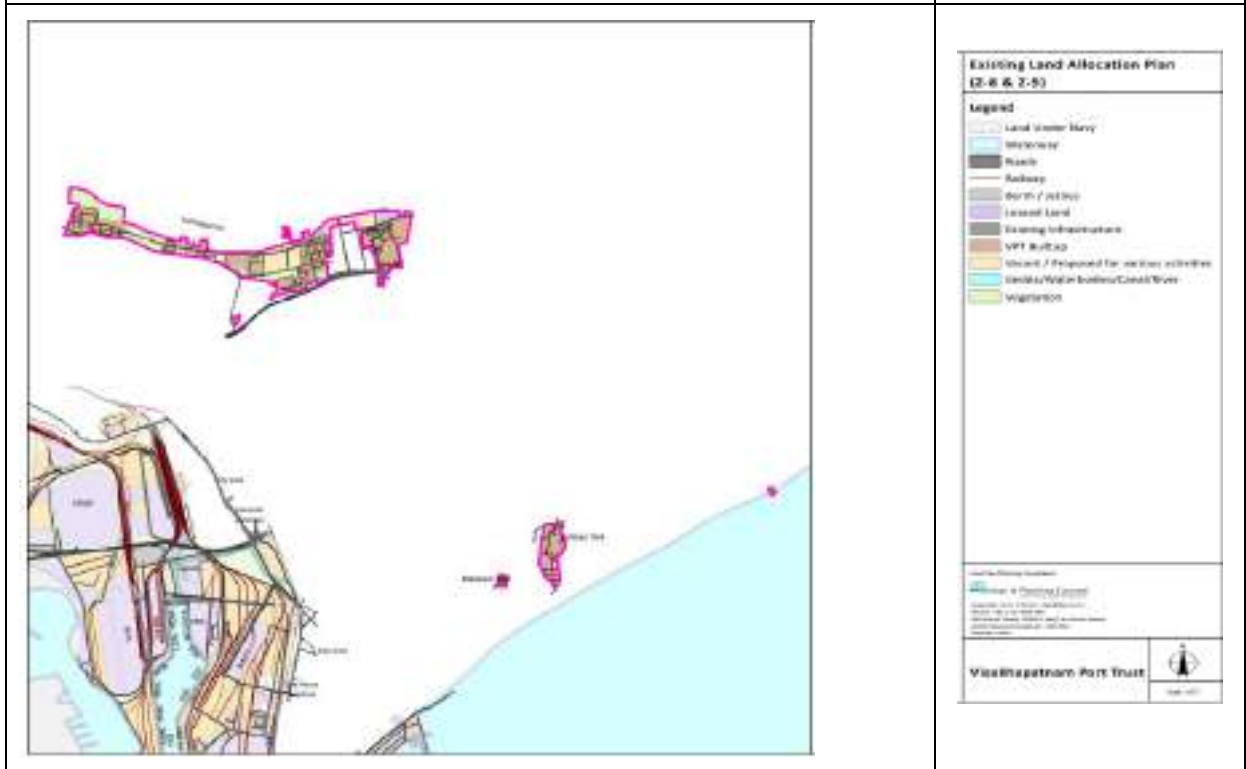
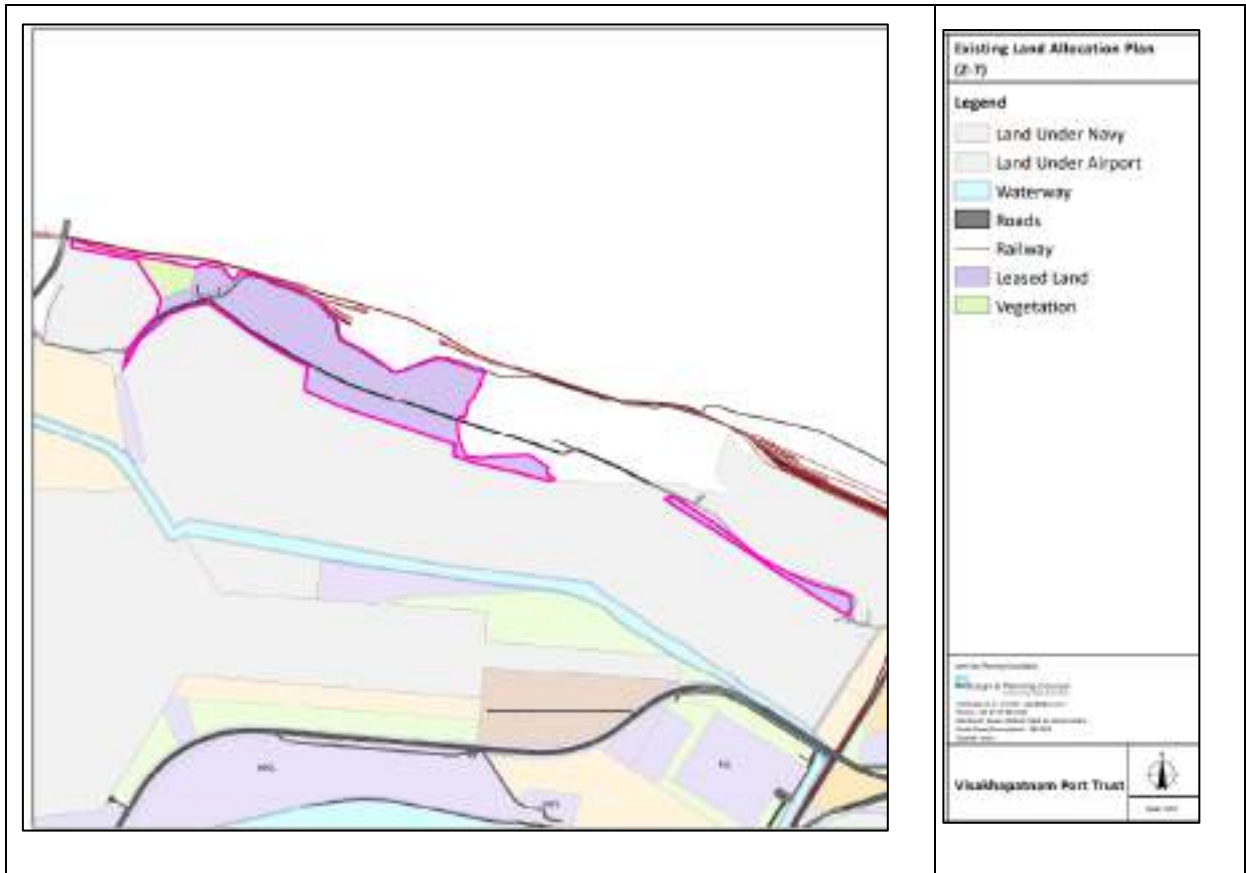
The major objectives of the prevailing land use plan are to prepare Land use plan of VPA, in accordance with the requirement as per land policy guidelines 2015 & 2020 issued by Ministry of Shipping. The Objective is also to ensure optimum utilization and development of the custom bound area, the port area and port allied areas. The plan shall include development control principles and recommendations on planning of three dispersed land parcels. For other parcels that are situated in Lankelapalem hill (Acs. 306.86 cts.), and at Mulakuddu (Acs.288.12 cts.), utilisation and its future development by hillock mining that will yield to nearest benefits at the least cost also needs to be assessed.

Figure 3-1: Zone wise images of Existing Land Use (VPA LU Plan 2021)









	<p>Existing Land Allocation Plan (Z-10)</p> <p>Legend</p> <ul style="list-style-type: none"> Deltas/Waterbodies/Canal/Weir <p> <small> Prepared by: Visakhapatnam Port Trust Approved by: Visakhapatnam Port Trust Date: 2021 </small> </p>
	<p>Existing Land Allocation Plan (Z-38)</p> <p>Legend</p> <ul style="list-style-type: none"> Hills <p> <small> Prepared by: Visakhapatnam Port Trust Approved by: Visakhapatnam Port Trust Date: 2021 </small> </p>
<p>(Source: Final Land use Plan Report, 2021)</p>	

Land use break up as per VPA Land use plan 2021The port of Visakhapatnam is landlocked, as it is surrounded by land and the water passage leads to the ocean or sea. The below land area table indicates the breakup of land of various categories. The port also has an outer

harbour that covers 200 hectares of water and has eight berths. The port also uses land near the VGCB terminal for coal storage. The port has also developed a 20-acre truck parking area near its solar power plant. VPA has total area of 7618ac. The extent of VPA land is predominantly distributed in 12 zones.

Table 3-1: Land Details of Visakhapatnam Port Authority as per the Land Use Plan 2021

Land Use Statement for VPA (As per the Land Use Plan 2021)			
		(Acres)	
Inside Port Area	Leased Land	3529.75	46.33%
	License Land	385.23	5.06%
	Existing Infrastructure	468.29	6.15%
	VPA Built Up	449.65	5.90%
	Vacant Land (Vacant +Proposed for various activities Reclaimed Land)	858.26	11.27%
	Water Bodies	156.21	2.05%
	Hills	461.36	6.06%
	Vegetation	714.27	9.38%
	Sub Total (A)	7017.87	92.12%
Outside Port Area	Lankelapalem	306.88	4.03%
	Mulakuddu, Bheemli	288.12	3.84%
	Sub Total (B)	599.78	7.87%
Total Area (A+B)		7618	100.00%

Source: Final Land use plan 2021

Opportunities:

- Development of Warehouses in the EXIM Park area.
- Development of a Multi-Modal Logistic Park to an extent of 103.00 Acres in EXIM Park.
- Development of shopping malls, in vacant lands situated in Salagrama Puram, very nearer to the National Highway under the non-port related activity category.

Active Proposals:

- Development of Free Trade Ware Housing Zone (FTWZ) at Sheela Nagar in an extent of 103.00 Acres.
- Development of truck parking in an extent of 20.00 Acres towards the West side of VPA Solar Power Plant near INS Dega in Exim Park of Visakhapatnam Port Authority including infrastructure facilities and operation of Truck Parking terminal in ZONE Z-5.

Overall findings from Existing land allocations are as below:

- At VPA, presently only 51.33% of the land is utilised under lease/license and it is crucial to adopt effective land optimisation strategies for better utilisation of land.
- Presently vacant land/ proposed land for various activities contributes around 11.27% of the land (858.26 Ac). Predominant vacant land parcels are in proximity to the airport area and have constraints of airport height restrictions, water coagulation, accessibility, and lack of rail connectivity.
- There is a shortage of dedicated parking areas and service lanes.
- There is a need to improve road connectivity, especially in port operation area.

- Though substantial land is available at Hill Area, Lankelapalem and Bheemli, but due to odd location and limited access, there is very less possibility of using this land for any back up activities related to port operation.
- Vegetation/ Plantation area has increased compared to previous Land use Plan, and also looking at pollution level, there is a need of more thick/ wider plantation at periphery of operational area.
- There is a possibility of utilization of land along major roads for commercial/ mixed use rather than given for lease for industrial purpose.
- Land around airport area, where there is a height restriction in development, can be used for logistic parks, warehouses and storage purpose.
- There is a need of proposing permissible uses within proposed zones, so that there will be flexibility in development, and it will lead to more revenue generation.

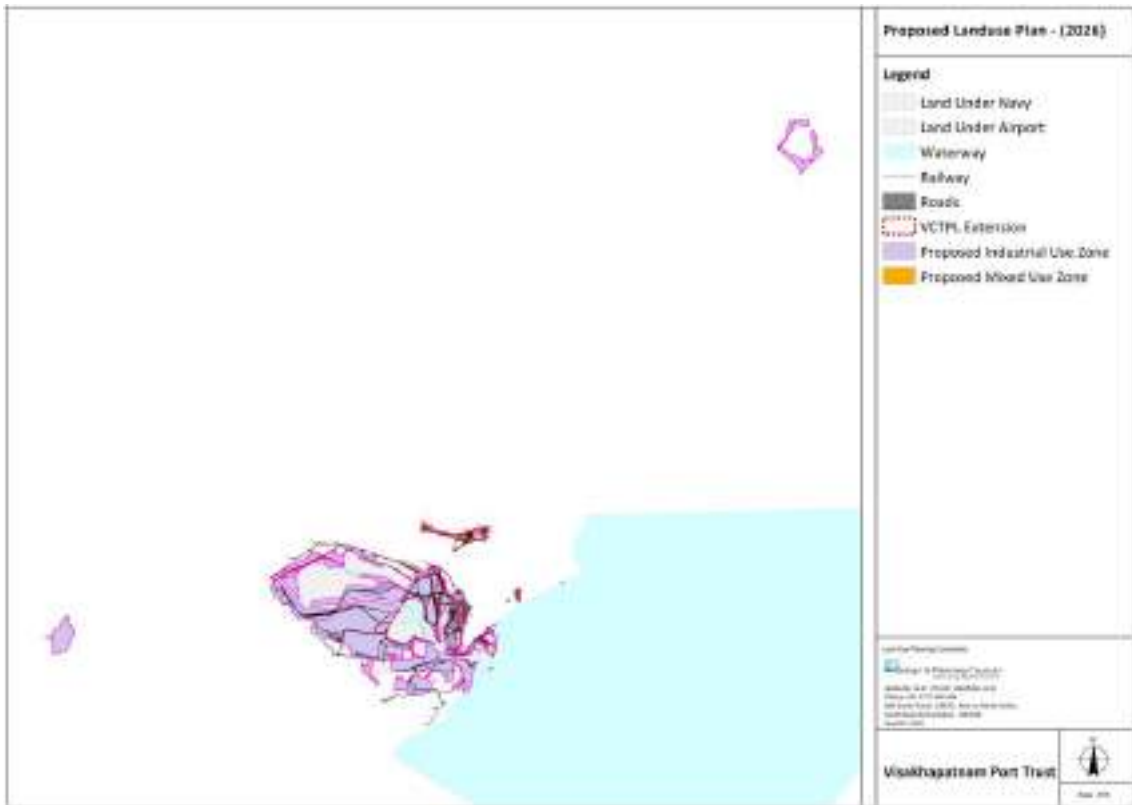
Figure 3-2 Proposed Land Use Plan of VPA Port Area in 2021 Land Use Plan



Source: Final Land use plan Report for Visakhapatnam port, 2021

It should be draw back of the plan is that the proposals are only categorised into 2 broad land uses i.e. industrial and mixed land uses and not detailed out. Connectivity of the other land parcels are also clearly not detailed out in the proposals.

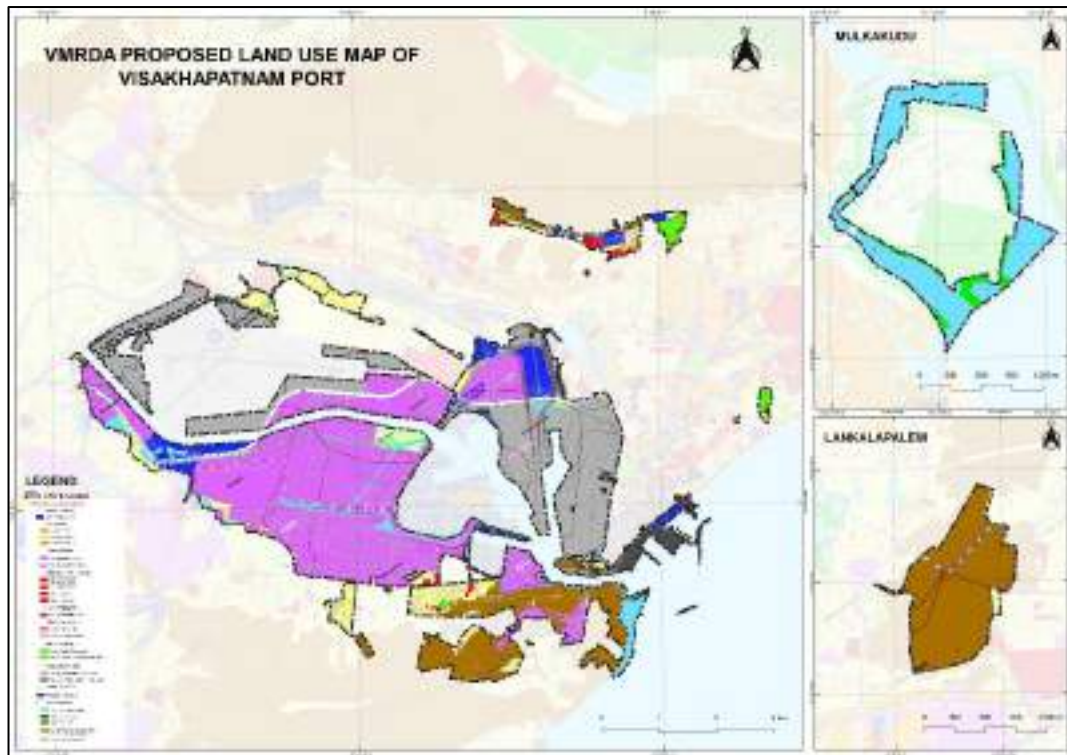
Figure 3-3 Proposed Land Use Plan of VPA Area in 2021 Land Use Plan



3.2 VMRDA Master Plan of VPA

It is also important to understand the statutorily approved masterplan for VPA, by Visakhapatnam Metropolitan Region Development Authority.

Figure 3-4 VMRDA Master Plan Overlay on VPA



As part of the study, VMRDA plan is overlaid on VPA boundary. VMRDA plan was prepared and approved by government of Andhra Pradesh with the G.O. Ms. No. 136 on November 8th, 2021. It was applicable to the entire VMRDA area in which the Port Area is also part of. The land use plan prepared was to be in accordance with the plan since the VPA is part of the region. And the same time, VPA has the authority to modify its land use plan. In the overlaid plan of VMRDA, it can be seen that the core port operational area is marked under the transportation use zone and the EXIM park area is marked under the industrial use zone, peripheral lands are marked under the commercial and residential uses. Mulakuddu is marked under water bodies and tourism potential use zones, and Lankelapalem is marked as a hill.

It is found that 60mts RoW Road is passing through the VPA area and it is to be maintained in the land use plan of VPA.

4 PHYSICAL FEATURES

4.1 Preamble

The objective of this chapter is to methodically interpret the prevailing environmental and social conditions surrounding the proposed project area. Undertaken at the order of the Visakhapatnam Port Authority, the study summarises a comprehensive examination aimed at preparing an accurate land use plan. Situated in the vibrant locale of Visakhapatnam Port, the project area serves as a central point for understanding the complex interaction between human activity and the surrounding ecosystem. By studying the existing conditions and the interactions in and around the study locale, this preamble sets the phase for an overall exploration crucial for making informed and sustainable decisions within the region.

4.2 Physical Conditions

Visakhapatnam Port is in Visakhapatnam city in Visakhapatnam District of Andhra Pradesh. The Port located on the shore of Bay of Bengal is also one of the major bases of the Indian Navy.

4.2.1 Connectivity

The port is connected by road to NH-5 (Chennai-Kolkata). Port connectivity road of length 12.47 km was implemented jointly by the Port and NHAI through SPV – Visakhapatnam Port Road Limited. This flyover cum road project facilitates smooth movement of cargo traffic between Port and National Highway-5.

Port is also well connected with the Indian railways network directly through the Waltair Railway Marshalling Yard to Chennai-Howrah Main line of East Coast, this line branches off at Kothavalasa leading to Bailadilla Iron Ore mines in Chhattisgarh. This main line goes further up North passing through coastal Orissa, West Bengal up to Assam facilitating movement of imported fertilizers petroleum products etc. to various stations.

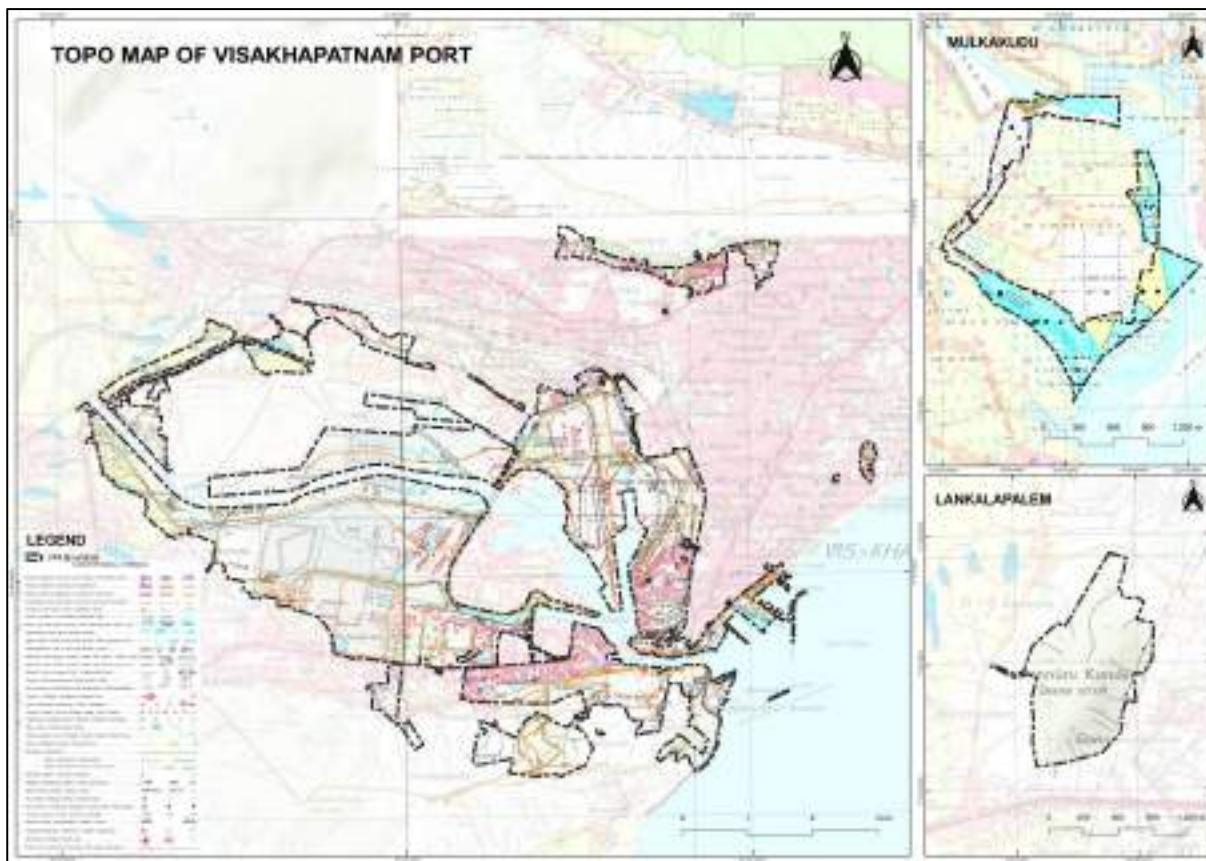
4.2.2 Physical features

The region presents two distinct Geographic divisions. The strip of the land along the coast and the interior called the plains division and hilly area of the Eastern Ghats flanking it on the North and West called the Agency Division.

Topographic maps depict in detail the ground relief (landforms and terrain), drainage (lakes and rivers), forest cover, administrative areas, populated areas, transportation routes and facilities (including roads and railways), and other man-made features. The topo map for the Visakhapatnam port serves as a complete overview of all natural and man-made features of the study area. It is as shown in **below figure**.

Port area, it can be observed that all the developments have come up and the other two parts, are still having the hill and water body representation in the map. Mulakuddu is filled with the water body and Lankelapalem is having representation of Kannuru Konda (Hill) with dense scrub representation.

Figure 4-1: Topographic Map of the Study Area



4.2.3 Meteorological Data

The nearest Indian Meteorological Department (IMD) station located to project site is Vishakhapatnam. The Climatological data for Vishakhapatnam (17°43'N and 83°14'E), published by the IMD, based on daily observations at 08:30 and 17:30 hour IST for a period from 1991-2020. The monthly variations of the relevant meteorological parameters are presented in **Table 4-1**.

Table 4-1: Climatological Data Summary – Vishakhapatnam Region (1991-2020)

Month	Temp (°C)		Rainfall (mm)		Relative Humidity (%)		Station Level Pressure hPa		Mean Wind Speed (km/h)	Predominant Wind Directions (From)*	
	Daily Max.	Daily Min.	Total	No. of days	08:30	17:30	08:30	17:30		08:30	17:30
Jan	27.7	20.7	11.1	0.7	72	70	1008.9	1005.7	6.7	NE,N	NE,E,S
Feb	29.2	22.3	10.5	1.1	73	72	1007.2	1003.9	8.4	W,NE,SW	SW,S
Mar	30.8	24.6	13.0	0.8	72	75	1005.1	1001.5	11.4	SW,W	SW,S
Apr	31.7	26.4	26.2	1.3	72	77	1002.5	998.9	14.5	SW,W	SW,S
May	32.9	27.5	70.5	3.5	73	77	998.6	995.2	13.7	SW,W,S	SW,S
Jun	32.7	27.5	117	6.0	75	76	995.1	992.4	12.8	SW,W	SW,S
Jul	31.2	26.3	133.3	8.5	79	78	995.5	992.9	12	SW,W	SW,W
Aug	31.3	26.1	163.6	8.6	79	79	996.2	993.5	11.1	SW,W	SW,W
Sep	31.3	26	191.1	8.7	79	80	999.4	996.4	8.8	SW,W	SW,S
Oct	31.0	25	258.1	8.3	75	74	1003.5	1000.6	7.3	NE,N	NE, E
Nov	29.7	23.2	115.5	3.8	67	68	1006.7	1003.8	8	NE,N	NE,E
Dec	28.2	21.1	8.8	0.8	66	65	1009.2	1006.1	7.3	NE,N	NE,E

As per the above Climatological table the observations drawn for the study area are given below

- Daily maximum temperature of 32.9°C and daily minimum temperature of 20.7°C were recorded in the months of May and January respectively.
- Maximum relative humidity of 80% was recorded in the months September and minimum relative humidity of 65% was recorded in the month of December.
- Maximum and minimum mean monthly rainfall of 258.1 mm and 8.8 mm was recorded in the months of October and December with 52.1 days of total rainfall days.
- Total annual mean rainfall recorded is 1118.7 mm.
- Maximum and minimum Mean wind speed is 14.5 kmph (4.02 m/s) and 7.3 kmph (2.02 m/s).

4.2.4 Land Use and Land Cover

4.2.4.1 Study Area Land Use Pattern

The project site is considered to understand the general land use of the area in the study area. LU/LC pattern was prepared for the entire port boundary i.e., the study area and is presented in **Figure 4-2**.

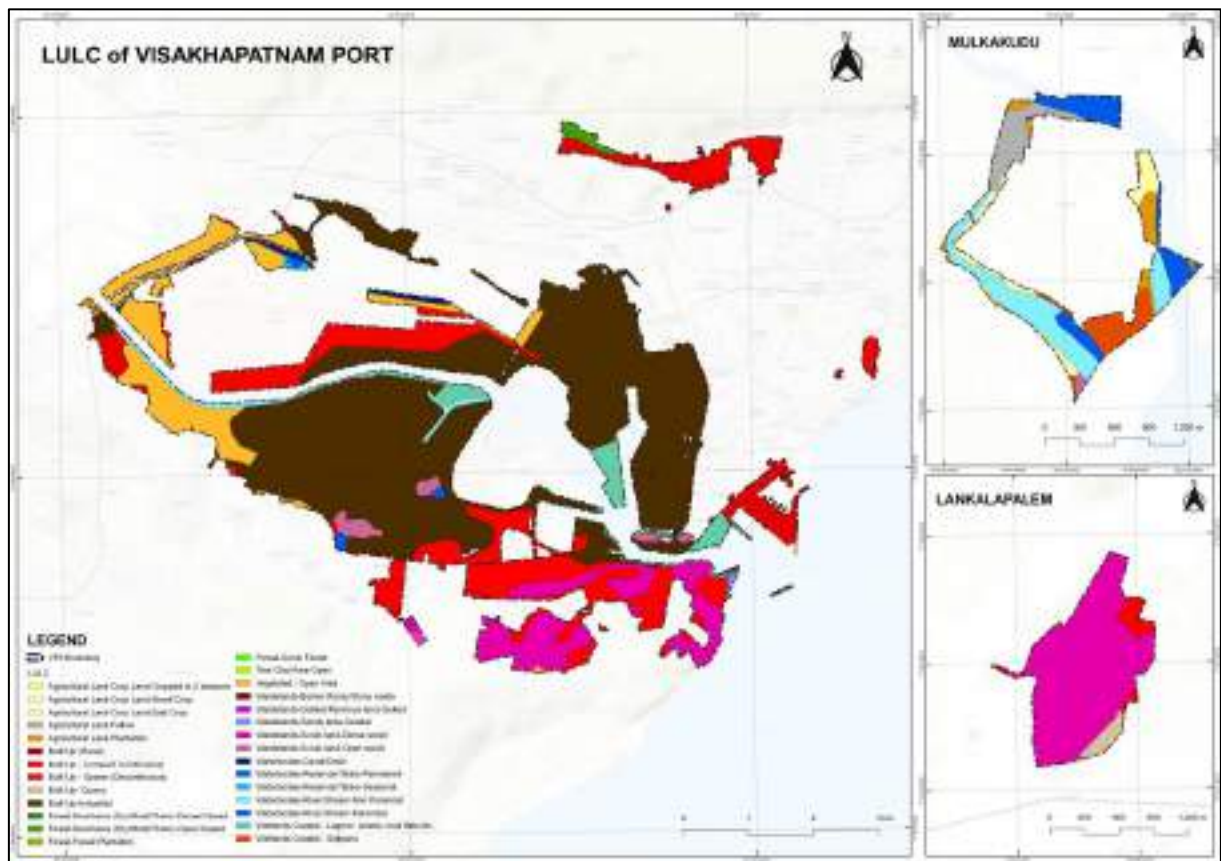


Figure 4-2: LU/LC pattern for the study area

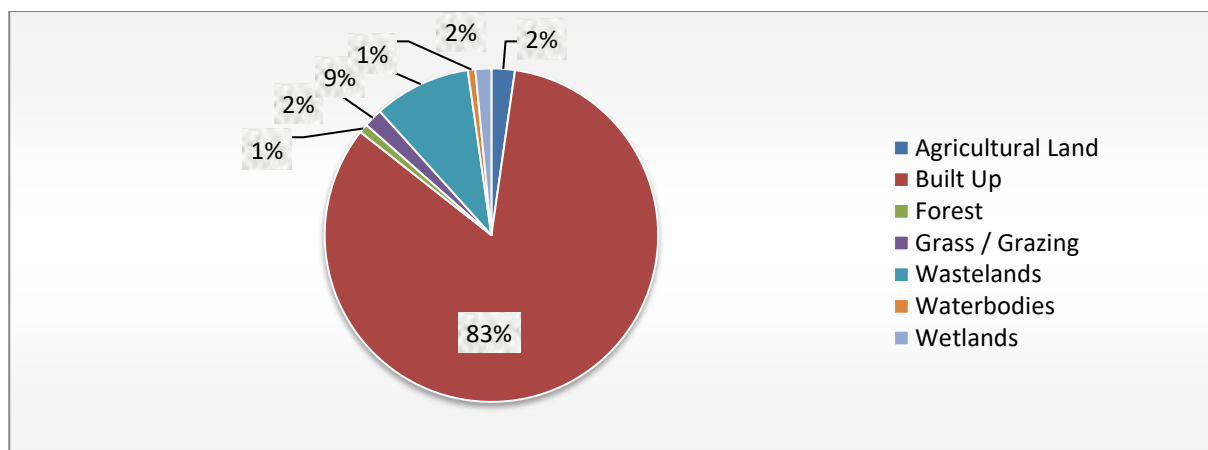
LU/LC statistics of study area is presented in **Table 4-2, Table 4-3** and below **figure**. The study area comprises of Built-up area, wastelands, agricultural land, grazing area, wetlands, forests and water bodies.

Table 4-2: Detailed Land Use/Land Cover Statistics of Study Area

Sl. No.	Land use Classification		% of Area
	Class	Sub Class	
1	Agricultural Land	Agricultural Land-Crop Land-Cropped in 2 seasons	0.00
2	Agricultural Land	Agricultural Land-Crop Land-Kharif Crop	0.19
3	Agricultural Land	Agricultural Land-Fallow	0.04
4	Agricultural Land	Agricultural Land-Plantation	2.03
5	Built Up	Built Up - Compact (Continuous)	61.43
6	Built Up	Built Up - Sparse (Discontinuous)	8.31
7	Built Up	Built Up- Quarry	0.02
8	Built Up	Built Up-Industrial	13.58
9	Forest	Forest-Deciduous (Dry/Moist/Thorn)-Open/Closed	0.89
10	Grass / Grazing	Vegetated / Open Area	1.83
11	Wastelands	Wastelands-Sandy Area-Coastal	0.41
12	Wastelands	Wastelands-Scrub Land-Dense scrub	8.94
13	Wastelands	Wastelands-Scrub Land-Open scrub	0.05
14	Waterbodies	Waterbodies-Canal/Drain	0.24
15	Waterbodies	Waterbodies-Reservoir/Tanks-Permanent	0.01
16	Waterbodies	Waterbodies-Reservoir/Tanks-Seasonal	0.01
17	Waterbodies	Waterbodies-River/Stream-Non-Perennial	0.27
18	Waterbodies	Waterbodies-River/Stream-Perennial	0.20
19	Wetlands	Wetlands-Coastal - Lagoon, creeks, mud flats etc.	1.42
20	Wetlands	Wetlands-Coastal - Saltpans	0.12
		TOTAL	100.00

Table 4-3: Land Use/Land Cover Statistics of Study Area

Sl. No.	Classes	% of Area
1	Agricultural Land	2.27
2	Built Up	83.34
3	Forest	0.89
4	Grass / Grazing	1.83
5	Wastelands	9.40
6	Waterbodies	0.73
7	Wetlands	1.54
	TOTAL	100

Figure 4-3: Land Use/Land Cover Statistics of Study Area

4.2.5 Forest Resources

More than the one third of the area in the district is covered by forest. The forests are of moist and dry deciduous type. The common species available in them are Guggilam, Tangedu, Sirimanu, Kamba, Yagisa, Nallamaddi, Gandra, Vepa etc. Bamboo shrubs are sparsely scattered. But forest area in the district has been showing a quiescent decline since 1955-56 perhaps due to podu practice, indiscriminate grazing and browsing.

Forest Cover Map of the study area is given in **below figure**. Within the project site there are no thick and dense forests.

Figure 4-4: Forest Cover and Eco-sensitivity Map of the 10km of Study Area



(Source: Bhuvan – NRSC data)

4.2.6 Wildlife

The fauna in the district has a livestock of 12.02 lakhs as per 2003 livestock Census. In the Livestock, Cattle 29.4% Buffaloes 34.8% Sheep 16.5% and Goats 17.3% about wild fauna Boars and Bisons are found in forest areas of the district and isolated instances of Cheetas and tigers.

- a. **Indira Gandhi Zoological Park:** It is located amidst Kambalakonda Reserve Forest in Visakhapatnam, Andhra Pradesh, India. It is the third largest zoo in the country. The zoological park is named after the former Prime Minister of India, Indira Gandhi. It was declared open to the public on 19 May 1977. It covers an area of 625 acres (253 ha). It is situated in Visakhapatnam amidst the scenic Eastern Ghats of India. It is surrounded by the Eastern Ghats on three sides and Bay of Bengal on the fourth side. Nearly eighty species of animals numbering to about eight hundred are present in the zoo. The Zoo Park has different sections for primates, carnivores, lesser

carnivores, small mammals, reptiles, ungulates and birds caged in their natural ambiance.

The zoo park is about 11 kilometres (6.8 mi) from the Visakhapatnam railway station on the National Highway 16 near Madhurawada. It has two Entrance and Exit gates - One towards National Highway 16 and the other towards Beach Road at Sagar Nagar. A Biosphere learning centre and a Library are present inside the zoo park near the canteen.

- b. **Tyda:** It is located about 75 Km. from Visakhapatnam on Araku road, Tyda is being developed with camping facilities at Jungle bells to provide an enchanting experience in wilderness to the tourists. A home for variety of wild mammals and avifauna, Tyda is ideal for viewing wildlife and bird watching. Other attractions are rock climbing, trekking and targeting with bow and arrows. They can also learn the language of the jungle, viz., identification of calls, marks, etc. Tourists can enjoy their stay in log huts and tents set in tribal environs. There is railway station at Tyda on DBK line located 75 Kms. away from Visakhapatnam on the way to Araku.
- c. **Kambalkonda Wildlife Sanctuary:** It has an area of 70.7 acres and is a Dry evergreen forest mixed with scrub and meadows. It was named after the local hillock "Kambalakonda" acting as a green lung for citizens of Vizianagaram and Visakhapatnam, is this large and sprawling sanctuary. Leopard is their indicator species. The invertebrate fauna too is wonderful with insects, arachnids, etc. Reptilian fauna is represented by Russell viper, Common Cobra, Chameleon, etc. Avifauna includes Paradise flycatcher, Tree pie, Quails, Partridges, etc. The mammalian fauna in the Sanctuary includes mammals like Leopard, Barking Deer, Jackal, etc. The floral diversity is wonderful with plants like *Tectona grandis*, *Randia Dumetorum*, *Grewia Tiliaefolia*, *Abrus Precatorius*, etc.

4.2.7 Agricultural Resources

Agriculture is the main stay of nearly 70% of the households. Though Visakhapatnam city is industrially developing, the rural areas continued to be backward. Rice is a staple food of the people and Paddy is therefore the principal food crop of the district followed by Ragi, Bajra and Jowar and Cash Crops such as Sugarcane, Groundnut, Sesamum Niger and Chillies are important. With no major Irrigation system in the region, about 36% of the cropped area is irrigated under the Ayacut of the Medium Irrigation System and Minor Irrigation Tanks. The rest of the cultivated area is covered under dry crops depending upon the vagaries of the monsoon. The productivity of the crops is low.

4.2.8 Animal Husbandry

Animal Husbandry is an important allied economic activity to Agriculture. Next to draught Animals which are main source of energy for Agriculture, Milch Animals, Sheep and Goat are important for income generation of the rural households. A sizable number of households earn subsidiary income by selling milk to Visakha Dairy and in Local markets. The total livestock of the district is 12.02 lakhs of which working animals account for 2.14 lakhs while milch Animals account for 3.10 lakhs. Goats and Sheep's totalling upto 4.06 lakhs are important for the livelihood of the considerable population.

4.2.9 Fishing

It is another important economic activity of the fishermen population living in about 59 fishery villages and hamlets on coastline stretching to a length of 132 KMs. covering 11 coastal

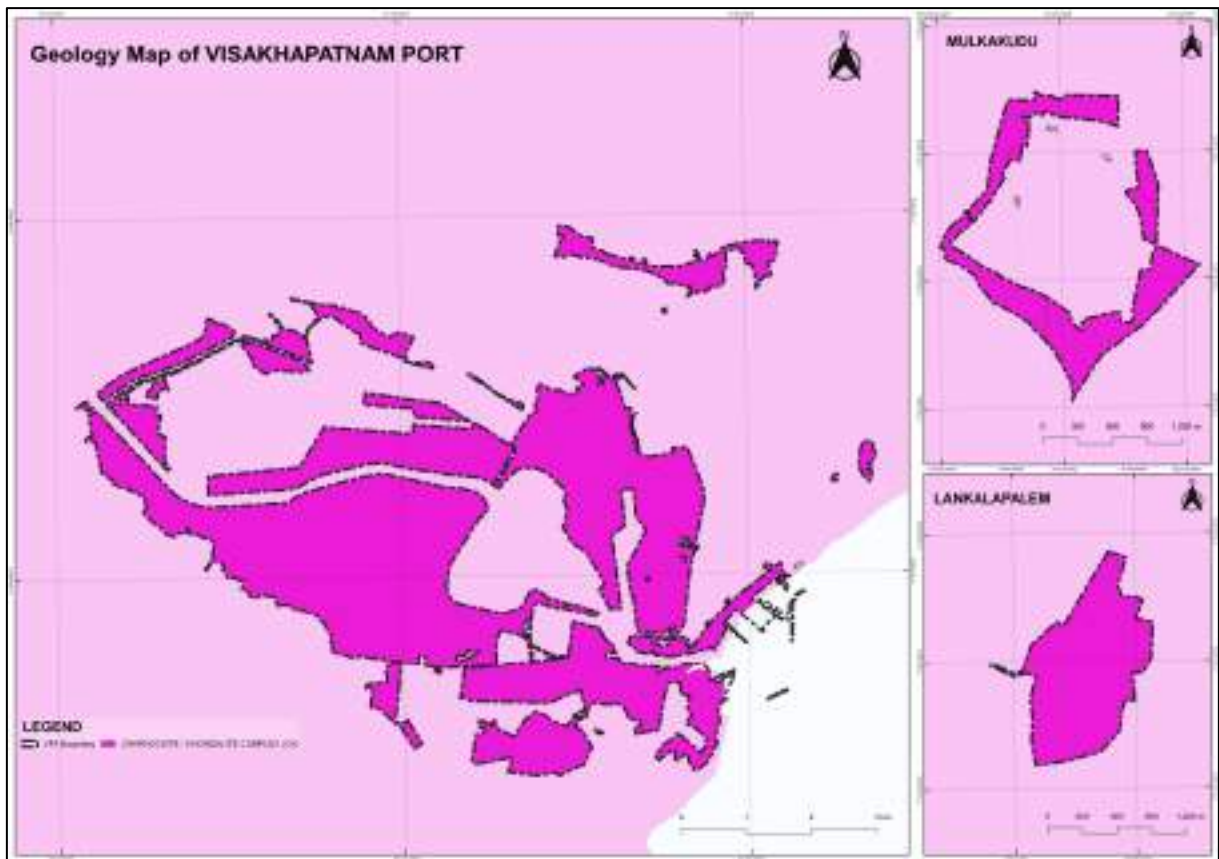
mandals. About 13,000 fishermen families to eke out their livelihood from marine, Inland and brackish water fishing besides catching fish living around Thandava and Raiwada reservoirs.

