Reliance Jio Infocomm Limited 4G OFC Network

DGPS Survey report for Forest Diversion of Proposed OFC Cable Route from Patla to Keshkal with Route Length 24.99 Km, in District Kondagaon (C.G.)

APPLICATION SUBMITTED BY:

RELIANCE JIO INFOCOMM LIMITED

DGPS SURVEY AND GIS MAPPING DONE BY:

Geotrax International Services
Raipur, Chhattisgarh.

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1. Introduction and Background

PROJECT 4G OPTICAL FIBER CABLE

1.1 Background

Reliance Jio Infocomm Limitedis setting up 4G Optical Fiber Cable network across the country. In the state of Chhattisgarh, the company plans to set up the telecom network (including laying of OFC cable) along the NHAI/PWD Road corridor. Reliance Jio Infocomm is granted license by Ministry of Communications & IT, Dept. of Telecommunications, and Govt. Of India, to establish Optical Fiber Cable network under the license number 370/2011 dated. 23.06.2011 issued to M/S Infotel Broadband Services Limited (company name changed to Reliance Jio Infocomm Limited on 22.01.2013). The OFC Cable is laid under the ground at approx. depth of 1.65m and the trench width is 0.5m. The cable trench line on National Highways is approx. at a distance of 14.5m from the road centerline and for State/District highways it is approx. 7m from the road centerline.

1.2 Location and Communication

The proposed OFC Cable route from Patla to Keshkal is on the National Highway corridor NH-43. The route length is approx. 24.99 km. The OFC cable route falls in Keshkal tehsil in district Kondagaon. The survey site is located in Keshkal ranges of Keshkal division. The cable route's proposed starting point is Patla Latitude 19°53'13.44" N and Longitude 81°38'4.23" E, and the end location is Keshkal at Latitude 20°6'3.48" N and Longitude 81°35'19.67" E. The OFC Cable route is covered under Survey of India Toposheet 64 N/8 and 64 O/5, on RF 1:50000.

1.3 Objective

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 Differential GPS (DGPS) and the same should be uploaded to MoEF website along with the online application.

To meet this requirement of MoEF, Reliance Jio Infocomm Limited, entrusted the DGPS survey work to M/s Geotrax International Services, Raipur, which is an empanelled agency of Directorate of Geology and Mines, Chhattisgarh (***Ref. Circular No. F-7-14/2013/12, dated. 10.11.2014***).

1.4 Geotrax Empanelment Certificate in Chhattisgarh

By Speed post

3666

छत्तीसगढ़ शासन
खनिज साधन विभाग
मंत्रालय
महानदी भवन, नया रायपुर–492002

10 NOV 2014

//अधिसूचना//

रायपुर, दिनांक नवम्बर, 2014

कमांक एफ 7–14/2013/12:: राज्य शासन एतद् द्वारा चीफ कन्ट्रोलर ऑफ माइन्स, भारतीय खान ब्यूरो नागपुर के परिपत्र कमांक 2/2010, दिनांक 06.4.2010 के पैरा–2 के बिन्दु–2 के तारतम्य में समस्त खनिजों के खनिज रियायतों के सीमा स्तम्भ का Differential Globle Positioning System(डीजीपीएस) का उपयोग करते हुए सर्वेक्षण करने के लिए तालिका में दर्शित संस्थानों को अधिमान्यता प्रदान करता है:–

क्र.	एजेंसी का नाम एवं पता
1	2
1	M/S SHREERAM GEMICON (PVT.) LIMITED GEOLOGICAL AND MINING CONSULTANTS L-09, Songanga Colony Seepat Road, Bilaspur (Chhattisgarh)
2	M/S SINHA MINING CONSULTANCY, GOA Office No. 9, D.Costa Commercial Apartment, Near Old Railway Station Gate, Malbhat, Margo - 403601, Goa-India
3	M/S SPATIAL PLANNING AND ANALYSIS RESEARCH CENTRE PVT. LTD. E/11, Infocity, Chandaka Industrial Estate, Bhubaneshwar, Orissa, India, Pin - 751024
4	M/S SIDDHARTH GEO CONSULTANTS, 21/3, First Floor Ramkund, Samta Colony, Behind Lifeworth Hospital, Raipur (Chhattisgarh) 492001
5	M/S SOHAM FERRO MANGANESE PVT. LTD. Block No. 16,17 Ground Floor N.K.Y. Tower, Anjani Sq. Wardha Road, Nagpur (Maharashtra)
6	M/S SAN SURVEY ENGINEERING , HOOGHLY(WB) Regd. Off. - 465, Jiban Pal Bagan, Karbala (West), P.O. & Dist. - Hooghly, West Bengal, Pin - 712103 Contact Office - Anjali Complex, Bankim Kanan, Chinsurah Station Road, Chinsurah, Hoogly, West Bengal -712102
(7)	M/S GEOTRAX INTERNATION SERVICES, HYDERABAD (TELANGANA) Plate No 156 & 157, Lokayuta Colony, Badangpet Nadergul, Hyderabad 500058, Telangana
8	M/S RAFT CONTRACTORS AND DESIGNERS, Plot No. D-36, Ground Floor, Koelnagar, Raurkela, Dist. Sundargarh, Orissa, Pin No. - 769014
9	M/S MICRONET SOLUTION, Bisesar House, Opp. HSSC Board Office, (P.B. 85 G.P.O.) Civil Line, Nagpur, Maharashtra - 440001
10	M/S BHARAT ALUMINIUM COMPANY LIMITED (BALCO) P.O. Balco Nagar Korba(C.G.), India, Pin 495684

2/ अधिमान्यता प्राप्त संस्थानो के लिए शर्तें:–

2.1. The Survey Agency Shall Be responsible for the accuracy of the data collected and Survey.

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

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

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

2.5 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.

