

कार्यालय वन मण्डलाधिकारी दन्तेवाड़ा वनमण्डल, दन्तेवाड़ा (छ.ग.)

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क्रमांक/क.त.अ./ 7968

दन्तेवाड़ा, दिनांक 19/06/2017

प्रति,

अपर प्रधान मुख्य वनसंरक्षक

(भू-प्रबंध)

छ.ग. रायपुर

**विषय :- Registration of FC online application in respect of slurry pipe line Project.
Associated facilities for diversion of 7.116 Ha. of forest land at Bacheli.**

**संदर्भ :- महाप्रबंधक स्लरी पाईप लाईन प्रोजेक्ट गीदम रोड़, जगदलपुर का पत्र क्रमांक/HO/DGPS/SPL
Project / Associate Facilities दिनांक 14.06.2017**

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उपरोक्त विषयातर्गत संदर्भित पत्र के माध्यम से महाप्रबंधक स्लरी पाईप लाईन प्रोजेक्ट जगदलपुर द्वारा स्लरी पाईप लाईन **Associated facilities** के लिए वन संरक्षण अधिनियम 1980 के तहत प्रकरण तैयार करने हेतु रकबा 7.116 हैं. क्षेत्र का डी.जी.पी.एस सर्वे किया जाकर गूगल मेप एवं के.एम.एल फाईल प्रस्तुत किया गया है।

अतः **DGPS survey Report** का गूगल मेप एवं **KML File** की 01 प्रति संलग्न है, अतः वनसंरक्षण अधिनियम 1980 के अन्तर्गत होने के फलस्वरूप पंजीयन आबंटन करने हेतु अनुरोध है।.

संलग्न :- उपरोक्तानुसार (KML File)।

वनमण्डलाधिकारी

दन्तेवाड़ा वनमण्डल, दन्तेवाड़ा

क्रमांक/क.त.अ./

दन्तेवाड़ा, दिनांक /06/2017

प्रतिलिपि :- 1. मुख्य वनसंरक्षक जगदलपुर वृत्त जगदलपुर की ओर उपरोक्त विषयांकित से संबंधित **DGPS SURVAY REPORT** एवं **KML File** संलग्न कर आवश्यक कार्यवाही हेतु संप्रेषित।

संलग्न :- उपरोक्तानुसार (KML File)।

2. सहायक महाप्रबंधक, स्लरी पाईप लाईन प्रोजेक्ट गीदम रोड़, जगदलपुर की ओर सूचनार्थ।

वनमण्डलाधिकारी

दन्तेवाड़ा वनमण्डल, दन्तेवाड़ा

**DGPS Survey report of Conveyor Gallery and its Associated Facilities
for Laying Beneficiation Plant for an area of 7.116 Ha Forest Land
falling in Dantewada Forest Division at Bacheli, South Bastar,
Dist. Dantewada, CG.**



DGPS SURVEY AND GIS MAPPING DONE BY:



Geotrax International Services

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Report Prepared For:



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वन मण्डलाधिकारी
दन्तेवाड़ा वन मण्डल
दन्तेवाड़ा

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1. Introduction and Background

1.1 Background

NATIONAL MINERAL DEVELOPMENT CORPORATION, incorporated in 1958 as a Government of India fully owned public enterprise. NMDC is under the administrative control of the Ministry of Steel, Government of India.

NMDC is setting up of Slurry Pipe line project involving construction of ore processing plant at Bacheli and Slurry pipe line for transportation of ore concentrate from Kirandul to Nagarnar. Conveyor gallery, slime/concentrate pipelines are associated requirements of slurry pipeline project.

NMDC Proposed to undertake DGPS Survey of slurry pipe line project associated facilities of conveyor gallery, Iron ore concentrate pipe lines and tailing dam pipe lines falling in forest compartment no 1843, 1844 and 1845 for an area of 7.116 Ha forest land falling in Bacheli Reserve Forest, Dantewada Division, South Bastar, Dist.Dantewada, CG .

1.2 Guidelines for Forest Area proposed to be diverted

As per directives of Indian Bureau of Mines circular 2/2010 submission of Geo-reference map is a basic requirement which is enclosed along with the Mining Plan / Scheme of Mining / Progressive Mine Closure Plan and Scheme of Prospecting.

Also, Ministry of Environment & Forests (MoEF) dated 8th July 2011; all applications for Forest Diversion, under Forest Conservation Act, 1980 must be accompanied with Geo-referenced shape file, showing the boundary of the proposed area (both soft copy and hard copy maps), prepared using Differential GPS (DGPS) and the same should be uploaded to MoEF website along with the online application.

To meet the requirements of IBM & MoEF, NMDC Limited entrusted the DGPS survey work to M/s Geotrax International Services, Raipur (B.O), which is an empanelled agency of Directorate of Geology and Mines, Chhattisgarh (Ref. Circular No. F-7-14/2013/12, dated. 10.11.2014).



2. Scope of Work

1. Establishment of one base station for DGPS Survey and temporary benchmarks.
2. Fixation of Corridor boundary point/location by DGPS (Boundary point fixed at 50m interval & at every corner and turning point.
3. Data processing and Interpretation
 - a. Geo-referencing of SOI Toposheet (1:50000), Forest Stock map (1:15000, if available) and satellite imagery
 - b. Creation of Corridor boundary vector map using the DGPS Surveyed data
 - c. Superimposition of Corridor boundary polygon layer on Georeferenced forest maps, SOI Toposheet and Satellite imagery.
 - d. Preparation of Geo-referenced map at 1:15000 scale, and at 1:50000 scale.
 - e. Preparation of DGPS survey report along with soft copy of – maps in shapefile format and kml file
4. Printing of report and Geo-referenced maps (7sets) and Technical compliance.

3. Deliverables

The deliverables envisaged for the assignment are described below

1. Post processed DGPS observations data as well as raw data in Excel format.
2. DGPS Reports - Base line & network adjustment report for the primary and temporary benchmarks.
3. Geo-referenced SOI map & forest block maps (for PF/RF areas, if any) based on DGPS observations.
4. Geo-reference shape file (Soft copy) of showing mining lease boundary
5. Area statement as per DGPS Survey showing proposed Corridor area,
6. DGPS Survey and mapping report



4. Brief description of the Technical approach

4.1 Input Data

National Mineral Development Corporation Limited of provided the Corridor demarcation on Map. The other maps such as SOI Toposheet & Forest Map required for geo-referencing were provided to M/s Geotrax International Services.

