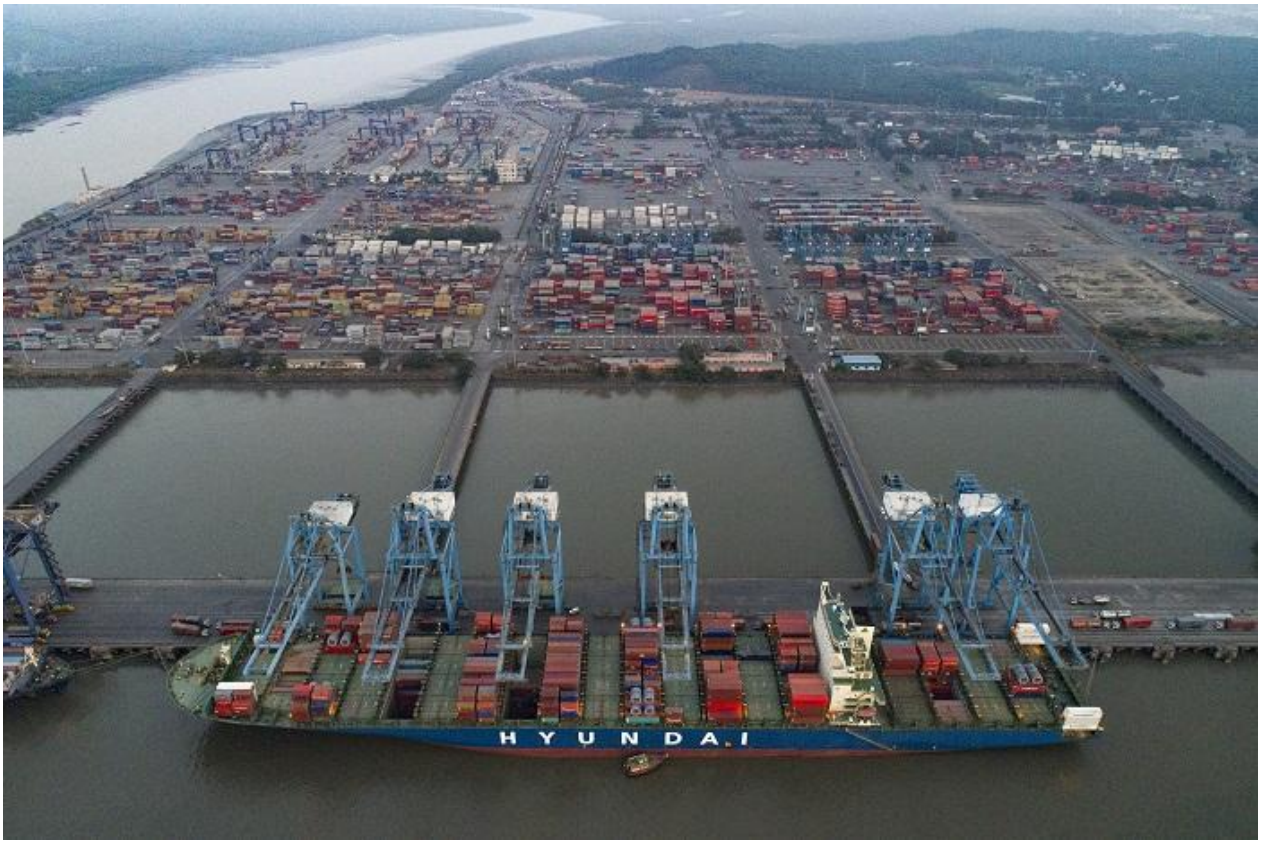

MONITORING OF ENVIRONMENTAL PLAN FOR JN PORT
ENVIRONMENTAL MONITORING REPORT- June, 2025
EXECUTIVE SUMMARY

REPORT NO: AEC/JNPA/Summary-06/June-25

MONTH & YEAR: June 2025

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1.0 Ambient Air Monitoring:

Table 1. Monthly average values of Air Quality parameters at various stations in JNP Area during June, 2025.

Parameters		Port (Port Operation) Area								Residential area	Eco Sensitive area
	NAAQS	IMC	NSFT-NG	SEZ	APM	BMCT	NSDT-CB	DP World	BPCL	RC	EC
PM_{10}	100	92.41	80.30	72.85	79.75	77.03	83.22	74.89	77.47	68.70	36.42
$PM_{2.5}$	60	32.91	30.49	31.15	34.53	30.93	25.36	36.79	32.71	28.33	21.92
SO_2	80	17.54	42.53	19.40	25.79	14.94	24.63	34.65	19.03	18.77	16.10
NO_2	80	15.91	23.13	20.84	19.99	16.67	18.20	19.71	25.35	15.96	14.16
NH_3	400	33.33	30.38	30.51	27.62	32.71	28.14	34.41	24.10	21.12	47.825
O^3	100	23.22	43.29	22.44	42.02	37.11	31.30	38.28	20.56	28.71	25.52
Pb	0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
As	6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ni	20	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
C_6H_6	5	1.89	1.89	1.81	1.75	2.05	2.01	1.87	1.32	1.11	0.55
B(a)P	1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
CO	4	0.66	0.69	0.84	0.93	0.77	0.70	1.09	0.40	0.94	0.21
AQI		92	80	73	80	77	83	75	77	69	47

