

Application of Satellite Images in Mining Surveillance System (MSS)

For NRSC User Interaction Meet -2021

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By

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What is MSS

- Mining Surveillance System to **detect Unauthorized mining instances**
- **Integrated Application**
 - Geo Spatial Information technology,
 - Remote sensing technology in the form of satellite images
- Ministry of Mines through IBM has developed the MSS in collaboration with BISAG(N) and MeitY
- The system launched on 15th October 2016 .
- Mining Surveillance System make uses of **latest satellite Imaginary** and superimposing digitized mining leases (boundary) .

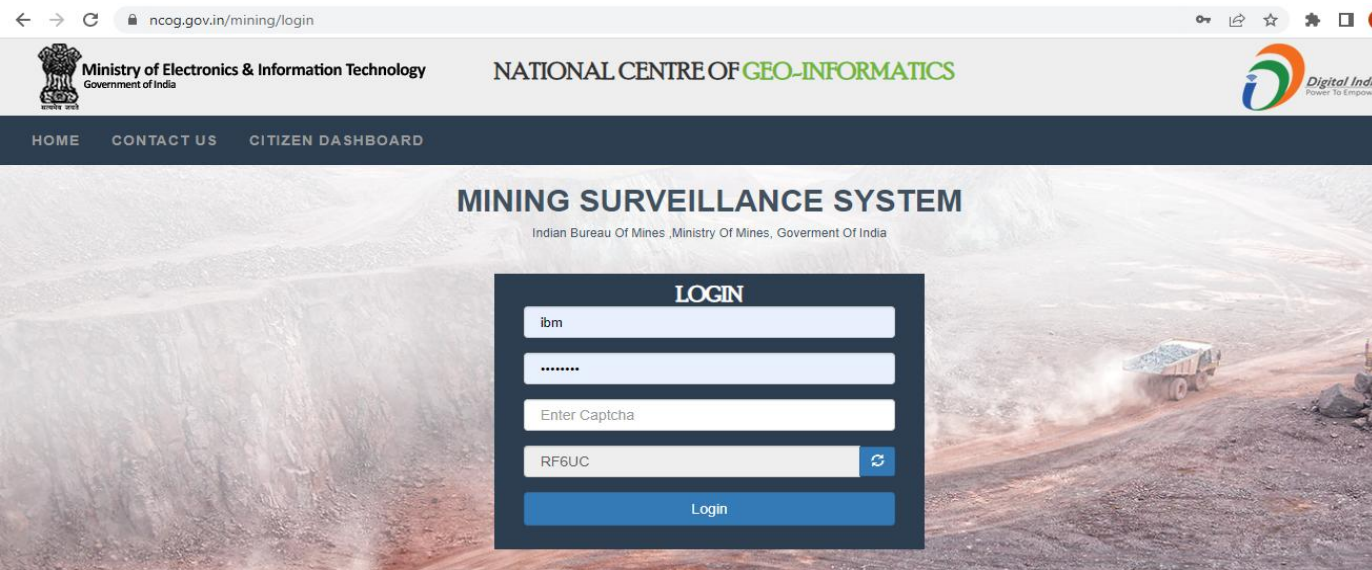
Need of MSS

- Illegal mining : an **endemic** problem in many mineral rich areas.
- Conventional checks: **inadequate**.
- **Technological intervention** : Simple - Transparent - Efficient
- Low Cost
- **Remote Sensing Technology** based Tools & Applications in Governance and Development

Principles

- Basic principle - most **minerals occur in continuity** and their occurrence is likely to extend in the vicinity of existing leases
- Surveillance of area up to **500m outside** the lease boundary using the satellite imagery
- To develop a system for **detection** of incidence of illegal mining **outside the lease boundary** by use of RS technology (Temporal imagery)
- Simple - Transparent - Efficient - Low Cost
- Being Developed initially for Major Mineral Leases