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

2.7 डीजीपीएस सर्वे कार्य हेतु पारिश्रमिक का निर्धारण अधिमान्य प्राप्त संस्थान एवं खनिज रियायतधारी के मध्य आपसी समन्वय से किया जाएगा। किसी भी प्रकार का आपसी विवाद होने पर राज्य शासन उत्तरदायी नही होगा।

2.8 डीजीपीएस 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।

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

2.10 राज्य शासन द्वारा जारी यह अधिमान्यता 03 वर्ष के लिए होगी। समयावधि समाप्ति से 03 माह पूर्व अधिकृत एंजेसी नवीनीकरण हेतु आवेदन कर सकेगा।

2.11 भारत सरकार एवं राज्य शासन द्वारा डीजीपीएस सर्वे के संबंध में समय–समय पर जारी निर्देशों का पालन किया जाना होगा।

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

छत्तीसगढ़ के राज्यपाल के नाम से
तथा आदेशानुसार,

(सुबोध कुमार सिंह)
सचिव
छत्तीसगढ़ शासन
खनिज साधन विभाग

पृ. कमांक एफ 7–14/2013/12 रायपुर, दिनांक नवम्बर, 2014

17 0 NOV 2014

प्रतिलिपिः–

1. सचिव, भारत सरकार, खान मंत्रालय, शास्त्री भवन, नई दिल्ली,
2. कंट्रोलर जनरल, भारतीय खान ब्यूरो, सेकण्ड फ्लोर, ए–ब्लॉक, इन्दरा भवन, सिविल लाईन, नागपुर (महाराष्ट)
3. चीफ कन्ट्रोलर ऑफ माईन्स, भारतीय खान ब्यूरो, सेकण्ड फ्लोर, ए–ब्लॉक, इन्दरा भवन, सिविल लाईन, नागपुर (महाराष्ट)
4. क्षेत्रीय खान नियंत्रक, भारतीय खान ब्यूरो, छटवां तल, बी एवं सी –ब्लॉक, इन्दरा भवन, सिविल लाईन, नागपुर (महाराष्ट)
5. संचालक, भौमिकी तथा खनिकर्म, छत्तीसगढ़ ब्लॉक–4, द्वितीय तल, इन्द्रावती भवन, नया रायपुर,
6. समस्त कलेक्टर, जिला ———————— छत्तीसगढ़

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7. समस्त संबंधित ----------

की ओर सूचनार्थ एवं आवश्यक कार्यवाही हेतु

8. संचालक, शासकीय मुद्रणालय, गोन्दवारा, भनपुरी, रायपुर(छत्तीसगढ़) की ओर राजपत्र में प्रकाशनार्थ।

9. श्री श्रीकांत राव, सहायक भौमिकी विद्, संचालनालय भौमिकी तथा खनिकर्म, द्वितीय फ्लौर, इन्द्रावती भवन, नया रायपुर। कृपया उक्त आदेश/अधिसूचना को संचानलालय की वेबसाईट में अपलोड करने का कष्ट करें।

10. गार्ड फाईल रजिस्टर

सचिव
छत्तीसगढ़ शासन
खनिज साधन विभाग

Not to Scale

Fig-1: Patla to Keshkal 4G OFC Cable Proposed Route on Satellite Imagery

2. Scope of Work

1. Establishment of one base station with 72 Hours observationand secondary control points at every 10km along the proposed route.
2. DGPS Survey for collection of ground coordinates along the OFCCable trench at every 50m interval and/or at every turn/bend along the porposed trench. The DGPS data is collected at forest patches only.
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 OFC Cable trench boundary vector map using the DGPS Surveyed data
    c. Superimposition of cable route layer on Georeferencedforest maps, SOI Toposheet and Satellite imagery.
    d. Computation of Forest area proposed for diversion. It includes Reserved/Protected Forest & Revenue Forest.
    e. Preparation of Geo-referenced forest map at 1:15000 scale, and SOI Toposheet at 1:50000 scale.
    f. 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 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 RINEX format.
2. DGPS Reports - Base line & network adjustment report for the primary and Secondary Control Points.
3. Geo-referenced SOI maps & forest block mapsbased on DGPS observations – Hard and Soft Copy (SHP and KML formats).
4. Proposed Forest Diversion area statement as per DGPS Survey
5. DGPS Survey and mapping report

4. Brief description of the Technical approach

4.1 Input Data

The proposed 4G Cable Route plan is shown on the ground by the engineer/ Vendor of Reliance Jio Infocomm Ltd (RJIL). The Forest & SOI maps required for geo-referencing were provided by Reliance Jio Infocomm Limited. It is proposed that the cable is laid within the ROW of the NHAI/PWD road corridor. The cable trench is laid at a depth of 1.65m below ground and the trench width is 0.5m. The revenue village maps were collected from NIC online website (http://cg.nic.in/bhunaksha/). The revenue forest information& details are collected from the District Revenue department and were provided by RJIL.

4.2 GIS Data Preparation

Based on the input data and information provided, the DGPS base station - Primary and Temporary Benchmarks Control Points (PCP and TBM) in the project area are planned. One PCP with 72 hours observation is planned and established on the roof top of the Forest Department office, Birgudi Range, Dhamtari.

Not to Scale

Fig-2: Satellite Image showing the location of the Primary Control Point

4.3 Establishment of Primary Control Point (PCP)

The Primary Control Point (PCP) with 72 hours of DGPS Observation was established as the DGPS base station. The PCP was established in the Forest Department office of Birgudi Range in Dhamtari division. As per Survey of India (SOI) Guideline, the PCP is to be fixed through continuous observation for 72 hours duration. The 72 hours of observation was carried out using DGPS from 8thMarch 2016 to 11thMarch 2016. 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).

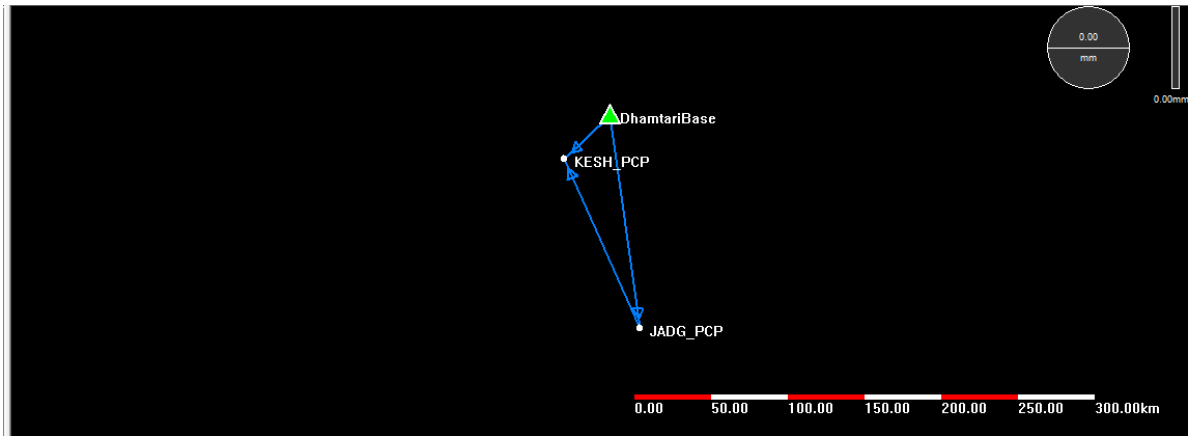
Station (s)	Submitted File	Antenna Type	Antenna Height (m)	Start Time	End Time
DhamtariPCP	03102966068t.16O	CNT300	1.835	3/8/2016 11:05	3/11/2016 11:08

The coordinate of the PCP is as follows:

Station	Latitude (d:m:s)	Longitude (d:m:s)	Ellipsoidal Height (m)
PCP Base @ Forest Office, Birgudi	20°19'27.95862''	81°51'30.09666''	526.826219

4.4 Establishment of Temporary Benchmarks (TBM)

The Temporary Control Point with 24hours of static observation was established in Jagdalpur(Station ID: **JADG_PCP**) and Keshkal (Station ID: **KESH_PCP**).The TBM are post-processed using the Dhamtari Base.



