Iqra national university peshawar

Project Report on

SITE SUITABILITY ANALYSIS FOR STADIUM NEAR Rehankot Dir Upper

Submitted By : S Mutasim billah

Student ID : 7725

Date of Submission: 8.7.2020

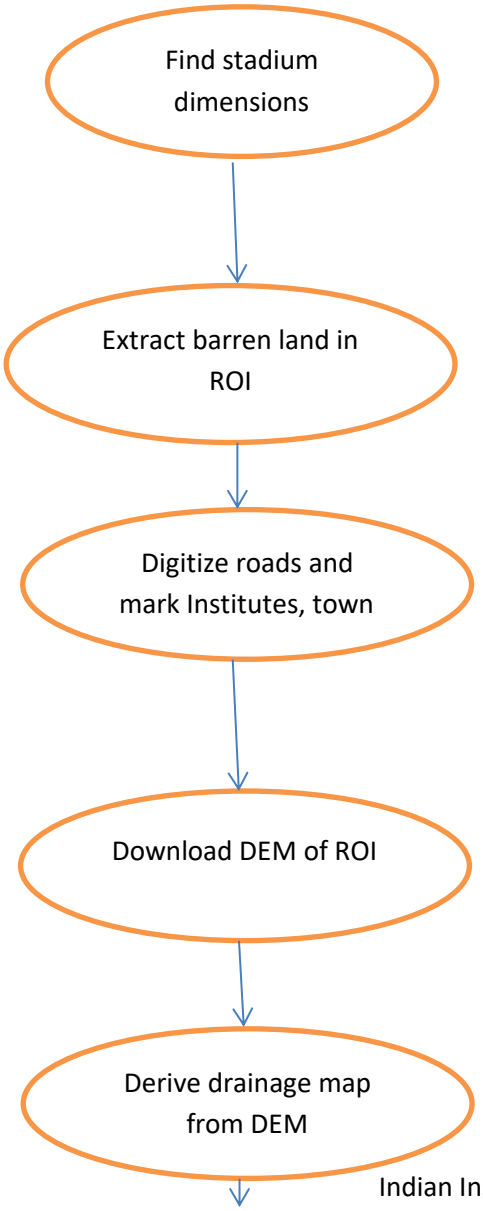
•

AIM: To find out a suitable place for construction of stadium near Rehankot dir

Software used:

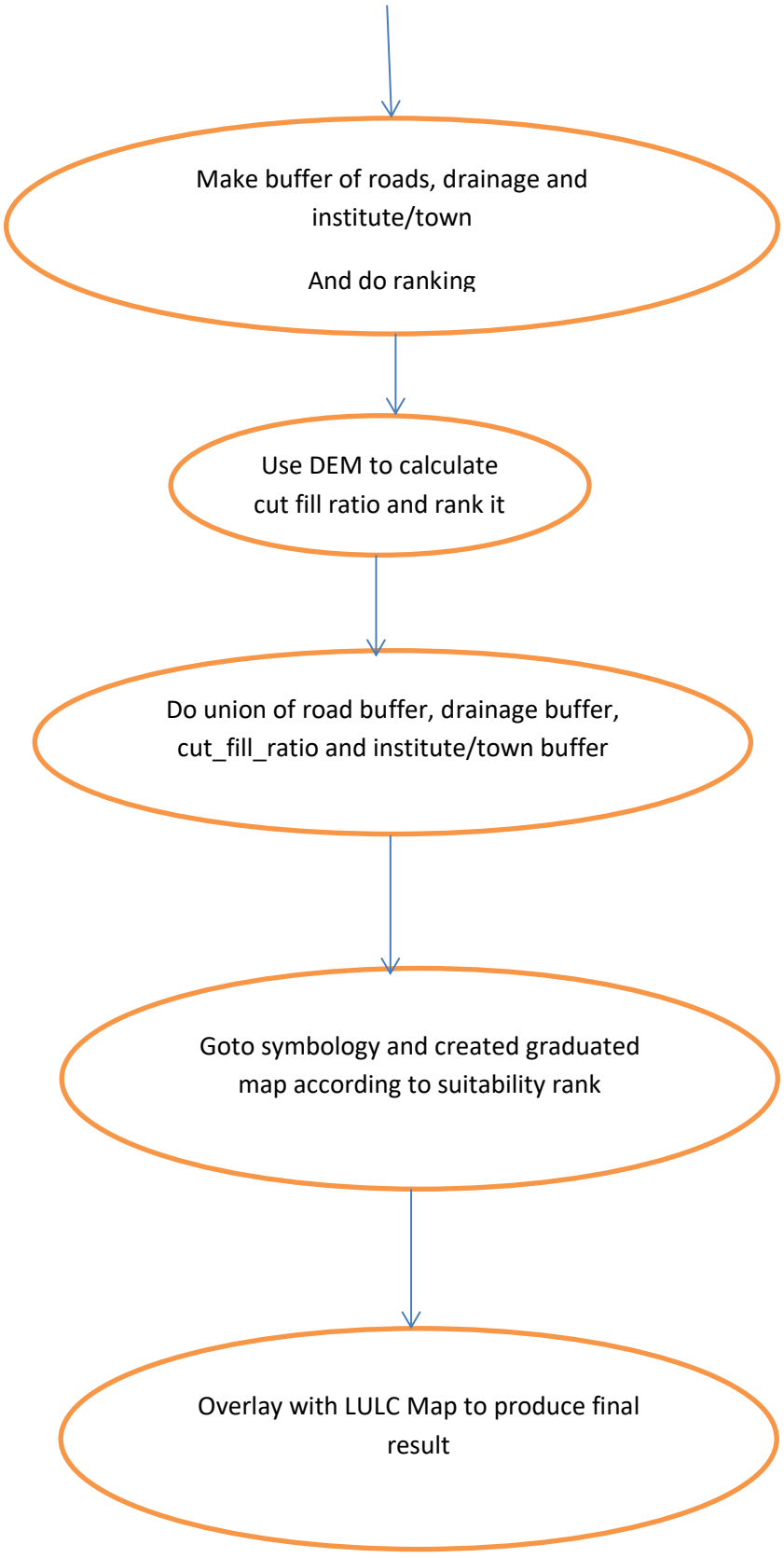
- QGIS 3.0.2
- ARCMAP 10.4.1
- Ecognition 64
- ENVI 5.3
- Google earth

Flowchart:



Indian Institute of Space Science and Technology
MTech Geoinformtics

Jayati Vijaywargiya (SC18M027)



Indian Institute of Space Science and Technology
MTech Geoinformtics

Jayati Vijaywargiya (SC18M027)

SITE SUITABILITY ANALYSIS:

- To determine the best place for development stadium or any other purpose site suitability analysis is done. It derives the most suitable site for the purpose.
- The purpose can be building hospital, bridge, industry, plantation, etc.
- In site suitability analysis many layers are considers.
- Sometimes buffer of road or river or any other feature is also considered.
- Site selection analysis can be performed with vector or raster data but one of the most widely used types of site selection, weighted site selection.
- Weighted site selection analysis allows users to rank the features or buffer and assign a relative importance value to each layer.
- Then union, intersection or any other operation is performed to yield the most suitable site.

