DGPS / Total Station Survey Report

For

Proposal for Diversion of Forest land For Consultancy Services for Preparation of DPR for Rehabilitation and Upgrading to 4- Lane with paved shoulders configuration of Bilaspur- Katghora Section of NH-111 in the State of Chhattisgarh. Pakage-I (0+00 to 53+300)

Bilaspur Forest Division

Total Area- 24.585 Ha

Submitted To

DFO Bilaspur,

Bilaspur, Chattishgarh

Submitted By

भारतीय राष्ट्रीय राजमार्ग प्राधिकरण
National Highways Authority Of India
(Ministry Of Road Transport & Highways Government Of India)

PIU Bilaspur,NHAI

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INTRODUCTION TO DGPS

WHAT IS DGPS AND WHY USE IT?

• **Differential Global Positioning System** (**DGPS**) is an enhancement to Global Positioning System that provides improved location accuracy, from the 15-meter nominal GPS accuracy to about 10 cm in case of the best implementations.

• DGPS refers to using a combination of receivers and satellites to reduce/eliminate common receiver based and satellite based errors reduce orbit errors reduce ionospheric and tropospheric errors reduce effects of SA eliminate satellite and receiver clock errors

• improve accuracy significantly 100's of metres to metres to centimetres to millimetres

1. DGPS uses one or several (network) fixed ground based reference stations (in known locations).

2. The base station compares its own known location, to that computed from a GPS receiver.

3. Any difference is then broadcast as a correction to the user.

Correction signals can be broadcast either from ground stations, or via additional satellites. These services are privately owned and usually require a user subscription.

Examples:

• Satellite Based Augmentation System (SBAS),
• Wide Area Augmentation System (WAAS),
• Local Area Augmentation System (LAAS),
• European Geostationary Navigation Overlay Service (EGNOS),
• Omni STAR
• Coast guard beacon service.

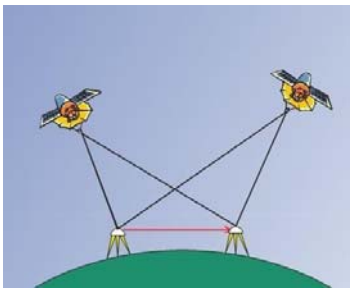
Why do we Need Differential GPS?

By using DGPS we can improve our positional accuracy from around 1.5m with standard GPS to around 40cm with DGPS, without the need for post processing.
In the case of the road survey van (top right), users can measure the amount of road wear and judge whether the road should be resurfaced justby driving over it. Just one day's driving can replace a month's manual work using traditional methods.

There are many other applications like this. The labour saving is immense but at the same time, previously impossible tasks are made possible such as the prediction of earthquakes before they occur.

DGPS Summary

• Term refers to simple C/A code differential
• Available on GPS receivers from low cost to high cost
• Produces accuracies from sub-metre to metres
• Many real-time DGPS correction providers - Coast guard, EGNOS, OmniSTAR
• Used for many different applications including marine navi-



gation, precision farming and vehicle testing applications.

What is RTK?

Real Time Kinematic is an advanced form of DGPS which uses the satellites carrier wave to compare 2 observations from different receivers within the system, to fine tune the satellite and receiver clock errors, thus improving positional accuracy.

Real Time Kinematic (RTK)

The GPS signal is made up of 3 distinct components:

• Carrier wave • GPS Code

• Navigation message

Typical GPS receivers will use the GPS navigation message to calculate its position. RTK uses the carrier wave of the GPS signal, which is 19.02cm long. By counting the number of cycles (and phase of the carrier), the travel time and distance can be measured more accurately.

RTK Summary

• Similar technique as DGPS that uses the carrier phase to provide more accurate positioning
• Cost is higher compared to DGPS receivers • Produces accuracies from 20 cm to sub-centimetres

• RTK corrections provided via a local base station or by a private correction provider - OmniSTAR, Leica, Trimble

• Produces accuracies from 20 cm to sub-centimetres

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Used for many different applications including machine control (construction, container ports, farming), vehicle testing applications, surveying (land, marine, hydrographic, aerial)

RINEX FILE

The first proposal for the ***Receiver Independent Exchange Format RINEX*** was developed by the Astronomical Institute of the University of Berne for the easy exchange of the Global.

Positioning System (GPS) data to be collected during the first large

European GPS campaign EUREF 89, which involved more than 60 GPS receivers of 4 different manufacturers. The governing aspect during the development was the following fact: Most geodetic processing software for GPS data use a well-defined set of observables:

• The carrier-phase measurement at one or both carriers (actually being a measurement on the beat frequency between the received carrier of the satellite signal and a receivergenerated reference frequency).
• The pseudorange (code) measurement, equivalent to the difference of the time of reception (expressed in the time frame of the receiver) and the time of transmission (expressed in the time frame of the satellite) of a distinct satellite signal.

• The observation time being the reading of the receiver clock at the instant of validity of the carrier-phase and/or the code measurements. Usually the software assumes that the observation time is valid for both the phase **and** the code measurements, **and** for all satellites observed. Consequently all these programs do not need most of the information that is usually stored by the receivers: They need phase, code, and time in the above mentioned definitions, and some stationrelated information like station name, antenna height, etc. Up till now two major format versions have been developed and published:

• The original RINEX Version 1 presented at and accepted by the 5th
International Geodetic Symposium on Satellite Positioning in Las Cruces, 1989. [Gurtner et al. 1989],[Evans 1989]

• RINEX Version 2 presented at and accepted by the Second International Symposium of Precise Positioning with the Global Positioning system in Ottawa, 1990, mainly adding the possibility to include tracking data from different satellite systems (GLONASS, SBAS). [Gurtner and Mader 1990a, 1990b], [Gurtner 1994]. Several subversions of RINEX Version 2 have been defined:

• Version 2.10: Among other minor changes allowing for sampling rates other than integer seconds and including raw signal strengths as new observables. [Gurtner 2002] • Version 2.11: Includes the definition of a two-character observation code for L2C pseudoranges and some modifications in the GEO NAV MESS files [Gurtner and Estey 2005]

• Version 2.20: Unofficial version used for the exchange of tracking data from spaceborne receivers within the IGS LEO pilot project [Gurtner and Estey 2002]. As spin-offs of this idea of a receiver-independent GPS

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exchange format other RINEX-like exchange file formats have been defined, mainly used by the International GNSS Service IGS:

• Exchange format for **satellite and receiver clock offsets** determined by processing data of a GNSS tracking network [Ray and Gurtner 1999]

• Exchange format for the complete **broadcast data of spacebased augmentation systems** SBAS. [Suard et al. 2004]

• IONEX: Exchange format for **ionosphere models** determined by processing data of a GNSS tracking network [Schaer et al. 1998] • ANTEX: Exchange format for **phase center variations** of geodetic GNSS antennae [Rothacher and Schmid 2005]. The upcoming European Navigation Satellite System Galileo and the enhanced GPS with new frequencies and observation types, especially the possibility to track frequencies on different channels, ask for a more flexible and more detailed definition of the observation codes. To improve the handling of the data files in case of "mixed" files, i.e. files containing tracking data of more than one satellite system, each one with different observation types, the record structure of the data record has been modified significantly and, following several requests, the limitation to 80 characters length has been removed. As the changes are quite significant, they lead to a new RINEX Version 3. The new version also includes the unofficial Version 2.20 definitions for space-borne receivers. The major change asking for a version 3.01 was the requirement to generate consistent phase observations across different tracking modes or channels, i.e. to apply ¼-cycle shifts prior to RINEX file generation, if necessary, to facilitate the processing of such data.