	Grid		WGS84	
JADG_PCP	**North(m)**	2109591.622	**Latitude**	19°04'34.70024"N
	East(m)	608826.178	**Longitude**	82°02'03.86504"E
	Height(m)	491.344	**Ellipsoid Height(m)**	491.344
KESH_PCP	**North(m)**	2218861.487	**Latitude**	20°03'56.56788"N
	East(m)	561503.883	**Longitude**	81°35'17.51417"E
	Height(m)	615.101	**Ellipsoid Height(m)**	615.101

4.5 DGPS Survey Procedure

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 (JADG_PCP). The base is shifted using the Real Time Kinematic Survey method. The distance between the Base Station TBM and rover was always less than 5km.

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 cable trench boundary. DGPS readings were collected at every 50m distance along trench and at every turn or bend. For Geo-referencing village maps around 5 GCPs were collected for the eachvillage having Govt. Forest Land.

During the survey the start and end of 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, compartment number etc.

The static data is Post Processed using Trimble Business Centre software for obtaining the TBM coordinates.

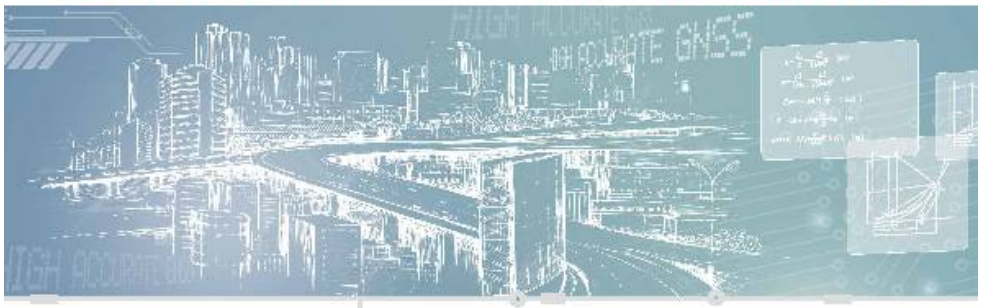
4.6 Creation of Vector Layers

The surveyed points captured through DGPS were plotted in the GIS Software and thePolygon and Polylinelayers are created using the DGPS Surveyed points. Different layers such as the Forest Patch polygon, Forest Trench centerline, Non-Forest Trench line, polygon showing Revenue forest patches (ChoteJadka Jungle + Bade JadKa Jungle) etc., are prepared. The vector layers prepared are then super-imposed on the Geo-referenced Forest map and Cadastral maps.

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-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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www.comnavtech.com

5. Results

The total route length from Patla to Keshkal is approx. 24.99 km and the proposed forest area for diversion is 0.830 Ha. DGPS Survey processing report and co-ordinates of the PCP are in Annexure-1, and DGPS coordinates of TBM and forest patch boundary coordinates is in Annexure-2. The geo-referenced maps are in Annexure -3.

AREA STATEMENT

Patla to Keshkal - Proposed Forest Diversion Area Statement			
Total Route Length (in KM)	Total Forest Patch Length (in KM)	OFC Cable Trench Width (in KM)	Total Forest Diversion Area (in HA)
24.99	**16.60**	**0.0005**	**0.830**

TABLE-A

Patla to Keshkal - Schedule of Forest Land - Protected Forest						
SL. NO.	PATCH NUMBER	DIVISION	RANGE	COMPARTMENT TYPE	COMPARTMENT NUMBER	DIVERSION AREA (in HA)
1	2	KESHKAL	KESHKAL	PROTECTED FOREST	10	0.031
2	11				14	0.043
3	15				13	0.032
4	1				16	0.026
5	5				17	0.041
6	7				18	0.061
7	14				13	0.011
8	19				2854	0.085
9	21				2737	0.030
10	22				2737	0.064
TOTAL AREA						**0.423**

TABLE-B	Patla to Keshkal - Schedule Of Forest Land - Revenue Forest (CJJ + BJJ)						
	SL. NO.	PATCH NUMBER	DISTRICT	TALUK	VILLAGE NAME	KHASRA NUMBER	DIVERSION AREA (in HA)
	1	13	KONDA GAON	KESHKAL	PIPRA	44/1	0.024
	2	18			BERMA	39/6	0.025
	3	20			SINGHANPUR	260/141	0.087
	4	23			BATRALI	66/1	0.084
	5	3			MANJHI ATGAON	3/2	0.002
	6	4				3/2	0.008
	7	6			PIPRA	339/1	0.028
	8	8			MASU KOKODA	74/10	0.029
	9	9				74/1	0.028
	10	10			PIPRA	152/1	0.009
	11	12				51/3	0.027
	12	16			BERMA	37/1	0.007
	13	17				39/7	0.005
	14	24			BATRALI	44/4	0.024
	15	25			BORGAON	77/3 KA	0.021
	TOTAL AREA						**0.407**
	TOTAL FOREST LAND (TABLE A+TABLE B)						**0.830**

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: PCP Observation Processing Report

AUSPOS GPS Processing Report

March 13, 2016

This document is a report of the GPS data processing undertaken by the AUSPOS Online GPS Processing Service (version: AUSPOS 2.2) . The AUSPOS Online GPS Processing Service uses International GNSS Service (IGS) products (final, rapid, ultra-rapid depending on availability) to compute precise coordinates in ITRF anywhere on Earth and GDA94 within Australia. The Service is designed to process only dual frequency GPS phase data.

An overview of the GPS processing strategy is included in this report.