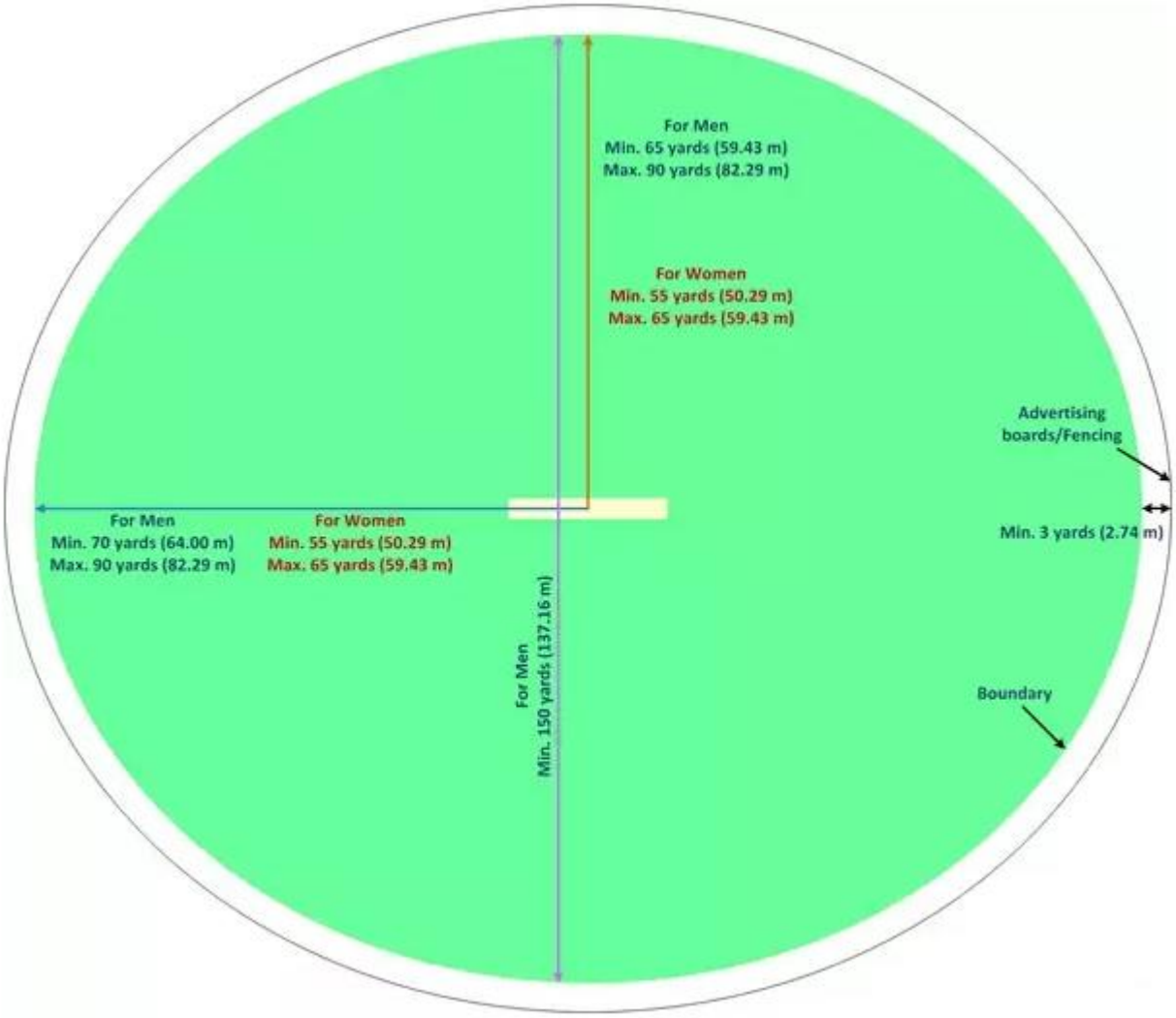
Layers/features used:

- Road
- Drainage
- Institute/ town
- Land use land cover
- Digital Elevation Model
- Barren land
- Cut fill volume

Projection used: World Azimuthal Equidistant ESPG: 54032

Project Implementation:

1. **Stadium size:**
   To find the approximate size of stadium, sizes of various stadiums were considered. Patch of the land selected for stadium is chosen of area > 1.2 times required area, for parking and further extentions.
   References for stadium:



The standard size of stadium can be interpreted from above image.
The maximum goes with a radius of 90 yards that is approximately 82.269 meters and requires an approximate square or polygonal area of 32400 meter square.
Keeping this criteria the barren lands are selected.

2. Extracting barren Land:

- The region of interest from approximately extending from 76 degree 58 minutes East to 77 degree 4 minutes East and from 8 degree 35 minute North to 8 degree 40 minute 15 seconds North was observed on Google earth.

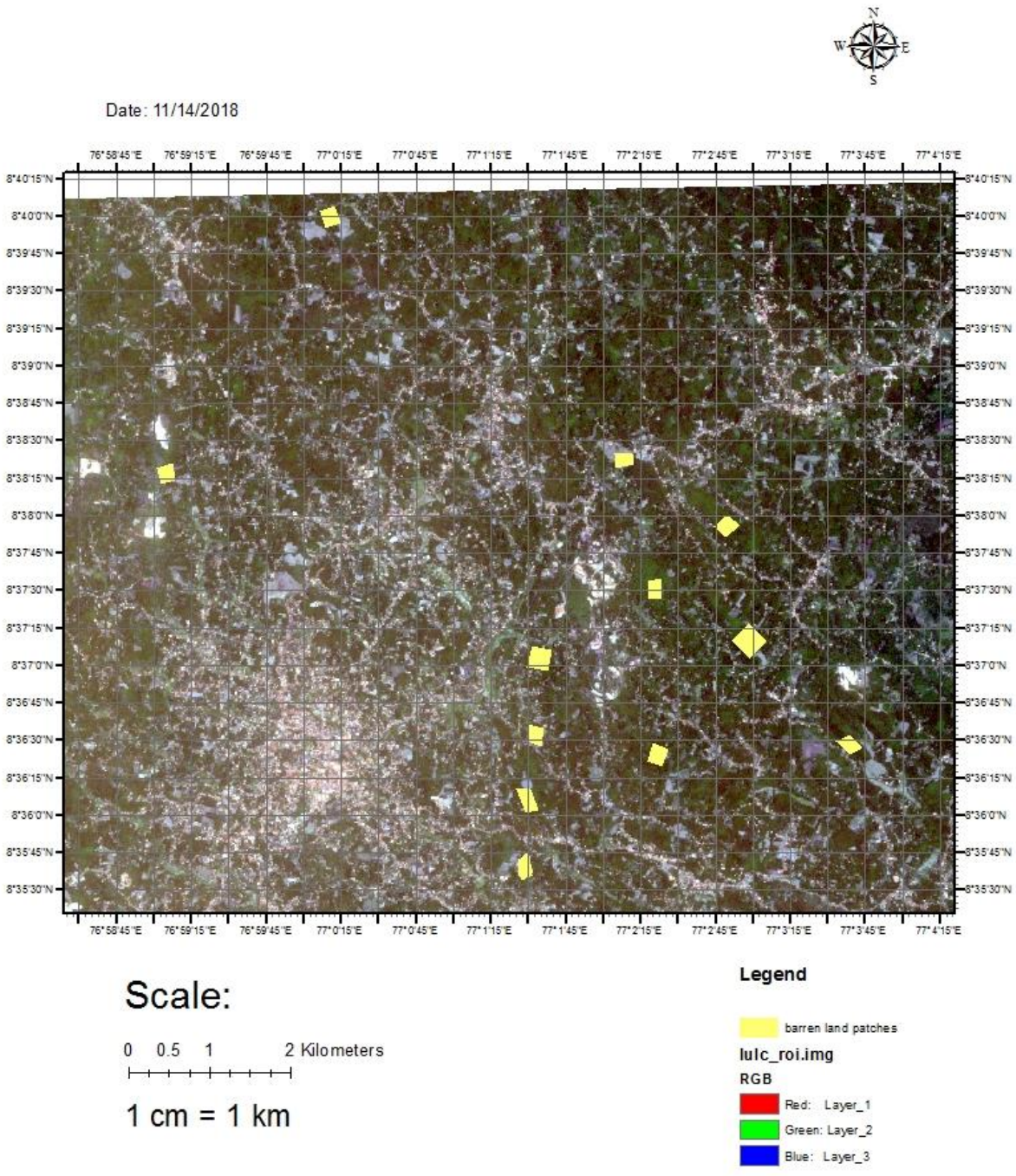
- The regions of minimum area having no built up was selected and extracted as polygon layer called barren_land.
- In this digitization process 12 such patches of land were retrieved.
- The file was exported as KML file and later converted to shapefile.
- The area of selected regions is:

