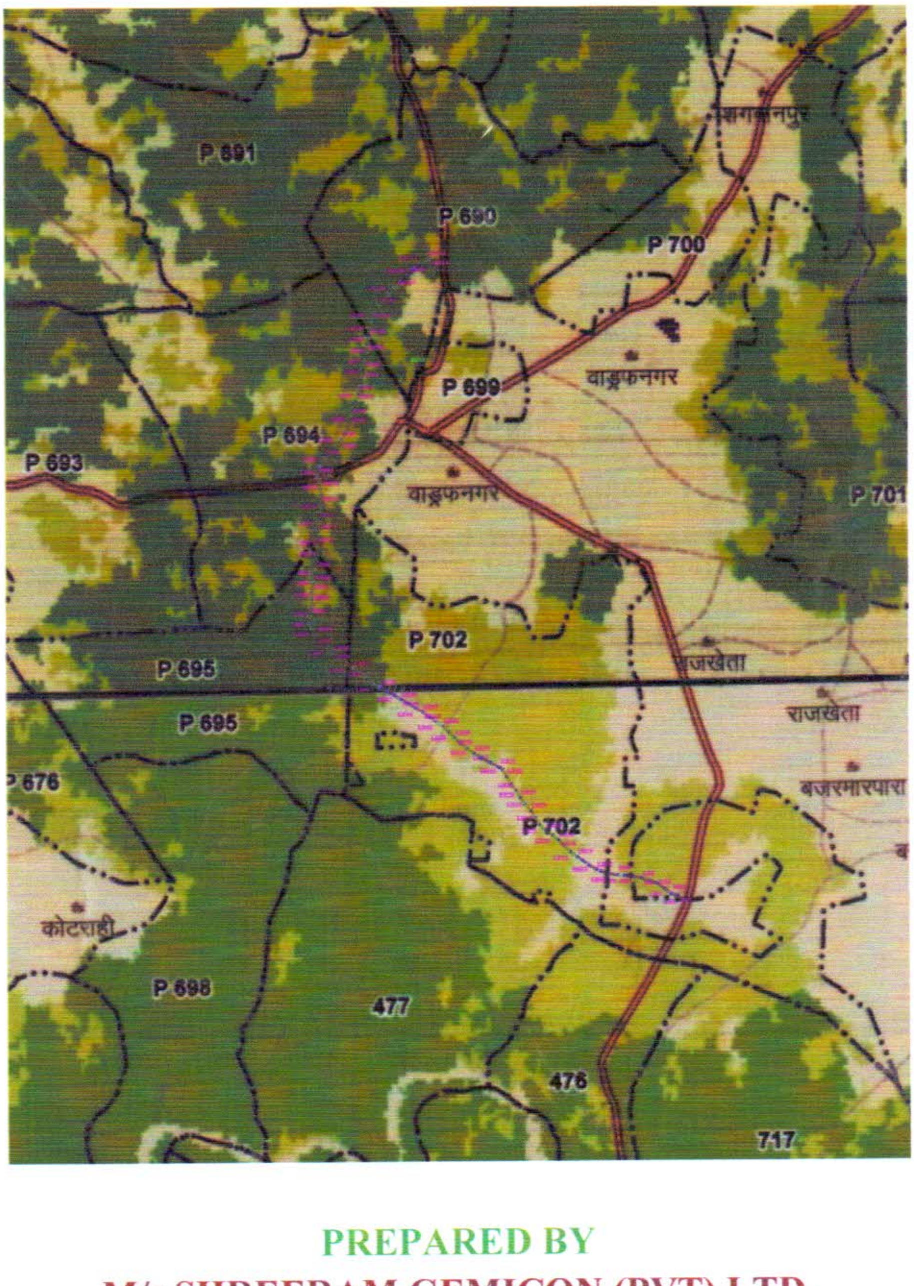
REPORT ON
DGPS SURVEY OF FOREST LAND BYPASS ROAD ALIGNMENT OF WADRAFNAGAR
FOR
M/s PUBLIC WORKS DEPARTMENT, DIVISION-RAMANUJGANJ, DISTRICT-BALRAMPUR, CHHATTISGARH



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1.0 INTRODUCTION:

M/s Public Works Department-Balrampur awarded the work of DGPS survey of Forest Land on Road alignment of Bypass road for preparation of Georefered Map on Toposheet No. 64 M/1 & 64 M/2 and Forest Map as per the Letter No. 3397/T0023/SAC/2016-17, dated 14/08//2016.