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The RINEX version 3.00 format consists of three ASCII file types:
1. Observation data File
2. Navigation message File
3. Meteorological data File

Each file type consists of a header section and a data section. The header section contains global information for the entire file and is placed at the beginning of the file. The header section contains header labels in columns 61-80 for each line contained in the header section. These labels are mandatory and must appear exactly as given in these descriptions and examples. The format has been optimized for minimum space requirements independent from the number of different observation types of a specific receiver or satellite system by indicating in the header the types of observations to be stored for this receiver and the satellite systems having been observed. In computer systems allowing variable record lengths the observation records may be kept as short as possible. Trailing blanks can be removed from the records. There is no maximum record length limitation for the observation records.

Each Observation file and each Meteorological Data file basically contain the data from one site and one session. Starting with Version 2 RINEX also allows including observation data from more than one site subsequently occupied by a roving receiver in rapid static or kinematic applications. Although Version 2 and higher allow to insert header records into the data section it is not recommended to concatenate data of more than one receiver (or antenna) into the same file, even if the data do not overlap in time. If data from more than one receiver have to be exchanged, it would not be economical to include the identical satellite navigation messages collected by the different receivers several times. Therefore the navigation message file from one receiver may be exchanged or a composite navigation message file created containing non-redundant information from several receivers in order to make the most complete file. The format of the data records of the RINEX Version 1 navigation message file was identical to the former NGS exchange format. RINEX version 3 navigation message files may contain navigation messages of more than one satellite system (GPS, GLONASS, Galileo, Quasi Zenith Satellite System (QZSS), BeiDou System (BDS) and SBAS).
The actual format descriptions as well as examples are given in the Appendix Tables at the end of the document.

BASIC DEFINITIONS

Time:

The time of the measurement is the receiver time of the received signals. It is identical for the phase and range measurements and is identical for all satellites observed at that epoch. For single-system data files it is by default expressed in the time system of the respective satellite system. Otherwise the actual time can (for mixed files must) be indicated in the Start Time header record.

Pseudo-Range:

The pseudo-range (PR) is the distance from the receiver antenna to the satellite antenna including receiver and satellite clock offsets–satellite clock offset + other biases) so that the pseudo-range reflects the actual behaviour of the receiver and satellite clocks. The pseudo-range is stored in units of meters.

Phase:

The phase is the carrier-phase measured in whole cycles. The halfcycles measured by squaring type receivers must be converted to whole cycles and flagged by the respective observation code.
The phase changes in the same sense as the range (negative doppler). The phase observations between epochs must be connected by including the integer number of cycles. The observables are not corrected for external effects like atmospheric refraction, satellite clock offsets, etc. If necessary phase observations are corrected for phase shifts needed to guarantee consistency between phases of the same frequency and satellite system based on different signal channels.
If the receiver or the converter software adjusts the measurements using the real-time-derived receiver clock offsets dT(r), the consistency of the 3

1 Time (corr) = Time(r) - dT(r)

2 PR (corr) = PR (r) - dT(r)*c 3 phase (corr) = phase (r) - dT(r)*freq

Doppler:

The sign of the doppler shift as additional observable is defined as usual: Positive for approaching satellites.

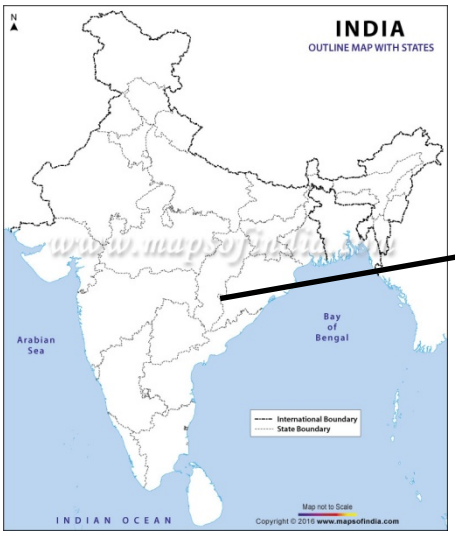
Satellite numbers:

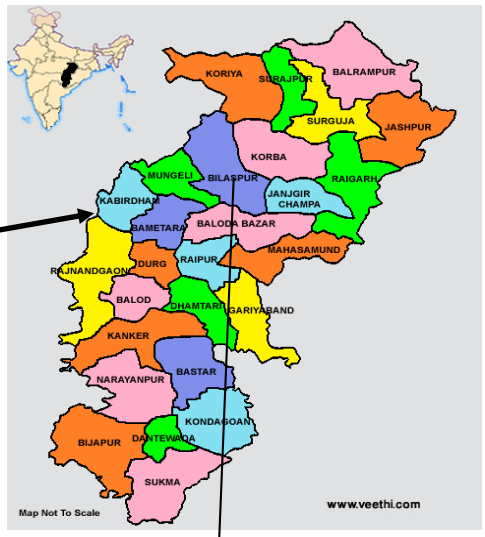
Starting with RINEX Version 2 the former two-digit satellite numbers **nn**are preceded by a one-character system identifier **s**. The same satellite system identifiers are also used in all header records when appropriate.

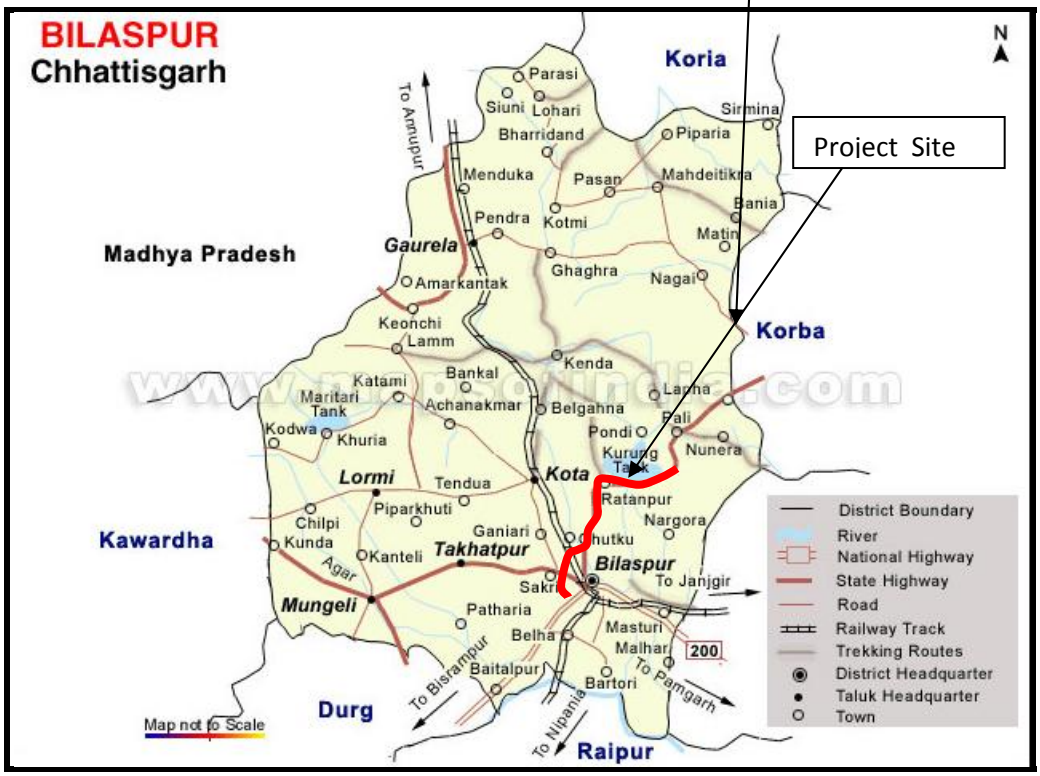
THE EXCHANGE OF RINEX FILES:

The original RINEX file naming convention was implemented in the MSDOS era when file names were restricted to 8.3 characters. Modern operating systems typically support 255 character file names. The goal of the new file naming convention is to be more: descriptive, flexible and extensible than the RINEX 2.11 file naming convention. All elements are fixed length and are separated by an underscore "_" except for the: file type and compression fields that uses a period "." separator. Fields must be padded with zeros to fill the field width. The file compression field is optional. In order to further reduce the size of observation files Yuki Hatanaka developed a compression scheme that takes advantage of the structure of the RINEX observation data by forming higher order differences in time between observations of the same type and satellite. This compressed file is also an ASCII file that is subsequently compressed again using the above mentioned standard compression programs.

