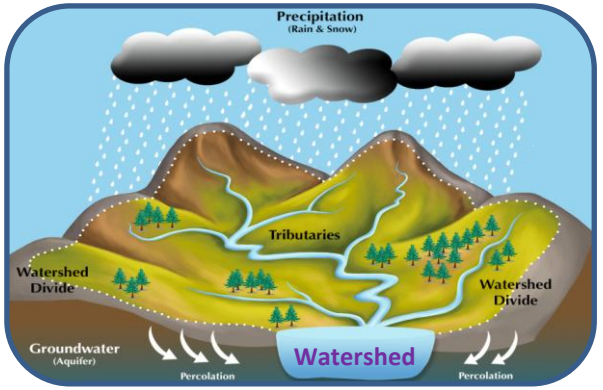
Government of Telangana – Forest Department

SITE SUITABILITY ANALYSIS FOR WATER HARVESTING STRUCTURES USING REMOTE SENSING & GIS



Prepared at Geomatics Centre
Office of Prl. Chief Conservator of Forests
Aranya Bhavan, Hyderabad - 04

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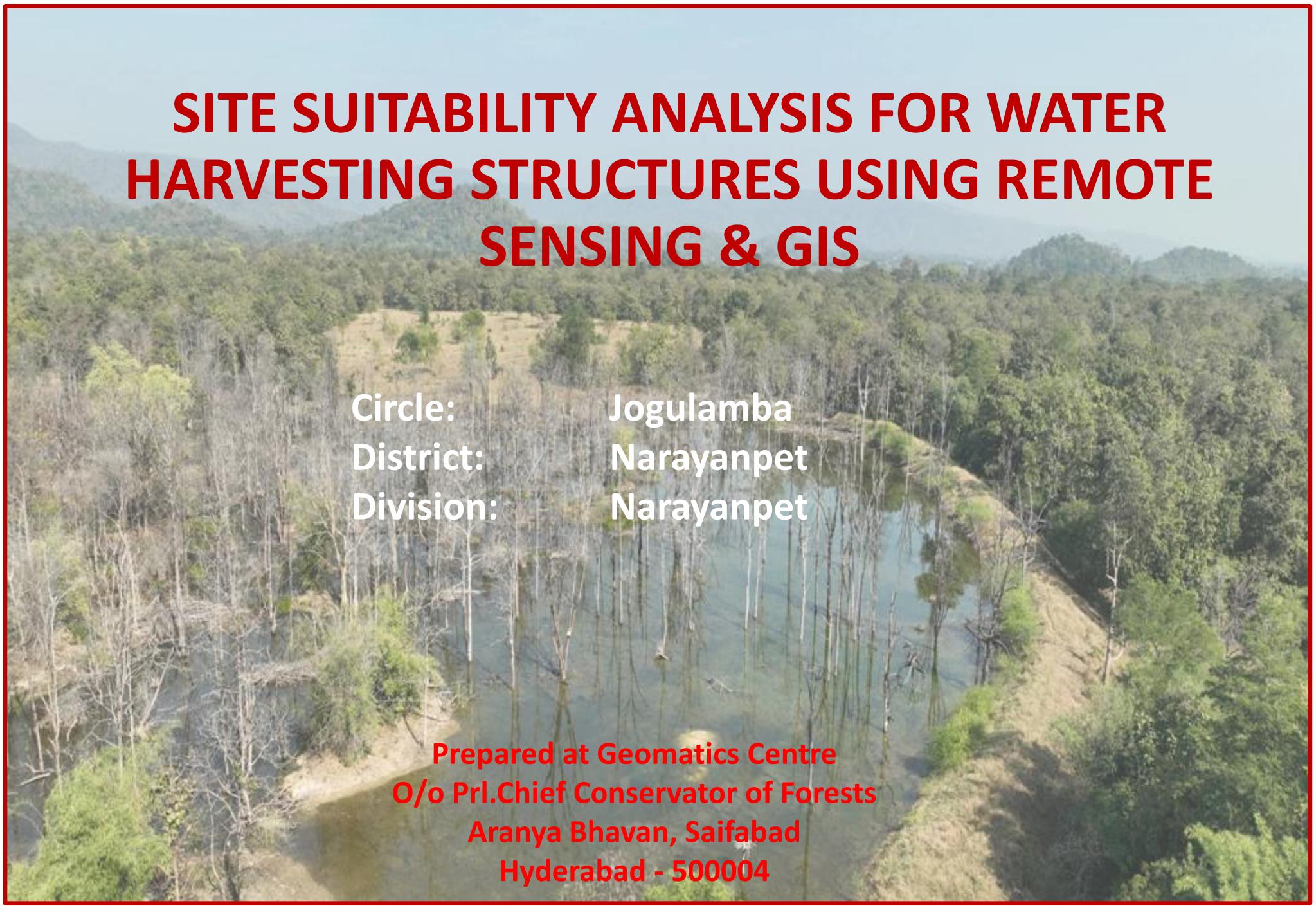
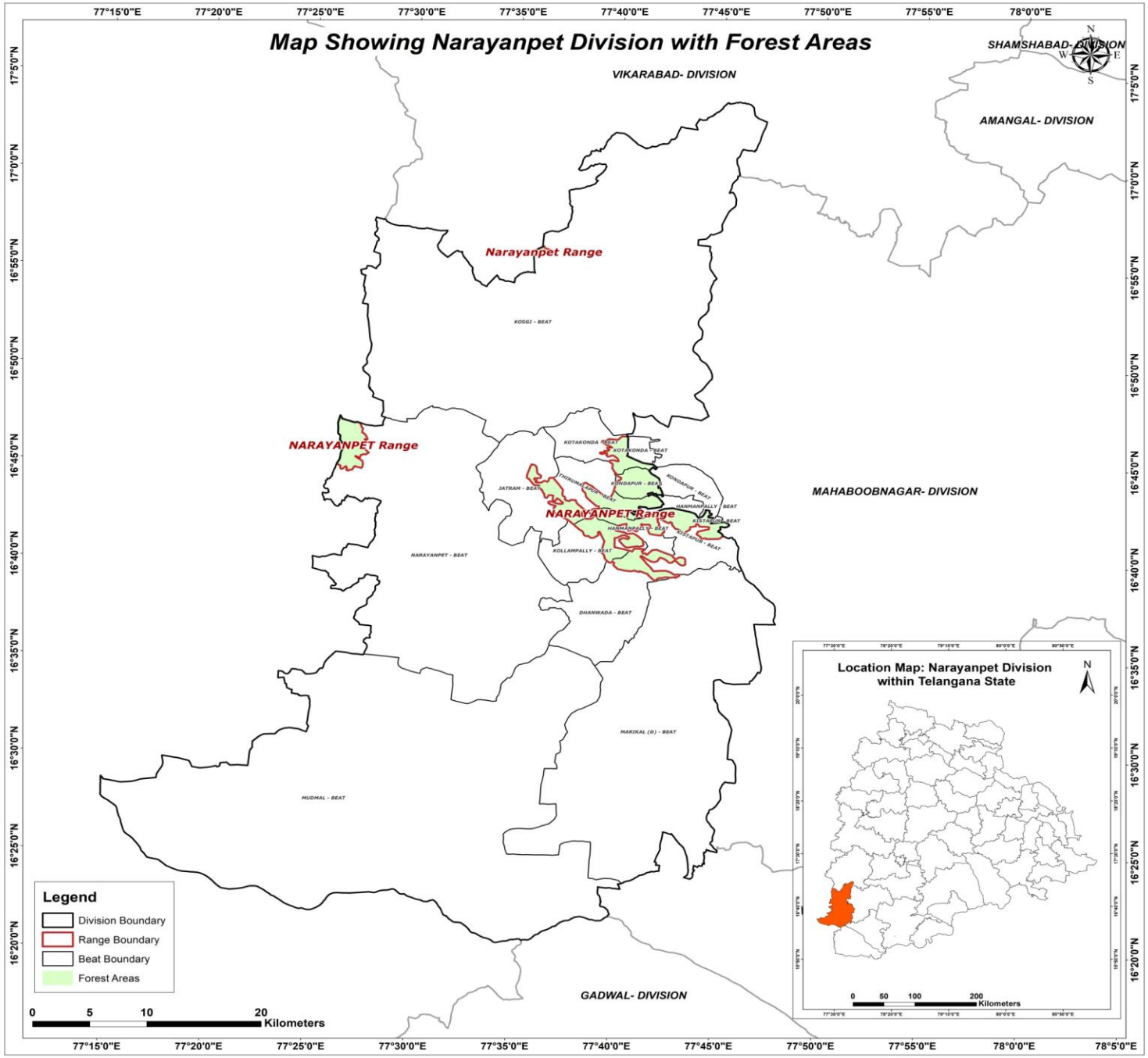


Circle: Jogulamba
District: Narayanpet
Division: Narayanpet

Prepared at Geomatics Centre
O/o Prl.Chief Conservator of Forests
Aranya Bhavan, Saifabad
Hyderabad - 500004


Map Showing Narayanpet Division with Forest Areas
VIKARABAD- DIVISION
SHAMSHABAD- DIVISION
AMANGAL- DIVISION
MAHABOOBNAGAR- DIVISION
GADWAL- DIVISION
Narayanpet Range
NARAYANPET Range
NARAYANPET Range
KOSGI - BEAT
NARAYANPET - BEAT
JATRAM - BEAT
KOTAKONDA - BEAT
KOTAKONDA - BEAT
KONDAPUR - BEAT
KONDAPUR - BEAT
HANWANPALLY - BEAT
KITTAKONDA - BEAT
HANWANPALLY - BEAT
KOLLAMPALLY - BEAT
DHANWADA - BEAT
MARIKAL (D) - BEAT
MUDMAL - BEAT
Legend
Division Boundary
Range Boundary
Beat Boundary
Forest Areas
0 5 10 20 Kilometers
Location Map: Narayanpet Division within Telangana State
0 50 100 200 Kilometers
77°15'0"E
77°20'0"E
77°25'0"E
77°30'0"E
77°35'0"E
77°40'0"E
77°45'0"E
77°50'0"E
77°55'0"E
78°0'0"E
78°5'0"E
17°5'0"N
17°0'0"N
16°55'0"N
16°50'0"N
16°45'0"N
16°40'0"N
16°35'0"N
16°30'0"N
16°25'0"N
16°20'0"N

METHODOLOGY

Various methods are available to evaluate the suitability of locations for Percolation Tanks and other SMC structures using Arc GIS.

- A common approach is to use Geographic Information System (GIS) tools to decide the suitability by analysing factors like topography, vegetation density, distance to water sources, and terrain slope.

- Data was gathered from various sources, including the Raster Sentinel data obtained from the Copernicus open access hub.

- Elevation values were applied to the raster data using the SNAP software to create a Digital Elevation Model (DEM).

- Using Arc GIS, streams were mapped based on DEM, and potential percolation tank sites were identified based on stream order.

