



Shell Energy India Private Limited
(Formerly known as Hazira LNG Private Limited)

Letter No.: SEIPL/MOEF/2023/0003

Date: 29th May 2023

Village & PO: Hazira
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Gujarat - 394 270
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To,
Deputy Director General of Forests (C),
Ministry of Environment, Forest and Climate Change,
Integrated Regional Office, Gandhi Nagar A wing- 407 & 409,
Aranya Bhawan, Near CH-3 Circle, Sector-10A, Gandhi Nagar-382010

Sub.: Environmental Compliance Report for the period November 22 - April 2023 from **Shell Energy India Private Limited.**

Respected Sir,

Please find enclosed the Environmental Compliance Report for the period November 22 - April 2023 from **Shell Energy India Private Limited** (formerly known as Hazira LNG Private Limited) and **Hazira Port Private Limited.** The report includes status of conditions stipulated as part of:

1. Environmental Clearance from Ministry of Environment and Forests, Government of India (Letter no. J-160011/23/2000IA-Ilt, dated 2nd March 2001 and letter no. J-160011/232000-IA III, dated 4th January, 2002);
2. Approval under CRZ Notification from Forests and Environment Department, Government of Gujarat (Letter no. ENV-10.2000-1883-PI, dated 29th March, 2001);
3. An amendment to the Environment clearance granted for M/s Hazira LNG Pvt. Ltd. for construction of storage tank of LNG having capacity of 200, 000 cubic meters. (F.No. J-16011/23/2000-IA-III/Pt) vide approval dated 9th April 2013.
4. Environmental Clearance from Ministry of Environment and Forests, Government of India (Letter no. J-160011/2f)/2003-IA-III, dated 24th October 2003 and no. J-160011/20/2003-IA-II, dated 24th May 2004 and subsequent amendment vide letter No. 10-6(J-2009-IA-III dated 08-12-2009 for 14 km Pipeline.

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5. Environmental and CRZ Clearance for augmentation in capacity of existing LNG Terminal of 5 MMTPA and 10 MMTPA along with pipeline of 13.9 km with suitable tap-off at survey no 319 vide letter no. F.No. 11-88/2011-IA-III vide Dated: 30th December 2013
6. Extension of Environmental and CRZ Clearance granted for 10 MMTPA capacity along with pipeline of 13.9 Km accorded by Ministry of Environment & Forests, Government of India, F.No. 11-88/2011-IA-III Dated: 13th January 2021

We trust that you would find the enclosed information / documents in order and would be happy to reply any query in this regard.

Thanking you.

Yours faithfully,

Rajesh Shah
HSE Manager
Shell Energy India Private Limited

Enclosures:

1. Annexure 1: Report on Mangroves Plantation Monitoring Using Remote Sensing Techniques
2. Annexure 2: Location Map
3. Annexure 3: Stack & Ambient Air Monitoring Report
4. Annexure 4: Wastewater outlet analysis report
5. Annexure 5: SP Highlights May 2022 to October 2022
6. Annexure 6: Environment Management Cell
7. Annexure 7: Environment Expenses

Cc:

- (1) The Unit Head - Surat, Gujarat Pollution Control Board, Gandhinagar
- (2) Regional Officer, Gujarat Pollution Control Board Surat
- (3) Chairmen, GCZMA, Govt of Gujarat, Sachivalaya, Gandhinagar
- (4) Zonal Office, Central Pollution Control Board, Parivesh Bhawan Opp. VMC Ward Office No. 10, Subhanpura, Vadodara-390 023



Shell Energy India Private Limited

(Formerly known as Hazira LNG Private Limited)

Hazira, District Surat

Environmental Compliance Report (Period- November 22 - April 2023)

Section I

Compliance to conditions imposed as part of Environmental Clearance accorded by Ministry of Environment & Forests, Government of India

Revision to Environment Clearance from Ministry of Environment and Forests;

Letter No. J-16011 /23/2000-IA.III Dated: 4th January 2002

Status Period: November 22 - April 2023

	Conditions	Compliance Status
i	Trenching technique shall be adopted for the movement of sea water during high and low tides into mangrove area near the project site to ensure that the mangroves are not affected adversely. In addition, program for mangrove afforestation shall be undertaken at appropriate locations to increase the mangrove plantation in the Hazira area. A periodic progress report (six monthly) shall be submitted to this ministry in this regard.	Hazira is monitoring mangroves at various locations as follows: Junagam Smashan, Junagam Sea Site, Rajgari Smashan Site, Rajgari Khada, Rajgari Khada New, Rajgari Sea Site, Vasva Site-1, Vasva Site-2, Tunda Dabhari, Tunda Mor Site-1, Tunda Mor Site-2, Karanj. Agency for satellite monitoring is identified & report of Dec 2022 is attached in Annexure I
ii	Compensatory afforestation shall be undertaken in lieu of the forest land to be used for widening of the road for the project.	Compensatory afforestation has completed. Plantation of total 9122 Horticulture grafts and 8685 terrestrial saplings carried out in Hazira Peninsula.
iii	The road widening shall be restricted to 20 meters and the pipeline corridor shall also be accommodated within this width.	The road is abandoned, and new road constructed by NHAI in use.
iv	It shall be ensured that no project activities except pipeline and approach road fall within CRZ I (i).	It is ensured that no project activities except pipeline and approach fall within CRZ (i) scope.
v	The specific conditions no. (v), (vi) and (vii) contained in this Ministry's earlier clearance of even no. dated 2 nd March 2001 shall stand deleted.	Noted. The specific conditions no. (v), (vi) and (vii) contained in this Ministry's earlier clearance of even no. dated 2 nd March 2001 shall stand deleted.
vi	A comprehensive EIA study shall be carried out to assess the impact of the proposed activities and based on the same the detailed Environmental Management Plan will be prepared and submitted within six months.	The EIA conducted for Hazira facility had been submitted to the ministry. Same was submitted again with Environment Compliance report for period November 18- April 19.
vii	NOC for Gujarat Pollution Control Board for the revised scope of the project shall be obtained and submitted within 30 days.	Revised NOC has been obtained Amendment to consent from GPCB dated 22 March 2002, submitted vide letter No 2 nd Feb 2004.

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Section II

Environment Clearance, MoEF letter Dated 2nd March 2001, OM No J-16011/23/2000-IA.III

Status Period: November 22 - April 2023

	Specific Conditions	Compliance Status
i.	All the conditions stipulated by the Forests and Environment Department, Government of Gujarat vide their letter no. ENV-10-2000-1883-P.1 dated 29.09.2000 should be effectively implemented.	Status of compliance is presented in Section II.
ii.	All the conditions stipulated by Gujarat Pollution Control Board in their NOC No. NOC/P/HAZ/CHEM/S-67/31803 dated 25.07.2000 should be effectively implemented.	Environmental Compliance Report for LNG Terminal and Port, Hazira, District Surat, submitted vide letter dated 2 nd Feb 2004. The conditions are being complied. Same was submitted again with Environment Compliance report for period November 18-April 19.
iii.	No change in scope of work shall be made without prior approval of this Ministry.	Noted. In order to enhance capacity to 10MMTPA: (1) EC & CRZ Clearance vide letter No. F.NO 11-88/2011 dated 30 th September 2013 obtained. (2) EC & CRZ Clearance extended till 29 th December 2023 vide letter no. F.NO 11-88/2011-IA.III Dated: 13 th January 2021.
iv.	The necessary approval for diversion of forest land involved in the project shall be obtained prior to commencement of construction at site and a copy furnished to this Ministry.	The forest clearance has been obtained from the Forest Department vide letter no. 8B/27/2001-FCW/3511 dated November 22, 2001.
v.	It shall be ensured that no project activities fall within CRZ I (i).	Deleted by MoEF letter No. J-16011/23/2000-IA.III of 04.01.2002.
vi.	The pipeline alignment should be reworked so as to avoid CRZ I (i).	Deleted by MoEF letter No. J-16011/23/2000-IA.III of 04.01.2002.
vii.	Expansion of existing service road into CRZ I (i) areas would not be permissible.	Deleted by MoEF letter No. J-16011/23/2000-IA.III of 04.01.2002.
viii.	The Horizontal Directional Drilling technique shall be adopted for laying of the pipeline along the existing road.	Noted.
ix.	A location map showing the various project activities with respect to the low and high tide lines (duly demarcated and authenticated by one of the authorized agencies) and the corresponding CRZ classification of the area (duly authenticated by State Environment Department) shall be furnished within one month.	The location map with respect to high tide and low tide lines has been attached in Annexure II.
x.	The construction designs relating to the project shall be reviewed to ensure their safety keeping in view the seismic potential of the area.	The construction design of the Jetty & Terminal has taken into account the seismic classification of the area. This requirement is complied.
xi.	No ground water shall be used for the project.	No groundwater is being utilized.
xii.	The project proponents should make specific arrangement for rainwater harvesting in the project design and the rainwater so harvested should be optimally utilized.	A rainwater harvesting is planned for implementation during the LNG terminal expansion project.
xiii.	A detailed study on the shoreline/accretion as a result of the project activities should be undertaken. Based on the results obtained from the study, the necessary shore erosion protection measures as may be required should be put in place by the proponent.	Detailed studies and results submitted to the Ministry vide our responses dated 30/10/2000. No negative impacts envisaged. Same was submitted again with Environment Compliance report for period November 18-April 19.
xiv.	The Bathymetric survey of the dredged material disposal site should be carried out regularly and it should be ensured that there is no navigational hazard due to reduction of navigational depth	Noted & Complied with.

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	as a result of project activities. Location of dumping site should be informed to all concerned including the Gujarat Maritime Board.	
xv	Regular surveys shall be conducted to identify changes in the channel morphology so that navigational hazards are minimal.	Noted & Complied with.
xvi	The approach channel shall be properly demarcated with lighted buoys with radar reflectors for safe navigation. Procedures for pilotage, navigating through the channel, entry to the port basin, etc. will be established and made freely available to the ships as well as the port operational staff.	Noted & Complied with.
xvii	Mangrove afforestation will be promoted in consultation with the expert agencies and the local NGOs in the area. A detailed plan shall be worked out in this regard and submitted to this Ministry within 3 months.	Noted & Complied with.
xviii	Marine environment of Hazira will be periodically monitored to assess changes, if any, in the ecology and suitable remedial measures, if required, will be taken.	Noted & Complied with.
xix	The budget allocated for environment safeguard measures shall not be diverted for any other purpose.	Noted & Complied with.
xx	The comprehensive EIA report which is under preparation shall be completed early and the final report submitted to this Ministry within one year.	Noted & Complied with.
xxi	Based on the risk analysis, Disaster Management Plan should be prepared and submitted to this Ministry within 6 months.	Noted & Complied with.
	General conditions	Compliance Status
i.	Construction of the proposed structures should be undertaken meticulously conforming to the existing Central/ local rules and regulations including CRZ Notification 1991 and its amendments. All the construction designs/ drawings relating to the proposed construction activities must have approvals of the concerned State Government Departments/ Agencies.	Construction activities are in line with applicable legislation. Approvals have been received on the proposed construction activities and designs from the relevant State government departments/ agencies.
ii.	The proponent shall ensure that as a result of the proposed constructions, ingress of the saline water into the ground water does not take place. Piezometers shall be installed for regular monitoring for this purpose at appropriate locations on the project site.	This requirement has been complied with during the project phase. Soil and risk assessment of the site is done to verify any contamination for ground water.
iii.	Handling, manufacturing, storage and transportation of all hazardous chemicals should be carried out in accordance with MSIHC Rules, 1989 and subsequent amendments. All approvals from State & Central nodal agencies including OISD, Chief Controller of Explosives, Chief Inspector of Factories must be obtained. A comprehensive contingency plan in collaboration with the concerned authorities must be formulated before commissioning of the project to meet any eventuality in case of an accident.	Compliances of MSIHC rules are submitted along with Jan-June 2012 Environmental compliance report. License under factories act is renewed till up to 31-12-2028. CCOE-PESO license for storage of diesel (1023.5kl) in tank-T-2101 & V-1501 renewed up to 31-12-2026. Third Party safety audit (under Gujarat Factories Rules) conducted in December 2022. Accreditation certificate for Hazira emergency response and disaster management plan from CEIL-Bureau Veritas-PNGRB approved agency obtained upto-12-08-2023.
iv.	A well-equipped laboratory with suitable instruments to monitor the quality of air and water shall be set up so as to ensure that the quality of ambient air and water conforms to the prescribed standards. The laboratory will also be equipped with qualified manpower including a marine biologist so that the marine water quality is regularly monitored in order to ensure that the marine life is not adversely affected as a result of implementation of the said project. The quality of ambient air and water shall be monitored periodically in all the seasons and the results should be properly maintained for inspection of the concerned pollution	The site laboratory has been established for important environmental parameters monitoring with respect to prescribed standards. Regular monitoring of water quality is being carried out by the MoEF and NABL accredited laboratory. Quality of ambient air and water monitored has been submitted as part of compliance to consent conditions. The same being submitted through compliance reports. Kindly refer to Annexure IV for the monitoring reports of last six months.

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	control agencies. The periodic monitoring reports at least once in 6 months must be sent to this Ministry (Regional Office at Bhopal) and SPCB.	
v.	Adequate provisions for infrastructure facilities such as water supply, fuel for cooking, sanitation etc., must be provided for the laborer during the construction period in order to avoid damage to the environment. Colonies for the laborer should not be located in the CRZ area. It should also be ensured that the construction workers do not cut trees including mangroves for fuel wood purpose.	Noted. These requirements have been considered during project construction phase.
Vi	To prevent discharge of sewage and other liquid wastes into the water bodies, adequate system for collection and treatment of the wastes must be provided. No sewage and other liquid wastes without treatment should be allowed to enter into the water bodies.	A dedicated combined effluent treatment package plant is fully operational. The wastewater after being treated is being discharged into the garden cum plantation area. Kindly refer to Annexure III for the analysis reports of the treated wastewater stream.
vii.	Appropriate facility should be created for the collection of solid and liquid wastes generated by the barges/ vessels and their safe treatment and disposal should be ensured to avoid possible contamination of the water bodies.	The barely Solid and liquid (mainly oil) waste generated from ships are being collected at Hazira port with prior intimation from ship authority. Waste is being handled and disposed as per the national laws.
viii.	Necessary navigational aids such as channel markers should be provided to prevent accidents. Internationally recognized safety standards shall be applied in case of barge/vessel movements.	The Hazira port is complying with the National Port Safety Standards.
ix.	The project authorities should take appropriate community development and welfare measures for the villagers in the vicinity of the project site, including drinking water facilities. A separate fund should be allocated for this purpose.	The project authorities are actively involved in the community development and welfare measures. Several community development and welfare measures have already been initiated and completed – programs for improvement of health and education are being implemented on an ongoing basis. The status of the same is being reported through compliance reports. 9 RO plants have already been established in various locations. Please refer Annexure V for Social Performance Highlights.
x.	The quarrying material required for the construction purpose shall be obtained only from the approved quarries / borrows areas. Adequate safeguard measures shall be taken to ensure that the overburden and rocks at the quarry site do not find their way into water bodies.	This requirement was during project phase. The quarrying material during construction phase was obtained from approved quarry site with proper environmental controls.
xi.	The dredging operations to be undertaken with the prior approval of this Ministry shall be executed with appropriate safeguard measures to prevent turbidity conditions in consultation with the expert agencies such as CWPRS/ NIO.	This condition was also included in the environmental clearance granted for the future expansion of the Multi-Cargo Port project as general condition (xi) and subsequently deleted as per communication from Ministry of Environment & Forests dated 12 November 2003. A presentation on the proposed dredging plan, turbidity control measures and a monitoring plan was made to the National Institute of Oceanography (NIO) on 15 September 2003 at Hazira. Comments from NIO were incorporated and a note on the proposed turbidity control measures and monitoring plan was submitted to NIO (dated 30 September 2003), which was subsequently endorsed by NIO (1 October 2003). Presently, as a part of maintenance of depth, dredging via water flushing mode is being done where no dredging material is generated, thus it is not required to be disposed.
xii.	For employing unskilled, semi-skilled and skilled workers for the project, preference shall be given to local people.	Skill assessment of the locals has been undertaken. Agreements with various contractors ensure that local people will be given priority for deployment based on the

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		appropriateness of their skills. Various capacity building initiatives taken under CSR activities.
xiii.	The recommendations made in the Environment Management Plan and Disaster Management Plan, as contained in the EIA and Risk Analysis Reports of the project shall be effectively implemented.	The recommendations made in EMP and ERDMP are implemented in project and operational phase.
xiv.	A separate Environment Management Cell with suitably qualified staff to carry out various environment related functions should be set up under the charge of a Senior Executive who will report directly to the Chief Executive of the Company.	The Environment Management Cell has been set up as part of the Operation and Maintenance team. A qualified Health, Safety and Environment (HSE) Manager is currently present on the site reporting directly to the Managing Director and supported by HSE Advisor & Environmental Engineer, Laboratory Manager, Occupational Health Physician. Kindly refer to the Annexure-VI.
xv.	The project affected people, if any should be properly compensated and rehabilitated.	The project is on reclaimed land in the sea and hence entails no land acquisition.
xvi.	The funds earmarked for environment protection measures should be maintained in a separate account and there should be no diversion of these funds for any other purpose. A year-wise expenditure on environmental safeguards should be reported to this Ministry.	Separate Budget are being maintained for environmental protection fund allocation and expenditure Being submitted every year. Expenditure for year for November 22 - April 2023 is being submitted as Annexure VII.
xvii.	Full support should be extended to the officers of this Ministry's Regional Office at Bhopal and the officers of the Central and State Pollution Control Boards by the project proponents during their inspection for monitoring purposes, by furnishing full details and action plans including the action taken reports in respect of mitigative measures and other environmental protection activities.	The site extends full support to all the officials visiting the premises for monitoring and furnish all the relevant details and action plans in the right spirit.
xviii.	In case of deviation or alteration in the project including the implementing agency, a fresh reference should be made to this Ministry for modification in the clearance conditions or imposition of new ones for ensuring environmental protection. The project proponents should be responsible for implementing the suggested safeguard measures.	Environmental Clearance for Augmented capacity up to 10 MMTPA is granted by MoEF. Compliance of conditions in matrix format submitted on 26 th November 2013. Front End Engineering has been completed to augment capacity to 10 MMTPA. Truck loading Unit is constructed & commissioned in December 2020.
xix.	This Ministry reserves the right to revoke this clearance, if any of the conditions stipulated are not complied with to the satisfaction of this Ministry.	Noted
xx.	This Ministry or any other competent authority may stipulate any other additional conditions subsequently, if deemed necessary, for environmental protection, which shall be complied with.	Noted.
xxi.	The project proponent should advertise at least in two local newspapers widely circulated in the region around the project, one of which shall be in the vernacular language of the locality concerned informing that the project has been accorded environmental clearance and copies of clearance letters are available with the State Pollution Control Board and may also be seen at Website of the Ministry of Environment & Forests at http://www.envfor.nic.in The advertisement should be made within 7 days from the date of issue of the clearance letter and a copy of the same should be forwarded to the Regional Office of this Ministry at Bhopal.	The site has published public hearing and EC clearance advertisement in two newspapers. Published in "Indian Express" and "Sandesh" newspapers. Same was submitted again with Environment Compliance report for period November 18-April 19.
xxii.	The Project proponents should inform the Regional Office as well as the Ministry the date of financial closure and final approval of the project by the concerned authorities and the date of start of Land Development Work.	Informed for initial project phase. Noted for any such future developments.

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Section III

Compliance to conditions imposed as part of approval under CRZ Notification, 1991, accorded by Forest and Environment Department, Government of Gujarat

CRZ Clearance from Department of Forests & Environment, Government of Gujarat

Letter No. ENV-10.2000-1883-P1 Dated 29th March 2001

Status Period: November 22 – April 2023

No	Condition	Compliance Status
1.	No activity shall be commenced on site before obtaining the necessary permissions under the Forest (Conservation) Act.	Approval was obtained under the Forest (Conservation) Act in November 2001 prior to commencement of construction activities.
2.	The ground water shall not be tapped in any case.	The ground water is not tapped.
3.	All suggestions/ recommendations given by the NEERI in their rapid Environment Impact Assessment report shall be implemented by the applicant.	All suggestions/ recommendations given by the NEERI in their rapid Environment Impact Assessment report are implemented. Same was submitted again with Environment Compliance report for period November 18-April 19.
4.	The Comprehensive EIA report including the study for assessing the long term impacts due to construction of break water, LNG Terminal, and jetty especially on the marine Environment and the coastal morphology, shall be prepared and submitted to this department before commencing the project activities and subsequent actions for better Environment have to be undertaken.	Comprehensive EIA report (for all the components of the project) as prepared by NEERI has been Submitted in July 2004. The same way CEIA submitted for project expansion (up to 10 MTPA). Same was submitted again with Environment Compliance report for period November 18-April 19.
5.	The applicant shall implement all the suggestions/ recommendations given by the NEERI in their comprehensive EIA report.	Being complied with suggestions / recommendations of NEERI during operation phase.
6.	A detailed study shall be carried out for identifying the fish breeding and spawning grounds before commencing any project activities and the project activities shall be kept away from it.	The study undertaken by NIO has concluded that no fish breeding and spawning grounds existed in project area.
7.	The applicant shall submit detailed Risk Assessment report containing the worst-case scenario and detailed 'Oil Spill Contingency Plan' before commencing the project and shall implement all the suggestions/ recommendations given in the report.	The Quantitative Risk Assessment for the project has already been submitted to the MoEF. An Oil Spill Contingency Plan for managing any possible oil spill within the port limits has already been prepared and submitted. Oil spill response plan is duly examined and approved by Indian Coast Guard. Last Approval vide letter No 7563, dated 1 st Jan 2014 obtained.
8.	The applicant shall adhere to the provisions of the National Oil Spill and Disaster Management Plan and shall install necessary facilities and equipment for controlling and combating the oil spill, before commissioning the operation.	The Oil Spill Control system has been procured and the staff training was conducted in line with the Oil Spill Control Plan.

