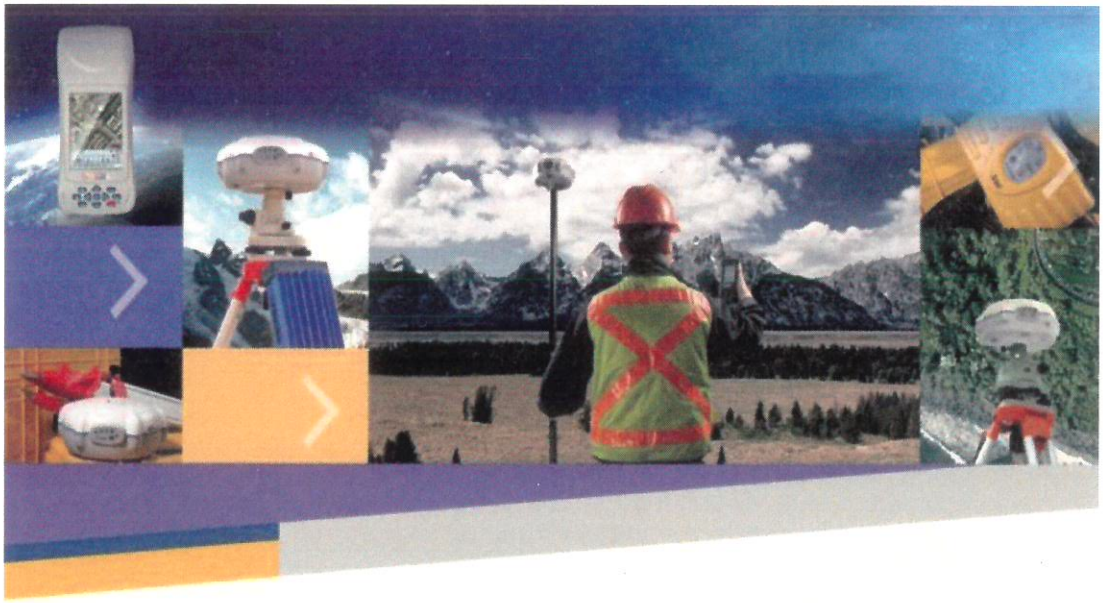
M/s Hindalco Industries Limited (HIL)

DGPS Survey report of proposed underground 11KV cable route in Forest compartment (Forest Area: 0.011 Hectares, Forest patch length-368 meters)

Survey & Demarcation of 11 KV route from Hindalco's Industries Limited 3 MW Solar power plant to Milupara substation – Total route length is 2.21 KM



April 2020

DGPS SURVEY AND GIS MAPPING DONE BY:
Geotrax International Services
Raipur, Chhattisgarh.

Dipankar Khan
Authorised Person
Gare Palma IV/5 Coal Mine
Hindalco Industries Ltd.

Table of Contents

1. Introduction and Background

1.1 Background

Gare Palma IV/4 Coal Mine and IV/5 coal mine has been vested with M/s Hindalco Industries Ltd. with effect from 23rd March 2015. As per the vesting order coal from this mine is used for captive consumption in the captive power plant of Aditya Alumina projects at Lapanga and Hindalco complex, Hirakud, Odisha.Both the mines are adjacent to each other and share many common facilities.

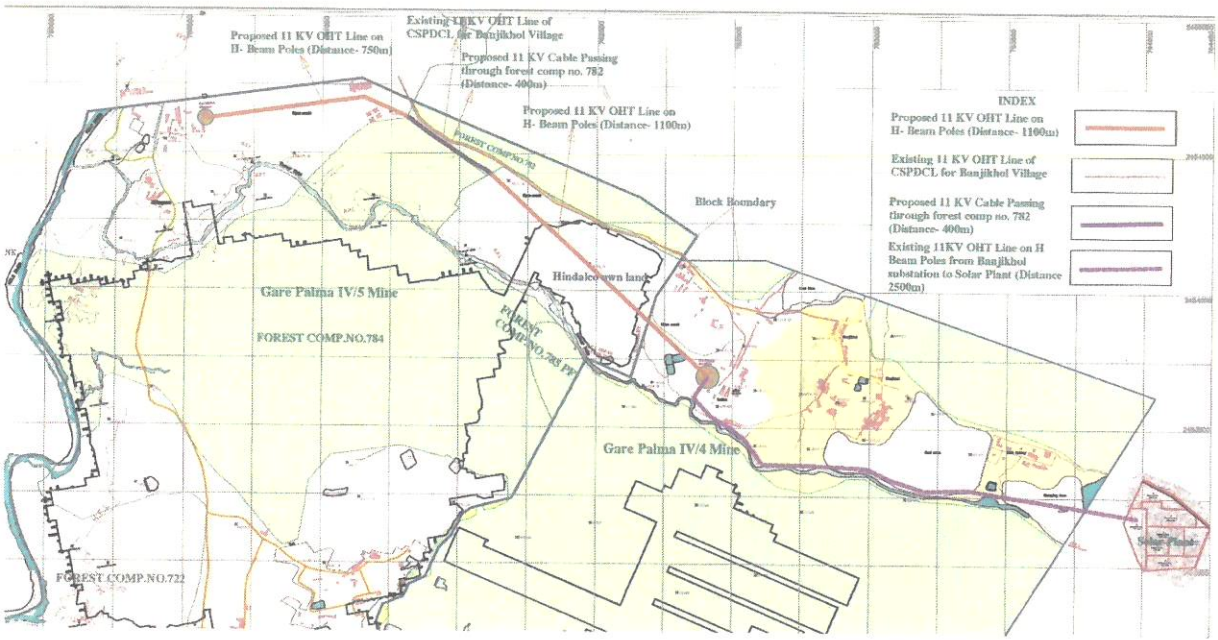
The operations at both the mines are carried out round the clock, for which we have established a 33/11 KV substation at Gare-Palms IV/5 coal mine. This substation receives the power from CSPDCL and distributes power to different location of both the mines.

