



**DETAILED PROPOSAL REPORT FOR RECONNAISSANCE
SURVEY (G-4 STAGE) FOR BAUXITE AND ASSOCIATED
MINERALS IN RELADIYA-RAYDHANJAR AREA,
KACHCHH DISTRICT, GUJARAT**

**RECONNAISSANCE SURVEY
(G-4 STAGE) NMEDT FUNDED**



COMMODITY:

BAUXITE AND ASSOCIATED MINERALS

Vardan Environet LLP
(Formerly known as Vardan Environet)

BY



May 16, 2026

**VARDAN ENVIRONET LLP
PLOT NO 82A, SECTOR-5 IMT MANESAR, GURGAON, HARYANA.**

Summary of the Block for G4 stage exploration

Table-1.1 Summary of the Reladiya- Raydhanjar Bauxite Block of kachchh Area, kachchh District, Gujarat

S. N.	Features	Details
	Block ID	----
	Current Exploration Agency	Vardan Environet LLP
	Previous Exploration Agency	Geological Survey of India, DMG Gujarat
	Previous stage Geological Report	1. Report on continuation of drilling for concealed bauxite at village kotadi, taluka mandvi, kutch. 2. Report on the pre-detailed mineral survey of a part of Mandvi and Abdasa talukas, Kutch district Gujarat state. 3. Appendix No.1, the Report on the Assessment of Bauxite deposits in Kutch dist., Gujarat state (1963-70) 4. Reconnaissance Survey for Lateritic Bauxite And Clay Around Asambiya Nana, Mandvi Talukas, Western Kachchh, Gujarat (Stage G-4)
	Commodity	Bauxite and Associated Minerals
	Mineral Belt	Sandhan, Matanomadh Formation of Paleocene
	Completion Period with entire Time schedule to complete the project	10 Months
	Objective	The present exploration programme at G-4 stage has been formulated to fulfill the following objectives: i) Preparation of large-scale Geological map at 1:12,500 scale to demarcate various lithounits like Bauxite, laterite, basalt (deccan volcanics), shale, limestone, sandstone, clay etc. with their structural manifestation. ii) Collection of 10 bedrock/chip samples from bauxite/ aluminous Laterite bearing zones. iii) To prove the occurrences of Bauxite zone(s) and to delineate the depth continuity of it by pitting & scout boreholes. iv) To assess the quality-quantity and the thickness of Bauxite horizons to delineate the Bauxite resources at G-4 (334) level in the block as per UNFC norms.

		v) Besides Bauxite, resources of Titanium, Gallium, Vanadium and Associated Minerals will also be assessed if encouraging values are encountered. vi) To carry out exploration as per Minerals (Evidence of Mineral Contents) Rules, 2015, Mineral Auction Rule-2015 and MMDR Act-2015 as to facilitate the Government of Gujarat for auctioning of the Bauxite Block.																					
	Whether the work will be carried out by the proposed agency or through outsourcing and details thereof. Components to be outsourced and name of the outsource agency	The geological mapping (1:12,500 scale), pitting, trenching, location of boreholes, core logging, sampling and report writing will be carried out by Vardan Environet LLP. However, the Vardan Environet LLP would outsource some of specialized works viz. topographic survey and petrographic work will be outsourced. 1. Chemical analysis and Petrological work will be outsourced as company has MOUs with Shiva analytic Lab, Bengaluru, SCS Enviro services, Jaipur, Radhey Testing Lab, Tundla and GSI chemical lab Western region, Jaipur, Rajasthan. 2. Drilling work will be outsourced to the lowest bidder.																					
	Name/ Number of Geoscientists	Two numbers of Geoscientists will be involved for carrying out exploration work.																					
	Expected Field days (Geology, Geophysics, Surveyor) Geological Party Days	Geologist: 120 man days Total man days for surveyor- 10 man days																					
1.	Location																						
	Latitude & Longitude	<table border="1"> <thead> <tr> <th>Point No.</th><th>Latitude</th><th>Longitude</th></tr> </thead> <tbody> <tr> <td>A</td><td>23°6'54.503"N</td><td>69°3'22.625"E</td></tr> <tr> <td>B</td><td>23°6'31.48"N</td><td>69°5'57.941"E</td></tr> <tr> <td>C</td><td>23°5'53.032"N</td><td>69°6'54.656"E</td></tr> <tr> <td>D</td><td>23°4'23.573"N</td><td>69°6'42.891"E</td></tr> <tr> <td>E</td><td>23° 4'30.76"N</td><td>69° 6'15.42"E</td></tr> <tr> <td>F</td><td>23° 6'22.08"N</td><td>69° 3'12.96"E</td></tr> </tbody> </table>	Point No.	Latitude	Longitude	A	23°6'54.503"N	69°3'22.625"E	B	23°6'31.48"N	69°5'57.941"E	C	23°5'53.032"N	69°6'54.656"E	D	23°4'23.573"N	69°6'42.891"E	E	23° 4'30.76"N	69° 6'15.42"E	F	23° 6'22.08"N	69° 3'12.96"E
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	Localities	Khirsara, Reladiya Manjal																					
	Tehsil/ Taluk	Abdasa, Nakhatrana																					
	District	Kachchh																					
	State/UT	Gujarat																					
2.	Area (hectares/ square km)																						
	Block Area	15 Sq.Km.																					
	Forest Area	Not Specified																					

