

Report No: GG/RP/2015-16/TS/043A

Report On
DGPS SURVEY FOR COMPENSATORY FORESTATION FOR
PROPOSED 132 KV BARSOOR – BIJAPUR TRANSMISSION
LINE



For
Chhattisgarh State Power Transmission Co Ltd
(A Govt. of Chhattisgarh Undertaking)

Report Submitted to
Office of the Executive Director (EHT: C&M)
Dagania, Raipur (CG)

By

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REPORT ON

DGPS SURVEY FOR COMPENSATORY FORESTATION FOR PROPOSED 132 KV BARSOOR – BIJAPUR TRANSMISSION LINE

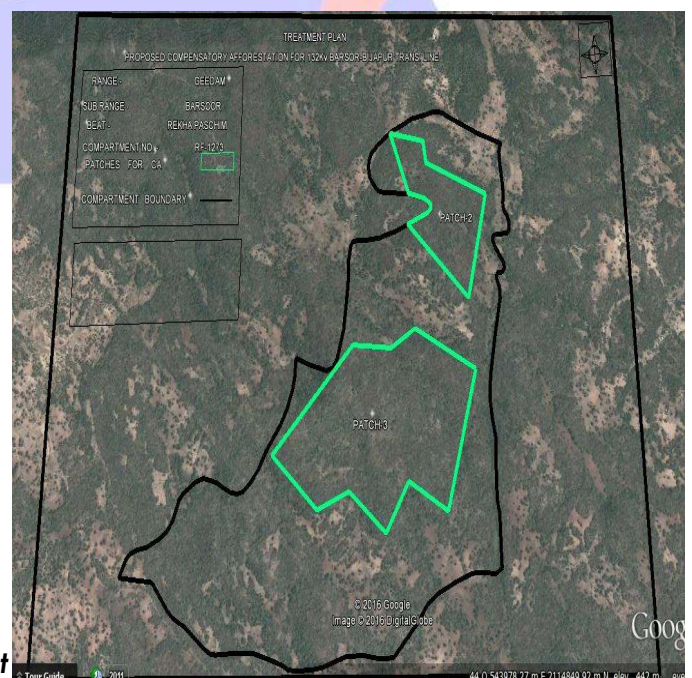
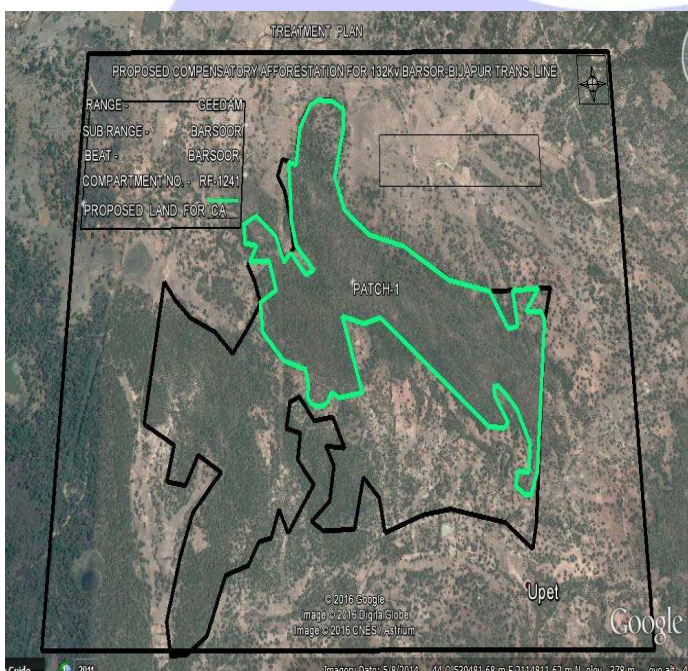
1.0 INTRODUCTION

132 KV DCSS line from 220/132 KV S/S Barsoor to proposed 132/33 KV S/s Bijapur was awarded by Chhattisgarh State Power Transmission Company Limited (A CG Govt Undertaking) to M/S Gaveshana Geosciences Pvt Ltd, New Delhi (India) vide contract agreement dated 11 Aug 2015. The proposed transmission line will be utilized to evacuate power from 220 kV Barsoor Sub Station.