4.2.10 Geology and mineral resources

The district has mineral deposits of Bauxite Apatite (Rock Phosphate) Calcite, Crystalline limestone confined to tribal tracts. Bauxite deposits at Sapparla, Jerrila and Gudem of G.K.Veedhi Mandal are considered to be the largest in the country. Bauxite deposits are also identified at Galikonda, Katuki, Chittengodndi of Araku group deposits, Katamrajukonda of Gurthedu sub-group of deposits. Phosphate Apatite is available in Kasipatnam village of Ananthagiri mandal. Rich deposits of crystalline limestone and Calcite are mapped in Borra Caves and along the Valley up to Araku from Borra and around Valasi village of Ananthagiri mandal. Ruby Mica is another mineral available in the district essential for electrical and electronic industries. The mineral occurs in the form of Phologopite and is confined to Borra tract.

Garnet – sillimanite – biotite gneisses (Khondalites), hypersthene granites (Charnockites), garnetiferous granites (Leptynites), quartzites and pegmatites are the chief rock types that occur as bedded and banded as well as massive formations in Visakhapatnam district. The area can be termed as Archean high grade metamorphic migmatite complex of the Eastern Ghat mobile belt. The Eastern Ghats Super Group comprising Khondalite and Chamockite Groups is exposed in the central part of the upland area. The project area completely has Charnockite / Khondalite complex and is as show in **below figure**.

Figure 4-5: Geology Map of the Study Area

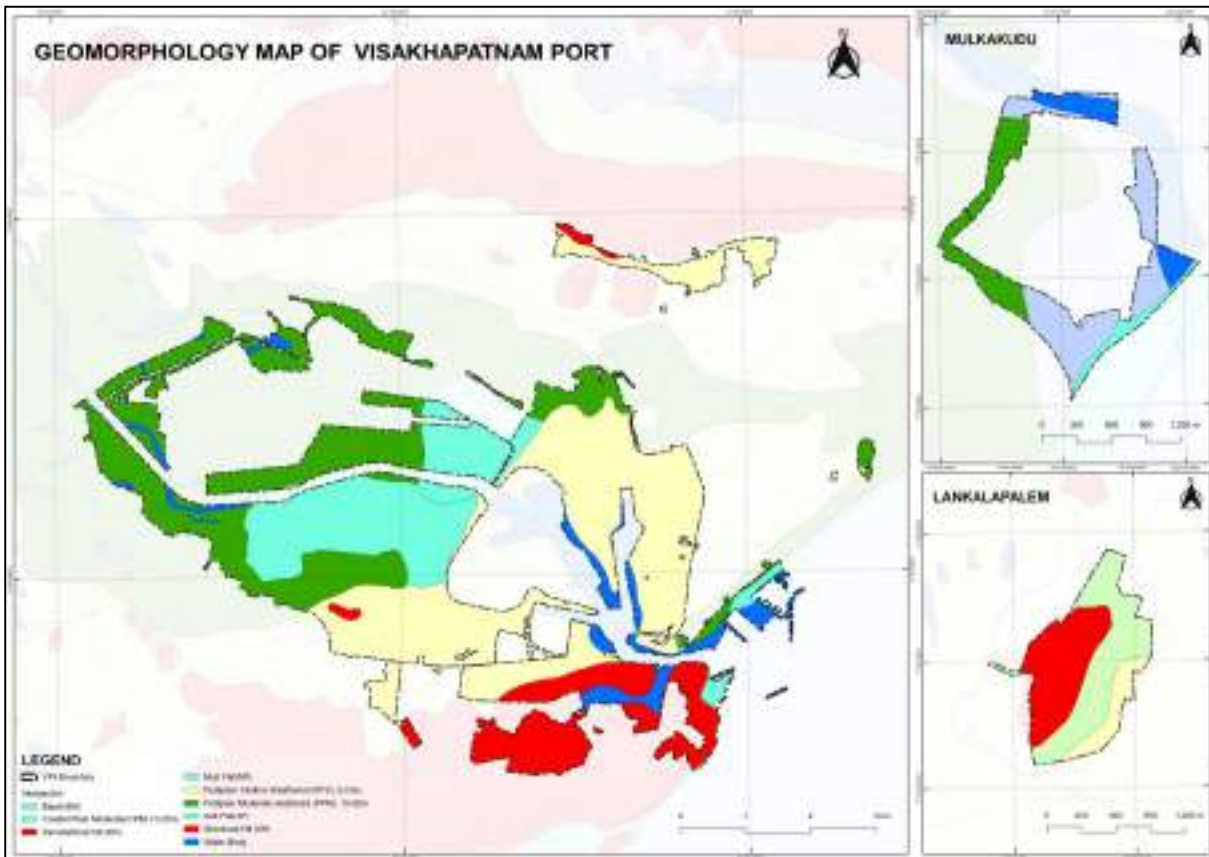


4.2.11 Geomorphology

The northern half of the district is mainly occupied by the structural hills and valleys, which is part of the Eastern Ghats. The hill range trends parallel to coast. The average altitude of hills is over 900 m amsl. The hills are densely forested. Pediment is well developed around the khondalite outcrops, whereas in the charnockite outcrops, it is not extensively developed. The pediment area accelerates surface run off with moderate to less infiltration along the jointed and weathered zone. The Tandava, Varaha, Sarada and Gosthani rivers and their tributaries have contributed to the formation of extensive flood plain areas. There is not much surface drainage in the plains because of the high infiltration and permeable characteristics of the sediments. The district has a coastline of about 132 km.

The study area majorly has shallow weathered pediplains, moderate weathered pediplains, waterbodies, saltflats and mudflats. It also shows moderate coastal plains, denudational hills, structural hills and beaches towards the eastern coast. Mulkakudu shows the presence of waterbodies along with pediplains and coastal plains. Lankalpalem is partly a hilly region with pediplain area. The geomorphology map for the port boundary is shown in **below figure**.

Figure 4-6: Geomorphology Map of the Study Area



4.2.12 Hydrogeology

The district is underlain by variety of geological formations from the oldest Archaean's to Recent Alluvium. The Archaean group of rocks includes Khondalites and Charnockites of Eastern Ghats super group and Granitic gneisses of Magmatic group. The Gondwana rocks which are represented by sandstones are in very limited aerial extent. The recent alluvium is prevalent along the rivers. Prominent lineaments are trending in NE-SW, NW-SE and ENE-WSW.

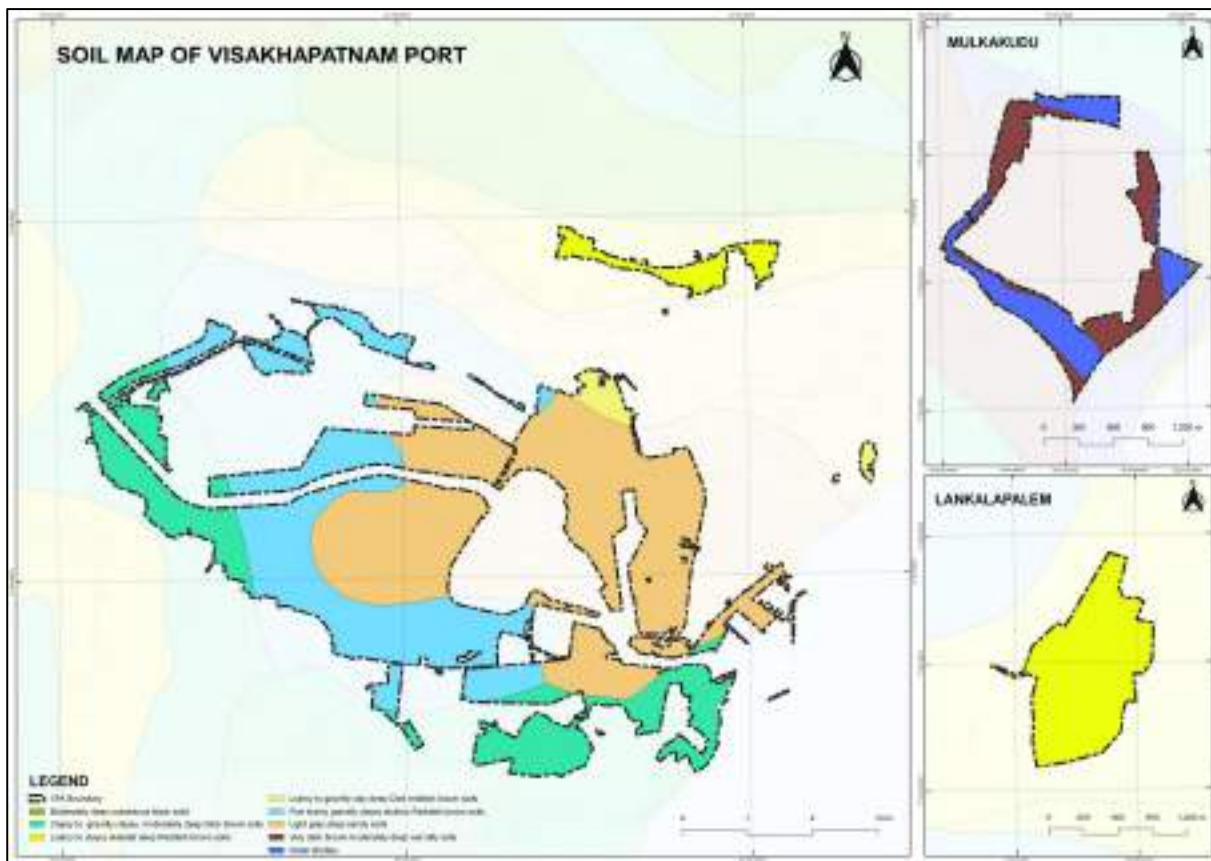
Ground water occurs in almost all geological formations. From the ground water point of view, the aquifers in the district can be broadly classified into hard formations (Khondalites, Charnockites, granitic gneisses etc.) and soft formations (sand stones and alluvium). Ground water occurs under unconfined to semi-confined conditions in the hard formations, while it occurs under unconfined to confined conditions in soft formations. The yields in the weathered zones of hard formations range from 25 to 100 m³/day. The bore wells drilled in the hard formations, generally tap the fractured and fissured zones. The yields of the bore wells in these formations range between 5 to 25 m³/hr. Sand stones are exposed in the small, isolated places around Nakkavanipalem and Elamanchili. In these formations, ground water occurs under both unconfined and confined conditions. The depth of dug wells in alluvium formations ranges from 2 to 10 mbgl and the yields generally ranges from 40 to 250 m³/day. The depth of filter points/tube wells varies from 9 to 35 m with discharges ranging from 15 to 30 m³/hour. As per the CGWB the study area falls in safe zone.

4.2.13 Soil

Red Loamy soils predominate with coverage of 69.9% of the villages in the district. The Soils are poor textured and easily drained. Sandy loamy soils come next with 19.2% villages coverage, these are largely confined to the coastal areas of Nakkapalli, Payakaraopeta, S.Rayavaram, Rambilli, Atchutapuram, Paravada, Visakhapatnam, Pedagantyada, Gajuwaka and Bheemunipatnam Mandals and to certain stretches in the interior Mandals of Chodavaram, Narsipatnam, K.Kotapadu and Madugula. Black cotton soils come up next having sizeable chunks of area in K.Kotapadu, Devarapalli, Cheedikada, Paderu and Hukumpeta Mandals. 45% of the soils in the district are low in organic content and 55% in Phosphorous content.

The port area comprises majorly of light grey deep sandy soils, fine loamy gravelly clayey shallow reddish-brown soils and Clayey to gravelly-clayey moderate deep dark brown soils. It also has some traces of Loamy to Clayey skeletal deep reddish-brown soils and Loamy to gravelly clay deep dark reddish-brown soils. Lankalapalem exclusively has Loamy to Clayey skeletal deep reddish-brown soils. Mulakuddu exclusively has very dark brown moderately deep wet silty soils. The soil map for the study area is shown in **below figure**.

Figure 4-7: Soil Map of the Study Area



4.2.14 Groundwater Resources

Ground water occurs in almost all geological formations. From the ground water point of view, the aquifers in the district can be broadly classified into hard formations (Khondalites, Charnockites, granitic gneisses etc.) and soft formations (sand stones and alluvium). Ground water occurs under unconfined to semi-confined conditions in the hard formations, while it occurs under unconfined to confined conditions in soft formations.

Dug wells are common in the district with depths ranging from 5-10 m. and rarely over 10 m. The depth to water level varies between 4-18 mbgl. The yield of dug wells range from 30-70 cum per day. The yield of wells piercing fresh and jointed gneiss varies from 0.3- 15 cum per hour, but is generally 5 cum per hour. wells in these areas yield up to 25 cum/hr. Alluvial areas occur along the major rivers, their larger tributaries and along the coast. In the alluvial areas, ground water is tapped through dug wells, Dug Cum Bore wells (DCBs), filter points and shallow tube wells.

4.2.15 Surface Water Resources

The major rivers flowing in the district are Sarada, Varaha and Tandava which flow from the east, with rivulets Meghadrigedda and Naravagedda. These rivers are ephemeral in nature and flow from north to south joining the sea. The Gosthani is an east flowing river from Ananthagiri hills and joins the Bay of Bengal. The area is mainly drained by Hanumanthavaka, Narvagedda, Peddagadda and other minor streams which have their origin in adjoining hills. The Tandava, Varaha, Sarada and Gosthani rivers and their tributaries have contributed to the formation of extensive flood plain areas. There is not much surface drainage in the plains because of the high infiltration and permeable characteristics of the sediments. The drainage pattern is mainly sub-dendritic to dendritic type. The six sub-

watersheds are elongated in shape. The Meghadrigedda reservoir supplies around 8 million gallon/day of water to the needs of Visakhapatnam city for domestic and industrial purpose. Most of the water tanks of the area have been silted. The drainage density is high in consolidated formations, low in semi-consolidated formations, whereas in alluvial areas the density is meagre.

4.3 Socio Economic Conditions of the district

4.3.1 Demography

The population of the district is 19.6 lakhs as per 2011 Census with 11.96% of growth rate and this constituted 3.95% of the population of the state while the Geographical area of the district is 1049 Sq. km. which is only 0.64% of the area of the State. Out of the total population 9.88 lakhs are Males and 9.71 lakhs are Females. The Sex Ratio is 983 Females per 1000 Males. The district has density of population of 1869 per Sq.km.

As per 2011 census Scheduled Castes constituted 8.54% of the population while Scheduled Tribes account for 1.2% of the population of the district. The district has a work force of 7.12 lakhs Nos. constituting about 19.60 lakhs Nos. of the population besides the marginal workers to a tune of 1.14 lakhs Nos. as per 2011 Census. The cultivators constitute 1.06%, Agricultural Labourers 2.55%, the Non-workers constitute 63.67% and the balance engage in Primary, Secondary, Industrial and Territory sectors.

4.3.2 Literacy

There are 13.90 lakhs literates forming 78.57% of the total population of the district. Male literates constitute 84.24% while female literates forming 72.81%.

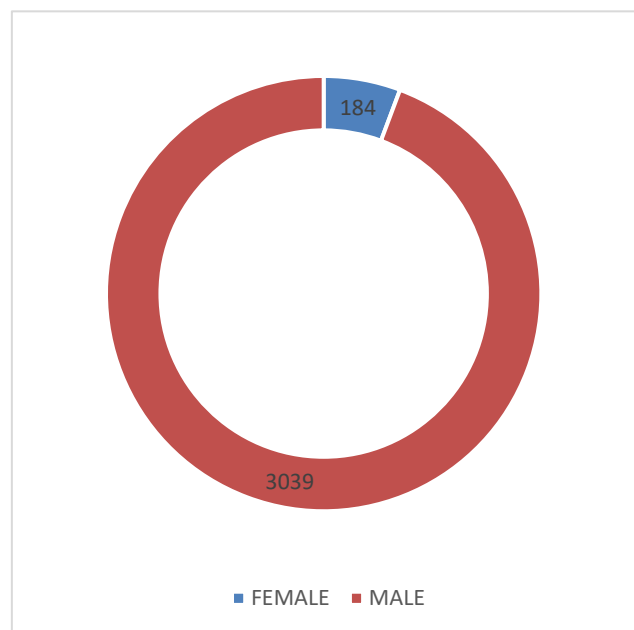
4.4 Employment of VPA

Visakhapatnam Port Authority provides employment quarters to their employees and the quarters are designed and located within the limits of Visakhapatnam Port Authority limits. The employees of other private traders are accommodated in the adjacent areas of the port area in and around Visakhapatnam city. Since the residential area of the port authority is significant in the land use assessment, employment of the authority is analysed in the chapter along with their quarters.

There are 3,223 active employees in the authority. 94% of the employees are of male employees and 6% is of female employees.

And from the consultations held at VPA, it is understood that the employment intake is gradually reducing and resulting in reduction of employment with the people retiring.

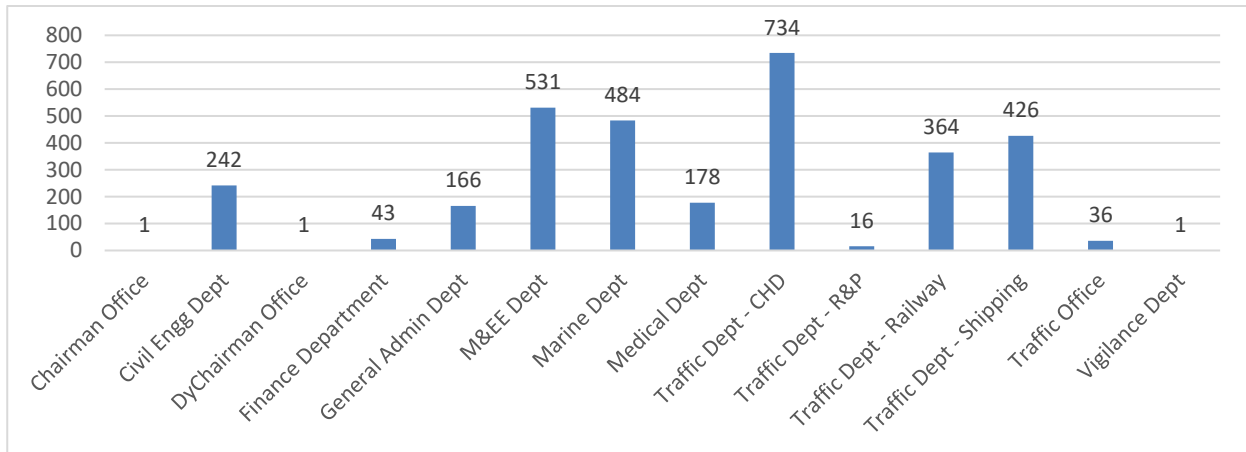
Figure 4-8 Gender Share of Employment



4.4.1 Sectors of VPA

Employees are categorised into 14 departments and traffic department is having the highest share of the employees followed by M&EE department. A detailed list is collected from the authority and the categorisation is presented below in the figure below.

Figure 4-9 Employment Distribution of VPA



4.4.2 Residential Quarters for Employees

Residential quarters are spread across in Zone-8&9 of VPA in Saligramapuram and Harbour area. 49.61 acres are marked in Saligramapuram and 24.42 acres in Harbour Park. The residential quarters are of 5 types allotted with respect to cadre of the employees. Type-4 and 5 are allotted to higher cadre officials. Condition of quarters is being assessed regularly to check whether any major repairs are required or to check the fitness of the structures.

Figure 4-10 Residential Quarters in Zone-8 &9



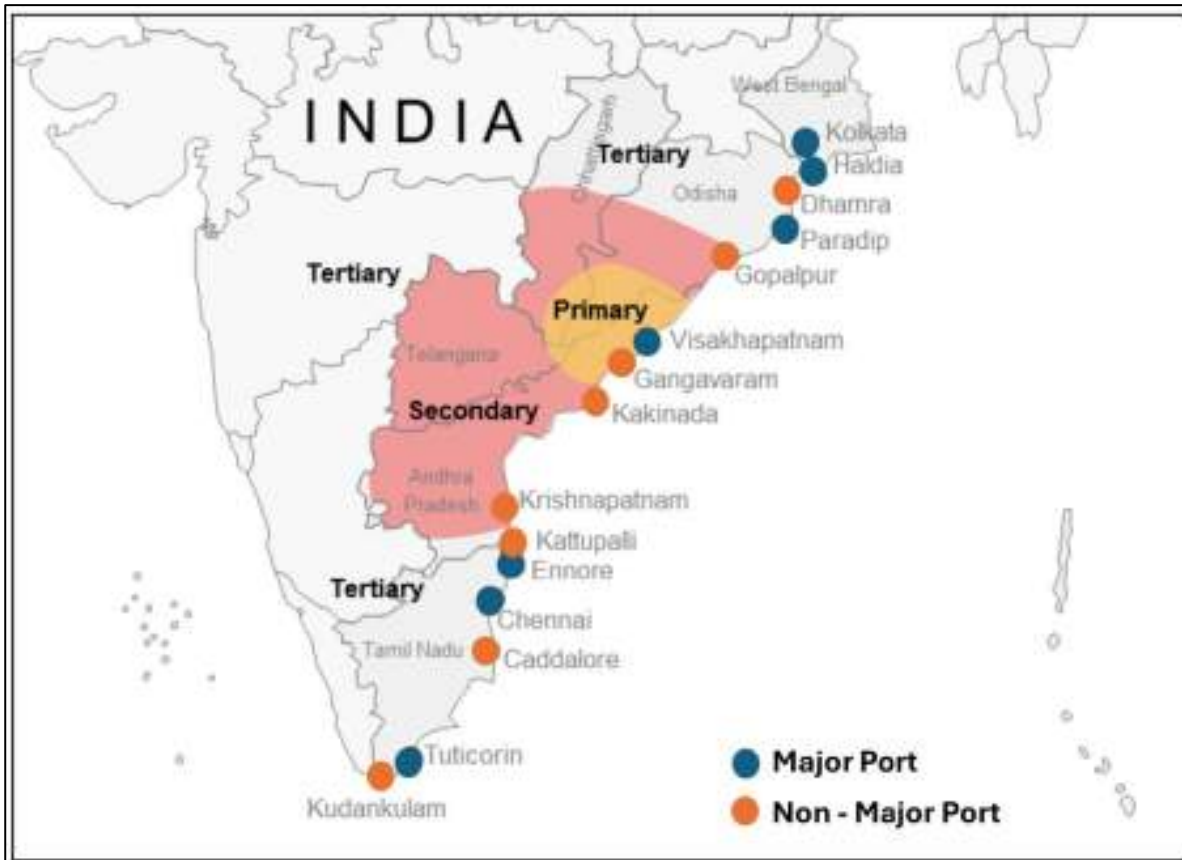
Figure 4-11 Residential Zoning of VPA



Residential area accounts for 74 acres in Zone-8 &9 and to be optimized as per the initial consultations held at VPA. The residential quarters will be assessed further based on their condition and proposals will be shared for optimising the land.

4.5 Hinterland Identification & Analysis

Figure 4-12 Mapping of hinterland of Visakhapatnam Port Authority



Source: DRAFT REPORT - Preparation of Comprehensive Masterplan for Visakhapatnam port with Planning Horizon of 2047 by royal haskoning.

4.6 Primary Hinterland:

The major Hinterland of VPA encompasses the immediate geographical region within a 300 km radius of Vishakhapatnam. VPA's key cargo-generating influence regions are Northern AP, Southern Odisha, and Southern Chhattisgarh. The VPA and Gangavaram ports are located 20 kilometres apart and are the only ports that can accommodate cargo for Vishakhapatnam's core influence region. VPA is a large port, while Gangavaram is a private port owned by Adani Ports and SEZ. The mechanised handling facilities at VPA, combined with ample storage space, would entice additional industries to handle their freight at VPA rather than Gangavaram. NTPC in the major impact region would import coal through VPA. Coal traders would handle their shipment at VPA due to competition with Gangavaram Port.

4.7 Secondary Hinterland:

Secondary hinterland goes beyond primary and covers territories such as central Odisha and Chhattisgarh, Telangana, and the rest of Andhra Pradesh, where goods can be handled at various ports. Cargo generated in secondary hinterlands may use VPA or other competitive ports in the region, such as Gangavaram, Kakinada, Krishnapatnam, and Gopalpur, depending on their suitability, Exim requirements, and berth availability. an overall logistical benefit. The hinterland of the aforementioned ports overlaps with the secondary region. Another major reason for competition among VPA, Gangavaram, Kakinada, Gopalpur, and Krishnapatnam ports is their shared cargo profile. Secondary influence regions have a high

chance of attracting traffic to any of them. However, a mechanised cargo handling facility, together with lower integrated logistic costs, is more likely to draw cargo from these regions' businesses to VPA than any other competitive ports in the area.

4.8 Tertiary Hinterland:

Tertiary hinterland goes beyond main and secondary hinterland and covers locations with multiple competing ports for commerce that are typically located far away. The tertiary hinterland includes the southern half of AP as well as states beyond the VPA's secondary hinterland, like as West Bengal, Tamil Nadu, Maharashtra, and so on. These places have additional rival ports in close proximity and are unlikely to move freight. Cargoes from these places may use rival ports based on their appropriateness, Exim requirements, and overall logistical advantage. Coal and iron ore mines are located in the Tertiary Influence Region of VPA, primarily in Odisha, Jharkhand, and Chhattisgarh. Currently, coal is transported from mines to power plants via trains or coastal movement. Paradip and Vishakhapatnam ports export coal via coastal movement to coal-fired thermal power facilities in the tertiary influence region. These power stations are located in Tamil Nadu (TANGEDCO) and Maharashtra (MAHAGENCO), among other places. goods from the tertiary influence region will only migrate if the present nearby port to mines lacks berth availability, adequate commodity handling equipment, storage, or takes longer to process goods.

Source: DRAFT REPORT - Preparation of Comprehensive Masterplan for Visakhapatnam port with Planning Horizon of 2047by royal haskoning.

4.9 Prominent Competitors of VPA

4.10 Gangavaram Port

Gangavaram is an all-weather, deep-water port on the east coast designed to handle important commodities. The port's cargo handling equipment includes stackers and reclaimers, four ship loaders, a wagon loader and tippler, and a conveyor for efficient cargo transfer, among other things. The port has nine berths, two of which are for mechanized coal processing and one for iron ore. There are four multipurpose berths, one general cargo berth, and one for dry bulk handling. Gangavaram has a water depth of 21 meters and can accommodate fully laden cape size boats weighing up to 200,000 DWT. The port is approximately 1 km from VPA and shares a similar hinterland as Visakhapatnam. In FY-21, the port's import and export figures are 24.91 million tonnes and 7.91 tonnes respectively.

Table 4-4:Gangavaram port facilities

Nature	Deep-water, all-weather port
Cargo handling equipment	Stacker & reclaimers, 4 ship loaders, wagon loader, wagon tippler, conveyor etc.
Storage Facilities	Covered transit storage for bulk and break-bulk cargoes. Storage capacity of coal 6 MMT & iron ore 1 million tonnes Mechanized storage facilities
Type of Jetties	9 berths, 2 berth mechanized handling for Coal and 1 for Iron ore, 4 multipurpose berth,1 general cargo berth, 1 for dry bulk.

Commodities handled	Coal, Iron Ore, Fertilizer, Limestone, Bauxite, Raw Sugar, Project Cargo, Alumina, Steel products etc.
Source: DRAFT REPORT - Preparation of Comprehensive Masterplan for Visakhapatnam port with Planning Horizon of 2047 by royal haskoning.	

Railway connectivity to Gangavaram Port has been constructed by linking to the broad-gauge Chennai-Visakhapatnam-Howrah train track. The port also has its own sidings, which include 14 railway sidings for receiving and dispatching rakes, specialized coal and iron-ore sidings for mechanized loading and unloading operations, four in-motion weighbridges for weighing rakes, and five locomotives for shunting rakes within the railway siding. Gangavaram is connected to National Highway (NH)-5 via a 3.8-kilometer-long four-lane expressway. The port has several storage facilities, including a covered transit storage facility for bulk and break-bulk cargoes, coal and iron ore storage capacity of 6 MMT and 1 million tonnes, respectively, as well as additional mechanized storage facilities. Gangavaram Port handles bulk and break-bulk goods like Coal, iron ore, fertilizer, limestone, bauxite, raw sugar, project cargo, alumina, steel goods, FRM, and so on. A new container terminal of 0.8 MTEUs at the port is anticipated to be commissioned and completed by September 2022.

4.11 Krishnapatnam Port

Krishnapatnam is an all-weather deep-water port that can handle cape-sized boats and offers direct berthing. The port has a maximum draft of 17.7 metres and 12 berths. Cargo handling equipment in Krishnapatnam includes liquid bulk pipelines, high-capacity mobile harbour cranes, ship unloaders, rail-mounted quay cranes, and a conveyor system for efficient commodity movement. The port has two container cargo berths, eight multipurpose berths, and two coal berths. Krishnapatnam employs robotic handling for both import and export cargo. The port's storage facilities include a covered warehouse of over 200,000 square kilometers, an open storage yard of around 608 acres, and a high transit storage area of 6,800 acres.

Table 4-5: Krishnapatnam port facilities

Nature	Deep-Water, All Weather Direct Berthing Port
Cargo handling equipment	Pipelines for Liquid Bulk High-Capacity Mobile Harbour Cranes, Ship Unloaders, Rail Mounted Quay Cranes, Conveyor System
Storage Facilities	Covered Warehouse – more than 200,000 Sq. m. Open storage yard – 2,460,489 Sq. m. (608 Acres) High Transit Storage area – 27,518,623 Sq. m. (6800 Acres)
Type of Jetties	2 Container berths, 8 Multipurpose berths, 2 Coal berths.
Commodities handled	Edible oil hub in India Handles Coal, Fertilizer, Limestone, Steel, Iron Ore, FRM etc.

The table above provides detailed information on Krishnapatnam Port's infrastructure. Krishnapatnam's rail connectivity has been enhanced, with a 26-kilometer electrified double line connecting to Venkatachalam. The port also features an internal rail linkage, increasing wagon loading capacity to 60 rakes per day. A 26-kilometer four-lane road connects the port area to National Highway 5. This port handles a wide variety of goods, including coal, iron ore, container cargo, fertilizer, limestone, steel, and FRM. Krishnapatnam is also recognized as India's edible oil hub. The port has a total capacity of around 64 million tonnes, with a coal unloading rate of 10,000 TPD. Krishnapatnam has plans to boost cargo handling capacity to 500 million tons by 2025. There are also proposals to build three SBMs and twenty new berths to handle 154 million tonnes of dry and liquid bulk cargo, as well as 2.2 million TEUs of containers.

4.12 Paradip Port

Paradip Port is Odisha's sole significant port and a deepwater port. The port is strategically located, with a vast hinterland that includes Odisha, Jharkhand, Chhattisgarh, Madhya Pradesh, Uttar Pradesh, Bihar, and West Bengal. Cargo handling equipment at the port includes pipelines for liquid bulk, automated handling for commodities such as coal and iron ore, two stackers, reclaimers, and ship loaders, a wagon tippler, and a mobile harbour crane. The port's maximum overall draft is 17 m, with a dry bulk handling capacity of 14.5 m. The port's storage facilities include a covered warehouse and an open stack yard.

Table 4-6 Paradip port facilities

Type	Description
Nature	Deep water
Cargo handling equipment	Pipelines for Liquid bulk. Mechanised handling for coal and iron ore 2 Stacker, 2 Reclaimer, 2 Ship Loader, Wagon tippler, Mobile Harbour Crane
Storage Facilities	Covered Warehouse – 30,200 Sq. m. Open Stackyard – 2,318,760 Sq. m
Type of Jetties	19 berths (2 coal & 3 Iron Ore), 3 Single Point Moorings (SPM), 1 Ro-Ro Jetty, 1 mooring berth, 1 for north Quay
Commodities handled	POL, Coal, FRM, Other Dry Bulk etc.

The table above provides information about Paradip Port's infrastructure. Paradip Port is well-connected by train to the east coast rail system's wide gauge lines. The closest railway stations are Cuttack and Bhubaneswar. The port also has a separate rail system with a 7.4-kilometer route and 84-kilometer track. This system can handle 19 full-rake and 6 half-rake sidings. The port offers access to National Highway 5A and State Highway 12. Paradip port has 19 berths in total, two of which are dedicated to coal and three to the handling of iron ore solely. There are three single point moorings (SPM), one Ro-Ro jetty, one mooring berth, and one on the north quay. The main commodities handled at Paradip are POL, coal, FRM, and other dry bulk cargo. The port's import and export traffic are 57.55 and 56.99 million tons, respectively. Paradip Port's projected expansion plans include boosting port capacity by 20 million tons per year and mechanizing the CQ-1 and CQ-2 docks.

4.13 Gopalpur Port

Gopalpur Port is a deep-sea port designed to endure fair weather conditions. It was designed as a direct berthing port. Gopalpur's cargo handling equipment includes material handlers, three mobile harbour cranes, heavy lift cranes, pay loaders, forklifts, trailers and tippers, conveyors, and so on. The port's storage capacity is 300,000 million tonnes for iron ore and 600,000 million tonnes for coal. Gopalpur Port features three deep water berths and two dry cargo berths, with a maximum draft of 14.5 meters. However, the port has yet to be fully constructed. The development plan includes provisions for mechanical handling facilities that handle bulk cargo.

Table 4-7 Gopalpur port facilities

Type	Description
Nature	Deep-Water, Fair Weather Direct Berthing Port
Cargo handling equipment	Material handlers, 3 Mobile Harbour Cranes, Heavy Lift Cranes, Payloaders, Forklifts, Trailers and tippers.
Storage Facilities	Storage capacity - 300,000 (Iron) & 600,000 (coal)
Type of Jetties	3 Deep-water Berths, 2 Dry Cargo Berths
Commodities handled	Illuminate Coal, Pet Coke, Steel, Cement, Iron Ore Fines & Pellets, etc.

The table above details Gopalpur Port's infrastructure. Gopalpur Port has two railway sidings that link to the wide gauge Howrah-Visakhapatnam-Chennai east coast trunk line, which runs parallel to the eastern coastline. Roadway access is available via a 6-kilometer local road to National Highway 516, which connects to National Highway 5 (Kolkata-Chennai). State Highways 7 and 17 also provide road access to the port. Gopalpur handles a variety of commodities, such as illuminate coal, pet coke, steel, cement, iron ore fines and pellets, among others. The port has further provisions for constructing mechanical handling equipment for bulk cargo.

4.14 Analysis of Facilities:

According to the above debates, Visakhapatnam's competitors include Gangavaram, Krishnapatnam, Paradip, and Gopalpur Ports. The table below provides a detailed review of port facilities at VPA and comparable ports.

Table 4-8 Comparison of port facilities with VPA

Features	Paradip	Gopalpur	VPA	Gangavaram	Krishnapatnam
Draft (m)	14.5	14.5	14.5	19.5	18.7
Road Connectivity	Available	Available	Available	Available	Available
Rail Connectivity	Available	Available	Available	Available	Available
Vessel Size (LOA - max)	370	240	390	350	250
Capacity (mn T)	277	15	136	62	64

Capacity Utilization	41.3%	48.6%	51.3%	52.9%	59.5%
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The table below lists the commodities that may be re-routed from each competitive port to VPA. Commodities handled by competing ports in the region provide a direct opportunity for traffic re-routing. VPA might provide infrastructure and generate a logistical advantage to attract these types of cargos that are now flowing through the influence region. VPA has the potential to outperform its competitors with planned upgrades such as increased port capacity, additional berths, and the installation of mechanized handling facilities for major commodities. The table below illustrates commodity-specific competitive mapping for VPA.

Table 4-9 Commodity-specific competitive mapping for VPA

Parameters	Risk to VPA	Opportunity to VPA
Paradip	<ul style="list-style-type: none"> • Another Major Port in hinterland. • Mechanized cargo handling facility. • Closer distance to mines in Odisha. 	<ul style="list-style-type: none"> • High berth occupancy leading to long pre-berthing delays at Paradip. • High demurrage charges. • High turn-around time for vessels • With improved infrastructure, logistics cost, and distance advantage, VPA could handle surplus cargo from mines of Odisha.
Gopalpur	<ul style="list-style-type: none"> • Closer distance to industries in the secondary hinterland 	<ul style="list-style-type: none"> • Private port has high tariff rates. • VPA offers better cargo handling and reasonable tariff structure. • Lower capacity than VPA, hence less cargo handling capability
Gangavaram	<ul style="list-style-type: none"> • Shares same hinterland as VPA. • Mechanized cargo handling facility. • Industries in the common hinterland prefer Gangavaram because of better infrastructure 	<ul style="list-style-type: none"> • Private port has high tariff rates. • VPA being major port offers reasonable tariff structure • Lower capacity than VPA, hence less cargo handling capability • Proposed developments would likely re-route Gangavaram’s traffic
Krishnapatnam	<ul style="list-style-type: none"> • Located at closer distance to industries in the secondary and tertiary hinterland. • Mechanized cargo handling facility. 	<ul style="list-style-type: none"> • Private port has high tariff rates. • VPA being major port offers reasonable tariff structure. • Lower capacity than VPA, hence less cargo handling capability • Proposed developments would likely re-route Gangavaram’s traffic

The presence of rail access to the Visakhapatnam Port Authority provides a competitive advantage and can assist acquire a small share of the long-distance freight handled at neighbouring competitor ports. With forthcoming advancements at VPA, such as increasing port capacity, planning new berths, and installing mechanized handling facilities for major commodities, the port may outperform its competitors.

5 EXISTING FACILITIES AT VPA

5.1 Existing Facilities – Overview

The Vizag port is divided into three zones: the inner harbour, the outer harbour, and the fishing harbour. The inner harbour is a natural harbour that is protected by land. Breakwaters on the southern and eastern sides of the port protect the outer and fishing harbours. The southern breakwater spans 1.54 km, while the eastern breakwater is 1.07 km long. The inner harbour now has 31 berths, while the outer harbour has 7. The inner harbour has a total quay length of 2.31 km, whereas the outer harbour is approximately 5.27 km long. Inner harbour has an approach channel length of 1.62km and a depth of (-)16.10mCD.

There are two turning circles in the port basin. The outer harbour turning circle has a dredge depth of (-) 21.0m CD, whereas the inner harbour turning circle is (-) 16.10m CD. The fishery harbour is located north of the outer harbour and is protected by a breakwater on the north and east sides. The breakwater's northern arm is approximately 0.41 km long, while the eastern arm is roughly 0.5 km long and extends from the outer harbour.

5.2 Categorisation of Berths:

VPA has 30 active berths, which handled an overall cargo volume of 81 million tons in FY23. The below table depicts commodity-specific berth categorization of VPA, including bulk cargo handling berths at the port. VPA's berths are classified according to the three main types of cargo handled: container, dry/break bulk, and liquid bulk. The traffic contribution of these cargoes at VPA's berths is as follows.

Table 5-1 VPA Berths

Sl. No	Berth Name	Existing Mechanisation Status	Berth Dimensions (Length)	Location of Berth	Type of Cargos Normally Handled	
1	Ore Berth-1 (EVTL)	Fully Mechanised	300	Entrance Channel Depth 20.00 Mts. OUTER HARBOUR Turning Circle Channel Depth 19.00 Mts	Captive berth for Iron Ore & Pellets Loading	
2	Ore Berth-2 (EVTL)	Fully Mechanised	300		Coal Import Mechanized Handling facility	
3	VGCB 2,00,000 DWT	Fully Mechanised	300		Single Point Mooring	
4	Visakhapatnam Cruise Terminal		150		Crude Oil & Transshipment operation	
5	SPM		360		LPG & POL operations & Transshipment Operations	
6	OSTT (Offshore Tank Terminal)		280		Captive Berth for Containers m/s. VCTPL	
7	LPG Berth		230			
8	VCTPL - 1	Fully Mechanised	320			
9	VCTPL - 2	Fully Mechanised	320			
10	EAST QUAY-1	Fully Mechanised	250		INNER HARBOUR BERTH INFORMATI	1.Food Grains, Fertilizers, Steel, Liquid Chemicals, Break Bulk and Multipurpose Cargos operational Berths 2.
11	EAST QUAY -3	Manual Loading	240			

12	EAST QUAY -4	Manual Loading	240	ON (MAXIMUM PERMISSIBLE LOA AT INNER HARBOUR IS 235.00 Mtrs	Facilitated with 20 Tons capacity Ele. Cranes, Pipeline for Chemicals Handling. 3. One Harbour Mobile Crane of m/s.SPPPL at EQ-7 Berth (140T HMC)	
13	EAST QUAY -6	For Proposal FM (Under Process)	182.9			
14	EAST QUAY -7	For Proposal FM (Under Process)	230			
15	EAST QUAY -8	Manual Loading	255		Multipurpose-BOT Berth m/s.VIZAG SEAPORT (4No's at Harbour Mobile Cranes)	
16	EAST QUAY -9	Manual Loading	255		Captive Berth for Chemical Cargos.	
17	EAST QUAY -10	Manual Loading	183		1.Gr.ch.b dedicated coastal berth, 2. Pipeline for Handling S.Acid and other Liquefied Cargos at WQ-1(RE) and WQ-1 Berths. 3. Coal, Coke and other Dusty Cargos and Non-Dusty Cargo operations. 4. 2no's 104 Tons HM Cranes (Seapol Port) and 1 No 54 Tons Material Handler (Bothra Mobile Crane) BMC	
18	Green Channel Berth (Gr.ch)	Manual Loading	145			
19	WQ-1 (RE) Return End	Manual Loading	145			
20	West Quay -1	Manual Loading	212			
21	West Quay -2	Manual Loading	226.76			
22	West Quay -3	Manual Loading	201.12			
23	West Quay -4	Manual Loading	243			
24	West Quay -5	Semi Mechanised	241.7			Captive Berth for Nalco with Conveyor and Pipe line (Conveyor System for loading alumina (2200TPH) and Caustic Soda (600TPH))
25	West Quay -6	For Proposal FM (Under Process)	255			CP Coke, Pet Coke, Lam Coke, Steel & Granite (2 Nos. 60T capacity Rail Mounted level luffing cranes)
26	West Quay -7	For Proposal FM (Under Process)	460			1 no 100 T HMC is operational at WQ7 & WQ8 berths. (Mechanization is in progress) Another 100T HMC shall be deployed by June 2021
27	West Quay -8	For Proposal FM (Under Process)	460		Captive Berth for POL Product and other Chemical Cargos	
28	Oil Wharf -1 (OR-1)		183			
29	Oil Wharf -2 (OR-2) (In Progress)		183			
30	Oil Wharf -3 (OR-3)		160		Captive Berth for Fertilizers along Pipeline for Liquid Fertilizers	
31	Fertilizer Berth (FB)	Fully Mechanised	173.13			

(Source:

5.2.1 Inner Harbour

The Inner Harbour has three navigational areas/basins: Northern, Western, and Northwest arms. The majority of commercial berths are in the Northern arm, ranging from EQ-1A to EQ10 and WQ1 to WQ8. The Northwest Arm is dedicated to Indian Naval activities. Berths WQ-1RE and Green CB are close the entrance to the Northwest arm. The Western arm accommodates berths OR1, OR2, OR3 and fertilizer on the right margin, while the Hindustan Shipyard has slipways on the left edge. Berthing buildings on the northern arm are classified

as EQ (East Quay) or WQ (West Quay) series. The information includes berthing structure dimensions, draft, equipment count, and cargo handling equipment details.