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9.	The applicant shall participate financially for any common study/ facilities for the Gulf of Khambhat that may be initiated by this department.	SEIPL/HPPL shall bear reasonable costs for any common study/ facilities for the Gulf of Khambhat that may be initiated by the department.
10.	The applicant shall bear the cost of the external agency appointed by this department for carrying out supervision and/or monitoring of the construction and/or operation activities.	Noted
11.	The applicant shall ensure that the construction labors do not cut mangroves for fuel, etc. Necessary amenities, including fuel, water supply and sanitation would be provided to the construction labors.	Company ensured during construction phase that the construction labors do not cut mangroves for fuel, etc. Necessary amenities, including fuel, water supply and sanitation provided to the construction labors.
12.	The camp of the construction labor shall be kept outside the CRZ area.	The camp of the construction labor was kept outside the CRZ area during construction.
13.	The applicant shall ensure that there will be no disposal of sullage and sewage generated from construction camps, surface run-off from construction sites, and oil and grease from construction equipment into the sea or the CRZ area.	Company ensured that no disposal of sullage and sewage generated from construction camps, surface run-off from construction sites, and oil and grease from construction equipment into the sea or the CRZ area.
14.	The applicant shall ensure that free flow of water is not hampered due to any project activities.	Company ensured that free flow of water is not hampered due to any project activities.
15.	The applicant shall carry out mangrove plantation in consultation with the forest department and shall also develop and implement greenbelt development plan.	The mangrove plantation has been undertaken in Hazira area by HPPL/SEIPL. & Development of green belt in 2.18 hectare is completed.
16.	The applicant shall carry out the monitoring of the various Environmental parameters in consultation with the Gujarat Pollution Control Board/ Forest & Environment Department.	Company carried out the monitoring of the various Environmental parameters in consultation with the Gujarat Pollution Control Board/ Forest & Environment Department & duly submitted. Refer Annexure III & IV.
17.	The Gujarat Maritime Board shall prepare the detailed Traffic Control Management Plan for the Hazira Port and Gulf of Khambhat in consultation with respective port user companies including Shell, Reliance, Essar, etc. and would make effective before commissioning of the activities of the Shell.	Hazira Port Private Limited has reached an agreement with Gujarat Maritime Board for the implementation of the hardware required for Vessel Traffic Management system (VTMS) in Gulf of Cambay. With the advancement in shipping technology and introduction of new generation vessels, the proposed expansion activity from 5 MMTPA to 10 MMTPA will involve increased handling capacity with minimal traffic.
18.	The applicant shall actively participate in Vessel Traffic management System (VTMS) to be developed for Gulf of Khambhat.	Company actively participated in Vessel Traffic Management System (VTMS) developed for Gulf of Khambhat.
19.	The applicant shall implement socio-economic upliftment program in consultation with the District Collector/ DDO.	A comprehensive area development program covering health, education, ecology has been implemented. Several NGOs are associated with this program.
20.	No construction activity shall be commenced by the company before obtaining all necessary clearances under various acts/rules from different Govt. departments/agencies.	Noted.
21.	The applicant shall comply with any other condition as may be stipulated by this department from time to time.	Noted

Section IV

Amendment to the Environment clearance granted for M/s Shell Energy India Private Limited for construction of storage tank of LNG having capacity of 200 000 cubic meters.

F. No. J-16011/23/2000-IA-III Dated: 9th April 2013

Status Period: November 22 – April 2023

As per the risk assessment report the proponent shall ensure that

	Conditions	Compliance Status
1.	<p>a. Tank is equipped with 3 independent Level transmitters which will be configured to trip the LNG receipt pump to avoid over flow of the tanks.</p> <p>b. In case of the over flow of the primary containment, the secondary containment will hold the total liquid volume.</p> <p>c. The tank shall be equipped with Pressure safety valve, Pressure relief valve and Reserved capacity relief valve - All three barriers will act independently, and each barrier will get the signal from independent pressure sensors, which makes the system more reliable</p> <p>d. The tank shall be protected by Vacuum control valve and vacuum relief valve. Similar to the High-pressure protection system, Vacuum protection also have independent pressure sensing element.</p> <p>e. The Appurtenances and piping are from the top of the tank penetrated thru the tank dome, which eliminates the possible leaks from the tank shell.</p> <p>f. The outer concrete tank is Pre-stressed and can withstand credible fire load due to external fire in the adjacent areas.</p> <p>g. All the piping is Stainless steel (SS304L, 316) and LNG is non-corrosive. The operating pressure of the piping associated with the tanks are less and the piping will have the cryogenic insulation.</p>	All the conditions mentioned are included in front end design which will be implemented during construction of the tank.
i	All the condition of EMP/DMP shall be complied with	Project documents are prepared taking inputs of EMP and DMP.
lii	All condition stipulated by Gujarat Coastal Regulation Zone Management shall be complied with.	Noted and the same will be complied during implementation of the project.
lv	All the condition under MSIHC as submitted by project proponent vide letter 25.07.2012 shall be complied with.	Noted. Will be complied with.
V	All other terms and conditions of the clearance letter no. J-16011/23/200-IA-III dated remain unchanged.	Noted.

Section V

Compliance to New Environmental and CRZ Clearance granted for 10 MMTPA capacity along with pipeline of 13.9 Km accorded by Ministry of Environment & Forests, Government of India

F.No. 11-88/2011-IA-III Dated: 30th December 2013

Status Period: November 22 – April 2023

	Specific Conditions	Compliance Status
I	Consent to establish shall be established.	Copy of consent to establish is obtained vide letter no GPCB/CCA/SRT-7A/ID-20783/143/55 dated 06/04/2013. The same is submitted along with compliance report (October 13-March 2014). CTE-45547 obtained from GPCB Dated: 31/03/2021
ii	The project involves diversion of 4.2 ha of forest land for which the proponent shall obtain the requisite Forest Clearance (FC). The proponent can execute the above project on the entire stretch located in non-forest land, provided the proponent submit an undertaking while making an application to get FC that the execution of work on non-forest land shall not be cited as a reason for grant of FC.	Noted. In principle (Stage - 1) approval for diversion of 4.30 ha. Forest land received from The Additional Chief Secretary (Forests) vide letter number: F.No. 6-GJB 015/2015-BHO/130 Dated: 25/05/2021.
iii	All the recommendation of the EMP shall be complied with letter and spirit. All the mitigation measures submitted in the EIA /EMP and risk assessment and Disaster Management Report shall be prepared in a matrix format and compliance of each mitigation shall be submitted to MoEF along with the half yearly compliance report to regional office of MoEF.	Noted and the same will be taken care of in Front End Engineering and Design.
iv	All the condition stipulated by Gujarat Coastal Zone Management Authority vide letter No. ENV. -10-2012-62-E dated 30.3.2013 shall be strictly complied with.	Already Complied with during project phase. Noted and will be complied.
V	The smooth and safe operation of the system shall be ensured by incorporating a computerized SCADA system. Any leakage in the pipeline shall be immediately detected by the computer system and product pumping shall be immediately cut-off.	SCADA is implemented in the existing system. The same will be integrated with the new installations. Pipeline will be provided with Remotely operated valves, which will cut-off the supply immediately in case of leakage.
Vi	The commitment made during the public hearing shall be complied with.	Noted and will be Complied with.
Vii	There shall be no disposal of waste into the coastal area. All the solid waste shall be handled as per the solid waste (management and handling) Rules, 2000.	Noted and ensure that there will not be any such disposal in coastal area.
Viii	Pipeline should be protected from external corrosion by combination of anti-corrosion coating and cathodic protection.	The same is being taken care of during design phase. The same will be implemented.
Ix	The location of new underground pipeline which is running parallel to an existing underground pipeline should be at minimum clear distance of 5.0 meters	Will be complied with.

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X	Ground patrolling of ROW shall be carried out on regular basis	24X7 pipeline monitoring will be done.
Xi	Norms of international standard OISD 194 and MB Lal recommendation shall be followed.	Noted.
Xii	Onsite emergency plan shall be put in place.	Up to 7 MMTPA regasification capacity onsite emergency plan is prepared. This will be integrated with the existing site plan.
Xiii	Mock drill shall be conducted in collaboration with the state disaster management authority or national disaster management authority.	The same will be done in collaboration. Conducted Level 3 mock drill on 23 rd December 2021 for NG leak and fire from pipeline emergency as per District Disaster Management Plan & in presence of Deputy Collector.
Xiv	Tie-up with the specialized hospitals for handling any disaster situation. Earmarking of identified beds and burn to be done.	Tie-up with existing hospitals is in place. MoU with hospitals is made for handling Medical Emergencies related injuries.
Xv	The compensation will be paid in accordance with the prevailing state/central rules/regulations/precedence/ for that region.	Noted and will be complied with.
Xvi	The project proponent shall set-up separate Environmental Management Plan cell for effective implementation of the stipulated safeguards under the supervision of senior executives.	Separate EMS cell integrated with existing will be made.
Xvii	The funds earmarked for environment management plan shall be included in the budget and this shall not be diverted for any other purposes.	Noted and will be complied with.
GENERAL CONDITIONS:		
	General Conditions	Compliance Status
i	Appropriate measures must be taken while undertaking digging activities to avoid any likely degradation of water quality.	Noted.
ii	Full support shall be extended to the officers of this Ministry /Regional Office at Bhopal by the project proponent during inspection of the project for monitoring purposes by furnishing full details and action plan including action taken reports in respect of mitigation measures and other environmental protection activities.	Noted.
iii	A six-Monthly monitoring report shall need to be submitted by the project proponents to the Regional Office of this Ministry at Bhopal regarding the implementation of the stipulated conditions.	Noted and being complied with.
iv	Ministry of Environment & Forests or any other competent authority may stipulate any additional conditions or modify the existing ones, if necessary in the interest of environment and the same shall be complied with.	Noted.

Environmental Compliance Report- November 22 - April 2023

V	The Ministry reserves the right to revoke this clearance if any of the conditions stipulated are not complied with the satisfaction of the Ministry.	Noted.
Vi	In the event of a change in project profile or change in the implementation agency, a fresh reference shall be made to the Ministry of Environment and Forests.	Noted.
Vii	The project proponents shall inform the Regional Office as well as the Ministry, the date of financial closure and final approval of the project by the concerned authorities and the date of start of land development work.	Noted.
Viii	A copy of the clearance letter shall be marked to concerned Panchayat/Local NGO, if any, from whom any suggestion/representation has been made received while processing the proposal.	The relevant stakeholders have been informed about the project clearance.
Ix	State Pollution Control Board shall display a copy of the clearance letter at the Regional Office, District Industries Center and Collector's Office/Tehsildar's office for 30 days.	Noted.
8	These stipulations would be enforced among others under the provisions of Water (Prevention and Control of Pollution) Act 1974, the Air (Prevention and Control of Pollution) Act 1981, the Environment (Protection) Act, 1986, the Public Liability (Insurance) Act, 1991 and EIA Notification 1994, including the amendments and rules made thereafter.	Noted.
9.	All other statutory clearances such as the approvals for storage of diesel from Chief Controller of Explosives, Fire Department, Civil Aviation Department, Forest Conservation Act, 1980 and Wildlife (Protection) Act, 1972 etc. shall be obtained, as applicable by project proponents from the respective competent authorities.	Noted.
10	The project proponent shall advertise in at least two local Newspapers widely circulated in the region, one of which shall be in the vernacular language informing that the project has been accorded Environmental and CRZ Clearance and copies of clearance letters are available with the State Pollution Control Board and may also be seen on the website of the Ministry of Environment and Forests at http://www.envfor.nic.in . The advertisement should be made within 10 days from the date of receipt of the Clearance letter and a copy of the same should be forwarded to the Regional office of this Ministry at Bhopal.	The site has published public hearing and EC clearance advertisement in two newspapers. Published in "Indian Express" and "Sandesh" newspapers. Same was submitted again with Environment Compliance report for period November 18-April 19.
11	This Clearance is subject to final order of the Hon'ble Supreme Court of India in the matter of Goa Foundation Vs. Union of India in Writ Petition (Civil) No.460 of 2004 as may be applicable to this project.	Noted

Environmental Compliance Report- November 22 - April 2023

12	Any appeal against this clearance shall lie with the National Green Tribunal, if preferred, within a period of 30 days as prescribed under Section 16 of the National Green Tribunal Act, 2010.	Noted.
13	Status of compliance to the various stipulated Environmental conditions and environmental safeguards will be uploaded by the project proponent in its website.	Noted and will be complied with for the project.
14	A copy of the clearance letter shall be sent by the proponent to be concerned Panchayat, Zilla Parisad/Municipal Corporation, Urban Local Body and the Local NGO, if any, from whom suggestions/ representations, if any, were received while processing the proposal. The clearance letter shall also be put on the website of the company by the proponent.	The relevant stakeholders have been informed about the project clearance.
15	The proponent shall upload the status of compliance of the stipulated Clearance conditions, including results of monitored data on their website and shall update the same periodically. It shall simultaneously be sent to the Regional Office of MoEF, the respective Zonal Office of CPCB and the SPCB.	Noted.
16	The environmental statement for each financial year ending 31 st March in Form-Vas is mandated to be submitted by the project proponent to the concerned State Pollution Control Board as prescribed under the Environment (Protection) Rules, 1986, as amended subsequently, shall also be put on the website of the company along with the status of compliance of Clearance conditions and shall also be sent to the respective Regional Office of MoEF by email	Environmental statement for the FY for April'21 - March'22 submitted to GPCB for current operations.

Compliance to extended Environmental and CRZ Clearance grated for 10 MMTPA capacity along with pipeline of 13.9 Km accorded by Ministry of Environment & Forests, Government of India

F.No. 11-88/2011-IA-III Dated: 13th January 2021

Status Period: November 22 - April 2023

	Specific Conditions	Compliance Status
1	Project proponent will undertake monitoring of migratory birds in the region and mitigation plan if necessary, through reputed institute like SECON or an academic institute / university of repute or through nationally recognized individuals known for the work on the subject.	Study in progress

Section VI

Hazira Mora Gas Pipeline, Hazira, District Surat

Environmental Compliance Report for Natural Gas Pipeline

Status Period: November 22 - April 2023

Section I

Environment Clearance from Ministry of Environment and Forests (J-16011/20/2003-IA-III, dated 24th October 2003 subsequent amendment vide letter No. 10-69-2009-IA-III Dated 08-12-2009

	Specific Conditions	Compliance Status
i	All the conditions stipulated by Environment Department, Government of Gujarat as contained in their letter No ENV-10.2003-55-P1 dated 15th July 2003 shall be effectively implemented. The project shall be implemented in such a manner that there is no damage whatsoever to the mangroves/ other sensitive coastal ecosystems. Further no portion of the project site should be located in CRZ I (i). If any damage to mangroves is anticipated/ envisages as a result of project activities then the clearance now being accorded shall stand cancelled and the proponents may seek fresh approval from the Ministry.	The conditions have been complied with. Status of specific conditions mentioned in MOEF clearance letter for revised route dated 24 th May 2004 is given in part III and V.
ii	All conditions stipulated by Gujarat Pollution Control Board vide letter No PC-NOC-SRT/1240/8997 dated 24th March 2003, shall be effectively implemented.	The conditions have been implemented. Please refer Environment Compliance Report dated 11 th Nov 2011 Section III.
iii	It should be ensured that no activities are taken up in the forest areas till necessary forest clearance is obtained and furnished to this Ministry.	Forest clearance has been obtained for the pipeline under Operation.
iv	It shall be ensured that there is no displacement of people, houses or fishing activity as a result of the project.	It was ensured no displacement was done as a result of this project.
v	It shall be ensured that due to the project there is no adverse impact on the drainage of the area and recharge of groundwater. No groundwater should be tapped in the project area falling in Coastal Regulation Zone.	It has been ensured that there is no adverse impact on the drainage or ground water due to this project.
vi	The project proponents must make necessary arrangements for disposal of solid wastes and for the treatment of effluents/ liquid wastes. It must be ensured that the effluents/ liquid wastes are not discharged into the backwater.	Waste management plan is in place for all kind of solid waste disposal and treatment of effluents/liquid waste disposal. There is no discharge into backwater.
vii	The camps of labor shall be kept outside the Coastal Regulation Zone area. Proper arrangements for cooking	Noted and complied with during construction phase.

Environmental Compliance Report- November 22 - April 2023

	fuel shall be made for the labor during construction phase so as to ensure that mangroves are not cut/destroyed for this purpose.	
viii	Regular drills should be conducted to check the effectiveness of the on-site Disaster Management Plan. The recommendations made in the Environmental Management Plan and Disaster Management Plan, as contained in the Environmental Impact Assessment and Risk Analysis reports of the project, shall be effectively implemented.	Regular drills are conducted to check effectiveness of on-site DMP. Recommendations for the same are noted and implemented as per chalked out action plan. The compliances of Risk Assessment, EMP and DMP submitted for project expansion vide letter HPL/MoEF/Expansion/2013/1 dated 20th November 2013. Conducted Level 3 mock drill on 23rd December 2021 for NG leak and fire from pipeline emergency as per District Disaster Management Plan & in presence of Deputy Collector.
ix	The entire stretch of the pipeline shall be buried except at the booster pumping station, which will be properly fenced, and the station would be manned round the clock. The buried lines will be protected with anti-corrosive coal tar-based coating. The coating will be tested by high voltage detector in accordance with prescribed standards.	The Gas pipeline has been constructed as per international codes and practices for Natural gas pipeline.
x	Markers shall be installed at every 30 m to indicate the position of the line.	Markers installed at every 30 m.
xi	The smooth and safe operation of the system will be ensured by incorporating a computerized SCADA system. Any leakage in the pipe shall be immediately detected by the Computer system and product pumping shall be immediately cut off.	Data acquisition and management system has been installed to collect pipeline data and transmit the same data to the computerized Plant Digital Control System (DCS). We have remote operated isolation valves on pipeline route at 4.2km distance from Terminal. Additionally, Pipeline intrusion detection system is provided to ensure integrity. In case of any excavation, digging alarm will be generated.
xii	Regular patrolling of the pipeline needs to be done. This will help in identifying any activity that have the potential to cause pipeline damage to identify small leaks whose effects are too small to be detected by instrument.	Regular patrolling of the pipeline is being done. The line is 1.5 m below GL. There is round the clock 24 x 7 monitoring of the pipe line by a dedicated pipeline surveillance team. Additionally, Weekly Patrolling of pipeline is undertaken.
xiii	There should be display boards at critical locations along the pipeline, viz., road/rail/river crossings giving emergency instructions as well as contact details of SEIPL. This will ensure prompt information regarding location of accident during any emergency. Emergency information board should contain instructions in addition to contact details.	The emergency information boards are available at critical locations with emergency instructions and contact details of site.

