CHHATTISGARH BHARATNET PHASE-II PROJECT

DGPS survey Report of COMPANSATORY AFFORESTATION PLANTATION in East Bhanupratappur Forest Division over an area of 12.426 Ha. For DIVERSION OF PROPOSED OFC ROUTES In ,CHHATTISGARH STATE BHARATNET PROJECT PHASE-2

Forest Division	:	**EAST BHANUPRATAPPUR**
Village (Beldo & Chaurgaon)	:	**12.426 Ha.**
Range	:	**Durgukondal**
District	:	**KANKER (C.G.)**

Applicant -

वन मण्डलाधिकारी
पूर्व भानुप्रतापपुर वन मण्डल
भानुप्रतापपुर

Chhattisgarh Infotech Promotion Society (CHiPS)
Raipur (Chhattisgarh)

Submitted By –

TATA

TATA PROJECTS

Tata Projects Limited, Raipur (Chhattisgarh)

Table of Contents

1. Introduction and Background

1.1. Background

The Government of Chhattisgarh intends to setup an Optical Fibre Cable Network from the Block Head Quarters to Gram Panchayats to provide high speed broadband connectivity by connecting the 85 Blocks, 5987 Gram Panchayats across the State. The proposed network architecture for BharatNet Phase-II project follows ring architecture with Internet Protocol – Multi Protocol Label Switching (IP-MPLS) technology. The network shall be leveraged to deliver scalable bandwidth to households, institutions and enterprises. It is planned to have an IP-MPLS ring at GP level with provisioning of 6 dedicated core of fibre as mandated by Government of India.

The Chhattisgarh Infotech Promotion Society (CHiPS), a Registered Society promoted by the Government of Chhattisgarh, is the nodal agency and prime mover for propelling IT growth and implementation of IT plans in the State.

The Chhattisgarh Infotech Promotion Society (CHiPS) has selected an implementation partner **"Tata Project Limited"** for BharatNet Phase-II Project. The project has been conceived with the ambitious vision of providing connectivity to the yet unreached blocks in Chhattisgarh and entails massive investment on the infrastructure creation across the state which would serve as the information highway for decades to come.
Under the Forest Conservation Act 1980 for laying underground optical fiber cables, DGPS survey has been proposed for compensatory afforestation in the diversion proposals of the following sanctuary/wildlife forest area.

Sl	District	Division	Registration No	Area Ha
1	Surajpur	Elefant Reserve Ambikapur	FP/CG/OFC/43274/2019	1.462
2	Bastar	Kanger Ghati National Park Jagdalpur	FP/CG/OFC/118817/2021	1.005
3	Raigarh	Gomarda Abhyaran, Raigarh Division	FP/CG/OFC/45147/2020	0.825
4	Bijapur	Indravati Tiger Reserve Bijapur	FP/CG/OFC/45471/2020	5.88
5	Gariaband	Udanti- Sitanadi Tiger Reserve, Gariaband	FP/CG/OFC/45530/2020	8.965
6	Baloda Bazar- Bhatapara	Barnavapara Abhyaran, Balaoda bazar	FP/CG/OFC/43975/2020	1.137
7	Kabeerdham	Bhoramdev Abhyaran, Kawardha Division	FP/CG/OFC/43124/2019	3.579

1.2. Objectives

As per directives of 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 LiDAR/Differential GPS (DGPS) and the same should be uploaded to MoEF website along with the online application.

To meet this requirement, **Tata Project Limited** entrusted the DGPS survey work to **RK Engineering and Consultants**.

RK Engineering and Consultants is a Professional Land Mapping and Services provider across India established in the year 2016. During the last 5+ years, we had an opportunity to execute a variety of surveying jobs all over India

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).

Our range of services is inclusive of Control surveys, Boundary surveys, Topographic Land surveys, setting out surveys, Route Surveys, Volume calculations. There is a great demand for these in varied kinds of project planning and management requirements in the field of civil and structural engineering. Our services are renowned for being prompt, relevant, effective and accurate. In our field operations, we use cutting edge technologies, and all of the latest office processing and CADsoftware.

It is our goal to produce high quality and accurate land surveys, while practicing professional ethics and best practices exceeding those found in the industry. Our client base includes civil engineers, architects, land developers, attorneys, commercial, residential and private property owners.

Our expertise and dedication to client service, timely completion of the projects, getting the job done right, and doing business ethically and professionally has earned RK Engineers and Consultants many reputedclients.

OUR TEAM

We have a strong team of dedicated professionals who work in tandem with the industry trends and try to align them with the requirements of our customers. We owe our success to them and ensure that they undergo regular training programsto keep themselves abreast with the latest technologicaladvancements.

Our team of Engineer, Supervisor, Draft Man, Technicians and Marketing Executives has in-depth knowledge which helps them in understanding the specific needs of the clients and strives to offer these services in a manner desired by them. Our competent experts have industry experience of many years and possess thorough knowledge of their respective domains.

OUR INFRASTRUCTURE

We have equipped state of the art facilities which ensure timely execution of services. The skilled personnel with us ensure that the quality standards are taken care of and there is no scope for any kind of damage to the in transit. We are backed by modern infrastructure facilities spread along with 1500 sq. feet office space. Our organization is equipped with latest surveys and survey instruments to carry out the surveys with utmost accuracy within the committed time frame. We also have a large fleet of vehicles that allow us to conduct the survey job efficiently and accurately. Our clients are regularly updated about the progress of the work, thereby, helping them to appraise the pace & progress of the workundertaken.

Backed by modern infrastructure facilities, we have installed CAD support system that allows us to deliver customized solutions as demanded by our customers. Further, we have technical and computerized facilities which also enable us to execute various high-profile projects at a fast pace and within allotted time frames. The use of sophisticated and technically advanced equipment also assists us to conduct the survey job efficiently and with great care. We are empanneled with the state department for DGPS survey allied work in Chhattisgarh.

By Speed post

छत्तीसगढ़ शासन
खनिज साधन विभाग
मंत्रालय
महानदी भवन, नवा रायपुर अटल नगर–492002
//अधिसूचना//

25 NOV 2022

अटल नगर, दिनांक नवम्बर, 2022

क्रमांक एफ 7–14/2013/12 : राज्य शासन एतद् द्वारा चीफ कन्ट्रोलर ऑफ माइन्स, भारतीय खान ब्यूरो, नागपुर के परिपत्र क्रमांक 2/2010, दिनांक 06.04.2010 के पैरा–2 के बिन्दु क्रमांक–2 एवं पत्र दिनांक 21.09.2011 तथा भारत सरकार के राजपत्र दिनांक 08.10.2014 एवं खनिज(परमाणु और हाइड्रोकार्बन ऊर्जा खनिजों से भिन्न) रियायत नियम, 2016 के नियम 12 के अनुपालन में Differential Global Positioning System(डीजीपीएस) का उपयोग करते हुए खनिज कोयला को छोड़कर समस्त खनिजों के खनिज रियायतों के सीमाओं में Pricise Boundary Pillar की स्थापना और सर्वेक्षण करने के लिए नीचे तालिका में दर्शित संस्थानों को अधिमान्यता प्रदान करता है :–

क्र0	आवेदक एजेंसी का नाम एवं पता	रिमार्क
01	02	03
01	छत्तीसगढ़ स्वामी विवेकानंद तकनिकी विश्वविद्यालय, भिलाई, पोस्ट नेवई, जिला दुर्ग–491107(छत्तीसगढ़)	खनिज कोयला को छोड़कर राज्य में समस्त खनिजों की खनिज रियायतों से डीजीपीएस सर्वे कार्य हेतु
02	मे0आर0के0इंजीनियर्स एण्ड कंसल्टेंटस, हाऊस नंबर 43, वार्ड नंबर–13 आर्य नगर, दुर्ग–491107 (छत्तीसगढ़)	
03	मे0आई कंसल्टेंट सर्विसेस, ओसीएम चौक, बैरन बाजार, एक्सीस बैंक के सामने, रायपुर–492001 (छत्तीसगढ़)	

2/ अधिमान्यता प्राप्त संस्थानो के लिए निम्नानुसार शर्तें निर्धारित की गई है :–

1. Each corner of the lease area shall have a boundary pillar(corner pillar).
2. There shall be erected intermediate boundary pillars between the corner pillars in such a way that each pillar is visible from the adjacent pillar located on either side of it;
3. The distance between two adjacent pillars shall not be more than fifty meters;
4. The pillar shall be of square pyramid frustum shaped above the surface and cuboids shaped below the surface;
5. Each pillars shall be of reinforced cement concrete;
6. The corner pillar shall have a base of 0.3m X 0.3m and height of 1.30m of which 0.70m shall be above ground level and 0.60m below the ground;
7. The intermediate pillars shall have a base of 0.25m x 0.25m and height of 1.0m of which 0.70m shall be above ground level and 0.30 m below the ground;
8. All pillars shall be painted in yellow color and the top ten centimeters in red color by enamel paint and shall be grouted with cement concrete.
9. On all corner pillars, distance and being to the forward and backward pillars and latitude and longitude shall be marked;
10. Each pillar shall have serial number in a clockwise direction and the number shall be engraved on the pillars;
11. The number of pillars shall be the numbers of the individual pillar upon the total number of pillars in the lease;
12. The tip of all the corner boundary pillars shall be a square of 15 centimeter on which a permanent circle of 10 centimeter diameter shall be drawn by paint or engraved and the actual boundary point shall be intersection of two diameters drawn at 90 degrees.
13. The lease boundary survey shall be accurate within such limits of error as the Control General, Indian Bureau of Mines may specify in this behalf;

.....2

14. The location and number of the pillars shall also be shown in the surface and other plans maintained by the lessee: and
15. In case of forest area within the lease, the size and construction and color of the boundary pillars shall be as per the norms specified by the Forest Department in this behalf.
16. The Survey Agency shall be responsible for the accuracy of the data collected during Survey.
17. Coordinates of boundary pillars shall be established in the World Geodetic System 1984 (WGS-84) Datum.
18. डी0जी0पी0एस0 सर्वे कार्य हेतु पारिश्रमिक का निर्धारण अधिमान्यता प्राप्त संस्थान एवं खनिज रियायतधारी के मध्य आपसी समन्वय से किया जायेगा। किसी भी प्रकार का आपसी विवाद होने पर राज्य शासन उत्तरदायी नही होगा।
19. डी0जी0पी0एस0 सर्वे कार्य के गुणवत्ता में कमी पाये जाने पर या किसी भी प्रकार की कार्य संबंधी शिकायत पाये जाने पर जांच उपरांत राज्य शासन को यह अधिकार होगा कि उक्त अधिकृत एंजेसी की मान्यता किसी भी समय समाप्त की जा सकती है।
20. डी0जी0पी0एस0 सर्वे के संबंध में भारतीय खान ब्यूरो/राज्य शासन द्वारा समय-समय पर जारी निर्देशों का पालन अधिमान्यता प्राप्त संस्थान को करना होगा।
21. राज्य शासन द्वारा जारी यह अधिमान्यता केवल 03 वर्ष के लिए होगी। समयावधि समाप्ति से 03 माह पूर्व अधिकृत एंजेसी नवीनीकरण हेतु आवेदन कर सकेगा।

3/ यह अधिमान्यता नवकरण अधिसूचना के जारी होने की तिथि से 03 वर्ष के लिए ही मान्य होगी।

छत्तीसगढ़ के राज्यपाल के नाम से
तथा आदेशानुसार,

(जय प्रकाश मौर्य)
संयुक्त सचिव
छत्तीसगढ़ शासन
खनिज साधन विभाग

पृ0क्रमांक एफ 7-14/2013/12 अटल नगर, दिनांक नवम्बर, 2022
25 NOV 2022

प्रतिलिपि:-

1. सचिव, भारत सरकार, खान मंत्रालय, शास्त्री भवन, नई दिल्ली,
2. कंट्रोलर जनरल, भारतीय खान ब्यूरो, सेकेण्ड फ्लोर, ए-ब्लॉक, इन्दिरा भवन, सिविल लाईन्स, नागपुर(महाराष्ट्र)
3. उप खान नियंत्रक, क्षेत्रीय कार्यालय भारतीय खान ब्यूरो, दूसरी मंजिल, जी.एस.आई. फील्ड प्रशिक्षण केन्द्र, महालेखाकार आफिस काम्पलेक्स, पोस्ट विधानसभा, रायपुर
4. संचालक, भौमिकी तथा खनिकर्म, छत्तीसगढ़, द्वितीय तल, इन्द्रावती भवन, नवा रायपुर अटल नगर, जिला रायपुर (छत्तीसगढ़)
5. समस्त कलेक्टर, जिला —————— छत्तीसगढ़
6. अधिसूचना के पैरा-01 में उल्लिखित एजेंसी मेसर्स ....

