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Project Proposal

for

**Design, Development & Maintenance of Web GIS and Mobile
Application for Monitoring of Plantations and Assets created by
State Forest Department (SFDs) under under Compensatory
Aforestation Fund (CAF)**

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Project Proposal**for****Design, Development & Maintenance of Web GIS and Mobile Application for Monitoring of Plantations and Assets created by State Forest Department (SFDs) under Compensatory Aforestation Fund (CAF)****1. Background**

Forest Survey of India (FSI) is an organization under the Ministry of Environment, Forest & Climate Change, Government of India. The mandate of the organization is to carry out regular assessment of forest resources of the country. The important activities of FSI are Forest Cover Mapping using satellite data, inventory of forest and TOF, training of forestry personnel in modern geomatics tools and RS/ GIS and field inventory based project on the request of central ministries and State Forest Departments (SFDs).

Compensatory Afforestation Fund Act, 2016 and Compensatory Afforestation Fund Rules, 2018 envisage third party monitoring of plantations and activities implemented by the State Forest Departments (SFDs) utilizing the funds sanctioned from the Compensatory Afforestation Funds by MoEF&CC, Govt. of India as per the approved Annual Plan of Operations (APOs) of the SFDs. In the meeting held on 31st August 2018 under the chairmanship of DGF&SS it was decided that Forest Survey of India will develop and implement a monitoring protocol to meet the above stated monitoring requirement, following a scientific approach.

To carry out the activities under CAF, FSI requested NIC to develop an android-based mobile application and Web based GIS based application for the monitoring of plantations and assets under CAF.

2. Scope and Objectives

Scope :

To develop a Web GIS based system for monitoring of plantations and other assets under CAF using specified stratified sampling methodology along with development of Android based mobile application for field data capture.

Objectives:

To develop

- I. Online Web/Mobile Application for uploading the details of Plantation Related Assets and other Assets for each plantation site by SFDs.
- II. Web GIS based integrated database application for geo-spatial & statistical data management, processing, analysis and reporting.
- III. Android based mobile App for field data collection for Monitoring of Plantations and Assets.
- IV. Android based mobile App for access of data and satellite images of the plantations from server.

3. System Design

This project proposes to build web services to integrate data for monitoring of plantations and assets. This shall enable the synchronized data update over common interface for web based users for data visualization, analysis and information sharing to one and all as per the schema defined.

The System will have the following four Modules:

User Management Module

The system will have role-based access control mechanism for application. It is proposed to have four kind of roles

- Admin user (for creating users and assigning roles),
- State forest department user for upload of plantation related document and other activities including upload of GIS polygons

- Decision makers (FSI and Ministry)(visualization of information for effective processing and validation of collected information) and
- FSI field officer who will capture sample site data collection general roles.

Web MIS Module

This will be an Online Web Application module for uploading the details of Plantation Related document and other Assets for each site by SFDs.

Web GIS Module

The methodology and approach for this module is defined in section 4 of this document.

Image Integration

FSI may procure sub meter resolution images of the work sites from NRSC or any other agency for public viewing and monitoring of the plantations. It is assumed that the image will be provided as a services from FSI or external agency as a rest based service to be integrated with application. The images may be procured on half-yearly/ yearly basis as per the work nature and other requirements. It will be integrated with Web GIS application as a service through NIC infrastructure or FSI infrastructure. The provision for ICT infrastructure for on-premise satellite image hosting will be the responsibility of FSI.

4. Web GIS Module- Methodology and approach

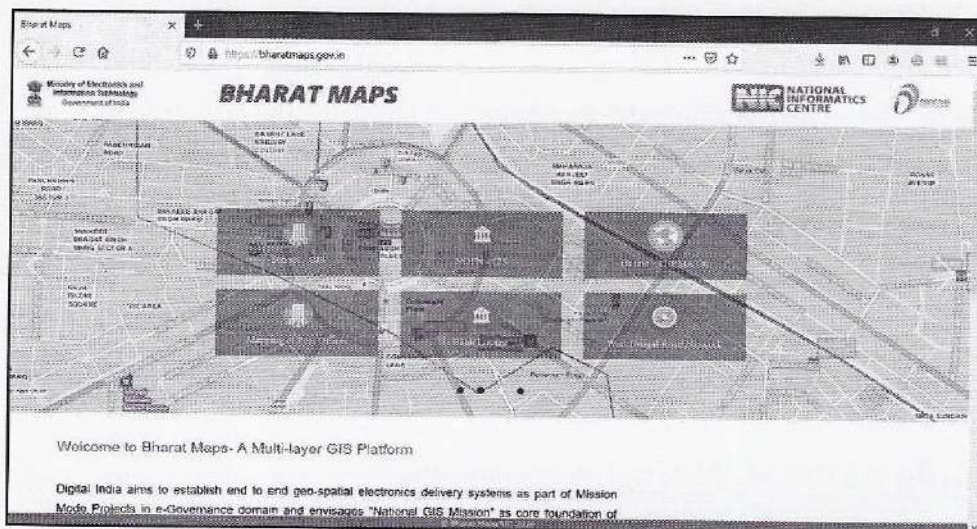
It is proposed to develop the web GIS application around Multi-layer GIS framework of NIC. The Asset layers under CAF will get overlaid on Bharatmaps framework data sets and FSI layers as described below. The system will have tools and functionalities required for analysis as desired by FSI.

4.1 Bharat Maps

Under the Multi Layered GIS for Planning project, NIC, MeitY has developed voluminous geospatial repository of heterogeneous datasets from SOI, ISRO, FSI and various other government agencies along with in-house data development efforts.

It may be seen that this data warehouse is the largest single spatial data repository in WGS84 datum with compliance to National Map Policy as well as global standards.

Dissemination / Utilization of these datasets was a real challenge and Bharat Maps Framework is a unique & robust infrastructure leveraging seamless country wide base maps, satellite images and terrain Maps, similar to the services rendered by Global GIS



communities. Initially, Bharat Maps was successful in establishing common platform for all the ministries to harmonize data and overlay their information both in spatial and non spatial formats for G2G access and was released to the NIC users for visualization and its consumption in various applications. However, with the success of the application, the same is made available to G2C access with necessary user registration process. Bharat Map Service as available today will be used and further enhanced in terms of its applications in planning and e-governance. This has been renamed as Bharat maps released in public domain with user authentication.

Some of the salient features of Bharat Maps are as follows:

- A robust and scalable framework based on service oriented architecture.
- NIC Common spatial data repository as per the OGC standards with 1000 vector layers comprising of administrative boundaries, transportation Network , natural resources etc.
- NIC Base Map Service consisting of pre-composed maps with scales ranging from 1: 40 Million to 1:20000.
- NIC satellite imagery service is a dynamic service using IRS satellite images of varying resolutions like AWiFS (56 m), LISS-III (23.5 m) and PAN (5.80 m).
- NIC Terrain Base Map service features shaded relief imagery to provide a neutral background for other data layers.
- Mash-ups with Global web services.
- Geo-coder which enable single line search for around 13 lakhs locations.
- Area of Interest (AOI) which enable user to view / analyze specific area with masking.
- Basic GIS tools for navigation, query , buffer , print and distance measurement.
- Advanced geo processing models for elevation profile, swipe and spotlight.
- Linkage to attribute data like census etc.
- Mode of access of Bharatmaps is Open for Government as well as Citizen at <http://bharatmaps.nic.in/>
- Some of the services of Bharatmaps may be accessed for visualization while others may be useful in various e-gov applications for decision making.

Available GIS Services from NIC, MeitY are listed as below:

(I) Base Map Service for Visualization:

| S.No. | Service Name | Scale & Resolution | Content &Source | Remarks (*) |
|-------|---------------|--------------------|--|-------------|
| 1. | NICMAPS | 1:36m to 1:18k | Administrative boundaries, locations, topographic layers, forest etc from Survey of India (1:50,000 scale data). | |
| 2 | NIC Street | 1:18K to 1:4k | Based on six layers captured by NIC using Satellite imagery -road, rail, river, canal, water bodies and settlements | |
| 2. | NIC Satellite | 2.5m | Imageries from NRSC | |

| | | | | |
|----|-----------------|----------|---|---------------------------|
| 3. | NIC Terrain | 20m | Relief map from 20m DEM based on 50k contours (20m contour interval). | |
| 4. | ESRI Aerial | Up to 1m | Satellite imagery service | As is Available with ESRI |
| | ESRI StreetMaps | | Map service | -do- |
| | ESRI Hybrid | | Satellite + map service | -do- |
| | ESRI Topomaps | | Topographical map service | -do- |

(II) Services required for various levels of decision making:

| S. No. | Service Level | Content/Layer Details vis-a-vis Base Map Service | Functions | Remarks |
|--------|--------------------------|---|---------------------------|--|
| 1. | National/State level | 1.State boundary 2.District boundary 3.Subdistrict/block boundary 4.Parliament constituency 5.Assembly constituency 6.Watershed 7.National capital 8.State capital | View, Query, Identify etc | At All levels, Base maps Services will be available as per Item (3), Section (iv) & sub-section(I). Functional Services at each level are detailed at sub-section (III) below. |
| 2. | District Level | 1.District boundary 2.Sub district/block boundary 3.Village boundary 4.Sub district hq 5.Census town 6.Panchayat hq | View, Query, Identify etc | -do- |
| 3. | Sub-District/Block Level | 1.Sub district/Block boundary 2.Village boundary 3.Panchayat hqs 4.Census village locations | View, Query, Identify etc | -do- |
| 4. | Village/Panchayat Level | 1.Census village 2.Habitations 3.Village boundary | View, Query, Identify etc | -do- |
| 5. | City/Town Level | 1.Village /town locations 2.Habitations | View, Query, Identify etc | -do- |

GIS layers from Forest Survey of India

- Forest Cover
- Forest Type
- Forest Fire
- Cluster boundary
- Forest boundaries – division, range, beat
- Physiographic zone

Above layers shall be provided by FSI at an appropriate scale. Layers other than the above, if required, may also be provided by FSI.

4.2 Development of Web GIS Module

The Web GIS Platform will have an online Web Application for uploading the details of Plantations, Assets and Plantation Related document with each plantation site by SFDs and a Web GIS based integrated database application for geo-spatial & statistical data management, processing, analysis and reporting.

State Forest Departments (SFDs) will upload information about each activity implemented under the approved (APOs) as per the prescribed forms and schedule (mentioned in Annexures of the proposal received from FSI) including photographs, latitude and longitude of the place of execution.

Each activity will be identifiable by an ID created by the system. Plantations and other activities will be assigned separate sets of IDs. An on-line Plantation Related document will also be tagged with each Plantation Id on the Web GIS Platform. Uploading of required information and regular updation will be the responsibility of the SFDs.

Based on the plantation related document, the application will provide aggregated reports based plantation size and age for each cluster. Out of the total plantations, a certain percentage of the plantations will be selected for field monitoring based on a suitable statistical design. The customized software will generate a sample of plantations based on stratification. The necessary input for sampling will be entered into the software by the concerned official of

FSI. The approximate sample size for field monitoring during a year will be 3000 polygons having average 3 plots in each polygon for the whole country.

The field Units of FSI will collect data through android based mobile App for the selected sample plot location as a point which gets integrated into Web GIS application. An edit and approval provision will be provided on Web application for approval of uploaded sample plot location.

The required Web GIS based integrated database application would be providing all possible viewing options of different combinations of spatial layers and sample plot data and statistical calculation from the sample plot data selected on the basis of criteria applied on the spatial layers along with the layer (overlay).

4.3 Development of Android based mobile application

It is proposed to develop two android-based mobile applications. One app for the field data collection work from the sample plots which have auto generated from the Web GIS platform and another one for the viewing the data along with the satellite images from the server with the public access within the country.

To efficiently utilize time and human resource, it is desirable to collect the field data from the sample plots using a mobile App and directly store the data into the geo-spatial server and automate the processing of data with the help of software/ application. The proposed system will enable the field crews to collect field data in online and offline mode in real time on the customized/developed forms through mobile application.