area
35183.09035269...
39987.99678265...
40916.21230560...
41139.98129608...
41454.59227157...
45930.79720557...
45935.80409686...
46154.62691950...
47014.88082754...
48730.03913371...
67781.47327614...
93097.74272832...

Table: Area of the barren land patches

The map representing barren land patches on the region of Interest is shown in next page.

Barren Land patches in Region of Interest



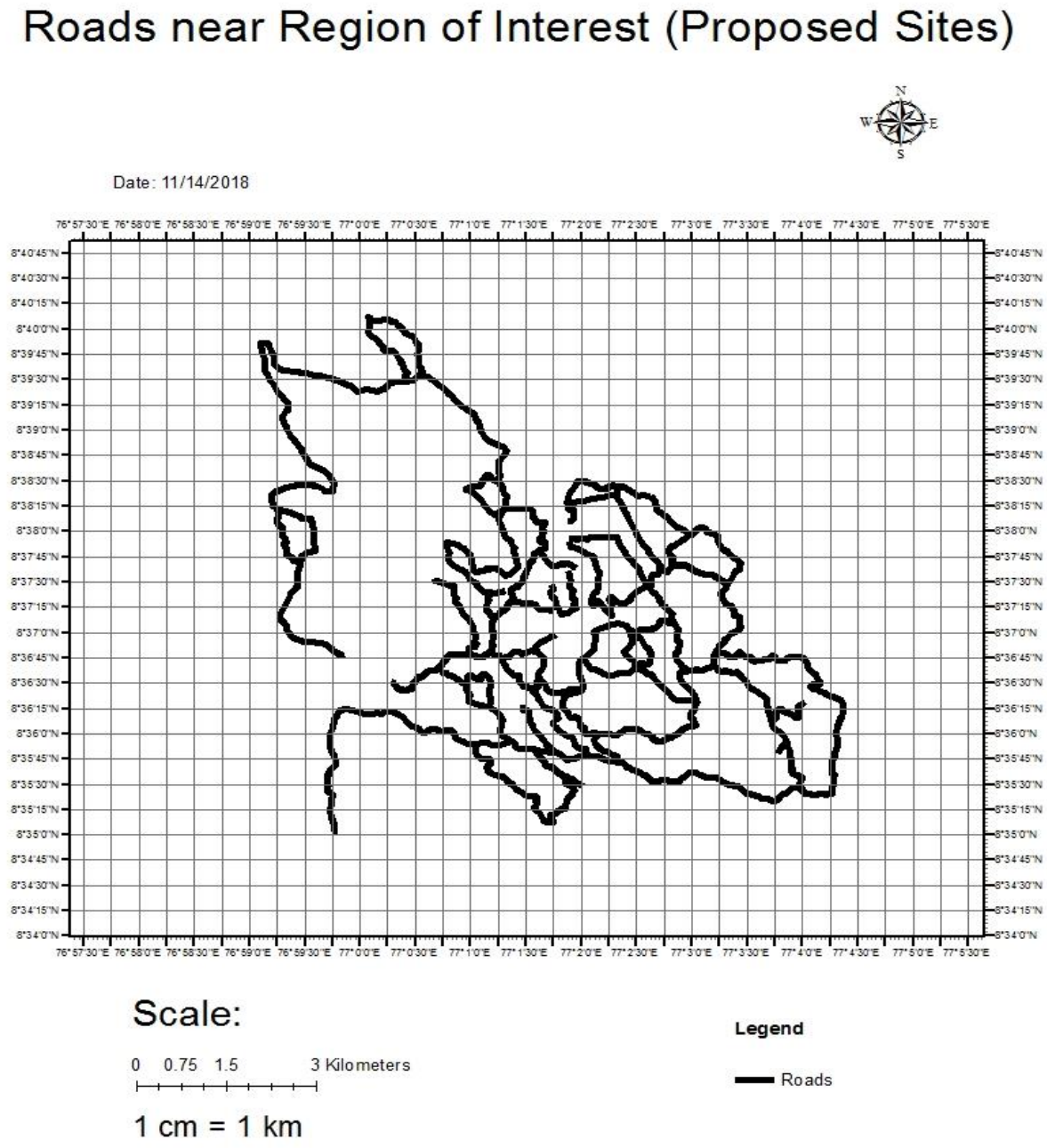
Map 1 Barren land patches

Indian Institute of Space Science and Technology
MTech Geoinformtics

Jayati Vijaywargiya (SC18M027)

3. Extracting road:

Required roads and Roads near the barren patches were digitized in Google earth and were exported as a vector file.



Map 2 Digitized roads

4. **Extraction institutes / town:**
   Town Nedumangad and Major Institute IIST and IISER were marked on google earth as point features and were exported as a vector file.

5. **DEM layer from ASTER:**
   The DEM of required region is available in 2 sets.

