

2025



M/s VADHVAN PORT PROJECT LIMITED



Geotechnical Investigation Report for assessment of suitability of rock and murrum reserves at Gargaon and Khanivade quarry sites for construction of breakwater for the Vadhvan Port Project, Palghar District, Maharashtra.

SEPTEMBER

SGS SURVEYS PRIVATE LIMITED



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EXECUTIVE SUMMARY

The contract has been awarded by **M/S. VADHVAN PORT PROJECT LIMITED**, to **M/s. SGS SURVEYS PRIVATE LIMITED**, Navi Mumbai, for taking up geotechnical investigation for assessment of suitability of rock and murrum reserves at Gargaon and Khanivade quarry sites for construction of breakwater for the Vadhvan Port Project, Palghar District, Maharashtra.”

The Geotechnical Investigations at various Locations along the alignment have been proposed. At present 20 Boreholes have been proposed to obtain the data on Geo-technical properties of the envisaged strata conditions of the project. In order to carry out the analysis and design of the structures, method of excavation and systematic support measures, boreholes are to be completed along the alignment with geotechnical logging followed by testing of soil samples for different engineering properties.

The investigations conducted comprise of geo-technical logging including lithological logging, interpretation of data, analysis of different soil types obtained through drilling, and testing for their physico-mechanical properties.

1. The locations of boreholes were fixed on ground by carrying out survey by the survey team of M/s SGS SURVEYS PRIVATE LIMITED.
2. The laboratory tests of representative soil samples were performed for physico-mechanical properties by M/s. Bureau Veritas.
3. The data obtained from different tests carried out in the field and laboratory on representative samples of the disturbed and undisturbed soil samples and field standard penetration tests forms the basis for the entire report of Geotechnical Investigation.

For SGS SURVEYS PRIVATE LIMITED

Sushant Singh
B-Tech (Civil)

1.0 INTRODUCTION

M/S. VADHVAN PORT PROJECT LIMITED, has proposed Project for “Geotechnical Investigation Report for assessment of suitability of rock and murrum reserves at Gargaon and Khanivade quarry sites for construction of breakwater for the Vadhvan Port Project, Palghar District, Maharashtra”. Hence, it was required to carry out the Geotechnical Investigation to check the subsurface profile and design suitable foundation system.

The work of soil investigation was awarded to **M/s. SGS SURVEYS PRIVATE LIMITED**. The report presented herein deals with the observation and findings during the field investigation work, analysis of data from laboratory tests and recommendations for boreholes drilled at the project location.

2.0 SCOPE OF WORK

This report contains the following information:

- ❖ Introduction
- ❖ Scope of work
- ❖ Geological Information of the Region
- ❖ Methodology of Investigation
- ❖ Subsurface conditions/ Geotechnical Assessment
- ❖ Foundation Support and Recommendations

3.0 GEOLOGICAL INFORMATION OF THE REGION

The Vadhvan region is part of the broader Saurashtra Coast, where the land is dominated by coastal sediments such as sands, silts, and clays. Beneath the coastal sediments, the region has a mix of soft rock layers and potentially consolidated sediments. Moving inland from the coastal plain, the terrain becomes more undulating and forms plateau. The low hillocks and the isolated hills around Gargaon and Khanivade in the Palghar District are part of the Deccan basaltic flow and the associated pyroclastic and plutonic rocks of Upper Cretaceous to Palaeogene age which are part of the Sahyadri Group. The thickness of the lava flow and the structural character of different types of basalts differ in different flows depending on the properties of magma, cooling history and geological conditions at the time of formation, which make these rock types suitable or unsuitable for different types of use. The basaltic rocks of the region exhibit columnar jointing, which are often reflected in the landscape also. The basalts of western Deccan volcanic

province are the youngest rocks of the Eocene age. Much of the basalts in the Palghar region are the amygdaloidal rocks which sometimes show porphyritic texture. They contain minerals such as plagioclase, pyroxene and olivine, contributing to their characteristic dark colour. The amygdaloidal rocks are seen with fillings of zeolites, calcites and other secondary silica bearing minerals. The grey basalt is generally massive, have high strength and hence they are useful as construction material, however they may be friable and highly weathered depending on the local geological conditions.

In-situ, the basalt rocks are highly suitable for various types of civil foundations as well as tunnel excavations; however, the use of amygdaloidal basalt and vesicular basalt as armour rock becomes selective depending on the influence from environmental conditions. In view of the fluid-rock interactions as a result of exposure to marine environment, there are possibility of secondary mineral separation like zeolites, calcite, quartz, chlorite, etc and the rock experiencing both physical and chemical weathering thereby leading to formation of solution cavities. Enhanced permeability and porosity of the rock may ultimately lead to reduction in the bulk density of rocks which are undesirable. It is therefore important to identify the basalt deposits which are non-vesicular and having higher bulk density/ UCS/ durability/ resistance to weathering & erosion. It is generally seen that the porphyritic basalts are characterised by high seismic p-wave velocity and high strength values and they are highly suitable as armour rocks. Earlier studies describe the rocks of the Deccan traps as basic igneous rocks which have low silica content. They largely exhibit an average rock density of 2900 kg/m³, however as the rocks become acidic, their density tends to reduce. Typical low density in basalts show value such as 2600 kg/m³ whereas the ultrabasics have density value as high as 3030 kg/m³. Literature survey related to ultrasonic measurements on core samples of basalt rock shows that the seismic P-wave velocity (V_p) of basalt varies from about 2280 m/s to 5740 m/s. Similarly, the seismic shear wave velocity (V_s) varies from 1150 m/s to 3300 m/s. Based on the best fit curves arrived by different researchers, there are several relations between V_p and V_s for basalt rock, however, in case of rocks with moderate overburden cover, it is likely that the linear relation $V_s = 0.53V_p$ may be the best applicable. Intact basalt rock has uniaxial compressive strength (UCS) ranging from 150-300 MPa, however presence of joints and fractures in the rock mass shows a significant reduction in the UCS range (30- 100 MPa) which is reflected during the in-situ measurements. Similarly, the Poisson's ratio of basalt typically falls in the range of 0.22 to 0.25, however values as high as 0.30 are noted in rocks that are harder to fracture.

Table 1: Seismic zone factor, Z (Source: IS: 1893 (Part -1): 2016 – Criterion for Earthquake resistant design of Structures)

Seismic Zone factor	II	III	IV	V
Z	0.10	0.16	0.24	0.36

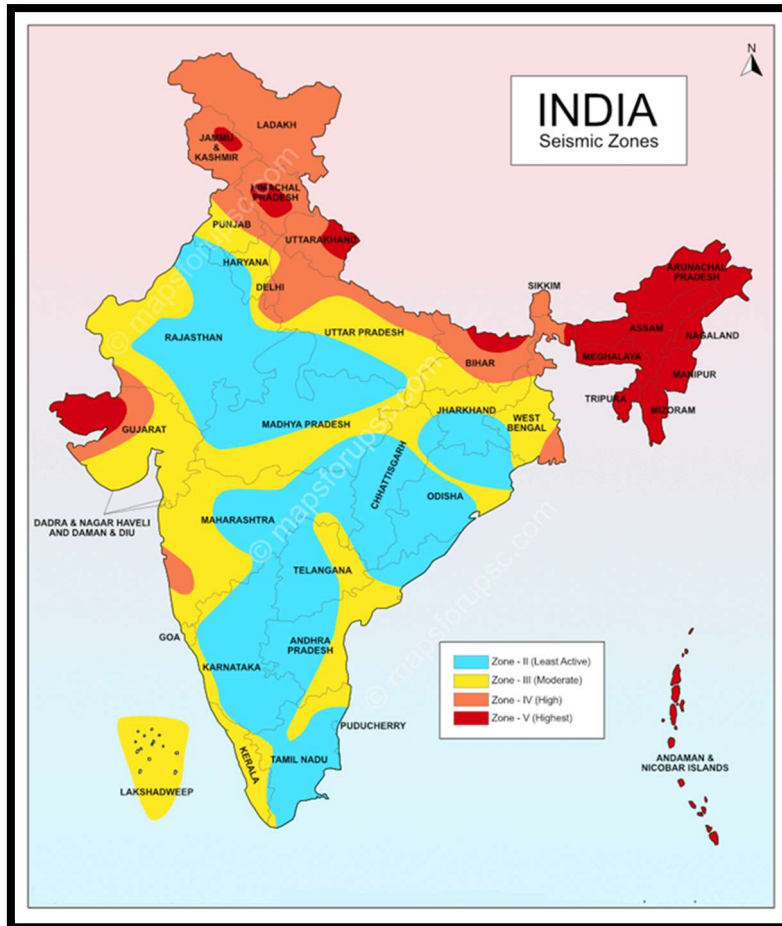


Figure 1: Seismic Zonation Map of India.

4.0 METHODOLOGY OF INVESTIGATION

The investigation was planned to obtain the subsurface stratification in the proposed project site and collect soil / rock samples for laboratory testing to determine the engineering properties.

4.1 BOREHOLES

For Geotechnical investigation work, drilling rig was installed at the specified borehole location. The boreholes were progressed using Rotary Drilling Rig. Boring was advanced at selected/ specified borehole locations. The following steps will be adopted during boring operations;

- i. Rotary boring / drilling machine will be assembled at site and will be shifted and erected at the borehole location.
- ii. Drilling through soil overburden will be advanced by soil cutters attached at end of drilling rods, drilling in rock will be advanced by drilling bit fixed to the lower end of drill rods with barrel, is rotated by a suitable chuck and always kept in firm contact with the bottom of the borehole.
- iii. A mud-laden fluid is pumped continuously down the hole through drill rods, and the fluid returns to the surface in the annular space between the rods and the side of the hole, and so the protective casing may not be generally necessary. The mud returning upwards brings the cuttings to the surface.
- iv. After reaching the drill rods attached with the cutting bit attain its full depth another piece (extension rod) will be attached and continue the drilling.
- v. Rotating core barrels, provided with commercial diamond / TC bits are also used for rotary drilling and simultaneously obtaining the rock cores or samples.
- vi. The casing pipe of reduced diameter (NX) if necessary, will be driven up to the required depth / level as the bore hole is advanced depending upon the rock conditions.

The following precautions were taken;

- i. Diameter of Borehole was 150mm in soil and 76mm in rock, all field work was supervised by well-trained /experienced persons.
- ii. Casing was used as per the prevailing soil conditions / rock, to stabilize the borehole.
- iii. Required field tests i.e., Standard Penetration Tests and collection of undisturbed/ disturbed samples was conducted as per requirements and specified depths / levels, the same has been discussed in detail in sampling and tests in a borehole clause of this document.

Rock core drilling was advanced using double tube core barrels with diamond bits.

4.2 GROUND WATER TABLE

Ground Water was encountered in the boreholes drilled. Correct method to determine ground water table is to install standpipe piezometer and monitor over long period of time. Seasonal Variations in the ground water level is expected. Water table depths are mentioned in table 7.

ROCK CORE SAMPLES

Drilling was advanced by rotary core drilling method using double tube core barrels as per the guidelines of IS: 6926-1996. A double tube core barrel and NX sized bits are used for drilling and recovering rock cores. Core Samples were extracted by the application of a continuous pressure at one end of the core with the barrel held horizontally without vibration.

Immediately after withdrawal from the core barrel, the cores were placed in a tray and transferred into boxes specially prepared for the purpose. The boxes are made of seasoned timber. Recovered rock cores were numbered serially as specified in IS: 4078-1980. Rock core recovery and Rock Quality Designation (RQD) were computed for every run length drilled. The description of the core samples was recorded. Rock classification in terms of weathering and state of fractures and strength is carried out in the following manner. Tabulations given in below explain it briefly.

It should be understood that all grades of weathering may not be seen in a given rock mass and that in some cases a particular grade may be present to a very small extent. Distribution of the various weathering grades of rock material in the rock mass may be related to the porosity of the rock material and the presence of open discontinuities of all types in the rock mass.