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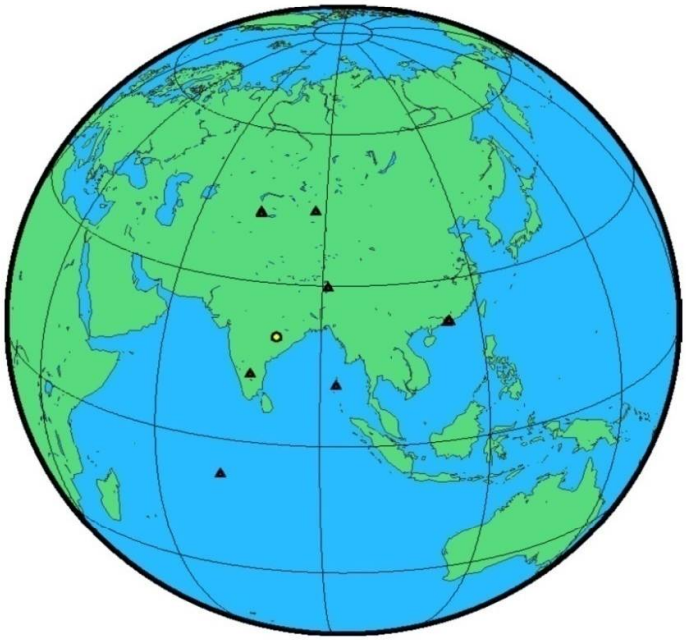
1 User Data

All antenna heights refer to the vertical distance from the Ground Mark to the Antenna Reference Point (ARP).

Station (s)	Submitted File	Antenna Type	Antenna Height (m)	Start Time	End Time
0310	03102966068t.16O	NONE NONE	1.835	2016/03/08 11:05:00	2016/03/11 11:08:00

2 Processing Summary



Date	User Stations	Reference Stations	Orbit Type
2016/03/08 11:05:00	0310	CHUM COAL DGAR FOMO HKNP HKSC HKSL IISC LHAZ PBRI POL2 URUM	IGS rapid

Remark: An IGS Rapid Orbit product has been used in this computation, IGS Rapid orbits are usually of very high quality. However, to ensure you achieve the highest quality coordinates please resubmit approximately 2 weeks after the observation session end to ensure the use of the IGS Final Orbit product.

3 Computed Coordinates, ITRF2008

All computed coordinates are based on the IGS realisation of the ITRF2008 reference frame. All the given ITRF2008 coordinates refer to a mean epoch of the site observation data. All coordinates refer to the Ground Mark.

3.1 Cartesian, ITRF2008

Station	X (m)	Y (m)	Z (m)	ITRF2008 @
0310	847431.032	5923497.015	2201542.645	08/03/2016
CHUM	1228950.494	4508079.980	4327868.536	08/03/2016
COAL	-2363061.244	5418784.895	2386861.974	08/03/2016
DGAR	1916268.941	6029977.645	-801719.532	08/03/2016
FOMO	-2359952.443	5416530.098	2394688.441	08/03/2016
HKNP	-2392360.793	5400226.084	2400094.284	08/03/2016
HKSC	-2414267.443	5386768.794	2407459.846	08/03/2016
HKSL	-2393382.945	5393860.986	2412592.226	08/03/2016
IISC	1337935.984	6070317.122	1427877.174	08/03/2016
LHAZ	-106941.954	5549269.791	3139215.168	08/03/2016
PBRI	-295635.867	6240848.757	1278178.473	08/03/2016
POL2	1239971.069	4530790.141	4302578.862	08/03/2016
URUM	193030.282	4606851.294	4393311.529	08/03/2016

3.2 Geodetic, GRS80 Ellipsoid, ITRF2008

Geoid-ellipsoidal separations, in this section, are computed using a spherical harmonic synthesis of the global EGM2008 geoid. More information on the EGM2008 geoid can be found at http://earth-info.nga.mil/GandG/wgs84/gravitymod/egm2008/

Station	Latitude (DMS)	Longitude (DMS)	Ellipsoidal Height(m)	Derived Above Geoid Height(m)
0310	20 19 27.95862	81 51 30.09666	374.523	439.432
CHUM	42 59 54.60521	74 45 03.96822	716.346	759.336
COAL	22 07 14.46822	113 33 40.99130	169.428	173.849
DGAR	-7 16 10.85492	72 22 12.87672	-64.945	8.936
FOMO	22 11 50.69337	113 32 32.97380	56.639	61.324
HKNP	22 14 56.63138	113 53 37.96948	350.665	354.011
HKSC	22 19 19.81344	114 08 28.29612	20.203	22.659
HKSL	22 22 19.21124	113 55 40.75260	95.266	98.809
IISC	13 01 16.21017	77 34 13.36859	843.700	929.621
LHAZ	29 39 26.40107	91 06 14.51053	3624.609	3659.300
PBRI	11 38 16.00933	92 42 43.69169	-22.497	38.437
POL2	42 40 47.17396	74 41 39.36737	1714.214	1754.280
URUM	43 48 28.61949	87 36 02.41330	858.876	922.255

3.3 Positional Uncertainty (95% C.L.) - Geodetic, ITRF2008

Station	Longitude(East) (m)	Latitude(North) (m)	Ellipsoidal Height(Up) (m)
0310	0.006	0.005	0.011
CHUM	0.006	0.005	0.009
COAL	0.008	0.005	0.010
DGAR	0.007	0.007	0.015
FOMO	0.008	0.005	0.010
HKNP	0.008	0.005	0.009
HKSC	0.008	0.005	0.010
HKSL	0.008	0.005	0.009
IISC	0.006	0.005	0.010
LHAZ	0.006	0.005	0.010
PBRI	0.006	0.005	0.010
POL2	0.006	0.005	0.009
URUM	0.006	0.005	0.008

4 Ambiguity Resolution - Per Baseline

Baseline	Ambiguities Resolved	Baseline Length (km)
CHUM - POL2	94.5 %	35.732
DGAR - IISC	88.9 %	2303.736
CHUM - URUM	90.6 %	1042.674
HKSC - HKSL	84.8 %	22.645
COAL - HKNP	92.0 %	37.121
HKNP - URUM	67.2 %	3359.554
HKNP - HKSL	85.1 %	14.063
HKNP - PBRI	66.7 %	2522.221
0310 - IISC	94.5 %	927.744
LHAZ - PBRI	70.9 %	1994.328
0310 - PBRI	75.0 %	1503.302
COAL - FOMO	91.4 %	8.718
AVERAGE	83.5%	1147.653

Please note for a regional solution, such as used by AUSPOS, ambiguity resolution success rate of 50% or better for a baseline formed by a user site indicates a reliable solution.