Entity ID:ASTGDEMV2_0N08E076
Coordinates:8.5 , 76.5
Acquisition Date:17-OCT-11

AND

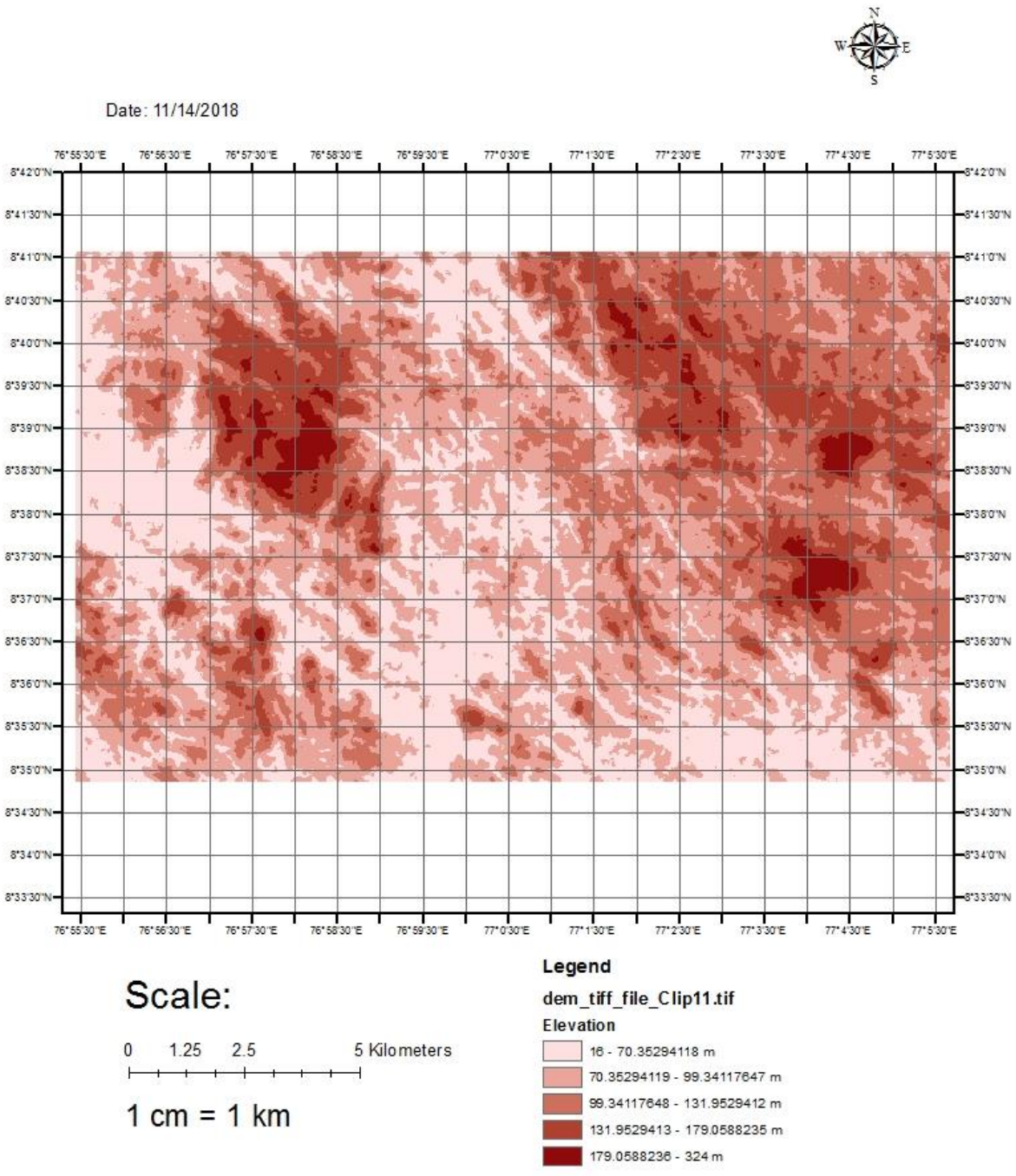
Entity ID:ASTGDEMV2_0N08E077
Coordinates:8.5 , 77.5
Acquisition Date:17-OCT-11

These two DEMs are downloaded and then are mosaicked to give final output. Further the region of interest is clipped from the mosaicked DEM. The final clipped DEM is represented in Map 3.

ASTER data:

- It has 14 different bands ranging from ultraviolet to infrared.
- 30m at ground solution
- The ASTER DEM is a product of the ASTER sensor which is on TERRA satellite

Land Elevation Map



Map 3 DEM of Region of Interest

Indian Institute of Space Science and Technology
MTech Geoinformtics

Jayati Vijaywargiya (SC18M027)

6. Deriving drainage map from DEM:

Drainage network:

- The area on which water falls and the network through which it travels to is referred to as a drainage network.
- It can be visualized as a tree, with the base of the tree being the outlet. The branches of the tree are stream channels.
- The intersection of two stream channels is referred to as a node or junction.
- The sections of a stream channel connecting two successive junctions or a junction and the outlet are referred to as stream links.

Drainage can be generated from DEM and the few of the intermediate layers are formed in the process are slope, stream, flow accumulation flow direction, etc.

The stadium area should not fall under major drainage line.

In this we have selected the streams with links or accumulation from more than 2 sub streams.

stream_order

Rowid	VALUE	COUNT
0	1	140205
1	2	72450
2	3	31688
3	4	19170
4	5	6680
5	6	2510

Table. Stream Order

7. Making Multi ring / multi distance buffers of Road, Drainage, institute and ranking them:

For the purpose of selecting suitable sites, buffer of

1. Roads
2. Drainage
3. Institute

Is made.