की ओर सूचनार्थ एवं आवश्यक कार्यवाही हेतु अग्रेषित

7. संचालक, शासकीय क्षेत्रीय मुद्रणालय, खैरागढ़ रोड, राजनांदगांव, जिला राजनांदगांव(छत्तीसगढ़) की ओर साधारण राजपत्र में प्रकाशनार्थ।

..........3

8. श्री श्रीकांत राव, उप संचालक(भौमिकी), क्षेत्रीय प्रमुख, संचालनालय भौमिकी तथा खनिकर्म, सोनाखान भवन, रिंग रोड़ नंबर–1, रायपुर(छत्तीसगढ़)। कृपया उक्त आदेश/अधिसूचना को संचालनालय की वेबसाईट में अपलोड करने का कष्ट करें।
9. गार्ड फाईल रजिस्टर

संयुक्त सचिव
छत्तीसगढ़ शासन
खनिज साधन विभाग

INTRODUCTION TO DGPS

The term DGPS stands for Differential GPS that is based on pseudo ranges, aka code phase. Even though the accuracy of code phase applications was given a boost with the elimination of Selective Availability (SA) in May 2000 consistent accuracy better than the 2.5-meter range still requires reduction of the effect of correlated ephemeris and atmospheric errors by differential corrections. Though the corrections could be applied in post-processing services that supply these corrections, most often operate in real-time. In such an operation pseudo range based versions can offer meter or even submeterresults.

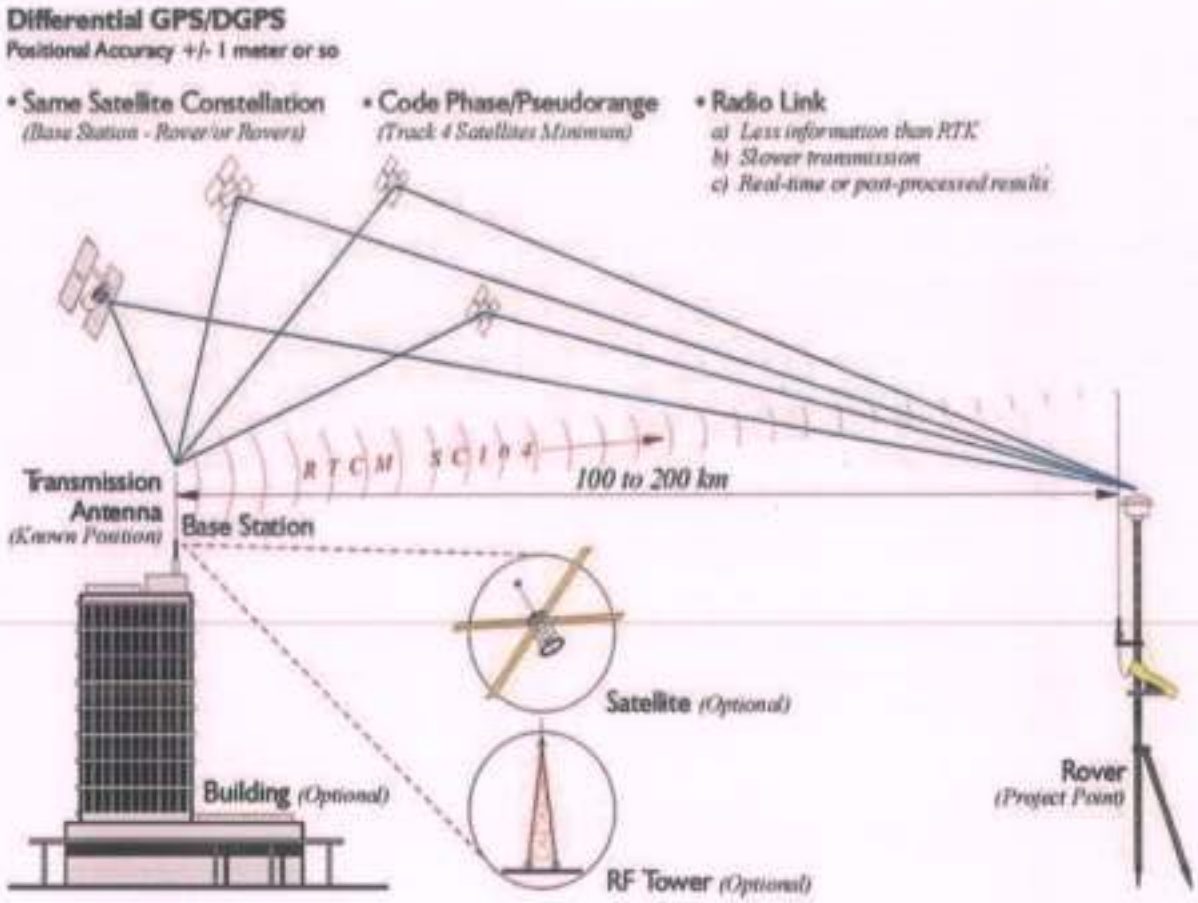


Fig. NO. 1

Usually, pseudo range corrections are broadcast from the base to the rover or rovers for each satellite in the visible constellation. Rovers with an appropriate input/output (I/O) port can receive the correction signal and calculate coordinates. The real-time signal comes to the receiver over a data link. It can originate at a project specific base station or it can come to the user through a service of which there are various categories. Some are open to all users and some are by subscription only. Coverage depends on the spacing of the beacons, aka transmitting base stations, their power, interference, and so forth. Some systems require two-way, some one-way, communication with the basestations.

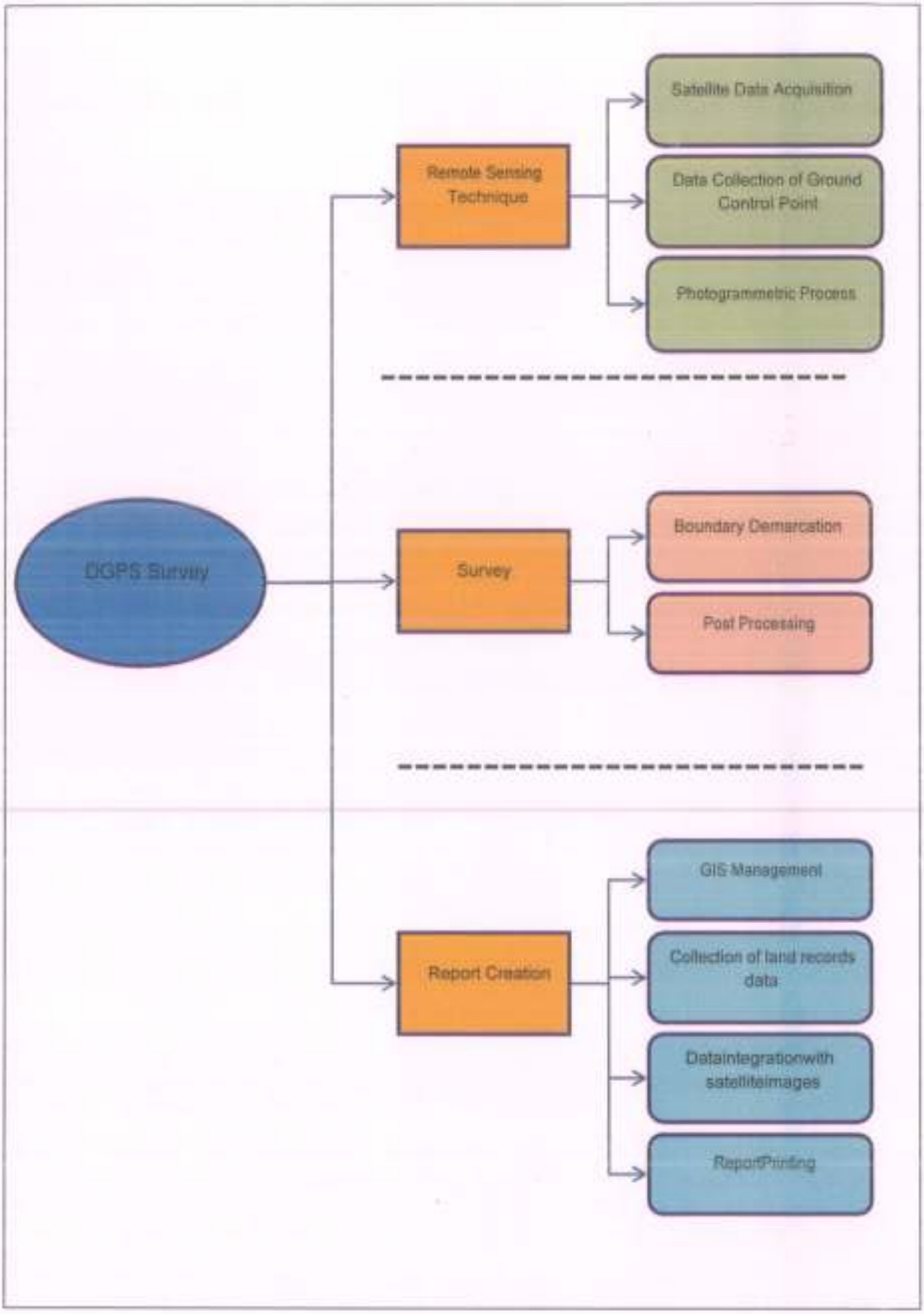

DGPS Survey
Remote Sensing Technique
Satellite Data Acquisition
Data Collection of Ground Control Point
Photogrammetric Process
Survey
Boundary Demarcation
Post Processing
Report Creation
GIS Management
Collection of land records data
Dataintegrationwith satelliteimages
ReportPrinting

Fig. NO. 2

DGPS SURVEY METHODOLOGY (SOP):-

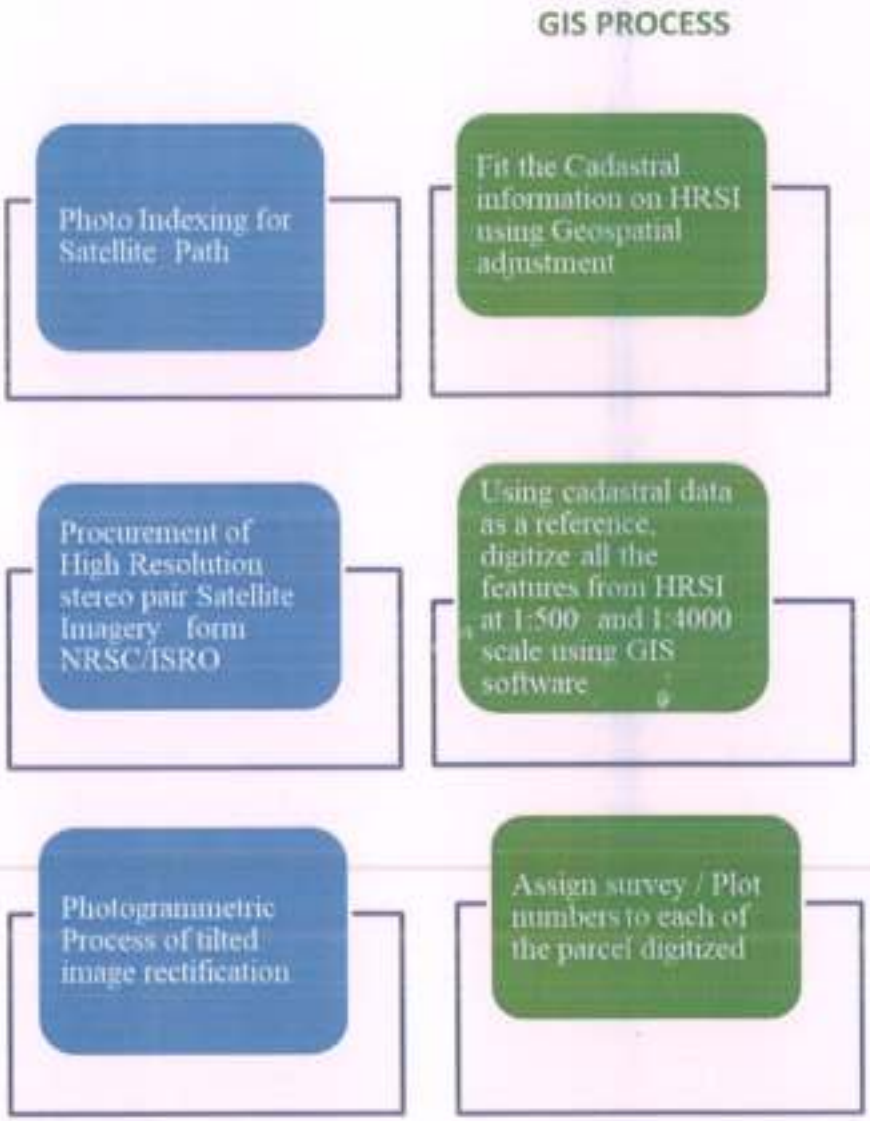


Fig. N0. 3

Establishment of Base stations (Control Points):

- Base Stations to be fixed by Multi/Dual frequency DGPS receivers with SOI Control Point as reference (to be supplied by SFD).
- The minimum observation time for base station shall be 12 hours from nearest SOI controlpoint.
- Required number of Control Points shall be established in such a way that the distance between the DGPS base station & rover shall be less than 10 km (for single frequency DGPS Rovers) and less than 50 km (for dual frequency DGPS Rovers).

