चेक लिस्ट क्रमांक संख्या 44

प्रस्ताव में अन्य (Misc.) का विवरण-

DGPS Survey Report Duly Authenticated By DFO

PROJECT DIRECTOR
NHAI, PIU, KORBA (C.G.)

DGPS / Total Station Survey Report

For

Proposal for Diversion of Forest land For Detailed Project Report for up gradation of Champa-Korba-Chhuri-Katghora Section of NH-149B in the state of Chhattisgarh to two/four lane with paved shoulder configuration (package no. NH/IAHE/09 in the State of Chhattisgarh. Pakage-I (0+00 to 37+000)

Champa Forest Divison (1.673 Ha)

& Korba Forest Division (2.82 Ha)

Total Area- 4.493 Ha

Submitted To

DFO Korba & DFO Champa,

Chattishgarh

Submitted By

भारतीय राष्ट्रीय राजमार्ग प्राधिकरण

National Highways Authority Of India

PIU Bilaspur,NHAI

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.

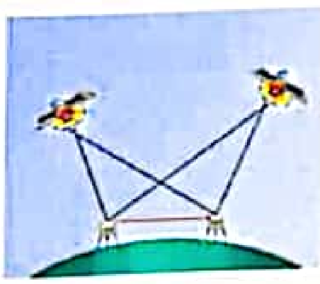
Why do we Need Differential GPS?

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

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

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.

• 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.

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.

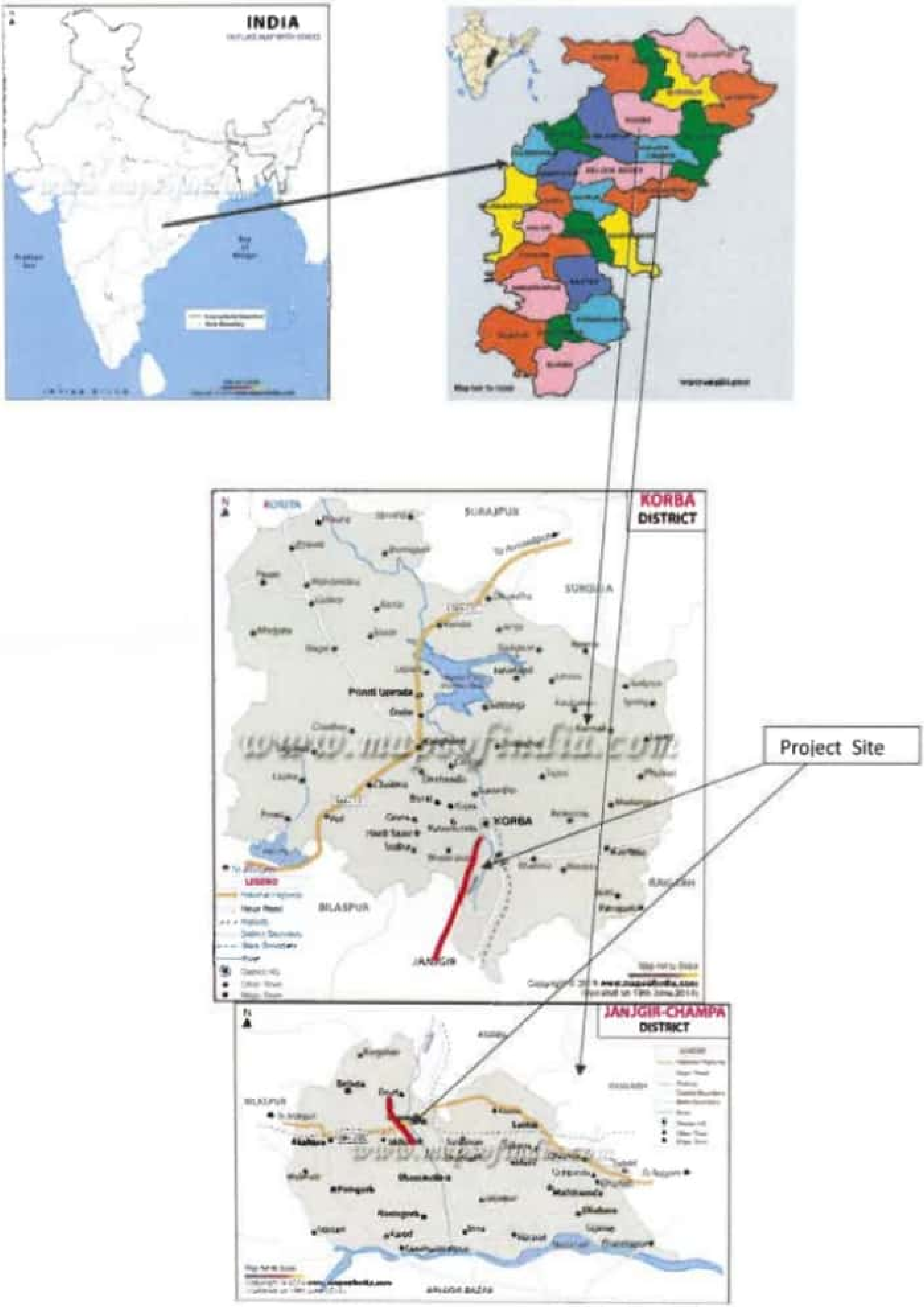
Satellite numbers:

Starting with RINEX Version 2 the former two-digit satellite numbers nnare 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 for Land Requirement for the Project

Details of land Requirement				
District	**Sub District**	**Non-Forest Land. (In Ha)**	**Forest Land (in Ha)**	**Total Area (in Ha)**
Janjgir Champa	Champa	67.552	1.673	**69.225**
Korba	Kartala	67.134	0.300	**67.434**
	Korba	32.413	2.52	**34.933**
	Total Area	**167.099**	**4.493**	**171.592**

Details of Revenue Forest land					
District/ Forest Division	**Sub District**	**Village**	**Khasra no.**	**Revenue Forest Land (in Ha)**	**Total Area (in Ha)**
Janjgir Champa	Champa	Kosmanada	892/1	1.588	**4.493**
		Seoni	1321/1	0.085	
Korba	Kartala	Banjari	5	0.300	
	Korba	Urga	67	2.520	
			Total Area		**4.493**

Forest Land Proposed for diversion in Champa Forest Division is 1.673 Ha

Forest Land Proposed for diversion in Korba Forest Division is 2.82 Ha

Total Revenue Forest Area Proposed to be diverted is **4.493 Ha.**

DGPS Survey Details

Forest Division Champa

Village- Kosmanada, Tehsil Champa,

Khasra no-892/1

Revenue Forest Patch 1- Area =1.588 Ha

Piller ID	Left Side		Piller ID	Right Side	
	Longitude	Latitude		Longitude	Latitude
LP1	22.035309°	82.711775°	RP1	22.035780°	82.712061°
LP2	22.035643°	82.711342°	RP2	22.036073°	82.711856°
LP3	22.035936°	82.710978°	RP3	22.036366°	82.711322°
LP4	22.036229°	82.710603°	RP4	22.036659°	82.710957°
LP5	22.036522°	82.710239°	RP5	22.036961°	82.710593°
LP6	22.036913°	82.709767°	RP6	22.037254°	82.710228°