As part of Green initiative, Hindalco has established a 3MW solar power plant to meet partially its power requirement. To facilitate evacuation of power generated at its captive solar power plant it is essential to have connectivity with its existing 33/11 KV substation. The solar plant is located at Gare Palma – IV/4 mine and the sub-station is located in IV/5 mine.

For transmitting solar power to the above mentioned substation, the transmission system has to be developed which will pass through the lease area of both IV/4 and IV/5. While the said route of power transmission is within the mining lease and we have surface rights over the area, a small patch of approx.. 0.011 Ha forest land in GP IV/5 is needed for laying of underground cable for a length of 372 meters.

As per the guidelines given by Ministry of Environment, Forest & Climate Change (MoEF) it is proposed to lay the cable in the forest patch Compartment RF 782 by cutting a trench of 0.3 meters wide.

1.2 Map of proposed 11 KV route



1.3 Permission Letter from DFO Raigarh for DGPS Survey

कार्यालय वनमण्डलाधिकारी, रायगढ़ वनमण्डल, रायगढ़ (छ.ग.)

☎ 07762-224426 (O), 07762-222178 (R), 07762-226047 (F) E-mail: dfo-raigarh.cg@gov.in

क्रमांक/तक.अधि./ 1105 /2020/रायगढ़, दिनांक – 27-04-2020

प्रति,

वन परिक्षेत्राधिकारी
तमनार

विषय :– **मेसर्स हिंडाल्को इण्डस्ट्रीज लिमिटेड़ द्वारा गारे पेलमा IV/4 स्थित सोलर प्लांट से गारे पेलमा IV/5 सब स्टेशन तक 11 के.व्ही. भूमिगत विद्युत पारेषण लाईन हेतु वनक्षेत्र कक्ष क्रमांक आर.एफ. 782 में डी.जी.पी.एस. सर्वे की अनुमति प्रदान करने बाबत् ।**

संदर्भः– मेसर्स हिंडाल्को इण्डस्ट्रीज लिमिटेड़ का पत्र क्रमांक/HIL/GP IV5/Forest/2020-21/003A **दिनांक 23.04.2020**

उपरोक्त विषयांतर्गत लेख है कि मेसर्स हिंडाल्कों इण्डस्ट्रीज लिमिटेड़ द्वारा गारे पेलमा IV/4 स्थित सोलर प्लांट से गारे पेलमा IV/5 सब स्टेशन तक 11 के.व्ही. भूमिगत पारेषण लाईन हेतु वनक्षेत्र के कक्ष क्रमांक 782 आर.एफ. में डी.जी.पी.एस. सर्वे कार्य किये जाने हेतु अनुमति चाही गयी है ।

अतः सुनिश्चित करें कि डी.जी.पी.एस. सर्वे कार्य वन विभाग के कर्मचारी के देख–रेख में किया जावें एवं कार्य पूर्ण होने पर प्रमाण पत्र संलग्न प्रारुप में प्रेषित करें । उक्त डी.जी.पी.एस. सर्वे कार्य में वन संपदा को किसी भी प्रकार की क्षति न पहुंचायें ।

संलग्नः– उपरोक्तानुसार ।

वनमण्डलाधिकारी
रायगढ़ वनमण्डल, रायगढ़

पृ. क्रमांक/तक.अधि./ 1106 2020/रायगढ़, दिनांक :- 27-04-2020

प्रतिलिपि सूचनार्थ एवं आवश्यक कार्यवाही हेतु :–

1. उप वनमण्डलाधिकारी, घरघोड़ा की ओर सूचनार्थ एवं आवश्यक कार्यवाही हेतु अग्रेषित ।
2. मेसर्स हिंडाल्कों इण्डस्ट्रीज लिमिटेड़ (गारे पेलमा IV/4 एवं IV/5), मिलूपारा तहसील– तमनार जिला– रायगढ़ (छ.ग.) की ओर सूचनार्थ अग्रेषित । वन विभाग की कर्मचारियों की उपस्थिति में डी.जी. पी.एस. सर्वे कार्य करावें एवं आवश्यक सहयोग प्रदान करें ।

वनमण्डलाधिकारी
रायगढ़ वनमण्डल, रायगढ़

1.4 Geotrax Empanelment Certificate in Chhattisgarh- from CGCOST

छत्तीसगढ़ विज्ञान एवं प्रौद्योगिकी परिषद
एम.आई.जी. 25, इन्द्रावती कॉलोनी, रायपुर, (छ.ग.) 492 001
Chhattisgarh Council of Science & Technology
MIG – 25, Indravati Colony, Raipur, (C.G.) 492 001
Tel : 0771-2434569 **Fax :** 2434093
E-mail : dgccost@gmail.com **Web :** www.cgcost.nic.in

Prof. M.M. Hambarde
Director General

No. 2470 **/CCOST/2026**
Date: 23/01 **/2016**

प्रति

Geotrax International Services
(Survey and Mapping Consultancy),
H/o. 23-88A,
Krishnavan Nagar, Kothipat,
Hyderabad (A.P.) 500 058,
Email: info@geotrax.in, Web: www.geotrax.in

विषय :– DGPS / GIS Services प्रदान करने हेतु Empanelment के संबंध में।

परिषद द्वारा पूर्व में DGPS / GIS Services प्रदान करने हेतु firms के empanelment हेतु EOI (Expression of Interest) बुलाये गये थे। जिसके संदर्भ में आपके द्वारा आवेदन प्रस्तुत किया गया था।

दिनांक 28.12.2015 को आपके द्वारा विषय विशेषज्ञ समिति के समक्ष दिये गये प्रस्तुतिकरण के आधार पर समिति द्वारा डीजीपीएस सर्वे कार्य हेतु आपकी संस्था का empanelment किया जाता है।