- The panoramic view surrounding the Base Station as well as antenna location showing the terrain in near proximity should be digitally photographed (should be taken in three or four different directions) anddocumented.
- Rovers shall be of Dual/Multiple frequency DGPS receivers within a radius of 50 km from the base. In case Single frequency DGPS receivers are used they should be used within 10 km radius only. Readings of the BPs shall be taken with a minimum observation period of 15 minutes. To differentially correct the DGPS Rover data with base station / control point data. 1. In case real-time DGPS rovers are used, the Dual Frequency DGPS with OMNISTAR XP/HP connection shall be used alone and reading taken when accuracy is within 25cm.

MAP GENERATION

- All Revenue forest / Khasra Forest / Village forest / non-forest land recorded as forest land diversion / compensatory afforestation are to be shown on the georeferenced cadastral sheets (the drawn plot boundaries in the submitted map should match with corresponding plot boundaries of cadastral sheet) and co-ordinates of all the boundary demarcation points of the forest plots are to be shown with derivedco-ordinates.
- The survey points used for Geo-referencing of cadastral sheet and the derived co-ordinate points are to be shown in differentsymbols.
- For the demarcation of R.F and P.F patch boundaries proposed for diversion / compensatory afforestation should be carried out only using the DGPS / ETS surveyed points.
- During map generation the survey agency must compared the allotted area with map / surveyed area and if a variation of more than 5% between allotted area and map area is observed, than the plot wise variation must be brought to the notice of concerned officer through the user agency for necessary correction and after necessary correction the data should be submitted forverification.
- All forest areas proposed for diversion should be shown within approved project boundary / corridor and within DGPS/ETS surveyed ML boundary for MLareas.
- After this the data (both survey as well as maps) would be submitted to concern department.

SURVEY METHOD

1. RTK (Real TimeKinematic)
2. STATIC METHOD

1. RTK (Real Time Kinematic):-

Most, not all, GPS surveying relies on the idea of differential positioning. The mode of a base or reference receiver at a known location logging data at the same time as a receiver at an unknown location together provide the fundamental information for the determination of accurate coordinates. While this basic approach remains today, the majority of GPS surveying is not done in the static post-processed mode. Post-processing is most often applied to control work. Now, the most commonly used methods utilize receivers on reference stations that provide correction signals to the end user via a data link sometimes over the Internet, radio signal, or cell phone and often in real-time.

In this category of GPS surveying work there is sometimes a distinction made between code based and carrier based solutions. In fact, most systems use a combination of code and carrier measurements so the distinction is more a matter of emphasis rather than an absolute difference. Well that's a bit of discussion about static surveying, but as you know, a good deal of GPS these days is done not static. Much work is now done with DGPS or real-time kinematic,RTK.

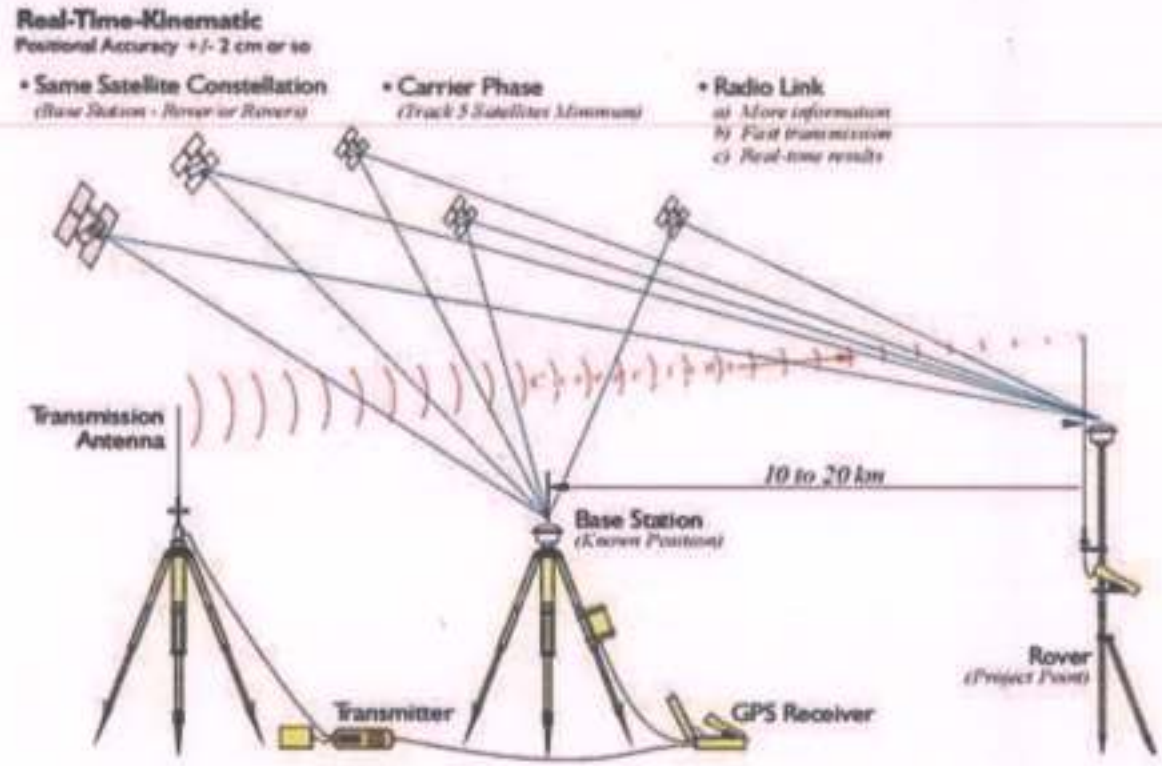


Fig. NO. 4

Real-time positioning is built on the foundation of the idea that, with the important exceptions of multipath and receiver noise, GPS error sources are correlated. In other words, the closer the rover is to the base the more the errors at the ends of the baseline match. The shorter the baseline, the more the errors are correlated. The longer the baseline, the less the errors are correlated.

The base station is at a known point, whether it was on a building permanently or it's a tripod mounted base station. The fact that it is in a known position allows the base station to produce corrections. The constellation is telling the base station that it is in a slightly different place, so corrections can be created to send to the rover at the unknown point. The corrections are applied in real time.

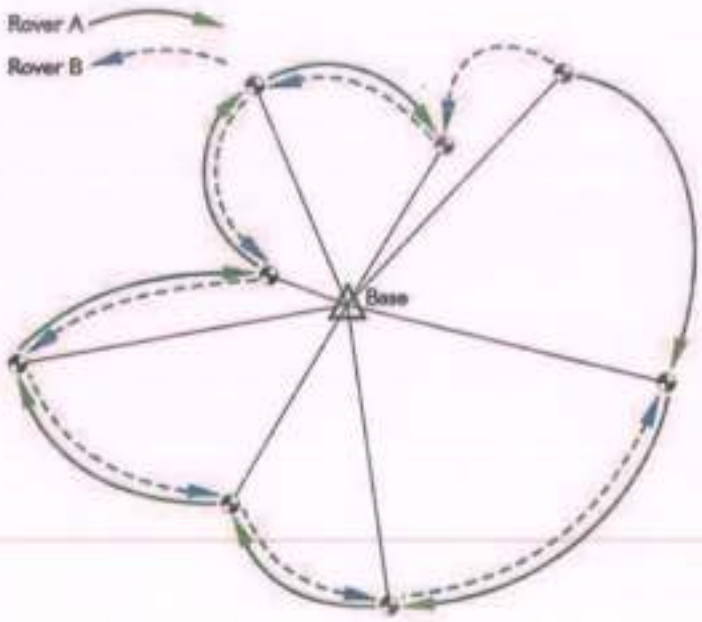


Fig. NO. 5

RADIAL GPS

Such real-time surveying is essentially radial. There are advantages to the approach. The advantage is a large number of positions can be established in a short amount of time with little or no planning. The disadvantage is that there is little or no redundancy in positions derived, each of the baselines originates from the same control station. Redundancy can be incorporated, but it requires repetition of the observations so each baseline is determined withmorethanoneGPSconstellation.Onewaytodoitistooccupytheproject points, the unknown positions, successively with more than one rover. It is best if these successive occupations are separated by at least 4 hours and not more than 8 hours so the satellite constellation can reach a significantlydifferentconfiguration.

RTK and DGPS are radial. You have a known point in the middle, the base, and then the unknown points around it. This provides little geometric solidity. If there's an error in one of these radial base lines, it would be tough to catch it because there's no real redundancy. The illustration shows a way around this difficulty. There are two receivers, A and B, and it's possible by double occupation, one receiver going one way and the other going the other, by double occupying the unknown points to get some redundancy and some checks against the positions from a base. Another way to do it is to use one receiver. That receiver would occupy each points twice with four to eight hours between the first occupation and the second occupation on the point. Another way is to move the base to another known point. Then if you have vectors from another base into these points, you have a check. This approach allows a solution to be available from two separate control stations. Obviously, this can be done with reoccupation of the project points after one base station has been moved to a new control point, or a two base stations can be up and running from the very outset and throughout of the work as would be the case using two CORS stations. It is best if there are both two occupations on each point and each of the two utilize different base stations.

A more convenient but less desirable approach is to do a second occupation almost immediately after the first. The roving receiver's antenna is blocked or tilted until the lock on the satellites is interrupted. It is then reoriented on the unknown position a second time for the repeat solution. This does offer a second solution, but from virtually the same constellation.

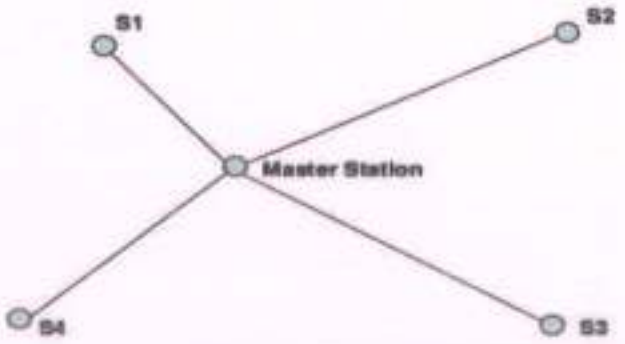
More efficiency can be achieved by adding additional roving receivers. However, as the number of receivers rises, the logistics become more complicated, and a survey plan becomes necessary. Also, project points that are simultaneously near one another but far from the control station should be directly connected with a baseline to maintain the integrity of the survey. Finally, if the base receiver loses lock and it goes unnoticed, it will completely defeat the radial survey for the time it is down.

These are a few possibilities to consider when you are doing a real-time survey.

An advantage to continuously operating reference station network is that since those bases are operating simultaneously and all the time, it's possible to download the positions from more than one base and process your new position based on these continuously operating reference stations and have someredundancy.

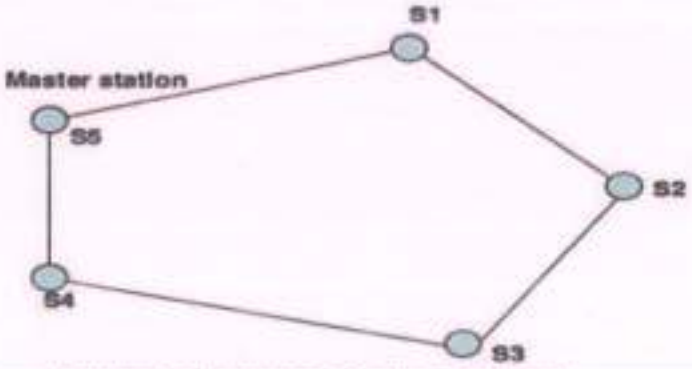
2. STATIC METHOD:-

I. Rapid Static Method



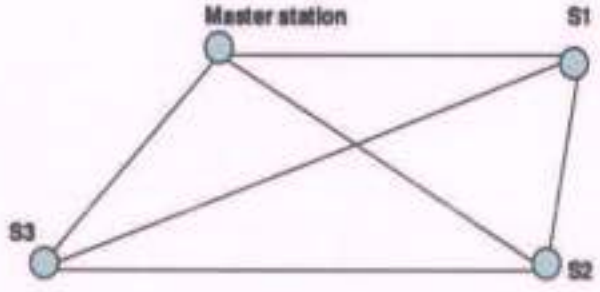
Schematic diagram of Rapid Static Method

II. Traverse Method



Schematic diagram of Traverse method

III. Trilateration Method



Trilateration method

2. Scope of Work

1. Establishment of Ground Control Point with 72 Hours observation which covering approx. 15 km radius of the proposed route.
2. DGPS Survey for collection of ground coordinates along the boundary at every 50 m interval and/or at every turn/bend along the proposed trench.
3. Data processing and Interpretation
    I. Geo-referencing of SOI Toposheet (scale 1:50000).
    II. Creation of boundary vector map using the DGPS Surveyed data
    III. Computation of area and preparation of Forest Area Statement for proposed diversion. It includes Reserved/Protected Forest/ Orange Area & Revenue Forest Land.
    IV. Preparation of Geo-referenced map showing Area.
    V. Superimposition of Area on Geo-referenced SOI Toposheet (scale 1:50000).
    VI. Preparation of DGPS survey report along with soft copy of maps including shapefile format and kml file.
4. Preparation of Desired report, Geo-referenced maps and technical compliance in Hard copy and soft copy.

