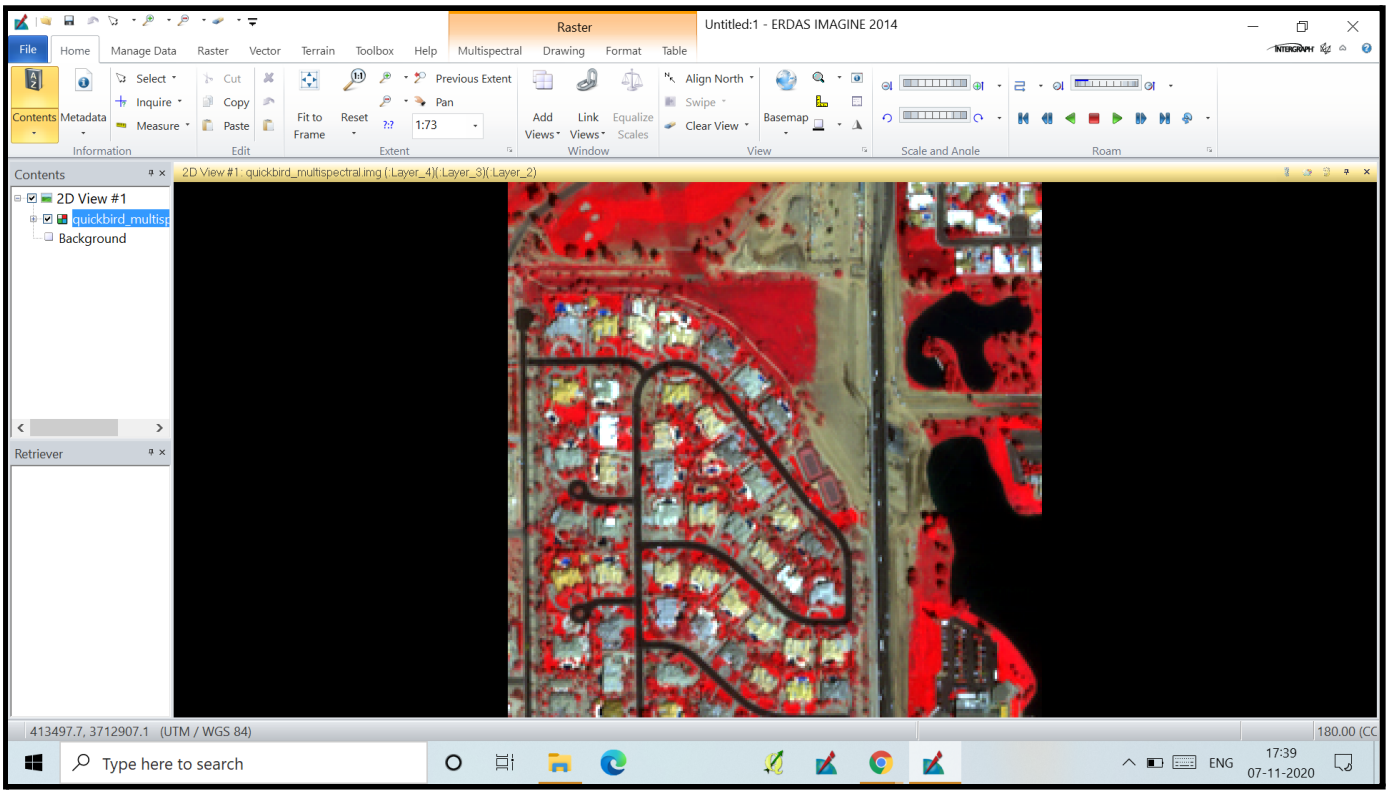
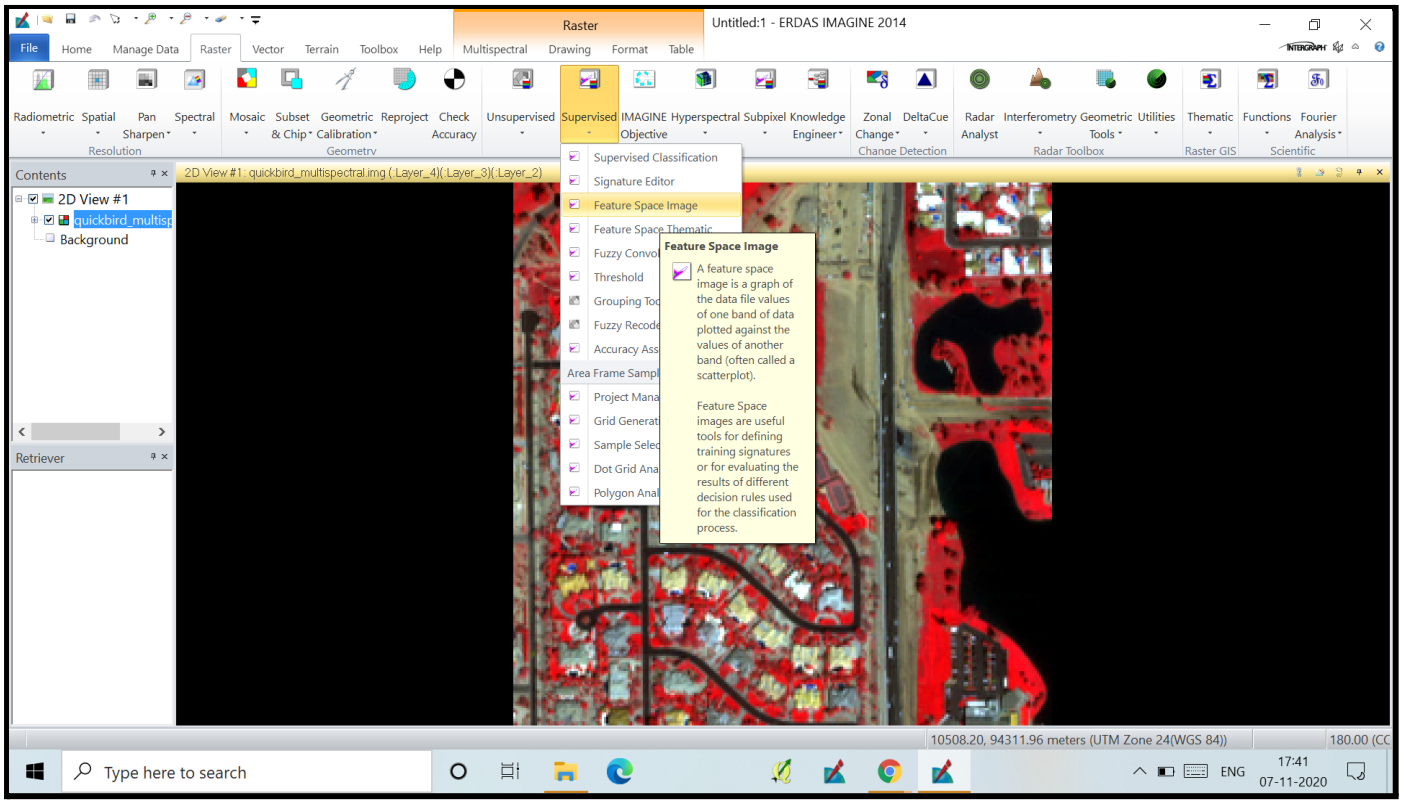
PART-1

2-D FEATURE SPACE

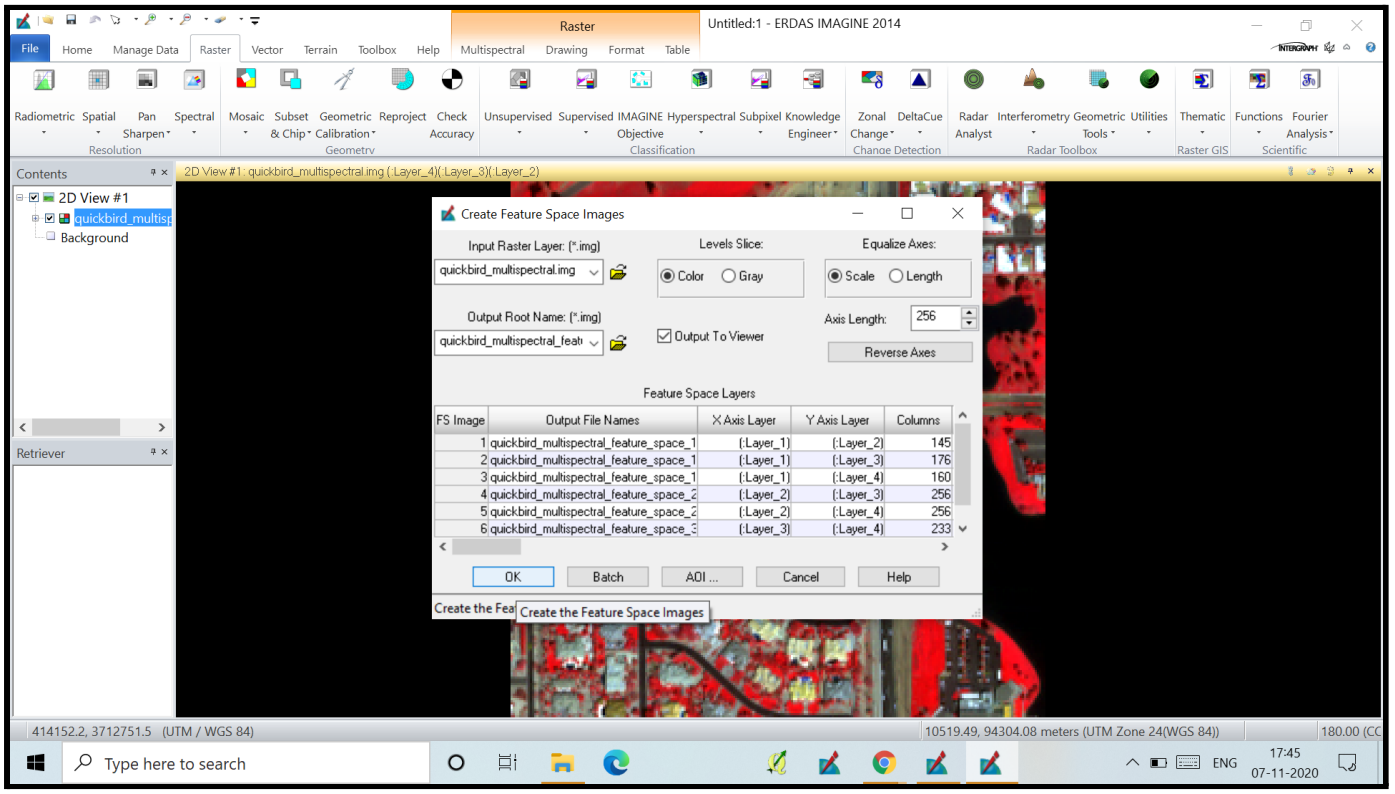
Step-1 Open the multispectral image.

