Remote Sensing and GIS for Rural Development
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Week - 06
Lecture No - 04
Extracting point and line features from georeferenced data

Hello everyone. Welcome to the NPTEL course on Remote Sensing and GIS for Rural Development. We are in week 6, lecture 4. In this week of lecture we have seen how we could look at coordinate reference system and projections to understand the conversion of a 2D map from a 3D map. We also saw that there are multiple methods to bring data into GIS out of which one is georeferencing.

Georeferencing is key because lot of data are stored in the government archives and we looked at certain websites where we could get data for free, especially the Survey of India and we downloaded the data. In the last class we successfully georeferenced a paper map which has been scanned and uploaded on the portal of Survey of India. We downloaded the data and put it in the QGIS software.

Now we were able to bring the map data and another data which is Government of India's boundary data and then see how these two data talk to each other. Now as I promised we will look into the extraction of features. Extraction of data and information from these georeference map. So let us continue the work that we did in the last class.

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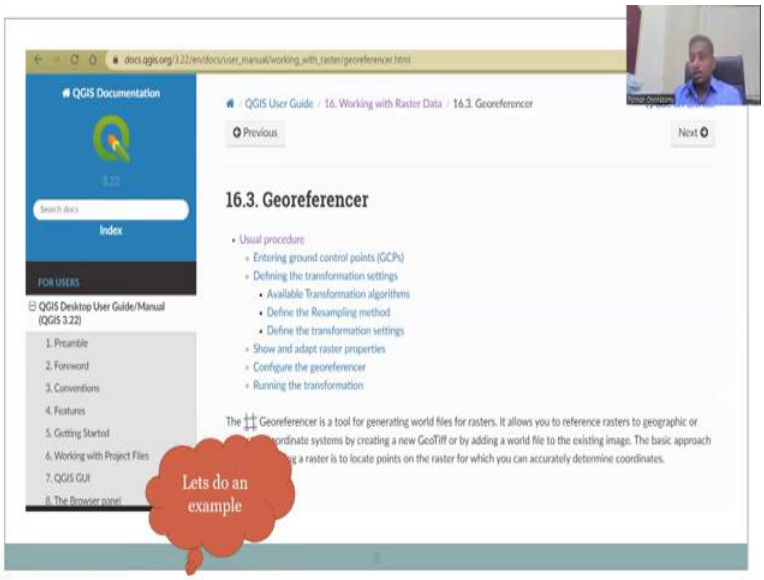

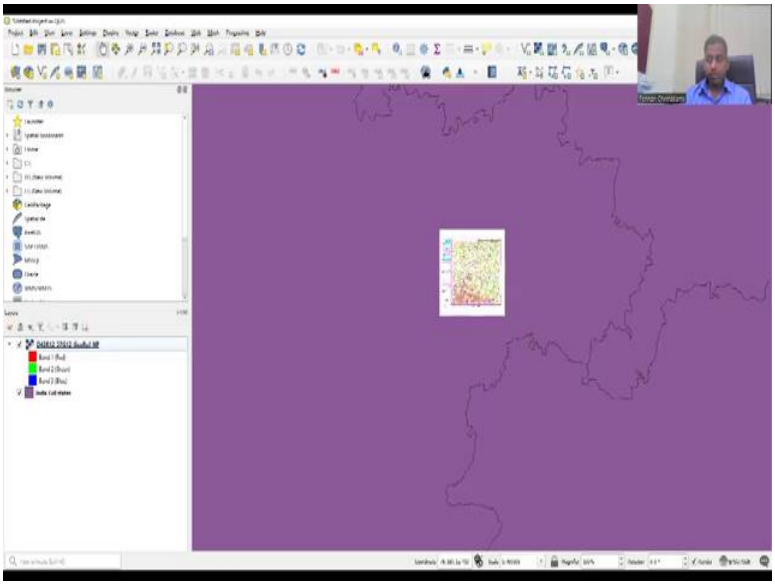

I hope you had time to revisit this manual and look into the subheadings and how to do it. My tutorial through the NPTEL lecture can also be used for georeferencing. And then in the example we found out that we can showcase, let me open that window also, that we can showcase the map in multiple ways. So can you share, so let me share the window again. So I am going to share my screen for the GIS.

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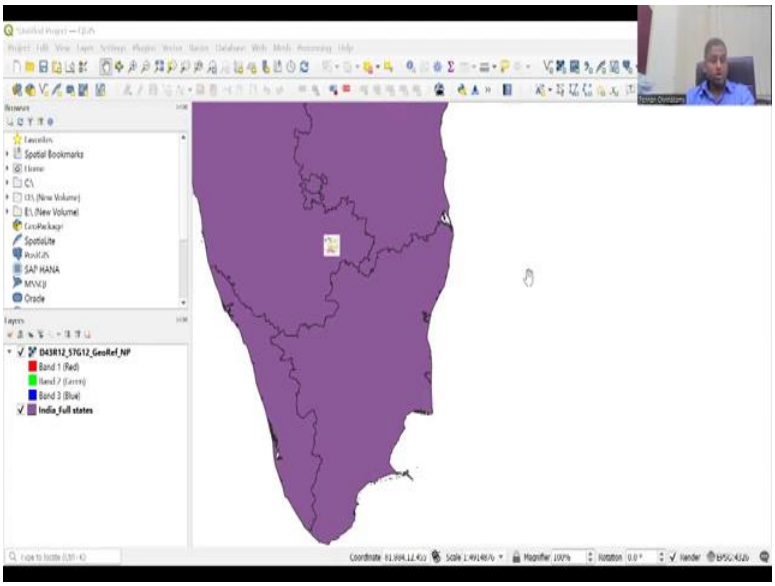

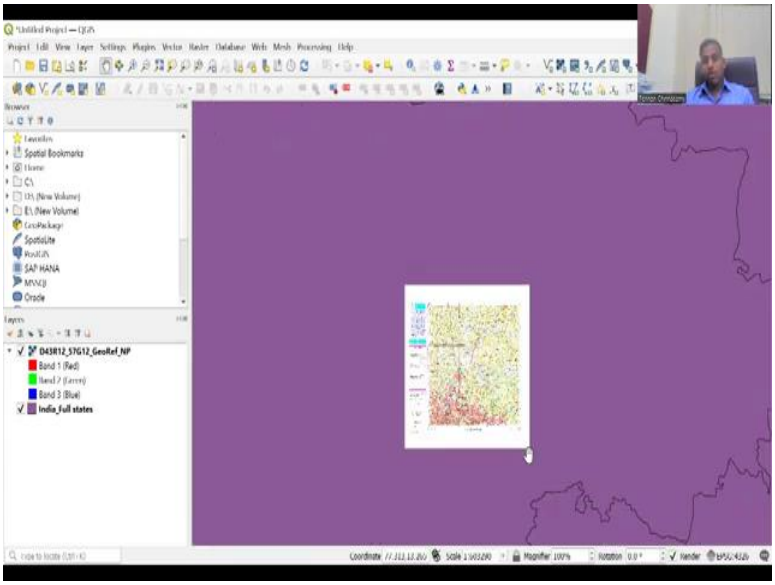

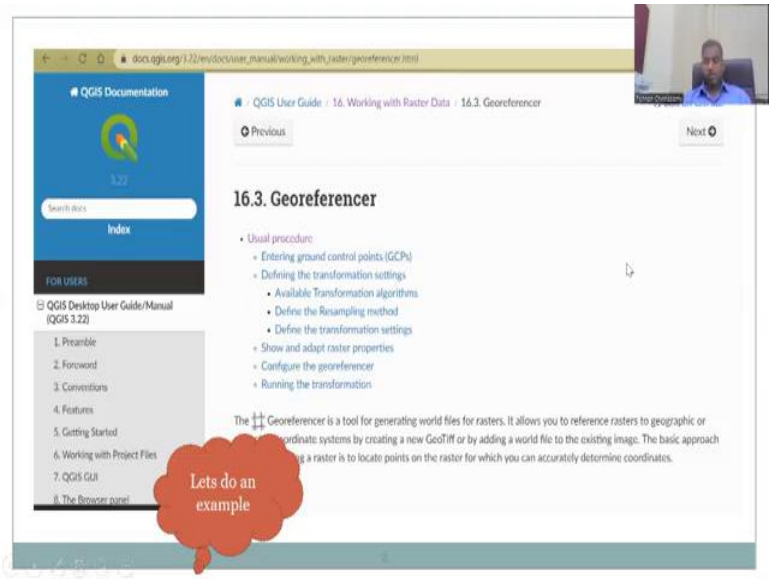

Yes, now it is visible. You could see that your map. We stopped here where we imported the Karnataka boundary through the Indian Boundary and we imported this map into the GIS software and now georeferenced. So there are other things that we can do.

The base layer does not help you to do it right now, but the base layer was kept so that we know that it is exactly in Karnataka location and the location where Tumkur is there. The Yelahanka lake is there is correct. Now the second step is going to look at how we collect data from this or what kind of data can we collect from this?

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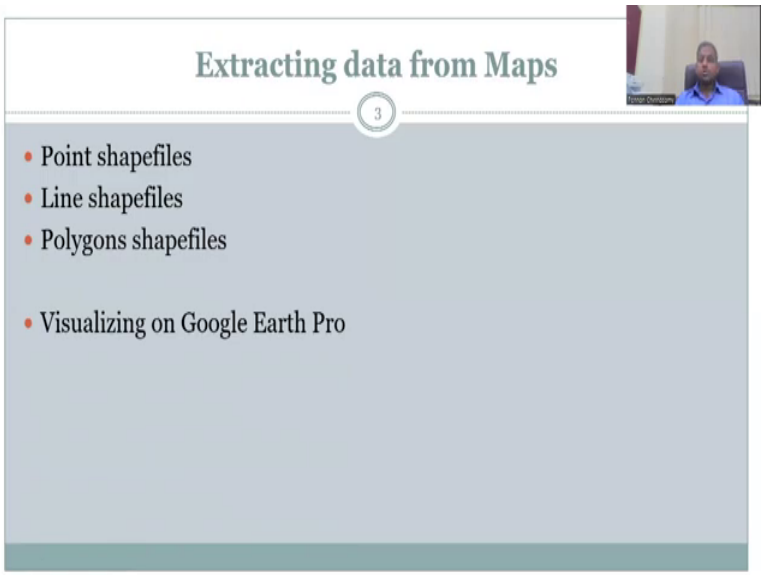

So to move on we are going to extract data from maps. Three different types of data that we can readily extract are point shapefiles, line shapefiles and polygon shapefiles. These are three vector data. The data can also be converted to raster in a later stage. But we will look into the vector shapefiles. And visualizing on Google Earth Pro.

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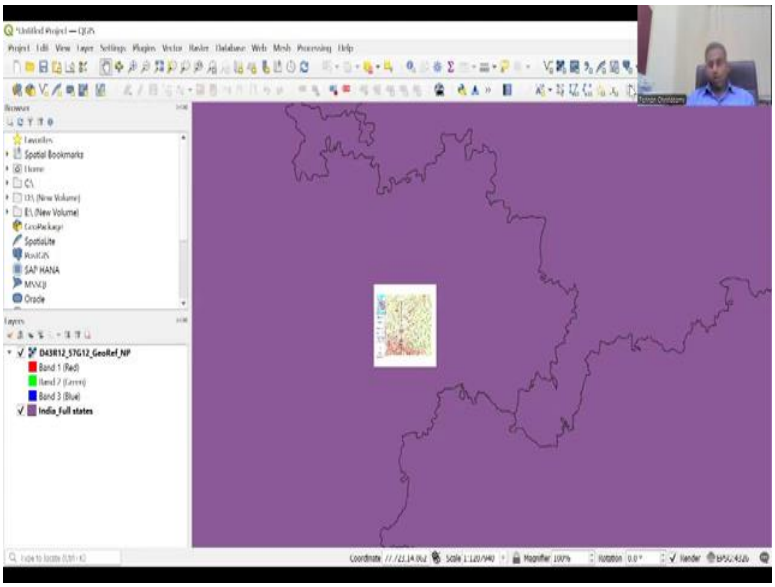
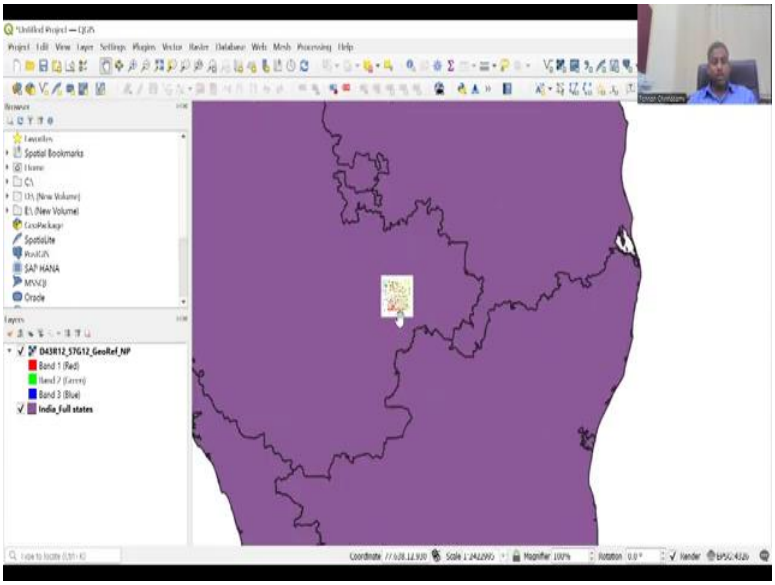
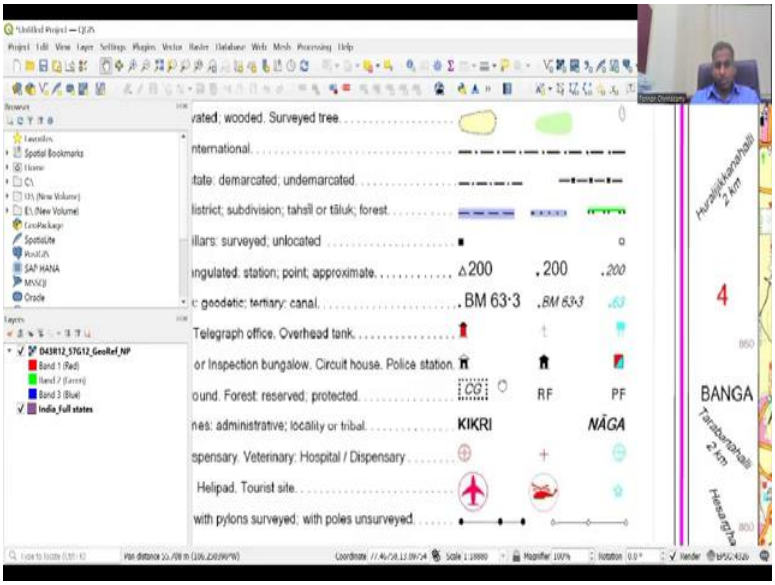