3. Deliverables

The deliverables envisaged for the assignment are described below -

1. Proposed Forest Diversion area statement as per DGPS Survey of proposed area.
2. Geo-referenced map showing forest area and superimposed on SOI maps based on DGPS observations – Hard and Soft Copy (Maps in PDF format, SHP and KML formats).
3. DGPS Survey and Mapping Reports containing Ground Control Points report as the primary Control Points.
4. DGPS Survey and mapping report on hard copy and soft copy in CD.

4. Technical Approach

The Primary Control Point (PCP) of DGPS Observation was established as the DGPS base station. The PCP was established near within 5 KM radius of surveyed area as per Survey of India (SOI) Guideline, the PCP is to be fixed through continuous observation. The observed data was processed with reference to the data of International GNSS Service (IGS) stations as per SOI guideline through Triemble software.

DGPS Survey Methodology

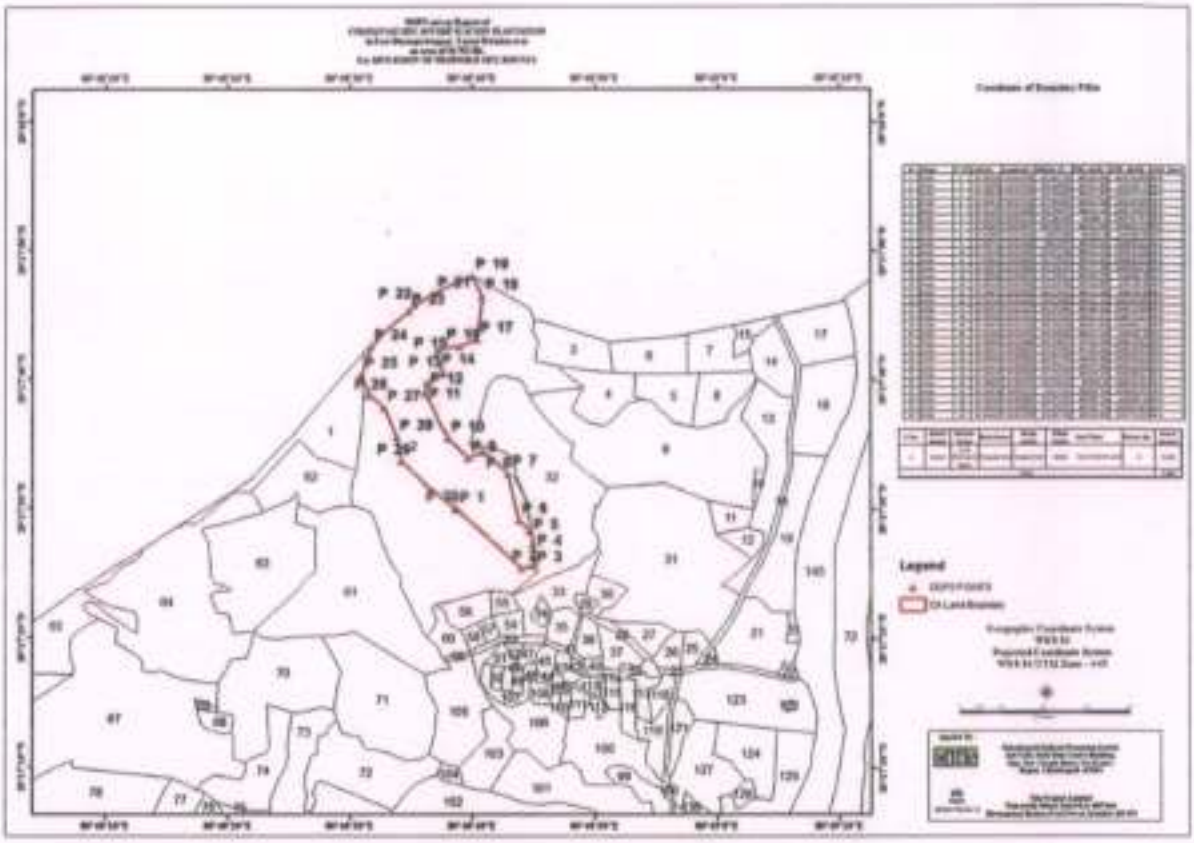
DGPS survey was carried out using a pair of DGPS instrument. One DGPS Instrument was used as Base Station. The first base station for the survey was established at the nearest TBM. The base is shifted using the Real Time Kinematic Survey method. The distance between the Base Station TBM and rover was always less than 5 km.

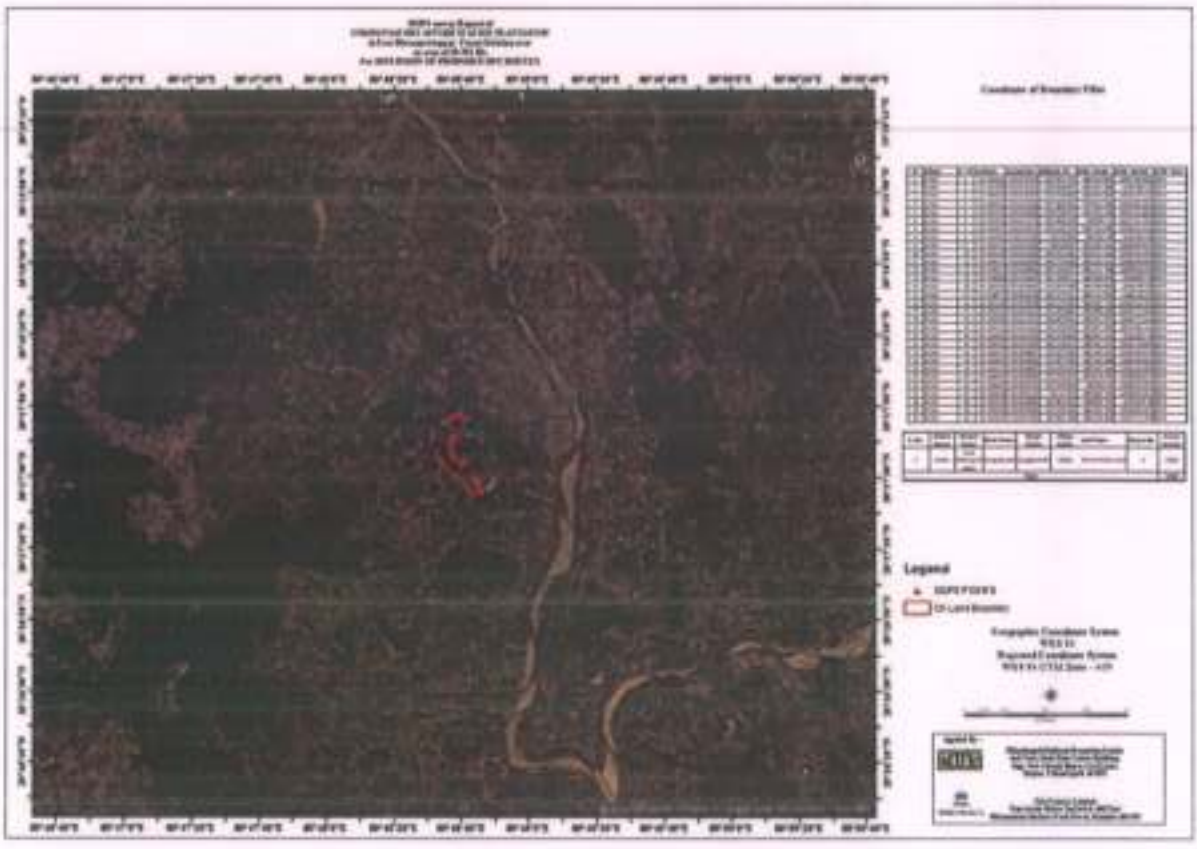
The other DGPS instrument was working as Rover. The survey was conducted in Real Time Kinematic (RTK) mode. The Survey team carried out DGPS Survey of boundary points by walking along the proposed Optical Fiber cable trench. DGPS readings were collected at every 50 m distance along boundry line and at every turn or bend.

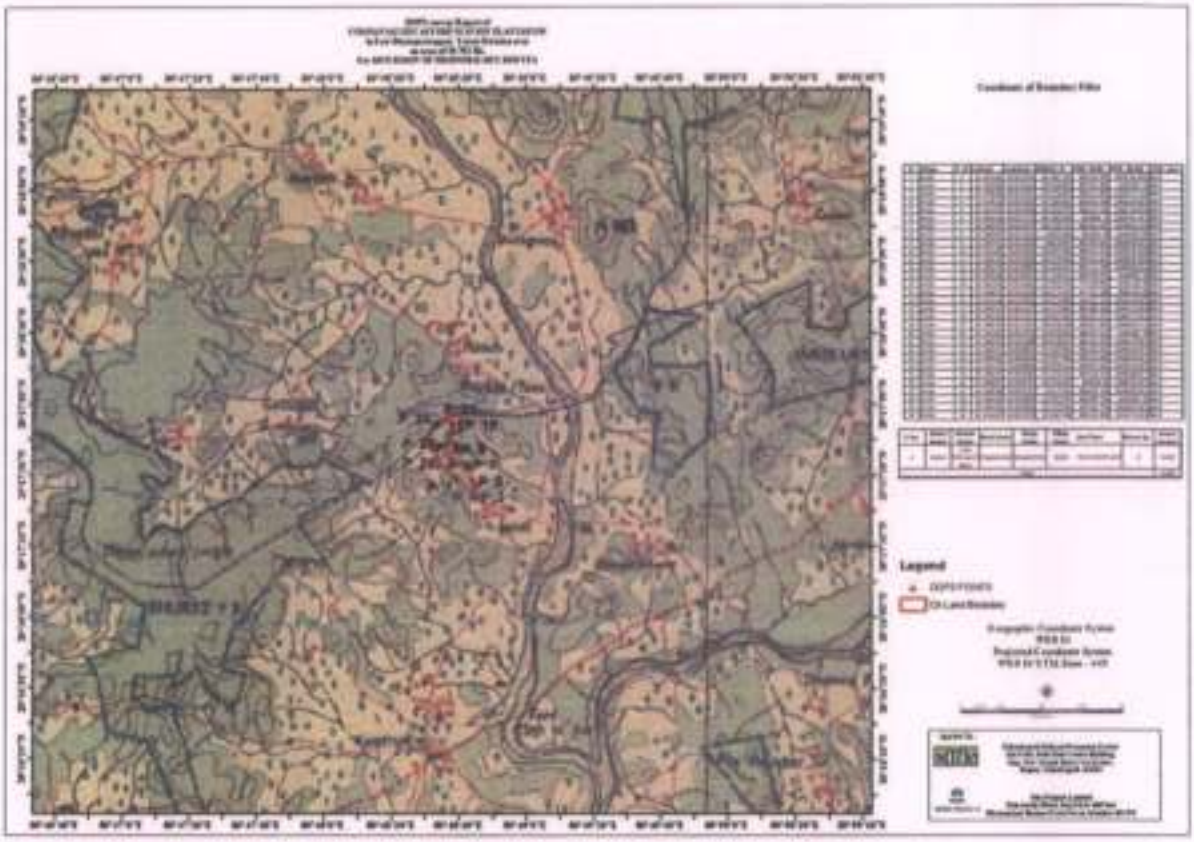
During the survey the orange Area boundary was identified in the field with the help of staff from the forest department. The forest department staff also provided information regarding the forest range, compartment/Khasara number etc. The static data is Post Processed using Triamble Business Centre software for obtaining the coordinates. Geo-referencing of SOI Toposheets and Forest Maps has been done. SOI Toposheets and Forest Maps are geo-referenced based on the coordinates provided on the maps.