Length of Inner Harbour is: – **5273.14 M**

Figure 5-1 Inner Harbour of VPA



5.2.2 East Quay

There are a total of eleven berths designated in the direction of East Quay. While berth EQ 1A is being built, berths EQ1 through EQ3 and EQ6 through EQ 10 are currently in use. Berths EQ4 and EQ5 are not in use at the moment.

Table 5-2 Berthing Details of East Quay

Berth	Cargo Handled	Length	Draft	Equipment
EQ1	Steam Coal	280	14.5	100T HMC, Wagon Loader, Stacker and Reclaimer, Conveyor system, Wagon tippler
EQ2	C.P Coke, Copper Concentrate, Iron Ore, Maize, Manganese Ore, Rice, Granite Blocks, Steel, Steam Coal, Fertiliser, Gypsum, Lam Coke, Manganese Ore, Petroleum Coke, General Cargo.	265	14.5	100T HMC
EQ3	C.P Coke, Copper Concentrate, Iron Ore, Maize, Manganese Ore, Rice, Granite Blocks, Steel, Steam Coal, Fertiliser, Gypsum, Lam Coke, Manganese Ore, Petroleum Coke, General Cargo	265	14.5	100T HMC
EQ6	C.P. Coke, Maize, Manganese, Stone, Sugar, Bitumen, Cement, General Cargo, Project Cargo, Rice, Steel, Anthracite, Fertiliser, Lam Coke, Manganese Ore, Petroleum Coke,	182.90	11.0	100T HMC

	Refact Minerals, Soda Ash, Phos. Acid			
EQ7	Animal Fat, B.F Slag, Iron Ore, Manganese Ore, Quartz, River Sand, Stone, Cement, Granite Block, Project Cargo, Steel, Anthracite, Bauxite, Cooking Coal, Fertiliser, Gypsum, Lam Coke, Limestone, Manganese Ore, Petroleum Coke Steam Coal, Phos. Acid, Project Cargo	255	14.5	4 Numbers -20T Wharf Cranes
EQ8	Iron Ore, Anthracite Coal, Coking Coal, Lime Stone, Manganese Ore, Petroleum Coke, Steam Coal	255	14.5	5 Numbers -104 T Harbour Mobile Crane
EQ9	Iron Ore, Iron Pellets, Anthracite, Cooking Coal, Iron Ore, Lam Coke, Limestone, Manganese ore, Petroleum Coke, Steam coal	255	14.5	
EQ10	MDC, Caustic Soda			Unloading arms 300 TPH

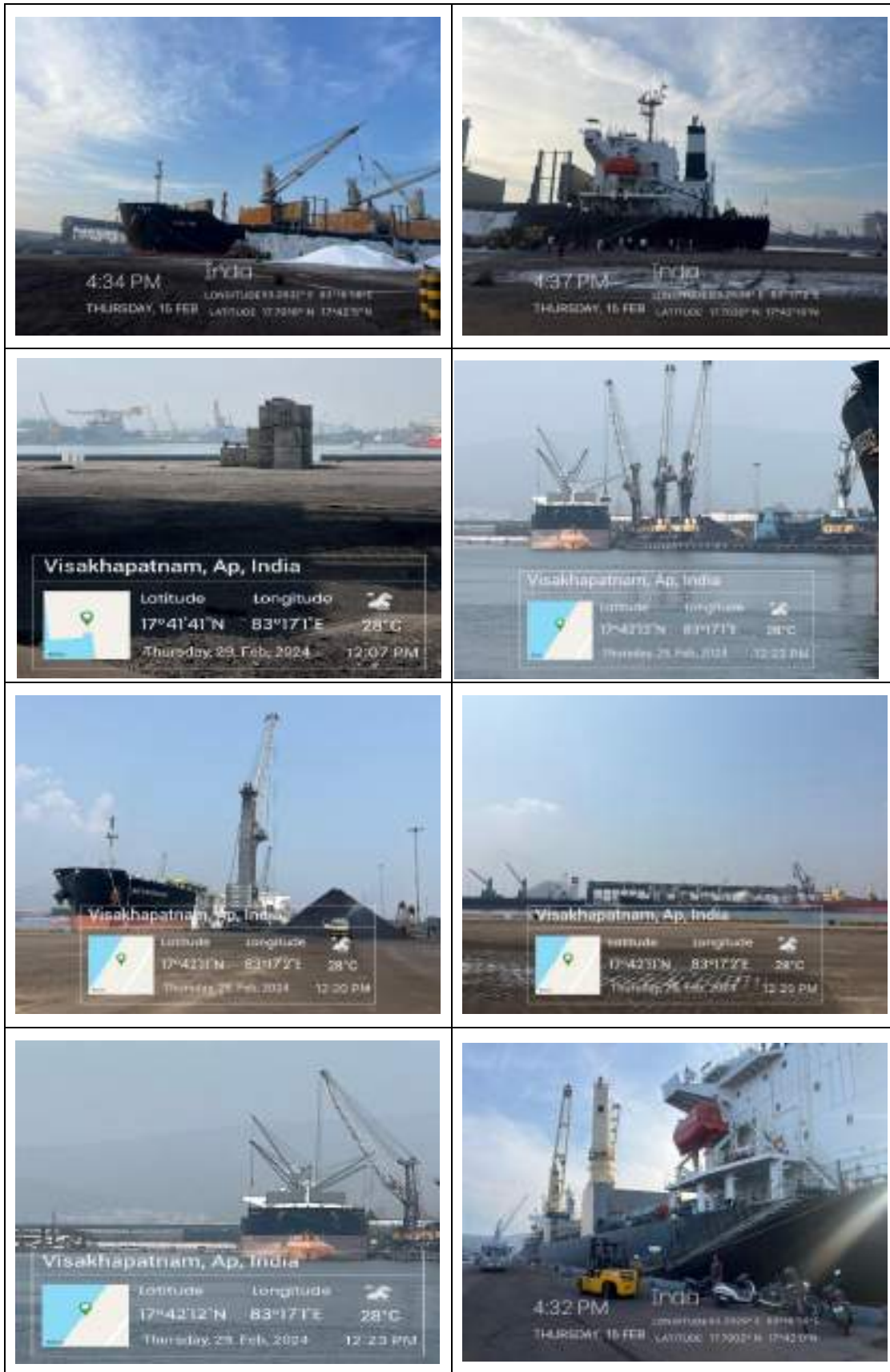
(Source: VPA)

Figure 5-2 East Quay of VPA



Rebuilt in 2015 using DBFOT mode, the Berth EQ1 has a diaphragm wall at the back and a piled deck construction. AVCTPL constructed and ran this terminal, and a concession agreement covered it until March 2022. Currently, VPA is in charge of operating this terminal. The terminal's sole purpose was to handle steam coal. 30.1 acres of land are leased to the terminal operator.

Figure 5-3 Berths of VPA



SVCTPL partially built the Berth EQ 1A on DBFOT, but the construction is still ongoing. This deck structure is piled and has a diaphragm wall at the back. The 28.35 acres of land allocated for the lease.

As of 2019, the EQ2 and EQ3 berths are in service. The diaphragm wall at the back of the piled deck structure, which houses the berths operated by VPA, is located in the rear. The berth EQ6 is a concrete monolith that is quite old. There is currently an 11-meter draft in front of the building. In order to handle freight, VPA intends to mechanize the current berthing arrangement.

VPA is currently in charge of running the berth. Since 1995, the berth EQ7 has been operational. Its structure is composed of vertical piles with a deck arrangement and rock anchors at the back, and a diaphragm wall at the front. This terminal has a 15.76-acre allotment. VPA is now in charge of the berth.

Under a concession deal with VSPL (Vizag Seaport Pvt Ltd) under PPP, the berths EQ 8 and EQ 9 have been in use since 2005. The berthing structure is composed of vertical piles with deck arrangement and rock anchors at the back, and a diaphragm wall at the front.

The 30.05 acres of leased land with the terminal operator. Since 2015, the berth EQ10 has been in use under a concession agreement with AVR IPL (AVR Infra Pvt Ltd). This deck structure is piled and has a diaphragm wall at the back.

5.2.3 West Quay

The West Quay WQ1 to WQ8 has nine berths in total, and the additional berth WQ-1 RE is situated between the North and Northwest Arms.

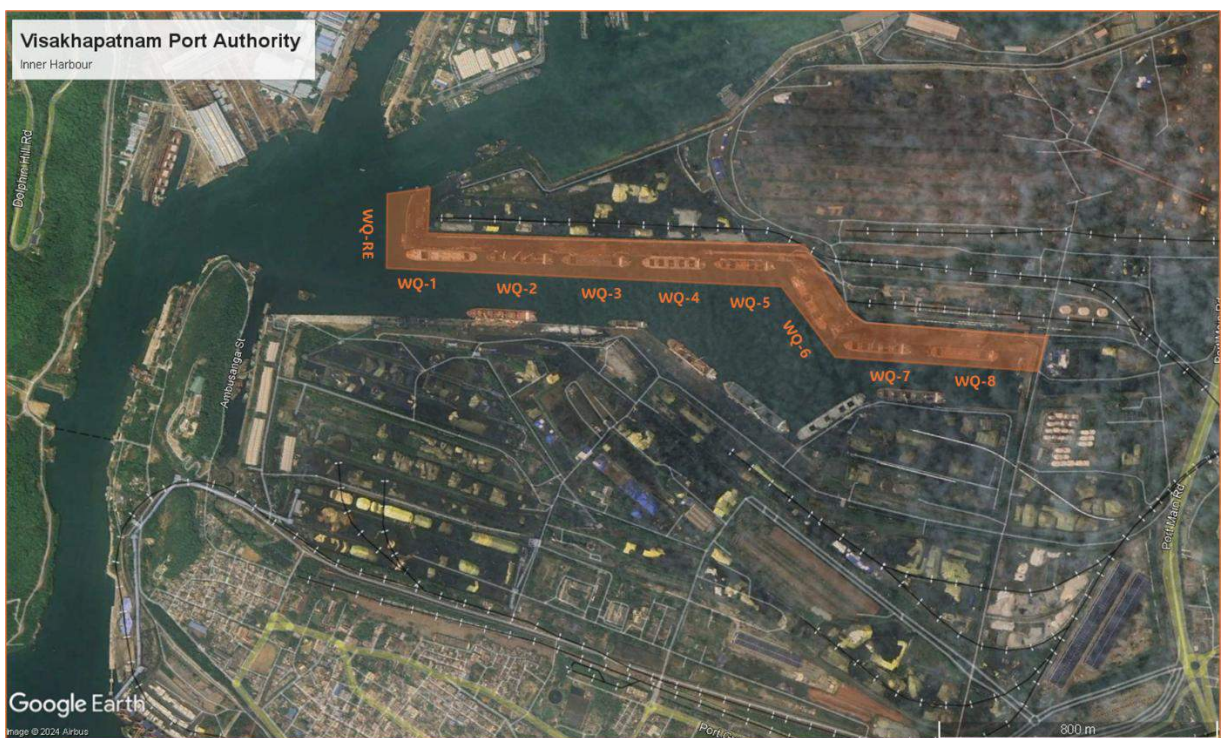
Table 5-3 Berthing Details of West Quay

Berth	Cargo Handled	Length	Draft	Equipment
WQ1	Iron Ore, Thermal Coal, General Cargo, Steel, Anthracite, Bentonite, Fertiliser, Lam Coke, Limestone, Manganese Ore, Steam Coal	212	13.50	
WQ2	Iron Ore, Iron Pellets, Granite Blocks, Steel, Anthracite, Fertiliser, Lam Coke, Lime Stone, Manganese Ore, Petroleum Coke, Steam Coal	226.70	13.50	2 Numbers -140T Mobile Harbour Crane
WQ3	Iron Ore, Iron Pellets, Lam Coke, Cement, Granite Blocks, Steel, Fertiliser, Gypsum, Lime Stone, Manganese Ore, Petroleum Coke	201.20	13.50	2 Numbers -140T Mobile Harbour Crane
WQ4	Iron ore, Stone, Granite Blocks, Steel, Bentonite, Fertiliser, Lam Coke, Manganese Ore, Petroleum Coke, Steam Coal, Caustic Soda, General Cargo,	243	11.0	Bulk cargos are handled with ship crane and the Caustic Soda is handled through underground pipeline
WQ5	Alumina, B.F Slag, Iron Ore, Granite Blocks, Fertiliser, Lam Coke, Manganese Ore, Petroleum Coke	241.70	11	Conveyor System for loading alumina (2200 TPH) and Caustic Soda (600 TPH)
WQ6	Manganese Ore, Rice, Steel, Fertiliser, General Cargo, Steel	255	14.50	2 Numbers of 60t LLC, Front end Loader

WQ7	Manganese Ore, Stone, Steel, Gypsum, Lam Coke, Limestone, Fertiliser	280	14.50	
WQ8	Manganese Ore, Stone, Fertiliser, Gypsum, Limestone	280	14.50	100T MHC
WQ1-RE	Coking Coal, Iron ore, Iron Pellet, Stone, Cement, Granite Block, Steel, Coal, Lam Coke, Manganese Ore, Sulphuric Acid	164	8.0	
(Source:VPA)				

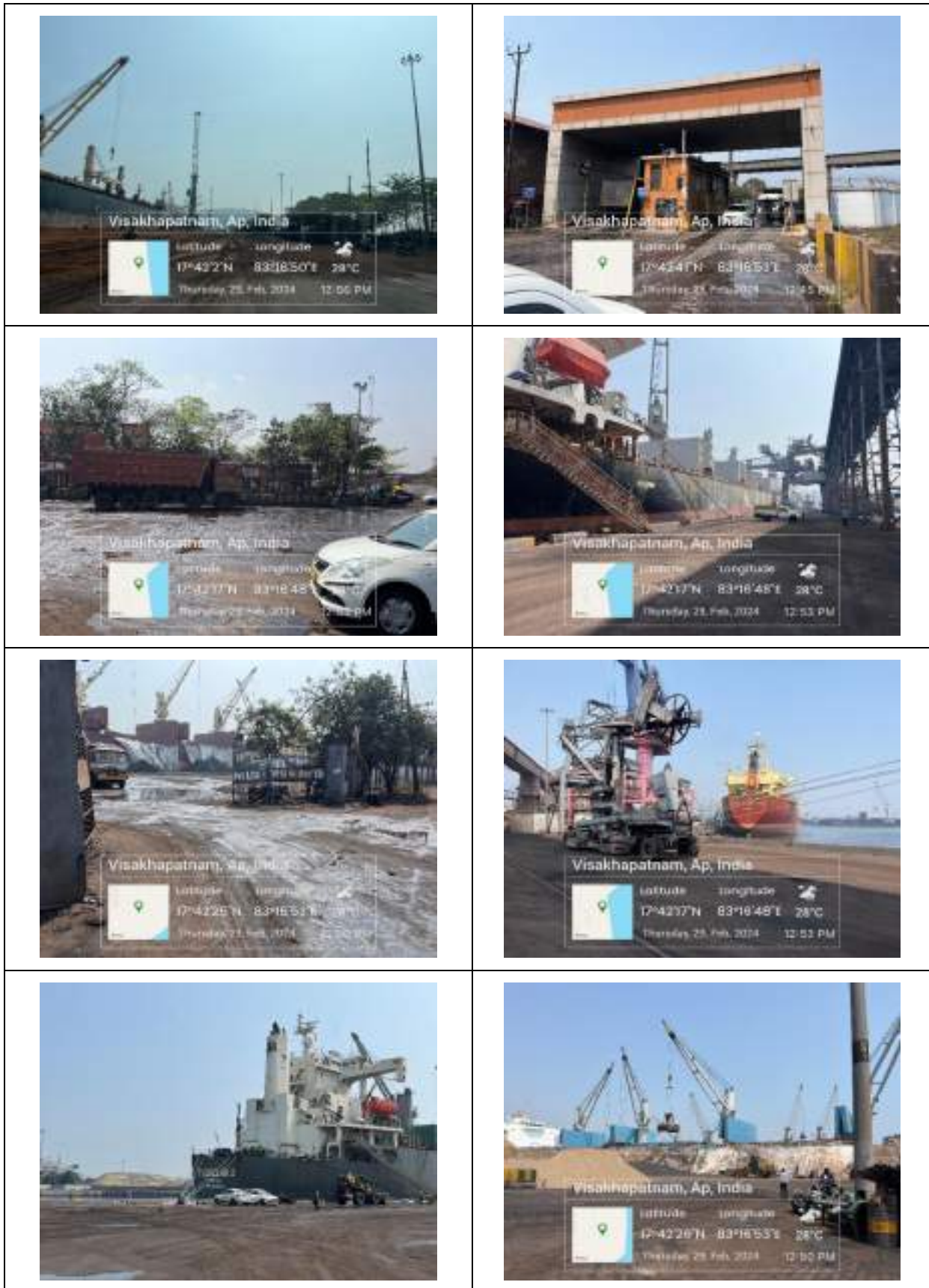
Operating since 1993, berth WQ1 is subject to a concession agreement with ESSAR. The berthing structure consists of vertical piles with a deck configuration and a diaphragm wall. Since 1992, the berths WQ2 and WQ3 have been in use. The berthing structure, which

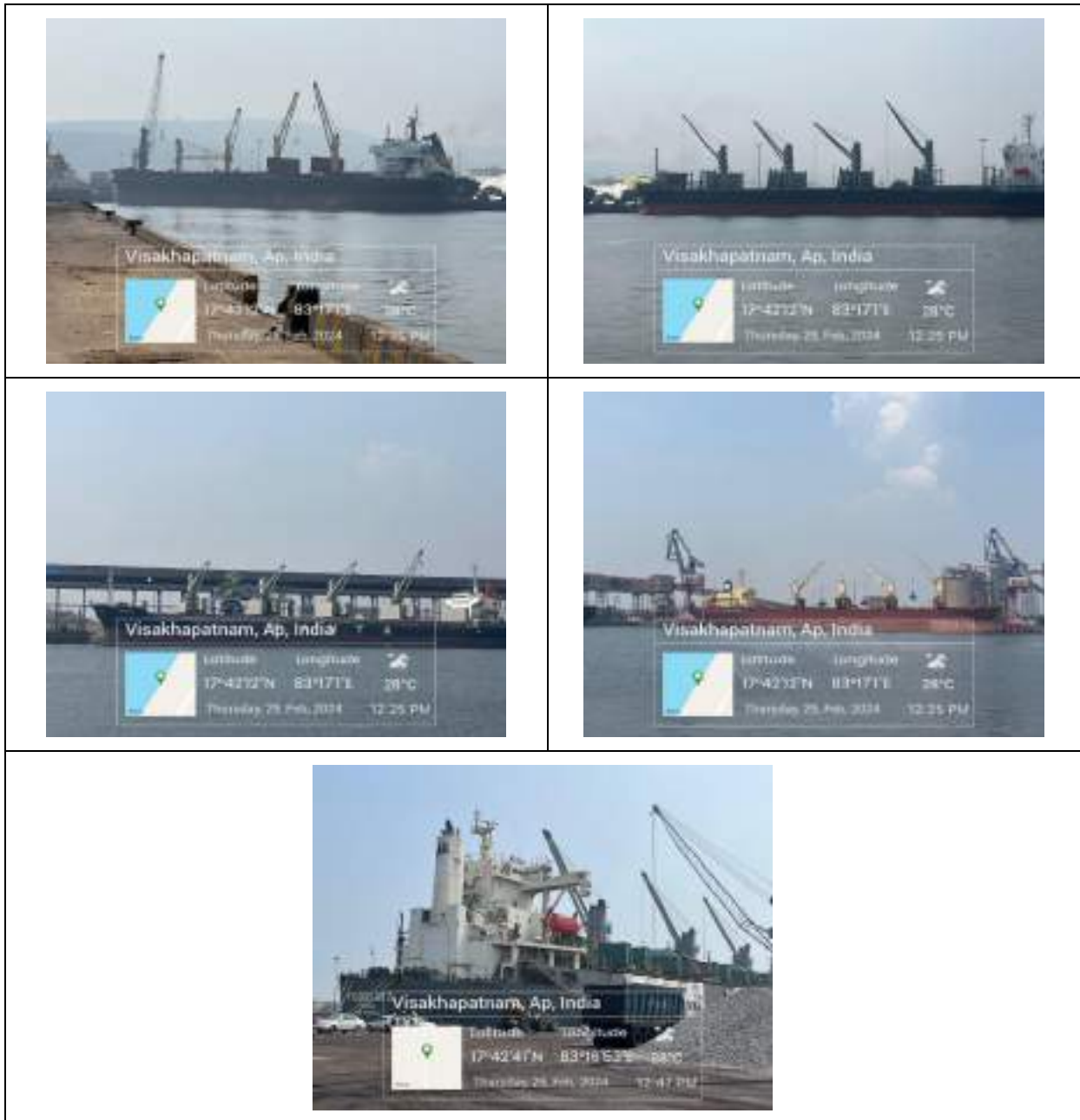
Figure 5-4 West Quay of VPA



comprises a diaphragm wall and vertical piles with deck layout, is managed by VPA. The WQ4 and WQ5 berths are made of concrete monoliths and are older constructions. There is now an 11-meter draft in front of the berthing structure. These berths have been in use since 1965 and are subject to a concession agreement with NALCO.

Figure 5-5 Images of West Quay





Operating since 2015, WQ6 is a recommissioned berth managed by VPA. The berthing structure consists of vertical piles with a deck configuration and a diaphragm wall. VPA intends to construct a mechanical freight handling system in order to modernize the current berthing structure. The work award is expected to take place in March 2023. The terminal's designated land area is 14.65 acres. 2018 saw the recommissioning of the berths WQ7 and WQ8, which are now controlled by VPA. The berthing structure consists of decked-out vertical piles. The 38.03 acres of land that the terminal is allocated. It is believed that in order to operate WQ7 and WQ8, VPA intends to enter into a concession arrangement with AMNS India. Operating since 2015, VPA is responsible for the recommissioning of the berth WQ1 Return end. The berthing structure consists of vertical piles with a deck configuration and a diaphragm wall.

5.2.4 West Arm

The West Arm has four numbers of berths overall. OR-I, OR-II, OR-III, and Fertilizer Berth are these berths.

Table 5-4 Details of West Arm

Berth	Cargo Handled	Length	Draft	Equipment
OR-I	Bitumen, POL, Styrene Monomar, Acetone, Hexane, I.P.Alcohol, MDC, Methanol, POL, Toluene	366	10.6	Unloading arms and pipeline System
OR-II	Bitumen, POL, Styrene Monomar, Acetone, Hexane, I.P.Alcohol, MDC, Methanol, POL, Toluene	366	10.6	Unloading arms and pipeline System
OR-III	Acetone, Hexane, I.P.Alcohol, MDC, Methanol, Toluene	180.0	11.0	Direct discharge through pipeline to tank farms.
Fertiliser Berth	Fertilisers Dry, LIQ Ammonia, Molten Sulphur, Sulphuric Acid	167.74	10.06	400 TPH Unloader

(Source: VPA)

The berths OR-I and OR-II are concrete monoliths lined with masonry that are older buildings. The berths that were commissioned in 1957 and OR-1 are currently unoccupied, although VPA plans to renovate them soon. There is currently a 10.06-meter draft in front of the building.

In 2021, the Berth OR-III is put back into service and is run by VPA. The berthing structure consists of vertical piles with a deck configuration and a diaphragm wall. Fertilizer Berth (FB) was put into service in 1967 and is presently run by VPA. The berthing structure consists of decked-out vertical piles. Adjacent to the docks are two 5,500-ton capacity silos used only for liquid fertilizer storage.

Figure 5-6 West of Arm of VPA



5.2.5 Northwest Arm

The Northwest Arm opening is where you may find the Green Channel Berth. The Green Channel berth was put into service in 2015 and is run by VPA as well. The berthing structure is composed of vertical piles with a deck arrangement and a diaphragm wall.

Table 5-5 Details of Northwest Arm

Berth	Cargo Handled	Length	Draft	Equipment
Green Channel berth	Fly ash	185	8.0	-

5.2.6 Outer Harbour

The east and south breakwaters guard the outer harbour. The outer harbour is home to the ore handling berths OB1 & OB2, the container terminal operated VCTPL, the general cargo berth-VGCB, OSTT, and LPG.

Figure 5-7 Outer Harbour of VPA



Length of Outer Harbour is – 2316.15 M.

Table 5-6 Details of Outer Harbour

Berth	Cargo Handled	Length	Draft	Equipment
OB-I	Iron Ore, Iron pellets	270	17	Ship Loader 8000 (TPH), 3 Numbers – Wagon tippler, 2 Numbers -Stacker 2700 (TPH) and 3 Numbers of reclaimer 4000 (TPH), Conveyor system
OB-II	Iron Ore, Iron pellets	270	17	
VGCB	Cooking Coal, Steam Coal	356	18	Ship Loader 8000 (TPH), 3 Numbers – Wagon tippler, 2 Numbers -Stacker 2700 (TPH) and 3 Numbers of reclaimer 4000 (TPH), Conveyor system
OSTT	POL, Crude Oil	408	17	3- Numbers Unloading arms - 5500 (TPH)
LPG Jetty	POL, Crude	371	14.50	Unloading arms and pipe line system
VCTPL-I	Containers	451.15	14.50	9 Numbers RMQC, 10 Numbers RTGC,

VCTPL-II	Containers	391.0	14.50	6 Numbers Reach Stacker
Channel Berth		132	7.0	-

Operating since 1975, the berths OB-I and OB-II are covered by a concession agreement with M/s ESSAR. The berthing facility is a caisson structure made of concrete. The leased land area is 93.38 acres with the terminal operator.

Figure 5-8 Ore Berth of VPA



Operating since 1983, the general cargo berth GCB, is owned and operated by M/s Vedanta under a concession arrangement. The berthing structure consists of decked-out vertical piles. 45.28 acres of leased land are owned by the port operator. OSTT was put into service in 1985 and is presently run by VPA. It's a caisson structure made of concrete.

Figure 5-9 General Cargo Berth of VPA



The LPG Jetty was put into service in 1998 and is run by VPA. The berthing structure is constructed on vertical piles with a concrete deck configuration, and it has dolphins and unloading platforms.

Figure 5-10 LPG Jetty of VPA



A concession agreement exists between VCTPL (M/s Visakha Container Terminal Pvt Ltd) and the container terminals VCTPL-I & II. Phase I of the terminal's development was put into service in 2001, while Phase II was completed in 2022. The berthing structure consists of decked-out vertical piles. For VCTPL-I and VCTPL-II, the leased land area with terminal operator is 40.37 and 44.46 acres, respectively.

Figure 5-11 VCTPL Berths of VPA



Now that it's operational, the International Cruise Terminal will play a key role in facilitating domestic and foreign cruise travel along India's eastern coast. This state-of-the-art facility aims to help local communities and promote economic progress while providing tourists with an unforgettable experience. The bottom level and first floor together comprise 4,580.46 square meters of the Cruise Terminal Building.

Lounges, customs, immigration, quarantine counters, baggage handling facilities, scanning, concourse, restaurant, entertainment, shopping, health, and business exhibitions, money exchange outlets, CCTV coverage, and plenty of parking space are just a few of the amenities that the Cruise Terminal

Figure 5-12 Cruise Terminal of VPA

Building has to offer.

The cruise terminal's features include:

- 180 meters is the length of the berth.
- There are four mooring dolphins totalling 300 meters, two on each side.
- A 2,000 square meter terminal building equipped with all the services needed.
- Sufficient parking for 70 vehicles, 40 two-wheelers, and seven buses. Good road access connectivity to make things simple.



Figure 5-13 Layout Plan of Cruise Terminal

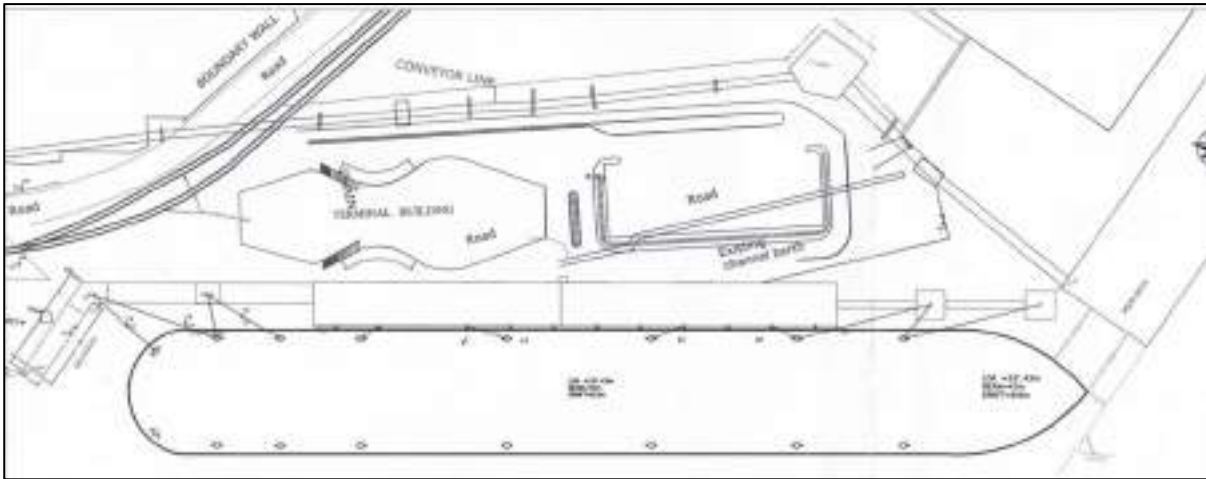


Figure 5-14 Location of Cruise Terminal



Figure 5-15 Interiors of Cruise Terminal





5.2.7 Offshore Single Buoy Mooring

The HPCL single buoy mooring location is situated around 3.5 kilometers from the east breakwater. The vessel's discharged crude oil is first kept in a cave close to Lova Garden before being sent to a refinery.

6 EXISTING LAND USE & LAND ALLOCATION

The pattern of land use surrounding the port region has been significantly impacted by port-based activities over the years. The city is India's largest seaport and oldest shipyard, and it is well-known for its heavy industry and the Eastern Naval Command of the Indian Navy. Anchor industries that rely on commodities like iron ore, POL, LPG, gasoline, and fertilizers use up large tracts of land. Iron ore, coal, crude oil, petroleum products, LPG, fertilizers, dry cargo, liquid cargo, and containers are just a few of the cargo kinds that Port can handle. The port has robust economic ties with nations in the Persian Gulf, such as the UAE and Southeast Asian nations, including Singapore, China, Malaysia, Colombo, and Indonesia.

Figure 6-1 Existing Land Use of VPA

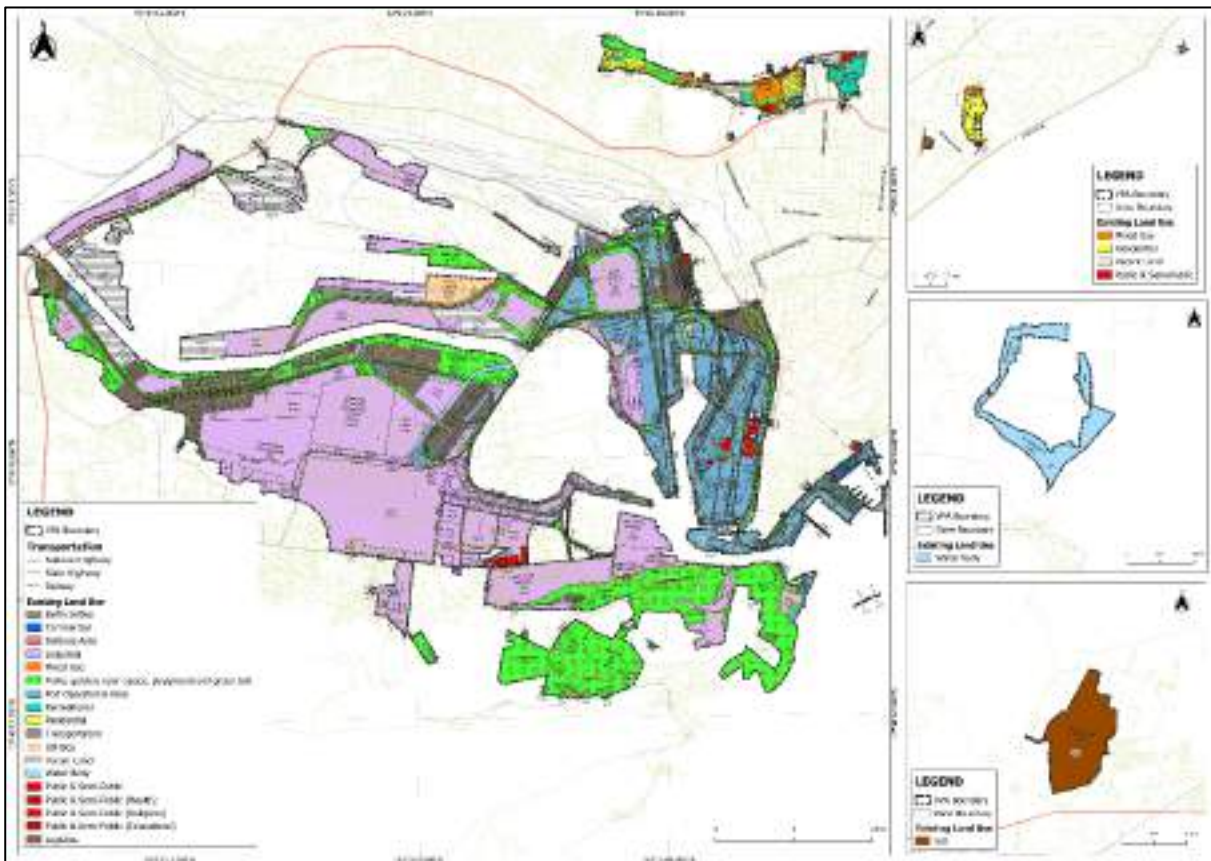


Table 6-1: Zone Wise - Land Information of Visakhapatnam Port Authority

Zone No	Area
1a	1405.3
1b	172.9
2	242.8
3	985.3
4	2459.6
5	673.9
6	680.2
7	122.0
8	247.7
9	28.0
10	292.9
11	306.8
Total	7618

Existing Land Use Statement - 2024													
Category	Inner Harbour		Outer Harbour	Hilly Areas	Industrial Areas		Near NH	Near NH	Residential area		Outside Port Area		Total Area (Acres)
	Z-1A	Z-1B	Z-2	Z-3	Z-4	Z-5	Z-6	Z-7	Z-8	Z-9	Z-10	Z-11	
Berth/Jetties	17.9	-	9.406	1.64	18.28	-	-	-	-	-	-	-	47.3
Port Operational Area	678	67.2	183.2	21.84	47.82	-	10.14	-	1.43	-	-	-	1009.7
Industrial	208.4	-	-	241.8	1726.3	323.7	184.3	112.1	-	-	-	-	2796.7
Commercial	8.37	-	10.4	0.10	2.27	-	0.05	0.80	6.51	-	-	-	28.6
Residential	-	-	-	-	-	-	-	-	49.9	21.5	-	-	71.5
Mixed Use	-	-	-	-	-	-	-	-	26.1	4.92	-	-	31.1
Defence Area	0.20	-	-	2.42	-	-	-	-	-	-	-	-	2.6
Transportation	196.2	51.09	15.7	8.98	132.18	75.90	45.92	-	22.6	-	-	-	548.659
Logistics	62.3	28.9	-	-	239.19	-	61.03	-	-	-	-	-	391.54
Utilities	4.16	0.16	0.2	-	2.96	54.86	5.683	-	-	-	-	-	68.106
Vacant Land	6.74	-	1.3	0.014	0.10	113.9	265.5	-	28.4	0.79	-	-	417.05
Geddas / Water bodies/ Canal	72.7	3.12	14.3	-	25.2	-	-	-	0.14	-	292.90	-	408.48
Hills	-	-	-	-	-	-	-	-	-	-	-	306.8	306.88
Parks, Garden, Open space and green belt	130.1	20.01	5.04	708.17	249.08	105.4	107.4	9.225	49.7	-	-	-	1384.28
Public & Semi-Public	19.9	2.304	2.8	-	0.80	-	-	-	8.14	0.72	-	-	34.817
PSP(Educational)	-	-	-	-	5.03	-	-	-	0.28	-	-	-	5.32
PSP(Health)	-	-	-	-	10.1	-	-	-	5.289	-	-	-	15.44
PSP(Recreational)	-	-	-	-	-	-	-	-	45.88	-	-	-	45.885
PSP(Religious)	0.06	-	0.15	0.37	0.18	-	-	-	3.10	-	-	-	3.888
Total	1405.3	172.9	242.882	985.366	2459.6	673.92	680.23	122.04	247.7	28.02	292.90	306.88	7618

Table 6-2: Existing Land Use Statement of Visakhapatnam Port Authority

Table 6-3: Existing Land Utilisation Statement of Visakhapatnam Port Authority

Category	Inner Harbour		Outer Harbour	Hilly Areas	Industrial Areas		Near NH	Near NH	Residential area		Outside Port Area		Total Area
	Z-1A	Z-1B	Z-2	Z-3	Z-4	Z-5	Z-6	Z-7	Z-8	Z-9	Z-10	Z-11	
Leased Land	489.9	2.2	92.45	231.28	2345.6	168.5	209.87	2.54	49.36	2.47	-	-	3594.3
Licensed Land (Open Stack area)	6.81	0.05	1.19	0.14	0.4	-	-	-	0.12	-	-	-	8.7
Vacant Land (Vacant + Proposed for various activities + Reclaimed Land)	6.74		1.37	0.014	0.102	113.9	265.5	-	28.48	0.79	-	-	417.0
Other Lands (Residential, Public-Semi-Public, Transportation, Infrastructure, Utilities, Water bodies, Hills)	950.8	170.7	98.5	753.9	113.6	391.4	204.8	119.5	169.8	24.8	292.9	306.9	3597.6
Others	503.5	2.3	95.0	231.4	2346.1	282.5	475.4	2.5	78.0	3.3	0.0	0.0	4020.0
Total	1454.3	172.94	193.54	985.38	2459.6	673.9	680.24	122.04	247.7	28.0	292.9	306.8	7618

6.1 Zone 1A & Zone 1B (Inner Harbour)

Figure 6-2 Existing Land Use of Zone-1A

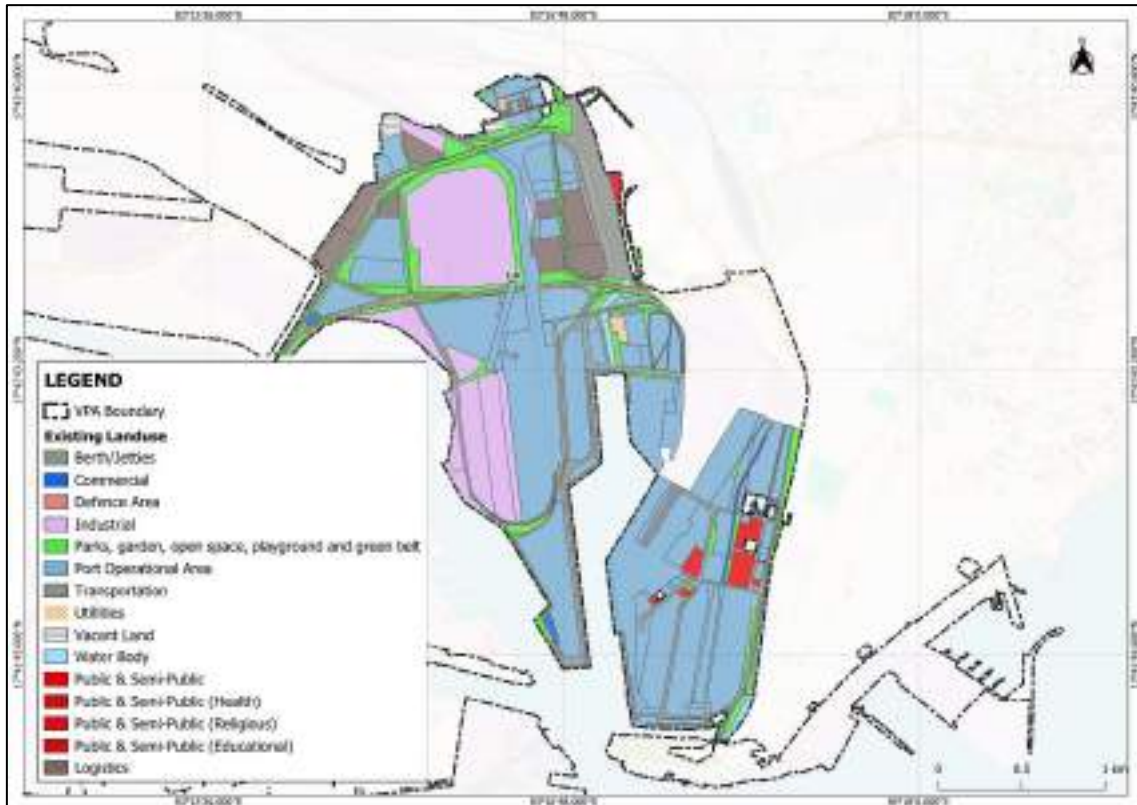


Figure 6-3 Existing Land Use of Zone- 1B



The inner harbour is the main operating region of the port, and it is divided into zones 1A and 1B. The main activities in these zones are freight transportation, storage, and berthing. Following the unloading of the cargo from the ship onto the berth, it is moved via trucks, rail, and conveyor belt system. A conveyor belt system with good connectivity is essential to the berth area's efficient operation.