Railways, broad gauge: double; single with station; under constrn.
Railways, other gauges: double; single with distance stone; do.
Mineral line or tramway. Kiln. Cutting with tunnel.
Contours with sub-features. Rocky slopes. Cliffs.
Sand features:(1)flat. (2)sand-hills(permanent). (3)dunes(shifting).
Towns or Villages: inhabited; deserted. Fort.
Huts: permanent; temporary. Tower. Antiquities.
Temple. Chhatri. Church. Mosque. Idgāh. Tomb. Graves.
Lighthouse. Lightship. Buoys: lighted; unlighted. Anchorage.
Mine. Vine on trellis. Grass. Scrub.
Palms: palmyra; other. Plantain. Conifer. Bamboo. Other trees.
Areas: cultivated; wooded. Surveyed tree.
Boundary, international.
state: demarcated; undemarcated.


vated; wooded. Surveyed tree.
nternational.
tate: demarcated; undemarcated.
listrict; subdivision; tahsil or tāluk; forest.
illars: surveyed; unlocated
ngulated: station; point; approximate.
c geodetic: tertiary: canal.
Telegraph office. Overhead tank.
or Inspection bungalow. Circuit house. Police station.
ound. Forest: reserved; protected.
nes: administrative; locality or tribal.
spensary. Veterinary: Hospital / Dispensary
Helipad. Tourist site.
with pylons surveyed; with poles unsurveyed.
△200
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.BM 63·3
RF
PF
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NĀGA
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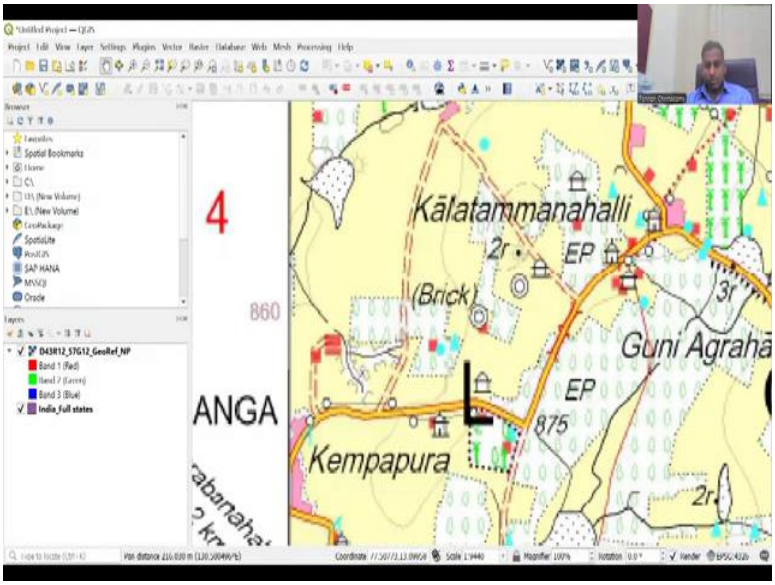
4
860
ANGA
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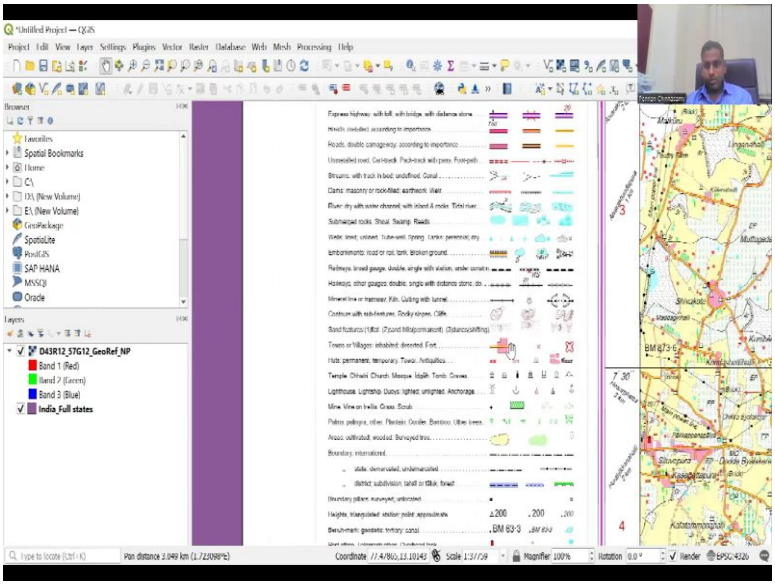

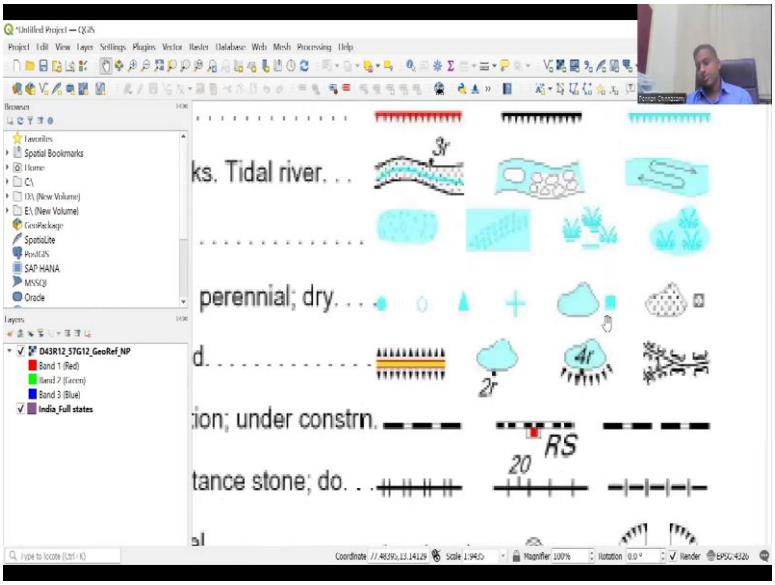
ks. Tidal river. . .
perennial; dry. . .
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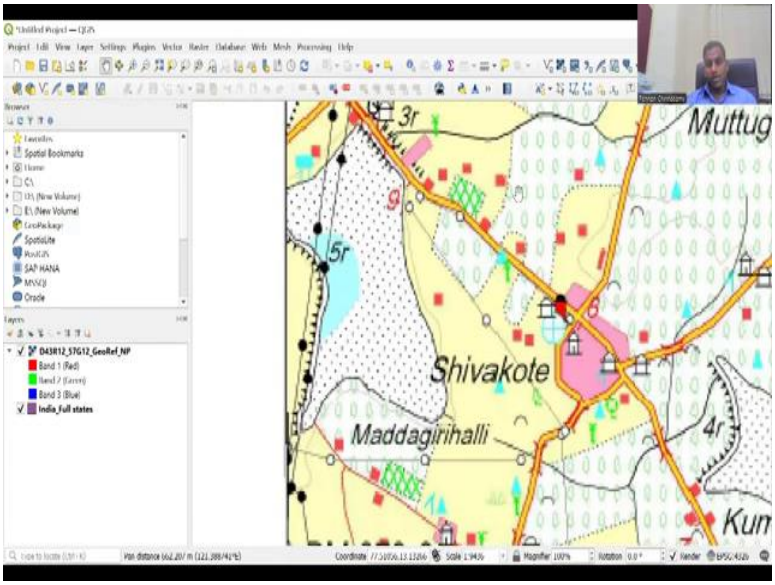
3r
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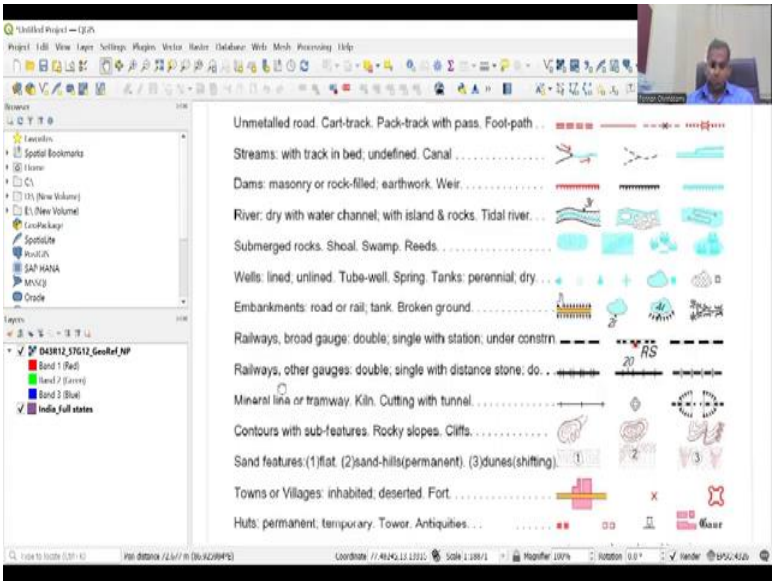
Unmetalled road. Cart-track. Pack-track with pass. Foot-path . . .
Streams: with track in bed; undefined. Canal . . . . . .
Dams: masonry or rock-filled; earthwork. Weir. . . . . .
River: dry with water channel; with island & rocks. Tidal river. . .
Submerged rocks. Shoal. Swamp. Reeds. . . . . .
Wells: lined; unlined. Tube-well. Spring. Tanks: perennial; dry. . .
Embankments: road or rail; tank. Broken ground. . . . . .
Railways, broad gauge: double; single with station; under constrn. . . .
Railways, other gauges: double; single with distance stone; do. . .
Mineral line or tramway. Kiln. Cutting with tunnel. . . . . .
Contours with sub-features. Rocky slopes. Cliffs. . . . . .
Sand features:(1)flat. (2)sand-hills(permanent). (3)dunes(shifting). . .
Towns or Villages: inhabited; deserted. Fort. . . . . .
Huts: permanent; temporary. Tower. Antiquities. . .
RS
20

So let us do one by one. I am going to go back to my QGIS map that we had initially worked on. Yes, the map is on now. On the top the toolbar is mostly used for adding vector layer and raster layer. It is green in color, the plus sign. However, when you come to this there is a yellow shape file and that yellow shape file is what we are going to use in today's lecture. Why? Because we want to see if we could extract data in different formats.

So let us go back to the zoom out and then see where we are and we are going to put this data in the first thing that is points. Let us see what points that we can extract. And you could see here there are multiple features that we can extract. One is huts, permanent, temporary, towers, towns, villages, inhabited desert, fort. These are lines we were looking at points. Lighthouses, buoys and then telegraph office, overhead tank.

See the overhead tank is good, but you do not see it many, maybe the map has not been updated from 2011. But we can definitely see post offices. So let us do post office because almost all villagers or location of villages together will have a post office. So let us look a very nearby what post office is there. Actually you do have some blue dots and the blue dots refer to here, wells lines, so let us do wells.

So wells are also good for rural data mapping. And here we have a lot of wells and then this is an overhead tank for the water supply. A triangle is given as wells, so you have to read it like this, wells, lined, unlined; so these are the different lines and unlined. Tube-wells is given as triangles. Springs, tanks, perennial and dry. So the dotted is perennial and dry is a dot.

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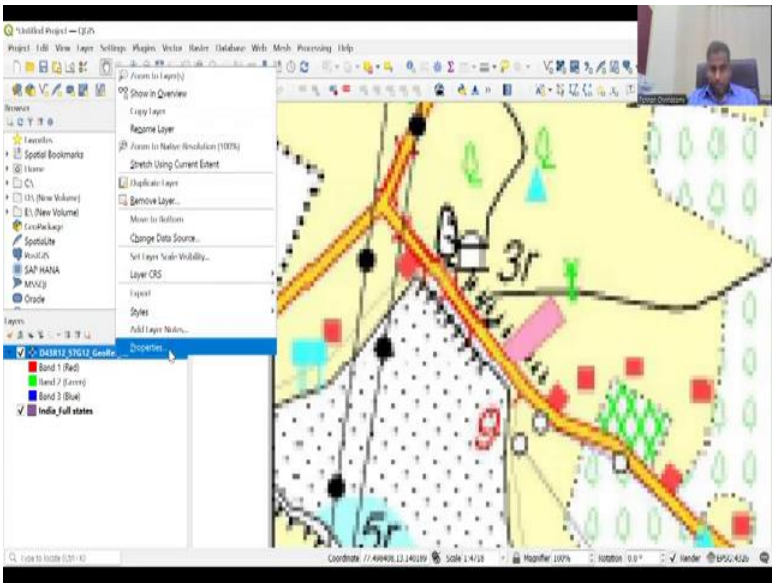

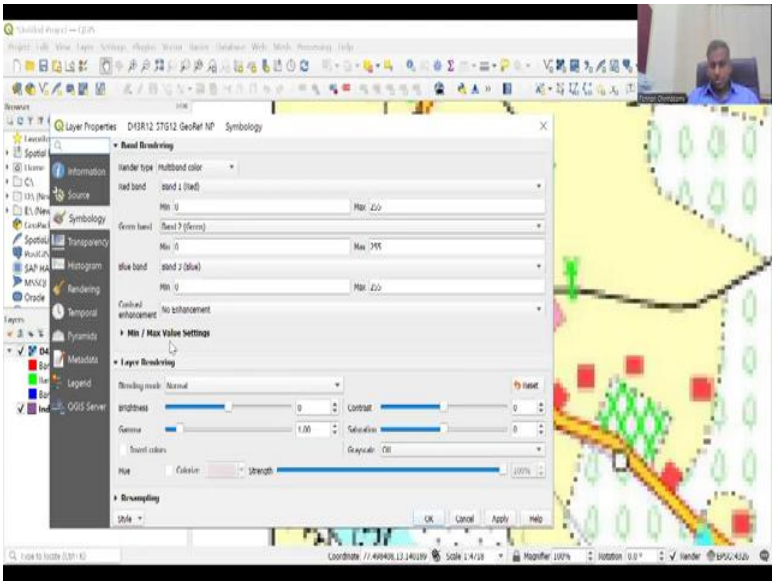

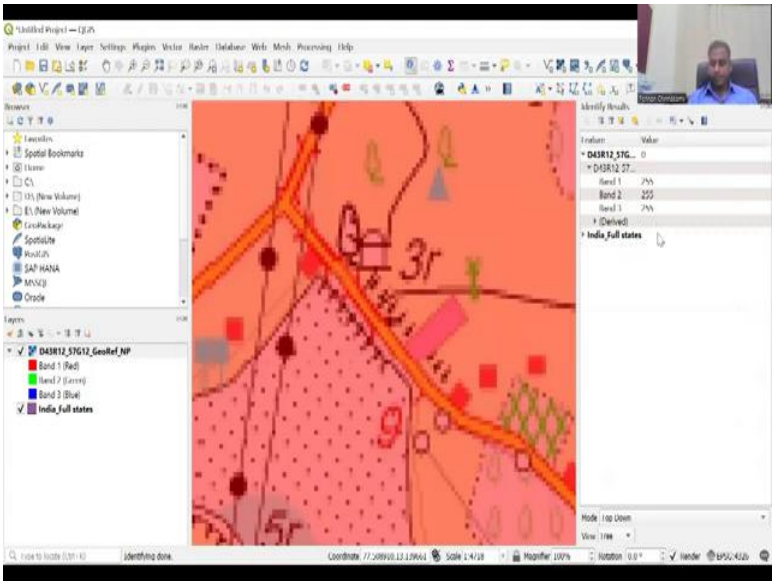
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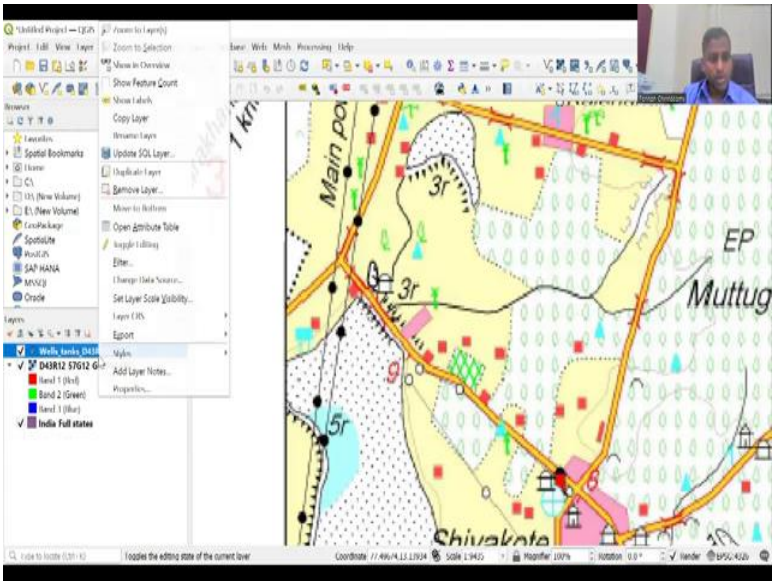
India_Full states


