

VIRTUAL RISK INSPECTION (VRI) REPORT

MORMUGOA PORT TRUST, GOA

MORMUGAO, VASCO, GOA, INDIA

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LAST DAY OF REVIEW: 9-MAR-21
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Purpose and Scope

Purpose

The purpose of this VRI report is to inform existing and/or prospective insurance markets of the physical conditions at Mormugoa Port Trust located in Goa, India. This report is based upon the information made available to Marsh Advisory, Consulting Solutions during the call on 8th & 9th March 2021 via video conferencing and do not purport to refer to or guarantee compliance with local, state or federal regulations which may be applicable to such practice and conditions.

Scope

The report involves information on construction, occupancy, fire protection systems and external exposure features excluding life safety. The scope of the assignment was limited to virtual discussion over call and do not relate to physical site visit. The report also includes commentary on administrative controls such as ignition source control, self-inspection program, electrical maintenance, emergency response procedures, inspection, testing, & maintenance of fire protection/ detection systems and impairments to these systems. The report only captures the site condition as inferred over the call and does not provide any risk improvement recommendations due to lack of site visit.

The basis for the information is from the below personnel:

- Ms. Chitra Nayak, Accounts Officer

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Construction

Type	Percentage	Comments
Combustible	Less than 1%	FRP sections in the cement-asbestos roofing of each of the storage sheds.
Non-combustible	99%	As informed, all the buildings are constructed from non-combustible materials (Brick Wall, RCC Ceilings, Cement Asbestos Sheet etc.)
Un-confirmed	0%	None

Construction Description

Most of the blocks managed by Mormugoa Port Trust (hereafter referred as MPT) are of non-combustible construction. The storage sheds are constructed from brick walls with Cement-Asbestos Sheets used for roofing, with small FRP sections on the roof (acting as skylight). These FRP sections are informed to constitute less than 2% of each roof. The other blocks are constructed from Brick Walls and RCC ceilings.

Compartmentalization and Fire Divisions

The storage sheds are informed having no internal compartmentations. Multiple substations are available in the port with considerable distances between them.

It is informed that the Transformers have a distance of 3 to 4 m in between and these are not segregated by any baffle wall. Metallic doors are used in the transformer rooms. However, fire rating of the same is not ascertained.

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Site Layout



Figure 1. Google Earth Image of MPT

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Construction Summary

Building/ Area Reference	Construction / Renovation Year	Area (Sq. m.)	Levels/ Stories	Building Structure	Building Structure Protected/ Unprotected	Roof, Wall, and Floor	Remarks
Shed V1	Construction Year: 1984 Renovation Year: None	2,042	Ground Floor Only	Heavy Non-Combustible	Unprotected	Roof: Light Non-Combustible Exterior Wall: Heavy Non-Combustible Interior Wall/Partitions: None Floors: RCC	Eaves Height = 5 m Peak Height = 9 m Finished Floor Level: Approx. 1.2 m
Shed V2	Construction Year: 1969 Renovation Year: None	2,042	Ground Floor Only	Heavy Non-Combustible	Unprotected	Roof: Light Non-Combustible Exterior Wall: Heavy Non-Combustible Interior Wall/Partitions: None Floors: RCC	Eaves Height = 5 m Peak Height = 9 m Finished Floor Level: Approx. 1.2 m
Shed T1	Construction Year: 1984 Renovation Year: None	7,822	Ground Floor Only	Heavy Non-Combustible	Unprotected	Roof: Light Non-Combustible	Eaves Height = Not Available Peak Height = Not Available Finished Floor Level: Approx. 1.2 m

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Building/ Area Reference	Construction / Renovation Year	Area (Sq. m.)	Levels/ Stories	Building Structure	Building Structure Protected/ Unprotected	Roof, Wall, and Floor	Remarks
						Exterior Heavy Non-Combustible Wall: Non- Interior Wall/ Partitions: None Floors: RCC	
Shed T2	Construction Year: 1986 Renovation Year: None	5,089	Ground Floor Only	Heavy Non-Combustible	Unprotected	Roof: Light Non-Combustible Exterior Heavy Non-Combustible Wall: Non- Interior Wall/ Partitions: None Floors: RCC	Eaves Height = 6.6 m Peak Height = 11 m Finished Floor Level: Approx. 1.2 m
Shed T3	Construction Year: 1986 Renovation Year: None	5,089	Ground Floor Only	Heavy Non-Combustible	Unprotected	Roof: Light Non-Combustible Exterior Heavy Non-Combustible Wall: Non- Interior Wall/ Partitions: None	Eaves Height = 6.6 m Peak Height = 11 m Finished Floor Level: Approx. 1.2 m

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Building/ Area Reference	Construction / Renovation Year	Area (Sq. m.)	Levels/ Stories	Building Structure	Building Structure Protected/ Unprotected	Roof, Wall, and Floor	Remarks
						Floors: RCC	
Shed T4	Construction Year: 1986 Renovation Year: None	3,960	Ground Floor Only	Heavy Non-Combustible	Unprotected	Roof: Light Non-Combustible Exterior Wall: Heavy Non-Combustible Interior Wall/Partitions: None Floors: RCC	Eaves Height = Not Available Peak Height = Not Available Finished Floor Level: Approx. 1.2 m
Signal Station	Construction Year: 1983 Renovation Year: None	185.4	Ground + 2 Floors	Heavy Non-Combustible	Unprotected	Roof: Heavy Non-Combustible Exterior Wall: Heavy Non-Combustible Interior Wall/Partitions: Heavy Non-Combustible Floors: RCC	Finished Floor Level: Approx. 1 m