Table 3: Scale of Weathering Grades of Rock Mass as Per IS 4464-1985, Page No-7

TERMS	DESCRIPTION	GRADE	INTERPRETATIONS
Fresh	No visible sign of rock material weathering; perhaps slight discoloration on major discontinuity surfaces.	W1	CR > 90%
Slightly Weathered	Discoloration indicates weathering of rock material and discontinuity surfaces. All the rock material may be discolored by weathering.	W2	CR between 70% to 90 %

Moderately Weathered	Less than half of the rock material is Decomposed or disintegrated to a soil. Fresh or discolored rock is present either as a continuous framework or as core as core stones.	W3	CR between 51% to 70 %
Highly Weathered	More than half of the rock material is decomposed or disintegrated to a soil. Fresh or discolored rock is present either as a discontinuous framework or as core stone	W4	CR between 11% to 50 %
Completely Weathered	All rock material is decomposed and / or Disintegrated to soil. The original mass structure is still largely intact	W5	CR between zero to 10 %

RELATION BETWEEN RQD AND IN-SITU ROCK QUALITY

Rock quality is further measured by frequency of natural joints in rock mass. Rock Quality Designation (RQD) is used to define state of fractures or massiveness of rock. Following table 4 defines the quality of rock mass.

Table 4: Relation between RQD and In-situ Rock Quality as per IS 13365 (Part 1):1998, Annexure-B, Page No-8.

ROCK CLASSIFICATION	RQD (%)
Excellent	90 to 100
Good	75 to <90
Fair	50 to <75
Poor	25 to <50
Very Poor	00 to <25

CLASSIFICATION OF ROCK WRT COMPRESSIVE STRENGTH

Rock is also classified by strength of intact rock cores collected during drilling. Rock Unconfined Compressive strength (UCS) is used to define strength of rock. Classification of rocks given in Table 2 of Appendix-2 of IRC: 78-2014.

Table 5: Relation between RQD and In-situ Rock Quality as per IRC: 78-2014, table-2, Appendix-2.

ROCK TYPE	UNCONFINED COMPRESSIVE STRENGTH (UCS) IN MPa
Extremely Strong	>200
Very Strong	100 to 200
Strong	50 to 100
Moderately Strong	12.5 to 50
Moderately Weak	5.0 to 12.5
Weak	1.25 to 5.0
Very Weak	<1.25

4.3 LABORATORY TESTING

Selected soil and rock cores were tested in Laboratory for the following tests:

4.3.1 Water Absorption, Porosity - The water absorption and porosity of the rock Sample was determined on rock samples. Water absorption is expressed as the percentage of water content with respect to the dry weight of the sample. The porosity of the rock sample is the ratio of voids to the total volume of the rock sample. The relation between Specific Gravity of rock (G), Dry Density of Rock (γ_d), Density of Water (γ_w) and porosity (n) can be expressed as –

$$n = 1 - (\gamma_d / G \gamma_w) * 100$$

4.3.2 Density- The density of the rock sample was determined by mercury displacement method. The density of the rock is the weight per unit volume of the rock material. Sometimes the term “Unit Weight” is also used for Density.

4.3.3 Specific gravity - The specific gravity of the rock sample was determined by using pycnometer. Specific gravity ‘G’ is defined as the ratio of the weight of a given volume of rock at a given temperature to the weight of equal volume of distilled water.

4.3.4 Unconfined compression strength – The Unconfined Compressive Strength of rock samples of rock with 7 days’ saturation and without saturation was determined using compressive testing machine.

4.3.5 Tensile test by Point load method - The point load strength index of rocks samples was determined by using compression testing machine with the conical loading platens.

4.3.6 Chemical Analysis - Chemical tests were performed on soil and rock sample and various parameters were determined. Permissible limits for different parameters were mentioned in Table 6.

Table 6: Permissible Limit for solids (IS 456:2000, clause 5.4)

	Tested as per	Permissible Limit, Max
Organic	IS 3025 (Part 18)	200 mg/l
Inorganic	IS 3025 (Part 18)	3000 mg/l
Sulphate (as SO ₃)	IS 3025 (Part 24)	400 mg/l
Chloride (as Cl)	IS 3025 (Part 32)	2000 mg/l For concrete not containing embedded steel and 500 mg/l for reinforced concrete work
Suspended matter	IS 3025 (Part 17)	2000 mg/l

The results of laboratory tests are attached below in Annexure III.

5.0 FINDINGS OF INVESTIGATION

Five boreholes were drilled at the project location and the observed sub-surface conditions are summarized below:

Table 7: Summary of Fieldwork

BOREHOLE NO.	COORDINATES				G.W.T (m)	BOREHOLE TERMINATION DEPTH (m)
	Easting	Northing	Lat	Long		
BH-01	2196667.072	272022.149	19.51101915	72.49228382	NIL	30.00
BH-02	2196496.086	272222.509	19.5104717	72.4929798	4.20	30.00
BH-03	2196303.588	272425.017	19.50585439	72.4936841	1.00	30.00
BH-05	2196183.821	272514.834	19.5054688	72.49399799	3.70	30.00
BH-13	2193540.026	272419.953	19.49287007	72.49378895	4.45	30.00

6.0 CONCLUSION

The report above enumerates the factual data obtained from field records and laboratory tests through a geotechnical investigation carried out at this site. The data presented in this report and recommendations are specific for the boreholes drilled and time at which tests were performed and sampling was conducted, it may vary after physical checking of samples.

The field and Laboratory records and results reported here are relevant for the test Locations and time at which the tests have been conducted.

Laboratory testing was carried out at our NABL Accredited Laboratory Facility in Navi Mumbai. Laboratory tests were carried out as directed by client, consultant and approved laboratory schedules in accordance with the procedures described in the relevant Indian Standard Codes (IS: 2720) of practice.


7.0 REFERENCES




The following Indian Standard Codes were referred:


1. IS 1498 (Reaffirmed 2021) - Code of Practice for Classification & Identification of Soils for General Engineering purposes.
2. IS 1892-2021 - Code of Practice for Subsurface investigation for foundations.
3. IS 4078 - Code of Practice for Indexing & storage of drill cores.
4. IS 4464- 2020 - Code of Practice for Presentation of drilling information and core description in Foundation investigation.
5. IS 5313-2020 - Code of Practice for Guide for core drilling observations.
6. IS 6926 - Code of Practice for Diamond Core Drilling for site investigation for river valley projects.
7. IS 9143 (Reaffirmed 2021) - Code of Practice for Method for determination of unconfined compressive strength of rock materials.
8. IS 9179- Code of Practice for Method for preparation of rock specimen for laboratory testing.
9. IS 9221- Code of Practice for Method for determination of modulus of elasticity & Poisson's ratio of rock material in Uniaxial Compression.
10. IS: 14040 - Code of Practice for Method of test for laboratory determination of water content, porosity, density and related properties of rock material.
11. IS:8764-1998 (Reaffirmed 2019) - Method for Determination of Point Load Strength Index of Rocks


12. IS: 13030-1991 (Reaffirmed 1996) - Method of Test for Laboratory Determination of Water Content, Porosity, Density and Related Properties of Rock Material.
13. ISRM - International Society of Rock Mechanics.







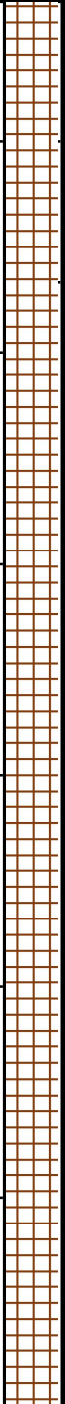
Client : M/S. VADHVAN PORT PROJECT LIMITED							 SGS SURVEYS PRIVATE LIMITED simplifying SURVEY							
Project : Geotechnical Investigation Report for assessment of suitability of rock and murrum reserves at Gargaon and Khanivade quarry sites for construction of breakwater for the Vadhvan Port Project, Palghar District, Maharashtra.														
Diameter of Borehole : 100 mm/ Nx			Bore Hole No : 01				BORE LOG (As per IS : 1892-1979, 4453-1980, 4464-1967)							
Drilling Method : Rotary			Sheet : 1 of 3											
Ground RL : 58.451 m			Date of Commencement : 30-08-2025											
Co-Ordinate : E-272022.149 N-2196667.072			Date of Completion : 10-09-2025											
Depth of GWT : NIL			Termination Depth : 30.00 m											
Depth (mm)	Bore Hole Dia (mm)	Depth (m)	Graphic Log	Stratum Description	Sample		Blows/15cm			N	TCR (cm)	% CR	% RQD	Other Tests / Remarks
					Type	Core Pieces	15	30	45					
0.00		0.00												
0.5					DS									0.5
1.0														1.0
1.5		1.50		Reddish to Brownish Sandy Soil	SPT 1		4	6	9	15				1.5
1.5		1.95												
2.0														2.0
2.5														2.5
3.0		3.00		Reddish to Brownish Sandy Soil With Gravels	SPT 2		5	8	13	21				3.0
3.0		3.45												
3.5														3.5
4.0														4.0
4.5		4.50		Reddish to Brownish Sandy Soil With Gravels	SPT 3		5	8	15	23				4.5
4.5		4.95												
5.0														5.0
5.5														5.5
6.0		6.00		Completely Decomposed Rock	SPT 4		6	12	19	31				6.0
6.0		6.45												
6.5														6.5
7.0														7.0
7.5		7.50		Highly Weathered Rock	SPT 5		19	13	-	R				7.5
7.5		7.78							52					
8.0														8.0
8.5														8.5
9.0		9.00		Highly Weathered Rock	SPT 6		12	-	-	R				9.0
9.0		9.12						52						
9.5														9.5
10.0														10.0
WS - Wash Samples RL - Reduced Level GR-Ground RQD - Rock Quality Designation SPT - Standard Penetration Test UDS-Undistributed Samples CR - Core Recovery RUN - Drill Run DS-Distributed Samples														
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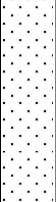

