Department of Science and Technology
Government of India

SECOND UNITED NATIONS WORLD GEOSPATIAL INFORMATION CONGRESS

10–14 October 2022, Hyderabad, India

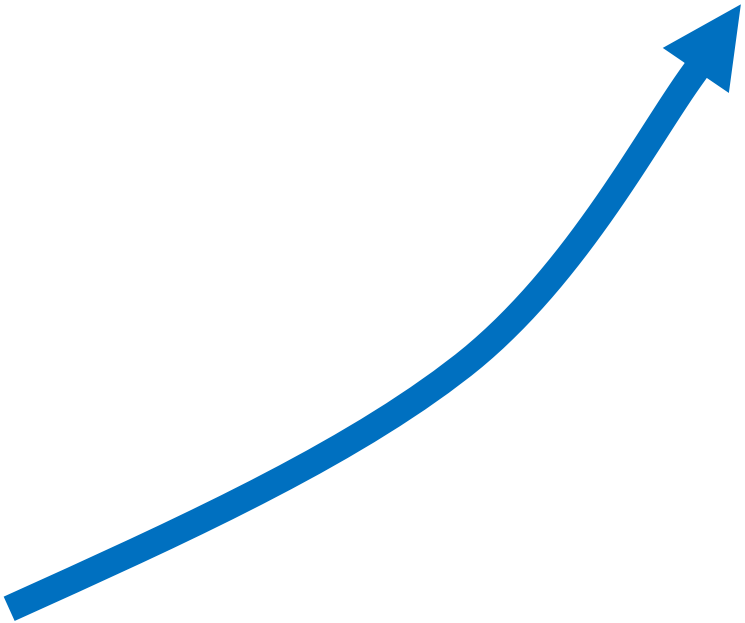
"Geo-Enabling the Global Village: No one should be left behind"

National implementation of Online Geospatial Transaction System

Sajeevan G

Associate Director, C-DAC Pune

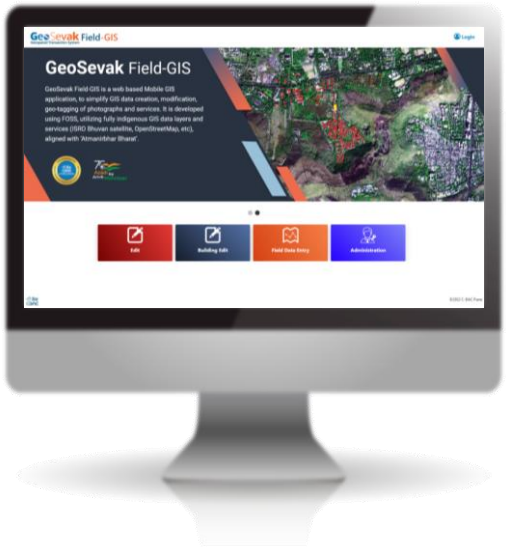
Chief Investigator - PMGSY National GIS



GIS-as-a-Service
Web API / Web Service

GeoSevak Framework

GeoSevak
Geospatial Transaction System



PMGSY

PMGSY – *Pradhan Mantri Gram Sadak Yojana* – Prime Minister's Rural Road Programme.

Launched by the Govt. of India to provide all weather road connectivity to unconnected rural habitations

01 Poverty alleviation

02 Access to market

03 Employment

04 Health care

05 Education

PMGSY & GIS

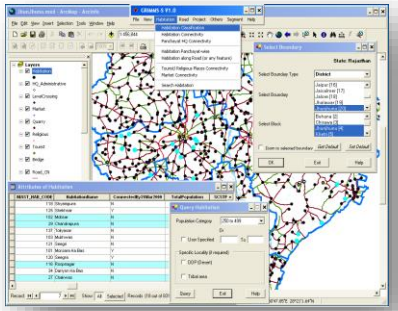
PMGSY National GIS

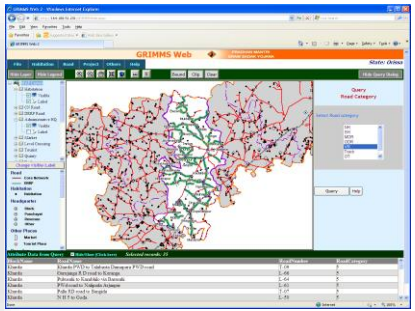
GRRIS http://pmgsy-grris.nic.in

(Project 2016 onwards)

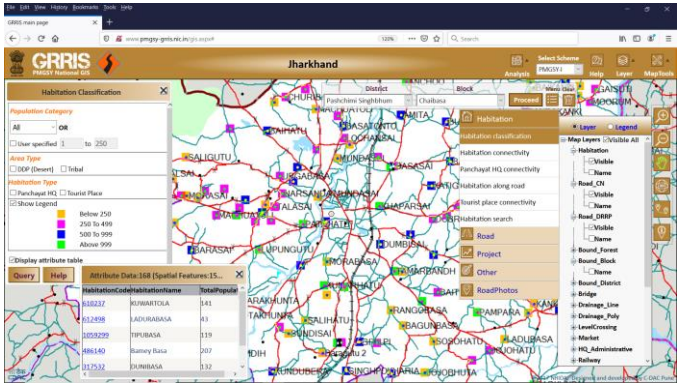
GeoSadak https://geosadak-pmgsy.nic.in

(Project 2019 onwards)





2005



2016

References

GEOSPATIAL ACCURACY & THE CHANGE

PMGSY NATIONAL GIS GUIDELINE

05PMGSY-GuidelinesGIS_V5.pdf - Adobe Reader

File Edit View Window Help

Open | 1 / 6 | 78.1% | Tools | Fill & Sign | Comment

PMGSY National GIS

GIS DATA STANDARD
(Version 5)

(Compared to the previous document version, additional explanations incorporated)

All the States should follow this GIS data standard.

For the spatial data creation/updating, the States may choose the methodologies in SRS (pmgsy.nic.in/circulars/GIS_SRS_29052015.pdf) or adopt any methodologies convenient to them.

1. GIS EXPERT

Hire GIS person (in case not available with the State) for managing the activity of spatial data generation throughout the project duration.

2. DATA FORMAT

GIS layers should be provided in shape (.shp) format.