कृपया अपनी सहमति परिषद को प्रदान करने का कष्ट करें।

23.01.16
(महानिदेशक)

खनिज साधन विभाग

मंत्रालय, महानदी भवन, नया रायपुर

नया रायपुर, दिनांक 5 जून 2014

क्रमांक एफ 7-14/2013/12 —राज्य शासन एतद्द्वारा चीफ कंट्रोलर आफ माईन्स, भारतीय खान ब्यूरो, नागपुर के परिपत्र क्रमांक N-11013/3/MP/90/CCOM Vol-VII, Circular No. 2/2010, दिनांक 06-04-2010 के पैरा-02 के बिन्दु क्रमांक-02 के प्रावधान में Differential Global Positioning System (डीजीपीएस) का उपयोग करते हुए सर्वेक्षण करने के लिए नीचे तालिका के कालम नंबर-02 में दर्शित संस्थान को कालम नंबर-03 में दर्शित खनिज से संबंधित खनिज रियायतों के लिए अधिमान्यता प्रदान करता है :—

तालिका

क्र.	एजेन्सी का नाम एवं पता	अधिमान्यता का विवरण
1.	छत्तीसगढ़ विज्ञान एवं प्रौद्योगिकी परिषद्, एम.आई.जी.-25 इन्द्रावती कालोनी, रायपुर-492001 (छत्तीसगढ़)	राज्य में समस्त खनिजों की खनिज रियायतों से संबंधित डीजीपीएस सर्वे कार्य हेतु.
2.	स्टील अथॉरिटी आफ इंडिया लिमिटेड, भिलाई इस्पात संयंत्र, भिलाई-490001, जिला-दुर्ग (छत्तीसगढ़)	राज्य में स्थित स्वयं की खनिज रियायतों से संबंधित डीजीपीएस सर्वे कार्य हेतु.
3.	भारतीय सर्वेक्षण विभाग, छत्तीसगढ़ जियो-स्पेशल डाटा सेंटर, सर्वे आफ इंडिया, रीना अपार्टमेंट 3रां फ्लोर, पचपेढ़ी नाका, धमतरी रोड, रायपुर-492001 (छत्तीसगढ़)	राज्य में समस्त खनिजों की खनि रियायतों से संबंधित डीजीपीएस सर्वे कार्य हेतु.

2. अधिमान्यता प्राप्त संस्थान के लिये शर्तें :—

1. Coordinats of boundry pillars shall be established in the World Geodetic System 1984 (WGS-84) Datum.

2. Each boundry pillar shall be surved using DGPS, at least 2 Hours observation, for its ground position.

3. The maximum distance between any two successive pillars should not be more than 100 meter.

4. All corner pillar should be of pyramid shaped whith base of 1 meter and height of 2 meter and should be placed 1 mater above the ground and 1 meter below the ground.

5. Distance and bearing to the forward and backward pillars and latitudes and longitudes should be marker on all the corner pillars.

3. उपरोक्त शर्तों के अतिरिक्त निम्नलिखित शर्तों को भी शामिल किया जाना होगा :—

1. उपरोक्त बिन्दु में दर्शित कार्य के लिए खनिज रियायतधारी द्वारा अधिमान्यता प्राप्त संस्थान को भुगतान करना होगा. डीजीपीएस सर्वे कार्य हेतु पारिश्रमिक का निर्धारण अधिमान्यता प्राप्त संस्थान एवं खनिज रियायतधारी के मध्य आपसी समन्वय से किया जाएगा.

2. डीजीपीएस सर्वे के संबंध में भारतीय खान ब्यूरो/राज्य शासन द्वारा समय-समय पर जारी निर्देशों का पालन अधिमान्यता प्राप्त संस्थान को करना होगा.

3. यह अधिमान्यता इस आदेश के जारी होने से आगामी आदेश पर्यन्त प्रभावशील होगी.

छत्तीसगढ़ के राज्यपाल के नाम से तथा आदेशानुसार,
के. डी. कंजाम, उप-सचिव

2. Scope of Work

1. Using the CMPDI established base station as reference, Geotrax will establish one or more temporary benchmark control points near/inside the proposed 11 KV route.
2. DGPS Survey for collection of ground coordinates of the proposed forest patch boundary and non-forest patches.
3. Assessment of total forest area in the proposed 11 KV corridor, which includes Protected Forest area, and non-forest Revenue area.
4. Collection of revenue records (P-II) and revenue maps.
5. Preparation of village wise non-forest area statement.
6. Data processing and interpretation: -
    a. Creation of geo-referenced proposed 11 KV route boundary vector map using the DGPS Surveyed data
    b. Superimposition of 11 KV route boundary layer on Georeferenced forest maps, SOI Toposheet and Satellite imagery.
    c. Computation of total 11 KV corridor area
    d. Preparation of Geo-referenced forest map at 1:15000 scale, SOI Toposheet at 1:50000 scale and Satellite imagery map at 1:10000 scale.
    e. Preparation of DGPS survey report along with soft copy of – maps in shapefile format and kml file
7. Printing of DGPS Survey report and Georeferenced maps.