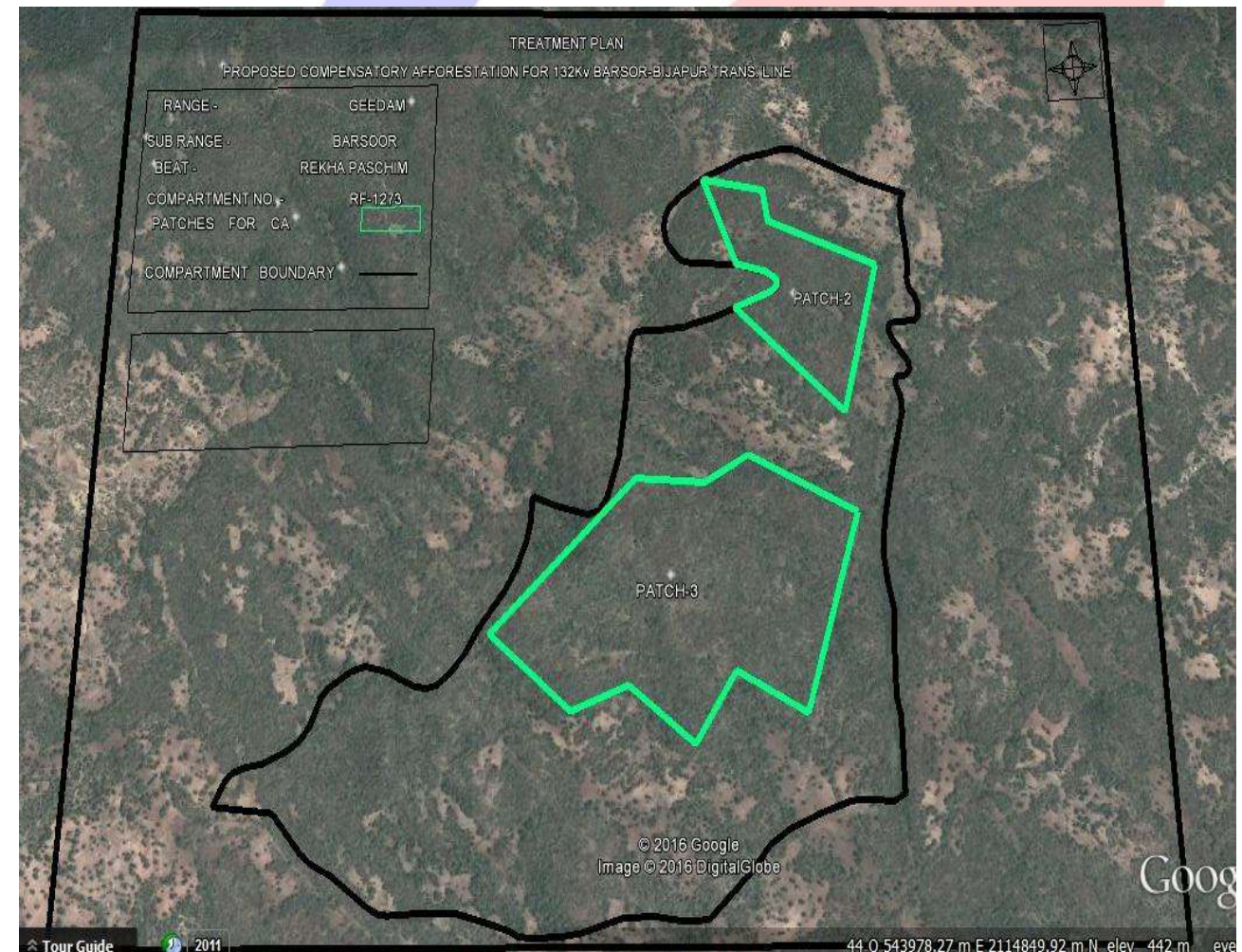
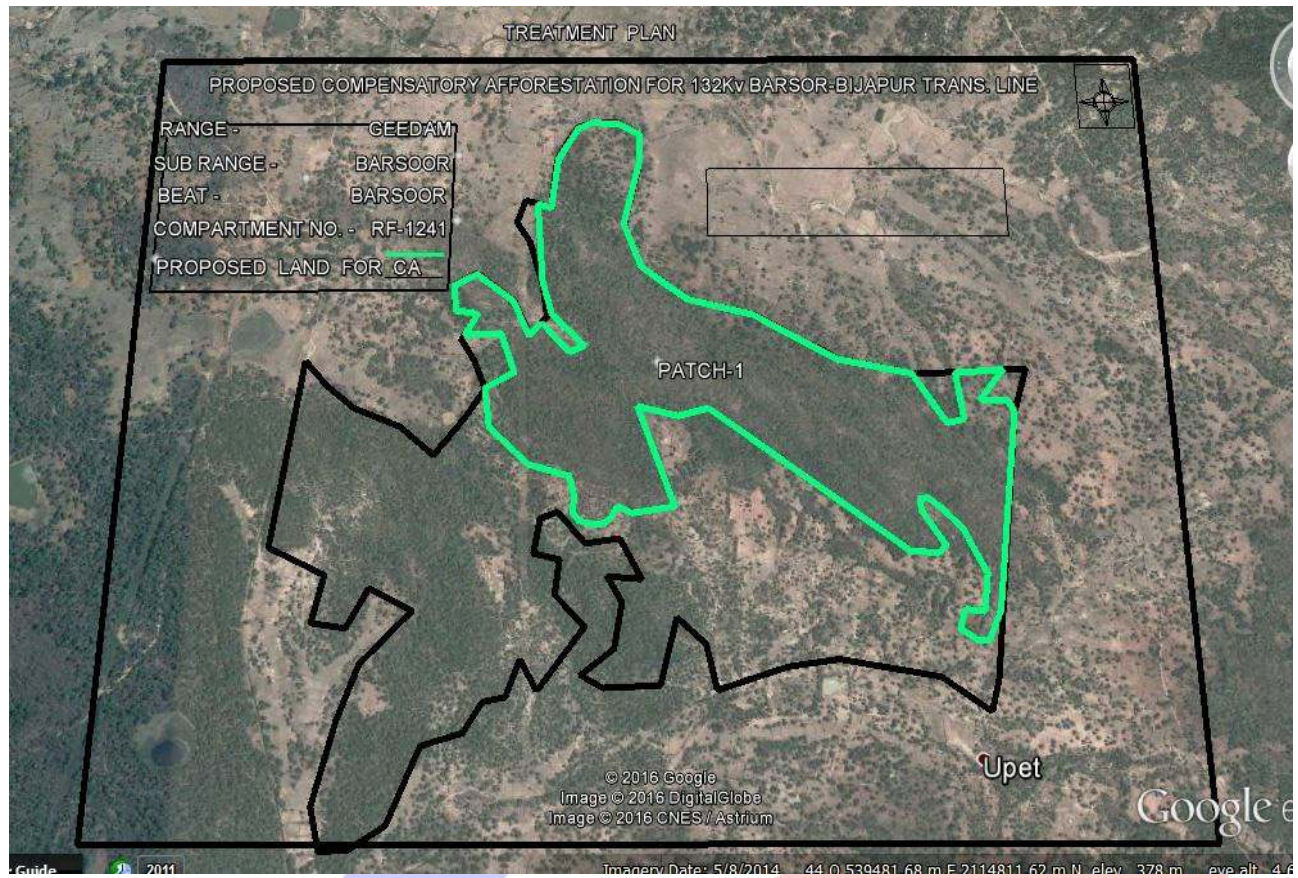
The scope of work include the identification of route, detail survey on identified route, tree enumeration and doing ground work related to finalization of forest proposal. With the requirement of DGPS survey for compensatory forestation area in order to finalize the forest proposal, this report summarizes the detail of DGPS survey for identified compensatory forestation area.

2.0 SURVEY AREA

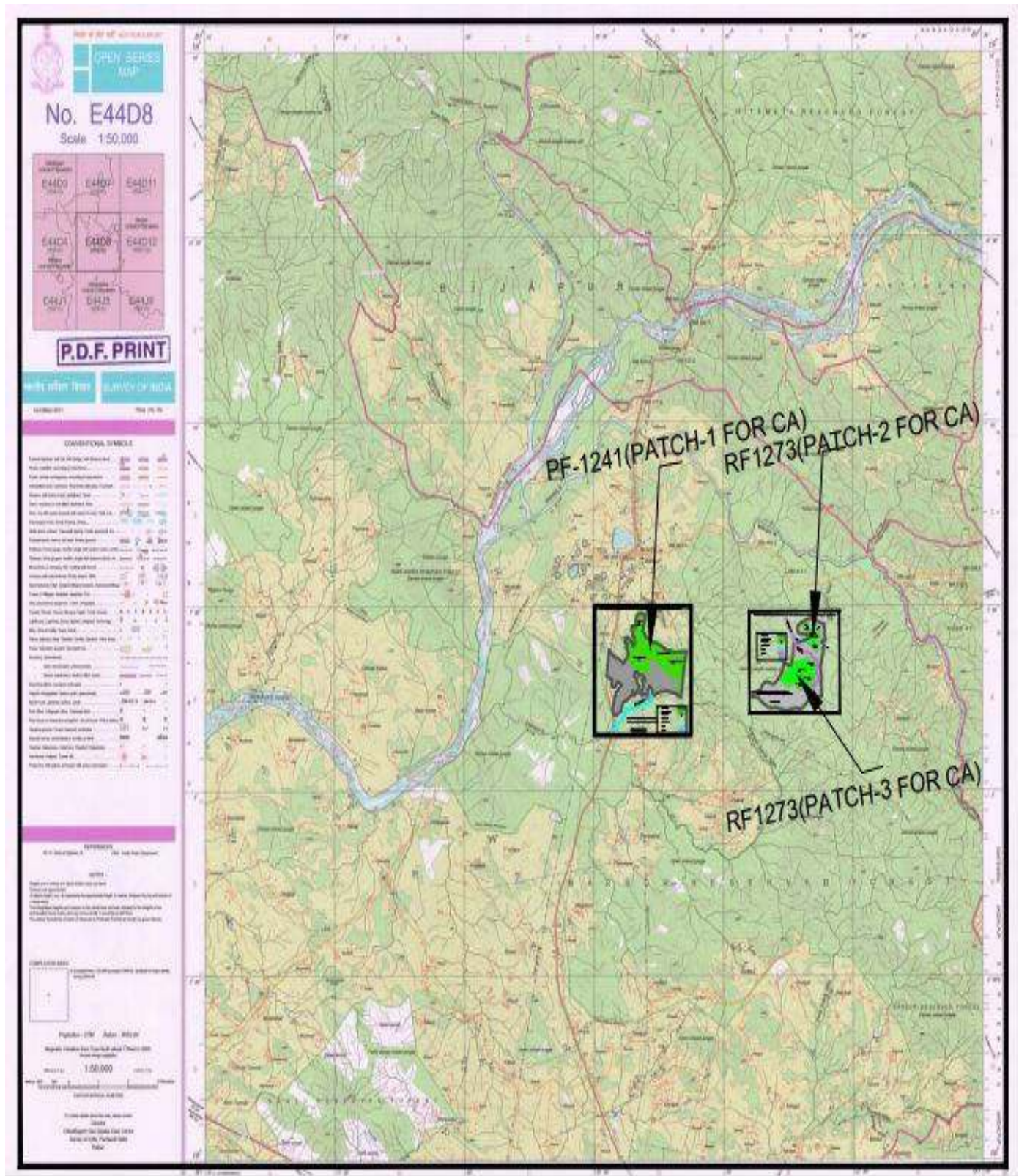
The compensatory forest area is identified around Barsoor area i.e. PF 1241 and RF 1273. PF 1241, which is situated around 2 km ground distance from Barsoor Sub station, whereas RF 1273 is situated around 9 km ground distance from Barsoor Sub station. PF 1241 could be described as 127.1 hectare area identified for plantation in which only 120 hectare area would be used for plantation, whereas RF 1273 could be described as 84.2 hectare area identified for plantation in which only 80 hectare area would be used for plantation.