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Building/ Area Reference	Construction / Renovation Year	Area (Sq. m.)	Levels/ Stories	Building Structure	Building Structure Protected/ Unprotected	Roof, Wall, and Floor	Remarks
Admin Building	Construction Year: 1998 Renovation Year: None	11,839.6	Ground + 3 Floors	Heavy Non-Combustible	Unprotected	Roof: Heavy Non-Combustible Exterior Wall: Heavy Non-Combustible Interior Wall/Partitions: Heavy Non-Combustible Floors: RCC	Finished Floor Level: Approx. 1 m

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Occupancy and Process

MPT is one of the oldest ports on the west coast of India, with a fine natural harbor. The port was commissioned in 1885 and is one amongst the 12 major ports of the iron ore port and handling largest quantum of ore exports amongst all the Indian Ports. There has been a steady increase in liquid bulk and general cargo traffic ever since it is joining the ranks of the Major Ports of India. Excellent facilities, high productivity, streamlined administration and a dedicated workforce all go towards making this Port one of the most efficient Port in the Indian subcontinent. It is an open type harbor protected by a breakwater and a mole built from the outer end of the breakwater and running parallel to the quay.

Description	Area (sq. m)	Occupancy/ Process	Classification
MPT Port	Approx. 1,012,300	Container Handling, Storage Warehouses, Railway Lines	2151 – Port Premises including jetties and equipment thereon and other port facilities

Note: The Rate Code mentioned in the Classification column of the above table is derived from IIB Ratings.

Key Features/Processes

Specifics for key machinery and key processes at the site are as follows:

Equipment & Facilities

MPT has total 11 berths and the details pertaining to each berth is given below:

Table 1. Berth Details

Berth Number	Operated by	Activity	Structure	Length (in m)
1	None	New Expansion - Domestic Terminal & International Terminal	RCC	-
2	None	New Expansion - Domestic Terminal & International Terminal	RCC	-
3	None	New Expansion - Domestic Terminal & International Terminal	RCC	-
4	MPT	For Smaller Craft, vessels of Indian Navy or Coast Guard Vessel	RCC	194

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5	JSW Steel.	Imports coal and exports finished steel products through the port	RCC	210
6	JSW Steel.	Imports coal and exports finished steel products through the port	RCC	240
7	Adani Mormugao Port Terminal	Handling of Coal	RCC	300
8	Multiple Agencies (IOCL, HPCL, Zuari etc.)	Liquid cargo handling berth - POL, Ammonia etc.	RCC	50
9	Public-Private Partnership	Earlier Iron Ore Handling. Talks underway for remodeling	RCC	357.5
10	MPT	General Cargo Handling	RCC	250
11	MPT	General Cargo Handling	RCC	270
Breakwater Berth	Cruise Terminal	Cruise Ships	RCC	450

Storage Facilities

MPT provides the following infrastructure for the storage of cargo.

Table 2. Storage Facilities

Description	No. of Sheds	Area (m ²)	Storage Capacity (Tons)
Covered Storage			
Owned by the Port	7 sheds	24,935.35	47,497.26
Owned by Others: FCI/CWC	4 sheds	14,480.00	22,216.00
Total Covered storage	11 sheds	39,415.35	69,713.26
Open Storage			
For Containers		14,823.00	11,830.95
Open Storage for other cargo		199,667.00	400,000.00
Total Open Storage		214,490.00	411,830.95

Additionally, MPT also provides infrastructure for handling of Liquid Cargo. However, the operation, maintenance and safety of the tanks, underground pipelines solely lie with the individual company managing it.

Table 3. Liquid Cargo Facilities

Sr. No.	Commodity	No. of Tanks	Capacity (in kL)
POL Product			
1	IOC -Vasco	11	87,113.00
2	HPCL – Vasco	8	33,700.00
3	ZIL – Zaurinagar	4	27,500.00
4	Ganesh Benzoplast- Sada	2	46,000.00
Phosphoric Acid			
1	ZIL- Zaurinagar	3	3,670.00
Caustic Soda Molasses & other liquids			
1	Ganesh Benzoplast- Sada	3	46,000.00
2	IMC - Harbor	9	1,500.00
3	JRE	2	7,800.00
Ammonia			
1	ZIL- Zaurinagar	1	3,000 MT
2	ZIL- Sada/Jetty	1	5,000 MT

Equipment Details:

Harbor Mobile Crane (HMC)

There is one Harbor Mobile Crane (HMC) provided for container handling purpose at berth no. 10 & 11.

Make: ITALGRU

Capacity: 120 T

Capacity of Hydraulic Tank: 1600 liters.

As per the MSDS of the hydraulic oil, Flash point is 210 C.

Designed Wind speed limit during travel = 72 km/hr.