Location Plan







Area Statement

Revenue Forest Area Details (0.000 to 53..00 Km)

Details of Revenue Forest land in Bilspur Division					
District	**Sub District**	**Village**	**Khasra no.**	**Revenue Forest Land (in Ha)**	**Total Area (in Ha)**
Bilaspur	**Bilha**	Pendridih	278	0.536	**2.178**
			277	0.477	
			262	0.769	
			249/1,2	0.396	
	Bilas pur	Beltara	589/1,2,3	0.0931	**1.9405**
			911/1,2	0.3074	
		Limha	293/1,2	1.51	
		Korbi	2/1	0.03	
	Takhatpur	Bodsara	1131	0.6565	**7.3876**
			1130/1	2.3214	
		Amsena	549	0.2489	
			517	0.0288	
			515/1,2,3,4,5,6,7,8	0.0561	
		Belmundi	863	1.3354	
		Paand	189	0.6304	
		Sakri	31/1 M2	1.6395	
			33M1	0.1883	
			49M1	0.0909	
			318/1	0.0931	
		Lokhandi	98M1	0.0908	
			100	0.0075	
	Kota	Ratanpur	2493	0.025	**13.079**
			2575/1 क to 1 व 2575/2क, ख, ग, 2575/3क, ख, ग,	0.012	
			2631	0.202	
			2849/1क	0.511	
			5360/1,2,3,4,5	1.0519	
			5962/1,2,3	0.3412	
			6241/1	0.9818	
			2850	1.523	
			4745/1	0.607	
			6635	0.526	
		Melanadih	163	0.122	
			162	0.8974	
			160/1	0.097	
			1,54,153	0.3788	
			63	0.0176	

		Karra	8,9	2.0348	
			2/1,2	2.3047	
			18/1	0.3644	
		Jaali	6/1	0.9975	
			307	0.0365	
			485	0.0474	
			Total Area		**24.585**

Total Revenue Forest Area Proposed to be diverted is **24.585 Ha**.

Total Station Coordinate

Bilaspur Forest Division

Reference Pillar Coordinate

Pillar Id	Chainage	Longitude	Latitude
C001	1+350	609315.68	2433255.65

Village- Pendridih, Tehsil Bilha,

Khasra no-278,277,262& 249/1,2

Revenue Forest Patch 1- Area(2.178 Ha)

Piller ID	Left Side		Piller ID	Right Side	
	Longitude (UTM)	Latitude (UTM		Longitude (UTM)	Latitude (UTM
RFP1-LP1	610212.13	2432249.55	RFP1-RP1	610241.53	2432281.9
RFP1-LP2	610192	2432264	RFP1-RP2	610212.82	2432307.29
RFP1-LP3	610166	2432284	RFP1-RP3	610198.43	2432331.8
RFP1-LP4	610141	2432303	RFP1-RP4	610171.97	2432351.61
RFP1-LP5	610116	2432323	RFP1-RP5	610150.56	2432369.14
RFP1-LP6	610089	2432343	RFP1-RP6	610125.16	2432387.53
RFP1-LP7	610060	2432364	RFP1-RP7	610101.2	2432406.75
RFP1-LP8	610030	2432384	RFP1-RP8	610077.27	2432425.2
RFP1-LP9	610005	2432402	RFP1-RP9	610057.22	2432440.21
RFP1-LP10	609979	2432426	RFP1-RP10	610038.2	2432455.48
RFP1-LP11	609952	2432453	RFP1-RP11	610020.95	2432468.24
RFP1-LP12	609928	2432484	RFP1-RP12	610002.08	2432486.73
RFP1-LP13	609897	2432524	RFP1-RP13	609982.38	2432510.94

Village- Bodsara, Tehsil Takhatpur,

Khasra no-1130/1, 1131

Revenue Forest Patch 2- Area(2.9779 Ha)

Piller ID	Left Side		Piller ID	Right Side	
	Longitude (UTM)	Latitude (UTM		Longitude (UTM)	Latitude (UTM
RFP2-LP1	609441	2433066	RFP2-RP1	609458.1	2433127.76
RFP2-LP2	609422	2433087	RFP2-RP2	609432.72	2433159.56
RFP2-LP3	609400	2433110	RFP2-RP3	609409.56	2433187.77
RFP2-LP4	609375	2433139	RFP2-RP4	609387.8	2433215.72
RFP2-LP5	609352	2433165	RFP2-RP5	609363.47	2433241.17
RFP2-LP6	609330	2433192	RFP2-RP6	609338.07	2433271.55
RFP2-LP7	609307	2433224	RFP2-RP7	609309.92	2433303.79
RFP2-LP8	609281	2433252	RFP2-RP8	609281.53	2433336.91
RFP2-LP9	609256	2433284	RFP2-RP9	609253.71	2433369.55
RFP2-LP10	609227	2433318	RFP2-RP10	609226.94	2433401.83
RFP2-LP11	609199	2433345	RFP2-RP11	609195.75	2433441.85
RFP2-LP12	609176	2433372	RFP2-RP12	609164.86	2433474.2
RFP2-LP13	609147	2433400	RFP2-RP13	609122.07	2433526.89
RFP2-LP14	609106	2433447			

Village- Amsena, Tehsil Takhatpur,

Khasra no-549,

Revenue Forest Patch 3- Area(0.2489 Ha)

Piller ID	Left Side		Piller ID	Right Side	
	Longitude (UTM)	Latitude (UTM		Longitude (UTM)	Latitude (UTM
RFP3-LP1	608269	2435310	RFP3-RP1	608296.8	2435305.02
RFP3-LP2	608267	2435339	RFP3-RP2	608291.28	2435343.56
RFP3-LP3	608265	2435371	RFP3-RP3	608292.56	2435373.66
RFP3-LP4	608265	2435404	RFP3-RP4	608293.83	2435391.85
RFP3-LP5	608276	2435421	RFP3-RP5	608294.41	2435412.98

Village- Amsena, Tehsil Takhatpur,

Khasra no-517,

Revenue Forest Patch 4- Area(0.0288Ha)

Piller ID	Left Side		Piller ID	Right Side	
	Longitude (UTM)	Latitude (UTM		Longitude (UTM)	Latitude (UTM
RFP4-LP1	608226.21	2436183.89	RFP4-RP1	608289.56	2436223.12
RFP4-LP2	608227.11	2436189.73	RFP4-RP2	608290.11	2436219.33

Village- Amsena, Tehsil Takhatpur,

Khasra no- 515/1,2,3,4,5,6,7,8,

Revenue Forest Patch 5- Area(0.0561Ha)

Piller ID	Left Side		Piller ID	Right Side	
	Longitude (UTM)	Latitude (UTM		Longitude (UTM)	Latitude (UTM
RFP5-LP1	608562.5	2436691.44	RFP5-RP31	608568.67	2436685.15
RFP5-LP2	608612.46	2436740.6	RFP5-RP32	608619.12	2436738.15