The scope of work as per the Work Order as follows.

i. Fixation of Base Point.
ii. DGPS Survey on Forest Land Control Points.
iii. Preparation of KML/KMZ, Shape file and Geo-Referenced map.

2.0 DGPS SURVEY BACKGROUND:

The need of using the Remote Sensing approach for the present study lies in its capability of providing the advantage point in space, for viewing large areas on the surface of the earth. This helps in broadening the view by enabling conversion of non-visible electromagnetic radiations like near and mid-infrared into interpretable information for specific applications. The advantages provided by this technology, for landuse / landcover analysis, are multifaceted, and include assessment of developmental and allied activities, which can be accurately mapped, with the use of remotely placed sensors. With the availability of the Indian Remote Sensing Satellite data giving information to the various scales, each category of landuse / landcover domain can be viewed with a different and clear perspective.

The first step of the exercise consisted of preparing the base map of the study area. The SOI toposheets were used for preparing the map depicting the important base features and important location references. The maps and statistics available as output from the study forms a base in identifying the percentage area of vegetation, agriculture, water, river, against the built-up and forest classes.

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3.0 REMOTE SENSING TECHNOLOGY:

Remote Sensing (RS) refers to acquisition of information about objects/ phenomena, through the use of sensors, which are kept away from the target. (*Lilly Sand & Kiefer, 1987*). The task is achieved by acquiring images of the earth surface features with the help of cameras / sensors placed on the remote sensing satellites. Remote sensing techniques are essentially based on the detection/ sensing of electromagnetic radiations which are reflected or emitted by objects, on the surface of the earth, which have characteristic spectral signatures. By dedicated analysis of reflected or emitted radiations in different bands it is possible to detect and classify the object. **Figure-1** depicts the mechanism of remote sensing.

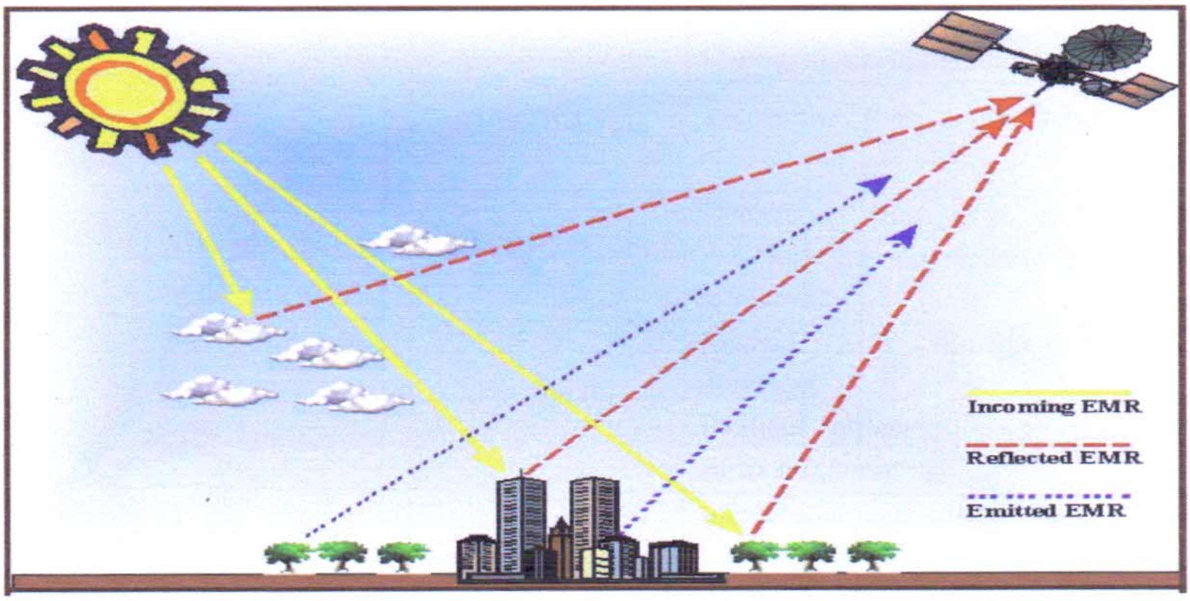

Figure-1: How Remote Sensing Works

3.1 Principles of Remote Sensing:

All objects on the surface of the earth continuously emit electromagnetic radiation. Sun is the important source of electromagnetic radiation used in the conventional Optical Remote sensing. The sun's energy is called electromagnetic energy owing to the presence of both electrical and magnetic components. The electromagnetic radiation (EM) spans a large spectrum of wavelength extending from short wavelength gamma rays to long wavelength microwave region. **Table-1** below shows the ranges of electromagnetic spectrum for Remote sensing.