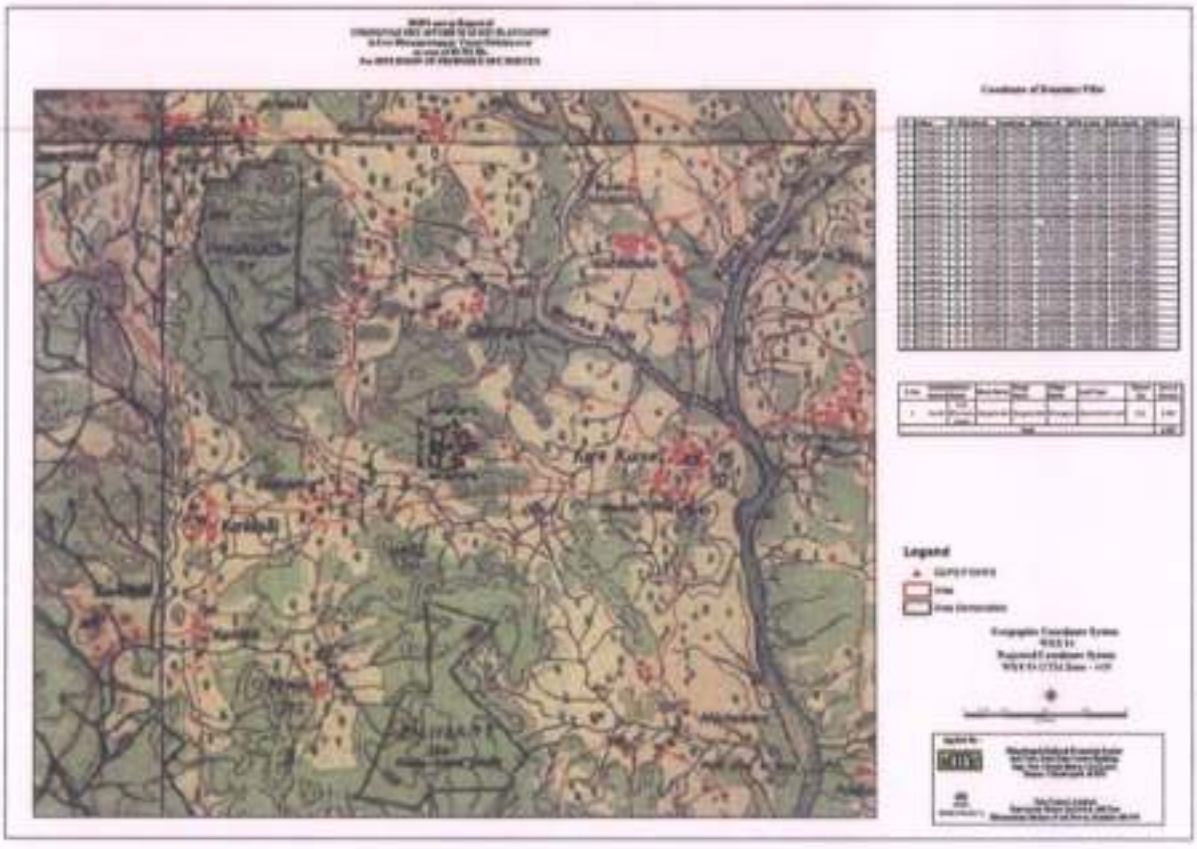
Creation of Vector Layers

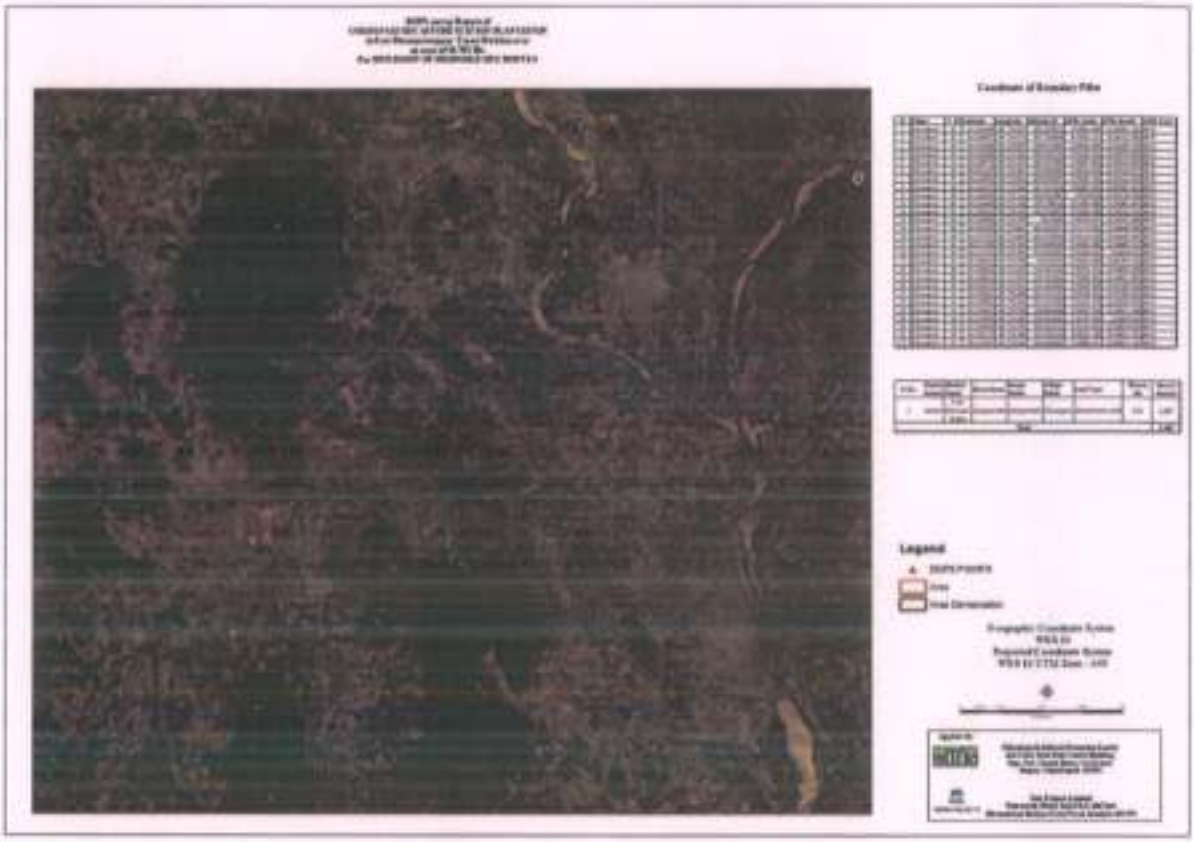
The surveyed points captured through DGPS were plotted in the GIS Software and the Polygon and Polyline layers are created using the DGPS Surveyed points. Different layers such as the Forest Patch polygon, prepared. The vector layers prepared are then super-imposed on the Geo-referenced Toposheet and Georeference Forest map.

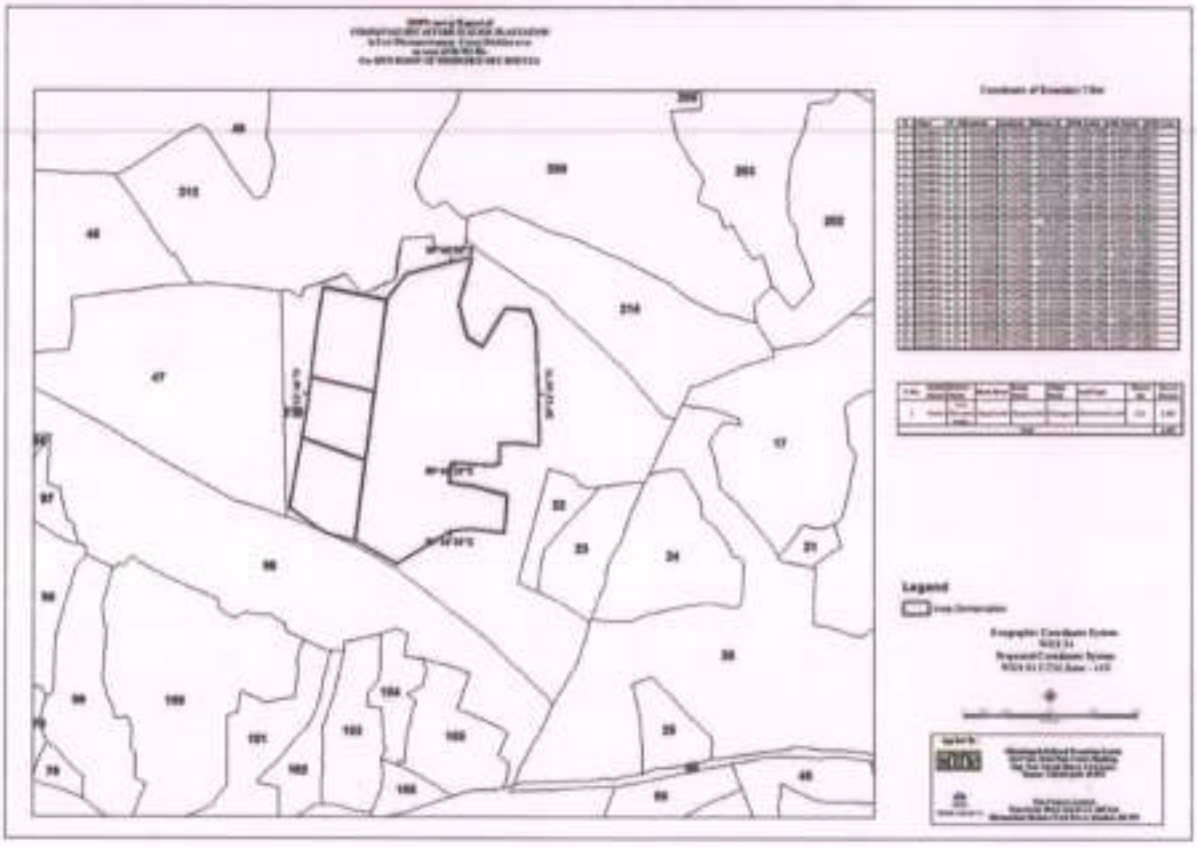












Generation of Map and Survey Reports for Forest Diversion:

A map is created by overlaying the created vector data for the forest patches on the Geo-referenced SOI Toposheets / Forest Maps. The reports are generated for DGPS Points (with Lat/long) placed at the regular intervals of 10 m on the boundary line. Another report is generated having area calculation for the proposed CA Plantation Land area.

Specification of DGPS Equipment

RK Engineers and Consultants 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.

DATASHEET

Trimble R8s

GNSS SYSTEM

One Receiver Configured for Today Scalable for Tomorrow

Rather than a pre-configured system, the Trimble® R8s GNSS system gives you just the features and benefits you need, in one flexible, scalable system. It's never been easier to build a system tailored to your job.

The Trimble R8s easily integrates with Trimble S-Series total stations and the innovative Trimble V10 imaging rover. Create a complete solution by combining the Trimble R8s receiver with a Trimble controller running Trimble Access™ field software, and Trimble Business Center office software.

Configure and Scale With Ease

With the Trimble R8s, it's easy and simple to build a receiver that is right for the job. Choose the configuration level that suits your needs best, whether it's post-processing, base, rover, or a combination of base and rover functionality. After you've selected a configuration level, additional individual options can be added to further extend the receiver functionality.

The Trimble R8s offers the ultimate in scalability. As your requirements change, the Trimble R8s can adapt. Simply add functionality whenever you need it.

Trimble 360 Technology

Each Trimble R8s comes integrated with powerful Trimble 360 tracking technology that supports signals from all existing and planned constellations, and augmentation systems. Trimble 360 technology can expand the reach of your GNSS rover to sites that were previously inaccessible due to moderate vegetation or other obstructions by taking advantage of the availability of additional satellite signals.

The Trimble R8s includes two integrated Maxwell™ 6 chips and 440 GNSS channels. Capable of tracking a full range of satellite systems, including GPS, GLONASS, Galileo, BeiDou and QZSS.

Communication Options and Remote Access Via Web UI

The Trimble R8s GNSS receiver provides data communication options including an integrated wide-band UHF radio or 3G cellular modem.

Trimble's exclusive Web UI eliminates the need to travel for routine monitoring of base station receivers.

The Complete Solution

Create an industry-leading field solution by pairing the Trimble R8s GNSS receiver with a powerful Trimble controller loaded with our easy-to-use Trimble Access field software.

Trimble Access field software offers the features and capabilities to simplify everyday work. Our streamlined workflow modules such as Roads, Monitoring, Mines, and Tunnels guide crews through common project types, enabling them to get the job done faster. Survey companies can also implement their unique workflows by taking advantage of the customization capabilities available in the Trimble Access Software Development Kit (SDK).

Once you're back in the office, Trimble Business Center enables you to check, process and adjust your data with confidence. No matter what Trimble solution you use in the field, you can trust that Trimble Business Center office software will help you generate industry-leading deliverables.