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Diameter of Borehole : 100 mm/ Nx			Bore Hole No : 01				BORE LOG (As per IS : 1892-1979, 4453-1980, 4464-1967)									
Drilling Method : Rotary			Sheet : 2 of 3													
Ground RL : 58.451 m			Date of Commencement : 30-08-2025													
Co-Ordinate : E-272022.149 N-2196667.072			Date of Completion : 10-09-2025													
Depth of GWT : NIL			Termination Depth : 30.00 m													
Depth (mm)	Bore Hole Dia (mm)	Depth (m)	Graphic Log	Stratum Description	Sample		Blows/15cm			N	TCR (cm)	% CR	% RQD	Other Tests / Remarks		
					Type	Core Pieces	15	30	45							
10.5		10.50		Highly Weathered Basalt Rock	CORE	SP						13	NIL	10.5		
11.0															11.0	
11.5															11.5	
12.0		12.00					CORE	SP						23	NIL	12.0
12.5																12.5
13.0																13.0
13.5		13.50					CORE	01-03						26	NIL	13.5
14.0																14.0
14.5														14.5		
15.0		15.00			CORE	04-05						37	NIL	15.0		
15.5														15.5		
16.0														16.0		
16.5		16.50			CORE	06-07						27	NIL	16.5		
17.0														17.0		
17.5														17.5		
18.0		18.00			CORE	08-15						47	NIL	18.0		
18.5														18.5		
19.0														19.0		
19.5		19.50			CORE	16-26						38	25	19.5		
20.0				Slightly Weathered Amygdaloidal Basalt Rock										20.0		
WS - Wash Samples RL - Reduced Level GR-Ground RQD - Rock Quality Designation SPT - Standard Penetration Test UDS-Undistributed Samples CR - Core Recovery RUN - Drill Run DS-Distributed Samples																
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Project : Geotechnical Investigation Report for assessment of suitability of rock and murrum reserves at Gargaon and Khanivade quarry sites for construction of breakwater for the Vadhvan Port Project, Palghar District, Maharashtra.															
Diameter of Borehole : 100 mm/ Nx			Bore Hole No : 01				BORE LOG (As per IS : 1892-1979, 4453-1980, 4464-1967)								
Drilling Method : Rotary			Sheet : 3 of 3												
Ground RL : 58.451 m			Date of Commencement : 30-08-2025												
Co-Ordinate : E-272022.149 N-2196667.072			Date of Completion : 10-09-2025												
Depth of GWT : NIL			Termination Depth : 30.00 m												
Depth (mm)	Bore Hole Dia (mm)	Depth (m)	Graphic Log	Stratum Description	Sample		Blows/15cm			N	TCR (cm)	% CR	% RQD	Other Tests / Remarks	
					Type	Core Pieces	15	30	45						
20.5		21.00		Slightly Weathered Amygdaloidal Basalt Rock	CORE	27-34						89	73	20.5	
21.0															21.0
21.5															21.5
22.0		22.50				CORE	35-42						84	74	22.0
22.5															22.5
23.0															23.0
23.5		24.00				CORE	43-47						94	88	23.5
24.0															24.0
24.5														24.5	
25.0		25.50			CORE	48-51						93	85	25.0	
25.5														25.5	
26.0														26.0	
26.5														26.5	
27.0		27.00			CORE	52-56						98	93	27.0	
27.5														27.5	
28.0														28.0	
28.5		28.50			CORE	57-61						97	87	28.5	
29.0														29.0	
29.5														29.5	
30.0		30.00			CORE	62-67						99	95	30.0	
BH IS TERMINATED AT 30.00 MTR BGL															
WS - Wash Samples			RL - Reduced Level			GR-Ground									
RQD - Rock Quality Designation			SPT - Standard Penetration Test			UDS-Undistributed Samples									
CR - Core Recovery			RUN - Drill Run			DS-Distributed Samples									
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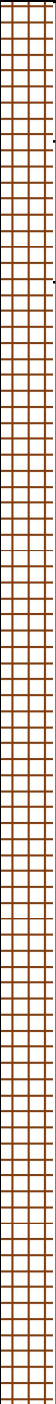
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Diameter of Borehole : 100 mm/ Nx				Bore Hole No : 02			BORE LOG (As per IS : 1892-1979, 4453-1980, 4464-1967)							
Drilling Method : Rotary				Sheet : 1 of 3										
Ground RL : 49.522 m				Date of Commencement : 30-08-2025										
Co-Ordinate : E-272222.509 N-2196496.086				Date of Completion : 10-09-2025										
Depth of GWT : 4.20 m				Termination Depth : 30.00 m										
Depth (mm)	Bore Hole Dia (mm)	Depth (m)	Graphic Log	Stratum Description	Sample		Blows/15cm			N	TCR (cm)	% CR	% RQD	Other Tests / Remarks
					Type	Core Pieces	15	30	45					
		0.00	[Dotted Pattern]	Reddish to Brownish Sandy Soil	DS									
0.5		0.50												
1.0			[Dotted Pattern]	Reddish to Brownish Sandy Soil With Gravels	SPT 1		3	16	25	41				
1.5		1.50												
2.0		1.95	[Dotted Pattern]											
2.5														
3.0		3.00	[Cross-hatch Pattern]	Reddish to Brownish Sandy Soil With Rock Fragments	SPT 2	SP	12	-	-	R		10	NIL	
3.5		3.12	[Cross-hatch Pattern]				52							
4.0					Reddish to Brownish Sandy Soil With Rock Fragments & Highly Weathered Basalt Rock									
4.5		4.50	[Cross-hatch Pattern]		SPT 3	01-03	10	-	-	R		13	NIL	
5.0		4.60				CORE		52						
5.5			[Cross-hatch Pattern]											
6.0		6.00				CORE	04						29	NIL
6.5			[Cross-hatch Pattern]											
7.0														
7.5		7.50	[Cross-hatch Pattern]	Highly Weathered & Fractured Basalt Rock	CORE	05-12						33	NIL	
8.0														
8.5			[Cross-hatch Pattern]											
9.0		9.00				CORE	13-16						39	NIL
9.5			[Cross-hatch Pattern]											
10.0														
WS - Wash Samples RL - Reduced Level GR-Ground RQD - Rock Quality Designation SPT - Standard Penetration Test UDS-Undistributed Samples CR - Core Recovery RUN - Drill Run DS-Distributed Samples														
SGS SURVEYS PRIVATE LIMITED Office No. 6, Tulsi Avenue Apartment, Plot No. 68 Sector 34, Kamothe, Navi Mumbai 410209. Email: info@sgsco.in														


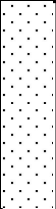



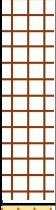

Client : M/S. VADHVAN PORT PROJECT LIMITED										 SGS SURVEYS PRIVATE LIMITED simplifying SURVEY				
Project : Geotechnical Investigation Report for assessment of suitability of rock and murrum reserves at Gargaon and Khanivade quarry sites for construction of breakwater for the Vadhvan Port Project, Palghar District, Maharashtra.														
Diameter of Borehole : 100 mm/ Nx					Bore Hole No : 02					BORE LOG (As per IS : 1892-1979, 4453-1980, 4464-1967)				
Drilling Method : Rotary					Sheet : 2 of 3									
Ground RL : 49.522 m					Date of Commencement : 30-08-2025									
Co-Ordinate : E-272222.509 N-2196496.086					Date of Completion : 10-09-2025									
Depth of GWT : 4.20 m					Termination Depth : 30.00 m									
Depth (mm)	Bore Hole Dia (mm)	Depth (m)	Graphic Log	Stratum Description	Sample		Blows/15cm			N	TCR (cm)	% CR	% RQD	Other Tests / Remarks
					Type	Core Pieces	15	30	45					
10.5		10.50		Highly Weathered & Fractured Basalt Rock	CORE	17						32	NIL	10.5
11.0														
11.5														11.5
12.0		12.00		Slightly Weathered Compact Basalt Rock	CORE	18						26	9	12.0
12.5														
13.0														13.0
13.5		13.50		Slightly Weathered Compact Basalt Rock	CORE	19-25						85	73	13.5
14.0														
14.5														14.5
15.0		15.00		Slightly Weathered Compact Basalt Rock	CORE	26-29						84	77	15.0
15.5														
16.0														16.0
16.5		16.50		Slightly Weathered Amygdaloidal Basalt Rock	CORE	30-35						93	82	16.5
17.0														
17.5														17.5
18.0		18.00		Slightly Weathered Amygdaloidal Basalt Rock	CORE	36-45						93	82	18.0
18.5														
19.0														19.0
19.5		19.50		Slightly Weathered Amygdaloidal Basalt Rock	CORE	46-49						90	85	19.5
20.0														
WS - Wash Samples RL - Reduced Level GR-Ground RQD - Rock Quality Designation SPT - Standard Penetration Test UDS-Undistributed Samples CR - Core Recovery RUN - Drill Run DS-Distributed Samples														
SGS SURVEYS PRIVATE LIMITED Office No. 6, Tulsi Avenue Apartment, Plot No. 68 Sector 34, Kamothe, Navi Mumbai 410209. Email: info@sgsco.in														



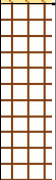
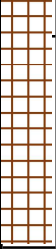

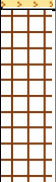
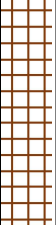
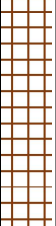
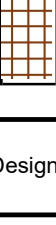

Client : M/S. VADHVAN PORT PROJECT LIMITED							 SGS SURVEYS PRIVATE LIMITED simplifying SURVEY								
Project : Geotechnical Investigation Report for assessment of suitability of rock and murrum reserves at Gargaon and Khanivade quarry sites for construction of breakwater for the Vadhvan Port Project, Palghar District, Maharashtra.															
Diameter of Borehole : 100 mm/ Nx			Bore Hole No : 02				BORE LOG (As per IS : 1892-1979, 4453-1980, 4464-1967)								
Drilling Method : Rotary			Sheet : 3 of 3												
Ground RL : 49.522 m			Date of Commencement : 30-08-2025												
Co-Ordinate : E-272222.509 N-2196496.086			Date of Completion : 10-09-2025												
Depth of GWT : 4.20 m			Termination Depth : 30.00 m												
Depth (mm)	Bore Hole Dia (mm)	Depth (m)	Graphic Log	Stratum Description	Sample		Blows/15cm			N	TCR (cm)	% CR	% RQD	Other Tests / Remarks	
					Type	Core Pieces	15	30	45						
20.5		21.00		Slightly Weathered Amygdaloidal Basalt Rock	CORE	50-59						91	73	20.5	
21.0					CORE										21.0
21.5					CORE	60-66							88	84	21.5
22.0		22.50			CORE										22.0
22.5														22.5	
23.0														23.0	
23.5		24.00			CORE	67-78						92	54	23.5	
24.0				Slightly to Fresh Weathered Amygdaloidal Basalt Rock										24.0	
24.5					CORE									24.5	
25.0		25.50			CORE	79-83						96	93	25.0	
25.5					CORE									25.5	
26.0														26.0	
26.5		27.00		CORE	84-88							92	89	26.5	
27.0				CORE										27.0	
27.5														27.5	
28.0		28.50		CORE	89-93							99	89	28.0	
28.5				CORE										28.5	
29.0														29.0	
29.5														29.5	
30.0		30.00		CORE	94-98							99	91	30.0	
BH IS TERMINATED AT 30.00 MTR BGL															
WS - Wash Samples			RL - Reduced Level			GR - Ground									
RQD - Rock Quality Designation			SPT - Standard Penetration Test			UDS - Undistributed Samples									
CR - Core Recovery			RUN - Drill Run			DS - Distributed Samples									
SGS SURVEYS PRIVATE LIMITED															
Office No. 6, Tulsi Avenue Apartment, Plot No. 68 Sector 34, Kamothe, Navi Mumbai 410209.															
Email: info@sgsco.in															