Village- Seoni, Tehsil Champa,

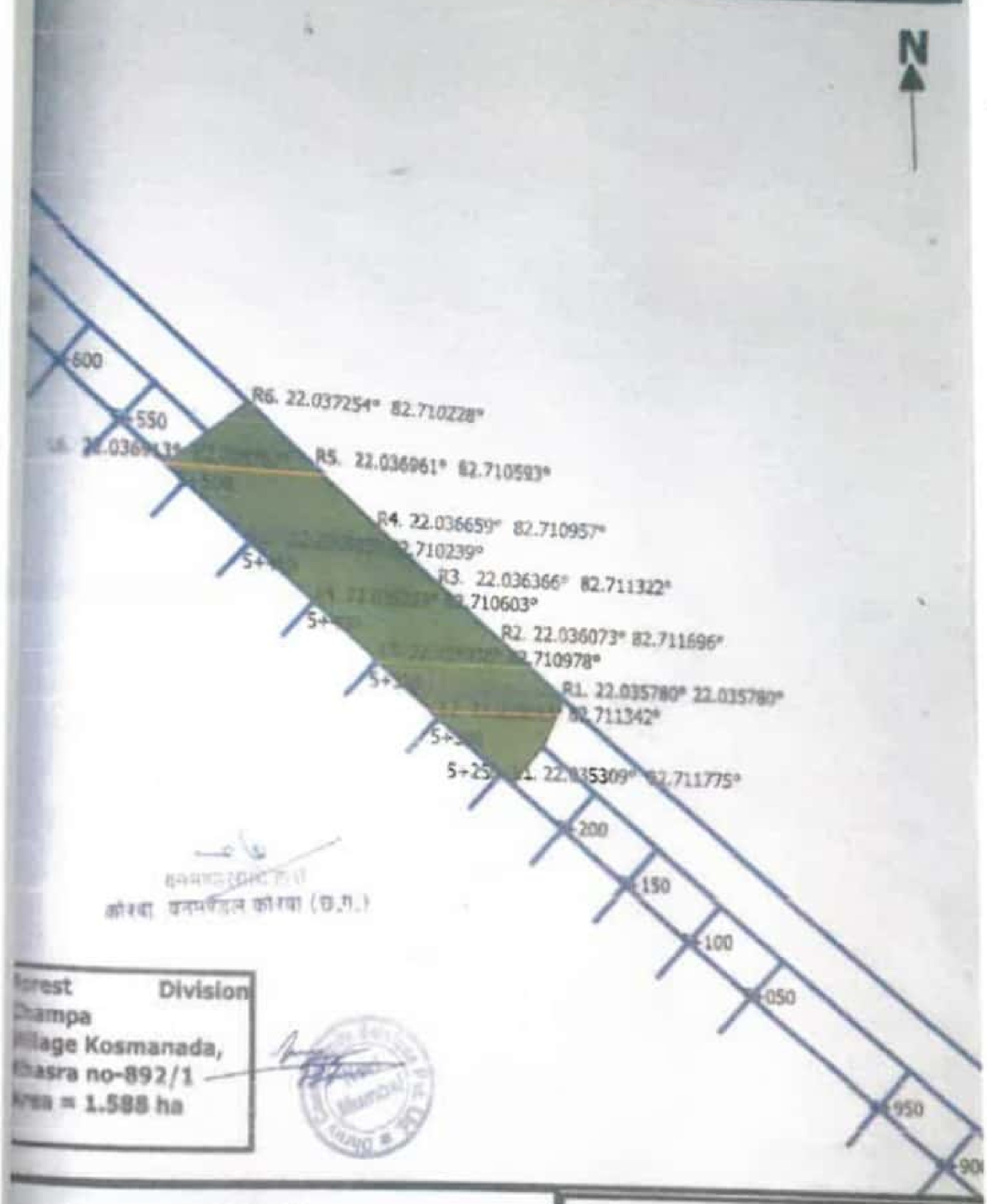
Khasra no-1321/1

Revenue Forest Patch 2- Area =0.085 Ha

Piller ID	Left Side		Piller ID	Right Side	
	Longitude	Latitude		Longitude	Latitude
LP1	22.071032°	82.687168°	RP1	22.071197°	82.687361°
LP2	22.071202°	82.686907°	RP2	22.071369°	82.686976°

उपवनमण्डलाधिकारी
कोरबा वनमण्डल कोरबा (छ.ग.)

...for Diversion of Forest land For Detailed Project Report for up gradation of Champa-Korba-Chh...
...Section of NH-149B in the state of Chhattisgarh to two/four lane with paved shoulder configurat...
...no. NH/IAHE/09 in the State of Chhattisgarh. Pakage-I (0+00 to 37+000)



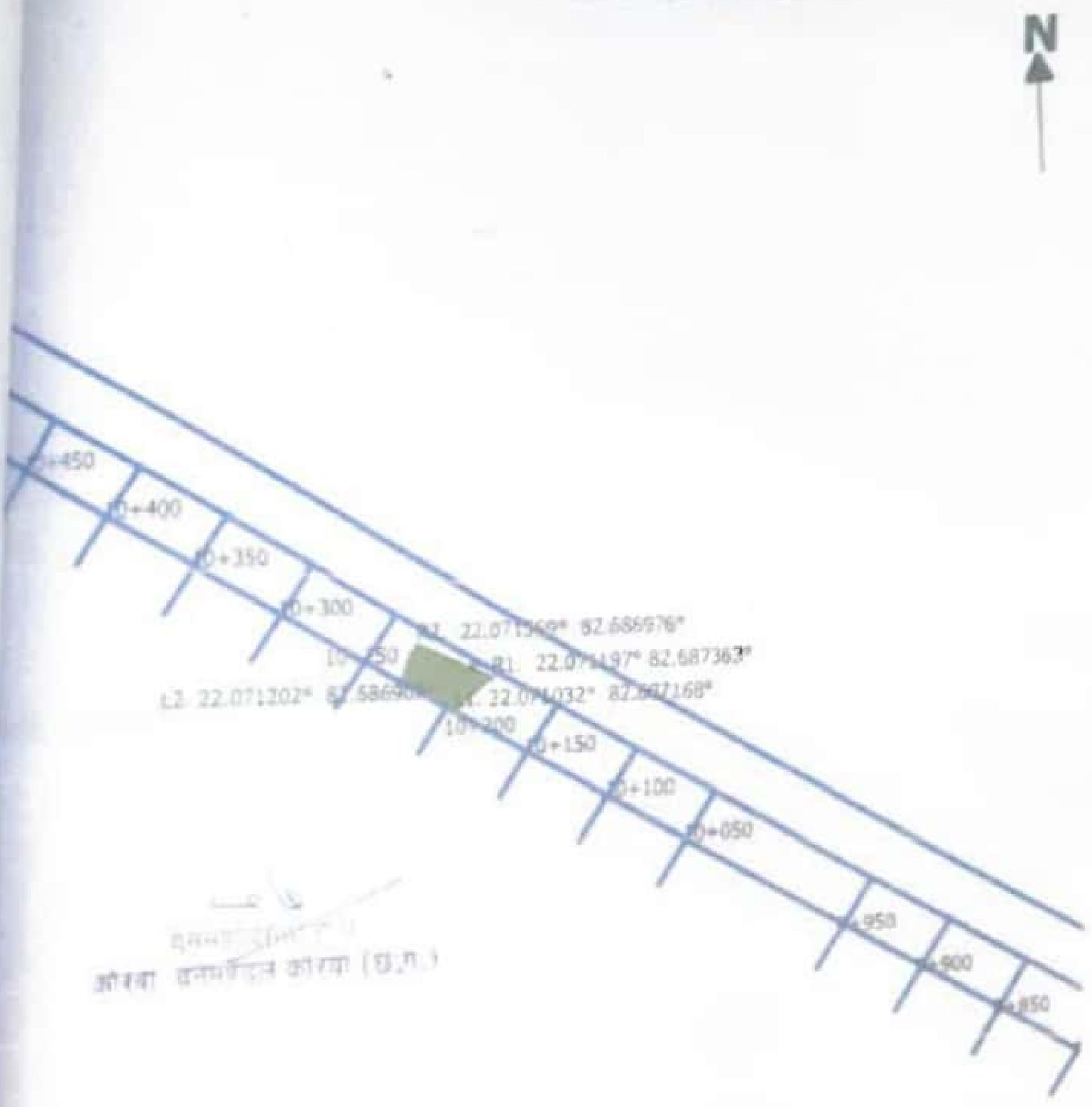
Applicant:
National Highway Athuority of India
Govt. Of Indai
(PIU Bilaspur)

0 50 100 150 200 m

Legend

- Forest Patches Pillar Coordinates
- Forest Patch
- PROW
- PROW Chainage

Map for Diversion of Forest land For Detailed Project Report for up gradation of Champa-Korba-Chhuri-
...ora Section of NH-149B in the state of Chhattisgarh to two/four lane with paved shoulder configuration
...age no. NH/IAHE/09 in the State of Chhattisgarh. Pakage-I (0+00 to 37+000)



Forest Division
Champa
Village Seoni,
Khasra no1321/1
Area = 0.085 ha

Applicant:
National Highway Athuority of India
Govt. Of Indai
(PIU Bilaspur)

50	0	50	100	150	200 m

Legend

- Forest Patches Pillar Coordina
- Forest Patch
- PROW
- PROW Chainage

Forest Division Korba

Village- Banjari, Tehsil Kartala.