4.2 Planning DGPS Survey

Based on the input data (maps, & other details) and information provided given by NMDC, the DGPS base station established by NMDC on roof top of site office of Deposit-14, is used as Primary Control Point (PCP). The PCP coordinates were provided to us by NMDC. Secondary control point (SCP) is planned Bacheli Railway Station Roof (Bacheli, Dist – Dantewada).

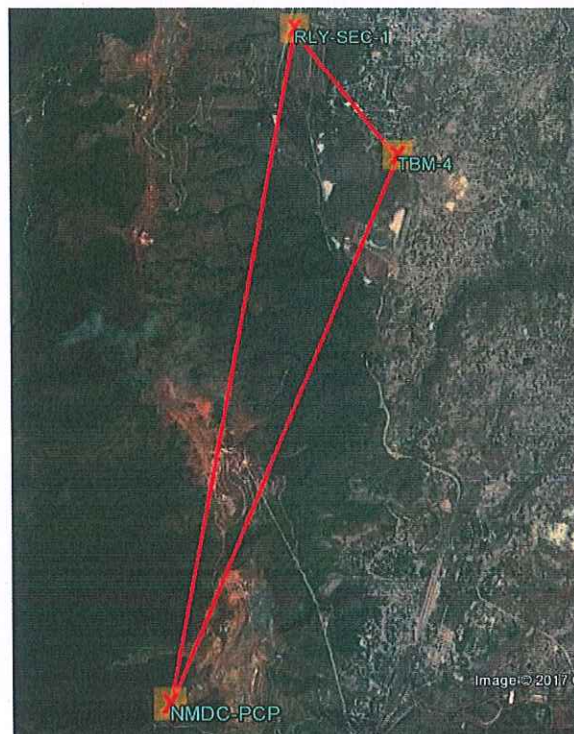


Fig-1: Satellite Image showing the location of PCP, SCP & TBM 4



4.3 Establishment of Primary Control Point

The Primary Control Point (PCP) coordinates were provide by NMDC. Geotrax has also carried DGPS observation for 72 hours at the same PCP location. As per Survey of India (SOI) Guideline, the PCP is to be fixed through continuous observation for 72 hours duration. The observed data was processed with reference to the data of International GNSS Service (IGS) stations as per SOI guideline (IGS processed report is enclosed as Annexure-1). The coordinate of the PCP after processing 72hrs data is as follows:

Latitude: $18^{\circ}37'34.88169''\text{N}$, Longitude: $81^{\circ}13'50.72103''\text{E}$

Ellipsoidal Height: 996.689 m.

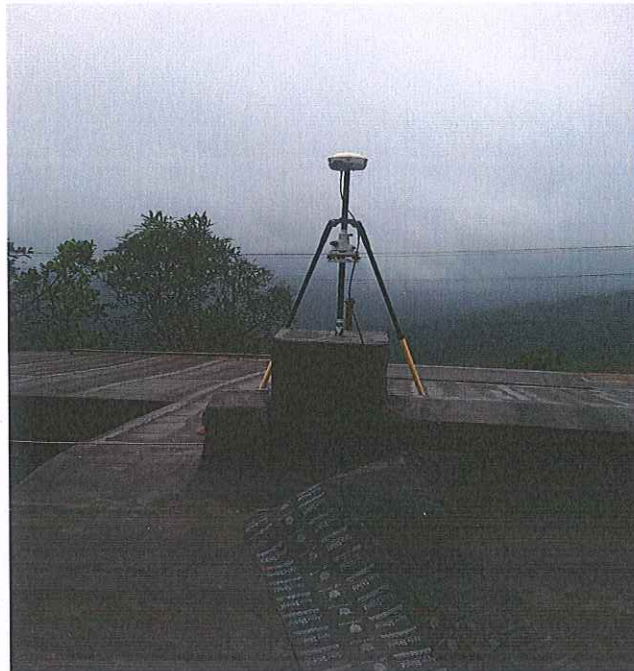


Fig-2: Picture showing the location of the PCP





Fig-4: Picture showing the location of the TBM (TBM-4)

4.5 DGPS Survey method to stake out the lease Boundary

DGPS survey was carried out using a pair of DGPS instrument. One DGPS Instrument was used as Base Station and the other is used as a Rover. The temporary bench marks are established w.r.t the SCP with the Real Time Kinematic (RTK) Survey method. The distance between Base Station and TBM was always less than 5km.

Conveyor Corridor & Pipe Line Corridor survey was conducted in Real Time Kinematic (RTK) mode. The Survey team carried out DGPS Survey by walking along the Conveyor Corridor & Pipeline Corridor. For Geo-referencing forest maps around at least 5 GCPs were collected.

During the survey start and end of the forest patch was identified in the field with the help of staff from the forest department. The forest department staff also provided information regarding the forest range, nearby compartment etc.

4.6 Creation of Conveyor Corridor, Pipeline Corridor layer

The surveyed points captured through DGPS were plotted in the GIS Software and the Polygon and Polyline layers are created using the DGPS Surveyed points. Different layers such as the Conveyor Corridor (CC), Online Slime Pipeline (OP), Pipeline Entering Plot (PEP) & Tailing Pipeline Corridor (TPC) in polygon etc. The

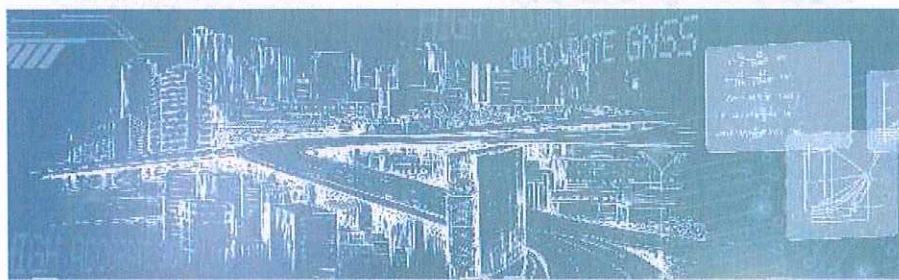
vector layers prepared are then super-imposed on the Geo-referenced Forest map and SOI Toposheet.

4.7 Specification of DGPS Equipment

Geotrax deployed the most advance and hi-precision devices to carry out the DGPS survey. The DGPS performance specifications are given below. The corresponding fact sheets are placed below for ready reference.