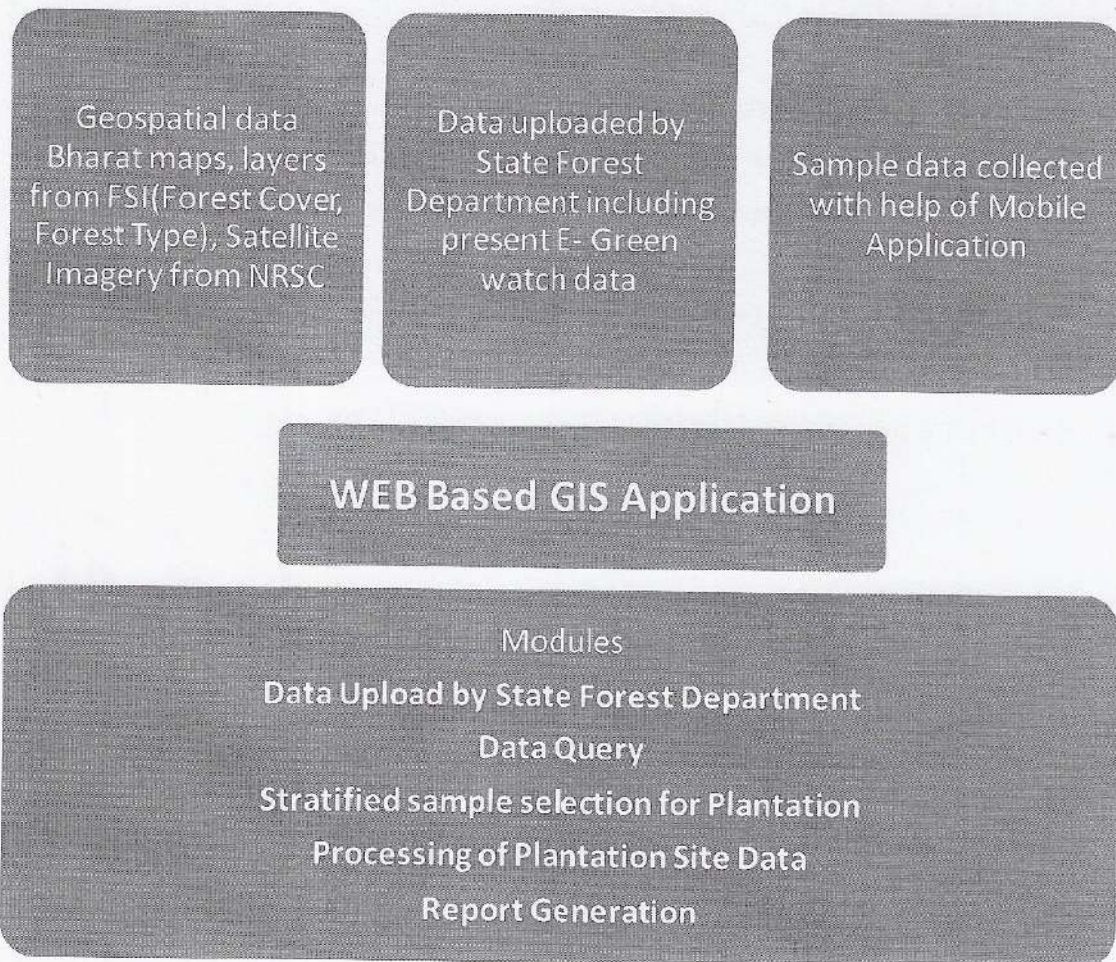
All data collection related work will be done through the android based mobile application in which forms will be customized and the mobile application will be capable of transmitting the data in real time/ near real time to the centralized database servers at FSI (HQ). After transmitting the field data and successfully receiving data into the database server, the sample plots will be directly visible in GIS on the screen in real time.

Another mobile app will be developed for the public access. It will have provisions for display of the desired report from integrated Web GIS Platform along with the satellite images for the general public level users. The report will be generated on the dropdown based selection parameters like State, District, Division, Plantation site ID, etc and the desired output will show on the mobile app along with the satellite image and data. The Mobile App shall also be having the capabilities of incident reporting with a simple interface of quick photograph reporting and assigning incident.

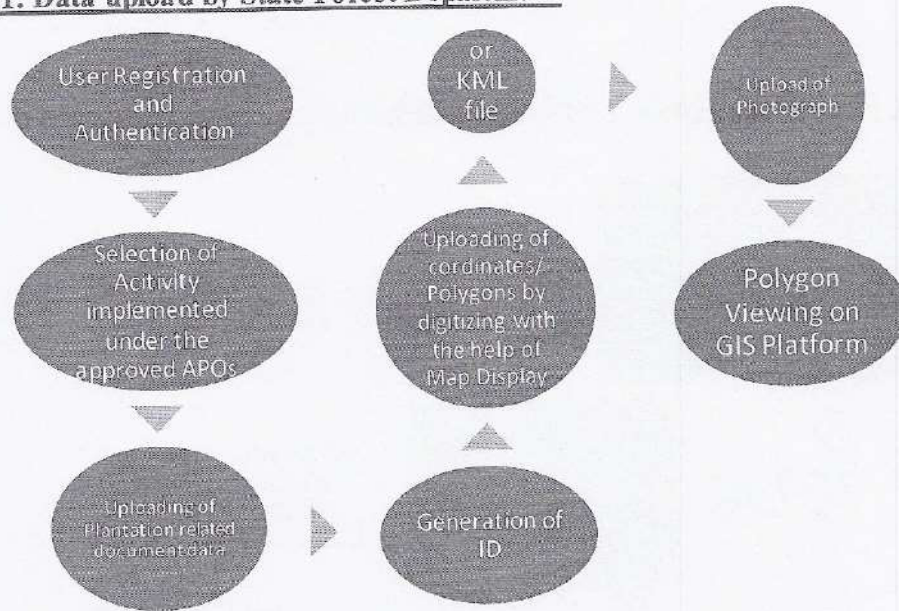
4.3.1 Features and functionality of Mobile App

- Connected mode to Forestry data at NIC
- Disconnected or offline mode for both raster and vector data
- Ability to place non-feature line and area vector for measuring in metric and imperial units
- Definable pick lists or drop-down lists for selecting attribute values
- Create feature geometry using GPS tracking
- Search for features based on attribute values

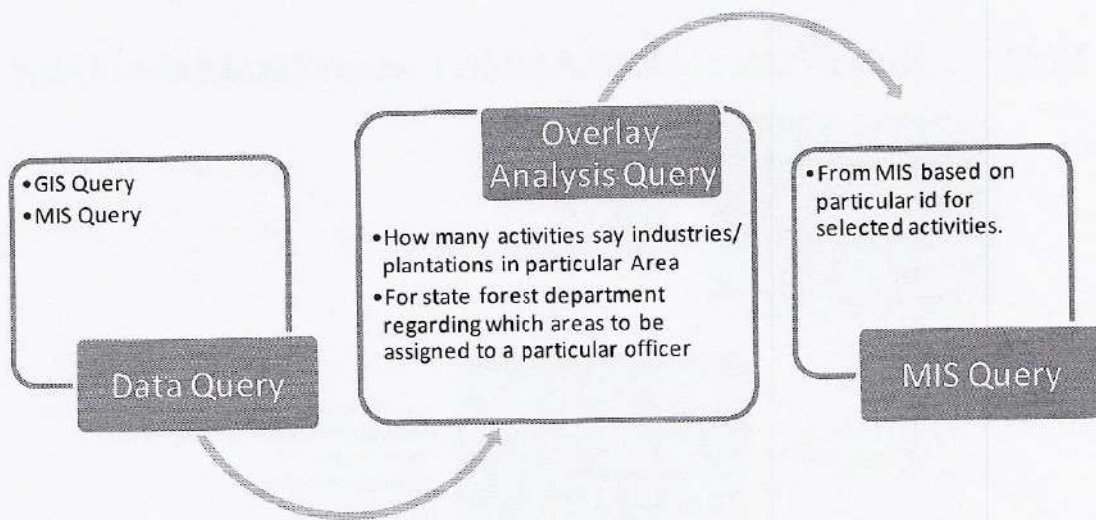
5. Workflow of the Submodules for Development of Web based GIS application and Android based mobile applications



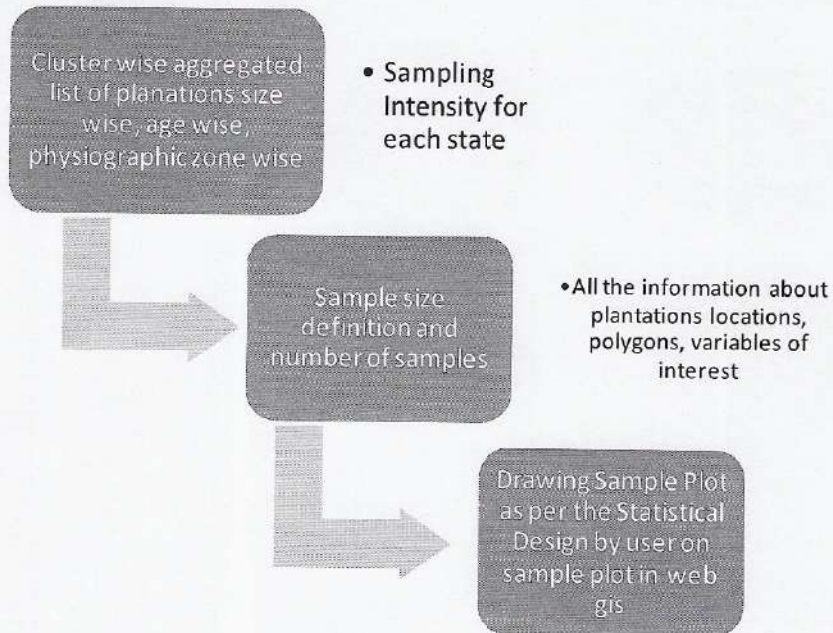
Module 1: Data upload by State Forest Department