Show Feature Count
Copy Layer
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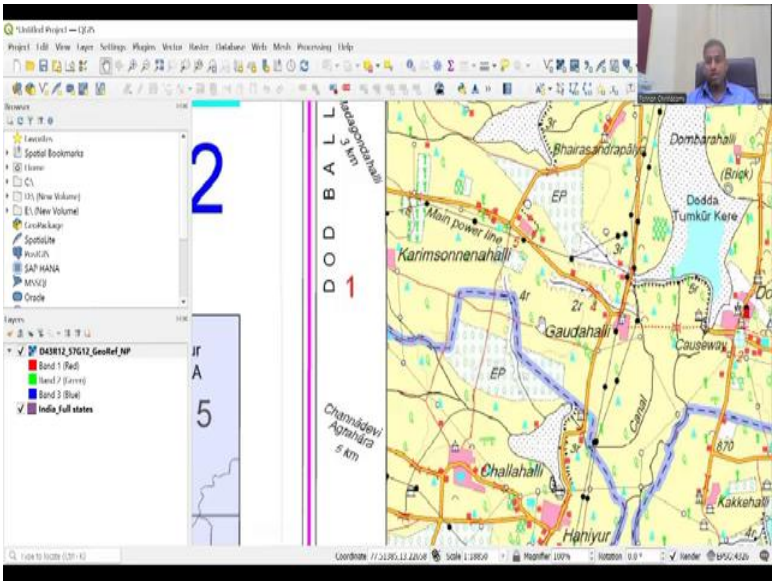
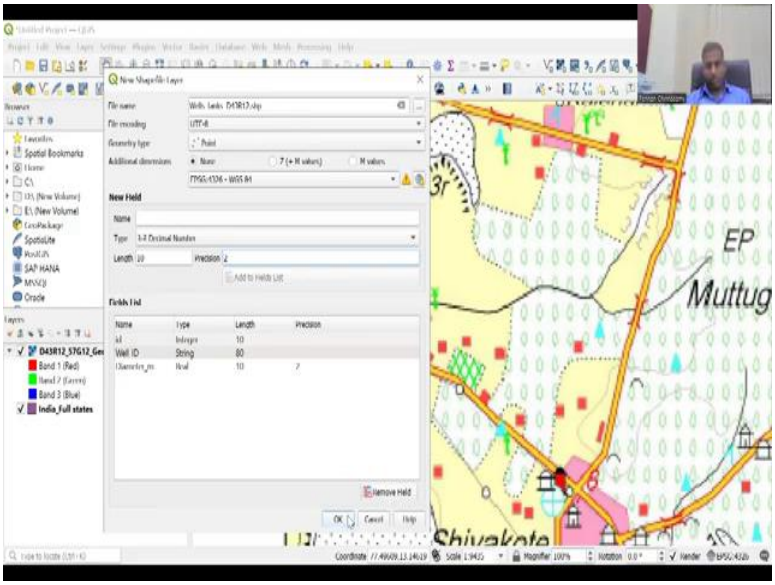
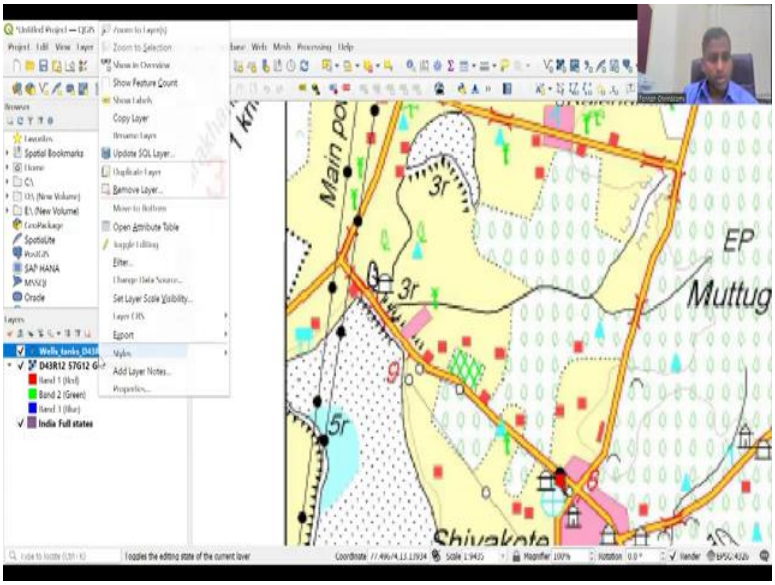

DOD BALL
Main power line
Karimsonnenahalli
Bhairasandrapalya
Dombarahalli
(Brick)
Dodda
Tumkūr Kere
Gaudahalli
Causeway
Canal
Challahalli
Kakkehalli
Haniyur
India_Full states





So let us look at wells which is lined and unlined or tube-wells. Tube-wells is good, so let us go add that tanks. So I am going to for this, we need to create a new shapefile, because we do not have a shapefile for this image. For example, if you go here and look at the properties, it is just an image. You do not see other data here. There is no attributes associated and there is no pixel value. For example, if I click on this pixel, for the India full states there is some data but here it is just bands.

Band one, band two, band three and what is the color of the band. Because it is purely a color, there is no data as such taken out. It is a information or image. So we have just scanned, taken a scanned image. So let me go back and then clear the selection. So I have this and then now I will close this window, so that we have more state to play with and here. So I am going to just for the time's sake, I am looking at the data.

We will look at these tube-wells in this area, this village area or we can even go up in the northern part where there is more, more lakes and tube-wells. So the tube-wells is what we are going to use. We are going to use tube-wells for this sake. So what we will do here is we have seen multiple legends, but we are going to only use tube-wells, so I am going to come down and then go to the same location where we had tube-wells.

And then I am zooming in. So here is where I am going to zoom in and I am going to make a shapefile. So now the first one we are going to make is points. So the points how I am going to make, you have these plus mark in yellow, so you can hover your mouse on top of it, it says new shapefile layer. So let us click that layer and then a new shapefile a window opens up, it is opening up in a different window.

So I am going to close it again and open. Hopefully, to see it open here. Yes, now it is opening in your screen. Now what we are going to do is we have to name it. So let us name it wells. So well locations, wells underscore tanks for this geolocation, but more details you have to give, but just for now we will say, let us say even that D43R12 which is the sheet number. File encoding is default is fine.

The geometry type is points, multi-point or is it a line string polygon. So there is three types, multi-point is just more points per entry. We do not want to lose that for now because how many, how do you assemble five wells into one that you can have a village boundary. So I am just going to click point, additional dimensions nothing is needed, the default coordinate system is the same as this coordinate system.

So you can keep the same coordinate system and now the table. So now I have created the file, but inside the file I need columns. The default is the first column which is saying that ID, ID is the number, serial number, so let it be default and unique name, you want to name the well, well ID or something. So name could be underscore well ID or you can just say well ID, well ID. And what type? Is it a text? Is it a whole number? Is it a decimal number or date?

Since we know that we are going to label it, we are going to put a name. Suppose you are going to add a date of when you are going to collect the data, you can put the date there. For example, everywhere you go and measure the water level, so that it could be a numeric value. Let us do that for this sake and then we say well ID and we have text is the thing, length of the text is 80. There is no precision for text, so that is it.

And then you have to click this. So add fields to list, now the field has been added. So one more, let us add diameter of the well in meters, underscore meters. It could be an open well, dub well, tube-well, that is fine. And we know that it is not a text data, it is a number. We will keep it whole number and there is no precision. If you do decimal number, then you have to say how many decimals do you want.

Let us keep decimals and two. So then we have length is 10, not go more than that and then we add. So we have three attributes in our attribute table and each feature will be now added. So if you want to remove anything, you can click remove, now we are good to go, so I am going to say. So now you see the shapefile already in my system. So you could see it being populated in my layer file, but if you right click and open it there is nothing.

There is no data on it. Again it is opening on a different window, so please allow me to open it again, it should come up, it is not coming up, so I am going to do it again. So it is not allowing to open up, so let me re-share my screen. I am going to stop share, new share and then projected.

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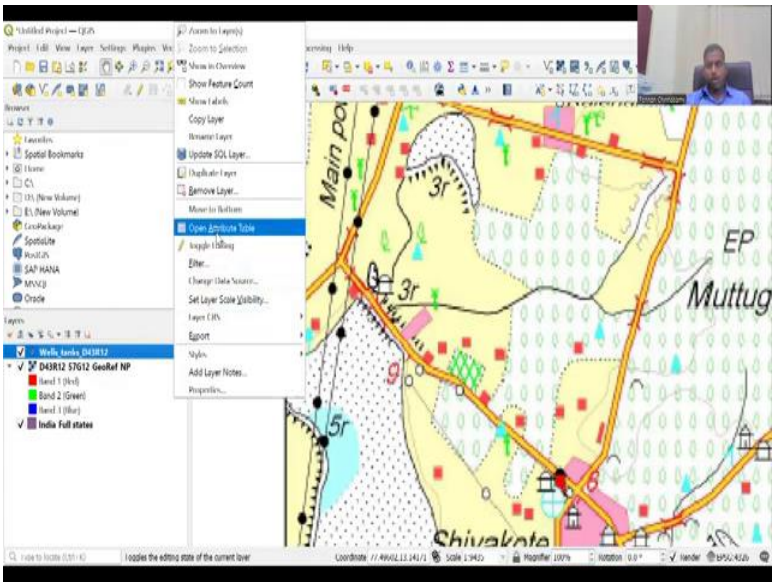

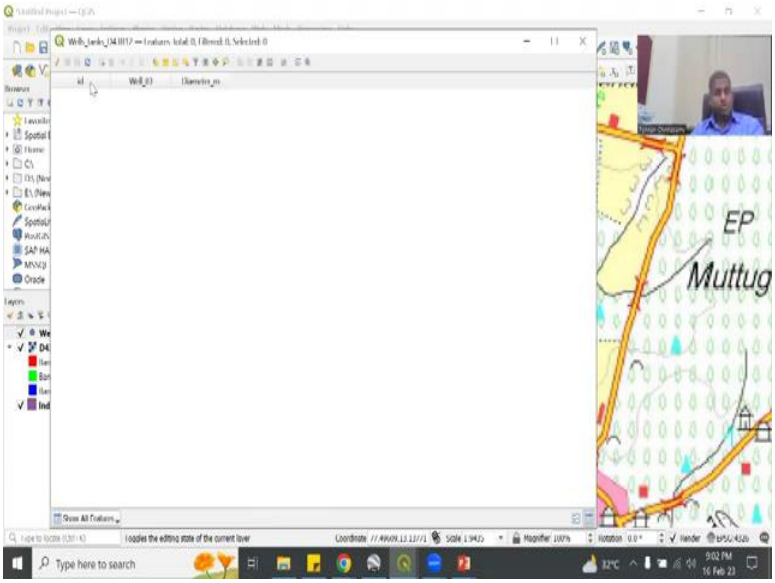

Good. So now I am going to do this again, go to here, right click, and then slowly open attribute table. It is not letting me show my attribute table, but I think I have another way. So I am going to do a new share and then, first my screen. So now it should be visible, open attribute table, yes, so this happens normally when you have multiple screens. So that is another trick in QGIS.

If you have multiple screens and working as most GIS professionals work with, the table moves up and down, so make sure you understand where the table is and sometimes it will be minimized and kept at the bottom. So if you lose it again the best way is to open it again, you will open it and now you see that ID is there, well ID is there, diameter is there, but there is no entry, features are not there, because we never input it.

Now we are going to use the map, the paper map that we georeferenced into a geospatial data. So we are going to input it now. Let us see how we are going to do it.