3. PROJECTION

All GIS layers should be in **WGS84** datum and **lat-long** coordinates. No map projection.

4. DATA VALIDATION/ACCURACY/QUALITY

All spatial features should be finally captured to the WGS84 datum and should be verifiable as per GPS. This means **the accuracy should be verifiable on the ground as per GPS and not directly as per SoI toposheets**. Therefore, any corrections on the data required should be carried out by the States.

However, the States can initially capture the data from any available source and later update. Updating can be carried out over available map services from GoogleEarth, Bhuvan etc. In other words, the States need not carry out GPS survey to map the layers. GPS enabled mobiles can also be used for updating. GPS enabled mobile could be helpful in validation of the data on the ground, uploading photographs or any other visual information on to the database, etc.

5. GIS DATA MOSAIC

pmgsy-gim.pdf - Adobe Reader

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INDIA LAUNCHES NATIONAL WEB GIS APPLICATION FOR PMGSY

Nation Building through GIS in India

Geographical information systems (GIS) are proven to solve complex spatial problems, and accurate digital geospatial data is essential for planning and development activities to help the government of India achieve its ambitious aims. With the involvement of all the States and the Union Territories (UTs), the National Rural Road Development Agency (NRRDA), along with the Centre for Development of Advanced Computing (CDAC), is currently carrying out national implementation of a web-based geographic information system for the *Pradhan Mantri Gram Sadak Yojana* ("Prime Minister's Rural Road Programme"/PMGSY). To conform to PMGSY GIS spatial accuracy guidelines, all the States are creating digital geospatial data. The web-based GIS application that is being developed will be open to all.

Spatial Accuracy

The spatial accuracy of geospatial features such as locations of habitations, roads and administrative boundaries is extremely important for planning and development activities. It is crucial that a feature is placed on the map at the same location where it is spatially located on the ground.

Looking at the trend, it may be observed that a good part of GIS project time is spent on creating digital base data. While the national projects struggle to get reasonably accurate digital spatial data, many establishments own and operate with higher-accuracy geospatial data, such as the data for vehicle navigation systems.

The accuracy of the Survey of India topographic map (*topo-sheet*) is sometimes questioned, citing that it is generated from very old surveys. However, those maps are reasonably accurate unless there has been any positional change of features on ground. The major reason for spatial inaccuracy in digital data is the wrong data conversion process. Before digital conversion, the map components and particularly the map projection parameters should be well understood. Overlaying spatial data from different sources clearly reveals any positional shifts if the correct digital data conversion process has not been followed.

GIS Guidelines

The PMGSY geospatial data creation process deviated from the traditional way of digitisation to ensure position accuracy of features. The base data and the enforcing boundaries have been discarded. Along with that, unprojected Global Positioning System (GPS) latitude-longitude coordinate readings on WGS84 datum are enforced. At the same time, geographical features could directly be captured using GPS rather than losing spatial accuracy through map projection conversions. The State officials have been trained to achieve spatial accuracy through GIS guidelines, research articles, presentations and workshops. However, the States have the freedom to choose an appropriate digitisation methodology.

Policy and Change

The government agencies involved in planning and development should have access to accurate digital base data. Gone are the days of project handling using hard-copy map sheets that are projected in varying projection parameters. It should be a collective responsibility of the government and the domain experts to bring about a change – a change for making accurate digital spatial data easily available for nation building. Rather than focusing on the elementary data conversion domain, the GIS industry should diversify on location-based services, GIS data processing, complex geospatial data capture/updating, etc. This can propel requirements for advanced spatial data and software.

Various GIS technological advancements have been applied to the PMGSY National GIS so that the output could contribute immensely for the national GIS. In future, the officials could focus on analysis, planning, modelling, etc., rather than hunting

Refer

1. **Sajeevan G (2005)**. *Correct usage of map projection parameters for spatial accuracy*. Map India 2005: Conference. 07-09 February 2005, Delhi.
2. **Sajeevan G (2008)**. *Latitude and longitude – A misunderstanding*. Current Science, vol. 94, no. 5, pp. 568-569.

GEOSADAK
PMGSY National GIS

आत्मनिर्भर भारत

GeoSadak, “Online Geospatial Transaction System”, developed using Free & Open Source Software utilizing fully indigenous GIS data layers including ISRO Bhuvan satellite data service.

https://geosadak-pmgsy.nic.in

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भारत सरकार
MINISTRY OF RURAL DEVELOPMENT
GOVERNMENT OF INDIA

सी डैक
CDAC

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PMGSY GeoSadak

https://geosadak-pmgsy.nic.in

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GEOSADAK
PMGSY National GIS

Login

Open Data | Upload / Approve | QC Report | Edit | State Report | National Report | Visualization | Proposals | Download | Data Service | Simulation | Administration

About GeoSadak

GeoSadak enables collating, managing, online spatial data quality report, editing and serving geospatial data in real time.

PMGSY-III envisages consolidation of the existing Rural Road Network launched with the primary obje

Designed, developed and maintained by C-DAC Pune

C-DAC GRRIS PMGSY National GIS OMMAS

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Admin Services PMGSY GeoSad

https://geosadak-pmgsy.nic.in/AdminService/AdminServiceMenu

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PMGSY National GIS

sadmin01

Home / Administration

Admin Services Menu

Update Labels

Update Labels

Update Labels

Submitted Labels Status

View Status

View Status

Lock/Unlock Layers

Lock/Unlock Layers

Lock/Unlock Layers

Users

Manage users - View users and information

Manage

Manage Roles

Add/Remove and view roles defined for users in the application

Manage Roles

Messages

Send Messages to users

SOS

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Uploaded Files Status PMGSY G

https://10.208.26.198/FileUpload/ListUploadedFiles

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Ministry of Rural Development
GOVERNMENT OF INDIA

GEOSADAK
PMGSY National GIS

Odisha | All | All

Admin26

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Uploaded Files Status

Awaiting For Approval | Approval History | Reject History

Show 10 entries

Search:

#	Uploaded by	Approved by	State/Block	Layers	Operation	Uploaded Time	Approved Time	Files
311	User26-1	Admin26	State - 26	road_drrp	overwrite	22-10-2020 12:40:53	22-10-2020 12:46:34	View Files
297	User26-1	Admin26	Block - 492 Name - Banarpal	bound_block	overwrite	16-10-2020 16:33:38	16-10-2020 16:43:08	View Files
265	User26-1	Admin26	Block - 492 Name - Banarpal	bound_block,habitation,road_cn	overwrite	30-09-2020 13:06:15	02-11-2020 13:32:51	View Files
202	User26-2	Admin26	Block - 492 Name - Banarpal	Bound_Block,Habitation,Road_DRRP	append	01-09-2020 09:42:51	09-09-2020 16:19:49	View Files
201	User26-2	Admin26	Block - 492 Name - Banarpal	Habitation	overwrite	01-09-2020 09:42:35	09-09-2020 16:20:06	View Files
195	User26-2	Admin26	Block - 5868 Name - Talcher	Road_DRRP	overwrite	28-08-2020 16:26:46	28-08-2020 16:31:18	View Files
167	User26-1	Admin26	Block - 2217 Name - Hindol	Habitation	overwrite	05-08-2020 16:01:27	05-08-2020 16:01:52	View Files
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141	User26-1	Admin26	Block - 2217 Name - Hindol	Road_DRRP	overwrite	28-07-2020 16:06:44	31-07-2020 11:11:37	View Files

Showing 1 to 9 of 9 entries

Previous 1 Next

File Edit View History Bookmarks Tools Help

PMGSY GeoSadak

https://10.208.26.198/QCReport/QCReportDraft

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GEOSADAK
PMGSY National GIS

Odisha | All | All

User26-1

Home / QC Report

QC Report

Scheme : PMGSY III

Note : Scheme selection NOT applicable for BOUND_BLOCK

Select layer(s) :

- ☐ Bound_Block
- ☐ Habitation
- ☐ Road_CN

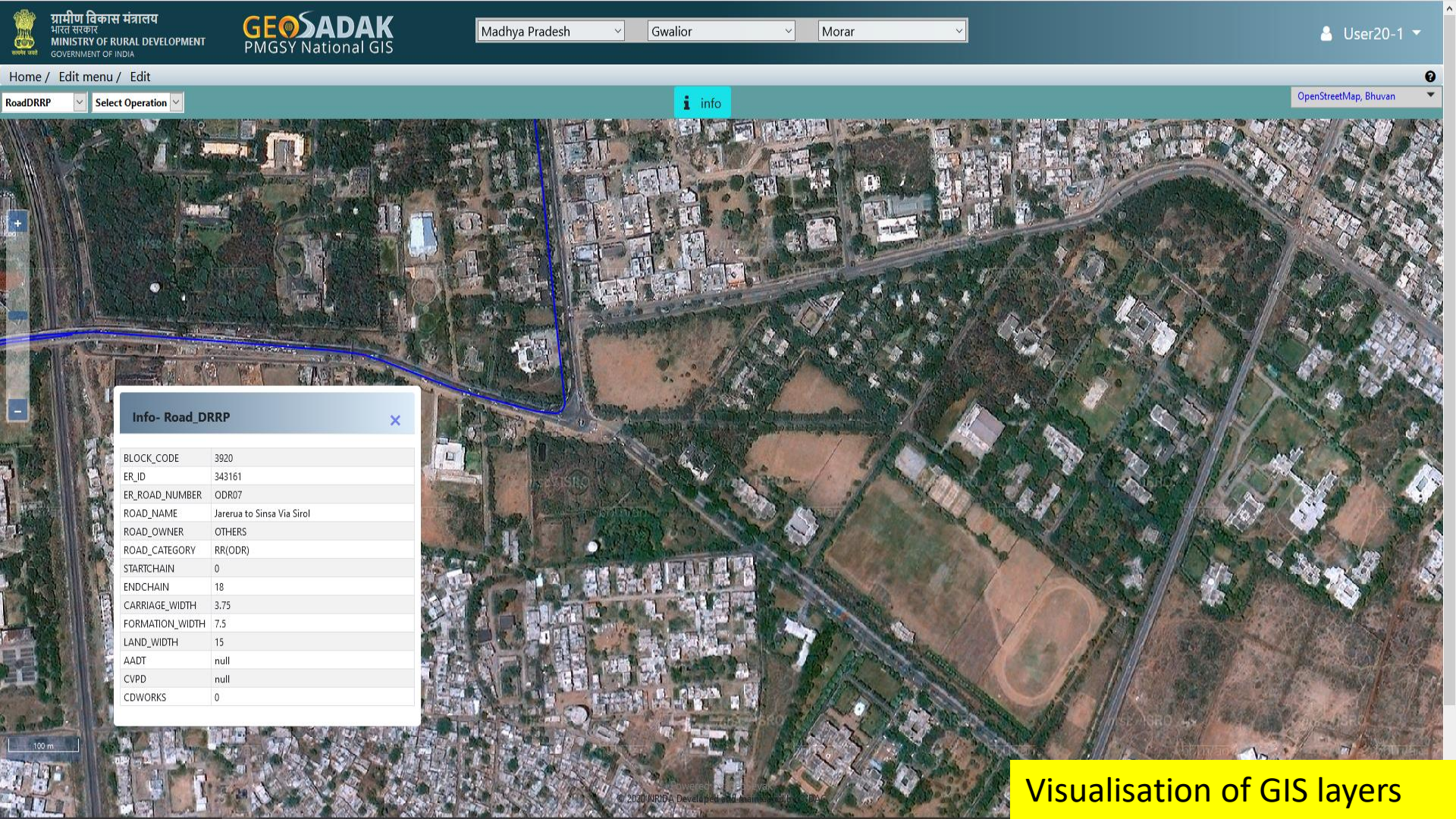
Generate New Report

Entire State QC Report

File Name	Generated On	Download
QC_Report_26_2020_09_10_15_25.xlsx	15-02-2022 16:35	Download