5 Computation Standards

5.1 Computation System

Software	Bernese GNSS Software Version 5.2.
GNSS system(s)	GPS only.

5.2 Data Preprocessing and Measurement Modelling

Data preprocessing	Phase preprocessing is undertaken in a baseline by baseline mode using triple-differences. In most cases, cycle slips are fixed by the simultaneous analysis of different linear combinations of L1 and L2. If a cycle slip cannot be fixed reliably, bad data points are removed or new ambiguities are set up A data screening step on the basis of weighted postfit residuals is also performed, and outliers are removed.
Basic observable	Carrier phase with an elevation angle cutoff of 7° and a sampling rate of 3 minutes. However, data cleaning is performed a sampling rate of 30 seconds. Elevation dependent weighting is applied according to $1/\sin(e)^2$ where e is the satellite elevation.
Modelled observable	Double differences of the ionosphere-free linear combination.
Ground antenna phase centre calibrations	IGS08 absolute phase-centre variation model is applied.
Tropospheric Model	A priori model is the GMF mapped with the DRY-GMF.
Tropospheric Estimation	Zenith delay corrections are estimated relying on the WET-GMF mapping function in intervals of 2 hour. N-S and E-W horizontal delay parameters are solved for every 24 hours.
Tropospheric Mapping Function	GMF
Ionosphere	First-order effect eliminated by forming the ionosphere-free linear combination of L1 and L2. Second and third effect applied.
Tidal displacements	Solid earth tidal displacements are derived from the complete model from the IERS Conventions 2010, but ocean tide loading is not applied.
Atmospheric loading	Applied
Satellite centre of mass correction	IGS08 phase-centre variation model applied
Satellite phase centre calibration	IGS08 phase-centre variation model applied
Satellite trajectories	Best available IGS products.
Earth Orientation	Best available IGS products.

5.3 Estimation Process

Adjustment	Weighted least-squares algorithm.
Station coordinates	Coordinate constraints are applied at the Reference sites with standard deviation of 1mm and 2mm for horizontal and vertical components respectively.
Troposphere	Zenith delay parameters and pairs of horizontal delay gradient parameters are estimated for each station in intervals of 2 hours and 24 hours.
Ionospheric correction	An ionospheric map derived from the contributing reference stations is used to aid ambiguity resolution.
Ambiguity	Ambiguities are resolved in a baseline-by-baseline mode using the Code-Based strategy for 180-6000km baselines, the Phase-Based L5/L3 strategy for 18-200km baselines, the Quasi-Ionosphere-Free (QIF) strategy for 18-2000km baselines and the Direct L1/L2 strategy for 0-20km baselines.

5.4 Reference Frame and Coordinate Uncertainty

Terrestrial reference frame	IGS08 station coordinates and velocities mapped to the mean epoch of observation.
Australian datum	GDA94 coordinates determined via Helmert transformation from ITRF using the Dawson and Woods (2010) parameters.
Derived AHD	For stations within Australia, AUSGeoid09 is used to compute AHD. AUSGeoid09 is the Australia-wide gravimetric quasigeoid model that has been a posteriori fitted to the Australian Height Datum.
Above-geoid heights	Earth Gravitational Model EGM2008 released by the National Geospatial-Intelligence Agency (NGA) EGM Development Team is used to compute above-geoid heights. This gravitational model is complete to spherical harmonic degree and order 2159, and contains additional coefficients extending to degree 2190 and order 2159.
Coordinate uncertainty	Coordinate uncertainty is expressed in terms of the 95% confidence level for both GDA94 and ITRF2008. Uncertainties are scaled using an empirically derived model which is a function of data span, quality and geographical location.

7.2 Annexure–2: DGPS Surveyed coordinates of Forest Patches

Sl. No	Patch No	Pillar Id	Easting (m)	Northing (m)	Latitude "N"	Longitude "E"
1	PATCH NO.1	P 1	566334.376	2199784.290	19.893169	81.633704
2		P 2	566319.692	2199836.216	19.893639	81.633565
3		P 3	566301.286	2199902.282	19.894236	81.633392
4		P 4	566247.556	2200028.640	19.89538	81.632883
5		P 5	566232.443	2200057.963	19.895645	81.63274
6		P 6	566189.499	2200159.334	19.896563	81.632333
7		P 7	566174.981	2200219.519	19.897107	81.632197
8		P 8	566144.320	2200269.857	19.897563	81.631906
9	PATCH NO.2	P 9	566111.684	2200322.473	19.89804	81.631596
10		P 10	566055.312	2200433.450	19.899044	81.631061
11		P 11	565991.151	2200573.448	19.900312	81.630453
12		P 12	565862.990	2200847.127	19.902789	81.629239
13		P 13	565847.981	2200879.051	19.903078	81.629096
14	PATCH NO.3	P 14	565828.079	2200944.251	19.903668	81.628909
15		P 15	565820.782	2200978.094	19.903974	81.62884
16	PATCH NO.4	P 16	565641.016	2201453.458	19.908276	81.62714
17		P 17	565679.585	2201295.342	19.906845	81.627503
18		P 18	565668.701	2201348.039	19.907322	81.6274
19	PATCH NO.5	P 19	565637.956	2201465.112	19.908381	81.627111
20		P 20	565608.917	2201630.488	19.909876	81.626839
21		P 21	565591.633	2201700.872	19.910513	81.626677
22		P 22	565587.217	2201722.748	19.910711	81.626635
23		P 23	565550.108	2201871.725	19.912058	81.626286
24		P 24	565501.284	2202018.159	19.913383	81.625825
25		P 25	565467.382	2202141.600	19.9145	81.625505
26		P 26	565445.535	2202215.572	19.915169	81.625299
27		P 27	565639.681	2201458.544	19.908322	81.627127
28		P 28	565436.747	2202252.606	19.915504	81.625217
29		P 29	565439.618	2202242.425	19.915412	81.625244
30	PATCH NO.6	P 30	565294.281	2202755.211	19.92005	81.623873
31		P 31	565284.030	2202791.457	19.920378	81.623777
32		P 32	565265.497	2202855.123	19.920954	81.623602
33		P 33	565151.623	2203281.545	19.924811	81.622529
34		P 34	565249.590	2202912.863	19.921476	81.623452
35		P 35	565227.453	2202990.242	19.922176	81.623243
36		P 36	565212.676	2203050.101	19.922718	81.623104
37		P 37	565183.892	2203155.996	19.923675	81.622833
38	PATCH NO.7	P 38	565129.022	2203369.476	19.925606	81.622316
39		P 39	565104.596	2203458.059	19.926408	81.622086