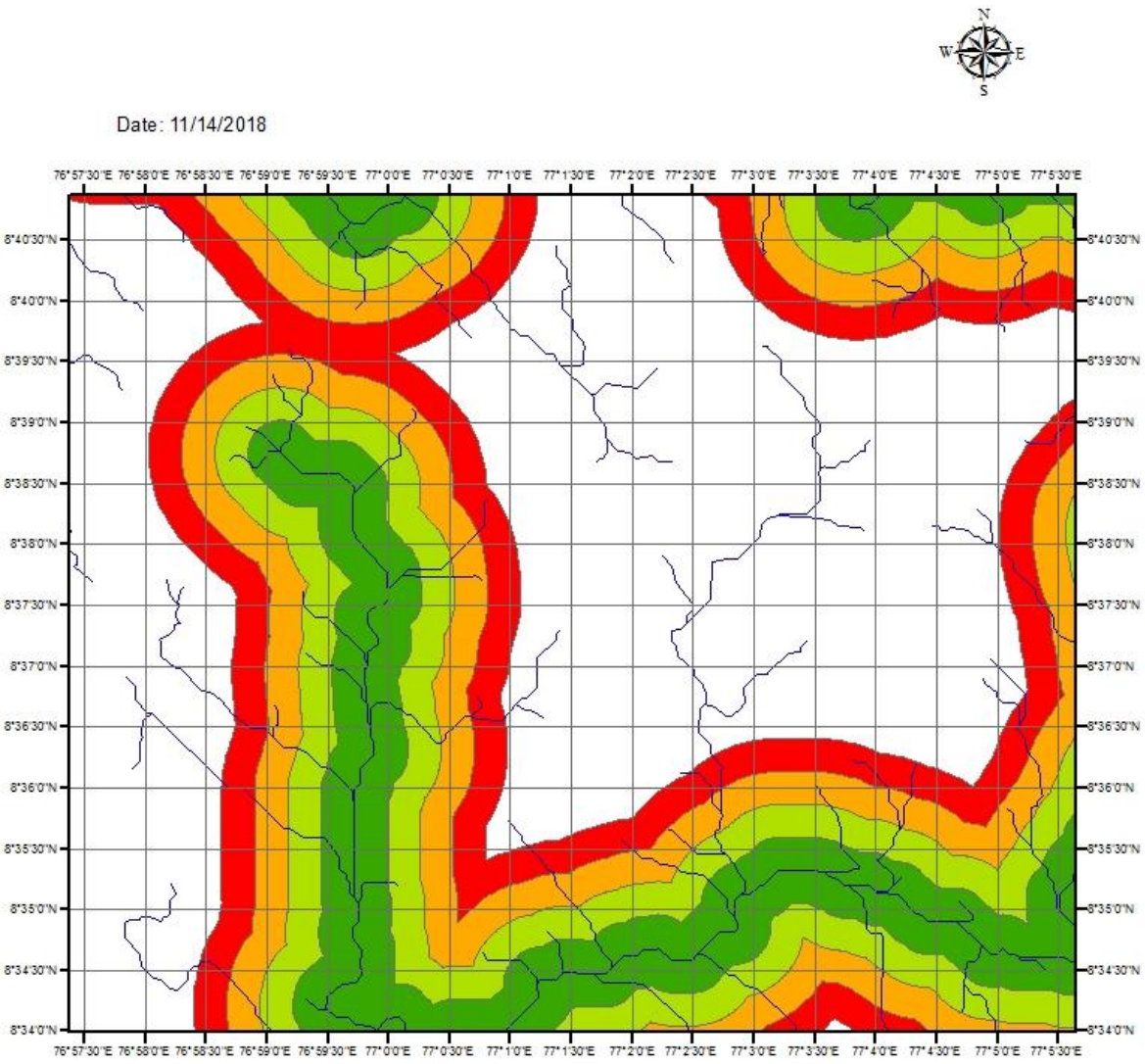
Based on the distance they are ranked.

For drainage buffer nearest to stream has rank 1 and farthest to stream has rank 4. Buffer of 500m, 1000m, 1500m and 2000m were considered.

For institute buffer, nearest has rank 4 and farthest has the rank of 1.Buffer of 1km, 2km 5 km and 15 km are taken.

For the roads the nearest has rank 5 and farthest has rank 1. Buffers of 100m, 200m 300m, 400m and 500m are taken.

Major Drainage Buffer

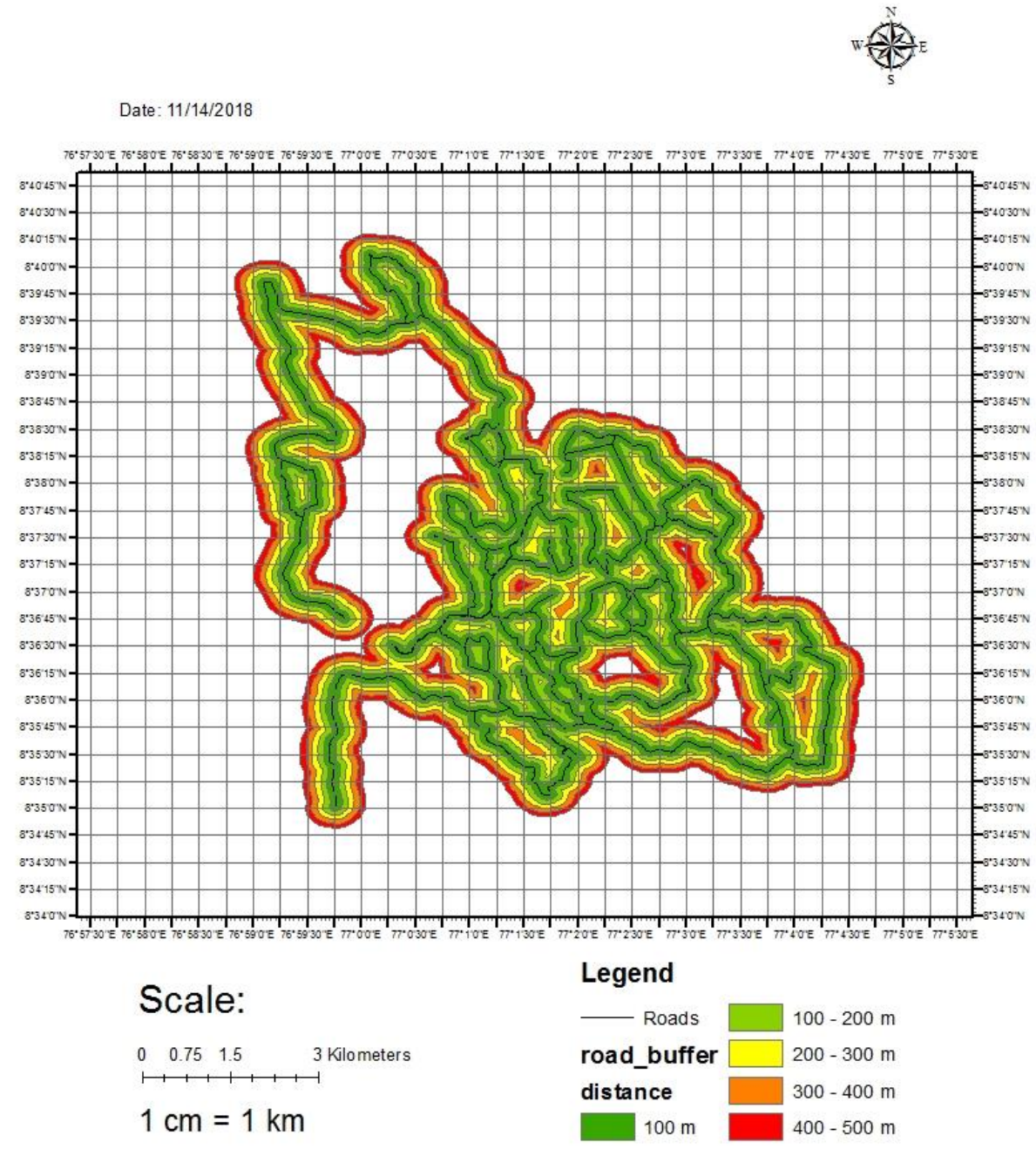


Map 4 Drainage buffer of Major streams

Indian Institute of Space Science and Technology
MTech Geoinformtics

Jayati Vijaywargiya (SC18M027)