COMNAV

T300 GNSS Receiver



Features

- Ultra small
- Super light
- Many user-friendly conveniences built in
- GPS L1/L2/L5, BeiDou B1/B2/B3, GLONASS L1/L2
- Low power consumption
- Support long baseline E-RTK

RTK robust enough for challenging environments, in a device that is light and easy to carry

With decades of experience in the surveying GNSS receiver, the T300 is a product which combines lots of market proved advantages together. It can track all the working GNSS constellations. By using ComNav's unique QUAN™ algorithm technology, it can function in RTK mode with all the GNSS constellations or by using any single GNSS constellation such as GLONASS or BeiDou. The strong anti-interference ability of the receiver makes it possible to work in any environment.

Design driven to improve user experience

Our R&D people are always thinking about how to improve the physical experience of users and workflow in the field. With this in mind, the T300 integrates a cutting edge GNSS board, Bluetooth®, UHF (Rx&Tx) into a compact board. Smart design makes the T300 the lightest and smallest (volume) receiver in the world.

Hot swap battery design

Extending the field working time is also a passion for our R&D people. They do lots of tests and analysis to reduce the power consumption, and make the whole system work more efficiently. In parallel, they've designed in the capability to hot swap the battery source. When the warning sounds and LED flashes, put your second battery in place. Then recharge the first while you keep working.

Consumer grade batteries... always available

Losing power in the field is significantly inconvenient for users, as the batteries for GNSS receivers are often unusual types and not readily available. Once again our R&D people developed a solution so that the T300 runs on normal consumer batteries.



Technical Specifications

T300

Signal Tracking

- 256 channels with simultaneously tracked satellite signals
- GPS: L1 C/A, L1 C, L2 P, L5
- BeiDou: B1, B2, B3
- GLONASS: L1, L2
- SBAS: WAAS, EGNOS, MSAS, GAGAN

Performance Specifications

- Cold start: <50 s
- Warm start: <30 s
- Hot start: <15 s
- Initialization time: <10 s
- Singal re-acquisition: <2 s
- Initialization reliability: >99.9%

Positioning Specifications

- Post Processing Static
 - Horizontal: 2.5 mm + 0.5 ppm RMS
 - Vertical: 5 mm + 0.5 ppm RMS
- Real Time Kinematic
 - Horizontal: 8 mm + 1 ppm RMS
 - Vertical: 15 mm + 1 ppm RMS
- E-RTK¹ (baseline<100 km)
 - Horizontal: 0.2 m + 1 ppm RMS
 - Vertical: 0.4 m + 1 ppm RMS
- Code differential GNSS positioning
 - Horizontal: 0.25 m + 1 ppm RMS
 - Vertical: 0.5 m + 1 ppm RMS
- SBAS: Typically <1 m 3D RMS
- Standalone: <1.5 m 3D RMS

Communications and Memory

- 1 Serial port (7 pin Lemo).
- Baud rates up to 921,600 bps.
- Radio modem: Tx/Rx with full frequency range from 410-470 MHz²
 - Transmit power: 0.5-2W adjustable
 - Range: 1-4 km
- Position data output rates: 1 Hz, 2 Hz, 5 Hz, 10 Hz
- 5 LEDs (indicating Power, Satellite Tracking, Bluetooth[®] and Differential Data)
- Bluetooth[®]: V 2.X protocol, work compatible with Windows 7, Windows mobile and Android

Data Format

- Correction data I/O:
 - RTCM 2.x, 3.x, CMR (GPS only), CMR+ (GPS only).
- Position data output:
 - ASCII: NMEA-0183 GSV, RMC, HDT, VHD, GGA, GSA, ZDA, VTG, GST, PJK, PTNL
 - ComNav Binary update to 20 Hz

Physical

- Size(W×H): 15.8 cm × 7.5 cm
- Weight: 0.95 kg (include 2 batteries)

Environmental

- Operating temperature: -40 °C to +65 °C (40 °F to 149 °F)
- Storage temperature: -40 °C to +85 °C (40 °F to 185 °F)
- Humidity: 100% condensation
- Waterproof and dust proof: IP67 protected from temporary immersion to depth of 1 meter, floats
- Shock: survives a 2 meter drop on to concrete

Electrical

- Input Voltage: 5-27 VDC
- Power consumption: 2.85 W (3 constellations)³
- Li-ion battery capacity: 2 × 1800 mAh, up to 8 hours typically
- Memory: 256 MB internal with up to 16 GB pluggable memory card

Software

- ComNav field data collection software CGSurvey
- Carlson's SurvCE field data collection software (optional)
- MicroSurvey's FieldGenius field data collection software (optional)

- 1 E-RTK, BeiDou B3 signal used in RTK calculate engine; concern the current situation, this mode can be used in APAD.
- 2 410-470 MHz, 3 frequency range, 410-430, 430-460, 460-470, need to clarify when place the order.
- 3 Power consumption will increase if using internal radio modem transmitter.

Specifications subject to change without notice.
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5. Results

The total RF Land area proposed for diversion is 7.116 Ha. DGPS Survey co-ordinates of Conveyor Corridor (CC), Online Slime Pipeline (OP), Pipeline Entering Plot (PEP) & Tailing Pipeline Corridor (TPC) are in Annexure-1, and the geo-referenced maps are in Annexure - 2, 3 & 4. Area Statement along with Forest compartment wise detail is shown below:

AREA STATEMENT

SL. NO.	DIVISION	RANGE	COMPARTMENT TYPE	COMPARTMENT NO.	NAME OF MAJOR UNIT	AREA (In Hect)
1	Dantewada	Bachel	Reserve Forest	1843	Conveyor Corridor (CC)	1.545
2				1843	Online Slime Pipeline (OP)	2.511
3				1844	Pipeline Entering Plot (PEP)	2.010
4				1845	Tailing Pipeline Corridor (TPC)	1.050
TOTAL FOREST AREA (In Hectares)						7.116

6. Background of Organization

6.1 Company Profile: Geotrax

Geotrax International Services (www.geotrax.in) is a Professional Land Mapping and Services provider across India established in the year 1999. During the last 14+ years, we had an opportunity to execute a variety of surveying jobs all over India and in the Middle East to various customer specifications for RIS, LIS, and Municipal GIS oriented jobs. Cadastral Surveys using ETS/DGPS and Provision of Ground control conforming to stringent accuracy standards using high end instruments as RTK/GPRS DGPS is our specialty. We also have a UAV (Drone) and Ground Penetrating Radar (on Roaster).

Geotrax is headed by Mr. V.V.S Bandhakavi (Ex-Survey of India employee) who has more than 40+ years' experience in the field of surveying in India and abroad.