Trimble Mobile App—A New Way to Quickly Collect GNSS Raw Data

The Trimble DL Android app provides a simple and easy to use mobile interface for collecting static GNSS raw data for post-processing purposes without the need of using a Trimble controller or Trimble Access field software. This free of charge app is available through the Google Play Store and operates on Android smart phones and tablets.

Key Features

- One configurable receiver that is scalable for future needs
- Available in post-processing, base only, rover only, or base & rover configurations
- Advanced satellite tracking with Trimble 360 receiver technology
- Includes Trimble Maxwell 6 chips with 440 channels
- Simple integration with Trimble S-Series Total Stations and the V10 Imaging Rover
- Intuitive Trimble Access Field Software and Trimble Business Center Office Software

Trimble.

DATASHEET

Trimble R8s GNSS SYSTEM

PERFORMANCE SPECIFICATIONS[1]

Measurements

[illegible]

- GPS: L1C/A, L2C, L2E, L5
- GLONASS: [illegible]
- SBAS: [illegible]
- Galileo: E1, E5A, E5B
- BeiDou (COMPASS): B1, B2

[illegible]

POSITIONING PERFORMANCE[2]

Code differential GNSS positioning

[illegible]

Static GNSS surveying

High-Precision Static

[illegible]

Static and Fast Static

[illegible]

Postprocessed Kinematic (PPK) GNSS surveying

[illegible]

Real Time Kinematic surveying

[illegible]

HARDWARE

Physical

[illegible]

ELECTRICAL

[illegible]

COMMUNICATIONS AND DATA STORAGE

[illegible]

Data Formats

[illegible]

WebUI

[illegible]

Supported Trimble Controllers

[illegible]

CERTIFICATIONS

[illegible]

[illegible]

Bluetooth

Contact your local Trimble Authorized Distribution Partner for more information

NORTH AMERICA
Trimble Inc.
10368 Westmoor Drive
Westminster CO 80021
USA

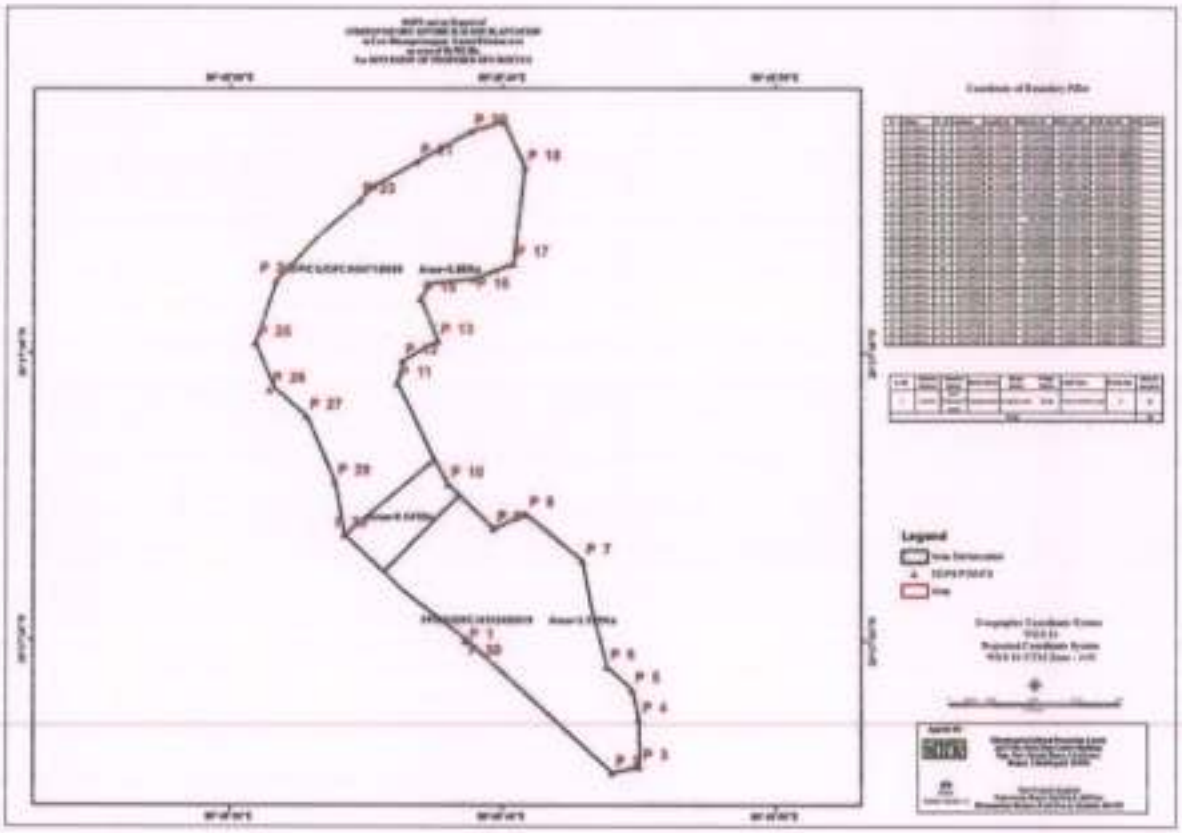
EUROPE
Trimble Germany GmbH
Am Prime Parc 11
65479 Raunheim
GERMANY

ASIA-PACIFIC
Trimble Navigation
Singapore Pty Limited
80 Marine Parade Road
#22-06, Parkway Parade
Singapore 449269
SINGAPORE

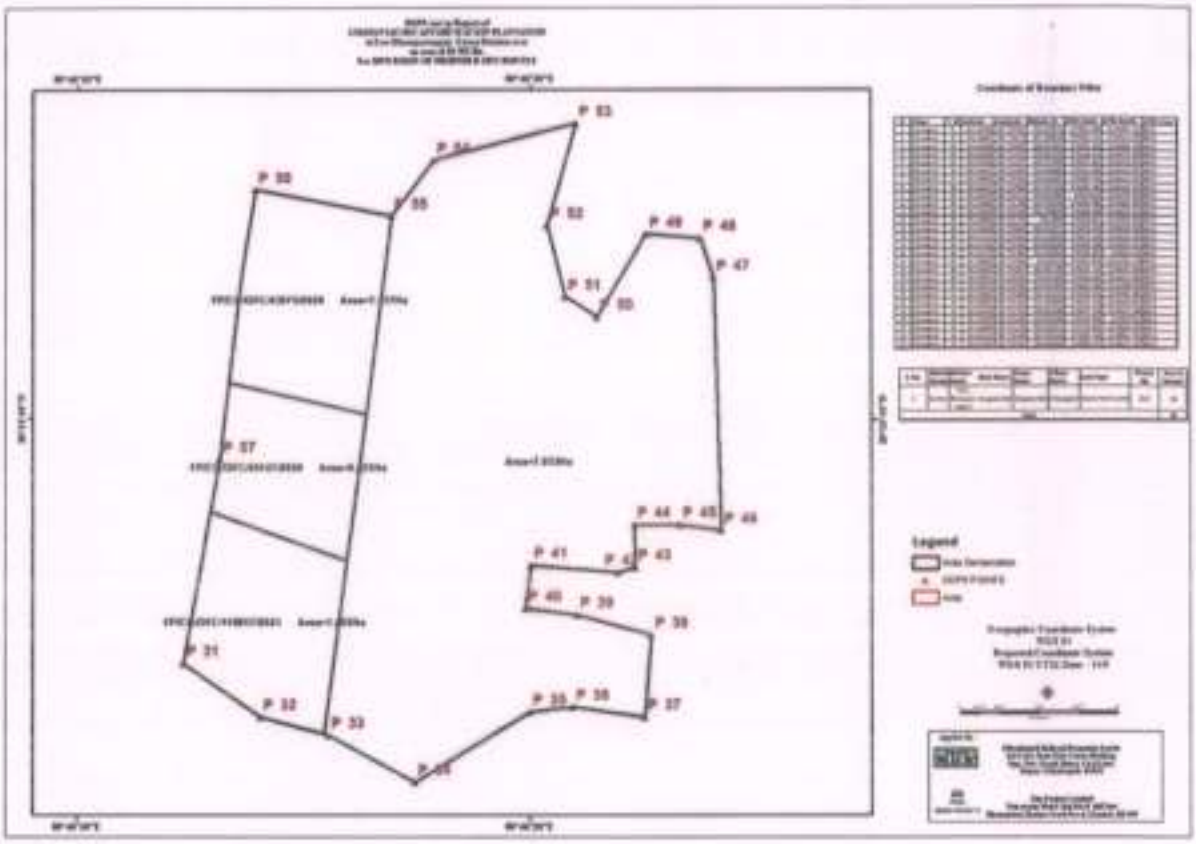
Trimble.

Generation of Map and Survey Reports for Forest Diversion

A map is created by overlaying the created vector data for the forest patches on the Geo-referenced SOI Toposheets. The reports are generated for DGPS Points (with Lat/long) placed at the regular intervals of 100 m on the proposed OFC route in the forest area. Another report is generated having area calculation for the proposed trench area in different type of Forest Lands. Samples of these are as below.