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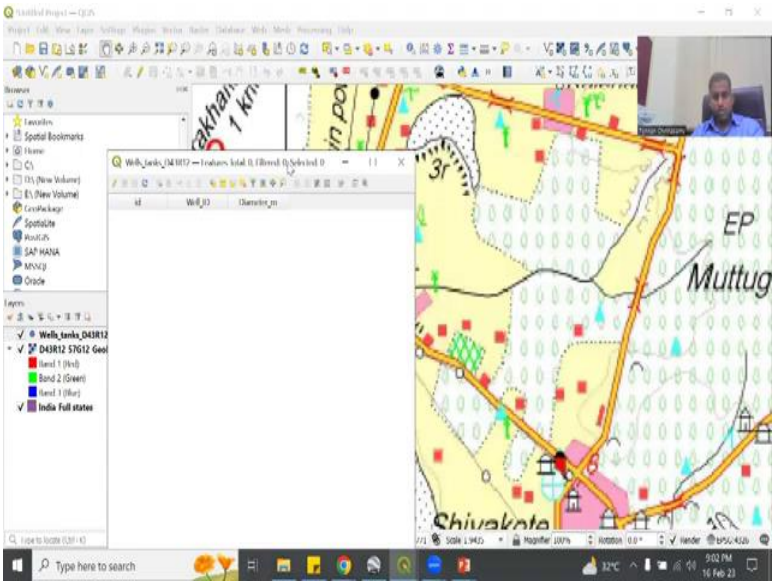

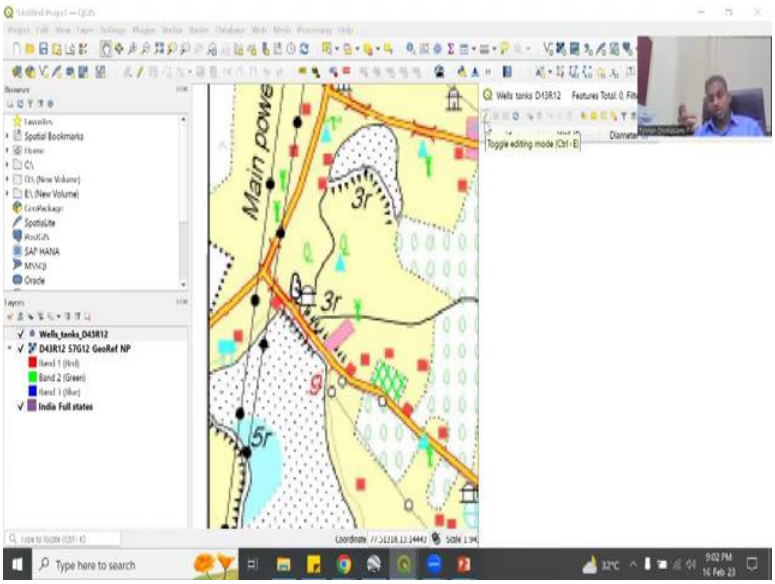

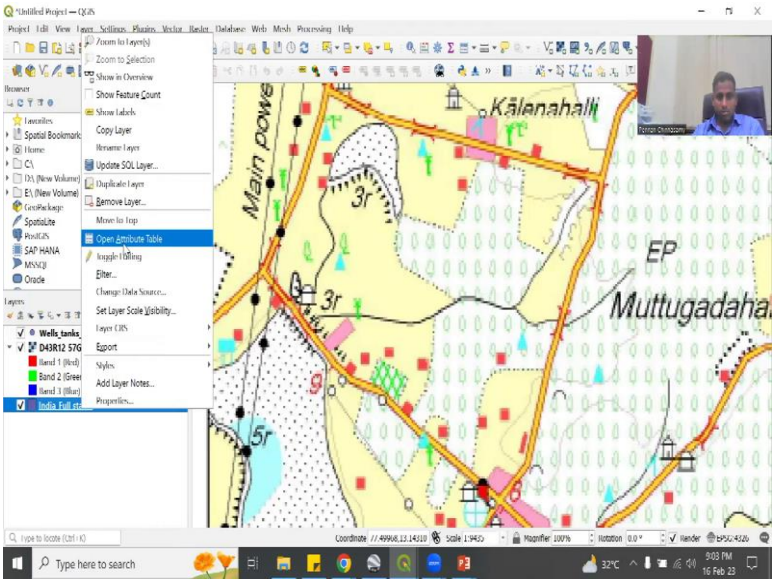

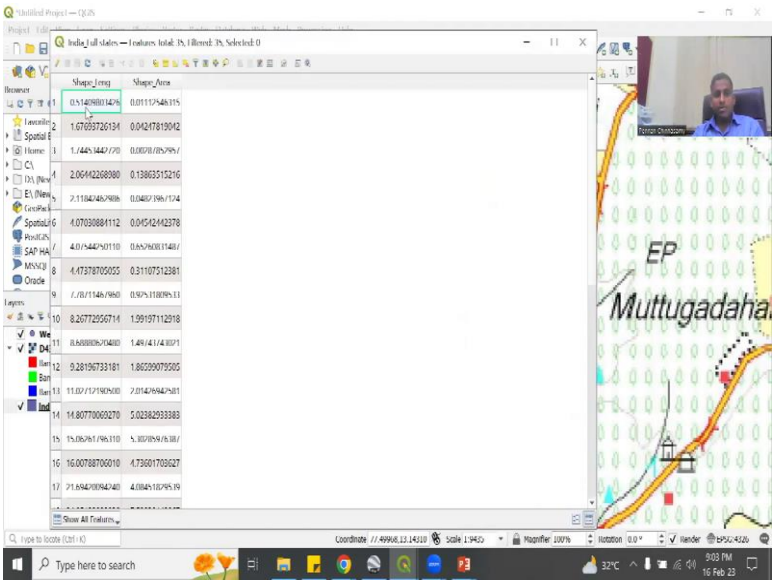

So I am just going to keep it small, so that you can see it here. Let us keep it this side. And this is the part we are going to work on. So you will see this part also, so you have the two things coming here. Now you see this yellow pencil, it is called toggle. So if you want to edit a table you need to first turn it editable, if you do not turn it editable, it will not be edited. This is a protection in QGIS to make sure that no one edits the numbers without permission.

Let us say, for example, I am opening the attribute table here, I have the shape within shape area, so if I click and then type any numbers, it does not work because it has been locked.

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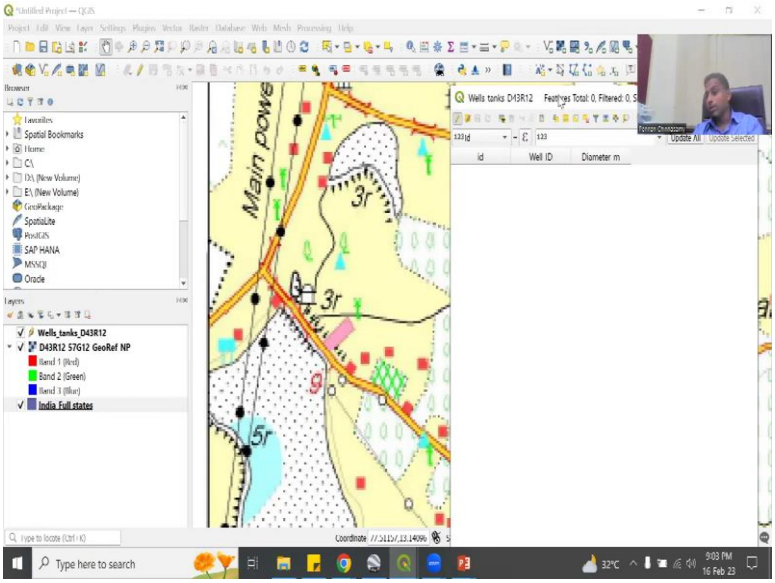

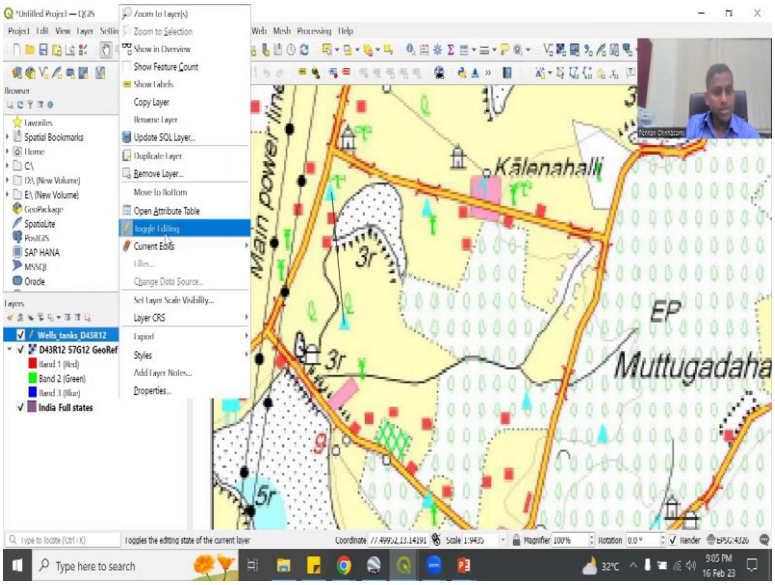

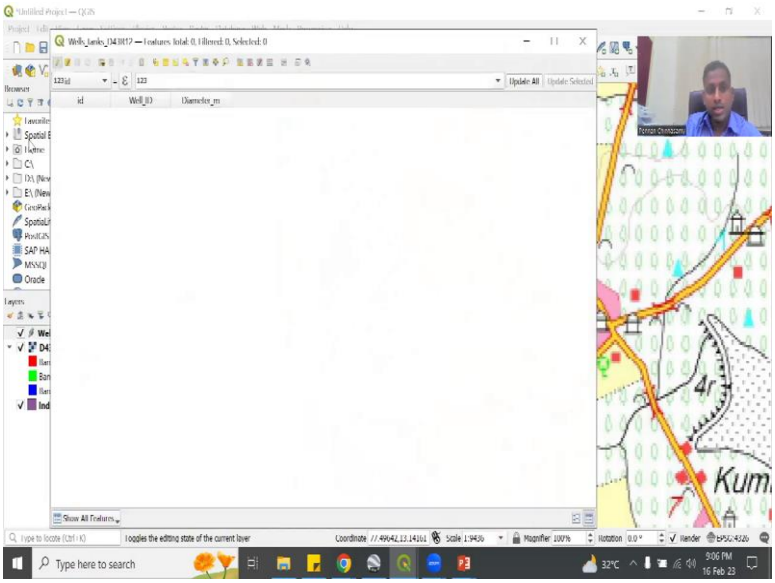

So now what I am going to do is you have to unlock the table. So for that you have to click this yellow pencil, I am going to click it. Now toggle has been turned on. Now you could easily put down the well details. So now you see here there is a well.

What I am going to do is we are going to go back here, let us first take out the toggling. So no edit has been done, so this is about on-ing and turning off the toggle. Then you go back to toggle, just this layer. So the pencil coming up. Once this pencil comes up you can see this getting populated, because it is a point file, there is a point toggle that can come up.

So we are going to look at this area as I mentioned. Shivakote, Maddagirihalli, etcetera and we are going to add. So if you open the attribute table for this you see that it is empty, we did not add any details yet. So I am just going to close it for now and still the pencil symbol is on and then I am going to click the add point. You can add a feature point or you could move a feature point, but let us add for now.

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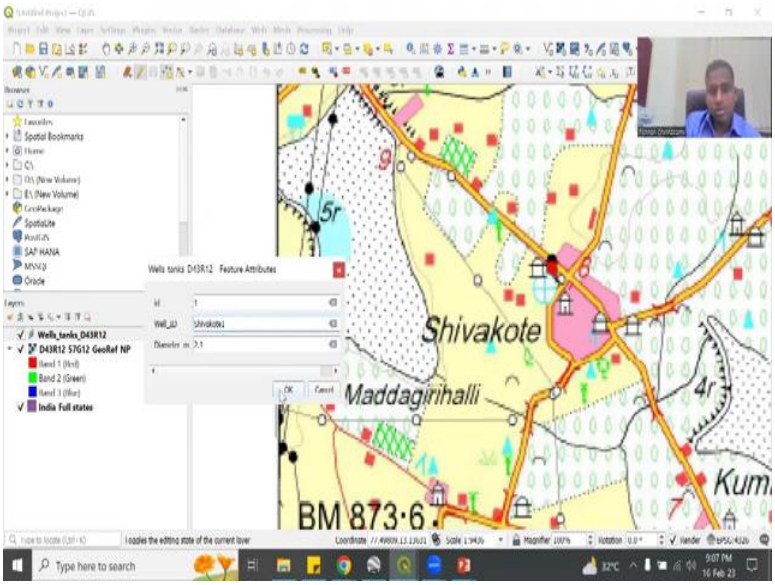
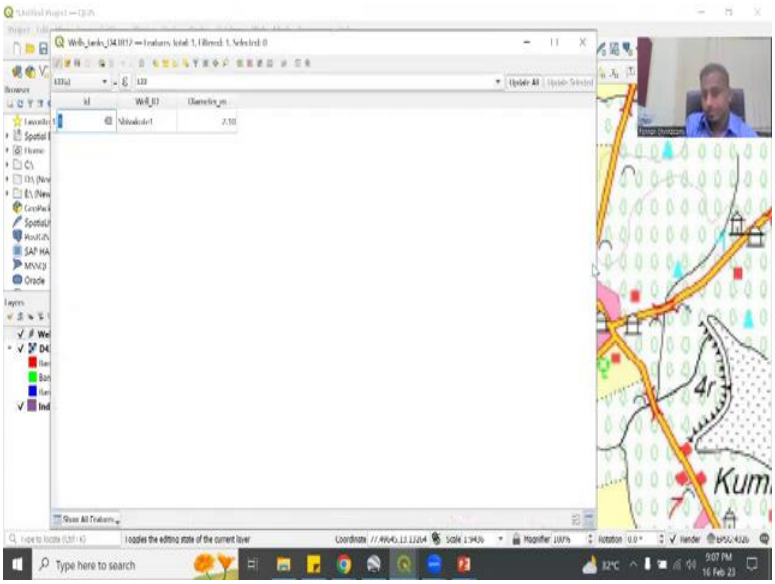
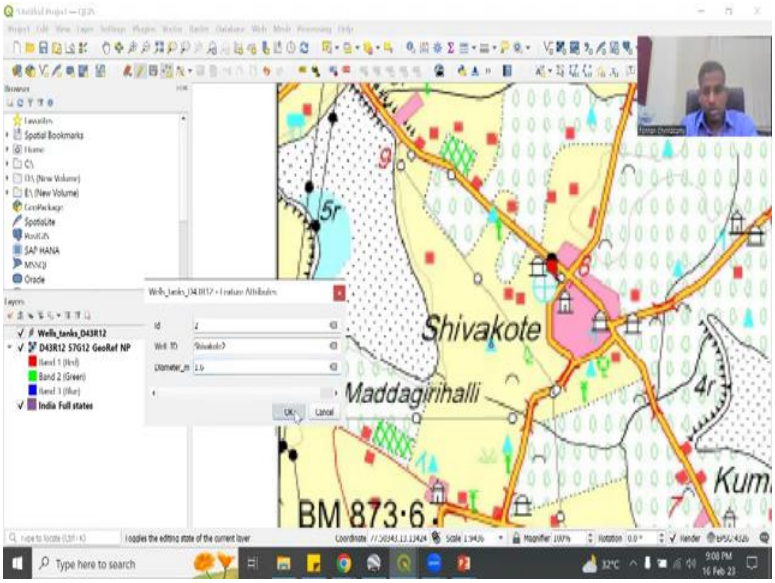
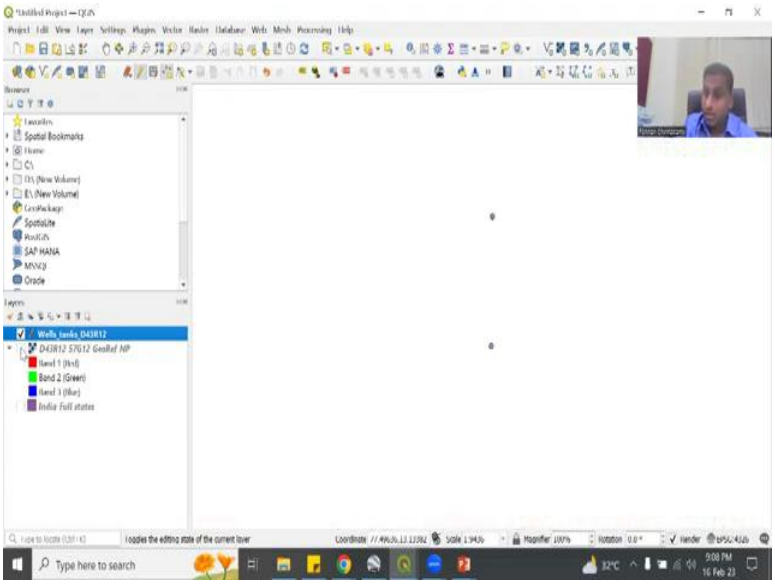








