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**Detailed Project Report  
(DPR) on  
RECONNAISSANCE SURVEY (G4)  
FOR REE IN WANDHAYA BLOCK,  
KACHCHH DISTRICT, GUJARAT**

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**Geovale Services Pvt  
Ltd.**

*Earth System Science for sustainable Development*

**December 2025**

**Proposal for Reconnaissance Survey (G4) for REE in Wandhaya**  
**Block, Kachchh District, Gujarat**  
**under NMET**

**(REE)**

**By**

**Geovale Services Private Limited**

**Place: Kolkata**

**Date: December 2025**

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## Summary of the Block for Reconnaissance Survey (G4 Stage)

### GENERAL INFORMATION ABOUT THE BLOCK

Sl. No.	Features	Details
1	<b>Block ID</b>	GSPL/NMET/GUJARAT/2025/BLOCK-01
2	<b>Exploration Agency</b>	Geovale Services Private Limited
3	<b>Block Name</b>	Wandhaya REE Prospect Block
4	<b>Commodity</b>	HREE and LREE
5	<b>Mineral Belt</b>	Stratabound REE horizon in the Jurassic sediments near and hydrothermal mineralization in Bhuj Sandstones
6	<b>Completion Period to complete the project</b>	10 months
7	<b>Objectives</b>	<ol style="list-style-type: none"> <li>1. To assess the exploration target potential for HREE and LREE in the Stratabound REE horizon in the Jurassic sediments.</li> <li>2. Explore hydrothermal mineralization in Bhuj Sandstones</li> </ol>
8	<b>Whether the work will be carried out by the proposed agency or through outsourcing and details thereof.</b>	The exploration will be carried out by the proposed agency. Some elements of the exploration program like drilling, some geophysical and geochemical activities will be outsourced under supervision of Geovale's geoscientists.
9	<b>Name/ Number of Geoscientists</b>	Max.9 and Min. 4 geologists in different stages
10	<b>Expected Field days (Geology)  Geological Party Days</b>	<p>Total man-days: 120</p> <p>Man-days for field work: 60 man-days.</p>

Sl. No.	Features	Details
<b>11.</b>	<b>Location</b>	
a.	Latitude	Between 23° 9'52.23"N to 23° 18'0.89" N
b.	Longitude	Between 69°22'59.57"E to 69°29'59.22"E
c.	Villages	Kurbai, Nabhoi, Vandhay, Deshalpar, Samatra, Anandsar, Kanpar, Fotdi, Sadau Rakhal, Kuvathada etc.
d.	Tehsil/ Taluk	Wandhaya
e.	District	Kachchh
f.	State	Gujarat
<b>12.</b>	<b>Area (hectares/ square kilometers)</b>	
a.	Block Area	111 sq. km.
b.	Forest Area	Around 20 sq. km. (~4%) as per the forest map ( <i>source: CGM, Gujarat</i> ). However, actual status of forest boundaries is not verified.
c.	Government Land Area	Information not available in public domain
d.	Private Land Area	Information not available in public domain
<b>13.</b>	<b>Protected area</b>	The block does not fall under any Sanctuaries or National Park.
<b>14.</b>	<b>Accessibility</b>	
a.	Nearest Rail Head	Wandhaya Railway station
b.	Road	SH-42, SH-47, SH-48
c.	Airport	Wandhaya airport
<b>15.</b>	<b>Hydrography</b>	
a.	Local Surface Drainage Pattern (Channels)	Dendritic drainage pattern
b.	Rivers/ Streams	Khari River
<b>16.</b>	<b>Climate</b>	
a.	Mean Annual Rainfall	~424 mm

Sl. No.	Features	Details
b.	Temperatures (December) (Minimum) Temperatures (June) (Maximum)	Minimum – 2° to 3° C Maximum – 45° to 46° C
17.	<b>Topography</b>	
a.	Toposheet Number	41E/7,41E/8
b.	Morphology of the Area	Undulating topography with hill ranges occurring in the north-northeastern and south-southwestern parts, separated by a central valley
18.	<b>Availability of baseline geoscience data</b>	
a.	Geological Map (1:50K/ 25K)	1:50K map is available
b.	Geochemical Map	
c.	Geophysical Map (Aeromagnetic, ground geophysical, Regional as well as local scale GP maps)	
19	<b>Justification for taking up Reconnaissance Survey / Regional Exploration</b>	<p>1 Geovale has completed a similar REE project in the adjoining Bhuj block and revealed high potentials for REE in the clayey and sandy units of both Bhuj and Katrol formations. Similar lithology is continuing in this block also.</p> <p>2 Geovale has conducted a field survey in potential surrounding areas of this proposed block, focusing on the lithological extension of the ongoing Bhuj block. During the survey, three bedrock samples were collected from this block: two from the ferruginous shale of the Katrol Formation and one from the ferruginous sandstone of the Chari Formation. The highest Total REE content recorded among these bed rock samples is <b>788 ppm.</b></p>

## DETAILED DESCRIPTION OF WANDHAYA REE PROSPECT BLOCK

### I. BLOCK SUMMARY

#### Physiography

Physiographically, the Wandhaya Block occupies a part of the central Kachchh Mainland and shows a distinct variation in relief, dominated by structurally controlled hill ranges and intervening plains. The terrain is represented by gently to moderately sloping plains bordered by prominent east–west trending hill ranges that form the major physiographic element of the area.

The hill ranges exhibit steep to very steep escarpments along the northern flanks, while the southern slopes are comparatively gentler. The general elevation of these ridges varies between 160–220 m above MSL, whereas the adjoining plains on both sides remain relatively low-lying with elevations ranging between 130–160 m above MSL. The plains show a broad easterly to south-easterly gradient, forming gently undulating surfaces dissected by minor ephemeral streams.

Lithologically, the hill ranges and surrounding plains are predominantly composed of Mesozoic sedimentary sequences, mainly sandstones and shales belonging to the Jurassic–Cretaceous succession. In the south-central part of the block, an isolated upland capped by Deccan Trap basaltic flows occurs, representing the youngest volcanic episode of the region.

The drainage pattern of the Wandhaya Block is moderately developed and structurally influenced. The Khari River forms the principal drainage channel, flowing northward across the block. In addition, several minor channels belonging to tributaries of Nagmati Nadi and the Bhubhi (Ganga) Nadi flow towards the south in the southern sector of the block. Overall, the drainage exhibits rectangular to dendritic patterns, controlled by jointed and fractured Mesozoic strata, with localized occurrences of radial drainage around isolated uplands. Most of the streams are seasonal, responding primarily to monsoonal precipitation.

#### Background Geology (Regional Geology, Geology of the Block)

##### Regional Geology:

Regionally major part of the proposed block belongs to the Jurassic and Cretaceous sedimentary rocks belonging to the Chari, Katrol and Wandhaya formations (*Table 1*). Cenozoic Deccan Traps cover a very small part of the proposed block. Structurally, the area includes two very prominent Quaternary structures, the E-W trending Katrol Hill Fault and the NNE-SSW trending Median High of Kachchh Mesozoic basin (*Fig. 1*). SOI toposheet 41E/12 includes intersection of these two structures.

Stratigraphically the proposed block comprises of Chari Formation, overlain by the Katrol Formation and the Umia Formation (rechristened to 'Wandhaya Formation') subsequently. The Chari Formation is exposed as small lenses at the southern part of the Katrol Fault within the targeted area (*Fig. 1*).