The Google Imagery for both identified compensatory forest area is given below:

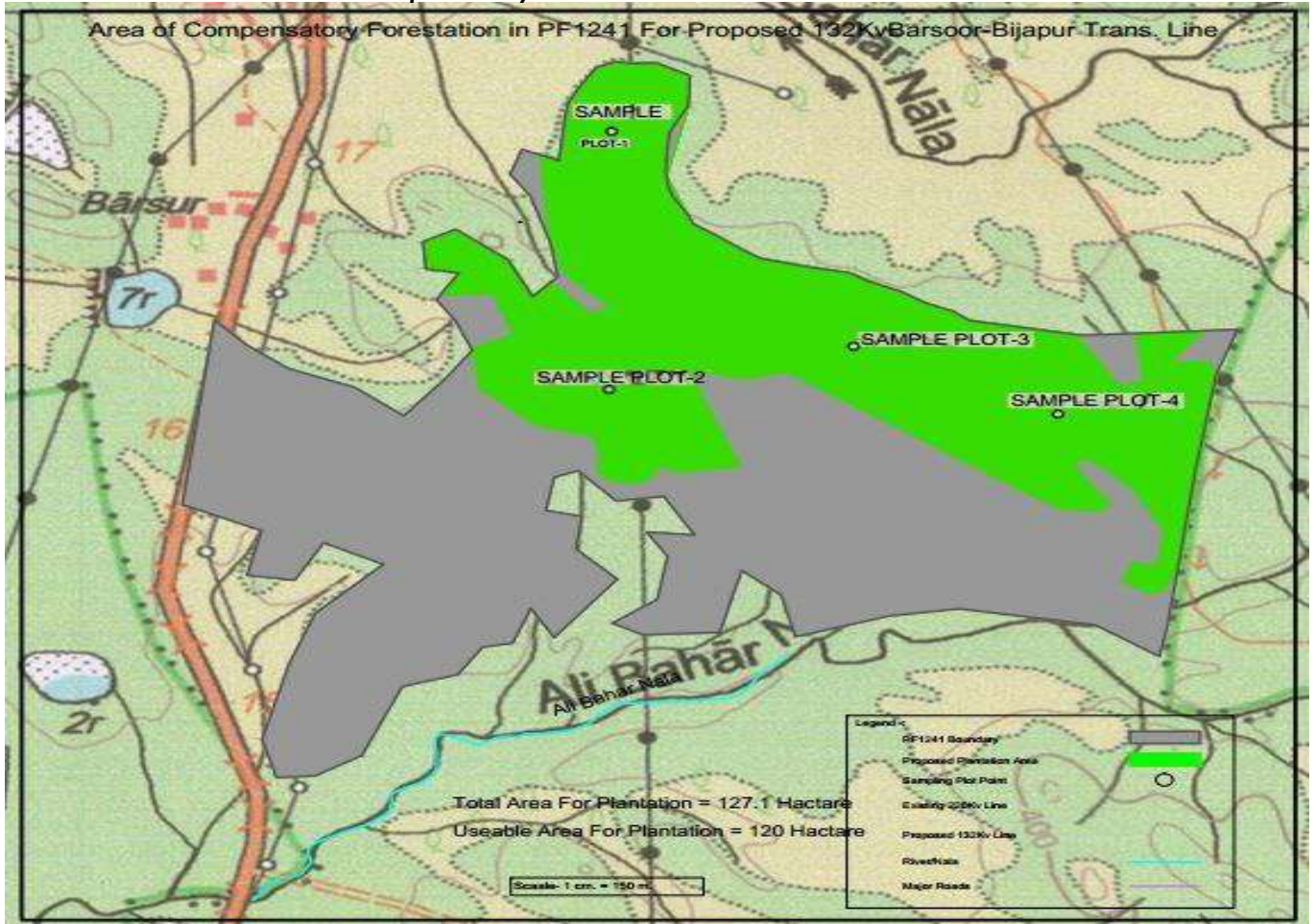


Both compensatory forest area i.e. PF 1241 and RF 1273 falls in survey of India toposheet No.E44D8, The toposheet plot is given below:



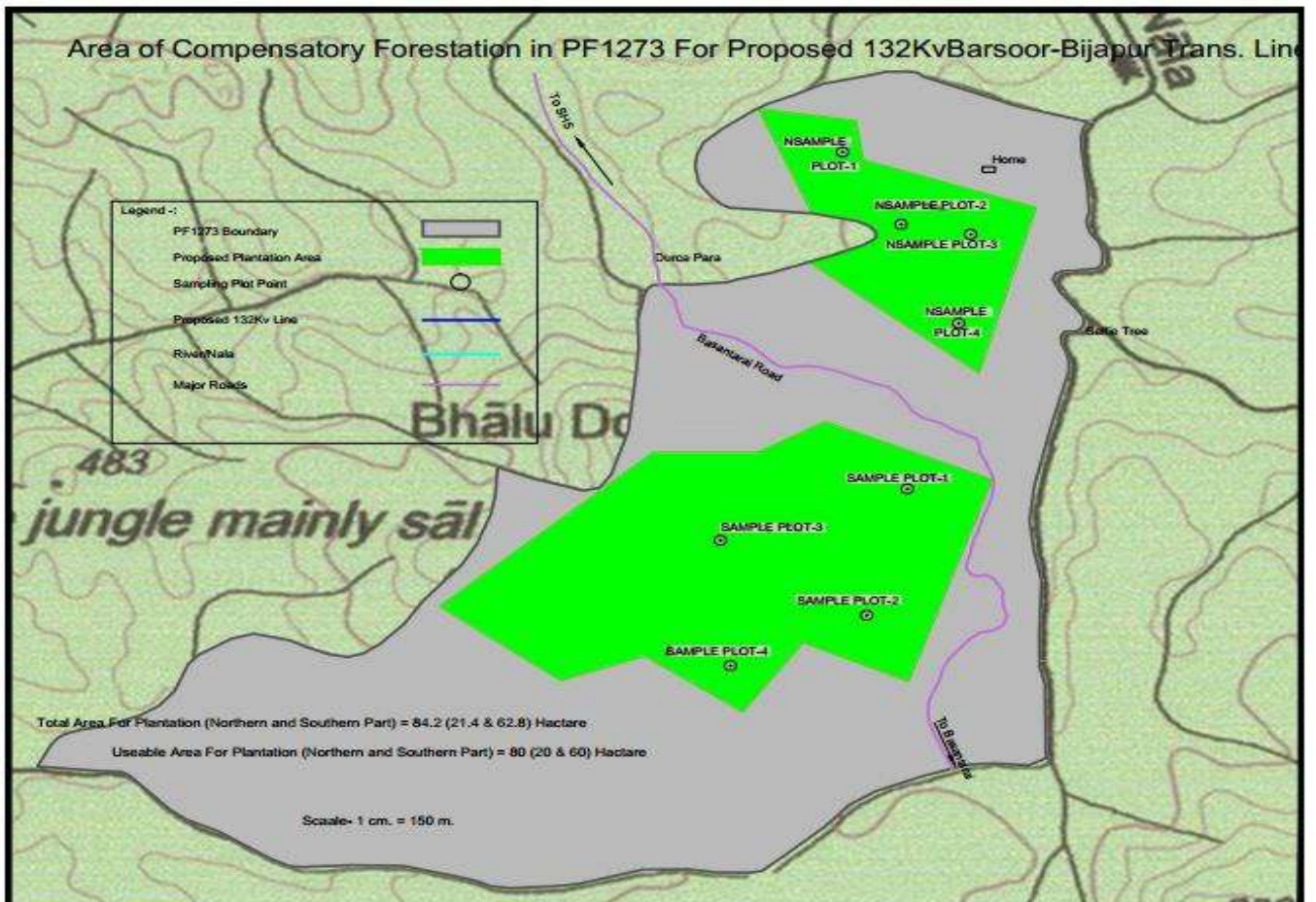
Layout of compensatory forest PF 1241 and RF 1273