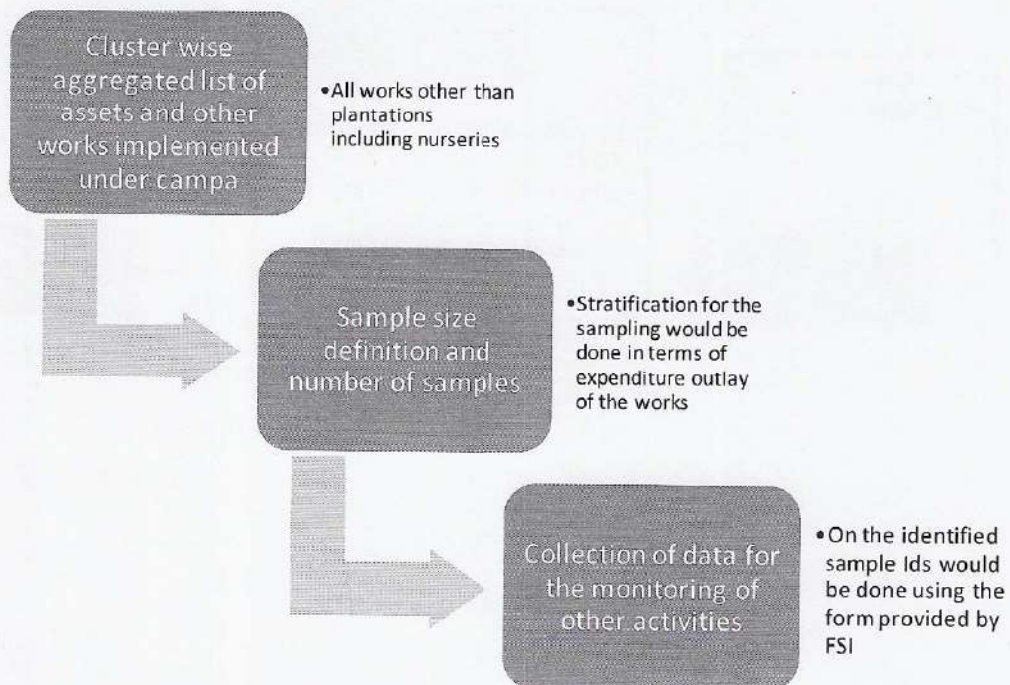
Module 2: Data Query



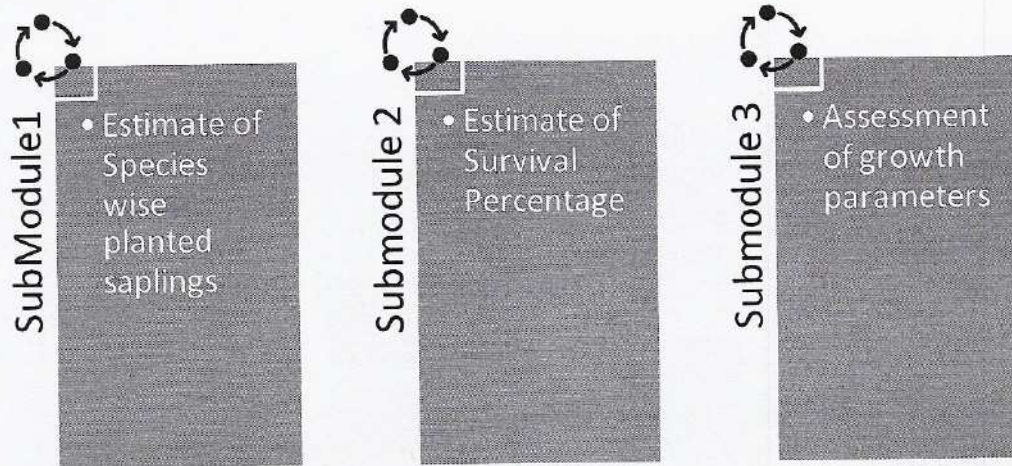
Module 3: Stratified Sample selection for Plantation



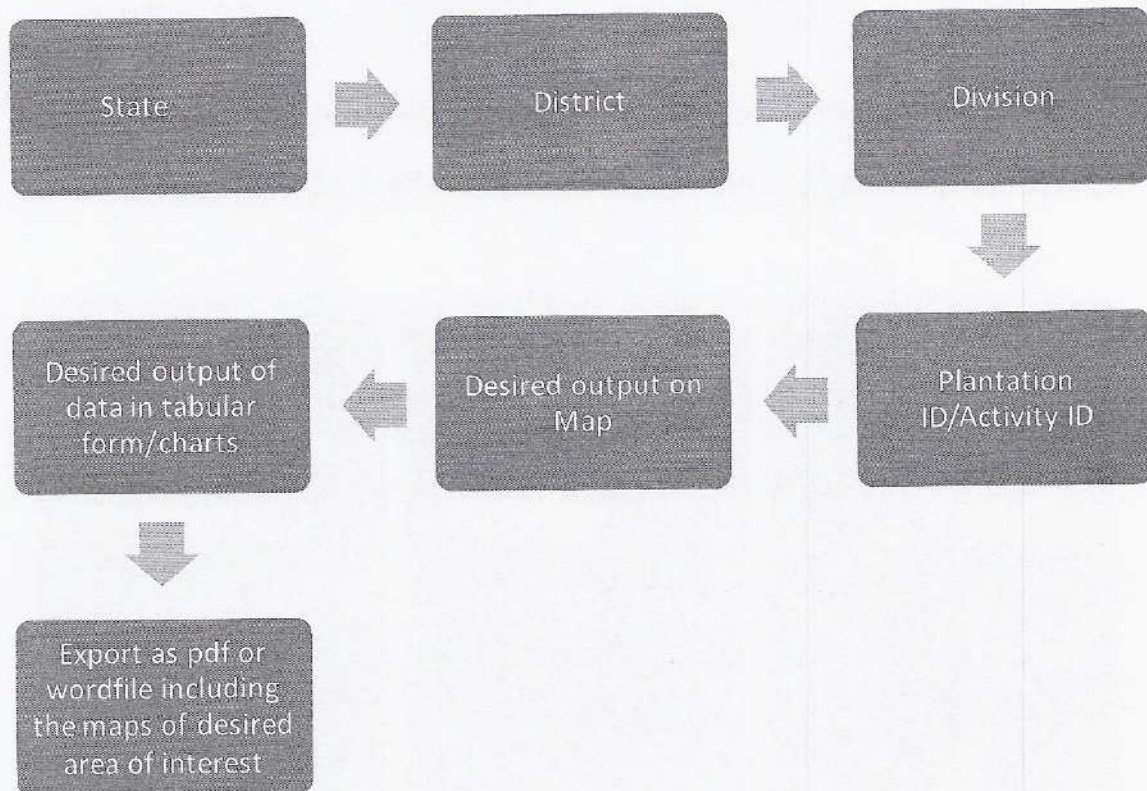
Module 3.1: Stratified Sample selection for Other works implemented under Campa

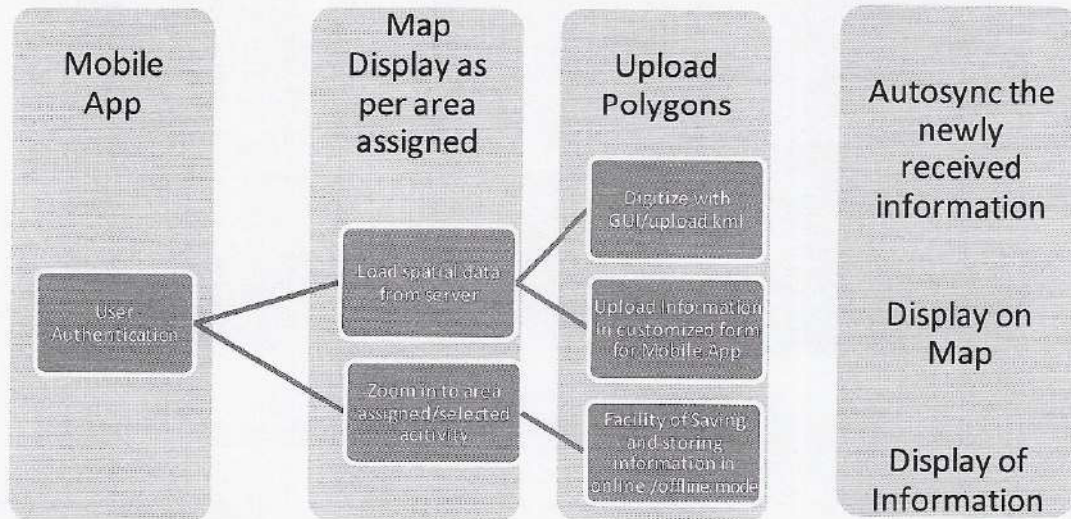
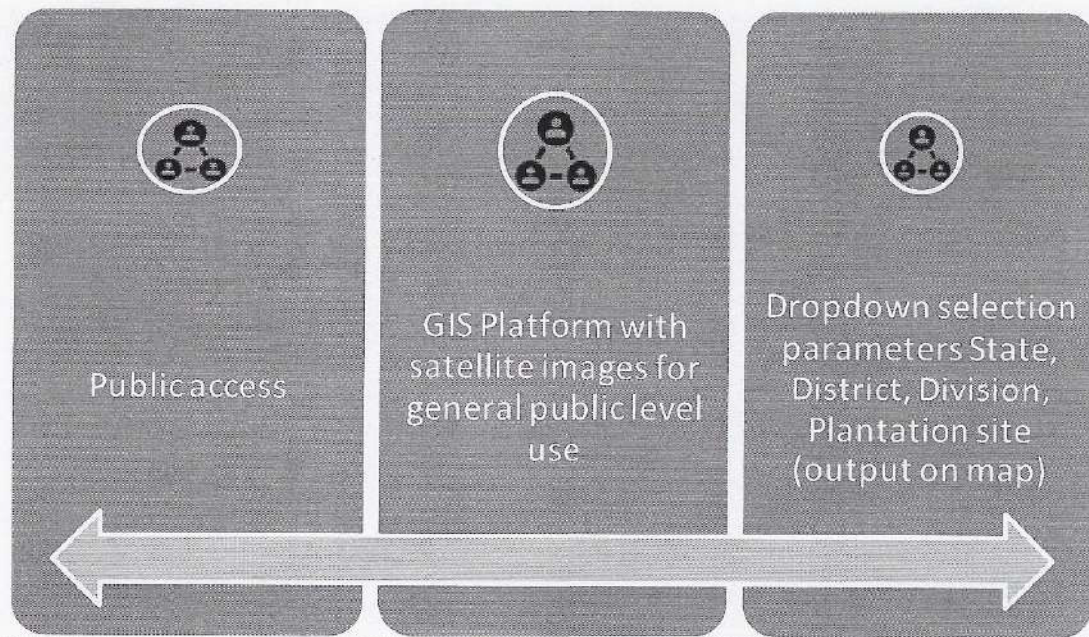


Module 4: Processing of Plantation Site data(Statistical, geo-spatial, geo-statistics analysis)



Module 5: Report Generation Dropdown based selection parameters



Module 6: Mobile App for field Data Collection**Module 7: Mobile App for access of data and satellite images from the server**

6 Roles and Responsibilities

(a) Forest Survey of India (FSI):

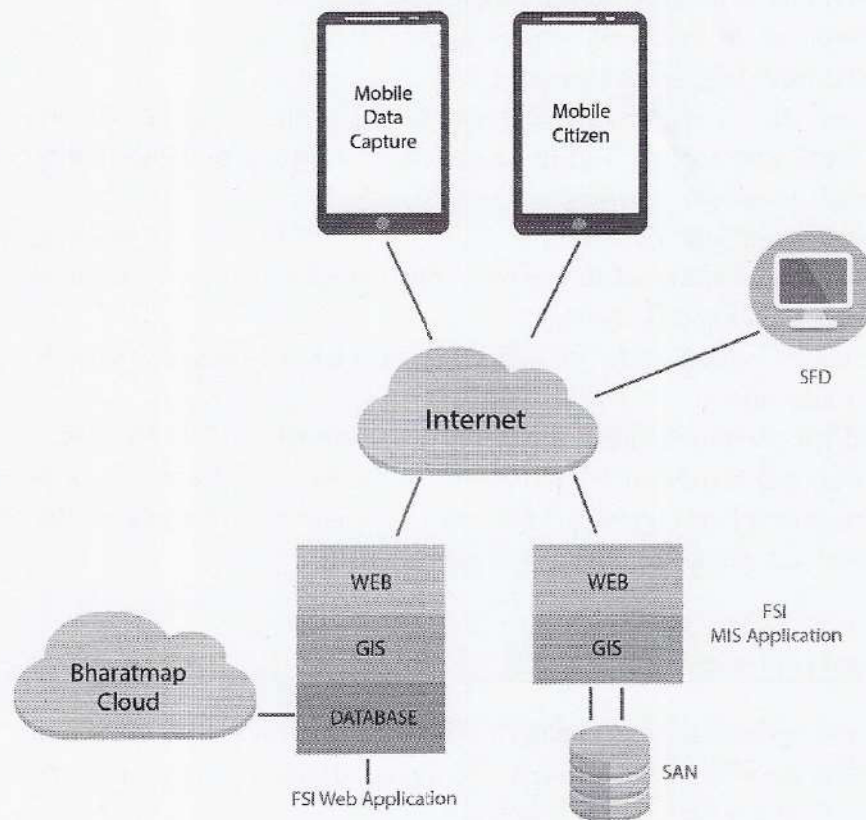
- To provide a single point of contact at FSI for all co-ordination.
- To provide or facilitate all coordination and administrative support, for making existing facilities available as per project requirements
- Project governance structure should clearly be defined for data capturing, integration and implementation into the web application.
- To provide necessary budgetary support for the development and execution of the project.
- To facilitate the data entry for collection, compilation and capture of desired digital attribute/non-spatial data in standard format with the help of GIS PORTAL to be prepared by NIC
- To provide list of probable decision-making queries to NIC to develop integrated GIS based decision support system.
- To provide the required layers including Forest cover, Forest type, Forest Fire, Forest boundary, cluster boundary and physiographic zones etc.
- To provide or facilitate all subject matter related inputs to the project, including analytical/modeling aspect as needed.
- To provide the list of users who will have editing facility in the GIS Portal.
- To facilitate and support logistics required for capacity building (brainstorming and user training session).
- The application will be hosted on NIC cloud. Based on the performance of the application any additional ICT Infrastructure needed will be provisioned by FSI as per NIC cloud team's specifications.
- To facilitate identification of collection of various datasets available within the ministry and outside.
- To facilitate the procurement of satellite data through NRSC. The data shall be geo-referenced and processed by FSI/NRSC to create a service to be consumed in the application developed by NIC. Modalities of consuming the service (API etc) into the developed web application shall be shared with NIC.