Client : M/S. VADHVAN PORT PROJECT LIMITED							 SGS SURVEYS PRIVATE LIMITED simplifying SURVEY							
Project : Geotechnical Investigation Report for assessment of suitability of rock and murrum reserves at Gargaon and Khanivade quarry sites for construction of breakwater for the Vadhvan Port Project, Palghar District, Maharashtra.														
Diameter of Borehole : 100 mm/ Nx			Bore Hole No : 03				BORE LOG (As per IS : 1892-1979, 4453-1980, 4464-1967)							
Drilling Method : Rotary			Sheet : 1 of 3											
Ground RL : 39.879 m			Date of Commencement : 30-08-2025											
Co-Ordinate : E-272425.017 N-2196303.588			Date of Completion : 19-09-2025											
Depth of GWT : 1.00 m			Termination Depth : 30.00 m											
Depth (mm)	Bore Hole Dia (mm)	Depth (m)	Graphic Log	Stratum Description	Sample		Blows/15cm			N	TCR (cm)	% CR	% RQD	Other Tests / Remarks
					Type	Core Pieces	15	30	45					
0.00		0.00		Reddish to Brownish Sandy Soil										
0.5														0.5
1.0														1.0
1.5		1.50			DS									1.5
2.0				Yellow to Brownish Sandy Soil With Sand										2.0
2.5														2.5
3.0		3.00			SPT 1	WS	6	-	-	R				3.0
3.5														3.5
4.0														4.0
4.5		3.06					52							4.5
4.5		4.50		Completely Decomposed Rock With Mass of Basalt	SPT 2	SP	3	-	-	R	8	NIL		4.5
5.0														5.0
5.5														5.5
6.0		4.53			CORE		52							6.0
6.5														6.5
7.0														7.0
7.5		6.00			CORE	SP					8	NIL		7.5
8.0														8.0
8.5														8.5
9.0		7.50		Slightly Weathered and Compact Basalt Rock	CORE	01-06					84	24		9.0
9.5														9.5
10.0		9.00			CORE	07-10					88	75		10.0
WS - Wash Samples RL - Reduced Level GR-Ground RQD - Rock Quality Designation SPT - Standard Penetration Test UDS-Undistributed Samples CR - Core Recovery RUN - Drill Run DS-Distributed Samples														
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Client : M/S. VADHVAN PORT PROJECT LIMITED										 SGS SURVEYS PRIVATE LIMITED simplifying SURVEY				
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Diameter of Borehole : 100 mm/ Nx					Bore Hole No : 03					BORE LOG (As per IS : 1892-1979, 4453-1980, 4464-1967)				
Drilling Method : Rotary					Sheet : 2 of 3									
Ground RL : 39.879 m					Date of Commencement : 30-08-2025									
Co-Ordinate : E-272425.017 N-2196303.588					Date of Completion : 19-09-2025									
Depth of GWT : 1.00 m					Termination Depth : 30.00 m									
Depth (mm)	Bore Hole Dia (mm)	Depth (m)	Graphic Log	Stratum Description	Sample		Blows/15cm			N	TCR (cm)	% CR	% RQD	Other Tests / Remarks
					Type	Core Pieces	15	30	45					
10.5		10.50	[Grid Pattern]	Slightly Weathered & Fractured Compact Basalt Rock	CORE	11-17						85	45	10.5
11.0														
11.5			[Cross-hatch Pattern]	Moderately Weathered & Fractured Compact Basalt Rock										11.5
12.0		12.00			CORE	18-21							89	79
12.5			[Cross-hatch Pattern]	Moderately Weathered & Fractured Compact Basalt Rock										12.5
13.0														
13.5		13.50			CORE	22-28						69	47	13.5
14.0			[Grid Pattern]											14.0
14.5														
15.0		15.00			CORE	29-35						71	29	15.0
15.5			[Grid Pattern]											15.5
16.0														
16.5		16.50			CORE	36-45						79	25	16.5
17.0			[Grid Pattern]	Slightly Weathered & Fractured Compact Basalt Rock										17.0
17.5														
18.0		18.00			CORE	46-55						70	23	18.0
18.5			[Grid Pattern]											18.5
19.0														
19.5		19.50			CORE	56-61						75	28	19.5
20.0														20.0
WS - Wash Samples RL - Reduced Level GR-Ground RQD - Rock Quality Designation SPT - Standard Penetration Test UDS-Undistributed Samples CR - Core Recovery RUN - Drill Run DS-Distributed Samples														
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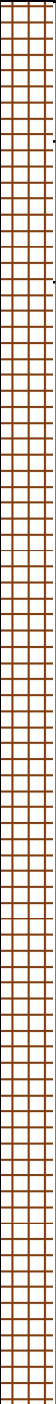
Client : M/S. VADHVAN PORT PROJECT LIMITED							 SGS SURVEYS PRIVATE LIMITED simplifying SURVEY								
Project : Geotechnical Investigation Report for assessment of suitability of rock and murrum reserves at Gargaon and Khanivade quarry sites for construction of breakwater for the Vadhvan Port Project, Palghar District, Maharashtra.															
Diameter of Borehole : 100 mm/ Nx			Bore Hole No : 03				BORE LOG (As per IS : 1892-1979, 4453-1980, 4464-1967)								
Drilling Method : Rotary			Sheet : 3 of 3												
Ground RL : 39.879 m			Date of Commencement : 30-08-2025												
Co-Ordinate : E-272425.017 N-2196303.588			Date of Completion : 19-09-2025												
Depth of GWT : 1.00 m			Termination Depth : 30.00 m												
Depth (mm)	Bore Hole Dia (mm)	Depth (m)	Graphic Log	Stratum Description	Sample		Blows/15cm			N	TCR (cm)	% CR	% RQD	Other Tests / Remarks	
					Type	Core Pieces	15	30	45						
20.5		21.00		Slightly Weathered & Fractured Compact Basalt Rock	CORE	62-65						80	59	20.5	
21.0															21.0
21.5															21.5
22.0		22.50				CORE	66-72						93	63	22.0
22.5															22.5
23.0															23.0
23.5		24.00			CORE	73-83						93	50	23.5	
24.0														24.0	
24.5														24.5	
25.0		25.50		Slightly to Fresh Weathered Compact Basalt Rock	CORE	84-89						99	81	25.0	
25.5														25.5	
26.0														26.0	
26.5														26.5	
27.0		27.00			CORE	90-95						99	72	27.0	
27.5														27.5	
28.0														28.0	
28.5		28.50			CORE	96-105						99	75	28.5	
29.0														29.0	
29.5														29.5	
30.0		30.00			CORE	106-110						99	88	30.0	
BH IS TERMINATED AT 30.00 MTR BGL															
WS - Wash Samples			RL - Reduced Level			GR-Ground									
RQD - Rock Quality Designation			SPT - Standard Penetration Test			UDS-Undistributed Samples									
CR - Core Recovery			RUN - Drill Run			DS-Distributed Samples									
SGS SURVEYS PRIVATE LIMITED															
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Project : Geotechnical Investigation Report for assessment of suitability of rock and murrum reserves at Gargaon and Khanivade quarry sites for construction of breakwater for the Vadhvan Port Project, Palghar District, Maharashtra.														
Diameter of Borehole : 100 mm/ Nx				Bore Hole No : 05			BORE LOG (As per IS : 1892-1979, 4453-1980, 4464-1967)							
Drilling Method : Rotary				Sheet : 1 of 3										
Ground RL : 37.226 m				Date of Commencement : 31-08-2025										
Co-Ordinate : E-272514.834 N-2196183.821				Date of Completion : 10-09-2025										
Depth of GWT : 3.70 m				Termination Depth : 30.00 m										
Depth (mm)	Bore Hole Dia (mm)	Depth (m)	Graphic Log	Stratum Description	Sample		Blows/15cm			N	TCR (cm)	% CR	% RQD	Other Tests / Remarks
					Type	Core Pieces	15	30	45					
0.00		0.00		Brownish Sandy Soil With Gravels										
0.5														0.5
1.0														1.0
1.5		1.50			DS									1.5
1.5		1.95		Medium to Course Grain Sandy Soil		W A S H								1.5
2.0														2.0
2.5														2.5
2.5		3.00			SPT 1	WS	3	-	-	R				2.5
3.0		3.03		Highly Weathered & Fractured Basalt Rock			52							3.0
3.0							No sample Collected							3.0
3.5														3.5
4.0														4.0
4.0		4.50			CORE	01						13	NIL	4.0
4.5														4.5
5.0														5.0
5.0		6.00			CORE	02-04						34	NIL	5.0
5.5														5.5
5.5		6.00		Moderately Weathered Basalt Rock										5.5
6.0														6.0
6.0		7.50			CORE	05-10						55	19	6.0
6.5														6.5
6.5		7.50		Slightly Weathered Amygdaloidal Basalt Rock										6.5
7.0														7.0
7.0		9.00			CORE	11-19						92	65	7.0
7.5														7.5
7.5		9.00		Moderately Weathered Amygdaloidal Basalt Rock										7.5
8.0														8.0
8.0		9.00												8.0
8.5														8.5
8.5		9.00												8.5
9.0														9.0
9.0		9.00												9.0
9.5														9.5
9.5		9.00												9.5
10.0														10.0
10.0		9.00												10.0
WS - Wash Samples RL - Reduced Level GR-Ground RQD - Rock Quality Designation SPT - Standard Penetration Test UDS-Undistributed Samples CR - Core Recovery RUN - Drill Run DS-Distributed Samples														
SGS SURVEYS PRIVATE LIMITED Office No. 6, Tulsi Avenue Apartment, Plot No. 68 Sector 34, Kamothe, Navi Mumbai 410209. Email: info@sgsco.in														

Client : M/S. VADHVAN PORT PROJECT LIMITED							 SGS SURVEYS PRIVATE LIMITED simplifying SURVEY							
Project : Geotechnical Investigation Report for assessment of suitability of rock and murrum reserves at Gargaon and Khanivade quarry sites for construction of breakwater for the Vadhvan Port Project, Palghar District, Maharashtra.														
Diameter of Borehole : 100 mm/ Nx			Bore Hole No : 05				BORE LOG (As per IS : 1892-1979, 4453-1980, 4464-1967)							
Drilling Method : Rotary			Sheet : 2 of 3											
Ground RL : 37.226 m			Date of Commencement : 31-08-2025											
Co-Ordinate : E-272514.834 N-2196183.821			Date of Completion : 10-09-2025											
Depth of GWT : 3.70 m			Termination Depth : 30.00 m											
Depth (mm)	Bore Hole Dia (mm)	Depth (m)	Graphic Log	Stratum Description	Sample		Blows/15cm			N	TCR (cm)	% CR	% RQD	Other Tests / Remarks
					Type	Core Pieces	15	30	45					
10.5		10.50		Moderately Weathered Amygdaloidal Basalt Rock	CORE	20-26						67	53	10.5
11.0														11.0
11.5														11.5
12.0		12.00		Slightly Weathered Amygdaloidal Basalt Rock	CORE	27-36						76	48	12.0
12.5														12.5
13.0														13.0
13.5		13.50			CORE	37-41						78	62	13.5
14.0				Moderately Weathered Amygdaloidal Basalt Rock										14.0
14.5														14.5
15.0		15.00			CORE	42-48						69	44	15.0
15.5														15.5
16.0														16.0
16.5		16.50			CORE	49-54						81	64	16.5
17.0														17.0
17.5														17.5
18.0		18.00		Slightly Weathered Amygdaloidal Basalt Rock	CORE	55-65						89	68	18.0
18.5														18.5
19.0														19.0
19.5		19.50			CORE	66-72						75	61	19.5
20.0														20.0
WS - Wash Samples RL - Reduced Level GR-Ground RQD - Rock Quality Designation SPT - Standard Penetration Test UDS-Undistributed Samples CR - Core Recovery RUN - Drill Run DS-Distributed Samples														
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Diameter of Borehole : 100 mm/ Nx			Bore Hole No : 05				BORE LOG (As per IS : 1892-1979, 4453-1980, 4464-1967)								
Drilling Method : Rotary			Sheet : 3 of 3												
Ground RL : 37.226 m			Date of Commencement : 31-08-2025												
Co-Ordinate : E-272514.834 N-2196183.821			Date of Completion : 10-09-2025												
Depth of GWT : 3.70 m			Termination Depth : 30.00 m												
Depth (mm)	Bore Hole Dia (mm)	Depth (m)	Graphic Log	Stratum Description	Sample		Blows/15cm			N	TCR (cm)	% CR	% RQD	Other Tests / Remarks	
					Type	Core Pieces	15	30	45						
20.5		21.00		Slightly to Fresh Weathered Amygdaloidal Basalt Rock	CORE	73-78						94	84	20.5	
21.0															21.0
21.5															21.5
22.0		22.50				CORE	79-83						89	68	22.0
22.5															22.5
23.0															23.0
23.5		24.00				CORE	84-90						99	86	23.5
24.0															24.0
24.5														24.5	
25.0		25.50			CORE	91-96						93	79	25.0	
25.5														25.5	
26.0														26.0	
26.5														26.5	
27.0		27.00			CORE	97-100						91	85	27.0	
27.5														27.5	
28.0														28.0	
28.5		28.50			CORE	101-109						96	77	28.5	
29.0														29.0	
29.5														29.5	
30.0		30.00			CORE	110-115						99	91	30.0	
BH IS TERMINATED AT 30.00 MTR BGL															
WS - Wash Samples			RL - Reduced Level			GR-Ground									
RQD - Rock Quality Designation			SPT - Standard Penetration Test			UDS-Undistributed Samples									
CR - Core Recovery			RUN - Drill Run			DS-Distributed Samples									
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Email: info@sgsco.in															

Client : M/S. VADHVAN PORT PROJECT LIMITED							 SGS SURVEYS PRIVATE LIMITED simplifying SURVEY							
Project : Geotechnical Investigation Report for assessment of suitability of rock and murrum reserves at Gargaon and Khanivade quarry sites for construction of breakwater for the Vadhvan Port Project, Palghar District, Maharashtra.														
Diameter of Borehole : 100 mm/ Nx			Bore Hole No : 13				BORE LOG (As per IS : 1892-1979, 4453-1980, 4464-1967)							
Drilling Method : Rotary			Sheet : 1 of 3											
Ground RL : 29.816 m			Date of Commencement : 28-08-2025											
Co-Ordinate : E-272419.953 N-2193540.026			Date of Completion : 09-09-2025											
Depth of GWT : 4.45 m			Termination Depth : 30.00 m											
Depth (mm)	Bore Hole Dia (mm)	Depth (m)	Graphic Log	Stratum Description	Sample		Blows/15cm			N	TCR (cm)	% CR	% RQD	Other Tests / Remarks
					Type	Core Pieces	15	30	45					
0.5			[Dotted pattern]	Reddish to Brownish Sandy Soil	DS									0.5
1.0		1.50		SPT 1			3	-	-	R				
1.5		1.53	[Cross-hatch pattern]	Completely Decomposed Rock			52							1.5
2.0		3.00		RUN 1	WS							NIL	NIL	2.5
2.5			[Cross-hatch pattern]	Boulders										3.0
3.0		4.50		CORE	WS							30	NIL	3.5
3.5			[Cross-hatch pattern]	Completely Decomposed Rock										4.0
4.0		6.00		WASH	WS							NIL	NIL	4.5
4.5			[Cross-hatch pattern]	Moderately Weathered & Fractured Amygdaloidal Basalt										5.0
5.0		7.50		CORE	01-06							64	58	5.5
5.5			[Cross-hatch pattern]	Slightly Weathered & Fractured Amygdaloidal Basalt										6.0
6.0		9.00		CORE	07-16							86	49	6.5
6.5			[Cross-hatch pattern]											7.0
7.0														7.5
7.5			[Cross-hatch pattern]											8.0
8.0														8.5
8.5			[Cross-hatch pattern]											9.0
9.0														9.5
9.5			[Cross-hatch pattern]											10.0
10.0														
WS - Wash Samples RL - Reduced Level GR-Ground RQD - Rock Quality Designation SPT - Standard Penetration Test UDS-Undistributed Samples CR - Core Recovery RUN - Drill Run DS-Distributed Samples														
SGS SURVEYS PRIVATE LIMITED Office No. 6, Tulsi Avenue Apartment, Plot No. 68 Sector 34, Kamothe, Navi Mumbai 410209. Email: info@sgsco.in														