Date	PM_{10}	$PM_{2.5}$	SO_2	NO_2	NH_3	O_3	C_6H_6	CO	C_7H_8	NO	NO_x	AQI
	µg /m^3	µg /m^3	µg /m^3	µg /m^3	µg /m^3	µg /m^3	µg /m^3	µg /m^3	µg /m^3	µg /m^3	µg /m^3	Remarks:
NAAQS	100	60	80	80	400	100	5	2	--	--	--	
Mar-25	80.05	30.28	0.80	21.10	7.94	9.32	0.75	0.21	1.28	5.68	26.78	80

IMC - Indian Molasses Company, NSFT-NGC –Nhava Sheva Free Port Terminal- North Gate Complex, SEZ Special Economic Zone, APM- A.P. Moller, BMCT- Bharat Mumbai Container Terminals, NSDT CB- Nhava Sheva Distribution Terminal-Coastal Berth, DP World - Dubai Ports International, BPCL- Bharat Petroleum Corporation Limited, RC- Residential Complex, EC- Elephanta Caves

Conclusion:

- The ambient air quality data from JNPA reveals that the overall concentrations of particulate matter, gaseous pollutants, and trace metals across port operational, residential, and eco-sensitive areas are within the permissible limits set by the National Ambient Air Quality Standards (NAAQS). PM10 and PM2.5 levels remain compliant across all zones, with the highest values recorded at Port locations such as IMC and NSDT-CB, but still below the threshold. Notably, the eco-sensitive area (EC) shows the lowest particulate levels, reflecting minimal Port influence and indicating effective environmental management in this zone.
- Gaseous pollutants including SO_2 and NO_2 also demonstrate healthy air quality status, with all recorded concentrations well below the prescribed limits. The highest SO_2 concentration at NSFT-NG (42.53 µg/m³) and NO_2 at DP World (25.35 µg/m³) indicate some emissions from port and vehicular activities, yet they do not pose significant environmental or public health concerns. These values reflect effective emission control strategies and fuel quality management within port premises.
- Ammonia (NH_3) and Ozone (O_3) concentrations show spatial variation but remain far below their respective NAAQS limits of 400 µg/m³ and 100 µg/m³. The slightly elevated NH_3 levels near the eco-sensitive zone (47.83 µg/m³) are still very low in absolute terms and could be attributed to natural or agricultural sources. Ozone levels, while highest near NSFT-NG (43.29 µg/m³), reflect secondary pollutant formation likely due to photochemical reactions, yet remain within safe exposure thresholds.
- The toxic trace metals Lead (Pb), Arsenic (As), and Nickel (Ni) were all recorded below detectable limits across all monitoring locations, indicating negligible emissions from heavy Port activities or combustion sources. Similarly, Benzene (C_6H_6) and Benzo(a)Pyrene (B[a]P), which are carcinogenic in nature, are found in very low concentrations. The highest Benzene value (2.05 µg/m³ at BMCT) is well under the permissible 5 µg/m³, highlighting effective control of volatile organic compounds in the port area.
- Carbon monoxide (CO) levels are consistently low at all sites, ranging from 0.21 to 1.09 mg/m³, significantly below the national standard of 4 mg/m³. This demonstrates limited emissions from incomplete combustion and suggests efficient traffic and fuel management in and around the port vicinity. Such low CO concentrations are a strong indicator of controlled vehicular and cargo-handling operations.
- The overall Air Quality Index (AQI) values across the ten stations fall within the 'Good' to 'Satisfactory' range, with the highest AQI recorded at IMC (92) and

the lowest at the eco-sensitive zone (47). These values confirm that air quality within JNPA's jurisdiction is being maintained at safe levels. The data reflects a well-implemented environmental monitoring and mitigation framework, supporting sustainable port operations while ensuring public health and ecological protection.

Solution towards the Green port:

- Implement shore power (cold ironing) to reduce ship emissions at berth.
- Promote use of cleaner fuels like LNG or biofuels in port operations.
- Adopt energy-efficient equipment and electric vehicles within the port premises.
- Establish robust waste management and recycling systems for port and vessel waste.
- Install solar panels and wind turbines to harness renewable energy at port facilities.
- Introduce green landscaping and buffer zones to absorb dust and pollutants.
- Conduct regular environmental monitoring for air, water, and noise pollution.
- Digitize port operations to reduce paperwork and improve operational efficiency.
- Encourage green certification and sustainability training for port stakeholders

2.0 Marine Water Quality:

Observed concentration ranges of Marine Water for various parameters for JNP area during tidal cycle (For June, 2025.).