Village- Belmundi, Tehsil Takhatpur,

Khasra no-863,

Revenue Forest Patch 6- Area(1.3354Ha)

Piller ID	Left Side		Piller ID	Right Side	
	Longitude (UTM)	Latitude (UTM		Longitude (UTM)	Latitude (UTM
RFP6-LP1	608692	2436867	RFP6-RP1	608735.89	2436829.01
RFP6-LP2	608707	2436897	RFP6-RP2	608764.15	2436880.34
RFP6-LP3	608721	2436925	RFP6-RP3	608781.56	2436912.27
RFP6-LP4	608735	2436954	RFP6-RP4	608793.15	2436941.9
RFP6-LP5	608750	2436983	RFP6-RP5	608805.34	2436970.71
RFP6-LP6	608765	2437022	RFP6-RP6	608817.24	2437002.47
RFP6-LP7	608784.07	2437072.86	RFP6-RP7	608834.11	2437041.97

Village- Pand, Tehsil Takhatpur,

Khasra no-189,

Revenue Forest Patch 7- Area(0.6304Ha)

Piller ID	Left Side		Piller ID	Right Side	
	Longitude (UTM)	Latitude (UTM		Longitude (UTM)	Latitude (UTM
RFP7-LP1	609992	2442746	RFP7-RP1	610042.47	2442744.34
RFP7-LP2	609993	2442802	RFP7-RP2	610015.11	2442818.06
RFP7-LP3	609998	2442854	RFP7-RP3	610009.17	2442857.17
RFP7-LP4	610001	2442888	RFP7-RP4	610005.1	2442890.64
RFP7-LP5	609991	2442907	RFP7-RP5	610000.58	2442918.47
RFP7-LP6	609988	2442939	RFP7-RP6	609995.19	2442949.65
RFP7-LP7	609978	2442963	RFP7-RP7	609989.51	2442993.36

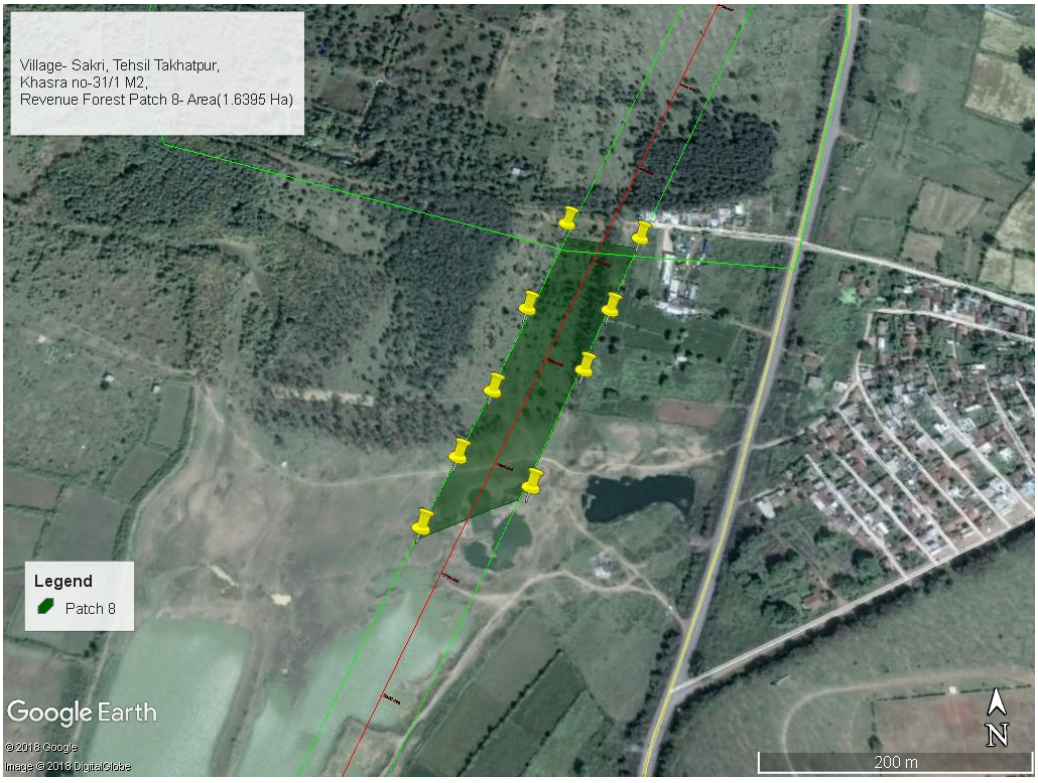
Piller ID	Left Side		Piller ID	Right Side	
	Longitude (UTM)	Latitude (UTM		Longitude (UTM)	Latitude (UTM
RFP7-2-LP1	610029.2	2442881	RFP7-2-RP1	610019.3	2443056

RFP7-2-LP2	610025.7	2442906	RFP7-2-RP2	610022.4	2443017
RFP07-2-LP3	610021.8	2442930	RFP7-2-RP3	610025.9	2442993
RFP7-2-LP4	610017.8	2442960	RFP7-2-RP4	610029.3	2442968
RFP7-2-LP5	610011.6	2442998	RFP7-2-RP5	610032.5	2442941
RFP7-2-LP6	610019.3	2443056	RFP7-2-RP6	610036.8	2442913
RFP7-2-LP7	610007.5	2443026	RFP7-2-RP7	610039.5	2442893

Village- Sakri, Tehsil Takhatpur,

Khasra no-31/1 M2,

Revenue Forest Patch 8- Area(1.6395 Ha)



Piller ID	Left Side		Piller ID	Right Side	
	Longitude (UTM)	Latitude (UTM		Longitude (UTM)	Latitude (UTM
RFP8-LP1	610247	2444625	RFP8-RP1	610333.6	2444656.73
RFP8-LP2	610276	2444684	RFP8-RP2	610380.82	2444756.07
RFP8-LP3	610305	2444741	RFP8-RP3	610405.41	2444809.32
RFP8-LP4	610336	2444814	RFP8-RP4	610435.09	2444875.74
RFP8-LP5	610373	2444893			

Village- Sakri, Tehsil Takhatpur,

Khasra no-33M1, 49M1

Revenue Forest Patch 9- Area(0.2792 Ha)

Piller ID	Left Side		Piller ID	Right Side	
	Longitude (UTM)	Latitude (UTM		Longitude (UTM)	Latitude (UTM
RFP9-LP1	610734	2445561	RFP9-RP1	610809.1	2445646
RFP9-LP2	610741	2445574	RFP9-RP2	610799.7	2445630
RFP9-LP3	610750.5	2445592	RFP9-RP3	610793.4	2445617
RFP9-LP4	610758.7	2445606	RFP9-RP4	610787.6	2445606
RFP9-LP5	610769.3	2445626	RFP9-RP5	610782.9	2445597
RFP9-LP6	610780.8	2445648	RFP9-RP6	610774.7	2445582
			RFP9-RP7	610766.1	2445564
			RFP9-RP8	610756.3	2445544

Village- Sakri, Tehsil Takhatpur,

Khasra no-318/1,

Revenue Forest Patch 10- Area(0.0931 Ha)

Piller ID	Left Side		Piller ID	Right Side	
	Longitude (UTM)	Latitude (UTM		Longitude (UTM)	Latitude (UTM
RFP10-LP1	611793.22	2446362.93	RFP10-RP1	611798.4	2446301.2
RFP10-LP2	611809.03	2446368.7	RFP10-RP2	611809.96	2446305.63