Client : M/S. VADHVAN PORT PROJECT LIMITED							 SGS SURVEYS PRIVATE LIMITED simplifying SURVEY									
Project : Geotechnical Investigation Report for assessment of suitability of rock and murrum reserves at Gargaon and Khanivade quarry sites for construction of breakwater for the Vadhvan Port Project, Palghar District, Maharashtra.																
Diameter of Borehole : 100 mm/ Nx			Bore Hole No : 13				BORE LOG (As per IS : 1892-1979, 4453-1980, 4464-1967)									
Drilling Method : Rotary			Sheet : 2 of 3													
Ground RL : 29.816 m			Date of Commencement : 28-08-2025													
Co-Ordinate : E-272419.953 N-2193540.026			Date of Completion : 09-09-2025													
Depth of GWT : 4.45 m			Termination Depth : 30.00 m													
Depth (mm)	Bore Hole Dia (mm)	Depth (m)	Graphic Log	Stratum Description	Sample		Blows/15cm			N	TCR (cm)	% CR	% RQD	Other Tests / Remarks		
					Type	Core Pieces	15	30	45							
10.5		10.50		Slightly Weathered Amygdaloidal Basalt Rock	CORE	17-24						80	42	10.5		
11.0															11.0	
11.5															11.5	
12.0		12.00					CORE	25-33						97	71	12.0
12.5																12.5
13.0																13.0
13.5		13.50					CORE	34-40						95	73	13.5
14.0																14.0
14.5														14.5		
15.0		15.00			CORE	41-46						84	73	15.0		
15.5														15.5		
16.0														16.0		
16.5		16.50			CORE	47-52						89	75	16.5		
17.0														17.0		
17.5														17.5		
18.0		18.00			CORE	53-59						95	82	18.0		
18.5														18.5		
19.0														19.0		
19.5		19.50			CORE	60-65						85	73	19.5		
20.0														20.0		
WS - Wash Samples RL - Reduced Level GR-Ground RQD - Rock Quality Designation SPT - Standard Penetration Test UDS-Undistributed Samples CR - Core Recovery RUN - Drill Run DS-Distributed Samples																
SGS SURVEYS PRIVATE LIMITED Office No. 6, Tulsi Avenue Apartment, Plot No. 68 Sector 34, Kamothe, Navi Mumbai 410209. Email: info@sgsco.in																

Client : M/S. VADHVAN PORT PROJECT LIMITED							 SGS SURVEYS PRIVATE LIMITED simplifying SURVEY								
Project : Geotechnical Investigation Report for assessment of suitability of rock and murrum reserves at Gargaon and Khanivade quarry sites for construction of breakwater for the Vadhvan Port Project, Palghar District, Maharashtra.															
Diameter of Borehole : 100 mm/ Nx			Bore Hole No : 13				BORE LOG (As per IS : 1892-1979, 4453-1980, 4464-1967)								
Drilling Method : Rotary			Sheet : 3 of 3												
Ground RL : 29.816 m			Date of Commencement : 28-08-2025												
Co-Ordinate : E-272419.953 N-2193540.026			Date of Completion : 09-09-2025												
Depth of GWT : 4.45 m			Termination Depth : 30.00 m												
Depth (mm)	Bore Hole Dia (mm)	Depth (m)	Graphic Log	Stratum Description	Sample		Blows/15cm			N	TCR (cm)	% CR	% RQD	Other Tests / Remarks	
					Type	Core Pieces	15	30	45						
20.5		21.00		Slightly to Fresh Weathered Amygdaloidal Basalt Rock	CORE	66-70						93	87	20.5	
21.0															21.0
21.5															21.5
22.0		22.50				CORE	71-75						93	90	22.0
22.5															22.5
23.0															23.0
23.5		24.00				CORE	76-80						93	91	23.5
24.0															24.0
24.5														24.5	
25.0		25.50			CORE	81-85						94	89	25.0	
25.5														25.5	
26.0														26.0	
26.5														26.5	
27.0		27.00			CORE	86-90						92	88	27.0	
27.5														27.5	
28.0														28.0	
28.5		28.50			CORE	91-98						99	84	28.5	
29.0														29.0	
29.5														29.5	
30.0		30.00			CORE	99-104						97	93	30.0	
BH IS TERMINATED AT 30.00 MTR BGL															
WS - Wash Samples			RL - Reduced Level			GR-Ground									
RQD - Rock Quality Designation			SPT - Standard Penetration Test			UDS-Undistributed Samples									
CR - Core Recovery			RUN - Drill Run			DS-Distributed Samples									
SGS SURVEYS PRIVATE LIMITED															
Office No. 6, Tulsi Avenue Apartment, Plot No. 68 Sector 34, Kamothe, Navi Mumbai 410209.															
Email: info@sgsco.in															



TEST REPORT

Report No.: MUM/986/9/2025/7-3737
Date of Receipt: 10.09.2025

Date: 18.09.2025
Page 1 of 1
ULR-TC549125000010554F

SGS SURVEYS PRIVATE LIMITED

Office No.6, Tulsi Avenue Apartments, plot no.68, Sectore 34, Kamothe, Navi Mumbai- 410 209.

MECHANICAL TESTING
Building Infrastructure & Construction

		TEST REPORT
Source of Sample	:	Sample supplied by the customer.
Number of Sample Tested	:	01 (One only)
Customer's Reference	:	Letter dt. 09.09.2025
Condition of Sample	:	Satisfactory
Lab Reference Number	:	2025/SEP/2525350
Product	:	Coarse Aggregate
Product Description*	:	Rock Core
Location*	:	BH-01, BH-02, BH-03, BH-05 & BH-13
Project*	:	Vadhvan Port Project Limited
Period of Test	:	15.09.2025 to 16.09.2025

PHYSICAL TEST: IS 2386 PART 4 -1963 RA 2021

Sl. No.	Test conducted	Result	Limits as per IS -383 -2016
		Rock Core	
1	Aggregate Abrasion Value (%)		Max. 50 % non-wearing surface Max.30 % for wearing surface
a	Grading (F)	23.5	

END OF REPORT

For Bureau Veritas (India) Pvt. Ltd.
Construction Services Laboratory

Jayvanth Keny
Lab Incharge - Concrete

Authorised Signatory



TEST REPORT

Report No.: MUM/986/9/2025/6-235-1
 Date of Receipt: 10.09.2025

Date:16.09.2025
 Page 1 of 2
 ULR-TC549125000010529F

SGS SURVEYS PRIVATE LIMITED
 Office No.6, Tulsi Avenue Apartments
 Plot no.68, Sector 34, Kamothe,
 Navi Mumbai - 410209

MECHANICAL TESTING
Rock - Basic

TEST REPORT

Source of Sample : Sample Supplied by the Customer.
 No. of Sample Tested : 11 (Eleven Only)
 Customer's Reference : Letter, dt: 09.09.2025
 Condition of Sample : Satisfactory
 Project* : Vadhvan Port Project Limited.
 Product* : ROCK
 Product Description* : Rock core
 Lab Reference number : 2025/SEP/2525350
 Period of Lab Test : 11.09.2025 To 15.09.2025

TEST RESULTS:

Sr. No.	Borehole No.*	Depth*	Rock Piece No.*	Diameter	Height	H: D	Area	Load	Point Load Index	Wet Density	Dry Density	Porosity	Water Absorption (%)	Specific Gravity
	No.	m	No.	cm	cm	-	cm ²	kN	MPa	(g/cc)	(g/cc)	(%)	(%)	G
1	BH-01	19.50-21.00	30	5.45	11.38	2.09	23.36	--	--	2.67	2.67	0.30	0.11	2.63
2	BH-01	19.50-21.00	32	5.46	6.05	1.11	23.44	5.75	2.01	2.68	2.68	0.13	0.05	2.65
3	BH-01	25.50-27.00	52	5.45	6.01	1.10	23.35	5.36	1.88	2.75	2.75	0.07	0.03	2.70
4	BH-02	15.00-16.50	34	5.45	5.64	1.04	23.30	6.40	2.25	2.77	2.76	0.85	0.31	2.74
5	BH-02	25.50-27.00	86	5.43	5.75	1.06	23.16	5.80	2.05	2.71	2.71	0.56	0.21	2.69
6	BH-03	10.50-12.00	19	5.47	5.35	0.98	23.50	3.70	1.29	2.57	2.56	1.47	0.58	2.55
7	BH-05	18.00-19.50	67	5.46	5.12	0.94	23.39	4.40	1.54	2.71	2.70	0.38	0.14	2.63
8	BH-05	22.50-24.00	88	5.48	5.97	1.09	23.59	7.72	2.69	2.79	2.79	0.18	0.06	2.79

*Indicates information supplied by the customer for which the laboratory has no control. Sampling not done by laboratory, results relate to the sample tested only. The contents of the report shall not be reproduced either in full or in part without prior written consent of the issuing authority. All services are rendered in accordance with Bureau Veritas General conditions of service. Kindly refer to the T&C at www.bureauveritas.co.in – General Terms & Conditions – General terms & Conditions-BVIL
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TEST REPORT

Report No.: MUM/986/9/2025/6-235-1
 Date of Receipt: 10.09.2025

Date: 16.09.2025
 Page 2 of 2
 ULR-TC549125000010529F

Sr. No.	Borehole No.*	Depth*	Rock Piece No.*	Diameter	Height	H: D	Area	Load	Point Load Index	Wet Density	Dry Density	Porosity	Water Absorption (%)	Specific Gravity
Test Method									IS 8764: 1998	IS 13030:1991				
	No.	m	No.	cm	cm	-	cm ²	kN	MPa	(g/cc)	(g/cc)	(%)	(%)	G
9	BH-13	13.50-15.00	41	5.46	11.66	2.14	23.41	--	--	2.77	2.77	0.10	0.03	2.74
10	BH-13	18.00-19.50	62	5.43	5.86	1.08	23.19	5.07	1.79	2.64	2.63	0.35	0.13	2.58
11	BH-13	28.50-30.00	104	5.46	5.98	1.10	23.44	7.02	2.46	2.77	2.76	0.48	0.18	2.74

END OF REPORT

For **BUREAU VERITAS (INDIA) PVT LTD.**
Construction Services Laboratory



Eknath Gorade

Lab Manager
Authorised Signatory

*Indicates information supplied by the customer for which the laboratory has no control. Sampling not done by laboratory, results relate to the sample tested only. The contents of the report shall not be reproduced either in full or in part without prior written consent of the issuing authority. All services are rendered in accordance with Bureau Veritas General conditions of service. Kindly refer to the T&C at www.bureauveritas.co.in – General Terms & Conditions – General terms & Conditions-BVIL
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TEST REPORT

Report No.: MUM/986/9/2025/6-235-2
 Date of Receipt: 10.09.2025

Date:16.09.2025
 Page 1 of 2

NOT UNDER NABL ACCREDITATION

SGS SURVEYS PRIVATE LIMITED

Office No.6, Tulsi Avenue Apartments
 Plot no.68, Sector 34, Kamothe,
 Navi Mumbai - 410209.