Designed Wind speed limit during work = 90 km/hr.

The following safety interlocks and equipment protection devices are available:

1. A display of current wind speed is available for all the Crane
2. Load indicators and load-moment indicators (which sense the load and boom angle)
3. Fail-safe holding brake
4. Travel limit switches for the hoist (forward, backward, upward and down ward movements with rate of acceleration and deceleration interlocks)
5. Absence of Hydraulic pressure or leakage in the system will actuate the brakes and stop the operations.

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This HMC vehicle is used largely for 'Non - Gear Vessels' whereas the 'Gear Vessels' have their own cranes. All the cranes and cargo handling is done by MPT personnel only. The traffic distribution between the gear vessels and non-gear vessels is informed to be 20%:80%. Additionally, 75 T, 11 T, 8T cranes are also available at the site.

Maintenance of the equipment is under AMC contract. Annual thorough examination of Crane and crane accessories is carried through DGFASLI certified third party agency and load testing is done every 5 years as per DGFASLI norms through certified third party agency. No life extension study has been carried out for crane. Crane securement procedures manual (CSPM) is available.

Port Railway:

A railway track approx. 3 km is available in the port, which is extended beyond Vasco Da Gama railway station.

Electrical Maintenance:

A formal preventive maintenance plan is drawn up to carry out periodical maintenance for all the equipment involved. The following systems are checked by external agency themselves:

1. Circuit breaker testing and calibration
2. Ups and battery testing
3. Earthpit & lightning arrestor continuity tests
4. Diesel generators
5. Oil type Transformer

For the dry type transformer, warranty period had recently expired and formal testing procedure is yet to be established for this transformer. Additionally, the following tests are not carried out for the following:

1. Oil Tests for Transformer
 - a. Dissolved Gas Analysis
 - b. Furan Analysis
2. Thermography for Electrical Equipment

Production and Logistics	Season: It is informed that September to May is a peak time whereas during the other months, occupancy is low. Occupancy Rate at the warehouses is informed to be around 40%.
Interdependency	Not Applicable
Make up Capabilities	Not Applicable

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Data Processing and Control Systems

Specific information about the electronic data processing and control systems in use at the site are as follows:

Equipment Type	Purpose & Importance	Back-up Procedures
Server Rack	Administrative Data	Physical Back up carried out and stored in an alternate location within the Port. SAP data is directly stored on cloud on real-time basis.

It is indicated that the availability of server is not critical for carrying out the activities at port. Largely desktops are available for the employees and these workstations are provided with Admin privileges to restricted personnel only. No training on cybersecurity has been provided in recent times.

Combustibles & Hazardous Materials

Storage of Combustible Materials

The extent, type, and location of significant combustible material storage are summarized as follows:

Warehousing	<p>Currently, 6 storage sheds are available and are managed directly by MPT. As on date of discussion, it is informed that these storage sheds were empty.</p> <p>The goods stored in the sheds were done directly on ground. Largely, steel coils and Muriate of Potash (MOP) was stored in these sheds. The coils were not stacked, stored within wooden wedges/slates whereas solid-pile storage style was adopted for MOP.</p> <p>It is indicated that since many years, these sheds have stored non-combustible goods only and thus sprinkler system is not installed for the storage sheds.</p>
External	Open Yard is available wherein intermodal containers are stored. Iron ore, Granite and bauxite are generally stored in open plots alongside the berth.
Dust Handling Systems	None
Others	None

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Storage Configuration:

Location	Method of Storage	Commodity/ Class	Form	Storage Details
Storage Shed (V1, V2, T1, T2, T3, T4)	Floor	Other	Non-Expanded (Steel Coils) Free-Flowing (MOP)	These products stored are non-combustible in nature.

Hazardous Materials

The extent, type, and location of flammable liquids and other hazardous materials are summarized as follows:

	Type	Configuration	Volume/Quantity	Containment
Diesel	Class II Liquid	Underground Tank	20,000 liters	Not Applicable
Diesel	Class II Liquid	Barrels	210 litres	Not Available

* Classification is as per NFPA 30

Utilities/Infrastructure

Power

Primary Supply to Site	Public Utility	Site Feed	Single
Incoming Voltage	33 kV	Distribution on Site	Grid
Back-up Power	Diesel Generators are available as per following.		
	300 kVA at Berth 10		
	320 kVA at Berth 10		
	125 kVA at Cruise		
	160 kVA at Gate 9		
	500 kVA at Admin Building		
	125 kVA at Admin Building		
	320 kVA at hospital		
	250 kVA at complex		
	These diesel generators are informed to take 100% of the load required.		