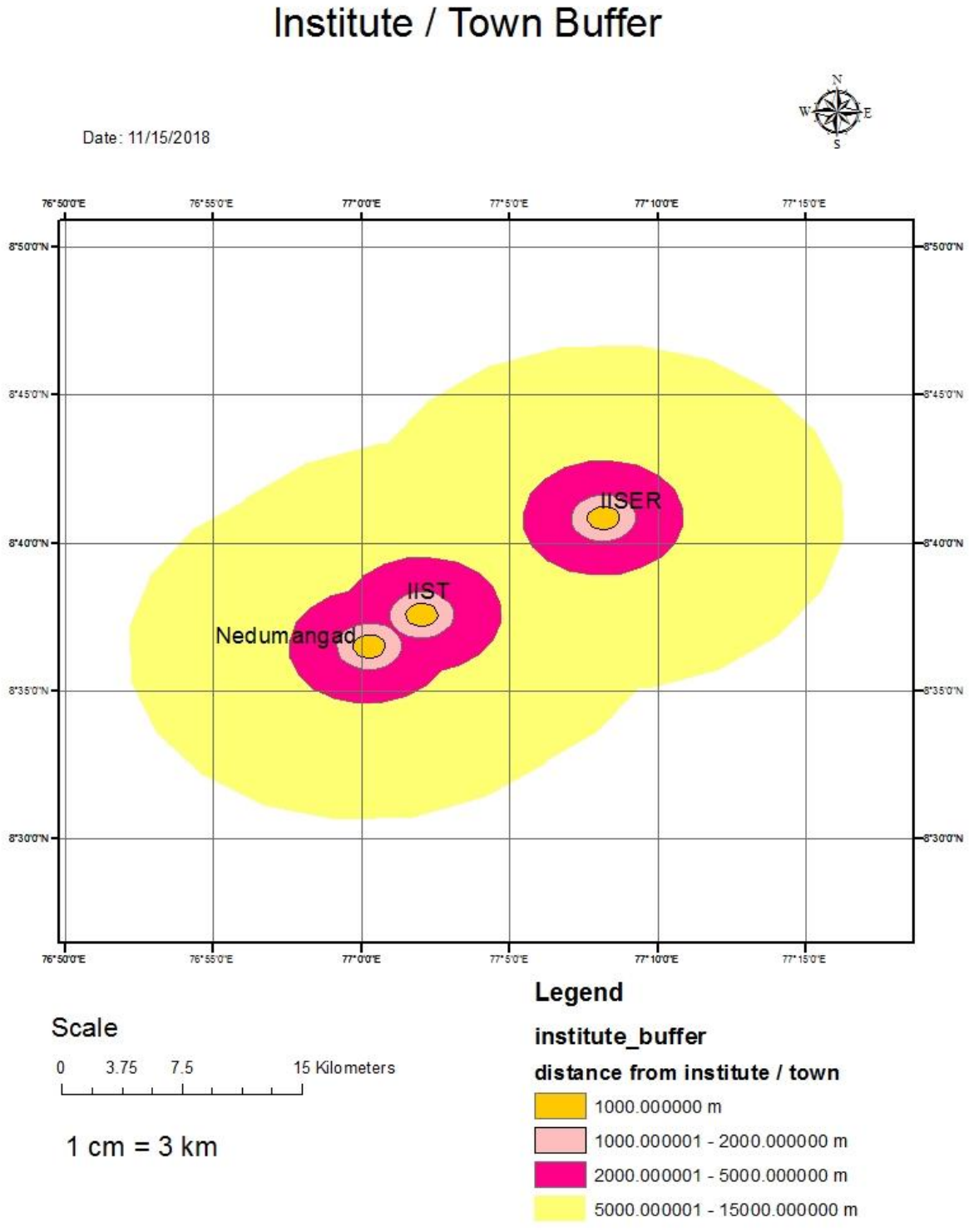
Road Buffer



Map 5 Road buffer

Indian Institute of Space Science and Technology
MTech Geoinformtics

Jayati Vijaywargiya (SC18M027)



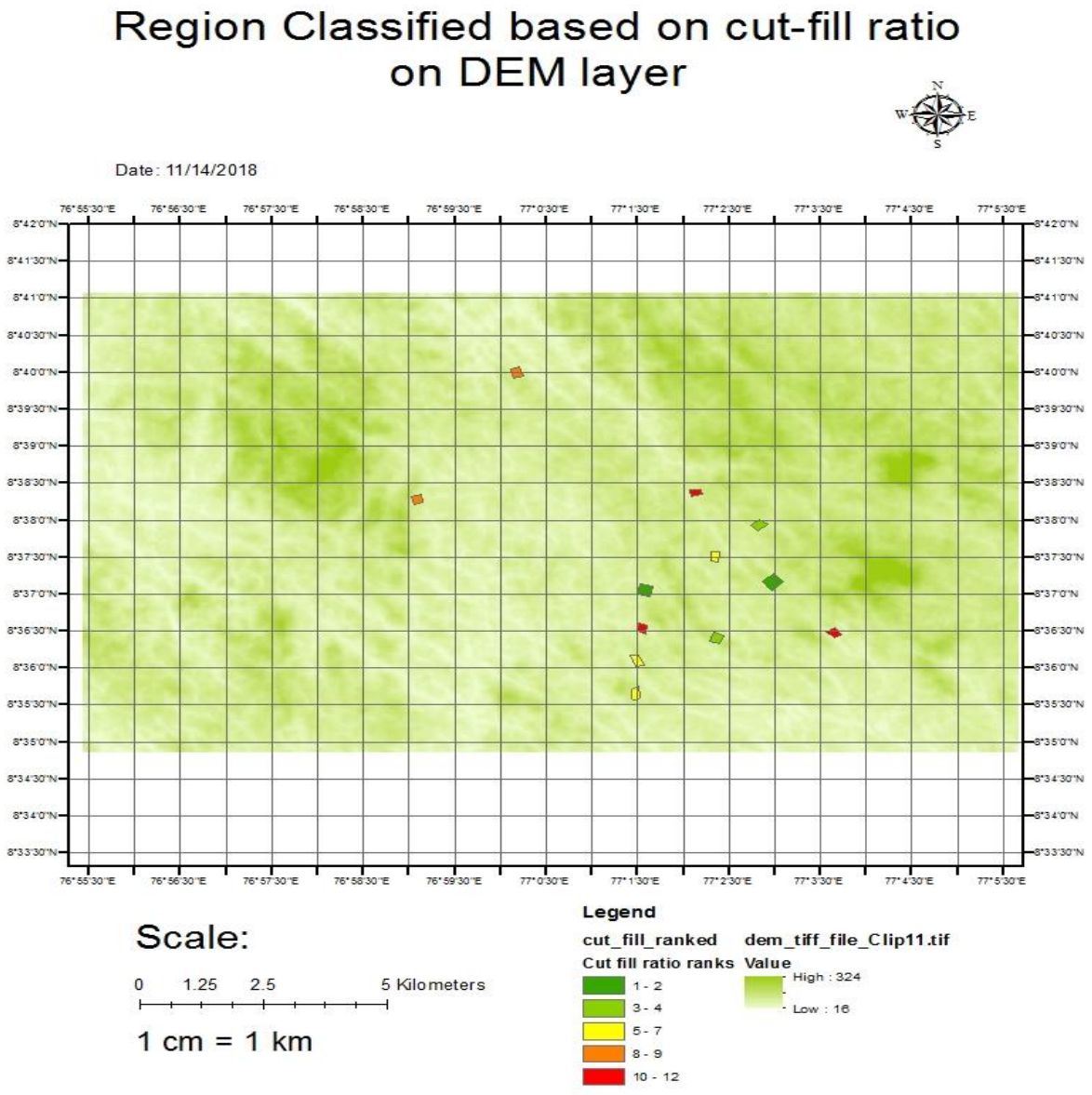
Map 6 Institute/ town buffer

Indian Institute of Space Science and Technology
MTech Geoinformtics

Jayati Vijaywargiya (SC18M027)