Environmental Compliance Report- November 22 - April 2023

xiv	During operation phase, proper precautions should be taken to avoid any oil spills and no oily wastes shall be discharged into the water bodies.	The Natural Gas pipeline operation is dry gas in nature and therefore, no envisaged chances of oil spillage.
	General Conditions	Compliance Status
i	Construction of the proposed structures should be undertaken meticulously confirming to the existing Central/ local rules and regulations. All the construction designs/ drawings relating to the proposed construction activities must have approvals of the concerned State Government/ Agencies.	The necessary information and approvals have been undertaken related to the designs or drawings of proposed construction activities.
ii	The project authorities should take appropriate community development and welfare measures for the villagers in the vicinity of the project site, including drinking water facilities. A separate fund should be allocated for this purpose.	The project authorities are actively involved in community welfare. A Community development plan (Called SOCIAL PLAN) is implemented with adequate resources and budget Refer Annexure V for social performance highlights.
iii	To meet any emergency situation, appropriate firefighting system should be installed. Appropriate arrangements for uninterrupted power supply to the environment protection equipment and continuous water supply for the firefighting system should be made.	The appropriate firefighting system is available to meet an emergency. (DCP fire tender & CO2 extinguishing system, mutual aid, emergency response, etc.)
iv	A separate Environment Management Cell with suitably qualified staff to carry out various environment related functions should be set up under the charge of a Senior Executive who will report directly to the Chief Executive of the Company.	The Environment Management Cell has been set up as part of the Operation and Maintenance team. A qualified Health, Safety and Environment (HSE) Manager is currently present on the site reporting directly the Managing Director, and supported by Environmental Engineer, Laboratory Manager, HSE Advisors, Occupational Health Physician. Kindly refer to the Annexure VI.
v	The funds earmarked for environment protection measures should be maintained in a separate account and there should be no diversion of these funds for any other purpose. A year-wise expenditure on environmental safeguards should be reported to this Ministry's Regional Office at Bhopal.	Separate Budget are being maintained for environmental protection fund allocation and expenditure Being submitted every year. Expenditure for year November 22 - April 2023 is being submitted as Annexure VII.
vi	Full support should be extended to the officers of this Ministry's regional office at Bhopal and the officers of the central and the state pollution control board by the project proponents during their inspection for monitoring purposes, by furnishing full details and action plans including the action taken reports in respect of mitigative measures and other environmental protection activities.	The site extends full support to all the officials visiting the premises for monitoring and furnish all the relevant details and action plans in the right spirit.
vii	In case of deviation in the project including the implementing agency, a fresh reference should be made to this Ministry for modification in the clearance conditions or imposition of new one for ensuring environmental protection. The project	Environmental Clearance for Augmented capacity up to 10 MMTPA is granted by MoEF. Compliance of conditions in matrix format submitted on 26 th November 2013.Truck loading Unit is constructed & commissioned in December 2020.

Environmental Compliance Report- November 22 - April 2023

	proponents should be responsible for implementing the suggested safeguard measures.	
viii	The Ministry reserves the right to revoke this clearance, if any of the conditions stipulated are not complied with to the satisfaction of this Ministry.	Noted and agreed.
ix	The Ministry of any other competent authority may stipulate any other additional conditions subsequently, if deemed necessary, for environmental protection, which shall be complied with.	Noted and agreed.
x	A copy of the clearance letter shall be marked to the concerned Panchayat/ local NGO, if any, from here any suggestion/ representation has been received while processing the proposal.	The relevant stakeholders have been informed about the project clearance.
xi	The State Pollution Control Board/ Committee should display a copy of the clearance letter at the District Industries Centre and Collector's office/ Tehsildar's office for 30 days.	Noted.
xii	The project proponent should advertise at least in two local newspapers widely circulated in the region around the project, one of which shall be in vernacular language of the locality concerned informing that the project has been accorded environmental clearance and copies of clearance letters are available with the Gujarat State Pollution Control Board and may also be seen at website of the MoEF.	The project proponent advertised in two local newspapers on 12 th Nov 2003.
xiii	The project proponents should inform Regional Office at Bhopal as well as this Ministry, the date of financial closure and final approval of the project by the concerned authorities and the date of start of work.	Project Proponent has informed RO at Bhopal and ministry via letter on April 2004.
xiv	The project proponent will obtain the forest clearance for the land passing through the Reserved Forest area as well as report of the public hearing before commencement of the project activities in forest area.	Forest clearance obtained for pipeline.
xv	So as to maintain ecological features and avoid damage to the ecosystem, movement of vehicles in the inter-tidal Zone shall be restricted to the minimum.	The movement of vehicles is restricted to avoid any damage to ecosystem.
xvi	Since the pipeline passes along mangrove areas and the mudflats of Tapi river, the project proponents will ensure adequate protection to the mangroves.	Adequate measures for protection of mangroves during pipeline construction have been taken.
xvii	650 trees are proposed to be cut along the pipeline corridor. Details regarding the clearances obtained for cutting the 650 trees and compensatory tree plantation at twice the number of trees cut may be provided.	Reference MOEF clearance for change of pipeline route dated 24th May 2004, 450 trees are expected to be removed in the pipeline corridor. Along with 1203 Ha of mangroves over the years, plantation of total 9122 Horticulture grafts and 8685 terrestrial saplings carried out.
xviii	Budgetary break-up for Environmental Management Plan for the project to be mentioned.	Yearly expenditure November 22 - April 2023 period is enclosed as Annexure VII

Section VII

Additional Specific Conditions by MOEF by Letter No. J-16011/20/2003-IA-III Dated 24th May 2004, partial amendment to earlier Environmental Clearance dated 24th Oct. 2003

Status Period: November 22 - April 2023

	Specific Conditions	Compliance Status
3 (i)	Project proponent shall be solely responsible and shall compensate for any loss or damage to the life of human beings and animal health and property	Third party liability insurance includes pipeline.
3 (ii)	The conditions stipulated by the Forest & environment department, GoG vide letter no. ENV-10.2003-55P dated 17 th March 2004 should be implemented strictly.	The conditions have been implemented.
3 (iii)	The new pipeline will not enter in reserved forest area	Re-routing of pipeline was worked out with an intension to avoid reserved forest.
3 (iv)	Conditions stipulated by GPCB vide letter no. PC/NOC/SRT-1240/1318 dated 16 th January 2004 should be strictly implemented.	The conditions have been implemented. Please refer Environment Compliance Report dated 11 th Nov 2011 Section IV.

Compliance to conditions imposed as part of Environmental Clearance accorded by Ministry of Environment & Forests, Government of India

Section VIII

Letter Reference No: ENV-10–2003-55-E Dated 24th August 2009

Amendment to letter no J-16011/20/2003-IA-III Dated: 24th May 2004 to CRZ clearance for re-routing of a section of the send out and laying of water pipeline along the re-routing send out line vide letter no 8th December 2009.

All conditions are the general condition for which the company is complying with the requirement.

Status Period: November 22 - April 2023

	Specific Conditions	Compliance Status
1	All the land for re-routing of the pipeline for the forest land shall be within the 34 hectares of the forest land already diverted for non-forest uses by MoEF.	The rerouting is within the approved land as per the forest clearance.
2	No-Forest Land shall be used for laying of re-routing of the gas pipeline and the water pipeline, which is not diverted for non-forest uses by the MoEF.	No forest land was used for laying of rerouting of pipelines which is not diverted for non-forest uses by MOEF.
3	The new pipeline will not enter in reserved forest area	Re-routing of pipeline was worked out with an intension to avoid reserved forest.
4	All the recommendation and suggestions given by NEERI in their above mentioned EMP shall be strictly implemented by the SEIPL and the ESSAR Limited for the laying and operation of the said pipeline.	All the recommendations given by NEERI in the EMP are implemented.

END OF REPORT

Monitoring of Mangrove Plantation Using Remote Sensing Techniques



Hazira LNG & Port

Prepared By :
CompuSense Automation, Ahmedabad

December 2022

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1. Introduction

Present study of mapping land use for estimation and monitoring of mangrove plantation using remote sensing data for a study area in estuarine system of Tapi river near Hazira and surrounding area in Surat District is carried out on behest of Hazira Port Private Ltd, Hazira. Remote Sensing technology because of synoptic, repetitive and multi spectral characteristics becomes very vital technology for mapping land use and land cover. In addition to this, this technology provides the facility of periodic monitoring of particular area. Geographic Information System (GIS) is a tool, which allows the integration of spatial data with non - spatial data.

In the present study, mapping and classification of mangroves according to their growth for study area comprising of 12 patches at 5 locations and measuring about 1203.80 Ha., have been carried out using the digital satellite data from various satellites and sensors as listed in section 3. This satellite data has been corrected geometrically and radiometrically. Various major categories as shown in definition, were identified based on growth and mapped using combination of digital image processing and visual interpretation techniques. Area statistics is calculated for different categories in different zones. A thematic map and pie chart are generated depicting various classes with different symbols.

2. Objectives

Main objectives of this analysis is

- To analyze study area spatially with respect to existing Mangrove coverage observed using latest remote sensing satellite data and NDVI analysis.
- To generate statistics of Mangrove coverage classes with marking of latitude/longitude information and prepare thematic maps.

3. Data Used

Data shown in following table was selected and procured from NRSC, Hyderabad.

Satellite	Sensor	Sub Scene	Path-Row	Date
Resource sat-2	LISS-IV	D	93-57	17 th November 2022

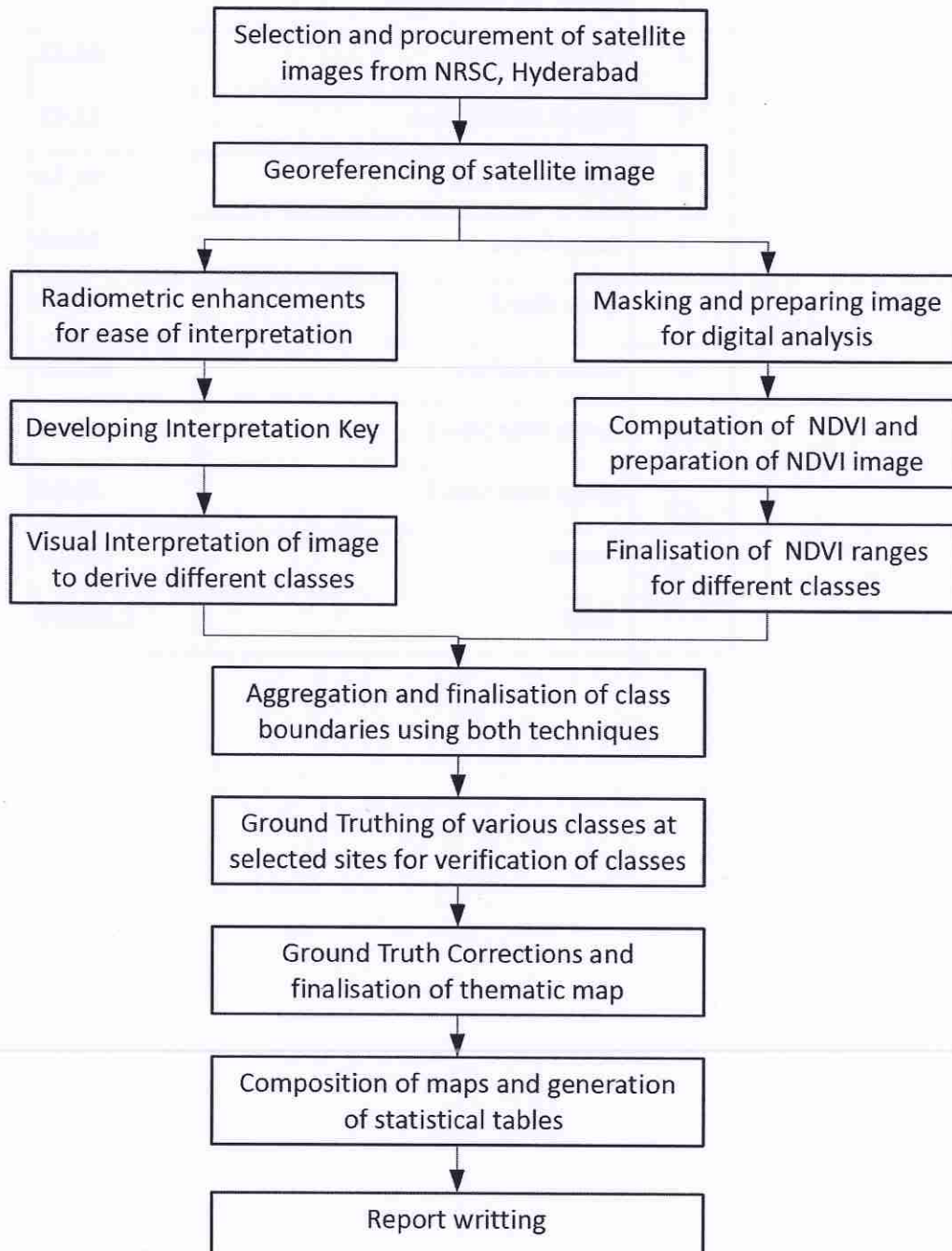
4. Study Area

The study area as shown in Location Map, lies around Hazira peninsula in Surat District. The area falls between 72°35'55.494"E to 72°41'26.203"E longitude and 21°7'45.163"N to 21°25'51.089"N latitude. Mangrove Plantation Project is carried out in this area with a purpose of conservation and development of Mangroves in collaboration with surrounding villages, forest department and external mangrove expert as a part of commitment towards statutory compliance on Coastal Ecology Restoration and Mangrove Conservation for establishing LNG Terminal by Shell Group of companies. Present study is comprised of 12 blocks as follows. Out of this, two blocks (No. 10 & 11) were new identified areas for bringing more area under plantation. It is understood, though these areas were not very ideal for raising mangroves depending on flooding pattern, ground elevation and soil structure, but attempts were made to enrich the areas, especially along the creeks, with introduction of suitable species, which used to grow in such 'difficult-to-grow' land.

Mangrove Plantation		
Sr. No.	Site name	Area in Ha.
1	Junagam Smashan	44.02
2	Junagam Sea Site	82.30
3	Rajgari Smashan site	146.69
4	Rajgari Khada	66.23
5	Rajgari Khada New	52.41
6	Rajgari Sea Site	82.54
7	Vasva Site-1	36.64
8	Vasva Site-2	22.43
9	Tunda Dabhari	463.30
10	Tunda Mor Site-1	45.59
11	Tunda Mor Site-2	29.58
12	Karanj	132.07
	Total	1,203.80

5. Methodology

Following flow chart shows the methodology of mapping and estimating present state of mangrove areas, as planted and the mangrove coverage density classes using Remote Sensing method.



Selection and procurement of satellite images :

Satellite data in India is procured from National Remote Sensing Center, Hyderabad. Data is selected using browsing facility of NRSC. For this project multi spectral data of LISS-IV was selected. Data should be cloud free as far as possible. Data as indicated in Section 3 was procured.

Geo-referencing of image :

Geographic location was assigned to satellite image in terms of latitude and longitude and a projection system was defined so that distances could be measured in meters.

Creating False Color Composite Image(FCC) and Radiometric enhancement:

A FCC image was created by using the Infra red, Green and Blue band of the digital data. The purpose of this is to visualize thematic features to make their interpretation easier. It is further enhanced radiometrically to bring out contrast for easy identification and demarcation of features.

Determination of Density/Coverage Classes :

The satellite image gives a synoptic top view of surface of earth. Based on this image or picture different areas of different densities (as coverage) are interpreted visually by experienced remote sensing application experts and using digital image processing techniques such as Normalized Difference Vegetation Index (NDVI) which also interprets image using mathematical ratios. Both the techniques are detailed below.

Developing interpretation key :

The image was studied to understand the topography and general land use. An interpretation key was developed for different features, specially related to Mangrove Density depending on tone, texture, size, pattern and association.

Image Interpretation :

Using the above developed interpretation key, the satellite image was visually interpreted. In addition to this satellite data is also analyzed digitally using NDVI technique given below.

Subsequently results of visual and digital interpretation are aggregated to derive various classes.

Digital Analysis using NDVI :

The Normalized Difference Vegetation Index (NDVI) is a numerical indicator that uses the visible and near-infrared bands of the electromagnetic spectrum, and is adopted to analyze remote sensing measurements and assess whether the target being observed contains live green vegetation or not.

The NDVI algorithm subtracts the red reflectance values from the near-infrared and divides it by the sum of near-infrared and red bands. Arc Map software was used to generate NDVI Images.

$$\text{NDVI} = (\text{NIR} - \text{RED}) / (\text{NIR} + \text{RED})$$

Ground Verification and Corrections :

Normally on completion of pre field interpretation maps are prepared for field verification of classes. During field verification few representative samples of each class are verified in the field and included in report with photographs. During ground verification local stakeholders and organizations working for conservation are also to be consulted to understand various changes.

Thematic map and statistics generation :

Thematic map was generated using proper symbols for the density polygons and statistics for each density class was calculated. Maps and tables were generated using Arc GIS software.

6. Mangrove coverage density Classification

The study area mainly covers inter tidal degraded areas in estuarine system of Tapi river and the adjoining sea coast. Mangrove classes based on density and growth, as appears in satellite images, were mapped using criteria of canopy or ground coverage, NDVI (Normalized Difference Vegetation Index) technique & ground verification, wherever feasible.

Satellite image is recording of radiation in different spectral bands. Since, satellite orbits at about 800 Km above earth, what is captured is essentially a top view. Density is defined in terms of range of percentage of ground area covered by plantation & corresponding value of NDVI observed. Type of mangrove plants and associated species are also considered while grading densities.

Good Growth

It generally refers to an area, where mangroves are dense, canopy covers more than 70% of ground area, height of plants may vary from 1.5 to 3 meter or more. It gives deep red tone, with smooth texture and mainly found near creek.

Moderate Growth

This category has ground cover of 30 to 70%. Plant height may be 0.5 meter to 2 meter. This class gives red signature with intermittent green spots. Generally, this is found next to good growth class.

Sparse Growth

This refers to class with ground cover of 10 to 30% and plant height may be 0.5 to 1m. Normally, these are newly planted areas or those areas where density is receding because of natural phenomenon or some human intervention. This class is less dense because the plantation is carried out in grid of about 2 m and space between the plants is not covered. This is identified by greenish signature with red spots.

Degraded area

These are the areas where mangrove plants have not survived but it has possibility of regenerating either through enrichment effort and subsequent natural regeneration. These

are degraded areas where tidal water reaches at least once or twice in a tidal cycle. This is seen as greenish or bluish green in satellite images. We retain this class in total area as there is possibility of growing mangroves.

Fishery Pond/Salt pan

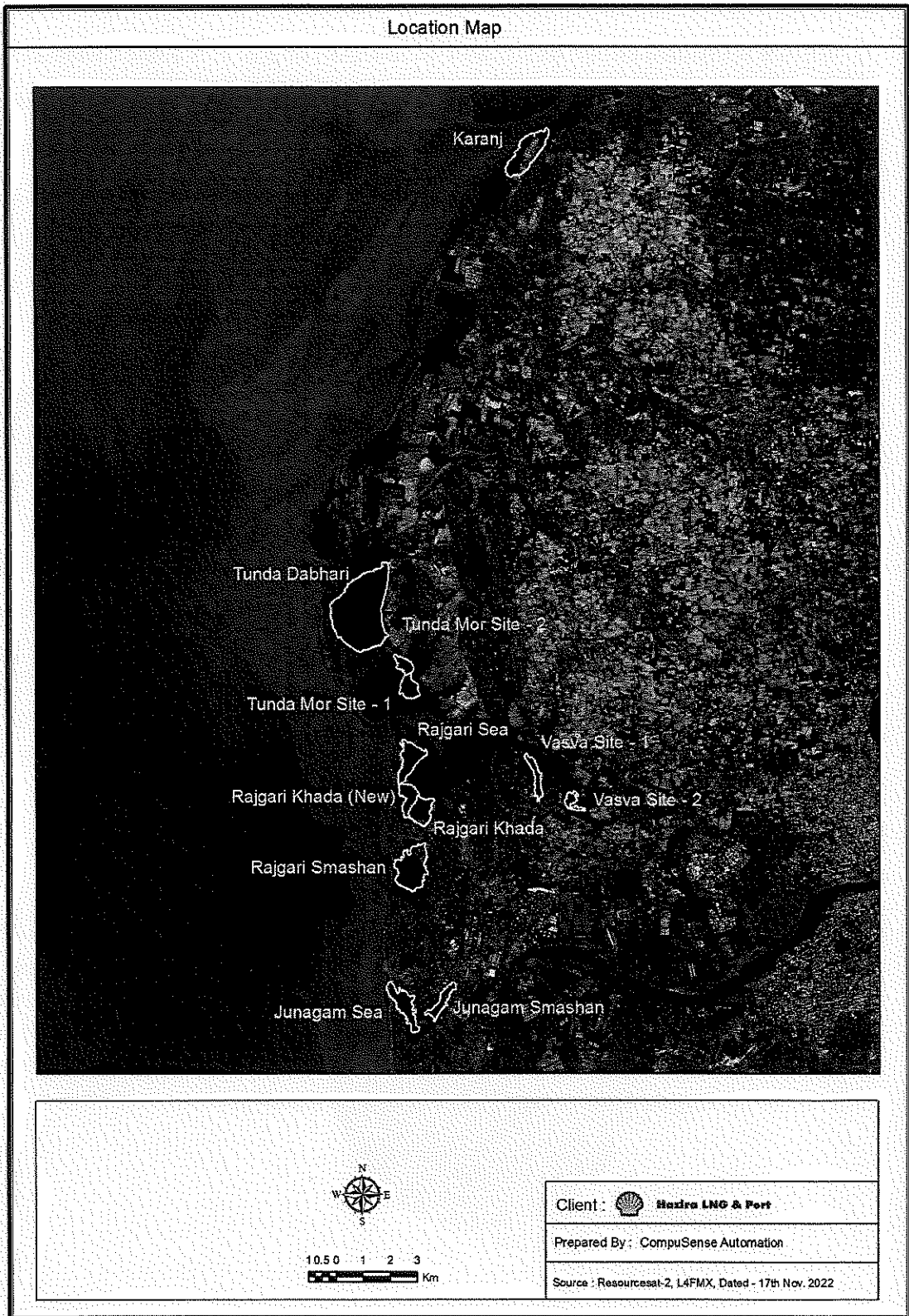
Construction of fishery pond is most common method of fish culture. Water is maintained in an enclosed area by artificially constructed ponds where species of fish are reared.