Some of our major clients include:

- Odisha Space Application Centre (ORSAC)
- Steel Authority of India (SAIL)
- National Thermal Power Corporation (NTPC)
- Survey Settlement and Land Records Department (Govt. Of Gujarat)
- Survey Settlement and Land Records Department (Govt. Of Madhya Pradesh)
- Irrigation Dept. (Govt. of Jammu and Kashmir)
- National Remote Sensing Agency (Hyderabad)
- Meinhardt India Private Limited (Delhi),
- Nagarjuna Construction Company (NCC, Hyderabad)
- Consulting Engineering Services (CES, New Delhi)
- Lee Associates of South Asia (LASA, Delhi)
- Power development Corporation (Govt. of Jammu and Kashmir)

Geotrax expertise covers:

- ❖ DGPS Surveys for Mining lease boundary, and Forest Diversion
- ❖ Consultancy services for Mining Plan & EIA
- ❖ Boundary and cadastral surveys using DGPS and Total station;
- ❖ Topographic surveys.
- ❖ Ground control surveys for photogrammetric projects, including Airborne GPS.
- ❖ Only one of the two companies in India who are empanelled by NRSA for DGPS survey for ground control point collection
- ❖ Route and alignment surveys combining conventional and photogrammetric methods.
- ❖ Construction and cross-section surveys (from road design to precision layout and quality control).

Being a client focused organization, Geotrax's combination of survey equipment, personnel, and computer resources allow for the tailoring of the project approach to match the orders of accuracy and precision requirements for each project. Geotrax's equipment resources include 250 DGPS, 33 hand-held GPS units, theodolites, electronic digital and automatic levels, 19 Electronic Total Stations, and data collectors.

On the mapping side, our CAD and GIS professionals assist the survey projects by creating accurate maps. We have dedicated CAD experts who have extensive experience with different CAD software.



7. Annexure

7.1 Annexure-1: DGPS Survey coordinates of the pillars fixed at Conveyor Corridor (CC), Online Slime Pipeline (OP), Pipeline Entering Plot (PEP) & Tailing Pipeline Corridor (TPC).

Sr. No.	Pillar Id	Easting (m)	Northing (m)	Latitude "N"	Longitude "E"	Remarks
1	1	525594.747	2066477.272	18°41'21.81120"	81°14'33.83880"	Conveyor Corridor(CC)
2	2	525590.018	2066508.922	18°41'22.84080"	81°14'33.68040"	Conveyor Corridor(CC)
3	2-A	525568.8348	2066522.108	18°41'23.26920"	81°14'32.95680"	Conveyor Corridor(CC)
4	2-B	525526.5838	2066548.844	18°41'24.14040"	81°14'31.51680"	Conveyor Corridor(CC)
5	2-C	525484.3329	2066575.581	18°41'25.01520"	81°14'30.07320"	Conveyor Corridor(CC)
6	2-D	525442.0082	2066602.2	18°41'25.88280"	81°14'28.62960"	Conveyor Corridor(CC)
7	2-E	525399.3945	2066628.355	18°41'26.73600"	81°14'27.17880"	Conveyor Corridor(CC)
8	2-F	525356.7808	2066654.509	18°41'27.58560"	81°14'25.72440"	Conveyor Corridor(CC)
9	9(CC04)	525314.1672	2066680.664	18°41'28.43880"	81°14'24.27000"	Conveyor Corridor(CC) & Online Slime Pipeline(OP)
10	8	525282.5074	2066700.599	18°41'29.09040"	81°14'23.19000"	Conveyor Corridor(CC) & Online Slime Pipeline(OP)
12	8-A	525254.0203	2066718.238	18°41'29.66640"	81°14'22.21800"	Online Slime Pipeline(OP)
11	8-B	525211.5096	2066744.56	18°41'30.52320"	81°14'20.76720"	Online Slime Pipeline(OP)
13	3	525167.596	2066771.75	18°41'31.40880"	81°14'19.26960"	Conveyor Corridor(CC)
14	4	525158.554	2066743.769	18°41'30.50160"	81°14'18.96000"	Conveyor Corridor(CC)
15	4-A	525179.9153	2066730.225	18°41'30.05880"	81°14'19.68720"	Conveyor Corridor(CC)
16	4-B	525216.78	2066706.849	18°41'29.29560"	81°14'20.94720"	Conveyor Corridor(CC)
17	4-C	525259.0066	2066680.074	18°41'28.42440"	81°14'22.38720"	Conveyor Corridor(CC)
18	4-D	525301.2372	2066653.305	18°41'27.54960"	81°14'23.82720"	Conveyor Corridor(CC)
19	4-E	525343.468	2066626.536	18°41'26.67840"	81°14'25.26720"	Conveyor Corridor(CC)
20	4-F	525385.6988	2066599.768	18°41'25.80360"	81°14'26.70720"	Conveyor Corridor(CC)
21	4-G	525427.9296	2066572.999	18°41'24.93240"	81°14'28.15080"	Conveyor Corridor(CC)
22	4-H	525470.4473	2066546.689	18°41'24.07560"	81°14'29.59800"	Conveyor Corridor(CC)
24	4-I	525512.9832	2066520.408	18°41'23.21880"	81°14'31.04880"	Conveyor Corridor(CC)
23	4-J	525555.5192	2066494.127	18°41'22.35840"	81°14'32.50320"	Conveyor Corridor(CC)
25	CC01	525570.996	2066484.564	18°41'22.04880"	81°14'33.02880"	Conveyor Corridor(CC)
26	5	525001.513	2066779.828	18°41'31.67880"	81°14'13.59960"	Online Slime Pipeline(OP)
27	5-A	525048.1133	2066796.373	18°41'32.21520"	81°14'15.19080"	Online Slime Pipeline(OP)
28	5-B	525095.2316	2066813.102	18°41'32.75880"	81°14'16.80000"	Online Slime Pipeline(OP)
29	5-C	525142.3499	2066829.831	18°41'33.30240"	81°14'18.40920"	Online Slime Pipeline(OP)
30	6	525191.806	2066847.39	18°41'33.87120"	81°14'20.10120"	Online Slime Pipeline(OP)
31	6-A	525227.5821	2066816.115	18°41'32.85240"	81°14'21.32160"	Online Slime Pipeline(OP)
32	7	525264.822	2066783.559	18°41'31.79040"	81°14'22.58880"	Online Slime Pipeline(OP)
33	7-A	525275.3587	2066734.134	18°41'30.18120"	81°14'22.94880"	Online Slime Pipeline(OP)
34	9-A	525304.2418	2066736.345	18°41'30.25320"	81°14'23.93520"	Online Slime Pipeline(OP)
35	10	525294.394	2066791.59	18°41'32.04960"	81°14'23.60040"	Online Slime Pipeline(OP)
36	10-A	525262.3375	2066821.347	18°41'33.01800"	81°14'22.50600"	Online Slime Pipeline(OP)
	OP07	525225.692	2066855.363	18°41'34.12680"	81°14'21.25680"	Online Slime Pipeline(OP)
		525206.391	2066891.668	18°41'35.31120"	81°14'20.60160"	Online Slime Pipeline(OP)