Khasra no-5

Revenue Forest Patch 3- Area =0.30 Ha

Piller ID	Left Side		Piller ID	Right Side	
	Longitude	Latitude		Longitude	Latitude
LP1	22.160074°	82.708875°	RP1	22.160084°	82.708562°
LP2	22.160920°	82.708934°	RP2	22.160947°	82.708620°

Village- Urga, Tehsil Korba,

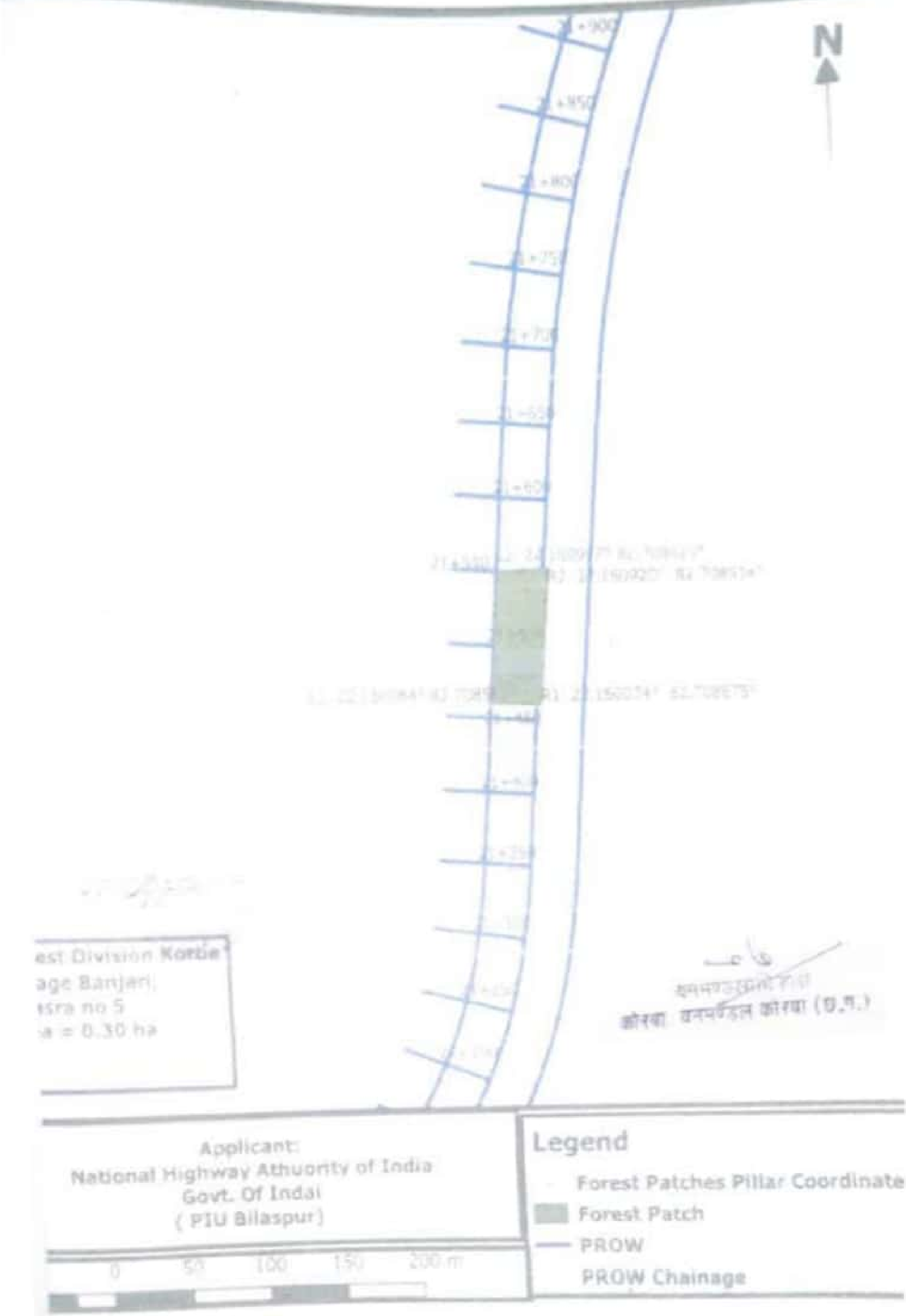
Khasra no-67

Revenue Forest Patch 4- Area =2.52 Ha

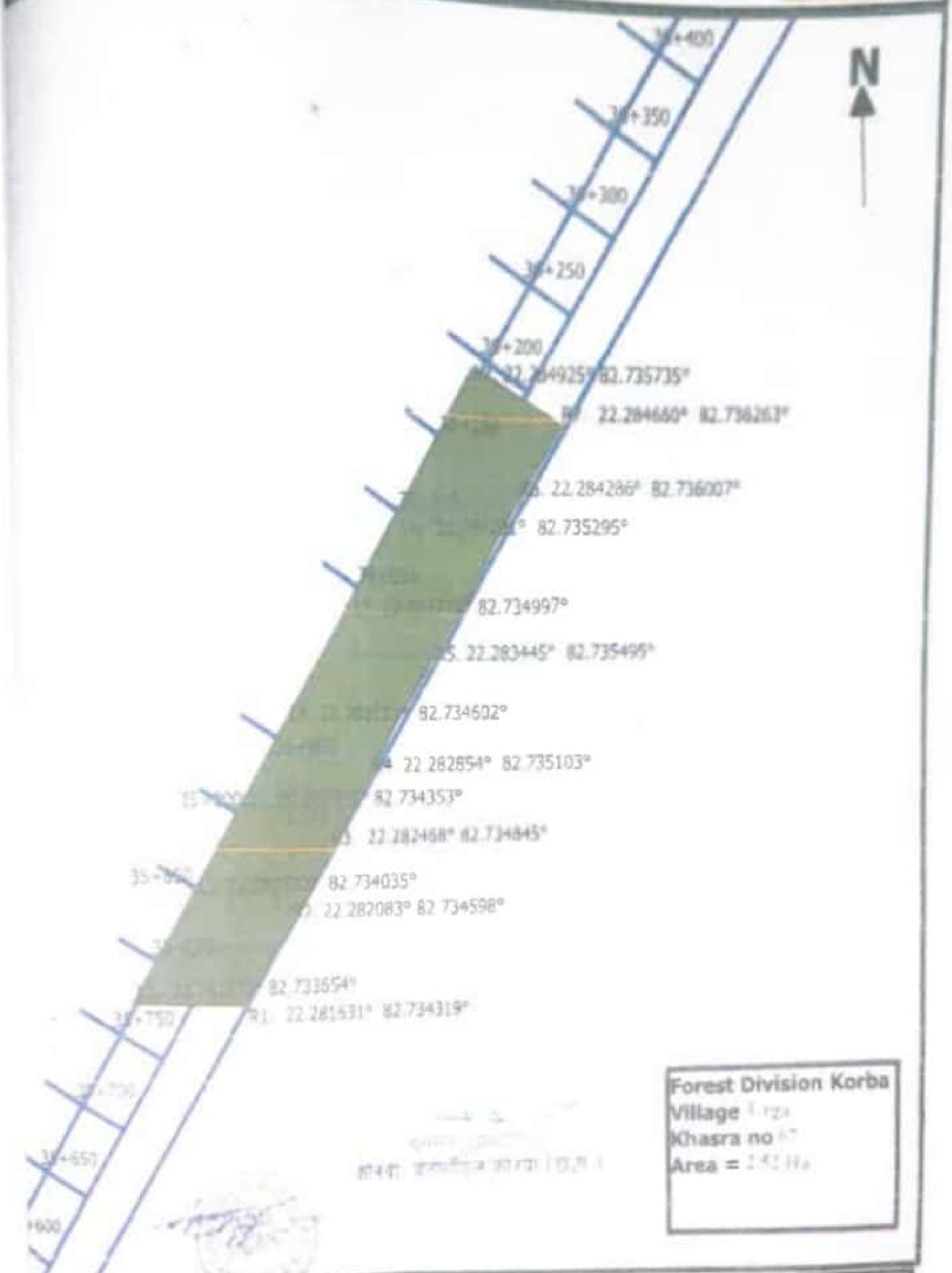
Piller ID	Left Side		Piller ID	Right Side	
	Longitude	Latitude		Longitude	Latitude
LP1	22.281672°	82.733654°	RP1	22.281631°	82.734319°
LP2	22.282232°	82.734035°	RP2	22.282083°	82.734398°
LP3	22.282742°	82.734353°	RP3	22.282468°	82.734845°
LP4	22.283129°	82.734602°	RP4	22.282854°	82.735103°
LP5	22.283745°	82.734997°	RP5	22.283445°	82.735495°
LP6	22.284201°	82.735295°	RP6	22.284286°	82.736007°
LP7	22.284925°	82.735735°	RP7	22.284660°	82.736263°

वनमंडलाधिकारी
कोरबा वनमण्डल कोरबा (छ.ग.)

for Diversion of Forest land For Detailed Project Report for up gradation of Champa-Korba-Chhu Section of NH-149B in the state of Chhattisgarh to two/four lane with paved shoulder configurati no. NH/IAHE/09 in the State of Chhattisgarh, Pakage-I (0+00 to 37+000)



...p for Diversion of Forest land For Detailed Project Report for up gradation of Cham... Dhuri-
...Section of NH-149B in the state of Chhattisgarh to two/four lane with paved shou... ...ration
...no. NH/IAHE/09 in the State of Chhattisgarh. Pakage-I (0+00 to 37+000)



Applicant:
National Highway Athuority of India
Govt. Of Indal
(PIU Bilaspur)

50 0 50 100 150 200 m

Legend

- Forest Patches Pillar Coordinates
- Forest Patch
- PROW
- PROW Chainage

Diversion of 4.493 Ha Forest for National Highway Authority of India (NHAI) , propose the Up gradation of Champa-Korba-Chhuri-Katghora Section of NH-149B in the state of Chhattisgarh Chhattisgarh. Pakage-I (0+00 to 38+150).