Identified compensatory forest area i.e. PF 1241 and RF 1273

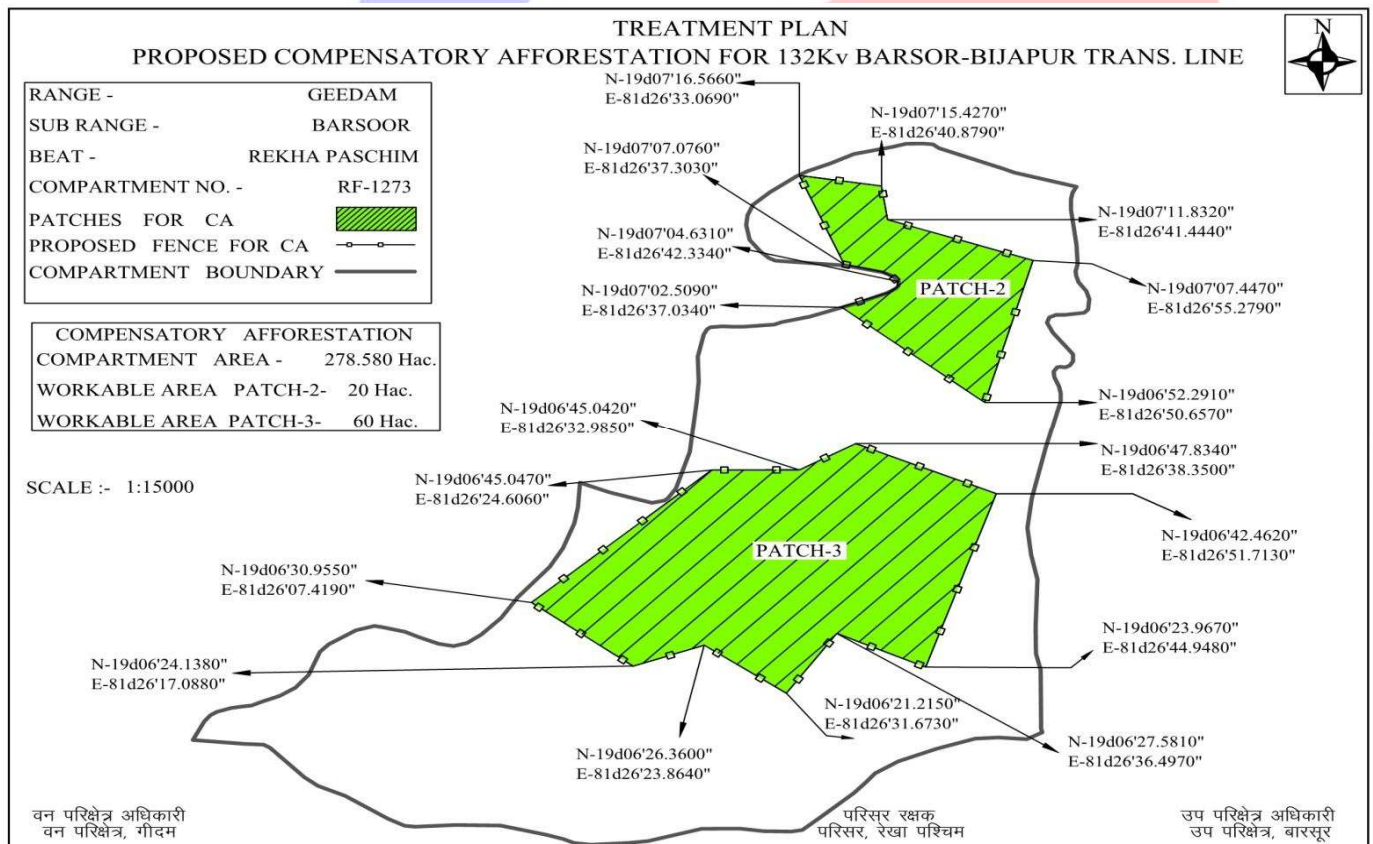
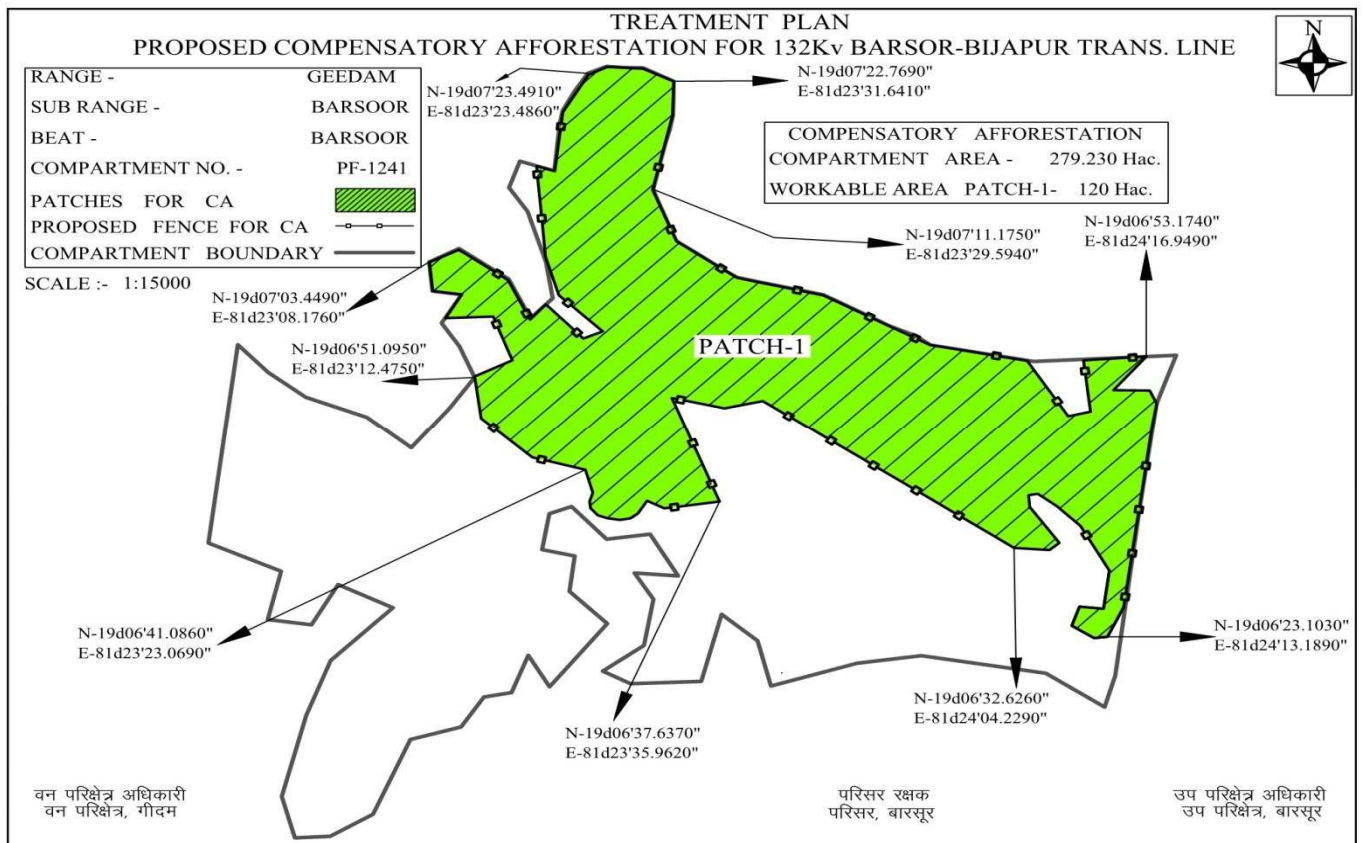


