

Geo-tagging Operational Guidelines

I. Context and Rationale

Government of India's *Pradhan Mantri Awas Yojana Housing for All (Urban)* mission, launched in June 2015, envisions every family in the country owning a *pucca* house with water connection, toilet facilities and electricity supply in the 75th year of independence. The programme is implemented through four components, namely *'In situ' Slum Re-development, Affordable Housing through Credit Linked Subsidy, Affordable Housing in Partnership* and *Subsidy for Beneficiary led Individual House Construction* in a 'mission mode'.

The Mission is being systematically monitored at city, state and central government levels as mandated by the Mission guidelines which states that "suitable monitoring mechanisms will be developed by the mission." Considering the progress of the Mission so far and the complexity of the monitoring task ahead, MoHUPA has signed a MoU with the National Remote Sensing Centre (NRSC) of Indian Space Research Organization to collaboratively implement a project to 'geotag' every single house which is being constructed under the 'Beneficiary led Individual House Construction' component of the Mission, using a mobile application.

II. Concept of Geo-tagging

Geotagging is a process of assigning a 'geo-tag' or adding some 'geographical information' in various 'media' forms such as a digital photograph, video or even in a SMS message. Geo-tagging has already proved to be a powerful tool in monitoring housing projects in some of the Mission implementing states, such as Andhra Pradesh, Karnataka and Kerala.

III. Purpose of Geo-tagging

The key objective of geo-tagging is to track progress of construction of individual houses through geo-tagged photographs, under the Beneficiary led Individual House Construction component of the mission.

IV. Institutional Mechanism

Geotagging is driven by 'surveyors' who collect data with *Bhuvan-PMAY* mobile app and 'supervisors' who moderate the collected data at *Bhuvan-PMAY geo-platform*, based in the cities/states. PMAY MIS in which Beneficiary details are captured is now integrated with the *Bhuvan app* and *Bhuvan geoplatform* (the details of which are explained in section VI).

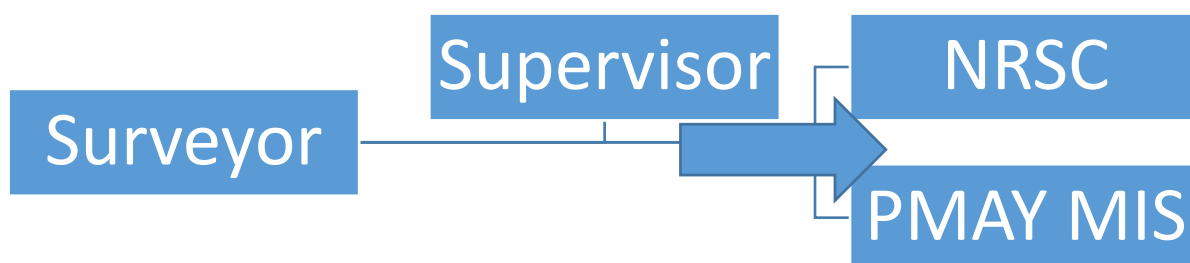
Surveyor: Surveyors are field level data collectors who will visit beneficiary locations to conduct geo tagging. A typical state would deploy 35 personnel with 35 mobile devices to complete geotagging of about 50,000 houses within 2 months. The surveyor should have completed basic school level education (up to class 10+2) with computer literacy and knowledge on 'how to operate phone cameras', take pictures of 'reasonably good resolution' and 'GPS accuracy of less than 10 meters'. She or he should also have clear understanding of field survey/ simple data collection

techniques. Surveyors should ideally come from the ULB staff itself. If that is not possible, the ‘surveyor’ work can be outsourced through competitive bidding process.

Supervisor: Supervisors are staff of ULB, not below the level of Junior Engineer or equivalent who are delegated supervisory responsibility by competent authority and should also have authority to verify beneficiaries and capable of validating geo-tagged images.

PMAY MIS and Bhuvan-PMAY application (NRSC and National Informatics Centre (NIC)): Desk based moderation of geo-tagged images available in the Bhuvan portal will be done at the Bhuvan Geo-platform. With support from NRSC and NIC, Bhuvan server applications have already been integrated with the PMAY-MIS (Management Information System). The system ensures two-way data exchange using Web Services. NIC and NRSC facilitate data exchange of beneficiary data and collected field data along with necessary filtering criteria.