3. Deliverables

The deliverables envisaged for the assignment are described below

1. Post processed DGPS observations data as well as raw data in RINEX format.
2. DGPS Reports - Base line & network adjustment report for the primary and Secondary Control Points.
3. Geo-referenced SOI maps & forest block maps based on DGPS observations – Hard and Soft Copy (SHP and KML formats).
4. 11KV route area statement as per DGPS Survey
5. DGPS Survey and mapping report

4. Brief description of the Technical approach

4.1 Input Data

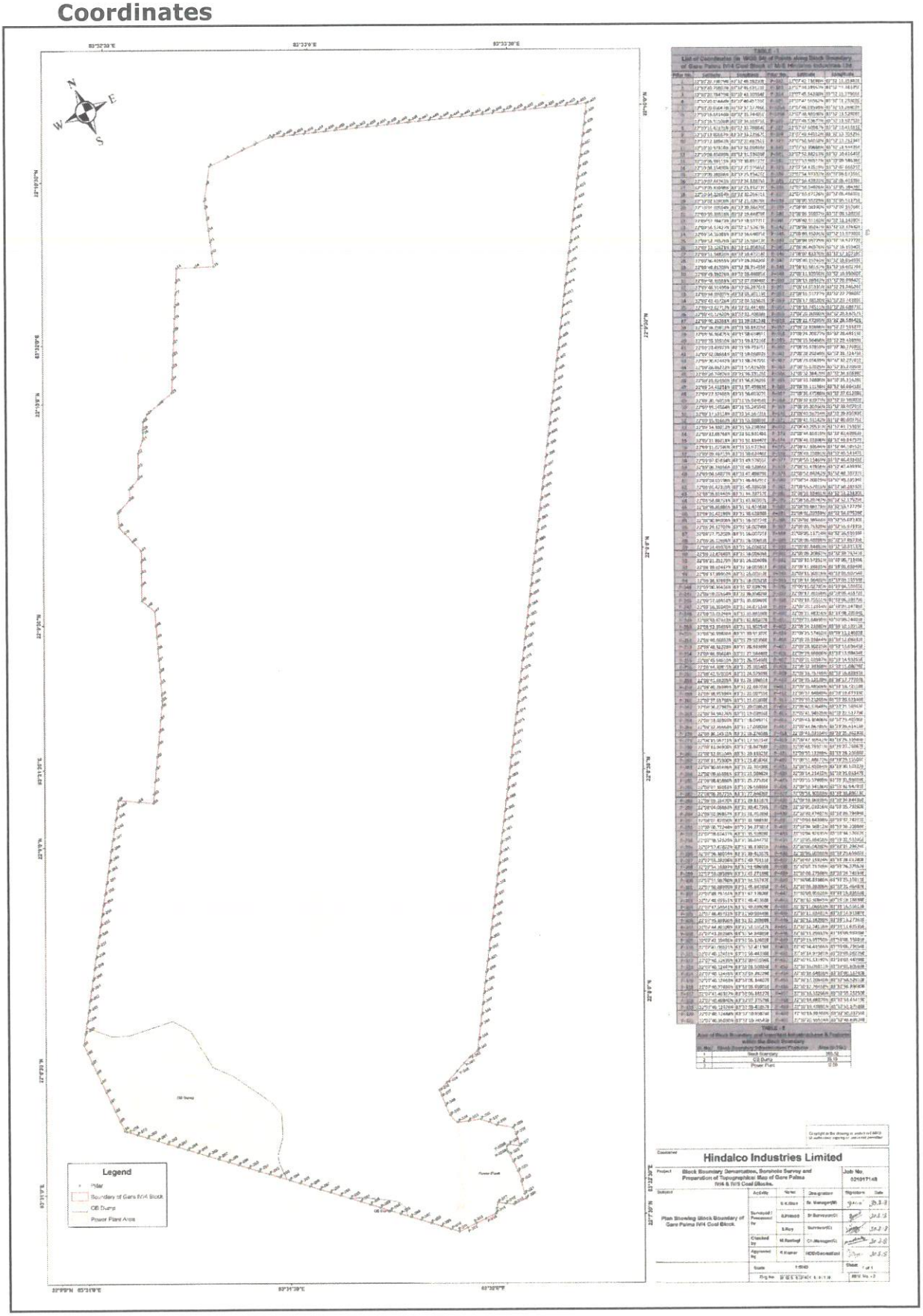
CMPDI certified block boundary coordinates and block boundary map was provided by M/s Hindalco Industries Limited (HIL). M/s HIL also provided the village maps, topographical land plan and SOI maps required for geo-referencing to Geotrax International Services. The village wise land schedule of the GP IV/4 & IV/5 coal mines was also provided to Geotrax.

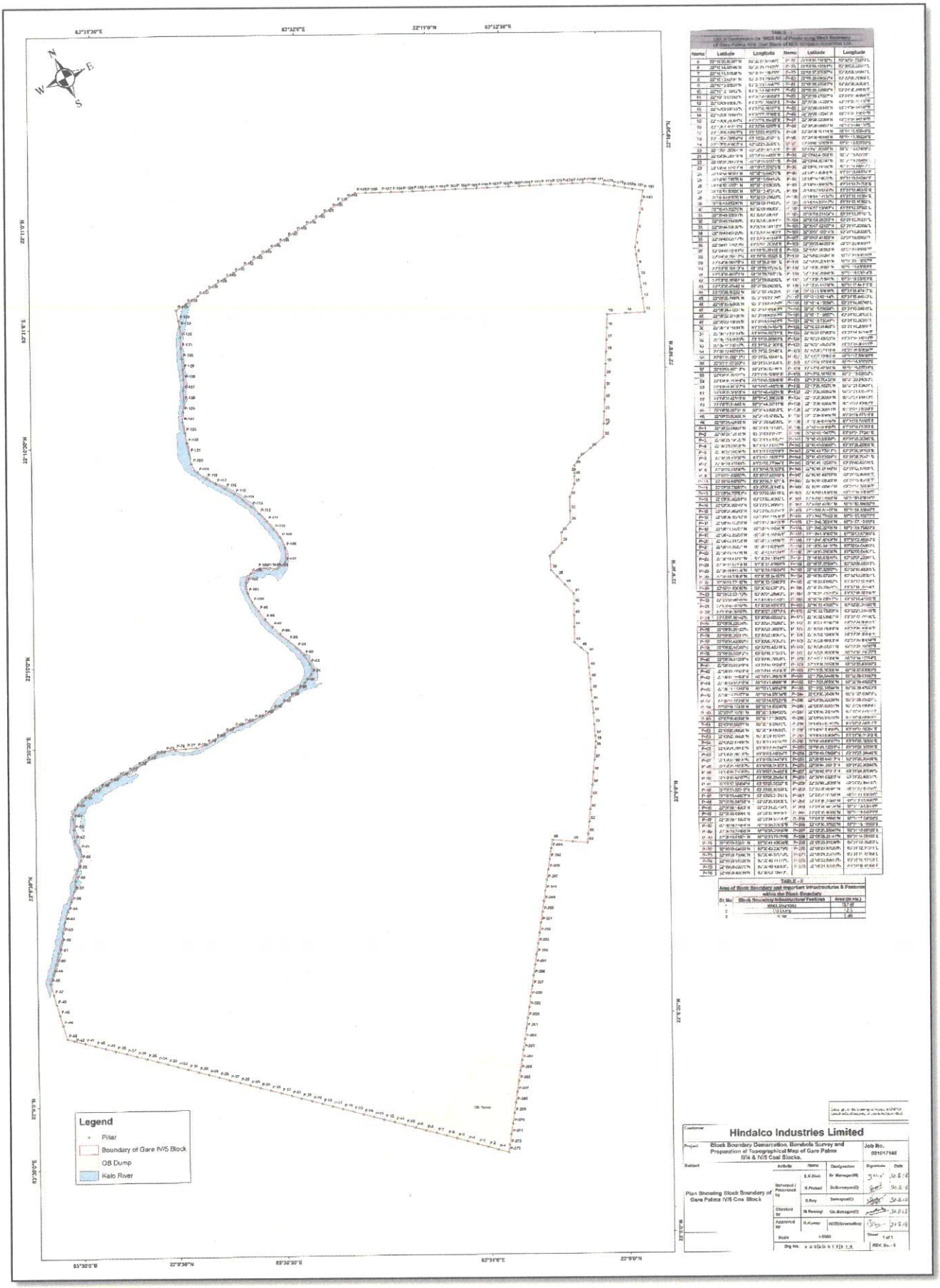
The forest stock map No. 64N12/1 and 64N12/2 was obtained by Geotrax.