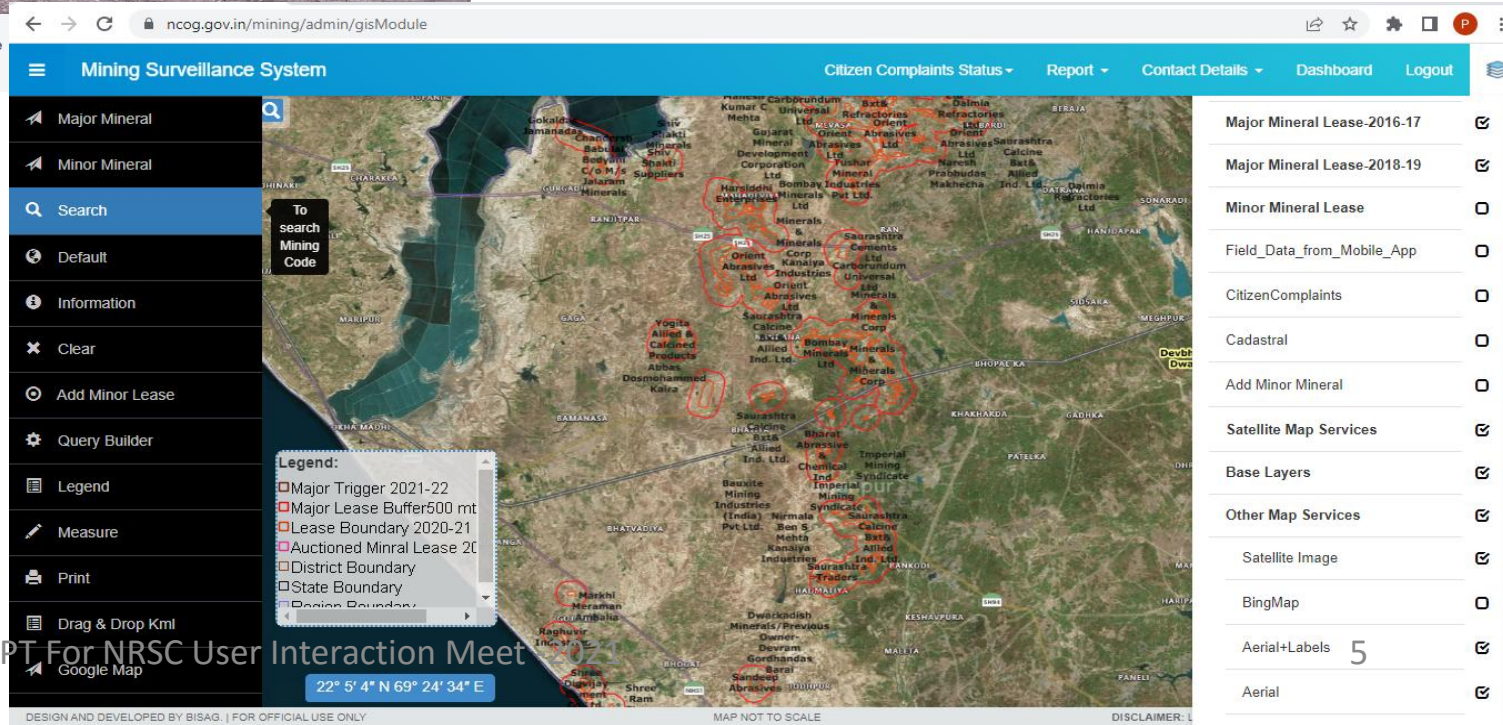
Interactive live portal/GIS Layer



*A dedicated portal for the system
has been prepared for all
stakeholders*

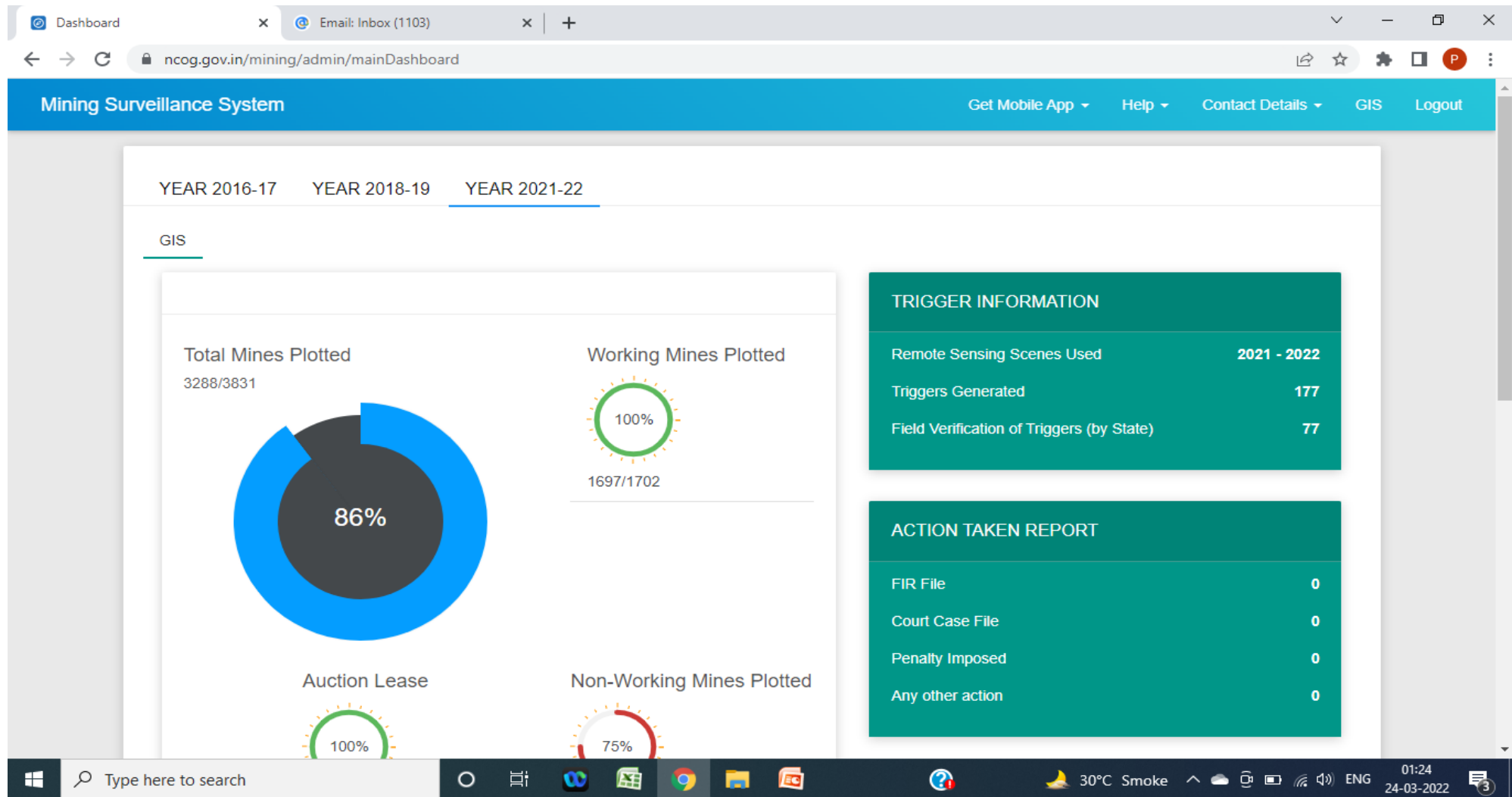
*Filters allow drill-down from state
level right upto mine name/owner
level*

*Option to select the type of
scenes/information layers which
have to be overlapped for
comparison*

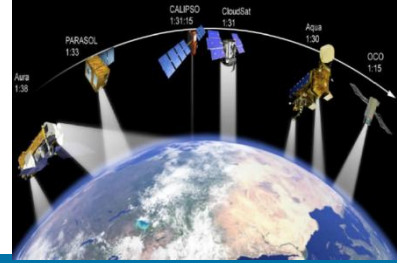


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Dashboard

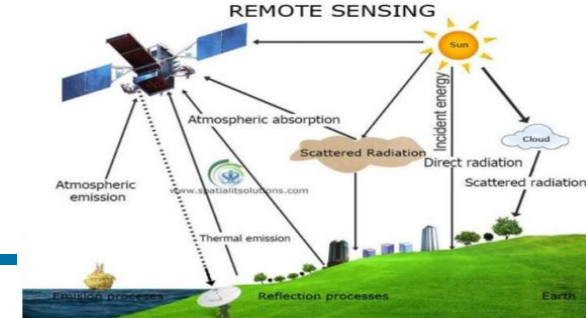


Advantages



- **Deterrence Effect** : ‘Eyes watching from the sky’
- **Transparency**: Satellite based technology with minimum human interference – transparent and unbiased recording
- **Participatory** : Citizens can report unusual mining activity
- **Bias-free**: No human interference
- **Quicker Response and Action**: Sensitive areas can be monitored more frequently.
- **Effective Follow-up**: Action on triggers monitored through Dashboard

Advantages contd...