Sl. No	Patch No	Pillar Id	Easting (m)	Northing (m)	Latitude "N"	Longitude "E"
40		P 40	565103.656	2203466.243	19.926482	81.622077
41		P 41	564818.625	2204436.428	19.935258	81.619388
42		P 42	565086.632	2203573.350	19.92745	81.621918
43		P 43	565047.122	2203626.685	19.927933	81.621543
44		P 44	565046.105	2203671.580	19.928339	81.621534
45		P 45	565046.079	2203671.606	19.928339	81.621534
46		P 46	565035.906	2203772.926	19.929255	81.621441
47		P 47	564999.731	2203850.674	19.929959	81.621098
48		P 48	564976.272	2203897.359	19.930381	81.620875
49		P 49	564938.460	2204014.750	19.931443	81.620518
50		P 50	564886.940	2204186.435	19.932997	81.620032
51		P 51	564838.918	2204384.791	19.934791	81.61958
52	PATCH NO.8	P 52	564804.338	2204472.784	19.935587	81.619253
53		P 53	564753.951	2204660.270	19.937283	81.618778
54		P 54	564732.085	2204741.789	19.93802	81.618572
55		P 55	564717.889	2204818.327	19.938712	81.618439
56		P 56	564713.815	2204844.184	19.938946	81.618401
57		P 57	564707.783	2204849.496	19.938994	81.618343
58		P 58	564683.648	2204931.971	19.93974	81.618115
59		P 59	564668.034	2204989.397	19.94026	81.617968
60	PATCH NO.9	P 60	564634.864	2205111.112	19.941361	81.617656
61		P 61	564608.410	2205214.571	19.942296	81.617406
62		P 62	564514.090	2205524.820	19.945103	81.616516
63		P 63	564648.463	2205061.212	19.940909	81.617784
64		P 64	564593.244	2205264.527	19.942748	81.617263
65		P 65	564586.308	2205269.257	19.942791	81.617197
66		P 66	564571.102	2205330.538	19.943345	81.617054
67		P 67	564558.529	2205377.871	19.943774	81.616936
68		P 68	564548.945	2205412.239	19.944084	81.616845
69		P 69	564535.544	2205463.747	19.94455	81.616719
70		P 70	564528.308	2205503.873	19.944913	81.616651
71		P 71	564520.227	2205507.193	19.944943	81.616574
72	PATCH NO.10	P 72	564467.623	2205698.457	19.946673	81.616078
73		P 73	564500.459	2205563.970	19.945457	81.616387
74		P 74	564484.357	2205641.527	19.946159	81.616236
75		P 75	564477.449	2205670.922	19.946424	81.616171
76	PATCH NO.11	P 76	564466.094	2205702.742	19.946712	81.616064
77		P 77	564443.378	2205787.755	19.947481	81.61585
78		P 78	564405.584	2205927.346	19.948744	81.615493
79		P 79	564384.290	2206003.967	19.949437	81.615292
80		P 80	564372.802	2206046.682	19.949823	81.615184
81		P 81	564367.594	2206079.561	19.950121	81.615136

Sl. No	Patch No	Pillar Id	Easting (m)	Northing (m)	Latitude "N"	Longitude "E"
82		P 82	564367.800	2206083.287	19.950154	81.615138
83		P 83	564366.267	2206104.824	19.950349	81.615124
84		P 84	564357.843	2206122.062	19.950505	81.615044
85		P 85	564347.861	2206132.821	19.950602	81.614949
86		P 86	564347.802	2206159.955	19.950848	81.614949
87		P 87	564349.540	2206176.470	19.950997	81.614966
88		P 88	564262.539	2206459.199	19.953555	81.614145
89		P 89	564241.695	2206516.927	19.954077	81.613948
90		P 90	564320.488	2206295.980	19.952078	81.614693
91		P 91	564291.805	2206378.145	19.952821	81.614422
92	PATCH NO.12	P 92	564075.307	2207083.254	19.959863	81.612175
93		P 93	563944.237	2207603.243	19.963903	81.611143
94		P 94	564034.249	2207222.184	19.960457	81.61199
95		P 95	564023.849	2207287.418	19.961046	81.611893
96		P 96	564000.823	2207380.590	19.961889	81.611676
97		P 97	563985.245	2207434.056	19.962373	81.611529
98	PATCH NO.13	P 98	563918.441	2207709.669	19.964865	81.6109
99		P 99	563903.764	2207775.013	19.965456	81.610762
100		P 100	563892.693	2207814.822	19.965816	81.610658
101		P 101	563828.170	2208072.210	19.968144	81.61005
102	PATCH NO.14	P 102	563792.539	2208142.447	19.96878	81.609712
103		P 103	563826.677	2208078.164	19.968198	81.610036
104		P 104	563772.975	2208214.043	19.969428	81.609527
105		P 105	563749.518	2208283.311	19.970054	81.609306
106	PATCH NO.15	P 106	563703.658	2208459.925	19.971652	81.608873
107		P 107	563690.599	2208520.844	19.972203	81.608751
108		P 108	563667.880	2208590.504	19.972833	81.608536
109		P 109	563631.855	2208721.582	19.974019	81.608196
110		P 110	563599.832	2208831.311	19.975011	81.607894
111		P 111	563746.799	2208286.266	19.970081	81.60928
112		P 112	563581.643	2208911.456	19.975736	81.607723
113	PATCH NO.16	P 113	563524.181	2209063.854	19.977115	81.607179
114		P 114	563529.744	2209165.394	19.978032	81.607236
115		P 115	563512.279	2209204.955	19.97839	81.60707
116	PATCH NO.17	P 116	563332.146	2209771.928	19.98352	81.605368
117		P 117	563354.798	2209682.404	19.98271	81.605581
118		P 118	563353.261	2209687.992	19.98276	81.605567
119		P 119	563338.217	2209751.662	19.983336	81.605425
120	PATCH NO.18	P 120	563321.876	2209806.210	19.98383	81.605271
121		P 121	563294.858	2209914.119	19.984806	81.605016
122		P 122	563274.987	2210008.394	19.985658	81.60483
123		P 123	563247.340	2210119.668	19.986665	81.604569