Details of Proposed Forest Area for Diversion

S. no	Type of alignment Proposed	Affected Length (in Km)	Forest Land Proposed For Diversion (in Ha)
1.	Existing Widening	0.1	0.30
2.	Realignments and Bypasses	0.719	4.193
	Total	0.819	4.493

Area Calculation Sheet for Forest Land Proposed for Diversion on Existing Alignment

District	Tehsil	Village	Khasra No.	DGPS Segment	Chainage		Length (in Km)	Width (in m)		Area (in Ha)	
					Start	End		Right Side	Left Side	As per Calculation (approx.)	As Per Record
Korba	Kartala	Banjari	5	Seg3	21.46	21.56	0.1	_	30	0.3	0.3
Total							0.1			0.3	0.3

Area Calculation Sheet for Forest Land Proposed for Diversion on Proposed Realignment & Bypasses

District	Tehsil	Village	Khasra No.	DGPS Segment	Chainage		Length (in Km)	Width (in m)	Area (in Ha)	
					Start	End			As per Calculation (approx.)	As Per Record
Janjgir Champa	Champa	Kesomand	892/1	Seg1	5.25	5.515	0.265	60	1.59	1.588
		Seoni	1321/1	Seg2	10.2	10.234	0.034	25	0.085	0.085
Korba	Korba	Urga	67	Seg4	35.78	36.2	0.42	60	2.52	2.52
TOTAL							0.719		4.195	4.193

PROJECT DIRECTOR
NHAI, PIU, Bilaspur (C.G.)

Diversion of 4.493 Ha Forest for National Highway Authority of India (NHAI) , propose the Up gradation of Champa-Korba-Chhuri-Katghora Section of NH-149B in the state of Chhattisgarh Chhattisgarh. Pakage-I (0+00 to 38+150).

Alternate Alignment Analysis

There 2 options are taken under consideration to achieve the goals of proposed projects. All options are viable the basic feature comparison is given below:-

S. no.	Feature	Option 1	Option 2
1.	Alignment	Existing widening	Existing widening with bypasses
2.	Length	44.9 Km	38.150 Km
3.	Speed	40 Kmph	100 Kmph
4.	Alignment Geometry	Poor	As per IRC Standard
5.	Habitation	Seoni, Urga (Highly populated	none
6.	Length of Bypasses and realignment	none	15 Km Bypasses & Realignment
7.	Affected Forest Land	5.3 Ha (approx. 1.2 Km length)	4.493 Ha (approx. 0.8 Km length)
		Not recommended	**Recommended**

The Option 2 is recommended with Minimum length(38.150 Km) of working with good geometrical properties, and least revenue forest area to be affected is 4.493 ha

The forest land involve in option 2 is unavoidable and necessary to achieve the goals of proposed project.

PROJECT DIRECTOR
NHAI, PIU, Bilaspur (C.G.)

भारतीय राष्ट्रीय राजमार्ग प्राधिकरण
(सड़क परिवहन और राजमार्ग मंत्रालय, भारत सरकार)
National Highways Authority Of India
(Ministry of Road Transport and Highways, Govt. of India)
Office of Project Director, Project Implementation Unit, Bilaspur

दूरभाष : 07752-281604
Phone : 07752-281604
Email : piubilaspur@nhai.org
Email : piubilaspur@gmail.com
Web : www.nhai.gov.in

भारतमाला

Certificate of Undertaking For Tree Felling

National Highway Authority of India, hereby gives the undertaking that minimum nos. of tree will be proposed to be felled and also to bear the cost of tree felling as per the scheme prepared by the Department of Forest, Environment and Wildlife management, Govt. of Chhattisgarh in lieu of Diversion of 4.493 Ha Forest for National Highway Authority of India (NHAI), propose the Up gradation of Champa-Korba-Chhuri-Katghora Section of NH-149B in the state of Chhattisgarh Chhattisgarh. Pakage-I (0+00 to 38+150).

Date: 1/08/2019

Place: Bilaspur

(Signature & Seal of Authorised Signatory)

PROJECT DIRECTOR
NHAI, PIU, Bilaspur (C.G.)

Justification for Locating the Project in Forest Land

Project Name - Consultancy Services for Preparation of DPR for National Highway Authority of India (NHAI), propose the Up gradation of Champa-Korba-Chhuri-Katghora Section of NH-149B in the state of Chhattisgarh Chhattisgarh. Pakage-I (0+00 to 38+150).

Dhruv Consultancy Services Pvt. Ltd. has been appointed as Consultants to carry out the consultancy services for Project Management Phase-I including preparation of Detailed Project Report for up-gradationof NH-149B of Champa-Urga sectionfrom two lane to four lane configuration in the State of ChhattisgarhThe project includes Champa-Urga section of NH-149 B in the state of Chhattisgarh has been taken up. The project corridor forms one of the important arterial highways in the National Highway network of Chhattisgarh. The project road is located in Northern part of Chhattisgarh state. The project road connects two district towm of Champa and Urga.

The project road is a section of newly declaredNH-149B which starts from existing Km 91.000 of NH-49 (Old NH-200) near Saragaon village and terminates at existing Km 29.000 of SH-09 (NH-149B) near Urga village. Total existing length of the project road is 40.000 km. The entire existing stretch has carriageway width of two lane. Package-I starts from Design ChainageKm 0+000 (Junction with NH-49) near Saragaon village and ends at Design ChainageKm 36+000 near Urga Village in the State of Chhattisgarh. The total length of the project stretch selected for up-gradation is approx. 38+150 km in the district Korba & Urga Champa District of State Chattisgarh.. Therefore, the construction of bypasses, widening and realignment of existing road requires forest clearance from Ministry of Environment, forest and climate change (GoI) as per forest conservation act 1980

The Forest area identified within the proposed alignment is revenue forest area. The alignment is not passing or Fragmenting any Protected or reserve forest. The diversion of revenue forest area has been limited to the minimum diversion because mostly existing alignment has been followed that satisfies the National Highway standards.

PROJECT DIRECTOR
NHAI, PIU, Bilaspur (C.G.)

Project Name

Survey Report of 10 Ha. for Compensatary Afforestation under Marwahi Forest Division in lieu of Diversion of 4.493 Ha. of forest land under Korba and Janjgir-Champa Division, for Rehabilitation and Up gradation of Champa-Korba-Chhuri-Katghora Section of NH-149B in the state of Chhattisgarh Chhattisgarh. Pakage-I (0+00 to 38+150).

Forest Proposal No- FP/CG/ROAD/37444/2018

Forest Area Proposed for Diversion- 4.493 Ha

Korba & Janjgir-Champa Forest Division

CA land Proposed- 10 Ha

Under Marwahi Forest Division

Project Propnent

PIU, Bilaspur,
National Highway Authority of India

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

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.

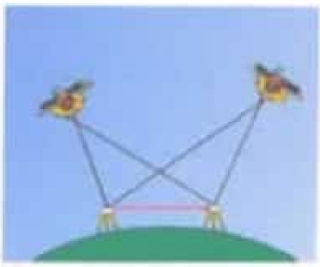
Why do we Need Differential GPS?

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

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

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.

• IONEX: Exchange format for **ionosphere models** determined by processing data of a GNSS tracking network [Schaer et al. 1998] •

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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.