Village- Lokhandi, Tehsil Takhatpur,

Khasra no-98 M1,

Revenue Forest Patch 11- Area(0.0908 Ha)

Piller ID	Left Side		Piller ID	Right Side	
	Longitude (UTM)	Latitude (UTM		Longitude (UTM)	Latitude (UTM
RFP11-LP1	613794.55	2447716.91	RFP11-RP1	613836.29	2447705.64
RFP11-LP2	613800.78	2447734.89	RFP11-RP2	613836.29	2447730.45

Village- Lokhandi, Tehsil Takhatpur,

Khasra no-100,

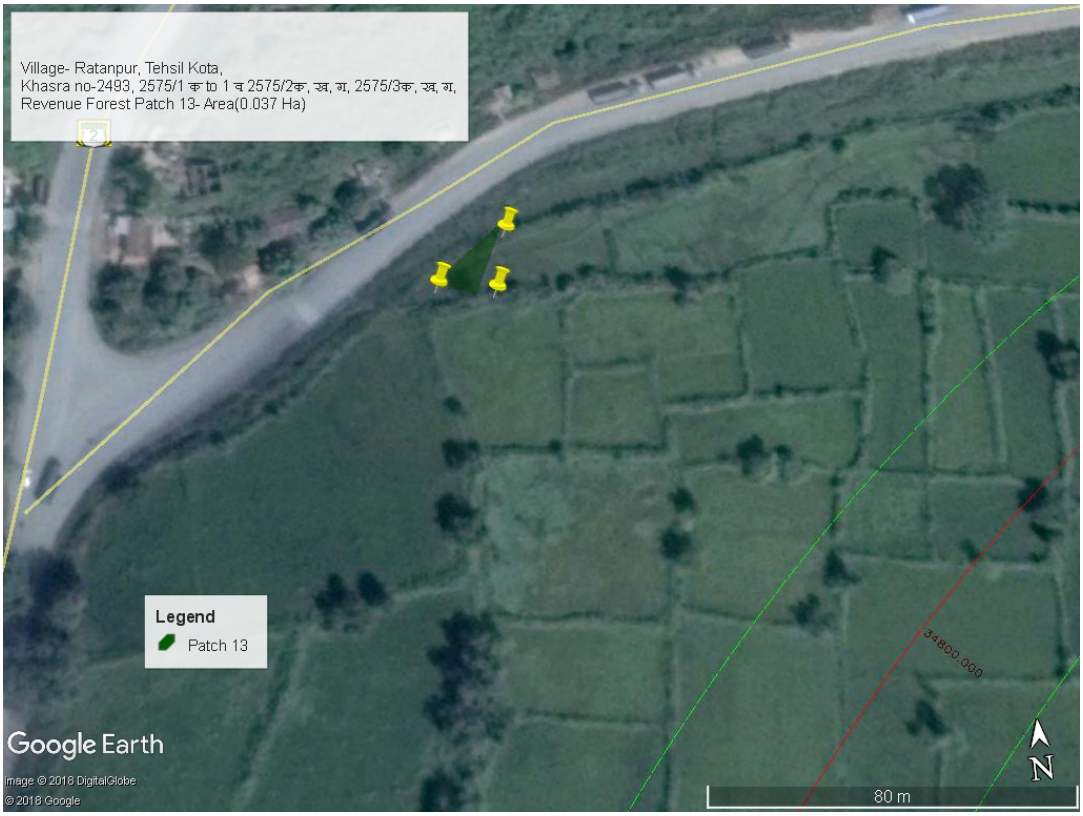
Revenue Forest Patch 12- Area(0.0075 Ha)

Piller ID	Left Side		Piller ID	Right Side	
	Longitude (UTM)	Latitude (UTM		Longitude (UTM)	Latitude (UTM
RFP12-LP1	613857.59	2447828.53	RFP12-RP1	613868.33	2447832.82
RFP12-LP2	613858.45	2447839.95			

Village- Ratanpur, Tehsil Kota,

Khasra no-2493, 2575/1 क to 1 व 2575/2क, ख, ग, 2575/3क, ख, ग,

Revenue Forest Patch 13- Area(0.037 Ha)



Piller ID	Left Side		Piller ID	Right Side	
	Longitude (UTM)	Latitude (UTM		Longitude (UTM)	Latitude (UTM
RFP13-LP1	618089.3	2462798.57	RFP13-RP1	618103.82	2462796.03
RFP13-LP2	618107.49	2462812.42			

Village- Ratanpur, Tehsil Kota,

Khasra no-2631,

Revenue Forest Patch 14- Area(0.202 Ha)

Piller ID	Left Side		Piller ID	Right Side	
	Longitude (UTM)	Latitude (UTM		Longitude (UTM)	Latitude (UTM
RFP14-LP1	618683.18	2462878.91	RFP14-RP1	618663.18	2462862.53
RFP14-LP2	618787.49	2462882.4	RFP14-RP2	618786.69	2462867.44

Village- Ratanpur, Tehsil Kota,

Khasra no-2849/1क,

Revenue Forest Patch 15 Area(0.511 Ha)

Piller ID	Left Side		Piller ID	Right Side	
	Longitude (UTM)	Latitude (UTM		Longitude (UTM)	Latitude (UTM
RFP15-LP1	619662.03	2462931.01	RFP15-RP1	619670.24	2462885.42
RFP15-LP2	619723.46	2462946.09	RFP15-RP2	619714.16	2462892.29
RFP15-LP3	619770.99	2462944.44	RFP15-RP3	619756.31	2462895.21
RFP15-LP4	619811.09	2462948.23	RFP15-RP4	619757.76	2462931.98
			RFP15-RP5	619816.28	2462927.66

Village- Ratanpur, Tehsil Kota,

Khasra no-5360/1,2,3,4,5 & 5962/1,2,3

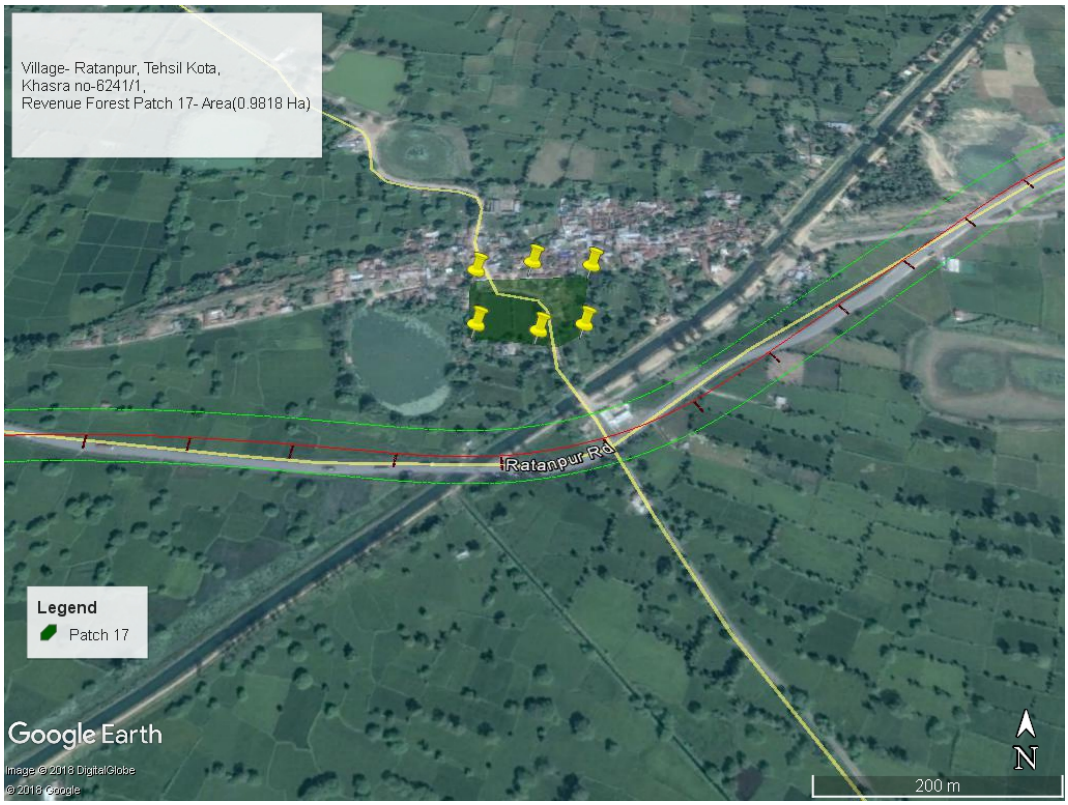
Revenue Forest Patch 16- Area(1.3931 Ha)