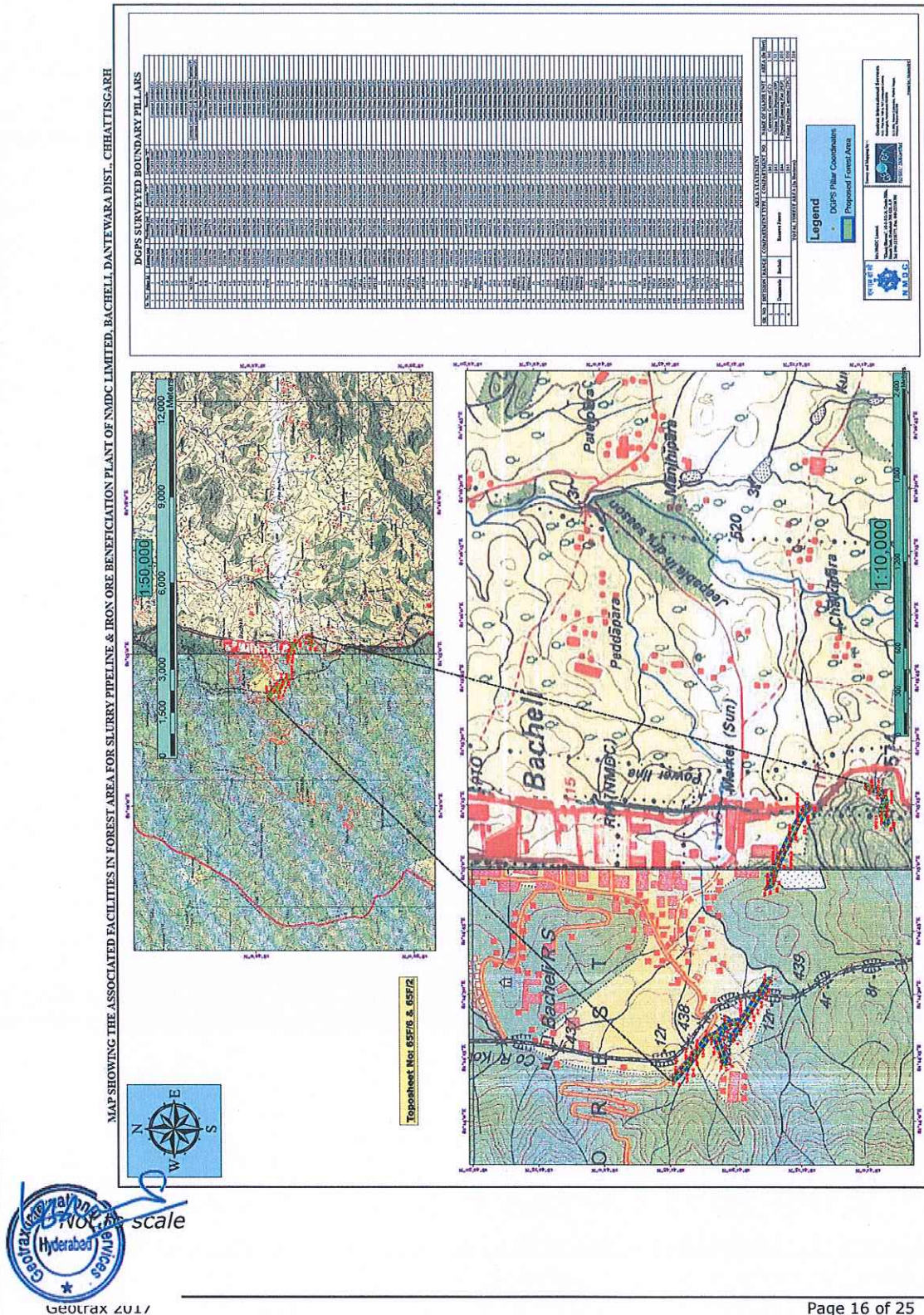
Sr. No.	Pillar Id	Easting (m)	Northing (m)	Latitude "N"	Longitude "E"	Remarks
39	12	525199.607	2066927.618	18°41'36.48120"	81°14'20.37120"	Online Slime Pipeline(OP)
40	12-A	525159.8034	2066957.879	18°41'37.46760"	81°14'19.01400"	Online Slime Pipeline(OP)
41	12-B	525120.0001	2066988.139	18°41'38.45400"	81°14'17.65320"	Online Slime Pipeline(OP)
42	OP10	525080.975	2067017.808	18°41'39.41880"	81°14'16.32480"	Online Slime Pipeline(OP)
43	OP10-A	525050.2315	2067041.181	18°41'40.18200"	81°14'15.27360"	Online Slime Pipeline(OP)
44	OP11	525018.763	2067065.104	18°41'40.95960"	81°14'14.20080"	Online Slime Pipeline(OP)
45	OP11-A	524990.4744	2067091.534	18°41'41.82360"	81°14'13.23600"	Online Slime Pipeline(OP)
46	OP11-B	524953.9387	2067125.668	18°41'42.93600"	81°14'11.99040"	Online Slime Pipeline(OP)
47	OP11-C	524917.403	2067159.802	18°41'44.04840"	81°14'10.74480"	Online Slime Pipeline(OP)
48	13	524894.955	2067180.775	18°41'44.72880"	81°14'09.98160"	Online Slime Pipeline(OP)
49	14	524880.344	2067154.939	18°41'43.89000"	81°14'09.48120"	Online Slime Pipeline(OP)
50	14-A	524909.1799	2067127.8	18°41'43.00440"	81°14'10.46400"	Online Slime Pipeline(OP)
51	14-B	524945.5905	2067093.532	18°41'41.88840"	81°14'11.70600"	Online Slime Pipeline(OP)
52	14-C	524982.001	2067059.265	18°41'40.77240"	81°14'12.94800"	Online Slime Pipeline(OP)
53	OP14	524999.309	2067043.039	18°41'40.24320"	81°14'13.53840"	Online Slime Pipeline(OP)
54	OP14-A	525040.3606	2067012.716	18°41'39.25680"	81°14'14.93520"	Online Slime Pipeline(OP)
55	OP15	525075.574	2066986.705	18°41'38.40720"	81°14'16.13760"	Online Slime Pipeline(OP)
56	OP15-A	525100.878	2066968.015	18°41'37.79880"	81°14'17.00160"	Online Slime Pipeline(OP)
57	OP15-B	525141.0961	2066938.308	18°41'36.83040"	81°14'18.37320"	Online Slime Pipeline(OP)
58	15	525172.677	2066914.981	18°41'36.07080"	81°14'19.44960"	Online Slime Pipeline(OP)
59	16	525175.656	2066877.796	18°41'34.86120"	81°14'19.55040"	Online Slime Pipeline(OP)
62	16-A	525134.3905	2066861.974	18°41'34.34640"	81°14'18.13920"	Online Slime Pipeline(OP)
61	16-B	525088.6809	2066844.449	18°41'33.77760"	81°14'16.58040"	Online Slime Pipeline(OP)
60	16-C	525035.2897	2066823.978	18°41'33.11520"	81°14'14.75520"	Online Slime Pipeline(OP)
63	17	524993.86	2066808.093	18°41'32.60040"	81°14'13.34040"	Online Slime Pipeline(OP)
64	18	526216.243	2066507.324	18°41'22.76160"	81°14'55.06080"	Pipeline Entering Plot(PEP)
65	18-A	526235.5904	2066497.133	18°41'22.42680"	81°14'55.71960"	Pipeline Entering Plot(PEP)
66	PEP02	526256.955	2066485.88	18°41'22.05960"	81°14'56.45040"	Pipeline Entering Plot(PEP)
67	19	526292.152	2066473.006	18°41'21.63840"	81°14'57.64920"	Pipeline Entering Plot(PEP)
68	PEP04	526331.96	2066464.136	18°41'21.35040"	81°14'59.01000"	Pipeline Entering Plot(PEP)
69	PEP04-A	526370.3557	2066448.717	18°41'20.84640"	81°15'00.32040"	Pipeline Entering Plot(PEP)
70	20	526408.196	2066433.521	18°41'20.34960"	81°15'01.60920"	Pipeline Entering Plot(PEP)
71	20-A	526443.672	2066415.96	18°41'19.77720"	81°15'02.81880"	Pipeline Entering Plot(PEP)
72	20-B	526488.4825	2066393.779	18°41'19.05360"	81°15'04.34880"	Pipeline Entering Plot(PEP)
73	20-C	526533.293	2066371.597	18°41'18.33000"	81°15'05.87880"	Pipeline Entering Plot(PEP)
74	20-D	526578.1035	2066349.416	18°41'17.60640"	81°15'07.40520"	Pipeline Entering Plot(PEP)
75	20-E	526622.914	2066327.234	18°41'16.88280"	81°15'08.93520"	Pipeline Entering Plot(PEP)
76	PEP06	526659.233	2066309.256	18°41'16.29600"	81°15'10.17360"	Pipeline Entering Plot(PEP)
77	PEP06-A	526703.364	2066282.823	18°41'15.43200"	81°15'11.67840"	Pipeline Entering Plot(PEP)
78	PEP06-B	526744.4477	2066258.215	18°41'14.62920"	81°15'13.08240"	Pipeline Entering Plot(PEP)
79	PEP06-C	526780.3362	2066236.718	18°41'13.93080"	81°15'14.30640"	Pipeline Entering Plot(PEP)
80	21	526815.641	2066215.572	18°41'13.23960"	81°15'15.50880"	Pipeline Entering Plot(PEP)
81	22	526798.102	2066190.959	18°41'12.44040"	81°15'14.91120"	Pipeline Entering Plot(PEP)
	22-A	526757.4272	2066214.375	18°41'13.20360"	81°15'13.52160"	Pipeline Entering Plot(PEP)