Table 6-4: Existing land Utilisation of zone 1A & 1B

Category	Inner Harbour	
	Zone 1A	Zone 1 B
Leased Land	489.98	2.2
Licensed Land (Open Stack area)	6.81	0.05
Vacant Land (Vacant + Proposed for various activities + Reclaimed Land)	6.744	
Other Lands (Residential, Public-Semi-Public, Transportation, Infrastructure, Utilities, Water bodies, Hills)	852.8	170.7
Total	1405.36	172.94
<i>Source: Visakhapatnam Port Authority</i>		

Table 6-5: Existing land Use of Zone 1A & 1B

Category	Inner Harbour	
	Zone 1A	Zone 1 B
Berth/Jetties	17.961	-
Port Operational Area	677.979	67.268
Industrial	208.438	-
Commercial	8.375	-
Residential	-	-
Mixed Use	-	-
Defence Area	0.203	-
Transportation	196.216	51.097
Logistics	62.324	28.98
Utilities	4.163	0.161
Vacant Land	6.744	-
Geddass/ Water bodies/ Canal	72.756	3.12
Hills	-	-
Parks, Garden, Open space and green belt	130.173	20.012
Public & Semi-Public	19.96	2.304
PSP(Educational)	-	-
PSP(Health)	-	-
PSP(Recreational)	-	-
PSP(Religious)	0.066	-
Total	1405.36	172.94
<i>Source: Visakhapatnam Port Authority</i>		

Industries are granted licenses and Leases to use approximately 500 acres of land within Zones 1A and 1B and major industrial players such as the Navy, HPCL, DRCO, Essar, Nalco, SAIL, VSPL, VCTPL, EVTL, AVR Infra Pvt. Ltd, and Shipping Building Center are granted leases to use approximately 226 ha of land outside custom bound area.

- Today, the majority of the land is utilized for industrial purposes, with relatively little for commercial usage.

- The port operating region has a large number of rail crossings, which negatively impacts traffic flow and movement.
- Unauthorized parking is common on roadside edges and in empty lots due to a lack of adequate parking facilities. The smooth flow of goods traffic from the port to the hinterland is thereby impeded by the resulting traffic bottlenecks on both sides of the road.
- Coal storage occupies a sizable portion of the land in these zones. Because of the open stacking of coal and the city's close vicinity to these areas, we must take extra care to reduce pollution by taking environmental safeguards.
- The inner harbour area does not currently have a well-defined road hierarchy or loop network, but after speaking with VPA authorities, we found that flyovers and the extension of current roads are being considered for this area. To sort the traffic from the inner harbour area, this could be helpful.
- Trucks are currently parked on the movement roadways, creating traffic bottlenecks, due to a lack of designated parking spaces and service lanes. To ensure smooth freight transportation into and out of the inner harbour region and port operation area, this needs to be solved.

6.2 Zone -2 (Outer Harbour)

Activities related to port operations at the outer harbour area and other activities at the fishing harbour are included in this zone. Cargo is moved out of this zone via trucks, trains, and conveyor belt systems, much like it is in this Outer harbour region.

Figure 6-4 Existing Land Use of Zone-2

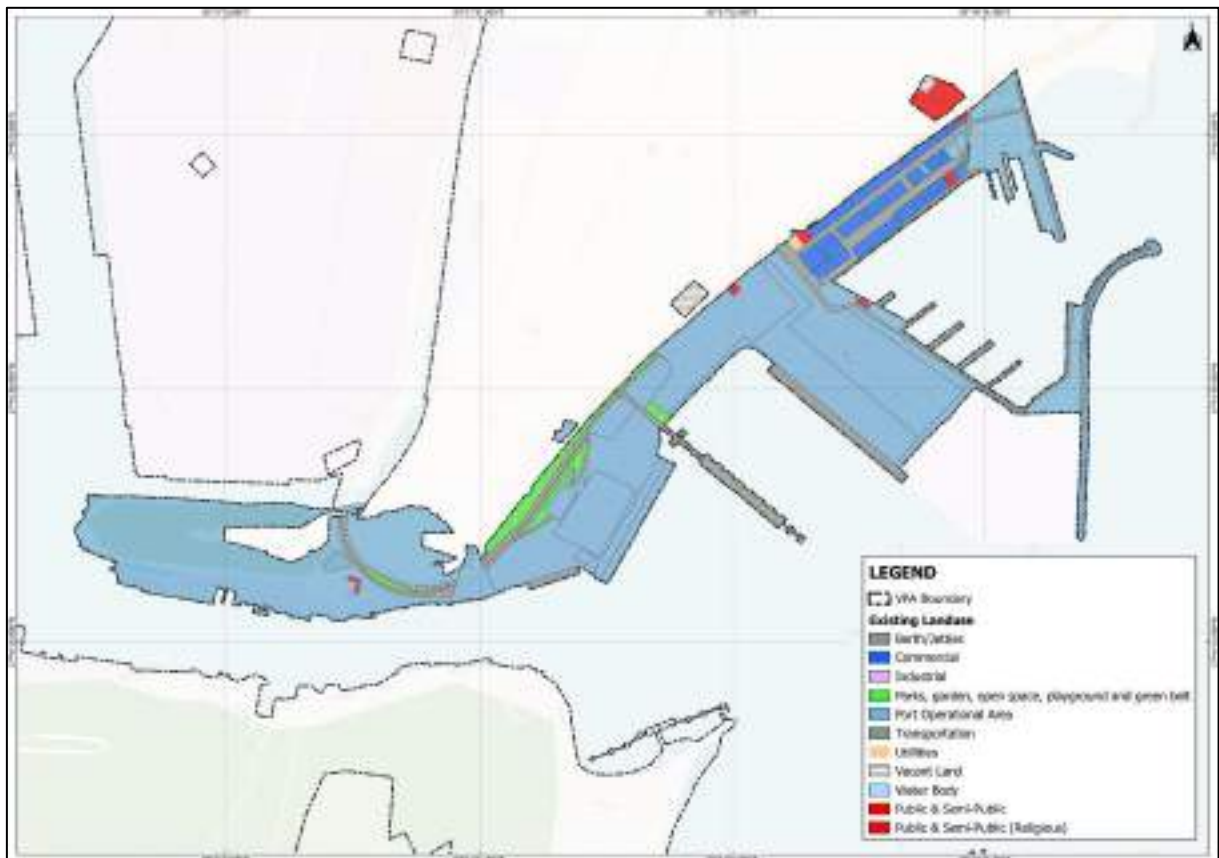


Table 6-6: Existing land Utilisation of Zone 2

Category	Outer Harbour
	Zone 2
Leased Land	92.45
Licensed Land (Open Stack area)	1.19
Vacant Land (Vacant + Proposed for various activities + Reclaimed Land)	1.376
Other Lands (Residential, Public-Semi-Public, Transportation, Infrastructure, Utilities, Water bodies, Hills)	197.1
Total	242.8

Source: Visakhapatnam Port Authority

Table 6-7: Existing land Use of Zone 2

Category	Outer Harbour
	Zone 2
Berth/Jetties	9.406
Port Operational Area	183.236
Industrial	-
Commercial	10.472
Residential	-
Mixed Use	-
Defence Area	-
Transportation	15.741
Logistics	-
Utilities	0.272
Vacant Land	1.376
Geddas/ Water bodies/ Canal	14.3
Hills	-
Parks, Garden, Open space and green belt	5.043
Public & Semi-Public	2.882
PSP(Educational)	-
PSP(Health)	-
PSP(Recreational)	-
PSP(Religious)	0.154
Total	242.8

- As per the existing Land use table, approximate 93 acres of land is given on lease basis in the outer harbour area.
- The market and fishing harbour don't have scheduled events. here are still activities and events that can happen in a fishing harbour, even if they are not formally scheduled that are fishing seasons, dock side activities, community gatherings, while these events may not be as predictable or structured as scheduled events in other venues, they still contribute to the dynamic and working nature of a fishing harbour.
- Goods vehicles were parked on the side of the road, causing traffic problems for other cars, and the carriageway's current width is less than what is needed.
- A few other notable industrial players are VCTPL, BPCL, HPCL, and others. The primary uses of land are industrial and storage.

- Due to heavy traffic, there are certain pollution-related problems in the residential neighbourhood right after the fishing harbour and outer harbour.

6.3 Zone 3

Activities related to Industrial & port operational and green area is included in this zone.

Figure 6-5 Existing Land Use of Zone-3

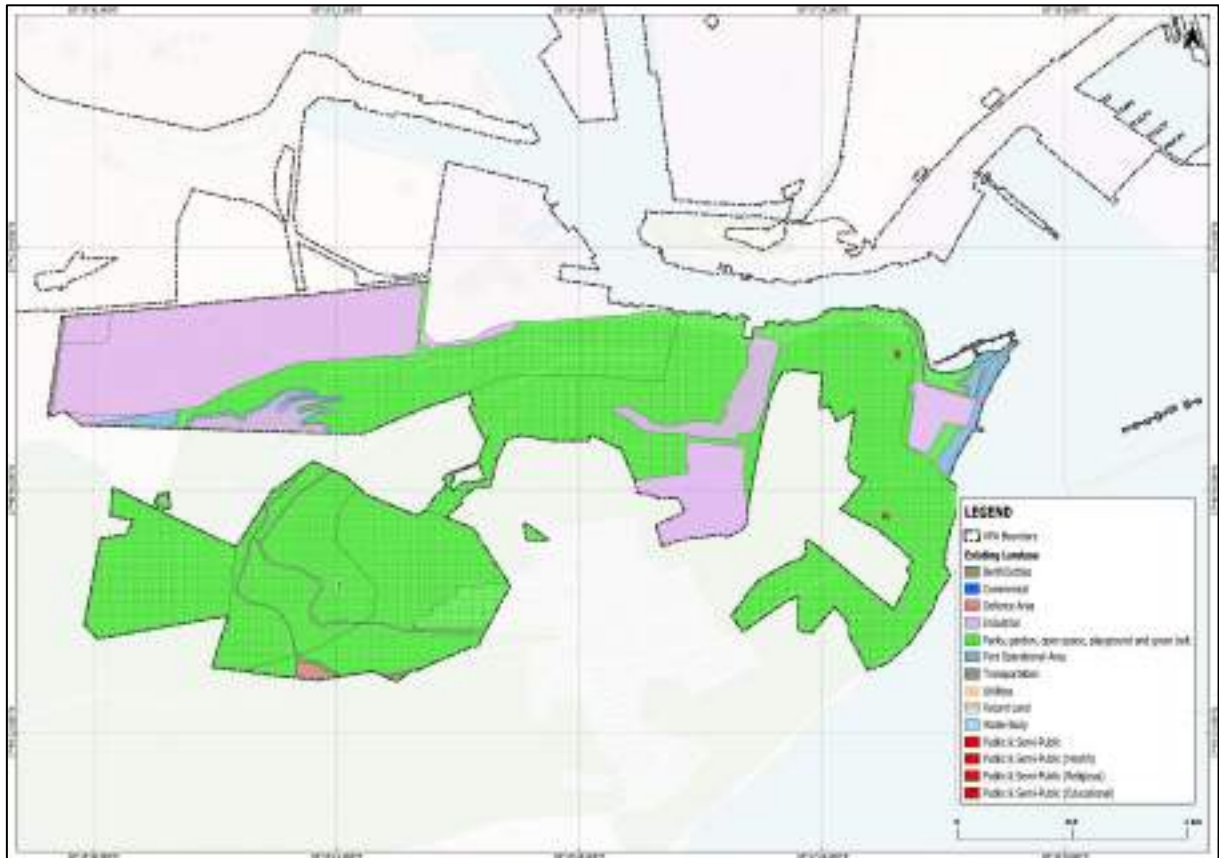


Table 6-8: Existing land Utilisation of Zone 3

Category	Hilly Areas
	Zone 3
Leased Land	231.28
Licensed Land (Open Stack area)	0.142
Vacant Land (Vacant + Proposed for various activities + Reclaimed Land)	0.014
Other Lands (Residential, Public-Semi-Public, Transportation, Infrastructure, Utilities, Water bodies, Hills)	753.9
Total	985.38

Source: Visakhapatnam Port Authority

Table 6-9: Existing land Use of Zone 3

Category	Hilly Areas
	Zone 3
Berth/Jetties	1.648
Port Operational Area	21.843
Industrial	241.8
Commercial	0.101
Residential	-

Mixed Use	-
Defence Area	2.424
Transportation	8.98
Logistics	-
Utilities	-
Vacant Land	0.014
Geddas/ Water bodies/ Canal	-
Hills	-
Parks, Garden, Open space and green belt	708.179
Public & Semi-Public	-
PSP(Educational)	-
PSP(Health)	-
PSP(Recreational)	-
PSP(Religious)	0.377
Total	985.38

- About 70% of the zone's total area is covered by hills and vegetation, 25% is allotted for lease that is 232 acres, and the remaining 5% is made up of built-up area and infrastructure. The main industrial companies in this area include HPCL, Hindustan Shipyard Ltd., IOCL, ISPRL, and a few more.
- Approach roads, pipelines, staff colonies, substations, storage, and yards are the supportive/dependent land use for these leasing areas.
- The hill area has restricted access, and the carriageway that currently exists is narrow.
- The Navy has built few residential units in the hill area.

6.4 Zone 4 & 5

Zones 4 and 5, which are located outside of the port operation area, are primarily used for industrial purposes.

Figure 6-6 Existing Land Use of Zone-4

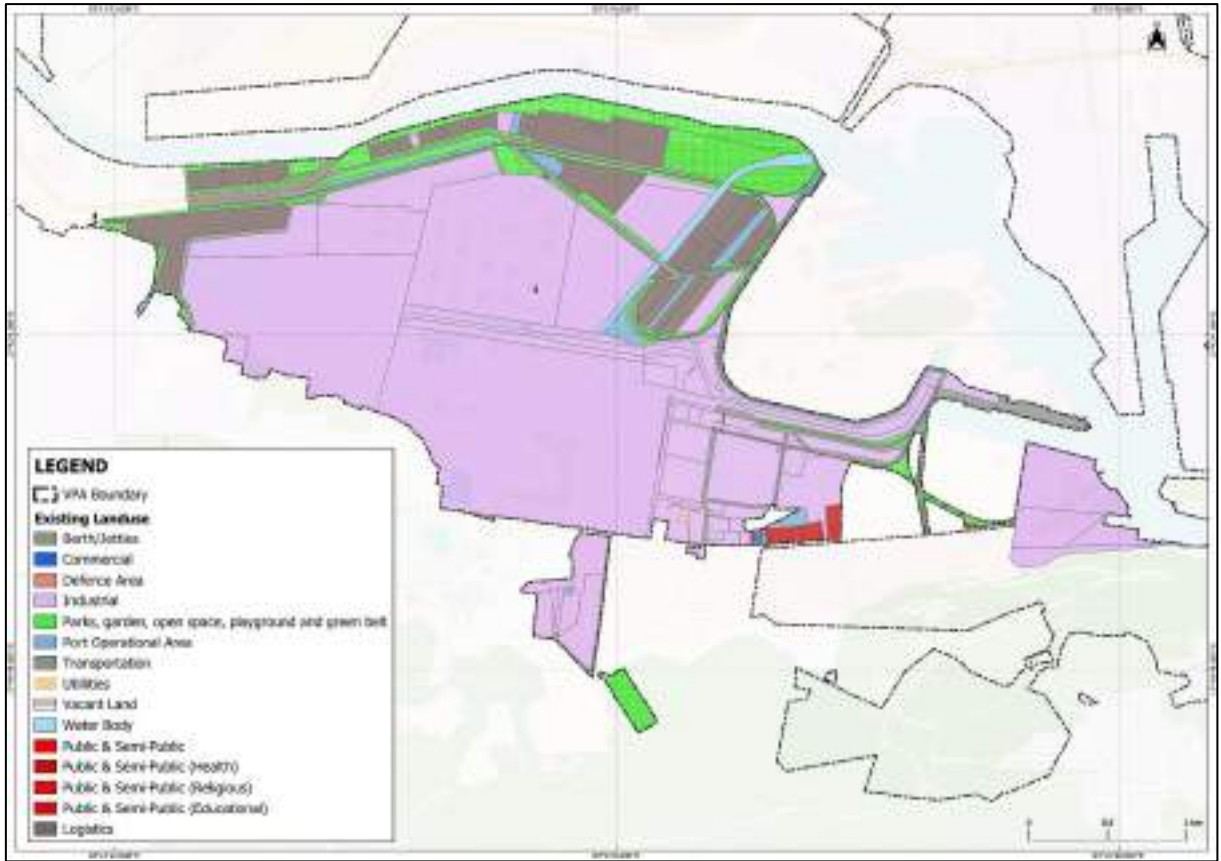


Figure 6-7 Existing Land Use of Zone-5

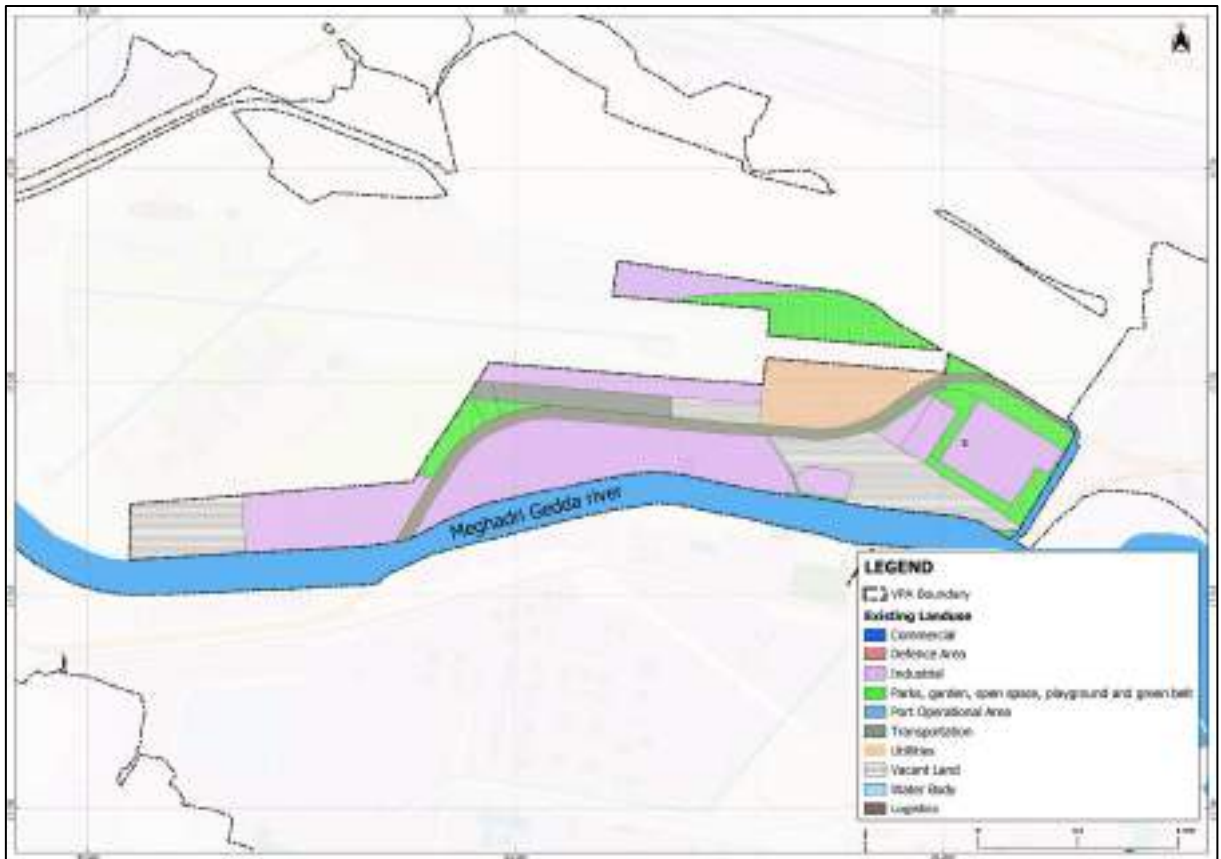


Table 6-10: Existing land Utilisation of Zone 4 & 5

Category	Industrial Areas	
	Zone 4	Zone 5
Leased Land	2345.6	168.51
Licensed Land (Open Stack area)	0.4	
Vacant Land (Vacant + Proposed for various activities + Reclaimed Land)	0.102	113.974
Other Lands (Residential, Public-Semi-Public, Transportation, Infrastructure, Utilities, Water bodies, Hills)	113.6	391.4
Total	2459.69	673.92
<i>Source: Visakhapatnam Port Authority</i>		

Table 6-11: Existing land Use of Zone 4 & 5

Category	Industrial Areas	
	Zone 4	Zone 5
Berth/Jetties	18.287	-
Port Operational Area	47.829	-
Industrial	1726.356	323.751
Commercial	2.27	-
Residential	-	-
Mixed Use	-	-
Defence Area	-	-
Transportation	132.18	75.908
Logistics	239.197	-
Utilities	2.961	54.866
Vacant Land	0.102	113.974
Geddas/ Water bodies/ Canal	25.259	-
Hills	-	-
Parks, Garden, Open space and green belt	249.08	105.422
Public & Semi-Public	0.801	-
PSP(Educational)	5.034	-
PSP(Health)	10.148	-
PSP(Recreational)	-	-
PSP(Religious)	0.183	-
Total	2459.69	673.92

- Approximately 2500 acres of the land in this zone is allotted for lease to support a range of industrially driven enterprises.
- APCL, BPCL, Balmer Lawrie & Co., VCTPL, C.F.L., Navy, EIPL, GAIL, HPCL, Hindustan Shipyard Ltd., Essar, IOCL, NHAI, VSPL, and a few other significant firms in the industry.
- There are about 115 acres of proposed or vacant land in this zone due to high restrictions imposed by INS Dega and also due to low lying area.
- Approximately 350 acres of the land are covered in vegetation, primarily in the Meghadri River area.
- There is a Solar Park in Zone 5 in 22 ha land.

6.5 Zone 6

Figure 6-8 Existing Land Use of Zone-6

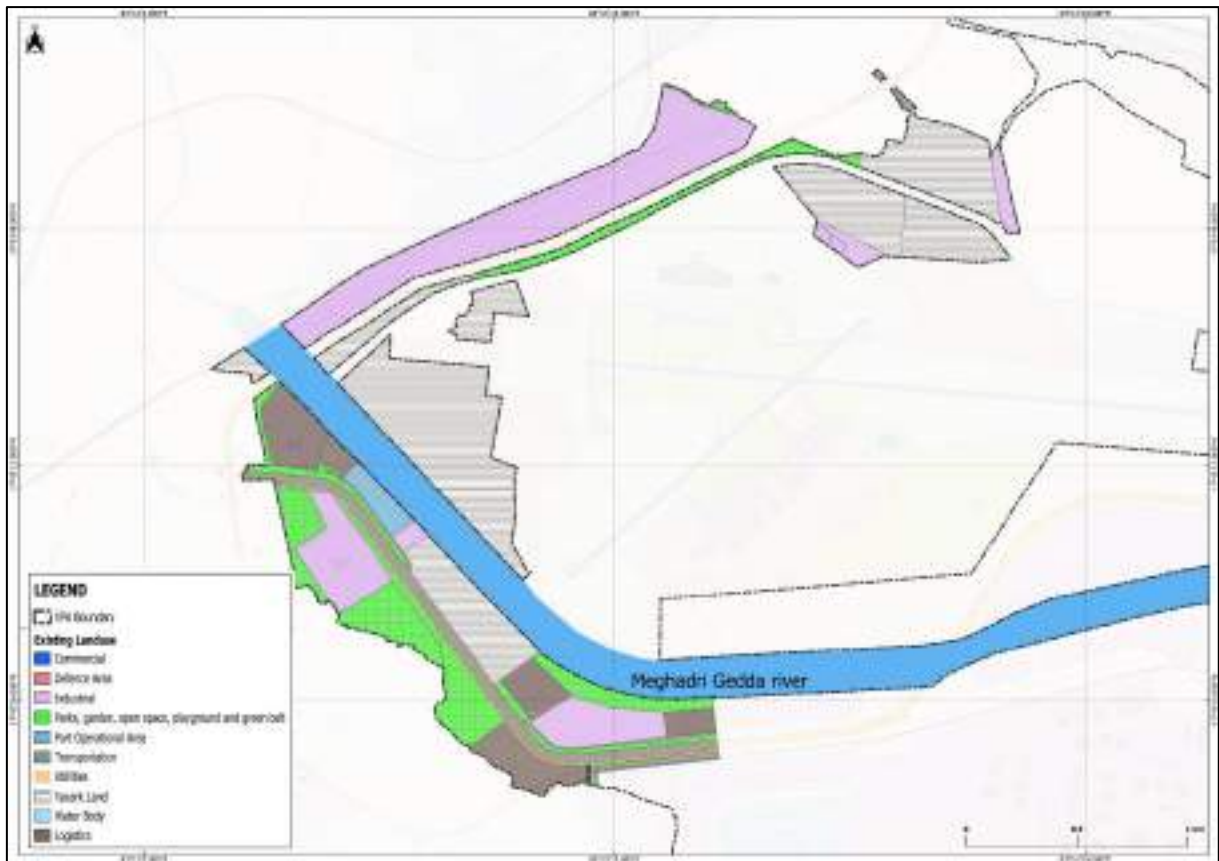


Table 6-12: Existing Land Utilisation of Zone 6

Category	Near NH Zone 6
Leased Land	209.87
Licensed Land (Open Stack area)	
Vacant Land (Vacant + Proposed for various activities + Reclaimed Land)	265.558
Other Lands (Residential, Public-Semi-Public, Transportation, Infrastructure, Utilities, Water bodies, Hills)	204.8
Total	680.24
<i>Source: Visakhapatnam Port Authority</i>	

Table 6-13: Existing Land Use of Zone 6

Category	Near NH Zone 6
Berth/Jetties	-
Port Operational Area	10.147
Industrial	184.393
Commercial	0.051
Residential	-
Mixed Use	-
Defence Area	-
Transportation	45.929
Logistics	61.037
Utilities	5.683

Vacant Land	265.558
Geddas/ Water bodies/ Canal	-
Hills	-
Parks, Garden, Open space and green belt	107.441
Public & Semi-Public	-
PSP(Educational)	-
PSP(Health)	-
PSP(Recreational)	-
PSP(Religious)	-
Total	680.24

- Approximately 210 acres of the zone's total area are leased for a variety of industrial uses, including aviation tanks, container freight stations, pipeline construction, truck parking, and other commercial operations.
- CONCOR, Navy, B.P.C.L. Aviation, HPCL Aviation, Gateway East India Pvt. Ltd., GAIL, NHAI, and a few other companies are significant industrial players.
- The majority of the leased land falls along NH.
- Because this leased site and an additional 267 acres of proposed or vacant land border the airport, only specific activities are permitted there, and development height is also restricted.

6.6 Zone 7

Figure 6-9 Existing Land Use of Zone-7

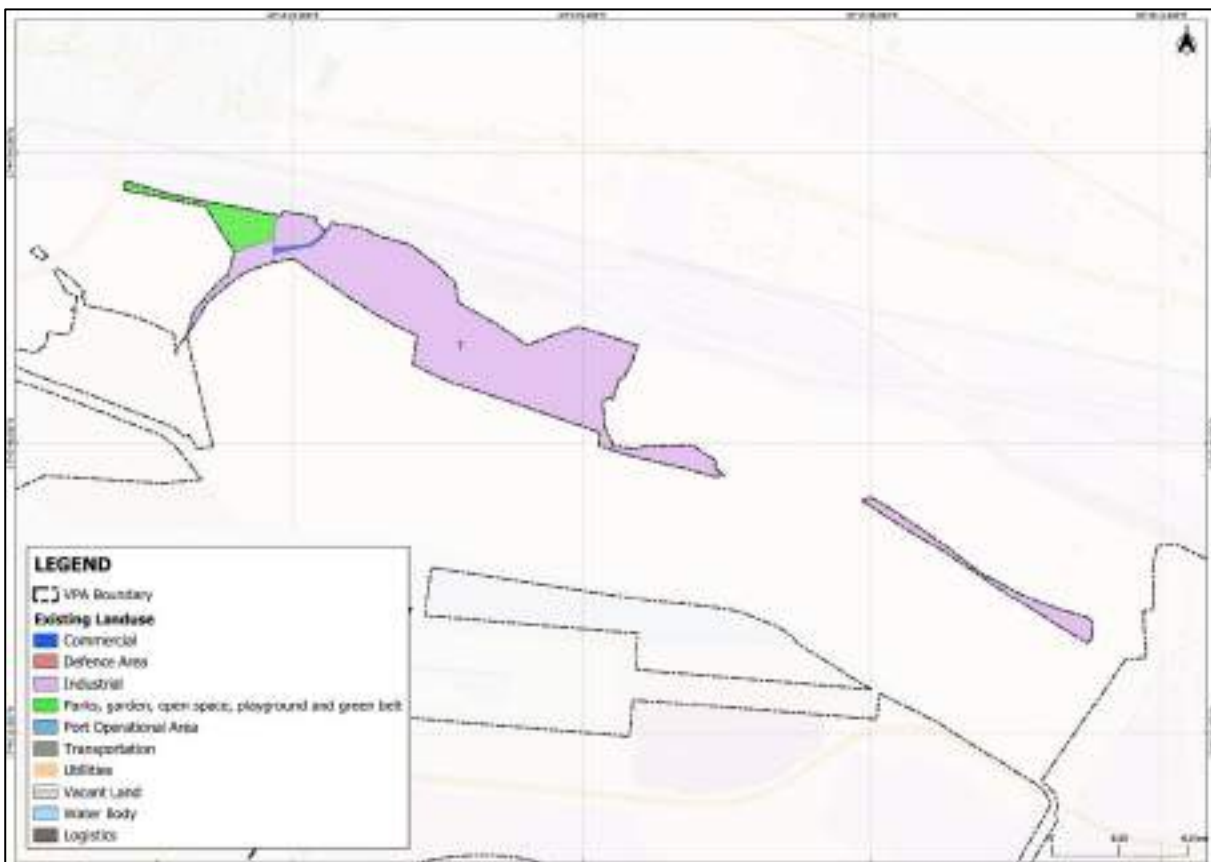


Table 6-14: Existing land Utilisation of Zone 7

Category	Near NH
	Zone 7
Leased Land	2.54
Licensed Land (Open Stack area)	
Vacant Land (Vacant + Proposed for various activities + Reclaimed Land)	
Other Lands (Residential, Public-Semi-Public, Transportation, Infrastructure, Utilities, Water bodies, Hills)	119.5
Total	122.04
<i>Source: Visakhapatnam Port Authority</i>	

Table 6-15: Existing land Use of Zone 7

Category	Near NH
	Zone 7
Berth/Jetties	-
Port Operational Area	-
Industrial	112.011
Commercial	0.804
Residential	-
Mixed Use	-
Defence Area	-
Transportation	-
Logistics	-
Utilities	-
Vacant Land	-
Geddas/ Water bodies/ Canal	-
Hills	-
Parks, Garden, Open space and green belt	9.225
Public & Semi-Public	-
PSP(Educational)	-
PSP(Health)	-
PSP(Recreational)	-
PSP(Religious)	-
Total	122.04

- The Navy has been granted a lease for the majority of the land in this zone for industrial purposes. This area is close to the NH route.

6.7 Zone 8 & 9 (Residential Zone)

Figure 6-10 Existing Land Use of Zone-8

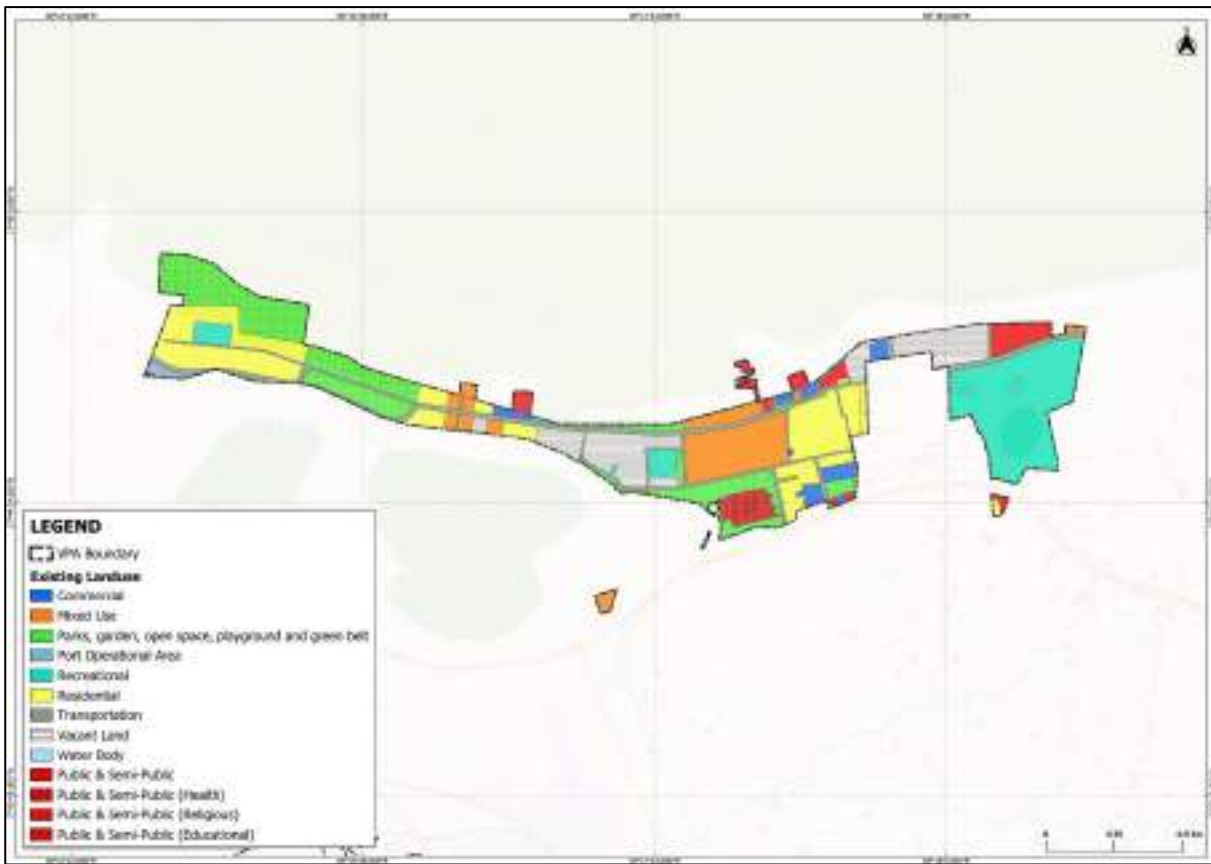


Table 6-16: Existing land Utilisation of Zone 8 & 9

Category	Residential area	
	Zone 8	Zone 9
Leased Land	49.36	2.47
Licensed Land (Open Stack area)	0.12	
Vacant Land (Vacant + Proposed for various activities + Reclaimed Land)	28.484	0.795
Other Lands(Residential,Public-Semi-Public,Transportation,Infrastucture,Utilities,Water bodies, Hills)	169.8	24.8
Total	247.72	28.03

Source: Visakhapatnam Port Authority

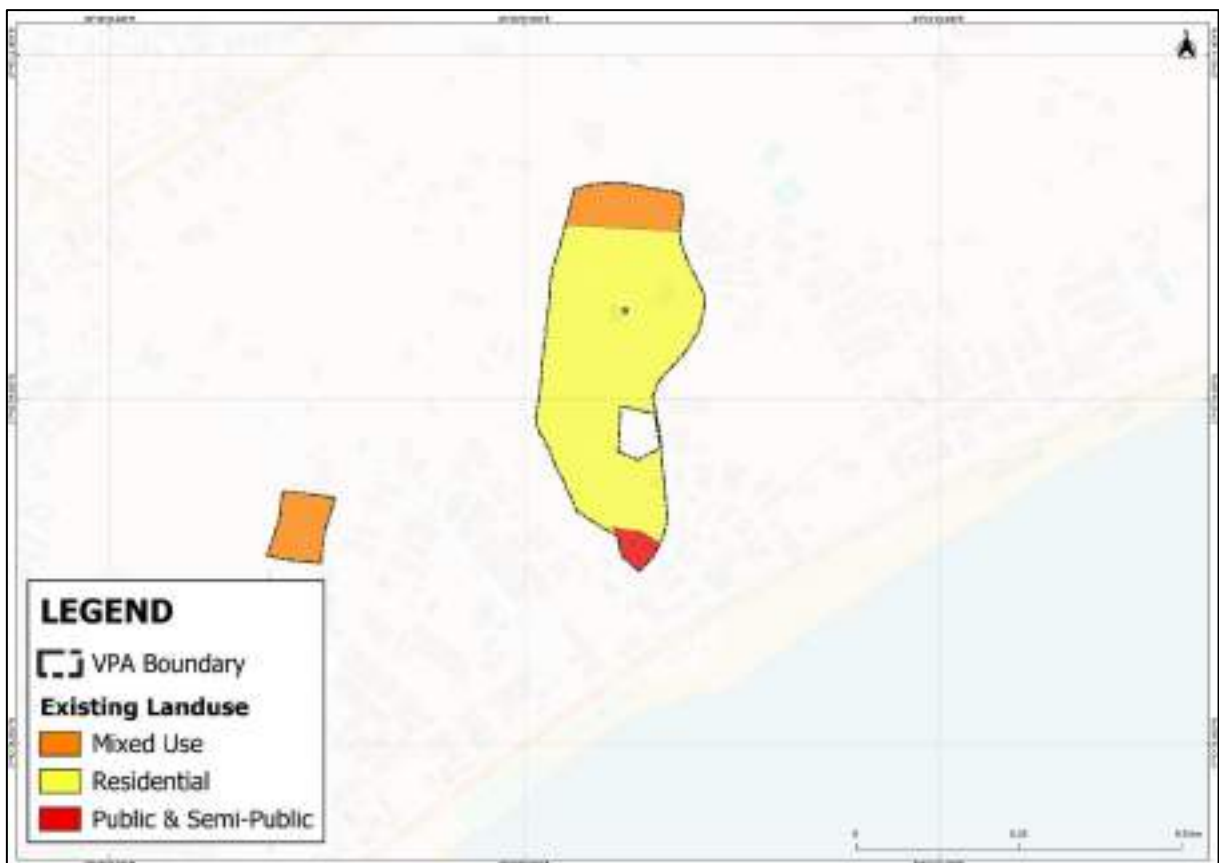
Table 6-17: Existing land Use of Zone 8 & 9

Category	Residential area	
	Zone 8	Zone 9
Berth/Jetties	-	-
Port Operational Area	1.436	-
Industrial	-	-
Commercial	6.51	-
Residential	49.93	21.577
Mixed Use	26.195	4.926
Defence Area	-	-
Transportation	22.608	-
Logistics	-	-
Utilities	-	-

Vacant Land	28.484	0.795
Geddas/ Water bodies/ Canal	0.146	-
Hills	-	-
Parks, Garden, Open space and green belt	49.706	-
Public & Semi-Public	8.144	0.726
PSP(Educational)	0.282	-
PSP(Health)	5.289	-
PSP(Recreational)	45.885	-
PSP(Religious)	3.108	-
Total	247.72	28.03

- Zone 8 contains approximately 52 acres of land that is leased for residential, commercial, and institutional uses.
- The majority of the land is leased for a minimum of the next ten years.

Figure 6-11 Existing Land Use of Zone-9



The Visakhapatnam Port Authority (VPA) has residential quarters for employees and officers. The VPA also has other residential quarters, including Harbor Park Port Guesthouse, Horticulture cum Holiday Home Port Guest House, and Trade Promotion Office cum Guesthouse and Land at Zone 9 is residential quarters.

Figure 6-12 Images of Residential Zone of Zone-8&9





6.8 Zone 10 & 11

The distance between the Mulakuddu area and the VPA port area is about 30 km. The Gosthani River runs through this location, and the land is low-lying. This site encompasses 292.90 Ac in total. The surrounding area has thick foliage covering it, and access from the main road is restricted.