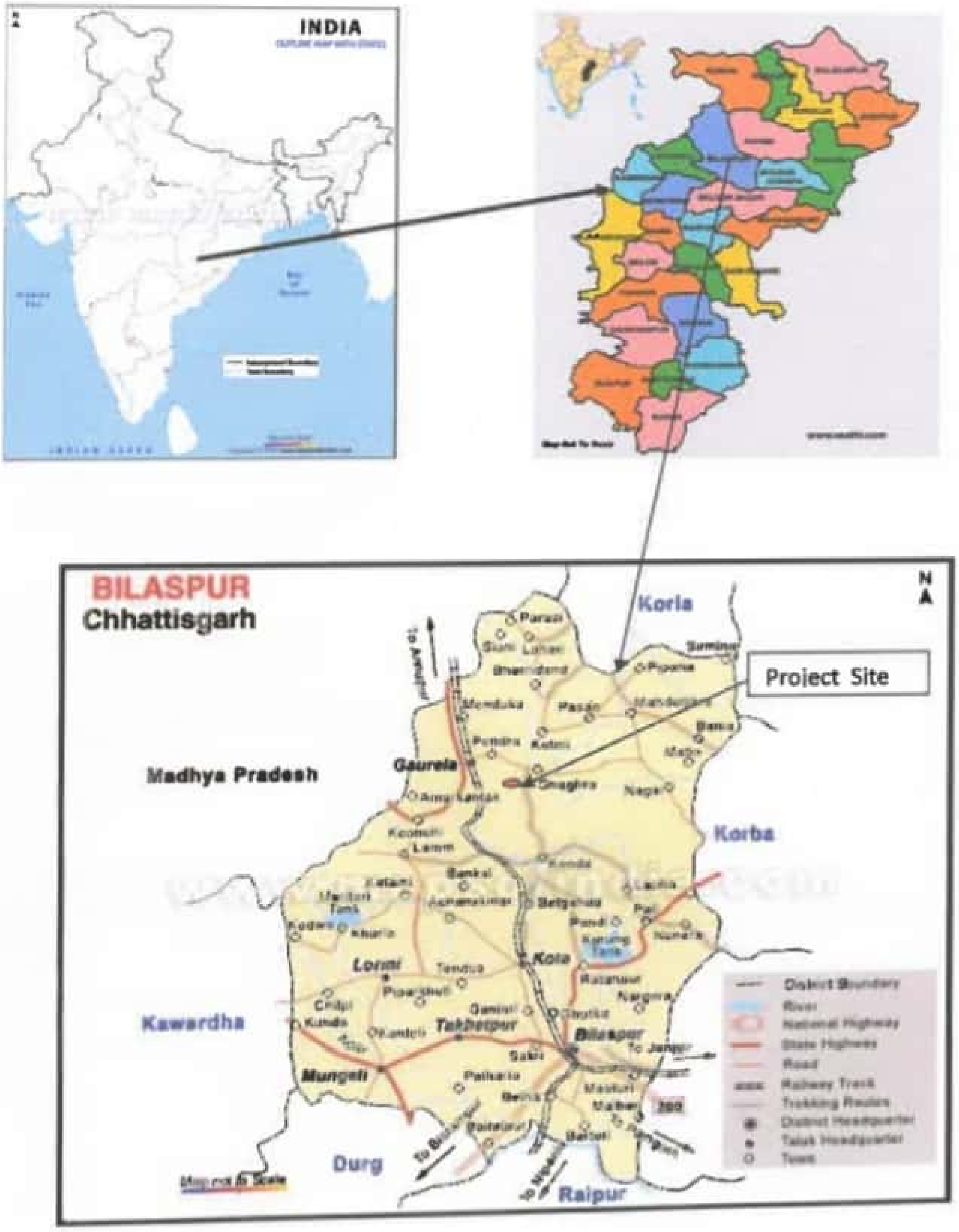
Satellite numbers:

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



Proposal of Compensatory Afforestation of 10 Ha. under Marwahi Forest Division in lieu of Diversion of 4.493 Ha. of forest land under Korba & Champa forest Division, for Rehabilitation and Up gradation of Champa-Korba-Chhuri-Katghora Section of NH-149B in the state of Chhattisgarh Chhattisgarh. Pakage-I (0+00 to 38+150).

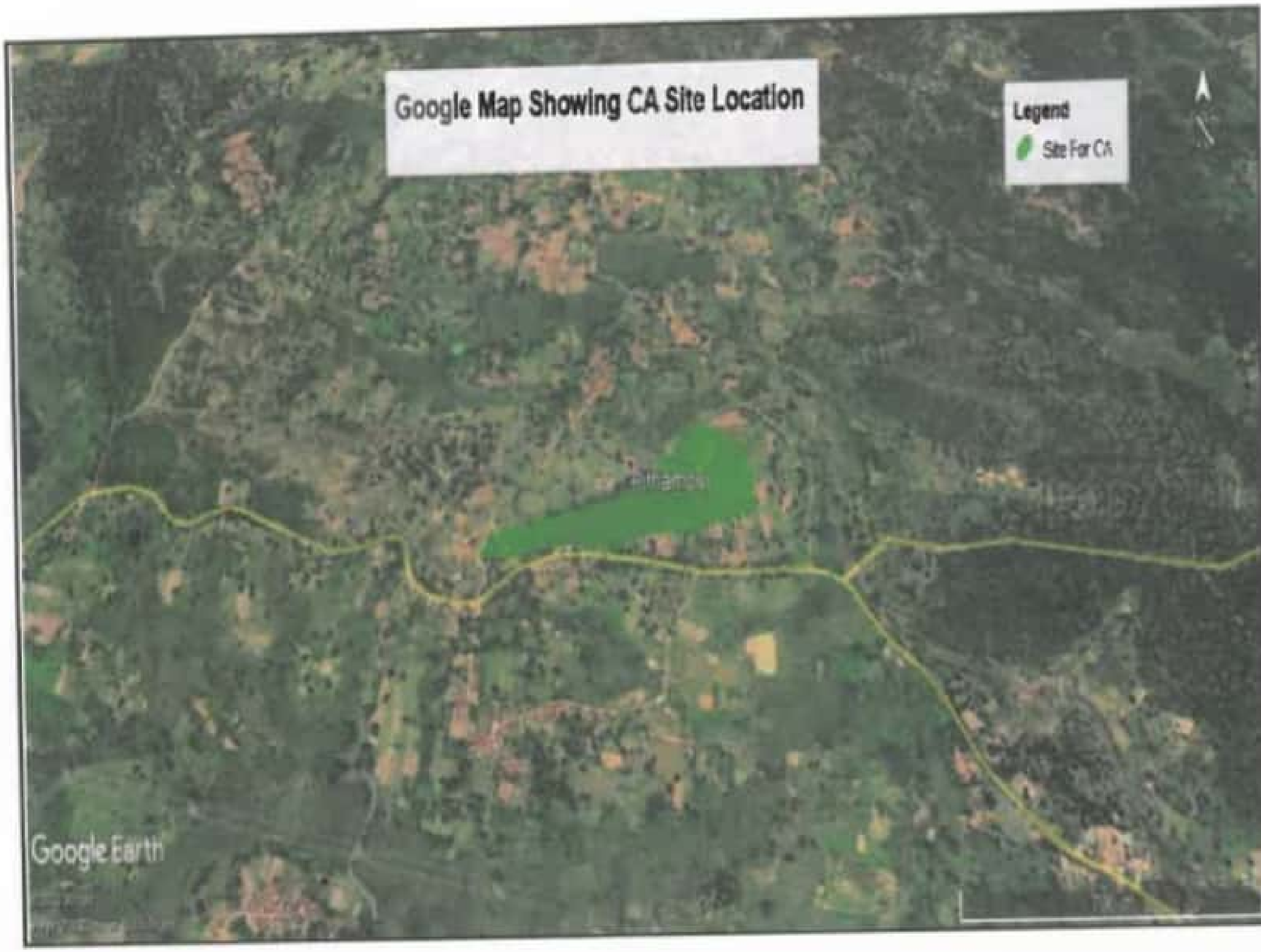
Details of Land identified for compensatory Afforestation:

S. no	Forest Division	Forest Range	Forest Beat	PF Comp. no.	Proposed Area for Compensatory Afforestation for Champa-Korba-Chhuri-Katghora Section of NH-149B
1.	Marwahi	Marwahi	Kodhgar	2355	10 Ha
				Total	**10 Ha**

Range Officer
Pendra Range

उपवनमण्डलाधिकारी
पेण्ड्रा उपवनमण्डल पेण्ड्रारोड

Location of Compensatory Afforestation Land on Google map.