- Cover remote & inaccessible areas
- Detection of mining activity through temporal satellite images
Integration of information from multiple sources
 - Satellite imagery,
 - Cadastral plan, etc.
 - Lease hold plan
- Effective tool for monitoring of illegal mining- location, extent and trends
- MIS reports

MSS - Geo-informatics : Database Creation

Village Map Geo-referencing through Indian Satellite Images

Collection of Village Map



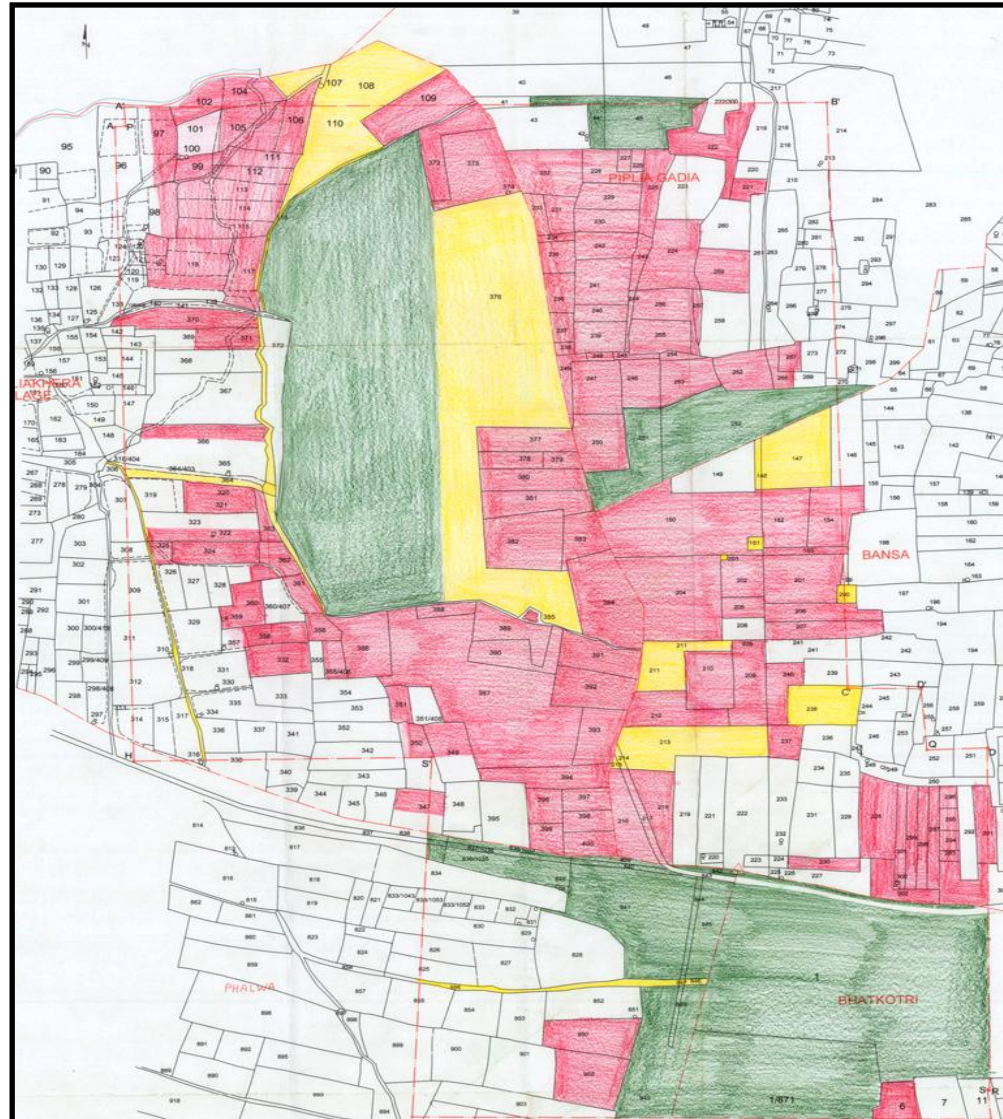
Scanning of Map



Geo-referencing of Scanned Map to Satellite data



Digitization of Geo-referenced village Map

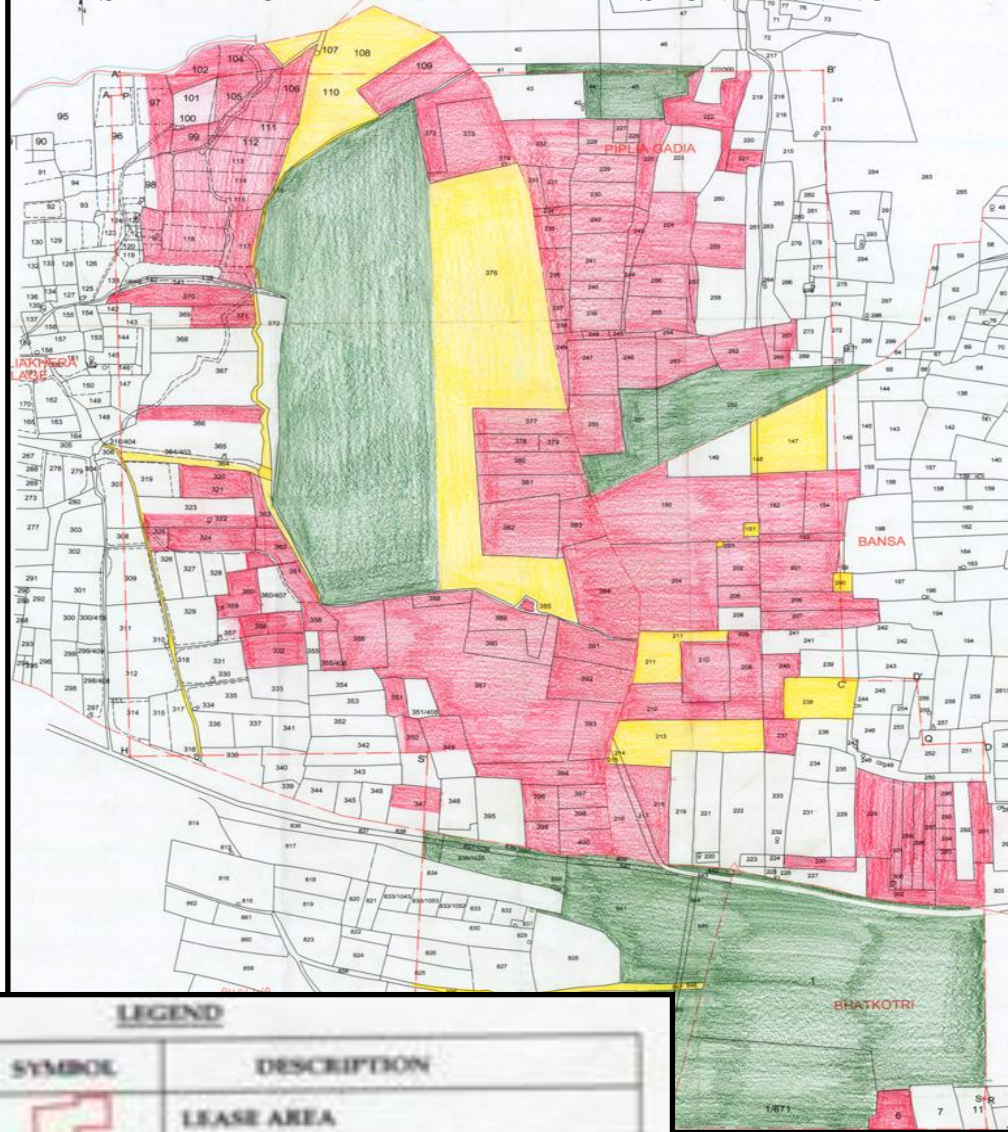


LEGEND		
S.N.	SYMBOL	DESCRIPTION
1.		LEASE AREA
2.		KHASRA NO.
3.		VILLAGE BOUNDARY
4.		NALLA
5.		GOVT LAND
6.		CHARNOT LAND
7.		PRIVATE LAND ACQUIRED BY STATE
8.		PRIVATE LAND NON ACQUIRED