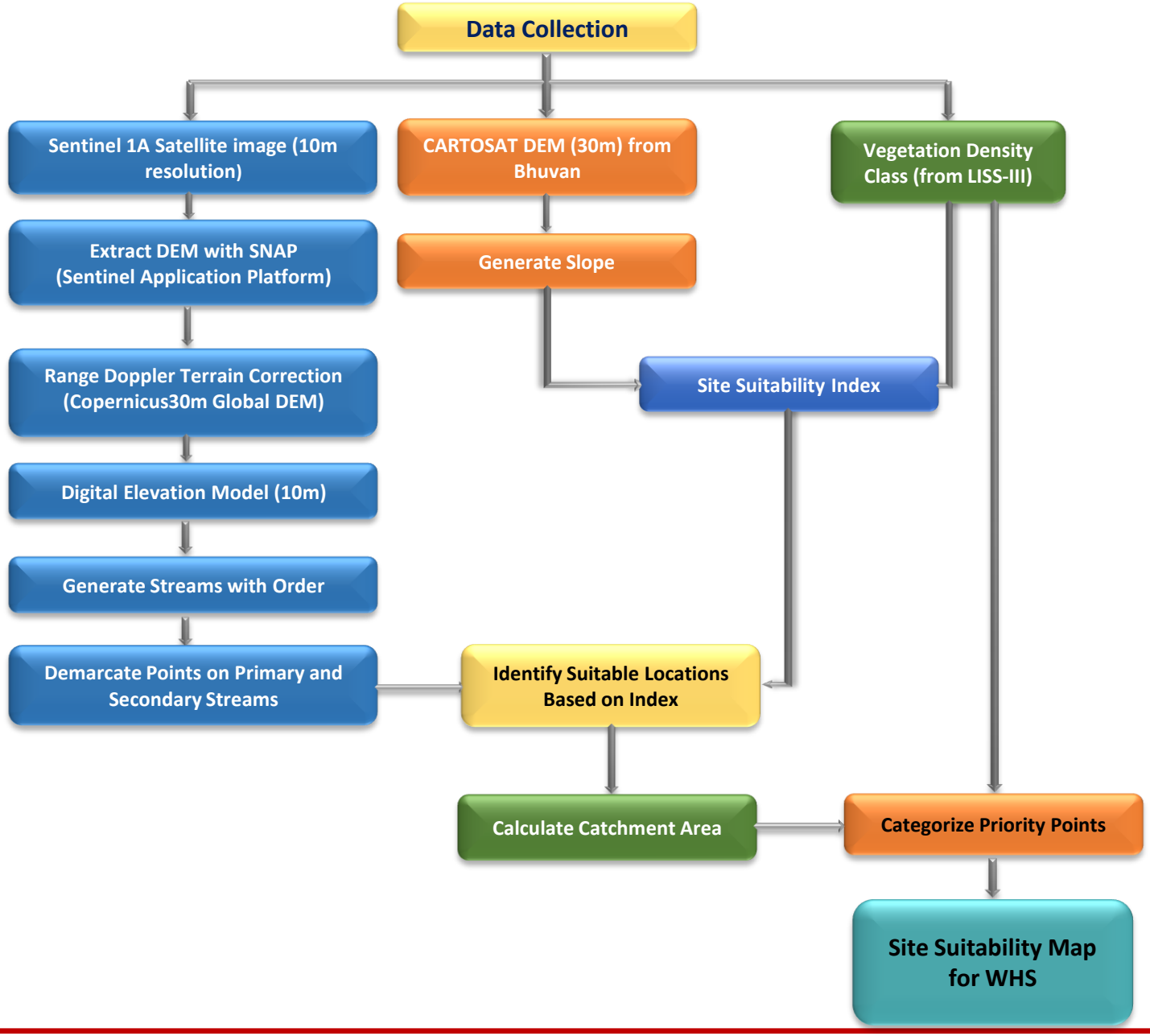
- Slope data generated from the CARTOSAT 30 m DEM (Source: Bhuvan) were also included in the analysis.

- By overlaying these spatial datasets and applying specific criteria, GIS can help identify optimal locations for building percolation tanks.

- Once the best location is identified, the catchment area is determined.

- The location is then ranked on the basis of catchment area and vegetation cover, with rankings ranging from I to V.

FLOW CHART FOR METHODOLOGY



Guidelines for building Percolation Tanks:

- Refer to the Site Suitability Map given by the GIS Cell for suitable locations

- Choose the best location for constructing a percolation tank based on the ranking priority. The priority for treatment of the watershed should be based on stream order, with primary streams taking precedence over secondary streams and secondary streams taking precedence over tertiary streams. This phased approach will ensure effective management of the watershed.

- Field conditions such as local climate, slope, vegetation and soil type must be considered when determining the location. It is important to move either upstream or downstream for a distance of about 50M, depending on the specific conditions of the site.

- It is essential to follow the priority given in the map. If no specific points are indicated, site suitability should be considered a determining factor.

- Encroached areas were not considered when demarcating points for constructing the Percolation tank.

- In the field, where streams are found at the optimal location, a percolation tank can be built if a point is missing on the map.

- The catchment area should also be considered when estimating the construction requirements like length of the bund, height of the bund, wear width etc., after verifying with the actual field conditions.

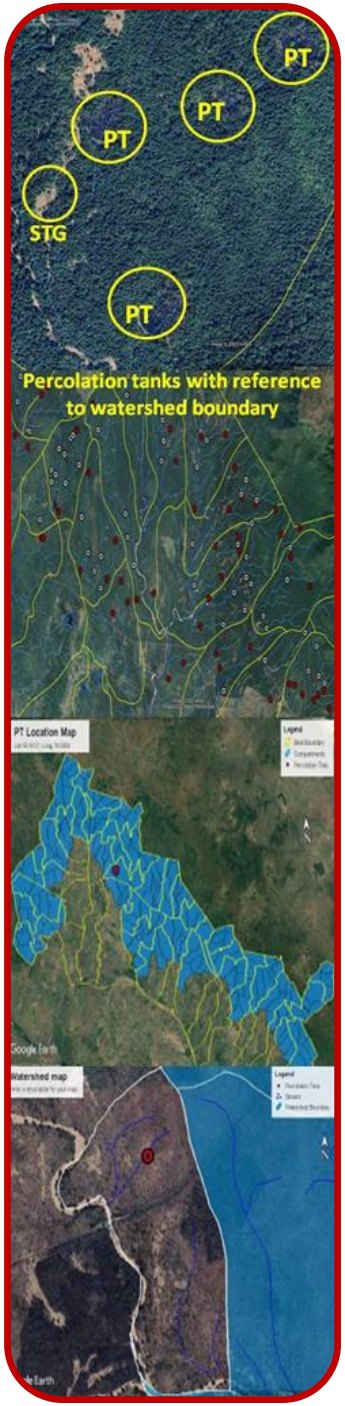
- Planting native vegetation around the tank can stabilize the soil, prevent erosion, and improve water absorption. Use plants that are well suited to the local environment.

Suitability criteria for Check-Dams and Percolation Tanks (SITE SUITABILITY INDEX)

Index	Slope(Degrees)	Density Class
Highly suitable	0-5	Blank & Scrub
Moderately suitable	0-5	Open Forest
Least suitable	0-5	Dense Forest

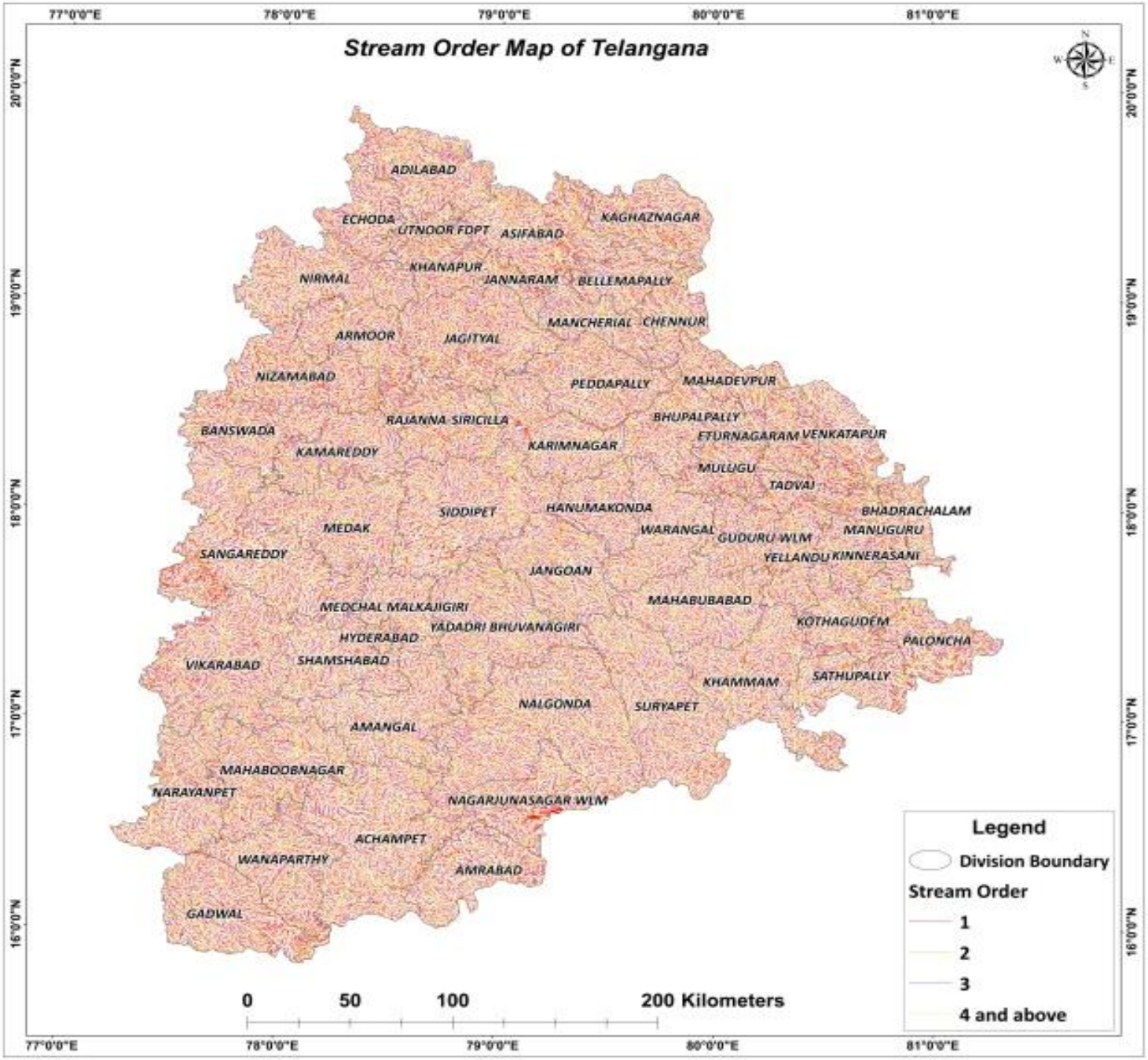
Suitability criteria for Continuous/Staggered contour trenches