Range Officer
Pendra Range

GPS Survey points for CA Land

PF Compartment no.-2355, Area- 10 Ha

Village/ Forest Beat- Kodhgar, Tehsil/ Forest Range- Marwahi,

Marwahi Forest Division, District-Bilaspur

Geo-Coordinate CA Site			
S. no.	Pillar ID	Longitude	Latitude
1	P01	82.09879	22.71563
2	P02	82.09674	22.7152
3	P03	82.09653	22.71474
4	P04	82.09742	22.71474
5	P05	82.09834	22.71493
6	P06	82.0987	22.71498
7	P07	82.09916	22.71498
8	P08	82.10014	22.71491
9	P09	82.10095	22.7152
10	P10	82.1018	22.71521
11	P11	82.1022	22.71528
12	P12	82.10282	22.71548
13	P13	82.10409	22.71582
14	P14	82.10402	22.71642
15	P15	82.10388	22.71712
16	P16	82.10305	22.7177
17	P17	82.10263	22.71776
18	P18	82.10098	22.71636
19	P19	82.10036	22.71597
20	P20	82.09879	22.71563

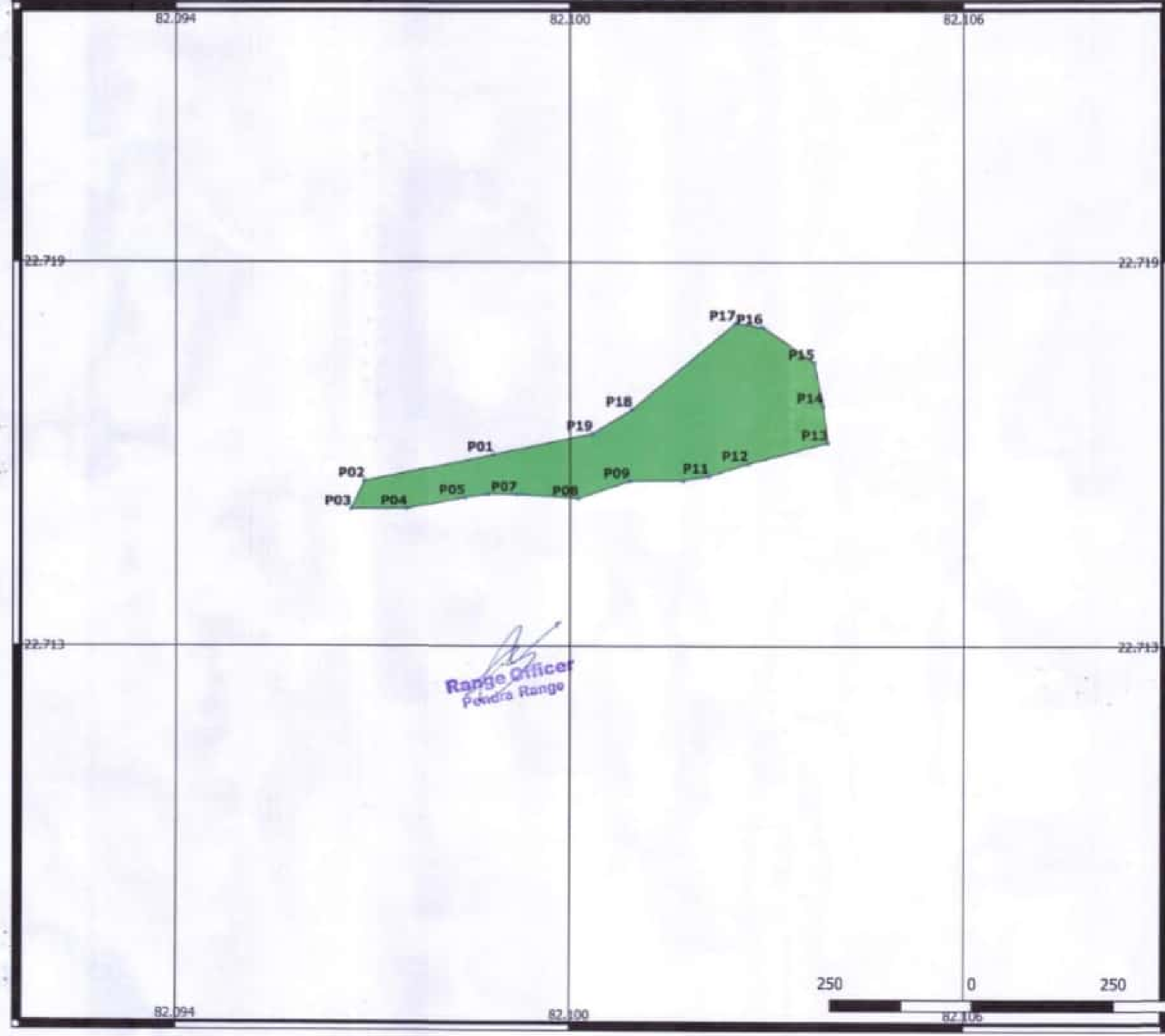
Range Officer
Pendra Range

उपवनमण्डलाधिकारी
पेण्ड्रा वनमण्डल पेण्ड्रारोड

Site Photographs

Range Officer
Pendra Range

DGPS Map Showing Site Coordinates of Land Parcel Identified for Compensatory Afforestation



N

Project Details :
Compensatory Afforestation Land in Lieu of Diversion of 4.493 Ha of forest land for Non-Forest Purpose for Widening, Rehabilitation and Upgrading of Champa-Korba-Chhuri-Katghora Section of NH-149B in the state of Chhattisgarh Chhattisgarh. Pakage-I (0+00 to 38+150).

Site Details:
PF Comparment No- 2355, Area- 10.00 Ha
Village/ Forest Beat:- Kodhgar
Tehsil/Range:- Marwahi
Forest Division:- Marwahi
District :- Bilaspur

GPS Coordinates

Geo-Coordinate CA Site		
Pillar ID	X	Y
P01	82.09879	22.71563
P02	82.09674	22.7152
P03	82.09653	22.71474
P04	82.09742	22.71474
P05	82.09834	22.71493
P06	82.0987	22.71498
P07	82.09916	22.71498
P08	82.10014	22.71491
P09	82.10095	22.7152
P10	82.1018	22.71521
P11	82.1022	22.71528
P12	82.10282	22.71548
P13	82.10409	22.71582
P14	82.10402	22.71642
P15	82.10388	22.71712
P16	82.10305	22.7177
P17	82.10263	22.71776
P18	82.10098	22.71636
P19	82.10036	22.71597
P20	82.09879	22.71563

वनमण्डलाधिकारी
मरवाही वनमण्डल, पेण्ड्रा

Applicant:-
National Highway Authority OF India
PIU, Bilaspur

Legend
- Pillar Geo Coordinate
- Site For CA

Project Details :
Compensatory Afforestation Land in Lieu of Diversion of 4.493 Ha of forest land for Non-Forest Purpose for Widening, Rehabilitation and Upgrading of Champa-Korba-Chhuri-Katghora Section of NH-149B in the state of Chhattisgarh Chhattisgarh. Pakage-I (0+00 to 38+150).

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Tehsil/Range:- Marwahi
Forest Division:- Marwahi
District :- Bilaspur

GPS Coordinates

Pillar ID	X	Y
P01	82.09875	22.71542
P02	82.09895	22.7152
P03	82.09957	22.71434
P04	82.09742	22.71475
P05	82.09898	22.71493
P06	82.0987	22.71498
P07	82.09893	22.71498
P08	82.10014	22.71493
P09	82.1009	22.7152
P10	82.1158	22.71521
P11	82.1022	22.71528
P12	82.10282	22.71548
P13	82.10408	22.71582
P14	82.10402	[illegible]
P15	82.10198	[illegible]
P16	82.10195	22.7177
P17	82.10283	22.7174
P18	82.10096	22.71538
P19	82.10036	22.71597
P20	82.09879	22.71542