A Starting Point

KHASRA MAP OF MALIA KHERA LIMESTONE MINING

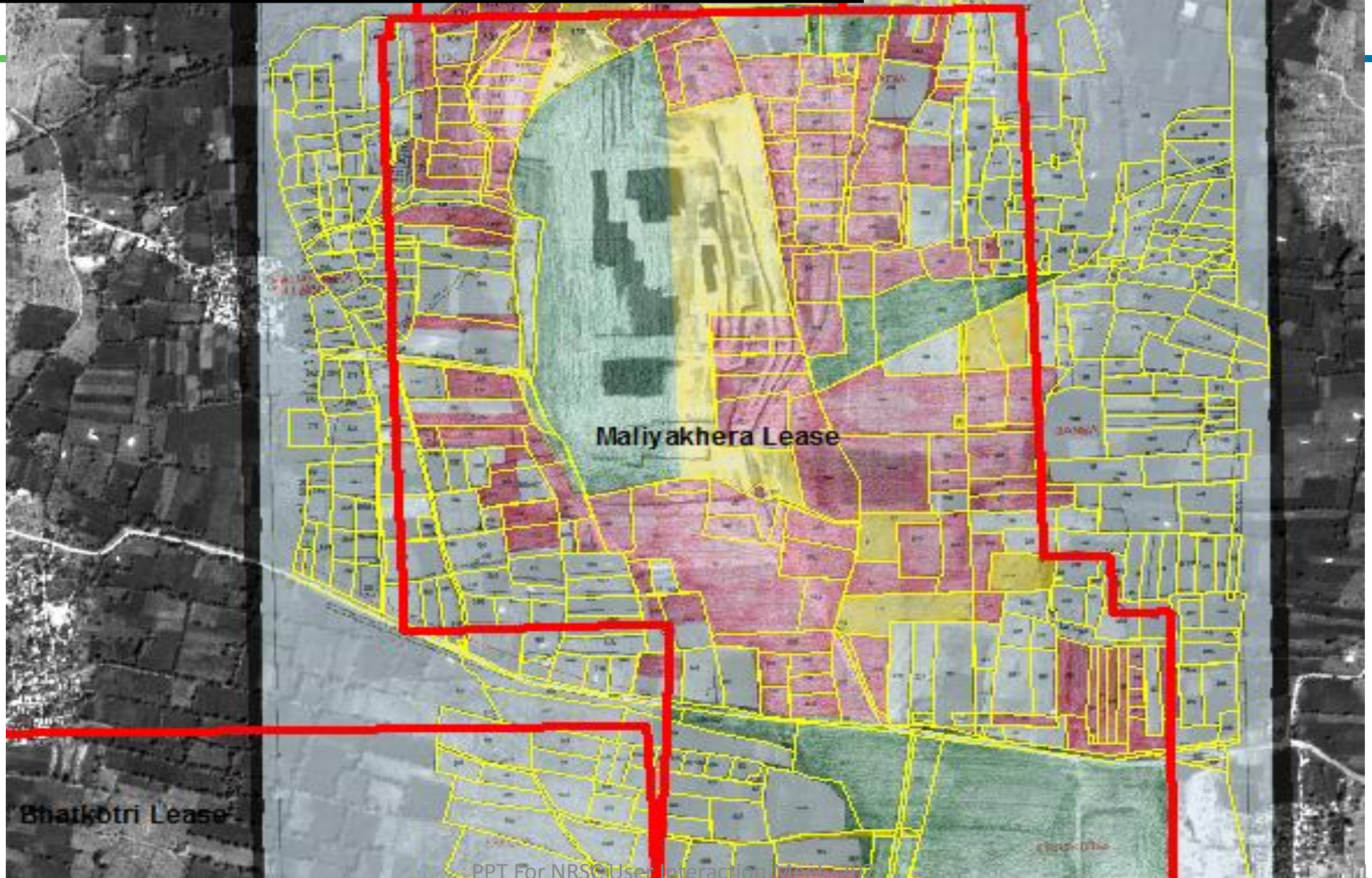


CARTOSAT SATELLITE IMAGE : RESOLUTION 2.5 METER

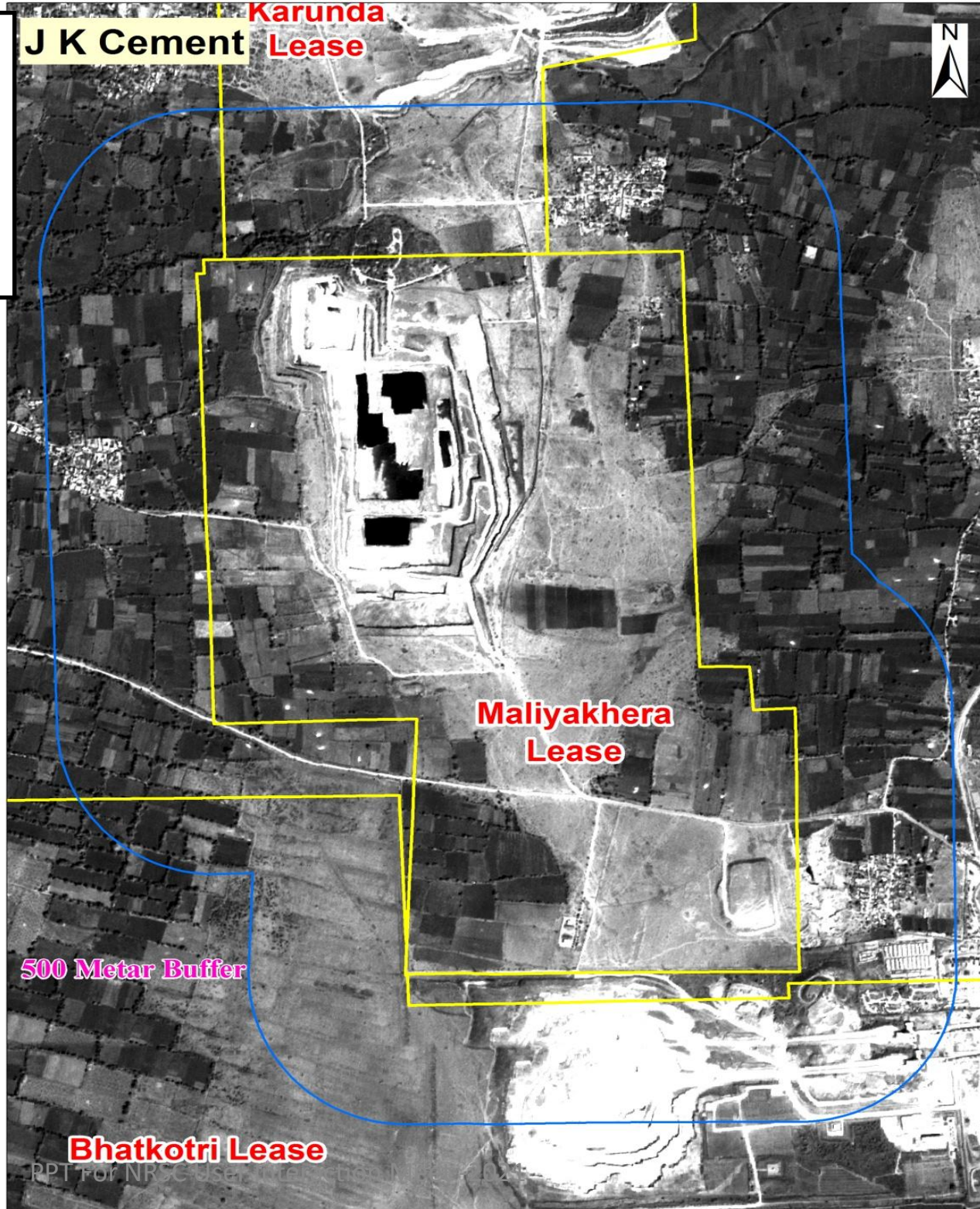