A shallow container or depression in the ground in which salt water evaporates to leave a deposit of salt is called salt pan.

Creek/Sea

This area is normally covered by water during high tide. These are essentially channels carrying water from sea to inter tidal zones. This area is dynamic in nature. Due to tidal flow with sediment deposition, the creeks change their course or new creeks are developed.

7. Location Map

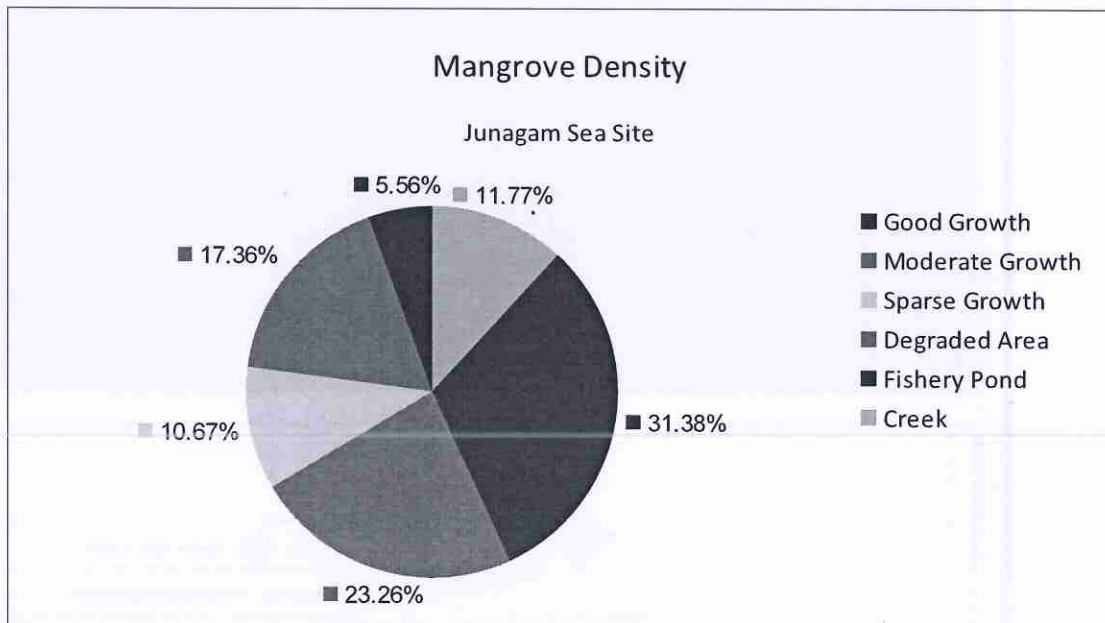


8. Mangrove Density Maps, Statistics & Observations

Junagam Sea

This site is situated on sea side in west of Junagam village. It is along a wide and somewhat deep creek. About 5.56% of the area is covered by dense mangroves, mainly along the creek on eastern side from north to south of plot area. A patch of dense mangrove is also located as a strip on western side of creek. Moderate and sparse growth covers 17.36% and 10.67% of the area respectively. 23.26% of area is degraded. 31.38% area is covered by Fishery ponds while 11.77% is covered by creek.

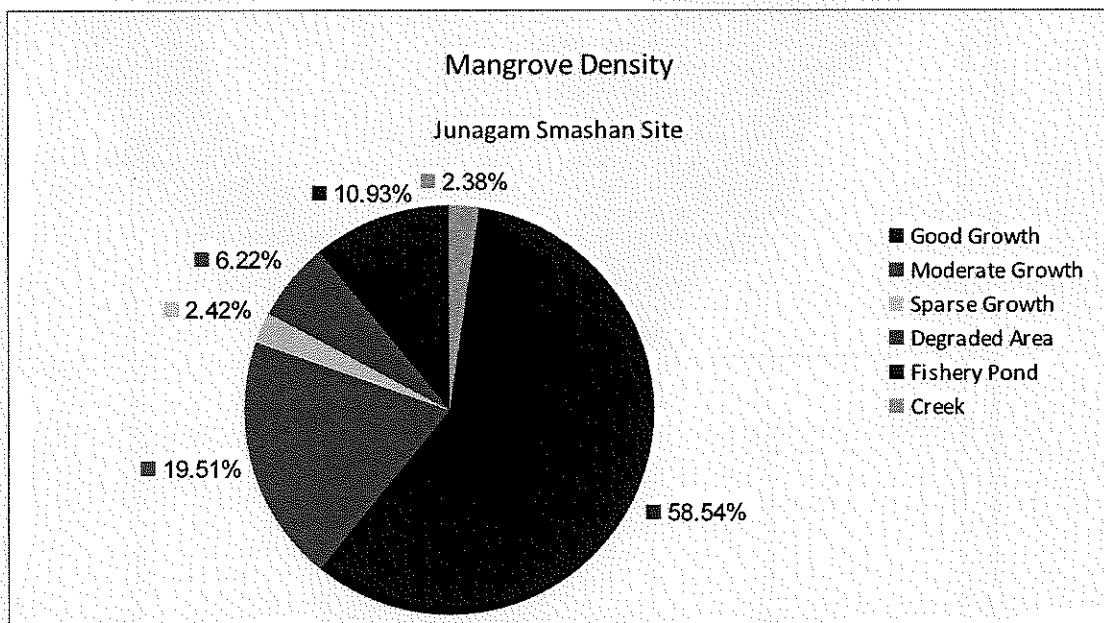
Mangrove Density of Junagam Sea			
Sr. No.	Description	% Area	Area in Ha.
1	Good Growth	5.56	4.58
2	Moderate Growth	17.36	14.29
3	Sparse Growth	10.67	8.78
4	Degraded Area	23.26	19.14
5	Fishery Pond	31.38	25.83
6	Creek	11.77	9.69
	Total	100.00	82.30



Junagam Smashan

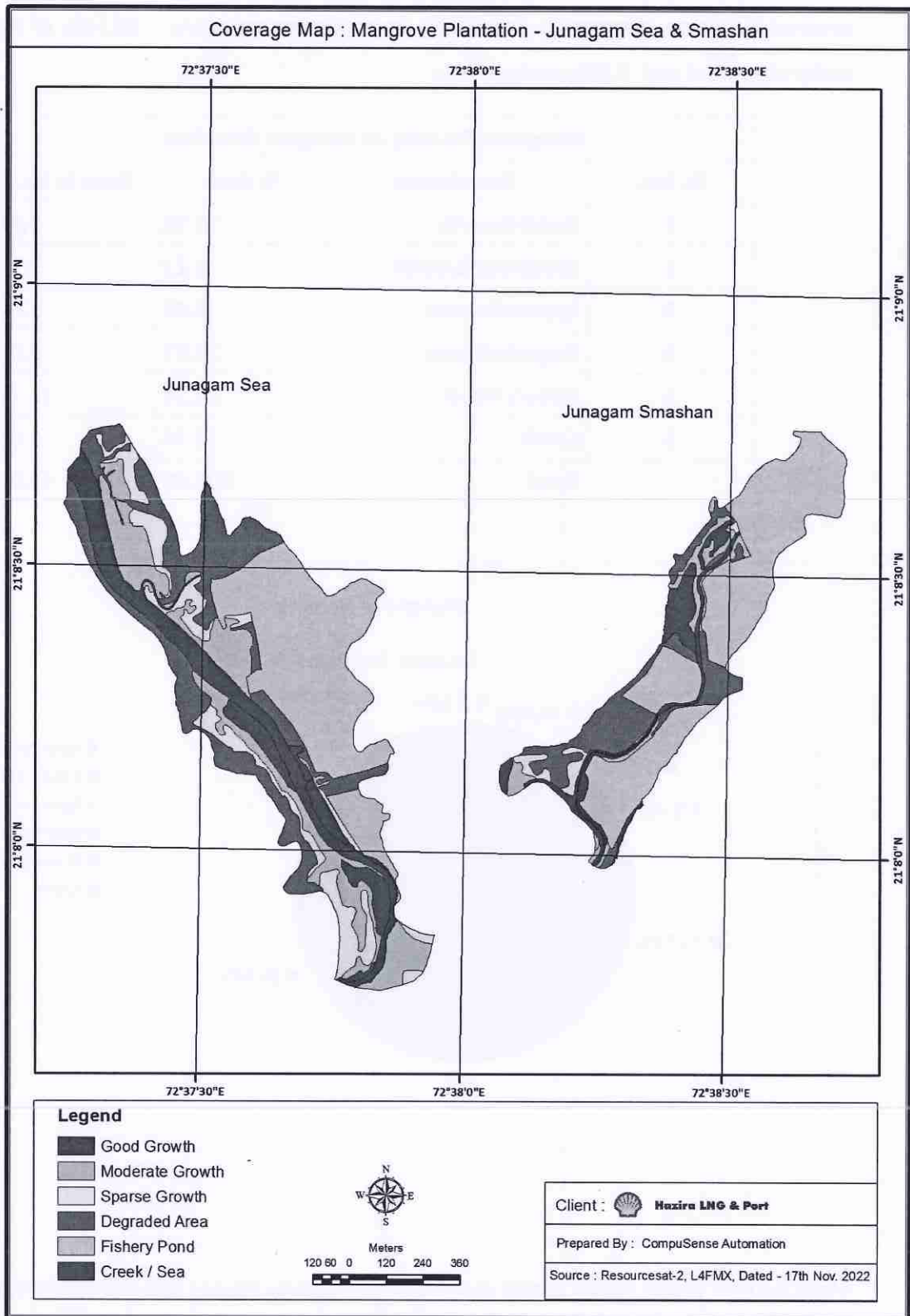
In this site majority of the area, 58.54% is occupied by Fishery ponds. 10.93% of the area is covered by dense mangroves and 6.22% by moderate category. 19.51% of the area is under degraded and 2.38% under creek.

Mangrove Density of Junagam Smashan			
Sr. No.	Description	% Area	Area in Ha.
1	Good Growth	10.93	4.81
2	Moderate Growth	6.22	2.74
3	Sparse Growth	2.42	1.07
4	Degraded Area	19.51	8.59
5	Fishery Pond	58.54	25.77
6	Creek	2.38	1.05
	Total	100.00	44.02

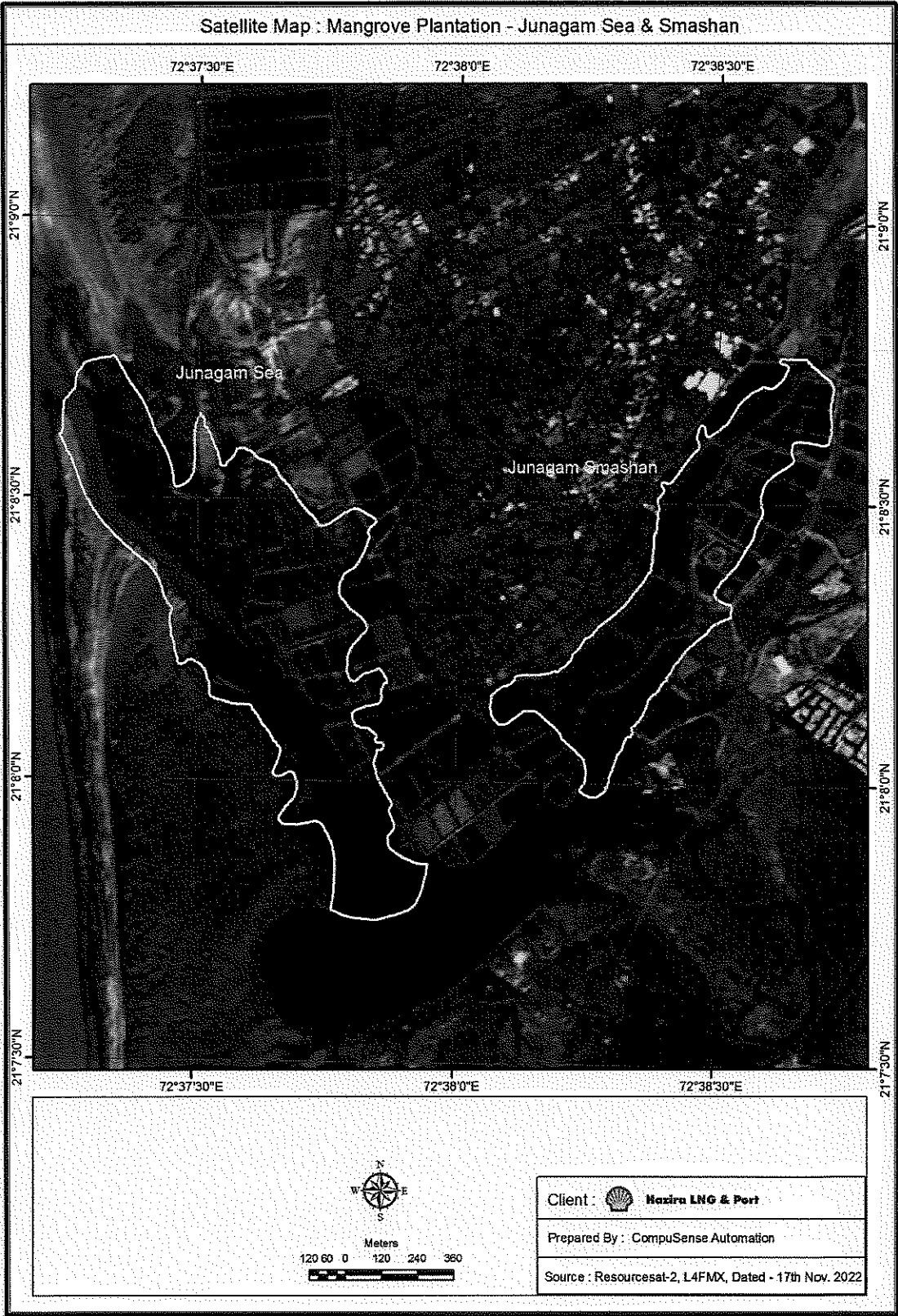


Maps on next pages shows spatial distribution of density classes and satellite image of site.

Junagam Sea and Smashan Site – Mangrove Coverage Map



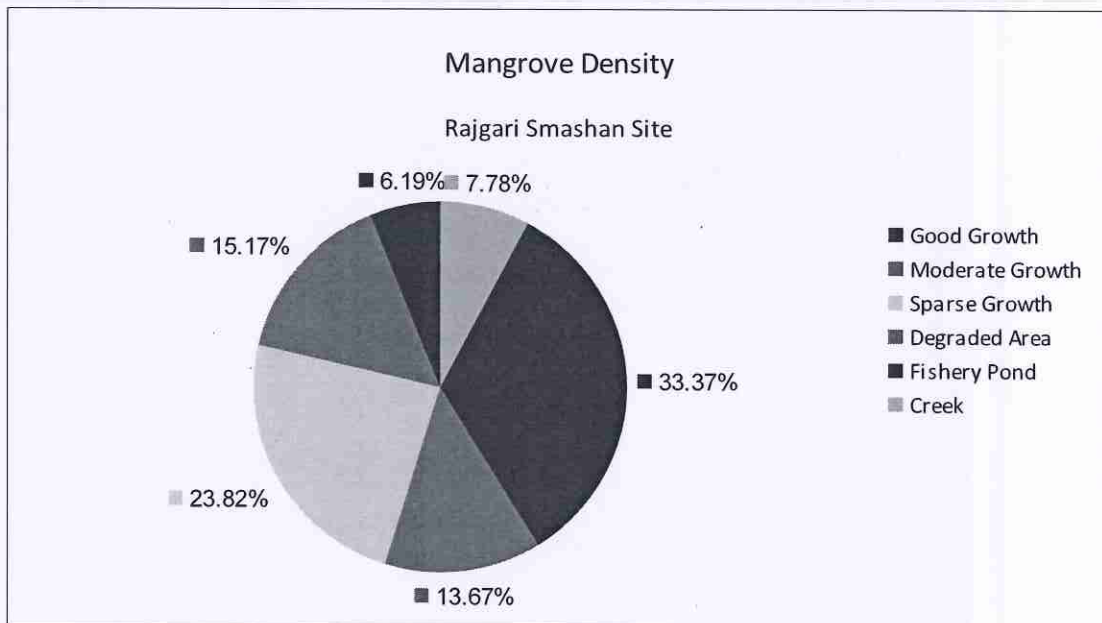
Junagam Sea and Smashan Site - Satellite Image



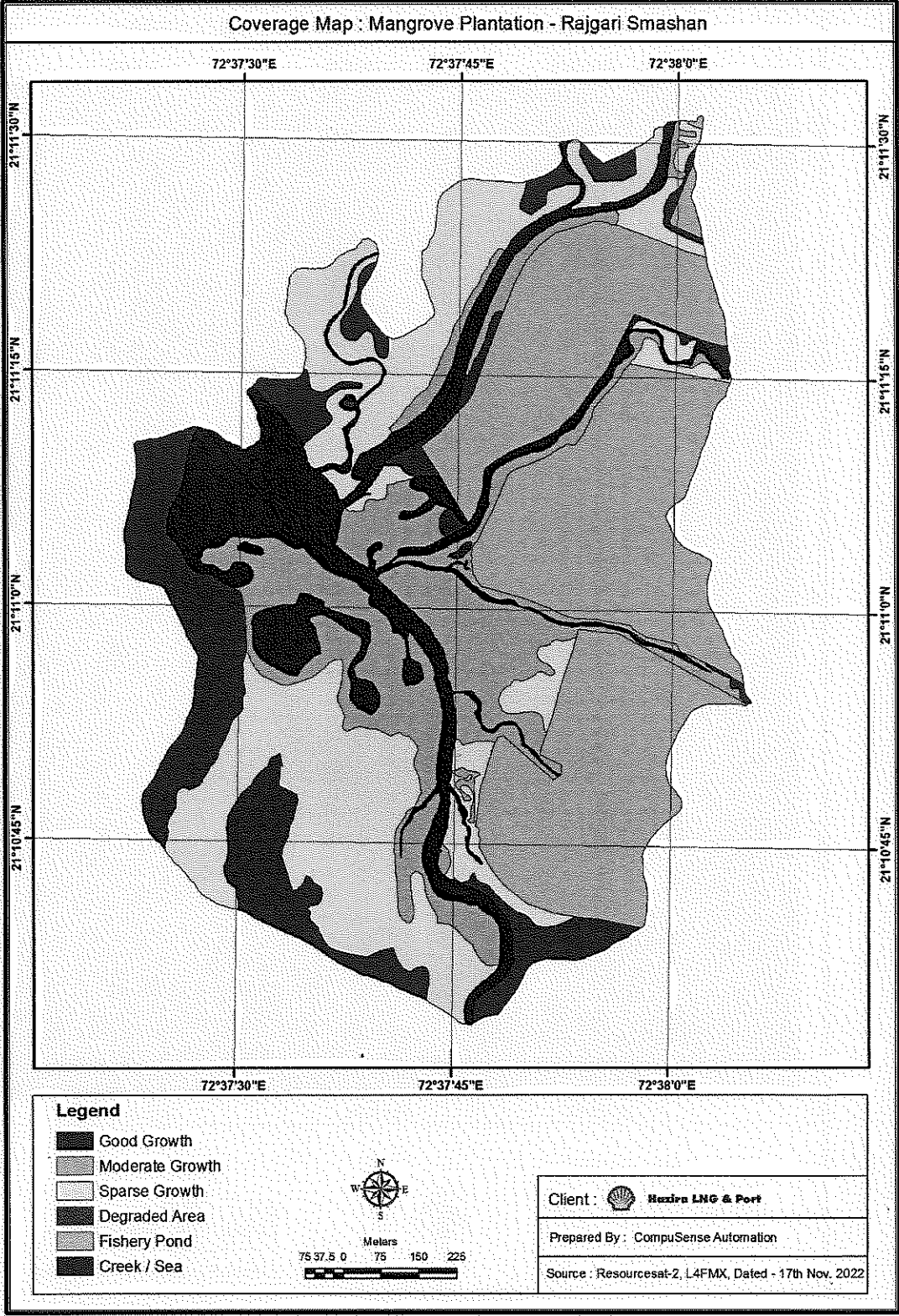
Rajgari Smashan

About 6.19% of the area is covered by dense mangroves and 15.17% by moderate growth. Sparse mangroves cover 23.82%, where as about 13.67% of the area is degraded. Here also 33.37% area is covered by Fishery ponds. Dense mangroves are located near creek and density decreases from creek to landward side.