Piller ID	Left Side		Piller ID	Right Side	
	Longitude (UTM)	Latitude (UTM		Longitude (UTM)	Latitude (UTM
RFP16-LP1	620862.31	2463013.8	RFP16-RP1	620889.25	2463011.07
RFP16-LP2	620940.05	2463018.27	RFP16-RP2	620970.47	2463010.66
RFP16-LP3	621017.55	2463018.29	RFP16-RP3	621052.22	2463010.52
RFP16-LP4	621102.11	2463029.84	RFP16-RP4	621117.99	2463007.65
RFP16-LP5	621182.24	2463026.83	RFP16-RP5	621171.22	2463008.34
RFP16-LP6	621255.45	2463043.5	RFP16-RP6	621217	2463012.52
RFP16-LP7	621328.67	2463053.84	RFP16-RP7	621280.63	2463010.45
RFP16-LP8	621380.94	2463052.93	RFP16-RP8	621341.95	2463016.61
RFP16-LP9	621432.02	2463050.56	RFP16-RP9	621401.64	2463020.06
RFP16-LP10	621487.47	2463058.71	RFP16-RP10	621396.81	2463040.38
RFP16-LP11	621507.87	2463088.98	RFP16-RP11	621458.32	2463033.08

Village- Ratanpur, Tehsil Kota,

Khasra no-6241/1,

Revenue Forest Patch 17- Area(0.9818 Ha)



Piller ID	Left Side		Piller ID	Right Side	
	Longitude (UTM)	Latitude (UTM		Longitude (UTM)	Latitude (UTM
RFP17-LP1	622692.74	2463395.55	RFP17-RP1	622695.29	2463323.54
RFP17-LP2	622752.07	2463406.71	RFP17-RP2	622758.87	2463315.88
RFP17-LP3	622813.93	2463402.6	RFP17-RP3	622805.24	2463324.41

Village- Ratanpur, Tehsil Kota,

Khasra no-2850,

Revenue Forest Patch 18- Area(1.523 Ha)

Piller ID	Left Side		Piller ID	Right Side	
	Longitude (UTM)	Latitude (UTM		Longitude (UTM)	Latitude (UTM
RFP18-LP1	618955.51	2462881.26	RFP18-RP1	618959.21	2462854.01
RFP18-LP2	619003.59	2462888.4	RFP18-RP2	619034.49	2462859.96
RFP18-LP3	619061.46	2462891.02	RFP18-RP3	619101.8	2462867.9
RFP18-LP4	619117.59	2462899.9	RFP18-RP4	619157.7	2462870.11
RFP18-LP5	619178.95	2462899.58	RFP18-RP5	619210.75	2462880.12
RFP18-LP6	619231.17	2462905.88	RFP18-RP6	619252.21	2462883.44
RFP18-LP7	619275.49	2462909.36	RFP18-RP7	619312.67	2462895.08
RFP18-LP8	619327.58	2462917.11	RFP18-RP8	619364.18	2462899.98
RFP18-LP9	619384.98	2462920.86	RFP18-RP9	619434.17	2462909.3
RFP18-LP10	619461.38	2462930.54	RFP18-RP10	619487.93	2462915.69
RFP18-LP11	619527.66	2462937.33	RFP18-RP11	619540.4	2462923.5
			RFP18-RP12	619590.64	2462932.76

Village- Ratanpur, Tehsil Kota,

Khasra no-4745/1,(0.607 Ha) & 6635 (0.526 Ha)

Revenue Forest Patch 19 & 20- Area(1.133 Ha)

Patch 19

Piller ID	Left Side		Piller ID	Right Side	
	Longitude (UTM)	Latitude (UTM		Longitude (UTM)	Latitude (UTM
RFP19-LP1	619858.14	2462988.31	RFP19-RP1	619858.31	2462968.56
RFP19-LP2	619920.04	2462989.37	RFP19-RP2	619911.05	2462968.77

Patch 20

Piller ID	Left Side		Piller ID	Right Side	
	Longitude (UTM)	Latitude (UTM		Longitude (UTM)	Latitude (UTM
RFP20-LP1	619972.65	2462990.6	RFP20-RP1	619965.35	2462970.88
RFP20-LP2	620020.47	2462990.45	RFP20-RP2	620018.78	2462977.28
RFP20-LP3	620073.85	2462993.28	RFP20-RP3	620076.23	2462980.83
RFP20-LP4	620121.93	2462994.12	RFP20-RP4	620126.37	2462981.81
RFP20-LP5	620171.37	2462995.85	RFP20-RP5	620170.09	2462985.15
RFP20-LP6	620222.96	2462997.95	RFP20-RP6	620216.85	2462985.03

RFP20-LP7	620270.8	2463002.16	RFP20-RP7	620282.49	2462990.34
RFP20-LP8	620319.77	2463000.82	RFP20-RP8	620336.72	2462992.3
RFP20-LP9	620375.44	2463004.81	RFP20-RP9	620396.97	2462995.64
RFP20-LP10	620422.57	2463006	RFP20-RP10	620451.88	2462997.95
RFP20-LP11	620476.22	2463012.62	RFP20-RP11	620505.36	2463000.88
RFP20-LP12	620533.9	2463015.65	RFP20-RP12	620553.12	2463004.44
RFP20-LP13	620597.29	2463017.43	RFP20-RP13	620613.22	2463007.04
RFP20-LP14	620662.74	2463018.25	RFP20-RP14	620654.91	2463008.64