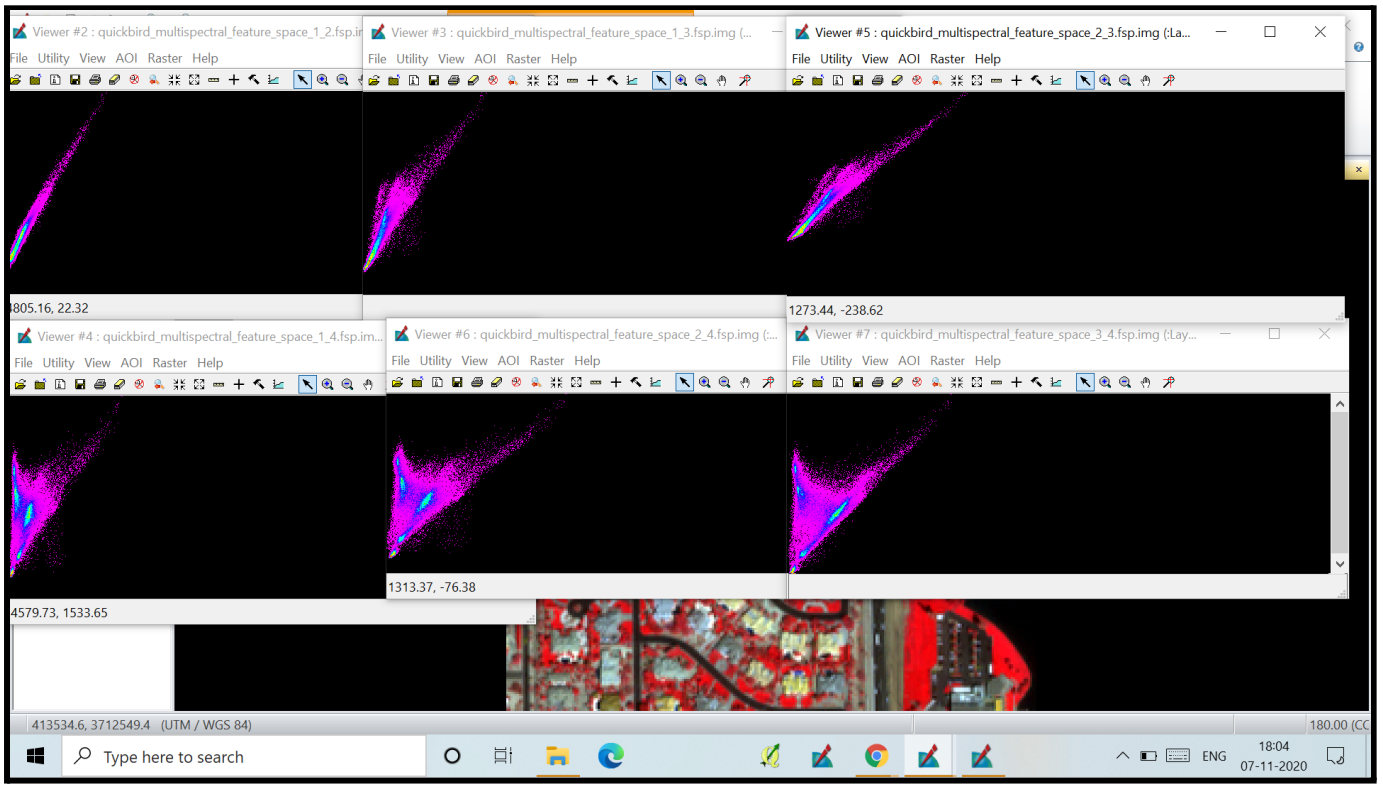


Step-2 Go to **Raster > Supervised > Feature Space Image.**



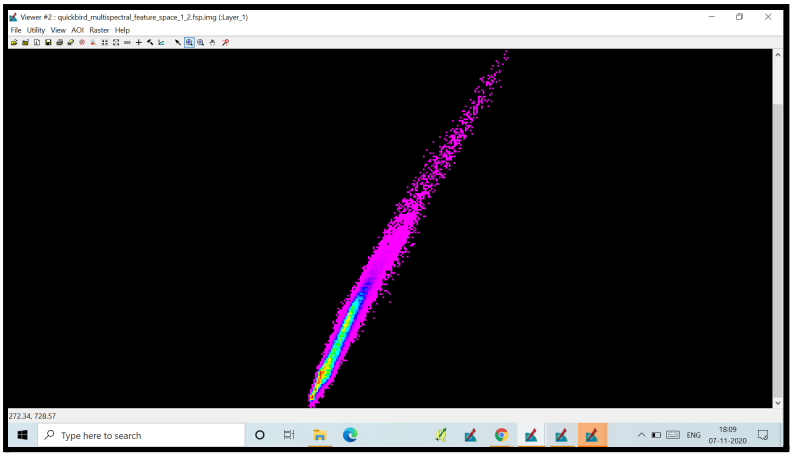
Step-3 Give the output file name and enable Output to Viewer and then click OK.





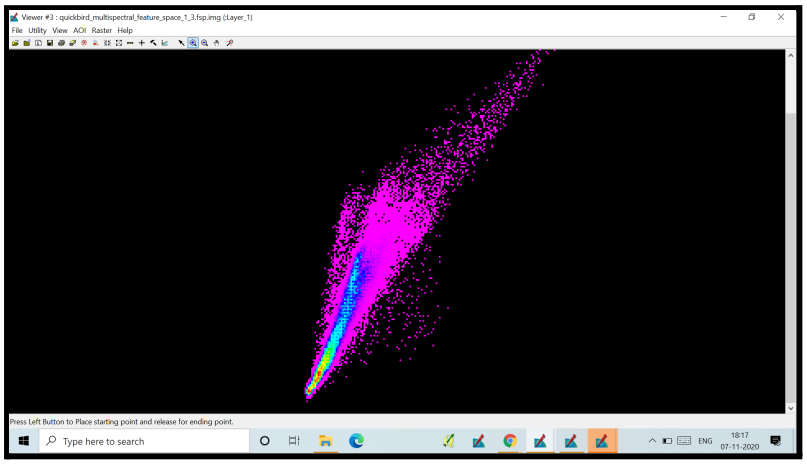
Six band combinations are produced. However, **not all band combinations are good for identification of clusters.**

a. Band 1 and Band 2



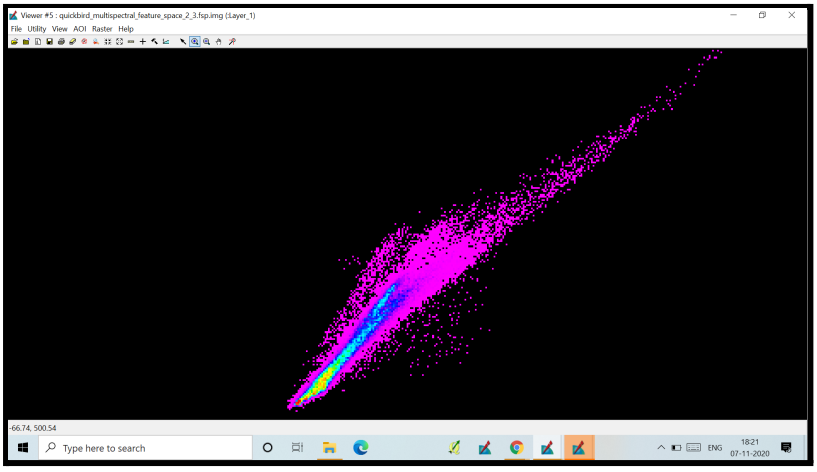
Not much information can be extracted from this band combination as it is **highly correlated**(straight line). It is not clustered and **no land use** can be identified. And hence, it is **less useful.**

b. Band 1 and Band 3



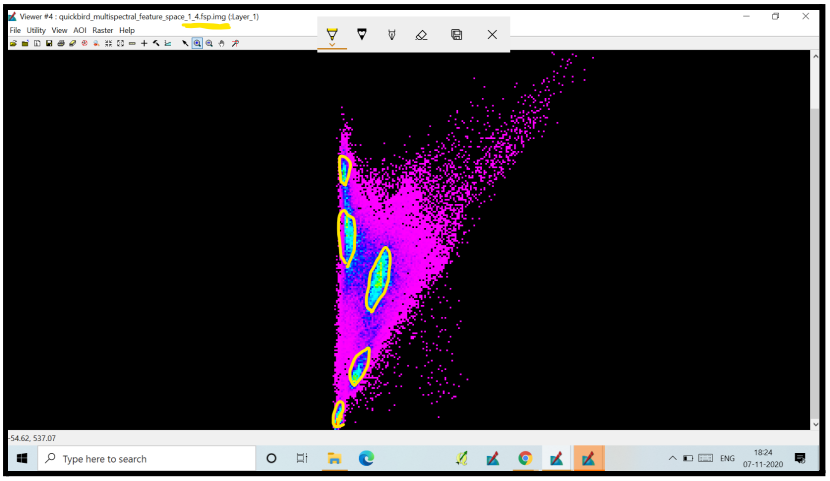
In this combination also, **not much information** can be extracted. It is **not clustered** and **no land use** can be identified.

