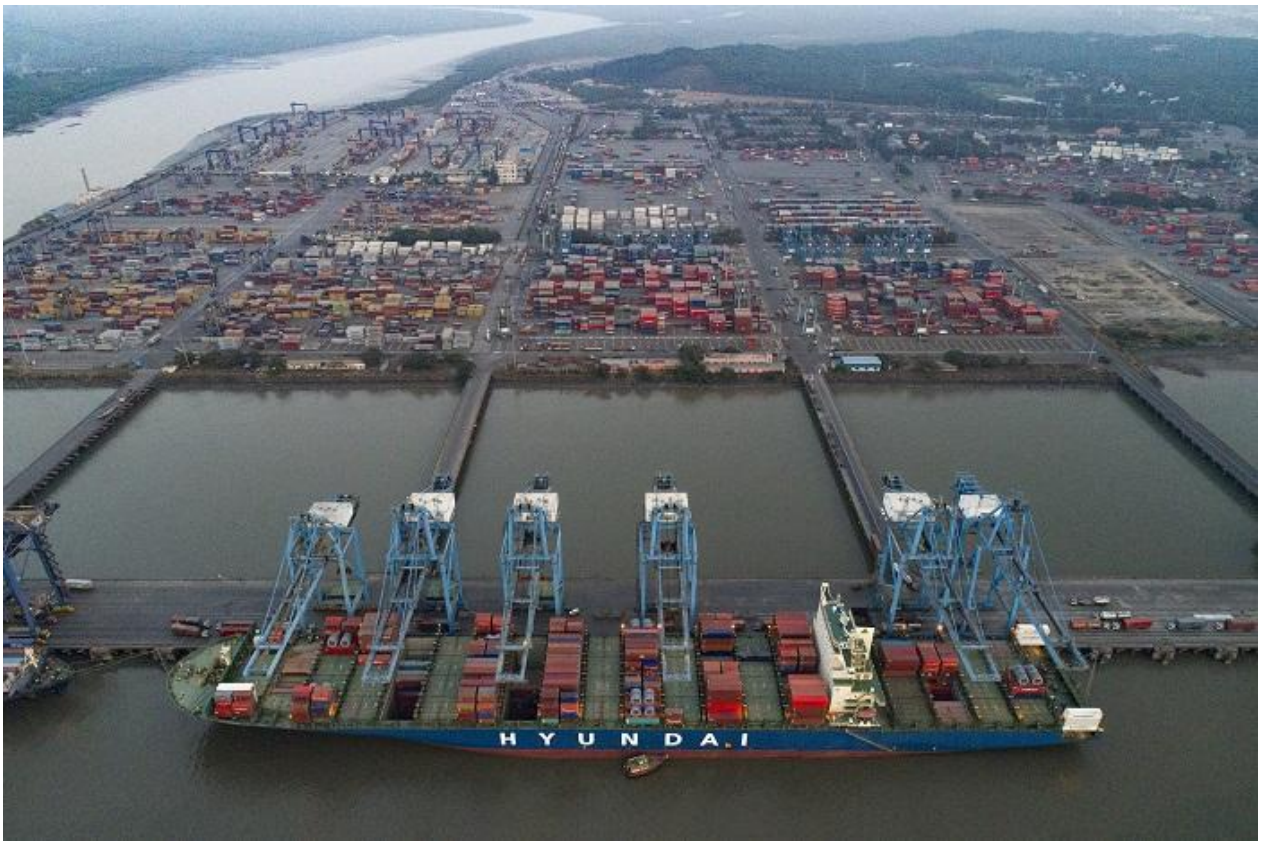
जनेप प्राधिकरण
JNPA

Ashwamedh
Engineers & Consultants CSL Pvt Ltd



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

REPORT NO: AEC/JNPA/Summary-05/May-25

MONTH & YEAR: May 2025

PREPARED BY: ASHWAMEDH ENGINEERS CSL PVT. LTD

1.0 Ambient Air Monitoring:

Table 1. Monthly average values of Air Quality parameters at various stations in JNP Area during May, 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	122.90	116.81	108.24	89.14	104.27	96.40	97.25	89.54	95.23	72.81
$PM_{2.5}$	60	45.76	36.62	37.28	29.94	31.29	35.08	35.76	35.82	29.41	29.09
SO_2	80	8.77	14.01	3.96	6.18	8.92	3.34	7.32	5.34	10.97	2.43
NO_2	80	54.52	38.14	14.03	11.79	11.72	20.17	20.74	21.92	26.76	12.12
NH_3	400	28.70	25.76	27.33	26.28	27.61	24.82	21.62	24.43	17.16	9.375
O^3	100	46.93	38.50	17.14	37.80	25.70	23.46	32.20	41.95	13.90	22.34
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	4.01	1.88	1.75	1.68	1.67	1.65	1.20	1.28	0.87	0.59
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	0.55	0.58	0.62	0.72	0.70	0.63	0.47	0.84	0.49	0.16
AQI		122.90	116.81	108.24	89.14	104.27	96.40	97.25	89.54	95.23	72.81

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 /m³	µg /m³	µg /m³	µg /m³	µg /m³	µg /m³	µg /m³	µg /m³	µg /m³	µg /m³	µg /m³	Remarks:
NAAQS	100	60	80	80	400	100	5	2	--	--	--	
Mar-25	62.19	27.04	1.54	24.67	6.52	10.59	0.84	0.39	1.56	6.72	31.17	62.00

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 air quality monitoring data from JNPA shows that most parameters are well within the limits set by the National Ambient Air Quality Standards (NAAQS). This is a strong indicator that air quality management and emission control measures in the port and surrounding areas are effective. Even in high-activity zones like IMC and NSFT-NG, pollutant levels remain controlled. The consistency in safe values across multiple parameters reflects well on operational protocols. This suggests a well-maintained balance between Port activity and environmental responsibility. Such compliance supports sustainable Port growth in the region.
- Toxic elements such as lead (Pb), arsenic (As), and nickel (Ni) were recorded below detectable limits at all monitoring locations. This is a positive sign, especially considering the Port nature of JNPA and nearby zones. It indicates the absence of significant heavy metal emissions, which are major health hazards. Continued maintenance of these low levels demonstrates effective source control. The data highlights that the risk of chronic exposure to metal pollutants is negligible. This strengthens confidence in JNPA's environmental risk management practices.