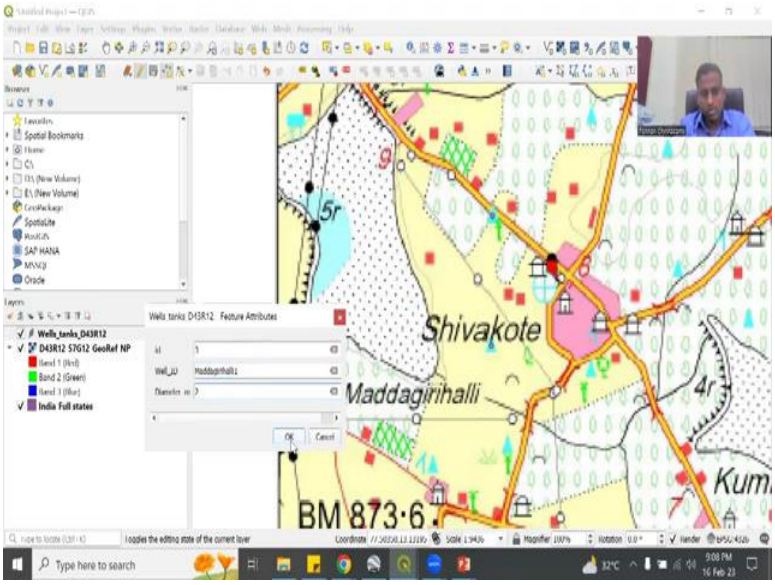
And then I am going to see this Shivakote well, so let us click it. Once you click the Shivakote well, the small table comes up, as I said the ID, the ID is a default number. Let us put one for the Shivakote and then you have a well ID. The well ID we said name. You see if you type numbers also, you can give numbers plus a name, but we can just give, because we already gave a name, so let us type Shivakote well, Shivakote 1.

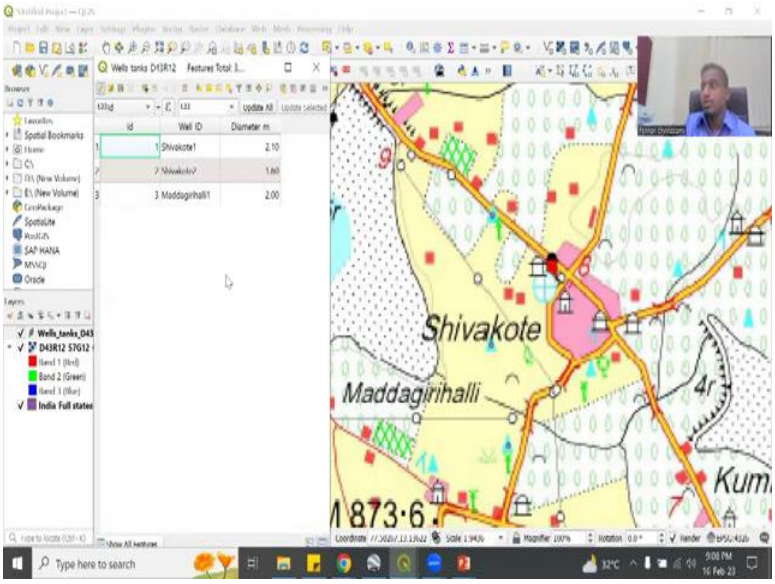
So Shivakote1 is the well ID and the diameter in meter is 2 meters, 2.1 meter, for example, and here if you type your text, it does not work. So I am now typing text, it does not work. It only takes numbers because we have declared it to be only numbers. In the string some numbers can be converted to string as a value. It is not going to add and delete, but here diameter can add.

So now if I click ok and go back to your attribute table, you could see that the first entry has come up. So the idea is to populate from the map data. So now you can see that the point has also come up. So let us do another one here. I am going to click. This is number two and this is Shivakote second well and maybe a diameter is 1.7 meters, 6 meters, let us say and then say ok. So now you see a point there also.

To see the point better I am just going to remove this image for now, you could see the two points coming up. So those are the two wells that have been populated.

(Refer Slide Time: 17:47)



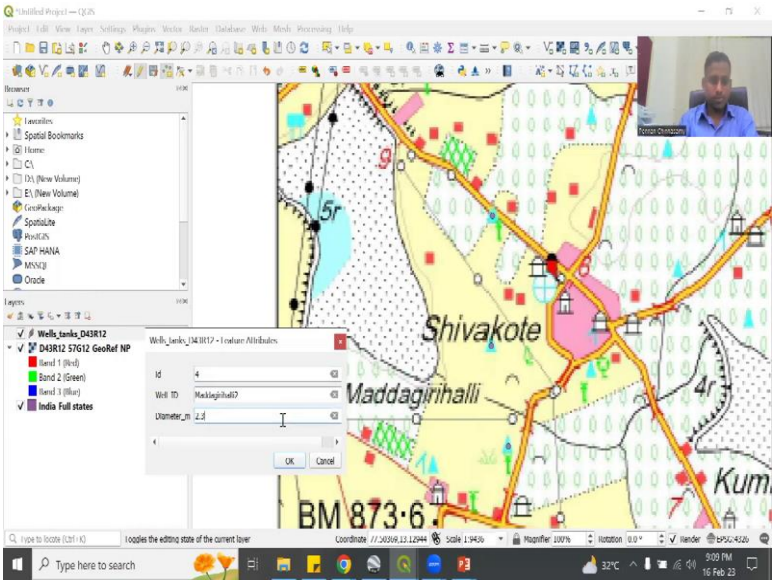


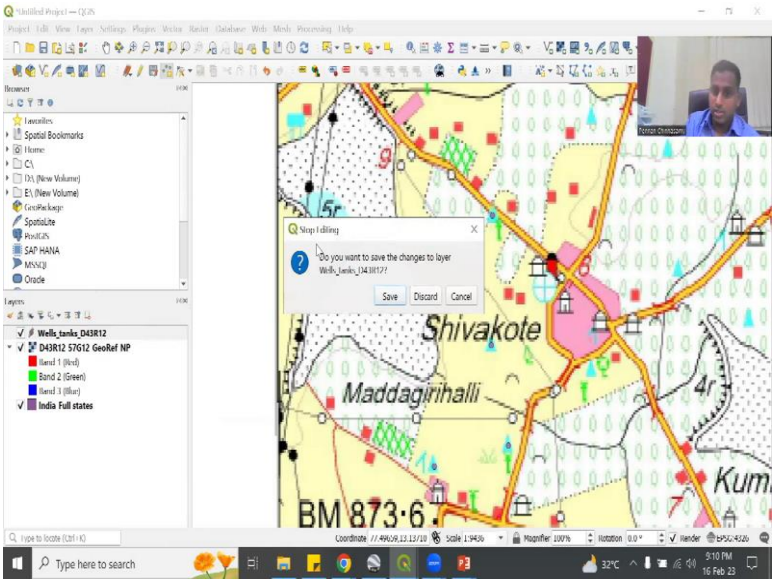
Let us add one more here and this, we can have this as three and then the name is Maddagirihalli. Just from the map and number one and then the diameter is 2, you can say ok.

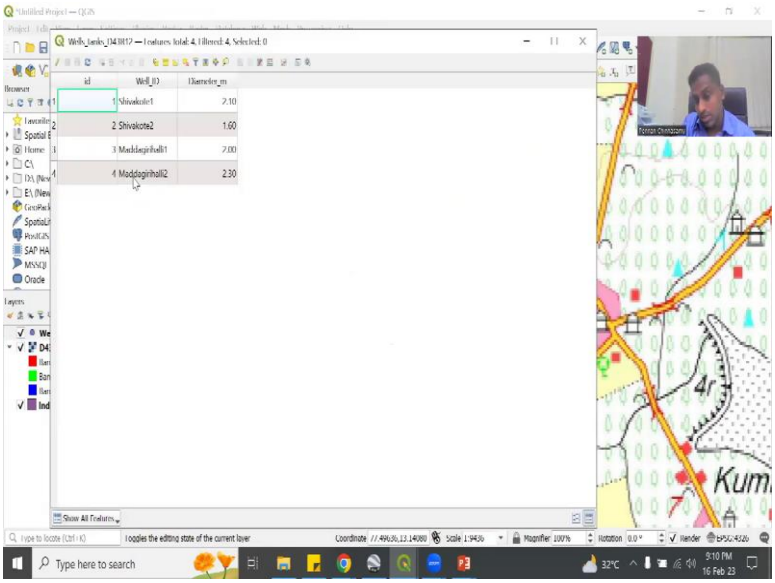
So now we have added three points. So these three points are very important to look into the attribute table.

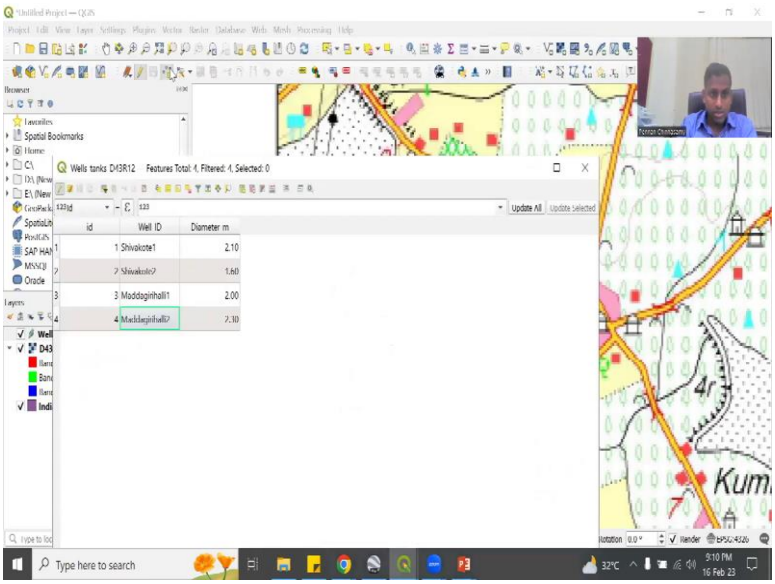
And you can see in the attribute table, we have the three points as point files. If you click the pencil again or save without saving, it will ask. See we have edited the file, we have created a shape file, we have looked into the map and then say okay, this is well I want, this is the well I want from 2011. So then you will shift it, shift the data into the table. That is what we have done. We have added the table, populated the table. We will add one more just for the region.

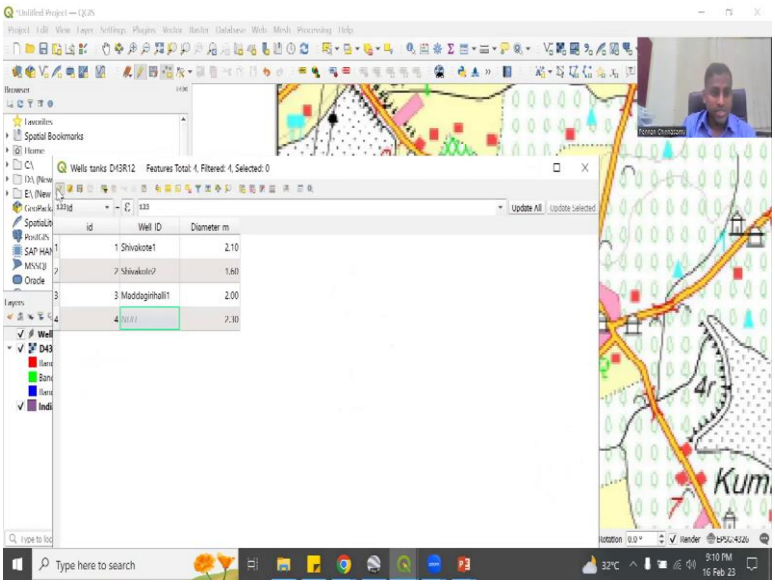
(Refer Slide Time: 18:48)

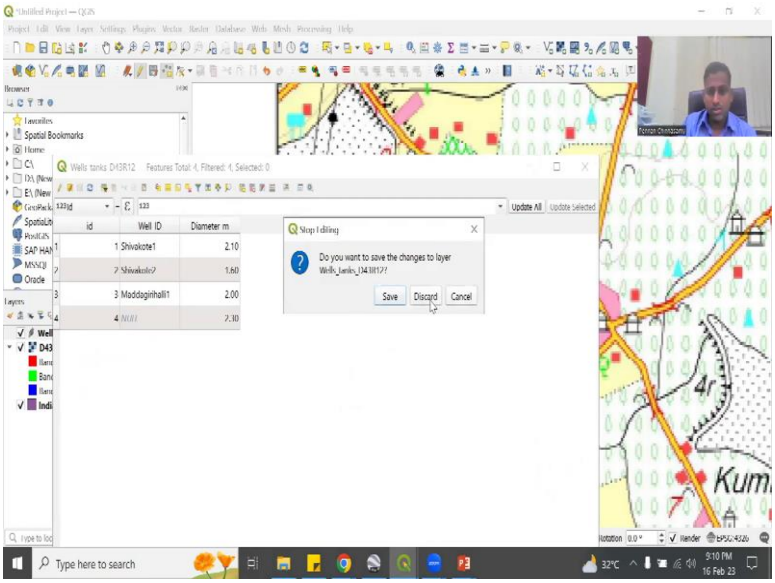





Wells_tanks_D43R12 — Features total: 4, Filtered: 4, Selected: 0
id
Well_ID
Diameter_m
1 Shivakote1 2.10
2 Shivakote2 1.60
3 Maddagirihalli1 2.00
4 Maddagirihalli2 2.30
Show All Features
Toggles the editing state of the current layer
Type here to search
32°C
9:10 PM
16 Feb 23


Wells tanks D43R12 Features Total: 4, Filtered: 4, Selected: 0
Update All
Update Selected
id
Well ID
Diameter m
1 Shivakote1 2.10
2 Shivakote2 1.60
3 Maddagirihalli1 2.00
4 Maddagirihalli2 2.30
Type here to search
32°C
9:10 PM
16 Feb 23


Wells tanks D43R12 Features Total: 4, Filtered: 4, Selected: 0
Update All
Update Selected
id
Well ID
Diameter m
1 Shivakote1 2.10
2 Shivakote2 1.60
3 Maddagirihalli1 2.00
4 2.30
Type here to search
32°C
9:10 PM
16 Feb 23



So let us say this one is another one and we are going to click here. It says ID4, Maddagirihalli2. So we have four wells done. Now you can go and see this has populated up. So it says save layer edits or stop editing. So if you want to save you save or you want to go back you can go back. If you accidentally press this yellow button which says stop the toggling, stop the editing.