c. Band 2 and Band 3



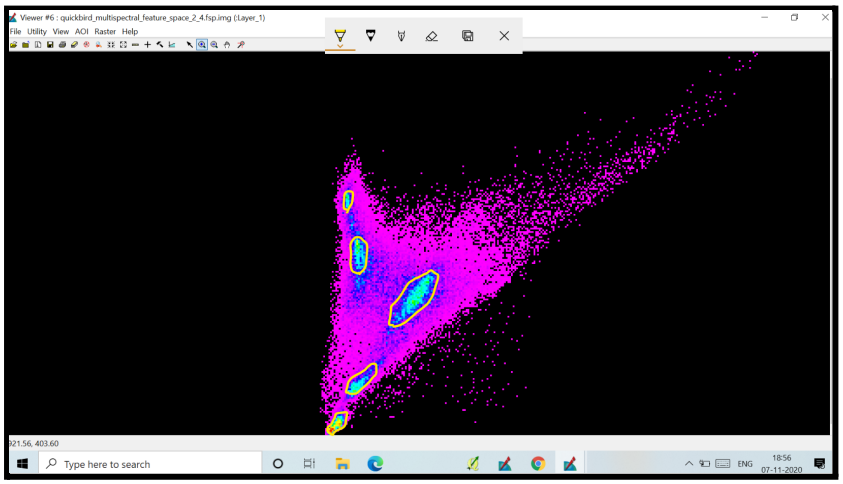
In this combination also, not much information can be extracted. It is difficult to distinguish between clusters. However, it is somewhat better than the above two to some extent.

d. Band 1 and Band 4



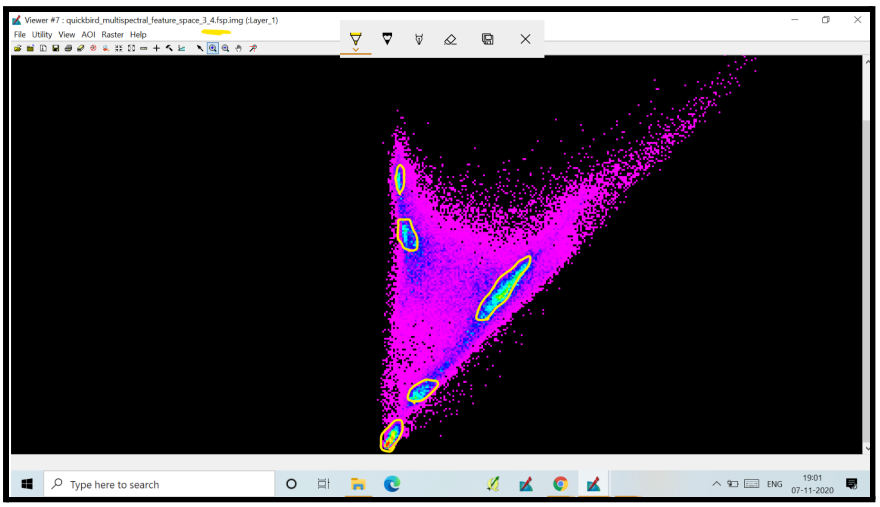
In this feature space, the band 1 and band 4 have **low correlation** with each other. It is **dispersed/spread**. And thus, **clusters** are easily identified. In this, **more information** can be extracted.

e. Band 2 and Band 4



In this feature space, the band 2 and band 4 have **very low correlation** with each other. It is **dispersed/spread**. And thus, **clusters** are easily identified. It is quite **useful** and **distinct classes** can be seen easily.

f. Band 3 and band 4

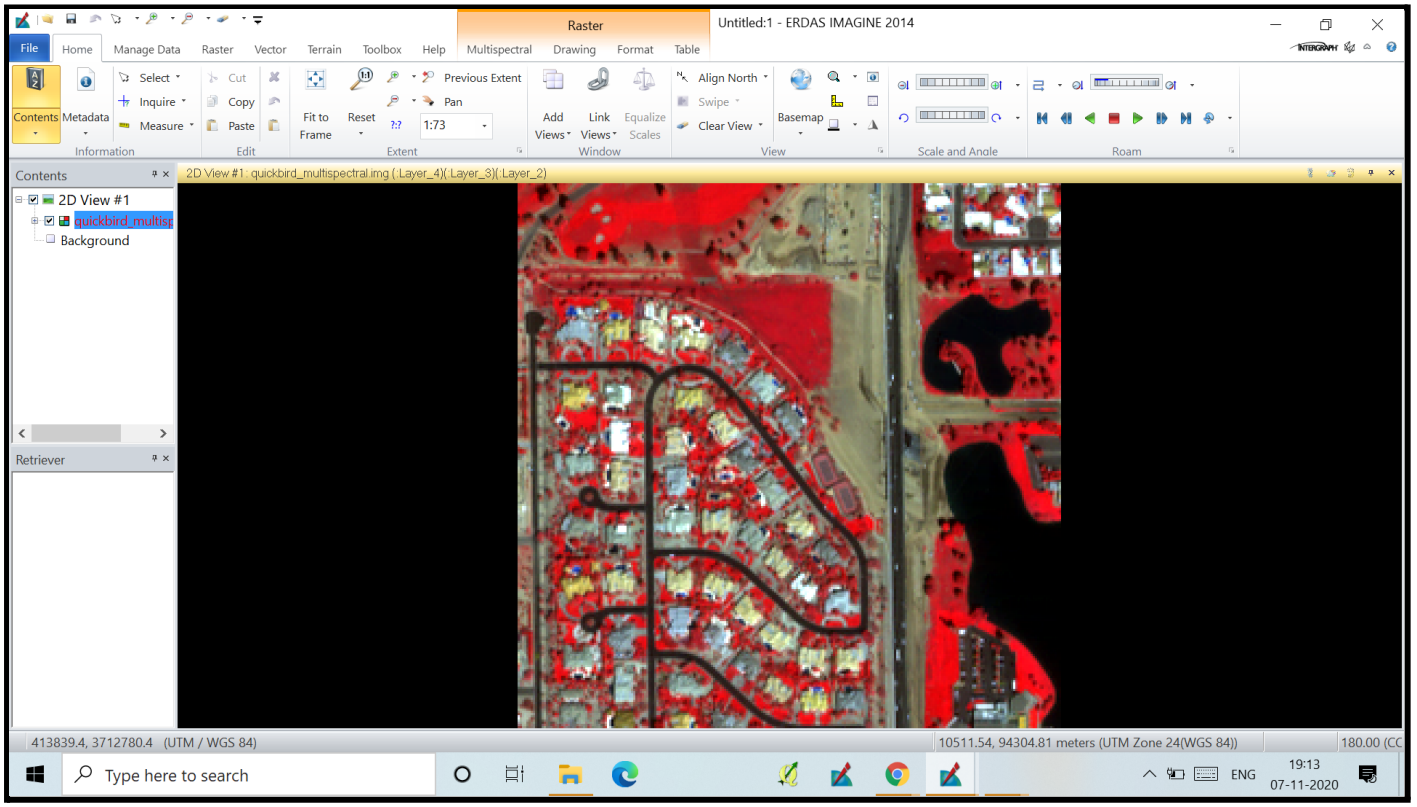


In this band combination, **clusters** can be easily identified. Thus, it is a good one to extract information.

Part-2A

IDENTIFY AND INTERPRET LULC

Step-1 Open the image to be classified.