(b) National Informatics Centre (NIC):

- To provide a single node of contact at NIC for all project related activities.
- To design, develop and implement GIS Portal Based Application System for Forest Survey of India which maps all facilities.

- To transfer the technology to user through appropriate GIS training package, for future continuing operational services.
- Provide work plan and time frame for analysis, design, development and testing of application packages, based on data provided by FSI. Any eventual delay in provisioning of data beyond agreed schedule will affect the progress of project.
- In case, satellite data procurement and processing is to be done by NIC, FSI shall facilitate the procurement of satellite data. The processing may be done by NIC and the service shall be created and consumed in the said application.
- Web application shall be hosted on the VMs at Shastri Park. Five numbers of VM shall be provided by NIC, however, the provision of required software(s) and SAN shall be responsibility of FSI.

7. Deployment Architecture



8. Cost Estimate:**(A) Development & Implementation Phase (12 Months –First Year)**

| S. No | Activity | Cost (Lakh) | Remarks |
|--------------|---|---------------|---|
| 1 | Development of Web MIS | 30.00 | User Management, Attribute Data Management & integration with user workflows related to CAF Programme |
| 2 | Development of Web GIS | 35.00 | Integrated Spatial Data Framework and Platform for visualization/data capturing/updates/verification and analytics |
| 3 | Development of Android based Mobile Application | 35.00 | Field Data Captured in sync with defined survey process & workflows as well as project component (1) & (2) as above |
| Total | | 100.00 | |

(B) Operation & Maintenance (24 Months – Second & Third Year):

25 % per annum the cost of first year

Note: Any Requirement beyond the Current Scope of Project will be defined separately with supplementary technical & cost proposal.

9. Project Duration:

Keeping in view of the urgency of the work, total duration of the project is 8 months (minimum). Various modules and their development are inter-related, hence the PERT chart of the activities is given below.

| S.N. | Activity | Month1 | Month2 | Month3 | Month4 | Month5 | Month6 | Month7 | Month8 |
|------|--|--------|--------|--------|--------|--------|--------|--------|--------|
| 1 | Preparation of required Infra-structure | | | | | | | | |
| 2 | Development of Web MIS | | | | | | | | |
| 3 | Development of Web GIS | | | | | | | | |
| 4 | Android based mobile App for field data collection for Monitoring of Plantations and Assets. | | | | | | | | |
| 5 | Android based mobile App for access of data and satellite images of the plantations from server. | | | | | | | | |

10. Terms & Conditions:**(a) General**

- (a) The project is proposed to be executed through NICSI; a section 8 company under NIC, facilitating provisioning of outsources services for project execution.
- (b) The project fund is to be released in favor of "NICSI" through demand draft/cheque in advance payable at NEW DELHI.
- (c) FSI has to define their priorities with definite work schedule & plan for all project components/States/Availability of Data and convey to NIC, so that timely resources could be mobilized by NIC for execution of project.

(b) Terms of Use (ToU) for NIC developed IT Application by User Department

1. **Written Communication:** User department should specify its requirements about IT Application preferably by formal communication in detail. User department should provide feedback on the adopted models, documents, demonstrative systems, and presentations etc., made by NIC, within a week or a reasonable time frame as agreed upon mutually. After which, the steps and stages of various project life cycle will get finalized for subsequent stages.
2. **Timely Feedback:** In the initial requirement gathering phase of the IT application, the efforts should be to capture the maximum of User content and business processes, so that there is least requirement change after phase 3 of the IT Application i.e. As-IS System Analysis to To-Be System Design.
3. **Default Clause:** In the absence of written feedback, it shall be presumed that User has accepted the system designed by NIC and to save time and cost overruns no further feedback shall be considered.
4. **Additional Cost & Time:** Under special circumstances, if any delayed feedback or modifications to already finalized model or released system are requested, the User Department may have to incur additional cost and time.

5. **Data and Business Process Ownership:** The Ownership of stored Data, entire transactional data, content data, validations and business rules/ functional requirements belongs to the User department.
6. **No Data Access to NIC:** NIC will not keep access right of the actual data inserted/generated in the IT Application of User department. The real-time actual implementation and operation of the IT Application will be the prime responsibility of the user department. The User Department shall nominate an officer who has the complete and exclusive access to the stored data. This officer can be trained by the NIC Project Team for this purpose.
7. **Technical Artefact Ownership:** All the artefacts specifically developed/produced under this project would be the Joint Intellectual Property of the User and NIC. NIC shall have the full right to modify the technical artefacts for use by other Departments at all levels of Government. NIC has the full rights to claim award(s)/felicitation(s) and submit related technical papers for its intellectual property. User shall have the perpetual right to use the same within the department and for marking any change in the artefacts, consent of NIC will be required.
8. **RTI queries:** All RTI queries related to the IT Application are to be answered by the User department. If any technical queries are there, NIC may provide inputs to the Nominated/ designated officer of the department, provided it is technically feasible.
9. **Queries from law enforcing, auditing and Regulatory Functionaries:** All queries from Government law enforcing, auditing and Regulatory agencies related to the Project IT Application are to be answered by the User department. NIC shall not be responsible to answer any such queries. The User department should envisage the reports and output required from the IT Application in advance, which will become the part of the IT Application. NIC can help in preparation of exceptional reports in the IT Application to answer such queries by the Nominated/ designated official of the User department.
10. **Cleaning of Sample/test Data:** The NIC uses sample/test data for IT Application engineering activities, it is the responsibility of the User to clean the sample data before go-live so that there will not be any harm or legal issues due to sample data.
11. **Indemnification:** NIC should be indemnified from all legal and associated consequences arising due to the usage of the IT application.

12. Sensitization of Govt. Laws. Acts/ Rules and Regulations: User department should give due consideration to sensitize themselves with existing various Government Laws/Acts/ Rules and Regulations such as IT Act 2000, IT Act 2008 (Amendment), IT Rules 2011, Adhaar Act 2016, Cyber Security Laws, Role of Cert-in, Sensitive Personal Data Information Rules and Privacy of Personal Data etc. issued by Government of India from time to time.

**FORM FOR MONITORING OF PLANTATIONS
A PLOT APPROACH FORM**

| S.No | Description | Codes |
|------|---|-------|
| 1. | Form Code | MP-1 |
| 2. | FSI Zone | |
| 3. | State | |
| 4. | District | |
| 5. | Circle | |
| 6. | Division | |
| 7. | Range Name | |
| 8. | Section/Beat/Sub beat Name | |
| 9. | Name of the camping place | |
| 10. | Time at which left the camp(in Hrs) | |
| 11. | Distance covered by the vehicle(in Kms) from the camp up to the plantation site | |
| 12. | Name of the nearest village where the patch is located | |
| 13. | Name of the Forest Area | |
| 14. | Year of plantation | |
| 15. | Time at which started on foot | |
| 16. | Location of the place up to which journey was performed by the Vehicle (Latitude & Longitude) | |
| 17. | Distance covered on foot up to the Patch centre (Kms) | |
| 18. | Time of arrival at the patch(in Hrs) | |
| 19. | Time of departure from the patch(in Hrs) | |
| 20. | Time at which returned to the camp(Hrs.) | |
| 21. | Remarks | |

Name & Sign of the SFD officer with Date Name & Sign of the Evaluator (FSI) with Date

B ENUMARATION DETAILS OF PLANTATION

Date:.....

| Job No | Form Code | Polygon code* | State Code | Circle Code | Division Code | Lat | Long | Patch No | Plot No | Total No of Bamboo Plants/Canes | Total No. of Trees |
|--------|-----------|---------------|------------|-------------|---------------|-----|------|----------|---------|---------------------------------|--------------------|
| | MP-2 | | | | | | | | | | |

| Sl.No. | Name of the Species | Species Code | Spacing between Sps Code(mts*mts) | Height (cms) | Collar Diameter in 10cms(at 10cm ht) | Status of Seedling codes {Dead(1)/Alive(2)} | He (1) |
|--------|---------------------|--------------|-----------------------------------|--------------|--------------------------------------|---|--------|
| | | | | | | | |
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*System generated code will be recorded.

Name & Signature of the SFD officer

Name &Signature of the Evaluatc

C GENERAL ANALYSIS OF PLANTATION

Date:.....

PATCH DESCRIPTION FORM

| Job No | Survey Code | Form Code | Polygon code | Name of the Forest patch where plantation site present | Name of the VSS/VFC etc covered by the Plantation |
|--------|-------------|-----------|--------------|--|---|
| | | MP-3 | | | |

| FSI Zone | State Code | District Code | Circle Code | Forest Division Code | Name of the Range | Name of the Scheme | Lat. | Long | Legal Status of Patch | Patch size class | Type of Plantation |
|----------|------------|---------------|-------------|----------------------|-------------------|--------------------|---------------------------------|------|-----------------------|------------------|--------------------|
| | | | | | | | Lat/Long of centre of the patch | | | | |
| | | | | | | | | | | | |

| S. No. | Description | Suitable Codes or (Yes/No) | |
|--------|---|---|----|
| 1. | Crop composition(only for gap plantation) | -Code From FSI field Manual- | |
| 2. | Forest Type(only for gap plantation) | As per Champian and Seth Classification | |
| 3. | Land Use(only for gap plantation) | -Code From FSI field Manual- | |
| 4. | Soil Depth | -Code From FSI field Manual- | |
| 5. | Soil Colour | -Code From FSI field Manual- | |
| 6. | Grazing incidence | -Code From FSI field Manual- | |
| 7. | Fire incidence | -Code From FSI field Manual- | |
| 8. | Presence of weeds | -Code From FSI field Manual- | |
| 9. | Presence of Grass | -Code From FSI field Manual- | |
| 10 | Injuries to patch | -Code From FSI field Manual- | |
| 11 | Whether plantation is carried out or not | YES | NO |
| 12 | Whether Plantation Journal is maintained | YES | NO |

| | | | | | |
|----|--|--------------------------------|---------|--------------|----------------|
| 13 | Whether planted as per Journal | YES | | NO | |
| 14 | Reference to Measurement Book No. & Page | -As per record- | | | |
| 15 | Month & Year of plantation | -As per record- | | | |
| 16 | Area of patch as per record (ha) | -As per record- | | | |
| 17 | Area of patch as observed (ha) | -As observed by the Evaluator- | | | |
| 18 | Cost Estimate for the Plantation | -As per record- | | | |
| 19 | Cost estimate for the nursery | -As per record- | | | |
| 20 | Type of fencing | -As observed by the Evaluator- | | | |
| 21 | Suitability of site | Good | Average | Not suitable | |
| 22 | Source of Seedlings | -As per record- | | | |
| 23 | Top 10 Species Codes | -As per record- | | | |
| 24 | Whether advance work was done before plantation | YES | | NO | |
| 25 | Method of planting as per record | -As per record- | | | |
| 26 | Method of planting as observed | -As observed by the Evaluator- | | | |
| 27 | Shape & Size of Pits | -As per record- | | | |
| 28 | Number of plants planted per Ha | -As per record - | | | |
| 29 | Whether plantation is maintained or not | YES | | NO | |
| 30 | Status of first year maintenance(if applicable) | Good | Average | Poor | Not Applicable |
| 31 | Status of Second year maintenance(if applicable) | Good | Average | Poor | Not Applicable |
| 32 | Whether the cattle/fire watcher has been engaged after second year maintenance | YES | | NO | |

| | | | |
|----|---|--|----|
| 33 | Age of plantation | -As per record- | |
| 34 | Whether plantation is made as per working plan/scheme | YES | NO |
| 35 | Survival percentage as per record & Date of calculation | -As per record- | |
| 36 | Whether plantation sketch attached | YES | NO |
| 37 | Plantation photo ID | -view of the plantation site to be attached- | |
| 37 | Name of the RFO when the plantation was raised | -As per record- | |
| 38 | Name of the DFO when the plantation was raised | -As per record- | |

Name & Signature of the SFD Officer with Date Name & Signature of the Evaluator (FSI) with Date

| | | | | | | | | | | | | | | | | | | | |
|----|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| | facility, other contingencies etc.) | | | | | | | | | | | | | | | | | | |
| | Procurement of | | | | | | | | | | | | | | | | | | |
| 15 | Computer and accessories | | | | | | | | | | | | | | | | | | |
| 16 | Software | | | | | | | | | | | | | | | | | | |
| 17 | Hardware | | | | | | | | | | | | | | | | | | |
| 18 | Digital Camera & Vernacular | | | | | | | | | | | | | | | | | | |
| 19 | Satellite imageries | | | | | | | | | | | | | | | | | | |
| 20 | Research and Training support for GIS / MIS | | | | | | | | | | | | | | | | | | |
| 21 | GPS | | | | | | | | | | | | | | | | | | |
| 22 | Vehicles | | | | | | | | | | | | | | | | | | |
| 23 | Other accessories as procurement of wireless, cell phones etc. | | | | | | | | | | | | | | | | | | |

In case of construction, length will be in meters and in case fire line, it will be in Kms.