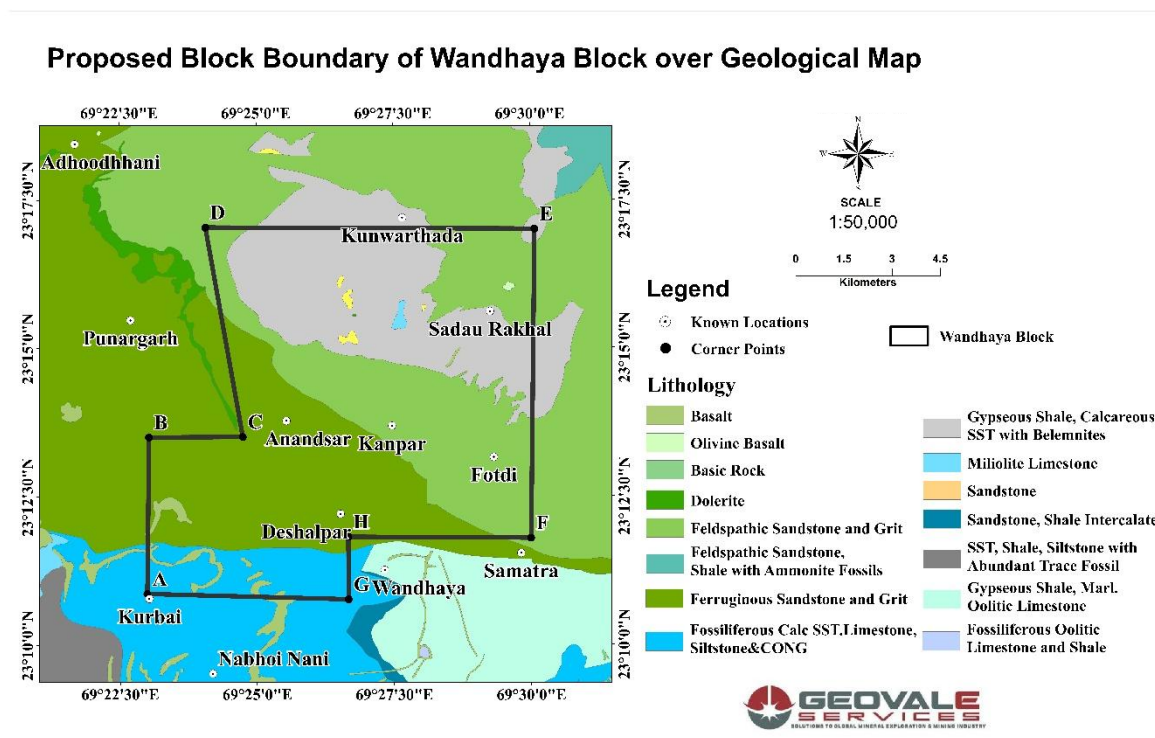


Figure 1 Map showing the geology of the Wandhaya REE Prospect Block.

It comprises gypseous shales, fossiliferous limestone, calcareous and ferruginous gritty sandstone, conglomerate, and greenish grey shales. The ~750m thick Katrol Formation (138 + 22 M.Y, *Srivastava et. al., 1994*) is represented by dark grey to black shale interbedded with calcareous/ferruginous sandstone, and siltstone/clays. Wandhaya Formation consists of sandstone, shales, grits, and conglomerates. The Deccan Traps (Anjar Volcanics) at the south-central part of the proposed block comprise lava flows and intrusive dykes of different ages and composition, primarily containing black, olive green colored amygdule basalt with isolated occurrences of silica and zeolite.

Table 1 Stratigraphic table of the proposed Wandhaya REE Prospect Block.

Stratigraphic unit		Age	Lithology
Rajnath, 1932	Biswas, 1977		
Deccan Trap		~67-65 Ma Uppermost Cretaceous	Basalt, tholeiitic, minor alkalic basalt

<b>Umia Series</b>	<b>Wandhaya Formation</b>	Jurassic Cretaceous boundary 149-145 Ma	Sandstone-shale in the lower part, succeeded by glauconitic sandstone, sandstone-claystone
<b>Katrol Series</b>	<b>Jhuran Formation</b>	Late Jurassic	Predominantly dark grey to black shale in the lower part, interbedded with ferruginous sandstone and micaceous siltstone and shale
<b>Chari Series</b>	<b>Jhumara Formation</b>	Middle part of Upper Jurassic ~155 Ma -~149 Ma	Olive green shale, succeeded by sandstone, limestone with golden oolites, and shale

### Geology of the Block:

The lithological succession within the proposed block encompasses a range of marine to marginal-marine and shallow-clastic facies, represented by mainly Katrol, and Bhuj formations, arranged in ascending stratigraphic order (Fig.1; Plate I).

The Katrol Formation is the most laterally extensive unit in the area, forming gently undulating E–W trending ridges. It comprises heterolithic successions where shale-dominated intervals are sandwiched between lower and upper sandstone-dominated packages. The shale-rich unit records rhythmic, laminated grey to black shales with thin ripple- to hummocky-laminated sandstones, indicating lower-energy offshore to distal pro-delta/outer-shelf conditions influenced by storms. The sandstone-dominated units contain sharp-based, pinch-and-swell sandstone beds with massive to planar-laminated interiors, reflecting higher-energy shoreface to storm-dominated proximal settings with episodic reactivation. Laterally persistent tuffite horizons and common gypsum seams point to intermittent volcanoclastic input and evaporitic/salinity fluctuations during deposition (Geovale’s G4 Exploration).

The Bhuj Formation conformably overlies the Katrol Formation and forms prominent E–W to ENE–WSW trending ridges and escarpments across the block, with thickness exceeding ~350 m. It is dominated by medium–fine, moderately well-sorted sandstones with subordinate clay–silt partings

### Mineral potentiality based on geology, geophysics, ground geochemistry etc.

Regional scale mineral exploration in the Kachchh district was undertaken by multiple agencies through independent projects targeting different commodities of economic potential. The major initiatives include investigations for bauxite and laterite, phosphorite, and bentonite–clay deposits, which together established the mineralogical framework of the region.

Geovale undertook a REE exploration project in Bhuj area and successfully revealed high potentials for REE in the clayey and sandy units of both Bhuj and Katrol formations.

Two key mineralization have been identified:

1. Stratiform/strata-bound horizons (notably phosphatic/ferruginous tuffite-bearing packages) that can concentrate REE in primary phases (e.g., fluorapatite/monazite).
2. Fault-controlled alteration corridors within competent sandstones, where hydrothermal processes can form IOCG-style Fe-oxide alteration, metasomatism, and brecciation, creating efficient traps and upgrade zones.

Similar lithology with REE rich facies of Katrol and Bhuj Formation are continuing in this block also.

Geovale has also conducted a field survey in potential areas of this proposed block, focusing on the lithological extension of the ongoing Bhuj block. During the survey, a few bedrock samples were collected from this block: two from the ferruginous shale of the Katrol Formation and one from the ferruginous sandstone of the Chari Formation. The highest Total REE content recorded among these bed rock samples is 576 ppm.

### Scope for Proposed Exploration:

The scope of work in the proposed area should begin with

1. **Regional-scale data compilation and reinterpretation:**

This data compilation will include review of geological maps, geochemical datasets and subsurface information from the Geovale's G4 project to identify continuity of fertile Katrol and Bhuj formations beyond the block. This should be followed by remote sensing-based regolith, lineament, and alteration mapping, with special emphasis on extensions of the Katrol Hill Fault, Median High zone, and their subsidiary splays that act as fluid pathways for hydrothermal mineralization

2. **Reconnaissance field investigations (G4 level) and systematic geochemical sampling:**

This phase will include geological mapping in 1:12,500 scale, stream sediment and regolith sampling (multi-fraction), and selective rock sampling from Katrol tuffite horizons and ferruginized Bhuj sandstones to test for REE and polymetallic signatures.

Samples will be collected in one square kilometer grid pattern in the thick (>3m) covered areas. Profile sections in the areas having very thick (>4m) loose sediments would also be systematically assayed for REE concentration. In high gradient areas with low or no regolith cover (<3m), the sampling strategy would follow micro-catchment discharge zones. A total of 250 numbers of sample would be collected from the proposed area. The regolith samples would be used for an assessment of REE resource in loose sediments whereas sampling (both stream sediment and bed rock) following micro-catchment discharge zones would give vectors to REE host formation and area.

3. **Ground geophysical surveys:**

In Geological and structural favourable zones, ground geophysical surveys like magnetics, gravity, and resistivity should be deployed to identify subsurface alteration zones, breccia bodies, and potential feeder structures analogous to those identified within the Bhuj block.