Sr. No.	Pillar Id	Easting (m)	Northing (m)	Latitude "N"	Longitude "E"	Remarks
83	22-B	526714.0948	2066239.321	18°41'14.01720"	81°15'12.04560"	Pipeline Entering Plot(PEP)
84	22-C	526670.7625	2066264.267	18°41'14.83080"	81°15'10.56600"	Pipeline Entering Plot(PEP)
85	PEP09	526645.709	2066278.69	18°41'15.30240"	81°15'09.71280"	Pipeline Entering Plot(PEP)
86	PEP09-A	526612.7108	2066295.552	18°41'15.85320"	81°15'08.58600"	Pipeline Entering Plot(PEP)
87	PEP09-B	526574.495	2066315.081	18°41'16.49040"	81°15'07.28280"	Pipeline Entering Plot(PEP)
88	PEP09-C	526533.6147	2066335.971	18°41'17.17080"	81°15'05.88600"	Pipeline Entering Plot(PEP)
89	PEP09-D	526487.9723	2066359.295	18°41'17.93040"	81°15'04.33080"	Pipeline Entering Plot(PEP)
90	PEP09-E	526440.4625	2066383.573	18°41'18.72240"	81°15'02.71080"	Pipeline Entering Plot(PEP)
91	23	526393.881	2066407.376	18°41'19.50000"	81°15'01.11960"	Pipeline Entering Plot(PEP)
92	23-A	526358.3069	2066421.536	18°41'19.96080"	81°14'59.90640"	Pipeline Entering Plot(PEP)
93	PEP11	526323.688	2066435.316	18°41'20.41080"	81°14'58.72560"	Pipeline Entering Plot(PEP)
94	PEP11-A	526305.0923	2066439.262	18°41'20.54040"	81°14'58.08840"	Pipeline Entering Plot(PEP)
95	24	526285.164	2066443.491	18°41'20.68080"	81°14'57.41160"	Pipeline Entering Plot(PEP)
96	24-A	526263.2783	2066451.651	18°41'20.94720"	81°14'56.66280"	Pipeline Entering Plot(PEP)
97	25	526237.395	2066461.558	18°41'21.27120"	81°14'55.78080"	Pipeline Entering Plot(PEP)
98	26	526939.85	2065793.453	18°40'59.49840"	81°15'19.73160"	Tailing Pipeline Corridor(TPC)
99	27	526929.04	2065774.075	18°40'58.86840"	81°15'19.36080"	Tailing Pipeline Corridor(TPC)
100	27-A	526922.4185	2065747.064	18°40'57.99000"	81°15'19.13400"	Tailing Pipeline Corridor(TPC)
101	27-B	526914.7182	2065715.654	18°40'56.97120"	81°15'18.86760"	Tailing Pipeline Corridor(TPC)
102	28	526909.82	2065695.674	18°40'56.31960"	81°15'18.69840"	Tailing Pipeline Corridor(TPC)
103	TPC04	526872.552	2065669.258	18°40'55.46280"	81°15'17.42760"	Tailing Pipeline Corridor(TPC)
104	TPC04-A	526848.868	2065662.466	18°40'55.24320"	81°15'16.61760"	Tailing Pipeline Corridor(TPC)
105	TPC05	526819.352	2065654.001	18°40'54.96960"	81°15'15.60960"	Tailing Pipeline Corridor(TPC)
106	TPC06	526798.984	2065658.588	18°40'55.11720"	81°15'14.91480"	Tailing Pipeline Corridor(TPC)
107	TPC07	526765.193	2065673.454	18°40'55.60320"	81°15'13.76280"	Tailing Pipeline Corridor(TPC)
108	TPC08	526741.779	2065674.339	18°40'55.63200"	81°15'12.96360"	Tailing Pipeline Corridor(TPC)
109	TPC09	526704.664	2065656.307	18°40'55.04880"	81°15'11.69280"	Tailing Pipeline Corridor(TPC)
110	29	526677.031	2065640.635	18°40'54.54120"	81°15'10.74960"	Tailing Pipeline Corridor(TPC)
111	30	526656.204	2065661.813	18°40'55.22880"	81°15'10.04040"	Tailing Pipeline Corridor(TPC)
112	TPC12	526689.638	2065683.936	18°40'55.94880"	81°15'11.18160"	Tailing Pipeline Corridor(TPC)
113	TPC12-A	526715.1332	2065695.362	18°40'56.31960"	81°15'12.05280"	Tailing Pipeline Corridor(TPC)
114	TPC13	526737.999	2065705.61	18°40'56.65080"	81°15'12.83400"	Tailing Pipeline Corridor(TPC)
115	TPC14	526767.109	2065704.687	18°40'56.61840"	81°15'13.82760"	Tailing Pipeline Corridor(TPC)
116	TPC14-A	526791.0119	2065694.242	18°40'56.28000"	81°15'14.64480"	Tailing Pipeline Corridor(TPC)
117	TPC15	526814.028	2065684.185	18°40'55.95240"	81°15'15.42960"	Tailing Pipeline Corridor(TPC)
118	TPC16	526855.88	2065694.983	18°40'56.30160"	81°15'16.85880"	Tailing Pipeline Corridor(TPC)
119	31	526885.191	2065712.235	18°40'56.85960"	81°15'17.85960"	Tailing Pipeline Corridor(TPC)
120	31-A	526890.9946	2065736.083	18°40'57.63720"	81°15'18.05760"	Tailing Pipeline Corridor(TPC)
121	31-B	526898.4716	2065766.81	18°40'58.63440"	81°15'18.31680"	Tailing Pipeline Corridor(TPC)
122	32	526904.12	2065790.021	18°40'59.39040"	81°15'18.51120"	Tailing Pipeline Corridor(TPC)
123	33	526915.222	2065810.015	18°41'00.03840"	81°15'18.88920"	Tailing Pipeline Corridor(TPC)