Figure 6-13 Images of Zone-10&11

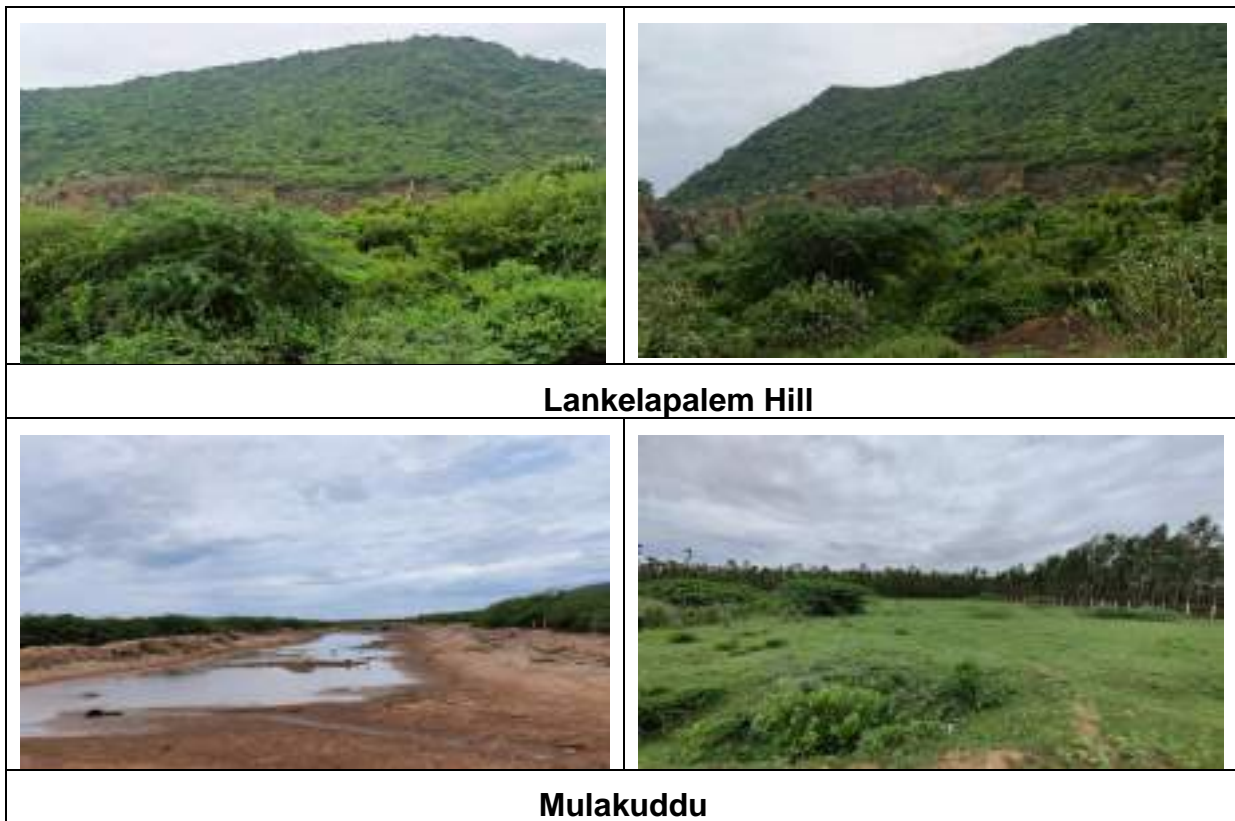


Figure 6-14 Existing Land Use of Zone-10

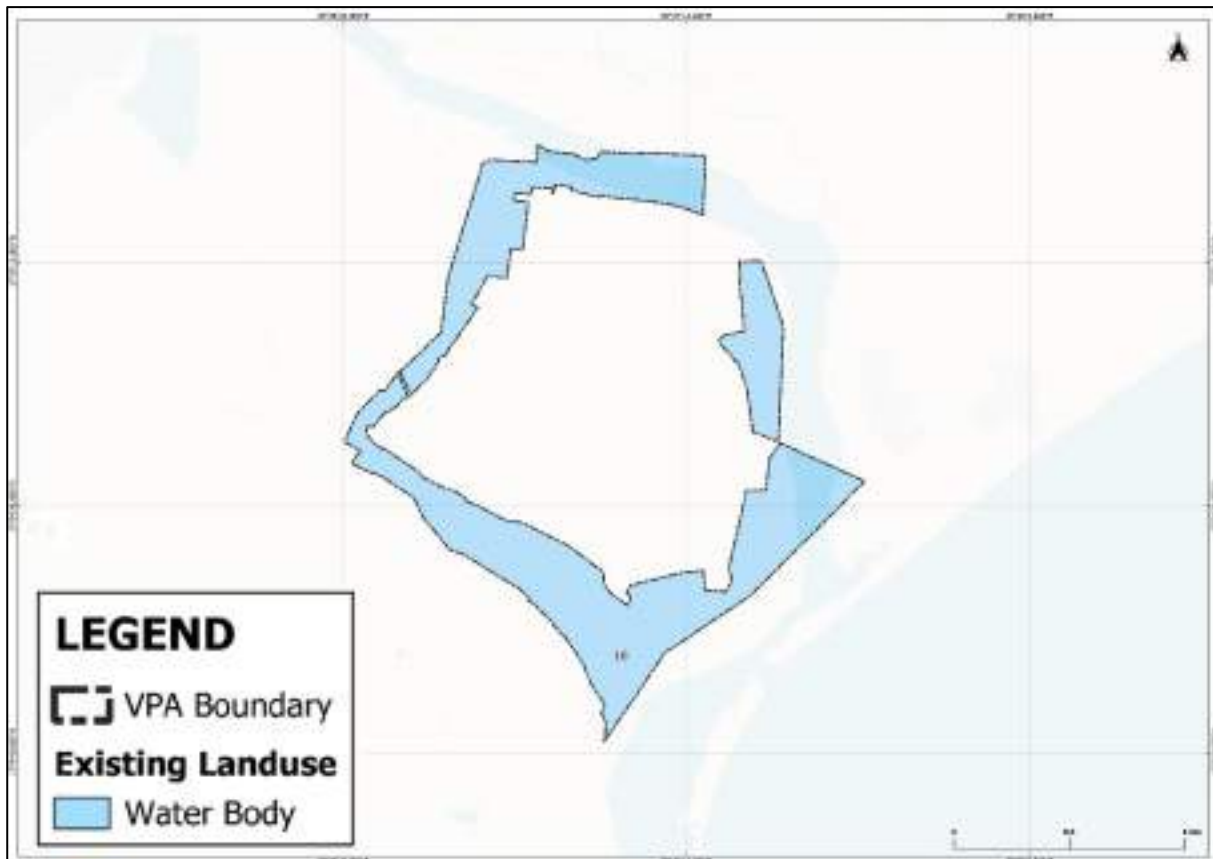


Table 6-18: Existing land Utilisation of Zone 10 & 11

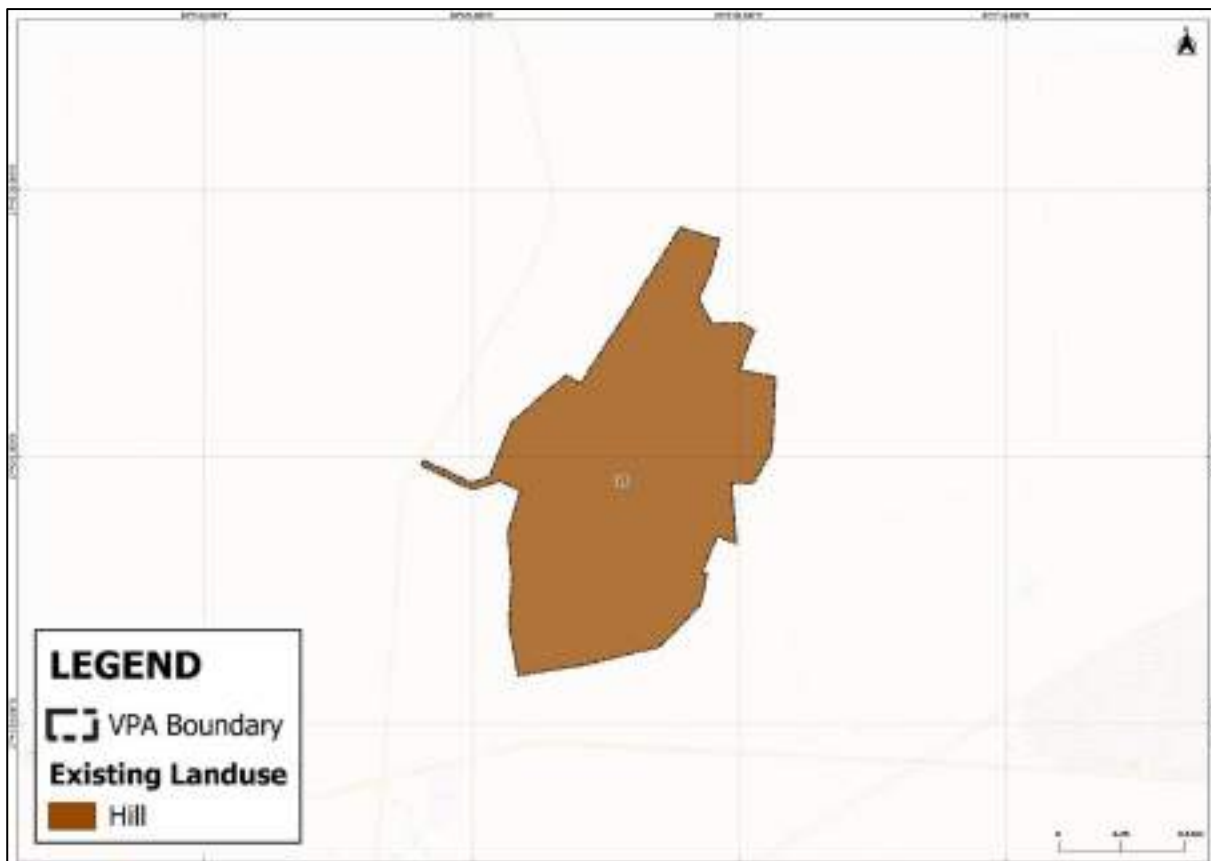
Category	Outside Port Area	
	Zone 10	Zone 11
Leased Land		
Licensed Land (Open Stack area)		
Vacant Land (Vacant + Proposed for various activities + Reclaimed Land)		
Other Lands (Residential, Public-Semi-Public, Transportation, Infrastructure, Utilities, Water bodies, Hills)	292.9	306.9
Total	292.9	306.88

Source: Visakhapatnam Port Authority

Table 6-19: Existing land Use of Zone 10 & 11

Category	Outside Port Area	
	Zone 10	Zone 11
Berth/Jetties	-	-
Port Operational Area	-	-
Industrial	-	-
Commercial	-	-
Residential	-	-
Mixed Use	-	-
Defence Area	-	-
Transportation	-	-
Logistics	-	-
Utilities	-	-
Vacant Land	-	-
Geddass/ Water bodies/ Canal	292.901	-
Hills	-	306.884
Parks, Garden, Open space and green belt	-	-
Public & Semi-Public	-	-
PSP(Educational)	-	-
PSP(Health)	-	-
PSP(Recreational)	-	-
PSP(Religious)	-	-
Total	292.9	306.88

Figure 6-15 Existing Land Use of Zone-11



The hilly region of Lankelapalem is roughly 306.88 Ac. The distance between this location and the port area is about 30 km. There are hills with high slopes and no flat spots or land available at the base.

6.9 Land Lease Details of VPA

The Visakhapatnam Port Authority has plans to lease land for commercial development under the PPP model. The land will be leased to real estate developers for the construction of shopping malls or office blocks etc.

Table 6-20: Land Information of Visakhapatnam Port Authority

Category	Inner Harbour		Outer Harbour	Hilly Areas	Industrial Areas		Near NH	Near NH	Residential area		Outside Port Area		Total Area
	Z-1A	Z-1B			Z-2	Z-3			Z-4	Z-5	Z-6	Z-7	
Leased Land	489	2.2	92.4	231.2	2345.6	168.51	209.87	2.54	49.36	2.4			3594
Licensed Land (Open Stack area)	6.8	0.05	1.1	0.142	0.4				0.12				8.7
Vacant Land (Vacant + Proposed for various activities + Reclaimed Land)	6.7		1.3	0.014	0.10	113.9	265.5		28.4	0.8			417
Other Lands (Residential, Public-Semi-Public, Transportation,	951	170.7	98.5	754	113.6	391.4	204.8	119.5	170	24	292.9	306.9	3597.6

Infrastructure, Utilities, Water bodies, Hills)														
	503	2.3	95.0	231.4	2346.1	282.5	475.4	2.5	78	3.3	0.0	0.0	4020	
Total	1454	173	193.5	985.3	2459.6	673.92	680.24	122.04	247	28.03	292.9	306.8	7618	

Source: Visakhapatnam Port Authority

Table 6-21: Zone wise Land Lease details in Hectares

Category	Inner Harbour		Outer Harbour	Hilly Areas	Industrial Areas		Near NH	Near NH	Residential area		Outside Port Area		Total Area
	Z-1A	Z-1B	Z-2	Z-3	Z-4	Z-5	Z-6	Z-7	Z-8	Z-9	Z-10	Z-11	
Leased Land	489.98	2.2	92.45	231.28	2345.6	168.51	209.87	2.54	49.36	2.47			3594.3

Source: Visakhapatnam Port Authority

Table 6-22: Land Lease Details

Sl. No	Details
1	M/s. Visakha Container Terminal Pvt. Ltd (VCTPL) — Container Terminal (Acr. 40.50 cents) License Agreement signed on: 11-09-2002 License Period: 30 Years from Date of Agreement Signed. License expiring in 2032
2	M/s. Vizag Seaport Pvt. Ltd (VSPL) — EQ-8 & EQ-9 (Acr. 24.189 cents) License Agreement signed on: 27-11-2001 License Period: 30 Years from Date Of Agreement Signed License expiring in 2031
3	M/S. Vizag General Cargo Berth Pvt. Ltd (VGCBPL) — GCB (Acr. 45.28 cents) License Agreement signed on: 10-06-2010 License Period: 30 Years from Date of Agreement Signed License expiring in 2040
4	M/s. AVR Infra Pvt. Ltd (AVRIPL) — EQ-10 (Acr. 6.94 cents) License Agreement signed on: 16-08-2010 License Period: 30 Years from Date of Agreement Signed License expiring in 2040
5	M/s. Essar Vizag Terminals Ltd (EVTL) — OB-I & OB-II (Acr. 98.05 cents) License Agreement signed on: 13-12-2013 License Period: 30 Years from Date of Agreement Signed License expiring in 2043
6	M/s. Visakha Container Terminal Pvt. Ltd — Extension container Terminal (Acr. 44.56 cents) License Agreement signed on: 17-12-2014 License Period: 30 Years from Date of Agreement Signed License expiring in 2044

6.10 Land License Details of VPA

Table 6-23: Land License Details of VPA

Category	Inner Harbour	Outer Harbour	Hilly Areas	Industrial Areas	Near NH	Near NH	Residential area	Outside Port Area
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	Z-1A	Z-1B	Z-2	Z-3	Z-4	Z-5	Z-6	Z-7	Z-8	Z-9	Z-10	Z-11
Licensed Land (Open Stack area)	11 1.9	27. 3	0	0	12. 8	0	4.1	0	0	0	0	0

Source: Visakhapatnam port Authority

6.11 Vacant Lands of VPA

The Visakhapatnam Port Authority (VPA) has vacant land, including land in Lankelapalem (Hill) and Mulakuddu villages. Lankelapalem is about 40 km from the port, on the road to Anakapalli, while Mulakuddu village is near Bheemunipatnam, on the beach road. The VPA has opportunities to develop warehouses, multi-modal logistic parks, and shopping malls in Salagrama Puram.

Figure 6-16 Vacant lands of Visakhapatnam Port Authority

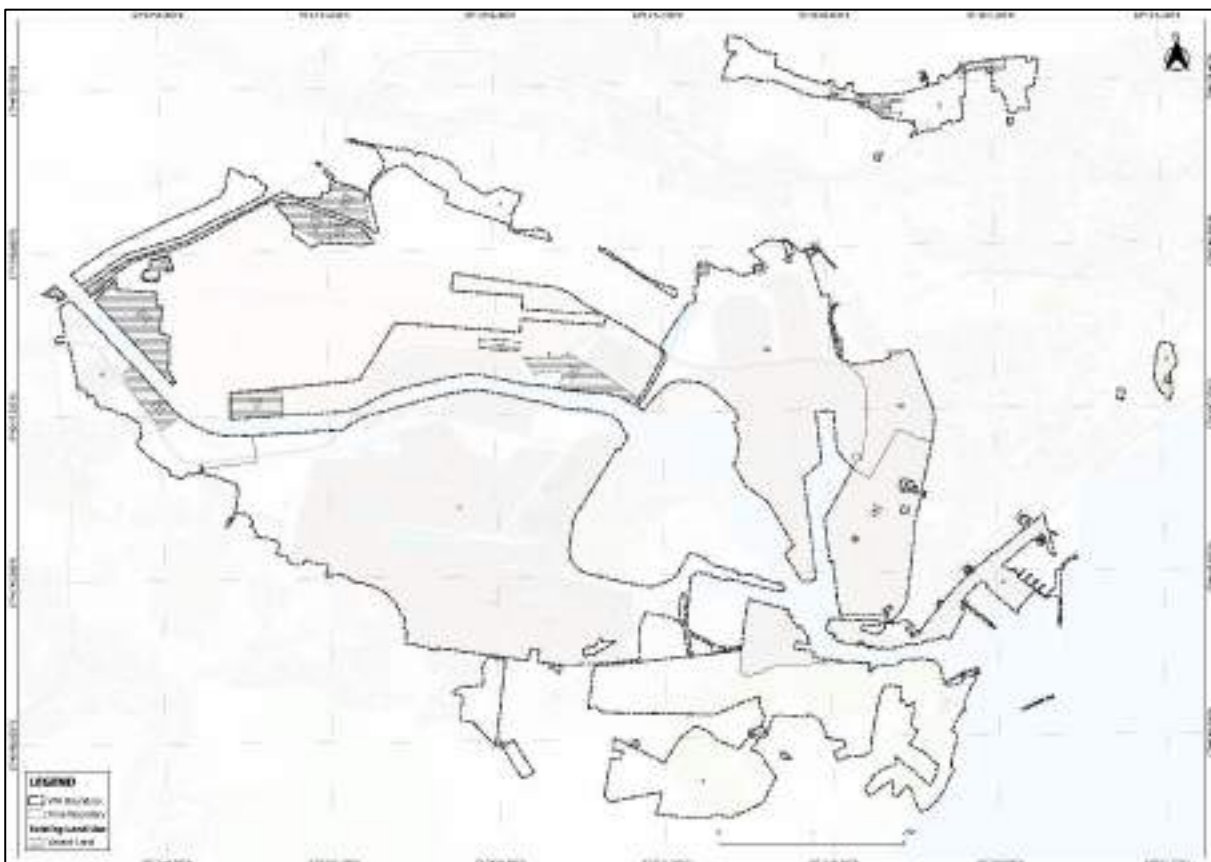


Table 6-24: Vacant land details of Port area

Sl.No	Details of land	Extent of land in acres	Status	Purpose	Category
1	SW Corner of CISF Complex in SG Puram	0.06	Tenders Opened E-auction to be Conducted	Water Servicing station	Non-Port Related activity
2	Near Venkateshwara temple SG Puram	1.73	Technical bids Opened Under evaluation	Construction yard	Non-Port Related activity
3	West of land leased to APEPDCL on north	0.02	In process, technical bids		Non-Port Related activity

	of sports complex in SG Puram		opened on 07-12-2023		
4	Near DLB Playground in SG Puram	3.59	Bids opening on 22.02.2024		Non-Port Related activity
5	West side of land leased to Andaman & Nicobar in SG Puram	2.10	Bids opening on 29.02.2024		Non-Port Related activity
6	Behind sports complex in SG Puram	9.60	Bids opening on 06.03.2024		Non-Port Related activity
7	at DLB Shopping Complex in SG Puram	0.40	Bids opening on 07.03.2024		Non-Port Related activity
8	At old DLB dispensary complex	0.40	Bids opening on 08.03.2024		Non-Port Related activity
9	At west of Trion properties plot	10.50	Bids opening on 14.03.2024		Non-Port Related activity
10	North of GJH	2.70	In Process Pre acceptance letter issued to M/s TGS Minmet PVT Ltd on 15-03-2023	Amount yet to be paid and to be Handed over	Non-Port Related activity
11	North of CISF Complex	19.50	No Response and to be re tendered		Non-Port Related activity
12	On the North side of stadium	5.20	Drooped in view of port developmental activities		
	Total	55.8			

7 TRAFFIC & TRANSPORTATION

7.1 Region and Surrounding Developments and its Connectivity

The presence of a port fosters the development of industries in the hinterland, primarily due to the reduction in logistical costs. Simultaneously, surrounding industrial and mining activities contribute to an increase in port traffic, with both phenomena mutually influencing each other. The efficient performance of a port hinges largely on its infrastructure for cargo delivery and evacuation. Consequently, connectivity emerges as a crucial element for the sustenance of the port.

The primary hinterland of Vishakhapatnam port encompasses the immediate geographical vicinity within a 300 km radius of Vishakhapatnam. This area predominantly comprises Northern Andhra Pradesh, Southern Odisha, and Southern Chhattisgarh, exerting significant influence on cargo generation.

Expanding beyond the primary hinterland, the secondary hinterland includes central Odisha, Chhattisgarh, Telangana, and the remainder of Andhra Pradesh. Further extending its reach, the tertiary hinterland encompasses regions beyond the secondary hinterland, such as the southern part of Andhra Pradesh and states lying beyond Vishakhapatnam port's secondary hinterland, including West Bengal, Tamil Nadu, Maharashtra, and others. The primary, secondary and tertiary hinterland areas are shown in **Figure 7-1**.



Figure 7-1: Hinterland of Vishakhapatnam Port

Source: VPA Master Plan - 2023

Rich in mineral resources such as iron ore, limestone, coal, and bauxite presence in the secondary hinterland has facilitated the establishment of numerous mineral-based industries like steel plants, fertilizer plants, alumina, and cement plants within the primary hinterland of the port. VPA maintains robust connectivity with its hinterland through air, rail, and road networks.

The port is surrounded by numerous major industries, including M/s RINL, SAIL, NALCO, NMDC, MMTC, Hindustan Shipyard, Coromandel Fertilizers, Hindustan Zinc Ltd., RCL, and HPCL, among others, in its vicinity.

Coal and iron ore mines are located in Odisha, Jharkhand, and Chhattisgarh. Currently, the transportation of coal from these mines to power plants primarily relies on railways or coastal shipping. Coal is exported from Paradip and Vishakhapatnam ports via coastal shipping to coal-based thermal power plants located in tertiary influence regions, which are Tamil Nadu Generation and Distribution Co. Ltd. (TANGEDCO) and Maharashtra State Power Generation Company (MAHAGENCO). Additionally, National Thermal Power Corporation (NTPC) is situated in the primary influence region, imports coal through Vishakhapatnam port.

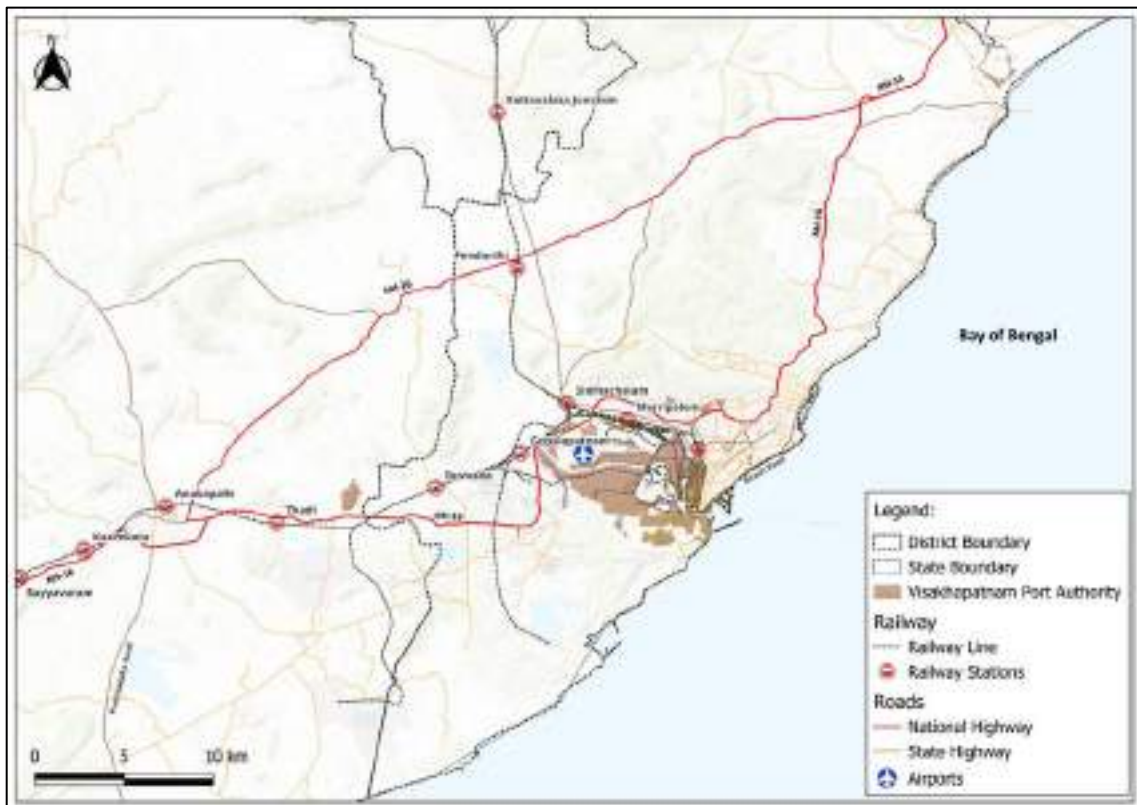


Figure 7-2: Connectivity of the Port

A joint venture between the Port and the National Highways Authority of India (NHAI) has developed a port connection road, named the Port Main Road, through a special purpose entity called Visakhapatnam Port Road Limited. The connectivity of the port is shown in **Figure 7-2**. This road extends from Sheela Nagar junction (NH 16) to Convent junction, providing connectivity to the port and its hinterland by road. Currently the port main road widening is under construction stage, once it completed it will provide a dedicated port vehicle corridor from Sheela Nagar to Convent junction.

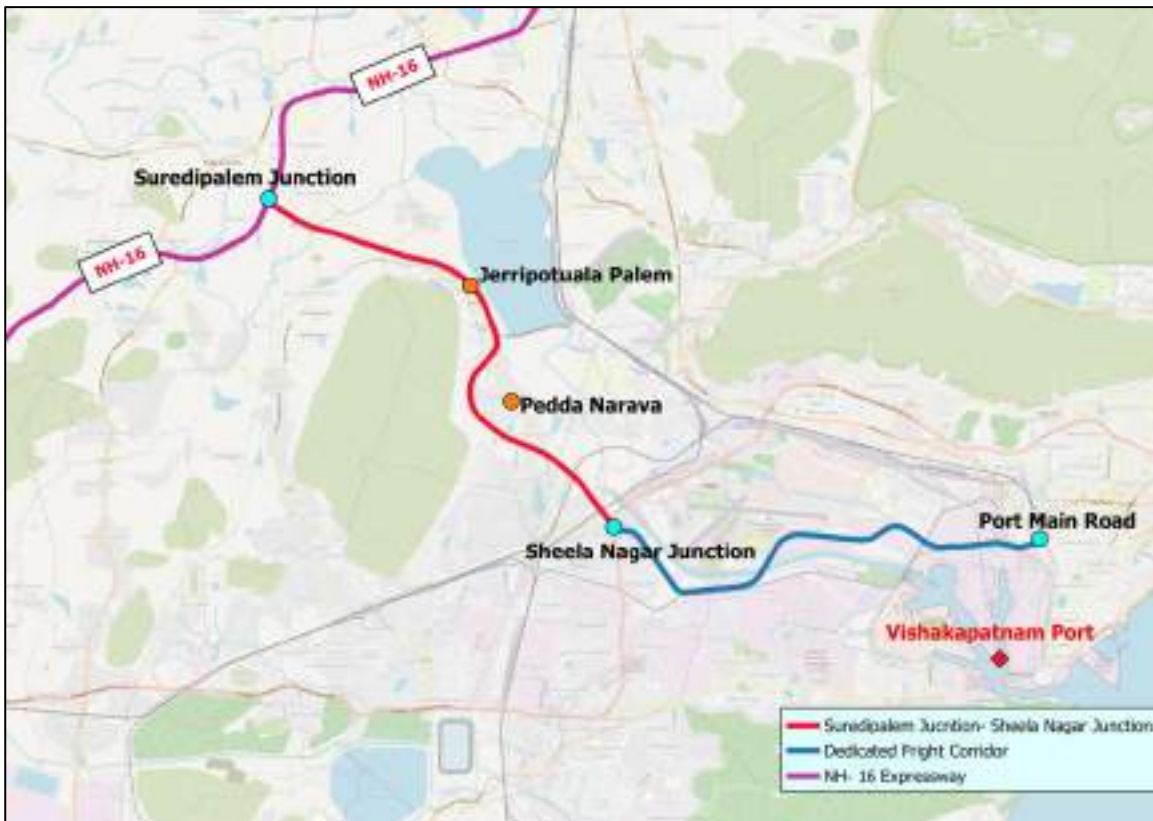


Figure 7-3: Connectivity of the Port from NH-16

Additionally, the NH 16 passing through the city has become a bottleneck due to the steady increase in traffic. As a result, a new link is being developed, the Ministry of Road Transport and Highways has sanctioned Rs 963.93 crore for a six-lane in the month of January 2025¹, access-controlled between Sheela Nagar junction and Sureddipalem (Anakapalli - Anandapuram bypass). The road connection from Sheela Nagar Junction to NH-16 is illustrated in **Figure 7-3**.

The Port also boasts strong connectivity to the Indian railway network, offering direct access to the Chennai-Howrah Main Line on the East Coast through the Waltair Railway Marshalling Yard. This railway line diverges at Kotha Valsa, providing access to the Bailadilla Iron Ore mines in Chhattisgarh. Over the past five years, the modal share of railway transportation has ranged 43% to 46%, underscoring the efficiency of railways in facilitating cargo handling at the port.

The Government of India is actively enhancing logistics through the projects such as the Dedicated Freight Corridor, Economic corridors, Expressways, MMLPs, and freight terminals under schemes like Bharat Mala, Sagarmala, and others. Significant progress has been achieved in developing better infrastructure for transportation and shipping.

Dedicated Freight Corridors near Vishakhapatnam Port

The proposed East Coast Dedicated Freight corridor, stretching 1080 km, traverses through three states of India, namely West Bengal, Orissa, and Andhra Pradesh. It mostly runs parallel to the existing Kharagpur-Vijayawada coastal railway line. It also passes over three zonal railways, namely Southeastern, East Coast, and South-Central Railway. The major

¹ <https://www.constructionworld.in/transport-infrastructure/highways-and-roads-infrastructure/visakhapatnam-s-six-lane-highway-project-to-gain-momentum/67282>

traffic generators which will be contributing to the East Coast Corridor are mines of Coal, Iron ore, Thermal Power Plants, Ports, Fertilizers, POL, CONCOR ICDs, FCI godowns, etc. In addition to the East Coast corridor, the construction of the proposed North-South Corridor between Itarsi in Madhya Pradesh and Vijayawada would also help improve the connectivity of Madhya Pradesh with Vishakhapatnam Port via Vijayawada. Project map of DFCCIL is shown in **Figure 7-4**.



Figure 7-4: Project Map of DFCCIL

Source: <https://dfccil.com/Home/DynamicPages?MenuId=327> (DFCCIL website)

Raipur - Vishakhapatnam Economic Corridor

The Raipur – Vizag Economic Corridor project starts from Abhanpur near Raipur (Chhattisgarh) and ends at Sabbavaram near Vizag (Andhra Pradesh) is shown in **Figure 7-4**. It is being developed under the Bharathmala Pariyojana Phase 1. The highway is a Greenfield alignment will pass through the states of Chhattisgarh (124.611 km), Odisha (262.211 km) and Andhra Pradesh (99.629 km). The development of this project will help to provide better port connectivity with the hinterland of Chhattisgarh, Odisha and Andhra Pradesh.



Figure 7-5: Raipur - Vishakhapatnam Economic Corridor

Chennai - Vishakhapatnam Industrial Corridor

The Vishakhapatnam Chennai Industrial Corridor (VCIC) has been identified to be implemented in the first phase of the East Coast Industrial Corridor, with Vishakhapatnam, Chittor, Koppaerthy, Machilipatnam, and Danakonda being developed as nodes for industrial development. The development of the VCIC Industrial corridor will improve the connectivity of the port with these nodes as they will function as hubs for industrial development and help increase the productivity of industries along this region, which would further increase the volumes that are handled by the port. Chennai – Vishakhapatnam Industrial Corridor as shown in

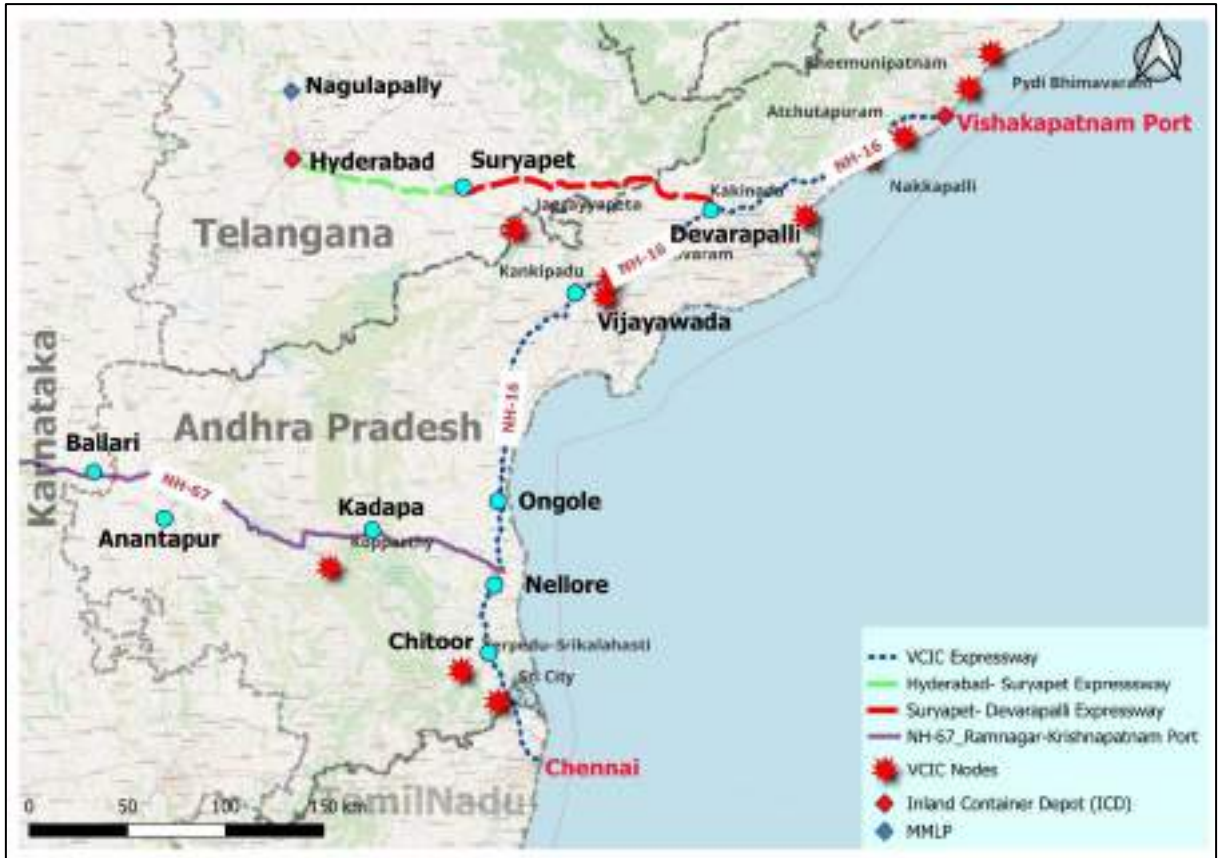


Figure 7-6.

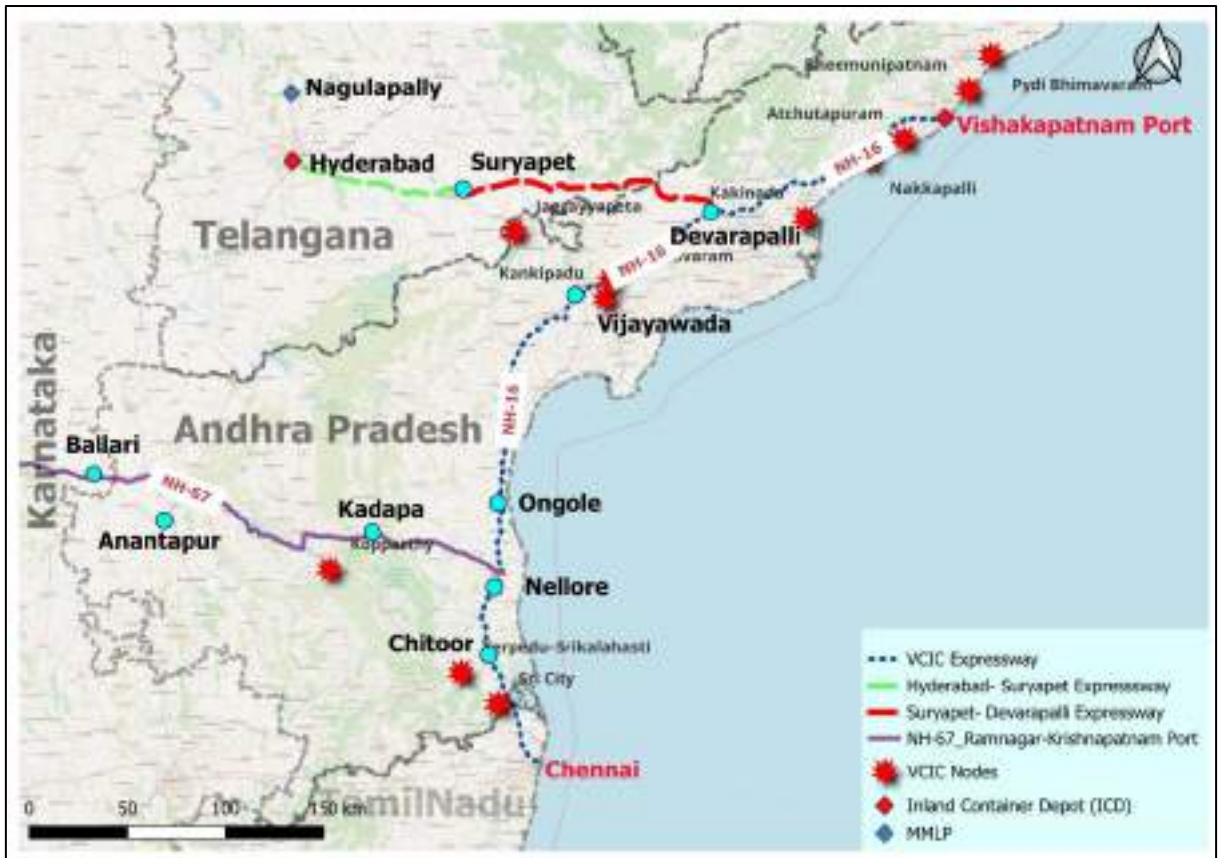


Figure 7-6: Chennai - Vishakhapatnam Industrial Corridor

Hyderabad (Suryapet) Vishakapatnam (Devarpalle) Expressway

The construction of the Suryapet Devarpalle Greenfield expressway, which connects Suryapet in NH 65 near Hyderabad with Devarpalle in NH 16 leading to Vishakapatnam, would improve the road connectivity between Hyderabad and Vishakapatnam and enable efficient movement of freight traffic between the two regions. The road connectivity from Hyderabad (Suryapet) to Vishakhapatnam (Devarapalli) Expressway as shown in Error! Reference source not found.

Inland Container Depots and Multi Modal Logistic Parks

The Ministry of Road, Transport, and Highways is developing 35 Multi-Modal Logistics Parks (MMLP) under the Bharatmala Phase 1, under which the existing MMLP in Vishakapatnam was developed. Now, under the Sagarmala Programme, a total of 13 logistic parks are being planned to be developed by the Ministry of Road Transport & Highways, Ministry of Railways, Major Ports, and State Governments. Of these 13 locations, the following locations come under the influence area of Vishakhapatnam Port: Phase II of MMLP Vishakhapatnam Port, New Inland Container Depot (ICD) Development in Raipur, Chhattisgarh, and New ICD Development in Hyderabad – MMLP Nagulapally, Telangana. The development of the ICD and MMLP would help to improve the ease of transport of goods, reduce costs, and enable manufacturers to produce and transport cargo in bulk, thereby increasing the volume for Vishakhapatnam Port.

The above projects aimed to increase business by improving connectivity and the required infrastructure, as well as streamlining logistics processes, all with the goal of attracting more cargo traffic to the port.

7.2 Existing Traffic and Transportation Network

The Vishakhapatnam port has a rated capacity of 136.39 MTPA, of which 95.47 MTPA is the desired capacity (70% of the rated capacity). In the fiscal year 2023-2024, VPA handled 81.09 MTPA, marking the highest volume ever handled by the port, standing third among the major ports in India in terms of cargo handling. This chapter discusses the cargo handling trend, port utilization, modal share of cargo transfer and vehicular traffic of the port.

Cargo Handling Trend of VPA

The **Figure 7-7** illustrates the trend of cargo handled by the VPA across fiscal years. Starting at 65.3 MTPA in FY 19, there was a notable increase to 72.72 MTPA in FY 20. However, the subsequent years saw a minor decline, with cargo handling dipping to 69.84 MTPA in FY 21 and further to 69.03 MTPA in FY 22, possibly reflecting the repercussions of the COVID-19 pandemic on global trade and transportation. Nevertheless, there was a rebound in FY 23, with cargo handling rebounding to 73.73 MTPA and in FY 24 81.09 MTPA, indicating a return to growth or normalization post-pandemic.

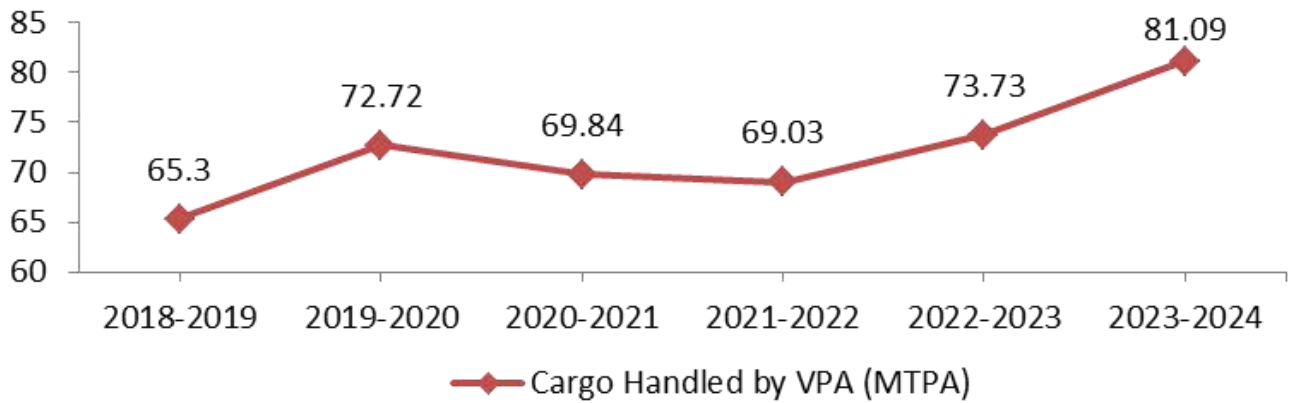


Figure 7-7: Past 6-year cargo Handling Trend

Capacity Utilization

The desired operational capacity of the port stands at 70% of its rated capacity, representing an optimal balance between efficiency and practicality. Over the past six years, the port has consistently operated within a range of 51% to 59% of its rated capacity, indicating a significant margin of growth and utilization. It is observed that there's a room for enhancement and increased activity to bridge the gap between current operations and the desired capacity level. Past 6-year capacity utilization trend is shown in Figure 7-8.