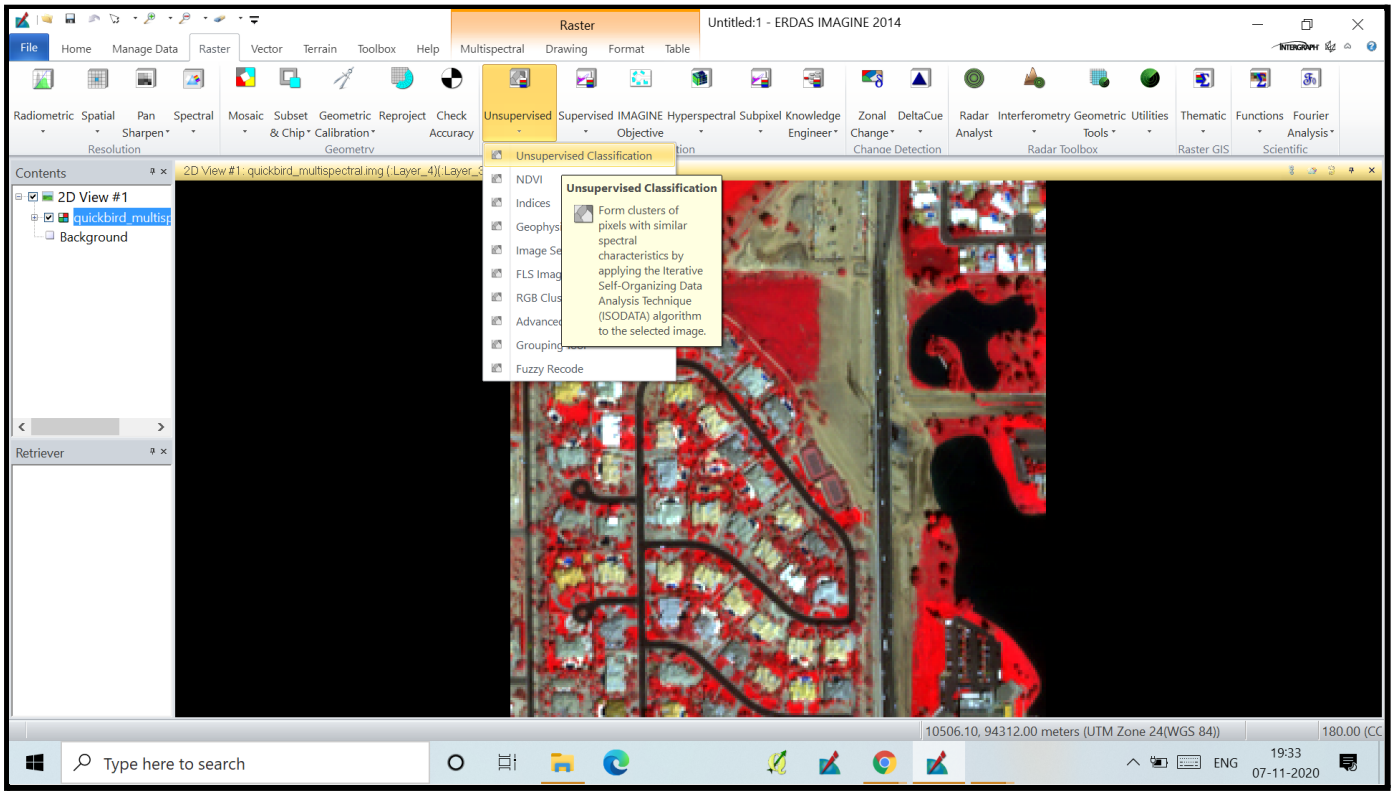


In this image, **five major classes** can be identified. They are **water body, road, vegetation, Build up area** and **barren land.** Further variations can be seen within classes of water body, vegetation and build up area. In the **water body**, the bigger ones may be natural water bodies whereas the small ones might be personal swimming pools attached to houses. Within, **vegetation** also two groups can be identified i.e. trees located sparsely and forest. Similarly, in the **build up area**, the rooftops have variety. Also, **functional features** can also be seen in the image. But boardly five classes can be identified clearly.

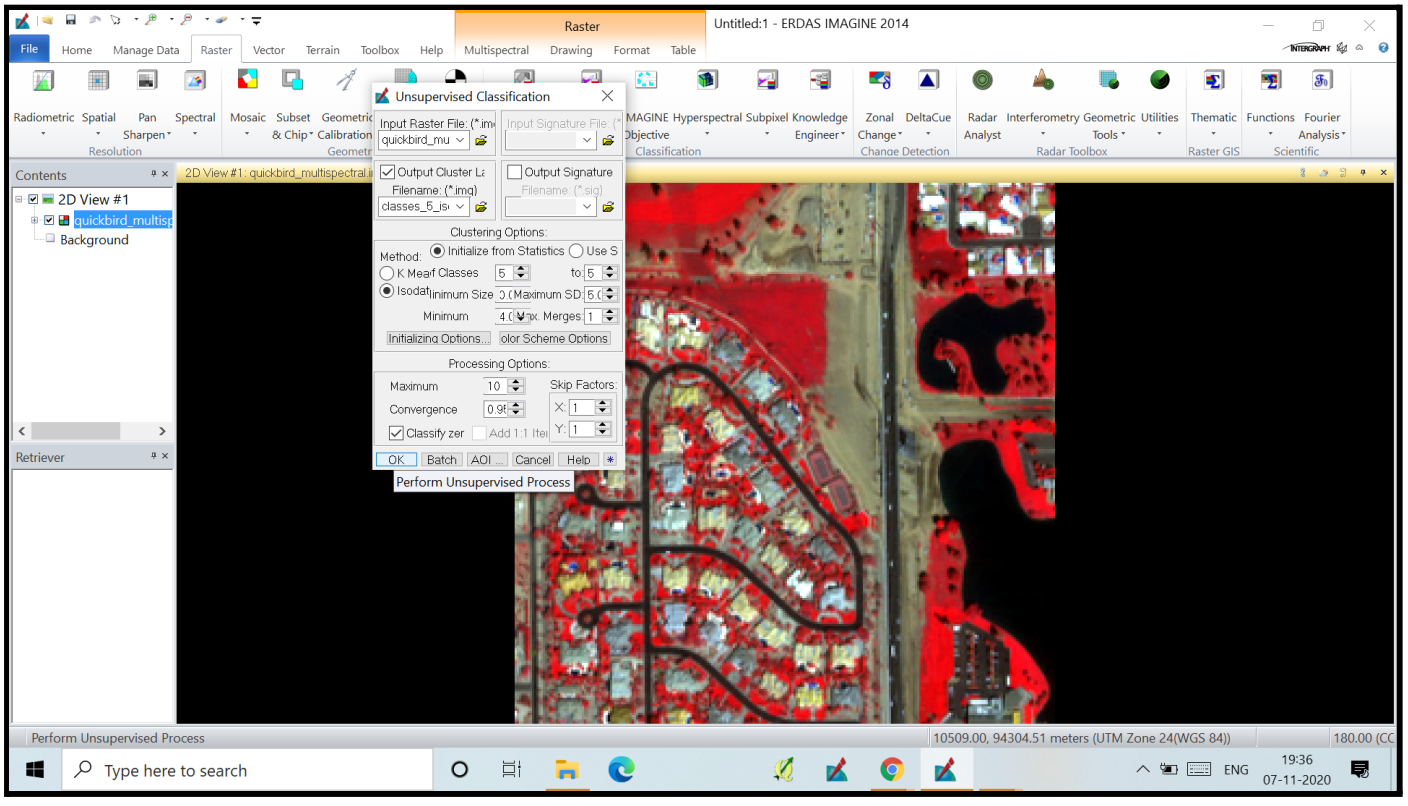
Part- 2B

PERFORM UNSUPERVISED CLASSIFICATION (ISODATA METHOD)

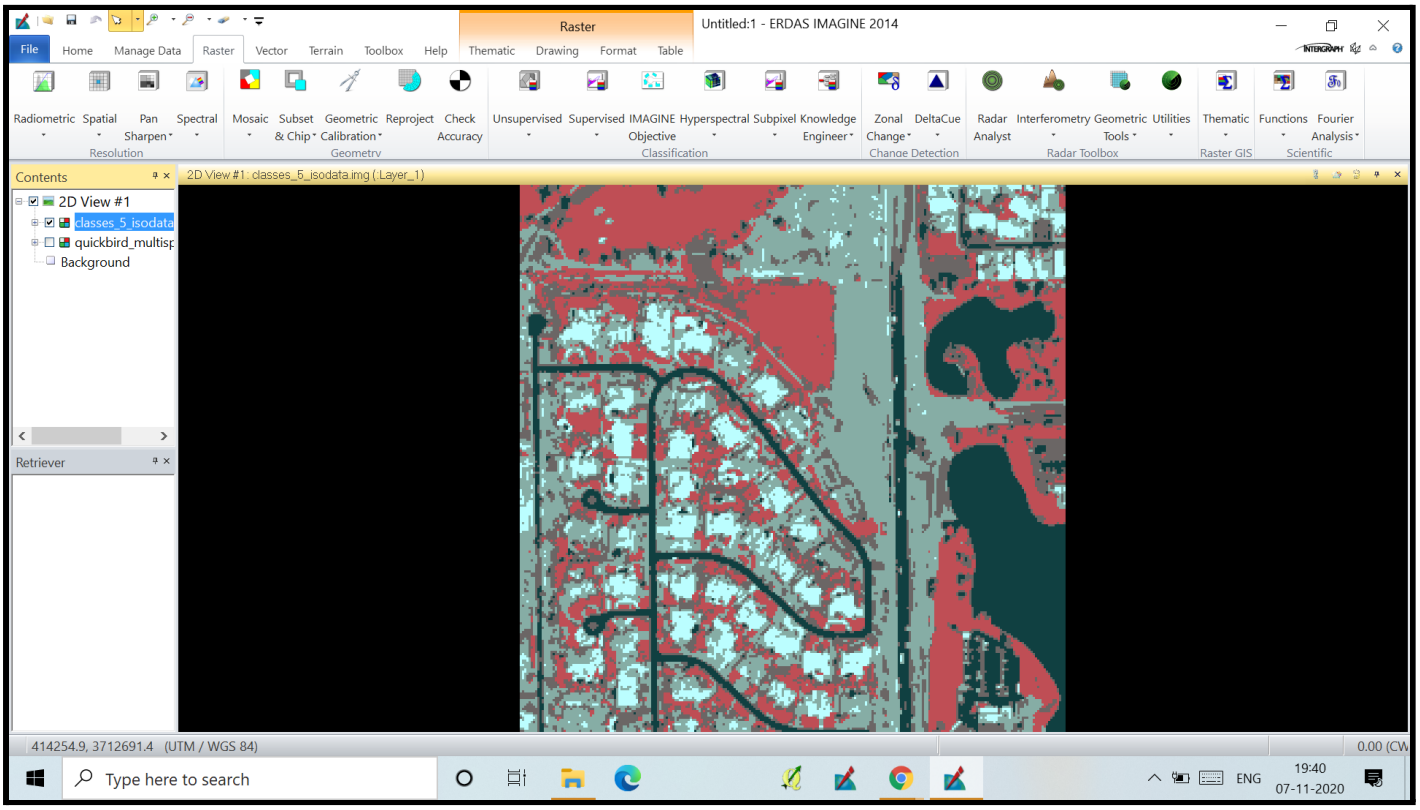
Step-1 Go to **Raster > Unsupervised > Unsupervised Classification**