4.2 CMPDI Certified Base Station DGPS Surveyed Coordinates

Station Name	Observed Geographic Co-ordinates (WGS-84)		UTM Co-ordinates (Zone 44 N)	
	Latitude	Longitude	Northing	Easting
IV/6A1	22°07'34.83780N	83°28'58.84973E	2448902.828	756128.955
INC1	22°10'36.84758N	83°31'33.94548E	2454576.194	760481.886
INC2	22°10'37.51716N	83°31'35.42479E	2454597.502	760523.935
INC4	22°09'43.06445N	83°31'55.03758E	2452931.452	761113.932
STN5	22°09'40.12060N	83°31'55.33190E	2452841.016	761123.878
N1	22°10'19.19977N	83°32'40.38537E	2454065.018	762394.959
N2	22°10'16.48556N	83°32'44.05654E	2453983.271	762501.568
B1	22°09'08.84703N	83°32'34.25895E	2451897.424	762255.652
B3	22°09'09.20966N	83°32'35.17976E	2451909.024	762281.857

4.3 CMPDI Certified Coal Block Boundary Map and Block Boundary Coordinates




Legend
Pillar
Boundary of Gare IV/5 Block
OB Dump
Kelo River
Hindalco Industries Limited
Block Boundary Demarcation, Borehole Survey and Preparation of Topographical Map of Gare Palma IV/4 & IV/5 Coal Blocks.
Plan Showing Block Boundary of Gare Palma IV/5 Coa Block

4.4 Establishment of Temporary control Benchmark (TBM) points

The Temporary Control Point are established in Real Time Kinematic (RTK) Mode using DGPS Instrument with reference to the INC1 and other CMPDI established base stations

Below table lists the coordinates of TBMs:

TBM	Location	Easting (UTM Zone 44)	Northing (UTM Zone 44)	Latitude	Longitude
Base - INC 04	Fan house Structure (IV/5)	761113.932	2452931.452	22°09'43.06445"N	83°31'55.03758E
TBM-1	Fixed Stone	762501.436	2453983.175	22° 10'16.48251"N	83°32'44.5187"E
TBM-2	Fixed Stone	763883.808	2453437.144	22° 9'57.98577"N	83°33'31.95321"E
TBM-3	Top of Hill-Fixed Stone	762372.099	2453046.541	22° 9'46.12031"N	83°32'38.99226"E
TBM-4	Top of Dumping Area-Fixed Stone	762403.97	2452449.047	22° 9'26.68941"N	83°32'39.75466"E
TBM-5	Roof on Building	761111.633	2452939.355	22° 9'43.32246"N	83°31'54.96196"E
TBM-6	Top of Hill-Fixed Stone	762187.204	2451155.469	22° 8'44.77690"N	83°32'31.43833"E
TBM-7	Roof on Building	761201.459	2454626.673	22° 10'38.9782"N	83°31'59.7785"E

4.5 DGPS Survey Procedure

Geotrax started the DGPS Survey using the above mentioned CMPDI Base station control points. The coordinate of the Base Station is as follows:

Point ID	Latitude (d:m:s)	Longitude (d:m:s)	Ellipsoidal Height(m)
INC1	22°10'36.84758N	83 31'33.94548E o	NA