TABLE -1

ELECTROMAGNETIC SPECTRAL REGIONS

Region	Wavelength	Remarks
Gamma ray	< 0.03 nm	Incoming radiation is completely absorbed by the upper atmosphere and is not available for remote sensing
X – ray	0.03 to 3.00 nm	Completely absorbed by atmosphere. Not employed in remote sensing
Ultraviolet	0.03 to 0.40 µm	Incoming wavelengths less than 0.3 mm are completely absorbed by Ozone in the upper atmosphere
Photographic	0.30 to 0.40 µm	Transmitted through atmosphere.
UV band	0.40 to 0.70 µm	Detectable with film and photo detectors, but atmospheric scattering is severe
Visible	0.70 to 100.00 µm	Imaged with film and photo detectors. Includes reflected energy peak of earth at 0.5 mm
Infrared	IR 0.70 to 3.00 µm	Interaction with matter varies with wavelength. Absorption bands separate Atmospheric transmission windows.
Reflected band	IR 3.00 to 5.00 µm	Reflected solar radiation that contains no information about thermal properties of materials. The band from 0.7 to 0.9 mm is detectable with the film and is called the Photographic IR band.
Thermal band	8.00 to 14.00 µm	Principal atmospheric windows in the thermal region. Images at these wavelengths are acquired by optical mechanical scanners and special vidiocon system but not by film

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Region	Wavelength	Remarks
Microwave	0.10 to 30.00 cm	Longer wavelengths can penetrate clouds, Fog and rain. Images may be acquired in active or passive mode.
Radar	0.10 to 30.00 cm	Active form of microwave remote sensing. Radar images are acquired at various Wavelength bands.
Radio	> 30.00 cm	Longest wavelength portion of electromagnetic spectrum. Some classified radars with very long wavelength operate in this region.

In Remote sensing the most useful regions of EM spectrum are visible (0.4 to 0.7 micrometers), reflected infrared (0.7 to 3.0 micrometer), the thermal infrared (3 to 5 micrometer and 8 to 14 micrometers) and the microwave regions (0.3 to 30 centimeters).

All the matter on the earth has specific characteristics of transmission, reflection, absorption, emission, and scattering of electromagnetic energy at different wavelengths. In remote sensing the reflectance characteristics are of prime importance as they dominate the recorded energy on the sensor.

The electromagnetic radiation when incident on the earth's surface gets reflected absorbed or transmitted through the materials depending upon the nature of objects and the wavelength.

The sensors placed on the synchronous satellites) record emitted by the objects. The remotely placed platforms (aircraft/polar sun-synchronous satellites) record the electromagnetic radiations reflected from or information received by the sensors is suitably processed and transmitted to the ground receiving station. The data is formatted, and processed at a centralized facility to produce either photographic products or digital format CD's/Tapes. By analyzing the data, either by visual interpretation technique or by digital analysis, it is possible to detect, identify, and classify various objects and phenomena on the earth's surface.

Remote sensing satellites have provided an enviable advantage for the present day planners in the area of natural resources assessment. The satellites send precise information on earth's resources, which can be used for mapping and evaluation of natural resources. Remote sensing has been found to be an extremely valuable tool in mapping, targeting and managing the natural resources (Landuse / Landcover in case of present study). The most important advantage of remote sensing for geo-environmental applications is the ability to measure the spatial information unlike the point data from which most of our environmental concepts and models have been developed. Remote sensing plays a key role in assessing the land and water resources on the surface of earth. This information forms the base, for evolving strategies, which are required for Holistic development and hence the Remote Sensing technology is used in this study for mapping the environmental resources in the Study area.