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Transformer Details

Name/ Purpose	OEM	Type	Rating (Power/ Primary Voltage)	Units	Oil Capacity
Substation A	Electric Transformer And Equipment	Oil – Non PCB	5 MVA 33 kV/ 3.3KV	1	4800
Substation A	Electric Transformer And Equipment	Oil – Non PCB	5 MVA 33 kV/ 3.3KV	1	4800
Substation A	Trinity Transformer Industry	Oil – Non PCB	2 MVA 33 kV/440V	1	1900
Substation A	NGEF	Oil – Non PCB	630 kVA 33 kV/440V	1	1144
Jetty Transformer	Kirloskar Electric Co. Ltd	Oil – Non PCB	630 kVA 3.3 kV/ 433 V	1	1250
Jetty Transformer	The Indian Transformers Ltd	Oil – Non PCB	500 kVA 3.3 kV/415V	1	490
Berth No. 10	NGEF	Oil – Non PCB	315 kVA 3.3 kV/ 415 V	1	450
Berth No. 10	The Indian Transformers Ltd	Oil – Non PCB	315 kVA 3.3 kV/ 415 V	1	450
Berth No. 10	Pactil Transformer	Oil – Non PCB	500 kVA 3.3 kV/415V	1	545
Harbor Substation	Siemens	Dry	1 MVA 11 kV/433 V	2	NA
Harbor Substation	Current Electricals Ltd.	Oil – Non PCB	500 kVA 11 kV/433 V	2	710

Fuels/Energy Supplies

Fuel Type	Source	Purpose	Reliability	Capacity (units)	Back-up Capabilities
Diesel	Multiple	Power generation	High	Approx. 21,000 liters	Complete

Other Site Services

None

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Management Programs

Program Category	Comments
Arson Risk Management	The site is provided CCTV cameras as well as CISF personnel are deployed at all times. A protocol is established prior to entry to the port area and multiple areas inside port area.
Business Continuity Planning	As informed, business continuity plan is not established.
Contractor Management	Prior to appointment of any contractor, a reference check is carried out. An induction program is arranged for the contractors wherein the contractors are briefed on the important PPE's and hazards. Necessary documents like certifications/licenses are also checked.
Electrical Maintenance	<p>A formal preventive maintenance plan is drawn up to carry out periodical maintenance for all the equipment involved. The following systems are checked by external agency:</p> <ol style="list-style-type: none"> 1. Circuit breaker testing and calibration 2. Ups and battery testing 3. Earthpit & lightning arrestor continuity tests 4. Diesel generators 5. Oil type Transformer
Employee Awareness Programs	<p>A training calendar is established wherein all the employees are trained on various topics. Additionally, mock drills are also done on a weekly basis.</p> <p>Site-specific emergency response plan (ERP) is present wherein many emergencies such as fire, flooding, cyclone events, spillage scenarios etc. are identified. Furthermore, roles and responsibilities for all the personnel are written and established.</p>
Emergency Response Procedures	<p>A written Mutual Aid Agreement established with following:</p> <ol style="list-style-type: none"> 1. Zuari Industries Ltd 2. Indian Oil Corporation Ltd 3. Goa Shipyard Ltd 4. Indian Molasses Co Ltd 5. Indian Navy 6. Indian Coast Guard 7. Hindustan Petroleum Corporation Ltd

Program Category	Comments
Equipment Maintenance	Maintenance of the equipment is under AMC contract. Annual thorough examination of Crane and crane accessories is carried through DGFASLI certified third party agency and load testing is done every 5 years as per DGFASLI norms through certified third party agency. No life extension study has been carried for crane.
Fire Protection System Maintenance	A daily check as well as quarterly inspection is done for all the fire pumps available in the port. During mock drills, it is informed that the pumps are run. It is also informed that the fire protection valves are subjected to weekly checks for its leakages, accessibility as well as monthly checks for the oiling/greasing and operability of the valves.
Fire Protection Impairment Management	All the relevant stakeholders (safety team, engineering team, security team, operations team) are notified about the impairment. Furthermore, the practice also implements suspension of hot work system and with Fire Brigade Tenders also being deployed.
Self-inspections	Multiple daily inspection checklist is available wherein multiple areas like Protection System, Operation of the Cranes. Additionally, dock inspector inspects the facility on a daily basis.
Smoking Controls	A strict smoking policy is implemented inside the Port area.

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Fire Protection

Site Protection

Site protection overall is summarized as follows:

	Public	Private
Distance to Fire Department	4 km – Vasco	Fire Tenders – Within Port
Fire Department Type	Paid	Full Time
Response Time (minutes)	Less than 10 minutes	Less than 10 minutes
# of Hydrants Available	Unknown	10 Hydrant Points 7 Hose Reels
Hydrants Supply Type	Pumped-off Private supply	Pumped-off Private supply

Fire Protections Means

Means	Type(s)	Buildings/Areas Protected
Detections Alarms & Sprinklers, etc.	Smoke Detection System	Admin Building
Manual Protection	Hydrant, Hose Reels and Fire Extinguishers	All Areas
Special Protection	Not Available	Not Applicable

Sprinkler Systems Location & Demands:

Not Applicable as no sprinklers available.

Special Protection Systems:

None

Water Supply Details:

As informed, the water is directly taken from the sea and the pumps are informed to be arranged in negative suction system. For the pumps, it is informed that priming system is provided for the pumps. The priming tank is checked on a daily basis.

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Pump Details

Access to the room is restricted to authorized personnel only and is always manned. In-house team is conducting the inspection, testing and maintenance of the fire system and in maintenance; the fire protection system is subjected to daily checks wherein the systems are checked for pressures, water level checks, pumps – On/Off or Auto/Manual etc.