Information

QC report is generated based on OMMAS data (PMGSY Scheme II / III) and most recently uploaded GIS data. All districts, all blocks and all Layers QC report will be available for ready to download.
If QC report is not available for download, user may generate new report. Please refer user manual for more details.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GOVERNMENT OF INDIA
GEOSADAK
PMGSY National GIS
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User20-1
Home / Edit menu / Edit
RoadDRRP
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Info- Road_DRRP
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ER_ROAD_NUMBER ODR07
ROAD_NAME Jarerua to Sinsa Via Sirol
ROAD_OWNER OTHERS
ROAD_CATEGORY RR(ODR)
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ENDCHAIN 18
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CVPD null
CDWORKS 0
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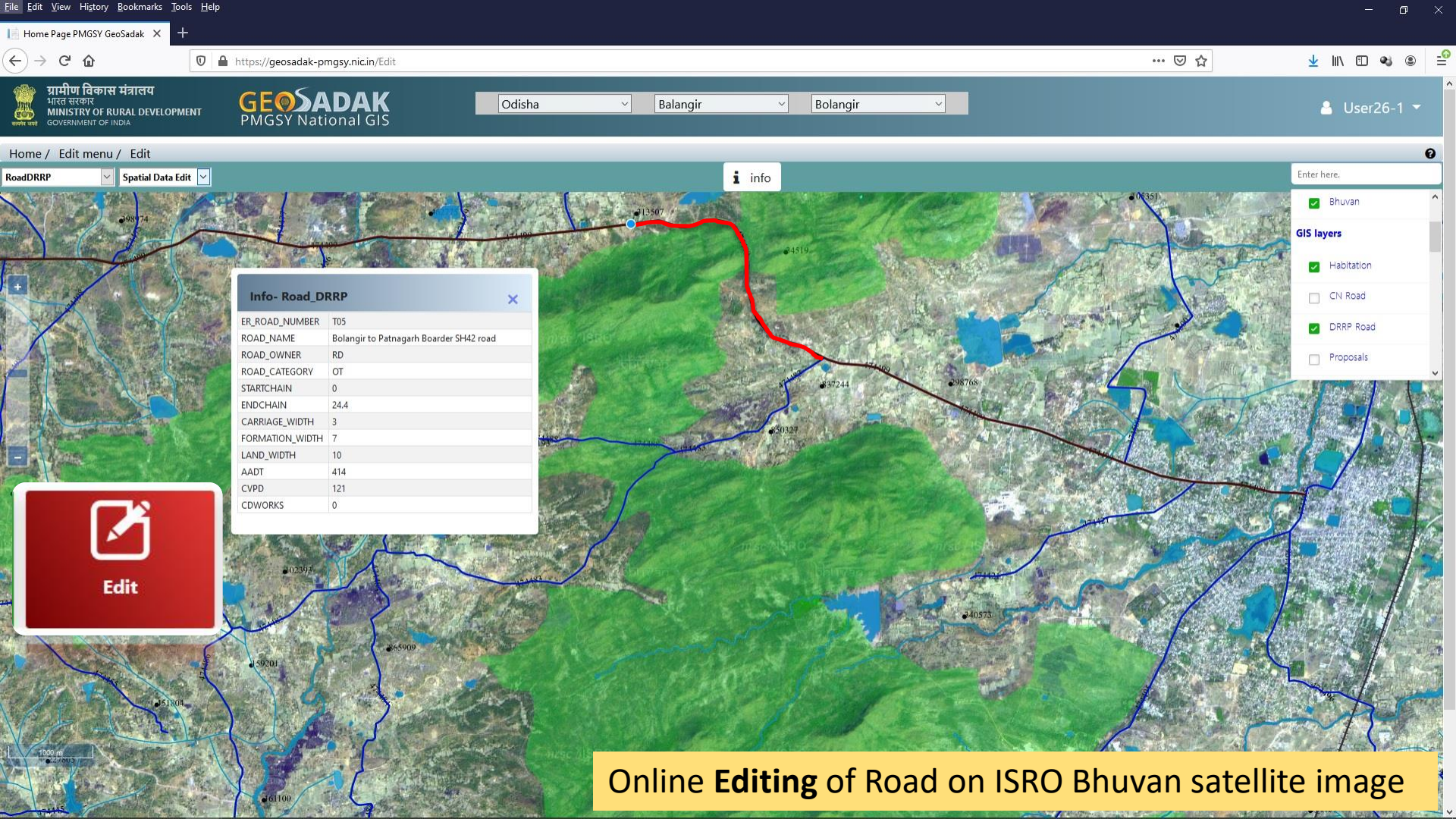
Visualisation of GIS layers


Home Page PMGSY GeoSadak
https://geosadak-pmgsy.nic.in/Edit
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Home / Edit menu / Edit
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info
Enter here.
Bhuvan
GIS layers
Habitation
CN Road
DRRP Road
Proposals
Info- Road_DRRP
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ROAD_NAME Bolangir to Patnagarh Boarder SH42 road
ROAD_OWNER RD
ROAD_CATEGORY OT
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ENDCHAIN 24.4
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FORMATION_WIDTH 7
LAND_WIDTH 10
AADT 414
CVPD 121
CDWORKS 0
Edit
Online Editing of Road on ISRO Bhuvan satellite image

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Edited Feature Status PMGSY G

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Odisha | All | All

Admin26

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Edited feature Status

Awaiting For Approval | Approval History

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Search:

Approve/Reject	#	code	District	Block	Operation	Layer	Time	View
☐	1191	333	23 (Angul)	283 (Athamallik)	ADD	Road_DRRP	2020-10-26T10:39:44.598699	👁
☐	862	1318507	89 (Boudh)	2736 (Kantamal)	ADD	Road_DRRP	2020-08-27T15:23:05.47382	👁
☐	875	1	23 (Angul)	283 (Athamallik)	ADD	Construction_Materials	2020-09-09T10:43:20.259175	👁
☐	978	349014	23 (Angul)	3053 (Kishorenagar)	EDIT	Road_CN	2020-09-30T14:19:08.92836	👁
☐	877	1	23 (Angul)	283 (Athamallik)	ADD	Construction_Materials	2020-09-09T11:12:17.583297	👁
☐	1196	475439	89 (Boudh)	1043 (Boudh)	ADD	Road_DRRP	2020-10-26T15:49:29.506755	👁
☐	1231	1410037	152 (Dhenkanal)	2669 (Kamakhyanagar)	DELETE	Road_DRRP	2020-11-02T13:19:38.54611	👁