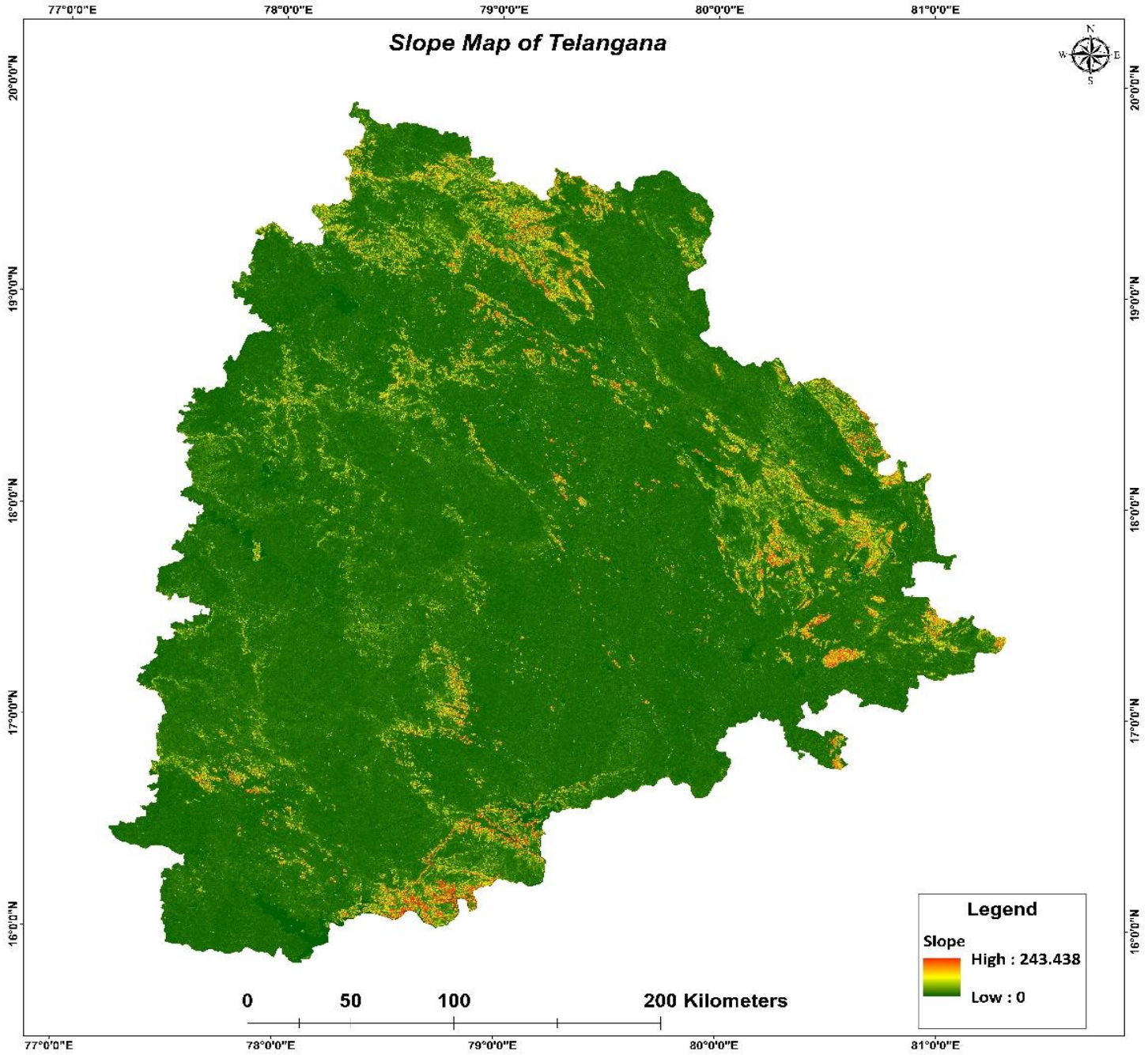
Rank	Slope classes (Degrees)	Density Classes
Highly Suitable	>5 and <= 10	Blanks
Moderately Suitable	>5 and <= 10	Scrub forest
Least suitable	>5 and <= 10	Open forest
	> 10 and < 25	Blanks & scrubs
MPTs and SGPs	>5 and <= 10	Dense Forest
	> 10 and < 25	Open and Dense forest



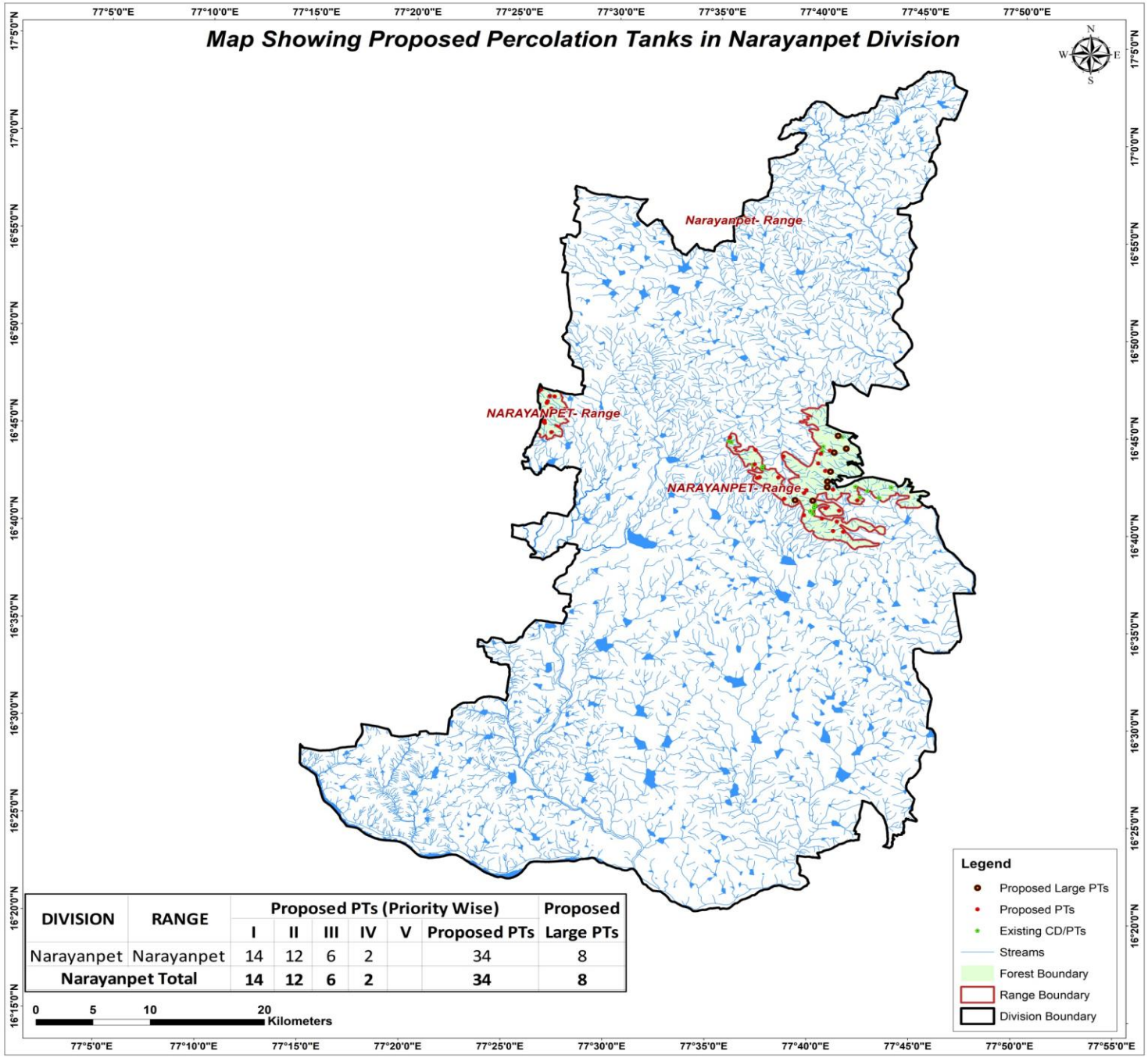
PRIORITY CLASSES FOR PERCOLATION TANK

Priority	Catchment Area(Ha)	Density Class
1	0-25 0-25	Scrub Blank
2	0-25 25-50	Open Forest Blank
3	25-50 >50	Open Forest Scrub & blank
4	0-25 >50	Dense Forest Open Forest
5	25-50 >50	Dense Forest Dense Forest


Stream Order Map of Telangana
77°0'0"E
78°0'0"E
79°0'0"E
80°0'0"E
81°0'0"E
20°0'0"N
19°0'0"N
18°0'0"N
17°0'0"N
16°0'0"N
ADILABAD
ECHODA
UTNOOR FDPT
ASIFABAD
KAGHAZNAGAR
KHANAPUR
NIRMAL
JANNARAM
BELLEMAPALLY
MANCHERIAL
CHENNUR
ARMOOR
JAGITYAL
NIZAMABAD
PEDDAPALLY
MAHADEVPUR
BHUPALPALLY
RAJANNA SIRICILLA
BANSWADA
ETURNAGARAM
VENKATAPUR
KAMAREDDY
KARIMNAGAR
MULUGU
TADVAI
SIDDIPET
HANUMAKONDA
BHADRACHALAM
MEDAK
WARANGAL
MANUGURU
GUDURU WLM
SANGAREDDY
YELLANDU
KINNERASANI
JANGOAN
MAHABUBABAD
MEDCHAL MALKAJIGIRI
KOTHAGUDEM
YADADRI BHUVANAGIRI
HYDERABAD
PALONCHA
VIKARABAD
SHAMSHABAD
KHAMMAM
SATHUPALLY
NALGONDA
SURYAPET
AMANGAL
MAHABOOBNAGAR
NARAYANPET
NAGARJUNASAGAR WLM
ACHAMPET
WANAPARTHY
AMRABAD
GADWAL
0
50
100
200 Kilometers
Legend
Division Boundary
Stream Order
1
2
3
4 and above