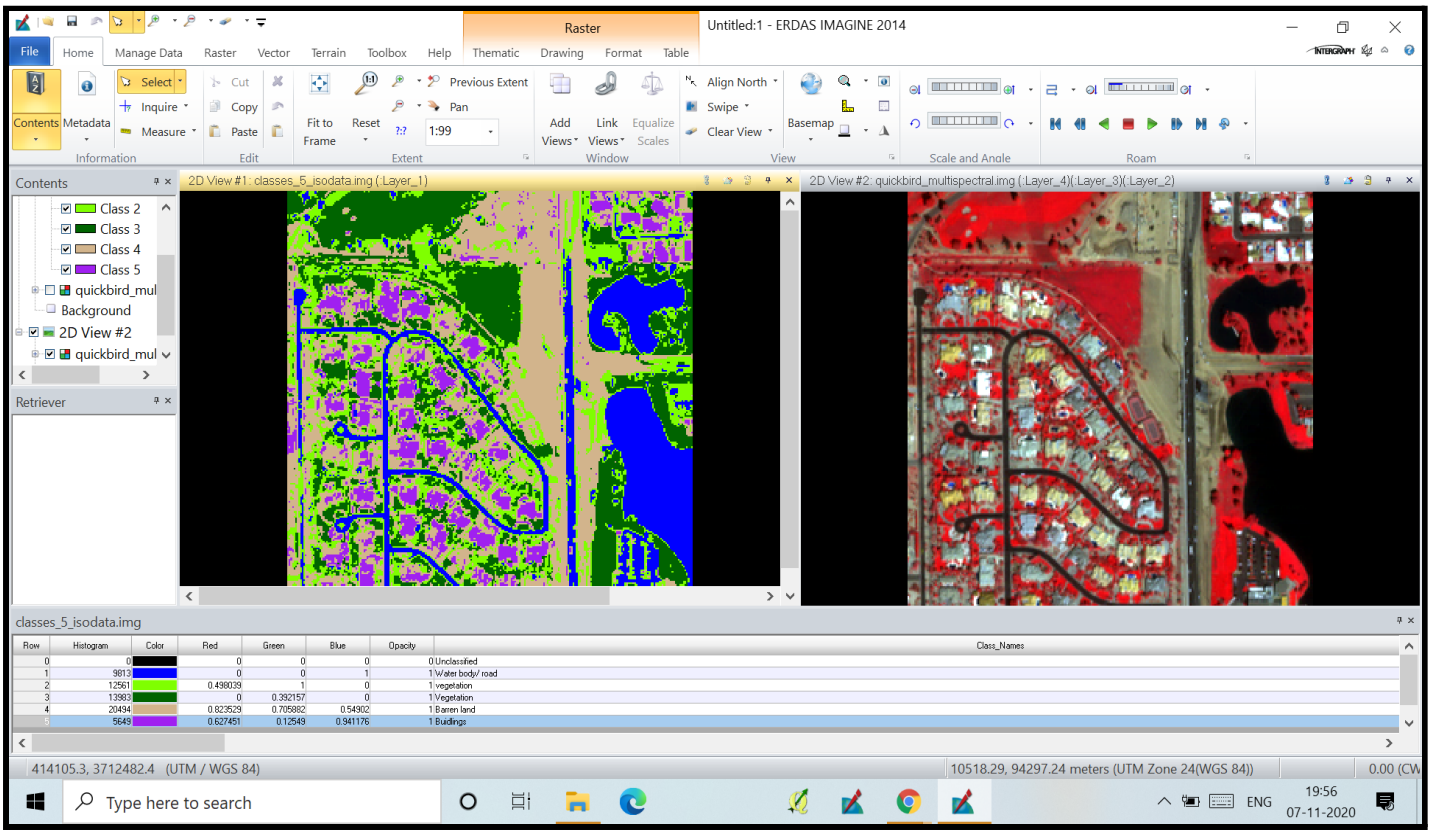
Step-2 Give output file name, in method choose: **Isodata,** Classes: **5**, enable **Classify 0** and click ok.



Step-3 Open the **thematic map** created.



Step-4 Open the **attribute table** of the thematic map created. Label the classes and change color code accordingly.



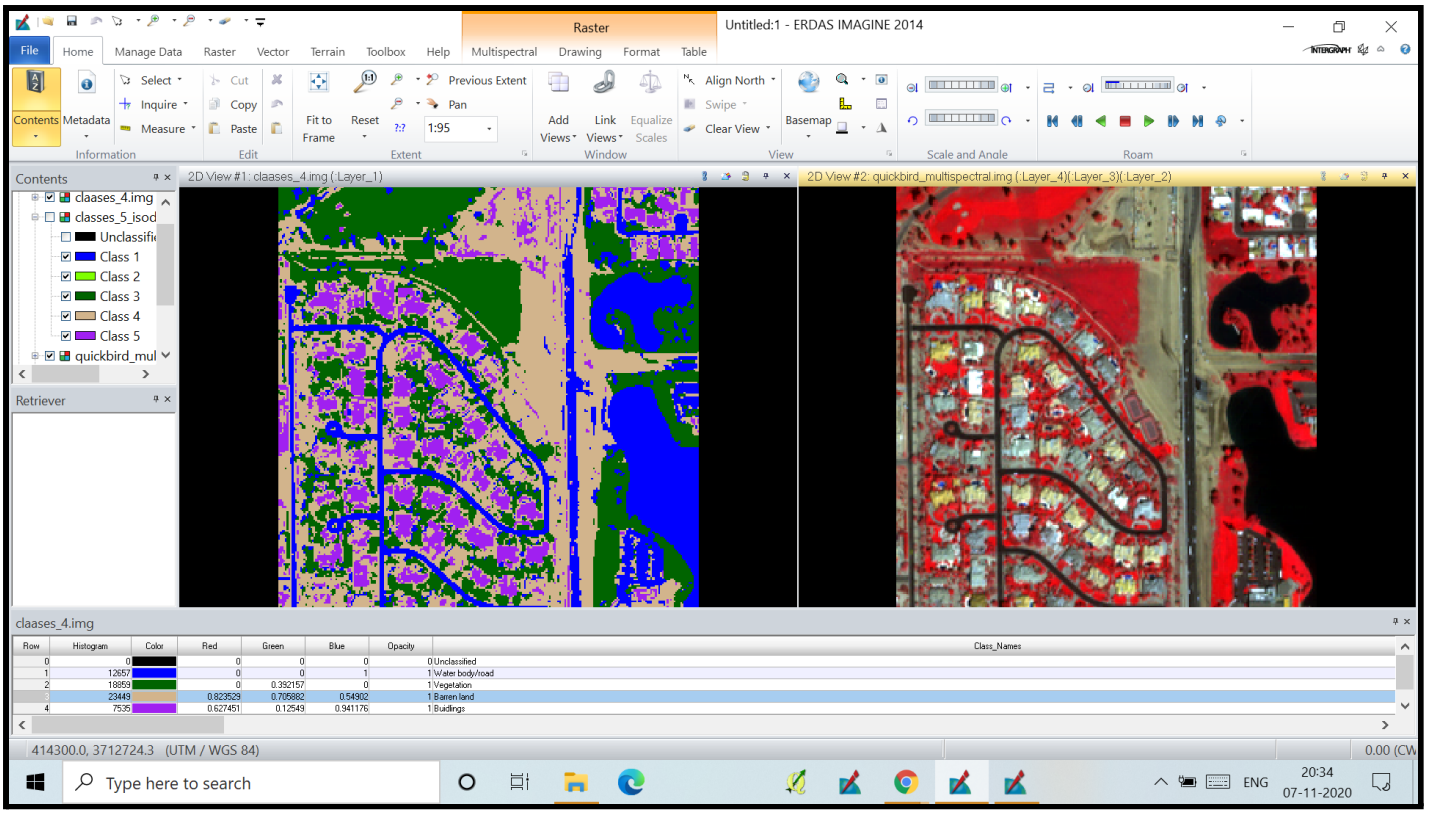
In this thematic map, it is **not able to distinguish between water bodies and roads** i.e. why it has assigned the same colour to both the features. However, one may distinguish between road and water bodies using **conceptual properties.** But here, it is only based on **spectral properties.** Thus, it is difficult to distinguish.

Within vegetation, 2 groups have been identified. However, to certain extent vegetation has been demarcated **amlostly correctly**. The **barren area is fine** to certain extent and all the **rooftops** are given a single colour.

As it is a **very high resolution** image, **pixel based classification is very problematic**. However, in **object based classifications**, results would have been better as shape would also be incorporated.