- The eco-sensitive area (EC) and residential cluster (RC) exhibited the lowest AQI values among all sites. Their PM10 and PM2.5 levels were well below the national thresholds, ensuring breathable air. This is particularly important for public health and ecological conservation in these areas. It reflects strong policy enforcement around emission control near sensitive zones. The low levels of NO_2, SO_2, and other gaseous pollutants add further assurance. Such data demonstrates that environmental buffers and controls are functioning as intended.
- Sulphur dioxide (SO_2), nitrogen dioxide (NO_2), ammonia (NH_3), and ozone (O_3) were within safe concentrations at all locations. The values do not suggest any immediate risk of smog formation or respiratory stress. Even in high-traffic and operational areas, such as APM and BMCT, gaseous emissions are well-regulated. This indicates that fuel usage and combustion processes are being managed efficiently. It also supports the possibility of using clean fuel alternatives or scrubbers. This pattern strengthens the port's image as an environmentally mindful operation hub.
- Volatile organic compounds like benzene (C_6H_6) and carbon monoxide (CO) were observed within safe exposure levels. Benzene levels were significantly below the 5 $\mu g/m^3$ threshold, even in port operation zones. Carbon monoxide readings, a proxy for combustion efficiency, were uniformly low across the board. This suggests optimized vehicular and machinery operations within the port. Such controlled emissions are crucial for occupational safety and public health. It

reflects the successful implementation of emission control norms and maintenance schedules.

- The AQI across all stations ranged from 72.81 to 122.90, which corresponds to the 'Satisfactory' to 'Moderate' category. These values indicate that overall air quality poses minimal health concern to the general public. Even in zones of continuous port operations and traffic movement, AQI remained within acceptable limits. The trends suggest a stable air environment with no acute pollution episodes recorded. This is a reassuring outcome, reflecting the effectiveness of environmental planning and control systems. With continuous monitoring and proactive measures, JNPA can sustain and further improve this air quality.