Village- Melandih, Tehsil Kota,

Khasra no-163,162,160/1,

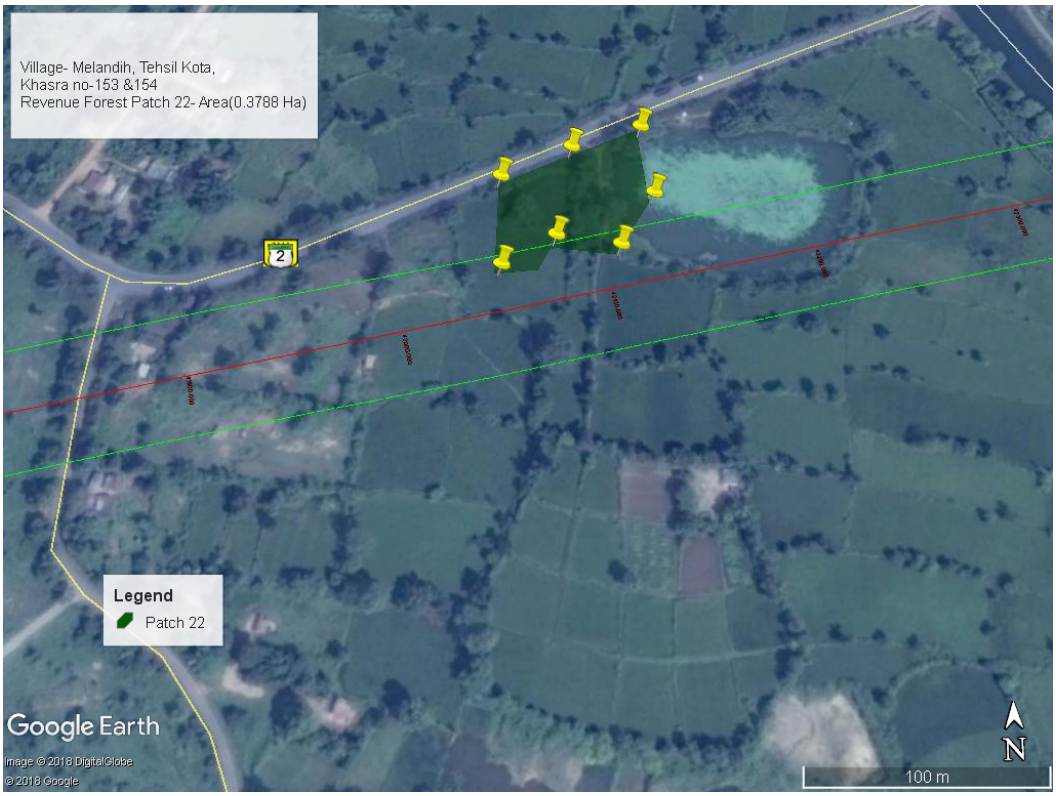
Revenue Forest Patch 21- Area(1.1164 Ha)

Piller ID	Left Side		Piller ID	Right Side	
	Longitude (UTM)	Latitude (UTM		Longitude (UTM)	Latitude (UTM
RFP21-LP1	624679.14	2464326.89	RFP21-RP1	624696.08	2464292.44
RFP21-LP2	624706.54	2464339.76	RFP21-RP2	624725.24	2464298.46
RFP21-LP3	624718.95	2464358.68	RFP21-RP3	624753.98	2464303.15
RFP21-LP4	624757.96	2464363.17	RFP21-RP4	624797.98	2464313.18
RFP21-LP5	624804.86	2464373.36	RFP21-RP5	624835.98	2464319.5
RFP21-LP6	624858.42	2464384.98	RFP21-RP6	624886.93	2464328.71

Village- Melandih, Tehsil Kota,

Khasra no-153 &154

Revenue Forest Patch 22- Area(0.3788 Ha)



Piller ID	Left Side		Piller ID	Right Side	
	Longitude (UTM)	Latitude (UTM		Longitude (UTM)	Latitude (UTM
RFP22-LP1	625016.25	2464451.69	RFP22-RP1	625015.41	2464404.14
RFP22-LP2	625051.42	2464466.67	RFP22-RP2	625042.1	2464418.74
RFP22-LP3	625086.05	2464476.85	RFP22-RP3	625072.82	2464412.46
			RFP22-RP4	625090.41	2464439.74

Village- Melandih, Tehsil Kota,

Khasra no-63,

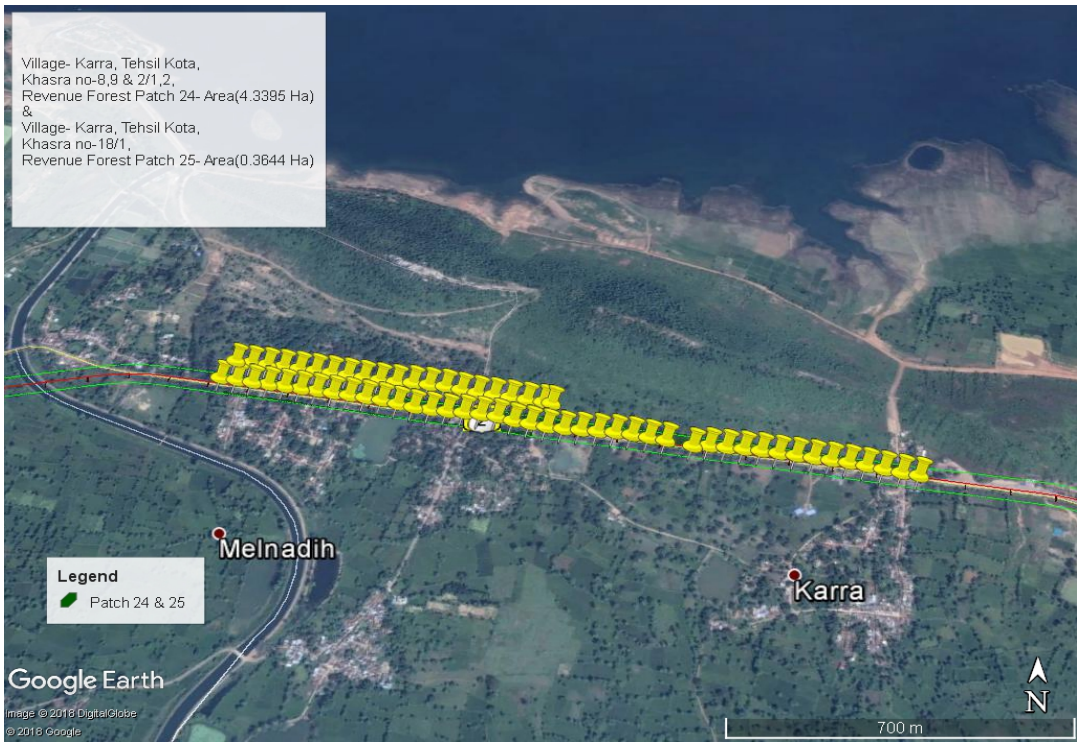
Revenue Forest Patch 23- Area(0.0176 Ha)

Piller ID	Left Side		Piller ID	Right Side	
	Longitude (UTM)	Latitude (UTM		Longitude (UTM)	Latitude (UTM
RFP23-LP1	625503.99	2464473.41	RFP23-RP1	625503.29	2464419.88
RFP23-LP2	625533.12	2464479.19	RFP23-RP2	625532.69	2464419.17

Village- Karra, Tehsil Kota,

Khasra no-8,9 & 2/1,2,

Revenue Forest Patch 24- Area(4.3395 Ha)



Patch 24

Piller ID	Left Side		Piller ID	Right Side	
	Longitude (UTM)	Latitude (UTM		Longitude (UTM)	Latitude (UTM
RFP24-LP1	625780.096	2464426.524	RFP24-RP1	625809.319	2464482.614
RFP24-LP2	625819.593	2464420.208	RFP24-RP2	625848.817	2464476.297
RFP24-LP3	625859.092	2464413.891	RFP24-RP3	625888.316	2464469.979
RFP24-LP4	625898.59	2464407.574	RFP24-RP4	625927.813	2464463.664
RFP24-LP5	625938.087	2464401.258	RFP24-RP5	625967.311	2464457.347
RFP24-LP6	625977.586	2464394.941	RFP24-RP6	626006.81	2464451.029
RFP24-LP7	626017.084	2464388.624	RFP24-RP7	626046.307	2464444.714
RFP24-LP8	626056.582	2464382.308	RFP24-RP8	626085.806	2464438.396
RFP24-LP9	626096.08	2464375.991	RFP24-RP9	626125.303	2464432.081
RFP24-LP10	626135.577	2464369.675	RFP24-RP10	626164.802	2464425.764
RFP24-LP11	626175.077	2464363.358	RFP24-RP11	626204.521	2464420.816
RFP24-LP12	626213.818	2464352.306	RFP24-RP12	626244.638	2464418.147