These geochemical and geophysical survey would together help to identify the potential anomalous target zone or stratigraphy and/or area for target testing based on the mineralization vectors like stratigraphic controls, structural controls, and mineral geochemistry

### **3. Target testing:**

Scout drilling in fertile zones will be the final scope of this G4 level exploration. This will confirm the subsurface continuity of the mineralized zones.

### **4. Report preparation, Peer Review and Project Conclusion:**

Finally, all data of mapping, sampling, and REE assay values would be collated with geological, tectonic and lineament control of tectonics on REE enrichment zones. Such correlation will produce the final report with recommendation for next phase of exploration.

### **Observation and Recommendations of previous work:**

Geochemical and mineralogical evidence confirmed that REEs are hosted in primary, discrete mineral phases within bedrock.

Two distinct, in-situ mineral systems with significant economic potential have been discovered: Mineral System I (Katrol Stratiform REE) and Mineral System II (Bhuj IOCG-Style).

Mineral System I is a syngenetic, volcanoclastic-hosted REE system within the Late Jurassic Katrol Formation. Mineralization is hosted in laterally continuous, vertically stacked phosphatic-ferruginous tuffite layers. The primary REE-hosting minerals are fine-grained fluorapatite and monazite.

Mineral System II is an epigenetic, structurally controlled hydrothermal system within the Cretaceous Bhuj Formation. It exhibits the characteristic geological, mineralogical, geochemical, and geophysical signatures of an Iron-Oxide-Copper-Gold (IOCG) deposit.

The Bhuj IOCG-style system is characterized by intense iron-oxide alteration (hematite/magnetite), hydrothermal brecciation, and a polymetallic association of Fe-Cu-Au-Ag-Co-SnU-REE.

The principal structural controls for Mineral System II are the Katrol Hill Fault and the Median High, which acted as primary conduits for mineralizing hydrothermal fluids. A distinct, pipe-like low-resistivity anomaly identified by VES surveys provides strong geophysical evidence for a potential feeder zone for the IOCG system, representing a prime exploration target.

Scout drilling has successfully intersected both mineral systems, confirming their subsurface continuity and validating the geological models.

The Bhuj Prospect represents a newly identified and significant REE and polymetallic province in western India, warranting immediate advancement to the next stage of exploration.

## II. Previous Work

### Previous Exploration in adjoining area (Regional area)

Geovale's G4 exploration in adjacent Bhuj REE block has identified two distinct REE-bearing mineral systems were discovered and confirmed: (i) stratiform volcanoclastic/tuffite-hosted REE in the Katrol Formation and (ii) a structurally controlled IOCG-style hydrothermal system in the Bhuj Formation.

Katrol (MSA-I): thin but laterally persistent phosphatic–ferruginous tuffite horizons (generally <1–3 m) were identified, with reported grades up to ~0.10–0.15% total REO and a high HREE proportion. bedrock tuffites returned TREEY 164–1721 ppm (avg ~400 ppm) and drilling (BH01–BH02) confirmed multiple tuffite intersections with TREEY peaks up to ~549 ppm and ~995 ppm.

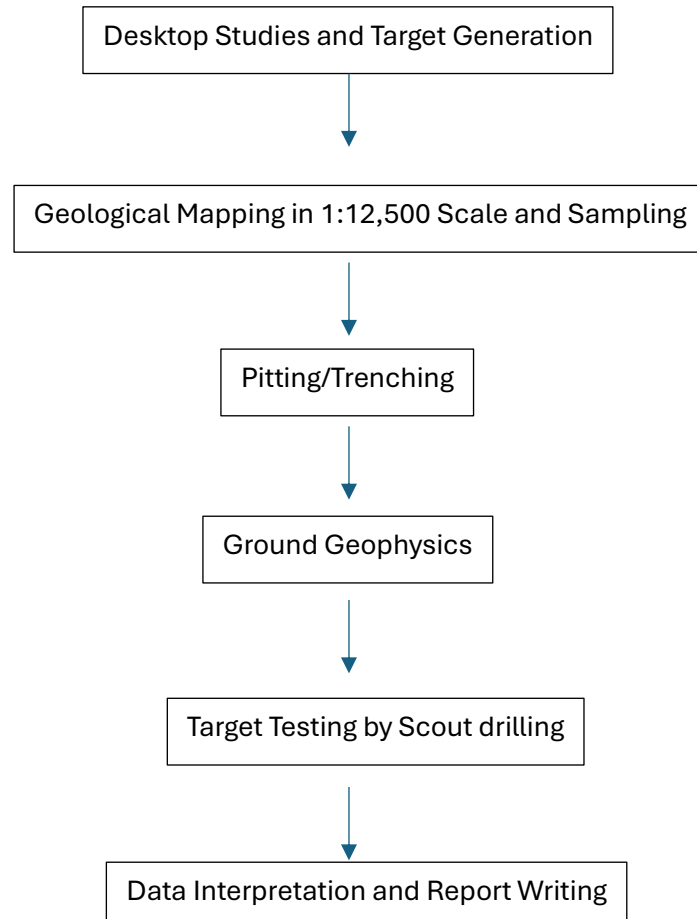
Bhuj (MSA-II): drill core and petrography/geochem indicate an epigenetic hydrothermal Fe–Cu–Au–Ag system (IOCG-type) overprinting Bhuj sandstones (BH04–BH08), distinct from the Katrol tuffite REE style.

Scout drilling successfully “de-risked” the project: 8 boreholes / ~603.5 m (June–Aug 2025) tested both systems—2 holes in Katrol tuffites and 6 holes in Bhuj IOCG corridors—confirming subsurface continuity consistent with the integrated geology–geochem–geophysics model.

### III. Block description

Name	Latitude	Longitude
A	23.18108	69.38326
B	23.22503	69.38389
C	23.22511	69.41242
D	23.28397	69.40118
E	23.28340	69.50132
F	23.19657	69.50004
G	23.19698	69.44442
H	23.17942	69.44450

### IV. Planned Methodology



### **Desktop studies and target generation**

In this phase, all available regional and project-scale information is analyzed to generate and prioritize targets before heavy field spending begins. Remote sensing interpretation, GIS compilation, review of regional geology and known mineral occurrences, and mineral system thinking are combined to create a conceptual model of how and where mineralization may occur. The outcome is a short list of priority zones to validate on the ground.

### **Fieldwork: Geological mapping and sampling**

This phase is designed to validate desktop targets with on-ground observations and preparation of 1:12,500 scale geological map of the proposed block. Sampling for geochemical studies will also be conducted in this stage and after that assay results will be evaluated.

### **Detailed evaluation by Pitting/ Trenching and Ground geophysical survey:**

After mapping and geochemical analysis through systematic sampling, some anomalous zones will be identified/ Trenching or pitting will be conducted where exposures are limited. Where appropriate, ground geophysics may be used to extend interpretations beneath cover and strengthen target geometry. The phase concludes with defined drill targets supported by geology, continuity evidence, and clear rationale.

### **Target testing by Scout drilling:**

This is the key data acquisition phase to test depth continuity and quantify mineralization or quality at scale. Drill planning finalizes the drill method, spacing, collar locations, access preparation, and meterage based on the target model. During execution, supervision, recovery monitoring, logging, and sampling protocols are followed, with robust QA/QC using blanks, standards, and duplicates. Assay results are tracked carefully for turnaround time and quality. The primary output is a validated drilling dataset suitable for geological modelling and resource estimation.

### **Data interpretation and Report writing**

This phase ensures the technical integrity of the dataset and converts raw observations into geological understanding. All drilling, sampling, survey, and assay data are validated and compiled into a structured database, followed by rigorous QA/QC analysis to confirm precision, accuracy, and absence of contamination or bias. The exploration model is updated through integrated interpretation of geology, structure, alteration, geochemistry, and geophysics. Finally a complete technical report or Geological Report will be prepared.