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4.0 DATABASE GENERATION METHODOLOGY:

In the present study, the databases are generated from different sources and are discussed in the sections below.

4.1 COLLATERAL DATA:

The Survey of India Topographical maps 64 M/2 and 64 M/3 and Forest Map are used to compile basic topographic information, preparation of base maps, selecting the location, identification of forest Land, Revenue Land, Road, Water body etc.

4.1.1 BASE MAP PREPARATION:

For any study to be carried out in the geographic environment, the first process consists of preparation of the base map. The base map is prepared from the Survey of India Toposheet as mentioned above and the area of Bypass Road alignment of Wadrafnagar provided by M/s Public Works Department-Balrampur.

The **Figure-2** shows the base map for the present study area.

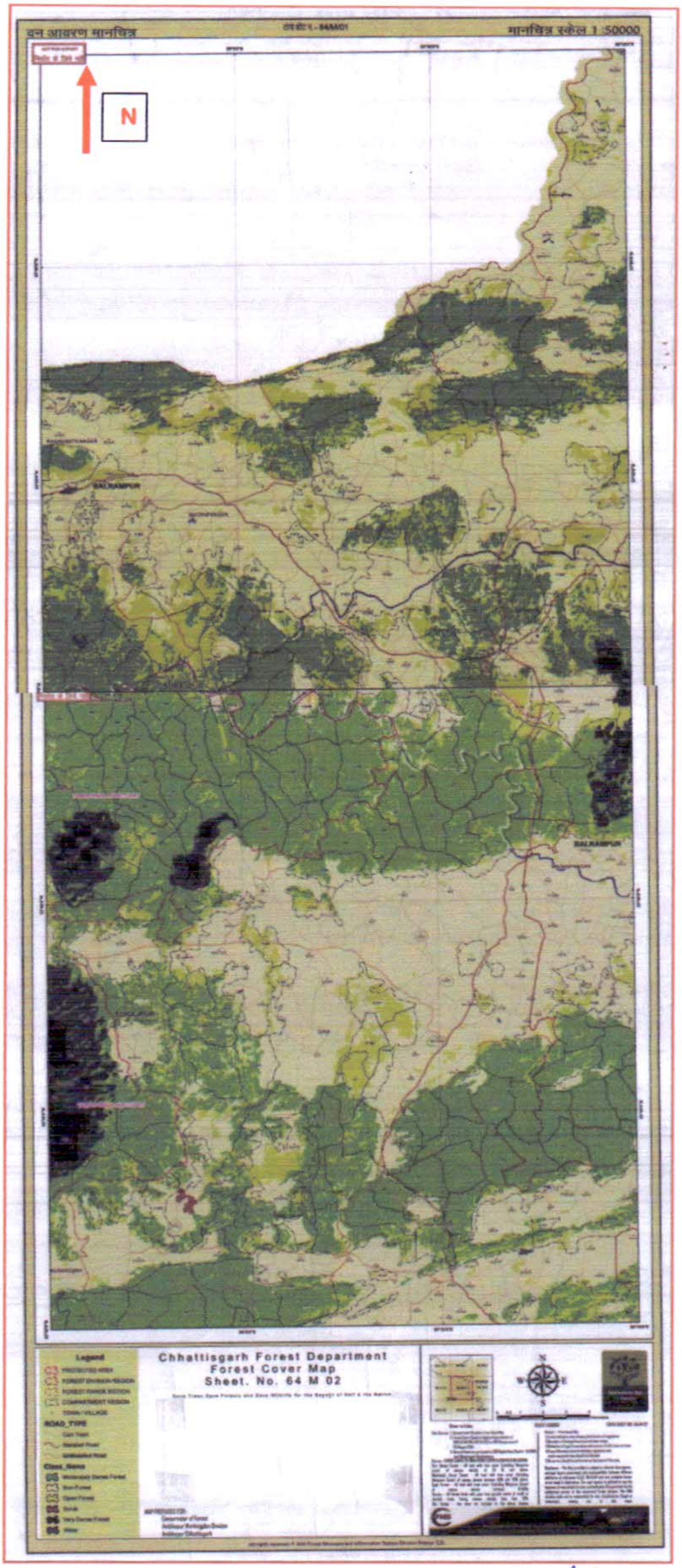

FIGURE-2: BASE MAP

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