VILLAGE : MALIYA KHERA
 TEHSIL: NIMBAHERA
 DISTRICT: CHHITORGARH
 STATE : RAJASTHAN

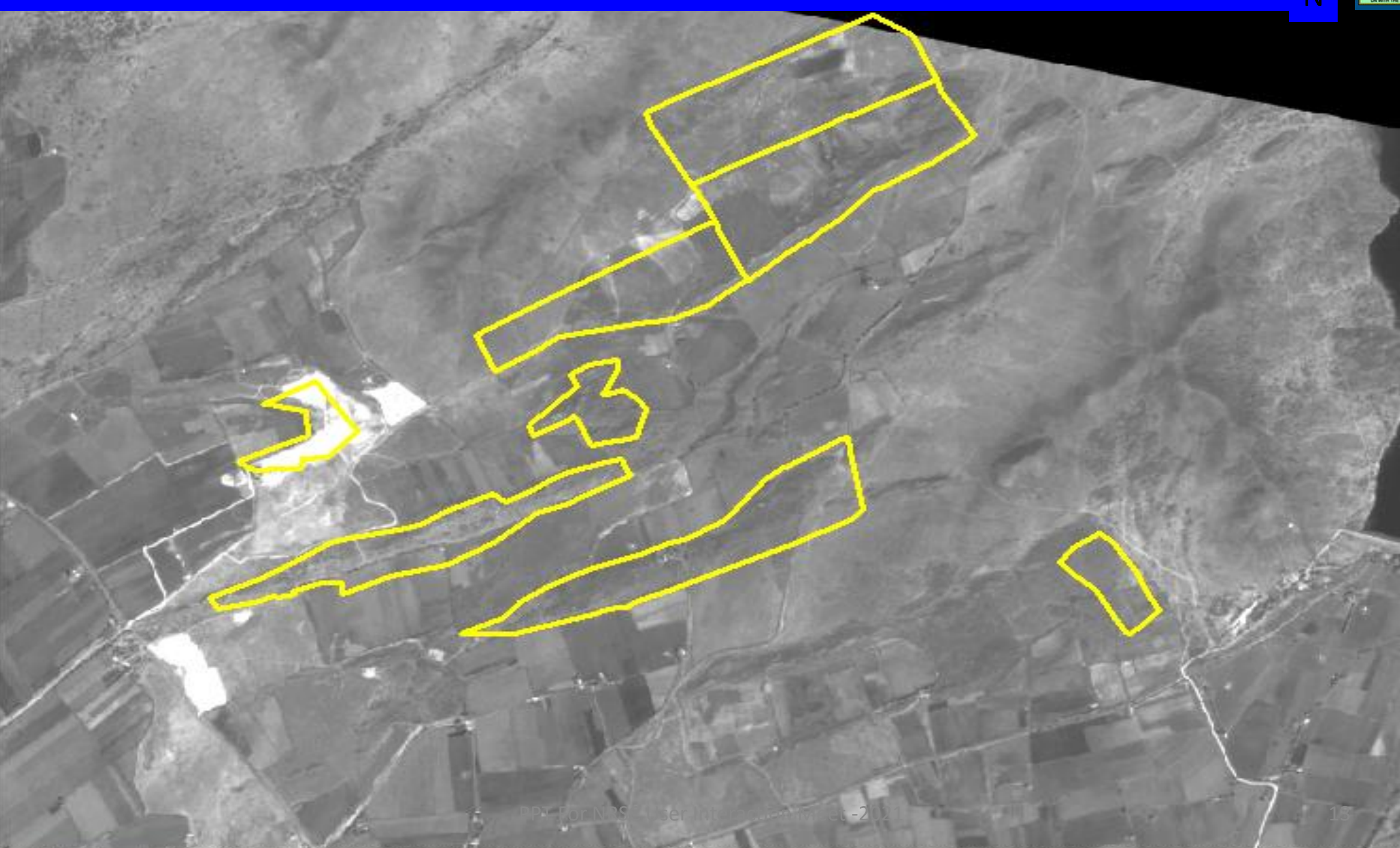
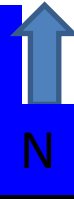
LEASE BOUNDARY SUPER- IMPOSED ON KHASRA NUMBERS