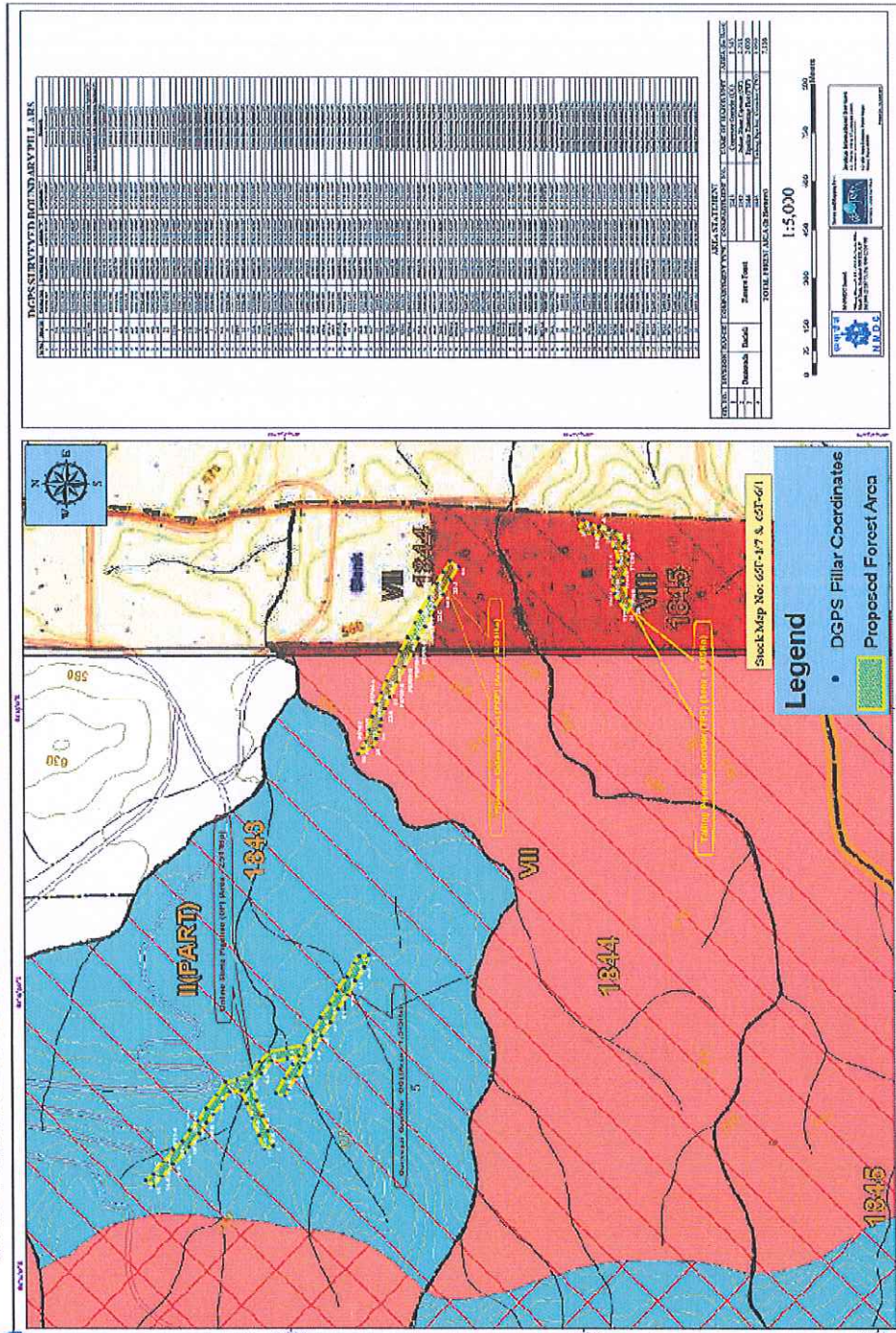


7.2 Annexure-2: DGPS Surveyed Map showing associated facilities in forest area for *SLURRY PIPELINE & IRON ORE Beneficiation Plant* of NMDC Limited on Geo-referenced SOI Map.