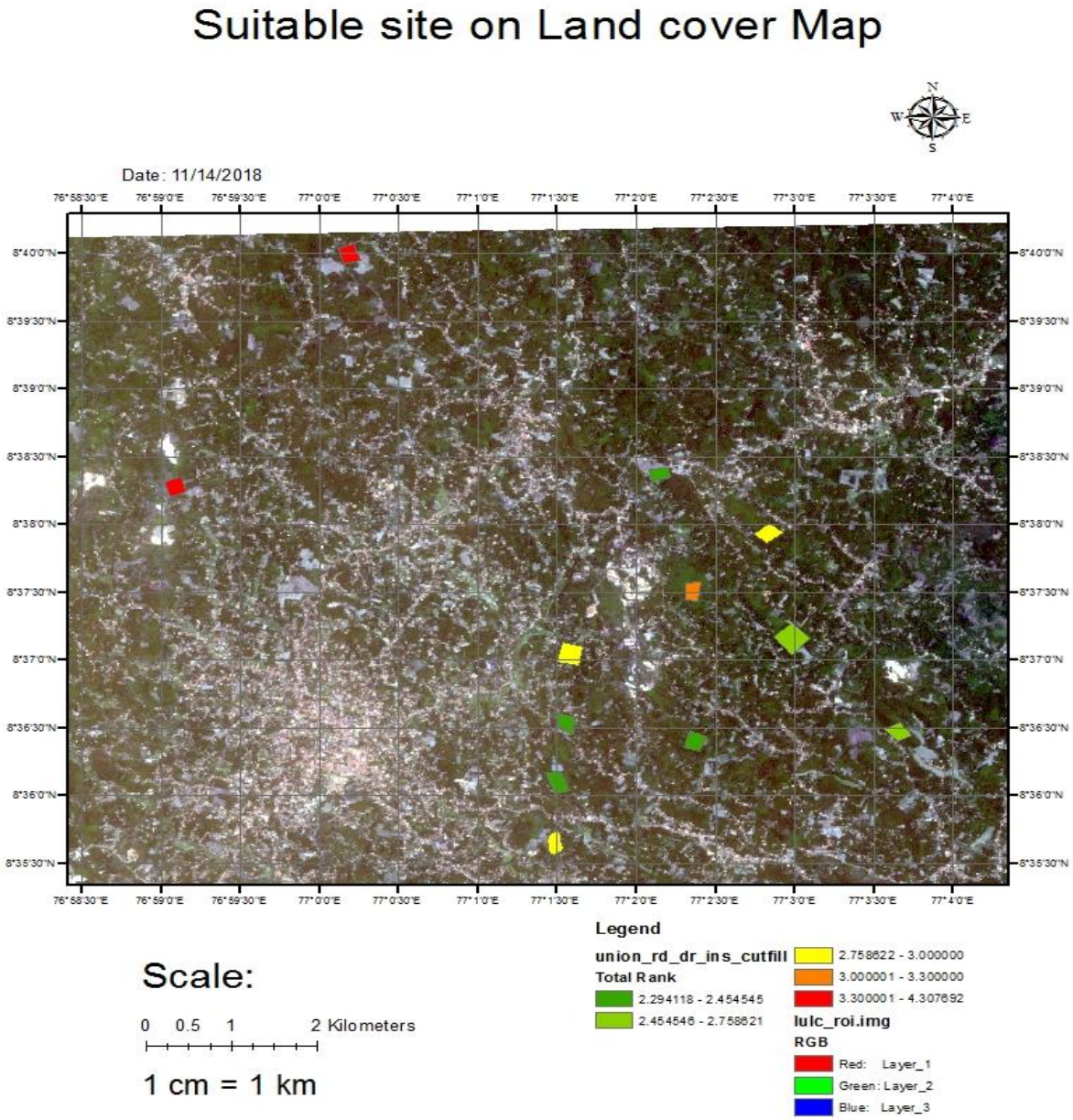
8. Derive cut fill volume from DEM:

- For building stadium Levelling, smoothing and shaping the field surface is to be done. To reduce the cost the fill amount must balance the cut amount. As this region is hilly, it will be required to level the land by cutting hill and filling the local valleys. A mean height of 80m is taken for each stadium to calculate cut fill ratio.



Map 7 Regions ranked according to cut fill

9. Do union of road buffer, drainage buffer, institute buffer and cut fill ratio and derive cumulative rank with respect to each patch of barren land:



Map 8 Barren patches classified based on cumulative rank

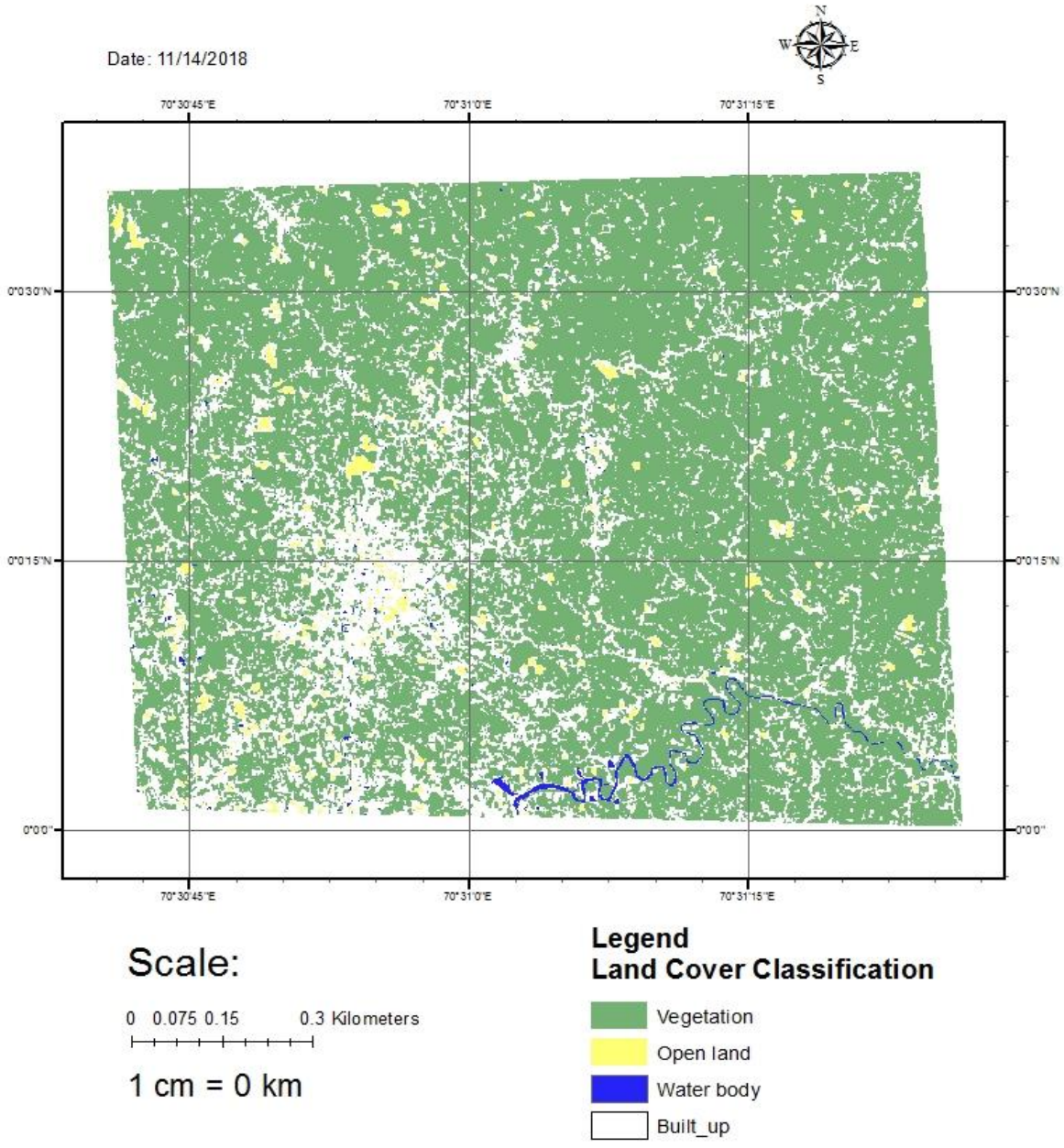
Union and Overlay was used to unite the road_buffer, drainage_buffer, institute_buffer, and ranked cut_fill. They were joined with respect to the spatial location. Average rank was calculated for each patch.