Applicant:-
National Highway Authority OF India
PIU, Bilaspur

Legend
Pillar Geo Coordinate
Site For CA

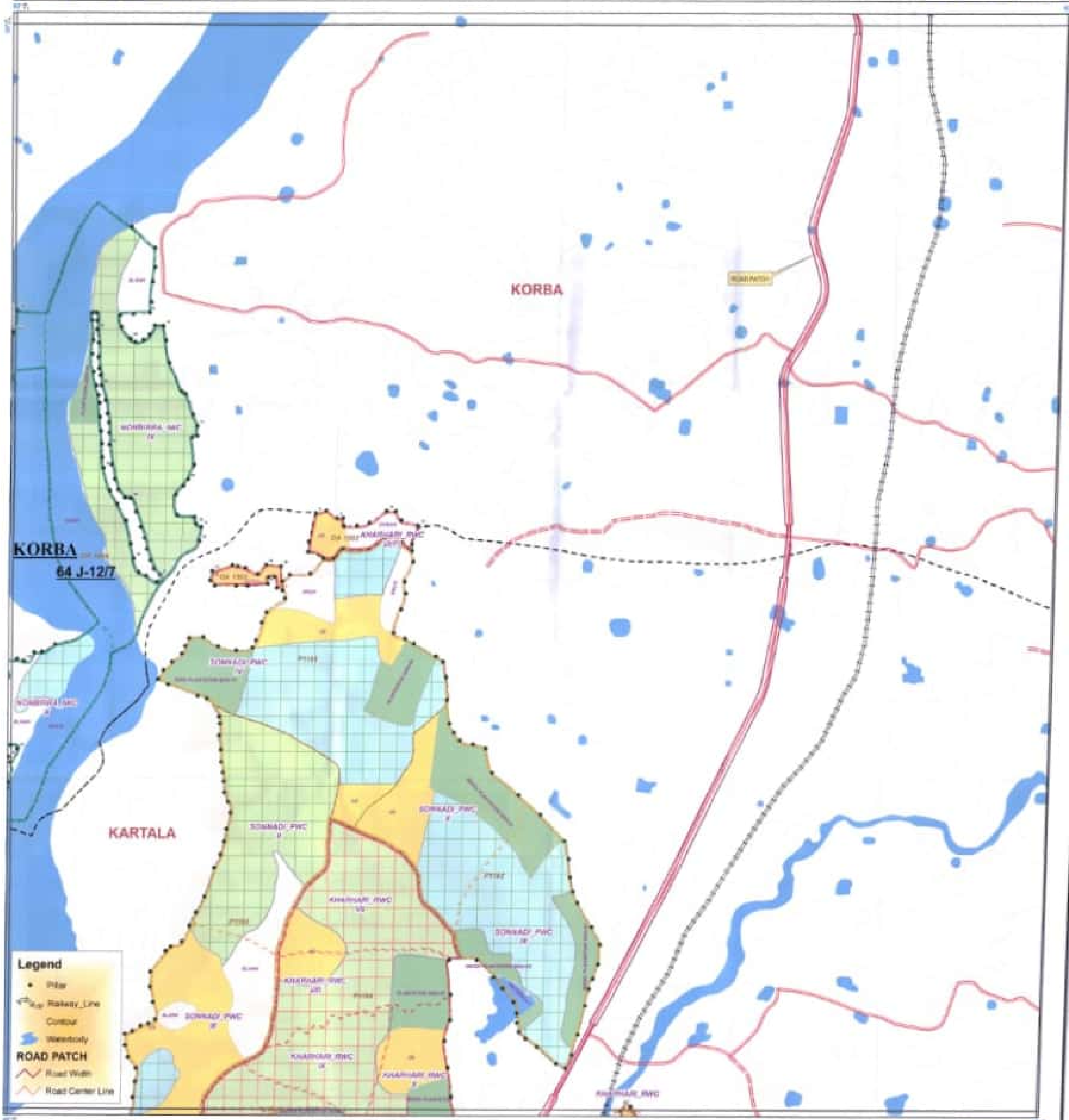
250 0 250 500 750 1000 m

Range Officer

STOCK MAP

(FOR AFFECTED FOREST LAND DUE TO UPGRADATION OF NH-149 B ROAD CHAMPA TO KATGHORA SECTION)

TOPOSHEET NO. 64-J 12/7 SCALE - 1:15,000



MAP PREPARED FOR PIU BILASPUR, NHAI

LEGEND

Forest Class

Under Stocked	Blank	Encroachment	Forest Village	Preservation Plot
US	Blanks	Encr		PP

Forest Boundary Type	
Govt. Forest Boundary	
Compartment	
Division Boundary	
Range Boundary	
Forest Road	
PWD. Road	

TOPOSHEET INDEX

64 J-11/6	64 J-11/9	64 J-15/3
64 J-12/4	64 J-12/7	64 J-16/1
64 J-12/5	64 J-12/8	64 J-16/2

NOT FOR EXPORT

MAP SUBJECT:
STOCK MAP FOR AFFECTED FOREST LAND DUE TO UPGRADATION OF CHAMPA-KORBA-CHHURI-KATGHORA SECTION OF NH-149 B ROAD IN FAVOR OF PIU BILASPUR, NHAI

SHAPEFILE PROVIDED BY USER AGENCY

SCALE 1:15,000

Prepared by

Stock Mapping by

Coordinates/Projection System used:

COORDINATE SYSTEM OF SHAPEFILE:

Data Source (s):

Digitally Compiled and Printed at : REGIONAL GEOMATIC CENTER, BILASPUR

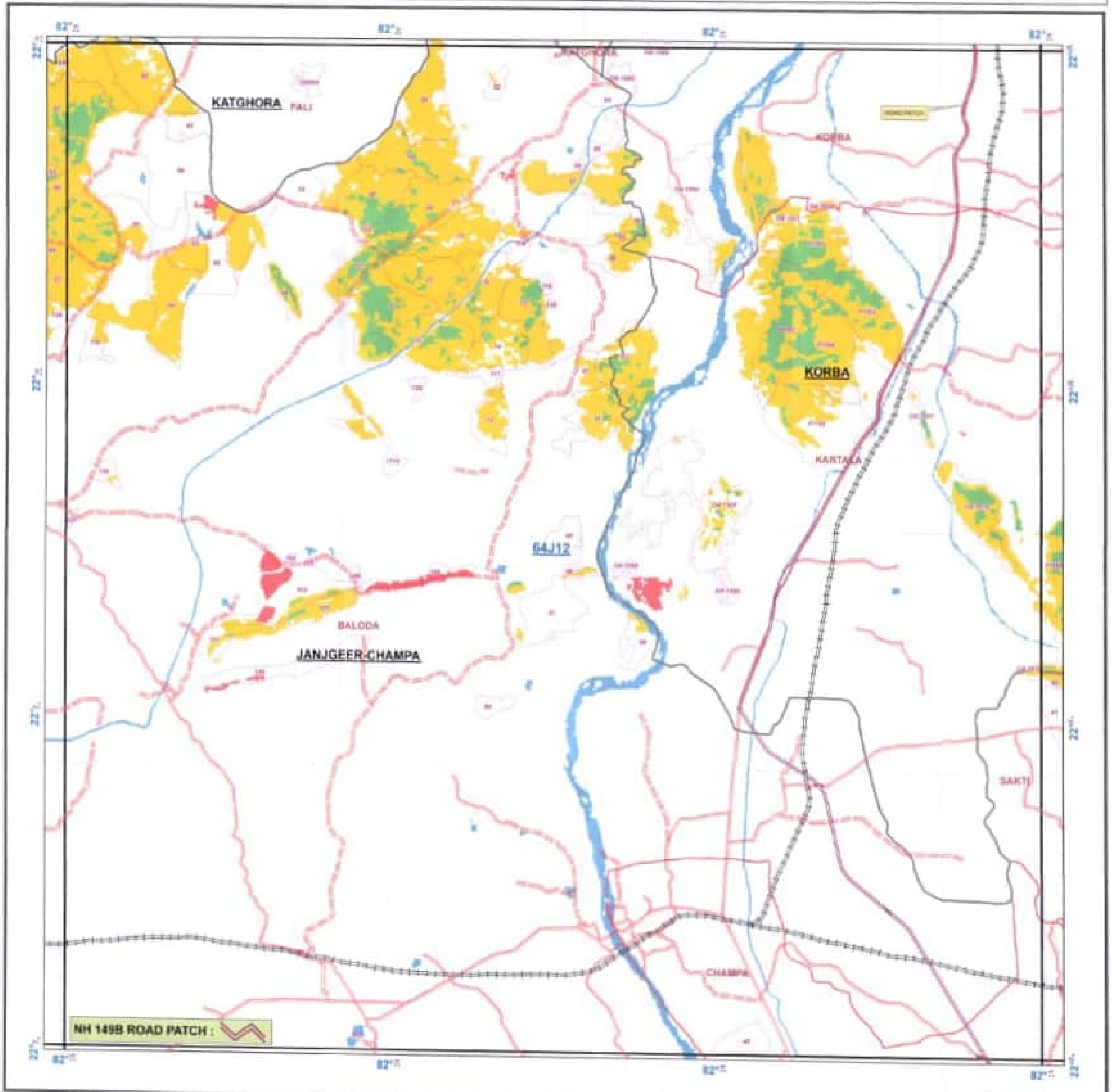
274

FOREST COVER MAP

(FOR AFFECTED FOREST LAND DUE TO UPGRADATION OF NH-149 B ROAD CHAMPA TO KATGHORA SECTION)

TOPOSHEET NO. 64-J 12

SCALE - 1:50,000



Legend

- Railway_Line
- Division_Boundary
- Range_Boundary
- Compartment_Boundary

Vegetation

- Moderately Dense Forest
- Non-Forest
- Open Forest
- Scrub
- Very Dense Forest
- Water

RD_TYPE

- Metalled Road
- Unmetalled Road

MAP PREPARED FOR PIU BILASPUR, NHAI

TOPOSHEET INDEX

64J7	64J11	64J15
64J8	64J12	64J16
64K5	64K9	64K13

N S E W

1:50,000

NOTE:-
* Forest Cover based on Digital Interpretation of Data Period 2014-15 IRS P6-LISS-III 23.5 m, IRS-Resourcesat 2 FSI Report 2015.