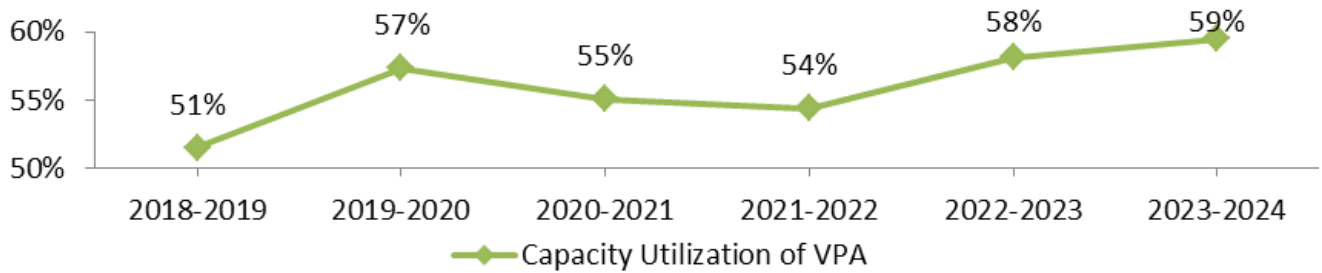


Figure 7-8: Past 6 Year capacity utilization Trend

Modal Share

VPA cargo is transferred through rail, road, and pipeline (from Berth to Tanker farms). In the past 5 years, the modal share of VPA is depicted in the **Figure 7-9**. Rail consistently maintains the highest share, at around 45% throughout all the years, compared to other modes of transport. It is important to note that the significant amount of cargo is transported via rail due to its capacity and mechanized infrastructure for loading and unloading.

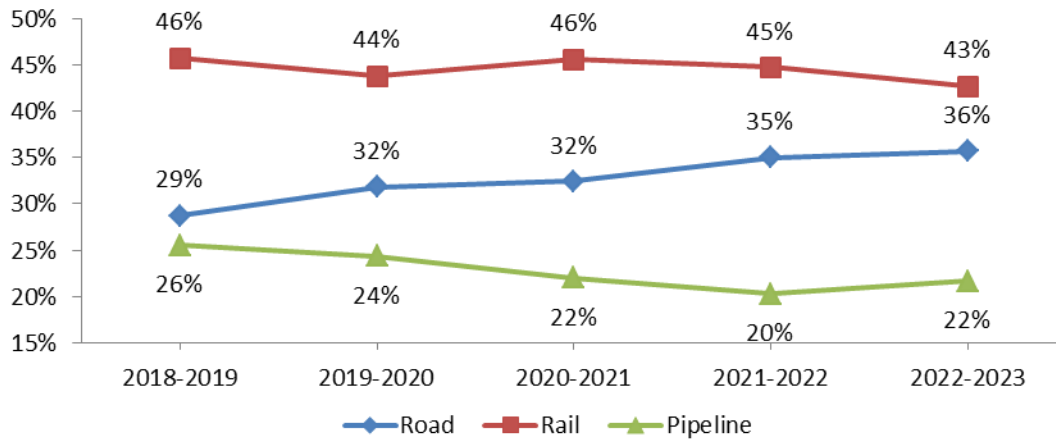


Figure 7-9: Past 5-year Modal share of VPA

7.3 Vehicular Traffic and Transportation Network

Rail Network

The Visakhapatnam Port boasts a network of 170 Equated Track Kilometres (ETKM). Of this, the Port authority oversees 105 ETKM, while private entities manage the remaining 65 ETKM. The port has a total of 42 sidings, of which 25 are full length sidings, while the remaining 17 are of half or partial length sidings. On an average, 40 rakes are exchanged between the port authority and the Railways every day. Additionally, the R&D yard features 20 lines, of which 17 are allocated for Port use, while Indian Railways utilizes the remaining 3 lines. The availability of a robust rail infrastructure and good connectivity to the main trunk lines have contributed to the high mode share of railways in the port.

Road Network

A total of 65.88 kms of road network is available in the custom bound area of the port. The RoW details of the road network are presented in below figure.



Figure 7-10: RoW details of the roads present near East and West Quay and storage areas

Trends in Vehicular Traffic

Over the past 5 years, vehicular traffic data has been collected at RFID gates from Vishakhapatnam Port Authority. The summary of the RFID gates is shown in the below table. The summary of the VCTPL vehicular traffic is shown in **below table**. It is observed that EQ7, WQ7&8, and the West ore Berth gates have high traffic compared to others. The average traffic is around 1,900 vehicles per day altogether, amounting to 8,550 PCUs per day. By considering peak hour factor as 15% for a day, the peak hour PCU would be 1,285, which can be serviced by a two-lane road as per IRC 106 – Guidelines for Capacity of Urban Roads. However, the port road is facing congestion due to operational constraints such as queuing at facilities like gates, weighing bridges, loading/unloading points, and scanning centres.

Table 7-1: RFID Gates Vehicular Traffic

RFID Gate	Average Daily Traffic (in Vehicles)				
	2019	2020	2021	2022	2023
EQ 7 3	650	635	599	558	495
General Cargo Berth	59	47	46	88	116
Dock Main Gate	115	131	64	124	145
WQ7 & 8 2	302	390	415	441	490
West Ore Berth	644	337	425	456	456
North West Gate	127	342	196	174	259
Total Vehicles	1896	1882	1745	1841	1961
Total PCUs	8533	8468	7854	8287	8826

Table 7-2: VCTPL Vehicular Traffic

VCTPL	Average Daily Traffic				
	2019 - 2020	2020 - 2021	2021 - 2022	2022 - 2023	2023 -2024
Total Vehicles	960	918	981	1030	1185
Total PCUs	4322	4132	4414	4634	5332

7.4 Berth Details

The achievable berth capacity, storage and handling method available in all locations as provided in the Vishakhapatnam Port Master Plan are summarised.

Table 7-3: Berth Details

Berth	Achievable Capacity of the Berth -2047 (MMTPA)*	Handling Technique	Storage Yard	Mode of Transport
WQ 1	7.67	Dump Trucks	Common Storage	Road and Rail
WQ 2	7.63	Dump Trucks	Common Storage	Road and Rail
WQ 3	7.48	Dump Trucks	Common Storage	Road and Rail
WQ 4	6.45	Dump Trucks	Common Storage	Road and Rail
WQ 5	4.8	Mechanized Handling	Dedicated Storage	Through Rail
WQ 6	5.23	Dump Trucks	Common Storage	Road and Rail
WQ 7	7.29	Dump Trucks	Common Storage	Road and Rail
WQ 8	6.98	Dump Trucks	Common Storage	Road and Rail
EQ 1	8.9	Conveyor and Hopper	Dedicated Storage	Through Rail
EQ 2 to 7	12.6	Dump Trucks	Common Storage	Road and Rail
EQ 8 & 9	14.7	Mechanized Handling and Dump Truck	Dedicated Storage	Road and Rail
EQ 10	5.1	Mechanized Handling	Dedicated Storage	Pipeline
VGCB	12.9	Mechanized Handling	Dedicated Storage	Road and Rail
VCTPL	20.6	Combination of RTG and trucks	Dedicated Storage	Road and Rail
FB	1.78	Mechanized Handling	Dedicated Storage	Road and Pipeline
OR 2 & 3	15.5	Mechanized Handling	Dedicated Storage	Pipeline
OB 1 & 2	20.6	Mechanized Handling	Dedicated Storage	Road and Rail
LPG and OSTT	46.5	Mechanized Handling	Dedicated Storage	Pipeline

VPA Master Plan – 2023

7.5 Existing Issues in the Road Network

The following issues were observed in case of the internal road network with the VPA port area and shown in below figure.

- Queuing was observed on the internal roads near RFID gates and weighing bridges. The lanes at RFID gates are limited, leading to increased service times. It was noted that truck drivers get down from the truck to punch the RFID, further increase the service time at RFID gates.
- Weighing bridges have insufficient parking spaces, forcing trucks to stand in the carriage way, exacerbating congestion for other vehicles.

- In addition to the above issues, on-street parking of empty trucks was observed in the internal roads which cause a reduction in the effective carriage-way width resulting in congestion.
- Railway level crossings are causing traffic disruptions, thereby contributing to the congestion on the internal roads.
- It was observed that water tankers pour water on the roads to reduce dust pollution within the port, resulting in waterlogging in many areas due to improper drainage system design.
- The Vishakhapatnam Port Authority plans to expand the customs-bound area, aiming to alleviate queues at RFID gates by providing additional lanes and parking spaces for truck entries.
- A number of level crossings are also present within the Vishakhapatnam Port area and whenever a train passes through the truck movement is hindered along the links. The location of level crossings is presented in below figure. To overcome this Port authority awarded the contract to build the internal flyovers in the Visakhapatnam Port area.



Water logging at Internal Roads



On-street parking



Queue at EQ7 Weighing Bridge



Queue at RFID gates



Queue at Weighing Bridge

Figure 7-11: Issues observed in the Internal Roads



Figure 7-12: Level crossings in Vishakhapatnam Port area

7.6 Existing issues in Truck circulation

The existing entry/exit points for the port are mentioned in below figure. In the present condition the trucks entering the Vishakhapatnam port area with bulk cargo predominantly enter through the SBC junction and STP Pond entry to access the storage areas present close to the East and West quay berths and exit through the same gate or through the B Ramp gate.



Figure 7-13: Entry/Exit for Bulk Cargo trucks

As mentioned in the Vishakhapatnam Port Master Plan there is no defined loops and road hierarchy for entry and exit of trucks to each of the quays in case of bulk cargo. During site visits, the WQ 7 & 8 gate, and West ore berth gate is not able to handle the traffic during heavy loading condition as queuing and congestion was observed in the VP12 and VP19 road. The main reason for the occurrence of congestion is the concentration of majority of entry and exit of vehicles from the two entrances namely the STP Pond and B ramp. The unplanned entry/exit of trucks to the port allow for vehicles to traverse the roads of the Port area for longer durations resulting in congestion as we would have less control on the routes used by these trucks. This congestion is further aggravated by the parking of trucks along the road sides while waiting for their turn to load the consignments due to the insufficient parking space within the port area. This congestion also results in higher service and evacuation times resulting in lower efficiency.

Hence proper circular loop movements with dedicated entry and exit points shall be proposed for each of the quays and also for the container terminal. The proposal along with justification is provided in the following headings.

Port officials awarded a contract to build the internal flyovers to alleviate this internal circulation issues, with the internal flyovers consultant proposed a circulation pattern for smooth movement of cargo evacuation which is discussed in the section 11.2

7.7 Historic Traffic Growth

Export Traffic:

VPA's export traffic increased from fiscal year 2001 to fiscal year 2011. The port's traffic has fluctuated during the last decade, primarily due to a reduction in iron-ore commerce. Iron ore traffic dropped following the prohibition on iron ore exports in FY-12. This resulted in a drop in its traffic share, from 19.3 million tonnes in FY11 to 6 million tonnes in FY16. The port's iron-ore exports have steadily increased since the revival of mining in Goa and Odisha. Coal suffered loss in coastal traffic in the last 5 years due to movement of trade to other ports from VPA, especially Paradip and Dharma (mechanised handling). Coal traffic has decreased from 3.5 million tonnes in FY16 to 0.7 million tonnes in FY21.

Table 7-4: Commodities wise Historic Growth Trend for Export/Coastal Traffic

Sl.No	CAGR	5 years	10 years	15 years	20 years
1	Iron ore	25.90%	-0.10%	1.10%	3.50%
2	Coal	-27.20%	-16%	-8.40%	-9.60%
3	POL	-6.10%	-1.60%	-0.10%	2.90%
4	Container	12.20%	14.00%	19.00%	18.40%
5	Food Grains	125%	11.90%	-1.50%	4.50%
6	Iron & Steel	37.50%	15.30%	5.40%	6.20%
7	Others	-13.70%	-4.30%	-1.80%	2.40%
Total		11.00%	0.30%	1.30%	2.60%

VPA is still in the process of mechanizing cargo handling on its berths, which has shifted commodity traffic to competitor ports. Other commodities, such as containers and POL, have shown small changes during the past two decades. The above table depicts VPA's CAGR growth by commodity during the last two decades. VPA's overall export traffic climbed at an 11% CAGR during the last five years. Commodities including containers, food grains, and iron and steel have all seen steady increases. Iron-ore trade has fluctuated during the last ten years. VPA's coastal coal traffic movement has diminished as a result of the establishment of private ports in the hinterland with efficient mechanized coal handling.

Import Traffic:

Commodities such as POL, coal, dry bulk, and fertilizer provide a significant contribution to the port's import trade. The total import traffic has nearly doubled over the last two decades, rising from 26.5 million tonnes in FY-01 to 47.4 million tonnes in FY-20. However, import traffic at VPA has reduced over the last year due to a drop in coal imports. Coal cargo decreased from 17.2 million tonnes in FY20 to 11.3 million tonnes in FY21. Seaborne trade was impacted by the global pandemic, primarily due to supply chain interruption and delay. This resulted in decreasing demand from industries. This has resulted in an increase in domestic coal production. Commodities including POL, fertilizer, dry bulk, and containers have shown slight variations over time.

Table 7-5: Commodities wise Historic Growth Trend for Import /Coastal Traffic

Sl. No	CAGR	5 years	10 years	15 years	20 years
1	POL	-0.1%	-1.9%	-0.4%	2.8%
2	Coal	-3.5%	0.9%	1.2%	3.4%
3	Fertiliser	2.7%	-1.8%	0.4%	4.5%
4	Other dry bulk	-3.1%	5.1%	8.4%	NA
5	Container	6.5%	10.0%	18.1%	18.4%
6	Others	-6.6%	-1.6%	1.3%	-11.3%
Total		0.2%	0.2%	1.7%	2.0%

The table above depicts the commodity-wise CAGR rise in import traffic at VPA during the last 20 years. As previously stated, POL and coal make up the majority of VPA's import flow. These commodities have grown at varying rates over the last ten years. Fertilizer and container cargo have expanded at CAGRs of 2.7% and 6.5%, respectively, over the last five years. Container cargo increased between fiscal years 19 and 20, when the port's container facility regained full operation.

8 INFRASTRUCTURE

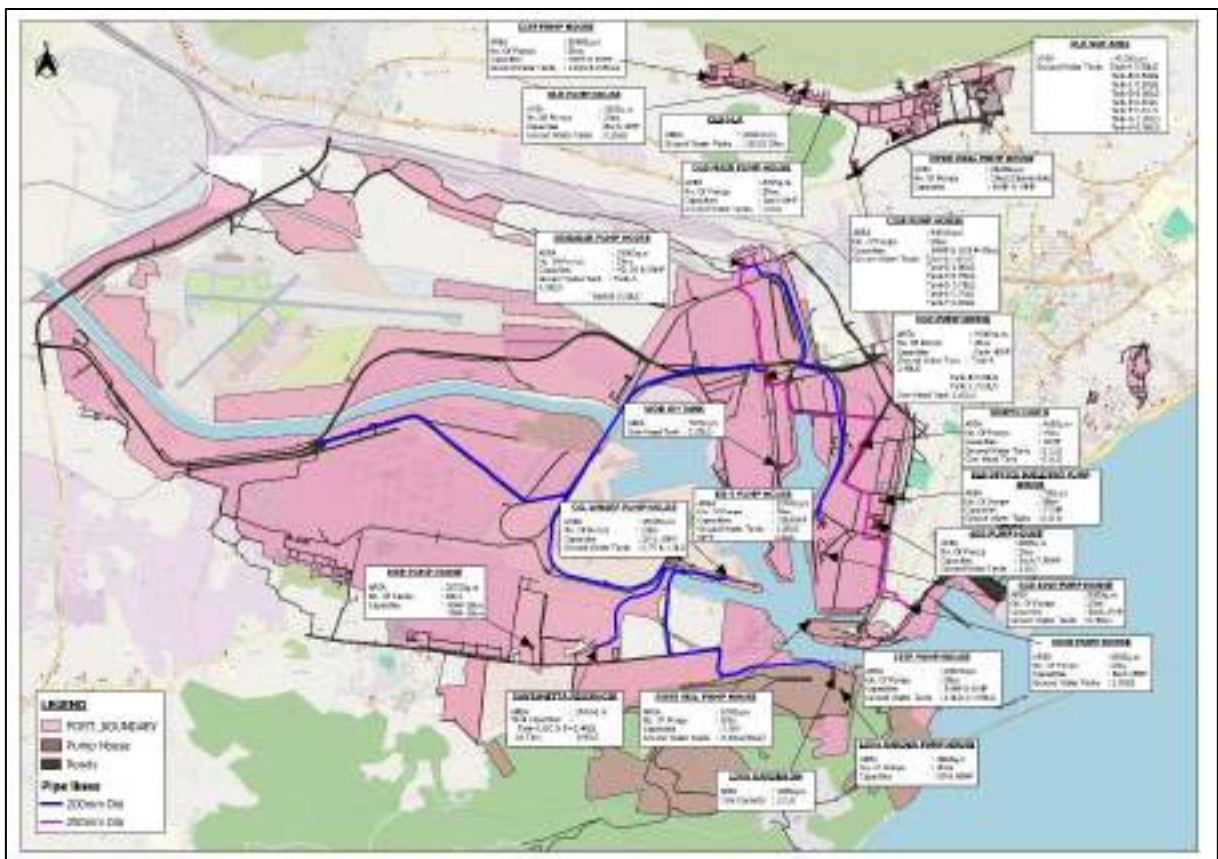
As part of assessment, Infrastructure requirement for VPA are also studied in terms of water supply, sewerage, solid waste and other social infrastructure components.

8.1 Physical Infrastructure

8.1.1 Water Supply

Water supply sources for the authority is GVMC and its groundwater sources. GVMC is supplying 6.05 Lakh gallons of water per day to VPA which is meeting the requirements of VPA in the core area. VPA is also depending on its wells and extracting 1.89 MLD of water from the wells. The water supply mains are laid out in such a way that both sources can serve the entire area even if a single source is not working/supplying the water. The network map is presented below. And as of now, consumption is less than the expected capacity. At present, the authority is only utilising 1.89 MLD of GVMC water per day.

Figure 8-1 Water Supply Network of VPA



8.1.2 Sewerage

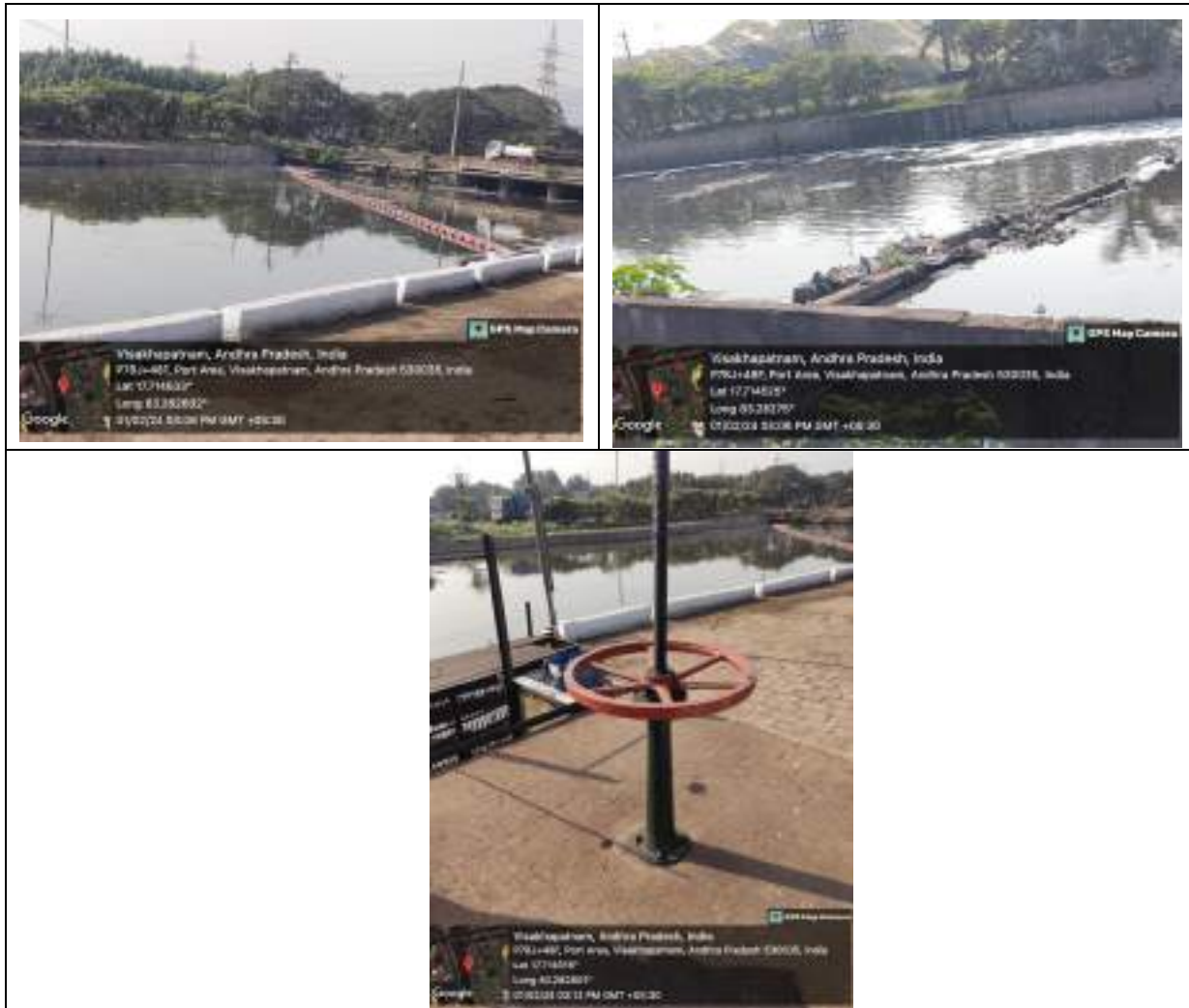
Sewage Treatment Plant, VPA (Capacity - 10 MLD)

STP is located along the Port main road. Location coordinates are 17.7145° N and 83.2826° E. Capacity of the STP is 10 MLD. As of now, only 50% of the total capacity is utilized. Average treatment is 4.5 to 5 MLD per day. Average consumption is 5 to 5.5 MLD per day. The Average Pond level is 2M.

Raw Sewage collection pond

- Raw sewage which is generated during the port activities is collected in pond as shown in figure.
- Floating trash barrier is installed on the sewage collection pond to prevent floating matter to go inside the inlet channel.

Figure 8-2: Inlet Channel & Raw Sewage Sump



- Through the inlet channel, the raw sewage is collected in raw sewage sump.
- By gravity flow, the sewage is sent for screening as a primary treatment.

Figure 8-3: Screening unit



- For the screening, two screening bars are installed to remove floating matters, rags, plastic, solid waste.
- It is generally used for coarse screening of the sewage.
- Segregated solid matter is collected separately. Storage and disposal are done with safety measures.

Figure 8-4: Pump House



- After removal of coarser materials, for the fine screening, the sewage is sent to the detritor unit by means of pumping for further treatment.
- Three Pumps are installed to generate pressurized flow for the further treatment process.

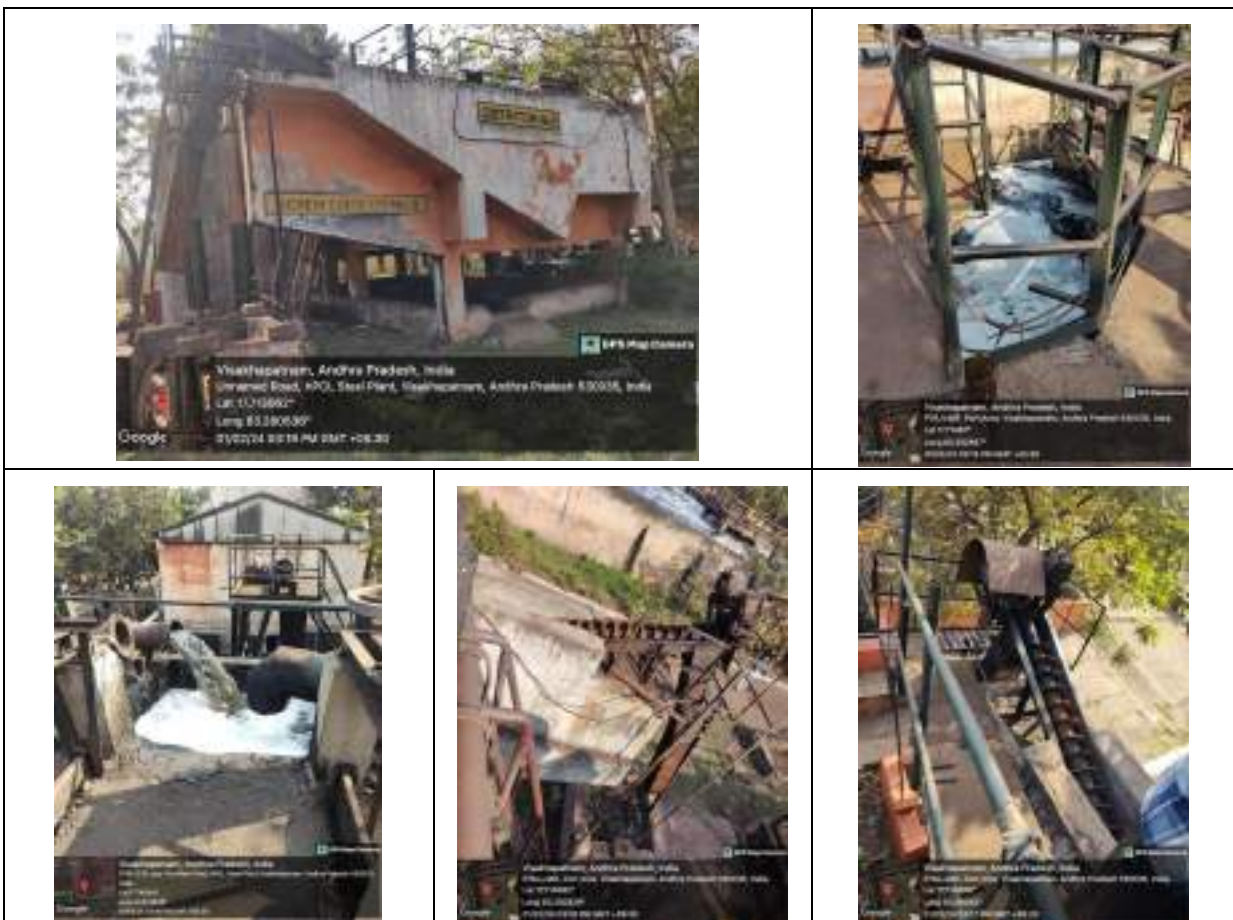
Figure 8-5: Detritor





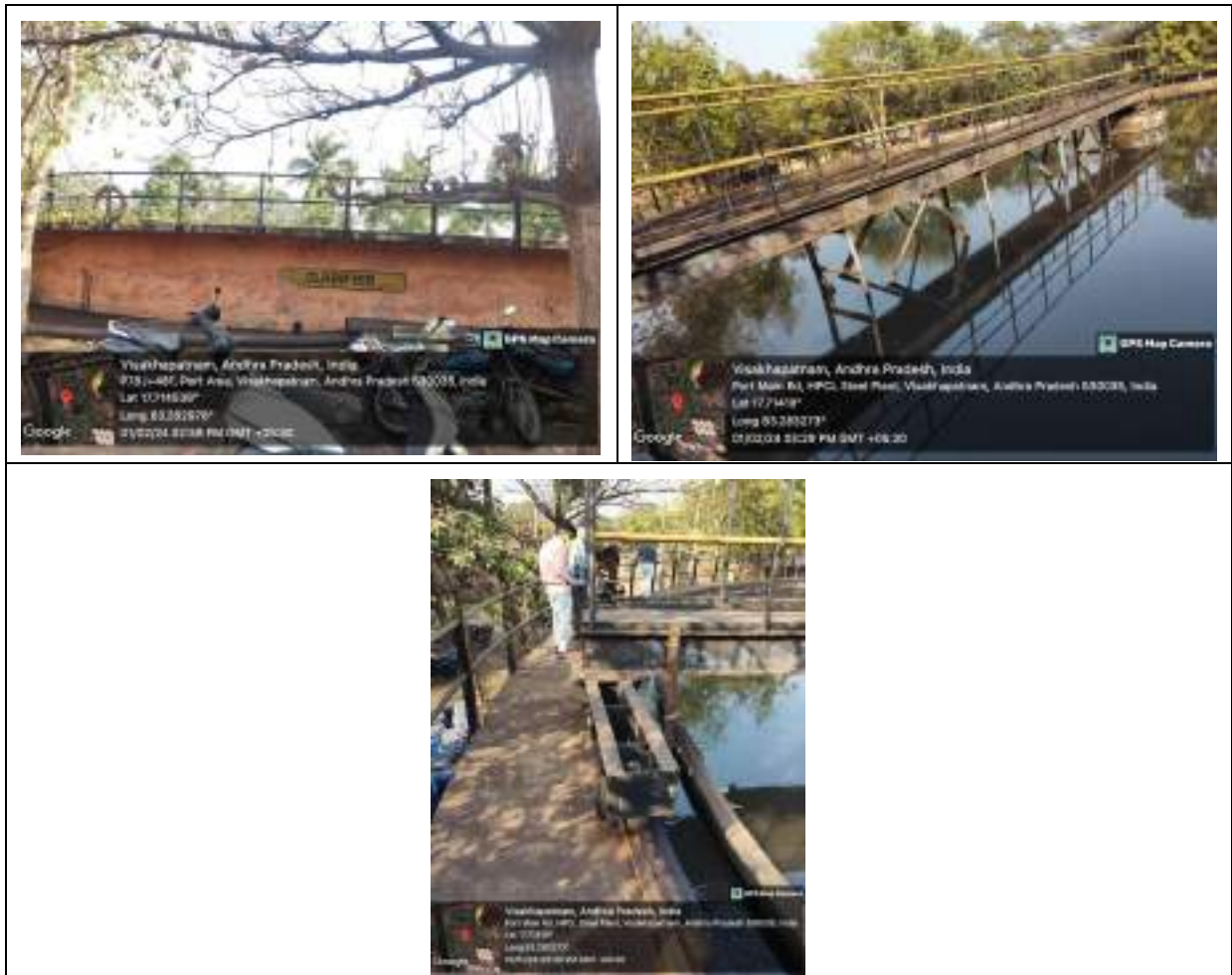
- Once the sewage comes to the detritor unit, fine sand and grit i.e. finer particles are settled down at the bottom.
- Settled sludge (grit) is removed by the screw conveyor which is installed at the side of the detritor unit, which is collected in raw sludge sump.
- There are two detritors and two screw conveyors present in the unit.

Figure 8-6: Clarifier



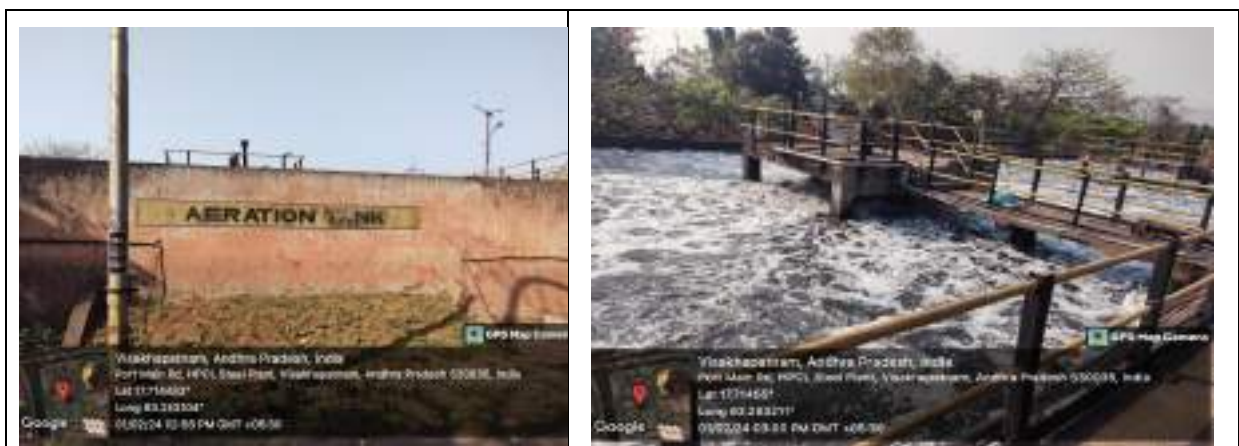
- Treated sewage is sent to clarifier by means of gravity, so the remaining fine particles can be removed and can be collected in raw sludge sump.

Figure 8-7: Aeration Tank



- After the clarifier, sewage is sent to aeration unit where soluble contaminants, toxic compounds can be treated and removed.
- The aeration process helps in reducing odour by great extent.

Figure 8-8: Chlorination Unit





- After aeration of the sewage, water is sent for chlorination which kills harmful microorganisms, pathogens, bacteria and viruses.

Figure 8-9: Raw Sludge Sump



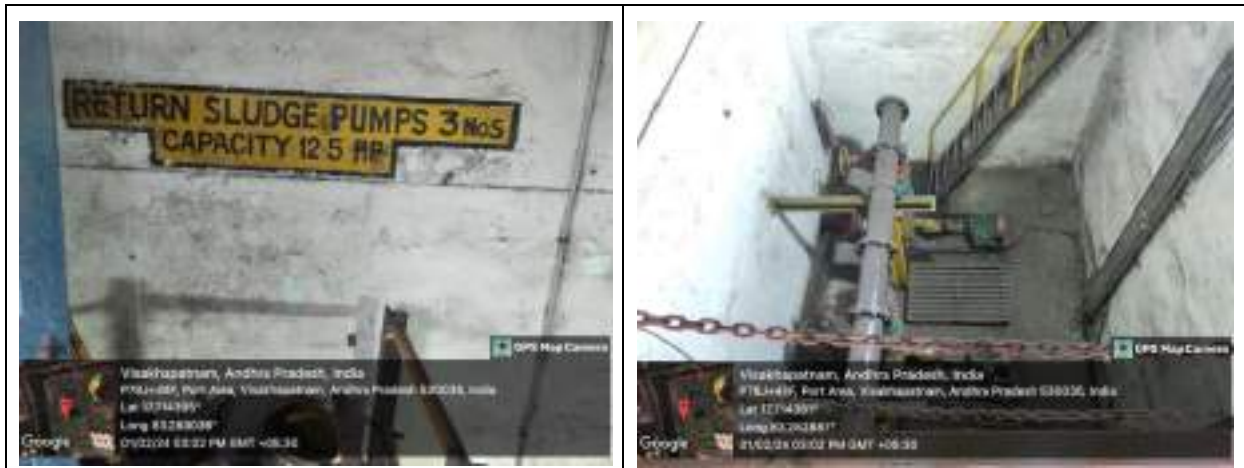
- It is the place where all kind of sludge from various levels of treatment can be collected in the raw sludge sump.

Figure 8-10: Raw Sludge Pimp



- Collected sludge is sent to sludge drying beds by means of pumps.
- Three nos. of sludge pumps are installed having 12.5 HP capacity.

Figure 8-11: Sludge Drying Beds



- By pumping, sludge is sent to sludge drying beds, where sludge is kept for drying for 6-7 days.
- After drying, it can be used as manure and fertilizers.

Figure 8-12: Delta Pond (Treated Sewage collection pond)



- Treated wastewater is collected in Delta Pond near the STP site, which can be further used for gardening and recreational activities.



8.1.3 Solid Waste Management

The solid waste generated in and around port areas (1.5 Ton approx.) is segregated categorically as biodegradable, non-biodegradable and hazardous waste and collected in separate colour coded dustbins. The garbage thus collected is being disposed in GVMC

dumping yard, Kapuluppada. Solid waste like corroded steel plates, rubber pieces, discarded spares/ equipments are being disposed on regular basis.

At present, collection of solid waste managed by VPA through the sanitary department and disposed through closed vans (4 No.) to the Kappulapadda (4 trips daily) located in the off limits of the city where the GVMC. During construction and operation phases, the solid wastes generated will contain mainly vegetable matter followed by paper, cardboard, packaging materials, wood boards, polythene, etc. The solid waste generated during project construction and operation phases will be collected and disposed at same Kappulapadda dump site.

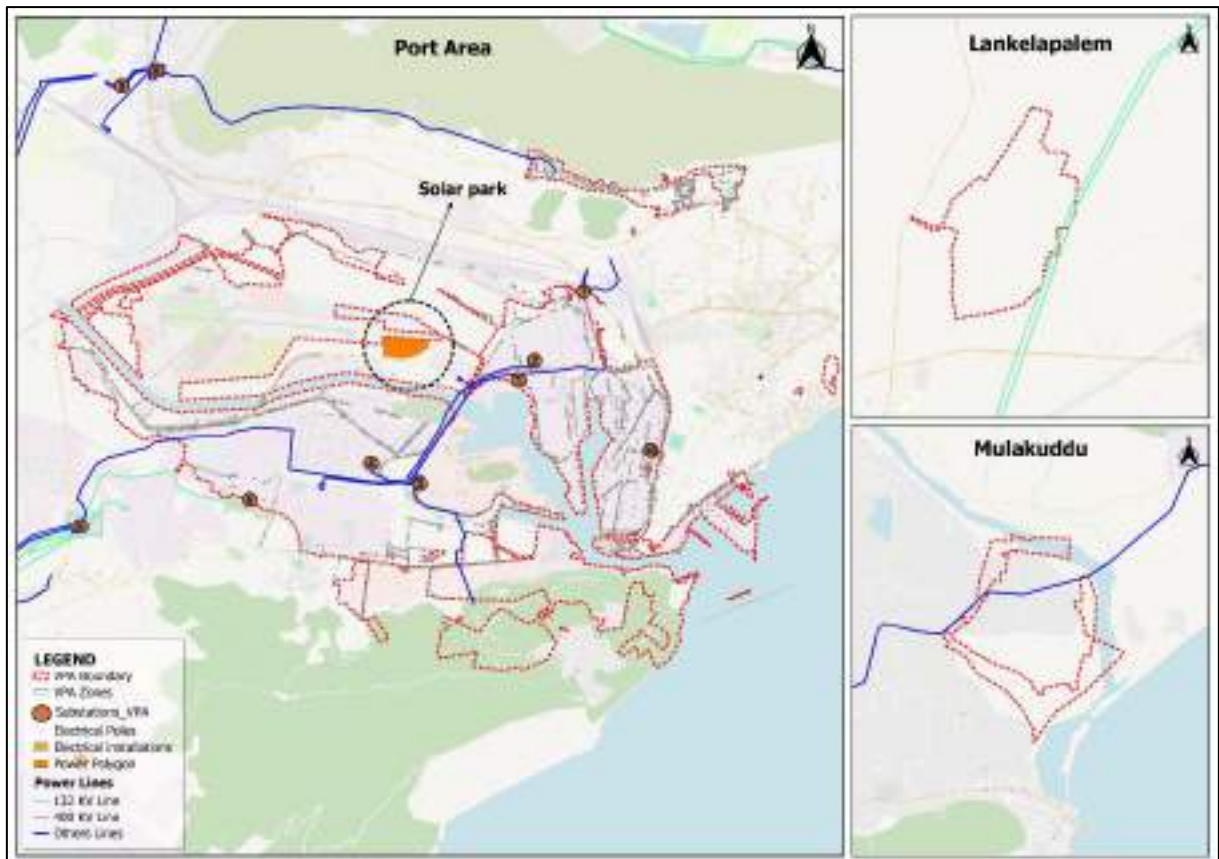
Figure 8-13: Solid Waste Management



8.1.4 Power Supply

VPA is depending on state discoms - Andhra Pradesh Eastern Power Distribution Private Limited (APEPDPL) through the 132 KV sub-stations for electricity and also has 10 MV solar plant developed in 30.3 acres.

Figure 8-14 Power Network of VPA.



- Entire Port Operations are Provided with Power Supply Industrial Lighting (LED Lights) with by Utilizing the 10 MW ground-mounted, grid-connected photo volatile solar system that is currently in place.
- Production of 1.45 billion units annually, saving 14300 tons of carbon footprint.
- Maintenance And Operation of ELL Wharf Cranes with a 20 Ton Capacity.
- X-ray container scanner operation and maintenance.

Visakhapatnam Port Authority is diversifying its power sources, utilizing ten different sources along with a 10MW solar power park. Their strategy likely aims to enhance energy reliability, sustainability, and potentially reduce costs associated with energy consumption. Diversifying energy sources can also contribute to environmental goals by incorporating renewable energy like solar power into their energy mix.

8.2 Social Infrastructure

8.2.1 Health

Golden Jubilee hospital is 80 bedded with 60% occupancy with 24hrs casualty facility with fully equipped one major and one minor operation theatres. Everyday 600-900 OP patients visit the center for health services. One chief medical officer, 4 DCMOs, 2 Sr. DCMOSs and 3 Sr. medical officers are working at the medical center. The center is serving and catering the needs of the VPA staff.