## V. Nature Quantum and Target

*Attached in Annexure I.*

### rehole spacing (As per MEMC, 2015)

Type of deposit	Bedded Stratiform and tabular	Bedded stratiform and tabular deposits of irregular habit (Minerals to be identified)	Lenticular bodies occurring En-
<b>G4 Stage</b>	Not Applicable	Approximately 4 boreholes, Core drilling: Total 1000m (1BH-400m 3BH 200m,)	Not Applicable
<b>Remarks</b>		Decision on the number of boreholes and depth of drilling may vary depending on the nature and disposition of the ore minerals in the area.	
<b>(Vertical depth of intersection of mineralized zone should be specified (first level), number of boreholes, approximate borehole spacing, approximate length of boreholes may be specified)</b>			

## Vi. Manpower deployment (includes both field and non-field deployment)

*Attached in Annexure II.*

Title of Project - Reconnaissance Survey(G4) For REE In Wandhaya Block,Kachchh Districr,Gujarat Name of the Exploration Agency - Geovale Services Pvt. Ltd. Total Area - 111 sq. km; Core drilling: Total 250m (1*100m, 3*50m); Completion Time -10 Months, Review: 4 months & 8 months						
<b>MANPOWER DEPLOYMENT</b>						
Sr. No.	Activity	Type of Job	Geologist HQ/ Geospatial/ Geophysicist (mandays)	Geologist/ Geophysicist (mandays)	Labour (mandays)	Sampler (mandays)

1	Geospatial and remote sensing work	Desktop	60			
2	Geologist			60		
3	Geophysical Survey	Desktop+Field				
4	Geological Investigation, Lab Studies	Field			35	140

## VII. Breakup of expenditure

The total cost of the project is ₹ 1,35,00,082.88. The breakup of the expenditure is attached in [Annexure III](#).

### *Annexure III*

<b>Title of Project - Reconnaissance Survey(G4) For REE In Wandhaya Block,Kachchh Districr,Gujarat</b> <b>Name of the Exploration Agency - Geovale Services Pvt. Ltd.</b> <b>Total Area - 111 sq. km; Core drilling: Total 250m (1*100m, 3*50m); Completion Time -10 Months,</b> <b>Review: 4 months &amp; 8 months</b>							
S. N	Item of work	Unit	Rates as per NMET Revised SoC	Rates as per SOC	Quantum	Total Amount (Rs)	Remarks
			SoC-Item -SI No.				
1	Geological Work						
A	HQ Activities						
B	Geological Mapping (1:12,500) & sampling	111 sq km					
a	Geologists (HQ) days (1 No)	1 geologist/day	1.2.1a	10,500.00	60.00	630,000.00	

b	Large Scale Geological mapping	sq km	1.1	18,300.00	111	2,031,300.00	
c	Geologist Field day	Per day	1.1	14,500.00	60	870,000.00	
d	Labour Field days	Per day	1.1	541.00	120	64,920.00	
	<b>Sub-Total 1</b>					<b>3,596,220.00</b>	
2	Pitting(Excavation of Pit up to 2.0 m depth with back filling)	per cu.m	2.1.2	4,725.00	100	472,500.00	
	<b>Sub-Total 2</b>					<b>472,500.00</b>	
3	<b>Laboratory Studies</b>						
	<b>Geochemical Analysis for regional and detail survey</b>						
a	XRF (major oxides)	per sample	4.1.17a	4,200.00	25	105,000.00	
b	Check samples for XRF	per sample	5.1.17a	4,200.00	3	10,500.00	
c	ICPMS (14 REE +9 Trace)	per sample	4.1.15	7,400.00	150	1,110,000.00	100 BRS+ 50 Pit
e	Check samples	per sample	4.1.5a	7,400.00	15	111,000.00	
g	XRD	per sample	4.5.2	4,000.00	20	80,000.00	
h	Separation of heavy minerals from stream sediment samples of -2mm size	per sample	4.3.6b	13,820.00	50	691,000.00	
i	Sampler man-days	one sampler per day	1.2.1b	7,850.00	35	274,750.00	
j	Labor(4 workers per sampler)	per labor day	5.7	541.00	140	75,740.00	Amount will be reimburse as per the notified rates by the Central Labor Comission

							or respective State Govt. whichever is higher
	<b>Sub-Total 3</b>					<b>2,457,990.00</b>	
<b>4</b>	<b>Petrological studies</b>						
a	Thin section preparation	per sample	4.3.2	800	20	16,000.00	
b	Microscopic study	per sample	4.3.4	2,800	20	56,000.00	
c	SEM-EDX per hour (with 6 hours per day target)	per sample	4.4.1a	8,800	10	88,000.00	
d	EPMA	per hour	4.4.1	10,500	10	105,000.00	
	<b>Sub-Total 4</b>					<b>265,000.00</b>	
<b>5</b>	<b>Geophysical Survey</b>						
a	Resistivity Profiling (Station interval 200m.)	per line km	3.6a	58,880.00	0	-	
b	Expert Charges for Geophysicist (HQ)	Geophysicist per day	3.18	10,500.00	0	-	
	<b>Sub-Total 5</b>					-	
<b>6</b>	<b>Drilling In-house</b>						
a	Core drilling up to 800m depth	per meter	2.2.1.1d	10,000.00	250	2,500,000.00	
b	Drill core preservation	per meter	5.3.0	1,590.00	100	159,000.00	
c	Miscellaneous Charges (Transportation of Drilling Rig, Accommodation, Camp setting, Approach road, etc.)			1,500,000.00		6,25,000	Drilling cost < 50 Lakhs: 25% of Drilling Cost
	<b>Sub-Total 6</b>					<b>32,84,000</b>	
<b>7</b>	<b>Laboratory Studies</b>						

	<b>Geochemical Analysis (BH samples)</b>						
a	XRF (major oxides)	per sample	4.1.17a	4,200.00	10	42,000.00	
b	Check samples for XRF	per sample	5.1.17a	4,200.00	1	4,200.00	
c	ICPMS (14 REE +9 Trace)	per sample	4.1.15	7,400.00	100	740,000.00	
d	XRD	per sample	4.5.2	4,000.00	20	80,000.00	
	<b>Sub-Total 7</b>					<b>866,200.00</b>	
<b>8</b>	<b>Petrological studies (BH Samples)</b>						
a	Thin section preparation	per sample	4.3.2	800	0	-	
b	Microscopic study	per sample	4.3.4	2,800	0	-	
c	SEM-EDX per hour (with 6 hours per day target)	per sample	4.4.1a	8,800	0	-	
d	EPMA	per hour	4.4.1	10,500	0	-	
	<b>Sub-Total 8</b>					-	
	<b>Total (Sub-Total 1-8)</b>					<b>10,941,910.00</b>	
<b>9</b>	Preparation of Exploration Proposal (5 Hard copies with a soft copy)	Lumpsum	5.1	2% of the cost subject to a maximum of 5 lakhs	1	218,838.20	This amount will be reimbursed after submission of the Hard Copies and the soft copy of the final proposal along with Maps and Plan as suggested by the TCCNMET in its meeting while clearing

							the proposal.
<b>10</b>	Final report preparation	3% of project cost or 7.5 lakh whichever is higher	5.2	i) Project cost up to 50 lakh: 1.50 lakhii) Cost > 50 lakh < 150 lakh: 2.5 lakhiii) Cost > 150 lakh: 7.5 lakh		250,000	Final report submission , peer review and project conclusion
<b>11</b>	Report Peer Review	Lump sum	As per EC	30,000.00	1	30,000.00	
<b>Project Cost without GST</b>				<b>Project Cost without GST</b>		<b>11,440,748.20</b>	
<b>18% GST</b>				<b>18% GST</b>		<b>2,059,334.68</b>	GST will be reimbursed as per actual and as per the applicable notified rate
				<b>Total Project Cost</b>		<b>13,500,082.88</b>	

### VIII. Timeline

The project is planned to be completed in 10 months of time with interim reviews at the end of the 4<sup>th</sup> and 6<sup>th</sup> months.