Above Fig.1 is Compensatory forest PF 1241

bellow Fig.2 Compensatory Forest RF 1273



The Layout map of the compensatory forest is hereunder:



Layout of compensatory forest PF 1241 and RF 1273

3.0 INTRODUCTION ABOUT DGPS

The survey using DGPS (Differential Global Positioning system) was the purpose to enhance location accuracy as compare to hand GPS from 7 – 10m to 10 cm.

The real time DGPS occurs when the base station calculates and broadcasts corrections for each satellite as it receives the data. The correction is received by the roving receiver via a radio signal if the source is land based or via satellite signal if it is satellite based and applied to the position it is calculating. As a result, the position displayed and logged to the data file of the roving GPS receiver is a differential corrected position.

Another method for obtaining real – time differential correction data in the field is by using geostationary satellites. This system obtains corrections from more than one reference station. Reference stations collect the base station GPS data and relay this data in RTCM SC-104 format to a network control center, which sends the information to a geostationary satellite for verification. The verified information is sent to the roving GPS receiver to ensure it obtains GPS positions in real time.

4.0 EQUIPMENT DEPLOYED:

Specific Surveying equipment was used for fixing the control points on ground for this project. The present work was performed by using GRX-1 dual frequency GNSS base receiver in RTK model.





The GRX1 receiver is a multi-frequency, GNSS receiver built to be the most advanced and compact receiver for the surveying market. The receiver is a multi-function, multi-purpose receiver intended for survey and construction markets.

The GRX1 receivers and processes multiple signal types (including GPS L1, L2, C/A, L2C GLONASS L1, L2, C/A Signals) improving the accuracy and reliability of the survey points and positions, especially under difficult jobsite conditions. The receiver provides the functionality, accuracy, availability, and integrity needed for fast and easy data collection.

PRINCIPLES OF OPERATION:

Surveying with the right GPS receiver can provide users accurate and precise positioning; a requirement for any surveying project. This section gives an overview of existing and proposed Global Navigation Satellite Systems (GNSS) and receiver functions so that basic operating principles can be applied.

GNSS OVERVIEW:

Currently the following two global navigation satellite systems (GNSS) offer line of site radio navigation and positioning, velocity, and time services on a global, all – weather scale to any user equipped with a GNSS tracking receiver on or near the earth surface:

- GPS: The Global Positioning System maintained and operated by the United States Department of Defence. For information on the status of this system, visit the US Naval Observatory website (<http://tycho.usno.navy.mil/>) or the US Coast Guard website (<http://www.navy.mil/>).
- GLONASS: The Global Navigation Satellite system maintained and operated by the Russian Federation Ministry of Defence. For information on the status

of this system, visit the Coordinational Scientific Information Center Website (<http://www.glonas-ianc.rsa.ru/>).

Despite numerous technical differences in the implementation of these systems, satellite positioning systems have three essential components:

- **SPACE:** GPS and GLONASS satellites orbit approximately 12,000 nautical miles above Earth and are equipped with a clock and radio. These satellites broadcast ranging signals and various digital information (ephemerides, almanacs, time and frequency corrections, and so forth).
- **CONTROL:** Ground stations located around the Earth that monitor the satellites and upload data, including clock corrections and new ephemerides (satellite positions as a function of time), to ensure the satellites transmit data properly.
- **USER:** the community and military that use GNSS receivers to calculate positions.

CALCULATING ABSOLUTE POSITIONS:

When calculating an absolute position, a stationary or moving receiver determines its three – dimensional position with respect to the origin of an Earth-Center Earth-Fixed coordinate system. To calculate this position, the receiver measures the distance (called pseudoranges) between it and at least four satellites. The measured pseudoranges are corrected for clock differences (receiver and satellites) and signal propagation delays due to atmospheric effects. The positions of the satellites are computed from the ephemeris data transmitted to the receiver in navigation messages. When using a single satellite system, the minimum number of satellites needed to compute a position is four. In a mixed satellite scenario (GPS and GLONASS), the receiver must lock onto five or more satellites to account for the different time scales used in these systems and to obtain an absolute position.

CALCULATING DIFFERENTIAL POSITIONS:

DGPS (Differential GPS) is a relative positioning technique where the measurements from two or more remote receivers are combined and processed using sophisticated algorithms to calculate the receivers relative coordinates with high accuracy. DGPS accommodates various implementation techniques that can be classified according to the following criteria:

- The type of GNSS measurements used, either code-phase differential measurements or carrier – phase differential measurements
- If real – time or post-mission results are required. Real-time applications can be further divided according to the source of differential data and communication link used.

With DGPS in its most traditional approach, one receiver is placed at a known, surveyed location and is referred to as the reference receiver or base station. Another receiver is placed at an unknown location and is referred to as the remote receiver or rover. The reference station collects the code-phase and carrier – phase measurements from each GNSS satellite in view.