	Government Land Area	Not Specified
	Private Land Area	Not Specified
3.	Accessibility	
	Nearest Rail Head	Bhuj Railway Station (70 Kms).
	Road	Gujarat SH-91 passes 4kms north from the block connecting Bhuj-Kothara-Naliya. NH-41 passes 21kms west from the block. The entire block area is well connected by motorable roads.
	Airport	Bhuj airport is around 72 kms from the block.
4.	Hydrography	
	Local Surface Drainage Pattern	The overall drainage pattern is dendritic, particularly over the Deccan volcanics. Coarse trellis to sub-trellis pattern, suggestive of structural control, is prominent in the sedimentary terrain. Trellis pattern is seen on the back slopes of basaltic cuestas. The drainage density and the drainage frequency is high in this area, but due to scanty rainfall these streams are ephemeral in nature and remains mostly dry throughout the year and act as flood channels during the monsoon. The drainage is controlled by both lithology and structures in the area.
	Rivers/ Streams	Kankawati, Naira and Vengdi rivers are the major rivers in the area. The rivers flow from NE to SW direction.
5.	Climate	
	Mean Annual Rainfall	The average annual rainfall ranges from 25 cm to 40 cm and is mostly received between July and September months.
	Temperatures	Minimum temperatures is around 5-7°C (Nov-Jan) Maximum temperatures reach up to 42-45°C (March-June)
6.	Topography	
	Toposheet Number	41E/04
	Morphology of the Area	The area under toposheet No, 41E/04 shows a high degree of physiographic variations with small hills and intermittent valleys. The hills are gentle and flat topped with fine grained massive basalt. The ground level in the area is at about 100 m above MSL and the maximum elevation is at 170 m.
7.	Availability of baseline geoscience data	
	Geological Map (1:50K/25K)	Included
	Geochemical Map	Available on NGDR
	Geophysical Map (Gravity & Magnetic Map)	Available on NGDR

8.	Justification for taking up G3 stage exploration	Justification: - • The Commissioner of Geology and Mining (CGM), Gujarat has carried out exploration in Kachchh basin for bauxite and identified several blocks for exploration of Bauxite based on their previous works. They published the information of these blocks in Gujarat's Mineral Wealth booklet. CGM, Gujarat (via official email dated 20/09/2025) sent Vardan Environet llp a NOC approval to take up exploration investigation in some blocks. The proposed Reladiya-Raydhanjar Bauxite Block (G-4 stage) is one of them. • The lithology of the area includes Bauxite/Laterite associated with Deccan Trap Volcanics. The bauxites of Matanomadh formation have been formed by supergene alteration of the pyroclastic facies of Deccan basalts. It consists of ferruginous laterites which rests on the Deccan traps and, in turn, are covered by the Eocene Gypseous shale beds. • Geological mapping of Mesozoic and Tertiary rocks of Kachchh (FSP- 1981-82 & 1984-85) of the area reveals presence of Bauxite. The rocks belonging to the supra-trappean formation is represented by oolitic and pisolitic, at times conglomeratic (reworked) bauxite and laterites of varied colour along with ash/shale beds, lithomarge aluminous grit, felspathic sandstone and aluminous clays. The supra-trappean sediments form hard compact, low ridges and plateau above Deccan Trap Mesozoic rocks. It is suggested that in-situ lateritization and bauxitization of Deccan Traps and associated pyroclastic materials have resulted in the formation of this bauxite. • The bauxite in the study area has formed by the in-situ alteration of underlying Deccan traps. Bauxite over basalt parent rock has higher titania compared to the bauxite from Khondalite-Charnockite. Based on that, prospecting of titania is also kept under the proposed exploration scheme.
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Detailed description on the following titles to be made in the proposal.