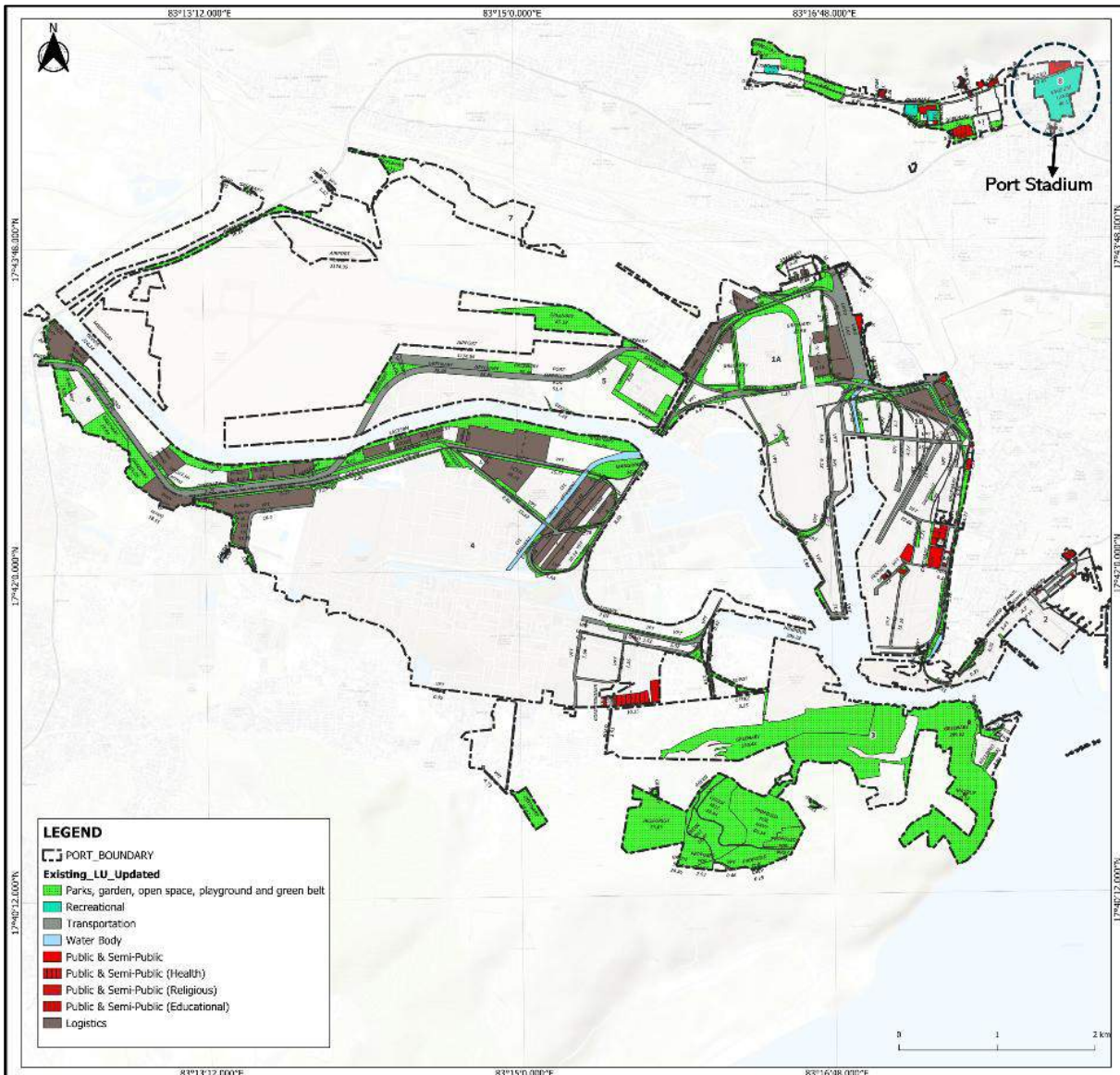
Figure 8-15 Port Hospital of VPA



8.3 Other Recreational Facilities

There are other social facilities in VPA such as sports club in zone-8, green buffers, green spaces round VPA which are mapped in below map.

Figure 8-16 Recreational Facilities in VPA



9 ENVIRONMENT

9.1 Environment

This chapter provides a comprehensive overview of the current environmental situation, focusing on key aspects such as air pollution, noise pollution, and marine water pollution through the thorough analysis of secondary data. Additionally, it delves into critical factors such as eco-sensitivity, Coastal Regulation Zone (CRZ) zoning, and disaster vulnerability, aiming to provide a distinct understanding of the current environmental challenges. By examining these interconnected elements in the present state of our environment, strategic interventions and informed decisions can be made to ensure sustainable development.

9.1.1 Air Pollution

Continuous Ambient Air Quality Monitoring Data from VPA was collected for three years (2018-2020). Four parameters have been measured to understand the air quality - Sulphur Dioxide (SO₂), Nitrogen Oxides (NO_x), Particulate Matter 2.5 (PM_{2.5}) and Particulate Matter 10 (PM₁₀). The monitoring and analysis have been carried out as per CPCB standard methods of measurements.

9.1.1.1 Results

The variations of PM₁₀, PM_{2.5}, SO₂ and NO_x are compared with National Ambient Air Quality Standards (NAAQS), MoEF & CC Notification, November 2009. Ambient Air Quality Monitoring Data for the study area given and graphically presented in **below graphs & Charts**.

Figure 9-1: Ambient PM₁₀ Levels

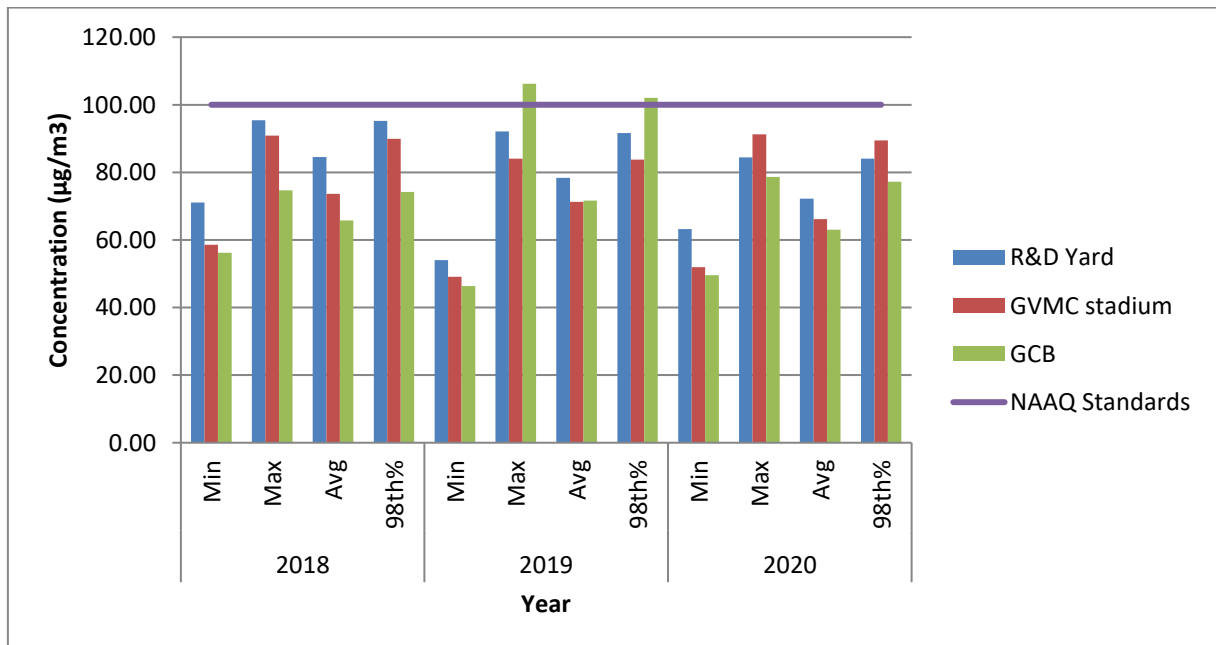


Figure 9-2: Ambient PM_{2.5} Levels

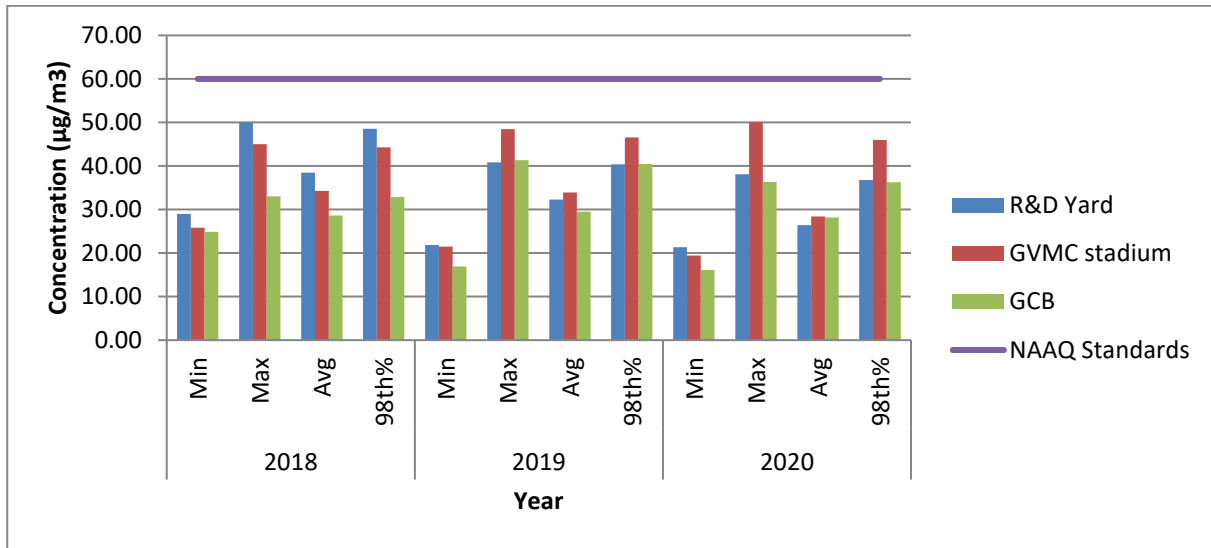


Figure 9-3: Ambient SO₂ Levels

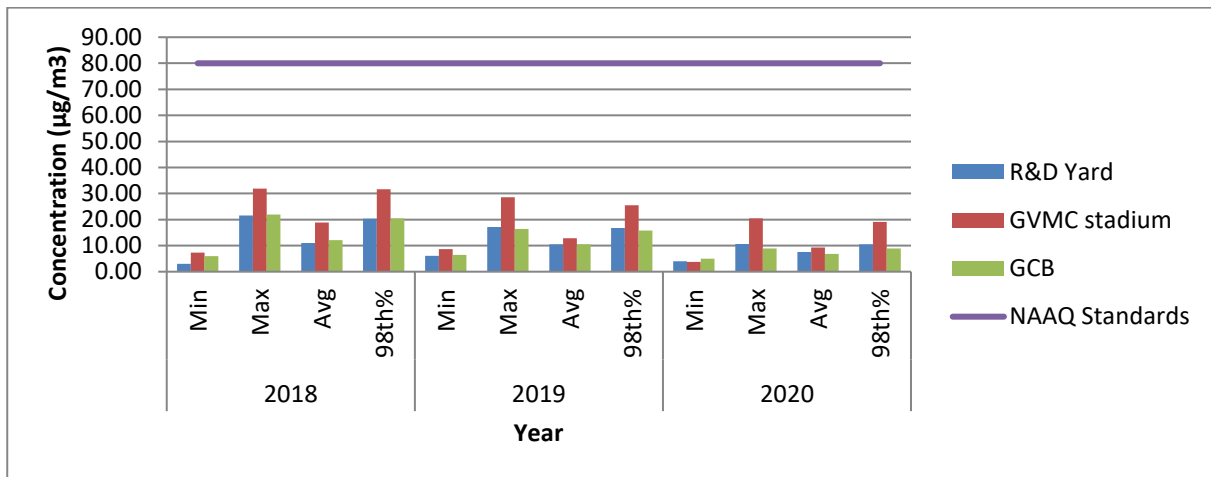
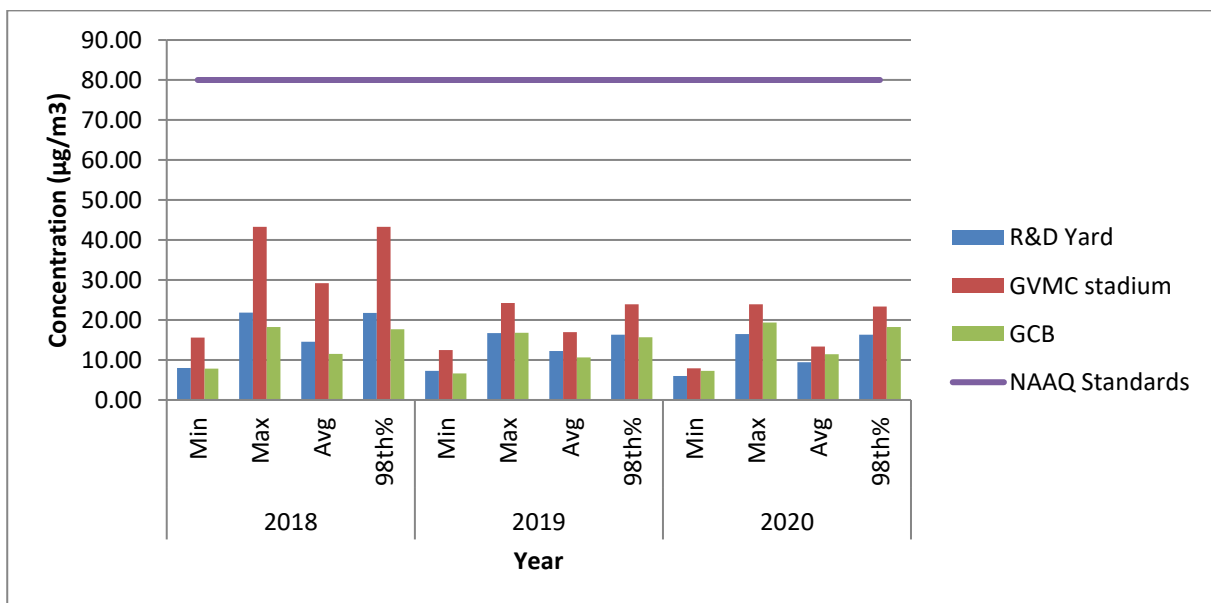


Figure 9-4: Ambient NO_x Levels



9.1.1.2 Observations

Maximum concentrations of Sulphur Dioxide (SO₂), Nitrogen Oxides (NO_x), Particulate Matter (PM_{2.5}) and Particulate Matter (PM₁₀), are well within the National Ambient Air Quality Standards for Industrial areas at all monitoring locations during the study period.

- PM₁₀ ranged between 56.17µg/m³ and 95.44 µg/m³ in 2018, between 46.39 µg/m³ and 106.21 µg/m³ in 2019 and between 49.55 µg/m³ and 91.22 µg/m³ in 2020. NAAQ stipulated standard for PM₁₀ for 24 hr. average is 100µg/m³.
- PM_{2.5} ranged between 24.87µg/m³ and 50µg/m³ in 2018, between 16.94µg/m³ and 48.45 µg/m³ in 2019 and between 16.15µg/m³ and 50.06µg/m³ in 2020. NAAQ stipulated standard for PM_{2.5} for 24 hr. average is 60µg/m³.
- SO₂ ranged between 3.07µg/m³ and 31.92µg/m³ in 2018, between 6.04µg/m³ and 28.55 µg/m³ in 2019 and between 3.04µg/m³ and 20.48µg/m³ in 2020. NAAQ stipulated standard for SO₂ for 24 hr. average is 80µg/m³.
- NO_x ranged between 7.83µg/m³ and 43.3µg/m³ in 2018, between 6.65µg/m³ and 24.28 µg/m³ in 2019 and between 5.99µg/m³ and 23.94µg/m³ in 2020. NAAQ stipulated standard for NO_x for 24 hr. average is 80µg/m³.
- The concentrations of PM₁₀, PM_{2.5}, SO₂ and NO_x are observed to be well within the NAAQ standards prescribed by Central Pollution Control Board (CPCB) for industrial zone.

9.1.2 Noise Pollution

Annual Average noise levels have been established by Andhra Pradesh Pollution Control Board for years 2014-2018 for the whole of Andhra Pradesh. Additionally, they have also published monthly noise levels for the year 2019. For our project area, we considered data of Siripuram which is ~0.24km from Lankalapalem and ~2.4km away from the main port boundary. The monitoring and analysis have been carried out as per CPCB standard methods of measurements.

9.1.2.1 Results

Ambient Noise Quality Monitoring Data for the study area is given in Annexure II. The comparison of day equivalent noise levels (Ld) and night equivalent noise levels (Ln) with the respective Ambient Noise Quality standard for the study area is graphically presented in below graphs & Charts.

Figure 9-5: Ambient day time noise levels in dB (A)

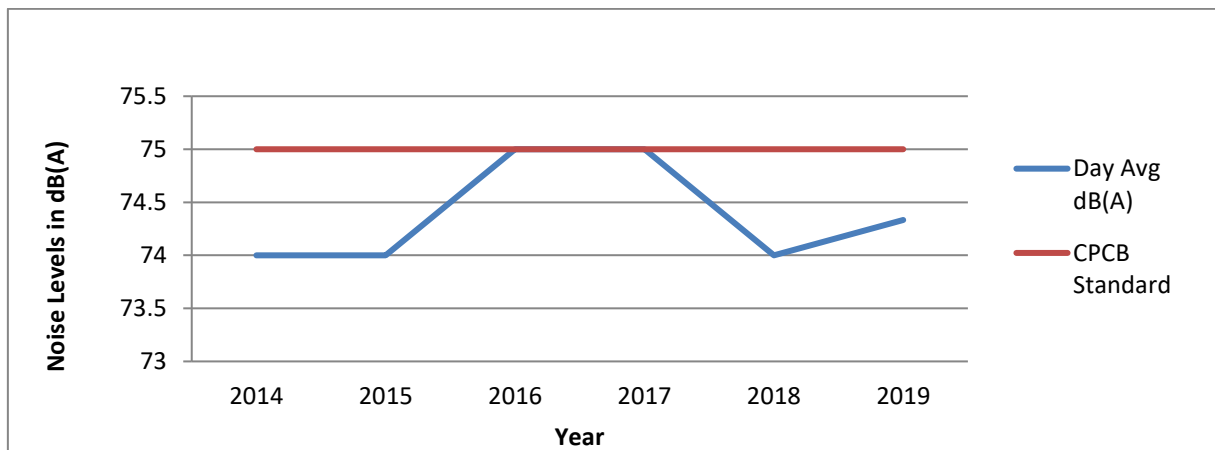
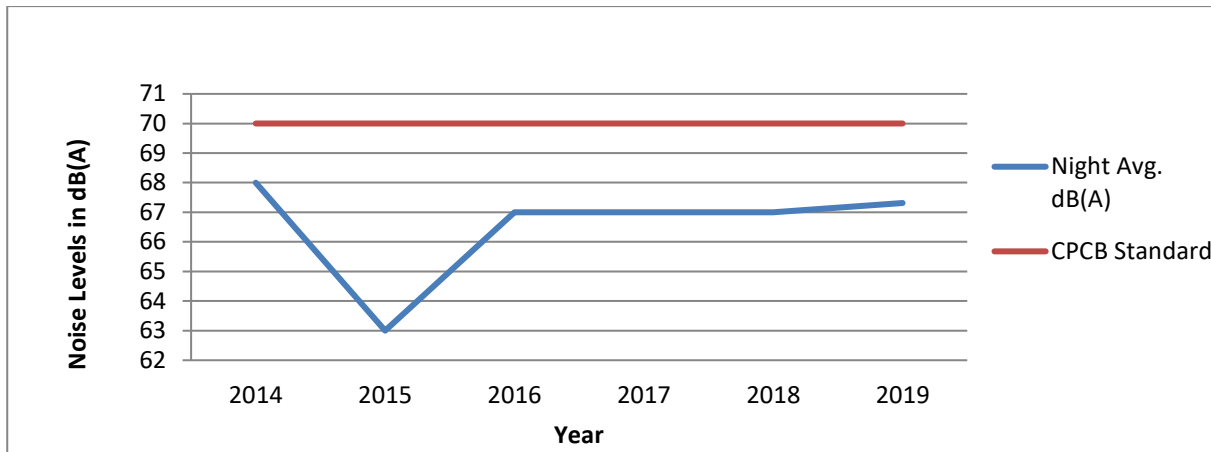


Figure 9-6: Ambient nighttime noise levels in dB (A)



9.1.2.2 Observation

It is observed that the day and night equivalent noise levels are consistently well within the prescribed CPCB standards.

- Day equivalent noise levels (Ld) ranged between 74 dB(A) to 75 dB (A)
- Night equivalent noise levels (Ln) ranged between 63 dB(A) to 68 dB (A)

9.1.3 Marine Water Pollution

Marine water has been monitored at three locations within the port – Northern Arm, Western Arm and Outer Harbor in 2019 for 5 different parameters, namely – Turbidity, Dissolved Oxygen, Ammonical Nitrogen as N, Sulphates as SO₄²⁻ and Phosphates as PO₄³⁻. The monitoring and analysis have been carried out as per CPCB standard methods of measurements.

9.1.3.1 Result

The variations of Turbidity, Dissolved Oxygen, Ammonical Nitrogen as N, Sulphates as SO₄²⁻ and Phosphates as PO₄³⁻ in the Marine water is compared to the Primary Water Quality Criteria for Class SW-IV Water (For Harbour Water) as per CPCB standards. Monitoring Data for the study area is given in annexure and graphically presented in **below graphs & Charts**.

Figure 9-7: Turbidity of Marine water in the study area

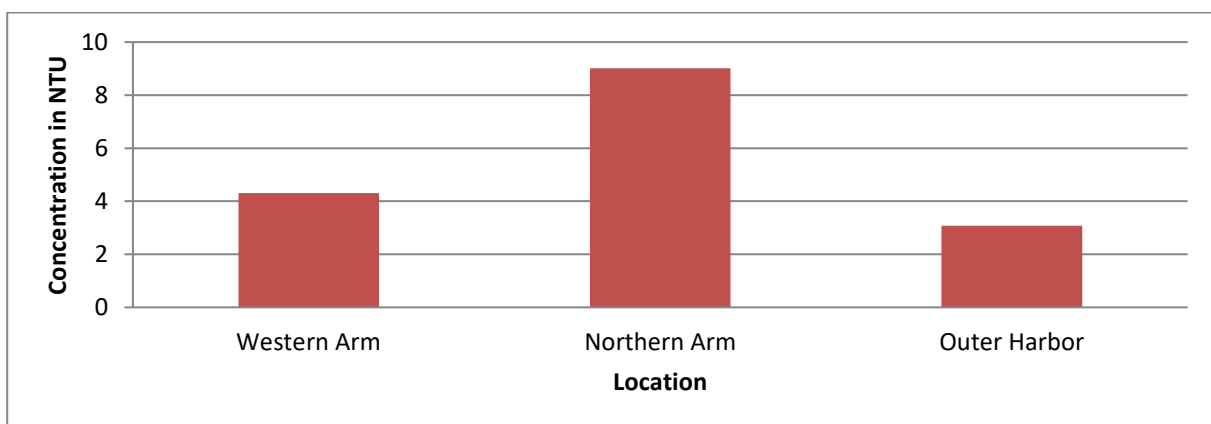


Figure 9-8: Dissolved Oxygen of Marine water in the study area

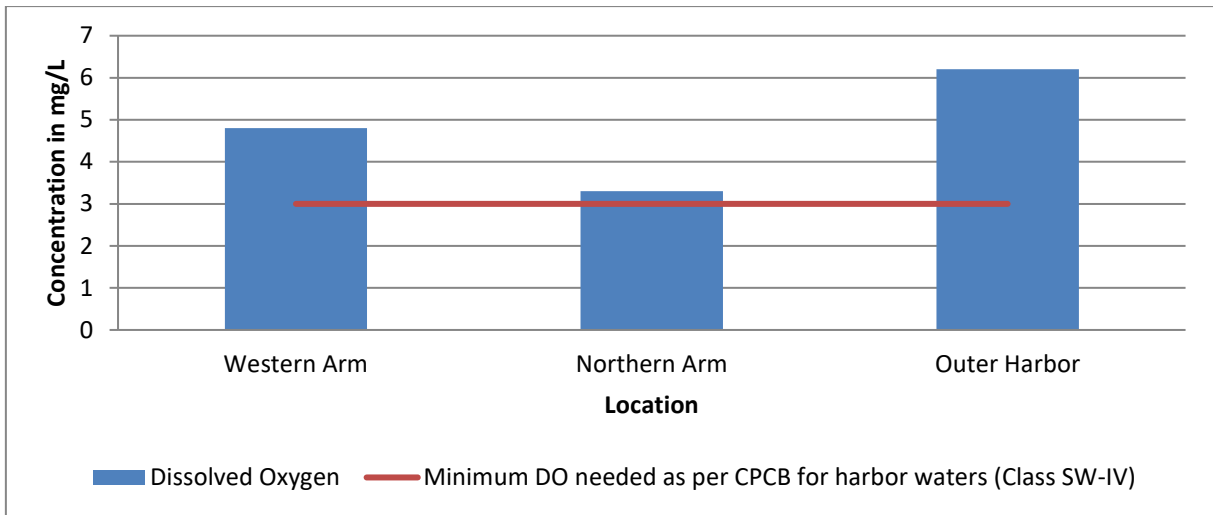


Figure 9-9: Ammonical Nitrogen of Marine water in the study area

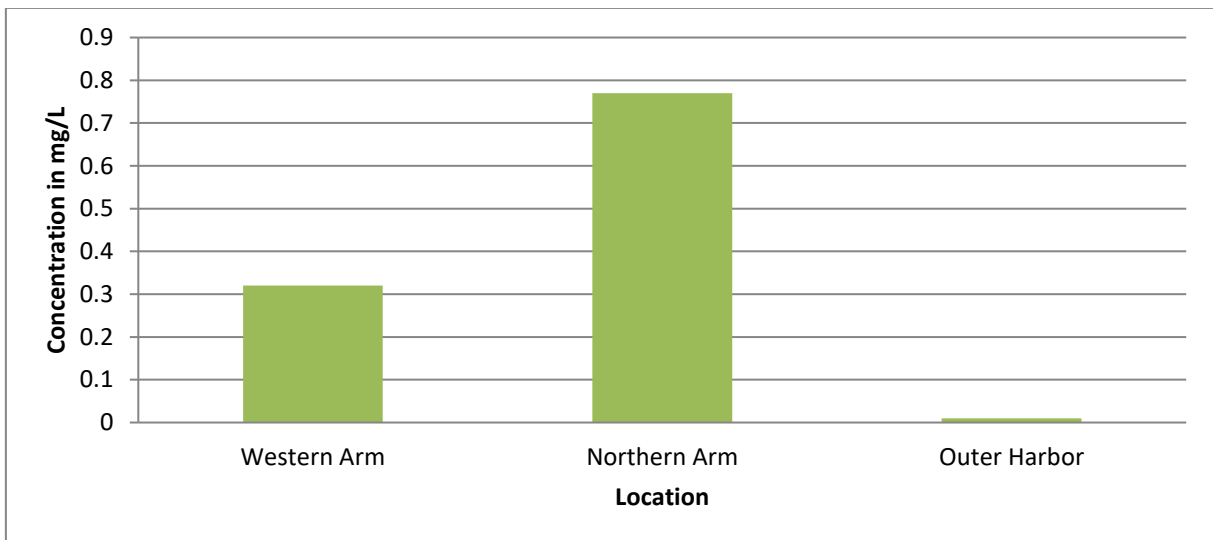


Figure 9-10: Sulphates of Marine water in the study area

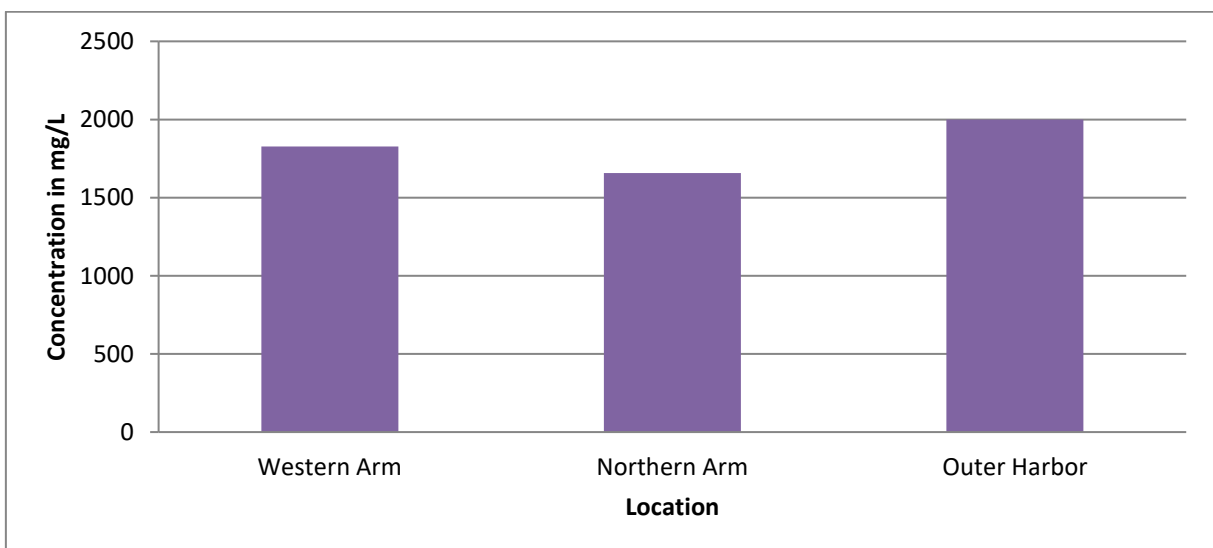
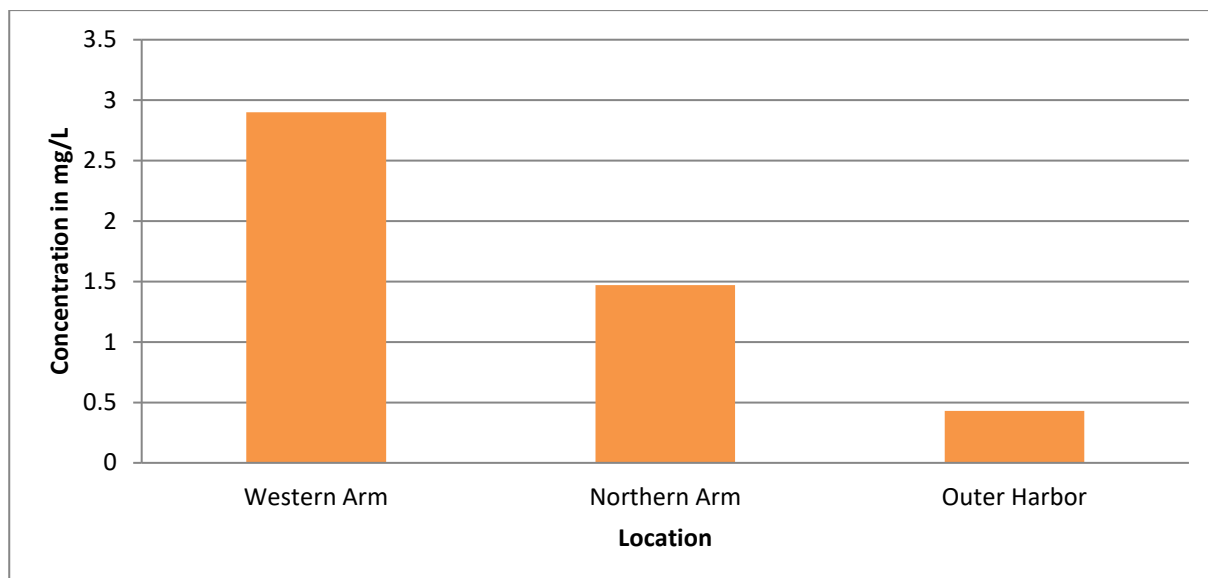


Figure 9-11: Phosphates of Marine water in the study area



9.1.3.2 Observation

The observed results show that,

- The turbidity varied from 3.08NTU to 9.01NTU
- The concentration of dissolved oxygen varied from 3.3mg/L to 6.2mg/L
- The concentration of ammonical Nitrogen as N varied from <0.01mg/L to 0.77mg/L
- The concentration of Sulphates varied from 1657mg/L to 1999mg/L
- The concentration of dissolved oxygen varied from 0.43mg/L to 2.9mg/L
- All the parameters are well within the Primary Water Quality Criteria for Class SW-IV Water (For Harbor Water).

9.1.4 Ecologically Sensitive Areas

Eco Sensitivity map for 10km radius of project boundary is as shown in **below figure** .The environmental sensitive areas covering an aerial distance of 10 km from project boundary is given in **Table 9-1**.

Table 9-1: Environmental Sensitive Areas within 10km of Project Boundary

S. No.	Areas	Name/ Identity	Aerial distance (Within 10 km.) ²
		1	Areas protected under international conventions, national or local legislation for their ecological, landscape, cultural or other related value
2	Areas which are important or sensitive for ecological reasons - Wetlands, watercourses or other water bodies, coastal zone, biospheres, mountains, forests	Kambalakonda RF	~10Km, NW, NE
		Simhachalam Hill	~7.24 km, NW
		Amanam Range	~1 km, NE from Mulakoodu
		Duvvada Range	~6 Km, W
		Pothukunda Range	~10 Km, W
		Mudasarlova Range	~10 Km, N
		Naval Dock yard	~1km, NW

² Distances are aerial distances measured from the boundary of project site

		Mudasarlova Reservoir	~8.7km, NW
3	Areas used by protected, important or sensitive species of flora or fauna for breeding, nesting, foraging, resting, over wintering, migration	Kambalakonda RF	~10Km, NW, NE
		Simhachalam Hill	~7.24 km, NW
		Amanam Range	~1 km, NE from Mulakoodu
		Duvvada Range	~6 Km, W
		Pothukunda Range	~10 Km, W
		Mudasarlova Range	~10 Km, N
4	Inland, coastal, marine or underground waters	Megha Canal	~7.22km, NE
		Bay of Bengal	~0.1km, NE
		Mudasarlova Reservoir	~8.7km, NW
5	State, National and International boundaries	-	
		SH 39	~9.63km, NW
		Port Main Road	~3.9km, NW
		Beach Road	~1.2km, NE
		NH16	~6km, NE
7	Defence installations	-	
8	Areas occupied by sensitive man-made land uses (hospitals, schools, places of worship, community facilities)	Visakhapatnam Urban	~5km, NW
		Goplalapatanam Rural	~10Km, NW, NE
		Gajuwaka	~9.5km, SW
		Padagantyada	~9.7km, SW
9	Areas occupied by sensitive man-made land uses (hospitals, schools, places of worship, community facilities)	Visakhapatnam Urban	~5km, NW
		Goplalapatanam Rural	~10Km, NW, NE
		Gajuwaka	~9.5km, SW
		Padagantyada	~9.7km, SW
10	Areas containing important, high quality or scarce resources, (ground water resources, surface resources, forestry, agriculture, fisheries, tourism, minerals)	Kambalakonda RF	~10Km, NW, NE
		Simhachalam Hill	~7.24 km, NW
		Amanam Range	~1 km, NE from Mulakoodu
		Duvvada Range	~6 Km, W
		Pothukunda Range	~10 Km, W
11	Areas already subjected to pollution or environmental damage. (those where existing legal environmental standards are exceeded)	-	
12	Areas susceptible to natural hazard which could cause the project to present environmental problems, (earthquakes, subsidence, landslides, erosion or extreme or adverse climatic conditions)	The proposed development area falls under Seismic Zone II (Low Damage Risk Zone) as per IS 1893 (Part I). During the design stage, the effects from natural disasters will be considered as per IS: 1893 (Part1): 2002 and necessary precautionary measures would be built-in /implemented	

9.1.5 Environment Measures

In last five years VPA has spent Rs. 5456.09 lakhs towards environment protection & recurring cost towards environment protection measures is Rs. 2036.01 lakhs. The following are environment measures taken are:



- Providing dust barrier system from existing high-rise wall at AKP level crossing to OHC compound wall under NHAI bridge
- Providing Dust barrier along the existing compound wall from Northwest (NW Gate) gate to Coastal cargo berth (Green Channel berth) in WOB.
- Providing Dust Barrier cum view cutter from GCB RFID gate towards GCB Pump house
- Ground preparation with lova garden rock and usage of NTPC pond ash for filling at VPA low lying area of Ac 20 cts on North of CFL near PCR junction in western sector area
- Providing drainage facilities to the road on west of ESSAR road
- Improvement to Water supply system, drains and culverts
- EMS (Energy Management System)
- Regular monitoring of Air, Harbour water quality, STP quality, Marine sediments
- Controlling and managing the dust generated by Coal handling is the Mechanical Dust Suppression System (MDSS)
- Roads in the Visakhapatnam Port are being wetted by water tankers round the clock to prevent emission of dust during movement of vehicles.
- Reorganization of the stack yards so that the dust generating stacks such as Coal is being shifted to the inner side of the Harbour and non-dusty cargos at the periphery

9.1.5.1 Green belt

- 2014-15 and 2015-16. 50,000 Nos (30,000 by VPA and 20,000 by HPCL) of plantation in port areas during 2016-17 was completed.
- For the year 2017-18 plantation about 20,000 Nos. around stack yards was also completed. During 2018-19 and 2019-20, 2 lakh Shelter Belt plantation was completed through AP Forest department at a cost of Rs.2.30 crores.
- 70,000 nos. out of 1.02 lakh plantation is completed during year 2020-21 at an estimated cost of 3 .87 Crores.
- 25,000 nos of Avenue plantation completed up to September 2022 balance 5,000 nos of plantation will be completed by March 2023.

9.1.5.2 Solar Power

Visakhapatnam port is the pioneer in implementing Solar power under green initiatives and initiated 10MW solar power plants at a cost of about Rs.60 crores. Already 100 Kw roof top solar power is being used for hospital purposes. In addition, 770 KW roof top solar power is being generated.



Apart from Environmental Mitigation measures VPA has taken up CSR activities for the livelihood development around the Visakhapatnam port area. An amount of Rs.473.88 lakhs has been spent on various activities such as

- Medical equipment to KGH
- Digital Education
- Medical camps
- Skill development
- Green vision

9.1.6 CRZ Compatibility

The CRZ compatibility of the proposed facilities with respect to CRZ Notification, 2011 and 2019 is given in **Table 9-2**.

Table 9-2: CRZ Compatibility of the proposed facilities as per CRZ Notification, 2011 and 2019

S No	Infrastructure Facility	Falling in CRZ area with classification	Permissible / not permissible as per CRZ notification, 2011 and 2019	Applicable clause No. of CRZ Notification, 2011	Applicable clause No. of CRZ Notification, 2019
1	Railway Line	-	-	-	-
2	Conveyor	CRZ II	Permissible	3 (i)(a), 4(i)(a)	5.2 (i), 5.1.2 (xiv), 5.1.2 (xv)
3	Road	CRZ II	Permissible	3 (i)(a), 4(i)(a)	5.2 (i), 5.1.2 (iv)

4	Jetty/Breakwater	CRZ IV(B)	Permissible	3 (i)(a), 4(i)(a)	5.4 (ii)(a), 5.4 (iii) (v) (vi)
5	Stackyard area	CRZ II	Permissible	3 (i)(a), 4(i)(a)	5.2 (i), 5.1.2 (ii), 5.1.2 (iv), 5.1.2 (v)
6	Berth and Backup Area	CRZ II	Permissible	3 (i)(a), 4(i)(a)	5.2 (i), 5.1.2 (ii), 5.1.2 (iv), 5.1.2 (v)
7	Silo	-	-	-	-

9.2 Disaster Vulnerability

The proposed development area falls under Seismic Zone II (Low Damage Risk Zone) as per IS 1893 (Part I). During the design stage, the effects from natural disasters will be considered as per IS: 1893 (Part1): 2002 and necessary precautionary measures would be built-in /implemented.

The city is a coastal city and is predominantly prone to hydrological events such as depressions, cyclones, sea storms, tsunamis etc. In the Bay of Bengal, depressions are likely to be encountered during all seasons of the year with a local fall in the pressure. On an average one cyclone per annum may occur. Cyclones are frequent during the month of November. Cyclones are also likely to occur during the month of May. The Visakhapatnam city has experienced severe cyclonic storms several times since 1895 and its frequency has increased in recent times notably in 1965, 1965, 1983, 1985, 1995, and 1998. On an average the city is experiencing a cyclone almost every year. It gives a warning to the city that the severe cyclone may bring loss of destruction or damage to the city. In general the duration between September to November of every year will be important with reference to the floods or inundation due to the occurrence of significant amount of the rainfall events.