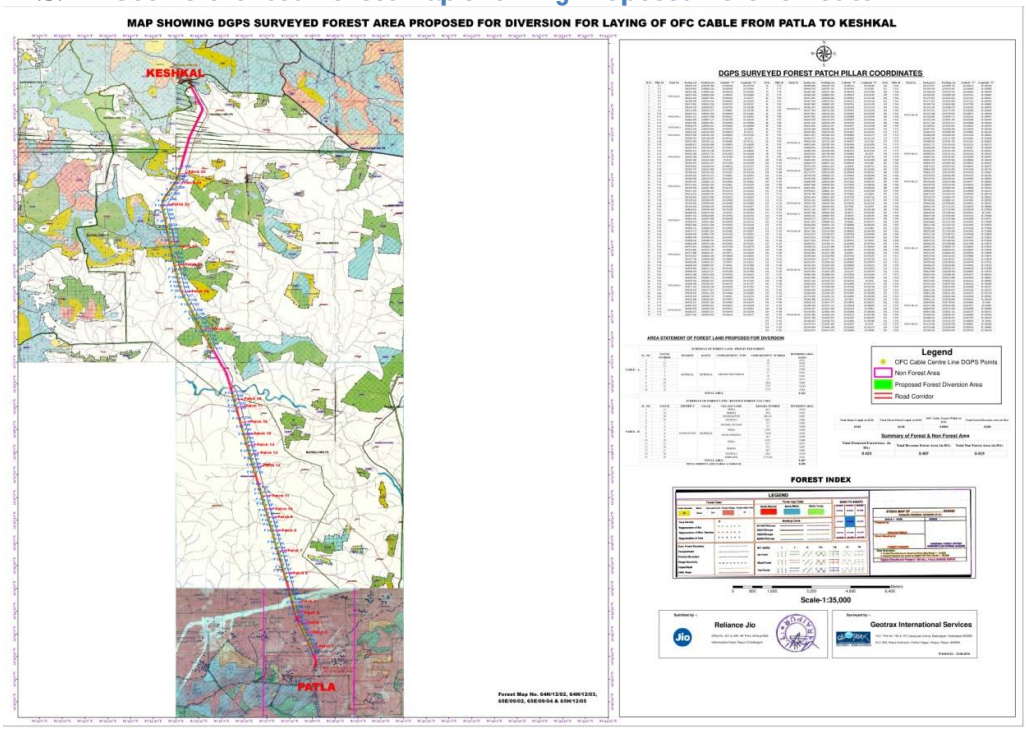
Sl. No	Patch No	Pillar Id	Easting (m)	Northing (m)	Latitude "N"	Longitude "E"
124		P 124	563229.875	2210190.871	19.987309	81.604405
125		P 125	563232.922	2210198.718	19.987379	81.604434
126		P 126	563217.638	2210257.752	19.987913	81.60429
127	PATCH NO.19	P 127	562450.911	2212106.717	20.004646	81.597024
128		P 128	562408.120	2212224.988	20.005716	81.596619
129		P 129	562363.866	2212301.353	20.006407	81.596199
130		P 130	562349.902	2212317.086	20.00655	81.596066
131		P 131	562285.840	2212426.904	20.007544	81.595457
132		P 132	562258.094	2212477.534	20.008003	81.595194
133		P 133	562203.427	2212568.362	20.008825	81.594674
134		P 134	562165.381	2212654.939	20.009609	81.594313
135		P 135	562119.304	2212738.663	20.010367	81.593876
136		P 136	562076.942	2212835.180	20.01124	81.593474
137		P 137	561994.780	2212988.556	20.012629	81.592694
138		P 138	561922.090	2213126.248	20.013875	81.592004
139		P 139	561911.134	2213156.770	20.014152	81.5919
140		P 140	561856.404	2213239.932	20.014905	81.591379
141		P 141	561827.911	2213298.995	20.015439	81.591109
142		P 142	561664.092	2213609.022	20.018246	81.589553
143		P 143	561806.668	2213349.510	20.015897	81.590908
144		P 144	561743.594	2213456.722	20.016867	81.590308
145	PATCH NO.20	P 145	561660.386	2213616.122	20.01831	81.589518
146		P 146	561630.135	2213674.737	20.018841	81.589231
147		P 147	561589.260	2213751.711	20.019538	81.588843
148		P 148	561556.357	2213815.934	20.020119	81.58853
149		P 149	561520.061	2213891.538	20.020804	81.588186
150		P 150	561435.486	2214059.220	20.022321	81.587383
151		P 151	561327.184	2214265.307	20.024187	81.586354
152		P 152	561288.407	2214338.378	20.024849	81.585986
153		P 153	561279.353	2214362.466	20.025067	81.5859
154		P 154	561244.844	2214449.388	20.025853	81.585573
155		P 155	561235.037	2214472.574	20.026063	81.58548
156	PATCH NO.20	P 156	561221.917	2214495.752	20.026273	81.585356
157		P 157	561193.426	2214557.811	20.026834	81.585085
158		P 158	561189.620	2214570.755	20.026952	81.585049
159		P 159	561183.002	2214600.558	20.027221	81.584987
160		P 160	561175.961	2214622.632	20.027421	81.584921
161		P 161	561177.181	2214633.830	20.027522	81.584933
162		P 162	561169.754	2214662.668	20.027783	81.584863
163		P 163	561150.146	2214698.270	20.028105	81.584676
164		P 164	561142.541	2214727.355	20.028368	81.584604
165		P 165	561135.188	2214782.974	20.028871	81.584536