**Title of Project - Reconnaissance Survey (G4) for REE in Wandhaya Area, Kachchh District, Gujarat**  
**Total Area - 111 sq. km; Core drilling: Total 250m (1BH 100m & 3BH 50m); Completion Time -10 Months,**  
**Review: 4 months & 8 months**  
**Timeline in months**

S. No.			1	2	3	4	Review	5	6	7	8	Review	9	10		
1	Prefield Activity (HQ)	Months/Days														
2	Geological Mapping & Sampling	days														
3	Laboratory Studies For Surface Samples	Nos.														
4	Petrographic Studies For Surface Samples	Nos.														
5	Pitting	cu.m														
6	Geophysical survey	L.km														
7	Drilling	m														
8	Laboratory Studies For BH Samples	Nos.														
9	Petrographic Studies For BH Samples	Nos.														
10	Report Writing with Peer Review	months														

## IX. References

*Srivastava, A.P., Krishna, J., Rajagopalan, G., Pathak, D.B. and Ojha, J.R., 1994. The first ever absolute agedetermination from the Jurassic of Kachchh, Western India. Geobios, 27, pp.529-533.*

### List of Plates

Plate 1: Geological map on 1:50,000 with location index.

Plate 2: Geological map on 1:50,000.

Plate 3: Ground geophysical map/s (NGPM) on 1:50,000.

Plate 4: Not available

Plate 5: Proposed block boundary over Geological map.

Plate 6: Proposed block boundary over LULC

Plate 7: Proposed block boundary over topographic map on 1:50,000.

*Annexure I*

**Title of Project - Reconnaissance Survey(G4) For REE In Wandhaya Block,Kachchh  
District,Gujarat**

**Name of the Exploration Agency - Geovale Services Pvt. Ltd.**

**Total Area - 111 sq. km; Core drilling: Total 250m (1\*100m, 3\*50m); Completion  
Time -10 Months, Review: 4 months & 8 months**

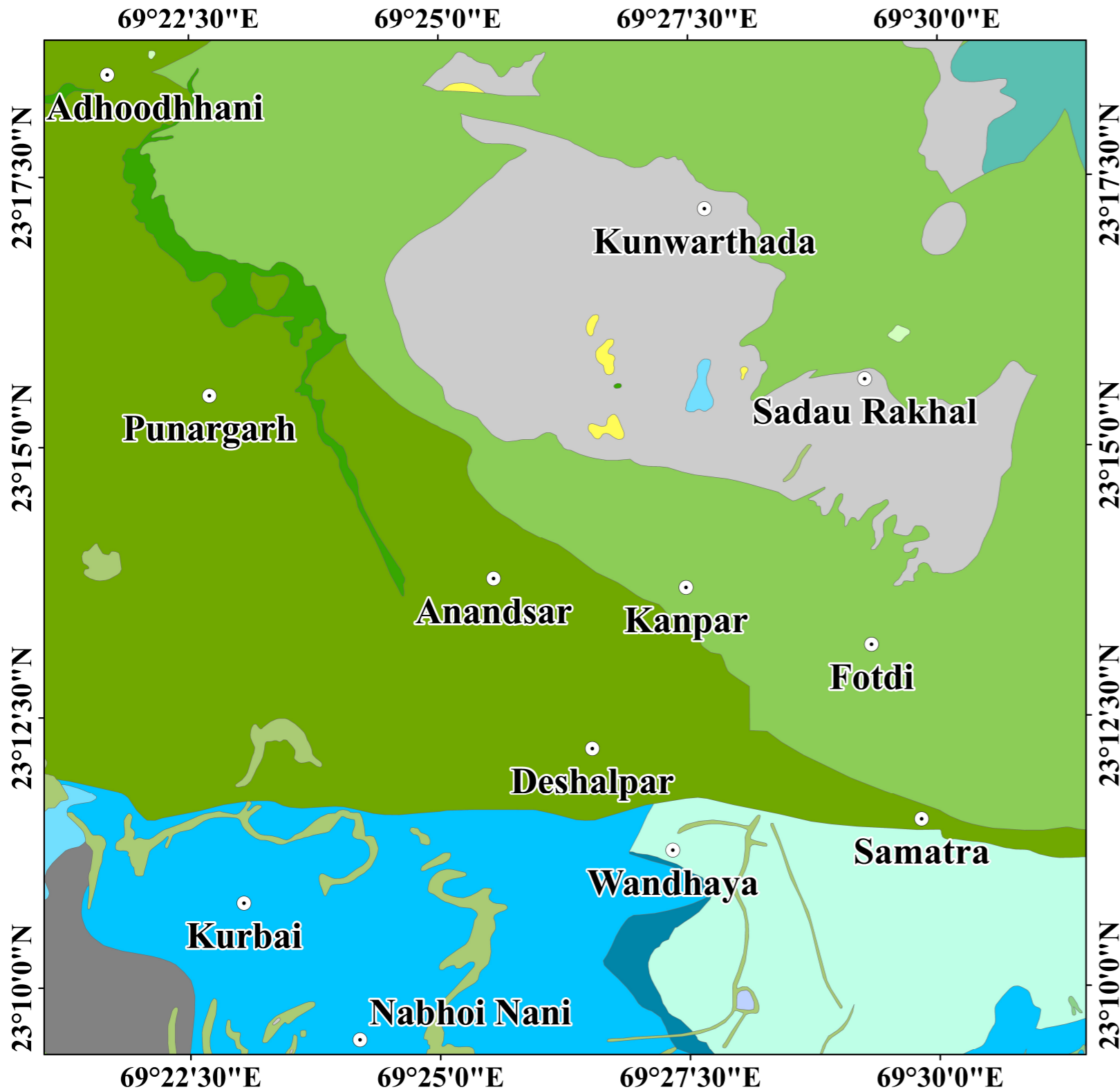
### NQT TABLE

S.N	Item of work	Unit	Quantum	Remarks
<b>1</b>	<b>Geological Work</b>			
<b>A</b>	<b>HQ Activities</b>			
<b>B</b>	<b>Geological Mapping &amp; sampling</b>	sq km	111	
a	Geologists (HQ) days (1 No)	1 geologist/ day	60.00	
b	Geological mapping/ Geologist field-days (2 field parties, 4 geologists)	sq km	111	
c	Geologist Field day	Per day	60	
d	Labour Field days	Per day	120	
<b>2</b>	<b>Pitting(Excavation of Pit up to 2.0 m depth with back filling)</b>	per cu.m	100	
<b>3</b>	<b>Laboratory Studies</b>			
	<b>Geochemical Analysis for regional and detail survey</b>			
a	XRF (major oxides)	per sample	250	
b	Check samples for XRF	per sample	3	
c	ICPMS (14 REE +9 Trace)	per sample	150	
d	Check samples	per sample	15	
e	XRD	per sample	20	
f	Separation of heavy minerals from stream sediment samples of -2mm size	per sample	50	
g	Sampler man-days	one sampler per day	35	

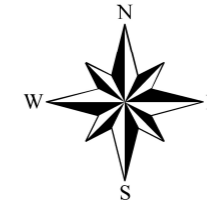
h	Labor(4 workers per sampler)	per labor day	140	Amount will be reimburse as per the notified rates by the Central Labor Comission or respective State Govt. whichever is higher
<b>4</b>	<b>Petrological studies</b>			
a	Thin section preparation	per sample	20	
b	Microscopic study	per sample	20	
c	SEM-EDX per hour (with 6 hours per day target)	per sample	10	
d	EPMA	per hour	10	
<b>5</b>	<b>Geophysical Survey</b>			
a	Resistivity Profiling (Station interval 200m.)	per line km	0	
b	Expert Charges for Geophysicist (HQ)	Geophysicist per day	0	
<b>6</b>	<b>Drilling In-house</b>			
a	Core drilling	per meter	250	
b	Drill core preservation	per meter	100	
c	Miscellaneous Charges (Transportation of Drilling Rig, Accommodation, Camp setting, Approach road, etc.)		1	
d	Geologist man days for Drilling supervision and logging	Manday	0	
e	Labour man days		0	
<b>7</b>	<b>Laboratory Studies</b>			
a	<b>Geochemical Analysis (BH samples)</b>			
b	XRF (major oxides)	per sample	10	
c	Check samples for XRF	per sample	1	
d	ICPMS (14 REE +9 Trace)	per sample	100	
e	XRD	per sample	20	
f	Sampler man-days	per day	0	
g	Labor (4 workers per sampler)	per labor day	0	