5.0 CONCLUSION:

The DGPS survey is conducted for two identified compensatory forest area i.e. PF 1241 and RF 1273. The sample survey was also conducted for four parts in the identified area for both PF 1241 and RF 1273 in order to calculate the present density of proposed area for compensatory forestation. The detail of DGPS survey for PF 1241 is given hereunder:

DGPS OBSERVATION OF COMPENSATORY FORESTATION AREA OF pf 1241 FOR PROPOSED 132KV BARSOOR-BIJAPUR TRANS. LINE

S.N	Point ID	Distance From Base (in Meter)	Co-Ordinate in UTM-44N		Co-Ordinate in WGS-84(DMS)		Co-Ordinate in WGS-84(DD)	
			Easting	Northing	Latitude	Longitude	Latitude	Longitude
1	BASE1	0	542271.000	2113052.000	19°06'36.1520"N	81°24'06.7950"E	19.110040	81.401890
2	1	131.786	542196.270	2112943.450	19°06'32.6260"N	81°24'04.2290"E	19.109060	81.401170
3	2	118.206	542295.400	2112936.340	19°06'32.3880"N	81°24'07.6210"E	19.109000	81.402120
4	3	106.131	542323.300	2112959.650	19°06'33.1440"N	81°24'08.5770"E	19.109210	81.402380
5	4	40.451	542239.820	2113077.770	19°06'36.9930"N	81°24'05.7300"E	19.110280	81.401590
6	5	73.179	542236.620	2113116.600	19°06'38.2570"N	81°24'05.6230"E	19.110630	81.401560
7	6	69.552	542263.080	2113121.100	19°06'38.4010"N	81°24'06.5290"E	19.110670	81.401810
8	7	53.436	542315.680	2113081.310	19°06'37.1030"N	81°24'08.3260"E	19.110310	81.402310
9	8	117.587	542382.680	2113015.200	19°06'34.9470"N	81°24'10.6140"E	19.109710	81.402950
10	9	266.222	542463.650	2112868.260	19°06'30.1600"N	81°24'13.3740"E	19.108380	81.403710
11	10	355.169	542447.060	2112743.540	19°06'26.1040"N	81°24'12.7960"E	19.107250	81.403550
12	11	320.534	542380.060	2112750.590	19°06'26.3380"N	81°24'10.5040"E	19.107320	81.402920
13	12	374.862	542358.110	2112687.400	19°06'24.2840"N	81°24'09.7470"E	19.106750	81.402710
14	13	432.195	542421.190	2112646.740	19°06'22.9560"N	81°24'11.9030"E	19.106380	81.403310
15	14	442.460	542458.750	2112651.350	19°06'23.1030"N	81°24'13.1890"E	19.106420	81.403660
16	15	382.360	542503.410	2112748.380	19°06'26.2570"N	81°24'14.7250"E	19.107290	81.404090
17	BASE2	357.201	542141.090	2113384.740	19°06'46.9880"N	81°24'02.3750"E	19.113050	81.400660
17	BASE2	0.000	-	-	-	-	-	-
18	16	456.991	542596.630	2113421.130	19°06'48.1370"N	81°24'17.9690"E	19.113370	81.404990
19	17	442.818	542576.710	2113464.260	19°06'49.5420"N	81°24'17.2900"E	19.113760	81.404800

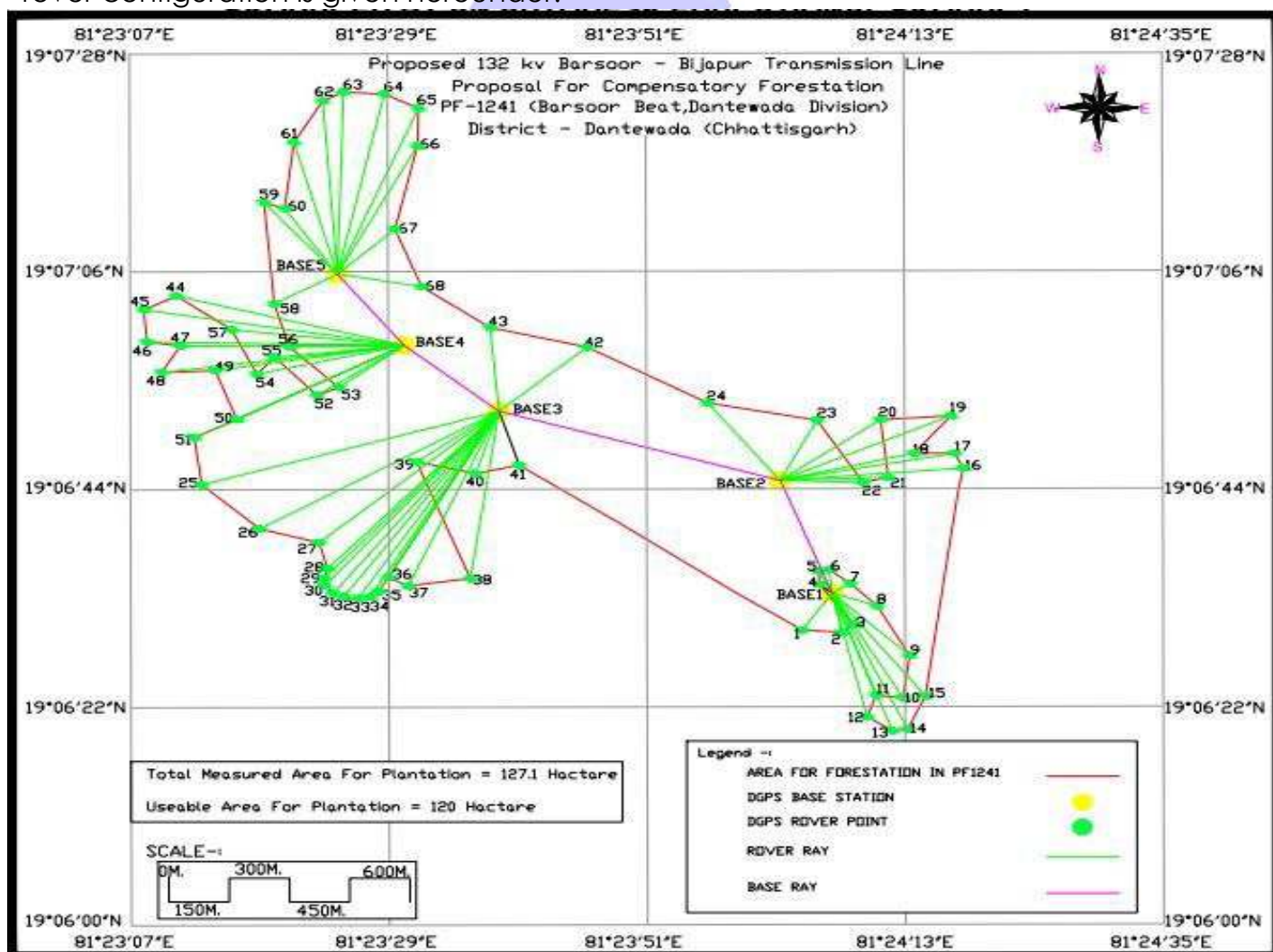
Layout of compensatory forest PF 1241 and RF 1273