1. Block Summary:

Physiography:

The study area is located in the Abdasa taluka, Kachchh district in the western region of Gujarat. The area under investigation is a western plain, these plains are mainly composed of recent alluvium, wind-blown sands covering the Tertiary strata. These plains gradually merge into mudflats of Rann of Kutch. The topography is mostly undulating, where major portion is gently flat barren fields. There is no major river in the area. The area is mostly drained by numerous streams and nallas which are seasonal in nature and mostly remain dry in summer.

Background Information:

The geology of the area includes Matanomadh formation which is reported to be bauxite bearing. CGM studied the area by means of pitting, trenching and drilling with an estimated resource of 12.19 MT. Chemical analysis of the bauxite from the proposed area shows Al_2O_3 (average 49.77%) and low SiO_2 percentage (average 2.49 %). In the vicinity of the proposed block leases of bauxite exist which shows the potentiality of the block. Hence, G3 level of exploration is recommended by CGM, Gujarat.

Background Geology (regional and geology of the block):

Kachchh, located in western Gujarat, is renowned for its intricate geological history. The stratigraphy of Kutch mainly comprises rocks ranging in age from middle Jurassic to Recent. Major part of the Kutch mainland is occupied by the Mesozoic sediments and Deccan Trap rocks. Tertiary sediments occupy the coastal strips of the mainland bordering Mesozoic sediments and Deccan traps. The study area falls in the western part of Kutch mainland where Tertiary sequence is developed, and Tertiary rocks overlie unconformably the basaltic rocks belonging to Deccan traps. Lithologically, the proposed area comprises of Matanomadh Formation including Bauxite, laerite, Sandstone and different clays.

Lithology	Formation	Age
Soil and Alluvium		Recent to sub-recent
-----Unconformity-----		
Milliolite limestone		Pleistocene (?)
Marl, yellow limestone Grey to Reddish clay Carbonaceous clay	Gaj beds	Miocene
-----Unconformity-----		

Laterite/bauxite with associated Lithomarge and ferruginous clay	Supra Trappean	Lower Eocene
-----Unconformity-----		
Basaltic lava flows	Deccan traps	Upper cretaceous to lower Eocene.

Mineral potentiality within the proposed block based on geology:

In CGM report titled “Report on concealed bauxite in the area between jarjok and kharuva villages of abdasa taluka of kachchh district, gujarat state (field season 1977-78, 78-79 & 79-80)” by B.A..amin, & D.D.patel reported that the bauxite occurs in the form of pockets, capping the laterites of Supra-Trappean group. In situ lateritization and bauxitization of Deccan Traps and associated pyroclastic materials have resulted in the formation of bauxite. Also, there are reworked bauxites which cap the in-situ bauxites. In the field, bauxite forms shinning fawn grey boulders which can be recognised very easily. Near Balachod, Kalar Vandh Bauxite and Nandra, extensive areas are strewn over with bauxite boulders.

CGM, Gujarat explored this area by means of drilling and the estimated resource for the region is 12.19 MT. Chemical analysis data of the bauxite shows high Al₂O₃ (average 52.05%) with low SiO₂ percentage (average 4.33%).

Scope for proposed exploration:

The proposed work for G4 Exploration comprises large scale geological mapping in 1: 12500 scale. Total 21 numbers of Pits having length of 1m, width of 2m and depth of 4m with total volume amounting to 168m³ in the area is proposed and the locations shall be selected based on the geological mapping. Also, to prove the depth continuity of the identified mineralised zone, 8 scout boreholes is planned within the Reladiya-Raydhanjar Bauxite Block (about 25 m depth for each borehole) over an area of 21 sq. km.

2.Previous Work:

The document titled “Report on concealed bauxite in the area between jarjok and kharuva villages of abdasa taluka of kachchh district, gujarat state (field season 1977-78, 78-79 & 79-80),” published by the Commissioner of Geology and Mining, Gujarat, mentions the exploration activities carried out by the CGM in this region. A total no of 39 borehole drilled nearby areas. Samples are recovered through drilling, and the estimated bauxite resource is 12.19 million tons in the entire region.

Chemical analysis of the bauxite indicates a high average aluminium oxide (Al₂O₃) content of 52.05%, accompanied by a low silicon dioxide (SiO₂) percentage of 4.33%. Furthermore, satellite imagery analysis confirms the presence of laterite and bauxite in the region. Based on these findings, a G3 level of exploration is recommended to further assess and develop the bauxite resources.