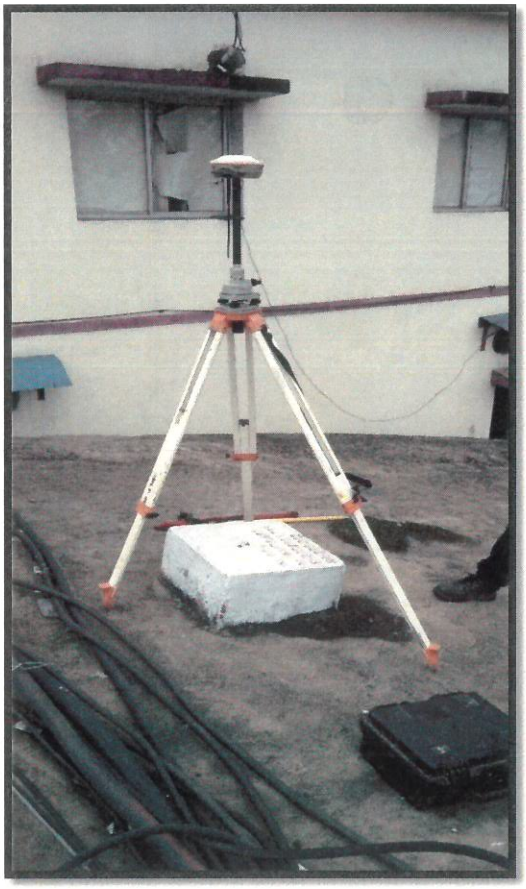


Fig-3: Images showing CMPDI Base Station

DGPS survey was carried out using a pair of DGPS instrument. One DGPS Instrument was used as Base Station (INC1). With reference to Base station other TBM are established which are spread out through-out the lease block. The forest pillar coordinates are collected with reference to CMPDI Base station and TBM base stations. The distance between the Base Station and rover was always less than 5km.

The survey was conducted in Real Time Kinematic (RTK) mode. The Survey team collected DGPS coordinates of forest pillars and block boundary points by walking along the forest compartment boundary and/or block boundary. DGPS readings were collected at every 50m distance along forest compartment boundary and at every turn or bend. For Geo-referencing village maps ground control points were also collected.

4.6 Forest Compartment Pillar Photographs taken during DGPS Survey

4.7 Creation of forest compartment boundary map

The 11 KV route surveyed along with forest pillars surveyed points captured through DGPS were plotted in the GIS Software and the forest compartment 11 KV corridor route line was created by joining the route boundary points. The total 11 KV route corridor along with forest patch boundary polygon was created using the survey data.

The block boundary coordinates given by CMPDI was used for creating the GP IV/4 block boundary polygon and IV/5 boundary polygon.

The forest map and Survey of India map are geo-referenced to the WGS 84 datum and UTM Projection system. The village maps are also geo-referenced and mosaicked to the same datum (WGS 84) and UTM Projection system (UTM Zone 44N).

The Cadastral map is geo-referenced and revenue Khasras are digitized. After digitization and some editing of the boundary of the revenue Khasra, a village wise non-forest land (revenue land) statement is prepared.

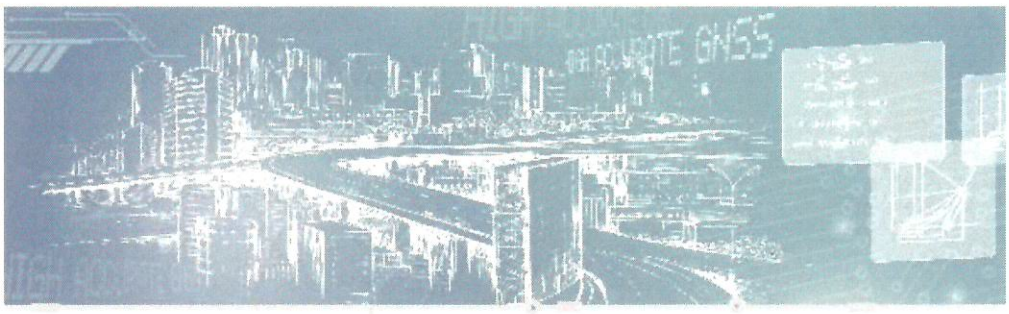
The total 11 KV route corridor, proposed forest patch boundary polygon layer and non-forest Khasra layer is superimposed on survey of India Map and Forest stock map.

A final map showing the proposed 11 KV route along with forest and non-forest patches is composed in Arc GIS Software. The map also details the land schedule – area statement of forest and non-forest land.

4.8 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-RTK[1] (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 MHz [2]
  -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 APAC.

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. DGPS Survey and Mapping Results

The total route length of proposed 11 KV route is approximately 2212 meters which passes GP IV/4 & IV/5 coal mines.

There proposed 11 KV route passes through forest patch (RF 782) inside GP IV/5 Coal mine.

The 11KV cable passing through forest compartment RF 782 is proposed to be laid underground with a trench width of 300 mm (or 0.3 meters). The total 11 KV route area is 0.066 Ha.

The total Protected Forest area inside the proposed 11 KV corridor is 0.011 Ha, and the total non-forest area is 0.055 Ha.

The DGPS Survey coordinates of forest compartment boundary points and herewith annexed and marked as **Annexure-1.** The geo-referenced maps are herewith annexed and marked as **Annexure -2.** The CMPDI block boundary pillar coordinates table is herewith annexed and marked as **Annexure-3.**

Total Land Schedule Forest & Non Forest Land					
Sl. No	**District/Division**	**Tehsil/ Range**	**Forest/Non-Forest**	**Village / Compartment No**	**GIS Area (Ha.)**
1	Raigarh	Tamnar	Forest	RF 782	0.011
2	Raigarh	Tamnar	Non-Forest	Milupara	0.022
3	Raigarh	Tamnar	Non-Forest	Banjhikhol	0.033
Total Area (Forest + Non Forest)					**0.066**

Sl.No	Length of 11 KV route in Forest and Non-Forest area	Distance (Meter)
1	Passing through Forest Comp RF 782	372
2	Length in Non-forest area Milupara Village	752
3	Length in Non-forest area in Banjhikhol Village	1088
	Total Route Length of 11 KV line in meters	**2212**