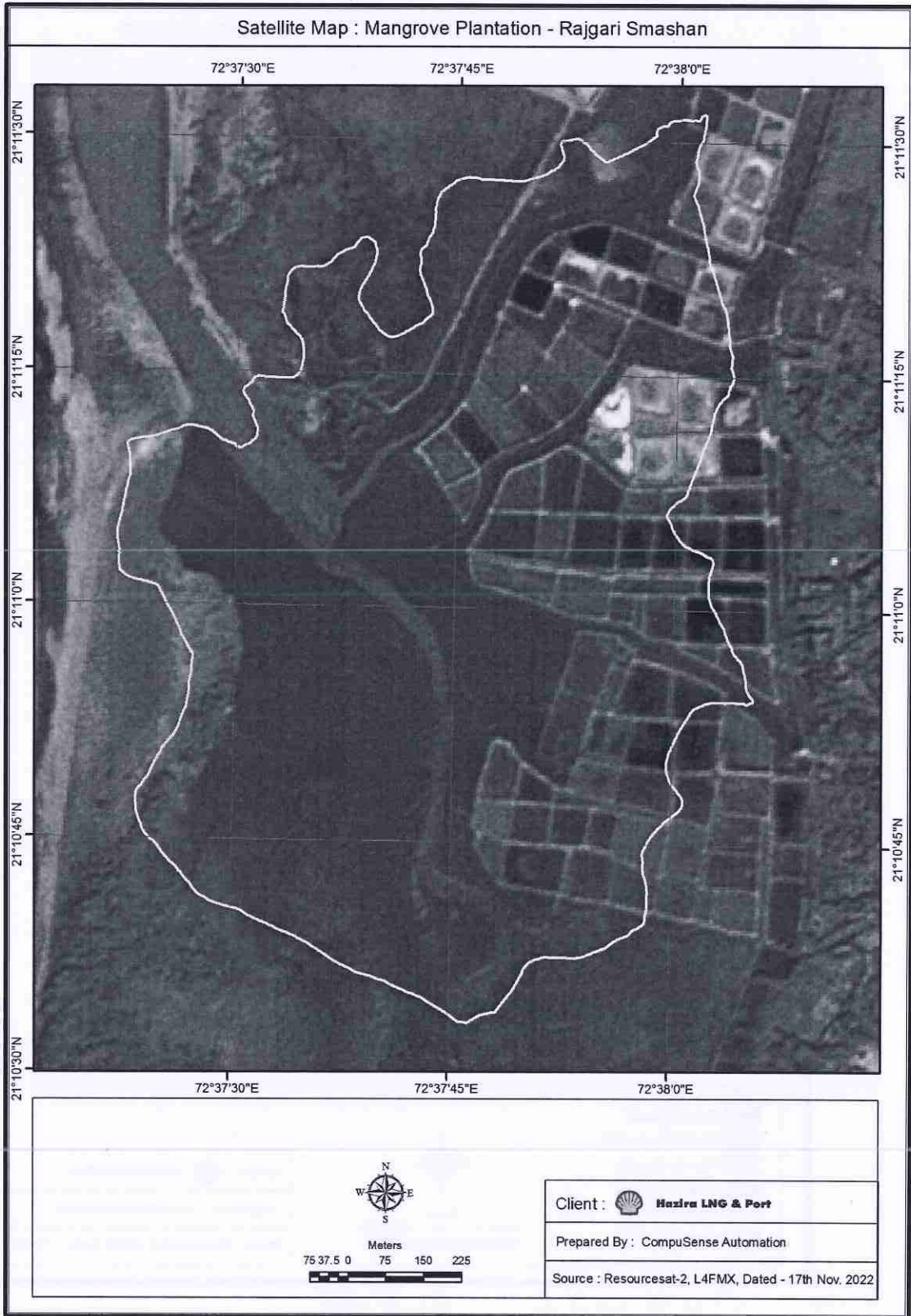
Mangrove Density of Rajgari Smashan			
Sr. No.	Description	% Area	Area in Ha.
1	Good Growth	6.19	9.08
2	Moderate Growth	15.17	22.26
3	Sparse Growth	23.82	34.94
4	Degraded Area	13.67	20.05
5	Fishery Pond	33.37	48.95
6	Creek	7.78	11.41
	Total	100.00	146.69



Rajgari Smashan – Mangrove Coverage Map



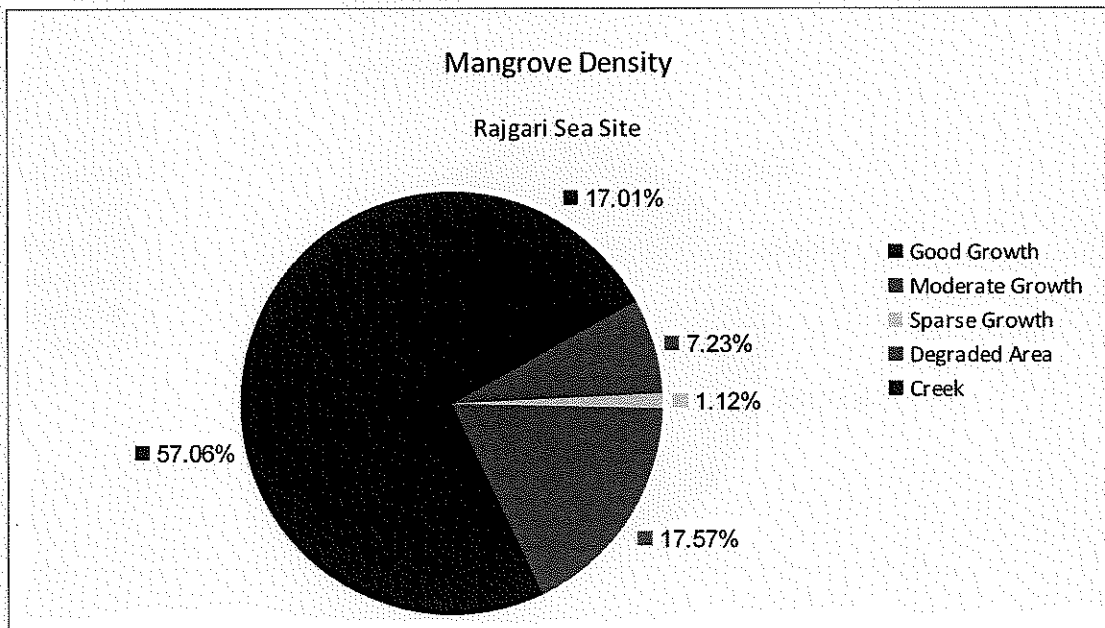
Rajgari Smashan - Satellite Image



Rajgari Sea

This plot is located towards sea away from land line. Dense growth of about 57.06% is observed towards sea side. Moderate growth covers about 17.57 % of the area. In this site, sparse growth covers 1.12%. About 7.23% of the area is degraded and creek covers 17.01% of area.

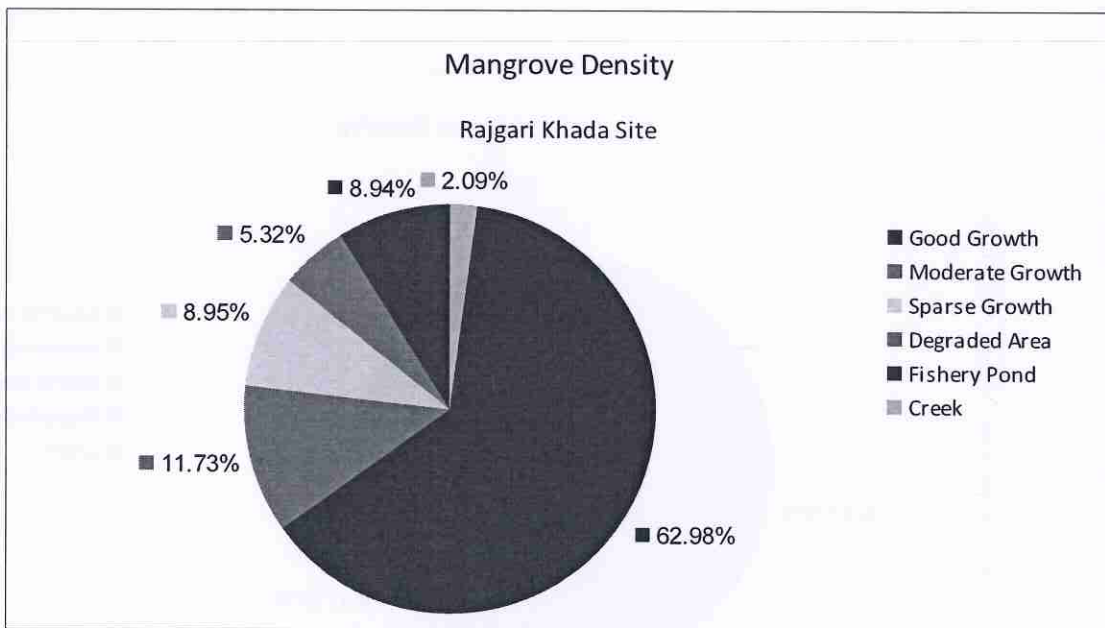
Mangrove Density of Rajgari Sea			
Sr. No.	Description	% Area	Area in Ha.
1	Good Growth	57.06	47.10
2	Moderate Growth	17.57	14.51
3	Sparse Growth	1.12	0.93
4	Degraded Area	7.23	5.96
5	Creek	17.01	14.04
	Total	100.00	82.54



Rajgari Khada

In this site also fishery ponds cover 62.98% of area. Whereas 8.94% of the area is covered by dense mangroves and 5.32% by moderate category. Sparse category covers 8.95% area. 11.73% area is degraded. Creek covers 2.09% area.

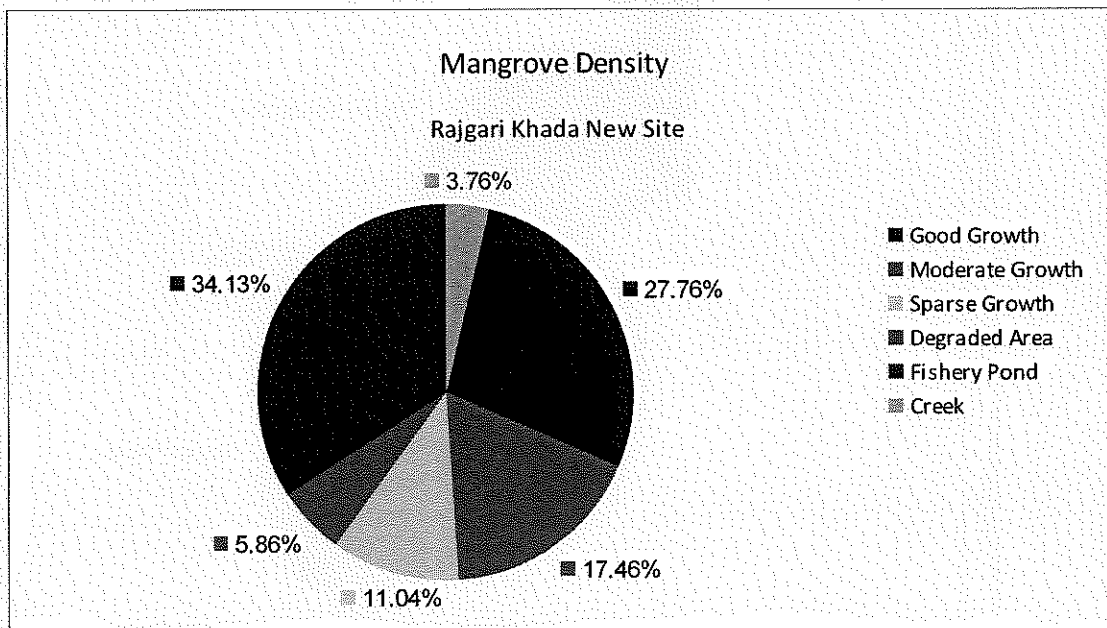
Mangrove Density of Rajgari Khada			
Sr. No.	Description	% Area	Area in Ha.
1	Good Growth	8.94	5.92
2	Moderate Growth	5.32	3.52
3	Sparse Growth	8.95	5.92
4	Degraded Area	11.73	7.77
5	Fishery Pond	62.98	41.71
6	Creek	2.09	1.38
	Total	100.00	66.23



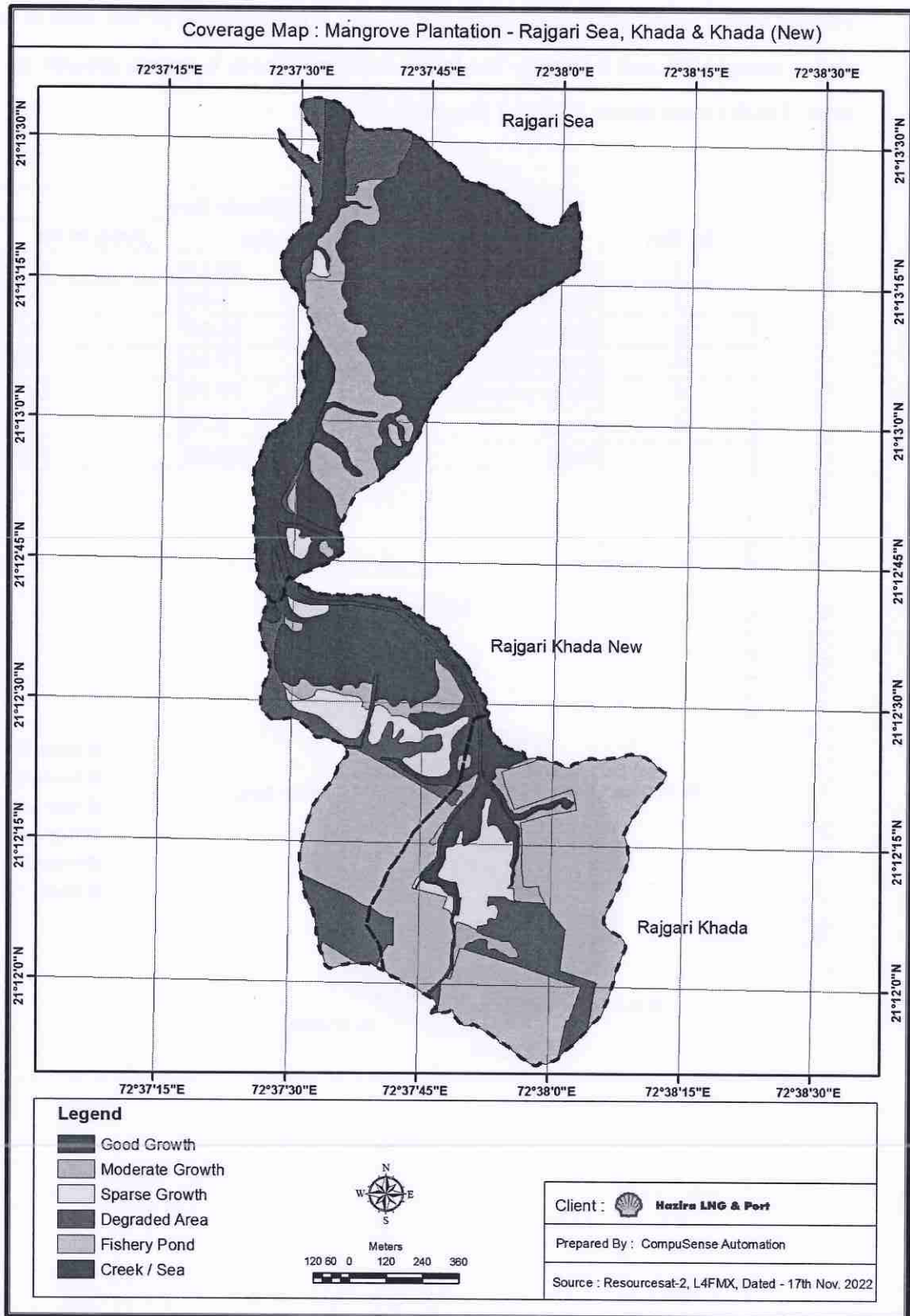
Rajgari Khada New

Fishery ponds cover 27.76% of area in this site. About 34.13% of the area is covered by dense mangroves and 5.86% by moderate category. There is sparse growth in 11.04% of area. Creek covers about 3.76% of the area.

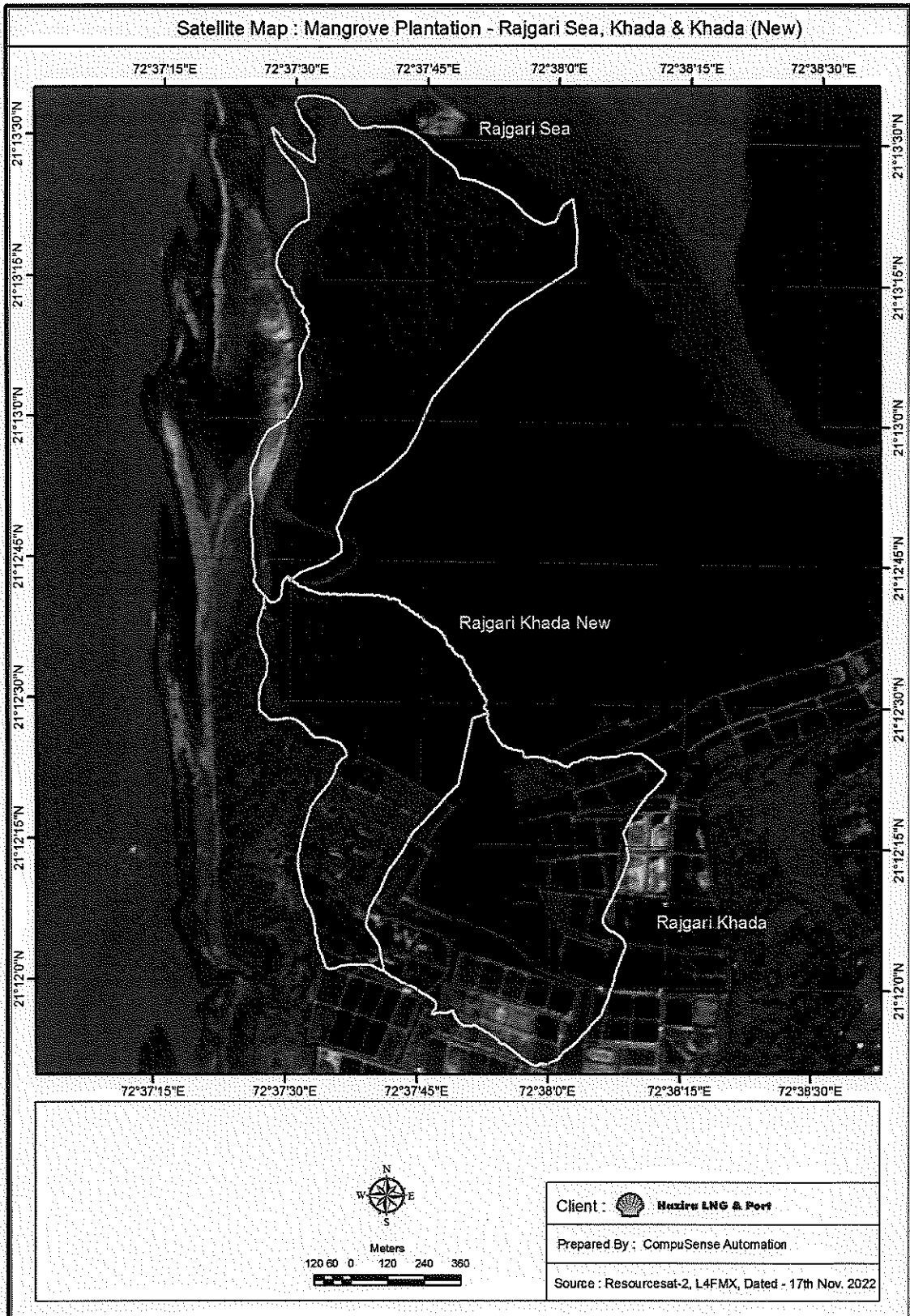
Mangrove Density of Rajgari Khada New			
Sr. No.	Description	% Area	Area in Ha.
1	Good Growth	34.13	17.89
2	Moderate Growth	5.86	3.07
3	Sparse Growth	11.04	5.78
4	Degraded Area	17.46	9.15
5	Fishery Pond	27.76	14.55
6	Creek	3.76	1.97
	Total	100.00	52.41



Rajgari Sea, Khada & Khada (New) Site – Mangrove Coverage Map



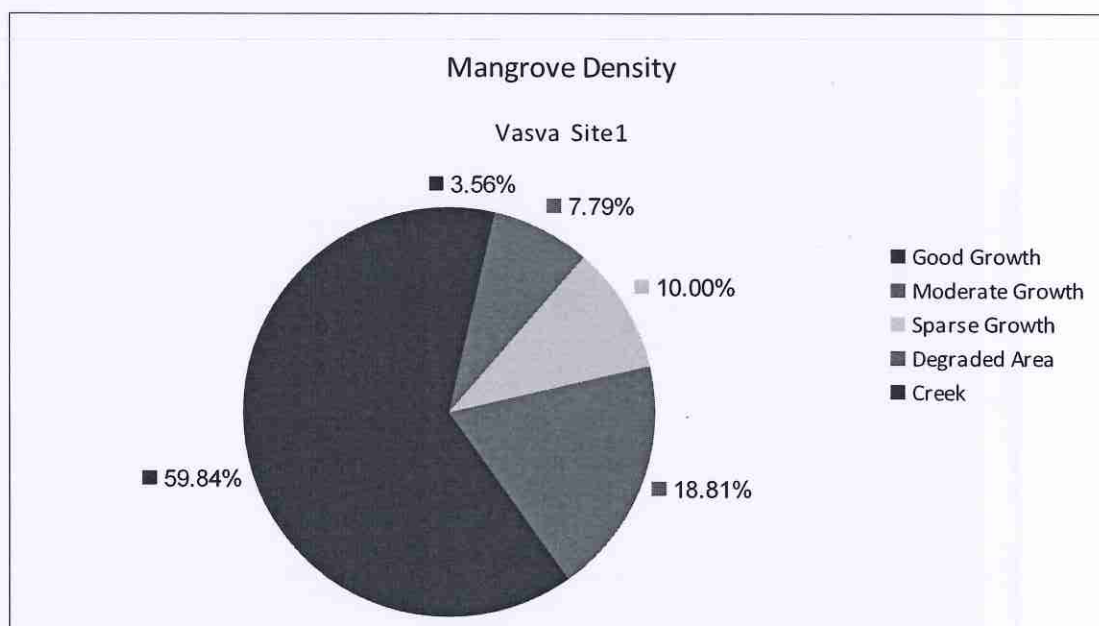
Rajgari Sea, Khada & Khada (New) Site – Satellite Image



Vasva Site - 1

This site is situated along a road going to newly constructed Tena Khadi bridge. Dense category is found to be about 59.84%. Moderate growth covers about 18.81% of the area. There is sparse growth in 10.00% . Degraded area covers 7.79% of the area and creek 3.56%.