9	Preparation of Exploration Proposal (5 Hard copies with a soft copy)	Lumpsum	1	
10	Final report preparation	3% of project cost or 7.5 lakh whichever is higher	1	Final report submission, peer review and project conclusion
11	Report Peer Review	Lump sum	1	

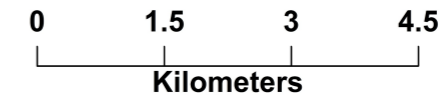
# Geological Map on 1:50K Scale with Location Index



## PLATE 1


















SCALE  
1:50,000



## Legend

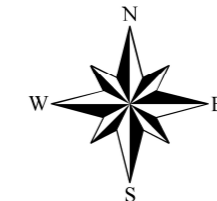
○ Known Locations

## Lithology

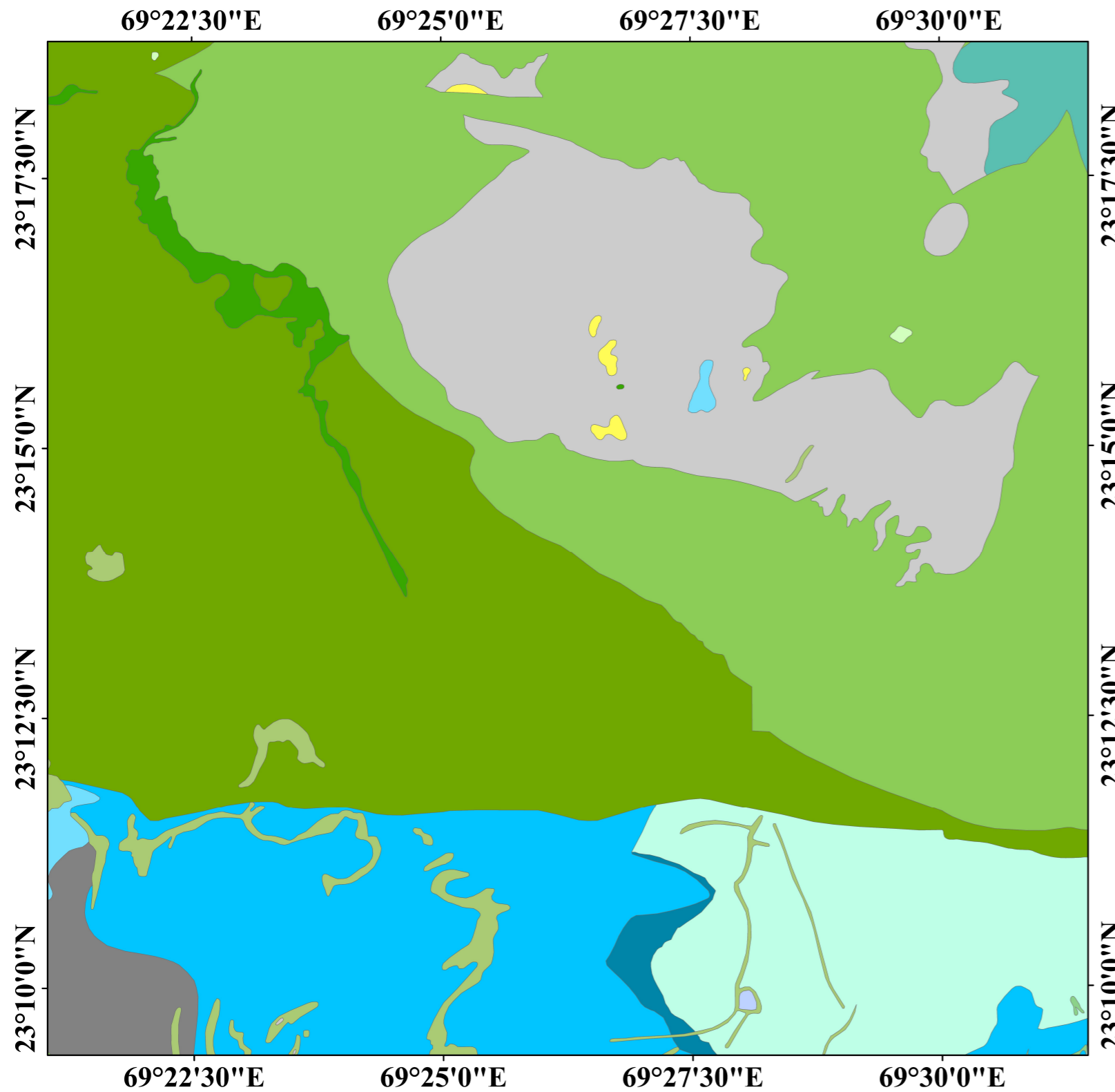
- |  |  |
|--|--|
|  Basalt   |  Gypseous Shale, Calcareous SST with Belemnites   |
|  Olivine Basalt                                     |  Miliolite Limestone                              |
|  Basic Rock   |  Sandstone  |
|  Dolerite   |  Sandstone, Shale Intercalated                    |
|  Feldspathic Sandstone and Grit                     |  SST, Shale, Siltstone with Abundant Trace Fossil |
|  Feldspathic Sandstone, Shale with Ammonite Fossils |  Gypseous Shale, Marl. Oolitic Limestone          |
|  Ferruginous Sandstone and Grit                     |  Fossiliferous Oolitic Limestone and Shale        |
|  Fossiliferous Calc SST.Limestone, Siltstone&CONG   |  |