Name & Signature of the SFD Officer with Date

Name & Signature of the Evaluator

Layout of Sample Plot

It is proposed to layout two shapes of sample plots for the evaluation of plantations raised under CAMPA scheme. They are:-

- 1) Square Plot of size 0.1 Ha (31.62mts*31.62mts)
- 2) Transect Plot of size 0.1 Ha(10mts*100mts)

Square Plot:

This shape of plot is usually followed by Forest Survey of India for all the monitoring work of NAP plantations and other plantation sites. The square plot is more feasible to layout in an area where the plants are raised uniformly inside the plantation sites as in case of AR plantations, etc. Number of plots to be laid out will vary as per the size of plantation as given below:-

- 1) If a plantation is having an area of up to 5 Ha, then a single square plot has to be laid out at the centre of the plantation (Fig-1).

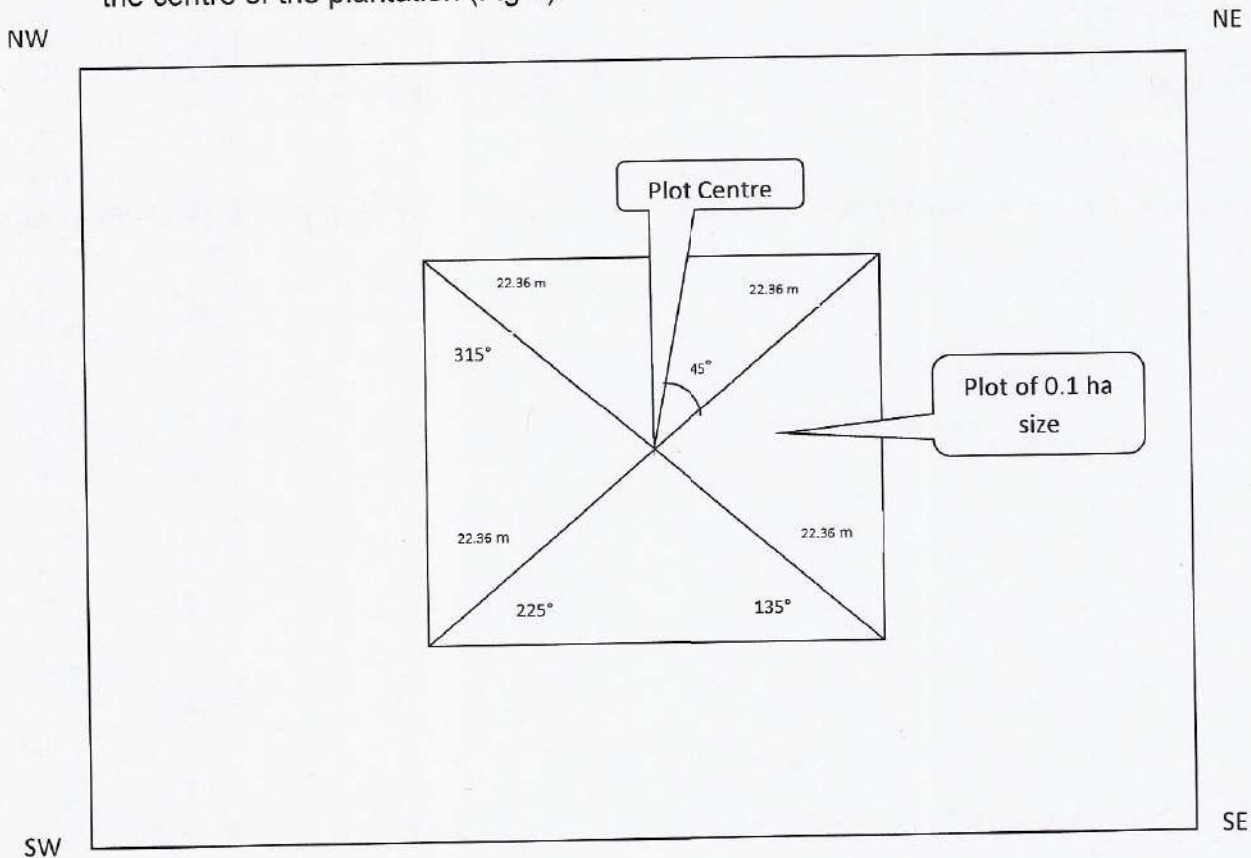


Fig 1: Image showing the laying out of single plot in a plantation patch of area up to 5Ha area.

- 2) If the area of plantation is $>5\text{Ha}$ and up to 40Ha then 3 square plots have to be laid out. First at centre of the plantation patch, second at North West corner of the patch and third at South East corner of the patch. The location of the plots should be so that the North West and the South East corners of the plots is at 50m away from the boundary of the plantation patch and it should be at an angle of 135Degrees & 315Degrees respectively, from the corners of the plantation patch (Fig-2).

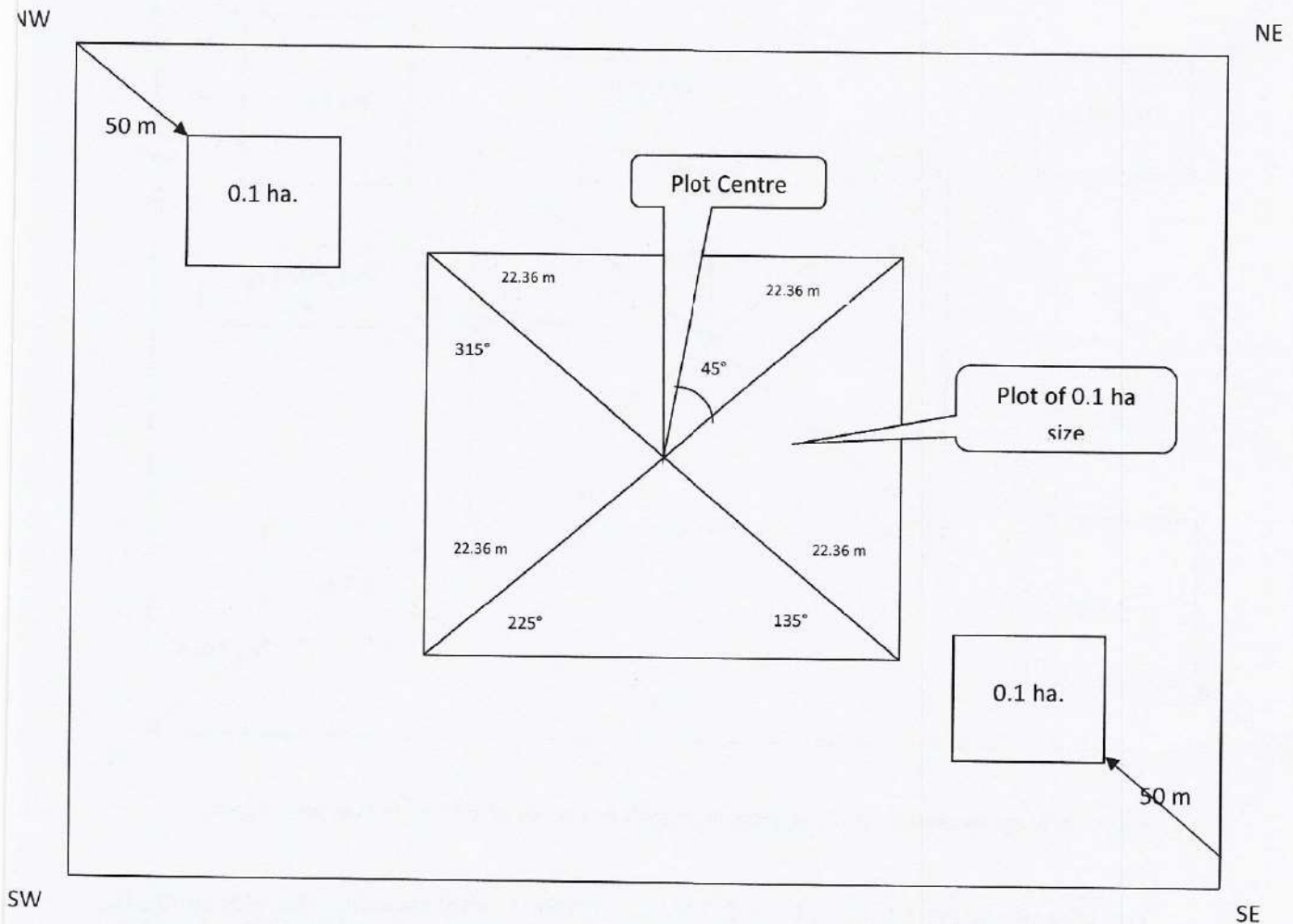


Fig 2: Image showing the laying out of three plots in a plantation patch of size varying from $>5\text{Ha}$ to 40Ha area.

- 3) If the area of plantation is more than 40Ha then 5 square plots of size 0.1Ha have to be laid out. First at centre of the plantation patch, second at North West corner of the patch, third at North East corner of the patch, fourth at South East corner of the patch and fifth one at South west corner of the patch. The corners of the plots should be so that it should be at an angle of 135Degrees , 225Degrees , 315Degrees and 45Degrees (Fig-3).