RFP24-LP13	626252.809	2464342.833	RFP24-RP13	626284.232	2464412.665
RFP24-LP14	626292.271	2464336.282	RFP24-RP14	626323.862	2464407.177
RFP24-LP15	626331.954	2464331.132	RFP24-RP15	626362.8	2464397.357
RFP24-LP16	626371.981	2464327.619	RFP24-RP16	626401.671	2464387.976
RFP24-LP17	626411.756	2464322.569	RFP24-RP17	626441.196	2464381.84
RFP24-LP18	626451.282	2464316.433	RFP24-RP18	626480.723	2464375.704
RFP24-LP19	626489.963	2464304.85	RFP24-RP19	626520.251	2464369.567
RFP24-LP20	626529.16	2464296.595	RFP24-RP20	626559.776	2464363.431
RFP24-LP21	626568.358	2464288.34	RFP24-RP21	626579.539	2464360.363
RFP24-LP22	626608.001	2464282.958			
RFP24-LP23	626647.947	2464279.517			
RFP24-LP24	626687.892	2464276.076			
RFP24-LP25	626727.968	2464273.479			
RFP24-LP26	626767.493	2464267.343			
RFP24-LP27	626806.759	2464259.521			
RFP24-LP28	626846.013	2464251.623			
RFP24-LP29	626861.74	2464202.8			
RFP24-LP30	626883.407	2464138.11			
RFP24-LP31	626907.616	2464236.094			
RFP24-LP32	626944.947	2464237.049			
RFP24-LP33	626984.745	2464232.654			
RFP24-LP34	627024.595	2464228.615			
RFP24-LP35	627064.417	2464224.371			
RFP24-LP36	627103.943	2464218.235			
RFP24-LP37	627143.47	2464212.099			
RFP24-LP38	627182.996	2464205.963			
RFP24-LP39	627222.523	2464199.827			
RFP24-LP40	627262.049	2464193.691			
RFP24-LP41	627301.224	2464185.299			
RFP24-LP42	627340.308	2464176.303			

RFP24-LP43	627379.391	2464167.307			
RFP24-LP44	627418.782	2464160.293			

Village- Karra, Tehsil Kota,

Khasra no-18/1,

Revenue Forest Patch 25- Area(0.3644 Ha)

	Left Side			Right Side	
Piller ID	Longitude (UTM)	Latitude (UTM	Piller ID	Longitude (UTM)	Latitude (UTM
RFP25-LP1	627598.83	2464200.37	RFP25-RP1	627600.82	2464189.32
RFP25-LP2	627695.03	2464185.23			

Village- Jaali, Tehsil Kota

Khasra no-485,

Revenue Forest Patch 26- Area(0.474 Ha)

	Left Side			Right Side	
Piller ID	Longitude (UTM)	Latitude (UTM	Piller ID	Longitude (UTM)	Latitude (UTM
RFP26-LP1	627543.6	2464245	RFP26-RP1	627557.7	2464202
RFP26-LP2	627671.4	2464211	RFP26-RP2	627663.4	2464182

Village- Jaali, Tehsil Kota,

Khasra no-6/1,

Revenue Forest Patch 27- Area(0.9975 Ha)

Piller ID	Left Side		Piller ID	Right Side	
	Longitude (UTM)	Latitude (UTM		Longitude (UTM)	Latitude (UTM
RFP27-LP1	628741.46	2463750.46	RFP27-RP1	628726.22	2463717
RFP27-LP2	628773.99	2463748.64	RFP27-RP2	628759.84	2463685.61
RFP27-LP3	628813.85	2463743.04	RFP27-RP3	628796.42	2463648.1
RFP27-LP4	628865.8	2463731.41	RFP27-RP4	628825.99	2463620.61

Village- Jaali, Tehsil kota,

Khasra no-307,

Revenue Forest Patch 28- Area(0.0365 Ha)

Piller ID	Left Side		Piller ID	Right Side	
	Longitude (UTM)	Latitude (UTM		Longitude (UTM)	Latitude (UTM
RFP28-LP1	628904.3	2463565	RFP28-RP2	628879.5	2463550
RFP28-LP2	627600.1	2464197	RFP28-RP2	628897.7	2463548

Village- Beltara, Tehsil Bilaspur,

Khasra no-911/1,2

Revenue Forest Patch 29- Area(0.3074 Ha)

Piller ID	Left Side		Piller ID	Right Side	
	Longitude (UTM)	Latitude (UTM		Longitude (UTM)	Latitude (UTM
RFP30-LP1	632700.71	2464669.18	RFP30-RP1	632707.22	2464645.9
RFP30-LP2	632728.34	2464680.1	RFP30-RP2	632737.16	2464655.52
RFP30-LP3	632755.99	2464689.85	RFP30-RP3	632765.07	2464665.38
RFP30-LP4	632781.75	2464700.55	RFP30-RP4	632792.73	2464677.95
RFP30-LP5	632811.9	2464713.26	RFP30-RP5	632822.57	2464686.82

Village- Beltara, Tehsil Bilaspur,

Khasra no-589/1,2,3

Revenue Forest Patch 30- Area(0.0931 Ha)

Piller ID	Left Side		Piller ID	Right Side	
	Longitude (UTM)	Latitude (UTM		Longitude (UTM)	Latitude (UTM
RFP29-LP1	632203.69	2464469.82	RFP29-RP1	632234.65	2464478.31
RFP29-LP2	632234.47	2464480.87	RFP29-RP2	632262.67	2464487.96
RFP29-LP3	632261.79	2464491.93	RFP29-RP3	632295.33	2464500.09
RFP29-LP4	632293.88	2464503.76	RFP29-RP4	632328.99	2464511.72
RFP29-LP5	632326.76	2464517	RFP29-RP5	632367.42	2464528.04
RFP29-LP6	632364.14	2464532.12	RFP29-RP6	632407.52	2464544.52
RFP29-LP7	632404.15	2464549.4			

Village- Limha, Tehsil Bilaspur,

Khasra no-293/1,2

Revenue Forest Patch 31- Area(1.51 Ha)

Piller ID	Left Side		Piller ID	Right Side	
	Longitude (UTM)	Latitude (UTM		Longitude (UTM)	Latitude (UTM
RFP31-LP1	634991.07	2466018.23	RFP31-RP1	635016.61	2466004.11
RFP31-LP2	635006.17	2466047.21	RFP31-RP2	635036.42	2466038
RFP31-LP3	635001.46	2466060.42	RFP31-RP3	635054.41	2466070.36
RFP31-LP4	635011.04	2466105.98	RFP31-RP4	635071.78	2466108.12
RFP31-LP5	635014.08	2466154.16	RFP31-RP5	635066.07	2466157.81
RFP31-LP6	635012.51	2466214.57	RFP31-RP6	635054.87	2466223.95
RFP31-LP7	635007.67	2466264.5	RFP31-RP7	635044.86	2466275
RFP31-LP8	634996.14	2466353.99	RFP31-RP8	635025.39	2466354.1

Village- Korbi, Tehsil Bilaspur,

Khasra no-2/1

Revenue Forest Patch 32- Area(0.03 Ha)

Piller ID	Left Side		Piller ID	Right Side	
	Longitude (UTM)	Latitude (UTM		Longitude (UTM)	Latitude (UTM
RFP32-LP1	635035.45	2466405.79	RFP32-RP1	635051.9	2466407.2
RFP32-LP2	635043.12	2466430.05	RFP32-RP2	635051.44	2466432.99