# Geological Map/s on 1:50K Scale
















## PLATE 2



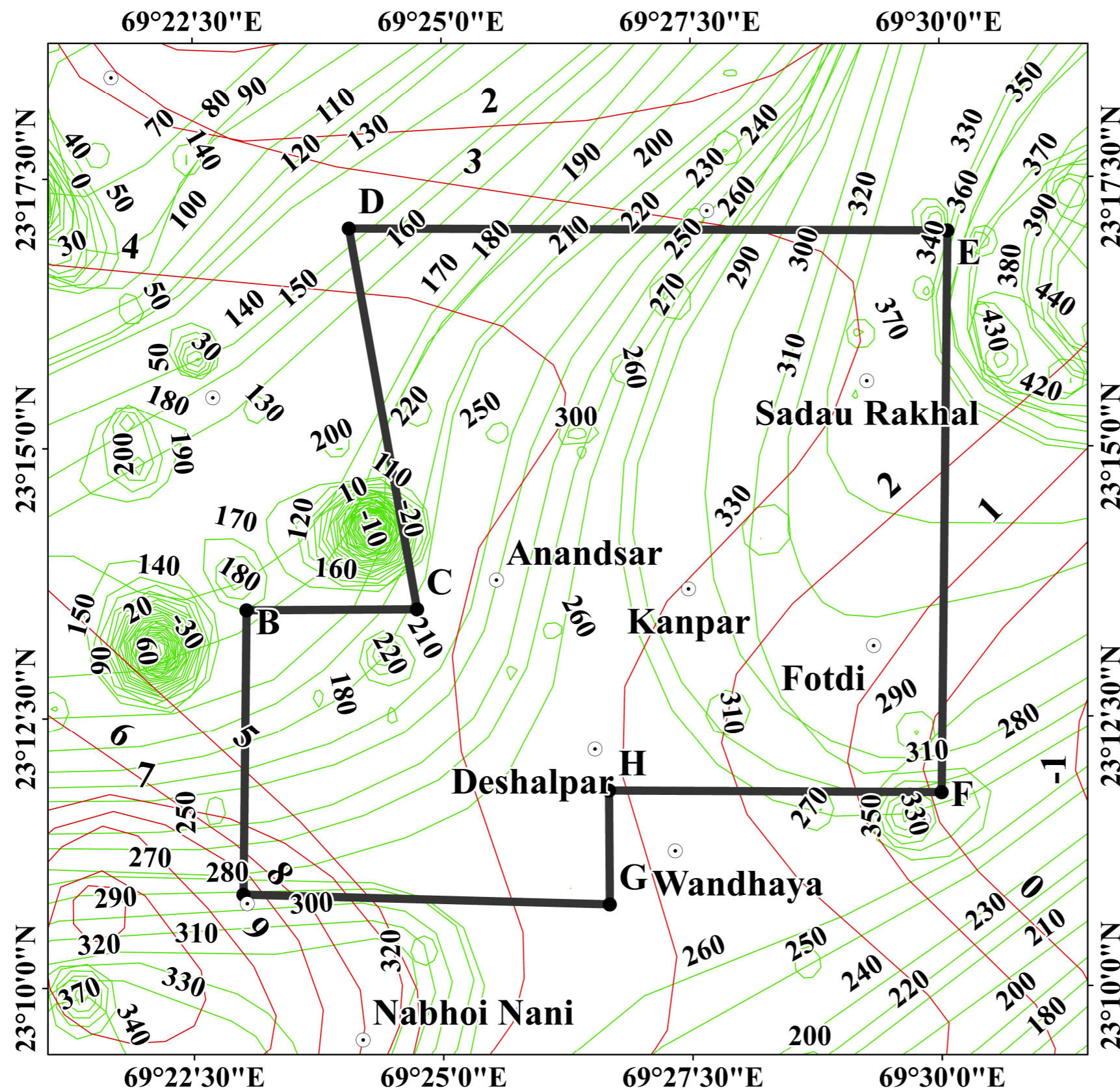
SCALE  
1:50,000



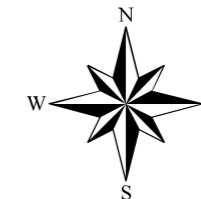
### Lithology

- |  |  |
|--|--|
|  Basalt   |  Gypseous Shale, Calcareous SST with Belemnites   |
|  Olivine Basalt                                     |  Miliolite Limestone                              |
|  Basic Rock   |  Sandstone  |
|  Dolerite   |  Sandstone, Shale Intercalated                    |
|  Feldspathic Sandstone and Grit                     |  SST, Shale, Siltstone with Abundant Trace Fossil |
|  Feldspathic Sandstone, Shale with Ammonite Fossils |  Gypseous Shale, Marl. Oolitic Limestone          |
|  Ferruginous Sandstone and Grit                     |  Fossiliferous Oolitic Limestone and Shale        |
|  Fossiliferous Calc SST.Limestone, Siltstone&CONG   |  |

# Ground Geophysical map/s NGPM on 1:50K



## PLATE 3



SCALE  
1:50,000



## Legend

- Known Locations
- Corner Points
- Wandhaya Block
- Bouguer Anomaly Contour
- Magnetic Anomaly Contour

# Proposed Block Boundary of Wandhaya Block over Geological Map

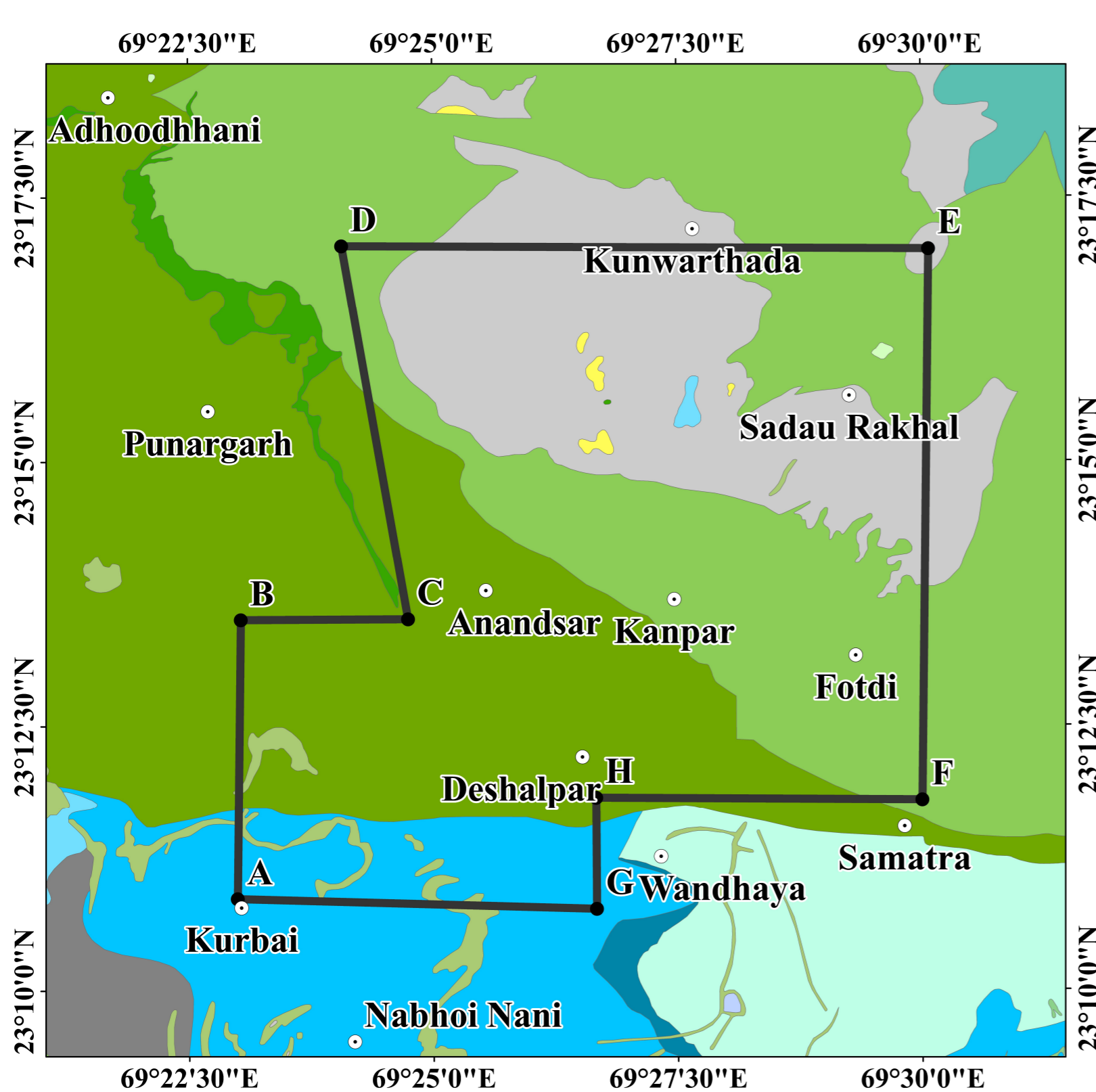
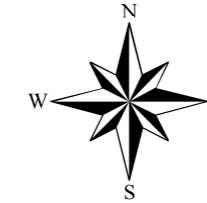