20	18	343.492	542474.980	2113465.390	19°06'49.5870"N	81°24'13.8090"E	19.113770	81.403840
21	19	466.351	542566.480	2113575.860	19°06'53.1740"N	81°24'16.9490"E	19.114770	81.404710
22	20	307.211	542390.980	2113563.440	19°06'52.7830"N	81°24'10.9410"E	19.114660	81.403040
23	21	269.772	542410.700	2113394.090	19°06'47.2720"N	81°24'11.6030"E	19.113130	81.403220
24	22	206.774	542347.790	2113379.200	19°06'46.7920"N	81°24'09.4490"E	19.113000	81.402620
25	23	200.036	542233.330	2113562.240	19°06'52.7560"N	81°24'05.5450"E	19.114650	81.401540
26	24	291.464	541960.720	2113613.690	19°06'54.4500"N	81°23'56.2190"E	19.115120	81.398950
27	BASE3	729.279	541441.000	2113589.000	19°06'53.6850"N	81°23'38.4290"E	19.114910	81.394010
27	BASE3	0.000	-	-	-	-	-	-
28	25	771.220	540701.050	2113371.620	19°06'46.6660"N	81°23'13.0860"E	19.112960	81.386970
29	26	690.048	540844.890	2113241.410	19°06'42.4190"N	81°23'17.9990"E	19.111780	81.388330
30	27	592.741	540993.120	2113200.740	19°06'41.0860"N	81°23'23.0690"E	19.111410	81.389740
31	28	630.747	541014.040	2113124.730	19°06'38.6110"N	81°23'23.7800"E	19.110730	81.389940
32	29	657.628	541005.690	2113096.070	19°06'37.6790"N	81°23'23.4920"E	19.110470	81.389860
33	30	672.718	541007.750	2113074.370	19°06'36.9730"N	81°23'23.5600"E	19.110270	81.389880
34	31	678.634	541027.970	2113050.530	19°06'36.1960"N	81°23'24.2510"E	19.110050	81.390070
35	32	670.288	541054.480	2113041.380	19°06'35.8960"N	81°23'25.1570"E	19.109970	81.390320
36	33	655.265	541089.830	2113035.780	19°06'35.7120"N	81°23'26.3670"E	19.109920	81.390660
37	34	635.341	541119.870	2113040.790	19°06'35.8730"N	81°23'27.3950"E	19.109960	81.390940
38	35	611.694	541140.600	2113056.150	19°06'36.3710"N	81°23'28.1060"E	19.110100	81.391140
39	36	562.410	541166.570	2113098.090	19°06'37.7330"N	81°23'28.9980"E	19.110480	81.391390
40	37	563.018	541215.050	2113073.310	19°06'36.9230"N	81°23'30.6560"E	19.110260	81.391850
41	38	498.496	541370.040	2113095.580	19°06'37.6370"N	81°23'35.9620"E	19.110450	81.393320
42	39	253.812	541235.890	2113439.500	19°06'48.8360"N	81°23'31.3970"E	19.113570	81.392050
43	40	192.649	541383.060	2113405.270	19°06'47.7120"N	81°23'36.4310"E	19.113250	81.393450
44	41	167.464	541491.400	2113429.300	19°06'48.4850"N	81°23'40.1410"E	19.113470	81.394480
45	42	289.439	541659.910	2113778.350	19°06'59.8290"N	81°23'45.9360"E	19.116620	81.396090
46	43	247.412	541418.640	2113835.400	19°07'01.7030"N	81°23'37.6820"E	19.117140	81.393800
47	BASE4	305.103	541204.910	2113782.260	19°06'59.9900"N	81°23'30.3620"E	19.116660	81.391770
47	BASE4	0.000	-	-	-	-	-	-
48	44	584.920	540638.421	2113927.938	38°00'34.0250"N	87°37'52.5570"E	38.009450	87.631270
49	44	584.922	540638.420	2113927.940	19°07'04.7700"N	81°23'10.9840"E	19.117990	81.386380
50	45	656.867	540556.470	2113887.140	19°07'03.4490"N	81°23'08.1760"E	19.117620	81.385600
51	46	639.925	540565.070	2113792.700	19°07'00.3760"N	81°23'08.4630"E	19.116770	81.385680
52	47	557.882	540647.030	2113780.860	19°06'59.9840"N	81°23'11.2680"E	19.116660	81.386460
53	48	608.889	540601.240	2113702.710	19°06'57.4450"N	81°23'09.6950"E	19.115960	81.386030
54	49	475.918	540734.780	2113708.260	19°06'57.6160"N	81°23'14.2660"E	19.116000	81.387300
55	50	470.202	540788.560	2113563.760	19°06'52.9110"N	81°23'16.0960"E	19.114700	81.387800
56	51	589.820	540682.890	2113507.700	19°06'51.0950"N	81°23'12.4750"E	19.114190	81.386800
57	52	261.888	540987.730	2113635.910	19°06'55.2440"N	81°23'22.9180"E	19.115350	81.389700
58	53	204.295	541042.140	2113658.800	19°06'55.9850"N	81°23'24.7820"E	19.115550	81.390220
59	54	376.362	540838.110	2113697.960	19°06'57.2740"N	81°23'17.8020"E	19.115910	81.388280
60	55	323.798	540882.940	2113747.900	19°06'58.8950"N	81°23'19.3400"E	19.116360	81.388710
61	56	285.853	540919.080	2113778.600	19°06'59.8910"N	81°23'20.5790"E	19.116640	81.389050
62	57	431.807	540775.630	2113828.910	19°07'01.5380"N	81°23'15.6730"E	19.117090	81.387690

Layout of compensatory forest PF 1241 and RF 1273

63	BASE5	268.212	541039.000	2113993.000	19°07'06.8580"N	81°23'24.7000"E	19.118570	81.390190
63	BASE5	0.000	-	-	-	-	-	-
64	58	180.277	540881.560	2113905.180	19°07'04.0120"N	81°23'19.3050"E	19.117780	81.388700
65	59	278.506	540856.490	2114203.370	19°07'13.7150"N	81°23'18.4690"E	19.120480	81.388460
66	60	234.007	540907.450	2114186.530	19°07'13.1640"N	81°23'20.2120"E	19.120320	81.388950
67	61	403.766	540930.590	2114381.940	19°07'19.5200"N	81°23'21.0190"E	19.122090	81.389170
68	62	512.459	541002.400	2114504.150	19°07'23.4910"N	81°23'23.4860"E	19.123190	81.389860
69	63	537.419	541054.000	2114530.210	19°07'24.3350"N	81°23'25.2540"E	19.123430	81.390350
70	64	544.102	541155.470	2114524.490	19°07'24.1410"N	81°23'28.7270"E	19.123370	81.391310
71	65	529.414	541240.690	2114482.490	19°07'22.7690"N	81°23'31.6410"E	19.122990	81.392120
72	66	427.330	541237.860	2114371.240	19°07'19.1500"N	81°23'31.5360"E	19.121990	81.392090
73	67	195.084	541181.700	2114126.020	19°07'11.1750"N	81°23'29.5940"E	19.119770	81.391550
74	68	212.729	541248.520	2113956.190	19°07'05.6450"N	81°23'31.8690"E	19.118230	81.392190

Total 5 nos. base points have been established on ground to cover 68 points on ground to complete the survey for identified area. The map showing Base and rover configuration is given hereunder:



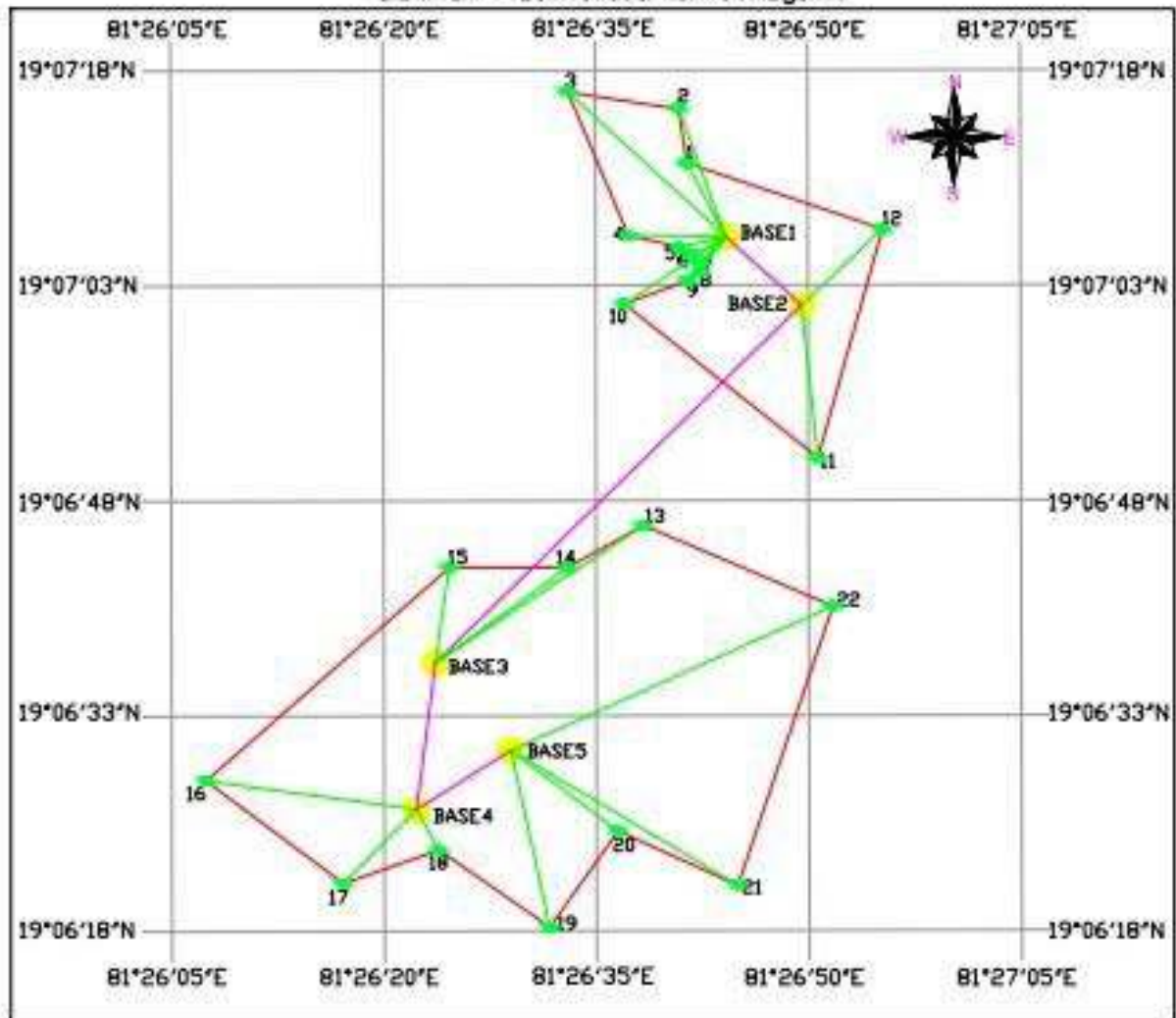
Map showing Distribution of observation points with respect to Base points for PF 1241

The detail of DGPS survey observation points for RF 2731 is presented hereunder:

DGPS OBSERVATION OF COMPENSATORY FORESTATION AREA FOR RF 1273 FOR PROPOSED 132KV BARSOOR-BIJAPUR TRANS. LINE								
S.N.	Point ID	Distance FromBase (in Meter)	Co-Ordinate in UTM-44N		Co-Ordinate in WGS-84(DMS)		Co-Ordinate in WGS-84(DD)	
			Easting	Northing	Latitude	Longitude	Latitude	Longitude
1	BASE1	0.000	546868.160	2114009.720	19°07'06.9490"N	81°26'44.2200"E	19.118600	81.445620
2	1	170.587	546786.670	2114159.590	19°07'11.8320"N	81°26'41.4440"E	19.119950	81.444850
3	2	278.275	546769.890	2114270.070	19°07'15.4270"N	81°26'40.8790"E	19.120950	81.444690
4	3	439.900	546541.610	2114304.480	19°07'16.5660"N	81°26'33.0690"E	19.121270	81.442520
5	4	202.118	546666.060	2114013.110	19°07'07.0760"N	81°26'37.3030"E	19.118630	81.443700
6	5	98.539	546771.970	2113988.290	19°07'06.2600"N	81°26'40.9260"E	19.118410	81.444700
7	6	77.518	546799.540	2113973.640	19°07'05.7810"N	81°26'41.8680"E	19.118270	81.444960
8	7	76.076	546815.360	2113954.940	19°07'05.1710"N	81°26'42.4080"E	19.118100	81.445110
9	8	90.059	546813.250	2113938.330	19°07'04.6310"N	81°26'42.3340"E	19.117950	81.445090
10	9	119.149	546789.270	2113920.420	19°07'04.0500"N	81°26'41.5120"E	19.117790	81.444860
11	10	250.399	546658.560	2113872.710	19°07'02.5090"N	81°26'37.0340"E	19.117360	81.443620
12	BASE2	208.664	547024.080	2113871.060	19°07'02.4250"N	81°26'49.5450"E	19.117340	81.447100
12	BASE2	0.000						
13	11	364.368	547057.360	2113559.670	19°06'52.2910"N	81°26'50.6570"E	19.114530	81.447400
14	12	358.229	547191.210	2114025.850	19°07'07.4470"N	81°26'55.2790"E	19.118740	81.448690
15	BASE3	944.050	546268.800	2113141.670	19°06'38.7570"N	81°26'23.6310"E	19.110770	81.439900
15	BASE3	0.000						
16	13	512.624	546698.140	2113421.760	19°06'47.8340"N	81°26'38.3500"E	19.113290	81.443990
17	14	334.674	546541.610	2113335.530	19°06'45.0420"N	81°26'32.9850"E	19.112510	81.442500
18	15	195.418	546296.810	2113335.070	19°06'45.0470"N	81°26'24.6060"E	19.112510	81.440170
19	BASE4	301.329	546230.150	2112842.830	19°06'29.0380"N	81°26'22.2820"E	19.108070	81.439520
19	BASE4	0.000						
20	16	438.245	545795.740	2112900.680	19°06'30.9550"N	81°26'07.4190"E	19.108600	81.435390
21	17	213.808	546078.760	2112691.850	19°06'24.1380"N	81°26'17.0880"E	19.106700	81.438080
22	18	94.374	546276.550	2112760.650	19°06'26.3600"N	81°26'23.8640"E	19.107320	81.439960
23	BASE5	228.894	546424.820	2112963.230	19°06'32.9390"N	81°26'28.9550"E	19.109150	81.441380
23	BASE5	0.000						
24	19	369.007	546505.140	2112603.070	19°06'21.2150"N	81°26'31.6730"E	19.105890	81.442130
25	20	275.085	546645.590	2112799.120	19°06'27.5810"N	81°26'36.4970"E	19.107660	81.443470
26	21	542.572	546892.790	2112688.660	19°06'23.9670"N	81°26'44.9480"E	19.106660	81.445820
27	22	726.498	547088.990	2113257.640	19°06'42.4620"N	81°26'51.7130"E	19.111800	81.447700

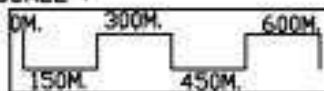
Total 5 nos. base points have been established on ground to cover 22 observation points on ground to complete the survey for identified area of RF 1273. The map showing Base and rover configuration is given hereunder:

Proposed 132 kv Barsoor - Bijapur Transmission Line
 Proposal For Compensatory Forestation
 PF-1273 (Rekha Pachin Beat, Dantewada Division)
 District - Dantewada (Chhattisgarh)



Total Area For Plantation (Northern and Southern Part) = 84.2 (21.4 & 62.8) Hactare
 Useable Area For Plantation (Northern and Southern Part) = 80 (20 & 60) Hactare

SCALE-1



Legend -

AREA FOR FORESTATION IN PF1273

DGPS BASE STATION

DGPS RIVER POINT

RIVER RAY

BASE RAY

Map showing observation points with respect to base points for RF 1273

Layout of compensatory forest PF 1241 and RF 1273

PHOTOGRAPHS:



Layout of compensatory forest PF 1241 and RF 1273