निर्यात के लिये नहीं
NOT FOR EXPORT

MAP SUBJECT:
FOREST COVER MAP FOR AFFECTED FOREST LAND DUE TO UPGRADATION OF CHAMPA-KORBA-CHHURI-KATGHORA SECTION OF NH-149 B ROAD; IN FAVOR OF PIU BILASPUR, NHAI

SHAPEFILE PROVIDED BY USER AGENCY

SCALE 1:50000

CoOrdinates/Projection System used :

Prepared by

COORDINATE SYSTEM OF SHAPEFILE:

Geographic Coordinate System: GCS_WGS_1984
Datum: D_WGS_1984
Prime Meridian: Greenwich
Angular Unit: Degree

Stock Mapping by

Data Source (s) :
1. Forest Boundaries are based on Stock Map (Scale 1: 15000)
2. Natural Features are based on Digital SOI Data (Scale 1: 50000)

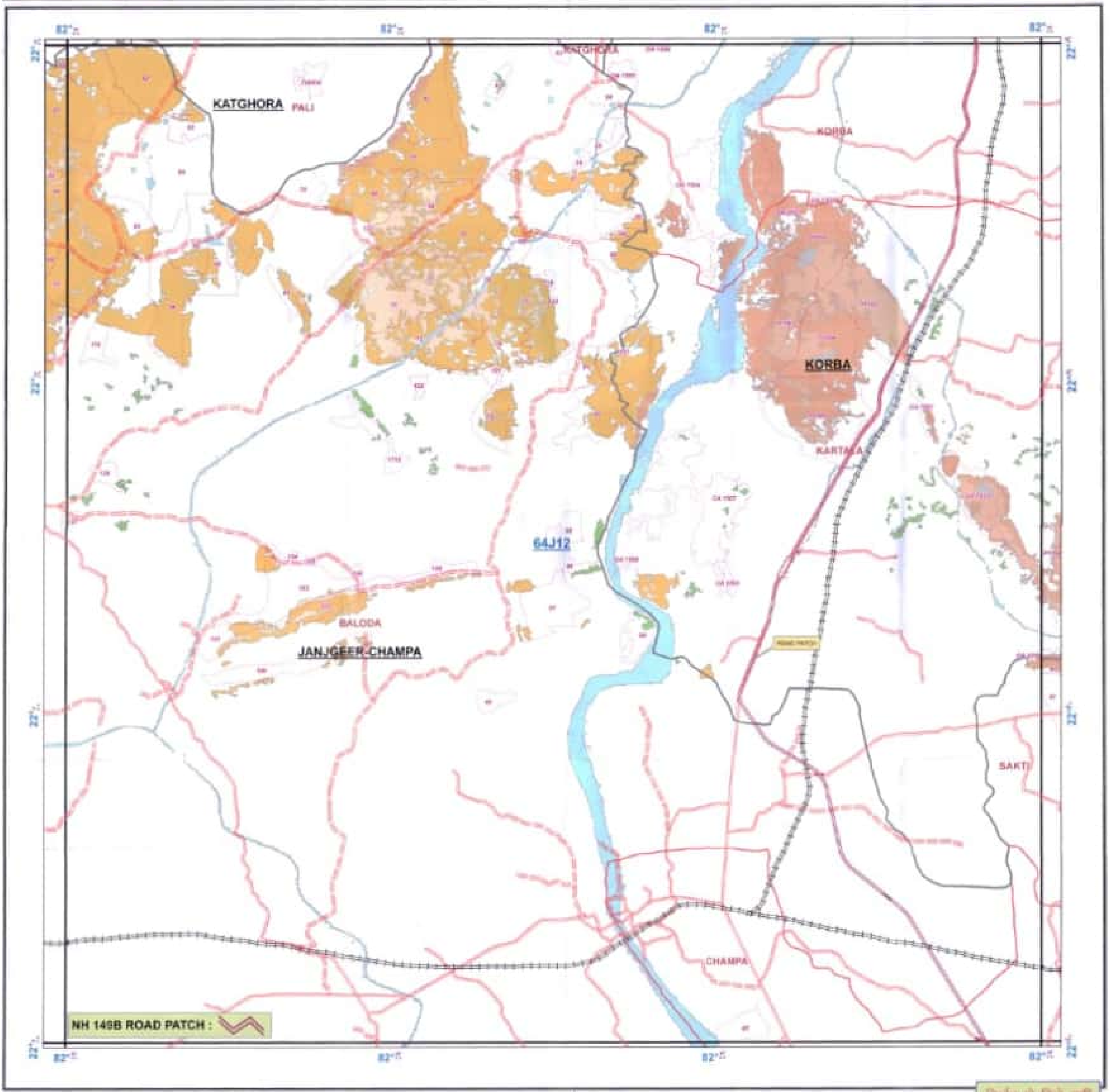
Digitally Compiled and Printed at : REGIONAL GEOMATIC CENTER, BILASPUR

FOREST TYPE / ECO CLASS MAP

(FOR AFFECTED FOREST LAND DUE TO UPGRADATION OF NH-149 B ROAD CHAMPA TO KATGHORA SECTION)

TOPOSHEET NO. 64-J 12

SCALE - 1:50,000



Legend

Railway_Line
Division_Boundary
Range_Boundary
Compartment_Boundary

Forest_Type/Eco_Class

- 3B/C1c Slightly Moist Teak Forest
- 3B/C2 Southern Moist Mixed Deciduous
- 3C/C3a(ii) Moist Peninsular Low Level Sal Forest
- 5DS1 Dry Deciduous Scrub
- 5E3 Dry Bamboo Brakes
- 5A/C3 Southern Dry Mixed Deciduous Forest
- 5B/C1c Dry Peninsular Sal Forest
- 5B/C2 Northern Dry Mixed Deciduous Forest
- Non Forest
- Plantation/TOF
- Water

RD_TYPE

- Metalled Road
- Unmetalled Road

Forest Type map

(As per Champion & Seth's Classification - 1968)

TOPOSHEET INDEX

64J7	64J11	64J15
64J8	64J12	64J16
64K5	64K9	64K13

N
W E
S

1:50,000

NOTE:-
* Forest Cover based on Digital Interpretation of Data Period 2014-15 IRS P6-LISS-III 23.5 m, IRS-Resourcesat 2 FSI Report 2015.

MAP-PREPARED-FOR-PIU-BILASPUR,-NHAI

NOT FOR EXPORT

MAP SUBJECT:

FOREST TYPE / ECO CLASS MAP FOR AFFECTED FOREST LAND DUE TO UPGRADATION OF CHAMPA-KORBA-CHHURI-KATGHORA SECTION OF NH-149 B ROAD; IN FAVOR OF PIU BILASPUR, NHAI

SHAPEFILE PROVIDED BY USER AGENCY

SCALE 1:50000	CoOrdinates/Projection System used :
Prepared by	COORDINATE SYSTEM OF SHAPEFILE: Geographic Coordinate System: GCS_WGS_1984 Datum: D_WGS_1984 Prime Meridian: Greenwich Angular Unit: Degree
Stock Mapping by	

Data Source (s) :
1. Forest Boundaries are based on Stock Map (Scale 1: 15000)
2. Natural Features are based on Digital SOI Data (Scale 1: 50000)

Digitally Compiled and Printed at : REGIONAL GEOMATIC CENTER, BILASPUR