For Berth 8

Hydrant 1 & 2				
Pump Mfg.:	Beacon	Design Rating		
Pump Type:	Centrifugal Pump	Rated Flow (LPM):	Rated Pressure (Bar):	Rated Speed (RPM):
Gear Ratio:	Not Applicable			
Supply Source:	Directly from Sea	11000	Not Available	1900
Driver Details				
Driver Mfg.:	Cummins	Horsepower (KW/ HP):	Speed (RPM):	Frequency (HZ):
Driver Type:	Diesel			
		650 HP	1900	Not Available
Controller Details				
Controller Mfg.:	Not Available	Controller Type:	Local Make	
Pump Start Pressure (bar):	Manual	Pump Stop Pressure (bar):	Manual	
Jockey Start Pressure (bar):	Not Available	Jockey Stop Pressure (bar):	7	

Monitor 1 & 2				
Pump Mfg.:	Beacon	Design Rating		
Pump Type:	Centrifugal Pump	Rated Flow (LPM):	Rated Pressure (Bar):	Rated Speed (RPM):
Gear Ratio:	Not Applicable			
Supply Source:	Directly from Sea	6500	Not Available	2100
Driver Details				
Driver Mfg.:	Cummins	Horsepower (KW/ HP):	Speed (RPM):	Frequency (HZ):
Driver Type:	Diesel			
		255 HP	2100	Not Available

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Monitor 1 & 2**Controller Details**

Controller Mfg.:	Not Available	Controller Type:	Local Make
Pump Start Pressure (bar):	Manual	Pump Stop Pressure (bar):	Manual
Jockey Start Pressure (bar):	Not Available	Jockey Stop Pressure (bar):	7

Foam 1 & 2

Pump Mfg.:	Rotodel	Design Rating		
Pump Type:	Centrifugal Pump	Rated Flow (LPM):	Rated Pressure (Bar):	Rated Speed (RPM):
Gear Ratio:	Not Applicable			
Supply Source:	10,000 Foam Tank	600	Not Available	1500

Driver Details

Driver Mfg.:	Cummins	Horsepower (KW/ HP):	Speed (RPM):	Frequency (HZ):
Driver Type:	Diesel			
		52 HP	1500	Not Available

Controller Details

Controller Mfg.:	Not Available	Controller Type:	Local Make
Pump Start Pressure (bar):	Manual	Pump Stop Pressure (bar):	Manual
Jockey Start Pressure (bar):	Not Available	Jockey Stop Pressure (bar):	7

For Berth 10

Electrical

Pump Mfg.:	Kirloskar	Design Rating		
Pump Type:	Centrifugal Pump	Rated Flow (LPM):	Rated Pressure (Bar):	Rated Speed (RPM):
Gear Ratio:	Not Applicable			
Supply Source:	Directly from Sea	7500	Not Available	1458

Driver Details

Driver Mfg.:	Kirloskar	Horsepower (KW/ HP):	Speed (RPM):	Frequency (HZ):
Driver Type:	Electric			
		88.49 HP	1458	Not Available

Electrical			
Controller Details			
Controller Mfg.:	Not Available	Controller Type:	Local Make
Pump Start Pressure (bar):	Manual	Pump Stop Pressure (bar):	Manual
Jockey Start Pressure (bar):	Not Available	Jockey Stop Pressure (bar):	7

Diesel				
Pump Mfg.:	Beacon	Design Rating		
Pump Type:	Centrifugal Pump	Rated Flow (LPM):	Rated Pressure (Bar):	Rated Speed (RPM):
Gear Ratio:	Not Applicable			
Supply Source:	Directly from Sea	6800	Not Available	1500
Driver Details				
Driver Mfg.:	Cummins	Horsepower (KW/ HP):	Speed (RPM):	Frequency (HZ):
Driver Type:	Diesel			
		127 HP	1500	Not Available
Controller Details				
Controller Mfg.:	Not Available	Controller Type:	Local Make	
Pump Start Pressure (bar):	Manual	Pump Stop Pressure (bar):	Manual	
Jockey Start Pressure (bar):	Not Available	Jockey Stop Pressure (bar):	7	

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Site Characteristics and Exposures

Location

Latitude	15°24'49.22"N
Longitude	73°47'27.15"E
Elevation	2 m

Boundary Exposures

North	Sea
East	Residential
South	Sea
West	Sea

Exposures

Type	NATHAN Zone	Exposure	Comments
Hail	Zone 1	Low Exposure	Low exposure from Hail
Tornado	Zone 1	Low Exposure	Low exposure from Tornado
Tropical Cyclone	Zone 0: 76 - 141 km/h	Low Exposure	Low exposure from wind exposure. As per FMDS 1-28 (October 2020), the location lies in 47 m/s. A wind emergency plan is available at the facility highlighting the roles and responsibilities. Additionally, it is informed that a securement manual is available for the crane. Details regarding design basis for roofs against the wind speed are not available.
Extratropical Storm	No Hazard	No Exposure	No exposure from Extratropical Storm.
Storm Surge	No Hazard	No Exposure	No exposure from Storm Surge.
River Flood	Zone 100	High Exposure	The area managed by MPT does not fall in the river flood area as per CATNET. However, as per NATHAN, Shed V1 and Shed V2 fall in Zone 100-year return period.