PLATE 5



SCALE  
1:50,000



## Legend

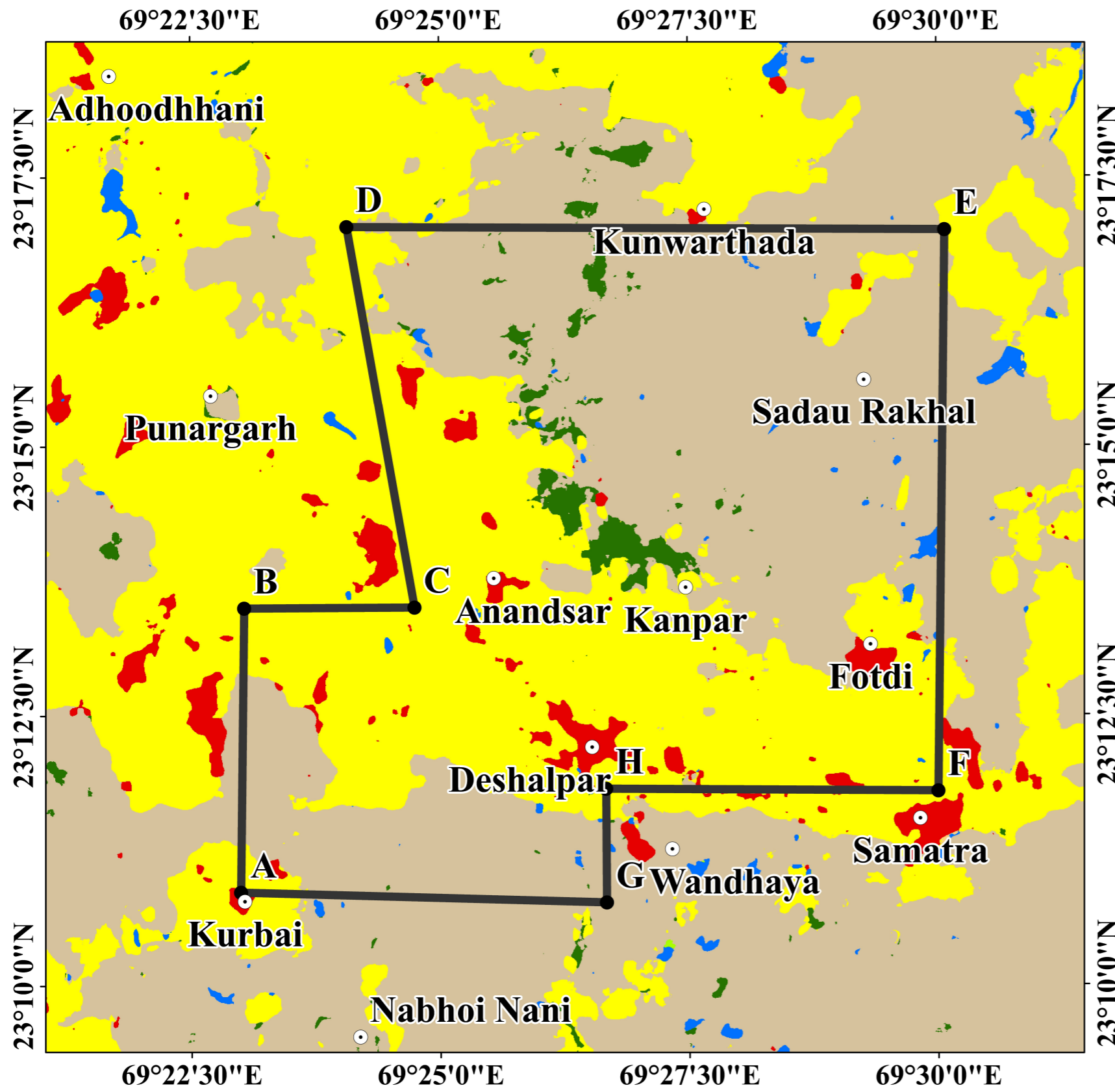
- Known Locations
- Corner Points

□ Wandhaya Block

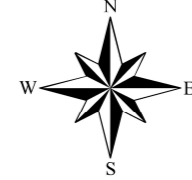
## Lithology

- |   |  |
|---|--|
| Basalt  | Gypseous Shale, Calcareous SST with Belemnites   |
| Olivine Basalt                                      | Miliolite Limestone                              |
| Basic Rock  | Sandstone  |
| Dolerite  | Sandstone, Shale Intercalated                    |
| Feldspathic Sandstone and Grit                      | SST, Shale, Siltstone with Abundant Trace Fossil |
| Feldspathic Sandstone, Shale with Ammonite Fossils  | Gypseous Shale, Marl. Oolitic Limestone          |
| Ferruginous Sandstone and Grit                      | Fossiliferous Oolitic Limestone and Shale        |
| Fossiliferous Calc SST. Limestone, Siltstone & CONG |  |

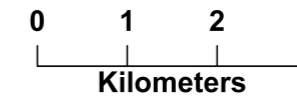
# Proposed Block Boundary of Wandhaya Block over Land Use and Land Cover



## PLATE 6



SCALE  
1:50,000



## Legend

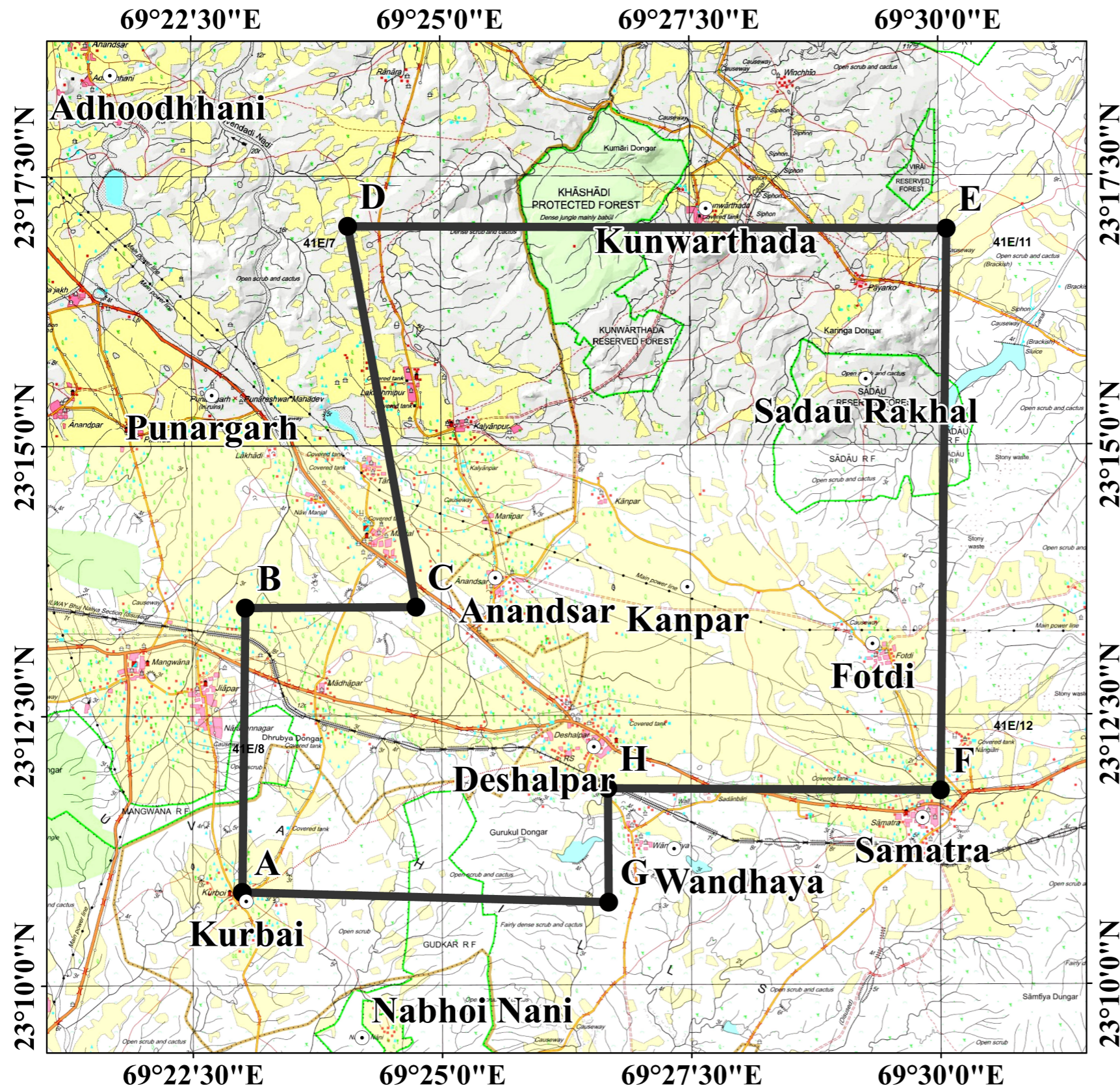
- Known Locations
- Corner Points
- Wandhaya Block

## LULC Classes

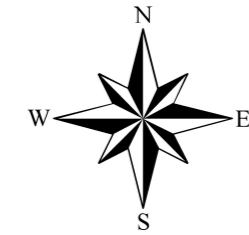
- Water
- Vegetation
- Flooded Vegetation
- Crop
- Built-Up
- Barren Land
- Rangeland



# Proposed Block Boundary of Wandahay Block over Topographic Map on 1:50k






**PLATE 7**



**SCALE**  
1:50,000



## Legend

-  **Known Locations**
-  **Corner Points**
-  **Wandhaya Block**