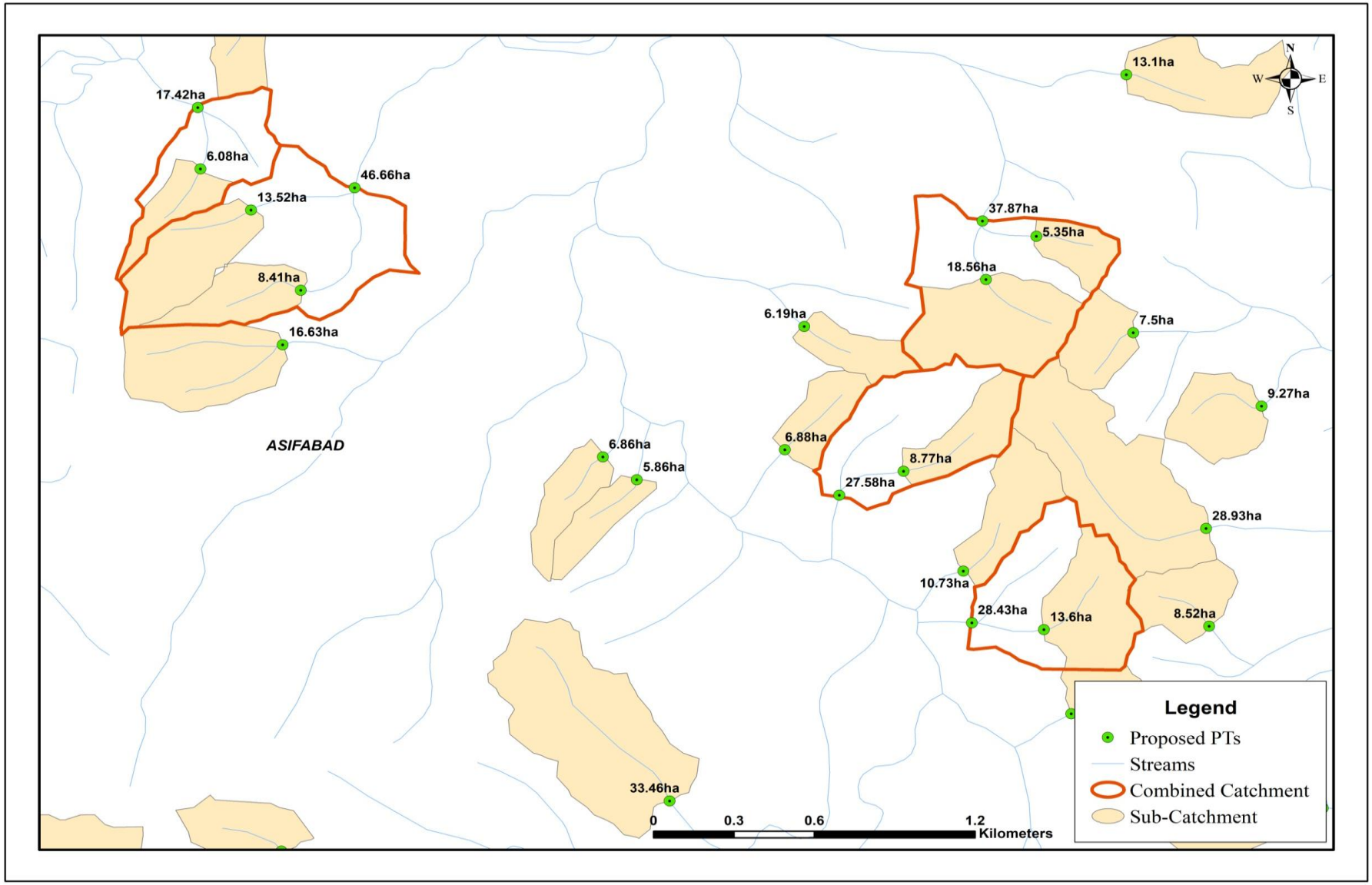

Slope Map of Telangana
77°0'0"E
78°0'0"E
79°0'0"E
80°0'0"E
81°0'0"E
20°0'0"N
19°0'0"N
18°0'0"N
17°0'0"N
16°0'0"N
N
W
E
S
Legend
Slope
High : 243.438
Low : 0
0
50
100
200 Kilometers

Map Showing Proposed Percolation Tanks in Narayanpet Division

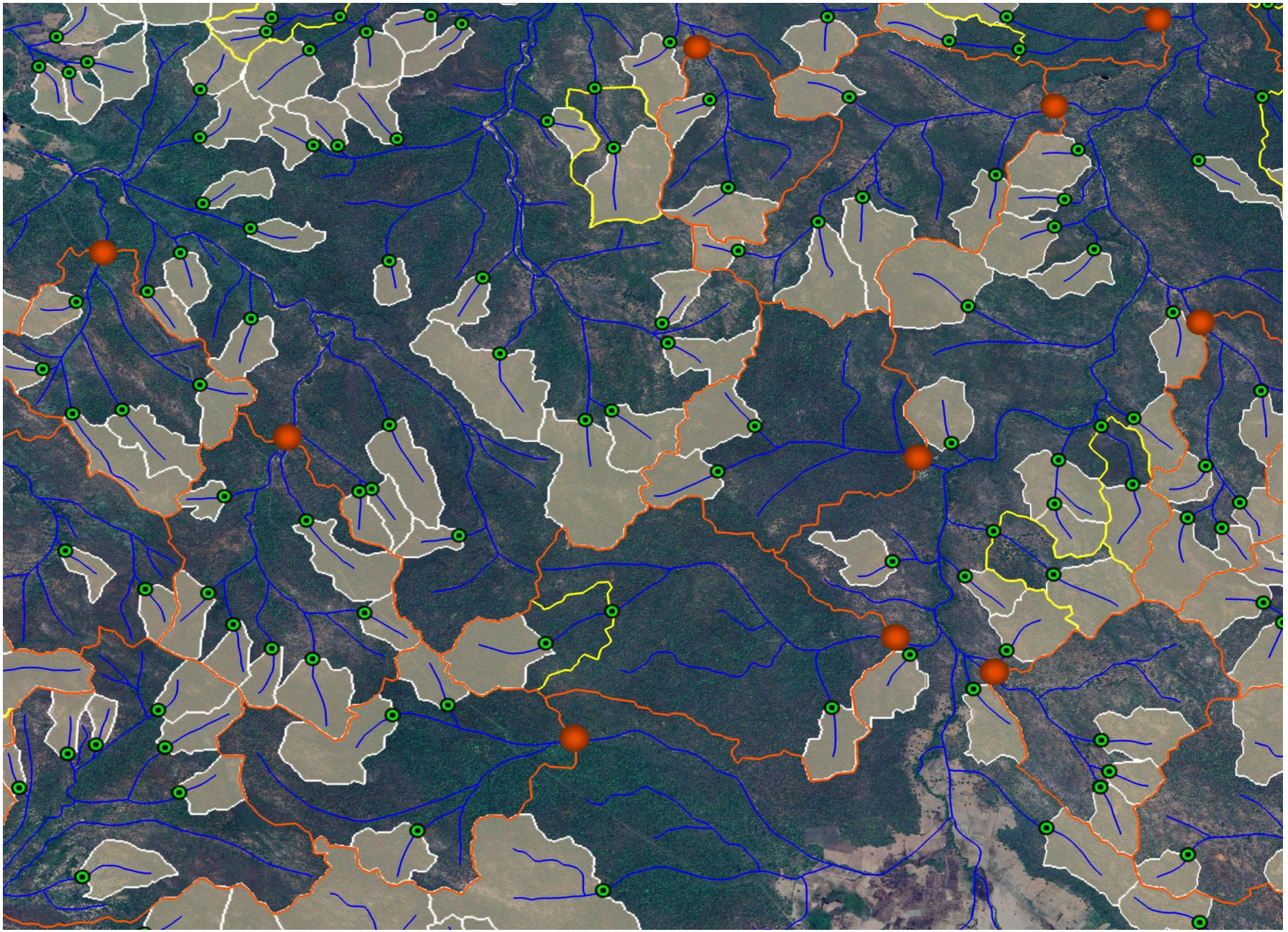


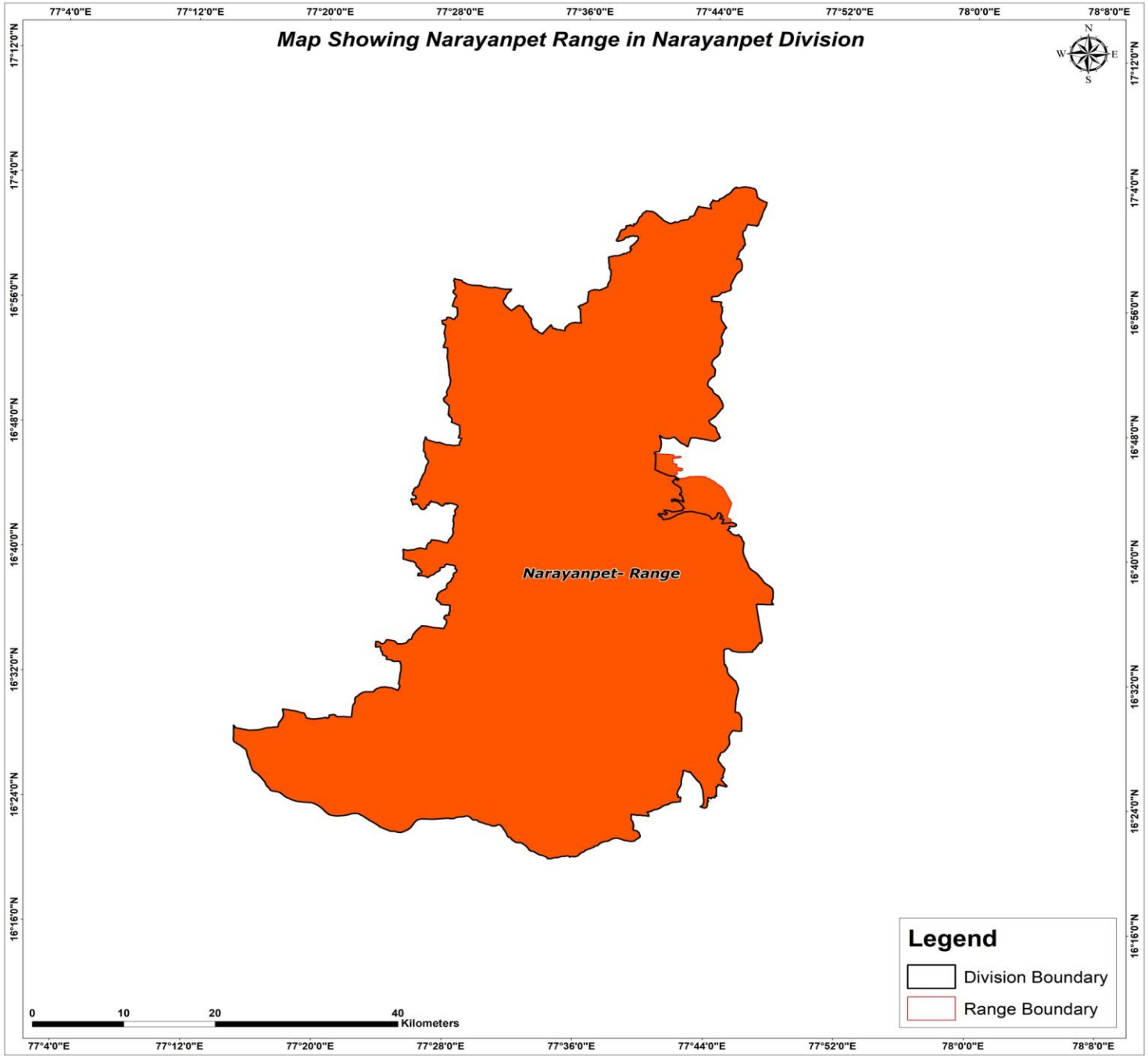
DIVISION	RANGE	Proposed PTs (Priority Wise)						Proposed
		I	II	III	IV	V	Proposed PTs	Large PTs
Narayanpet	Narayanpet	14	12	6	2		34	8
Narayanpet Total		**14**	**12**	**6**	**2**		**34**	**8**