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Type	NATHAN Zone	Exposure	Comments
			These sheds are located at an elevation of approx. 1,000 mm above the internal roads. In view of the elevated finished floor elevation, the river flood exposure can be considered low.
Flash Flood	Zone 5	High Exposure	The site lies in Zone 5, which is high exposure zone for flash flood per Munich Re World Map of Natural Hazards. As per Indian Meteorological Data, the 100 year 24 hr. rainfall is about 400 mm. The finished floor level of the blocks is about 1,000 mm above the internal roads. In view of the elevated finished floor elevation, the flash flood exposure can be considered low.
Tsunami	No Hazard	No Exposure	Remote exposure from Tsunami
Lightning	Zone 3 : 4 - 10	Moderate Exposure	Moderate exposure from Lightning. Annual checks for Earhpit and lightning arrestor are done.
Earthquake	Zone 0 : MM V and below	No Exposure	Remote exposure from Earthquake.
Volcanic	No Hazard	No Exposure	No exposure from Volcanic exposure
Wild Fire	No Hazard	No Exposure	No exposure from Wildfire
Soil and Shaking	No Hazard		

Type	Comments
Dust/Sandstorm	None
Snow/Ice	None
Avalanche	None
Landslide/Mudslide	None
Chemical Transportation	The transportation of the chemical/oil is done via underground pipelines.
Adjacent Spill Exposure	There are tank farms inside the Port Area. However, no information was available on the provision of containment as these were not under the jurisdiction of the port.

Type	Comments
Proximity from Airports/ Airstrip/ Rail Sliding	The nearest airport is located at 8 km from the Port. Additionally, a railway line is available inside the port area.

The legends for the above ranking is based on the NATHAN Risk assessment report and have been elucidated below.

<p>Earthquake</p> <ul style="list-style-type: none"> Zone 0: MM V and below Zone 1: MM VI Zone 2: MM VII Zone 3: MM VIII Zone 4: MM IX and above <p>Probable maximum intensity (MM: modified Mercalli scale) with an exceedance probability of 10% in 50 years (equivalent to a 'return period' of 475 years) for medium subsoil conditions.</p>	<p>Volcanoes</p> <ul style="list-style-type: none"> No Hazard Unclassified Zone 1: Minor hazard Zone 2: Moderate hazard Zone 3: High hazard <p>*Secondary effects that can occur as a result of the large-scale distribution of volcanic particles (e.g. climate impacts, suprarregional ash deposits) are not considered.</p>	<p>Tsunami</p> <ul style="list-style-type: none"> No Hazard Zone 0 minimal flood risk Zone 1000 year return period Zone 500 year return period Zone 100 year return period <p>Zones based on 100m SRTM (version 4.1) elevation model, taking into account height above sea level and distance from coasts.</p>
<p>Tropical Cyclone</p> <ul style="list-style-type: none"> Zone 0: 76 - 141 km/h Zone 1: 142 - 184 km/h Zone 2: 185 - 212 km/h Zone 3: 213 - 251 km/h Zone 4: 252 - 299 km/h Zone 5: ≥ 300 km/h <p>Probable maximum intensity with an exceedance probability of 10% in 10 years (equivalent to 'return period' of 100 years).</p>	<p>Extratropical Storm</p> <ul style="list-style-type: none"> No Hazard Zone 0: ≤ 80 km/h Zone 1: 81 - 120 km/h Zone 2: 121 - 160 km/h Zone 3: 161 - 200 km/h Zone 4: > 200 km/h <p>Probable maximum intensity with an average exceedance probability of 10% in ten years (equivalent to a 'return period' of 100 years). Areas were examined in which there is a high frequency of extratropical storms (approx. 30°-70° north and south of the equator).</p>	<p>Lightning</p> <ul style="list-style-type: none"> Zone 1: 0.2 - 1 Zone 2: 1 - 4 Zone 3: 4 - 10 Zone 4: 10 - 20 Zone 5: 20 - 40 Zone 6: 40 - 80 <p>Global frequency of lightning strokes per km² and year. Lightning frequency is determined by counting the total number of lightning flashes independently of whether they strike the ground or not.</p>
<p>Tornado</p> <ul style="list-style-type: none"> Zone 1: low Zone 2: Zone 3: Zone 4: high <p>Frequency and intensity of tornados.</p>	<p>Wildfire</p> <ul style="list-style-type: none"> No hazard Zone 1: low Zone 2 Zone 3 Zone 4: high <p>The effects of wind, arson and fire-prevention measures are not considered.</p>	<p>River Flood</p> <ul style="list-style-type: none"> 0 500 100 <p>Areas threatened by extreme floods. JBA flood maps with return periods of 100 and 500 years.</p>
<p>Flash Flood</p> <ul style="list-style-type: none"> Zone 1: low Zone 2 Zone 3 Zone 4 Zone 5 Zone 6: high <p>Frequency and intensity of flash floods.</p>	<p>Storm Surge</p> <ul style="list-style-type: none"> No Hazard Zone 1000 year return period Zone 500 year return period Zone 100 year return period <p>Detailed calculation for coasts and the shores of large lakes. Zones based on 30m ALOS Digital Elevation Model (DEM), taking into account wind speed and bathymetry (underwater depth of lake or ocean floors). Does not consider dykes.</p>	<p>Soil and Shaking</p> <ul style="list-style-type: none"> Class 1 - Low/ Hard Bedrock Class 2 - Rock Class 3 - Soft Rock/dense soil Class 4 - Stiff Soil Class 5 - Soft Soil Class 6 - High: Reclaimed Land <p>Underground conditions influencing earthquake intensity (based on geological, soil and hydrological information).</p>
<p>Hail</p> <ul style="list-style-type: none"> Zone 1: low Zone 2: Zone 3: Zone 4: Zone 5: Zone 6: high <p>Frequency and intensity of hailstorms.</p>		