FID	Shape *	FID_1	Avg_Road_R	Avg_Total_
0	Polygon ZM	0	2	3
1	Polygon ZM	1	2.5	3.3
2	Polygon ZM	2	2	2.4
3	Polygon ZM	3	2.692308	4.307692
4	Polygon ZM	4	1.818182	2.454545
5	Polygon ZM	5	2.333333	2.933333
6	Polygon ZM	6	2.428571	3
7	Polygon ZM	7	2.454545	4
8	Polygon ZM	8	2.068966	2.758621
9	Polygon ZM	9	1.823529	2.294118
10	Polygon ZM	10	2	2.4
11	Polygon ZM	11	2.333333	2.733333

Table: Attribute table of United Layer

10. **Classify LULC map:** The LULC classification is done by object based classification in ecognition. Here rule sets were defined based on the features of the vegetation, urban , water and open land. We used 3 indices, NDVI for extracting vegetation, NDWI for extracting water body and NDSI for extracting open land and urban. Road feature was mixed with the built up region.

Land Use Land Cover Classified Map

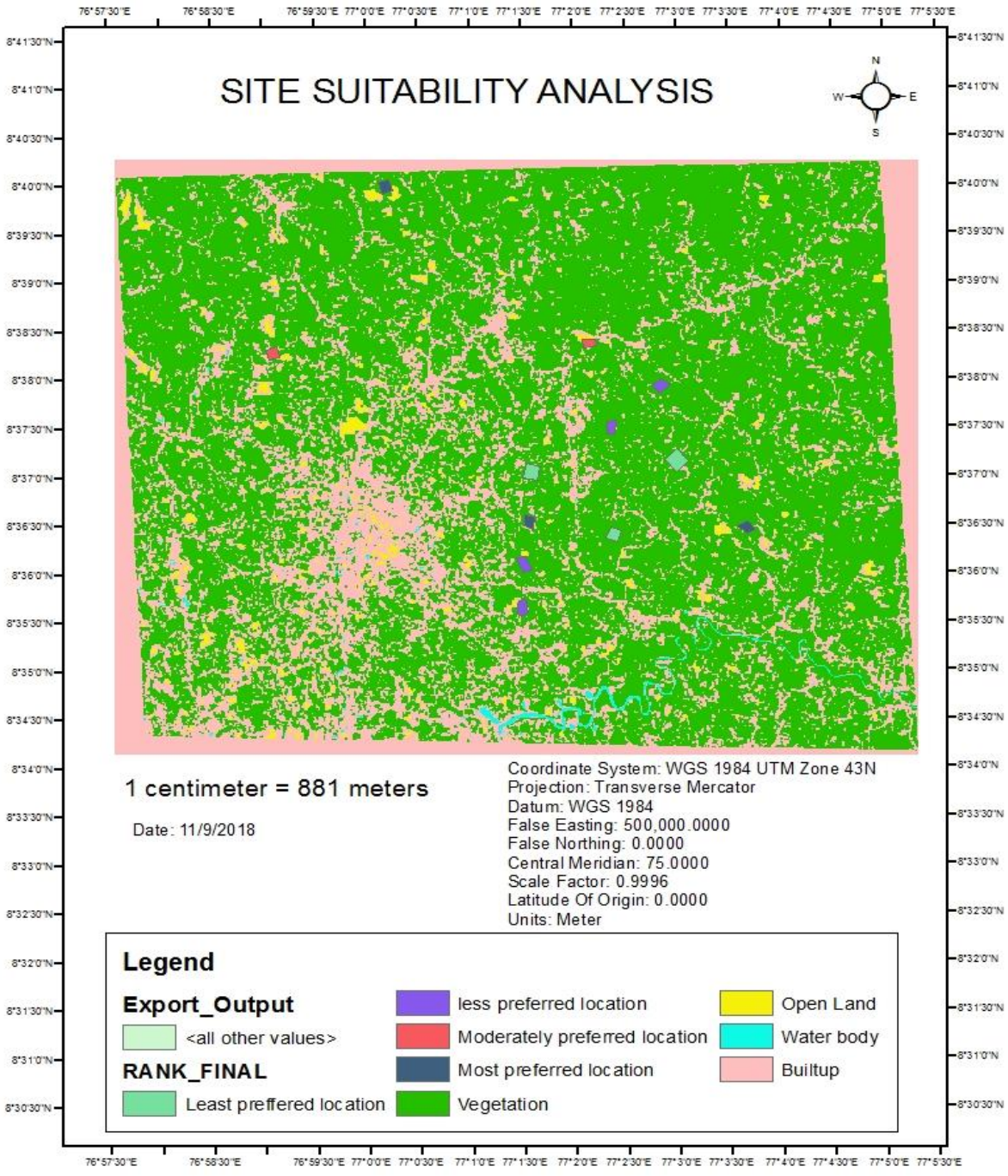


Map 9 Land use land cover classification in ecognition

Indian Institute of Space Science and Technology
MTech Geoinformtics

Jayati Vijaywargiya (SC18M027)

11. Use symbology to create final graduated map of suited sites for construction of stadium:



Map 10 Graduated map of available regions for construction of stadium