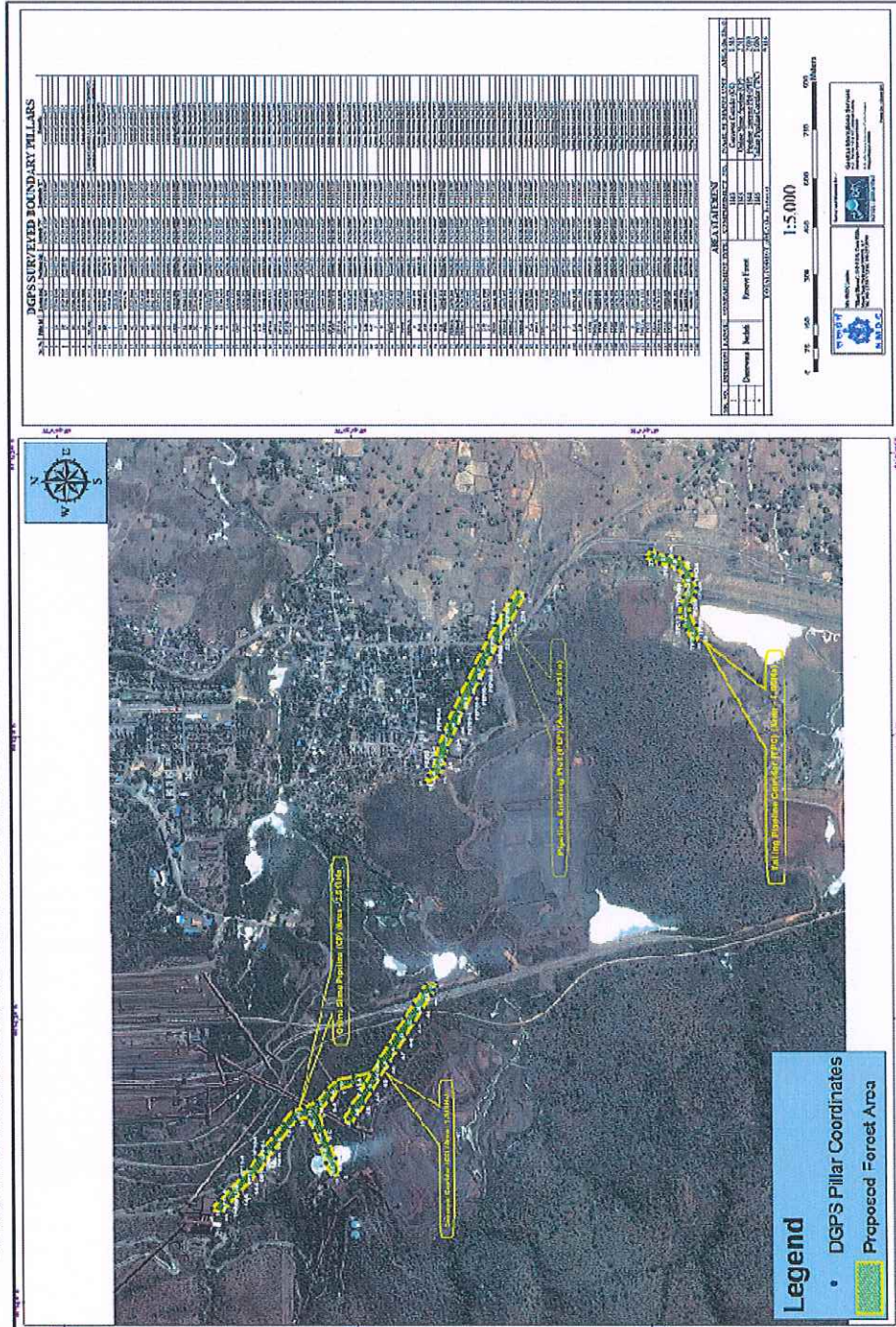
7.3 Annexure-3: DGPS Surveyed Map showing associated facilities in forest area for SLURRY PIPELINE & IRON ORE Beneficiation Plant of NMDC Limited on Geo-referenced Forest Stock Map.

MAP SHOWING THE ASSOCIATED FACILITIES IN FOREST AREA FOR SLURRY PIPELINE & IRON ORE BENEFICIATION PLANT OF NMDC LIMITED, BACHELLI DANTEWALA DIST., CHHATTISGARH

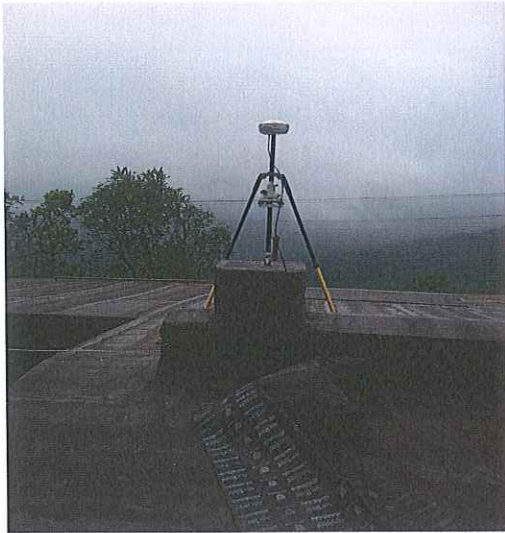


7.4 Annexure-4: DGPS Surveyed Map showing associated facilities in forest area for *SLURRY PIPELINE & IRON ORE Beneficiation Plant* of NMDC Limited on Geo-referenced Satellite Imagery.

MAP SHOWING THE ASSOCIATED FACILITIES IN FOREST AREA FOR SLURRY PIPELINE & IRON ORE BENEFICIATION PLANT OF NMDC LIMITED, BACHELL, DANTEWARA DIST., CHHATTISGARH



7.5 Field Photographs of Primary Control Point (PCP), Secondary Control Point (SCP) & Temporary Bench Marks (TBM).



7.6 Photographs of Surveyed Pillars



Geotrax ZU17