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Security

Threat Target Risk

High Value	No	Unrest Labor	No
Terrorism Target	No	Protest Group	No
Unrest Civil	No	Neighborhood	No
Vulnerability Assessment	No		
Threat Target Risk Description	None		

Control Features

Site Perimeter			
Vehicle Access	Yes	Perimeter Fencing	Yes
Entry Provisions Posted	Yes	Fencing Height	More than 2 m
No Trespassing Signs	Yes	Exterior Lighting	Yes

Building Physical Features			
Ground Level Windows Secure	Not Applicable	Lock and Key Control	Yes

Security Staff / Guards			
On-site Guards	Yes	Recorded Rounds	Yes
Visiting Patrols	Yes	Rounds Frequency	Continuous Monitoring through Check posts
Police Surveillance	Yes	CCTV	Yes

Intruder Detection		Access Management	
Motion Sensors	No	Access Monitored	Yes
Beams	No	ID Cards/Badges	Yes
Door Contacts	No	Visitors Monitored	Yes

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Other Security Programs/Controls			
Emergency Response	Yes	Bomb Threat	No
Employee Screening	Yes	Cash Management	Yes
Safe/Vaults	No	Parking	Yes
Mobile Equipment Storage	No		

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Loss Estimates

This section covers the results of loss estimating for this location based on the details provided during the call discussion on 8th & 9th March 2021 via video conferencing.

The results of these calculations are based on a scenario developed using site-specific data collected during the call.

The Loss Estimates presented here are believed to be reasonable, based on industry experience, events postulated, and information provided by the client. The calculation of Loss Expectancies is based on the review of building construction, operations, fire protection systems, and fire protection features at the time of our assessment. The estimates are further based on conditions observed at the time of the visit. By their nature, these estimates contain some element of subjectivity. Accordingly, the estimates cannot be taken as absolutes and could be exceeded due to changes in physical conditions on site, or the initiating event or escalation being more severe than anticipated within the boundaries of the estimate.

All damage and loss potential figures presented pertain exclusively to primary property damage, associated contents damage, and associated business interruption recovery time loss, caused directly by (fire or explosion) as defined in our Loss Estimate.

Values

Date Values	9-Mar-21	Currency	INR	Basis of Values	Replacement Cost
Property Damage Values			Business Interruption		
Buildings	8,161,600,000.00	Not Available			
Content/Equipment	1,597,082,637.00				
Stock	Not Applicable				
Total Site P.D.	9,758,682,637.00	Total Site B.I.			

These values are provided by the client unless otherwise specified. Unless stated differently the PD values are assumed to be Replacement Cost Values (RCV), and the financial numbers are deemed to be for a fiscal year.

The above values are provided by client's insurance team.

As understood, the stock is not the responsibility of the port authorities. Thus, the value for stock is taken as Not Applicable.

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The Loss Estimates Definitions applied:

Level	Loss Estimate Definition and Elaboration
Level I	<p><u>Primary Protection Systems are functioning</u></p> <p>A loss event in which damage is based on the nature of hazards and construction factors, and where:</p> <ul style="list-style-type: none"> • All fire protection systems are in service and functioning as designed. • Full facility Emergency Response Team (fire brigade or Plant Emergency Organization) and Municipal Fire Department response expected. • Credit is given to all properly maintained fire barriers up to their design duration rating • Construction features function as designed. <p>Under normal circumstances, the total damage would be confined to a relatively small area. Where inadequate protection is provided or unusual factors (e.g. smoke damage, burning liquid runoff, etc.) exists, the loss expectancy may be greater and even approach Level II.</p>
Level II	<p><u>Primary Protection Systems not functioning</u></p> <p>A level II Loss Event is one which occurs when:</p> <ul style="list-style-type: none"> • The fire protection system protecting the area with the largest PD/BI potential is impaired or is rendered inoperative or ineffective due to the nature of the event. Adjacent fire protection systems are presumed operational unless rendered inoperative or ineffective due to structural failure. Same applies for the use of special extinguishing systems. • Credit can be given for adequate manual emergency response, defined as: <ul style="list-style-type: none"> • A responding organization that is trained to address the hazards of the facility being evaluated. • Can arrive on site within a reasonable time of being notified to be effective in reducing or limiting impact. • Has up to date preplans or emergency response plans for the facility. • Credit given to minimum adequately maintained (including fire doors and fire penetrations) 3 hour rated walls where the combustible loading is light to ordinary, structural failure is not expected, and roof assembly is a listed or approved non-combustible. • Combustible roof construction (including combustible or unknown metal deck assemblies) results in a contiguous structure loss. <p>Damage may be limited to the area where the impaired protection system is located and the nearby surroundings or may extend to the nearest adequate separation or properly designed and approved construction cutoffs, depending on site conditions. In some cases, the size of this loss could approach the value associated with a Level III type event.</p>