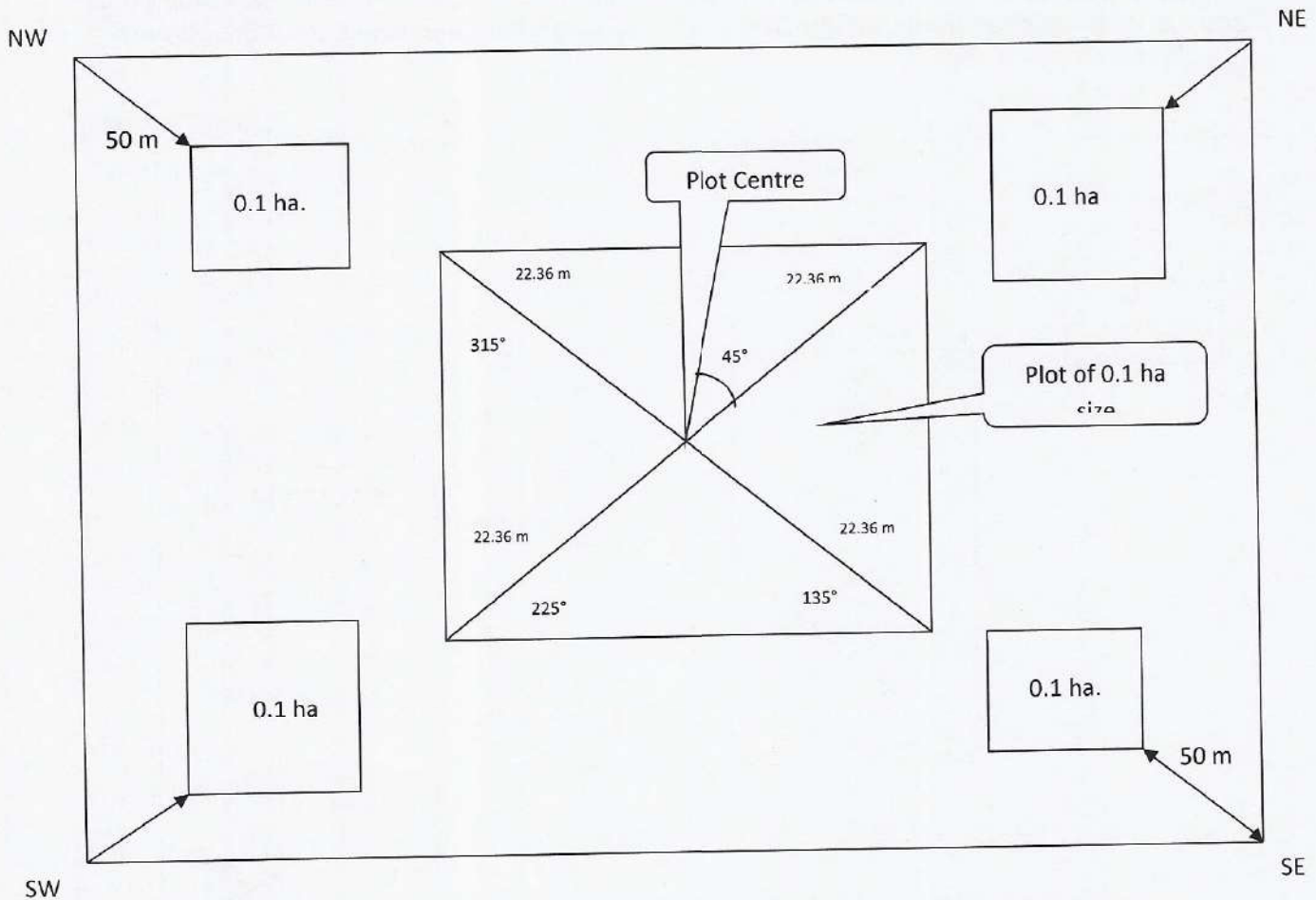


Fig.3- Image showing the laying out of five plots in a plantation patch of size more than 40 Ha area.

The size of square sample plot is 0.1 Ha i.e. 1000m². After reaching the plot centre fix a peg and mark a distance of 22.36mts from the centre at an angle of 45°, 135°, 225° and 315°. These four corners of the plot will be marked with the help of poles and red cloth. Joining these four corners will make our sample plot and the seedlings present inside the plot will be enumerated. If the distance between two corners of the sample plot is 31.62mts then it is presumed that the layout of plot is correct.

Transect Plot:

In another condition wherein planting is being done in isolated patches here and there where ever gaps are found as in case of ANR plantation(gap plantation). In this condition, It is proposed to lay out transect plot instead of square plot. This plot will cover maximum portion of the plantation patches and there will be a less chance of leaving a planting area. This model of sample plot will also be laid in linear plantations.

Transect plot will be in rectangle shape and the size of plot will be:

a) 10mts width*100mts length

Here also, number of plots will varies as per the size of the plantation as was done in case of square plot which is as shown below:-

- 1) If a plantation is having an area of up to 5 Ha, then a single transect has to be laid out at the centre of the plantation. The transect should go horizontally at the centre of the plot where in the centre of the patch and centre of the plot should be at the same point (Fig-4).

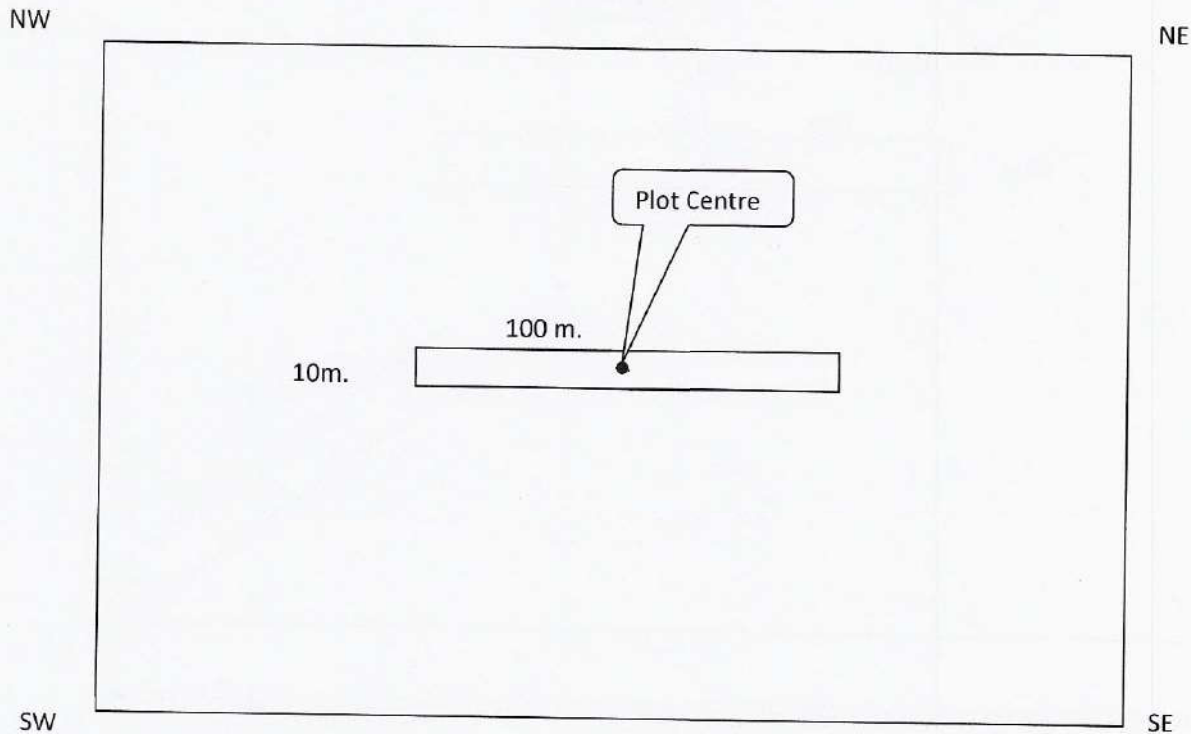


Fig4- Image showing the laying out of three plots in a plantation patch of size from more than 5Ha to 40 Ha area.

- 2) If the area of plantation is more than 5Ha and up to 40Ha then 3 transects have to be laid out. First, at centre of the plantation patch, second one at North West corner of the patch and third at South East corner of the patch. At the centre of the patch transect should go horizontally wherein the centre of the patch and centre of the plot should be at the same point. The location of the NW and SE transect start at 50mts from NW and SE corner of the patch respectively and will go towards the centre of the patch(Fig-5).

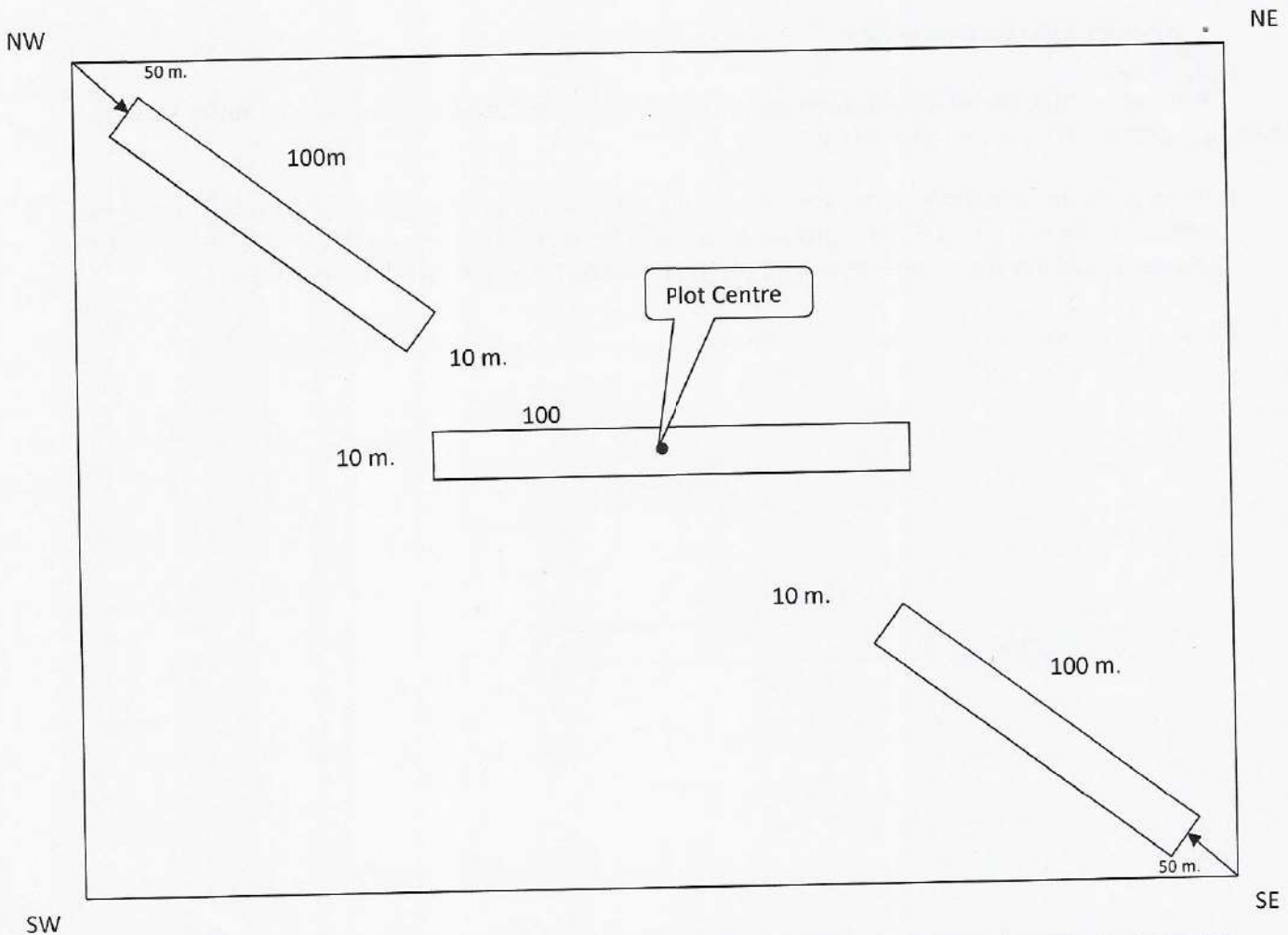


Fig.5- Image showing the laying out of three plots in a plantation patch of size from more than 5Ha to 40 Ha area.

- 3) If the area of plantation is more than 40 Ha, then 5 transects of size 0.1 Ha have to be laid out. First, at the centre of the plantation patch, second at the North West corner of the patch, third at North East corner of the patch, fourth at South East corner of the patch and fifth one at South west corner of the patch. At the centre of the patch transect should go horizontally wherein the centre of the patch and centre of the plot should be at the same point. The location of the NW, NE, SW & SE transect will start at 50mts from all the four corner of the patch and should go towards the centre of the patch (Fig-6).