The institutional mechanism for implementing the geo-tagging project is as depicted below:



V. Infrastructure Requirements

Smart Phone: Ministry will not encourage any investment in assets including smart phones. Therefore, as a strategy ULB may deploy its own staff (or hire an agency with staff who already own a smart phone) as surveyors. *(Specifications required for the smart phone are listed in Table 1.*

Table 1. Specifications Required for the Smart Phone to be Used in Geo-tagging

S. No.	Specification
1	Android OS (recent versions)
2	2GB or more RAM
3	16GB or more SD card memory
4	Touch screen of 3.5” size or larger
5	Camera (minimum specifications of 1.3 MP to have better resolution photos)
6	Internal GPS, GSM SIM (preferably), GPRS/3G/4G, Wifi, Bluetooth, compass

7	2500 mAH or better battery capacity
8	Charging cable, data cable, UB OTG support with OTG cable
9	20,000 mAH power bank to facilitate day long usage of mobile device

Data Pack: Data pack required for sending and receiving data between mobile device and Bhuvan server.

Computers: Any of the existing computers already available for the project work in ULB/CLTC/SLTC should be used to support the geo-tagging.

VI. The System Environment

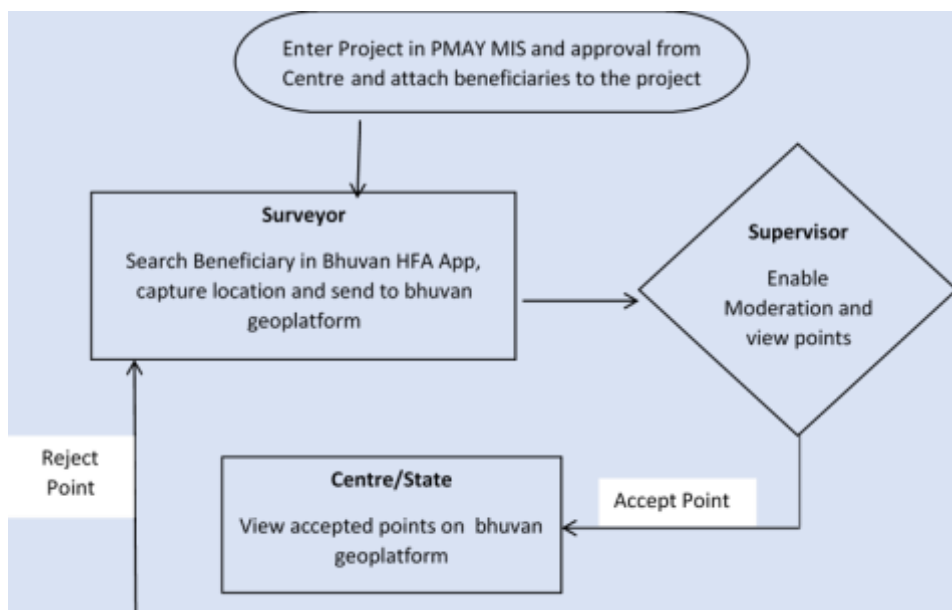
‘Bhuvan mobile app’ and ‘Bhuvan geo-platform’ are the two components of the system environment in geo-tagging.

Bhuvan Mobile App: Bhuvan Mobile App for the field based data collection has already been developed by NRSC and can be downloaded from

http://bhuvan.nrsc.gov.in/governance/housing_for_all.php

Once the relevant data on Beneficiary Led Construction (BLC) projects are entered in the PMAY MIS system, surveyor can access the full beneficiary list in her or his mobile phone through the app. (Surveyor has to refer ‘help manual’ available on phone, once app is downloaded.)

Surveyor or supervisor can assess from ‘date ranges’ regarding the beneficiaries that were tagged, and ‘at what stage’. State supervisors will regularly monitor the progress through these ‘date ranges’ and request surveyor visits accordingly for subsequent stages. The Bhuvan mobile app works as explained in the diagram below.



Bhuvan Geo-platform: This web-based application available at http://bhuvan.nrsc.gov.in/governance/housing_for_all.php

allows users to visualize the geo-tagged housing locations. It also allows authorized users (central, state and city) to moderate the collected geo-tagged points before it is made visible to the public. Different reports such as Date-wise search of beneficiaries that has been geo-tagged and their stages, reports regarding houses not being tagged as yet, or visits due after 1 month are available on Bhuvan platform. User manual on how to moderate is available on geo-platform. Bhuvan app is integrated with PMAY MIS, wherein MIS details of beneficiaries along with Bhuvan captured photograph of beneficiaries is available in PMAY MIS reports. Example of a report generated in the Bhuvan Geo Platform is given in the image below.

The screenshot displays the Bhuvan Geo-platform interface. On the left, the 'Field Data Viewer' panel shows filters for State (Tamil Nadu), Date Mode (Period), and Start/End Dates. A 'Total No of Points Found:10' is displayed at the bottom of this panel. The central area features a photo of a house under construction and a detailed data table. On the right, a map shows the location of the house in Kaveriranganagar, Annai Hospital area, with various streets labeled.