CATCHMENT AREA



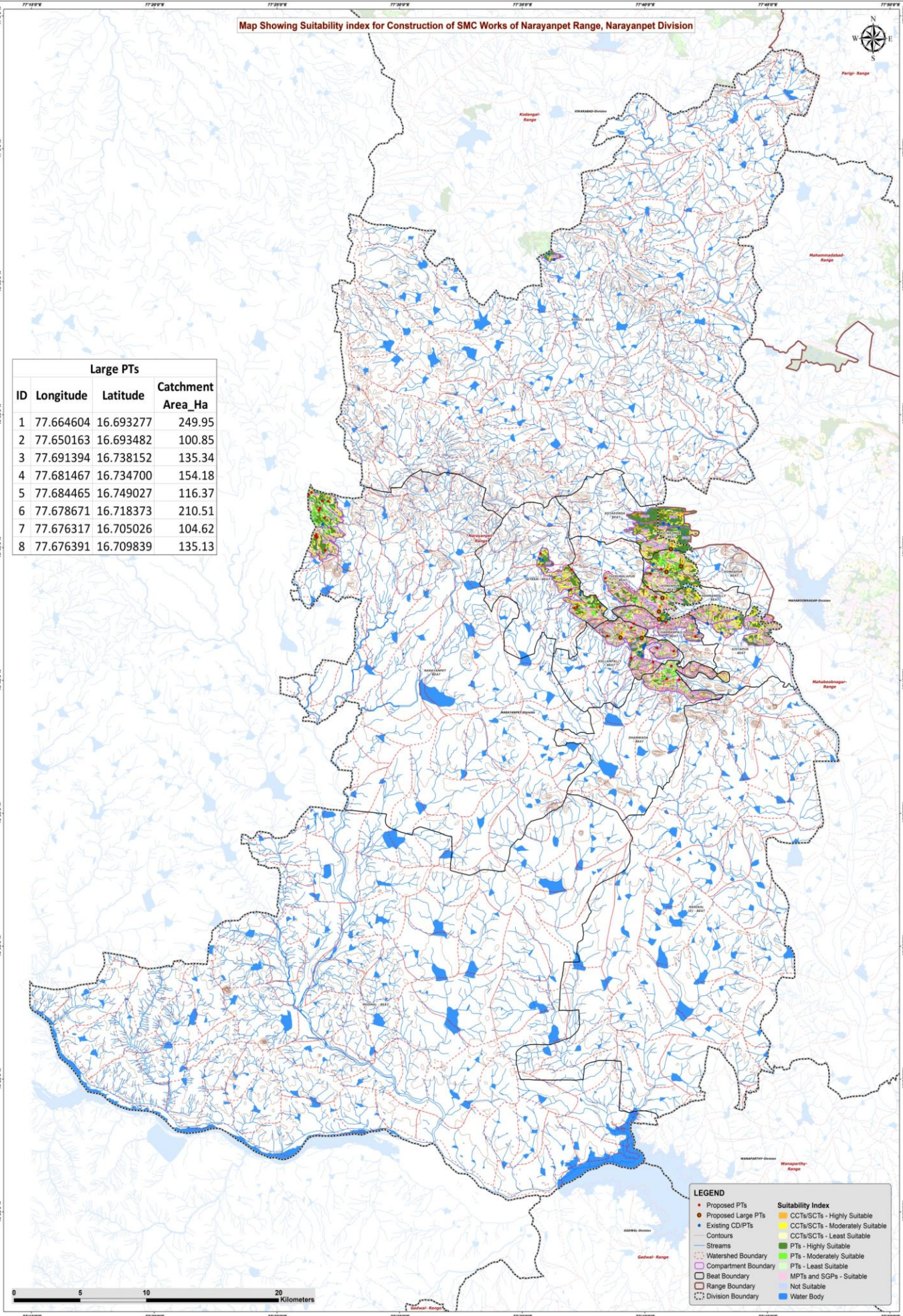
Sample Catchment Map

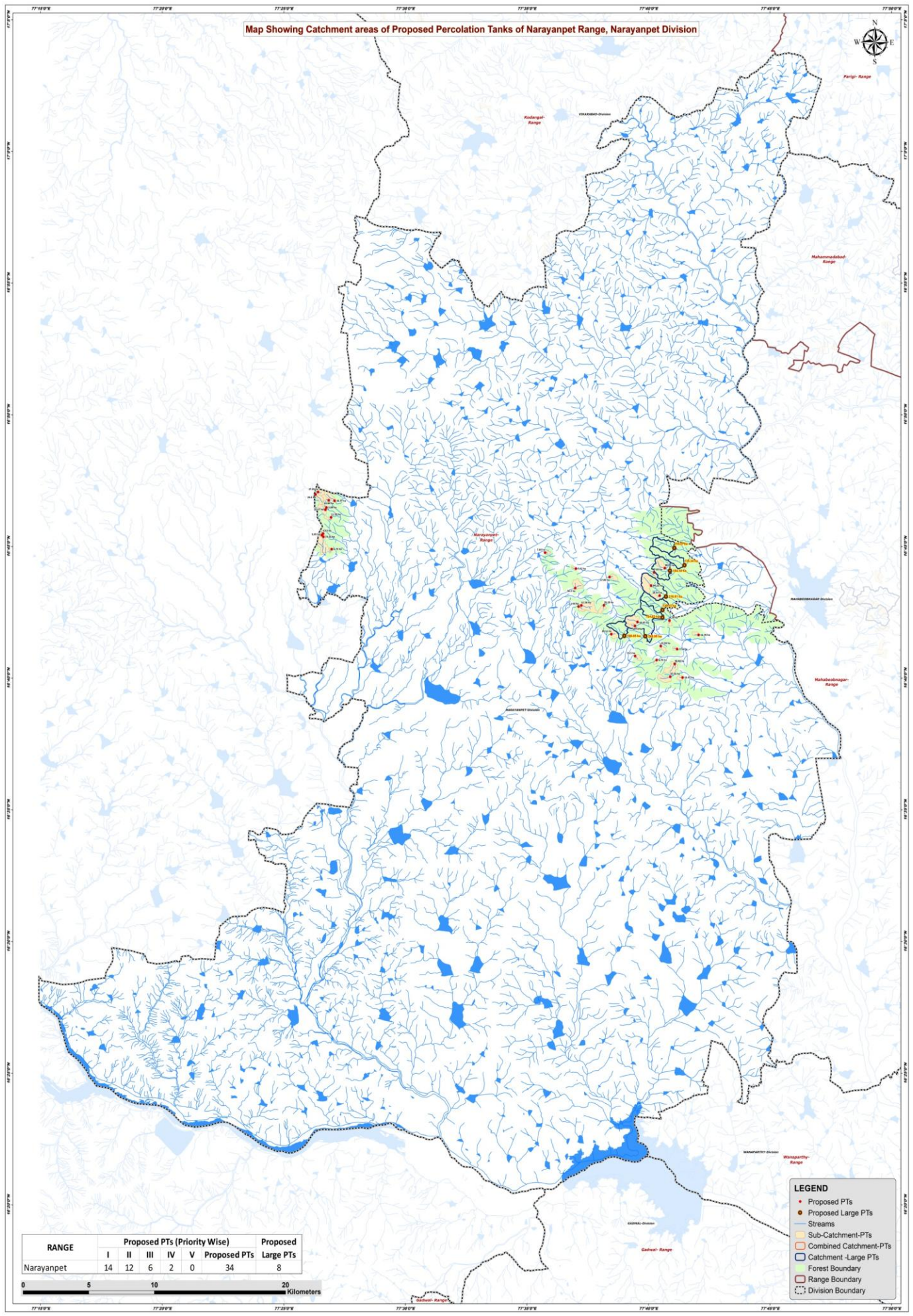



Map Showing Narayanpet Range in Narayanpet Division
77°4'0"E
77°12'0"E
77°20'0"E
77°28'0"E
77°36'0"E
77°44'0"E
77°52'0"E
78°0'0"E
78°8'0"E
17°12'0"N
17°4'0"N
16°56'0"N
16°48'0"N
16°40'0"N
16°32'0"N
16°24'0"N
16°16'0"N
N
W
E
S
Narayanpet- Range
0
10
20
40
Kilometers
Legend
Division Boundary
Range Boundary

Map Showing Suitability index for Construction of SMC Works of Narayanpet Range, Narayanpet Division

Large PTs			
ID	Longitude	Latitude	Catchment Area_Ha
1	77.664604	16.693277	249.95
2	77.650163	16.693482	100.85
3	77.691394	16.738152	135.34
4	77.681467	16.734700	154.18
5	77.684465	16.749027	116.37
6	77.678671	16.718373	210.51
7	77.676317	16.705026	104.62
8	77.676391	16.709839	135.13





RANGE	Proposed PTs (Priority Wise)						Proposed
	I	II	III	IV	V	Proposed PTs	Large PTs
Narayanpet	14	12	6	2	0	34	8

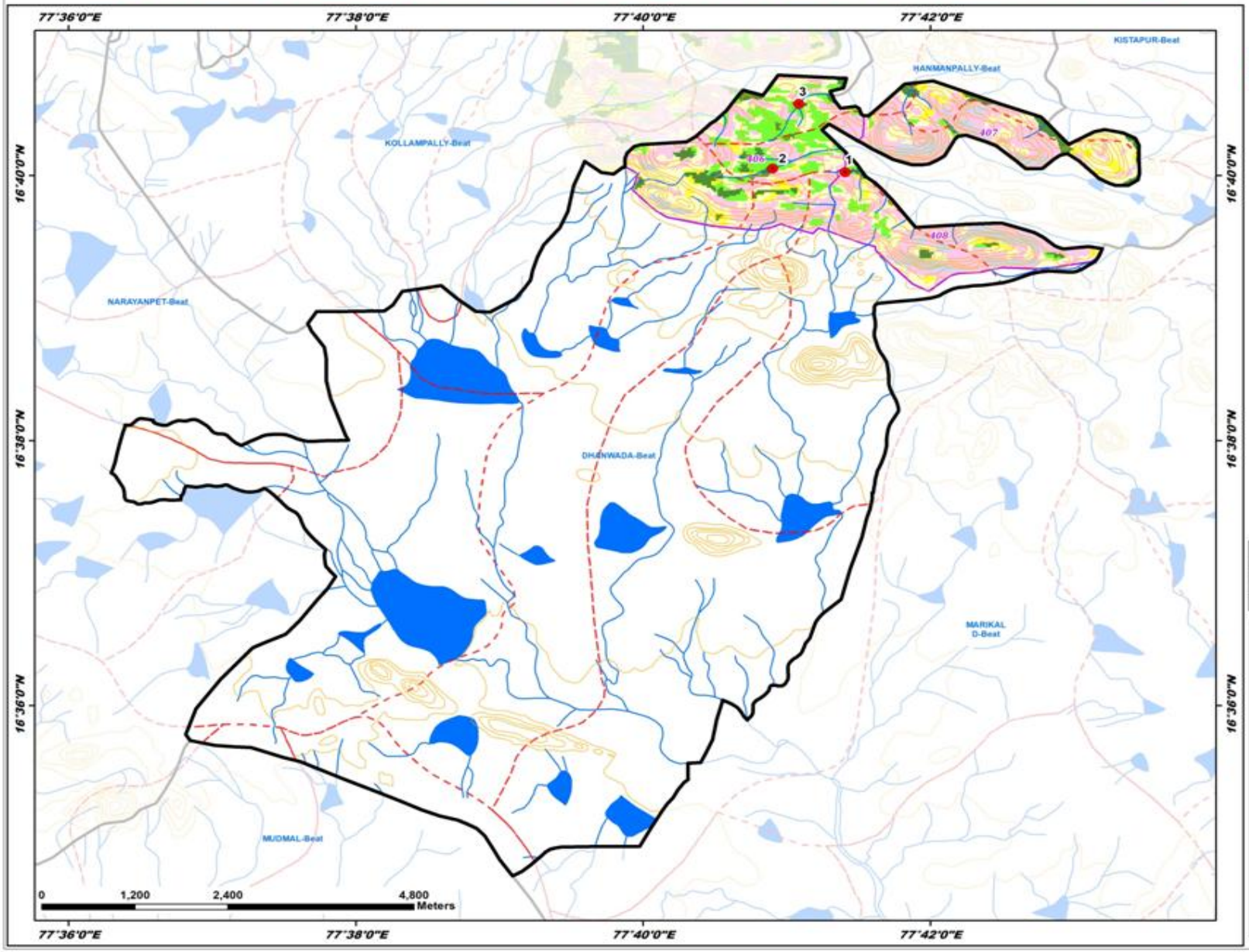
Beat wise Abstract of Proposed PT's – Narayanpet Range