3.a. Block description

Boundary Coordinates of Reladiya- Raydhanjar Bauxite Block are given below.

Table-1. Boundary coordinates of Reladiya- Raydhanjar Bauxite block, Gujarat.

Point No.	Latitude	Longitude
A	23°6'54.503"N	69°3'22.625"E
B	23°6'31.48"N	69°5'57.941"E
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b. Coordinates of Proposed Pit /Trench and Borehole Locations: Geographical coordinates of the proposed pit/trench and borehole locations will be planned after commencement of drilling work.

5.Planned Methodology:

a. Large Scale Geological mapping in 1:12500 scale: Reference points will be established within the mapping area by level transferring of SOI (Survey of India) benchmark point. The total area of 15 sq. km will be mapped on 1:12500 scale using DGPS survey method to bring out different geological units.

b.All the mapped units will be linked (geo-referenced) to the toposheet (41 E/04) pertaining to the area.

c.Core Drilling for Sub surface mineral content: Total 8 no. of scout borehole (25m each) will be planned after getting evidence of bauxite/laterite zone by pitting & trenching work.

6.Nature, Quantum, and Target:

A table containing the NQT is given in Annexure I.

7.Manpower Deployment

A table containing the manpower deployment table is given in chapter 9, Timeline.

8.Breakup Of Expenditure

The breakup expenditure for each phase is given in Annexure II.

9.TIME SCHEDULE/ACTION PLAN FOR TIME SCHEDULE/ACTION PLAN FOR RECONNAISSANCE SURVEY (G-4 STAGE) FOR BAUXITE AND ASSOCIATED MINERALS IN RELADIYA-RAYDHANJAR AREA, KACHCHH DISTRICT, GUJARAT, (21Sq. Km.; Scheduled Timeline 10 months)

S.N.	Activities	Months										
		MONTH-1	MONTH-2	MONTH-3	MONTH-4	MONTH-5	REVIEW	MONTH-6	MONTH-7	MONTH-8	MONTH-9	MONTH-10
1	LITERATURE SURVEY											
2	DETAILED MAPPING											
3	CORE DRILLING & ASSOCIATED WORKS											
4	SAMPLING											
5	GEOCHEMICAL STUDIES											
6	PETROGRAPHIC STUDIES											
7	PEER REVIEW											
8	REPORT WRITING & SUBMISSION OF FINAL REPORT											

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References:

- 1. Report on concealed bauxite in the area between jarjok and kharuva villages of abdasa taluka of kachchh district, gujarat state(field season 1977-78, 78-79 & 79-80)*
- 2. Report on investigation by drilling for bauxite in village of Nakhatrana and Abdasa Talukas Kutch district.*



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ANNEXURE -I

Reconnaissance Survey (G-4 Stage) For Bauxite And Associated Minerals In Reladiya-Raydhanjar Area, Kachchh District, Gujarat, 10 months, Review after 5 months.		
Sl. No.	Nature of Components	Cost of Component
1	Detailed Geological Mapping Other Geological	21,05,394
2	Survey work- Outsource	192000
3	Diamond Core Drilling & allied work- Outsource	1515000
4	Laboratory Studies including Physical & Petrological/mineragraphic Studies - Outsource	4288294
5	Reimbursement of cost in case of outsourced components of project work	129200
6	Tendering Process Cost	25840
7	Geological Report Preparation	1,50,000.00
8	Peer review charges	30,000.00
9	Preparation of Exploration Proposal	88867
10	Total Cost Without GST	4712201
11	Provision for GST (18%)	848196
12	Total Cost With GST	5560397
16	In Lakhs	55.60