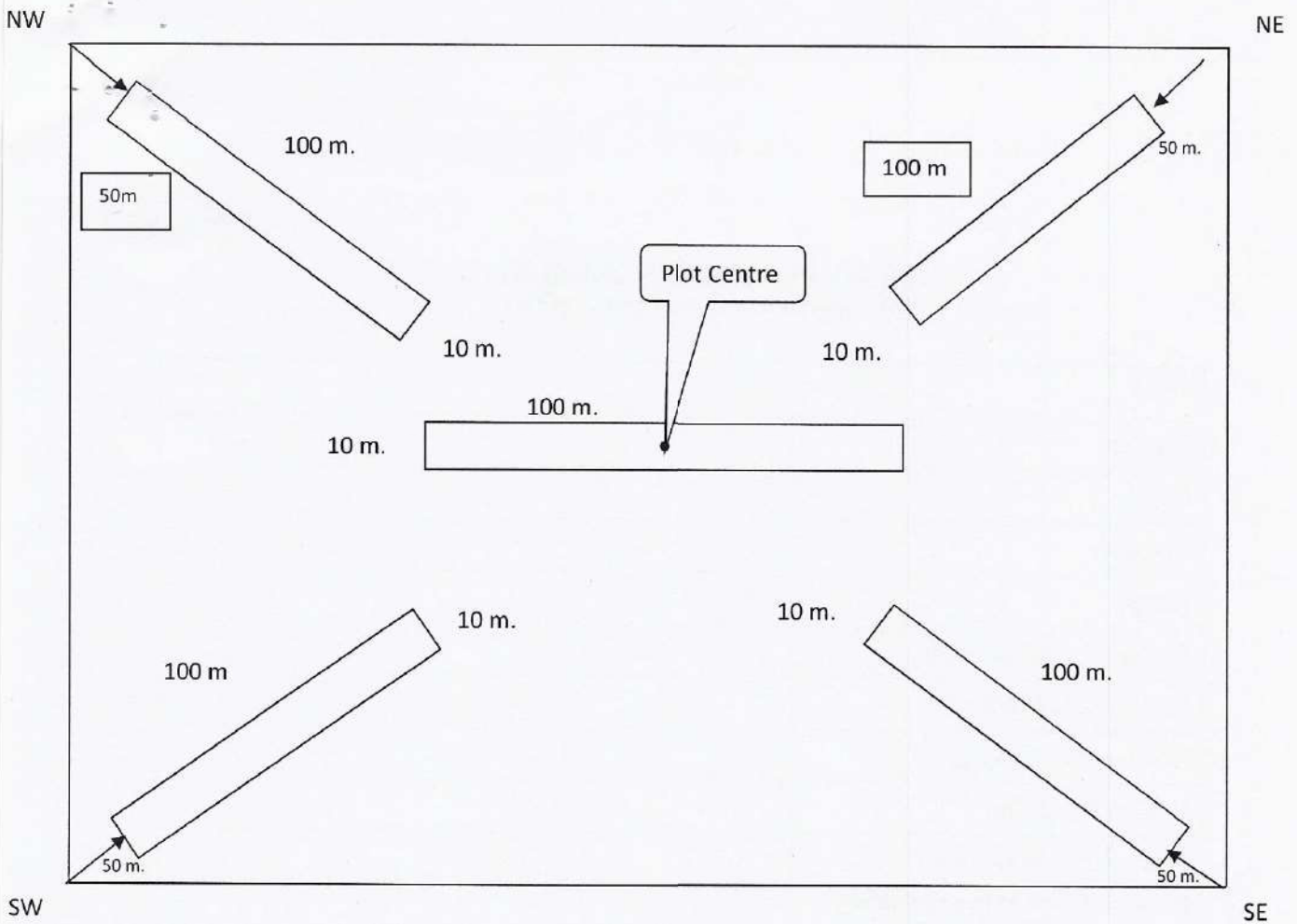


Fig-6- Image showing the laying out of three plots in a plantation patch of size from more than 5Ha to 40 Ha area.

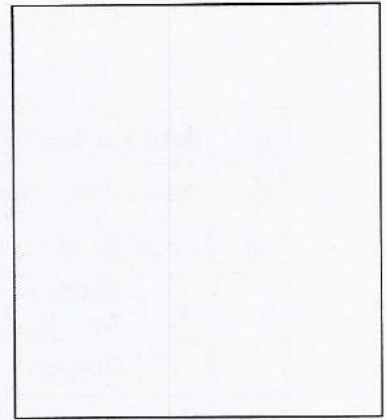
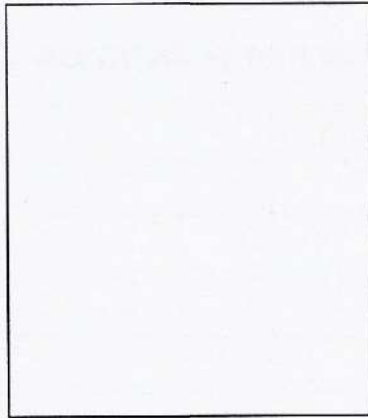
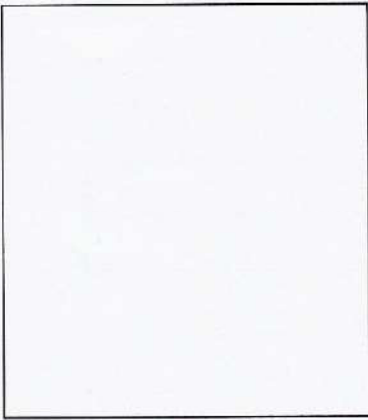
Sample plot of selected size have to be laid out in a manner that one centre line of length 100m is to be marked with the help of tape/nylon rope and then the plants present on either side of the line up to a width of 5 mts are to be considered for enumeration as shown in the diagrams.

Data collection from the sample plot: Data is collected in the prescribed proforma from all the sample plots. In proforma No.3 enumeration of all the seedlings (including dead sapling or empty pit) will be carried out and recorded. It is difficult to collect all the parameters for all the survived seedlings, hence, the height and collar diameter of every 10th survived seedlings will be recorded from the first survived seedling. The interval is not fixed at this time and may be decided by the H.Q

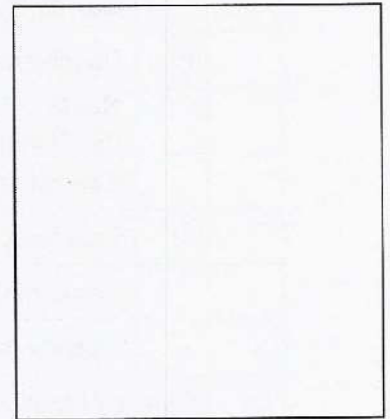
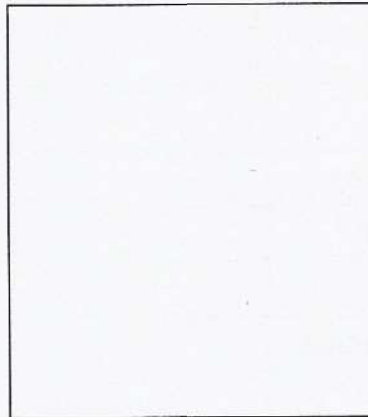
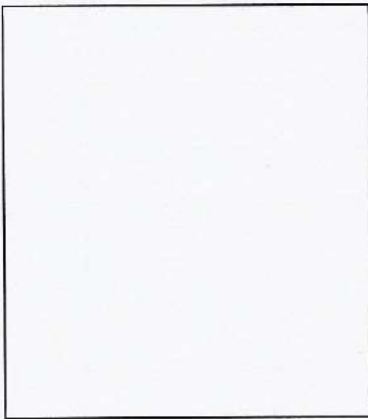
ONLINE PLANTATION JOURNAL
(to be Uploaded and Updated by SFDs)

| | |
|---|--|
| State | |
| District | |
| Circle | |
| Division | |
| Range | |
| Section/Beat/Sub Beat | |
| Name of the Plantation | |
| Name of the Scheme | |
| Year of Plantation | |
| Area of Plantation (Ha.) | |
| Polygon Code of the plantation area generated by the System | |

PHOTOGRAPHS OF PLANTATION



SATELLITE IMAGES OF EACH YEAR

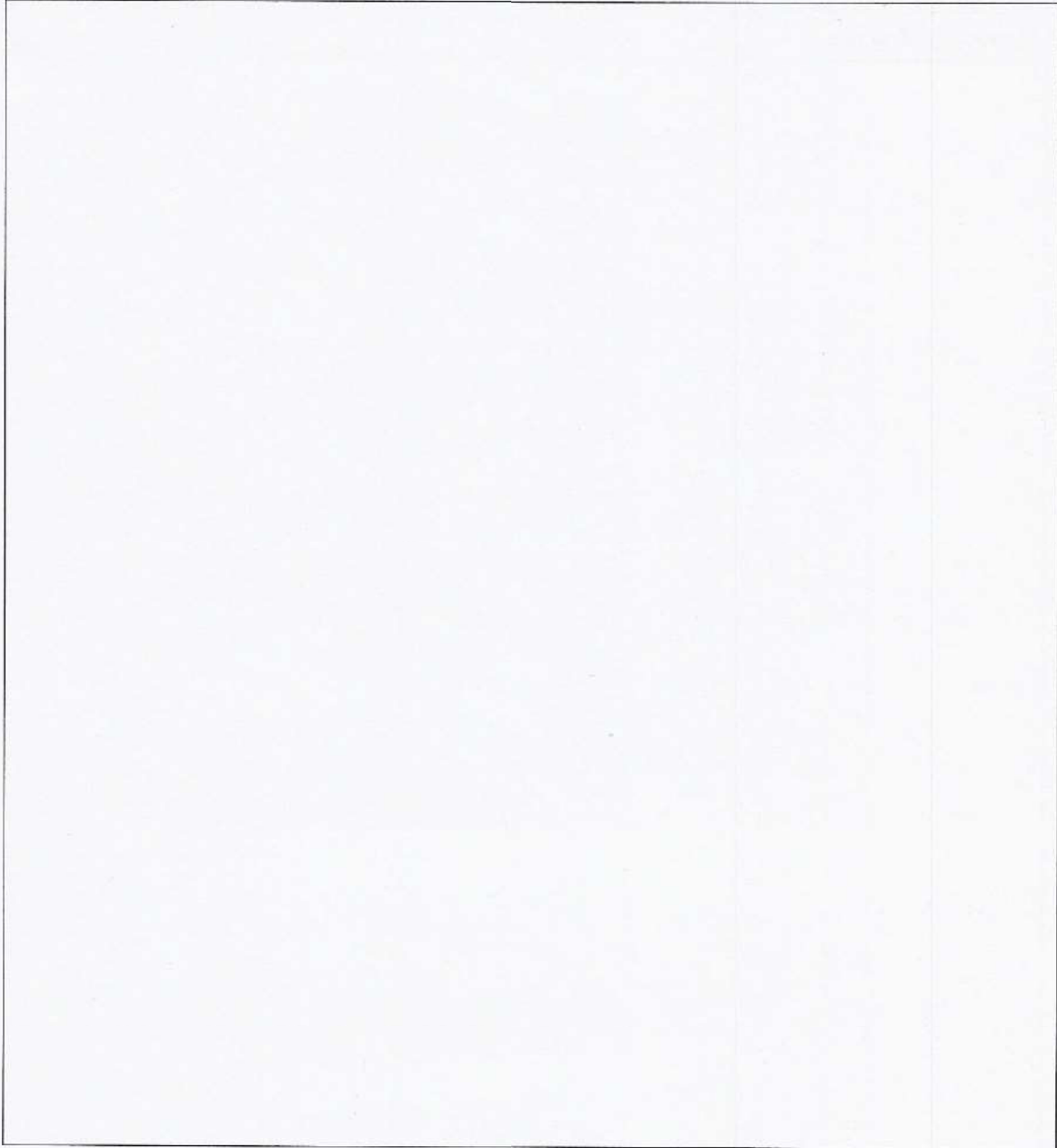


DETAILS OF PLANTATION

| | | | |
|-------|---|---------------------------------|--|
| i) | Name of the Plantation patch | | |
| ii) | Year of Planting | | |
| iii) | Location of Plantation | | |
| | a) | Social Forestry Jurisdiction | |
| | | Division | |
| | | Range | |
| | | Block | |
| | | Panchayat Samiti/VSS | |
| | | Survey No. | |
| | b) | Panchayat lands | |
| | | Name of Village Panchayat | |
| | | Resolution No. & Date | |
| | c) | Tankforeshore area | |
| | | Name of the tank | |
| | | Foreshore area available | |
| iv) | Species Planted | | |
| v) | Area in Hectares | | |
| vi) | Budget Estimate | | |
| Vii) | Espacement | | |
| viii) | Planting(through Pits/Trench) | | |
| ix) | Size & No of Pits(in case of Pit Planting) | Size: | |
| | | Number: | |
| x) | Method of Planting(sapling, stump planting, etc) | | |
| xi) | Source of Seedlings(Raised/Purchased) | | |
| xii) | No. Of Sectors/Strips | | |