500 METER BUFFER FROM LEASE BOUNDARY



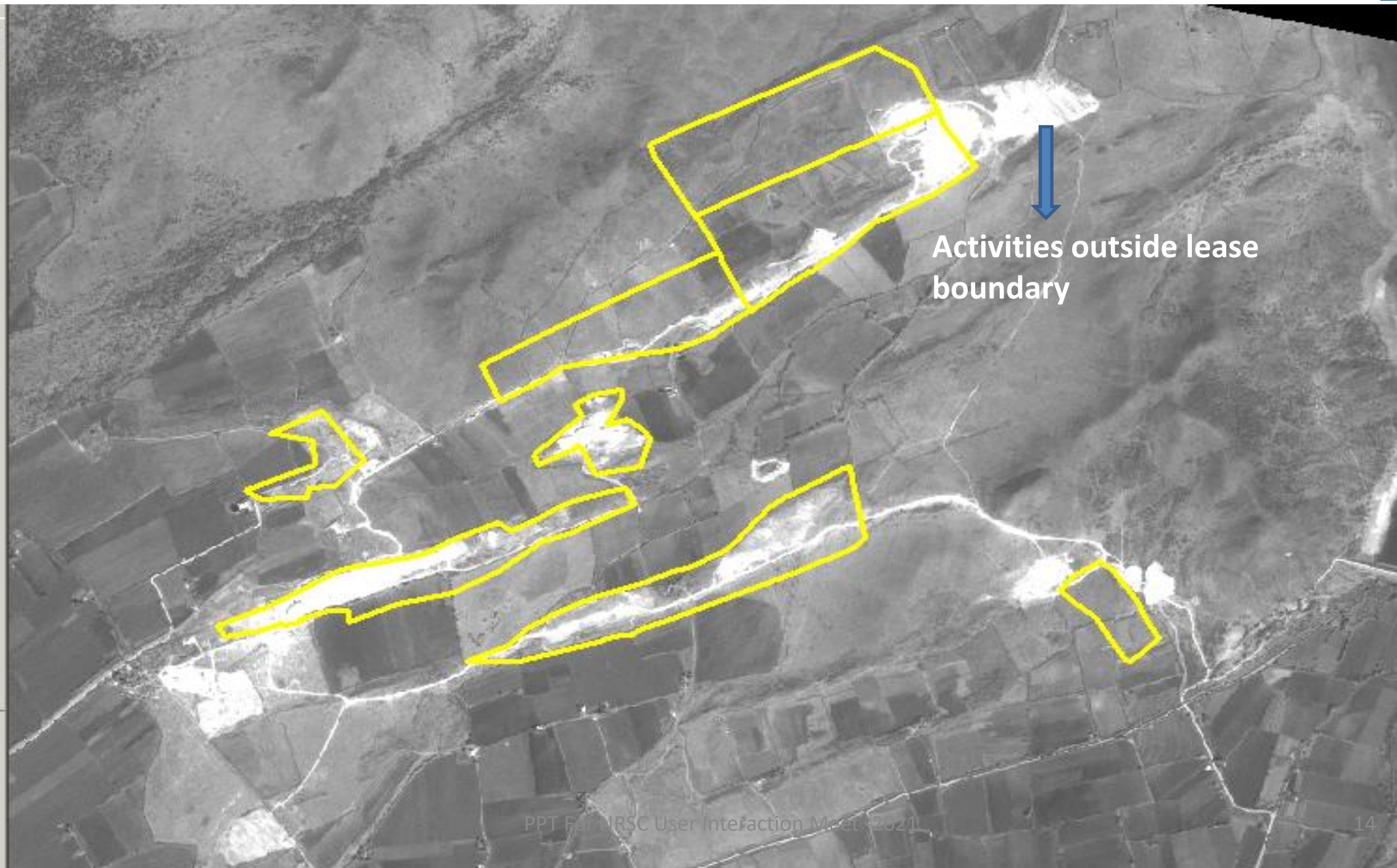
LEASE BOUNDARY MAP SUPERIMPOSED ON 2007 (CARTOSAT-1) SATELLITE IMAGERY



LEASE BOUNDARY MAP SUPERIMPOSED ON 2015 (CARTOSAT-1) SATELLITE IMAGERY

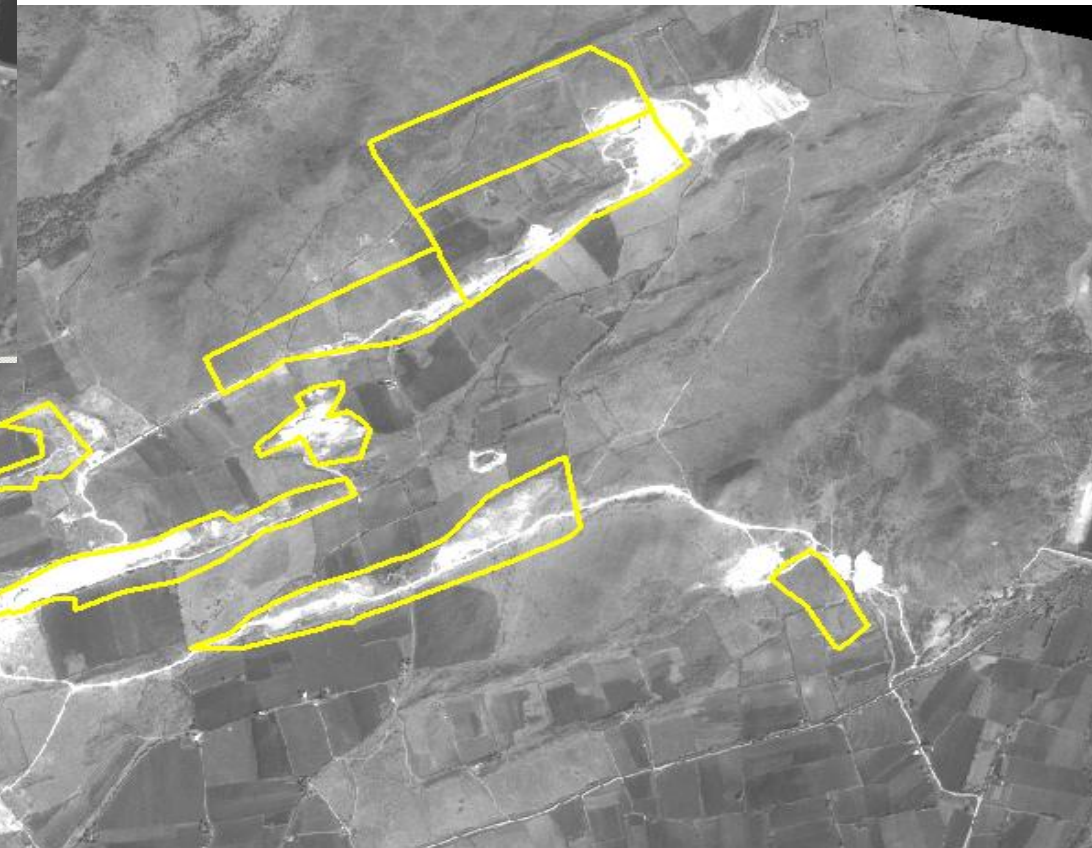