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Land Schedule of Non Forest Land							
Sl No	**District**	**Tehsil**	**Village**	**Khasra No**	**Type of Land**	**GP Lease Boundary**	**GIS Area (Ha.)**
1	**Raigarh**	**Tamnar**	**Milupara**	467/7		GP IV/5	0.000313
2				467/17			0.000177
3				467/24	Tribal		0.001985
4				467/10	Private		0.001101
5				526/1	Tribal		0.000912
6				467/2	Non Tribal		0.003564
7				467/11	Non Tribal		0.002847
8				467/25			0.001706
9				466	Tribal		0.003165
10				460/4			0.000472
11				461	Non Tribal		0.001705
12				465	Tribal		0.000774
13				463	Non Tribal		0.002792
14				462	Abadi		0.001197
Total Area in Milupara Village (i)							**0.02271**
15	**Raigarh**	**Tamnar**	**Banjhikhol**	2	Tribal	GP IV/5	0.001206
16				4	Tribal		0.002594
17				5	Tribal		0.002007
18				6	Tribal		0.002331
19				13	Road		0.003414
20				12	Tribal		0.002311
21				11			0.000314
22				14	Tribal		0.003743
23				42	School Play Ground		0.001961
24				41	Road		0.000774
25				45/1	Tribal		0.003616
26				45/2	Tribal	GP IV/4, GP IV/5	0.001919
27				39	Tribal	GP IV/4	0.000215
28				54	Tribal		0.001268
29				55	Grass		0.001347
30				135	Nalla		0.00187
31				138	Tribal		0.000136
32				139	Tribal		0.001571
Total Area in Banjhikhol Village (ii)							**0.032597**
Total Non Forest Area (i+ii)							**0.055307**

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6. Background of Organization

Geotrax International Services (www.geotrax.in) is a Professional Land Mapping and Services provider across India established in the year 1999. During the last 15+ 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 speciality. 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: 11 KV Forest Compartment patch Boundary DGPS coordinates

7.1.1 Forest Compartment Patch Boundary Points Coordinates

Proposed Forest Area Pillar Point Coordinates						
SI No	Compartment No	Pillar Id	UTM Coordinates		Geographic Coordinates	
			Easting (m)	Northing (m)	Latitude (°N)	Longitude (°E)
1	RF 782	P1	761613.374263	2454425.076220	22°10'31.32393"	83°32'13.33027"
2		P2	761613.004697	2454425.418240	22°10'31.33525"	83°32'13.31758"
3		P3	761591.252507	2454442.646800	22°10'31.90685"	83°32'12.56880"
4		P4	761561.100756	2454459.309610	22°10'32.46464"	83°32'11.52666"
5		P5	761538.874488	2454471.613450	22°10'32.87649"	83°32'10.75846"
6		P6	761538.864401	2454471.619690	22°10'32.87669"	83°32'10.75811"
7		P7	761458.297999	2454525.992090	22°10'34.68711"	83°32'07.97922"
8		P8	761394.399092	2454570.046630	22°10'36.15322"	83°32'05.77575"
9		P9	761351.652265	2454600.863740	22°10'37.17773"	83°32'04.30245"
10		P10	761308.905439	2454631.680850	22°10'38.20224"	83°32'02.82915"
11		P11	761309.103312	2454631.908020	22°10'38.20951"	83°32'02.83619"
12		P12	761351.837638	2454601.099920	22°10'37.18530"	83°32'04.30906"
13		P13	761394.571963	2454570.291820	22°10'36.16109"	83°32'05.78192"
14		P14	761458.467054	2454526.239920	22°10'34.69507"	83°32'07.98526"
15		P15	761539.026743	2454471.872060	22°10'32.88481"	83°32'10.76392"
16		P16	761561.245960	2454459.572130	22°10'32.47309"	83°32'11.53188"
17		P17	761591.429049	2454442.889680	22°10'31.91465"	83°32'12.57510"
18		P18	761613.204233	2454425.642340	22°10'31.34242"	83°32'13.32467"
19		P19	761613.650147	2454425.229650	22°10'31.32877"	83°32'13.33999"

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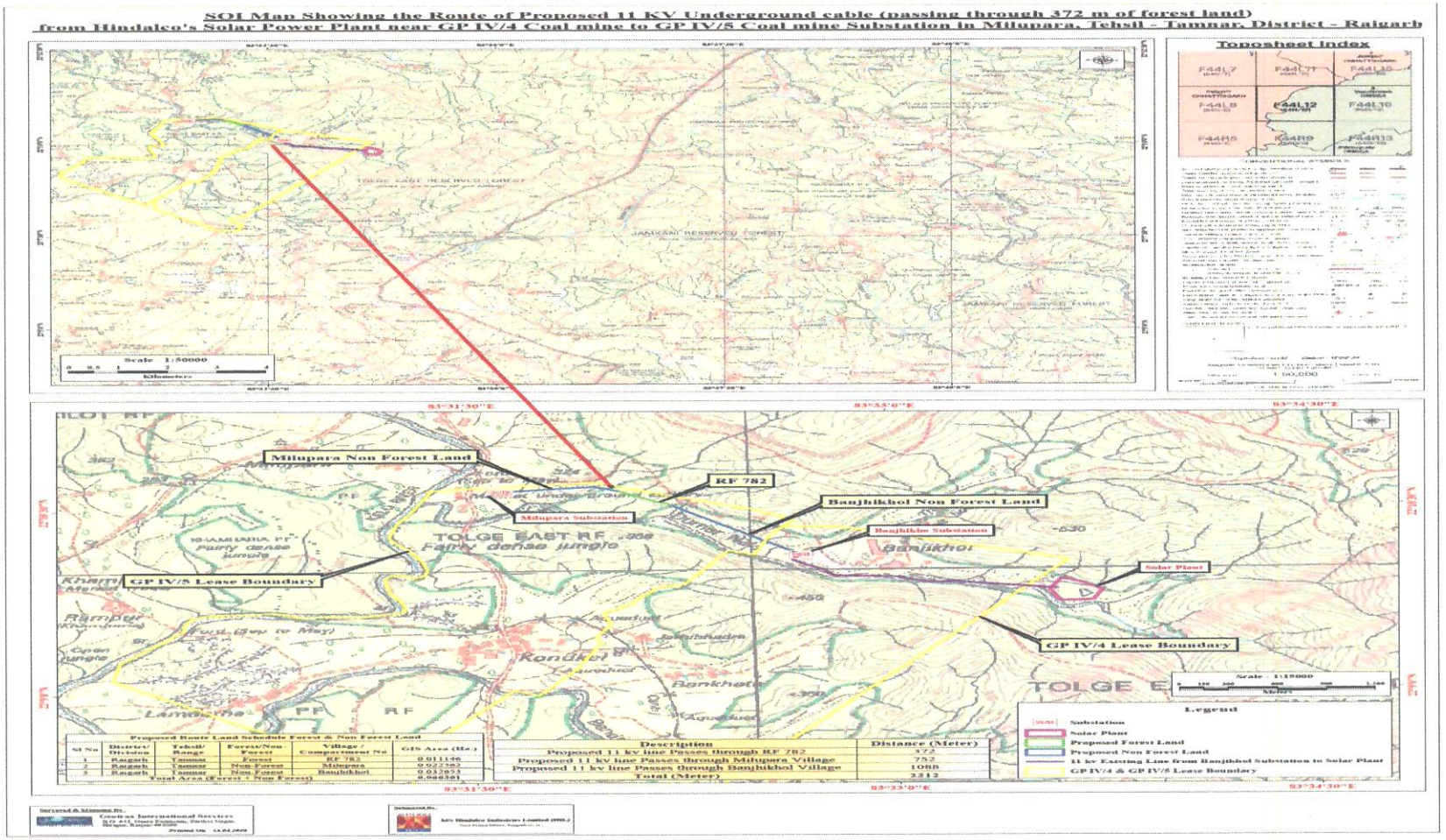
7.2 Annexure-2: Geo-referenced maps