TEST REPORT

Source of Sample	:	Sample Supplied by the Customer.
No. of Sample Tested	:	11 (Eleven Only)
Customer's Reference	:	Letter, dt: 09.09.2025.
Condition of Sample	:	Satisfactory
Project*	:	Vadhvan Port Project Limited
Product	:	ROCK
Product Description	:	Rock core
Lab Reference number	:	2025/SEP/2525350
Period of Lab Test	:	11.09.2025 To 15.09.2025

TEST RESULTS:

Sr.No.	Borehole No.*	Depth*	Rock Piece No.*	Diameter	Height	H : D	Area	Load	UCS
Test Method							*ASTM D 7012 - 23		
	No.	m	No.	cm	cm	-	cm ²	kN	MPa
1	BH-01	19.50-21.00	30	5.45	11.38	2.09	23.36	98.50	42.17
2	BH-01	19.50-21.00	32	5.47	11.13	2.04	23.47	76.60	32.64
3	BH-01	25.50-27.00	52	5.47	11.63	2.13	23.46	71.30	30.39
4	BH-02	15.00-16.50	34	5.45	11.69	2.14	23.35	146.60	62.78
5	BH-02	25.50-27.00	86	5.45	11.36	2.09	23.29	115.70	49.67
6	BH-03	10.50-12.00	19	5.46	11.67	2.14	23.41	52.80	22.55

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TEST REPORT

Report No.: MUM/986/9/2025/6-235-2
 Date of Receipt: 10.09.2025

Date:16.09.2025
 Page 2 of 2

NOT UNDER NABL ACCREDITATION

Sr.No.	Borehole No.*	Depth*	Rock Piece No.*	Diameter	Height	H : D	Area	Load	UCS
Test Method									*ASTM D 7012 - 23
	No.	m	No.	cm	cm	-	cm²	kN	MPa
7	BH-05	18.00-19.50	67	5.45	12.04	2.21	23.37	68.60	29.36
8	BH-05	22.50-24.00	88	5.49	11.59	2.11	23.69	132.30	55.84
9	BH-13	13.50-15.00	41	5.46	11.66	2.14	23.41	67.50	28.83
10	BH-13	18.00-19.50	62	5.43	11.53	2.12	23.20	115.40	49.75
11	BH-13	28.50-30.00	104	5.45	11.80	2.16	23.36	175.10	74.96

END OF REPORT

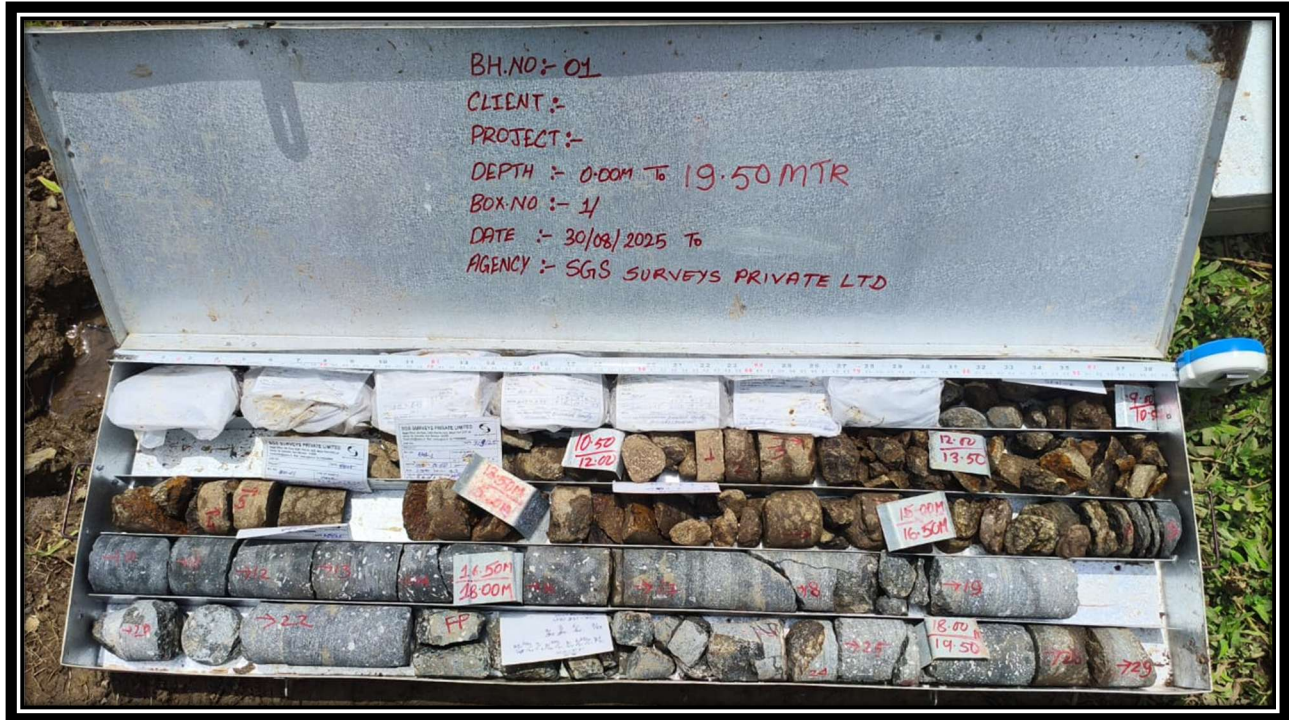
For **BUREAU VERITAS (INDIA) PVT LTD.**
Construction Services Laboratory



Eknath Gorade

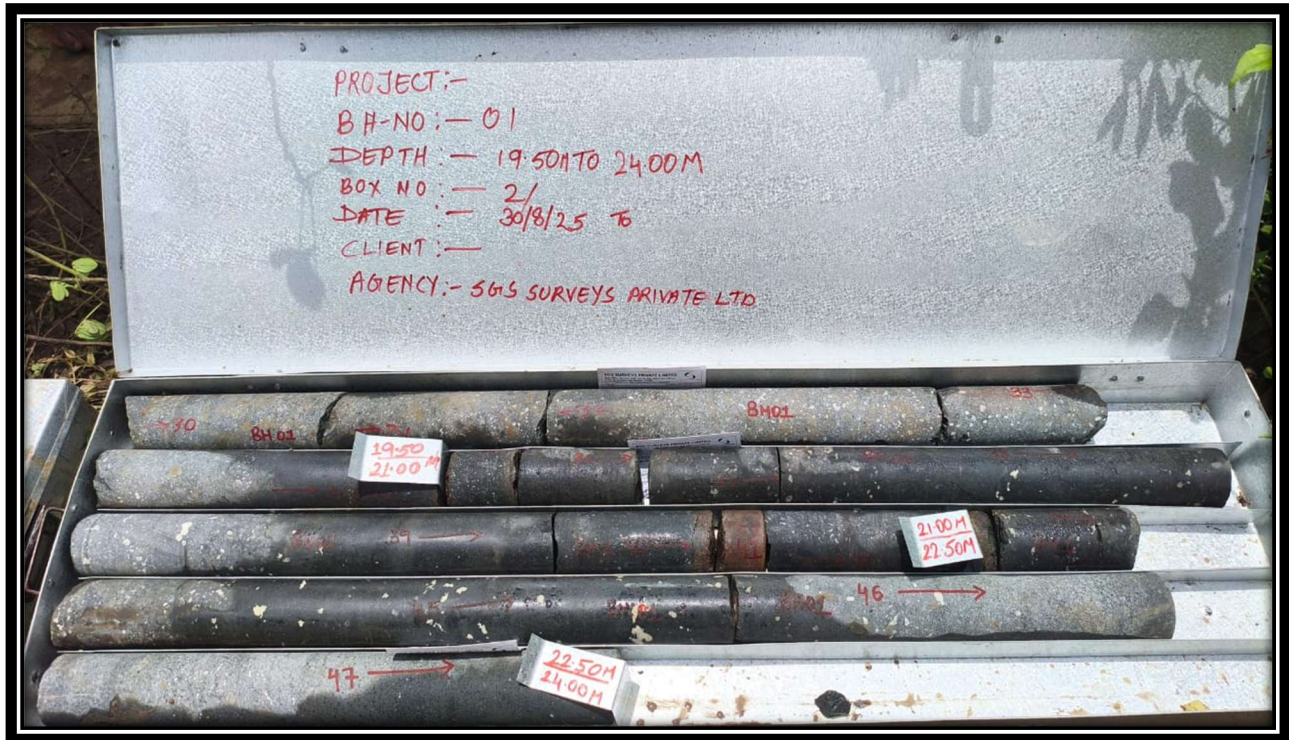
**Lab Manager
 Authorised Signatory**

M/S. VADHVAN PORT PROJECT LIMITED



BORE HOLE NO.: 01
SITE.: GARGAON AND KHANIVADE

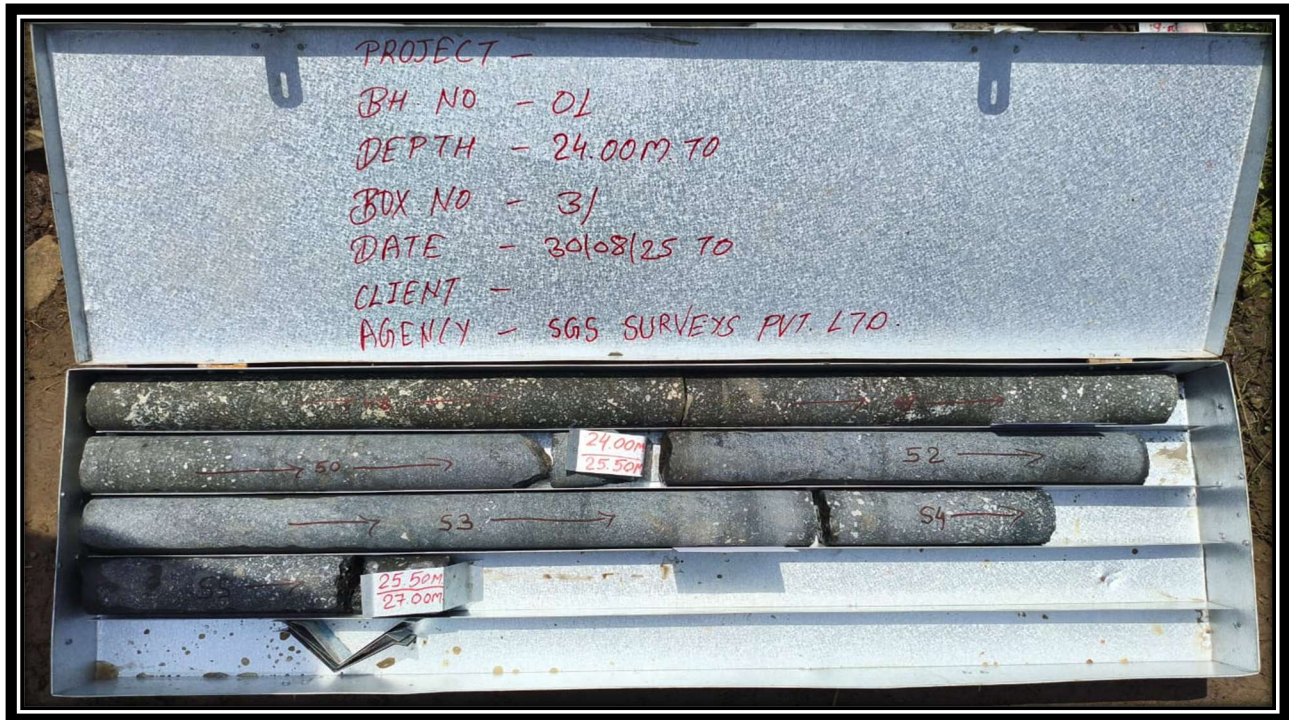
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AGENCY.: **SGS SURVEYS PRIVATE LIMITED**