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ANNEXURE -II

Cost Estimate for Reconnaissance survey (G4) for Bauxite and associated minerals in Reladiya-Raydhanjar area, Kachchh District, Gujarat										Annexure-11
Area:15 sq. km, Drilling: 200 m; BH:8; Schedule timeline- 10 months, Review: After 4 months and 8 months										
S. No.	Item of Work *	Unit *	Rates as per NMET SoC-Item No. *	Rates as per SoC * (a)	Estimated Cost of the		Remarks	PSC Approved		
					Qty. (b)	Total Amount (Rs) (a*b)		Qty.	Total Amount	
A	Geological Mapping Other Geological Work & Surveying									
1	Geological mapping, (1:12,500)	Per Sq.Km.	1.1	18,300	15.00	274500		15.00	274500	
2	Charges for one Geologist per day in field (without labour)	day	12.1a(b)	14,500	90	1305000		90	1305000	
3	Charges for engaging skilled, semiskilled and unskilled workers for attending work associated with the mineral exploration project in the field/camp/HQ.		5.8	556	180	100080		180	100080	
4	Charges for one Geologist per day at HQ	day	1.2.1a(a)	10500	30	315000		30	315000	
5	Charges for one Sampler per day	day	1.2.1b	7850	11	86350		9	70650	
6	Labours for sampler (4 Nos)		5.8	556	44	24464		36	20016	
						Sub Total- A			21,05,394	
B	Survey work- Outsource								20,85,246	
1	DGPS Survey for BH fixation & RL determination	Per Point of observation	1.3.2	24,000	8	1,92,000	8 BH	8	1,92,000	
						Sub-Total B			1,92,000	
C	DRILLING - Outsource									
1	Drilling	Per m	2.2.1.1c	5,500	200	11,00,000		200	1100000	
2	Drill core Preservation	Per m	5.3	1,590	100	1,59,000		100	159000	
3	Land / Crop Compensation (in case the BH falls in agricultural Land)	per BH	5.6	30,000	8	2,40,000	As per actuals as certified by local authorities subject to a maximum of 30,000 per bore hole	8	240000	
4	Construction of concrete Pillar (12"x12"x30")	per borehole	2.2.7	2,000	8	16,000		8	16000	
						Sub Total C			15,15,000	
D	LABORATORY STUDIES									
	Geochemical Studies									
1	Major oxides (WD XRF)- (oxides+ traces -24 elements)	Per Sample	4.1.17a	4,200	50	2,10,000	BRS-10+Drill core-40	50	2,10,000	
2	External (10%) Check samples	Per Sample	4.1.17a	4,200	5	21,000		5	21,000	
3	Analysis of one rock/ soil sample for quantitative analysis of 14 REE elements + 9 trace element (U,Ta,Ge,Be,Hf,Sn,As,Rb,Th) by ICP-MS (sequential technique)	Per Sample	4.1.15	7,400	20	1,48,000		20	1,48,000	
4	External (10%) Check samples	Per Sample	4.1.15	7,400	2	14,800		2	14,800	
5	Combined determination of Trihydrate Alumina (THA-140 C) Monohydrate Alumina (MHA-240 C) & Reactive Silica	Per Sample	4.1.19a	7,500	5	37,500		5	37,500	
	Physical,Petrological, Mineralogical Studies									
1	Preparation of standard thin section of rock	Per Sample	4.3.1	500	2	1,000		2	1,000	
2	Preparation of polished thin section of rock/ wafer	Per Sample	4.3.2	800	3	2,400		3	2,400	
3	Complete petrographic /ore microscopic study/mineralogical report of rock sample (along with 5 nos. digital photo micrographs)	Per Sample	4.3.4	2,800	5	14,000		5	14,000	
4	Bulk density determination	Per Sample	4.8.3	2,500	5	12,500		5	12,500	
5	XRD Studies	Per Sample	4.5.2a	4,900	3	14,700		3	14,700	
						Sub Total D			4,75,900	
						Total Outsource Cost	-		12,92,000	
	Total A to D					42,88,294			42,68,146	

E	Reimbursement of cost in case of outsourced components of project work (Technical Supervision Cost)	Lumpsum	6			1,29,200	10% of outsourcing cost subject to maximum of 20 lakh & combined cost of component & technical supervision should not exceed per unit cost as per	1,29,200
F	Tendering Process Cost	One time in case of outsourced components of project work	5.9			25,840	2% of the Cost or Rs. 5.0 Lakhs whichever is less	25,840.00
Total Cost						44,43,334	-	44,23,186
G	Geological Report Preparation	soft copy	5.2(iii)			1,50,000		1,50,000
H	Peer review Charges	As per EC decision				30,000		30,000
I	Preparation of Exploration Proposal	soft copy	5.1			88,867		88,463.72
Total Estimated Cost						47,12,201	-	46,91,650
Provision for GST						8,48,196	GST will be reimburse as per actual and as per notified prescribed rate	8,44,496.95
Total Estimated Cost with GST						55,60,397		55,36,147
Rs. In Lakhs						55.60		55.36

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1. RELADIYA-RAYDHANJAR BLOCK BOREHOLE LOCATION PLAN