S. No.	Beat	Proposed PT's
1	DHANWADA	3
2	HANMANPALLY	3
3	JATRAM	6
4	KOLLAMPALLY	6
5	KONDAPUR	3
6	NARAYANPET	11
7	THIRUMALAPUR	2
	Total	**34**

List of Proposed PTs – Narayanpet Range

ID	Latitude	Longitude	Catchment Area_Ha	Priority	Beat
1	16.667091	77.690125	11.67	II	DHANWADA
2	16.667571	77.681713	37.56	III	DHANWADA
3	16.675684	77.684747	50.64	III	DHANWADA
4	16.694080	77.701132	11.76	I	HANMANPALLY
5	16.703167	77.681151	8.29	II	HANMANPALLY
6	16.702229	77.659252	53.97	IV	HANMANPALLY
7	16.687009	77.675182	13.36	I	KOLLAMPALLY
8	16.680705	77.657580	13.50	I	KOLLAMPALLY
9	16.699704	77.657453	19.72	I	KOLLAMPALLY
10	16.694554	77.641302	29.11	II	KOLLAMPALLY
11	16.678166	77.672366	6.79	II	KOLLAMPALLY
12	16.685070	77.686426	7.14	II	KOLLAMPALLY
13	16.712792	77.636170	19.18	I	JATRAM
14	16.735963	77.617003	7.42	I	JATRAM
15	16.712003	77.618786	11.34	I	JATRAM
16	16.746104	77.595897	7.55	I	JATRAM
17	16.723684	77.616523	38.30	II	JATRAM
18	16.712696	77.620754	61.56	III	JATRAM
19	16.733599	77.670594	7.65	I	KONDAPUR
20	16.736308	77.677969	38.24	II	KONDAPUR
21	16.725263	77.668557	84.23	III	KONDAPUR
22	16.748325	77.449590	6.79	I	NARAYANPET
23	16.757225	77.442815	5.95	I	NARAYANPET
24	16.779162	77.447578	14.94	I	NARAYANPET
25	16.758164	77.443632	6.63	I	NARAYANPET
26	16.784495	77.440217	17.26	II	NARAYANPET
27	16.768436	77.449188	11.39	II	NARAYANPET
28	16.774693	77.445978	5.89	II	NARAYANPET
29	16.773268	77.445294	22.67	II	NARAYANPET
30	16.778915	77.451562	35.77	III	NARAYANPET
31	16.783006	77.438493	26.60	III	NARAYANPET
32	16.756176	77.443880	79.55	IV	NARAYANPET
33	16.730698	77.640031	17.83	I	THIRUMALAPUR
34	16.718956	77.674453	19.53	II	THIRUMALAPUR

Map Showing Suitability Index for Construction of SMC Works of Dhanwada Beat



Division : Narayanpet
Range : Narayanpet

ID	Latitude	Longitude	Catchment Area Ha	PRIORITY
1	16.667091	77.690125	11.67	III
2	16.667571	77.681713	37.56	III
3	16.675684	77.684747	50.64	III

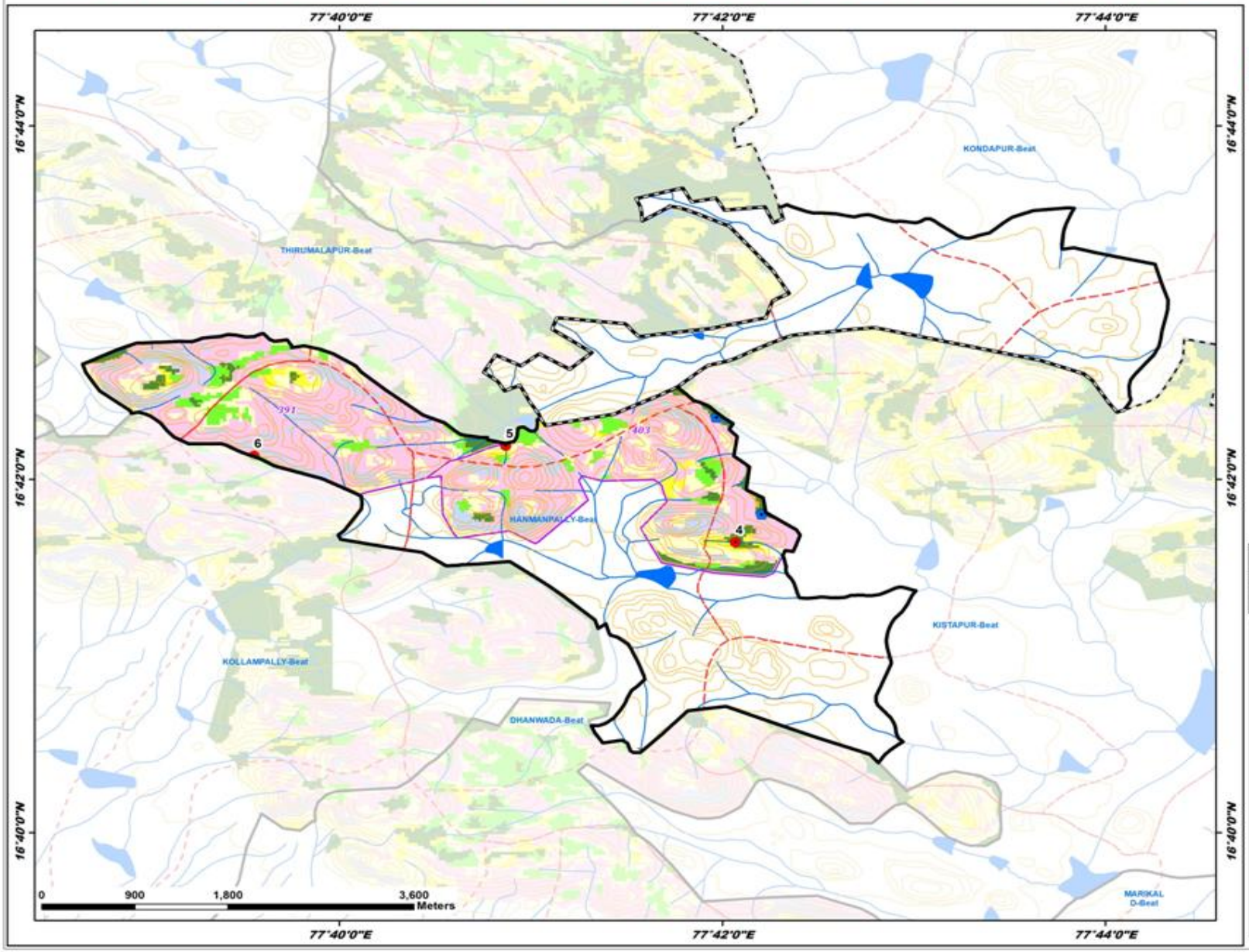
LEGEND

- Proposed PTs
- Existing CD/PTs
- Contours
- Streams
- Watershed Boundary
- Compartment Boundary
- Beat Boundary
- Division Boundary

Suitability Index

- CCTs/SCTs - Highly Suitable
- CCTs/SCTs - Moderately Suitable
- CCTs/SCTs - Least Suitable
- PTs - Highly Suitable
- PTs - Moderately Suitable
- PTs - Least Suitable
- MPTs and SGPs - Suitable
- Not Suitable
- Water Body

Map Showing Suitability Index for Construction of SMC Works of Hanmanpally Beat



Division : Narayanpet
Range : Narayanpet

ID	Latitude	Longitude	Catchment Area Ha	PRIORITY
4	16.694080	77.701132	11.76	I
5	16.703167	77.681151	8.29	II
6	16.702229	77.659252	53.97	IV