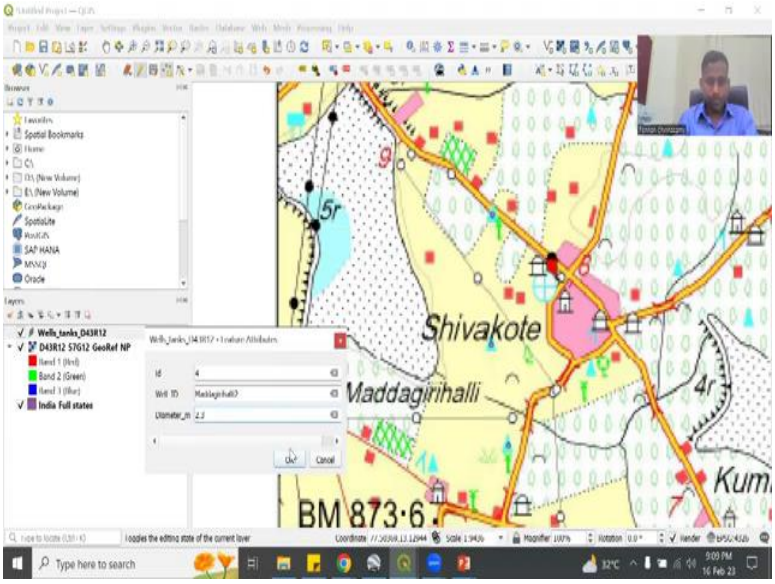
It will ask, do you want to save the edits or not, see if you can see, it is asking you want to say, so the first step you should do is always save your edits, if you are okay with it. Now if you saved it you can close the pencil, the pencil symbol goes off, you can go and open your attribute table. The table has been populated. So now if I click anything, now I am typing and clicking, it does not change.

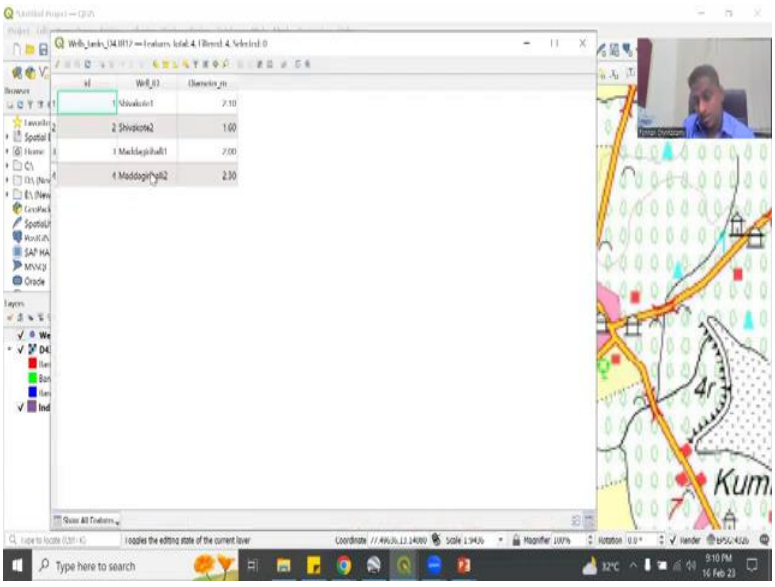
Why? Because the toggle button is off. If I toggle it on again, see I toggle it back again, on again this this symbol comes up and this can be edited. Let us see, let us show you for now. This has been, I accidentally deleted it. So, oh, I made a mistake. How do I go back, do not worry, if you press this toggle again, it will ask do you want to save the changes, say no, I do not want to save the changes. So discard and your name comes back again.

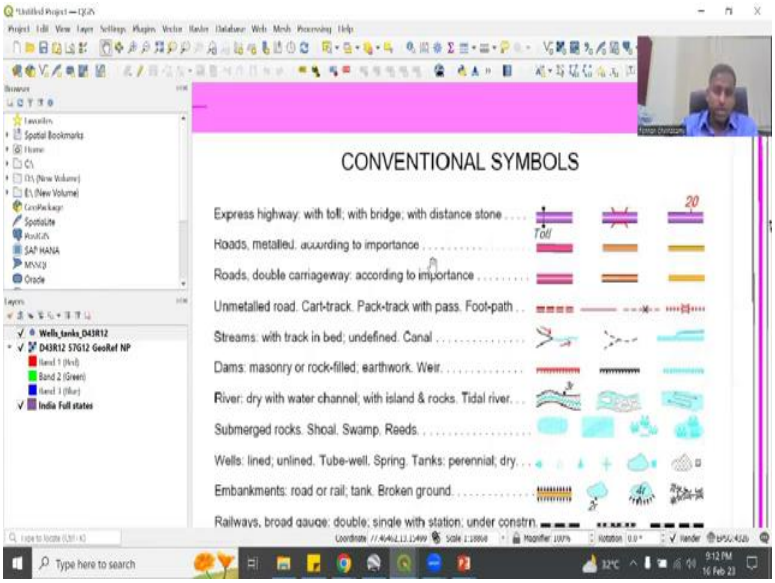
So let us do this again. I am going to say I am going to add a underscore for 2 and then I say save edits, it saves the edit. I toggle off the button, it is okay. But now if I toggle the button again and then this goes off, so you will delete it, save it and then close the pencil. So this is how you would create a point file in QGIS and extract from the image, any image. So this is the same thing you will do for drone image, photograph image.

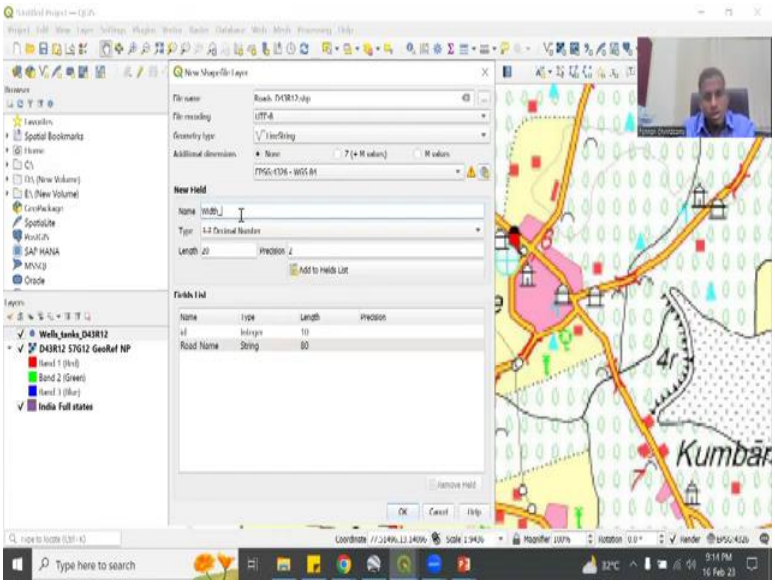
And this is the image that you have taken from a paper map. First thing is to make sure the images are georeferenced. Most of the images are georeferenced, so you do not have to worry if it is from the drone or GPS handheld camera, but scanned images like this needs to be georeferenced. So this is the first step.

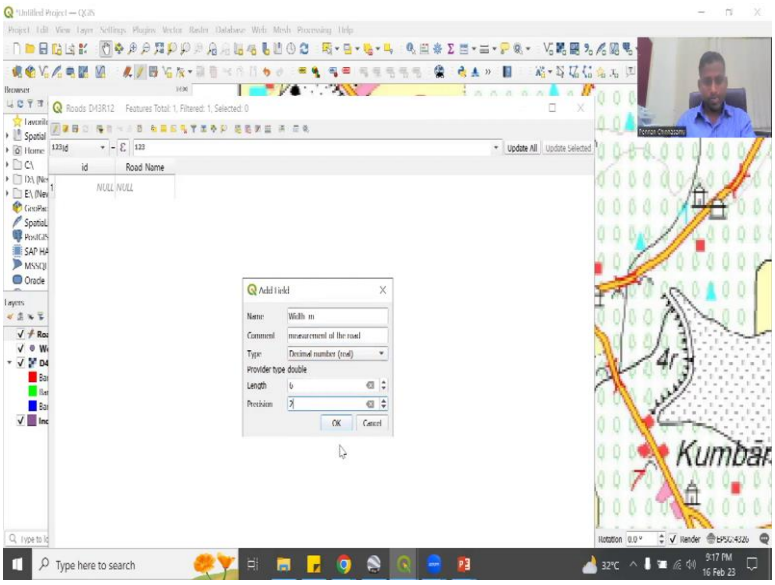
(Refer Slide Time: 21:20)






CONVENTIONAL SYMBOLS
Express highway: with toll; with bridge; with distance stone
Roads, metalled, according to importance
Roads, double carriageway: according to importance
Unmetalled road. Cart-track. Pack-track with pass. Foot-path
Streams: with track in bed; undefined. Canal
Dams: masonry or rock-filled; earthwork. Weir.
River: dry with water channel; with island & rocks. Tidal river.
Submerged rocks. Shoal. Swamp. Reeds.
Wells: lined; unlined. Tube-well. Spring. Tanks: perennial; dry.
Embankments: road or rail; tank. Broken ground.
Railways, broad gauge: double; single with station; under constrn.
Toll
20
Type here to search


Type here to search


Type here to search

In the next step let us look at a road. This is a road as per the definition. The yellow lines I am saying. Let us double confirm. These are the yellow lines with red boundaries. It could be a different road all together, but let us double check. Yes, here. So it says it is roads metalled according to importance. So if it is important road it is bigger, if it is less important, it is smaller. That is what it means. So we have three.

But it is still good for us, we are going to use it for our region Shivakote. So let us now go to the next step of a shapefile. What shapefile do we need? We need a line shapefile. And in the line shapefile again you go here to the yellow button, you click the yellow button and let us say we are going to say roads is the name of the file and we are going to do the same thing, D43R12. And then geometry type is line string.

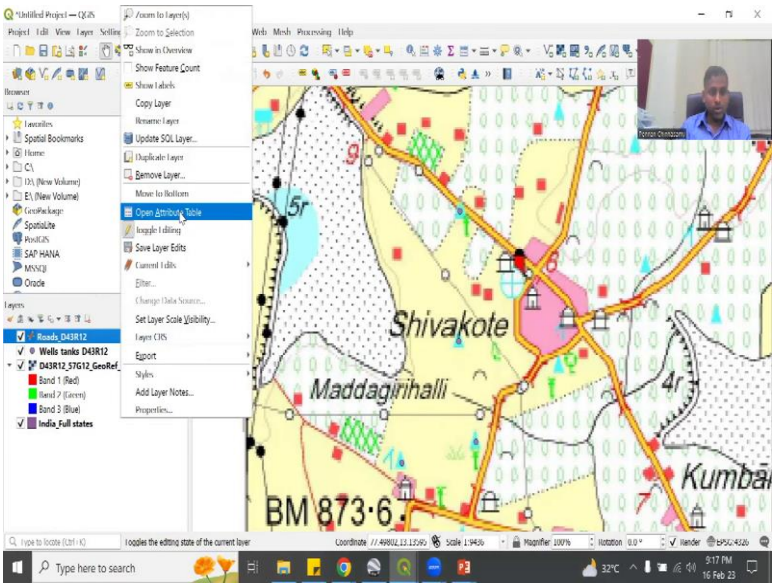
It is a line not a point. The coordinate system is defined, it is the same thing and ID number is already created. So what are we going to say? We are going to say road name. Road underscore name is one thing, it is a text data, there is no precision, let us add it. Maybe one more thing we can say is road width. So this road with may not be available from the map, but when you are going the physical world and taking a measurement you can do it.

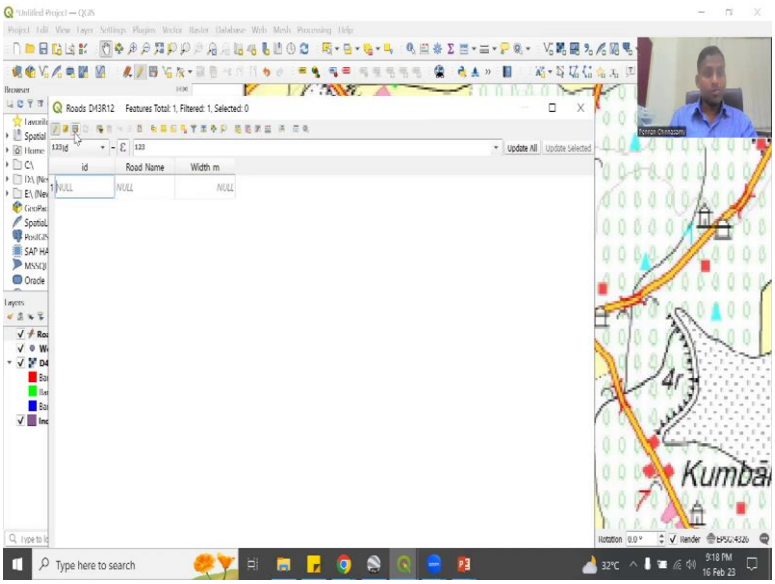
Since it is a number I am going to put decimal and then precision as again two. Let us say meters, road width underscore meters. There is a limit for the name length. So let us say road, the road underscore width, because it is anyways a road, the shapefile is road in meters. So we have added that layer. Now if we open the layer, add a new field, so you can see that, you can have a new toggle columns, add feature.