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Proposal Details PMGSY GeoSa

https://geosadak-pmgsy.nic.in/Proposals/SuperArea

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---Select State--- | All | All

sadmin01

Home / Proposal / Proposal Details

Proposal Details

Approved | GIS (Deleted) | Modify

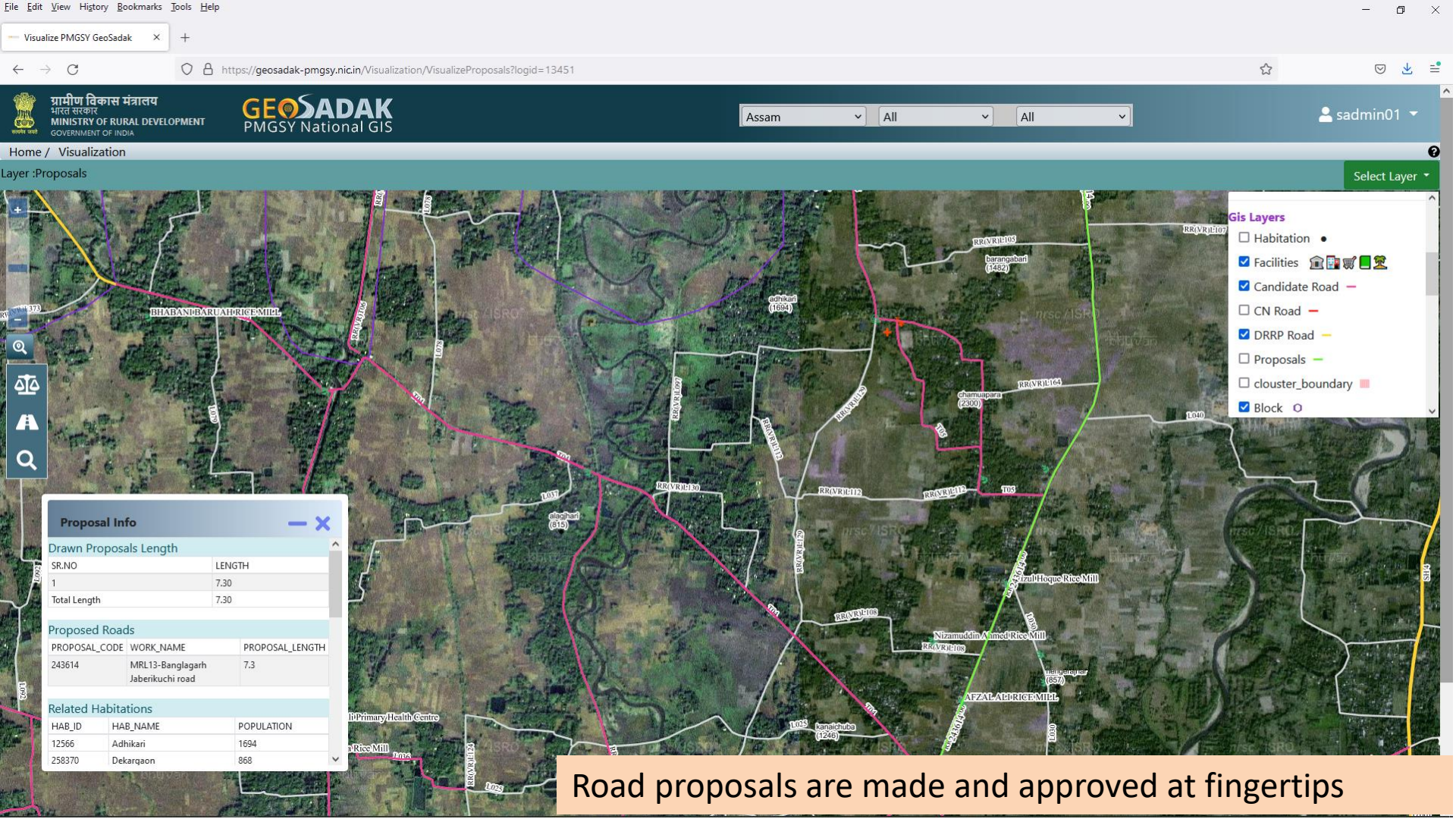
--Select Proposal Type-- | --Select Batch-- | --Select Year-- | --Select Sanction Status--

Show 10 entries

Search:

Copy CSV Excel PDF Print

Select	Proposal code	State	District	Block	Batch	Sanction Year	Package Id	Sanction Status	Proposal Type	Submission Date	View
☐	259109 (T01-Ajaygarh Bariyarpur Canal Road to U.P.Border Bridge at Ch.-21000)	Madhya Pradesh	417 (Panna)	49 (Ajaygarh)	2	2022	MP28BR312	No	Bridge	2022-10-04	👁
☐	259108 (Majhgaon to UP Border Bridge At CH-13000)	Madhya Pradesh	417 (Panna)	49 (Ajaygarh)	2	2022	MP28BR311	No	Bridge	2022-10-04	👁
☐	263773 (Bridge No. 8/1 at Ch 7683)	Meghalaya	590 (West Garo Hills)	1389 (Dadenggre)	1	2022	MG06/III/02/03	No	Bridge	2022-09-30	👁
☐	264512 (T08-Nathdwara Railmagra Road)	Rajasthan	454 (Rajsamand)	4941 (Railmagra)	2	2022	RJ2607	No	Road	2022-09-30	👁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Visualize PMGSY GeoSadak
https://geosadak-pmgsy.nic.in/Visualization/VisualizeProposals?logid=13451
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Assam
All
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Gis Layers
Habitation
Facilities
Candidate Road
CN Road
DRRP Road
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Proposal Info
Drawn Proposals Length
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LENGTH
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Total Length
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Proposed Roads
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WORK_NAME
PROPOSAL_LENGTH
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MRL13-Banglagarh Jaberikuchi road
7.3
Related Habitations
HAB_ID
HAB_NAME
POPULATION
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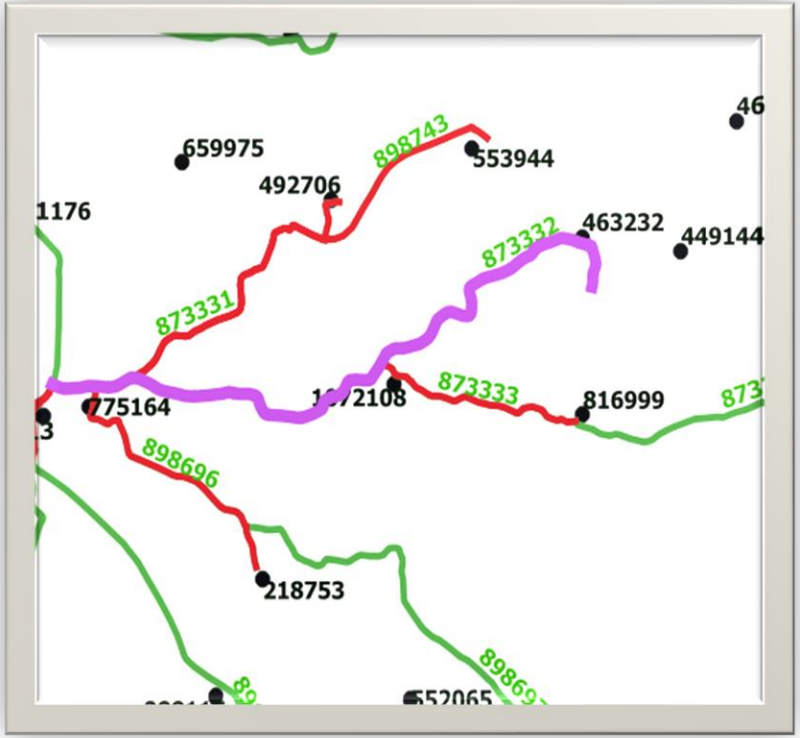
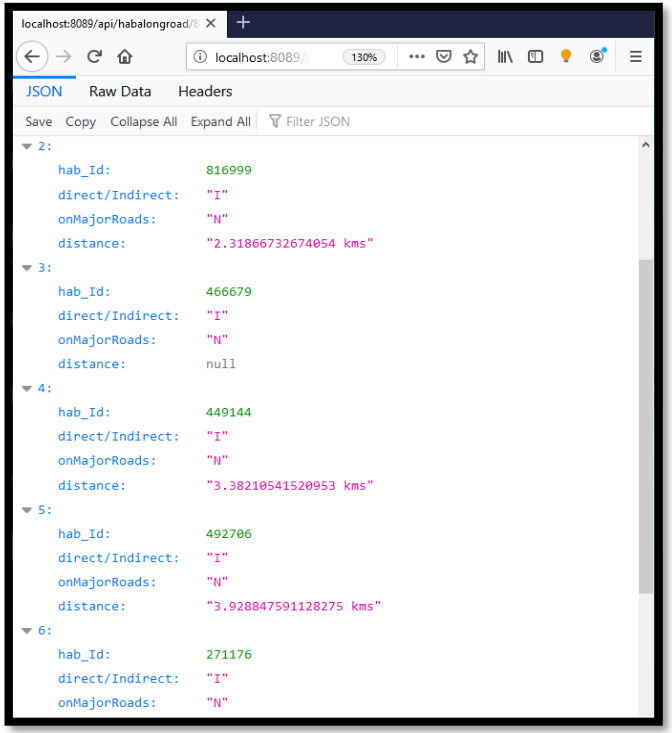
Adhikari
1694
258370
Dekargaon
868
BHABANI BARUAH RICE MILL
AFZAL ALI RICE MILL
Nizamuddin Ahmed Rice Mill
Road proposals are made and approved at fingertips

GEOSADAK
PMGSY National GIS

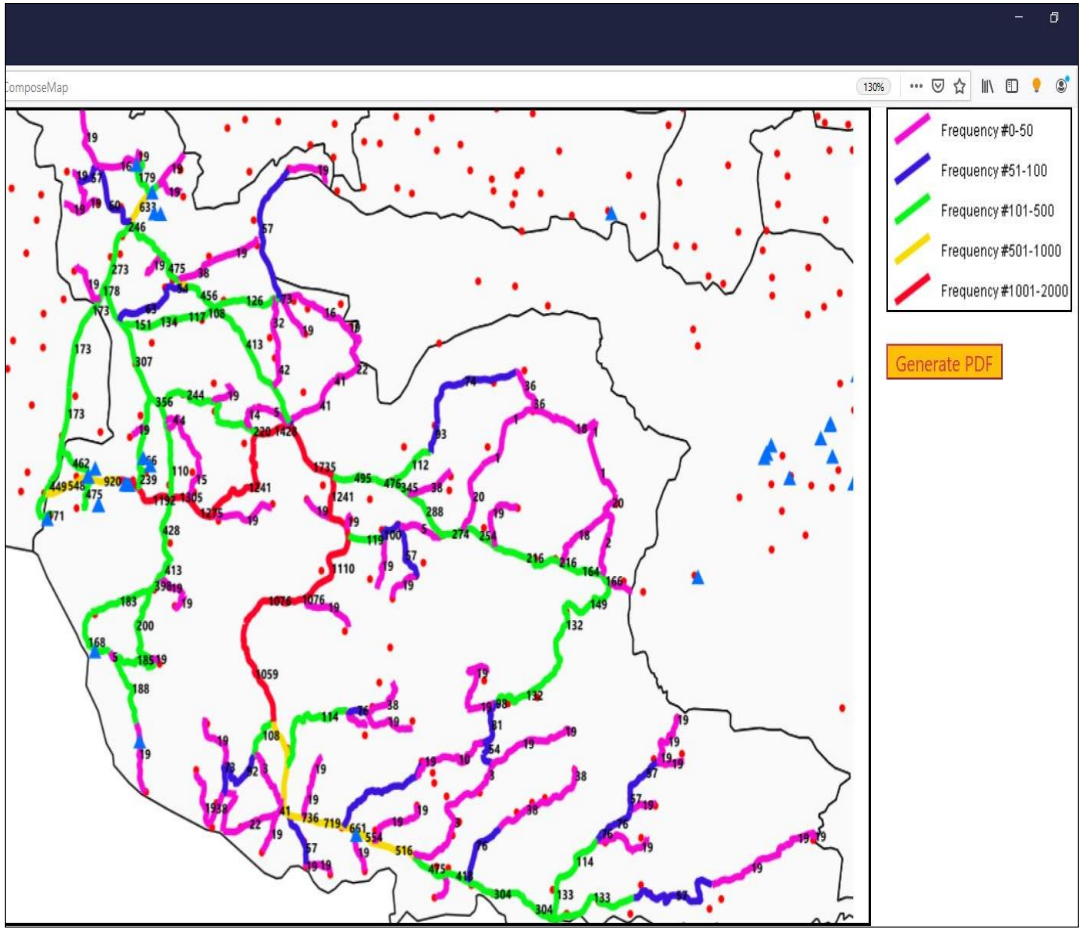
Benefitted habitations along the road extracted using spatial analysis