BORE HOLE NO.: 01
SITE.: GARGAON AND KHANIVADE

CORE BOX NO.: 2/4
AGENCY.: **SGS SURVEYS PRIVATE LIMITED**

M/S. VADHVAN PORT PROJECT LIMITED

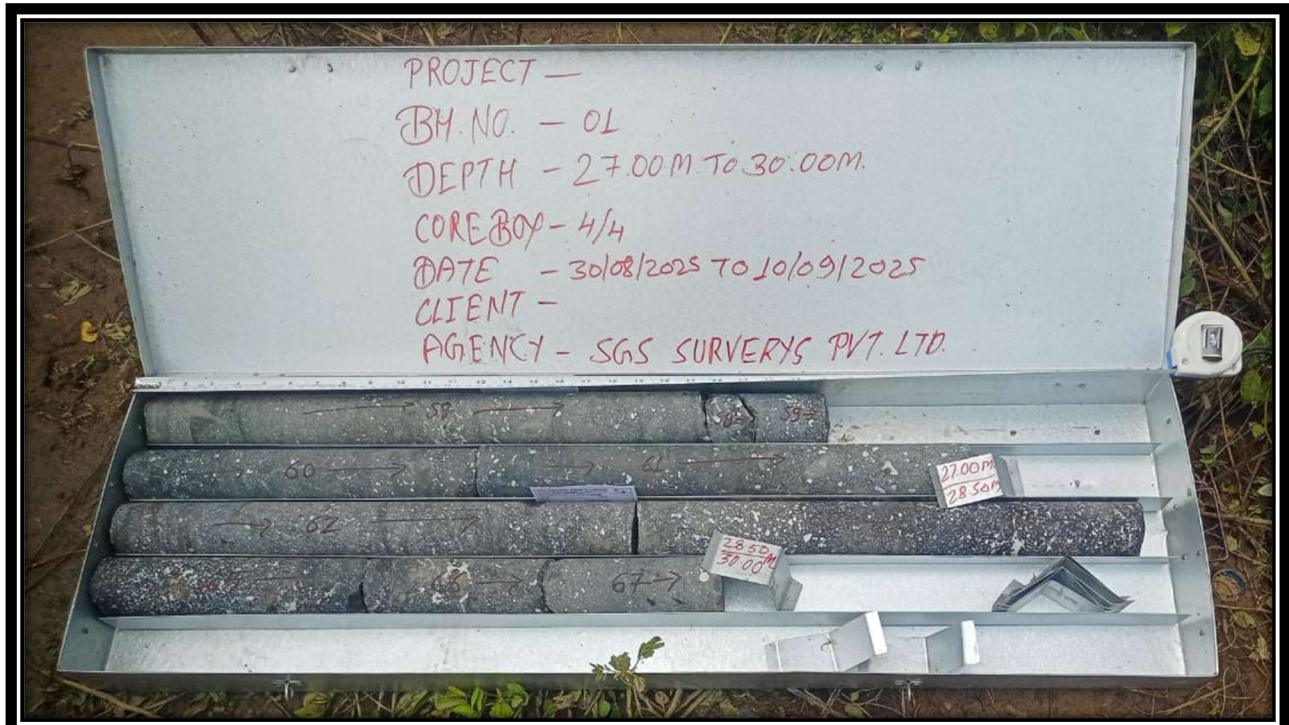


BORE HOLE NO.: 01

SITE.: GARGAON AND KHANIVADE

CORE BOX NO.: 3/4

AGENCY.: SGS SURVEYS PRIVATE LIMITED



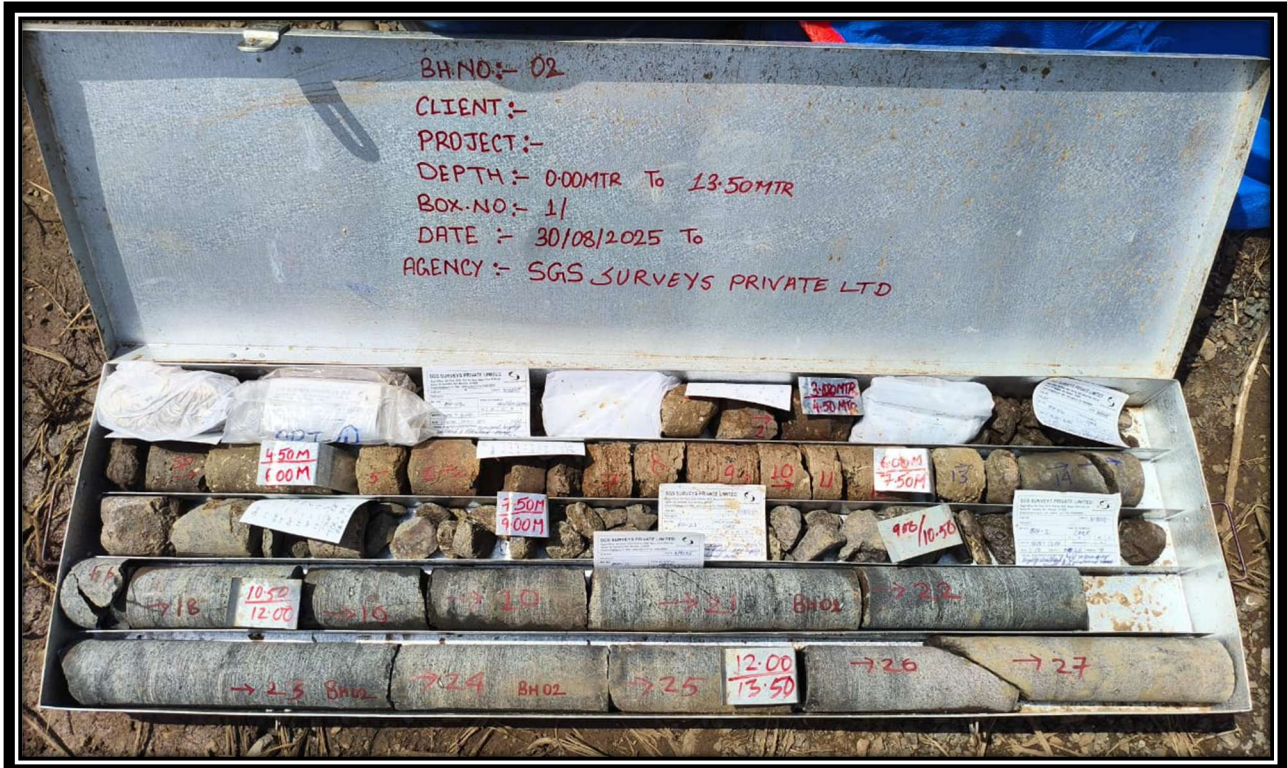
BORE HOLE NO.: 01

SITE.: GARGAON AND KHANIVADE

CORE BOX NO.: 4/4

AGENCY.: SGS SURVEYS PRIVATE LIMITED

M/S. VADHVAN PORT PROJECT LIMITED



BORE HOLE NO.: 02

SITE.: GARGAON AND KHANIVADE

CORE BOX NO.: 1/5

AGENCY.: **SGS SURVEYS PRIVATE LIMITED**



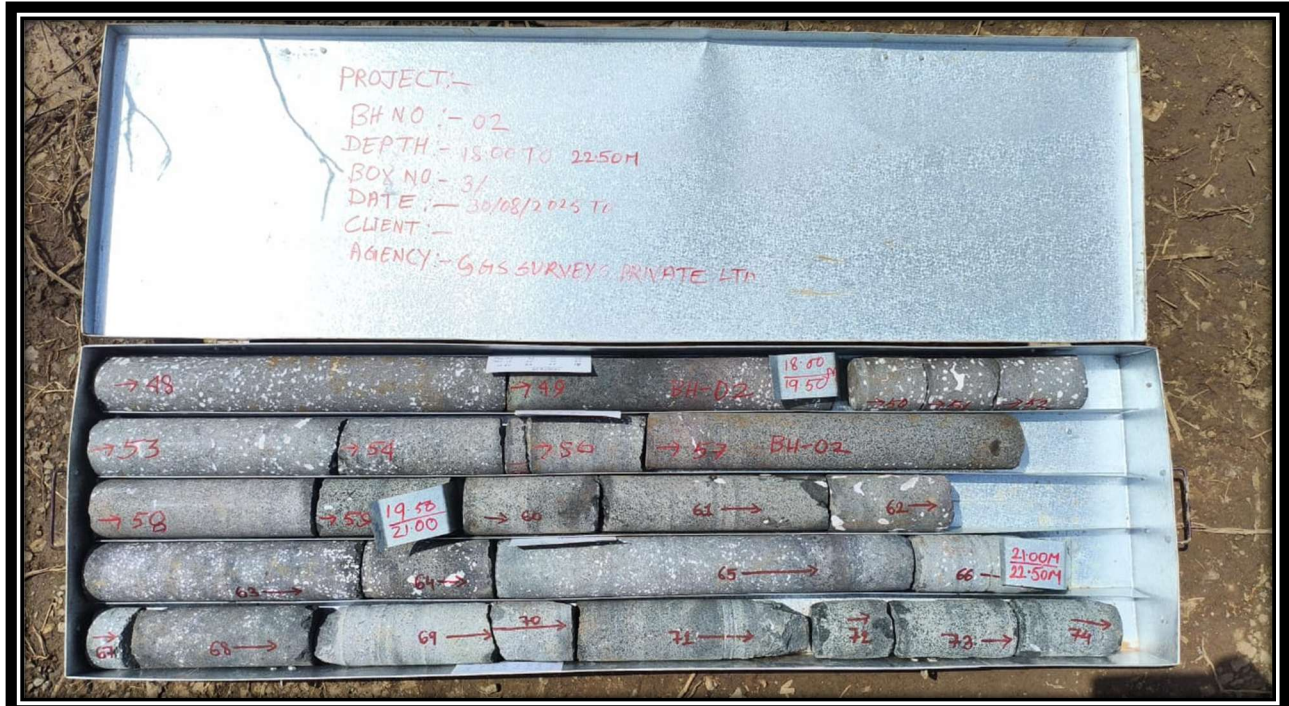
BORE HOLE NO.: 02

SITE.: GARGAON AND KHANIVADE

CORE BOX NO.: 2/5

AGENCY.: **SGS SURVEYS PRIVATE LIMITED**

M/S. VADHVAN PORT PROJECT LIMITED



BORE HOLE NO.: 02

CORE BOX NO.: 3/5

SITE.: GARGAON AND KHANIVADE

AGENCY.: SGS SURVEYS PRIVATE LIMITED



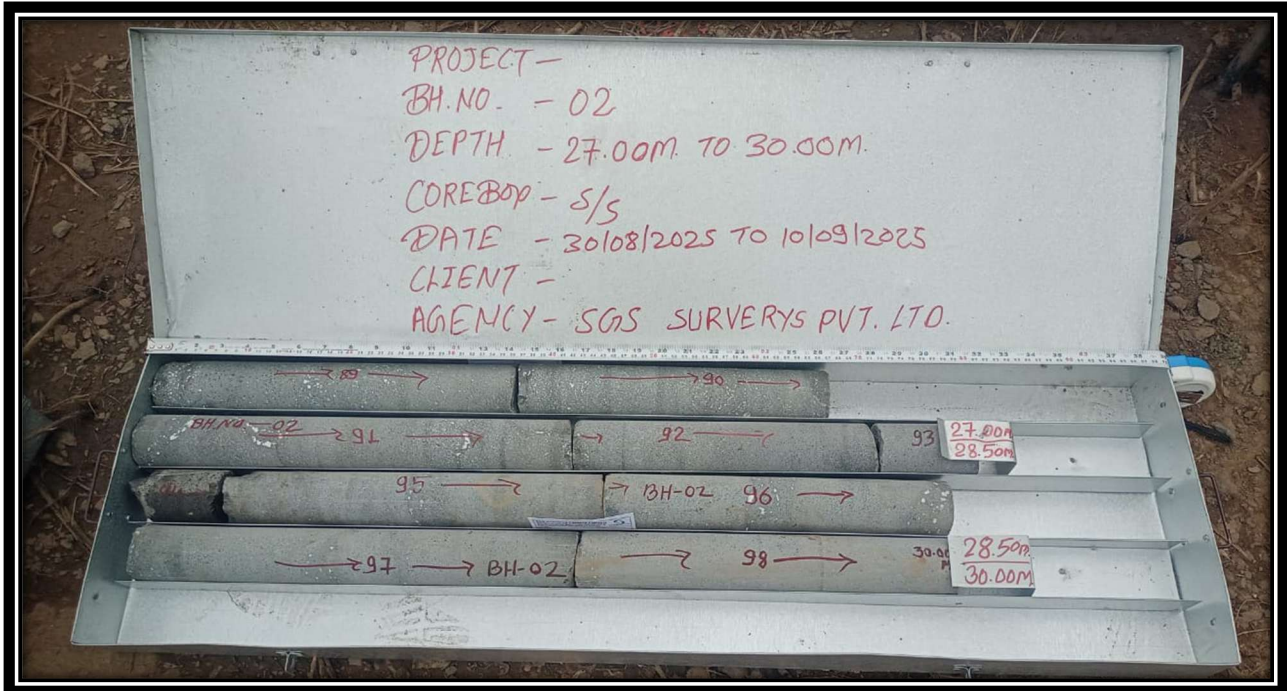
BORE HOLE NO.: 02

CORE BOX NO.: 4/5

SITE.: GARGAON AND KHANIVADE

AGENCY.: SGS SURVEYS PRIVATE LIMITED

M/S. VADHVAN PORT PROJECT LIMITED



PROJECT -
BH.NO. - 02
DEPTH - 27.00M. TO 30.00M.
COREBOX - 5/5
DATE - 30/08/2025 TO 10/09/2025
CLIENT -
AGENCY - SGS SURVEYS PVT. LTD.