7.2.1 11 KV route shown on Survey of India Toposheet



Note: The map when printed from this page should be treated as NOT TO SCALE

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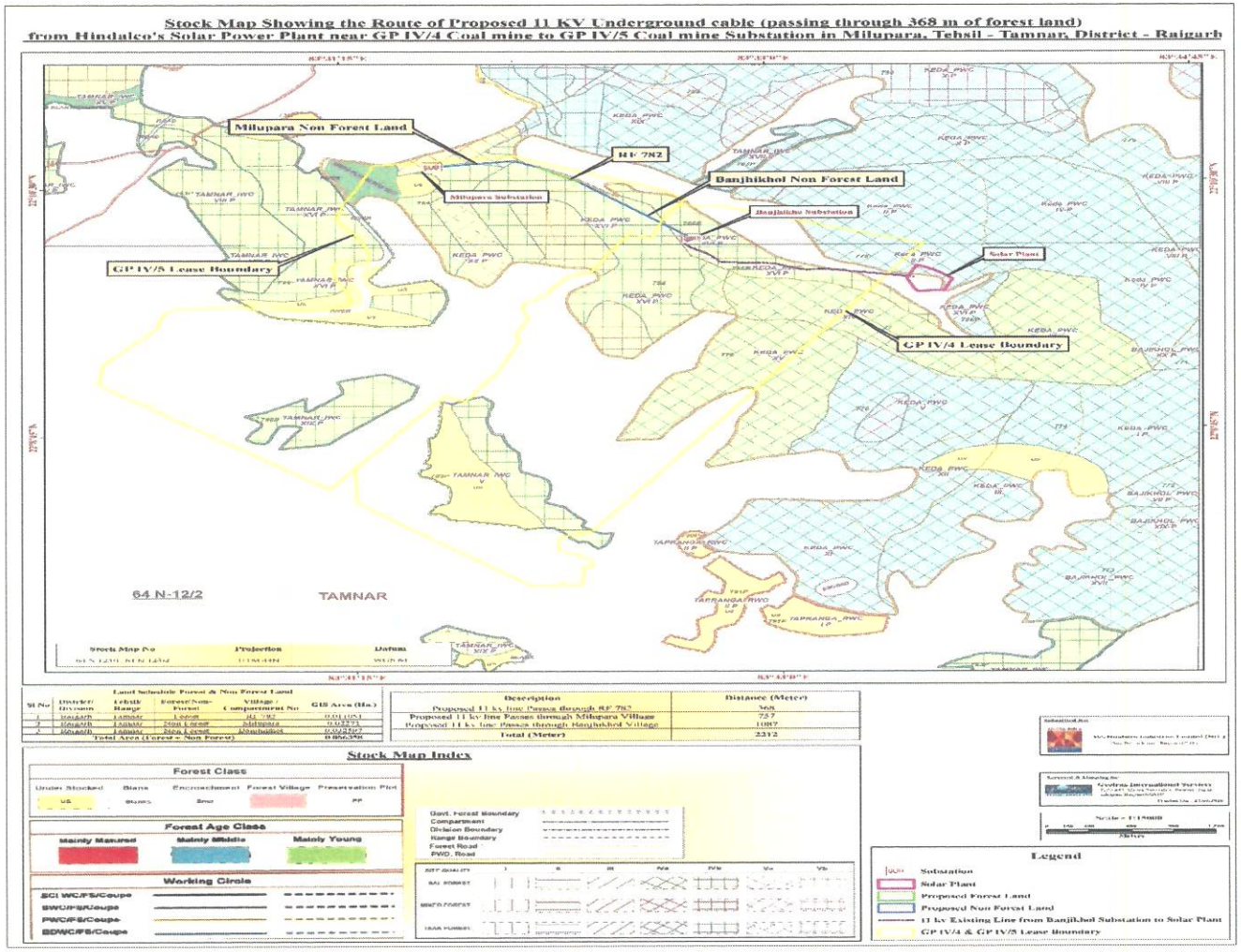
7.2.2 11 KV route shown on Forest Stock Map



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