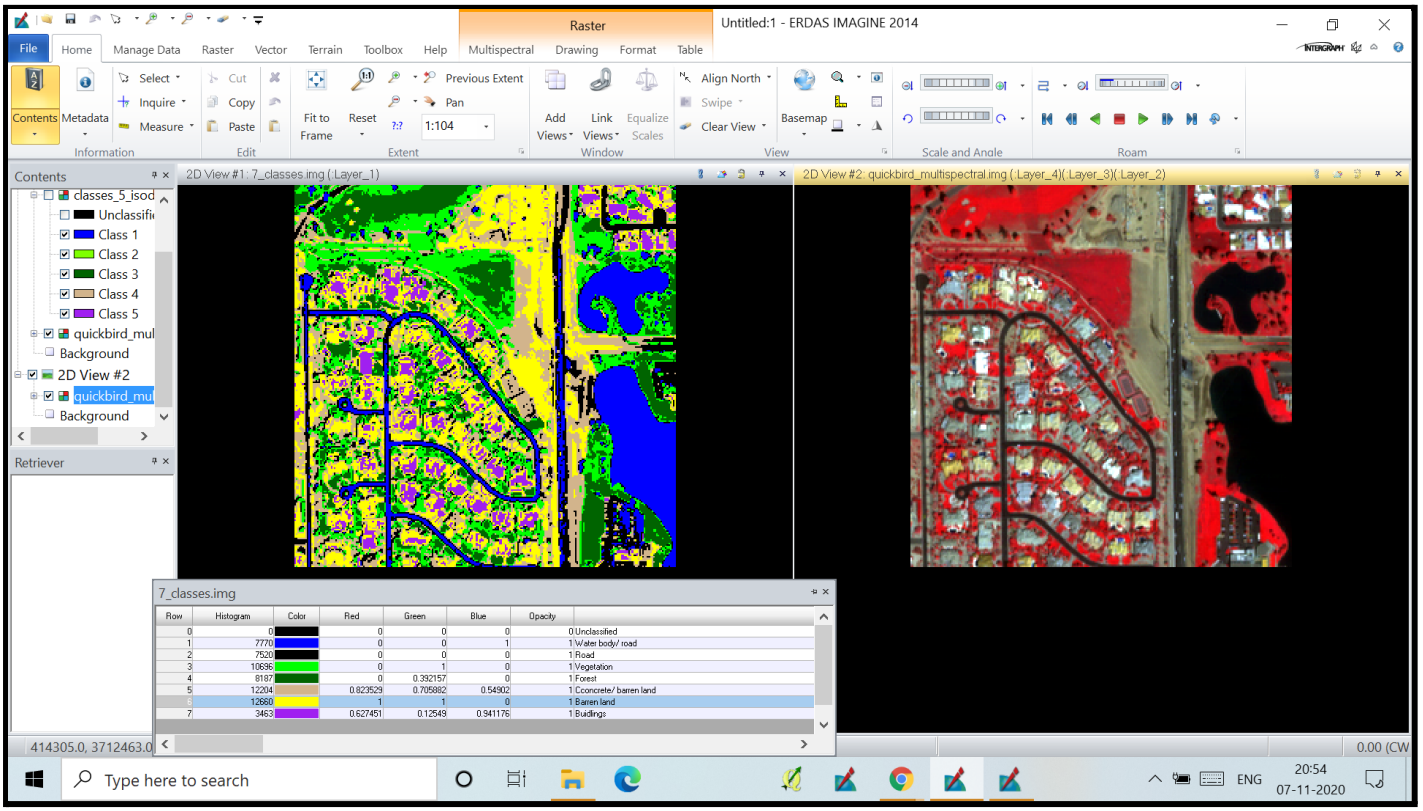
Changing the class size

a. 4 classes



In four classes, **only the water body and road are merged**. Otherwise, four classes is good.

b. 7 classes

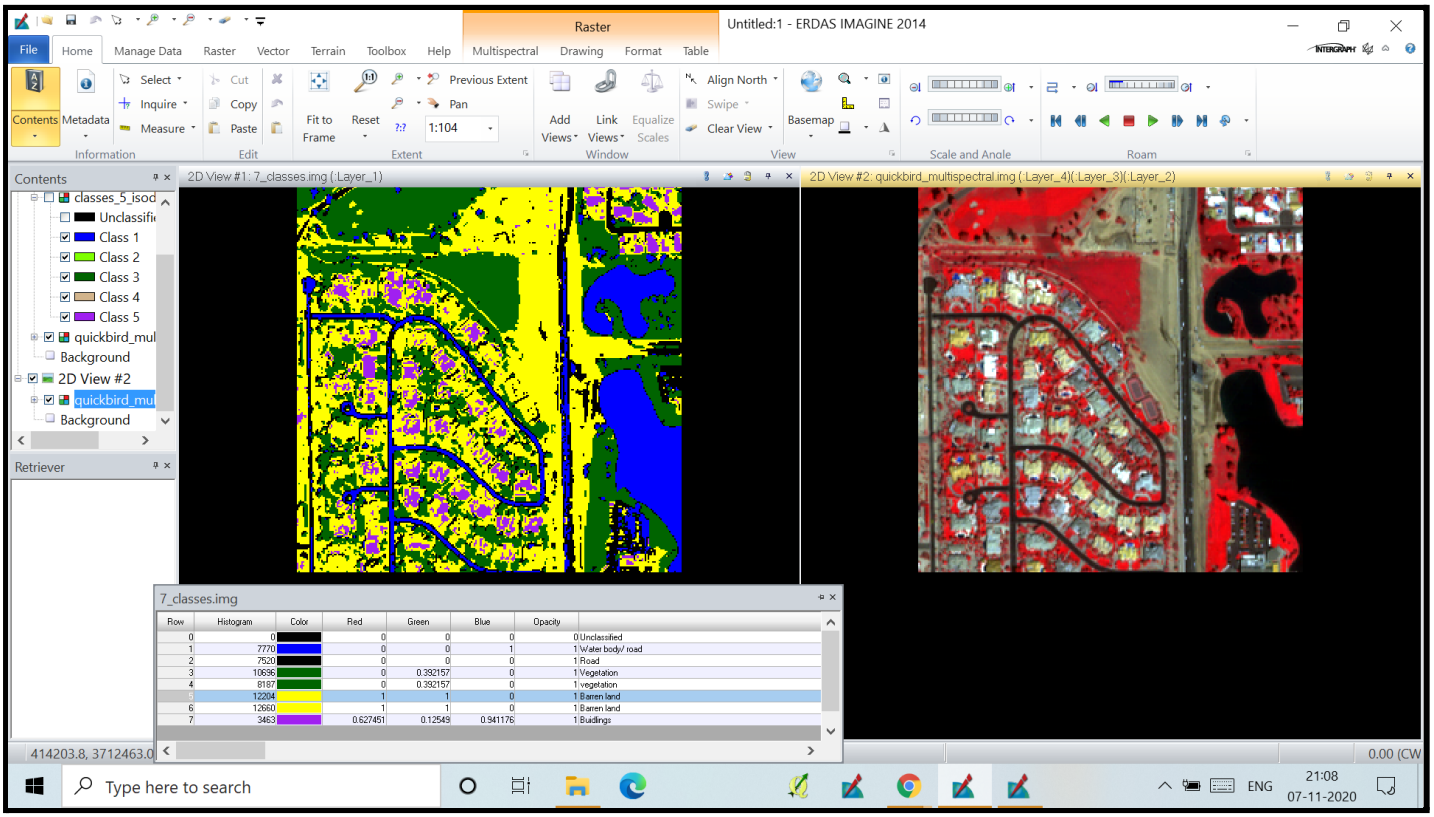


In this thematic map, first class (blue) represents the **water body and road**. But in this case, the second class represents some of the **road** (black). Third and fourth classes represent vegetation. Fifth and sixth classes are used to differentiate barren land and concrete material present above the soil. The seventh class represents building.

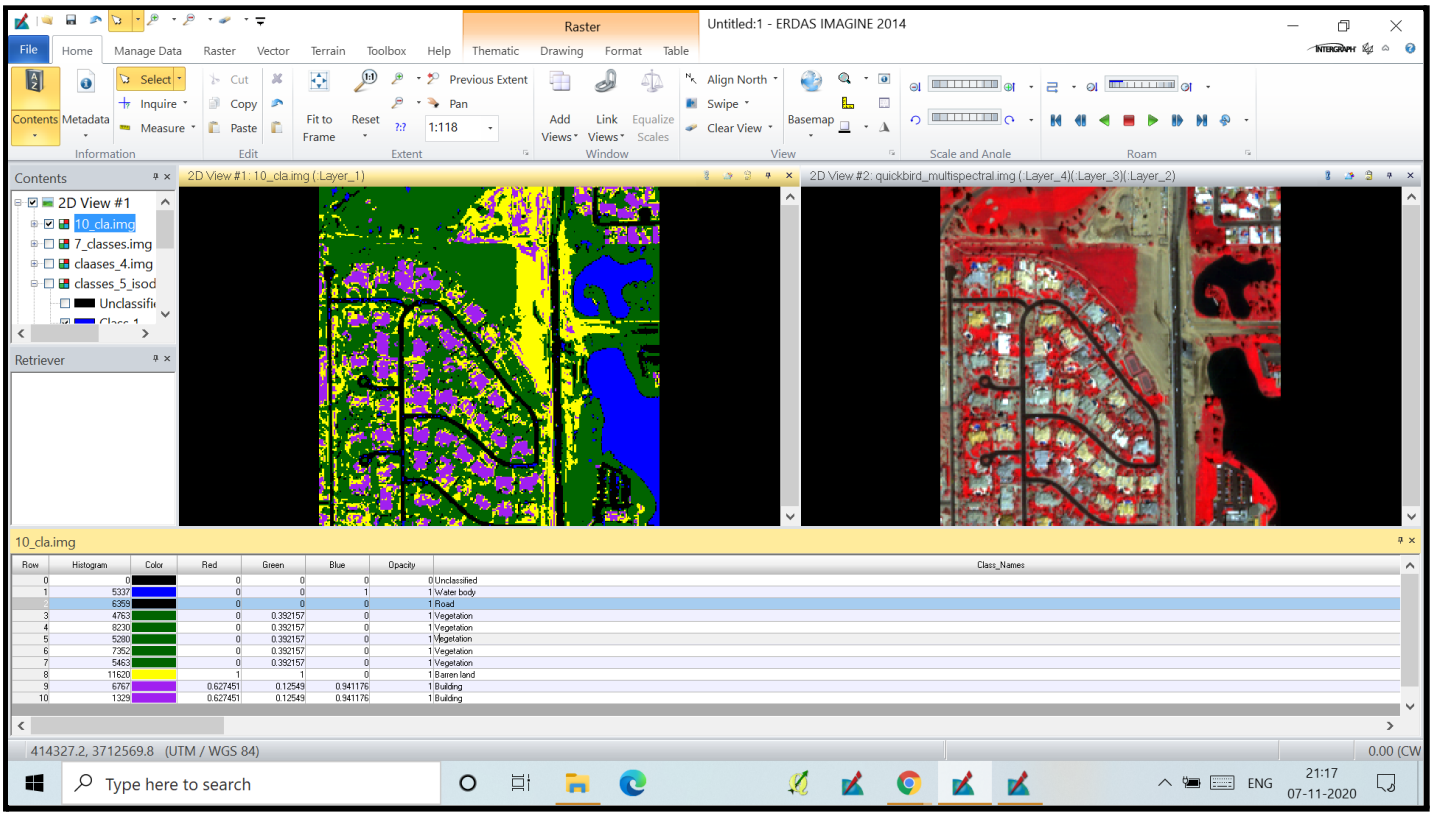
By increasing the no. of classes, confusion increases and does not solve the problem i.e. it **gives the idea but not the desired result.**

Thus, one solution may be **to merge the similar classes after increasing the number of classes** (so that features may be distinguished).