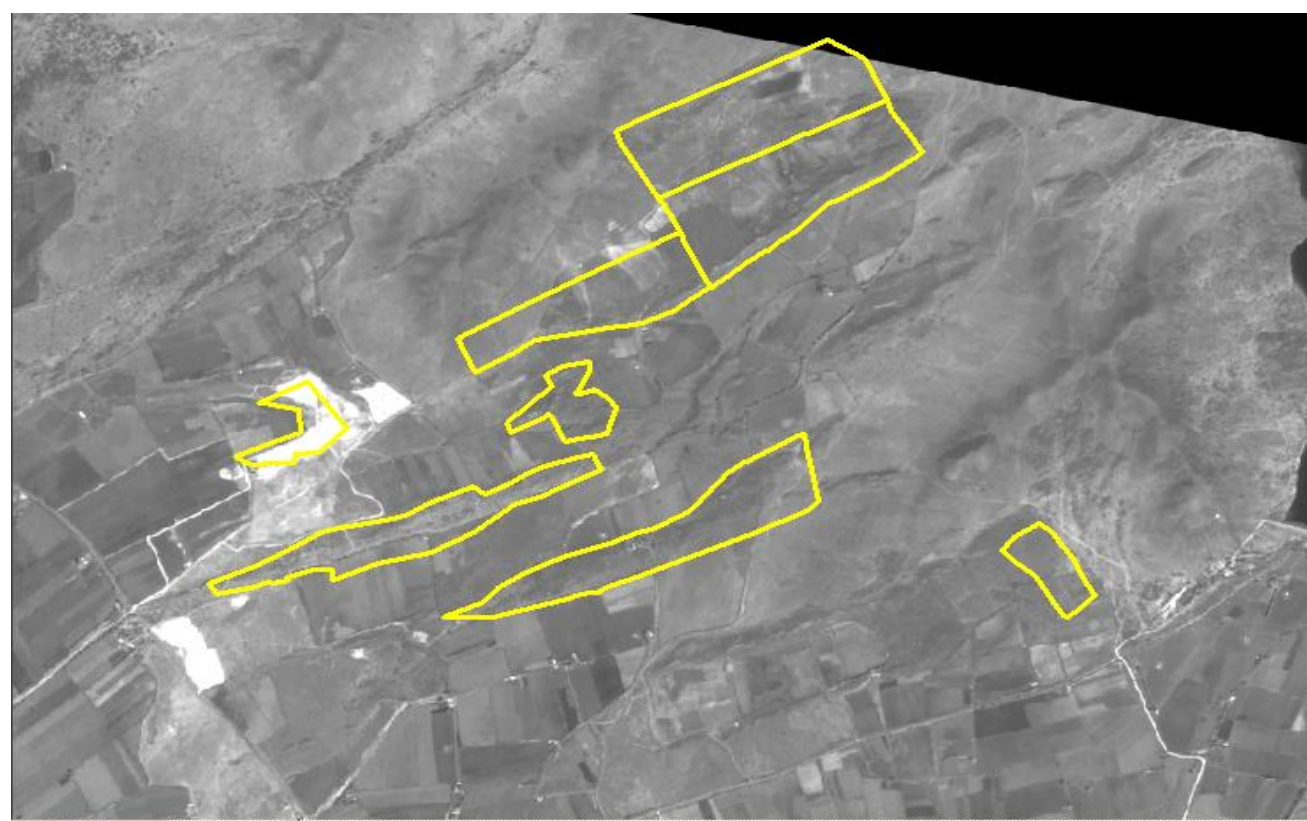
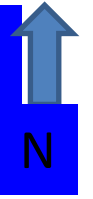


N



Activities outside lease
boundary

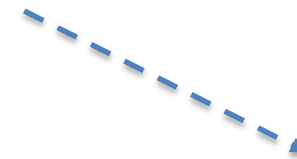
COMPARISON OF TEMPORAL SATELLITE IMAGES 2007 (CARTOSAT-1) Vs 2015 (CARTOSAT-1) SATELLITE IMAGERY