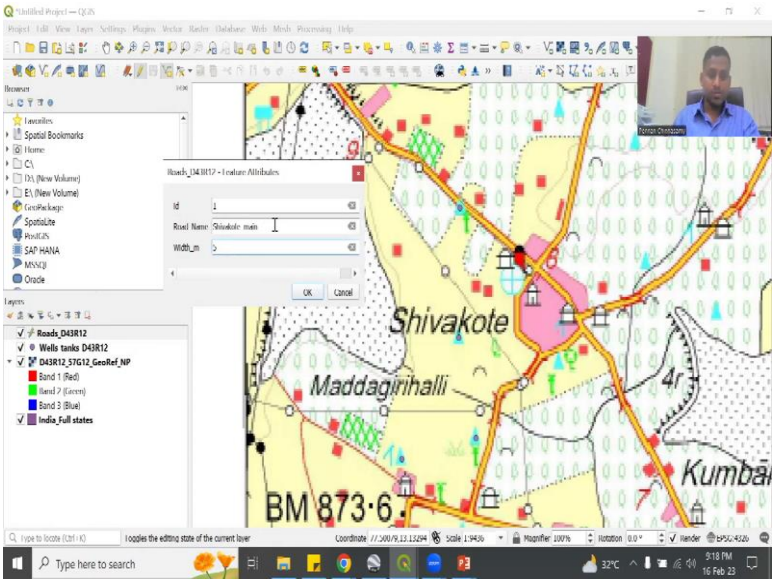
So add feature comes only when you add the pencil thing and the add feature, it can also be a value that you can put. So the best way is here. So you have a new field which turns out because of the pencil or you can delete a field, so as I said the new field is road width, I want it to be with meters you can add a comment about the field like what is it, measurement of the road and then you say it is going to be a decimal and it is going to be 6 and 2.

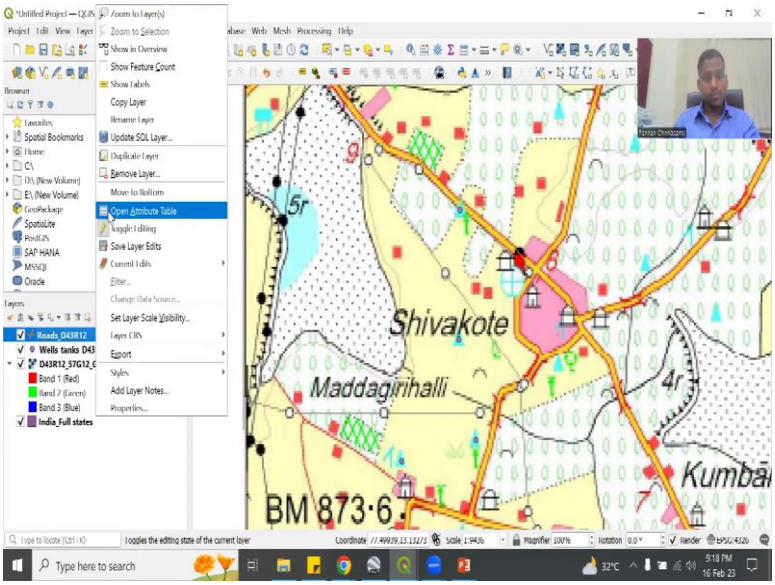
When you click ok, now it has been created. Now I am going to close this, but not save it. Why? Because we are going to do the add features now.

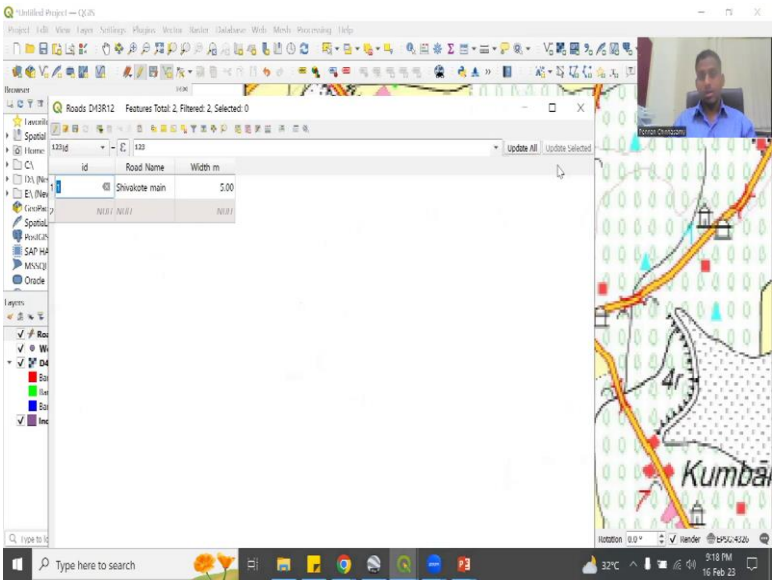
(Refer Slide Time: 24:45)






Roads_D43R12 - Feature Attributes
Id 1
Road Name Shivakote main
Width_m 5
OK
Cancel
Shivakote
Maddagirihalli
BM 873·6
Kumbā
Type here to search


Zoom to Layer(s)
Zoom to Selection
Show in Overview
Show Feature Count
Show Labels
Copy Layer
Rename Layer
Update SQL Layer...
Duplicate Layer
Remove Layer...
Move to Bottom
Open Attribute Table
Toggle Editing
Save Layer Edits
Current Edits
Filter...
Change Data Source...
Set Layer Scale Visibility...
Layer CRS
Export
Styles
Add Layer Notes...
Properties...
Shivakote
Maddagirihalli
BM 873·6
Kumbā
Type here to search

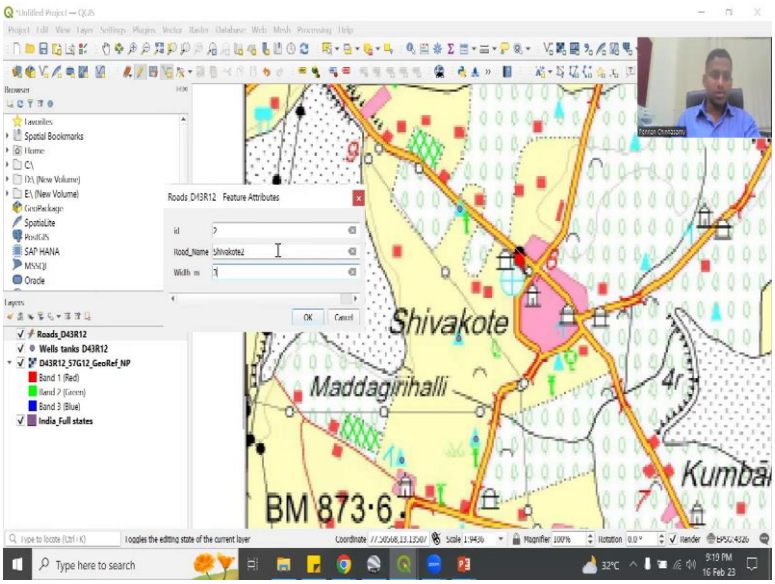

Roads D43R12 Features Total: 2, Filtered: 2, Selected: 0
Update All
Update Selected
id
Road Name
Width m
1
Shivakote main
5.00
NULL NULL NULL
Shivakote
Maddagirihalli
Kumbā
Type here to search

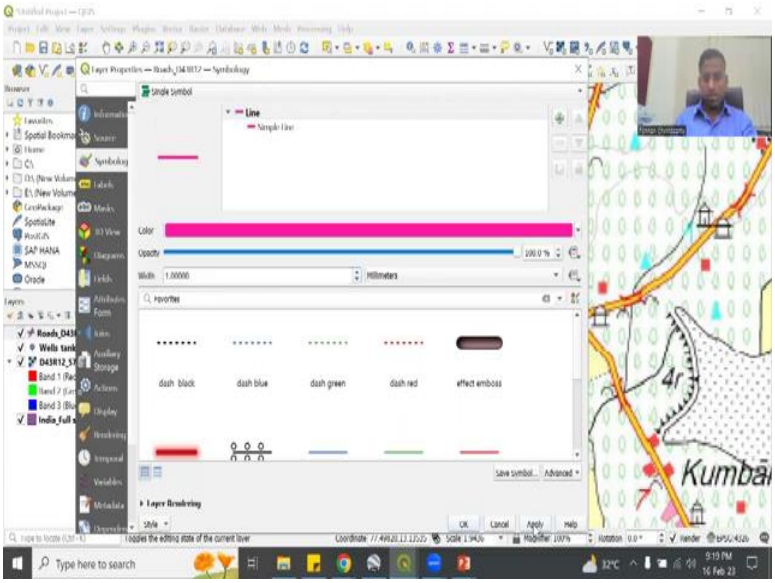
So you can add features in two ways. If you go to this layer again, open attribute table, I can add it physically. Physically, ID name and stuff, but it still needs a location. So for the location what I am going to do is I am just going to first save my edits and toggle off.

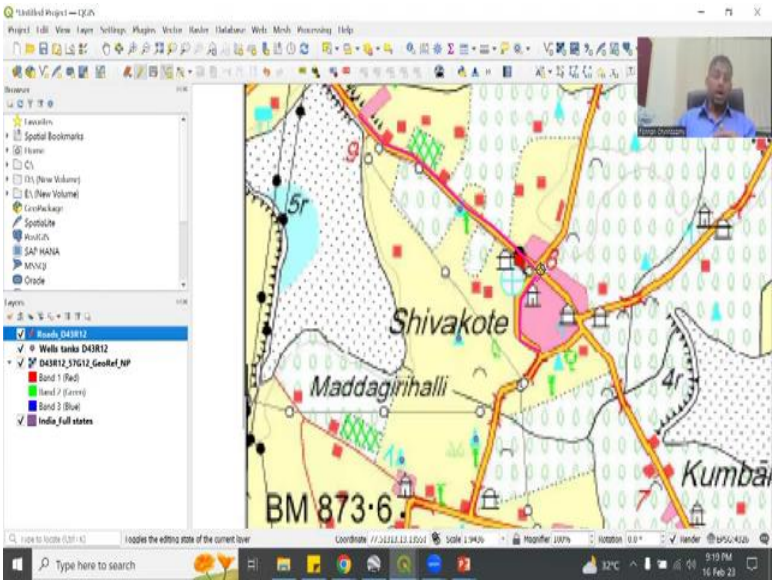
So there is no value. Now I am going to toggle it on again, the pencil is on and I am going to draw. So now you could see that this line tool has come up, add line feature. So I am going to click it and then say this is one road. You could see that I am drawing and the line is retracing this, so I am just going to click here. When you are done right click, this thing will come up to say which is the ID; so the ID is number one, the road name is Shivakote main and then the width is let us say meters. And I say ok.

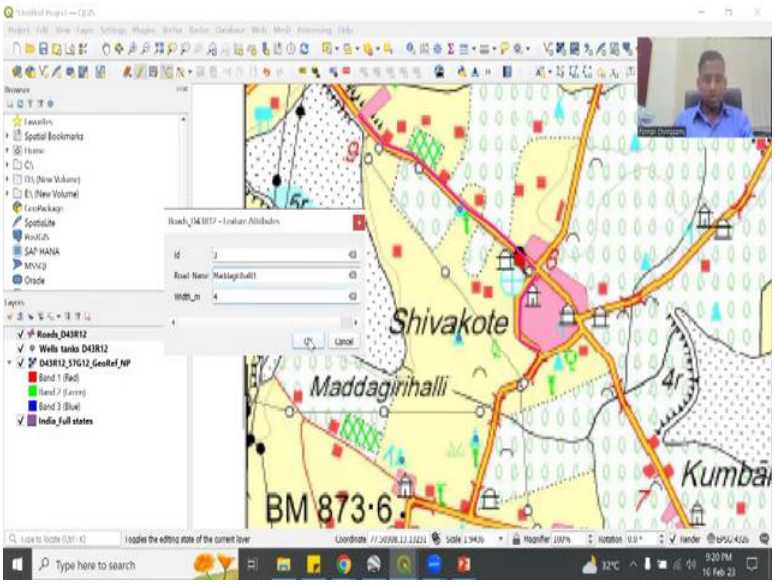
Now if I go to the attribute table you will see the first legend put in. So let us add four more like we have done in the past.

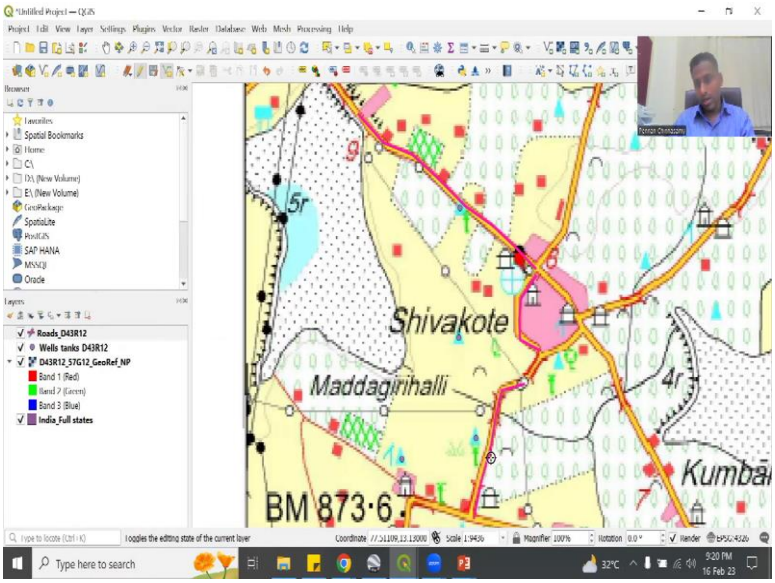
(Refer Slide Time: 26:02)

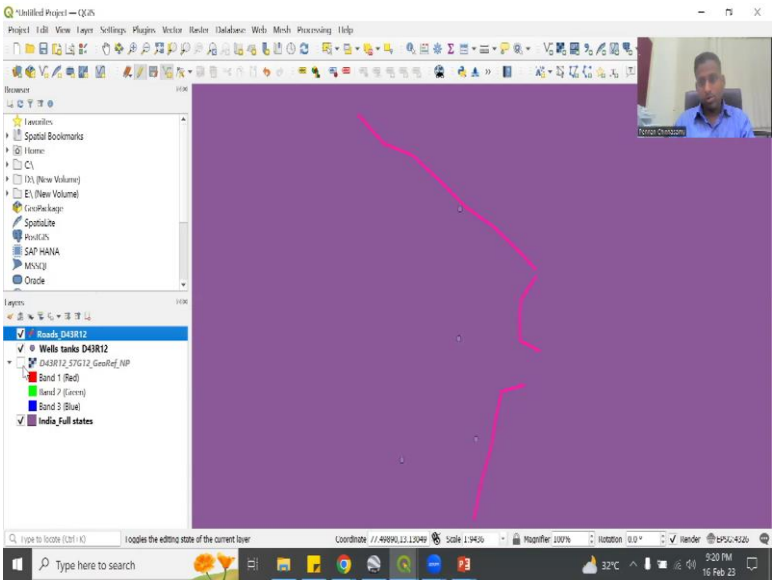



Layer Properties — Roads_D43R12 — Symbology
Single Symbol
Line
Simple Line
Color
Opacity
Width
Millimeters
Favorites
dash black
dash blue
dash green
dash red
effect emboss
Save Symbol...
Advanced
Layer Rendering
Style
OK
Cancel
Apply
Help
4r
Kumbā
Type here to search
9:19 PM
16 Feb 23