7 Classes after merging 2 classes of variety in vegetation and barren land

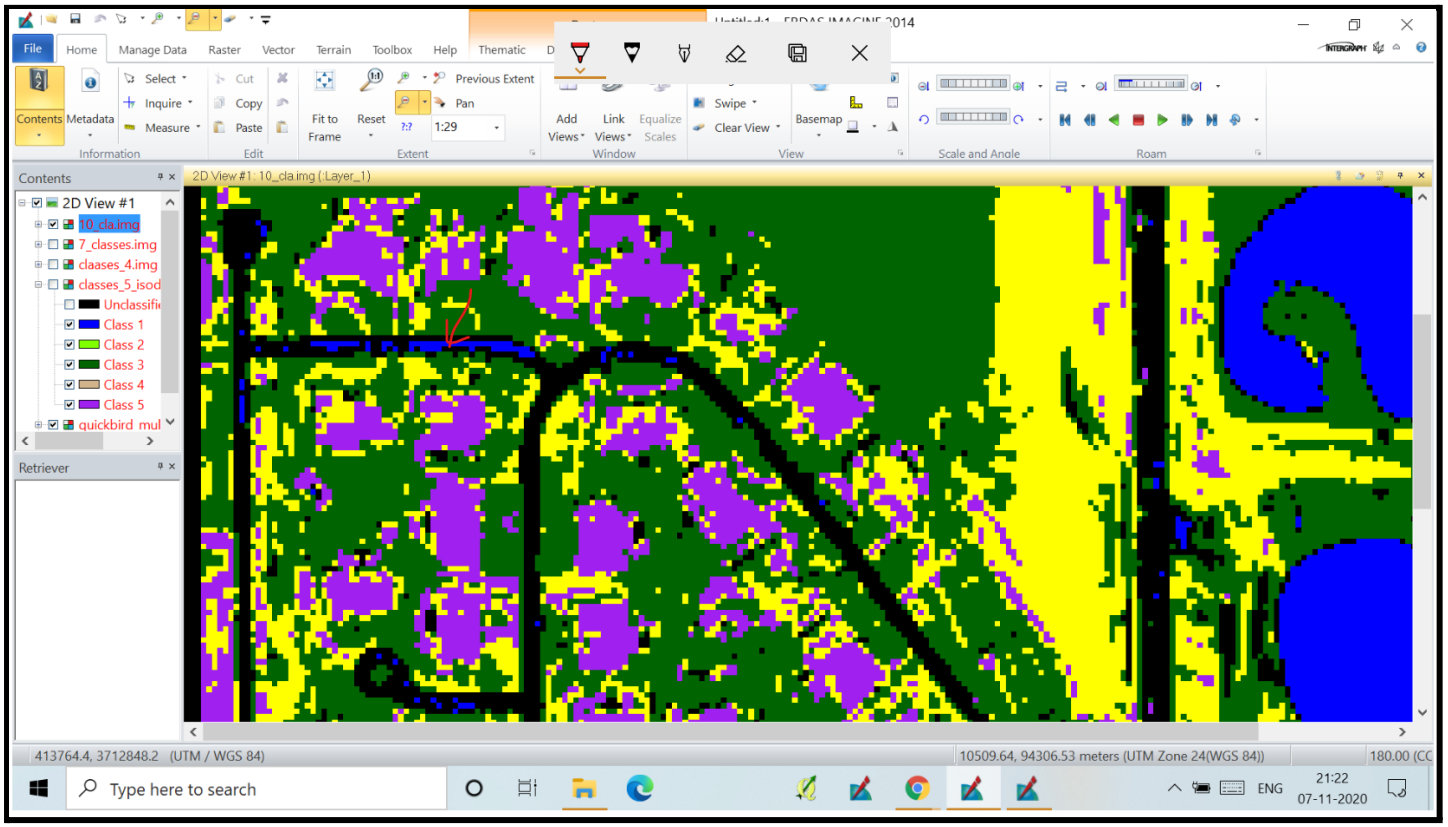


c. 10 Classes



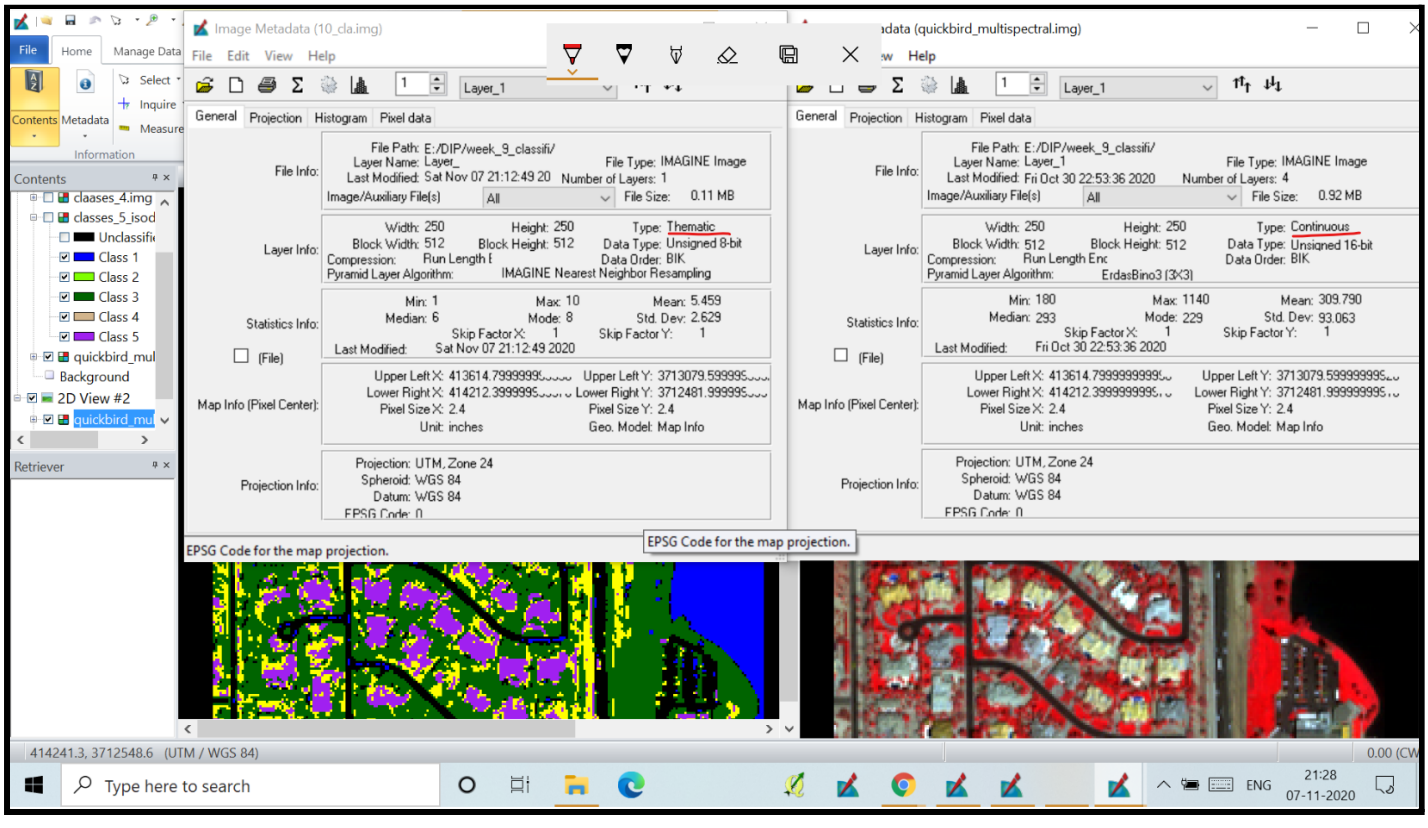
In this, the **road and water body can be easily distinguished.** And the similar classes can be merged together to reduce unwanted classification. Here, 10 classes have been reduced to **5 border classes.**