Generation of triggers



NRSC Hyderabad provides satellite scenes over a period of time regularly

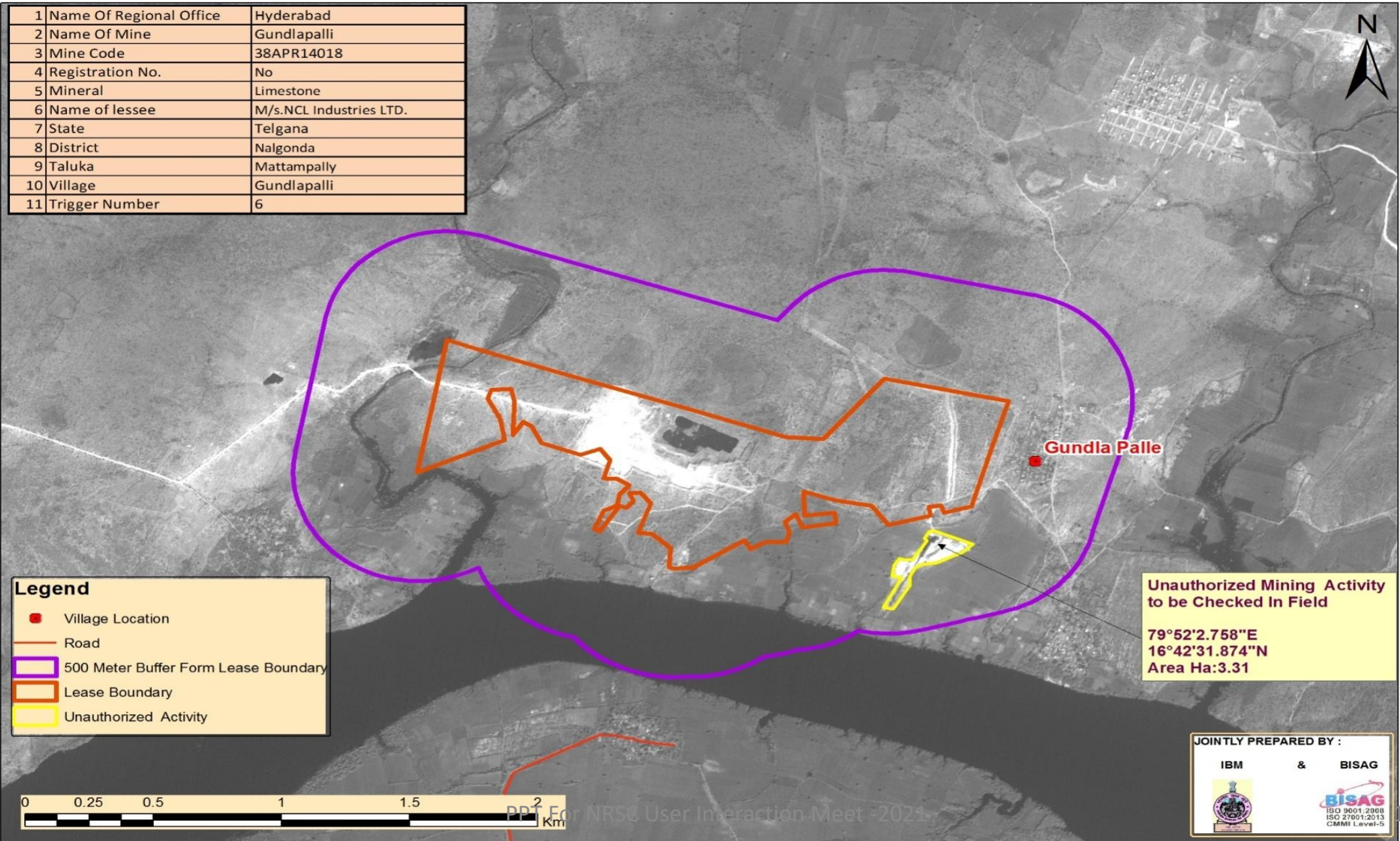


Trigger generated

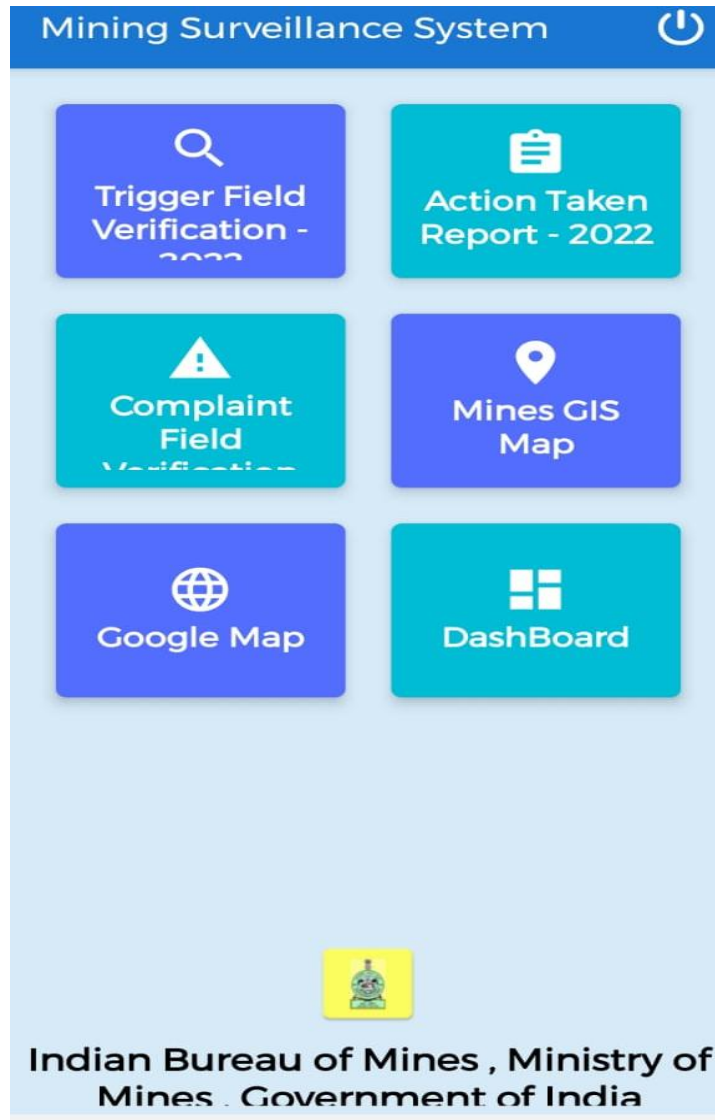


The geo-referenced mining lease is superimposed on a satellite scene

MSS - Checking unauthorized mining in vicinity of existing leases



A user-friendly mobile app for field officials



Inspection report by the field officers can be submitted on the app directly



Complaints can be lodged on the app for consideration of regulatory authorities



The app allows checking the location of nearby mining leases even in the offline mode



Information on mining leases, MIS reports etc. can be accessed on through the app

A user-friendly mobile app for citizens

**Mining Surveillance System
(Public)**

[Home](#)

Mobile No :
9989534566


Mineral Type : ☐ Major ☒ Minor

Mineral Name :
Limestone

Name of Complainant :
xyz

Description of complain :
observation

[Take Photo](#)



[Submit](#)



Complaints by Citizens



Geo-Tagged photograph



Inspection to be done by mining officers



*citizen complaints – field verification
being done by State*

Way Forward

- High Resolution Satellite Images required for better clarity.
- The time span for availability of next satellite images to be reduced for same area, so that frequency of triggers can be increased.
- Satellite Data may be made available free of cost of Project like MSS.

Thank You