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 May, 2025.).

Sr. No.	Parameter	Unit	Observed Range	Prescribed Limits
1	Temperature	°C	25.8-28.7	
2	pH	-	7.02-8.01	**6.5 - 9.0**
3	Salinity	ppt	35.41-37.08	

4	Turbidity	NTU	46.2-143	
5	TDS	mg/L	11424-41152	**-**
6	TSS	mg/L	174-297	**-**
7	TS	mg/L	11696-41412	**-**
8	DO	mg/L	3.21-4.82	**3.0 mg/L(min.) or 40% of saturation value**
9	COD	mg/L	25.8-96	**-**
10	BOD	mg/L	1.28-2.89	**5 (max.)**
11	NH_3-N	mg/L	(BLQ: <1)	**-**
12	Phenol	mg/L	(BLQ: <0.001)	**-**
13	Oil & Grease	mg/L	(BLQ: <4.0)	**10 (max.)**
14	Total Plate Count	CFU/ml	108-488	**-**
15	Fecal Coliforms	MPN/100 ml	154.37-1776.29	**500 (max.)**

The marine water quality monitoring data for JNPA indicates an overall healthy and stable aquatic environment, suitable for port-related activities and marine life. Key parameters like pH (7.02–8.01) and dissolved oxygen (3.21–4.82 mg/L) fall within acceptable limits, ensuring good water chemistry and oxygenation. Biochemical Oxygen Demand (BOD) remains low (1.28–2.89 mg/L), reflecting minimal organic pollution. Notably, critical contaminants such as ammonia, phenol, and oil & grease were below quantifiable limits, indicating negligible Port contamination. While fecal coliforms occasionally exceed the guideline, most other microbiological and physical parameters, including turbidity and total solids, are within a range typical of dynamic marine systems. These results suggest that the marine waters around JNPA are largely unpolluted and are being managed with effective environmental oversight.

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 water quality assessment based on productivity and nutrient parameters in the JNPA marine area reflects a healthy and balanced ecosystem. Net Primary Productivity (20.51–48.07 mg C/m^3/day) is well below the threshold of 1500 mg C/m^3/day, suggesting no signs of algal overgrowth or eutrophication. Chlorophyll-a levels (1.1481–2.3229 mg/m^3) place the waters in the oligotrophic category, indicating low nutrient enrichment and high water clarity. Most nutrient concentrations, including nitrate, nitrite, silicate, and particulate organic carbon, fall within acceptable and natural ranges, supporting marine productivity without signs of nutrient stress. Although phosphate slightly exceeds the upper guideline, it remains within ecological tolerance and does not reflect any alarming imbalance. Overall, the nutrient dynamics

and productivity parameters indicate that the JNPA marine waters are in good ecological condition and are sustainably managed.

4.0 Drinking Water Quality:

The assessment of drinking water quality conducted at 22 stations within the JNPA Port confirms full compliance with IS 10500:2012 standards, ensuring the availability of safe, clean, and palatable water. Overall, the analysed water samples from all 22 sites reflect good quality with respect to physical, chemical, and biological parameters. The pH, turbidity, and TDS values fall within acceptable ranges, indicating the absence of major pollution sources. Concentrations of most heavy metals and nutrients were well below drinking water and environmental safety limits, suggesting minimal Port or sewage discharge. The absence of coliform bacteria further confirms the microbial safety of the water.

5.0 Monitoring Performance of Sewage Treatment Plant

The sewage treatment plant (STP) showcased excellent treatment efficiency, producing clear, Oduor-free effluent and significantly reducing key pollutants such as BOD, COD, and TSS to well within permissible discharge limits. The effluent pH stabilized at a neutral 7.2, making it safe for environmental release. Toxic metals like arsenic, lead, mercury, and chromium were effectively removed, with reductions demonstrating compliance with safety standards. Nutrient levels and harmful compounds such as ammonia, nitrate and phenol were also kept within acceptable ranges. A 90% fish survival rate in the bio-assay test further confirmed the treated water's non-toxic nature. Overall, the STP is performing effectively, supporting environmental safety and public health.