Location Map (Scale=1:50000)

Photostat Copy from the Survey of India map including at least one latitude and one longitude may be fixed here. (The latitudes and longitudes may be numbered as per the S.I. Sheet if the numbers are not included in the photo copy)



SITE MAP/TREATMENT MAP

| | |
|-----------------------|---------|
| Map Scale | 1:10000 |
| Soil Type | |
| location of Soil pits | |
| | |

POLYGON OF PLANTATION USING GPS

| | |
|-----------------------|--|
| latitude polygon | |
| longitudes of polygon | |
| | |

YEAR AND SCHEME WISE (RAISING AND MAINTENANCE)

| Sl. No. | Year | Scheme under which work is taken up including authority | S.O. No. And Date | Sanctioned Amount | Remarks |
|---------|------|---|-------------------|-------------------|---------|
| | | | | | |
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DESCRIPTION OF SITE

| | | | | |
|------|---|---------|-------------------------|---------|
| i) | Present land use of plantation site like Dense Forest, Open Forest, Degraded Forest, tank foreshore area etc. | | | |
| ii) | Geology, Rock & Soil | | | |
| iii) | Drainage | | | |
| iv) | Climate | | | |
| | a) Mean annual temp(°C) | | | |
| | b) Mean annual rainfall (mm) | Maximum | Minimum | Average |
| | | | | |
| | c) Number of rainy days | | | |
| | d) Period of rainfall (months) | | | |
| | e) Rainfall during the planting season | Date | Heavy/Medium/Scanty/Nil | |
| | | | | |
| | | | | |
| | | | | |
| | f) Composition of the crop | | | |
| | i) Forest type | | | |
| | ii) Dominant Trees | | | |
| | iii) Dominant shrubs | | | |
| | iv) Forest Density | | | |
| v) | Whether any Plantation was carried out in the same area if Yes, then | | | |
| | i) Name of the Scheme | | | |
| | ii) Year of Planting | | | |
| | iii) Model Name | | | |
| | iv) Area Planted | | | |
| | v) Species | | | |
| | vi) Survival % of plants(If any) | | | |

PRE-PLANTING OPERATIONS

| Sl. No | | Date of Execution | Name & Dates of inspection by the Range Officer/other officers |
|--------|---------------------------|-------------------|--|
| i) | Survey & Demarcation | | |
| II) | Clear felling | | |
| iii) | Slash felling and burning | | |
| iv) | Earth work | | |
| v) | Fencing | | |

DETAILS OF PLANNING

| Sector No | Species | No. Planted | Total | Replacements |
|-----------|---------|-------------|-------|--------------|
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POST PLANTING OPERATIONS

| Sl. No | Name of Operation | First Year(Period) | Second Year(Period) | Third Year(Period) |
|--------|---|--------------------|---------------------|--------------------|
| 1 | First weeding, hoeing & manuring | | | |
| 2 | Second weeding, hoeing & manuring | | | |
| 3 | Third weeding weeding, hoeing & manuring | | | |
| 4 | Fire Protection Measures | | | |
| 5 | Applying of Pesticides | | | |
| 6 | Applying of Fertilizers | | | |
| 7 | Casualty Replacement(mention the no of seedlings planted) | | | |
| 8 | Miscellaneous | | | |

Note: The information may be filled wherever applicable

OTHER USEFUL INFORMATION

Information Like villages where labour force has been recruited, damage due to fire, insects etc.

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ENUMERATION DETRAILS

| Date | Age of the Plantation | % of Enumeration | Method of enumeration | Total Plants | Survival % | Height | | | Girth (cms) | | | Cause of Mortality |
|------|-----------------------|------------------|-----------------------|--------------|------------|--------|------|------|-------------|------|------|--------------------|
| | | | | | | Min. | Max. | Avg. | Min. | Max. | Avg. | |
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ABSTRACT OF SANCTIONED ESTIMATE

| Sl. No. | Description of work | FSR item No. | Quantity | Rate(Rs.) | Unit | Amount (Rs) |
|---------|---|--------------|----------|-----------|------|-------------|
| 1 | Raising of Nursery | | | | | |
| 2 | Site Clearence | | | | | |
| 3 | Fencing(indicate type) | | | | | |
| 4 | Pit Digging/Trenching/Mound | | | | | |
| 5 | Planting including Transportation | | | | | |
| 6 | I Year weeding, hoeing including ferilizer& pesticide application | | | | | |
| 7 | II Year weeding, hoeing including ferilizer& pesticide application | | | | | |
| 8 | III Year weeding, hoeing including ferilizer& pesticide application | | | | | |
| 9 | Fence maintainance | | | | | |
| 10 | Protection of Plantation (expenditure on watchers) | | | | | |
| 11 | Fire protection | | | | | |
| 12 | I Year Casualty Replacement | | | | | |
| 13 | II Year Casualty Replacement | | | | | |
| 14 | III Year Casualty Replacement | | | | | |
| 15 | Miscellaneous | | | | | |

EXPENDITURE STATEMENT (INCLUDING NURSERY)

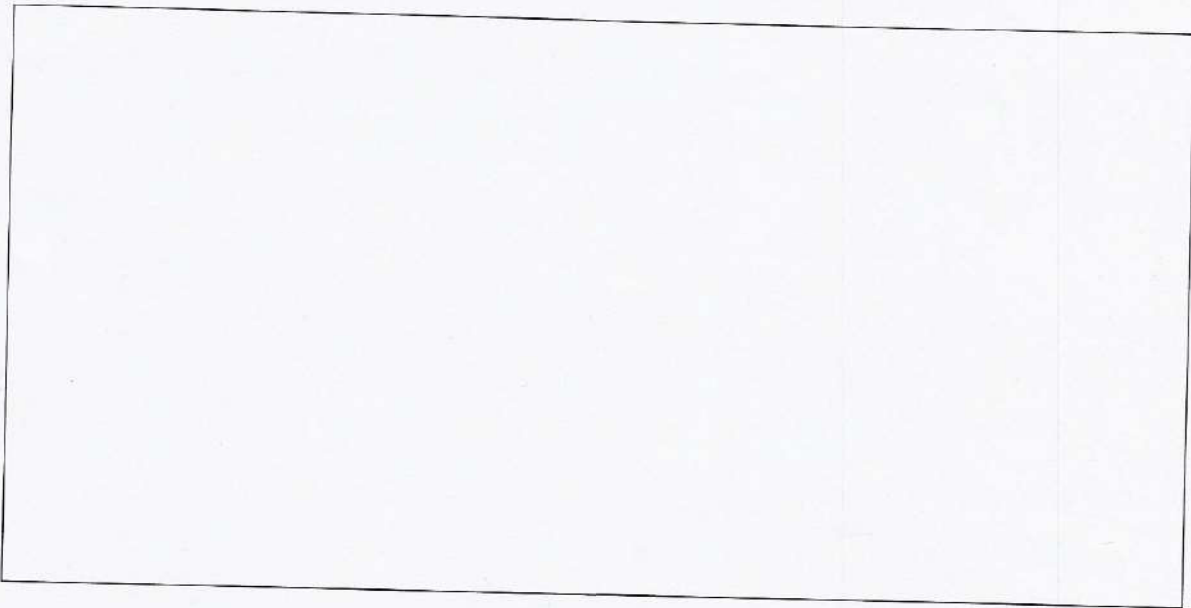
| Sl. No. | Date | Voucher/Muster | Item of work | Reference to M-Book No. & Page | | |
|---------|------|----------------|--|--------------------------------|----------|-------------|
| | | | | Date of Execution | Quantity | Expenditure |
| 1 | | | Raising of Nursery | | | |
| 2 | | | Site Clearence | | | |
| 3 | | | Fencing(indicate type) | | | |
| 4 | | | Pit Digging/Trenching/Mound | | | |
| 5 | | | Planting including Transportation | | | |
| 6 | | | I Year weeding, hoeing including fertilizer& pesticide application | | | |
| 7 | | | II Year weeding, hoeing including fertilizer& pesticide application | | | |
| 8 | | | III Year weeding, hoeing including fertilizer& pesticide application | | | |
| 9 | | | Fence maintainance | | | |
| 10 | | | Protection of Plantation (expenditure on watchers) | | | |
| 11 | | | Fire protection | | | |
| 12 | | | I Year Casualty Replacement | | | |
| 13 | | | II Year Casualty Replacement | | | |
| 14 | | | III Year Casualty Replacement | | | |
| 15 | | | Miscellaneous | | | |

SUMMARY OF EXPENDITURE

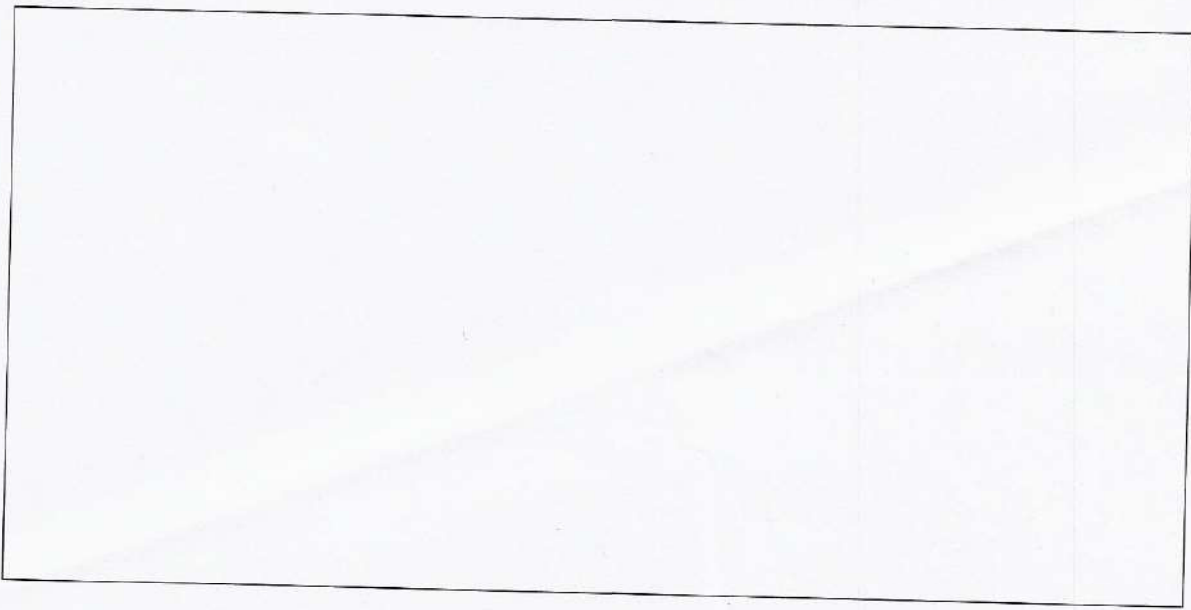
| Sl.No. | Type of Expences | Total Expenditures |
|--------|--|--------------------|
| 1 | Expenditure on Labour | |
| 2 | Expenditure on Material | |
| 3 | Total Expenditures | |
| 4 | Expenditure per Plant (Total Expenditures/Total Number of Plants) | |

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OBSERVATION OF RANGE FOREST OFFICER



INSPECTION NOTES OF OFFICERS



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