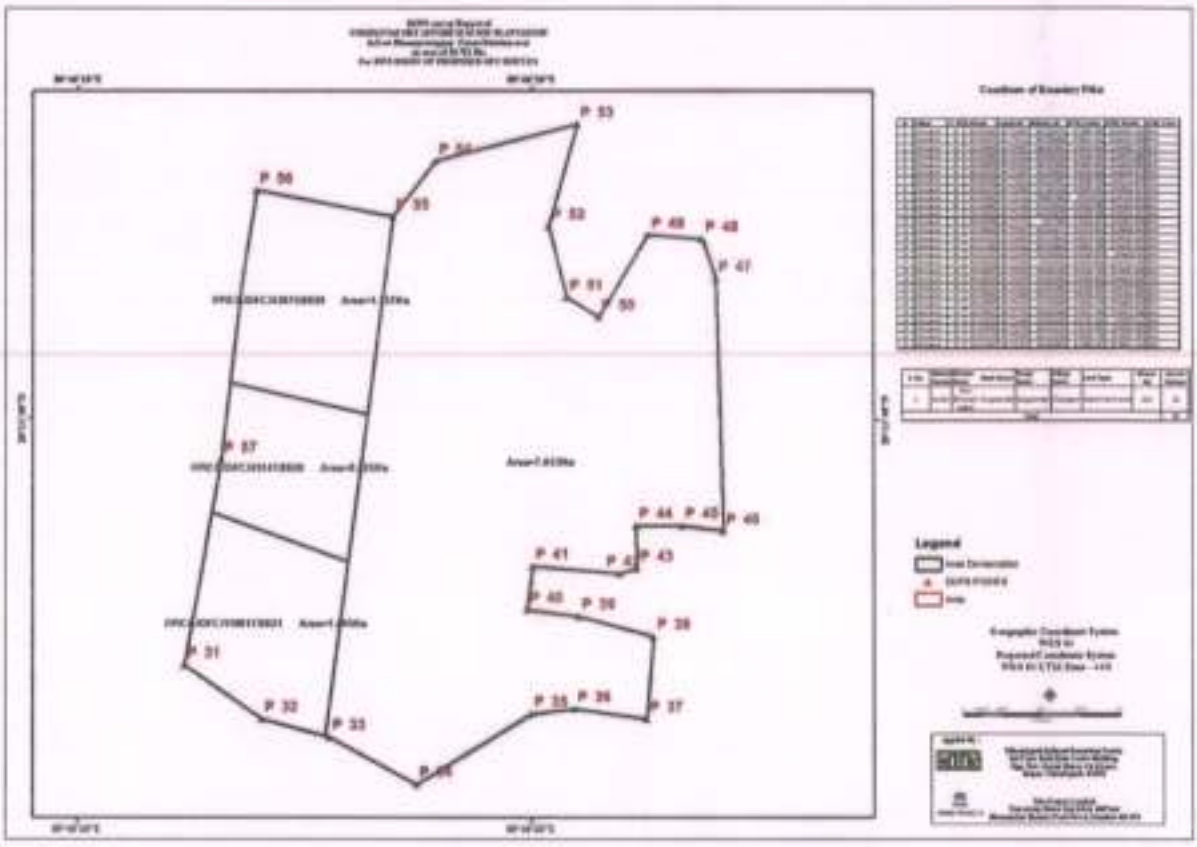


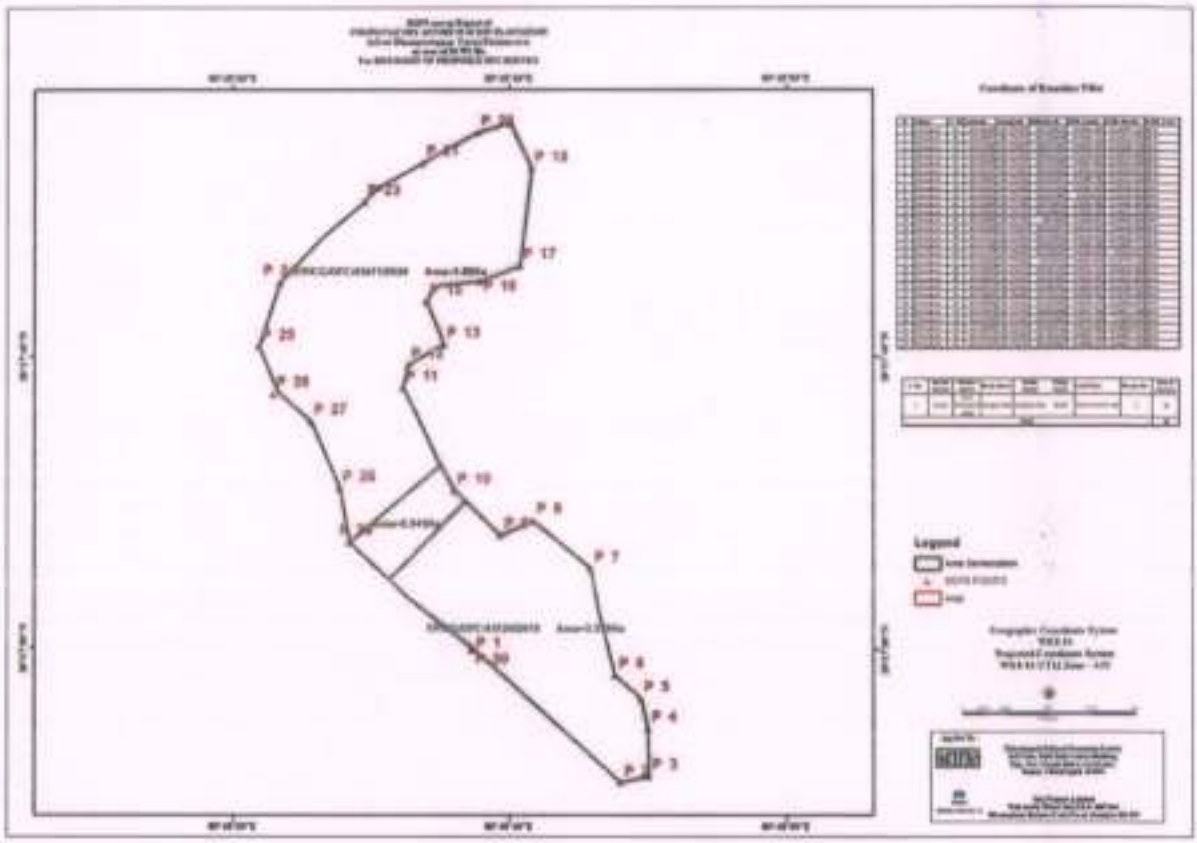
Geo-referenced Map


P 53
P 54
P 50
P 55
P 52
P 49
P 48
P 47
P 51
P 50
P 57
P 44
P 45
P 46
P 41
P 43
P 40
P 39
P 38
P 31
P 32
P 33
P 34
P 36
P 37
P 35
Legend

Sl	District	Division	Registrati	Area_ Ha	Village Name	Khasara No
1	Surajpur	Elefant Reserve Ambikapur	FP/CG/OFC/43274/2019	1.462	Pondgaon	174
2	Bastar	Kanger Ghati National Park Jagdalpur	FP/CG/OFC/118817/2021	1.005	Chaurgaon	213
3	Raigarh	Gomarda Abhyaran, Raigarh Division	FP/CG/OFC/45147/2020	0.825	Chaurgaon	213
4	Bijapur	Indravati Tiger Reserve Bijapur	FP/CG/OFC/45471/2020	5.88	Beldo	2
5	Gariaband	Udanti- Sitanadi Tiger Reserve, Gariaband	FP/CG/OFC/45530/2020	8.965	Pondgaon	174
6	Baloda Bazar-Bhatapara	Barnavapara Abhyaran, Balaoda bazar	FP/CG/OFC/43975/2020	1.137	Chaurgaon	213
7	Kabeerdham	Bhoramdev Abhyaran, Kawardha Division	FP/CG/OFC/43124/2019	3.579	Beldo	2

Area Demarcation of Different Forest Diversion Proposals




Legend

5. DGPS Survey Results

Trimble.

Post-Processing Service Based on RTX Technology

TrimbleRTX.com

Contributor:	gaonapaengineering@gmail.com
Reference Name:	10633320.T02
Upload Date:	11/30/2022 15:19:00 UTC
Report Time Frame:	
Start Time:	11/28/2022 10:32:42 UTC
End Time:	11/28/2022 11:20:28 UTC
Observation File Type(s):	T02
Observation File(s):	10633320.T02
Antenna:	
Name:	TRMRBS NONE
Height:	1.853 m
Reference:	Bottom of antenna mount
Coordinate System:	ITRF2014
Tectonic Plate:	India (Auto-detected)
Tectonic Plate Model:	MORVEL56
Processing Interval:	10 s

Statistics

# Total Obs	# Usable Obs	# Used Obs	Percent
1434	286	282	98

Used Satellites

# Total Satellites:	21
GPS:	G01 G03 G04 G07 G08 G09 G14 G16 G21 G27 G30
GLONASS:	R01 R07 R08 R11 R21
BeiDou:	C09 C10 C11 C12 C14

Processing Results

ITRF2014 at Epoch 2010.0		
Coordinate	Value	σ
X	921733.452 m	0.072 m
Y	5918609.893 m	0.044 m
Z	2184746.820 m	0.028 m
Latitude	20° 09' 46.41589" N	0.024 m
Longitude	81° 08' 53.37283" E	0.071 m
El. Height	328.415 m	0.047 m

ITRF2014 at Epoch 2022.91		
Coordinate	Value	σ
X	921732.883 m	0.072 m
Y	5918609.810 m	0.044 m
Z	2184747.286 m	0.028 m
Latitude	20° 09' 46.43202" N	0.024 m
Longitude	81° 08' 53.39173" E	0.071 m
El. Height	328.416 m	0.047 m

Report Information

Trimble RTX Solution ID:	27013634
Solution Type:	Static
Software Version:	8.5.1.20196
Creation Date:	11/30/2022 15:19:07 UTC

Disclaimer

Trimble Navigation Limited does not guarantee availability, reliability, and performance of the current RTX Post-Processing service and accepts no legal liability arising from, or connected to, the use of information on this document or use of this service.

6. DGPS Survey Results

The total area is 12.419 Hectare covered in Beldo and Chaurgaon Village of Durgukondal Range. Land Area Statement Report is as below

S. No.	District Names	Division Name	Block Name	Range Name	Village Name	Land Type	Comp/Khasra No	Area in Hectare
1	Kanker	East Bhanupratappur	Durgukondal	Durgukondal	Beldo	Government Land	2	9.452
2	Kanker	East Bhanupratappur	Durgukondal	Durgukondal	Chaurgaon	Government Land	213	2.967
Total								12.419

DGPS coordinates

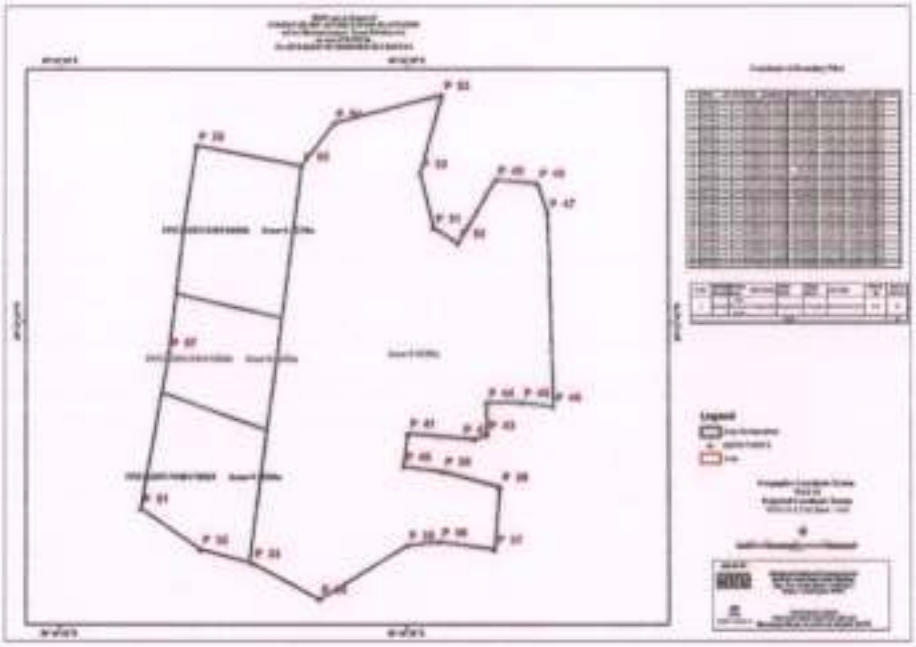
Sl	Village	P_ID	Latitude	Longitude	Altitude_M	UTM_Eastin	UTM_Northi	UTM_Zone
1	Beldo	1	20.291662	80.810743	341.467733	480239.441	2243768.492	44 N
2	Beldo	2	20.290398	80.812225	340.464045	480393.986	2243628.51	44 N
3	Beldo	3	20.290458	80.812507	339.764004	480423.403	2243635.116	44 N
4	Beldo	4	20.290912	80.812502	337.865005	480422.938	2243685.285	44 N
5	Beldo	5	20.291197	80.812428	338.765677	480415.316	2243716.833	44 N
6	Beldo	6	20.291422	80.812173	341.866328	480388.72	2243741.762	44 N
7	Beldo	7	20.292437	80.811927	345.168713	480363.093	2243854.116	44 N
8	Beldo	8	20.292897	80.811350	339.97008	480302.94	2243905.09	44 N
9	Beldo	9	20.292755	80.811022	348.16997	480268.641	2243889.452	44 N
10	Beldo	10	20.293180	80.810565	346.971186	480221.014	2243936.539	44 N
11	Beldo	11	20.294155	80.810040	346.773658	480166.322	2244044.499	44 N
12	Beldo	12	20.294373	80.810092	341.574107	480171.744	2244068.655	44 N

RANGE OFFICER
DURGUKONDAL

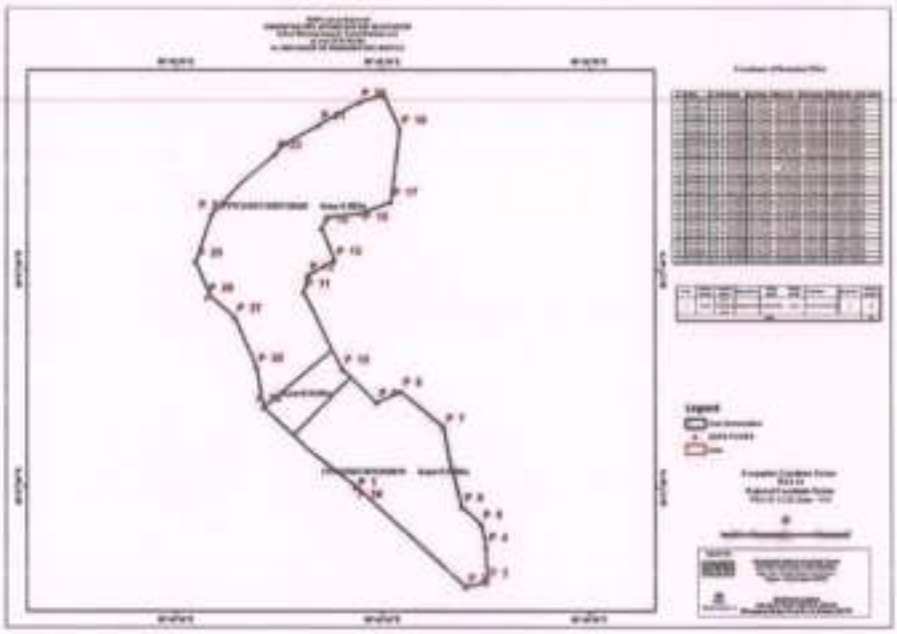
Sl	Village	P_ID	Latitude	Longitude	Altitude_M	UTM_Eastin	UTM_Northi	UTM_Zone
13	Beldo	13	20.294568	80.810457	351.574311	480209.879	2244090.19	44 N
14	Beldo	14	20.295100	80.810350	352.875548	480198.809	2244149.04	44 N
15	Beldo	15	20.294973	80.810282	349.575311	480191.659	2244135.03	44 N
16	Beldo	16	20.295168	80.810818	340.775409	480247.716	2244156.545	44 N
17	Beldo	17	20.295313	80.811217	341.375482	480289.324	2244172.544	44 N
18	Beldo	18	20.296242	80.811337	338.877452	480301.971	2244275.263	44 N
19	Beldo	19	20.296676	80.811122	340.378194	480287.043	2244308.111	44 N
20	Beldo	20	20.296582	80.810793	336.478343	480247.015	2244303.73	44 N
21	Beldo	21	20.296292	80.810244	339.178017	480191.815	2244270.963	44 N
22	Beldo	22	20.296057	80.809807	337.677992	480142.202	2244254.973	44 N
23	Beldo	23	20.295922	80.809658	337.877786	480126.698	2244240.052	44 N
24	Beldo	24	20.295152	80.808805	354.276616	480037.503	2244154.943	44 N
25	Beldo	25	20.294547	80.808590	355.375415	480014.978	2244088.017	44 N
26	Beldo	26	20.294097	80.808735	350.674334	480030.06	2244038.201	44 N
27	Beldo	27	20.293838	80.809115	351.27353	480069.702	2244009.567	44 N
28	Beldo	28	20.293203	80.809403	360.871953	480099.726	2243939.26	44 N
29	Beldo	29	20.292692	80.809500	355.370766	480109.754	2243882.625	44 N
30	Beldo	30	20.291687	80.810743	339.867788	480239.444	2243771.259	44 N
Sl	Village	P_ID	Latitude	Longitude	Altitude_M	UTM_Eastin	UTM_Northi	UTM_Zone
1	Chaurgaon	31	20.226358	80.770097	345.359575	475985.408	2236547.152	44 N
2	Chaurgaon	32	20.226047	80.770573	347.558454	476035.151	2236512.593	44 N
3	Chaurgaon	33	20.225940	80.770987	348.457841	476078.309	2236500.729	44 N
4	Chaurgaon	34	20.225668	80.771522	349.256754	476134.152	2236470.588	44 N
5	Chaurgaon	35	20.226078	80.772227	343.757009	476207.856	2236515.859	44 N
6	Chaurgaon	36	20.226107	80.772487	341.956833	476235.018	2236518.957	44 N
7	Chaurgaon	37	20.226050	80.772925	334.556307	476280.796	2236512.623	44 N
8	Chaurgaon	38	20.226527	80.772968	337.657314	476285.395	2236565.367	44 N
9	Chaurgaon	39	20.226643	80.772515	334.457986	476238.06	2236578.342	44 N
10	Chaurgaon	40	20.226680	80.772198	339.758356	476204.988	2236582.445	44 N
11	Chaurgaon	41	20.226932	80.772232	342.058879	476208.508	2236610.291	44 N