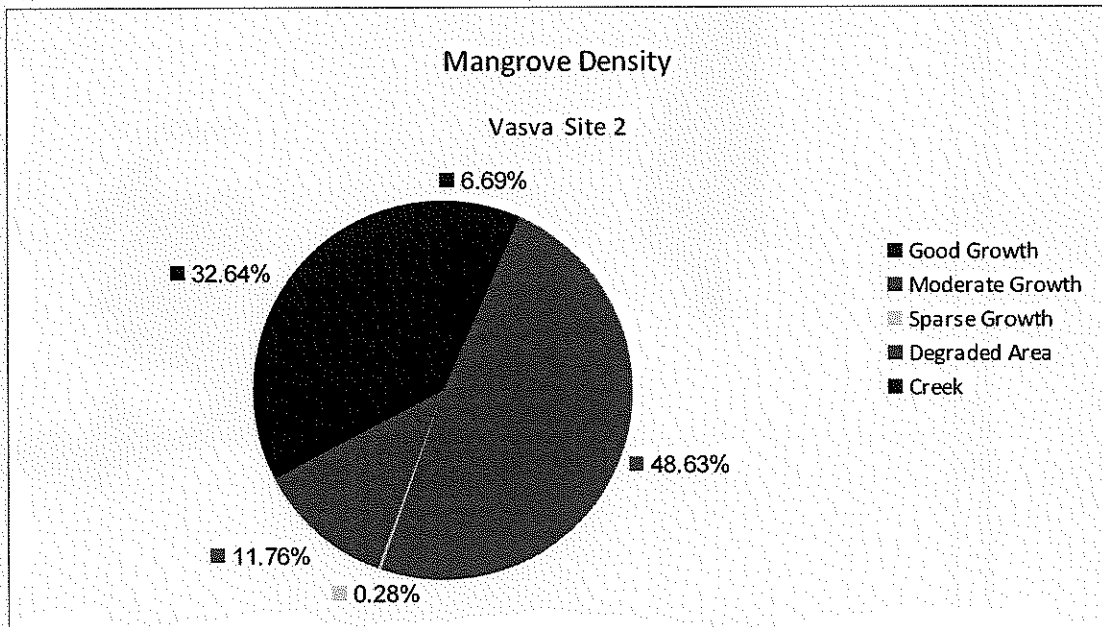
Mangrove Density of Vasva Site – 1			
Sr. No.	Description	% Area	Area in Ha.
1	Good Growth	59.84	21.93
2	Moderate Growth	18.81	6.89
3	Sparse Growth	10.00	3.66
4	Degraded Area	7.79	2.85
5	Creek	3.56	1.31
	Total	100.00	36.64



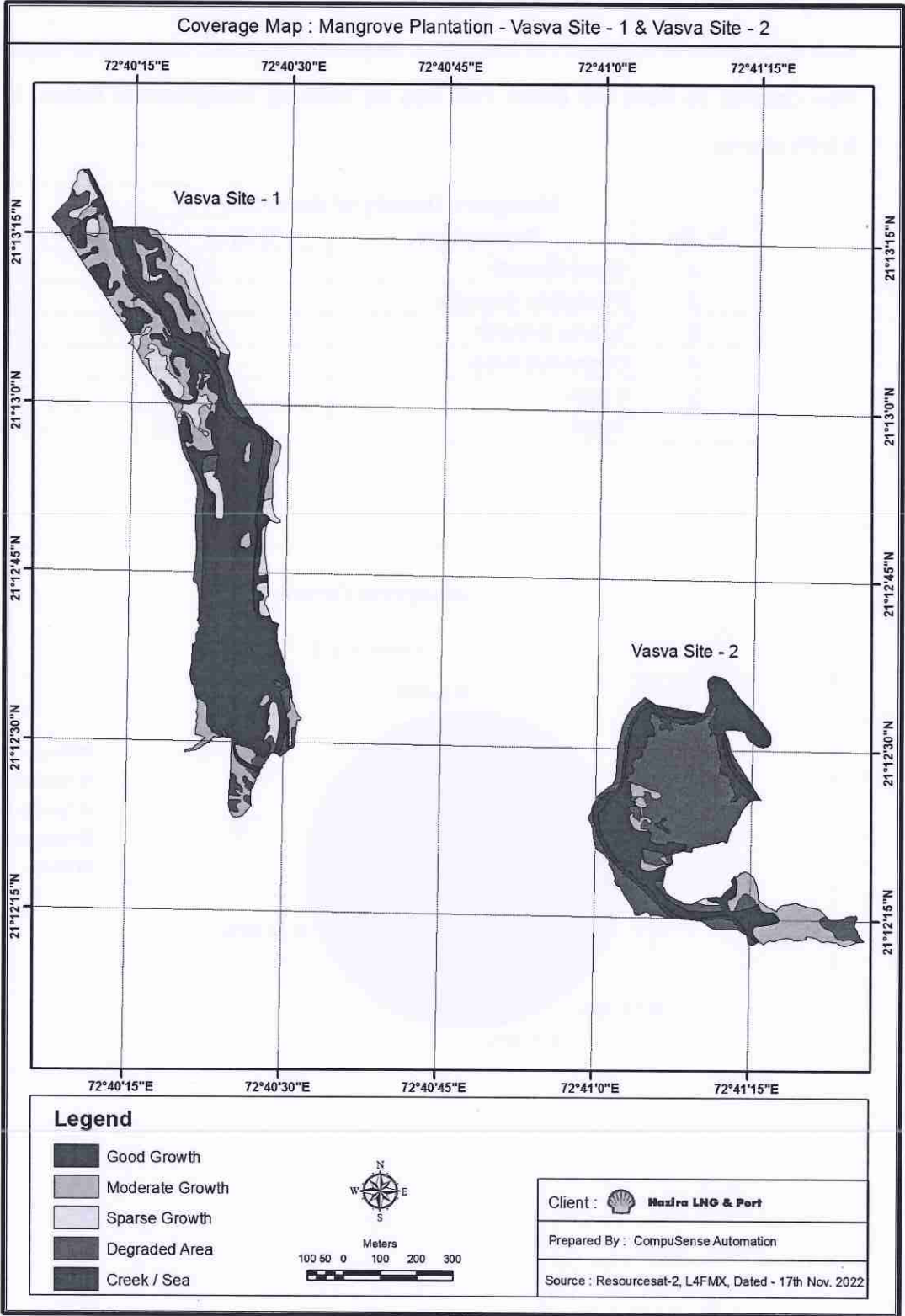
Vasva Site - 2

This plot is situated near the creek in Vasva village. Dense mangroves are found to cover an area of 32.64%. A large part of this plot is degraded (48.63%). Majority of degraded area is now covered by trees like Babul. This may be invading mangroves in future. Creek covers 6.69% of area.

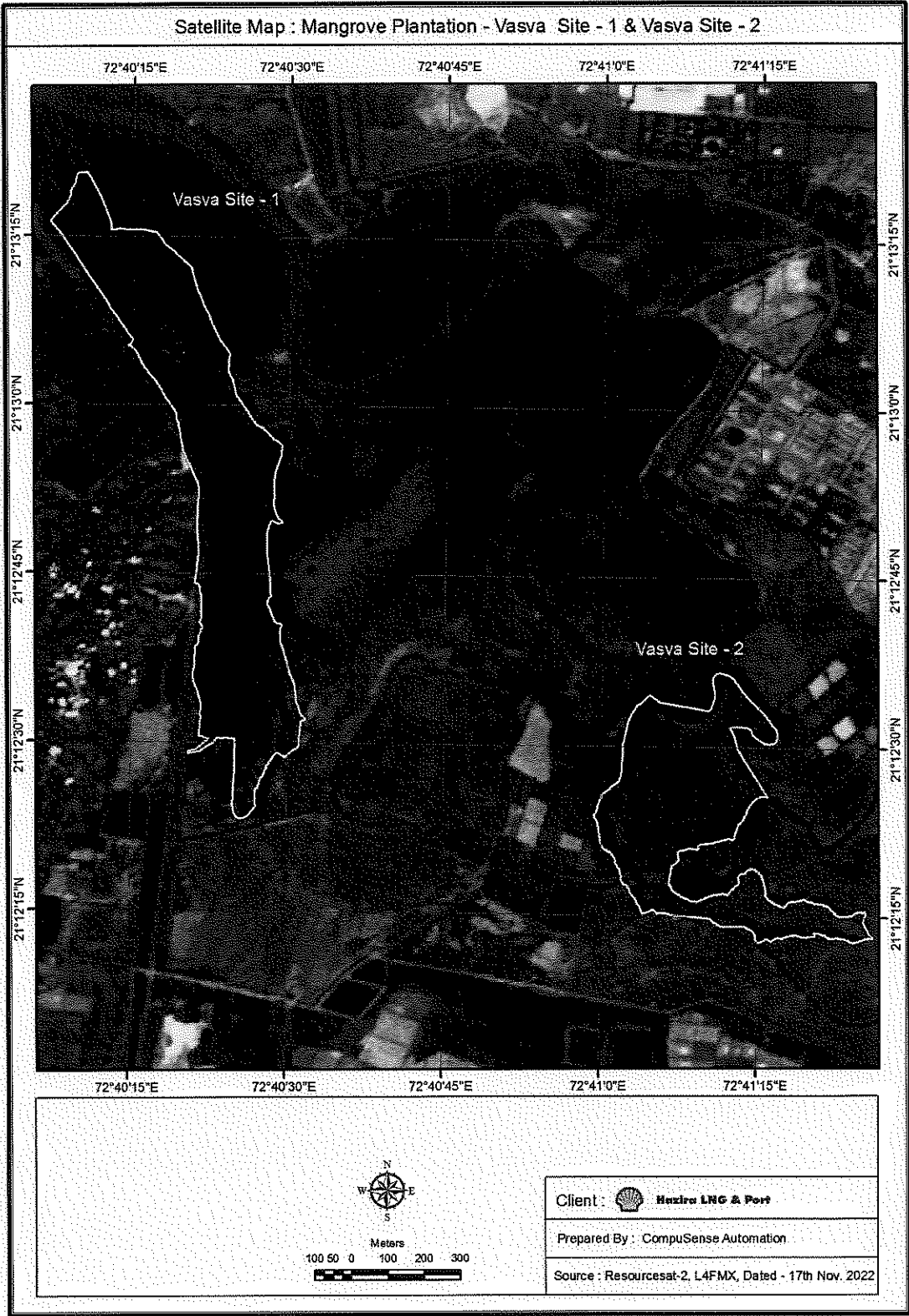
Mangrove Density of Vasva Site – 2			
Sr. No.	Description	% Area	Area in Ha.
1	Good Growth	32.64	7.32
2	Moderate Growth	11.76	2.64
3	Sparse Growth	0.28	0.06
4	Degraded Area	48.63	10.91
5	Creek	6.69	1.50
	Total	100.00	22.43



Vasva Site – Mangrove Coverage Map



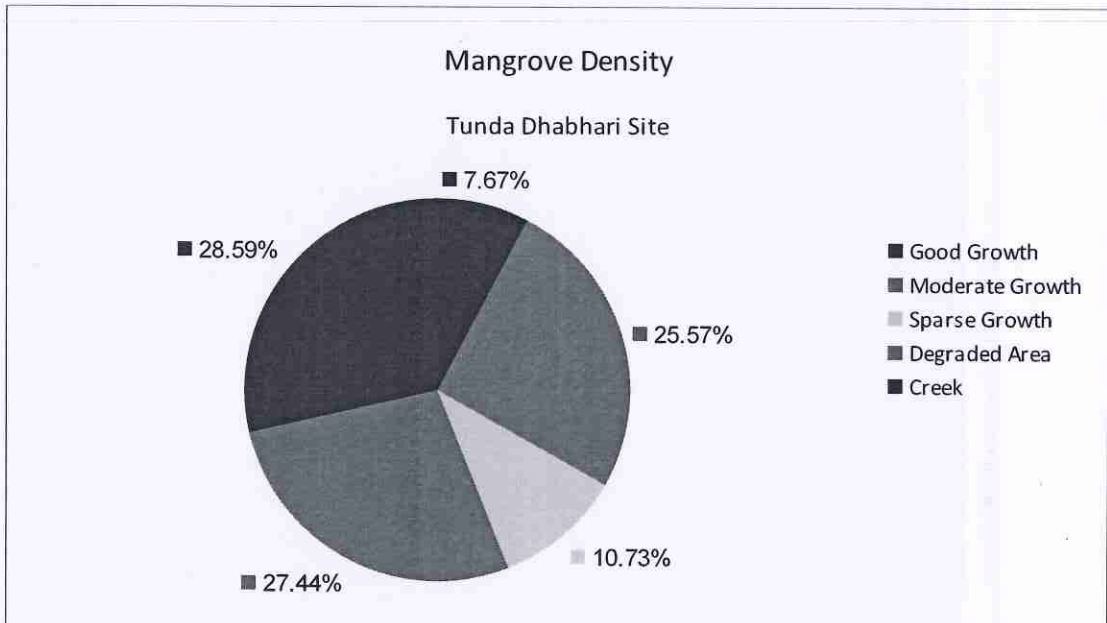
Vasva Site – Satellite Image



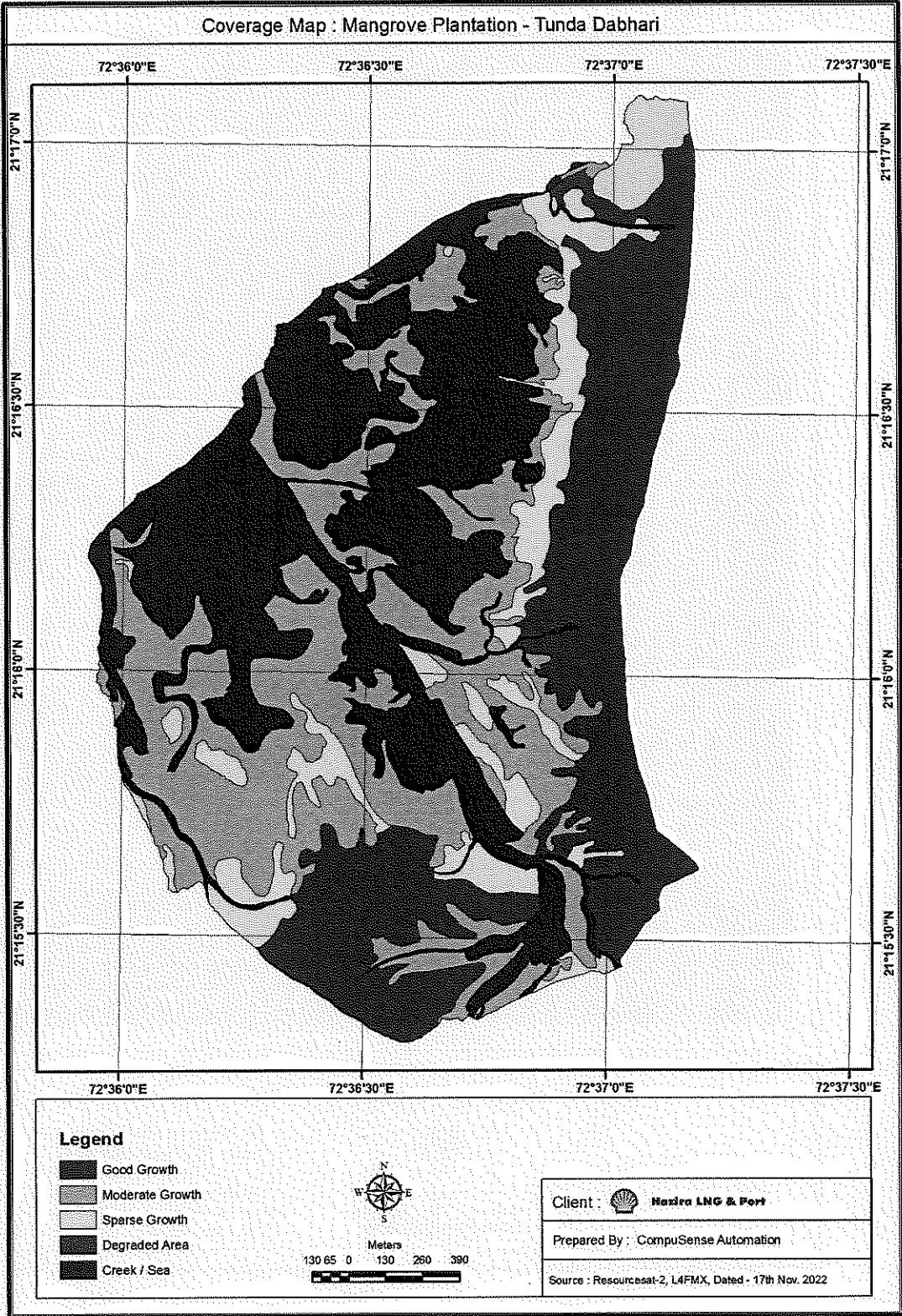
Tunda Dabhari

This is the biggest site covering area of 463.30 ha. 28.59% of this site is covered by Dense mangroves. Moderate category covers 27.44%. There is sparse growth in 10.73% of area where as 25.57% is degraded. Creek covers 7.67% area.