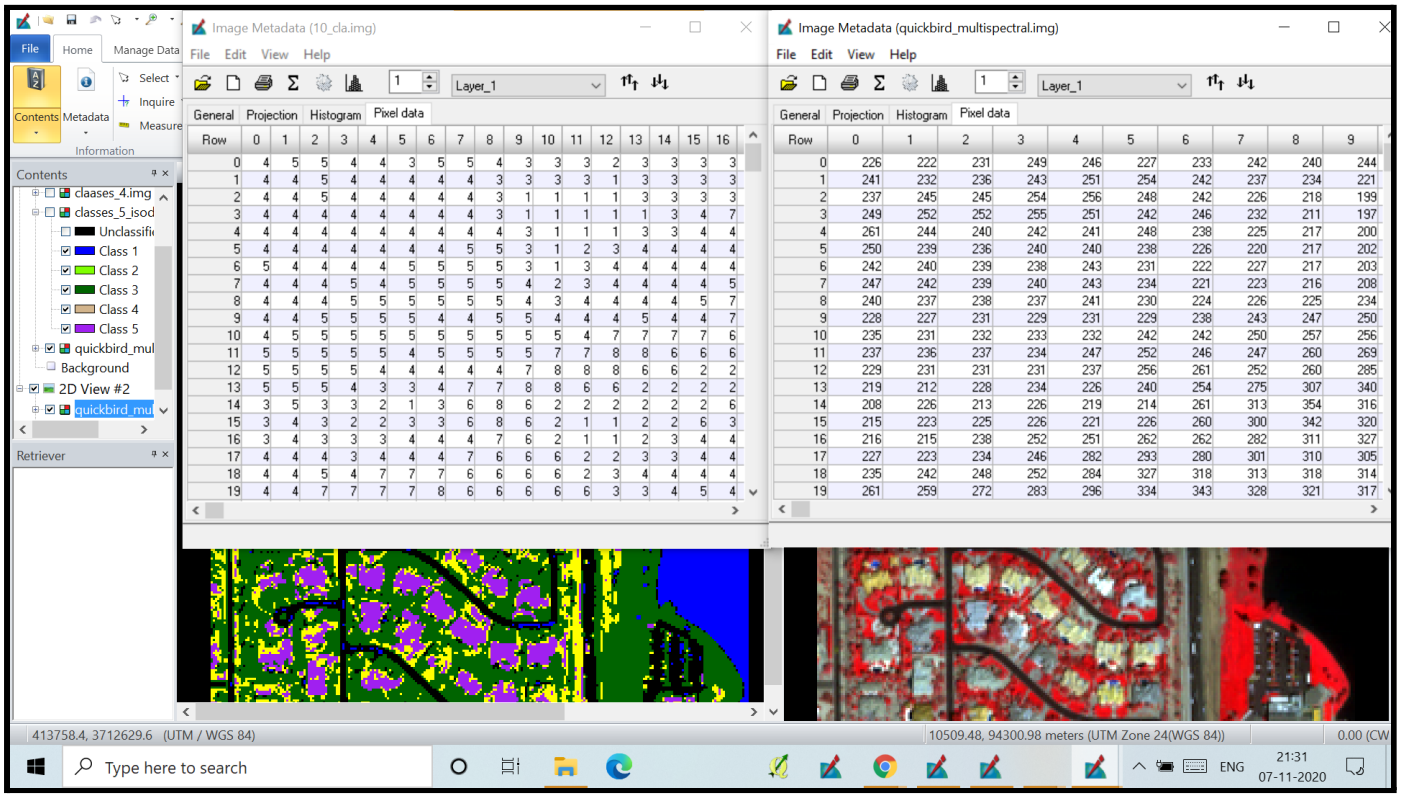
Rectification of Mixed classification



It is not possible to have water bodies on the road. Thus, this mixed classification needs to be rectified using **statistical filtering as it is a thematic map.**

Here, convolution filters cannot be used as it is not continuous data rather it is thematic data.

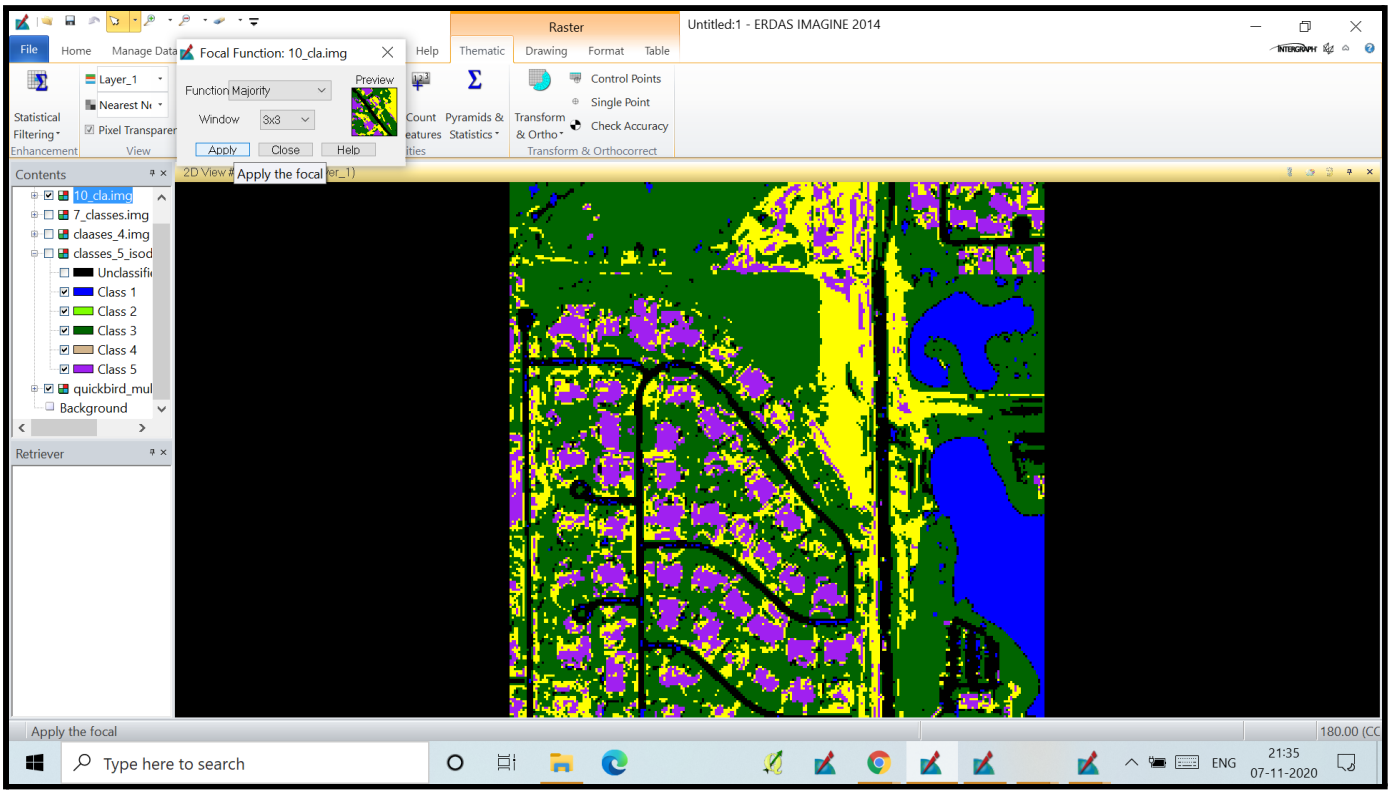


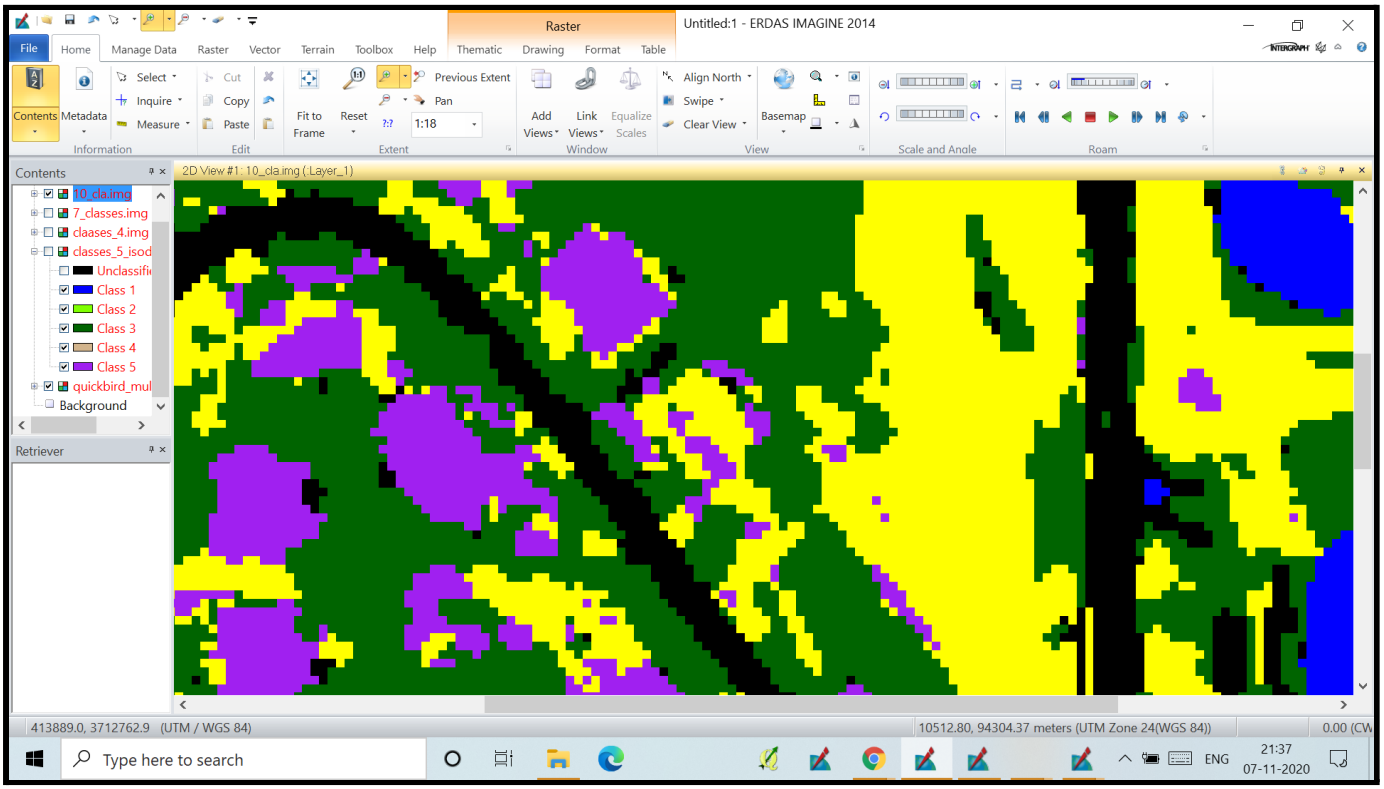


In the thematic map, the **DN values (Pixel view) has been converted to Thematic View.**

<u>Step-1</u> **Thematic > Statistical Filtering > Statistical Filtering.**

Function: **Majority** and then click **Apply.**





The water body represented on the road has been rectified. Here, **neighbourhood operations** applied to raster data. In **qualitative operation, the majority filter has been used to remove mixed classification.**

Thus, one may conclude that **unsupervised classification is useful when one does not have prior information of the study area.** So, when working for the first time, it can be used to classify the features and **generate LULC maps.** However, in this classification not everything is left to the computer to decide. The **arrangement and mapping decisions lie in the hands of analyst .**