Sr. No.	Parameter	Unit	Observed Range	Prescribed Limits
1	Temperature	˚C	25.3-28.8	
2	pH	-	7.15-8.03	**6.5 - 9.0**
3	Salinity	ppt	35.42-37.6	
4	Turbidity	NTU	81.9-171.22	
5	TDS	mg/L	13886-49606	**-**

6	TSS	mg/L	171-296	**-**
7	TS	mg/L	14152-49872	**-**
8	DO	mg/L	4.17-6.1	**3.0 mg/L(min.) or 40% of saturation value**
9	COD	mg/L	36.21-57.52	**-**
10	BOD	mg/L	0.96-3.85	**5 (max.)**
11	NH_3-N	mg/L	0.0114-0.053	**-**
12	Phenol	mg/L	0.011-0.034	**-**
13	Oil & Grease	mg/L	0.098-0.489	**10 (max.)**
14	Total Plate Count	CFU/ml	138-526	**-**
15	Fecal Coliforms	MPN/100ml	89.54-482.3500	**500 (max.)**

The observed marine water quality parameters indicate a largely healthy and stable aquatic environment in the monitored region. Key indicators such as pH (7.15–8.03) and dissolved oxygen (4.17–6.1 mg/L) fall well within acceptable limits, supporting aquatic life sustainability. Biochemical Oxygen Demand (BOD) levels remain low (0.96–3.85 mg/L), indicating minimal organic pollution, while Oil & Grease and Fecal Coliform counts are significantly below their respective permissible limits, reflecting good sanitary conditions and limited Port discharge impact. Though turbidity and solids (TDS, TSS, TS) show variability, the absence of prescribed limits for these parameters suggests the values are acceptable for the specific marine context. Overall, the data demonstrates effective environmental management and low pollution stress in the area.

3.0 Continuous Marine Water Quality Monitoring;

A Continuous Marine Water Quality Monitoring system was installed at the JNPA berth bridge location to monitor parameters such as Temperature, pH, Dissolved Oxygen,

Ammonia, Conductivity, Nitrate, Salinity, Turbidity, and Total Dissolved Solids. These parameters are found satisfactory as per prescribed limits.

3.0 Marine Ecology (Flora and Fauna):

Sr. No.	Parameter	Observed Range	Criteria
1	Net Primary Productivity	The observed values falls under 20.51-48.07 mgC/m3/day	<1500 mg C/m3/day at surface
2	Chlorophyll A	The observed values fall under 1.1481-2.3229 mg/m3	<4 mg/m3 (Oligotrophic class), 4-10 mg/m3 (Mesotrophic class), >10 mg/m3 (Eutrophic class)
3	Phosphate	78.39-106.22	0.1-90 µg/L
4	Nitrate	9.76-34.68 mg/m^3	1.0-500 µg/L
5	Nitrite	50.2-81.5	<125 µg/ L
6	Particulate Organic Carbon	The observed values falls under 30.68 µg /L	10-100 mg/m3
7	Silicate	The observed values falls under 36.2-56.42 µg/L	10-5000 µg/L

The data reflects a positive and healthy status of the marine ecosystem in the monitored region. Net Primary Productivity and Chlorophyll-a levels fall within low ranges, indicating oligotrophic conditions and the absence of nutrient over-enrichment, which is a sign of balanced ecological functioning. Nutrient parameters such as phosphate, nitrate, and nitrite remain within or near acceptable limits, suggesting minimal anthropogenic input and controlled nutrient loading. The measured Particulate Organic Carbon and silicate concentrations also lie within optimal ranges, supporting stable phytoplankton growth and a functioning food web. Overall, the observations highlight good water quality with no signs of eutrophication, pointing to effective environmental stewardship and a well-maintained marine environment.

4.0 Drinking Water Quality:

The study presents a positive outlook on the drinking water quality in the region, as all core parameters align with the Indian standards for potable water. The data confirms that the water is safe, clear, well-mineralized, and free from biological contamination across all 22 sampling stations. The favourable values of pH, TDS, turbidity, and essential minerals suggest that the water is not only suitable for consumption but also beneficial for maintaining daily health and hydration needs. The successful control of microbial content through adequate chlorination and the presence of essential nutrients without harmful levels of contamination highlight the effectiveness of current water management strategies.

5.0 Monitoring Performance of Sewage Treatment Plant

The performance of the Sewage Treatment Plants (STPs) at JNPA and POC in June 2025 reflects highly effective and efficient wastewater management. Key indicators such as pH, TSS, BOD, and COD consistently fell within permissible limits, demonstrating robust treatment processes and strong organic load removal. The remarkable reduction of heavy metals like arsenic, mercury, and lead — often exceeding 90% — further underscores the advanced treatment capabilities of these facilities. Bioassay results, with 100% survival at POC and over 90% at JNPA, confirm the non-toxic nature of the treated effluent and its suitability for safe discharge into the environment, the overall results highlight the success of both STPs in maintaining compliance and protecting environmental and public health.