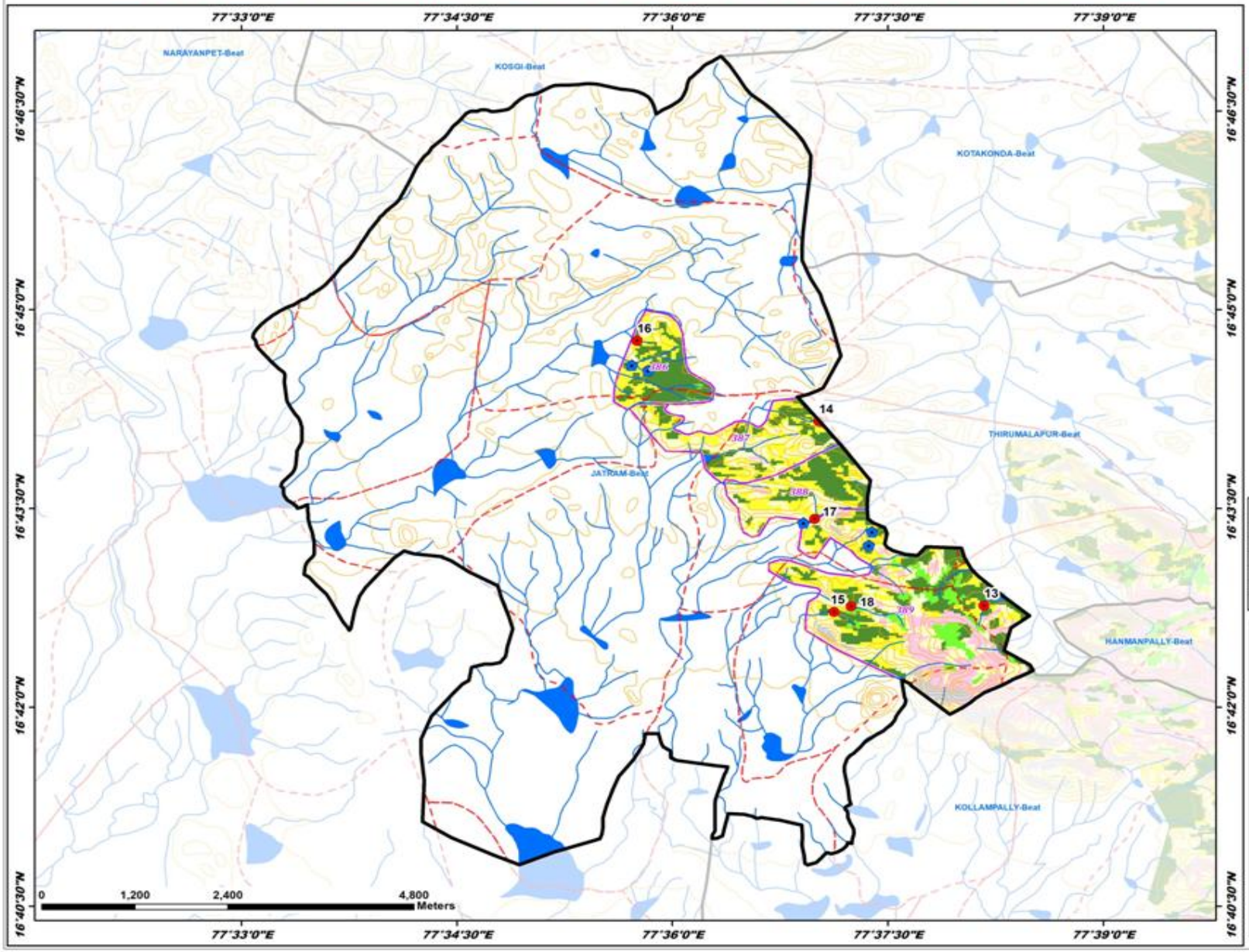
LEGEND

- Proposed PTs
- Existing CD/PTs
- Contours
- Streams
- Watershed Boundary
- Compartment Boundary
- Beat Boundary
- Division Boundary

Suitability Index

- CCTs/SCTs - Highly Suitable
- CCTs/SCTs - Moderately Suitable
- CCTs/SCTs - Least Suitable
- PTs - Highly Suitable
- PTs - Moderately Suitable
- PTs - Least Suitable
- MPTs and SGPs - Suitable
- Not Suitable
- Water Body

Map Showing Suitability Index for Construction of SMC Works of Jatram Beat



Division : Narayanpet
Range : Narayanpet

ID	Latitude	Longitude	Catchment Area Ha	PRIORITY
13	16.712792	77.636170	19.18	I
14	16.735963	77.617003	7.42	I
15	16.712003	77.618786	11.34	I
16	16.746104	77.595897	7.55	I
17	16.723684	77.616523	38.30	II
18	16.712696	77.620754	61.56	III

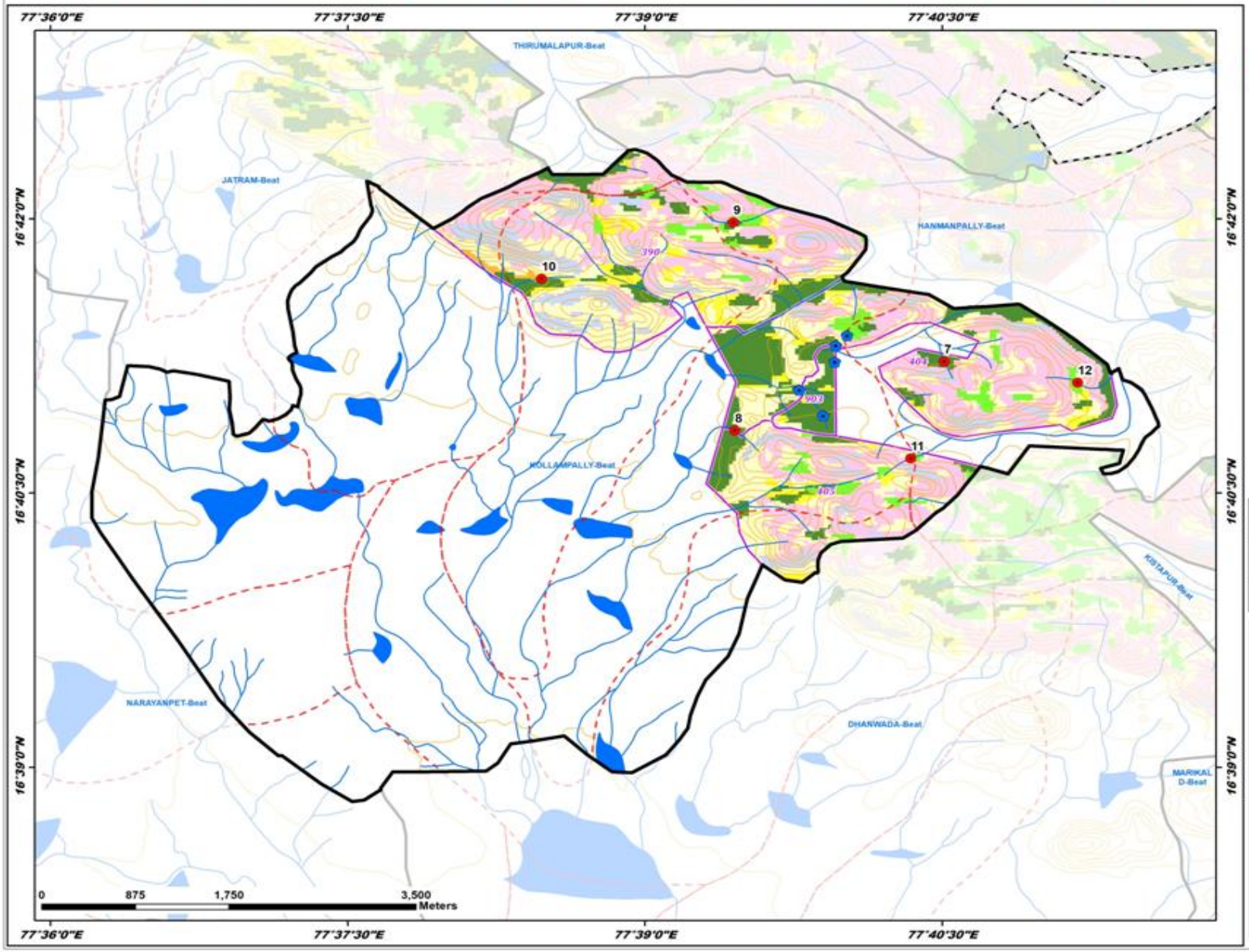
LEGEND

- Proposed PTs
- Existing CD/PTs
- Contours
- Streams
- Watershed Boundary
- Compartment Boundary
- Beat Boundary
- Division Boundary

Suitability Index

- CCTs/SCTs - Highly Suitable
- CCTs/SCTs - Moderately Suitable
- CCTs/SCTs - Least Suitable
- PTs - Highly Suitable
- PTs - Moderately Suitable
- PTs - Least Suitable
- MPTs and SGPs - Suitable
- Not Suitable
- Water Body

Map Showing Suitability Index for Construction of SMC Works of Kollampally Beat



Division : Narayanpet
Range : Narayanpet

ID	Latitude	Longitude	Catchment Area Ha	PRIORITY
7	16.687009	77.675182	13.36	I
8	16.680705	77.657580	13.50	I
9	16.699704	77.657453	19.72	I
10	16.694554	77.641302	29.11	II
11	16.678166	77.672366	6.79	II
12	16.685070	77.686426	7.14	II

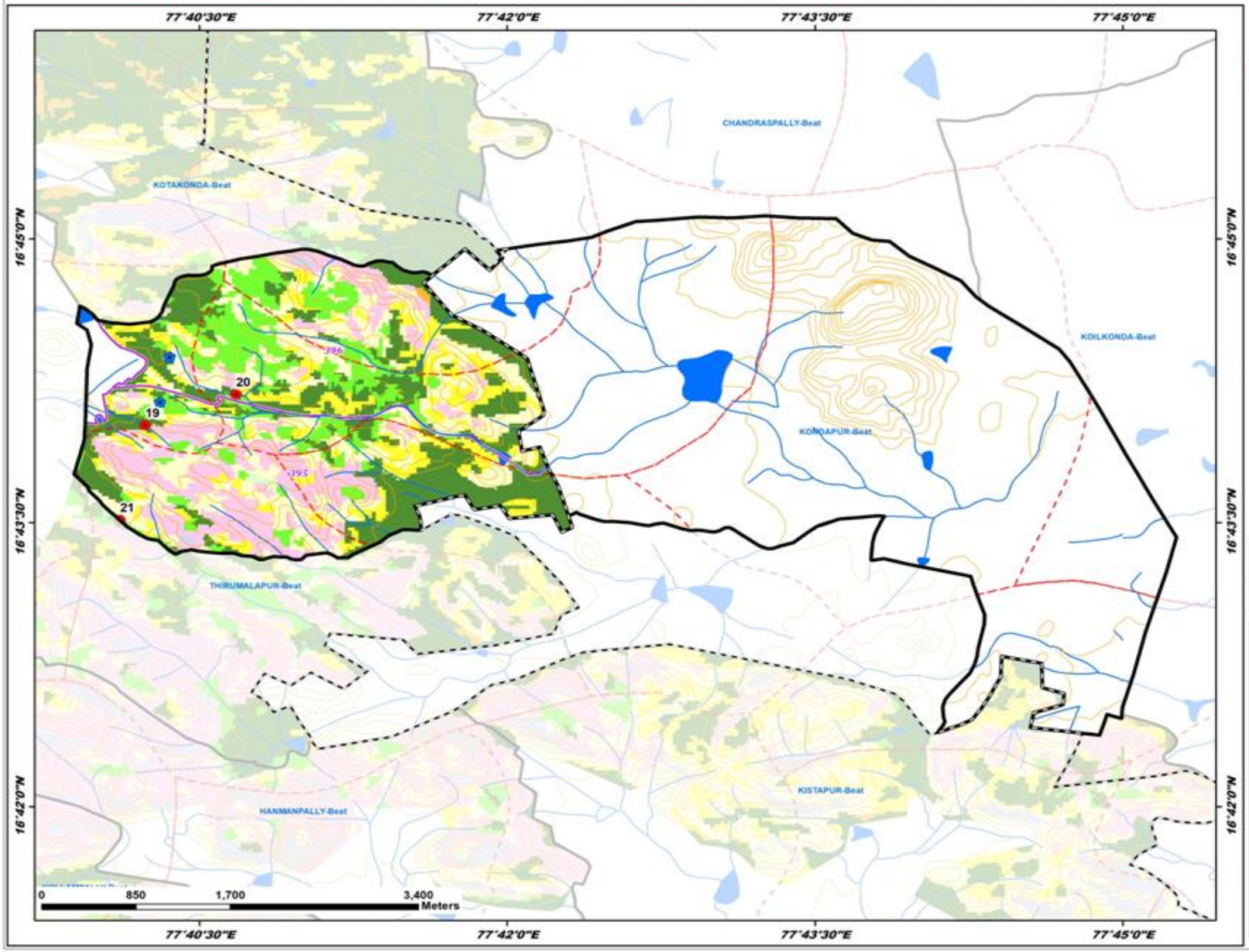
LEGEND

- Proposed PTs
- Existing CD/PTs
- Contours
- Streams
- Watershed Boundary
- Compartment Boundary
- Beat Boundary
- Division Boundary