Sl. No	Patch No	Pillar Id	Easting (m)	Northing (m)	Latitude "N"	Longitude "E"
166		P 166	561126.840	2214814.171	20.029153	81.584457
167		P 167	561125.344	2214841.104	20.029396	81.584444
168		P 168	561121.104	2214873.111	20.029686	81.584404
169		P 169	561109.452	2214910.837	20.030027	81.584294
170		P 170	561097.991	2214958.586	20.030459	81.584186
171		P 171	561092.624	2214996.592	20.030803	81.584136
172		P 172	561084.638	2215036.541	20.031164	81.584061
173		P 173	561040.786	2215217.566	20.032801	81.583648
174		P 174	561080.654	2215052.785	20.031311	81.584024
175		P 175	561051.771	2215145.653	20.032151	81.583751
176	PATCH NO.21	P 176	561036.580	2215245.100	20.03305	81.583609
177		P 177	561018.781	2215322.730	20.033752	81.583441
178		P 178	560998.761	2215472.112	20.035102	81.583255
179		P 179	560967.263	2215591.837	20.036185	81.582957
180		P 180	560916.150	2215795.566	20.038028	81.582476
181	PATCH NO.22	P 181	560902.333	2215893.336	20.038912	81.582347
182		P 182	560873.421	2216035.922	20.040201	81.582075
183		P 183	560843.458	2216142.835	20.041168	81.581792
184		P 184	560832.291	2216194.401	20.041634	81.581687
185		P 185	560778.554	2216426.484	20.043733	81.581181
186		P 186	560754.475	2216554.813	20.044894	81.580955
187		P 187	560740.409	2216674.698	20.045977	81.580824
188		P 188	560740.329	2216722.976	20.046414	81.580825
189		P 189	560914.828	2215803.165	20.038096	81.582463
190		P 190	560898.863	2215892.913	20.038908	81.582313
191		P 191	560671.547	2217052.512	20.049393	81.580178
192		P 192	560718.579	2216821.074	20.047301	81.580621
193		P 193	560706.092	2216883.315	20.047863	81.580503
194	PATCH NO.23	P 194	560668.209	2217068.861	20.049541	81.580147
195		P 195	560653.319	2217121.012	20.050013	81.580006
196		P 196	560648.136	2217145.992	20.050239	81.579958
197		P 197	560643.032	2217180.055	20.050547	81.57991
198		P 198	560637.346	2217264.861	20.051313	81.579858
199		P 199	560625.892	2217323.990	20.051848	81.579751
200		P 200	560618.806	2217413.249	20.052655	81.579686
201		P 201	560613.190	2217433.123	20.052835	81.579633
202		P 202	560589.362	2217469.671	20.053166	81.579406
203		P 203	560555.829	2217556.699	20.053953	81.579089
204		P 204	560531.329	2217665.613	20.054938	81.578858
205		P 205	560505.565	2217785.801	20.056025	81.578616
206		P 206	560507.351	2217938.362	20.057403	81.578638
207		P 207	560490.240	2217959.883	20.057598	81.578475

Sl. No	Patch No	Pillar Id	Easting (m)	Northing (m)	Latitude "N"	Longitude "E"
208		P 208	560497.312	2218009.173	20.058043	81.578544
209		P 209	560506.789	2218049.452	20.058407	81.578636
210		P 210	560513.345	2218060.316	20.058505	81.578699
211		P 211	560531.364	2218124.652	20.059086	81.578874
212		P 212	560535.940	2218140.817	20.059232	81.578918
213		P 213	560558.190	2218198.023	20.059748	81.579132
214		P 214	560568.542	2218206.682	20.059826	81.579232
215		P 215	560596.295	2218242.373	20.060148	81.579498
216		P 216	560617.804	2218280.929	20.060495	81.579705
217		P 217	560691.546	2218389.194	20.061471	81.580414
218		P 218	560717.894	2218427.808	20.061819	81.580667
219		P 219	560751.602	2218482.437	20.062312	81.580992
220		P 220	560761.240	2218507.987	20.062543	81.581085
221		P 221	560787.504	2218553.053	20.062949	81.581337
222		P 222	560812.184	2218584.057	20.063228	81.581574
223		P 223	560831.100	2218611.166	20.063473	81.581756
224	PATCH NO.24	P 224	560862.848	2218661.668	20.063928	81.582061
225		P 225	560901.122	2218706.664	20.064333	81.582429
226		P 226	560939.665	2218778.615	20.064982	81.5828
227		P 227	561073.786	2219010.856	20.067077	81.58409
228		P 228	560948.393	2218791.438	20.065098	81.582884
229		P 229	560974.286	2218811.133	20.065275	81.583132
230		P 230	561058.456	2218958.741	20.066606	81.583942
231	PATCH NO.25	P 231	561080.910	2219035.073	20.067295	81.584159
232		P 232	561104.708	2219120.225	20.068064	81.58439
233		P 233	561114.596	2219186.308	20.068661	81.584486
234		P 234	561155.688	2219308.448	20.069763	81.584883
235		P 235	561181.523	2219414.874	20.070724	81.585134

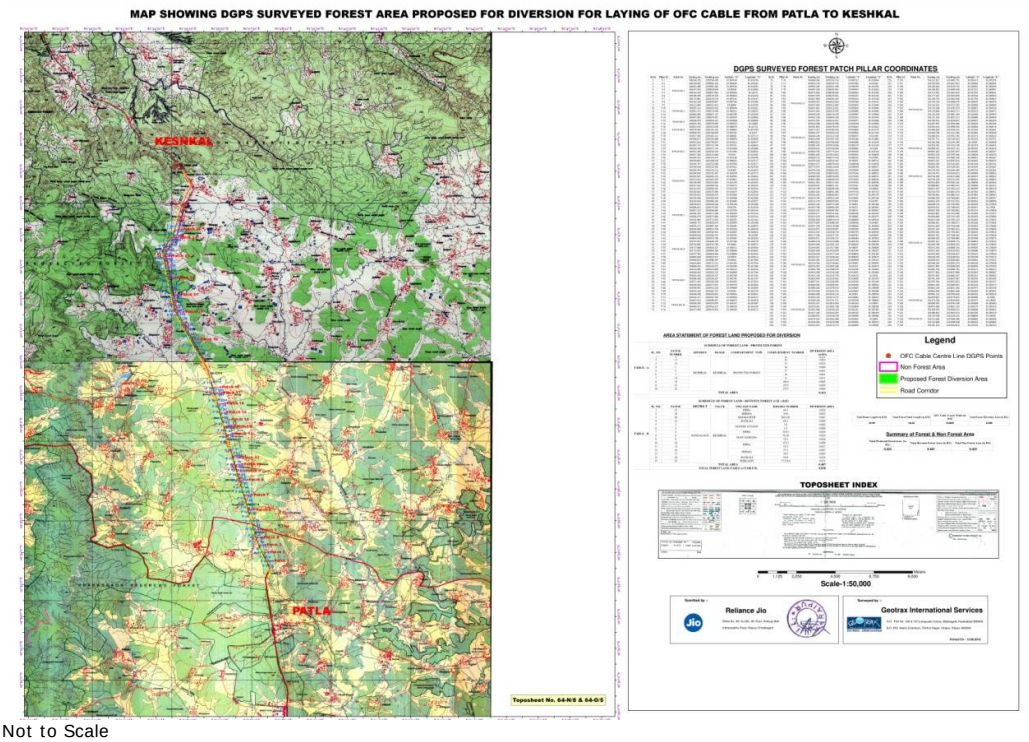
7.3 Annexure – 3: Geo-Referenced Maps of the Proposed Route

7.3.1 Geo-referenced Forest Map showing Proposed 4G OFC Route



Not to Scale

7.3.2 Geo-referenced SOI Map showing Proposed 4G OFC Route



Not to Scale

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