Figure 9-12: Seismic Hazard Map

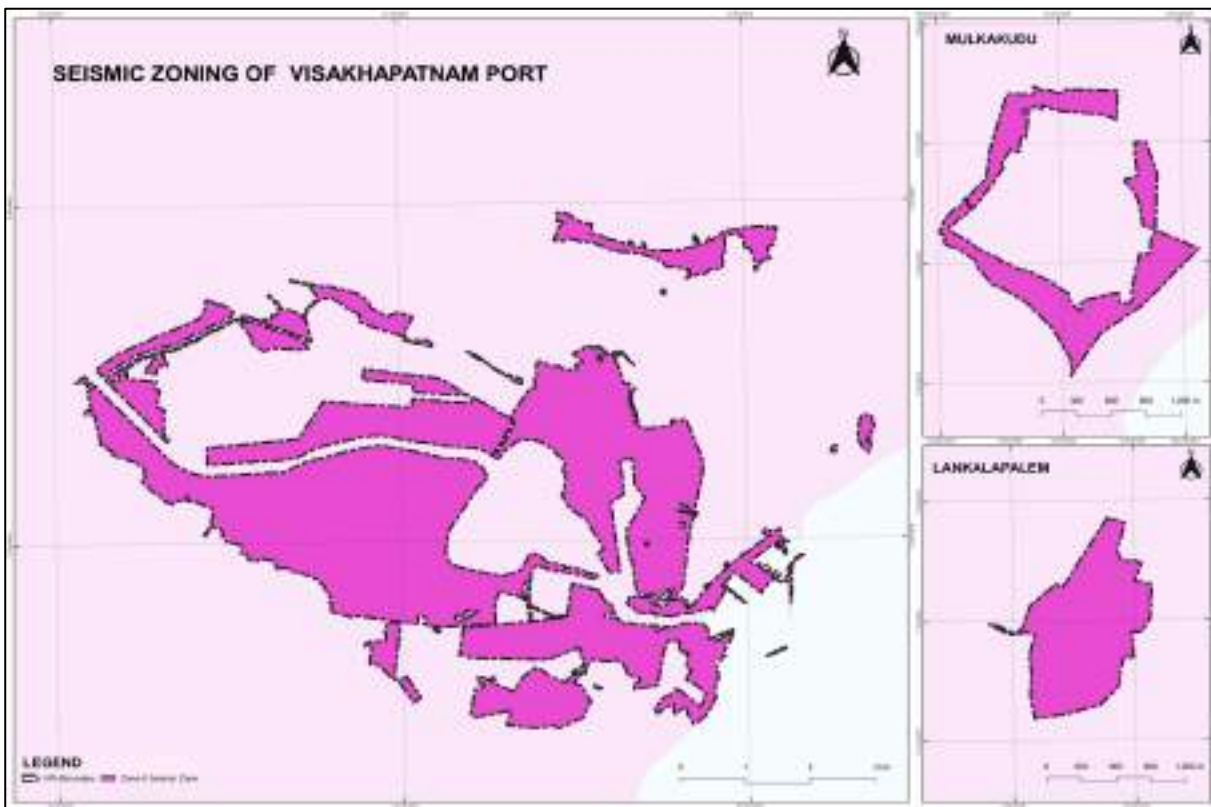
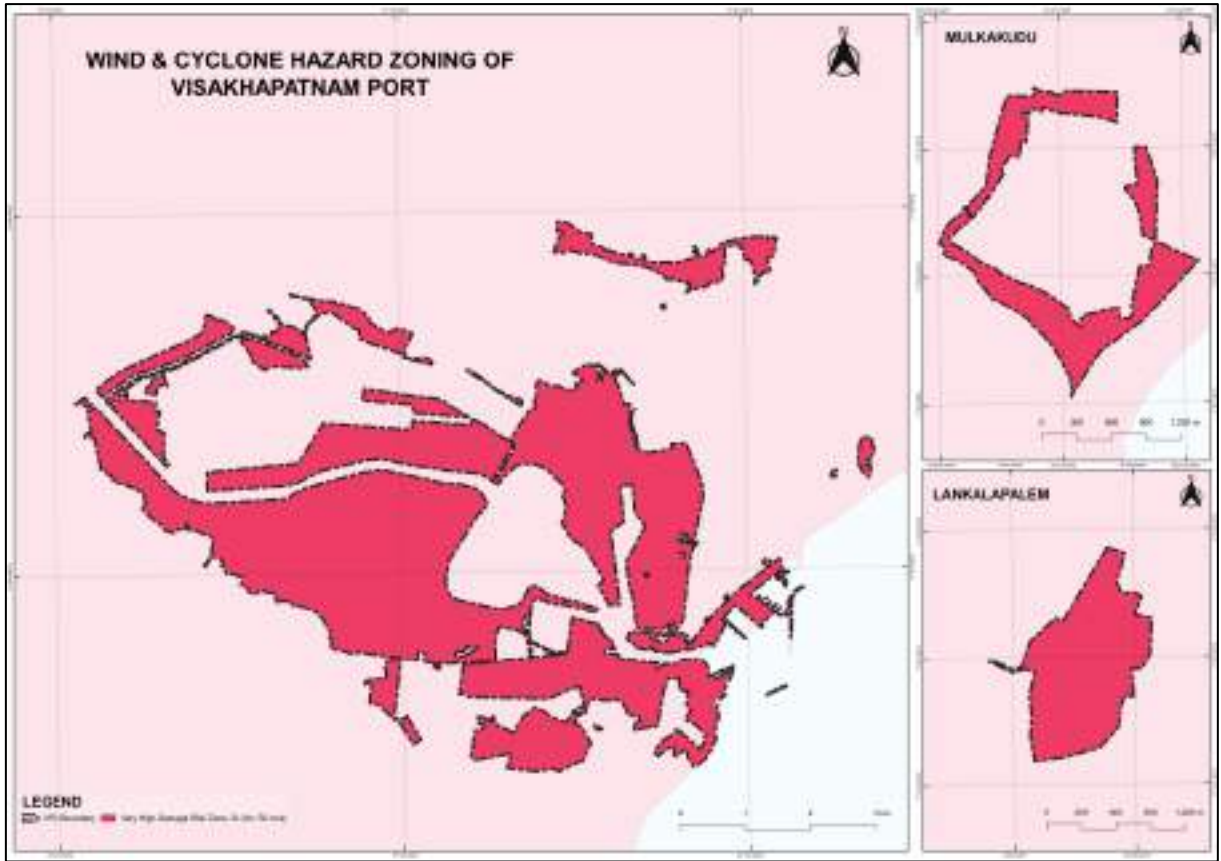
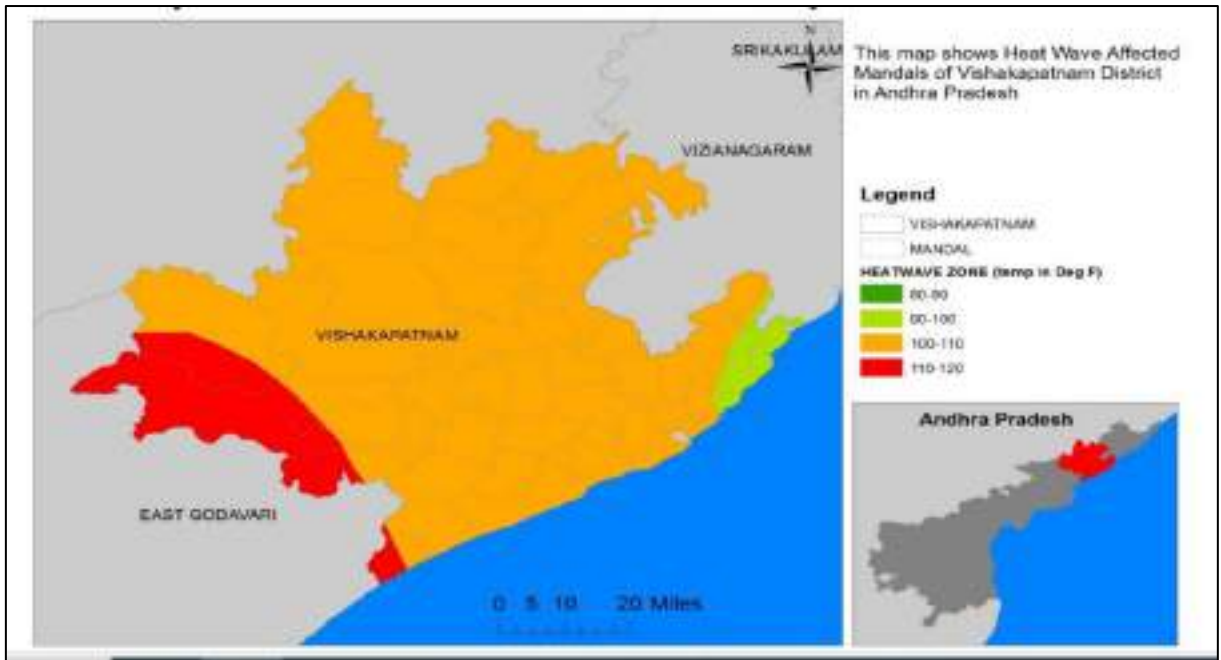


Figure 9-13: Wind Hazard Map of Study Area



Visakhapatnam district is witnessing more frequent and devastating heat wave conditions over the past years as explained in the section of HVCA. Major portion of the district has been found witnessing and exposed to extreme heat wave conditions.

Figure 9-14 Heat Wave Affected Areas of Visakhapatnam District



10 STAKEHOLDER CONSULTATION

10.1 STAKEHOLDER CONSULTATION MEETING – 1

A consultation meeting has been conducted after the submission of inception report on 29th February 2024 to understand the aspirations of the traders, lessees and other stakeholders. A total of 49 stakeholders attended the meeting and the minutes of the meeting are annexed in the report. Project brief is presented to the stakeholders and a questionnaire has been circulated among the stakeholders in Google forms and noted down their inputs on the land use plan have taken up.

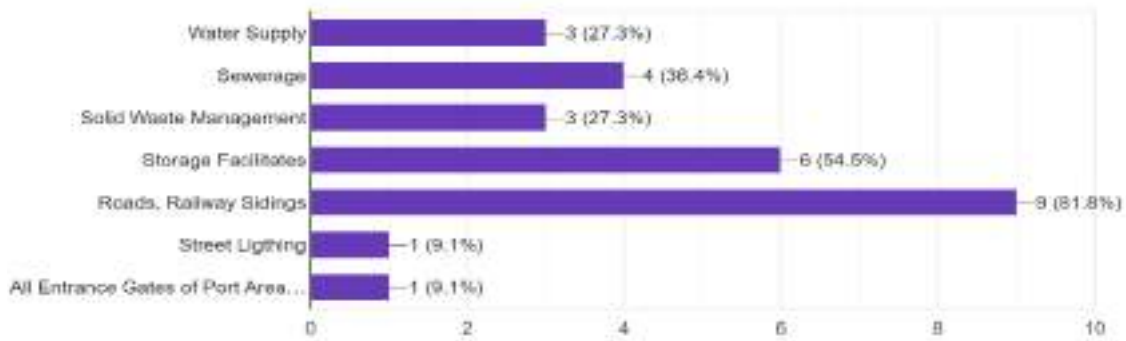
Figure 10-1 Stakeholder Consultation



Outcomes of the stakeholder review are presented down below.

10.1.1 Facilities to be improved in VPA

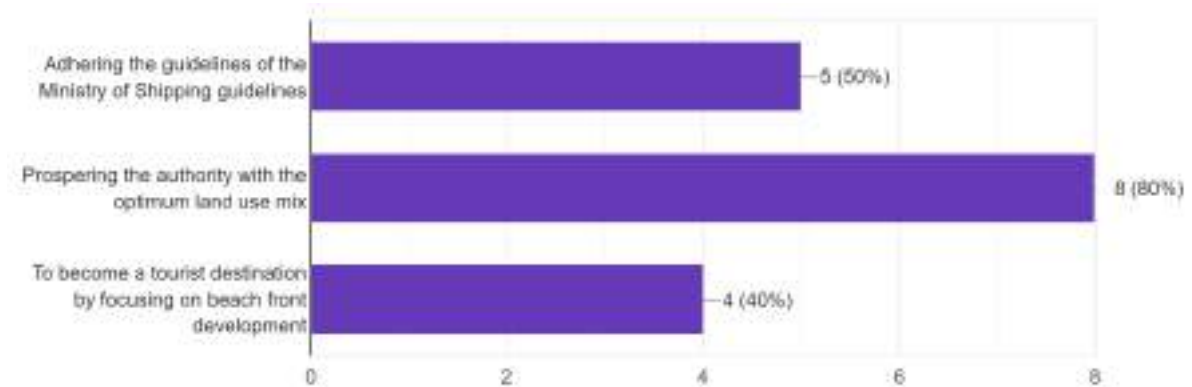
Figure 10-2 Facilities to be improved in VPA



Roads and Railway Sidings are appearing to be the most identified issue for the stakeholders.

10.1.2 Vision for VPA Land Use Plan

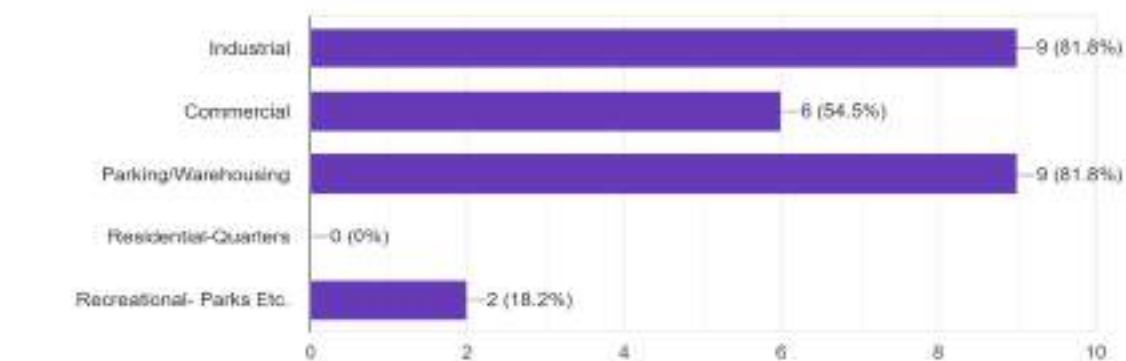
Figure 10-3 Vision for VPA Land Use Plan



Stakeholders feel that the mix land use plan to be the vision for land use plan.

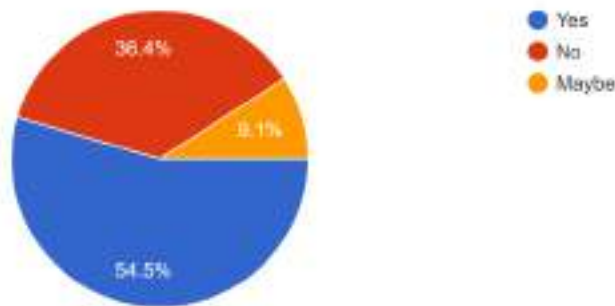
10.1.3 Focussed Land Uses for VPA

Figure 10-4 Focussed Land Uses for VPA



Stakeholders feel that industrial and parking/warehousing land uses to be focussed land uses on the proposed land use plan.

10.1.4 Existing Stackyards fulfilling traders' Requirements

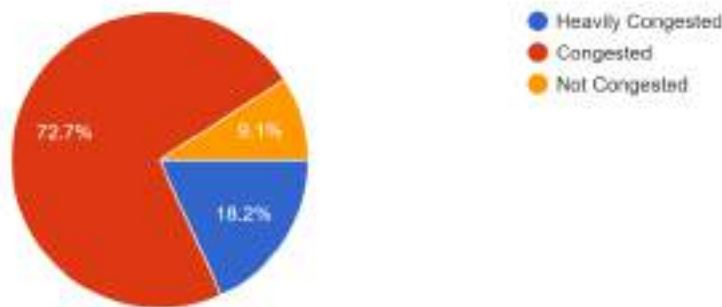


More than half of the stakeholders feel that the existing stack yards are sufficient and all of them feel that the reorganization of stack yards is necessary.

10.1.5 Access Road

Around 73% of respondents feel that the access roads are always congested, and 18 % respondents feel that access roads are heavily congested and suggested the changes required.

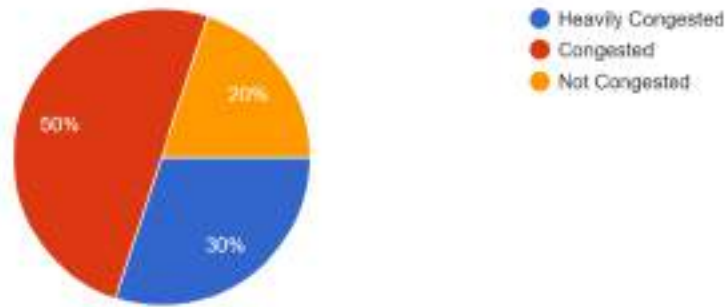
Figure 10-5 Congestion in Access Roads



10.1.6 Internal Roads

Similarly for internal roads, 50% respondents feel that internal roads are congested and 30% respondents feel that internal roads are heavily congested and suggested the changes required.

Figure 10-6 Congestion in Internal Roads



10.2 STAKEHOLDER CONSULTATION MEETING – 2

Considering the inputs shared by lessees and the authority, consultants have prepared a draft land use plan and submitted to the authority for their review on 30th April 2024. After reviewing the draft report authority has shared their inputs on the plan with the consultants during May 2024. With inputs shared by the authority on the draft land use plan, consultants have revised the draft plan and submitted a revised land use plan on 15th July 2024 and a stakeholder consultation has been called out with lessees on 17th July to understand the views of the traders, lessees and other stakeholders on land use plan. A total of 29 stakeholders attended the meeting and the minutes of the meeting are annexed in the report. Project brief is presented to the stakeholders and a questionnaire has been circulated among the stakeholders in Google forms and noted down their inputs on the draft land use plan have taken up.

Figure 10-7 Stakeholder Consultation - 2





Meeting was initiated with a formal introduction of project and team to deputy chairman by superintendent engineer. The stakeholder consultation meeting for the land use plan of Visakhapatnam Port Authority served as a vital platform for engaging community members, local businesses, urban planners, and government representatives in a collaborative discussion about future land development strategies.

During the meeting, participants were encouraged to voice their perspectives on proposed zoning changes and community amenities and infrastructure development & improvements. Attendees expressed diverse viewpoints on issues such as green spaces, and transportation access, fostering a rich dialogue about balancing growth with sustainability. The meeting aimed to ensure that the land use plan reflects the community's vision while addressing concerns related to environmental impact and economic viability.

The primary objective of the meeting was to understand on the proposed developments and address any concerns regarding environmental impact, economic benefits, and logistical challenges. By actively involving stakeholders in the planning process, the meeting sought to build consensus and promote a shared commitment to creating a vibrant and inclusive urban environment.

By fostering an open dialogue, the meeting aimed to ensure that all voices were heard and that the final plan reflected the community's needs and aspirations while promoting economic growth and environmental stewardship of VPA.

10.2.1 Recommendations for the inputs shared in stakeholder consultation

Advisor Sir suggested that Mulakuddu shall be further explored for Marine aqua processing units/Marine Agro industries

As recommended by the VPA regarding Mulakuddu 154 ac in addition to the port area. As we have suggested waterfront tourism in Mulakuddu additional area also, Land use zoning and detailing is also proposed for additional land that is under proposal for acquisition by VPA. 154.01 acres out of 172 acres additional land is proposed with detailed land uses under waterfront tourism node. we have developed the recommendations and explanations below based on the authority's comments on alternative proposals regarding marine aqua processing and marine Agro industries.



- The proposed Marine -Aqua Agro Procession Industry is an Orange Category industry (as per CPCB Industrialization)
- As the proposed area is 62 Ha it attracts 8 (b) Township and area development as per EIA 2006 notification clearance need to be obtained from state.

Land Use Statement for Mulakuddu Site:

Landuse	Colour	Area in Acre.	%
Industries	Purple	101.93	66.2
Utility	Yellow	4.35	2.8
Parking	Grey	7.50	4.9
Road	Light Grey	17.82	11.6
Green Belt	Green	17.04	11.1
Open Space	White	5.37	3.5
Total		154.00	100.0

- The industrial area allocated (Aqua/Marine processing industries) is around 66.2% with 101.93 acres out of the total area.
- Truck parking area is 4.9% with 7.50 acres whereas area allocated to utilities is 2.8% with 4.35 acres.
- Green area comprising of green buffer, open spaces and peripheral green belt are around 11.1% with 17.04 acres. And open space is 3.5%. with 5.37 acre and for roads 11.6% with 17.82 acres.
- The Total processing area is 101.93 Acre which is 66.2% whereas non processing area is 52.07 acre which is 33.8% of the total area.
- The Total Saleable Area is 101.93 acre which is 66.2% whereas non-saleable area is 52.07 acre which is 33.8%.
- Twenty industrial plots total, each with more than 3 acres, have been suggested in the proposal.

Need to look after Harbour Park proposal, suggested changes in the residential and commercial land allotment:

Land Use plan showing Predominantly Residential Zone

- To integrate current residential areas with the intended development, resulting in improved facilities and utilities.
- Redevelopment of the residential quarters will maximize the utilization of existing land for mixed residential development.

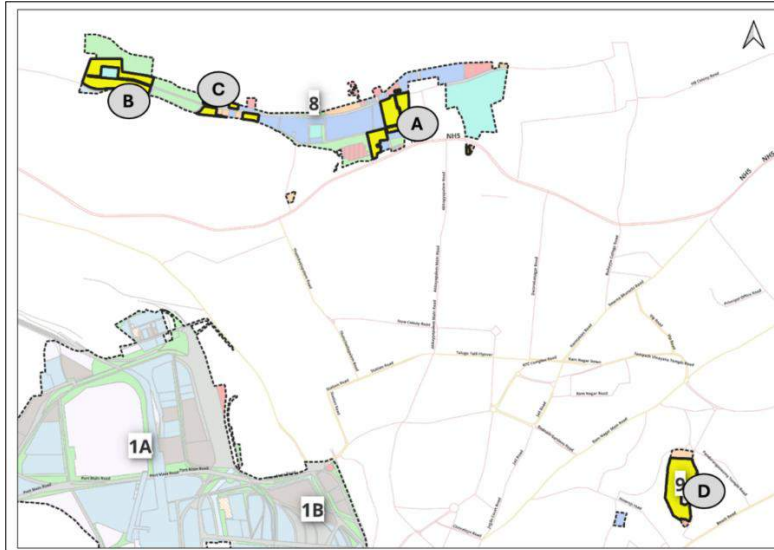


Figure 10-8 Residential Use Zone

Residential Proposals

VPA is accommodating its employees with residential quarters. There are 5 types of flats planned for its employees based on their cadre.

There are 34 type-1 quarters, 348 type-2 quarters, 63 type-3 quarters, 13 type-4 quarters, 6 type-5 quarters and bungalows as well excluding the dismantled structures.

It is suggested to optimise the quarters with the same existing number during the consultations. These all-existing buildings are Ground, G+1, G+2 structures. We have further worked out to optimise the land parcel wise and described in the following sections

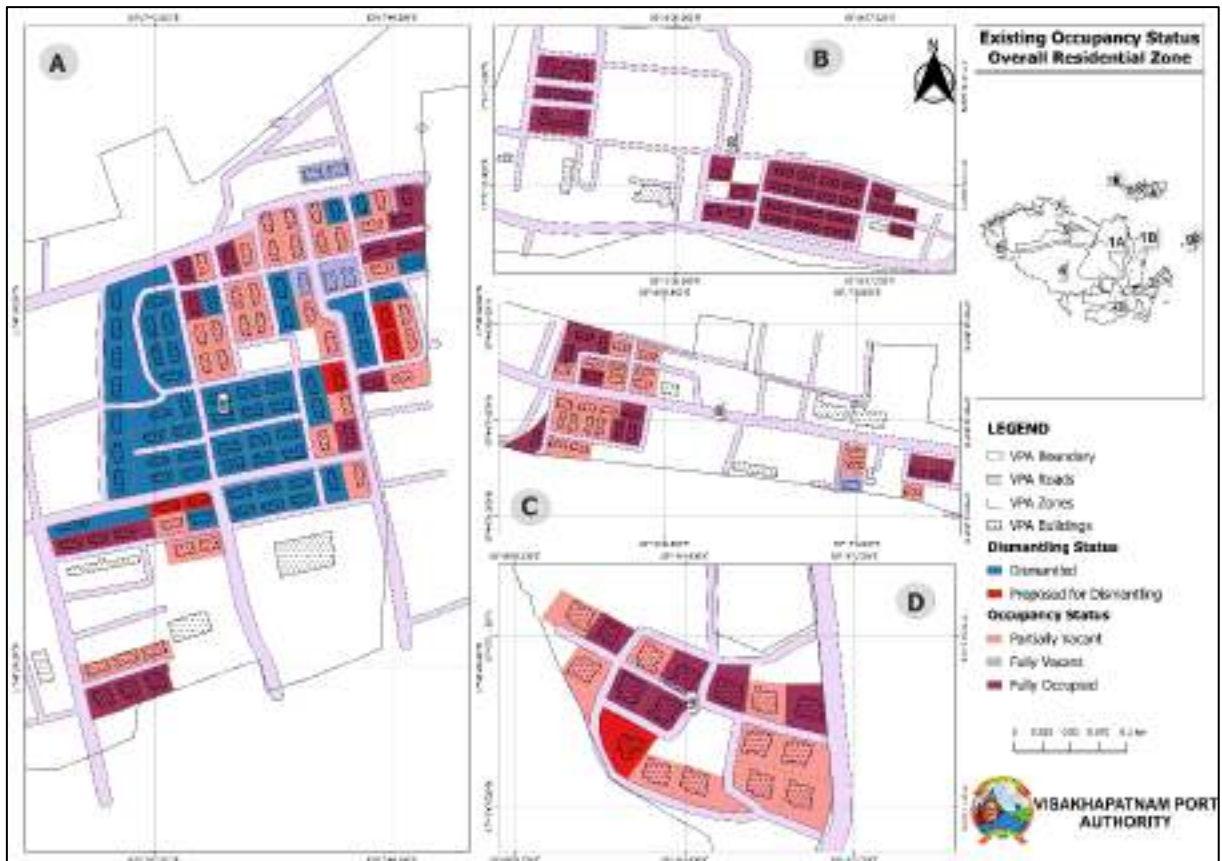


Figure 10-9 Existing Occupancy Status of Residential Use Zone of VPA

Salagramapuram residential quarters, Harbour Park Quarters, DLB Quarters, and CISF Quarters are all part of the VPA residential area but getting to the VPA Scenario Occupancy of quarters is gradually decreasing, so there is no growth observed in residential population as per VPA official consultation meetings, and the reason is that there is no new recruitment and existing employees are retiring, and for optimal usage of land based on the existing condition of quarters and their occupancy status, quarters in Harbour Park, Salagramapuram, and dlb are scattered horizontally, so for better usage of land proposing new residential towers in all residential areas.

Salagramapuram:

Three residential buildings will be developed on 3.57 acres, with a built-up area of 2.14 acres.

Thus, the entire area would be around 466092 square feet and would be developed in three blocks with 288 flats (Type 2 - 1200 SFT), 36 flats (Type 3 - 2000 SFT), 12 flats (Type 4 - 2300 SFT), and 6 flats (Type 5 - 3450 SFT). The plot of land is 2.14 acres, or 93218 square feet (Basement 1 & 2, Stilt + 5 Floors).

Harbour Park:

Two residential buildings will be developed on 0.71 acres, with a built-up area of 0.42 acres. Thus, the entire area would be around 89295 square feet and would be developed in two blocks with 38 flats (Type 5 - 2350 SFT).The plot of land is 0.41 acres, or 17860 square feet (Basement 1 & 2, Stilt + 5 Floors).

DLB quarters:

Two residential buildings will be developed on 1.12 acres, with a built-up area of 0.67 acres. Thus, the entire area would be around 145925 square feet and would be developed in two

blocks with 28 flats (Type 1 - 2200 SFT), 28 flats (Type 2 - 2400 SFT) and 6 Flats (Type 3 - 2500 SFT) The plot of land is 0.67 acres, or 29186 square feet (Basement 1 & 2, Stilt + 5 Floors).

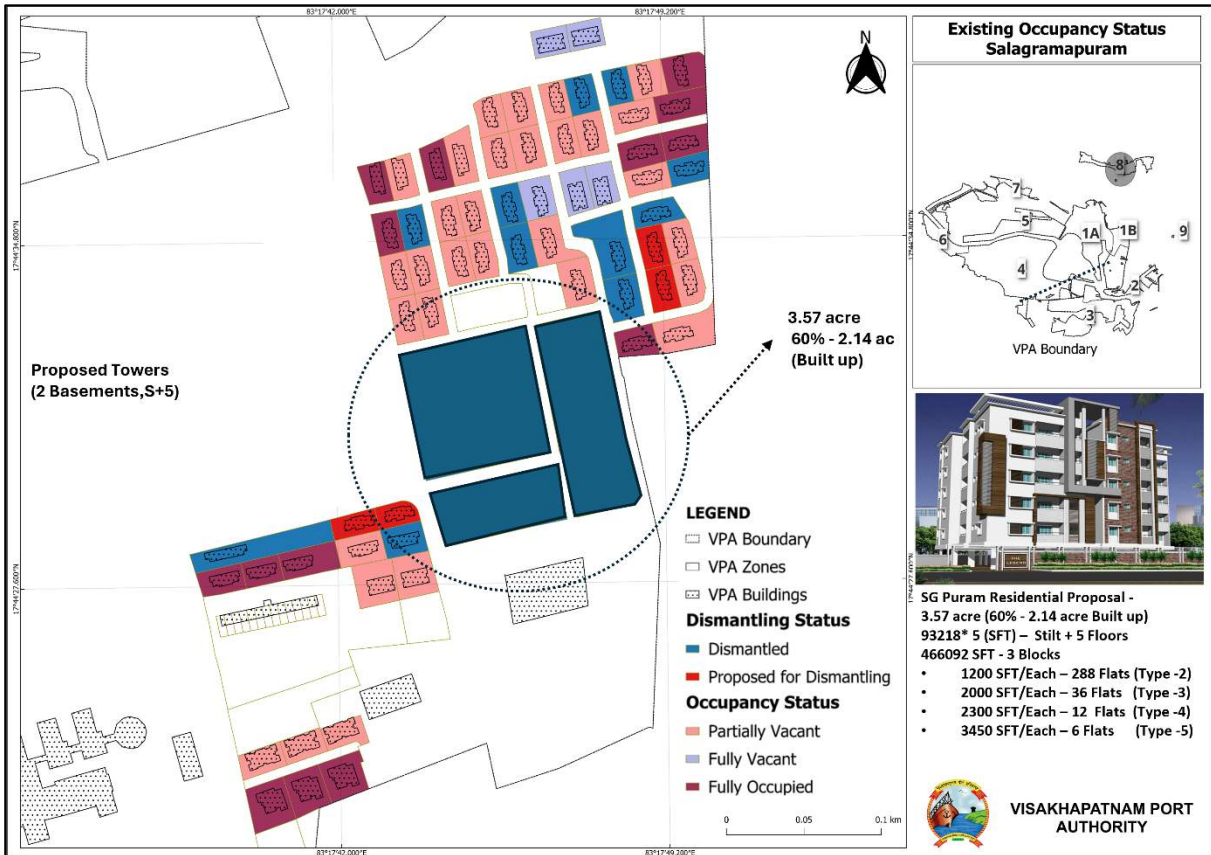


Figure 10-10 Proposed Residential Blocks of Salagramapuram

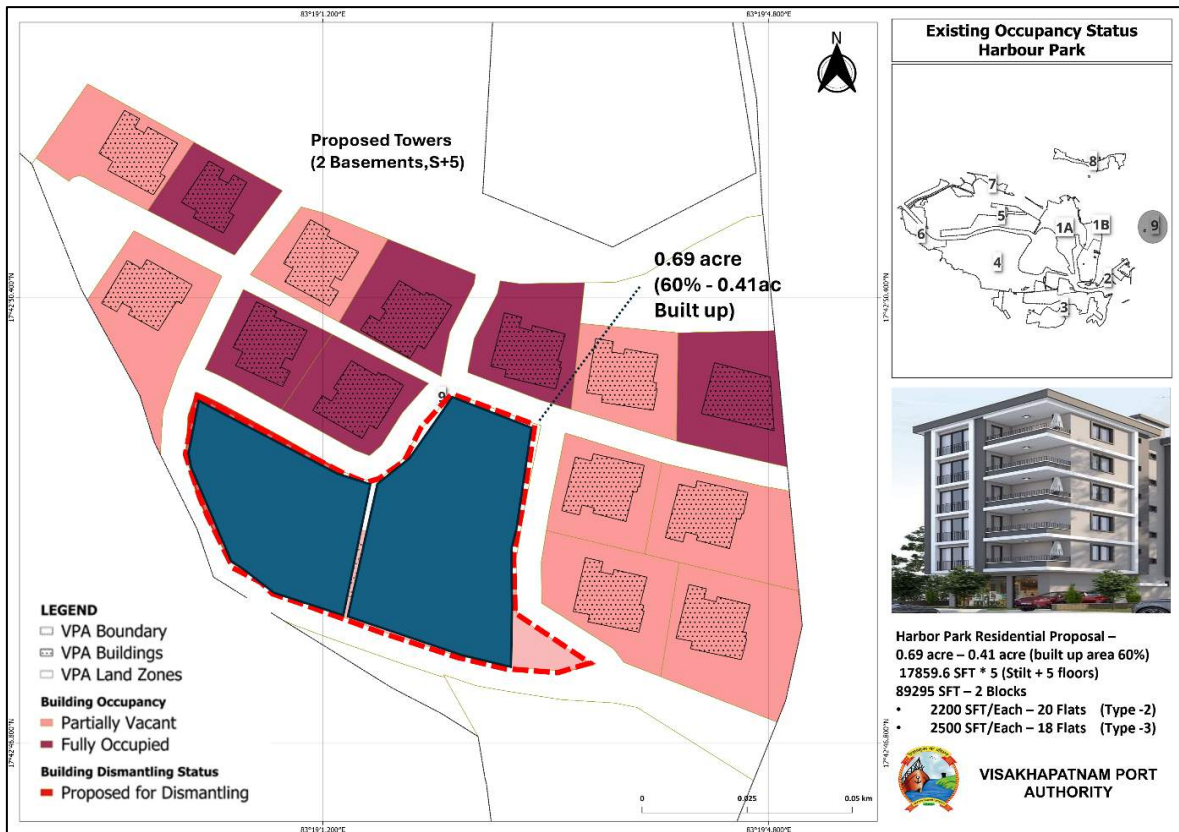


Figure 10-11 Proposed Residential Blocks of Harbour Park in Draft land use

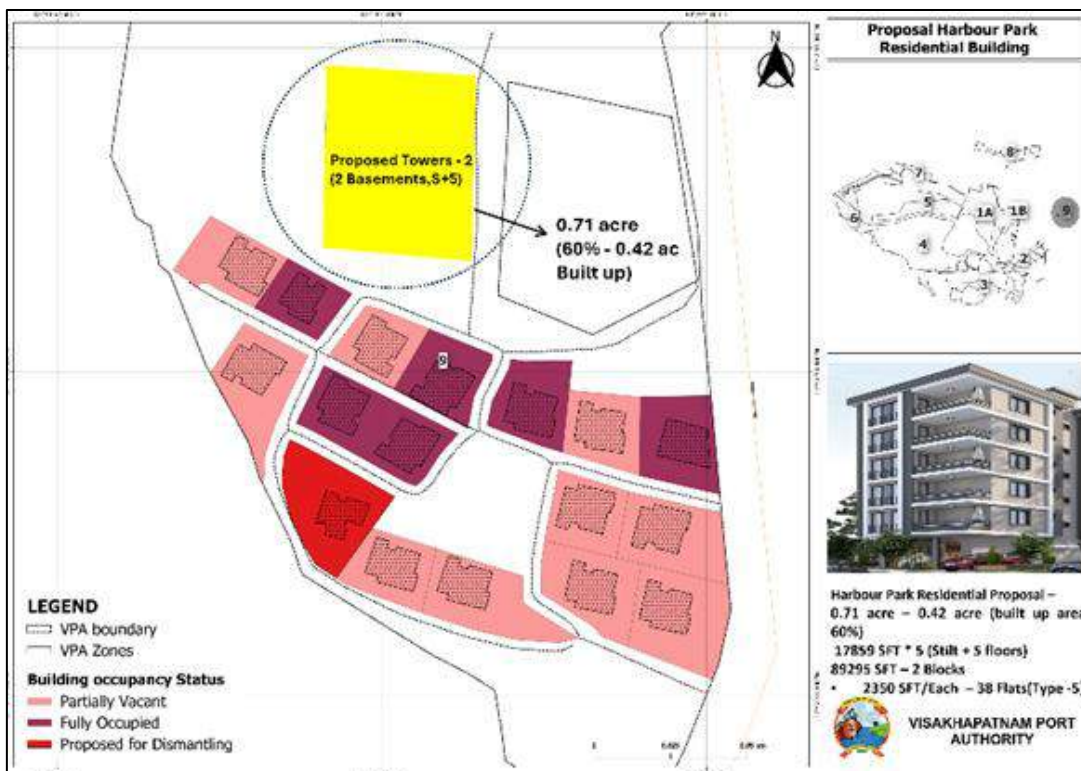


Figure 10-12 Revised Proposal of Residential Blocks of Harbour Park as per VPA's recommendations

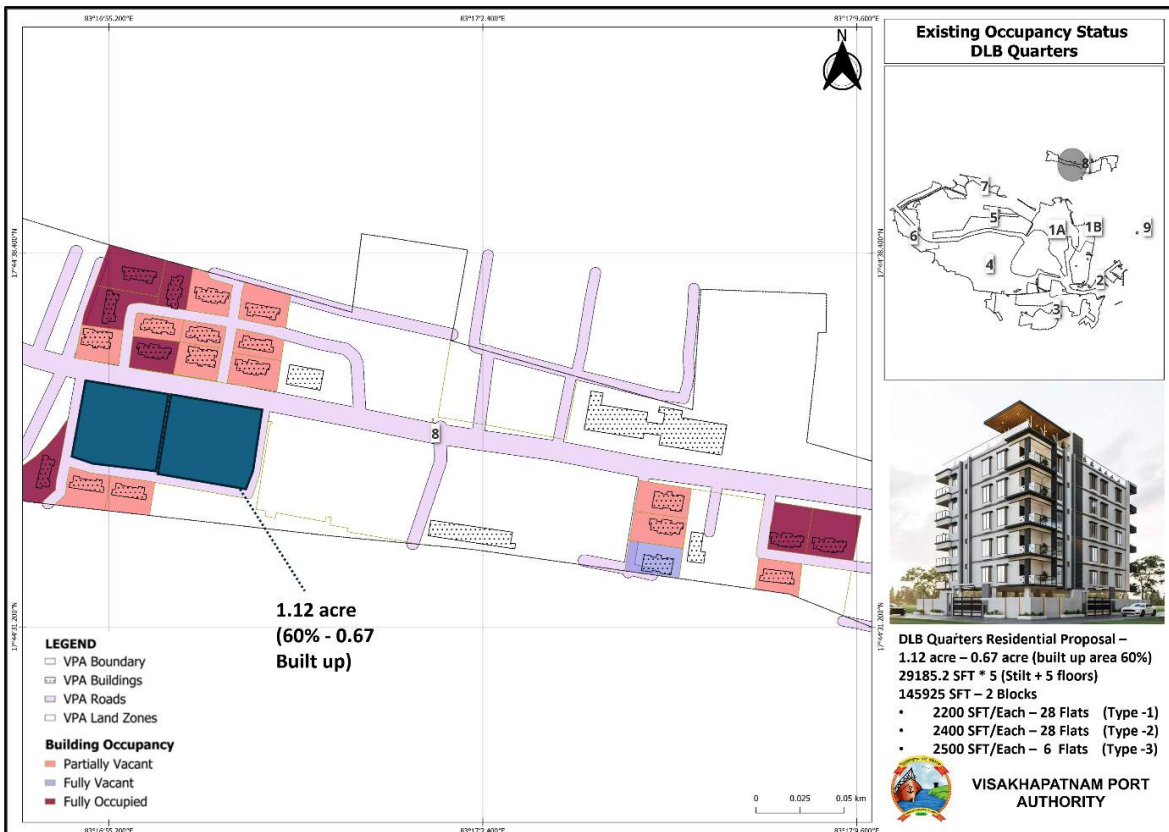


Figure 10-13 Proposed Residential Blocks of DLB Quarters

1. Deputy chairman suggested that the proposal for mechanised sweepers to control the dust pollution shall be relooked and other alternatives may be explored.



Water Curtain System

- Water Curtain system can be introduced along the roads on both the sides

Anti-dust water curtain system is a part of an eco-friendly, hygienic anti-dust building system for roads.

Manufacturing process:

A recovery water tank, a drainage ditch, and water collection pits make up the water collection system. The water spray curtain is positioned above the recovery water tank. The anti-dust water curtain system also includes water pumps. The water spray curtain is created by attaching water spray tubes to a support and evenly distributing water outlets at the lower sides of the tubes. The water source is connected to the water collection system, the water pits are spaced out in the drainage ditch, the water pumps are fixed in the water collection ditches, and the recovery water tank and the ditch are connected by an interval channel. The anti-dust water curtain system's features include a quick installation time, little material loss,

reduced labour requirements, effective control, stable operation, and significant financial gain. an anti-dust water curtain system for port roads is designed to mitigate dust emissions generated by vehicle traffic on unpaved or poorly surfaced roads within port facilities.

Components of an Anti-Dust Water Curtain System:

Water Sprayers:

Positioning: Strategically placed along the sides of the road or above it, depending on the design and road layout.

Control System: Automated or manual control to regulate water flow and timing.

Water Source:

Tank: Large capacity reservoirs or tanks to hold water.

Pump: High-capacity pumps to deliver water to the sprayers.

Nozzles:

Type: Typically, fine mist nozzles or atomizers to create a mist-like curtain of water.

Distribution: Evenly distributed to cover the width of the road or specific sections prone to dust.

Automation and Control:

Sensors: Environmental sensors (like dust concentration sensors) to detect dust levels.

Automated Control: Integration with sensors to activate water sprayers when dust levels exceed a certain threshold.

Manual Override: Option for manual activation or adjustment by operators.

Environmental Considerations:

Water Usage: Efficiency measures to minimize water consumption while effectively controlling dust.

Water Quality: Consideration of water quality to prevent environmental contamination.

Functionality and Benefits:

Dust Suppression: Creates a mist curtain that captures dust particles, preventing them from becoming airborne.

Environmental Compliance: Helps ports meet environmental regulations and standards for air quality.

Improved Visibility and Safety: Reduces airborne dust that can impair visibility and pose health risks to workers and nearby communities.

Cost-Effectiveness: Compared to other dust control methods, can be cost-effective in the long term with proper maintenance and operation.

Operational Efficiency: Helps maintain road surfaces by reducing erosion caused by dust and vehicle traffic.

Considerations for Implementation:

Site Assessment: by Conducting a thorough assessment of road conditions, traffic patterns, and dust emission sources.

Maintenance: Regular maintaining of equipment such as pumps, nozzles, and sensors to ensure continuous and effective operation.

Monitoring and Adjustment: Regular monitoring of dust levels and system performance to optimize water usage and dust suppression effectiveness.