BORE HOLE NO.: 02

SITE.: GARGAON AND KHANIVADE

CORE BOX NO.: 5/5

AGENCY.: SGS SURVEYS PRIVATE LIMITED



BH.NO:- 03
CLIENT :-
PROJECT:-
DEPTH - 0.00M TO 10.50M
BOX.NO - 1/
DATE :- 30/08/2025 To
AGENCY :- SGS SURVEYS PRIVATE LTD

BORE HOLE NO.: 03

SITE.: GARGAON AND KHANIVADE

CORE BOX NO.: 1/4

AGENCY.: SGS SURVEYS PRIVATE LIMITED

M/S. VADHVAN PORT PROJECT LIMITED



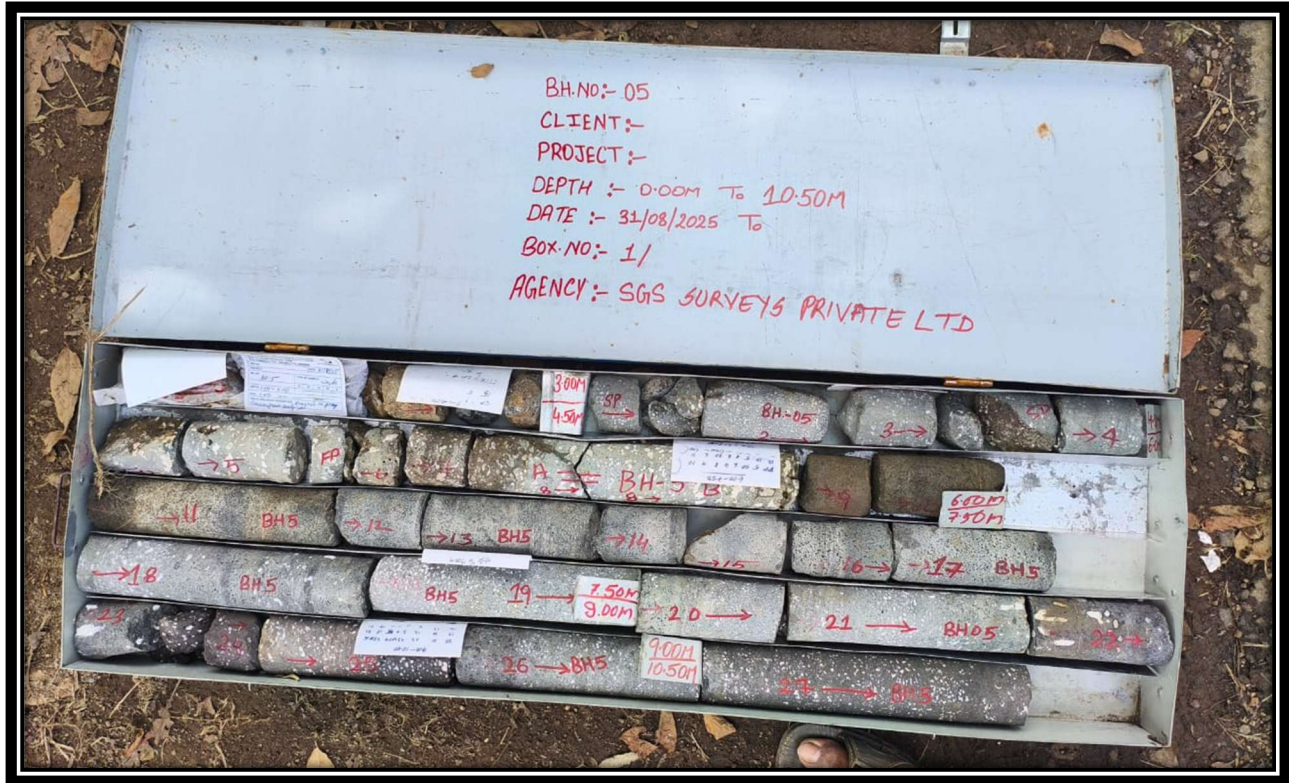
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SITE.: GARGAON AND KHANIVADE

CORE BOX NO.: 2/4

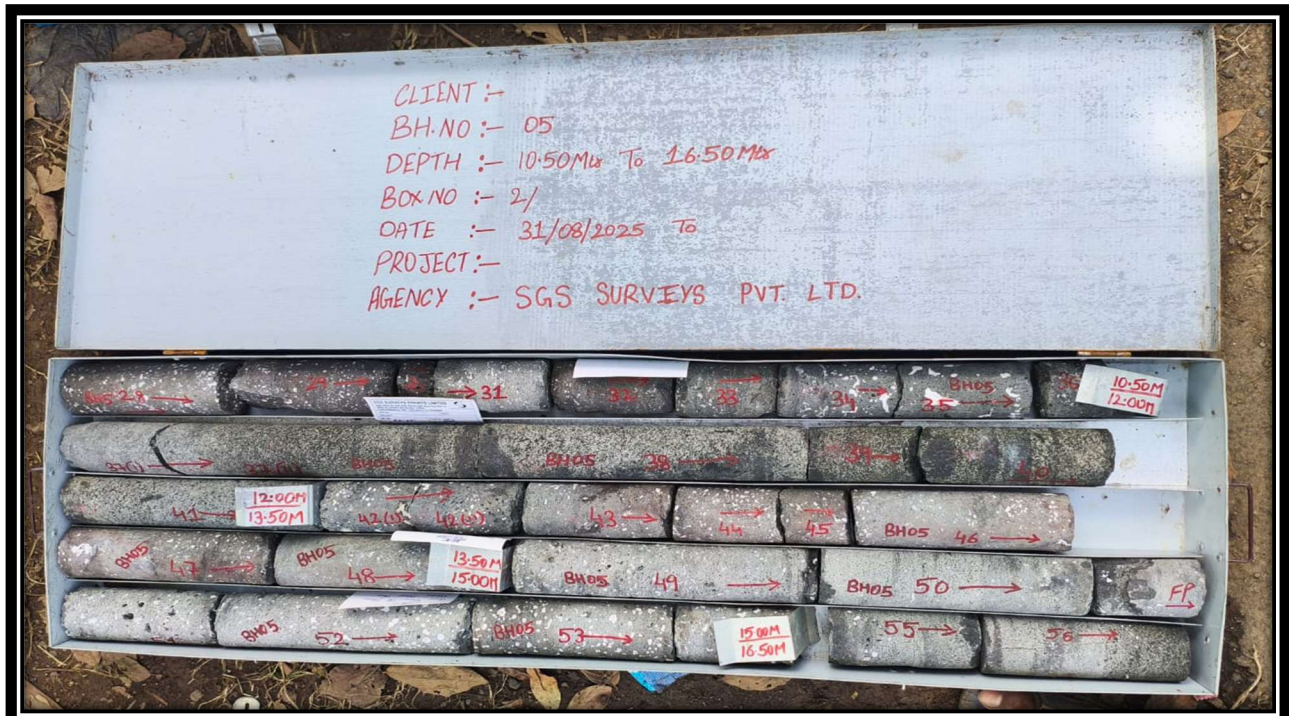
AGENCY.: SGS SURVEYS PRIVATE LIMITED

M/S. VADHVAN PORT PROJECT LIMITED



BORE HOLE NO.: 05
SITE.: GARGAON AND KHANIVADE

CORE BOX NO.: 1/4
AGENCY.: **SGS SURVEYS PRIVATE LIMITED**



BORE HOLE NO.: 05
SITE.: GARGAON AND KHANIVADE

CORE BOX NO.: 2/4
AGENCY.: **SGS SURVEYS PRIVATE LIMITED**

M/S. VADHVAN PORT PROJECT LIMITED

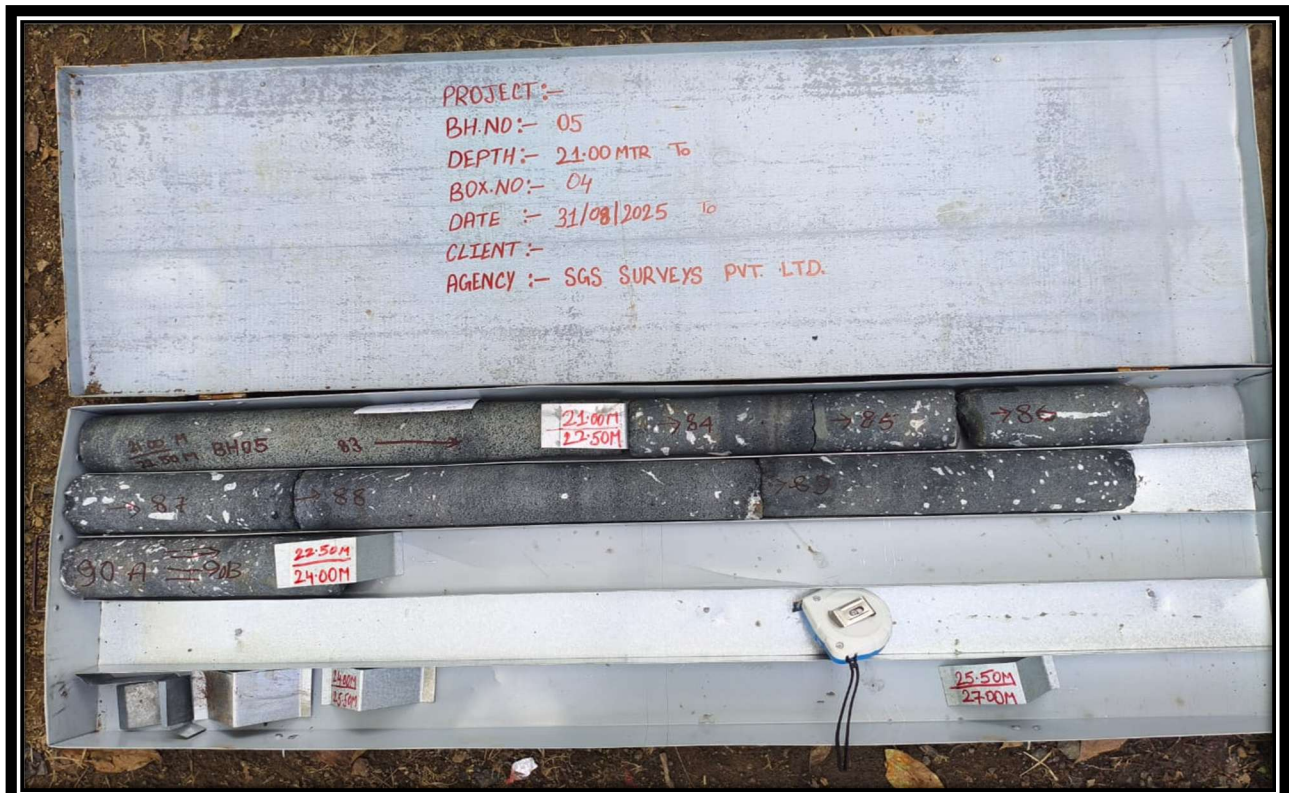


BORE HOLE NO.: 05

SITE.: GARGAON AND KHANIVADE

CORE BOX NO.: 3/4

AGENCY.: **SGS SURVEYS PRIVATE LIMITED**



BORE HOLE NO.: 05

SITE.: GARGAON AND KHANIVADE

CORE BOX NO.: 3/4

AGENCY.: **SGS SURVEYS PRIVATE LIMITED**

M/S. VADHVAN PORT PROJECT LIMITED



BORE HOLE NO.: 13

SITE.: GARGAON AND KHANIVADE

CORE BOX NO.: 2/4

AGENCY.: SGS SURVEYS PRIVATE LIMITED



BORE HOLE NO.: 13

SITE.: GARGAON AND KHANIVADE

CORE BOX NO.: 2/5

AGENCY.: SGS SURVEYS PRIVATE LIMITED

M/S. VADHVAN PORT PROJECT LIMITED



BORE HOLE NO.: 13
SITE.: GARGAON AND KHANIVADE

CORE BOX NO.: 3/5
AGENCY.: SGS SURVEYS PRIVATE LIMITED



BORE HOLE NO.: 13
SITE.: GARGAON AND KHANIVADE

CORE BOX NO.: 4/5
AGENCY.: SGS SURVEYS PRIVATE LIMITED