Roads D43R12
Wells tanks D43R12
D43R12_57G12_GeoRef_NP
Band 1 (Red)
Band 2 (Green)
Band 3 (Blue)
India_full states
5r
Shivakote
Maddagirihalli
4r
BM 873·6
Kumbā
Type here to search
9:19 PM
16 Feb 23


Roads_D43R12 — Feature Attributes
Id
Road Name
Width_m
Cancel
Roads_D43R12
Wells tanks D43R12
D43R12_57G12_GeoRef_NP
Band 1 (Red)
Band 2 (Green)
Band 3 (Blue)
India_full states
5r
Shivakote
Maddagirihalli
4r
BM 873·6
Kumbā
Type here to search
9:20 PM
16 Feb 23





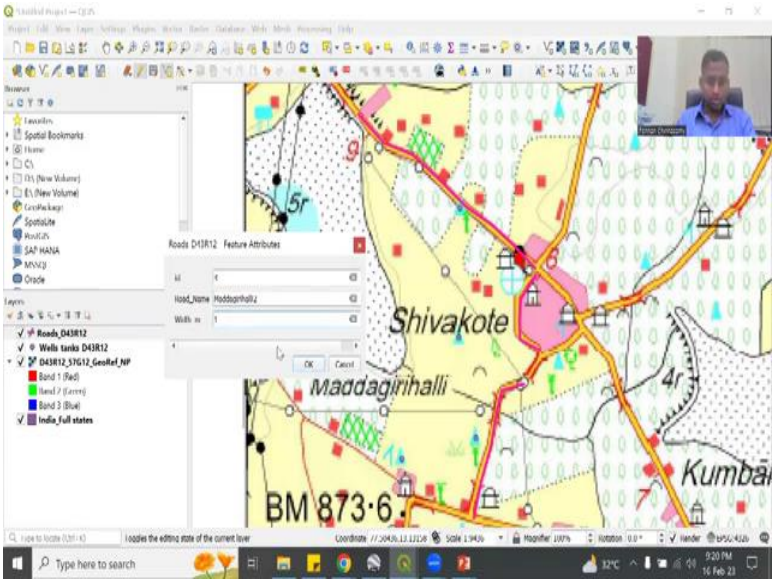
So this is one road, which has come up to here and then I am going to click another road and then I am going to say 2 ID Shivakote2 and then width is smaller than the other one, let us say 3 meters and say ok. I can see it properly, so what you could do is also right click, go to properties and make the line thicker.

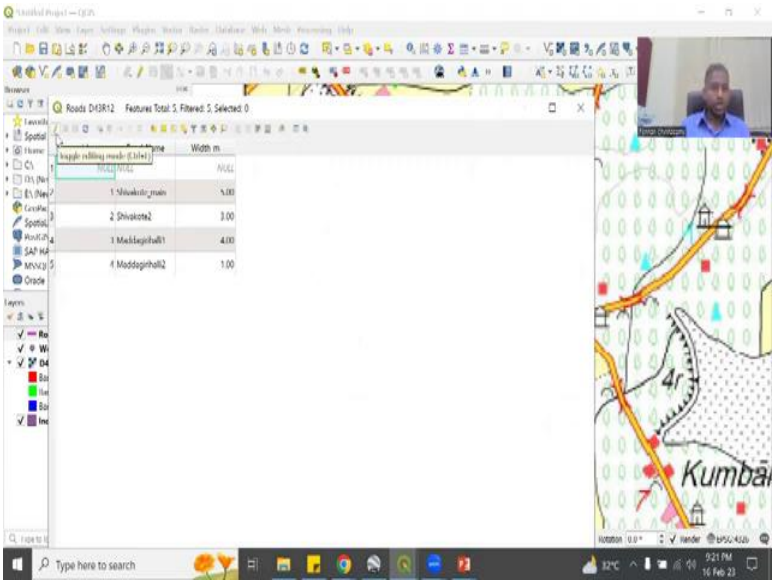
So the line color could be somewhat red or this color, so that the map can also see and then it will close it. So I have to say ok. And the width is too small, let us make it 1 and then apply, say ok. Now you could see the line coming up big, correct. I want to see the line otherwise maybe in the screen it will not be visible. Good. We have done two. Let us do two more on this side.

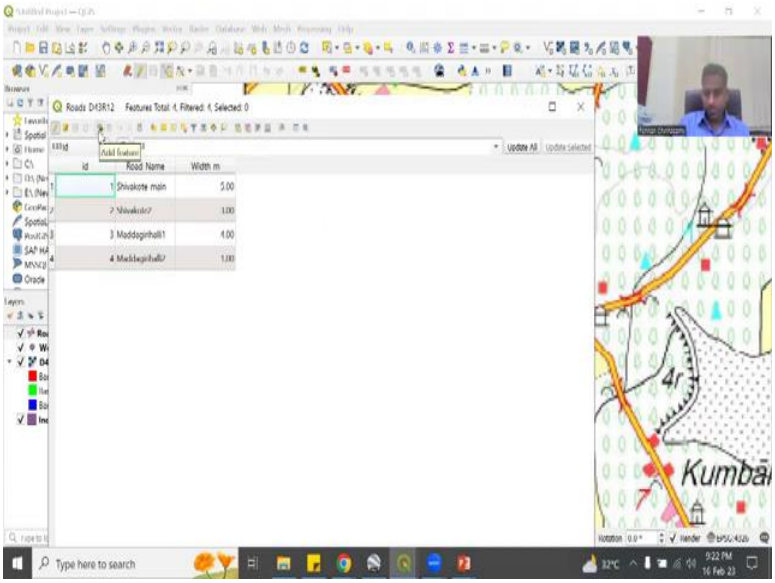
So until here I have drawn the road and this is a bridge, so let us leave the bridge and then, let us draw this road. So and I am just going to click, right click, first left click and click on the buttons and then right click it, it will open the feature ID name and this is going to be Maddagirihalli1 and this is thicker road, so let us say four meters and say ok and now you see the line has come up.

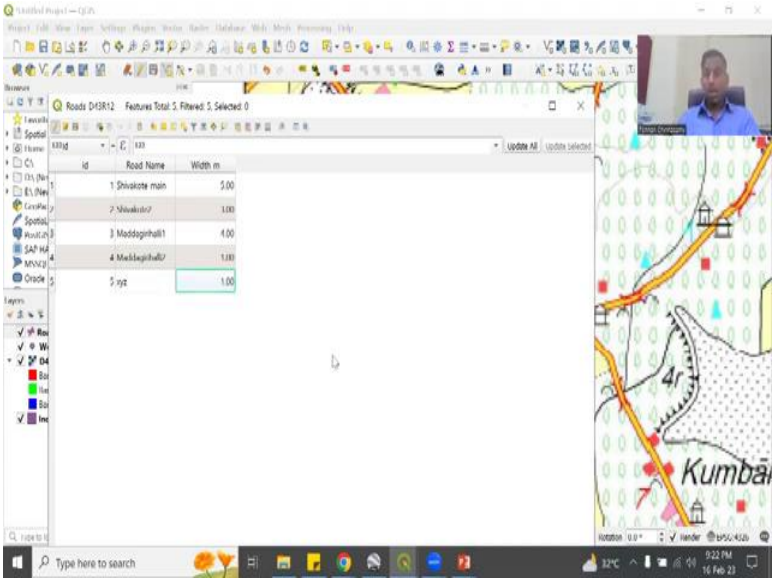
Just to show how the line has come up, I am going to take it off and you can see that three lines have already been come up.

(Refer Slide Time: 27:26)






Roads D43R12 Features Total: 4, Filtered: 4, Selected: 0
id
Road Name
Width m
1 Shivakote main 5.00
2 Shivakote2 3.00
3 Maddaginhalli1 4.00
4 Maddaginhalli2 1.00
Kumbā
Type here to search
32°C
9:22 PM
16 Feb 23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id
Road Name
Width m
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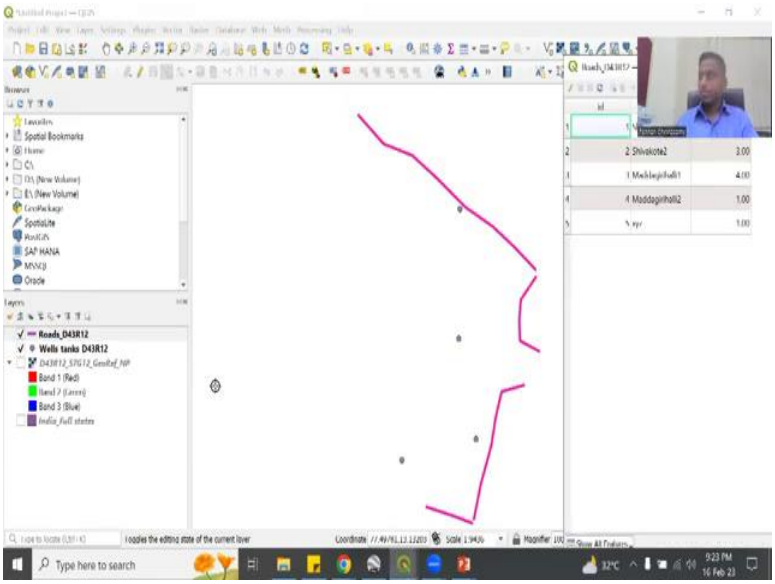
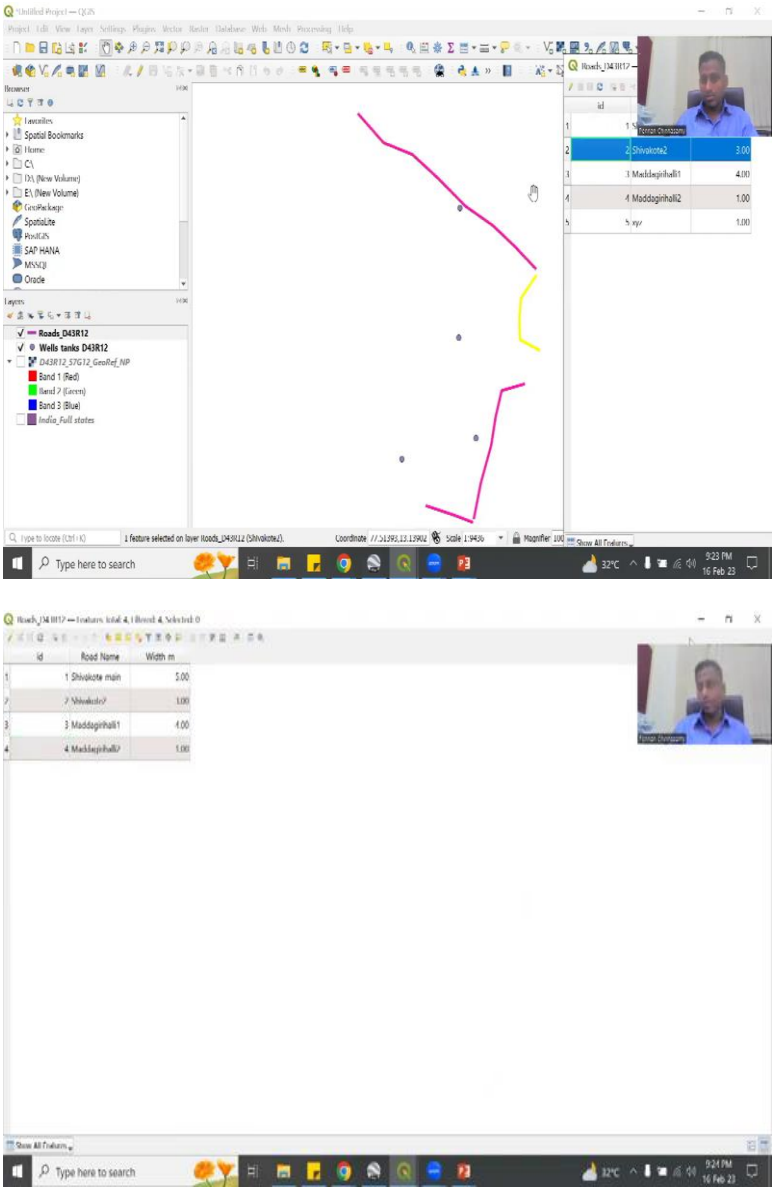
2 Shivakote2 3.00
3 Maddaginhalli1 4.00
4 Maddaginhalli2 1.00
5 xyz 1.00
Kumbā
Type here to search
32°C
9:22 PM
16 Feb 23


Roads_D43R12
Wells tanks D43R12
Band 1 (Red)
Band 3 (Blue)
2 Shivakote2 3.00
1 Maddaginhalli1 4.00
4 Maddaginhalli2 1.00
5 xyz 1.00
Type here to search
32°C
9:23 PM
16 Feb 23



Now I am going to finish it off with this line connecting it to a house. So one, two, three and then right click, it becomes four, Maddagirihalli2 and it is a small road, let us say one meter, very small and it is done. So now we have populated a line a point and the last one is a polygon.

I will do the polygon in the next lecture. But before that we have to save it. So let us save the edits. I am going to click save edits and then turn off the pencil and now you could see the pencil is gone. These two have, each have 4 4 data. So you can see four data, the first one is not okay. We need to delete it, because I typed it and then it did not work, sometimes it gets stuck so do not worry, just close and do it again, it will work.

Let us delete this entry. So you see I have clicked it and then it says you can delete a field. This is a delete a field or you can delete an ID. So and then you can see delete. Correct, so there is a delete selected features. I will say delete, I just need four, there is only four values. So what it also means is that you have one, two, three, four, also means is that you cannot just create a value in the attribute table, you need data for it.

But still because you put the toggle switch on it will still look at the value. The interesting part is even without a geospatial location it will still exist. I will show you how. So you have this. Now you have, again let us open it. First let us close the toggle. Now I am going to open it. The first ID is gone, because we deleted it, we have four. So I am going to click it and then we are going to add one more feature.

So you can go here and add a feature. So let us say I have added it, let us I have feature ID is 5 xyz is the name and then 1 width is there. I can close it, but if you look at the road there is only 4 because there is no spatial location for this. So I am just going to close it and then close, close it, just to show you there is no pencil. So there is no editing now possible. I open it and you have the fifth one.

But where is the fifth one? So if you zoom in to see the fifth one you will not see, I am going to show you something just to take out the image and then we have the attribute table. So now if I click this, you see it is coming yellow, if I click this this comes yellow. This is the third entry, this becomes yellow and then fourth entry becomes yellow. But the fifth entry which was initially not drawn for this because there is only one, two, three and four.

It will retrace it. So what it does is it retraces the last entry and or it does not have an entry, so there is no entry for it, unless and otherwise you give an entry it will not come yellow. So you have one, first road, second, two road, third is the third road and fourth is this road and five there is no road. So it is a error and this is how you should also clean attribute tables if needed. So I am going to open it.

Open the pencil, click on delete, delete that road, save button, toggle off and then I close. And add the layers back. As I said we will stop here and then do the other part which is the polygon in the next class and then apply it on the model. Thank you.