Simulation for Road Prioritisation

GEOSADAK
PMGSY National GIS



[Network analysis / Trace-map]

Identification/prioritization for road construction/maintenance

Algorithm based on

- Shortest route
- Population served
- Agricultural market
- Educational facility
- Medical facilities

Users SPEAK UP

Democratizing GIS

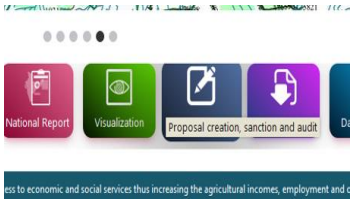
Use of GIS in Roads

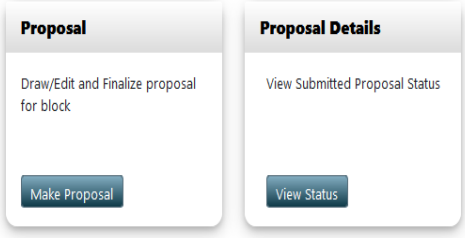
Digitizing of Assets	Proposal Planning	Proposal Submission	Proposal Audit
			

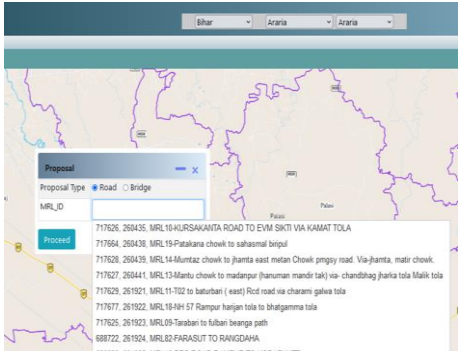
GeoSadak enables all 4 stages using Web GIS that PIUs can directly used without GIS expertise

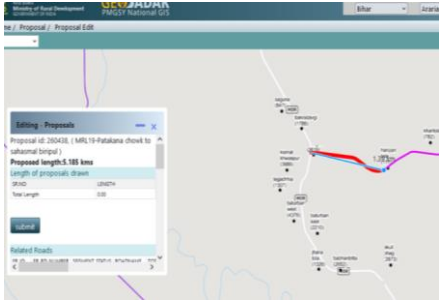
Adding Proposal

Add Proposal module → **Add Proposal/view status** → **Selection of proposal** → **Draw Proposal**





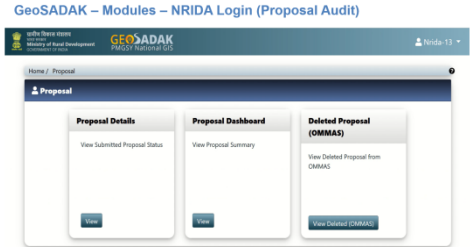




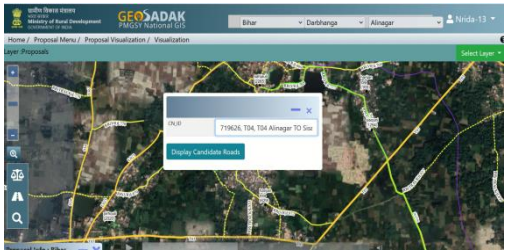
Enables authorised user to draw the proposals (Road/ Bridge) for scrutiny of proposal

Proposal Audit

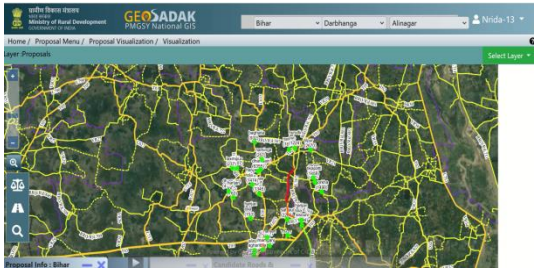
Proposal module → Proposal details → List of proposals within the block → Proposal visualization



Candidate Road Selection



Overlayed view of Proposal, Candidate Road and benefited habitation



Enabled users to visualise all benefited habitation along to candidate road to check the utilisation of proposal.

Proposal Summary

14646 (102198.01 km)	550	16040	20028
Approved	Pending	Total Drawn Proposal	Available in OMMAS

Report generation Date:-06-Oct-2022 05:56:PM

Proposal Type (•) All ( ) Road ( ) Bridge

Show 10 entries

Search:

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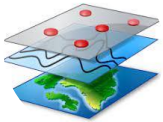
State	Approved	Pending	Total Drawn	Approved Proposals Length	OMMAS
Uttar Pradesh	2540	5	2574	17936.06	2625
Madhya Pradesh	1732	8	1809	11934.18	1887
Odisha	1497	55	1702	9797.22	1812
Bihar	1061	8	1276	8015.35	1961
Maharashtra	1039	0	1064	6497.74	1165
Karnataka	824	79	938	5628.14	1040
Assam	703	0	706	4413.93	848
Chhattisgarh	649	0	653	5630.59	751
Jharkhand	617	2	657	4299.91	773
AndhraPradesh	538	0	569	3610.62	719

Showing 1 to 10 of 29 entries

Previous 1 2 3 Next

GeoSadak in PMGSY

1 million habitations & 2.5 million km rural road network



14,000+ road & bridge proposals for PMGSY III have been created and approved.

1000+ active users from block to MoRD/State Level are utilizing the system.

Share data with civil society, academia and other departments.