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Level	Loss Estimate Definition and Elaboration
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Level III	<u>No Protection Systems functioning; no manual fire fighting</u>
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A level III Loss Event is one which occurs when:

- All fire protection systems throughout the entire site or facility are impaired.
- No credit is given for manual emergency response.
- Damage is limited only by adequate separation and/or free-standing 4-hours rated firewalls or equivalent. (Equivalencies must be well defined and proven.)
- Combustible roof construction (including combustible or unknown metal deck assemblies) results in a contiguous structure loss.

The size of this loss can approach the value of the buildings of origin or an entire facility, depending on site layout.

Level IV	<u>Catastrophic</u>
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A catastrophic Loss Event has the potential to affect multiple plant areas or the entire facility. "Catastrophic" as used in this category refers to the initiating event, not the consequences due that event.

Typical events falling into this category would be (including, but not limited to the following):

- Massive Releases of Hazardous Materials.
- Massive Detonation of Explosives.
- Natural Hazards (floods, tidal waves, hurricanes, seismic disturbances, tornadoes, etc.)
- Falling Aircraft.
- Terrorism, War Driven Events.

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Level 4 Loss Estimate (Catastrophic Loss)

Scenario	Consider a 47 m/s high wind event at the port area. It is expected that high wind speeds will topple the HMC. Additionally, roofing sheet for the shed areas are anticipated to fail due to the high wind speed.
	Due to the damage to the roofing, rain water damage as well as impact of wind borne debris is anticipated on the buildings (admin building, storage shed, electrical utility building).

Property Damage Loss Estimate: The property damage considered for the above scenario is approximately 8% of the total facility value.

Description	Value of loss (INR)	% of Building Involved	% of Total Site Value (rounded off)
Building	408,080,000	5%	5%
Content	370,000,000	25%	25%
Stock	Not Applicable	Not Applicable	Not Applicable
Total Property Damage	778,080,000	8%	8%

Business Interruption Loss Estimate: The above loss scenario is expected to lead to 6 months of down time for site operations. The split of the various restoration activities and their likely time frame is enumerated below:

Recovery Activity (Category)	Months/ Weeks	
Investigations	1	Month
Demolition, Debris removal and Clean-ups	1	Month
Reconstruction of Building, Lead time for equipment including transit, Installation Phase	4	Months

	Duration Estimate	Duration Units
Recovery time	6	Months
Work-in-progress	0	Months
Make up capability	0	Months
Estimated downtime	6	Months
Total B.I Loss	6 Months	

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Level 3 Loss Estimate (Maximum Foreseeable Loss)

In absence of any of fire protection system for the transformer and the switchgears, the Level 1 & Level 2 loss estimates will tend towards Level 3 loss estimates.

Scenario	<p>Consider a fire event in 5 MVA transformers located in Substation A. As no smoke detection system is available in the enclosure housing these transformers, the fire will remain unnoticed and spread further. As the segregating walls between the transformer has openings (acting as passageway and having a metallic door only), the fire from one transformer will travel onto the other transformer. This will creates a bottleneck for electrical supply at port, due to power interruption. The fire is expected to engulf the building and damage all the transformers and the equipment located in the building.</p> <p>With Diesel Generator available at downstream of the panels, these diesel generators are expected to reduce the downtime of power.</p>
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Property Damage Loss Estimate: The property damage considered for the above scenario is approximately 2% of the total facility value.

Description	Value of loss (INR)	% of Building Involved	% of Total Site Value (rounded off)
Building	81,616,000.00	70%	1%
Content	111,795,784.59	85%	7%
Stock	Not Applicable	Not Applicable	Not Applicable
Total Property Damage	193,411,784.59	79.75%	2%

Business Interruption Loss Estimate: The above loss scenario is expected to lead to 4 months of down time for site operations. The split of the various restoration activities and their likely time frame is enumerated below:

Recovery Activity (Category)	Months/ Weeks	
Investigations	1	Month
Demolition, Debris removal and Clean-ups	1	Month
Reconstruction of Building, Lead time for equipment including transit, Installation Phase	2	Months

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	Duration Estimate	Duration Units
Recovery time	4	Months
Work-in-progress	0	Months
Make up capability	0	Months
Estimated downtime	4	Months
Total B.I Loss	4 Months	

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Loss History and Expansion Activities

Loss History

None

Expansion Activities

International & Domestic Cruise Terminal and related amenities are planned to be developed on Berth No 1, 2 & 3. The project is in inception stage and is estimated to have an invested about Rs. 100 crore.

Changes since last survey: changes from previous survey(s)

Not Applicable

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Site Images and Other Information

Site Images

Not Available

Other Information

None

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