Suitability Index

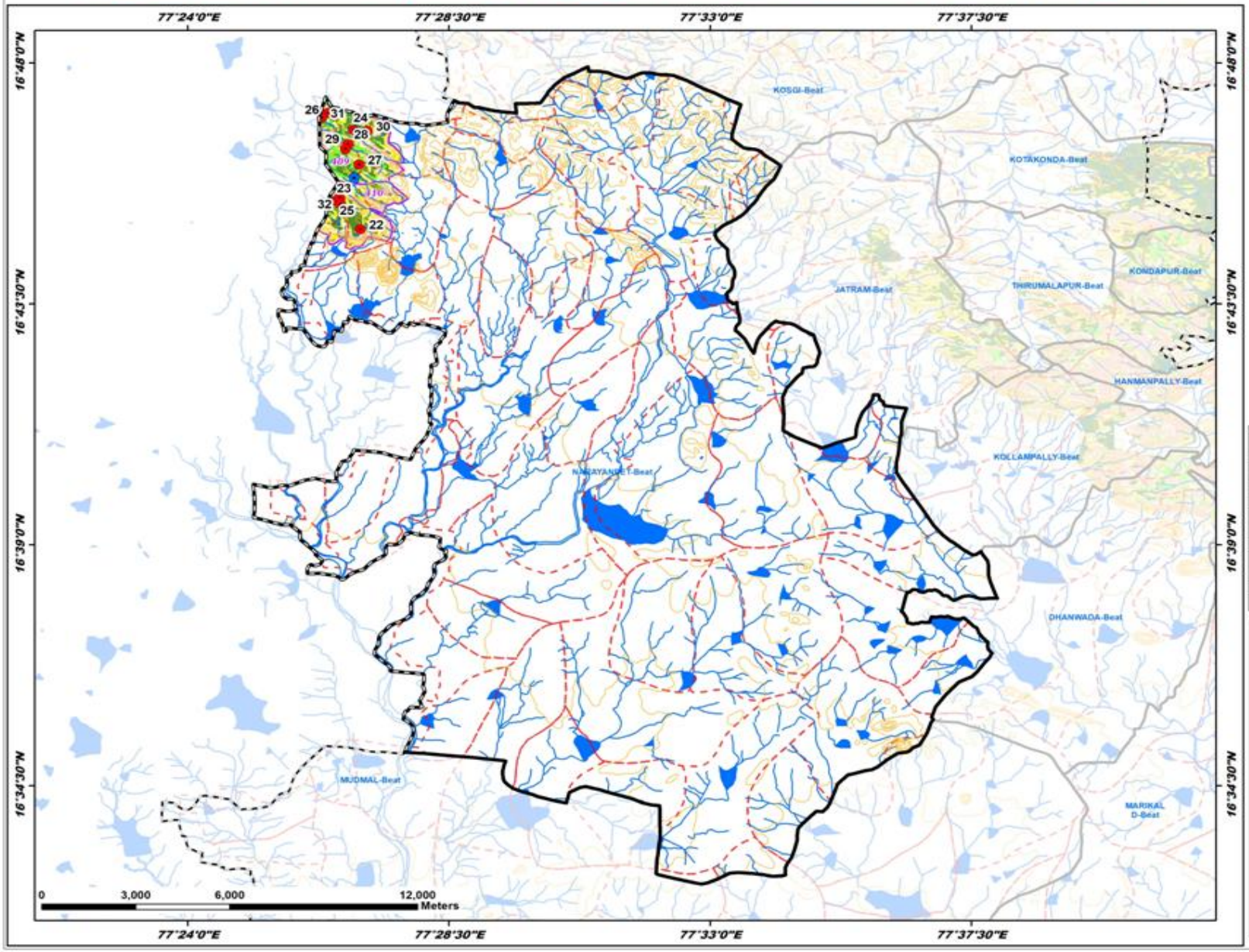
- CCTs/SCTs - Highly Suitable
- CCTs/SCTs - Moderately Suitable
- CCTs/SCTs - Least Suitable
- PTs - Highly Suitable
- PTs - Moderately Suitable
- PTs - Least Suitable
- MPTs and SGPs - Suitable
- Not Suitable
- Water Body

Map Showing Suitability Index for Construction of SMC Works of Kondapur Beat



ID	Latitude	Longitude	Catchment Area Ha	PRIORITY
19	16.733599	77.670594	7.65	I
20	16.736308	77.677969	38.24	II
21	16.725263	77.668557	84.23	III

Map Showing Suitability Index for Construction of SMC Works of Narayanpet Beat



Division : Narayanpet
Range : Narayanpet

ID	Latitude	Longitude	Catchment Area Ha	PRIORITY
22	16.748325	77.449590	6.79	I
23	16.757225	77.442815	5.95	I
24	16.779162	77.447578	14.94	I
25	16.758164	77.443632	6.63	I
26	16.784495	77.440217	17.26	II
27	16.768436	77.449188	11.39	II
28	16.774693	77.445978	5.89	II
29	16.773268	77.445294	22.67	II
30	16.778915	77.451562	35.77	III
31	16.783006	77.438493	26.60	III
32	16.756176	77.443880	79.55	IV

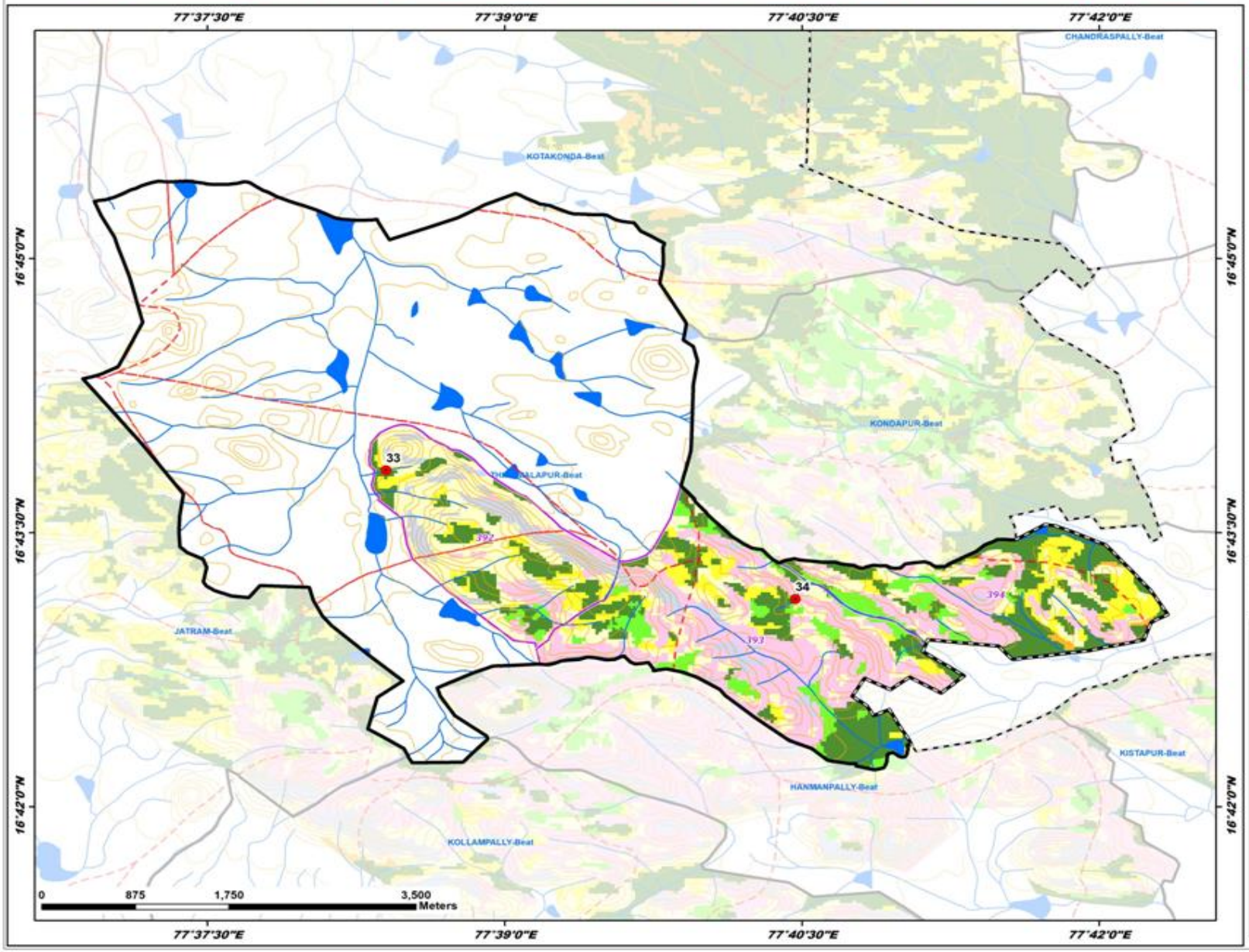
LEGEND

- Proposed PTs
- Existing CD/PTs
- Contours
- Streams
- Watershed Boundary
- Compartment Boundary
- Beat Boundary
- Division Boundary

Suitability Index

- CCTs/SCTs - Highly Suitable
- CCTs/SCTs - Moderately Suitable
- CCTs/SCTs - Least Suitable
- PTs - Highly Suitable
- PTs - Moderately Suitable
- PTs - Least Suitable
- MPTs and SGPs - Suitable
- Not Suitable
- Water Body

Map Showing Suitability Index for Construction of SMC Works of Thirumalapur Beat



Division : Narayanpet
Range : Narayanpet

ID	Latitude	Longitude	Catchment Area Ha	PRIORITY
33	16.730698	77.640031	17.83	I
34	16.718956	77.674453	19.53	II

LEGEND

- Proposed PTs
- Existing CD/PTs
- Contours
- Streams
- Watershed Boundary
- Compartment Boundary
- Beat Boundary
- Division Boundary

Suitability Index

- CCTs/SCTs - Highly Suitable
- CCTs/SCTs - Moderately Suitable
- CCTs/SCTs - Least Suitable
- PTs - Highly Suitable
- PTs - Moderately Suitable
- PTs - Least Suitable
- MPTs and SGPs - Suitable
- Not Suitable
- Water Body