GeoSadak in PMGSY

- Complete transparency, paperless decision-making, and speeding up process for immediate benefits to public
- System has been developed in a manner so that it could cater anybody who is concerned in this field with minimum training and maximum learning by using the software more and more
- Proposals are audited to verify whether road proposals are meeting objectives of PMGSY-III
- User can update and add new GIS features directly on the system by point-and-click mechanism
- Visualization of layers i.e. Habitation, Block, Road, DRRP, Facilities, Proposals and others
- Role based user's login i.e. District Engineer, State Admin, NRIDA
- Integration of MIS and GIS
- Online QC reports generation to find the data gaps
- 27+ layers are hosted such as Water Bodies, Forest, Rural Facilities, Quarries and Railways

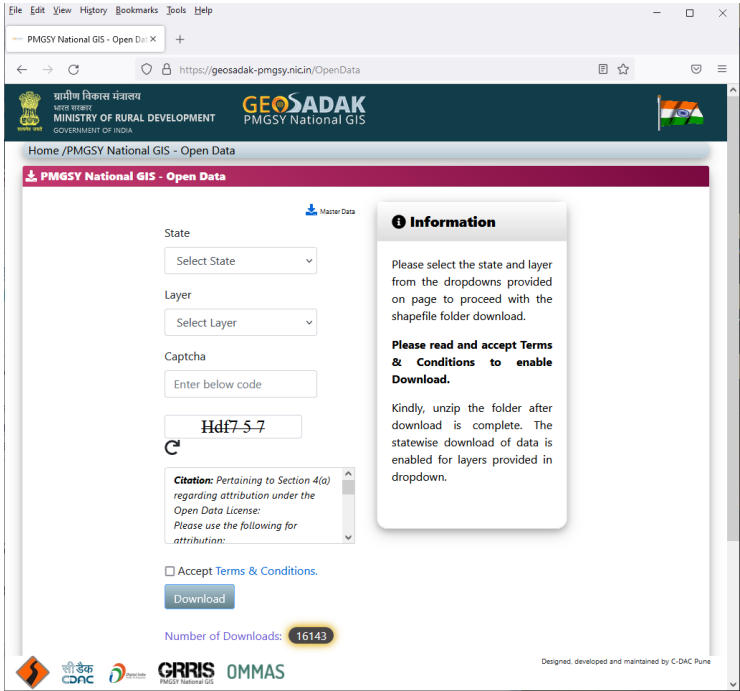
Open Geospatial Data – PMGSY National GIS

Based on

Government liberalises geospatial data rules, issues new guidelines
DST F.No.SM/25/02/2020 (Part-I) dated 15th February, 2021
Draft National Geospatial Policy

MINISTRY OF ELECTRONICS AND INFORMATION TECHNOLOGY
NOTIFICATION
New Delhi, the 10th February, 2017
Government Open Data License - India
National Data Sharing and Accessibility Policy

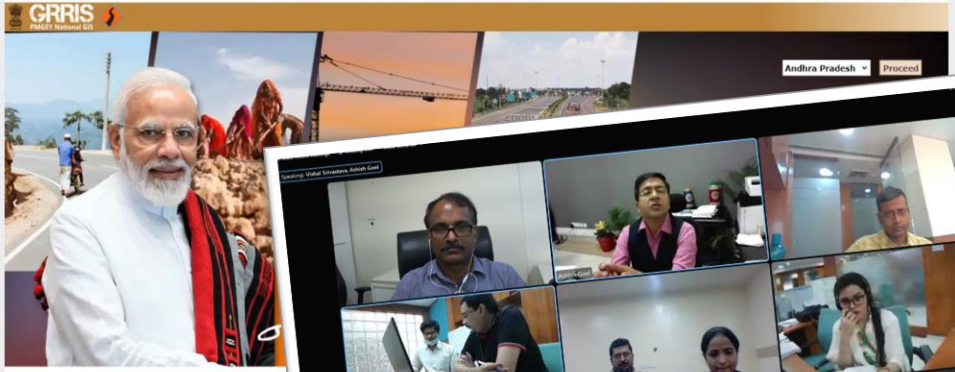
- **Open GIS data** - GIS data for 800,000+ rural facilities as points, 1 million + habitations and 25,00,000+ km of rural roads

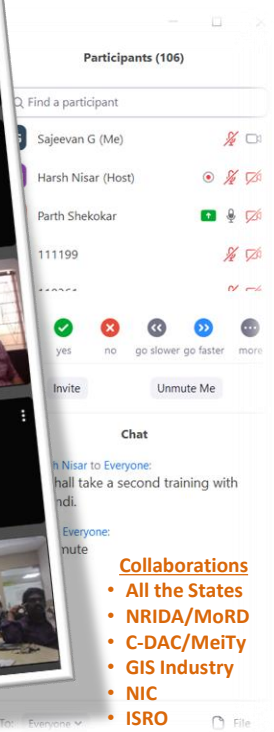


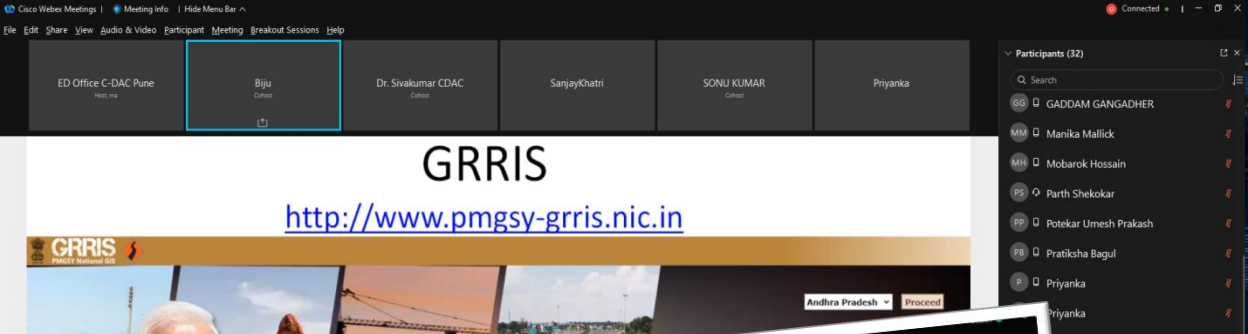
COLLABORATION

GRRIS

http://www.pmgsy-grris.nic.in







Collaborations

- All the States
- NRIDA/MoRD
- C-DAC/MeiTy
- GIS Industry
- NIC
- ISRO

GEOSPATIAL OPPORTUNITIES

Collaboration

GIS-as-a-Service

System Integration/Interoperability/OGC

Customised applications

Geo-AI-HPC

National Geospatial Clearinghouse

National implementation of Online Geospatial Transaction System

Thank You

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