1 2	
Sl.No	28075
Beneficiary Name	
Address	
Beneficiary Id	338033390347300026
Capture Location	Door Step (DS)
Photo1	Center
Captured From	
Photo2	
Captured From	
Construction Type	New House
House Type	Semi-Pucca (Asbestos or Steel Sheet or Tiled)
Construction Stage	Roof
Electricity	Yes
Water	Yes
Sewerage	Yes
Occupation Status	Occupied by Beneficiary
Any Other Details	
Deprived Field	
Project Name	Periagrammam and Muthamiz Nagar slums

VII. Data and Images to be Collected from the Beneficiary Location

The key data to be collected from the beneficiary location are:

SNo	Data/ parameter	Options / Remarks
1	Geo-location coordinates of house	To be captured by button click when the app displays the smart phone's GPS reading as < 5m.
2	House location captured from	One option to be selected from drop-down box: Centre of Roof Top, Centre of House, Door Step, Rear Side of House
3	Photo 1 to 4	2 photographs to be taken for initial 3 stages and at the time of completion, 4 photographs to be taken along with photograph of beneficiary
4	Photo captured from	One option to be selected from drop-down box: Left, Right, Centre, Rear side. Preferably one side should have the name of the scheme and beneficiary ID can be displayed on the exterior wall of the house
5	Construction Type	New House or Enhancement
6	House type	01-Pucca (CC & Stone Slab),02-Semi-Pucca (Asbestos/Steel Sheet, Tiled),03-Katcha (Grass/Thatched, Tarpaulin, Wooden)
7	Construction stage	One option to be selected from drop-down box: Not started*, Foundation, Lintel, Roof, Completed
9	Occupation status	One option to be selected from drop-down box: Vacant, Occupied by Beneficiary, Rented, None
10	Water supply status	To be selected from: Yes, No
11	Sewerage status	To be selected from: Yes, No
12	Electricity status	To be selected from: Yes, No
13	Any other Details	Free text entry for capturing additional info
14	Automatically collected information tagged with each observation (without explicit user input)	Observer name, organization, mobile number, device unique ID, date time stamp, photo geo-coordinates

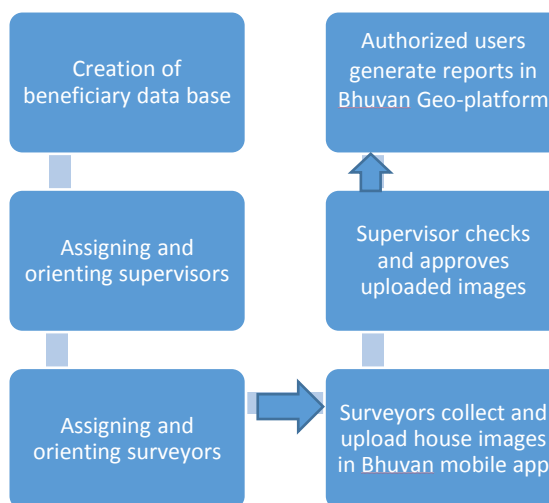
* 'Non Started' stage is mandatory for BLC Enhancement

VIII. Steps Involved in Geo-tagging

1. PMAY MIS creates a data base with required beneficiary details and provision to login for authorized individuals into the data base from various cities and states. (Pre requisite is to enter details of all the beneficiaries of CSMC approved projects in PMAY MIS, which will generate beneficiary ID).

2. NRSC creates state level logins to view State level data and State level users create city level logins for surveyors to authenticate data collected by surveyors at http://bhuvan.nrsc.gov.in/governance/tools/housingforall/admin/register_city.php. (Process of authentication of surveyors and supervisors is detailed in Annexure 1). Multiple surveyors in a city and single surveyor for multiple cities is allowed.
3. ULB identifies and assigns supervisors from their own staff to lead this at city level.
4. Orienting ULB supervisors through SLTC/CLTC
5. ULB identifies and deploys Surveyors with smart phones, after orienting them on the details of data and images required and use of ‘Bhuvan App’
6. ULB supervisor orients surveyors on use of app and required information and images from the beneficiary location. (Once surveyor downloads Bhuvan HFA app from http://bhuvan.nrsc.gov.in/governance/housing_for_all.php surveyor can search beneficiary name or ID in his mobile and go to location to capture an image which is then termed as “point” in the portal. Each surveyor’s mobile device is linked to its username with unique device ID. Help is available in app)
7. Surveyors search beneficiary details in the app and goes to the beneficiary location and capture image. A surveyor may capture up to 50 images per day. Surveyor uploads the captured images in the Bhuvan server through the app.
8. Supervisor checks the Bhuvan portal and approves the uploaded details. If there are images/data which do not meet the required quality and details, surveyors or supervisors will make follow up visits.
9. Once the supervisor approves the data uploaded, authorized users will generate various reports, as per requirement. The geotagged houses will also be made visible to the public or only to the authorised users, as deemed fit to the Ministry.
10. Supervisors frequently visit the portal to assess the stages of construction to advice on fund release or to monitor progress and instruct surveyors to make subsequent visits.