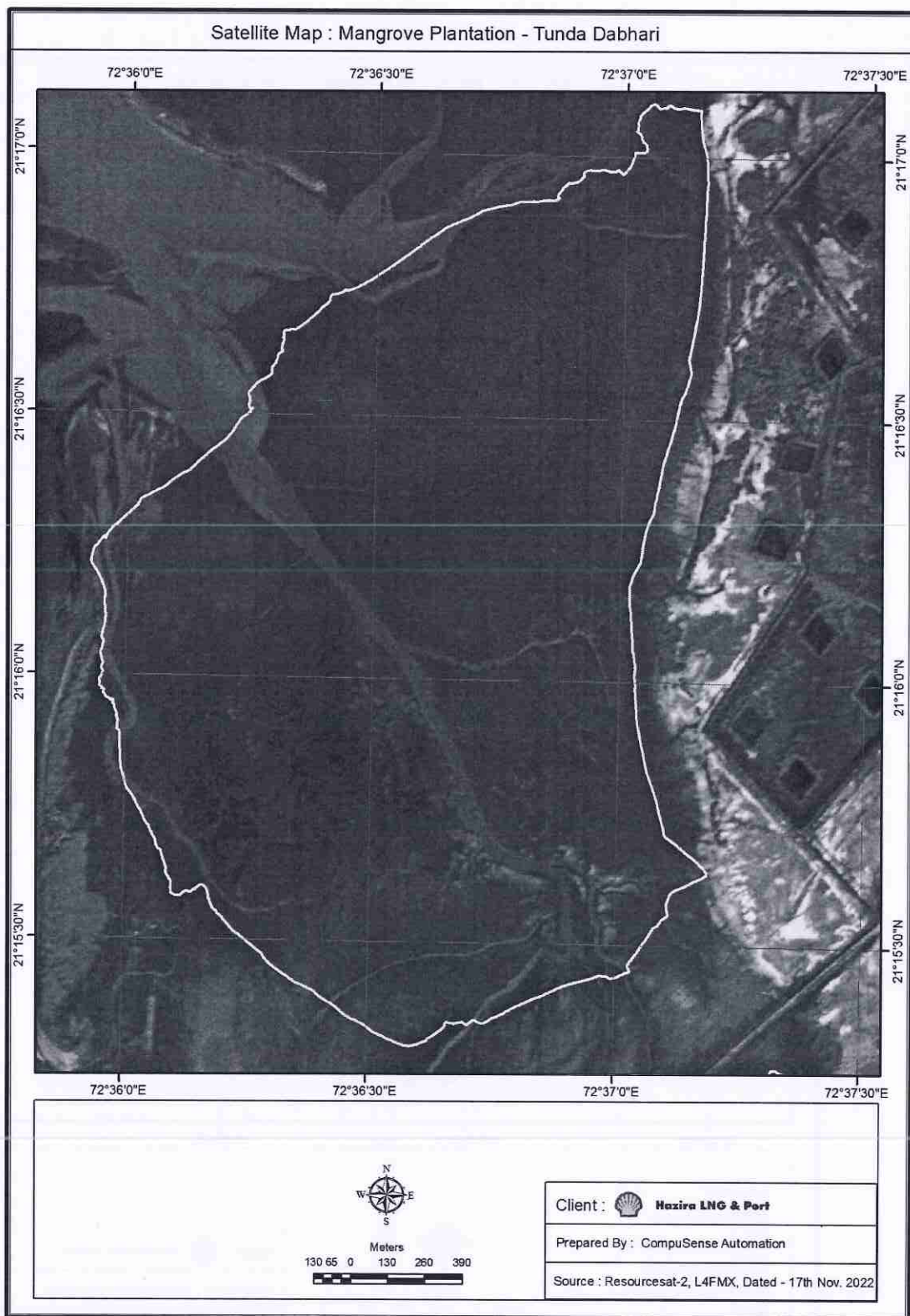
Mangrove Density of Tunda Dabhari			
Sr. No.	Description	% Area	Area in Ha.
1	Good Growth	28.59	132.48
2	Moderate Growth	27.44	127.12
3	Sparse Growth	10.73	49.69
4	Degraded Area	25.57	118.49
5	Creek	7.67	35.52
	Total	100.00	463.30



Tunda Dabhari Site – Mangrove Coverage Map



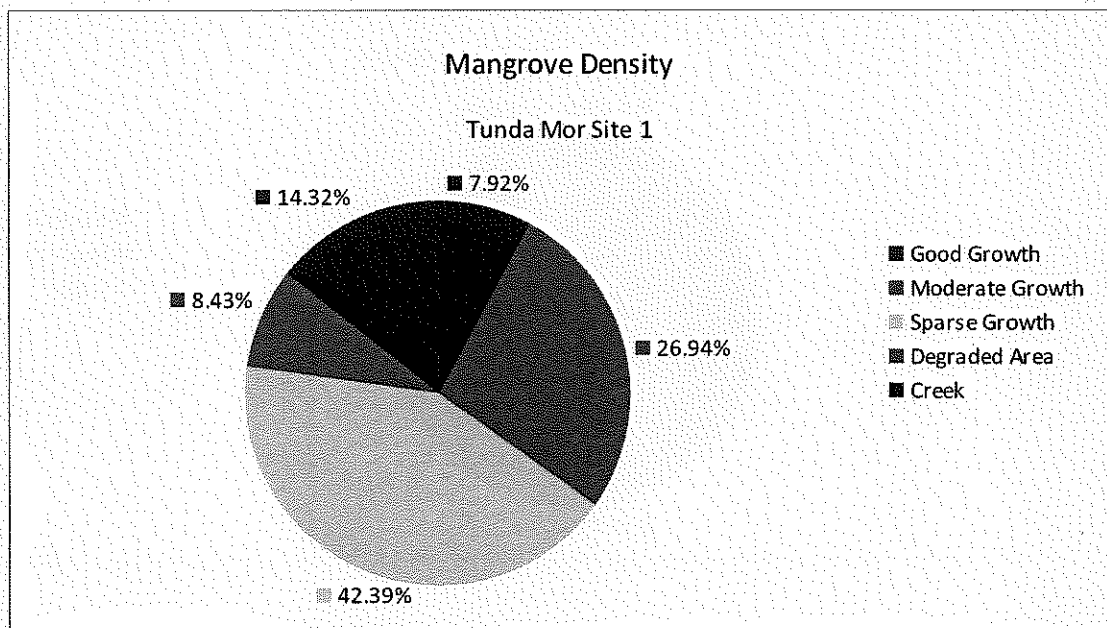
Tunda Dabhari – Satellite Image



Tunda Mor Site - 1

This site contains number of small and large creeks. Growth is mainly observed in a narrow strip along creeks. About 8.43% of the area is covered by moderate mangroves. Dense category is found in 14.32% of area . 26.94% of area is degraded. The area also contains associated spices. Creeks cover 7.92% of area.

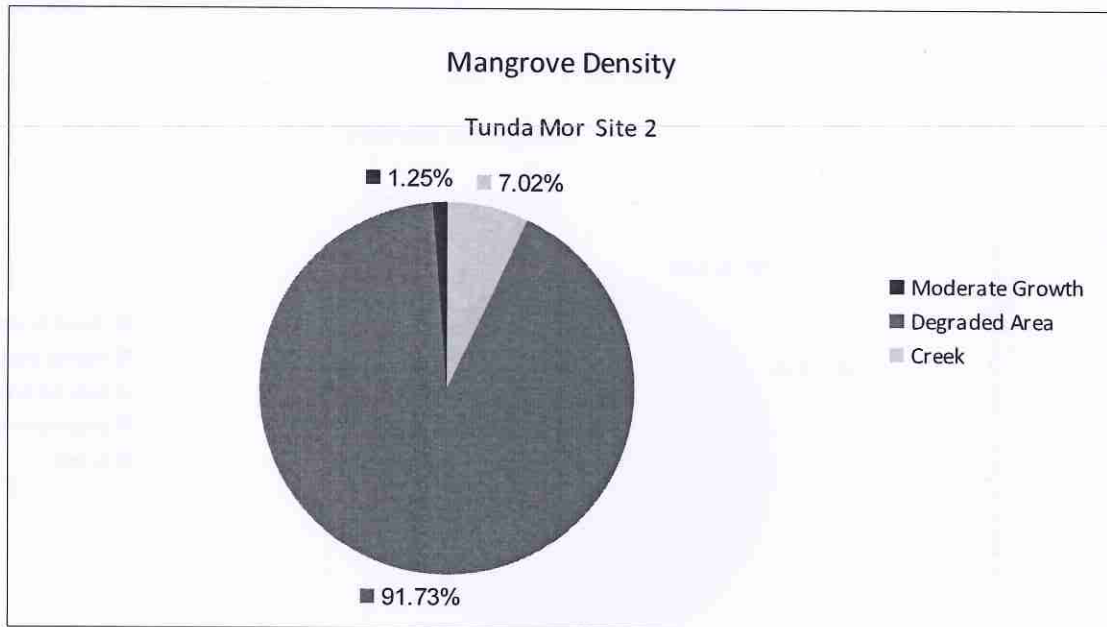
Mangrove Density of Tunda Mor Site – 1			
Sr. No.	Description	% Area	Area in Ha.
1	Good Growth	14.32	6.53
2	Moderate Growth	8.43	3.84
3	Sparse Growth	42.39	19.33
4	Degraded Area	26.94	12.28
5	Creek	7.92	3.61
	Total	100.00	45.59



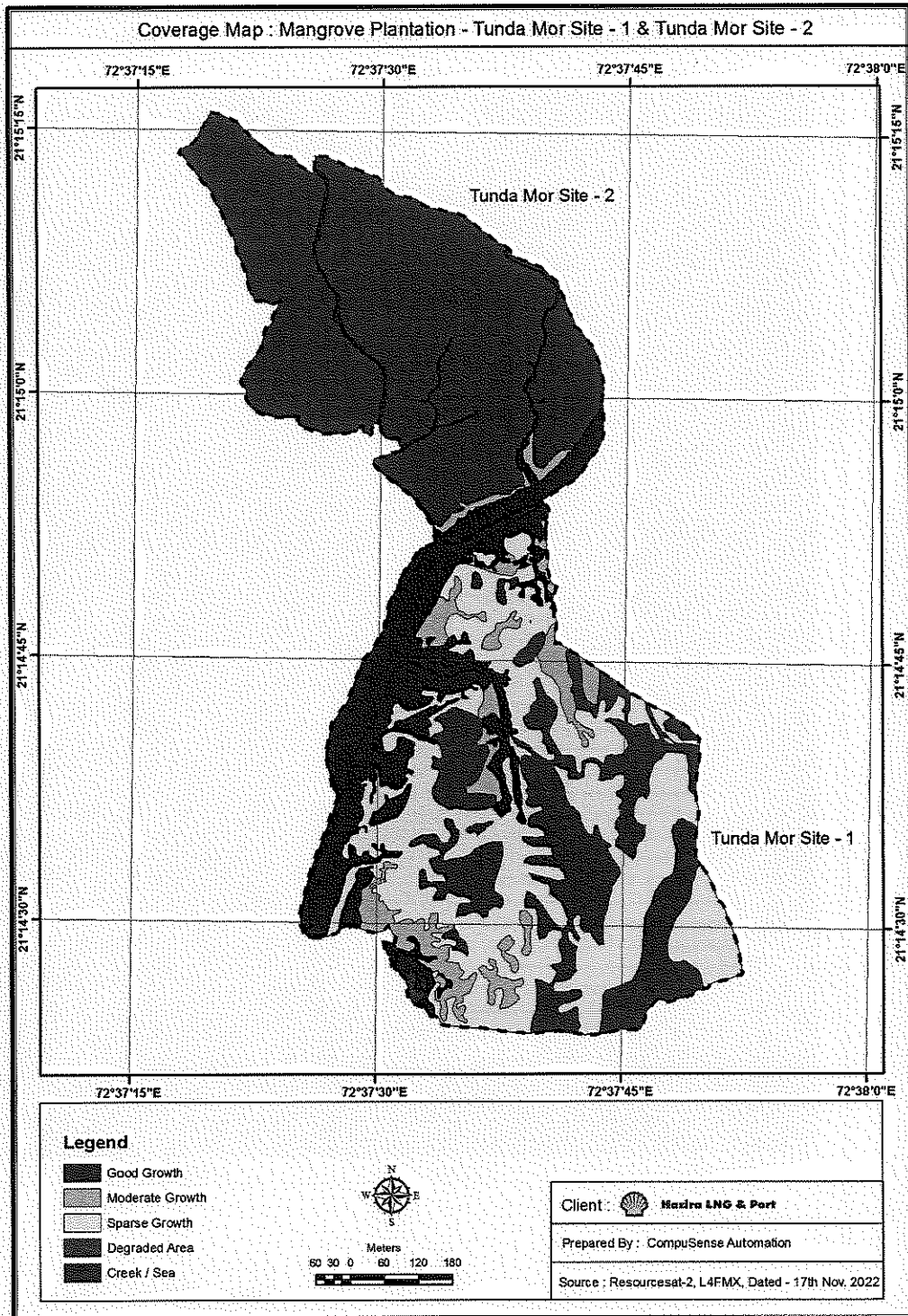
Tunda Mor Site -2

This site has also number of small creeks. Moderate mangroves are found only along big creek in south., covering about 1.25%. Rest of the area (91.73%) is either degraded or covered by associated spices. 7.02% of area is covered by creeks.

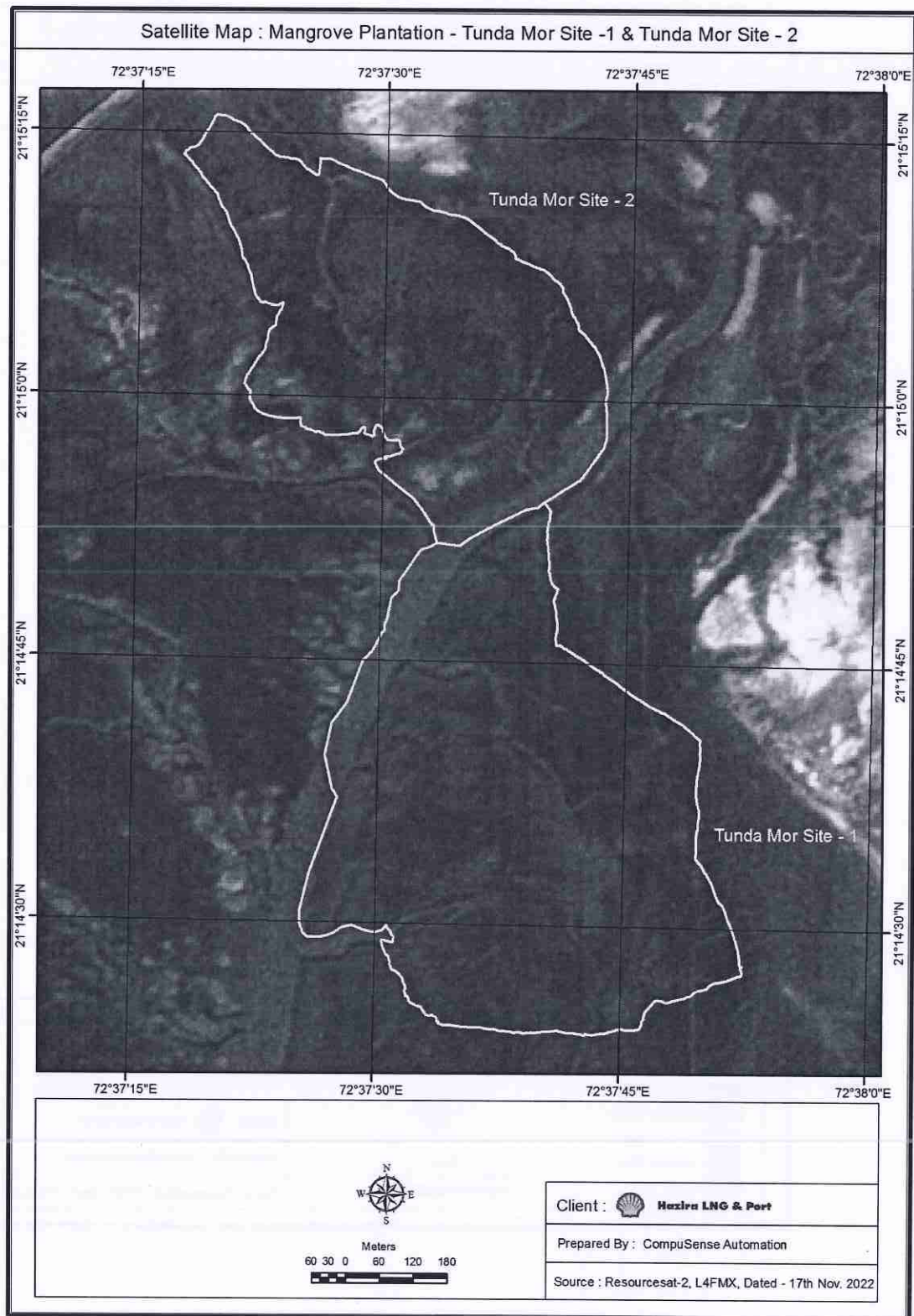
Mangrove Density of Tunda Mor Site – 2			
Sr. No.	Description	% Area	Area in Ha.
1	Moderate Growth	1.25	0.37
2	Degraded Area	91.73	27.13
3	Creek	7.02	2.08
	Total	100.00	29.58



Tunda Mor Site - 1 & Site - 2 – Mangrove Coverage Map



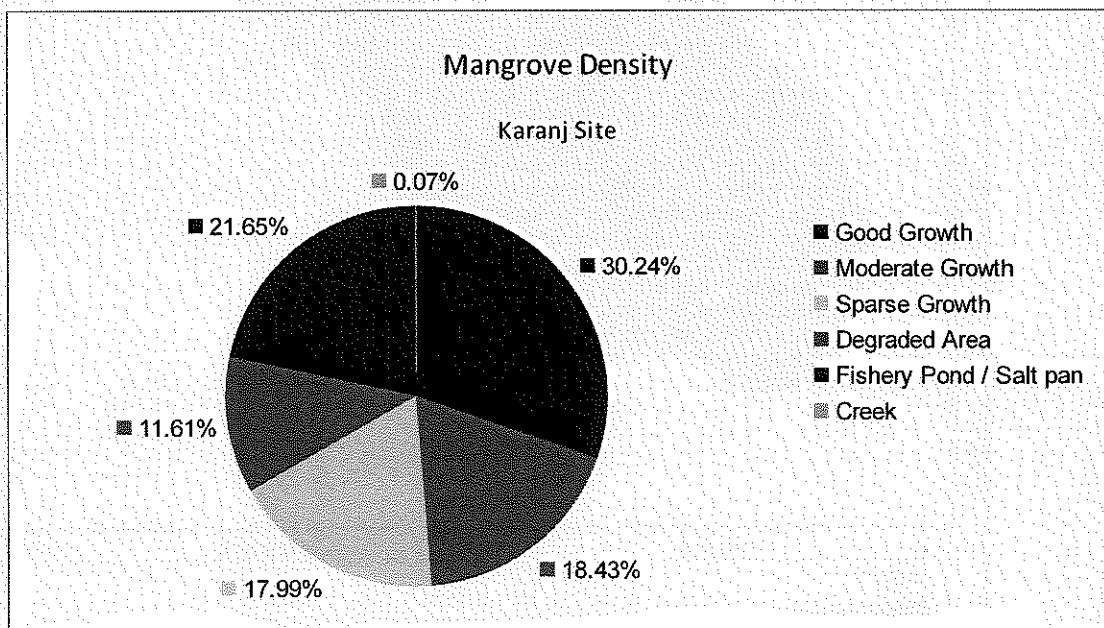
Tunda Mor Site – 1 & Site - 2 – Satellite Image



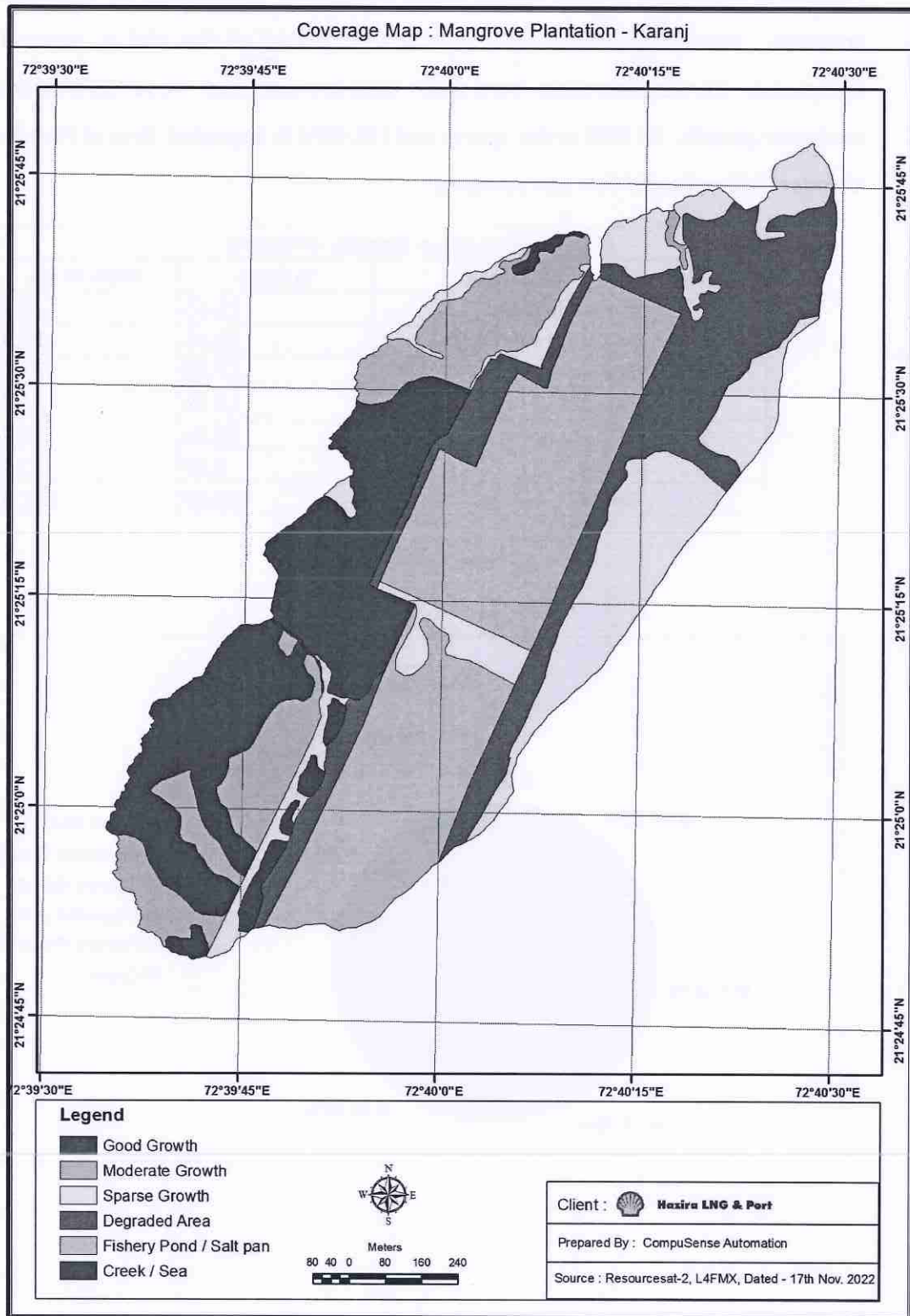
Karanj

This site is located on west of Karanj village is relatively undisturbed by industrial or human activities. About 21.65% of area on south west end of the plot is covered by dense mangroves. Density decreases from south west to north east. About 11.61% area is under moderate growth, 17.99% under sparse and (18.43%) is degraded. Rest of the area (30.24%) is under Fishery Pond / Salt pan category.