Sl	Village	P_ID	Latitude	Longitude	Altitude_M	UTM_Eastin	UTM_Northi	UTM_Zone
12	Chaurgaon	42	20.226890	80.772763	341.8583	476264.037	2236605.604	44 N
13	Chaurgaon	43	20.226920	80.772867	342.458271	476274.835	2236608.909	44 N
14	Chaurgaon	44	20.227167	80.772863	330.758816	476274.524	2236636.206	44 N
15	Chaurgaon	45	20.227168	80.773142	329.058564	476303.598	2236636.351	44 N
16	Chaurgaon	46	20.227137	80.773395	332.058263	476330.055	2236632.81	44 N
17	Chaurgaon	47	20.228603	80.773345	335.46153	476325.054	2236795.124	44 N
18	Chaurgaon	48	20.228832	80.773265	336.862105	476316.732	2236820.404	44 N
19	Chaurgaon	49	20.228853	80.772933	339.362456	476282.092	2236822.849	44 N
20	Chaurgaon	50	20.228375	80.772632	333.561682	476250.509	2236769.958	44 N
21	Chaurgaon	51	20.228492	80.772438	332.162116	476230.332	2236782.896	44 N
22	Chaurgaon	52	20.228906	80.772332	337.262959	476233.178	2236826.605	44 N
23	Chaurgaon	53	20.229655	80.772795	338.664344	476267.764	2236911.584	44 N
24	Chaurgaon	54	20.229283	80.771640	339.064586	476147.064	2236870.62	44 N
25	Chaurgaon	55	20.228958	80.771378	349.564112	476119.682	2236834.692	44 N
26	Chaurgaon	56	20.229112	80.770540	341.765218	476032.138	2236851.781	44 N
27	Chaurgaon	57	20.227547	80.770321	345.464826	475998.317	2236817.153	44 N

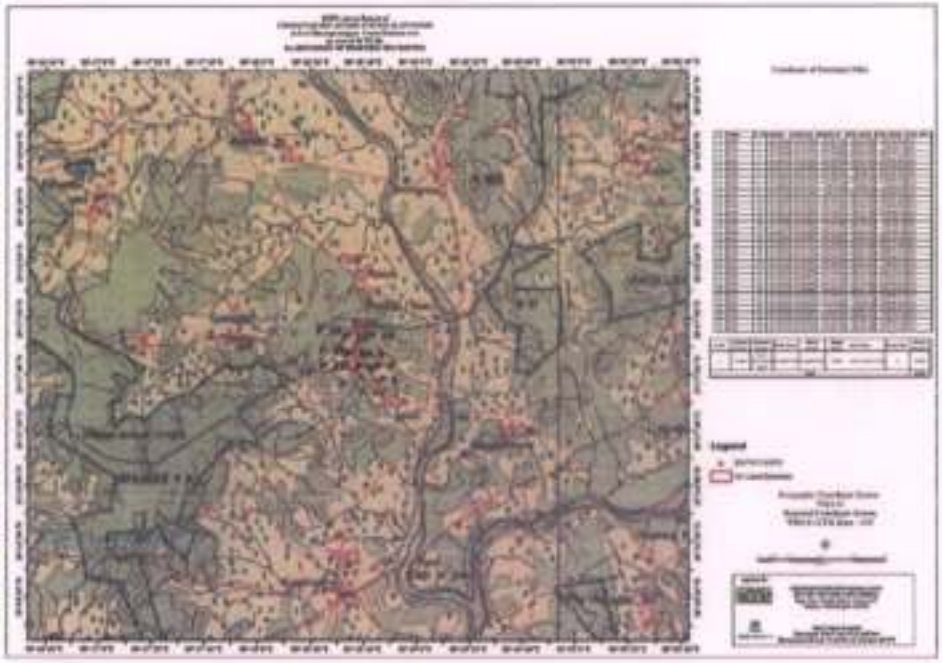
6.1. Geo-Referenced Maps of the Proposed Route (Annexure-3)

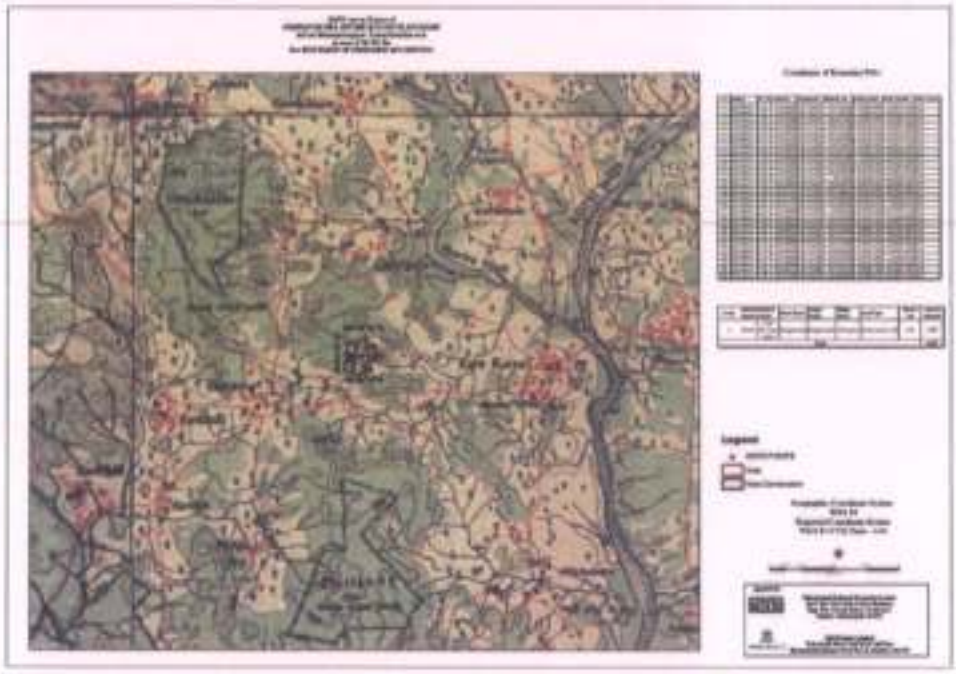


Geo-Referenced Maps



6.1.1. Map showing Geo-reference map



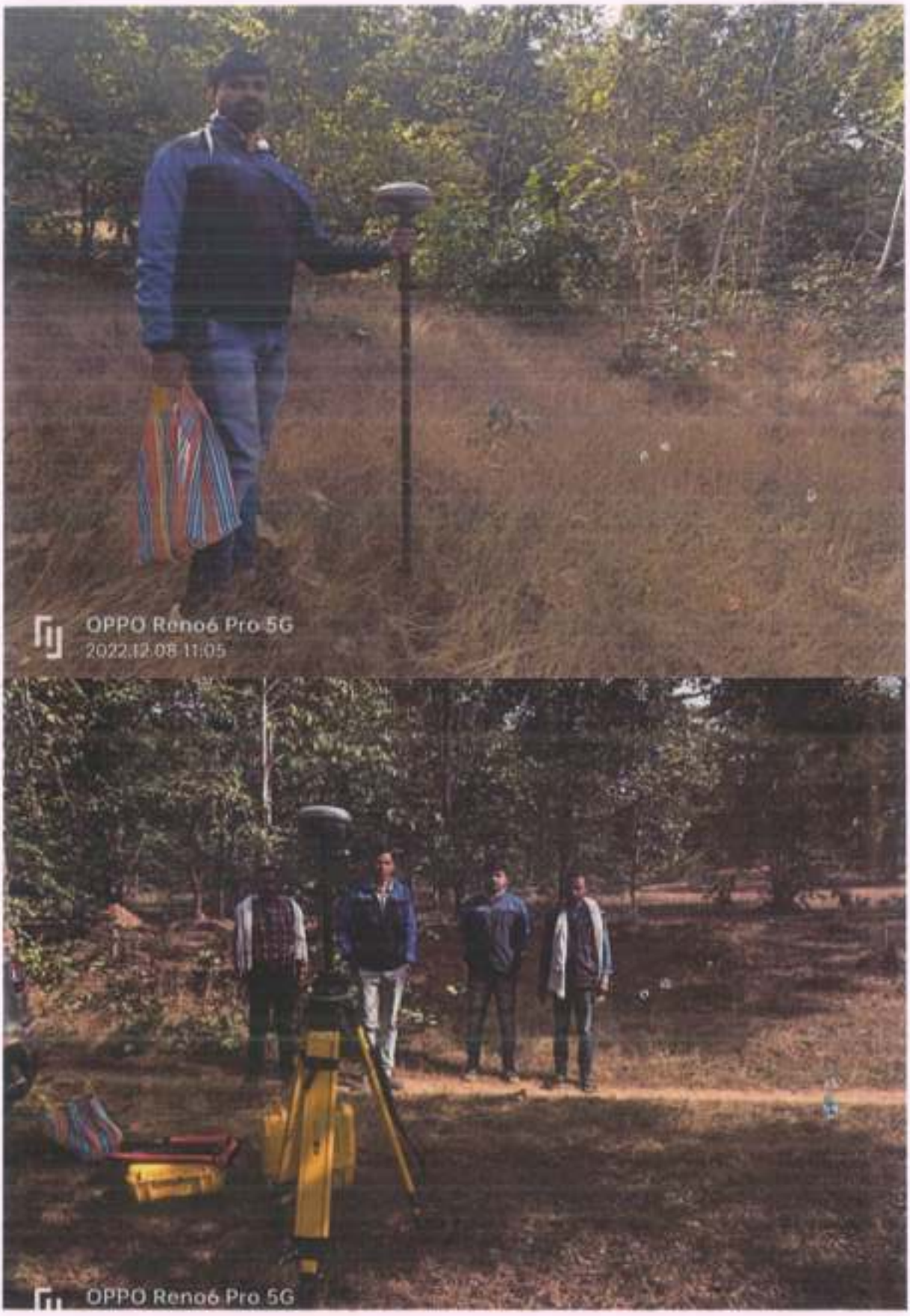


6.1.2. Map showing Toposheet map.

Field Photo Graph


OPPO Reno6 Pro 5G
2022.12.08 12:43


OPPO Reno6 Pro 5G


OPPO Reno6 Pro 5G
2022.12.08 11:05
OPPO Reno6 Pro 5G


OPPO Reno6 Pro 5G
2022.12.08 10:10


OPPO Reno6 Pro 5G
2022.12.08 10:14