The geotagging steps can be summarized as given below in the flow diagram:



Annexure

Guidance for City Level Surveyors and Supervisors

Tutorial for Authorizing City level Surveyors and Supervisors

URL - http://bhuvan.nrsc.gov.in/governance/tools/housingforall/admin/register_city.php

State-level moderators can approve city-level Surveyors and Supervisors (Moderators)

- **Surveyors** - Those officials who are authorized to collect field data for a given city
- **Supervisors (Moderators)** - Those officials who are authorized to accept/reject field data collected for a given city

Following are the steps to authorize City level Surveyors and Supervisors.

Prerequisites are below

- **Surveyors** - Should have a Bhuvan account. And also added one sample Geo-tagged point using the Android App **with device id same as Bhuvan username**.
- **Supervisors (Moderators)** - Should have a Bhuvan account.

Both Surveyors and Supervisors should share their Bhuvan username and registered email id to get authorized by State Moderator.

Tutorial for Authorizing City level Surveyors and Supervisors

The screenshot shows the Bhuvan Central Authentication Service login interface. At the top left is the Bhuvan logo with the text "Bhuvan Beta Gateway to Indian Earth Observation". At the top right are the logos of the Government of India and ISRO. The main heading is "Central Authentication Service". Below this, there is a "Bhuvan-Single Sign On" section with a "Username" field containing "Andhra_hfa" and a "Password" field with masked characters. A "Login" button is present. To the right, a "Note" section explains that Bhuvan is using CAS for SSO and that registration is optional but recommended for full features. At the bottom left of the login section, there are links for "Change Password?", "Forgot Password?", "New User?", and "Didn't receive the account activation link?".

1. Login with your State moderator Username and password

The screenshot shows a dropdown menu titled "Select Action". The menu is open, showing four options: "Accept Supervisor" (selected), "Accept Supervisor", "Accept Surveyor", and "Delete User".

2. You have options to authorize supervisor/surveyor or delete already authorized supervisor/surveyor

City	Username	Role
Currently there are no users.		

3. Currently there is no user authorized by you

Tutorial for Authorizing City level Surveyors and Supervisors

Select Action Accept Supervisor ▾

Bhuvan CAS User name

User Emailid

City

4. Select Action - Accept Supervisor. Give the username and Email id provided to you by your city Supervisor. Choose the city to be mapped with and click on "Accept Registration"

RECORD NOT Found in Bhuvan-Central Authentication Service. Please ask the user to register with Bhuvan and share their email id and username with you.

5. If the username and Email id entered by you is wrong you will get above message

Previous RECORD Not added as city name was empty.

6. If you have not selected any city to be mapped upon, you will get above message

Tutorial for Authorizing City level Surveyors and Supervisors

Welcome Andhra_hfa

Logout

Previous RECORD added successfully.

Select Action

Accept Supervisor ▾

Bhuvan CAS User name

User Emailid

City

Accept Registration

City	Username	Role
Amadalavalasa	sonal	supervisor

7. If correct username & Email id is given you will get above screen. And list of users will display the authorized user with her Role (as Supervisor).

Tutorial for Authorizing City level Surveyors and Supervisors

Select Action Accept Surveyor ▾

Bhuvan CAS User name

User Emailid

City Bhimavaram ▾

Unique Mobile Id ▾

8. In order to authorize a surveyor select action "Accept Surveyor". The moment you enter the Username automatically "Unique Mobile Id" drop-down will appear if the official has added one sample Geo-tagged point using the Android App **with device id same as Bhuvan username**. If not list will be empty.

Select Action Accept Surveyor ▾

Bhuvan CAS User name

User Emailid

City Bhimavaram ▾

Unique Mobile Id 736cdad08367854d ▾

9. As seen above user 'sonal' has added point through mobile App, thus Unique Mobile Id is visible. Click on Accept registration.

Tutorial for Authorizing City level Surveyors and Supervisors

User is already linked with Amadalavalasa as supervisor

10. Since the user is already registered as Supervisor, she cannot be a Surveyor.

Select Action

Delete User

Select User

sonal

Delete User

City	Username	Role
Amadalavalasa	sonal	supervisor

11. Select action 'Delete user' in order to un-authorize the user. Click on Delete user

Previous Request for user deletion is processed successfully.

12. The above message shows that user has been successfully unauthorized.