Mangrove Density of Karanj			
Sr. No.	Description	% Area	Area in Ha.
1	Good Growth	21.65	28.59
2	Moderate Growth	11.61	15.33
3	Sparse Growth	17.99	23.76
4	Degraded Area	18.43	24.34
5	Fishery Pond / Salt pan	30.24	39.94
6	Creek	0.07	0.10
	Total	100.00	132.07



Karanj – Mangrove Coverage Map

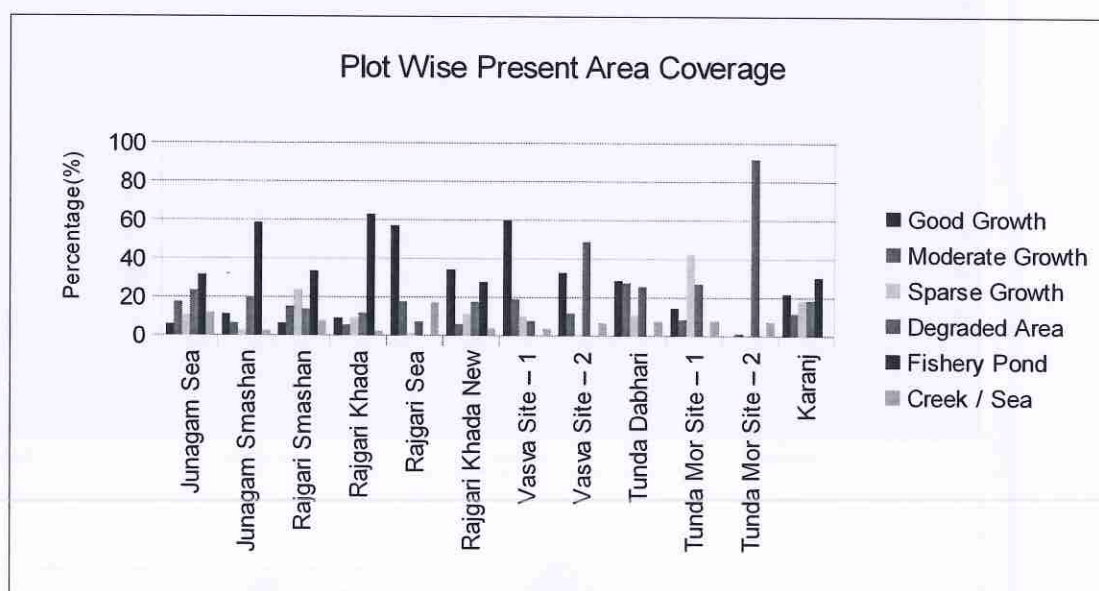


Karanj – Satellite Image



9. Present Mangrove Areas (ha) under different Growth Group :

Mangrove Growth Densities at a Glance in different sites as Ha. of plot area							
Density Category	Good Growth	Moderate Growth	Sparse Growth	Degraded Area	Fishery Pond	Creek / Sea	Total
Junagam Sea	4.58	14.29	8.78	19.14	25.83	9.69	82.30
Junagam Smashan	4.81	2.74	1.07	8.59	25.77	1.05	44.02
Rajgari Smashan	9.08	22.26	34.94	20.05	48.95	11.41	146.69
Rajgari Khada Site	5.92	3.52	5.92	7.77	41.71	1.38	66.23
Rajgari Sea Site	47.10	14.51	0.93	5.96	0.00	14.04	82.54
Rajgari Khada New	17.89	3.07	5.78	9.15	14.55	1.97	52.41
Vasva Smashan Site	21.93	6.89	3.66	2.85	0.00	1.31	36.64
Vasva Rama P	7.32	2.64	0.06	10.91	0.00	1.50	22.43
Tunda Dabhari	132.48	127.12	49.69	118.49	0.00	35.52	463.30
Tunda Mor	6.53	3.84	19.33	12.28	0.00	3.61	45.59
Tunda Mor (New)	0.00	0.37	0.00	27.13	0.00	2.08	29.58
Karanj	28.59	15.33	23.76	24.34	39.94	0.10	132.07
						Total (Ha)	1203.80



All figures in Ha.

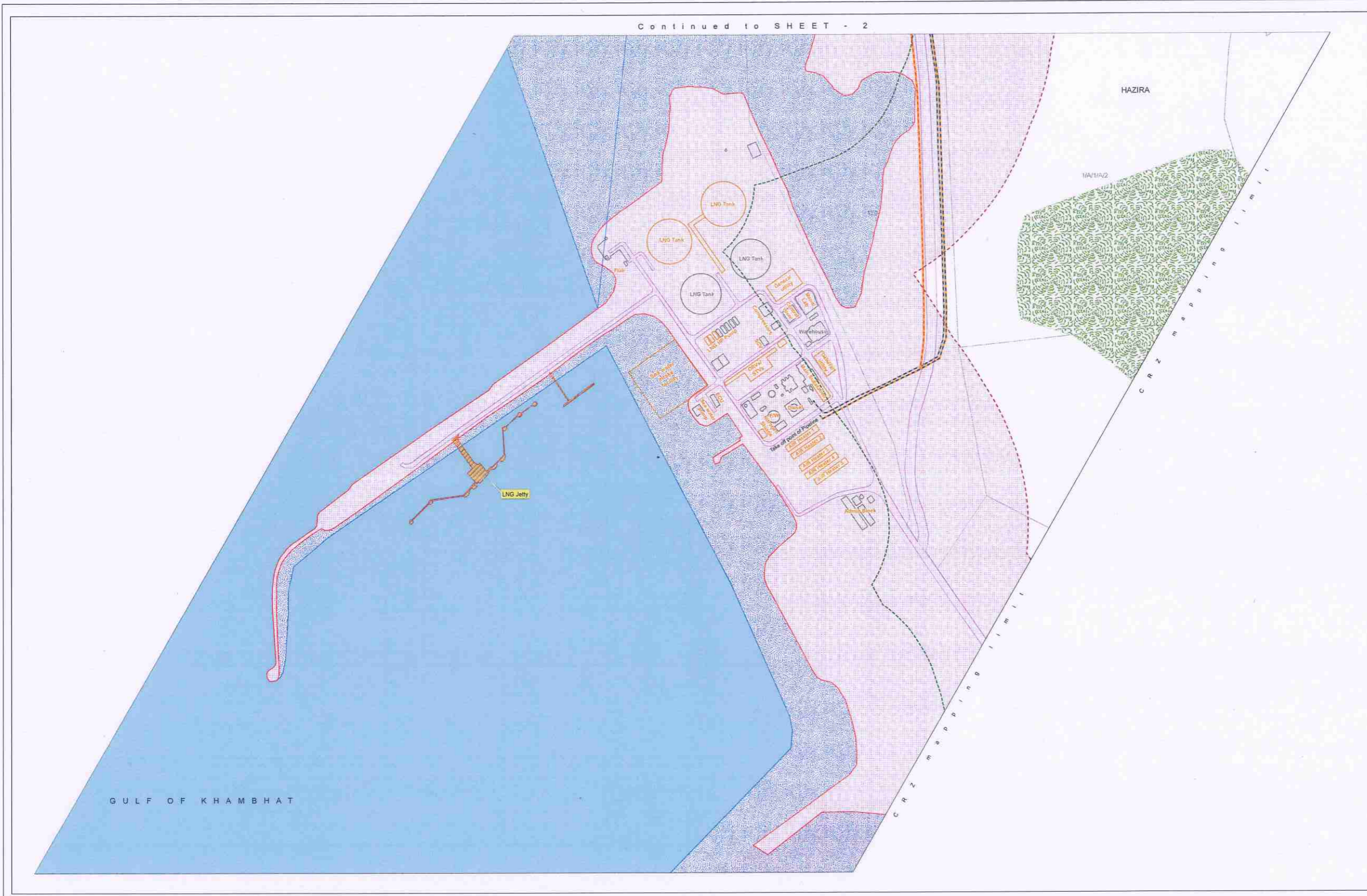
10. Conclusion

Remote sensing study for monitoring mangrove plantation is useful and cost effective method. A general trend of widening of creeks and deposition of sediments was observed in earlier studies. Deposition of sediments on sparse mangroves either buries all plants or raises the level of degraded areas which makes them less suitable for good growth. Increase in Fishery ponds has also resulted in overall decrease in mangrove cover.

Annex-2

Continued to SHEET - 2

SHEET - 1



- Legend**
- Road
 - High Tide Line
 - Low Tide Line
 - 200m CRZ line
 - 500m CRZ line
 - Proposed pipeline
 - Proposed Alternative pipeline
 - Existing pipeline - As given by LNG
 - Proposed Constructions
 - Existing Constructions - As given by LNG
 - ▨ Jetty
 - Proposed Tank
 - Existing Tank
 - ▨ Reserve Forest
 - ▨ 179 Survey Plots
 - ▨ Intertidal Zone - CRZ IB
 - ▨ CRZ landward of HTL
 - ▨ Waterbody - CRZ IV

HTL, LTL and CRZ for the Proposed Tank farm and Pipeline route for Hazira LNG Pvt Ltd at Hazira, Gujarat

Mapped During	Scale
December 2011	0 35 70 140 Meters 1:4,000
Checked by	Approved by

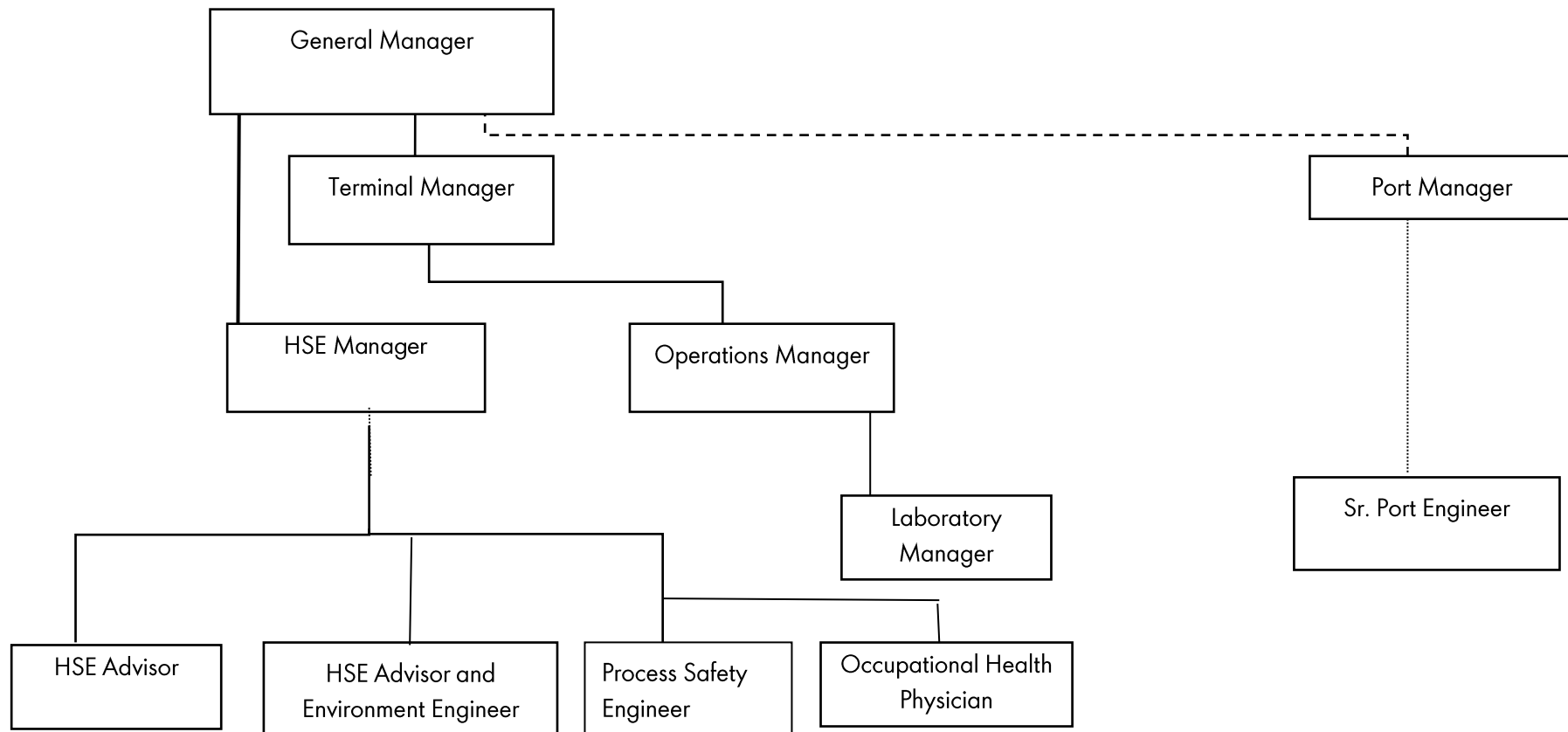
Centre for Earth Science Studies
 Akkalam, Thiruvarkal P.O.
 Thiruvananthapuram 31

Fig. 2a: SHEET 1 - CRZ map (Note: Refer CRZ report for details)

Annexure- VII

Environment Expenses - : BUDGET UTILISATION (November 22 - April 23) INR in lakhs			
Sr.No	Terminal and Port	Operating Cost(INR in lakhs)	
ENVIRONMENT	Sub Components		
A	Waste Management - Collection, Treatment, Transport, Recycling	9	
B	Env Monitoring cost	2.5	
C	Operation of the Env laboratory	4.5	
	Total	16	
SOCIAL PERFORMANCE	Sub Components		
A	Community Health Care and Drinking water	31.04	
B	Agriculture-based Sustainable Livelihoods	151.35	
C	Environment Sustainability	18.46	
	Total	200.85	
	Total Expenditure	216.85	

ENVIRONMENTAL MANAGEMENT CELL



Annex-3+4

STACK AND AMBIENT AIR QUALITY MONITORING-ANNEXURE-III

Fluegas

Sample Location	Parameters	limits	Results- Nov-22	Results- Dec-22	Results- Jan-23	Results- Feb-23	Results- March-23	Results- April-23
lab #								
GTG-1B Stack	S.P.M	150 mg/Nm3	S/B	S/B	S/B	S/B	S/B	S/B
	SO ₂	100 ppm						
	NO _x	50 ppm						
Lab #								
GTG-1A Stack	S.P.M	150 mg/Nm3	S/B	S/B	BQL	S/B	S/B	S/B
	SO ₂	100 ppm			BQL			
	NO _x	50 ppm			4.9			
Lab #								
GTG-2A Stack	S.P.M	150 mg/Nm3	S/B	S/B	S/B	S/B	S/B	S/B
	SO ₂	100 ppm						
	NO _x	50 ppm						
Lab #								
SCV Stack	S.P.M	150 mg/Nm3	S/B	S/B	S/B	S/B	S/B	S/B
	SO ₂	100 ppm						
	NO _x	50 ppm						
Ambient Air								
lab #		µg/m3						
Main Gate	Particulate matter.10	100	124	95	107	130	80	78
	Particulate matter2.5	60	36	39	45	45	39	41
	SO ₂	80	30.22	18.13	24.2	24.2	18.1	15.1
	NO _x	80	37.51	27.12	38.7	34.1	25.6	20.1
lab #								
Site- near warehouse / J	Particulate matter.10	100	147	129	137	165	130	119
	Particulate matter2.5	60	50	45	40	42	47	51
	SO ₂	80	15.11	24.18	21.2	21.2	24.2	33.2
	NO _x	80	28.28	32.9	25.4	27.1	30	31.7

Waste water outlet analysis report- IV

ETP OUTLET		Date	02.11.2022	06.12.2022	02.01.2023	07.02.2023	24.03.2023	13.04.2023
		Lab #	12085	13023	13056/B	13093	13146	13173
Parameter	Unit	GPCB spec.(max) waste water outlet						
PH	PH unit	6.5-8.5	7.11	7.11	7.07	7.12	7.04	6.8
Temp.	C	40	26	27	25	25	25	25
Colour (Pt co.scale)	Pt.Co Sc	100	BQL	BQL	BQL	BQL	BQL	BQL
Suspended Solids	mg/L	100	BQL	BQL	BQL	BQL	BQL	BQL
Oil & Grease	mg/L	10	BQL	BQL	BQL	BQL	BQL	BQL
Phenolic Compounds	mg/L	1	BQL	BQL	BQL	BQL	BQL	BQL
Cyanides	mg/L	0.2	BQL	BQL	BQL	BQL	BQL	BQL
Fluorides	mg/L	1.5	0.48	0.3	0.17	0.16	0.29	0.13
Sulphides	mg/L	2	BQL	BQL	BQL	BQL	BQL	BQL
Ammonical Nitrogen	mg/L	50	BQL	BQL	BQL	BQL	BQL	BQL
Total Chromium	mg/L	2	BQL	BQL	BQL	BQL	BQL	BQL
Hexavalent Chromium	mg/L	0.1	BQL	BQL	BQL	BQL	BQL	BQL
Copper	mg/L	2	BQL	BQL	BQL	BQL	BQL	BQL
Lead	mg/L	0.1	BQL	BQL	BQL	BQL	BQL	BQL
Mercury	mg/L	0.01	BQL	BQL	BQL	BQL	BQL	BQL
Nickel	mg/L	2	BQL	BQL	BQL	BQL	BQL	BQL
Zinc	mg/L	5	BQL	BQL	BQL	BQL	BQL	BQL
BOD (5 days,20°C)/(3 days, 27°C)	mg/L	30/100	BQL	BQL	BQL	BQL	BQL	BQL
COD	mg/L	250	20	10	10	10	20	10

Social Performance Highlights Nov'2022 to April'2023

- ✚ A total of 2222 patients have benefited from the Hazira Medical Centre.
- ✚ More than 37.99 lakh liter of drinking water has been distributed through RO facilities among 6366 beneficiaries in 17 villages.
- ✚ Shell has supported the clean drinking water scheme in Narthan and Saras Villages of Olpad Taluka and Water provided for RO water of Suvali Village under the Health Care and Drinking Water Program.
- ✚ A total of 11 RO purifiers are maintained in 10 Schools in the Hazira area villages. A total of around 4251 students are taking benefited from this facilities
- ✚ A total of 35 drip irrigation systems have been promoted with farmers in an agriculture-based sustainable livelihood program in the Choryasi & Olpad block of the Surat district.
- ✚ Under the Sustainable Livelihood program, Shell has supported 122 farmers for Sustainable Agriculture practices including creeper vegetable cultivation.
- ✚ Under Access to Energy initiatives , 34 Individual Rooftop Solar systems having total energy generating capacity of 68 kWh intalled to provide support irrigation.